Technical Guidance Document for Decommissioning Environmental Management Plan (DEMP)

April 2010

هيئة البيئة - أبوظبي
Environment Agency - ABU DHABI

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List of Abbreviations

AD EHS Center	Abu Dhabi Environment, Health, and Safety Center
DEMP	Decommissioning Environmental Management Plan
EAD	Environment Agency–Abu Dhabi
EHSMS	Environment, Health and Safety Management System
EIA	Environment Impact Assessment
ODS	Ozone-Depleting Substance
PCBs	Polychlorinated Biphenyls
PER	Preliminary Environmental Review
SRA	Sector Regulatory Authority

Definition of Terms

Construction—The time period that corresponds to any event, process, or activity that occurs during the construction phase (e.g., building of site, buildings, or processing units) of the proposed project or development. This phase terminates when the development goes into full operation or use.

Contractor and Subcontractor—Companies employed by the source owner to perform construction or decommissioning activities at the project site. It is the responsibility of the main contractor and subcontractors to adhere to requirements contained in approved environmental management plans and all applicable environmental regulations.

Decommissioning—The time period that corresponds to any event, process, or activity that occurs during the decommissioning phase (e.g., destruction, dismantling) of the project or development. The decommissioning phase follows the operation phase.

Ecological Restoration—The process of assisting in the recovery of a degraded or destroyed ecosystem or natural habitat to its prior condition.

Hazard—Any substance, physical effect, or condition with potential to harm people, property, or the environment.

Hazardous Waste—Waste containing properties that are potentially harmful to human health and the environment, such as toxic, explosive, flammable, or radioactive substances.

Method Statement—A statement that outlines the activities to be performed by the contractor and the methods to be implemented for minimizing environmental impacts and ensuring compliance with environmental regulations.

Operation—The time period that corresponds to any event, process, or activity that occurs during the operational (i.e., fully functioning) phase of the proposed project or development. (The operation phase follows the construction phase and then terminates when the project or development goes into the decommissioning phase).

Project Area—The physical area within which the proposed development—all construction, operations, and decommissioning activities and processes—will take place; the boundary of the project area is defined by the titled property boundary. The project area is equivalent to the project site.

Project Site—Equivalent to the project area.

Proponent—The developer, permit applicant, company, or agency associated with the proposed development.

Remediation—The removal of contaminants from environmental media—primarily soil, groundwater, surface water, or sediment—for the protection of human health and the environment.

Solid Waste—Rubbish, debris, garbage, and other discarded solid materials resulting from any event, process, or activity.

Purpose of this Guidance Document

This guidance document outlines the requirements for developing a Decommissioning Environmental Management Plan (DEMP) in Abu Dhabi Emirate for review and evaluation by Environment Agency–Abu Dhabi (EAD), which is the Competent Authority in the environmental field.

Section I. Background Information

The preparation and implementation of a DEMP helps to ensure that any environmental damages caused by operation of an establishment are remediated and compensated, in accordance with the requirements outlined in Federal Law No. 24 of 1999 for the Protection and Development of the Environment and the Abu Dhabi Emirate Environment, Health and Safety Management System (EHSMS) Regulatory Framework (Decree 42 of 2009).

If an SRA-nominated entity is required to submit a DEMP to EAD, then the DEMP will need to fulfil the requirements of EHSMS COP 04. The health and safety elements of the DEMP are defined within COP 04 of the EHSMS. The Sector Regulatory Authority (SRA; i.e., the Authority responsible for implementing EHSMS in each Emirate sector), in conjunction with EAD and the Abu Dhabi Environment, Health, and Safety Center (AD EHS Center; i.e., the Competent Authority for the EHSMS Regulatory Framework), will review, approve, and monitor the health and safety elements of the DEMP.

For entities that are currently not nominated under EHSMS, the SRA/AD EHS Center retains the right to request the DEMP to consider health and safety. All requirements for health and safety are included within the EHSMS Regulatory Framework and will be incorporated into the DEMP when requested.

Definition of DEMP

The DEMP is a site-specific plan developed to ensure that appropriate environmental management practices are followed during the decommissioning phase of a project and to detail all remediation, site control, and monitoring activities that will continue once the immediate decommissioning activities are completed.

The DEMP should be preceded by a Terms of Reference (TOR) document that describes the level of detail that the proponent will include in the future DEMP.

Objective of the DEMP

Based on the aspects of the project, EAD decides whether a DEMP should be submitted.

The intent of the DEMP is as follows:

- Provide effective, site-specific, and implementable procedures and mitigation measures to monitor and control environmental impacts throughout the decommissioning phase of the project, such that the related activities do not adversely impact amenity, traffic, or the environment in the surrounding area
- Establish long-term management of the project site for its next intended use, detailing plans for site assessment, remediation of contamination, and ecological restoration activities
- Eliminate the long-term liability issues related to the site for the proponent or owner of the facility or project site.

Specifically, a DEMP ensures that the environmental impacts identified will be properly managed and that activities will comply with all applicable environmental rules and regulations and decommissioning plans. The environmental impacts may have been identified during previously performed environmental studies (i.e., Environment Impact Assessment [EIA] or Preliminary Environmental Review [PER]). If an EIA or PER has been conducted previously, the DEMP is still

required. If no EIA or PER was completed for the project, the DEMP should describe in further detail the extent to which environmental effects, impacts, and risks exist, as well as the mitigation measures that will be conducted during the decommissioning.

The main goals of the plan include specifying the roles and responsibilities of those personnel involved with all aspects of the decommissioning activities, identifying potential environmental impacts and the mitigation measures that will be employed to address them, and establishing procedures for audits, monitoring, and inspections, as well as specifying training, recordkeeping, and documentation requirements.

A DEMP is intended for use by all personnel involved with decommissioning activities; therefore, the use of technical terms and graphics should be clear and understandable to nonspecialists.

