VOLUME 1
STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)

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PROPOSED NUCLEAR POWER PLANT COMPLEX
WESTERN REGION, ABU DHABI EMIRATE, UAE

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PURPOSE OF THIS SEA

This Strategic Environmental Assessment (SEA) has been developed to assist the Environment Agency – Abu Dhabi (EAD) in making environmental permitting decisions with respect to the development of a four-unit Nuclear Power Plant (NPP) (Project) at a Site approximately 53 kilometers (km) west-southwest of the Town of Ruwais in the Western Region of Abu Dhabi Emirate. Commercial electric power production from the first unit is planned for 2017. The additional three units are planned to begin generating power in successive one-year periods (2018, 2019, and 2020).

The primary purpose of this SEA is to provide information to answer several key strategic questions to allow EAD to develop a clear understanding of the Project and its potential impacts. This SEA is a companion document to an Environmental Impact Assessment (EIA), which contains the available technical and environmental information relevant to the Project.

1.0 OUTLINE

The SEA is structured in accordance with guidance provided by EAD as well as European Commission guidance (Directive 2001/42/EC of the European Parliament (EU, 2001)) and contains the following topics:

1.0 **Outline:** Description of the contents of the SEA, main objectives of the Project and relationship with other relevant plans and programs.

2.0 **Current Environmental Baseline:** Relevant aspects of the current state of the environment and changes likely to occur without implementation of the Project.

3.0 **Affected Environment:** Environmental characteristics of areas likely to be significantly affected by the Project.

4.0 **Existing Environmental Problems:** Existing and known environmental problems which are relevant to the Project and which relate to areas of particular environmental importance.

5.0 **Environmental Protection Objectives:** Environmental protection objectives which are relevant to the Project.

6.0 **Environmental Impacts:** Likely significant impacts of the Project on the environment.

7.0 **Mitigation Measures:** Measures envisaged to prevent, reduce, or offset significant adverse impacts on the environment from implementing the Project.

8.0 **Selection of Project Alternatives:** Outline of the reasons for selecting from among alternatives and a description of how the assessment was undertaken, including any difficulties encountered in compiling the required information.

9.0 **Monitoring Measures:** Description of proposed monitoring of recommended mitigation measures.

10.0 **Summary:** Non-technical summary of the information provided under the above headings.

1.1 CONTENTS

This submittal is presented in a three-volume format, which includes this SEA as Volume 1, an EIA in Volume 2, and the EIA Annexes (including the Terms of Reference (TOR)) in Volume 3. The SEA is intended to provide a holistic overview of the Project, with particular emphasis on

components that are associated with long-term operations of the Project. The EIA is termed the "Non-nuclear Construction EIA," and it provides available detail on the construction aspects of the Project, including potential impacts and proposed mitigation and monitoring measures. The EIA focuses on the construction aspects to assist EAD with evaluating this part of the Project so that EAD can provide a Construction Environmental Permit (CEP) before the detailed operational design is completed. The EIA also provides analyses of operational and decommissioning impacts to support the SEA based on the best available conceptual designs.

On 27 December 2009, the Korea Electric Power Corporation (KEPCO) was selected as the Prime Contractor (PC) to design and construct the Project at the Site. Since the final design is still being developed and will not be completed until late in 2010, bounding assumptions described in this SEA/NN-EIA and used in the absence of final designs will be confirmed in the subsequent Nuclear EIA. If the defined bounding conditions are confirmed, actual environmental receptor impacts are expected to be less than those estimated, and the EIA for that environmental aspect would not need revision. If the defined bounding conditions are exceeded in the final design, then analyses will be revised and reported in the subsequent Nuclear EIA. This approach is consistent with EAD guidance provided to Emirates Nuclear Energy Corporation (ENEC) during the summer of 2009, during which it was agreed that a set of bounding assumptions should be developed and used to describe the proposed Project and to predict impacts. It is expected that most bounding assumptions will be narrowed during final design, revealing that some of the bounded worst-case impacts were overestimated.

Chapter 2.0 of the EIA in Volume 2 presents a comprehensive list of bounding assumptions used in the EIA, with a designation as to whether the item appears in this EIA or as part of the comprehensive Nuclear EIA to be filed with the Federal Authority for Nuclear Regulation (FANR) Construction License Application (CLA). The Nuclear EIA will contain relevant parts of the current EIA and will be supplemented as needed with technology-specific analyses of operational impacts and mitigation. In either case, the assumptions will be verified and reported as part of the comprehensive Nuclear EIA.

1.2 OBJECTIVES OF THE PROJECT AND RELATIONSHIP WITH OTHER PROGRAMS

The United Arab Emirates (UAE) has proposed that the projected future base-load electric needs of the nation will be met in part by constructing and operating a four-unit NPP in the Western Region of Abu Dhabi Emirate. The Project will provide needed electrical power primarily for

future development in Abu Dhabi Emirate. Secondarily, the Project will supply additional base-load generation capacity to Abu Dhabi and the rest of UAE.

The Project will be built by KEPCO, but owned by ENEC, a government-owned company responsible for site selection, obtaining permits and licenses, and managing the power produced for UAE grid. Under the newly adopted Nuclear Law (UAE, 2009**)**, FANR will regulate NPP licensing, radiological health and safety of the public, and major nuclear fuel functions. EAD will regulate environmental permitting and compliance, working in close cooperation with FANR.

1.3 REGULATORY SETTING AND ENVIRONMENTAL PERMITTING

Established in 1996 as an expansion of the former Environmental Research and Wildlife Development Agency (ERWDA), EAD's mission is to conserve and manage Abu Dhabi Emirate environmental resources. EAD is specifically responsible for implementing UAE Federal Law No. (24) (UAE, 1999), including environmental permitting. Law No. (24) specifically requires a CEP, based on an EAD-approved EIA, for energy projects prior to their construction and operation. ENEC is following the EAD-defined CEP process (EAD, 2008) to assess environmental impacts.

FANR was formed in 2009 to regulate the safe operations of UAE's civil nuclear power program. To meet its safety responsibilities, FANR will establish a framework that includes the following regulatory functions: setting standards, issuing regulatory guides, promulgating regulations, issuing licenses and amendments, conducting inspections and audits, and enforcement. FANR and EAD are developing a Memorandum of Understanding to establish regulatory roles and responsibilities for the Project. In general, EAD will lead environmental issues while FANR will oversee nuclear safety and licensing.

ENEC's CEP strategy for the Site is composed of three steps and corresponding EAD submittals designed to synchronize environmental permitting with the Project's construction stages. The following illustrates alignment among the construction stages, CEP strategy steps, and EAD submittals:

CONSTRUCTION PHASE	THREE-STEP CEP STRATEGY	CEP SUBMITTAL
• Stage 1 – Site characterization	• Step 1 – Baseline studies	• Baseline study reports (***EIA Annex 1***)
• Stage 2 – Non-nuclear works and infrastructure	• Step 2 – SEA and Non-nuclear construction permitting	• Environmental Permit Application • Construction TOR • Construction EIA • Construction Environmental Management Plan (CEMP)
• Stage 3 – Nuclear generating unit delivery	• Step 3 – Nuclear construction permitting	• Nuclear TOR • Nuclear EIA • Nuclear CEMP

ENEC implemented this environmental permitting approach in January 2009 with initiation of baseline studies. Baseline study objectives were to assess the environmental suitability of the Site for the construction of the Project and to collect field data necessary to support development of an EIA. The EIA, which is presented in Volumes 2 and 3, presents the results of the baseline study, describes potential impacts, and proposes mitigation and monitoring measures.

Through this work, Paul C. Rizzo Associates, Inc. (RIZZO) has established the suitability of the Site and, therefore, ENEC is seeking the necessary authorizations to commence construction of the non-nuclear portions of the Project. ENEC submitted an Environmental Permit Application and the TOR to EAD to initiate the EIA process.

The team led by ENEC will implement the UAE Civil Nuclear Power Program for peaceful nuclear energy. KEPCO will supply the full scope of work and services, including engineering, procurement, construction, and nuclear fuel with the assistance of other Korean members of the KEPCO team, notably, Korea Power Engineering Company (KOPEC), which will provide NPP design and engineering services.