Applicability and Approach

A DEMP will be required for decommissioning activities that meet any of the following criteria, or as otherwise determined by EAD:

- Projects originally required to submit an EIA
- Buildings contaminated with asbestos-containing materials and/or lead-based paint
- Projects involving the removal of organic liquids, hazardous materials, or hazardous wastes
- Projects generating in excess of 100 m^3 in volume of waste
- Projects in which more than 50% of exterior walls are demolished
- Projects in which the land area is greater than 2,000 m^2
- Project sites in which residual impacts may pose a threat to the environment
- Project sites in which contamination levels exceed regulatory limits.

The Abu Dhabi Emirate EHSMS is a performance-based system that takes into consideration aspects related to the protection of the environment, as well as protection of the human health and safety of workers and the community at large. The SRAs are responsible for implementing EHSMS in each sector within the Emirate. The AD EHS Center is the Competent Authority for the EHS Management System, and EAD is the Competent Authority for environmental regulation at Emirate level.

As per Decree No. 42 of 2009 concerning implementation of the EHSMS, entities nominated under the EHSMS by SRAs are required to comply with the EHSMS Regulatory Framework. Any entity not yet nominated by these SRAs is considered to be in a transitional period. During the transitional period, project proponents must comply with the requirements set out in this guidance document for preparation of Environmental Management Plans. Future revisions to this guidance document will endeavor to provide greater clarifications on the requirements for environmental reporting under EAD and the AD EHS Center.

Preparation and Submission of the DEMP

The DEMP is the responsibility of the proponent for the project site and must be prepared by an EAD-approved and registered consultant that operates within Abu Dhabi Emirate. A current list of registered consultants can be obtained from EAD.

The DEMP should include the information provided within this technical guidance document. It is important to note that consulting companies assure that each DEMP is specific to the proponent and the proposed activities at the project site.

When the DEMP is complete, it should be submitted to EAD for approval prior to the scheduled beginning of decommissioning. Decommissioning will not commence until written approval has been received from EAD in the form of an official letter.

Review of the DEMP

Following submission of the DEMP, the plan will be reviewed by EAD officials to verify that all sections are complete and that it meets the stipulated requirements. EAD may seek clarification or revisions to the DEMP from the proponent and the environmental consultant for the proposed project. EAD may also require additional remediation plans to be incorporated based on its review of the DEMP. Following approval of the DEMP, EAD will issue an official letter of approval so that decommissioning activities can commence at the project site.

During the review process, EAD will evaluate the quality of the DEMP provided by the proponent. This evaluation ensures that the DEMP adheres to this guidance document and provides sufficient detail.

Section II. Required DEMP Content and Recommended Format

The content of a DEMP may vary by project because the size and scope of the decommissioning activities varies. To promote familiarity and ease of use, a recommended format for the DEMP is provided in **Table 1**. An overview of the individual DEMP sections is described below. Where other formats are used, the content of each DEMP must include, at a minimum, all of the sections listed in Table 1. The DEMP also should include a list of acronyms and abbreviations, a glossary of terms, and full references to sources of information.

Table 1. Recommended Format for the DEMP

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1. Project or Industry Title Page

At a minimum, the title page of the DEMP should include the following information:

- The title of the project or industry
- The proponent's name, address, and contact information
- The consultant's name, contact information, and EAD registration number
- The contractor's name and contact information.

2. Distribution List

The purpose of the distribution list is to establish communication channels that will enable more effective control of environmental issues. The distribution list should identify individuals and organizations that have or will receive a copy of the DEMP for implementation. Individuals of importance could include the proponent, environmental consultant, subcontractors, and any appointed environmental managers (or other identifiable titles for the persons in charge of implementing the contents of the DEMP).

In addition, the distribution list should consider entities such as the Abu Dhabi Waste Management Centre if an approved Environmental Service Provider needs to be used for proper handling and disposal of hazardous waste.

3. Introduction

The Introduction section of the DEMP should provide a brief discussion and overview about the proposed development project or the scope of the proposed work, as well as the following:

- Provide a brief discussion regarding the decommissioning activities or the scope of the proposed work.
- Describe the extent to which activities will be performed to achieve the environmental conditions that will allow for future use of the site. These activities could include, but are not limited to, performing remediation to a point where the site could be returned to a state close to its previous state, improving the site for another beneficial use, or performing remediation to a point where the site could be sold for another industrial use or project that would continue the long-term management of the property.
- Identify the proponent, the registered environmental consultant, and the location of the site, and provide an overview of the structures and areas requiring decommissioning.
- Mention any previously performed assessments or reports (e.g., EIA or PER) submitted to EAD that included discussion of decommissioning activities.
- Include contact information for the proponent and main contractor.

4. Project Description

The Project Description section of the DEMP should include information regarding the location, scope, overall project and planned decommissioning activities, and project schedule and milestones, as discussed below.

4.1 Location

The Location section should include a general description of the location and environment at the project site and surrounding area. It should also provide maps that show the geographic location of the project area and surroundings. Maps should include, at a minimum, the following features:

- Topography and geology
- Building structures
- Foundations
- Shipping/receiving areas
- Pipelines and other buried services
- Groundwater monitoring wells
- Drainage/hydrology
- Wastewater discharge points
- Stack locations or other air pollutant discharge areas
- Aboveground and underground storage tanks
- Chemical storage areas
- Hazardous and nonhazardous waste storage areas
- Waste disposal areas, including but not limited to, landfills, waste lagoons, and boneyard areas
- Sensitive receptors
- Surrounding land use
- Meteorological/wind patterns
- Key or legend

- North arrow
- Scale.

4.2 Scope

The Scope section should include, but not be limited to, information regarding the following:

- A discussion of the objectives and scope of the decommissioning activities. For example, if activities will be conducted in separate phases, and the DEMP is being submitted only for one particular phase of the development, then this section should describe those activities to be addressed by this specific plan.
- Activities for discussion may include, but are not limited to, demolition, deconstruction, deactivation, decontamination, equipment removal, sampling, monitoring, and remediation.

4.3 Overall Project and Planned Decommissioning Activities

The Overall Project and Planned Decommissioning Activities section should include information on the baseline conditions, identify sensitive receptors, include a method statement describing the planned decommissioning activities, and provide information on any required permits or licenses, discuss historical site activities and remediation activities, and identify potential future uses for the site. It should include the hours when activities will take place and identify any activities that will take place outside typical work hours. The following subsections provide instructions as to the required information that proponents should be included for this section of the DEMP.

4.3.1 Environmental Baseline, Current Conditions, and Sensitive Receptors

This section should include details regarding the current condition of the environment at areas potentially impacted by operations at the site, and should, at a minimum, accomplish the following:

- Briefly describe the existing environment for each environmental component at the site and surrounding areas. Relevant information may include previous or current land use, monitored noise levels, the presence of soil or groundwater contamination, air quality or water quality measurements, and the presence of wildlife, marine resources, or vegetation.
- Present previously reported baseline data that adequately represent the original condition of the environment on the project site and its adjacent surroundings prior to construction and operation of the project. These data may be taken from the EIA or PER performed for the project or other studies.
- Identify sensitive receptors located in the vicinity of the proposed project site, including a rationale for the ways in which the sensitive receptors were determined.
- Include maps to show the relative location of these receptors to the project site.

4.3.2 Decommissioning Project Description

This section should include a method statement of decommissioning processes and equipment to be used as outlined in the scope. This statement should include a flowchart describing the decommissioning processes to be performed. For more complex decommissioning activities, the DEMP should provide greater detail on those factors that have potential environmental impacts. In addition, the plan should provide sufficient technical detail to allow for EAD reviewers to determine the potential impacts from these processes and equipment and to detail the hours of the day during which activities will take place.

4.3.3 Environmental Permits

This section should provide a listing of environmental permits held for the project and describe any enforcement actions taken by EAD to address noncompliance with the conditions of the referenced permits.

4.3.4 Discussion of Historical Site Activities and Remediation Activities

This section should provide details on the historical and current operations and activities at the site, with a focus on those that have or have had the potential to create environmental impacts. This information should include details on the age of structures and their potential to contain hazardous materials, such as asbestos. The DEMP also should provide detailed information on any corrective action or remediation activities previously performed and identify any previously reported or unreported spills, equipment failures, emergencies, or environmental incidents.

4.3.5 Potential Future Uses of Site Property

This section should include a discussion of potential uses of the property following decommissioning and any required remediation or ecological restoration activities needed to allow for these uses.

4.4 Project Schedule and Milestones

The Project Schedule and Milestones section should provide an anticipated schedule for the decommissioning activities, including a proposed completion date and the main anticipated milestones; schedules for pre-decommissioning and project management activities; and schedules for any required deactivation processes. Should the decommissioning include different phases or stages, the proponent should provide the proposed schedule for each phase within the overall project. This information will be useful in determining whether the mitigation and monitoring measures provided in the plan are appropriate for the duration of the activities.

5. Environmental Management

The Environmental Management section of the DEMP should include information regarding the policy statement, Environmental Management Systems, project personnel roles and responsibilities, EHS regulations and requirements, environmental awareness and training, DEMP review and updates, environmental commitments, and coordination with external entities and addressing complaints. The following subsections provide instructions as to the required information that proponents should include for this section of the DEMP.

5.1 Policy Statement

The Policy Statement section should describe the proponent's commitment to environmental protection, health, and safety management and compliance with applicable regulations.

5.2 Environmental Management Systems

If applicable, the Environmental Management Systems section should discuss how the project corresponds to the proponent's and/or the main contractor's Environmental Management System or Environmental Health and Safety Management System framework.

5.3 Roles and Responsibilities

The Roles and Responsibilities section should outline a chain of command and include the roles and responsibilities of personnel in relation to implementation, management, and review. It is the responsibility of all contractors and subcontractors to adhere to requirements contained in the approved DEMP and all applicable environmental regulations, and DEMP adherence stipulations should be contained in any contractual documents between the entities. In keeping with this requirement, this section of the DEMP should accomplish the following:

- Provide names, positions, and contact information of personnel involved with ensuring the proper implementation of the DEMP. For those positions for which personnel have not yet been assigned, the proponent should note this information within the DEMP.
- Clearly discuss the roles and responsibilities of the proponent, contractors, and subcontractors identified and the interrelationships between these entities. Clearly defined roles and responsibilities help to ensure that the DEMP is an effective guideline document that will be properly implemented by all personnel involved in the decommissioning process.

- Provide organizational flowcharts or other diagrams of key personnel. Such graphics are a useful tool for users of the DEMP in understanding the relationships between the key individuals among each of the entities.

5.4 Regulations and Requirements

The Regulations and Requirements section should detail the legal framework and requirements to be adhered to during decommissioning activities and should include the following:

- A list of applicable EHS regulations, including local, national, and international rules, standards, or agreements (the EHSMS Regulatory Framework – Standards and Guideline Values should be referenced).
- A list of any applicable environmental standards, such as ambient noise levels, air quality or water quality concentrations (the EHSMS Regulatory Framework – Standards and Guideline Values should be referenced.) The DEMP should also provide sufficient information to clearly define these standards. In the absence of local or federal standards, a proponent should rely on best international standards.
- Information regarding the status of approval for any additional licenses required to perform decommissioning activities.
- A list of any voluntary agreements, stakeholder agreements, internal EMS, or procedural requirements that should be adhered to during decommissioning.

5.5 Environmental Awareness and Training

The Environmental Awareness and Training section should provide information on the proponent's systematic program to ensure that employees are aware of the DEMP and other environmental requirements. The program should define the competency of the training provider, the frequency of training, and the levels of training for personnel. This program should include, but not be limited to, the following information:

- Description of the environmental awareness and training program for personnel, contractors, and subcontractors that is needed to comply with measures contained within the DEMP.
- Identification of training needs, such as the general knowledge of the DEMP and activity-specific guidance for different activities (e.g., handling of hazardous waste, operation of certain equipment).
- Established procedures for maintaining records of all training to be performed, including the name of the person trained, date of training, name of the trainer, and description of the training content.