1.4 DESCRIPTION OF THE PLANNED NUCLEAR POWER PLANT PROJECT

The SEA provides an overview description of major systems and components to assist EAD in holistically evaluating the Project. The Project will consist of four power-generating units

producing up to 1,650 megawatts electric (MWe) each. Each NPP will consist of a reactor building housing the reactor and related safety and non-safety systems required to generate a supply of steam. A safety system is defined as a system whose proper performance is critical to the safe operation or safe shutdown of the reactor. Specifications for safety-related systems are generally more stringent than specifications for non-safety-related systems. Adjacent to the reactor building is the turbine building, in which thermal energy produced by the reactor is converted to electrical energy. Various support buildings include those for emergency power-generation, fuel handling, waste storage, operational control, and facilities maintenance. An Operations Center will provide control of the Emergency Services for the Site as required by the Site Security Emergency Plans. Emergency response plans will be provided as part of the CEMP. Communications with onsite medical and fire-fighting facilities, as well as offsite personnel, will be conducted through this facility, and it will be linked to the Facility Security center. Currently there are no medical facilities within UAE dedicated to the treatment of radiological illness. Development of facilities capable of treating radiological illness will represent a positive addition to national infrastructure.

An NPP produces electricity similarly to a gas, oil, or coal-fired power plant. The fuel source is used to heat water to produce steam which turns turbine blades to provide mechanical energy to a generator. The generator produces electricity, which is released to transmission lines and supplied to the electric grid. While gas, oil, or coal is directly burned to release the heat required to produce steam, the basic heat releasing process in a nuclear reactor is fission, or the splitting of atomic nuclei within the enriched uranium fuel contained in the reactor core to produce a chain reaction. This chain reaction releases energy in the form of heat to the contained water, which is super-heated to produce steam. The speed of the chain reaction, and thus the rate of heat produced, is controlled by a series of control rods inserted into the reactor core to absorb neutrons, thereby reducing the fission reactions.

Figure 1.4-1 illustrates basic power production concepts for the Pressurized Water Reactor (PWR), the type to be provided by KEPCO. KEPCO will bring its own country reference technology designs and approvals to the Site. However, the reference technology will be adapted to UAE conditions and the Site, as appropriate.

Primary components of the Project are organized into the following categories:

- NPP Power Block
- Onsite Permanent Infrastructure

- Onsite Temporary Construction Infrastructure
- Offsite Permanent Infrastructure

1.4.1 NPP Power Block

The operating NPP Power Block will consist of a nuclear island, turbine island, and switchyard. The nuclear island contains those systems, structures, and components that support the operation of the nuclear reactor, including related steam supply, new and spent fuel handling, heat removal, and support systems and equipment. The reactor buildings, one for each unit, are the tallest buildings on the Site. Each reactor building will be an upright cylindrical concrete structure, capped with a spherical dome, rising to a level as high as 63 meters (m) above Site grade. Main and support systems for operating the nuclear reactor include onsite standby diesel power units, auxiliary power, cooling water, and control systems.

The turbine island includes the steam turbine, electricity-generating equipment, transformers, and supporting systems, components, and structures. Each unit's bus works will connect to a switchyard, containing equipment to interconnect the Project generators and main transformers to the national electrical grid via a minimum of two independent 400 kilovolt (kV) transmission lines.

Ancillary NPP structures and components include the following:

- Auxiliary steam generators
- Control center with automated system control and monitoring equipment
- Uranium fuel handling and wet/dry storage facility
- Petroleum fuel storage
- Chlorination plant
- Cooling water pumps
- Essential service water system pumps
- Emergency Power Unit (EPU)

1.4.2 Onsite Permanent Infrastructure

Onsite permanent infrastructure and services at the Site will consist of the following key elements:

- Seawater Cooling System
- Site transportation
- Utilities
- Maintenance
- Administration
- Emergency services
- Security
- Waste management
- Landscaping and irrigation

1.4.3 Onsite Temporary Construction Infrastructure

The following temporary infrastructure components will be onsite to support construction:

- Construction utilities
- Construction/haul roads
- Construction materials lay down and staging areas
- Construction workforce housing and living accommodations
- Concrete batch and ice plants
- Concrete bulk materials storage
- Construction buildings
- Construction waste management
- Construction security

1.4.4 Offsite Permanent Infrastructure

Offsite permanent infrastructure constructed to support the Project will consist of the following key components:

- Electric Transmission and Distribution System
- Water Transmission System
- Communications System
- Access roads
- Operators housing, living accommodations, and support systems
- Visitors center

Although associated with the Project, the offsite permanent infrastructure will be constructed and permitted by the corresponding national infrastructure authority or developer.

1.4.5 Main Environmental Interfaces

Figure 1.4.5-1 shows those systems that will directly interface with the environment. Main environmental interfaces include the seawater cooling system and radioactive waste management.

1.4.6 Seawater Cooling System

The purpose of seawater cooling is to provide heat removal for turbine steam condensers and other smaller heat exchangers. The heat remaining following steam expansion through the steam turbine will be transferred to the once-through seawater circulating water system and ultimately to the Gulf via the discharge channel. A dilution structure will be incorporated within the Cooling Water System to assure the heated cooling water discharge meets EAD requirements. Cooler seawater will be pumped from the intake channel into the dilution structure in the discharge channel to reduce the temperature of heated water coming from steam condenser and other heat exchangers.

The seawater intake structure will consist of a dredged channel offshore (400 hectares (ha)), and a large forebay area onshore (100 ha). The channel will be dredged to a depth of approximately 6.5 m and will be up to 750 m wide. The length of the channel will be approximately 6,650 m, subject to detailed design changes. The sides of the channel will be lined with suitable riprap or armor rock. The bottom of the channel will be native sand/gravel/rock.

Cooling Water Intake Structures (CWIS), one for each NPP unit, including water intake screen and pump houses, will be built on the banks of a forebay excavated into the land at the terminus of the intake channel. The rates of fish impingement will be minimized by the use of low approach velocity travelling screens. KEPCO will provide the final CWIS designs intended to keep fish and shellfish impingement rates within acceptable limits.

The Water Discharge System will consist of cooling water from various plant systems, the supplemental dilution water, and some treated wastewater. The discharge from all four units will be combined in a common discharge channel. The seawater cooling discharge structure (200 ha)

is expected to be up to 400 m wide at the invert and dredged to a depth of approximately 6.5 m. The length of the discharge channel will be approximately 3,975 m, subject to detailed design changes. Like the intake channel, the discharge channel will be made from suitable riprap or armor rock taken in part from onsite excavation materials.

In order to construct the wharf, intake, discharge structures, and other shoreline features in excess of 15 million m^3 may require removal by dredging. A reclamation area will be developed along the shoreline in between the cooling water intake and discharge structures, which will contain much of the dredged and excavated material from the Site. Unused materials remaining after construction will be contoured within the reclamation area or in a stockpile area for final disposition. Stockpile management will follow EAD guidance.

Thermal dilution seawater will be drawn from the intake channel forebay by a series of dilution water pumps, but will not pass through the steam turbine condenser. This dilution water, still at ambient temperature, will be combined at the head of the discharge channel in a thermal dilution structure with the discharge cooling water where it will reduce both the temperature of the discharge water and its residual chlorine levels by up to 30 percent, based on straightforward dilution effects. The volume of the discharge water will be essentially the same as the intake volume. Only one percent will be lost through the process, primarily through evaporation.

1.4.7 Radioactive Waste Management System

Each NPP is expected to produce gaseous, liquid, solid, and mixed radioactive waste streams during normal operations. Most of the radioactivity produced (fission products) is contained within the fuel rods and is, therefore, not available for release to fluid systems or to the environment. However, imperfections in the cladding may result in a small fraction of these fission products escaping from the affected fuel rods to the reactor coolant. The other main source of radioactivity to the reactor coolant is the corrosion of primary system surfaces and irradiation of the corrosion products within the reactor core.

This radioactivity appears in leakage from these systems and components which, in turn, forms the source of radioactivity in waste streams. System wastes are collected, processed, and directed for either reuse or release to the environment by the radioactive waste treatment systems. Radioactive Waste Treatment Systems maintain, during normal operation, the radioactivity content of liquid and gaseous effluents within FANR dose standards (FANR-REG-04,

Regulation for Radiation Dose Limits and Optimization of Radiation Protection for Nuclear Facilities) (FANR, 2009). Radioactive waste management systems will be detailed in the Nuclear EIA.

1.4.7.1 Liquid Radiological Waste

During normal operations, the NPP will release small amounts of radioactive materials in liquid effluents. Wastes from the various systems will be collected and processed in the Liquid Waste Processing System, which will control radioactivity in the aggregate liquid waste discharges within FANR standards. Liquid waste discharges to the environment (approximately 0.0035 cubic meters per second (m^3/sec) per unit) will be co-mingled with the cooling water discharge and dilution will render the radioactivity to minimal levels. Radioactive waste quantities will be described in the Nuclear EIA after receipt of final Prime Contractor (PC) data.