5.6 Document Review and Updates

The Document Review and Updates section should establish procedures for the periodic review of the DEMP to ensure that the plan's contents are correct and that it is being properly implemented. These reviews will ensure that—should conditions arise that alter the plan's contents or requirements—the DEMP remains updated to reflect these changes. The information provided in this section should, at a minimum, accomplish the following:

- Demonstrate how the proponent intends to maintain the DEMP as a "live" document, capable of modification during the project's life cycle and as circumstances dictate.
- Indicate who will regularly review, update, and develop the DEMP as decommissioning progresses.
- Outline procedures for the periodic review of the DEMP to ensure that its contents are correct and that it is being properly implemented.

5.7 Environmental Commitments

The Environmental Commitments section should include a summary of the environmental commitments made to manage potential environmental effects. The DEMP environmental commitments statement should describe the following:

- Adherence to all outcomes and obligations of the DEMP
- Proposed mitigation measures and monitoring activities against all residual impacts, unexpected releases, and anything that compromises worker safety
- The nature of the work to be undertaken
- The objectives to be met
- Who is responsible for the DEMP environmental commitments
- Who will undertake the operation
- Who is responsible for monitoring and recording that the DEMP environmental commitments are properly fulfilled
- Who is responsible for reporting that the DEMP environmental commitments are met.

Each DEMP environmental commitment containing the information in the preceding list should be numbered and indexed in the body of the DEMP to allow for quick reference. The DEMP should also be designed to allow interested parties to determine whether relevant issues have been addressed.

5.8 Coordination with External Entities and Addressing Complaints

The Coordination with External Entities and Addressing Complaints section should include descriptions of correspondence with any additional parties that may be affected by the decommissioning activities (e.g., local communities that may be affected by noise or vibration). The proponent should also provide information on how it will create a system to receive and address complaints, including how it will manage documentation of complaints and corrective actions.

6. Environmental Impacts

The Environmental Impacts section of the DEMP should outline the specific decommissioning activities at the project site on the surrounding environment and note any significant impacts. The plan should also explain the methodology used for determining significant impacts and reference any previously performed environmental studies that provide more extensive assessment of these impacts (e.g., EIA, PER). If an environmental study was performed, the proponent should ensure that the impacts discussed in the study are included in the DEMP. If no prior environmental study was performed, the DEMP should include an in-depth analysis of the identification of potential impacts and how significant impacts were chosen. The environmental impacts that must be assessed in this section are, at a minimum, air emissions, surface water, soil and groundwater, terrestrial ecology, marine ecology, noise and vibration, traffic, and waste management, as discussed below.

6.1 Air Emissions Impacts

The Air Emissions Impacts section should include, but not be limited to, information regarding dust, gaseous pollutants and particulate matter (PM), and odour. The following subsections provide further information on these components.

6.1.1 Dust

Dust or PM may be emitted from various decommissioning activities, including but not limited to demolition, traffic along unpaved roads, wind from soil stockpiles, and graded or desert soil. Therefore, this section should accomplish the following:

- Identify of all types of dust emissions and sources present during different phases of decommissioning, as well as other pertinent information related to these components
- List EAD's emission standard limits, as well as Abu Dhabi EHSMS or other known international standards.

6.1.2 Gaseous Pollutants and Particulate Matter

Gaseous pollutants, such as nitrous oxides, sulphur oxides, and volatile organic compounds and PM may be emitted from various decommissioning activities, including but not limited to the burning of fossil fuel from vehicles and equipment. Therefore, the section on gaseous pollutants and PM should include, but not be limited to, the following information:

- Identification of all types of gaseous emissions and PM, sources, flow rates, and other pertinent information present during different decommission phases
- A detailed table that shows the fuel consumed for all decommissioning equipment, including fuel type (e.g., diesel, gas), consumption rates, source(s), the units that are operated, and the estimated quantity to be stored on site
- A listing of applicable EAD, Abu Dhabi EHSMS, and international emission standard limits.

6.1.3 Odour

Decommissioning activities have the potential to cause odour problems, which can be a nuisance and cause negative health impacts. Therefore, the DEMP should take into account the presence of compounds that cause odours and must, at a minimum, accomplish the following:

- Identify and describe the likely source(s) of odour
- Specify the qualities or characteristics of any odours (e.g., fruity, fishy, almond)
- Determine the concentration by measuring the amount of odour-causing chemicals in an air sample
- Discuss the anticipated odour intensity (e.g., point of detection, faint or distinct odour)
- Identify the relevant maximum allowable limits from EAD or international standards.

6.2 Surface Water Impacts

The Surface Water Impacts section should provide specific impacts related to stormwater. This information should include, but not be limited to, the following:

- A base map that contains boundary lines of the projected industry site and the nearest storm drain
- Identification of EAD, Abu Dhabi EHSMS, or local stormwater standards, rules, and objectives
- An analysis of site limitations and development constraints that includes factors such as slope, soil erodibility, depth to bedrock, depth to seasonal high water, and soil percolation to facilitate the evaluation of site suitability for proposed stormwater and erosion-control facilities in relation to the overall development proposal.

6.3 Soil and Groundwater Impacts

The Soil and Groundwater Impacts section should include, but not be limited to, the following:

- A summary of the site's geology (e.g., physiography, stratigraphy, tectonic structures)
- Soil and groundwater characteristics (e.g., chemical and physical analyses, ground stability, foundation considerations)
- A description of the site hydrogeology, including a description of aquifers, groundwater flow, and groundwater availability and use
- Seismology (e.g., seismic events, seismicity, presence of liquefiable soils)
- Potential impacts from decommissioning activities to the soil and groundwater.

6.4 Terrestrial Ecology Impacts

The Terrestrial Ecology Impacts section should include information on discharges to land and impacts on wildlife and vegetation, as discussed below.

6.4.1 Discharges to Land

This section should describe potential impacts to land on site and in surrounding areas from decommissioning activities including, but not limited to the following:

- The proximity of the event, process, or activity to the marine environment
- A description of discharge point(s) and disposal method(s)
- Information on volumes of discharge
- A list of chemical and physical properties of any discharges, including toxic characteristics
- A description of any flora or fauna in the terrestrial environment—specifically endangered or sensitive species—that are likely to be impacted
- The relevant maximum allowable limits from EAD, Abu Dhabi EHSMS, or other international standards
- A definition of discharge consent limits.

6.4.2 Wildlife (Fauna)

This section should describe potential impacts to habitats of terrestrial wildlife from decommissioning activities, including habitats located on site and off site.

6.4.3 Vegetation (Flora)

This section should detail potential impacts to vegetation from decommissioning activities, including ecological areas located on site and off site.

6.5 Marine Ecology Impacts

The Marine Ecology Impacts section should include information on discharges to marine waters; wildlife; and vegetation, as discussed below.

6.5.1 Discharges to Marine Waters

This section should describe potential impacts to marine waters from decommissioning activities and include, but not be limited to, the following information:

- The proximity of the event, process, or activity to the marine environment
- A description of discharge point(s) and disposal method(s)
- Information on volumes of discharge
- A list of chemical and physical properties of any marine discharges, including thermal and toxic characteristics
- A description of any flora or fauna in the marine environment—specifically endangered or sensitive species that are likely to be impacted
- The relevant maximum allowable water quality limits from EAD and the Abu Dhabi EHSMS
- A definition of discharge consent limits
- A hydrodynamic and flush modelling study, if required.

6.5.2 Wildlife (Fauna)

This section should describe potential impacts to habitats of marine wildlife from decommissioning activities, including marine wildlife located on site and off site.

6.5.3 Vegetation (Flora)

This section should describe potential impacts to marine vegetation from decommissioning activities, including ecological areas located on site and off site.

6.6 Noise and Vibration Impacts

The Noise and Vibration Impacts section should provide a description of the noise and vibration produced from decommissioning activities that includes, but not be limited to, the following information:

- Noise and vibration sources from decommissioning equipment and activities
- Expected noise and vibration levels under different scenarios, including both individual and cumulative sources
- Applicable EAD-allowable limits and Abu Dhabi EHSMS Standards and Guideline Values
- Noise level at the site boundary in decibels during the hours of 7:00 a.m. to 8:00 p.m. and 8:00 p.m. to 7:00 a.m.
- Noise level at identified sensitive areas near the project site
- A listing of the acoustic performances of machines and equipment, including occupational noise classifications provided with an accompanying noise contour map
- Modelling or monitoring, if deemed necessary, to demonstrate the noise impact in the surrounding environment, including sensitive areas.

6.7 Traffic Impacts

The Traffic Impacts section should include a description of the traffic impacts produced from the decommissioning activities and should include, but not be limited to, potential impacts to traffic from decommissioning and related activities, such as the closing of streets and increased vehicle usage for equipment, supplies, and disposal activities.

6.8 Waste Management Impacts

The Waste Management Impacts section should provide information on wastes generated from decommissioning activities, including, but not limited to, solid waste, liquid waste, and hazardous waste, as described below.

6.8.1 Solid Waste

This section should provide a detailed description of the anticipated solid and semi-solid wastes that will be generated during decommissioning activities. This information should include, but not be limited to, the following:

- The sources of solid waste and the average and maximum generation rates
- The type of solid waste (e.g., industrial) and its nature (i.e., hazardous versus nonhazardous)
- The identification of materials to be recycled or composted and methods to do so (e.g., on-site collection by contractor)
- The name of the approved Abu Dhabi Waste Management Centre service provider
- The physical, chemical, and biological properties of the solid wastes before and after treatment, and a comparison with the concerned party's solid and semisolid waste disposal limits (Abu Dhabi Municipality).

6.8.2 Liquid Waste (Effluent)

This section should provide detailed information about anticipated wastewater during the decommissioning process. This information should include, but not be limited to, the following:

- The identification of all liquid inputs, outputs, and waste (effluents), and the inclusion of information on the type(s), quantities, and source(s)
- By source, the amount anticipated, the average and maximum discharge rate, and the discharge pipe diameter
- The type of waste (e.g., industrial, cooling, cleaning) and waste risk analyses (i.e., hazardous versus nonhazardous)

- The method of treatment (if present), including attached diagrams that show units, treatment efficiency, country of origin, year of operation, chemical(s) used, design and maximum treatment capacity, and type and quantities of liquid and solid wastes generated
- The methods of liquid waste storage before and after treatment
- The means of discharge, specifying the point of discharge, the final discharge (e.g., sea, sewer network, stormwater network), and the means of transportation (if present)
- A no-objection letter from the concerned parties if the effluent is to be discharged to the sewer system
- The anticipated discharge quantity and quality in all decommissioning phases
- EAD's and concerned parties' discharge consent limits, and a discussion of the process level of compliance (the Abu Dhabi EHSMS Regulatory Framework – Standards and Guideline Values should be referenced).

6.8.3 Hazardous Waste

This section should provide detailed information about anticipated hazardous waste generation during the decommissioning process. This information should include, but not be limited to, the following:

- Identification of all hazardous waste streams and include the type(s), quantities, and source(s)
- Information on the storage locations of hazardous wastes and associated potential impacts to the environment from spills.

6.9 Other Environmental Condition(s) or System(s) Impacts

The Other Environmental Conditions or Systems Impacts section should provide additional information on pertinent environmental conditions, such as process impacts that affect worker health and safety.

7. Environmental Mitigation Measures

As part of the DEMP procedures for managing and mitigating risk for the project, the proponent will prepare and implement control plans, which should include, but not be limited to, the elements described in the following subsections. The proponent should thoroughly address site-specific mitigation measures for the applicable environmental components discussed in Sections 7.1 through 7.14 of this guidance. Mitigation measures should be based on the best available management practices and technologies that will eliminate or minimize adverse impacts to amenity, traffic, or the environment in the surrounding area. Note that it is *not* sufficient to solely provide a list of possible measures that will be employed at the discretion of the contractor or subcontractor; the DEMP should include measures that will be both performed and auditable to determine their effectiveness. Considerations for providing environmental mitigation measures include the following:

- Incorporate mitigation measures identified in any previously performed EIA or PER studies for the identified impacts.
- Discuss the appropriateness and cost effectiveness of the environmental protection measures selected.
- Discuss the selection of mitigation measures and their level of control to achieve environmental conditions that are consistent with the identified potential future uses of the site.