1.4.7.2 Gaseous Radiological Waste

Radioactive gaseous releases are proportional to the rate of fuel consumption and may be up to 0.32 cubic meters per minute (m^3/min) per unit from the Gaseous Radwaste System and 5,500 m^3/min per unit from the Heating, Ventilating & Air Conditioning (HVAC) units for radiation areas. Waste gases will be collected, dried, treated with carbon delay beds in the Gaseous Radwaste System, and released to the atmosphere combined with the compound building HVAC exhaust. Potentially radioactive gases generated from the radiation areas in the buildings are discharged to the environment through HVAC of each building. Treated (cleansed) gaseous waste will be discharged to the atmosphere through vents opening potentially as high as 13~27 m.

1.4.7.3 Solid Radioactive Waste

Solid radioactive waste is produced as a byproduct of the Liquid Waste Processing System. Typical solid wastes consist of dried evaporator concentrates, carbon delay beds, spent resins and filters, sludge, and dry active waste (DAW). Each NPP is expected to produce as much as 120 m^3 of treated solid waste per year. The waste will be collected, processed to obtain volume reduction and stored onsite until a permanent UAE disposal facility is developed and licensed to accept radiological waste.

1.4.7.4 Low-Level Radiological Waste and Irradiated Fuel

Low-level radiological waste generated by waste processing systems will be stored onsite until such time as an acceptable offsite storage facility is available. As there are currently no radiological waste management systems in place within UAE, the production of radiological waste and irradiated fuel will have no adverse impact on waste management systems. Future development of an offsite storage facility will represent a positive addition to national infrastructure. Irradiated (spent) fuel will be removed from the reactor during refueling outages scheduled every 18 to 24 months. Irradiated fuel will be stored in the spent-fuel pool where it cools for up to 20 years, at which time it will be transferred to casks approved for long-term storage. ENEC will store irradiated fuel onsite for the 60-year life of the Project. Disposal of the fuel at decommissioning will be addressed in consultation with EAD and FANR.

1.4.7.5 Transportation of Radioactive Materials

Enriched uranium fuel will be imported for NPP refueling. Fuel will arrive in UAE through a commercial port and, under appropriate security, transported to the NPP. Transportation of new fuel will comply with FANR and UAE Department of Transportation (DOT) regulations. Future transportation of the irradiated fuel and low-level radiological waste to a licensed facility will be addressed in consultation with EAD and FANR.

ADDITIONAL INFORMATION: Additional detailed discussion of the planned Project is located in ***Volume 2, Chapter 4.0.***

2.0 CURRENT ENVIRONMENTAL BASELINE

The existing environmental baseline comprised the basis for estimating Project impacts. Extensive baseline surveys were completed in accordance with the TOR and work plans provided in ***Volume 3***. This section also discusses the potential changes in the environment without implementation of the Project.

The existing environment consists primarily of terrestrial, marine, and human components. The following sections provide a summary of the major characteristics of these components. Habitats of the Western Region of Abu Dhabi Emirate, the location of the proposed Site, are mostly in a natural condition, and the resident human population is small. The only significant human settlements near the vicinity of the Site are the Town of Ruwais and the Town of Sila'a, approximately 53 km east-northeast and 48 km west-northwest, respectively, of the proposed Project. A major highway (Highway E11) runs through the area, approximately 1.4 km south of the western border of the Site and parallel to the coast. This is the main commercial road route between UAE and Saudi Arabia and is heavily used by freight trucks.

2.1 TERRESTRIAL HABITAT COMPONENT

The terrestrial environment at the Site is influenced by a strong seasonality. Air temperatures drop dramatically as solar radiation falls, reducing both heat and light stress significantly. Winter rains are perhaps the most important meteorological factor affecting terrestrial ecology, with heavy rain stimulating a quick increase in vegetation, followed by fairly rapid increases in insects and other herbivorous invertebrates. Increases in small mammal populations and reptiles soon follow. Winters with no or little rainfall are stressful on resident vegetation and animal populations.

A thorough terrestrial survey was conducted in June and July 2009 to characterize the Project Site (1.5-km radial distance from the Site centerpoint) and Project Vicinity (defined in the ecological surveys as the area within a 15-km radial distance of the Site centerpoint). Vegetation, mammals, reptiles, birds, and arthropods were the main terrestrial receptors surveyed. A migratory bird survey was also conducted in September 2009. An additional terrestrial survey was conducted in winter 2010, to record seasonal differences in species diversity and abundance.

The terrestrial portion of the Site is dominated by two habitats: sabkha (coastal and inland sabkha matti) and infilled sabkha. Mudflats and sandflats, which are exposed at low tide, run along the length of the Site and are oriented in an east-west direction parallel to the coastline. The mudflats and sandflats, together with a small lagoon that receives flows during high tidal periods via a seawater inlet, are utilized as feeding areas by resident and migratory birds. The vegetation within the Project Site and Project Vicinity is generally sparse, the greatest concentration of plants occurring in a coastal band of storm beach ridge and infilled sabkha behind the high tide line. Construction of beach houses has destroyed much of the natural vegetation in that zone.

The naturalness and low-density human population of the Project Site and Project Vicinity are factors that should make it attractive to wildlife, but the very harsh climate and the prevailing high levels of salinity in the substrate make the area unattractive to most forms of terrestrial life. The few types of native vertebrates that can survive in these habitats are strongly desert-adapted.

Although there was an increase in total bird numbers in September compared to the June/July survey period, a low density of birds was recorded. As expected, more species and greater numbers of birds were recorded in the inter-tidal areas during the September migrations compared to the June/July breeding period. The same trend was evident in the interior areas. Numbers were not significant. Despite the increase in the number and diversity of species since the June/July survey period, the Site does not appear to be an important area for birds during autumn migration. On the basis of this survey, the Site would not be classified as significant at either an international or national level for migratory birds in autumn. The number of birds recorded during the winter 2010 survey was minimal compared to survey results of September 2009, but comparable to the June/July 2009 survey numbers.

The globally threatened Socotra Cormorant was recorded at the Site, but it was not found to be breeding. No National Red Data species were found breeding within the Project Site or Project Vicinity. Only one instance of breeding of a Kentish Plover was recorded during the surveys. Breeding by species associated with human habitation would involve Feral Pigeon, Collared Dove, Laughing Dove, White-eared Bulbul, and House Sparrow.

Overall faunal catches and sightings in winter 2010 were considerably reduced from summer work, both in species encountered, and numbers of each species. The winter survey involved

only half the trapping and observation effort of the summer survey. Even taking this into account, the numbers and diversity of faunal species recorded was greatly reduced in the winter. Despite receiving rain in the two months preceding the winter survey, there was very little evidence of this in vegetation or in the faunal numbers.

2.2 MARINE HABITAT COMPONENT

A marine ecology baseline survey was conducted in June and July 2009 to describe the summer marine communities of flora, corals, invertebrates, fish, mammals, and reptiles at three spatial resolutions: Project Site, Project Vicinity, and Region (80-km radius). The marine ecological baseline survey included observations of marine flora and fauna.

Marine habitat maps were created based on sediment types and locations in relation to the seashore. Clearer water and calmer nautical conditions during summer aided habitat mapping. Important marine habitat types included intertidal sand flats, subtidal rippled sand, algal-dominated sediment veneer, algal-dominated reef, seagrass meadows, and deeper soft sediment areas.

A number of marine mammals and reptiles found in the Western Region of Abu Dhabi Emirate are listed as vulnerable or endangered, several of which were spotted within the Site study area. Because of the distance from major cities, the study area is mostly undisturbed and is therefore frequented by these species. Several marine mammals and reptiles were spotted within the Project Region, including Dugongs, Indo-Pacific bottlenose dolphins, and Indo-Pacific humpback dolphins, in addition to Green and Hawksbill turtles. Both Dugongs and green turtles depend on seagrass meadows for nourishment; however, the area of seagrass found within the 15-km radius (292 ha) is quite small compared to elsewhere in the Western Region. The low seagrass coverage would indicate that the Project Vicinity is not a major feeding and sheltering area for either marine mammals or reptiles.

Studies conducted by various government agencies between January 2005 and December 2007 to determine the extent of present coral colonies offshore of Abu Dhabi Emirate found several areas north and west of the Site consisting of dense, live coral communities restricted to offshore islands and shoals. Field surveys performed for this Project identified additional live coral in fringing reefs in relatively shallow water located northeast of the Site. Coral communities in the Western Region of Abu Dhabi Emirate have been relatively unthreatened by human development

and have a high conservation potential because of this. The government recognized this potential and declared the area around Al Yasat Island as a Marine Protected Area (MPA) in 2006, expanding the area to include the shoals to the northwest in 2009. Several small coral communities were identified within the Site Vicinity comprising of approximately 118 ha.

A supplemental marine survey was conducted during winter 2010 to verify the extent of seasonal changes at the Site. The conclusion of that survey indicated that the marine environment, as compared to the June/July 2009 baseline survey event, remained relatively unchanged. This indicates an overall low seasonal variability at the Site Vicinity.

2.3 HUMAN COMPONENT

The existing land use at the Site is mostly open space with recreational weekend villas located along the coast. There are no large towns located near the Site. However, there are temporary residences located next to the shoreline within 20 km of the Site, stretching approximately 12 km to the west and approximately 5 km to the east-northeast of the Site. Activities that occur in the area between 20 and 80 km from the Site are agriculture, small-scale fishing operations, and industrial activities. The population that works in small-scale fishing operations and agriculture within 80 km from the Site are considered to be residents from the towns between 20 and 80 km from the Site. There is no Population Center or any city within 80 km of the Site with a population greater than 25,000 people. However, based on the projected populations, the Town of Ruwais (2001 population of 19,925) was expected to become a Population Center in the year 2009. The other towns that are expected to become a Population Center within the Project time period are Dalma (in 2099), Ghayathi (in 2035), and Sila'a-Ba'aya (in 2073).

2.4 EXPECTED CHANGES WITHOUT THE PROJECT – NO ACTION ALTERNATIVE

The No Action Alternative describes a scenario in which neither the Project nor any other electric-generating plant is constructed or operated on the Site. A discussion of the No Action Alternative involves an understanding of the existing environment without the Project, and how that existing environment would change, should the Project not be built. The main environmental characteristics of the existing conditions most likely to be significantly affected were presented above.

The terrestrial and marine ecology at the Site is not expected to change significantly in the absence of the Project. One might expect that a few additional beach villas will be constructed over time and some increased pressure will be placed on marine resources from increased recreational fishing and boating.

3.0 AFFECTED ENVIRONMENT

The primary environments likely to be significantly affected were described in ***Section 2.0***. Marine, terrestrial, and human environments will be impacted by Project construction (***Section 6.0***).

During operations, only the marine habitat will be significantly affected. The terrestrial environmental impacts will be limited to the footprint of the Project, which is a small area compared with other similar terrestrial habitat in the Western Region of Abu Dhabi Emirate. The permanent workforce will reside in an Operators Village located on land to be acquired by the Urban Planning Council (UPC) for that purpose near the Town of Ruwais. The Project will provide benefits in terms of employment opportunities and support to the local economy.

4.0 EXISTING ENVIRONMENTAL PROBLEMS

The Site is not within a Marine or Terrestrial Protected Area. No particular environmental problems are known to occur at the Site or in the Project Vicinity. Consistent with being a previously undeveloped location, no soil, groundwater, or surface water contamination was detected during baseline surveys.

Terrestrial habitats at the Site are similar to those generally available in the Western Region of Abu Dhabi Emirate. No rare, threatened, or endangered terrestrial species occur in the Project Site or Project Vicinity. Marine habitats within the Project Site and Project Vicinity support a number of protected marine species, which are diverse, intact, and similar to other marine habitats in the southern Gulf.

5.0 ENVIRONMENTAL PROTECTION OBJECTIVES

Conceptual plans for the Project have been developed in an attempt to minimize temporary and permanent impacts to the maximum extent practical. During the siting study, selection criteria were applied to a number of important environmental issues to include sensitive habitats in the scored ranking of potential candidate sites. For example, official MPAs were specifically identified during the siting study as areas to be avoided.

ENEC will integrate environmental stewardship commitments into a comprehensive Environmental Management System (EMS) with regard to construction and operation of the Project. The EMS will be comprised of mitigation and monitoring programs (MMPs) and implementation plans governing construction and operations activities. The implementation plans will be described in detail in a Construction Environmental Management Plan (CEMP) and an Operations Environmental Management Plan (OEMP), respectively. The primary objective of the MMPs and associated management plans are to achieve compliance with EAD environmental guidance and regulations.

The baseline terrestrial survey confirmed that no rare, threatened, or endangered species or habitats would be impacted.

The most productive and sensitive marine habitats in the Gulf are coral reefs. Approximately 118 ha of coral communities were found in the Project Vicinity.

A Preliminary Cultural Review (PCR) of the Site was performed by the Abu Dhabi Authority for Culture and Heritage (ADACH) in order to determine whether any archaeological or cultural resources are present on the Site and to develop plans for the protection of these unique national treasures. As a result of the PCR, an ancient harbour has been found near the Site. ENEC is cooperating with ADACH in planning for the study and preservation of this discovery. Should archaeological, historical, or cultural resources be accidentally uncovered during Site construction activities, ENEC will promptly notify ADACH.

6.0 ENVIRONMENTAL IMPACTS

6.1 IMPACTS OF CONSTRUCTION, OPERATIONS, AND DECOMMISSIONING

Estimated construction, operations, and decommissioning impacts to environmental receptors are summarized in the table below. The impact assessment provided represents the bounded worst-case scenario. Additional modeling and impact assessment will be included in the Nuclear EIA as necessary. Construction impacts were estimated to be Adverse and Moderate to Large for the following environmental receptors: Land use (Moderate) and Marine Ecology (Moderate). Large Positive construction impacts were noted for Socioeconomics due to the economic increases associated with the construction workforce and the relatively long construction period.

Operation impacts were estimated to be Adverse and Moderate for the following receptors: Marine Ecology (Moderate) and Water Quality (Moderate). Positive large impacts of operations were noted for Air Quality, since the use of nuclear fuel, as opposed to fossil fuels, will provide significant air quality benefits to UAE over the 60-year life of the Project. In addition, positive moderate impacts of operations were noted for socioeconomics due to the influx of the new workforce.

Marine impacts of normal operation are limited to the thermal plume resulting from the once-through steam turbine condenser, turbine building component cooling, and reactor component cooling systems, and to the residual effects of chlorination of the cooling water system. The combined cooling water discharge, including dilution water required to meet the EAD discharge standard of 5°C above Gulf ambient water temperature, is 164 m^3/s. This rate of discharge indicates that a subsurface plume resulting from normal offshore operations extends for a distance of up to about 17 km to the east of the discharge channel. Plume width is approximately 6 km in width. Thermal plume modeling was conducted to present a bounded worst-case scenario.

Decommissioning impacts were estimated to be Adverse and Large for the following receptors: Land Use, Terrestrial Ecology, and Waste Management. Positive large impacts of decommissioning were noted for marine ecology due to the cessation of large volumes of intake water eliminating impingement and entrainment, cessation of thermal discharges permitting

ambient seawater temperatures to prevail, and socioeconomic benefits due to the increased workforce needed to complete decommissioning activities.

The series of tables that follow detail the Project's estimated construction, operation, and decommissioning impacts.

TABLE 6.1-1
RECEPTOR IMPACTS DUE TO CONSTRUCTION OF THE PROJECT

RECEPTOR	CONSTRUCTION ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Water-related	*Surface Water* Water Use of Construction	It is estimated that approximately 7.58 million lpd of fresh water will be required at the peak of construction. This will be supplied to the Site from the Shuweihat Desalination Plant. Although fresh water demands for construction sourced from desalination plants will constitute a significant demand, the required capacity is available.	No Impact
	Construction Effluents	Because rainfall is infrequent, storm water runoff and the associated sediment loads are not expected to be a concern at the Site.	Small
	Dredging and Excavation	The process of construction dredging and stockpile management will impact local Gulf water quality and may require dewatering facilities. Some dredged material may become temporarily suspended in the water column. Impacts are temporary and may extend beyond the immediate area. Water quality impacts due to dredging are considered temporary and reversible.	Small
	Groundwater Foundation Excavation	Temporary dewatering at the Site for the purposes of foundation work may result in the introduction of atmospheric oxygen to previously submerged sediments. However, groundwater quality measurements at the Site indicate that groundwater in the shallow and intermediate wells currently exist in an oxidated state. Therefore, impacts to groundwater quality are temporary and will be reversible.	Small
	Construction Effluents	Site grading and permanent building foundations will greatly reduce surface area that is currently available for infiltration at the Site. It is therefore expected that infiltration and subsequent impact on groundwater will be minimal.	Small
	Hydrology Construction Effluents	Due to the extremely arid climate of the region, the evaporation rate of water is greater than the infiltration rate. Since limited amounts of water are to be discharged, it is expected that infiltration into the subsurface and subsequent impact on groundwater will be minimal; therefore, the impact will be small.	Small
	Foundation Excavation and Reclamation Area Development	The foundation excavation and reclamation area will likely extend through one or more stratigraphic zones, resulting in disruption of groundwater in these zones locally in the area of excavation. Dewatering will also occur during construction as necessary. Resulting hydrologic alterations to groundwater from dewatering will be limited mostly to local and temporary depressions in potentiometric surfaces and will recover when dewatering activities are finished. Since dewatering activities are of a temporary nature and reversible, hydrologic alterations to groundwater at the Site will be small.	Small