The proponent should provide the following control plans in the DEMP:

- Air Quality Control Plan
- Erosion and Sediment Control Plan
- Soil and Groundwater Contamination Control Plan
- Terrestrial Ecology Control Plan
- Water Quality and Marine Ecology Control Plan

- Noise and Vibration Control Plan
- Traffic Control Plan
- Waste Management Control Plan
- Chemical and Hazardous Materials Control Plan
- Contingency Plan
- Emergency Management Plan
- Security Plan

An overview of the mitigation measures included in these control plans is provided below. Where generalized mitigation measures are provided in the sections below, note that these are provided only for clarification and are not to be taken as the only measures to be considered.

7.1 Air Quality Control Plan

The Air Quality Control Plan should provide the control measures to be used to minimize air emissions from all decommissioning activities. In each specific control identified below (i.e., dust management, gaseous pollutants management, and odour management), the plan should discuss procedures for the periodic inspection and routine maintenance of equipment in accordance with the manufacturer's instructions. These procedures should also include documentation requirements for all inspections and maintenance activities.

7.1.1 Dust Management

This section should provide mitigation measures used to address dust issues arising from sources such as demolition, eroded soil, cleared lands, stockpiles, transportation of materials, machinery, and dirt haul roads. Mitigation measures for dust management also may include those measures taken to prevent erosion and sediment runoff.

7.1.2 Gaseous Pollutants Management

This section should provide mitigation measures used to minimize gaseous pollutant air emissions from all decommissioning activities. Control measures may include, but are not limited to, the use of low sulphur or alternative fuels, the application of emissions-control equipment, operational controls, or the selection of materials that minimize the emission of gaseous pollutants.

7.1.3 Odour Management

This section should provide mitigation measures used to minimize odour from all decommissioning activities.

7.2 Erosion and Sediment Control Plan

Large projects usually involve extensive land disturbance, such as removing vegetation and reshaping topography, which make the soil vulnerable to erosion. Soil removed by erosion may become airborne, thereby creating a dust problem, or the soil may be carried by rain water into marine environments, thereby causing physical, chemical, biological, and economic impacts to the waters. To address these issues, the Erosion and Sediment Control Plan should include, but is not limited to, the following information:

- A discussion of the mitigation measures to be used at the project site to address erosion. When considering land disturbance and its potential impacts, priority should be given to preventative rather than treatment measures. When developing erosion-control options, the proponent should obtain information about the erosion potential of the site where soil disturbance is planned; erosion potential is determined by the soil type and structure, vegetative cover, topography, climate (e.g., rainfall, wind), and the nature of the land-clearing to be performed. Erosion is also affected by the type, nature, and intensity of the earthworks.
- A statement that describes how the decommissioning activities will meet any required local stormwater objectives.

- A calculation of the necessary storage volumes, and a description of the proposed stormwater measure(s).
- Designs and calculations for siting and sizing specialized measures and devices, such as filter strips, water quality inlets (e.g., oil/grit separator), and forebays, which will be used to remove sediment, oil-based products, and other contaminants found in urban runoff.

7.3 Soil and Groundwater Contamination Control Plan

The Soil and Groundwater Control Plan should outline measures to manage and minimize the impact of the project on soil and groundwater. This plan should include, but not be limited to, the following information:

- Documentation of the measures used to ensure that oil and hazardous materials are properly contained to prevent contamination of soil and groundwater
- As necessary, a listing of the measures needed to remove or remediate previously identified contaminated soil on site from prior industrial activities.

7.4 Terrestrial Ecology Control Plan

The Terrestrial Ecology Control Plan should provide information that accomplishes those aspects outlined below.

7.4.1 Terrestrial Ecological Management

The section on terrestrial ecological management should provide information that accomplishes the following:

- Describes the procedures used to control and prevent releases to on-site and surrounding terrestrial ecological systems
- Discusses procedures to help protect wildlife, including endangered species
- References any prior studies performed that address wildlife in the vicinity of the project area.
- Discusses the procedures for clearing and cutting activities at the decommissioning site and surrounding area
- Identifies buffer zones created to protect undisturbed areas
- Describes the measures to be taken to re-plant or compensate for any removed vegetation.

7.5 Water Quality and Marine Ecology Control Plan

The Water Quality and Marine Ecology Control Plan should include, but not be limited to, information regarding wastewater management and marine ecological management, as discussed below.

7.5.1 Wastewater Management

This section should include, but not be limited to, the following information:

- A description of the measures to be taken for the control, collection, treatment, or removal of wastewater produced during decommissioning activities
- Where applicable, a description of the systems and procedures established for wastewater produced at housing camps for decommissioning labour.

7.5.2 Marine Ecological Management

This section should include, but not be limited to, the following information:

- The procedures and mitigation measures that will be used to prevent contamination or damage to stormwater drains and waterways
- A discussion of the measures taken to protect marine ecology that could be impacted by decommissioning activities.

7.6 Noise and Vibration Control Plan

The Noise and Vibration Control Plan should outline measures to minimize the impacts on local noise levels and vibrations from decommissioning activities and should achieve the following:

- Identify the suitable noise suppression or abatement measures required to ensure that ambient noise level concentrations do not exceed established limits for both workers on site and for nearby receptors
- Discuss the measures that will be employed to minimize vibration and the procedures that will be used to notify potentially impacted receptors about these operations.

7.7 Traffic Control Plan

The Traffic Control Plan should outline measures to minimize the impacts on local traffic from the decommissioning activities and should achieve the following:

- Discuss the measures to minimize traffic disturbances and associated impacts from noise
- Describe the procedures for public notification of any anticipated traffic-related concerns, such as street closings
- Identify access roads for decommissioning vehicles and safety measures used for pedestrian access and crossings.