TABLE 6.1-1
RECEPTOR IMPACTS DUE TO CONSTRUCTION OF THE PROJECT
(CONTINUED)

RECEPTOR	CONSTRUCTION ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Water-related	*Water Use* Water Use of Construction	Groundwater will not be used in construction but will be produced during excavation from the dewatering process, when necessary; therefore, there will be a small impact.	Small
Land Use	Onshore Land Use Conversion from the Construction of Project	The presence of construction facilities was considered to be temporary and reversible following decommissioning. The land can be restored to its prior condition following construction; thus, impacts will be small.	Small
	Land Use Conversion from the Construction of Plant (Foundation Excavation)	Major onshore excavation for installation of deep foundations and other structures will result in a permanent and irreversible land use impact by altering previously undisturbed land. In addition, the reclamation area will change the Gulf shoreline, altering the present use of the area. The total land disturbed by site grading, excavation, and dredging will constitute a small percentage of undisturbed land available in the region. The management of this material may be offset by the reclamation area, cut and fill balance, and other constructive uses of excavated materials. Therefore, impacts will be small.	Small
	Dredging Stockpile Management	The cooling water structures and the wharf/barge channel will require significant offshore dredging. Dredged material will be dewatered when necessary and either stored onshore adjacent to the owner controlled area or in the defined reclamation area (***Figure 8.3-2***), altering the current land use. The total land disturbed by dredging will constitute a small percentage of undisturbed land available in the region; therefore, the impact will be small.	Small
	Displacement of Offsite Land Use	There are no industrial facilities or permanent residents within an area approximately 20-km radius of the Project center point. The area permanently affected by the Project is small compared to the area still available for recreation. Therefore, there will be no impacts to offsite industrial and recreational facilities at the Project.	No Impact
	Displacement of Offsite Land Use from Construction of the Project	The footprint for the Project will be located mostly on previously undisturbed and undeveloped land. This area is currently open to the public, but will be closed once the construction permits are granted; thus, there will be an impact to those areas of the Site currently available to the public. However, this impact will be small due to the total amount of open land in the Western Region of the Abu Dhabi Emirate. The land use changes are consistent with the pending Plan Al Gharbia 2030 (UPC, 2008) and, thus, these impacts are considered positive.	Small, positive

TABLE 6.1-1
RECEPTOR IMPACTS DUE TO CONSTRUCTION OF THE PROJECT
(CONTINUED)

RECEPTOR	CONSTRUCTION ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Land Use	Displacement of Offsite Land Use from Utility Corridors	During the construction phase, electricity, water, and communications will need to be distributed to the Site from existing providers. These utilities will be constructed within the same corridor to minimize land use impacts. All removed soil will be used to rebury the utilities and there is little or no vegetation in this corridor. These impacts are considered small since they are temporary and reversible	Small
	Displacement of Public Land Use from Waste Management	Construction and municipal waste management will have an effect on existing land use onsite and offsite. Waste produced during construction will be stored in an onsite transfer station before being shipped offsite to an existing offsite landfill. Types of waste to be managed this way include municipal waste from the Construction Workers Villages as well as other construction waste produced on the Site. The offsite landfill will be used by other waste generators, thus creating a cumulative impact. The impacts from construction on municipal waste management are permanent. Disposal in a landfill is not readily reversible, although the impact is offsite. However, this is a benefit to the business operations of the landfill. Therefore, the impact is considered small.	Small
Terrestrial Ecology	Habitat Loss or Species Displacement/ Mortality from Construction	The current terrestrial habitat of the Site is sparse and the species present are widespread throughout the Western Region of Abu Dhabi Emirate. Although the construction of the Project will permanently alter the onsite terrestrial ecology, the effects off-site are not expected to be significant. The dredged material will likely be stored near the Site in stockpiles and may require dewatering facilities. These impacts are temporary and reversible since the terrestrial ecology will reclaim portions of the land once construction is complete or will colonize areas nearby.	Small
	Habitat Loss or Species Displacement/ Mortality from Construction	Site grading and major excavation will affect the terrestrial ecology of the Site. Grading of the site will involve the removal and relocation of terrestrial habitat. The subsequent development of the Site will render these alterations as being permanent and irreversible. Site grading and major excavation will affect approximately 428 ha of terrestrial habitat.	Small
Marine Ecology	Habitat Loss or Species Displacement/ Mortality from the construction of the Cooling Water Intake and Outfall Structure	The offshore portion of the seawater cooling system will result in loss of ecosystems where dredging occurs. In excess of 12 million m^3 of material may require removal by dredging. Therefore, offshore land use impacts to the Site and the Site Vicinity are significant. These offshore impacts consist mainly of the disturbance and/or disappearance of marine and coastal ecosystems that are within the vicinity of the dredged area. However, it is anticipated that the ecosystems adjacent to the dredged areas will recover from the temporary effects of increased turbidity and settable solids.	Moderate

TABLE 6.1-1
RECEPTOR IMPACTS DUE TO CONSTRUCTION OF THE PROJECT
(CONTINUED)

RECEPTOR	CONSTRUCTION ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Marine Ecology	Construction Activities	Construction activities on the Gulf that produce light and noise will be temporary and reversible since the actions will only be performed until the marine structures are complete. Since the Site is not conducive for turtle nesting sites, there will be no impact.	No Impact
	Construction Activities	The distance to the conservation areas precludes adverse impacts to known conservation and wildlife areas within the region of the Project. Therefore, there will not be construction impacts to conservation and wildlife areas.	No Impact
	Habitat Loss or Species Displacement/ Mortality from the construction of the Cooling Water Intake and Outfall Structures	There is the potential for loss of benthic habitat due to sedimentation from silty dredged material. Short-term increases in turbidity can affect aquatic species' metabolism, interfere with spawning, or cause habitat stress and mortality.	Moderate
	Habitat Loss or Species Displacement/ Mortality from Construction	There is a potential for anthropogenic pollution to increase from materials entering the Gulf from an increase in usage, thus causing habitat stress and mortality from secondary anthropogenic effects.	Small
	Habitat Loss or Species Displacement/ Mortality from the construction of the Cooling Water Intake and Outfall Structures	The total footprint layout calls for approximately 767 ha of marine habitat types to be removed by dredging. Additionally, approximately 287 ha of marine and coastal habitat will be occupied by the reclamation area.	Moderate
	Habitat Loss or Species Displacement/ Mortality from Construction	Because rainfall is infrequent, storm water runoff and the associated sediment loads are not expected to be a concern at the Site. A Spill Prevention, Control, and Countermeasures plan will be in place to prevent storm water pollution. Site grading and permanent building foundations will greatly reduce infiltration at the Site, thereby minimizing the opportunity of surface water runoff to impact the groundwater table. Thus, the potential ecological impact to the marine environment from surface water runoff is considered small.	Small

TABLE 6.1-1
RECEPTOR IMPACTS DUE TO CONSTRUCTION OF THE PROJECT
(CONTINUED)

RECEPTOR	CONSTRUCTION ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Marine Ecology	Species Displacement or Mortality from the Construction of the Cooling Water Intake and Outfall Structures	With removal of seagrass habitats on which fish feed, fish species will not be harmed but will travel elsewhere, potentially reducing the commercial viability of the impacted area. The relatively small amount of adversely affected vegetated habitats when compared to the total area of similar habitat should not measurably adversely affect populations of associated marine species.	Small
	Habitat Loss or Species Mortality/Displacement from Maintenance Dredging	The main habitat type to be removed during construction is macroalgae-dominated. Some seagrass-associated habitat does exist to the west of the Site but should not be impacted by construction. With the removal of macroalgae-dominated habitats, associated species that feed on and use macroalgae for shelter (e.g., fish, turtle species, etc.) will be impacted. Sessile (immobile) species living in macroalgal communities will be impacted as well. This impact is small, however, due to additional pristine habitats available in the nearby Al Yasat and Morawah Marine Protected Areas.	Small
Socioeconomics	*Social* Construction Workforce	An estimated 78 percent (4,000 workers) of the construction workforce will consist of construction craft labor workers, with an additional 1,160 skilled workers, for a total peak workforce of approximately 5,160 workers per unit (DOE, 2005). The significant increase in employment opportunities will be a positive economic impact. Construction activities at the Site will generate positive impacts with respect to both direct and indirect, skilled as well as unskilled, employment opportunities, and income in the Project Vicinity.	Large, Positive
	Construction Workforce and Needed Materials	Impacts to socioeconomics from construction activities will be temporary, reversible, and positive. At the end of construction in approximately 2021, the workers will return to their home countries or move to support other projects. The impact is positive since the construction phase of the Project will create both direct and indirect jobs. The Project will also distribute currency through the purchase of goods, materials, equipment, or services needed for construction. These impacts are significant since they will draw resources from offsite locations; they also have the potential to be cumulative.	Large, Positive
	Aesthetics of Construction, Onshore	Aesthetics from the presence of the permanent structures will be minimized through aesthetic architectural finishes. The construction activities that will degrade the visual aesthetics of the land are limited to those activities potentially seen from local roads. The primary visual construction impairment visible to the public will be a large number of cranes. However, these are only a temporary impact; therefore, the impact is small.	Small

TABLE 6.1-1
RECEPTOR IMPACTS DUE TO CONSTRUCTION OF THE PROJECT
(CONTINUED)

RECEPTOR	CONSTRUCTION ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Socioeconomics	Aesthetics of Construction, Onshore	The dredging and excavation stockpiles will be a visual impairment initially until it is finally contoured and graded to become a permanent site feature. Construction is a temporary activity; therefore, the visible impacts of construction will disappear once construction is completed. The degree to which construction activities will be seen directly from the adjacent roads is expected to be minimal; therefore, the impact is small and temporary.	Small
	Aesthetics of Construction, Offshore	Although looking to the shoreline from the Gulf offers a much clearer view of the construction site than that from the roads, a very small percentage of the population (only those on boats) will be impacted by the visual aesthetic concerns of construction, which will be limited to the immediate area of the Site. Visual impacts from construction overall will be small and temporary.	Small
	Land Value Increase from Construction	Social impact on land values is positive since new housing will be created near the Town of Ruwais for the Operators Village, in accordance with the pending Plan Al Gharbia 2030.	Small, Positive
	Use of Public Facilities or Services due to Construction	There will be no impact on existing public facilities such as hospitals, schools, shops, etc. during construction because the Construction Workers Villages will develop all necessary facilities.	No Impact
	Use of Public Facilities or Services due to Construction	Public services to be provided in the Construction Workers Villages include utilities, a mosque, cafeteria, medical and life flight services, convenience stores, post office, laundry, and recreational facilities. The pending Plan Al Gharbia 2030 anticipates growth in the Western Region of Abu Dhabi Emirate.	No Impact
	Use of Public Facilities or Services due to Construction	Electricity needed to support the Construction Workers Villages and construction activities will be supplied by a combination of temporary generators provided by the contractor. The current infrastructure will meet the demands of construction of the Project; thus, there will be no impact on public services.	No Impact
	Use of Public Facilities or Services due to Construction	The impact on public social services due to in-migrating workers will be minimal. Most social services will be provided within the two Construction Workers Villages. In the event of more significant medical assistance, a nearby hospital with a helipad and life-flight access will be utilized. KEPCO will be responsible for providing fire and police services. Impacts on public social services are small.	Small
	Use of Public Facilities or Services due to Construction	All communication systems from the Site will tie in with the communication network currently present in along Highway E11. The local system will be upgraded due to the increase on demand. Therefore, there is no impact on these services.	No Impact

TABLE 6.1-1
RECEPTOR IMPACTS DUE TO CONSTRUCTION OF THE PROJECT
(CONTINUED)

RECEPTOR	CONSTRUCTION ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Socioeconomics	Water Demand of Construction	The water demand during construction will be obtained from a tap off the existing pipeline. The pipeline will supply the Site at a capacity of approximately 8.3 million lpd. That capacity will meet the needs of the Site during peak construction activities; thus, there will be no impact to public services.	No Impact
	Water Demand of Construction	All of the domestic wellfields in operation in the UAE are located in the Eastern Region of Abu Dhabi Emirate (EAD, 2005). Wellfields that had previously been in operation in the Western Region of Abu Dhabi Emirate are no longer in use (ERWDA, 2004). Therefore, there will be no impact on other groundwater users.	No Impact
	Recreational Activities	There is a variety of outdoor recreational activity available in the UAE such as fishing and Sir Bani Yas Island wildlife park. These activities can be utilized within the region of the Site. Since these recreational activities can be utilized by an unlimited number of participants, adverse impacts to recreational activities are not anticipated.	No Impact
	Tax revenue due to Construction	Impact on tax revenue generation is positive but small.	Small, Positive
Archaeology, Paleontology, and Cultural Heritage	Project Construction	A PCR has been completed at the site by the ADACH Department of Historic Environment (Al Neyadi, 2009). The review concluded that there is one archeological site within the project boundary. It is an ancient harbor, known as Sag Barakah, which will require protection to prevent damage during site activities. An agreement has been reached between ENEC and ADACH to secure and fence the discovered port area to prevent damage during construction activities. Should archaeological, historical, or cultural resources be accidentally discovered during Site construction activities, ENEC will promptly notify ADACH.	No Impact or Small
Geology	Excavation	Temporary dewatering at the Site for the purposes of foundation work may result in the introduction of atmospheric oxygen to previously submerged sediments and/or bedrock. Sample analysis indicates that the present condition currently exists in an oxidated state. Therefore, impacts to geology are considered temporary, reversible (to the extent that the Site can backfilled to original grade), and small.	Small
		During land reclamation, well installation, and rock coring, there will be minimal impacts to the soils although some minor salinization of the soils at the Site could occur. Proper management will be taken during this process to ensure the soil/rock will not be impacted. Excavating will not impact the soils or geology of the Site, other than removal of the soil/rock for infrastructure (Orica, 2009).	No Impact

TABLE 6.1-1
RECEPTOR IMPACTS DUE TO CONSTRUCTION OF THE PROJECT
(CONTINUED)

RECEPTOR	CONSTRUCTION ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Air Quality	Air Particulates from Construction	Stockpiles of excavated and dredged material will generate particles that may become airborne under windy conditions. Impacts to air quality will be reduced as distance from the Site increases. Air quality impacts from construction are expected to be temporary due to the finite length of the construction period and reversible since the impacts will disappear once construction is completed. Because there is not a permanent population in the Site Vicinity, the impact to the public is expected to be small.	Small
	Changes to Meteorology from Construction	Impacts to meteorology due to the construction of the Project are not expected. Since cooling towers will not be used for the Project, there will be no alterations to precipitation.	No Impact
	Equipment Emissions from Construction	Vehicles and engine-driven equipment (e.g., generators and compressors) will generate combustion product emissions such as carbon monoxide, nitrogen oxides, and, to a lesser extent, sulfur dioxides. Painting, coating, and similar operations will also generate emissions due to the presence of volatile organic compounds (VOCs). Impacts of air emissions will be reduced as distance from the Site increases. Impacts to air quality during construction are temporary and reversible since they will only occur during the actual use of the specific construction equipment or during specific construction activities.	Small
Noise	Equipment Operation during Construction	All vacation residences located within the Low Population Zone (LPZ) will be relocated. The closest remaining seasonal residence will be located outside the LPZ on the west side of the Site in close proximity to the temporary area required for construction boundary. Noise levels in the area of the Site will increase during construction primarily due to the operation of vehicles such as earth-moving, materials-handling, impact pile driving equipment, and other construction tools. Noise decreases when the distance from the emission point is increased. The greatest noise impact will occur during the peak of construction in 2014. After the construction peak, noise levels will begin to decrease until the last unit becomes operational in 2020, or the eleventh year after construction begins. The temporary construction boundary will be monitored to ensure EAD standards are met. In addition, the Construction Environmental Management Plan (CEMP) will contain measures to ensure that EAD standards for noise are met.	Small

TABLE 6.1-1
RECEPTOR IMPACTS DUE TO CONSTRUCTION OF THE PROJECT
(CONTINUED)