7.8 Waste Management Control Plan

The Waste Management Control Plan should outline the management of wastes during the decommissioning phase. The actions of this plan should meet EAD's requirements, including the classification of liquid and nonliquid wastes, and provide a description of how these wastes will be managed. As described below, the Waste Management Control Plan should include information on methods for minimizing or recycling wastes, with specific procedures for solid waste management, liquid waste management, hazardous waste management, and the handling or removal of polychlorinated biphenyls (PCBs), asbestos, and ozone-depleting substances (ODS). The plan also should provide information about the selected waste management service provider.

7.8.1 Minimization, Reuse, and Recycling

The section on minimization, reuse, and recycling should discuss the measures that will be used to avoid/minimize, reuse, and recycle wastes generated at the project site. Such measures may include technological applications, segregation of waste streams, purchasing decisions, the selection of construction materials, and product substitutions.

7.8.2 Solid Waste Management

The section on sold waste management should include, but not be limited to, the following information:

- The procedures to be used for solid waste management, including on-site activities related to collection, storage, transportation, processing, and disposal.
- If necessary, a discussion of the different procedures used for different waste streams, such as construction debris and litter.

7.8.3 Liquid Waste (Effluent) Management

The section on liquid waste management should provide on-site mitigation measures for the reduction, collection, and disposal or treatment of liquid wastes from decommissioning activities.

7.8.4 Hazardous Waste Management

The section on hazardous waste management should include, but not be limited to, the following information:

- The procedures to be used for the reduction, collection, handling, and storage of hazardous wastes from decommissioning activities.

- Information on hazardous waste identification processes, along with labelling and documentation requirements for waste transfer notes.

7.8.5 PCBs, Asbestos, and ODS Management

The section on PCBs, asbestos, and ODS management should establish procedures for the proper identification, handling, and removal of these materials when encountered in decommissioning activities, such as the removal, renovation, or demolition of any buildings on site. In the absence of local or federal standards, U.S. Department of Labour Occupational Safety and Health Administration (OSHA) standards should be used for asbestos abatement.

7.8.6 Use of Environmental Service Providers for Waste Management

For the identified wastes, the DEMP should provide information about the registered environmental service provider that will be used to handle the collection, transportation, and disposal of wastes. It is important to note that only these providers are authorized entities to receive waste. A list of environmental service providers can be obtained from the Abu Dhabi Waste Management Centre.

7.9 Chemical and Hazardous Materials Control Plan

The Chemical and Hazardous Materials Control Plan should provide information that, at a minimum, accomplishes the following:

- Discusses the measures that will be taken to minimize the risks associated with chemical, fuel, and oil spills and accidents. Measures can include, but are not limited to, monitoring purchasing requirements, product substitutions, design features for containment, operational controls, work practices, labelling, and storage requirements.
- Specifies the document-control procedures for maintaining material inventories and Material Safety Data Sheets.

7.10 Contingency Plan

The Contingency Plan should outline the procedures established and equipment available to respond to spills during decommissioning activities and should achieve the following:

- Establish procedures for responding to spills of oil and hazardous materials
- Identify potential sources of spills and the measures in place to control them
- Provide information about the presence of spill-response equipment throughout the project site
- Include maps showing the presence of chemical, oil, and hazardous waste storage locations, structures, and equipment for diversion and containment of spills and the location of spill-response equipment
- Define the roles and responsibilities of all personnel involved in responding to spills
- Clearly define immediate actions to be taken to address spills
- Discuss the measures for containment, cleanup, and disposal of contaminated materials and soil
- Clearly describe notification requirements for both internal spill-response teams and outside emergency personnel, and provide contact information for these individuals, along with local emergency agencies
- Establish documentation procedures for identifying the root causes, devising corrective and preventative actions, and setting time lines for their implementation. Corrective actions should be developed in accordance with the EAD *Technical Guidance Document for Environmental Action Plan*.

7.11 Emergency Management Plan

The Emergency Management Plan should outline the procedures established to respond to emergencies during decommissioning activities. This plan should include, but not be limited to, a list of emergency coordinators and emergency procedures, as discussed below.

7.11.1 List of Emergency Coordinators

The Emergency Management Plan should include an up-to-date list of names, addresses, and telephone numbers for emergency coordinators.

7.11.2 Emergency Procedures

The Emergency Management Plan should provide the following information regarding emergency procedures:

- Describe the actions to be taken in response to emergency situations, such as fires, explosions, or the unplanned releases of hazardous materials where such hazards exist
- Provide evacuation plans for the project site, including procedures and routes
- Describe any arrangements agreed to by local police or fire departments, hospitals, contractors, and emergency response teams to coordinate emergency response services.

7.12 Security Plan

The Security Plan should discuss the control measures to contain and secure the decommissioning site.

7.13 Infrastructure Plan

The Infrastructure Plan should describe the measures taken to ensure protection of infrastructure (e.g., water systems, transmission lines) during the decommissioning phase.

8. Monitoring and Auditing

The Monitoring and Auditing section of the DEMP should include, but not be limited to, information regarding the monitoring and auditing of environmental performance, as well as information on reporting requirements, environmental checklists, and monitoring review, as discussed below.

8.1 Environmental Performance Monitoring

The DEMP should include information about monitoring requirements for environmental performance. At a minimum, this section should accomplish the following:

- Discuss how identified impacts from decommissioning activities will be monitored, and provide information on indicators to be measured, methods to be used, sampling locations, frequency of measurements, detection limits, the thresholds that trigger corrective actions, and the party who will conduct monitoring
- Provide procedures that indicate corrective actions for noncompliance with monitoring targets, and specify notification requirements to responsible personnel and the time frames for notification and for corrective actions to be performed
- Identify the frequency and content of monitoring reports for internal use and for those required to be submitted to EAD for review
- Ensure that the monitoring activities and reports comply with EAD guidelines.

8.2 Reporting Requirements

The DEMP should outline procedures for reporting requirements, including the frequency and content of required reports, such as the following:

- Preoperation compliance reports
- Incident reports

- Periodic or annual performance reports
- Auditing reports
- Noncompliance reports
- Corrective action reports
- Complaints management reports
- Any special reports required by government agencies.

The following subsections provide further detail on the types of reporting-requirements information that should be included in the DEMP.

8.2.1 Incident Reports

A proponent must notify EAD as soon as practicable about any incident with actual or potential significance for impacts on the environment. Therefore, the DEMP should state that, should an incident occur, the proponent must inform EAD or the relevant authority immediately and provide an incident report outlining the details of the incident within 3 days of the incident. Incidents reports should be filed with EAD for the following:

- Fuel or chemical spills
- System failures or malfunctions
- Control failures or malfunctions
- Other emergencies (e.g., natural disasters)
- Other events that led to noncompliance with environmental standards or requirements.

8.2.2 Periodic or Quarterly Performance Reports

The DEMP should state that within 3 months of the date of approval of the DEMP and quarterly thereafter, the proponent should prepare a quarterly environmental performance report for the decommissioning project. This report should accomplish the following:

- Identify the standards, performance measures, and statutory requirements that apply to the decommissioning project
- Assess the environmental performance of the decommissioning project to determine whether it is complying with these standards, performance measures, and statutory requirements
- Identify any noncompliance with the conditions of this DEMP or any standards, performance measures, or statutory requirements that apply to the project or industry and occurred during the reporting period
- If any noncompliance is identified, describe the actions and measures that have been or are being performed to ensure compliance, clearly indicating who is or will be performing these actions and measures, when they were or will be conducted, and how the effectiveness of these measures will be monitored over time
- Include a copy of complaints for the quarter and a description of actions taken or being taken to address registered complaints
- Provide results of all environmental monitoring required by the environmental reports and permits, including interpretations and trends or exceptions in these results.

8.2.3 Monitoring Compliance and Audit Reports

The Monitoring Compliance and Audit Reports section of the DEMP should achieve the following:

- Establish a program to monitor environmental compliance of decommissioning activities in accordance with the established procedures defined in the DEMP. These activities may include daily, weekly, or periodic inspections.
- Provide procedures that establish corrective actions for noncompliance with established DEMP procedures and identify the root causes for the issue. These corrective actions should

not only provide an immediate "quick fix," but also help to ensure that similar non-compliance will not be repeated.

- Identify any required audit or inspection reports to be submitted to EAD for review, including the frequency and content of the reports.
- Outline that audit reports should be prepared by an EAD-approved third-party auditor and submitted periodically for review and should comply with EAD guidelines.

8.2.4 Environmental Checklists

The DEMP should include copies of environmental checklists to be used during site inspections. These checklists must be specific to the mitigation measures that will be used on site and allow for clear distinction about whether the measures are being implemented effectively.

8.2.5 Procedures to Review Inspections and Steps to Address Noncompliance

The Procedures to Review Inspections and Steps to Address Noncompliance section of the DEMP should include, but not be limited to, information that accomplishes the following:

- Identifies responsible personnel for the review of monitoring audits and compliance inspections
- Establishes procedures, including time lines, for responding to noncompliance findings from these audits and inspections
- As necessary, updates the DEMP to reflect changes to work practices or other measures needed to ensure compliance.

9. Long-Term Management

The Long-Term Management section of the DEMP should include, but not be limited to, information regarding environmental assessment, monitoring residual environmental impacts, remediation, and ecological restoration, as discussed below.

9.1 Environmental Assessment

The DEMP should establish an environmental assessment plan to determine the extent of residual impacts and ecology at the site property and in the surrounding environment following the initial decommissioning activities. The environmental assessment plan should include site-specific sampling plans for applicable environmental components, and should include indicators to be measured, methods to be used, sampling locations, frequency of measurements, and detection limits. Depending on the location, operations, and activities at the site, sampling plans may be required for the following:

- Soil sampling
- Soil gas sampling
- Groundwater sampling
- Surface water sampling
- Sediment sampling.

9.2 Monitoring Residual Environmental Impacts

For those samples that indicate that contamination is present, the DEMP should establish an environmental monitoring plan for the measurement and assessment of residual impacts following the conclusion of immediate decommissioning activities. The plan should include indicators to be measured, methods to be used, sampling locations, frequency of measurements, and detection limits.

9.3 Remediation

For contaminated sites that have been determined to pose a threat to human health or the environment, remediation plans may be required following the environmental assessment. Remediation plans are to

be submitted separately from the DEMP pending the results of the environmental assessment described in Section 9.1, and further EAD guidance will be made available on the development of these plans. At a minimum, remediation plans should accomplish the following:

- Discuss the cleanup objectives and target levels to be achieved for each environmental media consistent with the identified potential future uses of the site (the Abu Dhabi EHSMS Regulatory Framework – Standards and Guideline Values should be referenced)
- Describe of the costs and benefits of remediation technologies and cleanup methods available and their ability to achieve the identified target levels
- Detail the proposed cleanup method to be used
- Describe the technology or technologies to be used
- Provide a list of the mitigation measures taken to prevent hazardous discharges into surface water
- Specify disposal and treatment plans for contaminated wastes
- Provide a schedule for remediation activities
- Provide a site map of the affected area and proposed monitoring locations, installation of systems, and other controls to be used.

9.4 Ecological Restoration

The DEMP should describe additional efforts that will be taken to restore, to their previous conditions, natural habitats that have been impacted by the construction, operation, and decommissioning of the project.

10. Documentation

The DEMP should include requirements to maintain copies of the DEMP, the plans contained within the DEMP, changes to any of these plans, and training records or rosters, audits, monitoring data, and reports submitted to EAD, other agencies, or local authorities. These documents should be easily accessible for inspection.

11. Annexes

The DEMP should include annexes detailing the information described in the previous sections, which should include, but not be limited to, the following information:

- References and sources of information that were used to prepare the DEMP (e.g., previous environmental studies for the project, best international practices used)
- Operational procedures for demolition and ongoing activities
- Material Safety Data Sheets
- Environment policy
- Environment manual
- Large-scale drawings and diagrams (e.g., site layout, machinery and equipment layout, process flow diagrams, piping and instrumentation diagrams, emissions points, sewer and stormwater systems)
- Records, checklists, and log templates for such activities as inspections, audits, monitoring, maintenance, complaint procedures, and training.

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