RECEPTOR	CONSTRUCTION ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Noise	Noise from Transportation	Traffic noise in the local area will increase as materials and waste are transported to and from the construction site. The noise from transportation has the potential to be cumulative with existing traffic noise; however, construction is of a finite length; therefore, the impact is temporary, reversible, and small.	Small
Transportation	Transportation of Construction Workers	Transportation of construction workers from the Construction Workers Villages will occur along a marginal road that is parallel to Highway E11. The workers will not have to access Highway E11; therefore, impacts from the transportation of construction workers are not anticipated.	No Impact
	Land Transportation of Construction Material	A wharf will be developed at the Site to receive major construction materials in order to avoid significant impacts on local and regional transportation. Until a wharf is constructed at the Site, most bulk materials will arrive at the seaport in Sila'a, approximately 60 km west of the Site. The materials would then be transported over land by truck to the Site. Truck traffic would move south along unimproved roads to intersect with Highway E11, bypassing the Town of Sila'a, until a haul road network can be constructed. The anticipated route from the Port of Sila'a to the Site would require 2 u-turns, which could lead to traffic delays in the truck lane on Highway E11. ENEC has requested the construction of an overpass at the planned haul road intersection at E11 and is coordinating use of a military underpass near the site to avoid u-turns. ENEC is coordinating with Western Region Municipality, the Department of Transport (DoT), and Urban Planning Council to establish the haul route to align with current infrastructure and future planning. The impacts to Highway E11 would be temporary and reversible until a new route can be developed to the Site; however, these impacts will be cumulative with other Projects. Therefore, the impact is expected to be moderate.	Moderate
	Sea Transportation of Construction Material	A wharf will be developed at the Site to receive major construction materials in order to avoid impacts on local and regional land transportation. The onsite wharf is expected to be available within 24 to 30 months after the start of construction. Peak barge traffic is estimated at approximately three barges per day. The impact of this traffic on Gulf shipping is expected to be negligible. Captain Shamisi of the Abu Dhabi Ports Company reported that there are no mapped or dug shipping channels in the Site Vicinity. The Port of Sila'a is approximately 50 km from the nearest marked shipping lanes. These marked shipping lanes are in the vicinity of Sir Bani Yas Island and serve the Ruwais refining and petrochemical complex and the Shuweihat cogeneration facility. Barge traffic into the Port of Sila'a would have a wide range of open water to navigate away from or around the more heavily traveled shipping routes.	Small

TABLE 6.1-1
RECEPTOR IMPACTS DUE TO CONSTRUCTION OF THE PROJECT
(CONTINUED)

RECEPTOR	CONSTRUCTION ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Waste Management	Management of Sanitary Waste Produced from Construction	The impacts of sanitary waste management during construction are temporary, reversible, and small. The impacts during the life of the Project have the potential to be cumulative with outside future waste management projects.	Small
	Management of Solid Waste Produced from Construction	Currently, there are no solid waste collections or disposal facilities located within the Site, and the closest facility is in the nearby Town of Sila'a. The Construction Workers Villages will generate municipal, non-hazardous wastes, and the construction of the Project and its associated facilities will produce construction wastes such as metal rods, cement, concrete, etc. Waste will be temporarily stored onsite until final disposal within the local waste infrastructure. The estimated generation rate of non-radioactive municipal solid waste is 27 tons per day from the Project Site, which will peak in 2014, or the fifth year of construction. The management of construction and municipal waste will have an impact on existing waste management infrastructure. Waste produced during construction, including the preparation of the foundation, will be transferred to an offsite landfill. The landfill will also be used by other waste generators, thus creating a cumulative impact with offsite contributions. The impact of waste disposal is generally irreversible due to the permanent nature of landfills and cumulative. All management and disposal will be performed according to EAD and Center for Waste Management standards and also has been anticipated in the pending Plan Al Gharbia 2030, thus the impact is considered small.	Small

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TABLE 6.1-2
RECEPTOR IMPACTS DUE TO OPERATIONS OF THE PROJECT

RECEPTOR	OPERATIONS ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Water-related	***Surface Water*** Effect of Cooling Water Discharge to Water Quality	The discharge of once-through cooling water will thermally impact surface water quality. The impact is significant because impacts will extend beyond the Site boundary and the action will be permanent.	Moderate
	Effect of Cooling Water Discharge to Water Quality	Chlorine may be added to cooling water as sodium hypochlorite to control biological activity in the cooling system and discharges as total residual chlorine. The concentrations of potential chemicals used in water treatment will rapidly dilute in the cooling water channel within recommended EAD guidelines shortly after exiting the point of effluent discharge. Impacts of the plant discharges to the quality of Gulf waters are small.	Small
	Effect of Runoff to Water Quality	Measures will be taken to avoid the introduction of sediments and other effluents that could be present in runoff. These measures include application of appropriate best management practices. There are no wetlands or buffer zones in the area that will be impacted by Site runoff. Therefore, impacts to water quality from runoff are anticipated to be small.	No Impact
	Water Use	Normal plant operations will require a total Gulf water use of up to 656 m^3/s during full operation of all four plants. Due to the amount of water available from the Gulf, no impact is expected.	No Impact
	Water Use	Potable water for operations will be supplied by the Shuweihat Desalination Project. The full operational water demand is estimated to be 880,000 lpd for the Project. Although the Project will create an additional demand on the Shuweihat Desalination Project, no impact is anticipated since the Shuweihat Desalination Project is currently expanding their capacity to produce potable water.	No Impact
	Groundwater Water Use	Following plant construction, there will be no impacts on groundwater as it will not be used and there will be no discharges to groundwater.	No Impact
Land Use	Land Use Conversion during Operations of Project	There may be some minor land impacts over the life of the facility when new facility areas are landscaped or new structures added. These activities will be confined to the facility in previously disturbed areas and are therefore considered to have no impact.	No Impact

TABLE 6.1-2
RECEPTOR IMPACTS DUE TO OPERATIONS OF THE PROJECT
(CONTINUED)

RECEPTOR	OPERATIONS ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Terrestrial Ecology	Terrestrial Habitat Loss and Species Displacement/Mortality during Operations of Project	Some maintenance or infrastructure improvements may occur, which will disturb small areas. Disturbance could impact small populations of plant and animal species. Terrestrial wildlife will likely seek other open areas in the immediate vicinity if disturbed. Therefore, there are no impacts to the terrestrial ecosystem.	No Impact
	Habitat Creation	Positive impacts will be obtained by ongoing landscaping, irrigation, and establishment of aesthetic vegetation around the Site. The overall impact to the terrestrial ecology of the area is positive. Also, the areas developed will be evaluated prior to disturbance to ensure that threatened or endangered species or habitats are not impacted. Thus, the overall impact to terrestrial species by the operation of the Project is anticipated to be small and positive.	Small, positive
Marine Ecology	Habitat Loss or Species Mortality/Displacement from the Discharge of Cooling Water	The discharge of once-through cooling water will thermally impact surface water quality. Thermal discharge will meet EAD standards for water quality. The impact is significant because impacts will extend beyond the Site boundary and the action will be permanent.	Moderate
	Habitat Loss or Species Mortality/Displacement from the Discharge of Cooling Water	Some erosion will occur from the initial discharge cooling waters into the Gulf. Once the top layer of loose sediments (approximately 1 m in the deepest boring) is removed, erosion will end. The impact is expected to be temporary, and reversible.	Small
	Habitat Loss or Species Mortality/Displacement from the Discharge of Cooling Water	An additional impact of discharge plume outfall will stem from residual chlorine released into the Gulf from treatment of intake water. Because a plume of chlorinated water may be released into the Gulf impacts could occur on organisms near the outfall channel. Current ambient water quality levels outlined by EAD (2008a) assess ambient chlorine levels in the Gulf at around 0.01 mg/l. Maximum allowable input at the point of discharge must be at or below 1 mg/l (EAD, 2008a). Despite chlorine levels falling within EAD requirements, there will be an impact on exposed marine life. Long-term exposure to elevated levels of chlorine could have detrimental impacts on marine life (Brungs, 1976). However, it is expected that the intense sunlight normally present much of the year would quickly reduce chlorine levels to background concentrations.	Small/Moderate

TABLE 6.1-2
RECEPTOR IMPACTS DUE TO OPERATIONS OF THE PROJECT
(CONTINUED)

RECEPTOR	OPERATIONS ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Marine Ecology	Species Mortality or Displacement from the Cooling Water Intake System (CWIS)	Marine ecological impacts resulting from the intake of once-through cooling water during operations could be significant because the action will be permanent and potentially cumulative to marine ecology through losses of organisms from entrainment and impingement. The intake structure at base of the channel will be designed to avoid impingement and mortality on marine aquatic organisms through engineering controls and state-of-the-art design; therefore, impact is expected to be moderate.	Moderate
	Habitat Loss or Species Mortality/Displacement from Thermal Discharge	Total mortality of macroalgae is predicted to cover approximately 1,552 ha based on the modeled thermal plume. Out of approximately 12,019 ha of macroalgae habitats currently identified in the area, this equals approximately 13 percent of current available populations, with a total of approximately 25 percent of macroalgae habitats experiencing additional stresses. Out of approximately 118 ha of coral-dominated habitats currently identified in the area, approximately 78 ha would experience stressful conditions resulting from the thermal discharge. This equals approximately 66 percent of the current local population (***Annex 5***). Although localized negative Project impacts to common marine communities are expected, the cooling system's intake and discharge structures (foundations, rip-rap) will likely mitigate for some of these impacts by creating a beneficial hard-substrate habitat that is otherwise limited within the Study Area.	Moderate
	Habitat Loss or Species Mortality/Displacement from Maintenance Dredging	During the operational period, maintenance of offshore structures could remove benthic communities established since construction (i.e., reefs established on new structures). In addition, siltation within and around the wharf structures could occur. Continued usage of these facilities will create an occasional need for dredging of these structures. Nearby habitats could experience stresses and potential mortality due to increased turbidity and scouring from barge prop wash. However, these habitats are expected to recover once construction has ended and barge delivery events are reduced in number; thus, impacts are temporary and small.	Small
	Habitat Loss or Species Mortality/Displacement from Maintenance Dredging	Turbidity reduces sunlight entering the water column, restricting vegetation living in the photic zone from performing photosynthesis. Since maintenance dredging is a temporary action and the vegetation expected to be impacted is limited, the impact will be small.	Small

TABLE 6.1-2
RECEPTOR IMPACTS DUE TO OPERATIONS OF THE PROJECT
(CONTINUED)

RECEPTOR	OPERATIONS ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Marine Ecology	Habitat Creation	With construction of large-scale offshore structures at the Project, a new breakwater habitat type based on hard-bottom substrate will be created.	Small, Positive
	Site Security During Operations	A restricted zone extending perhaps 1.2 km from the Site Area will become a refuge for numerous organisms not impacted by daily operations of the Project. Fishing will be restricted from the artificial reef structures, allowing species to thrive and increase in abundance.	Small, Positive
Socioeconomics	Aesthetics of the Project to the Community	The Project will not emit any visible plumes or changes in the Gulf waters with respect to turbidity or color. Site facilities will be visible from the Gulf waters and from roads near the Site such as Highway E11. The facility will be landscaped and maintained, creating a more aesthetic environment. There will be limited shipping or recreational waterway traffic in the immediate area of the Site due to the security zone; thus, approaches near the Site from the Gulf side will be from greater than 1.2-km and therefore less noticeable. Based on these considerations, the incremental visual impact from the operation of the Project is anticipated to be small.	Small
	Aesthetics of the Project to the Community	The facilities at the Site will not generally be visible at ground level from existing residential, community, or recreational areas on land because of their distance and the topography. Therefore, the incremental visual impact is anticipated to be small.	Small
	Recreational Activities	There is a variety of outdoor recreational activity available in the UAE such as fishing and Sir Bani Yas Island wildlife park. These activities can be utilized within the region of the Site. Since these recreational activities can be utilized by an unlimited number of participants, adverse impacts to recreational activities are not anticipated.	No Impact
	Social Public Services or Facilities; Economic Tax Revenue	Operation of the Project will provide reliable power to sustain growth throughout Abu Dhabi Emirate. The impact of the Project on the Western Region will last throughout the operational stage of the Project and is expected to be moderate and positive because of the increased availability and reliability of power, the socioeconomic benefits from construction wages, the influx of skilled operators and their families, and the resulting growth that will occur in the region.	Moderate, Positive

TABLE 6.1-2
RECEPTOR IMPACTS DUE TO OPERATIONS OF THE PROJECT
(CONTINUED)

RECEPTOR	OPERATIONS ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Socioeconomics	Social Public Services or Facilities	During operations, the responsibility for public services such as fire protection, medical, and offsite security will be the responsibility of the municipal administration in Ruwais. Additionally, to maintain the exclusion zone, there will be a permanent security force at the Project. As the population increases under the plans for regional development, police, fire, medical, and other services will expand to meet the needs of the community under the authority of the local government. This is consistent with the pending Plan Al Gharbia 2030 and is therefore a small and beneficial impact.	Small, Positive
Archaeology, Paleontology, and Cultural Heritage	Operations and Maintenance of the Project	There is no impact on cultural resources from operational practices; however the ancient harbor will remain protected during the operations phase. Should archaeological, historical, or cultural resources be accidentally discovered during Site activities, ENEC will promptly notify ADACH.	No Impact
Geology	Operations and Maintenance of the Project	There is no expected impact on local or regional geology directly from operations. Over the life of the Project, there may be small construction projects that involve ground disturbance, but these will be on already disturbed land and, therefore, there will be no impact.	No Impact
Air Quality	Equipment Emissions	The principal air emission sources associated with operations will be emergency power standby diesel generators which will operate only sporadically (primarily for routine testing). Emissions from operations will be sporadic and low; therefore, there will be no impacts. The use of nuclear fuel, as opposed to fossil-fuels, to power the Project will provide significant and large positive air quality benefits to the UAE over the sixty year life of the Project.	Large, Positive
	Operations and Maintenance of Project	There is no impact expected on local or regional meteorology from station operations. The Project will not be using cooling towers, so there will be no potential for mists, ground fogging, thermal, atmospheric, or related plumes. The once-through cooling water discharge will be sufficiently diffused in returning to the Gulf waters so that it will not result in a localized ambient air temperature increase or produce other impacts such as increased or decreased cloud cover or increased relative humidity.	No Impact

TABLE 6.1-2
RECEPTOR IMPACTS DUE TO OPERATIONS OF THE PROJECT
(CONTINUED)

RECEPTOR	OPERATIONS ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Noise	Use of Equipment during Operations and Maintenance of the Project	The principal noise sources associated with operations will be contained within facilities and structures for power generation, pumping, etc. The transformers and substations may produce an audible noise in the range of 30 to 3,000 Hz. For reference, normal speech has a sound level of approximately 60 dB and a bulldozer idles at approximately 85 dB. Gulf is on one side of the Site and will allow many kilometers of attenuation distance of any noise. The closest populated area is Sila'a, which is located approximately 48 km from the Site. Because of the attenuating distance between potential sources of noise and potential receptors near the Site, there will be no impact of noise from operations.	No Impact
Transportation	Transportation of Materials and Workforce	The regional highway system is more than adequate to accommodate the potential increase in traffic supporting operations. The eventual permanent Project-associated population will be easily serviced by the capacity of Highway E11. A typical highway can handle approximately 1,800 vehicles per lane per hour (Transportation Research Board, 1985). Highway E11 will handle upwards of 7,200 vehicles per hour in both directions without traffic congestion. While the operation of the Project will increase the daily traffic load on Highway E11 and could be cumulative, the highway is capable of increasing capacity. In addition, the amount of traffic to the Site during construction exceeds the amount anticipated during the operations phase. Access routes to the Site may be constructed during the construction phase of the Project which would further decrease the demand on Highway E11. Therefore, there will be no impacts of operations on traffic.	No Impact
Waste Management	Sanitary Waste Management	The permanent disposal of all bio-solids from either a packaged water treatment system or lagoon water treatment system will be in an EAD-approved landfill, composted and appropriately treated for agricultural use, or disposed of on land if they meet applicable discharge criteria for bio-solid waste. All treatment of bio-solids will be in accordance with UAE standards. Sanitary wastewater treatment will not affect storm water runoff. Impacts from the management of sanitary waste are expected to be small.	Small

TABLE 6.1-2
RECEPTOR IMPACTS DUE TO OPERATIONS OF THE PROJECT
(CONTINUED)

RECEPTOR	OPERATIONS ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Waste Management	Sanitary Waste Management	Sanitary wastewater will be maintained and treated onsite at the packaged water treatment system or lagoon water treatment system. Measures will be taken to control spills and prevent runoff; therefore; impacts from the management of sanitary wastewater are expected to be small.	Small
	Municipal Solid Waste Management	Municipal solid waste includes non-radiological household waste, office waste, and debris. Solid waste will be recycled and recovered to the extent possible thereby minimizing landfill disposal needs. Solid wastes appropriate for recycling or reclamation will be managed per EAD requirements. Non-radioactive solid waste destined for offsite land disposal will be disposed of at EAD-approved and licensed disposal sites. The management of municipal waste will have an impact on existing waste management infrastructure. Waste produced during operations will be transferred to an offsite landfill within the region of the Site. The landfill will also be used by other waste generators, thus creating a cumulative impact with offsite contributions. The impact of waste disposal is generally irreversible due to the permanent nature of landfills and cumulative. All management and disposal will be performed according to EAD and Center for Waste Management standards, thus the impact is considered small.	Small
	Hazardous Waste Management	Most hazardous waste arises from maintenance and lab-related activities and includes used oil, batteries, scrap, waste paint, coatings, lab waste, spent solvents, cleaners, contaminated rags, lead, and lead waste (from radiological shielding). The waste will be managed by a licensed waste disposal company according to regulatory requirements within UAE. The impact of hazardous waste disposal is generally irreversible and cumulative due to the permanent and hazardous nature of the waste. Impacts from the management of hazardous waste are expected to be small.	Small

TABLE 6.1-2
RECEPTOR IMPACTS DUE TO OPERATIONS OF THE PROJECT
(CONTINUED)

RECEPTOR	OPERATIONS ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Waste Management	Low-level and Mixed Waste Management	Mixed waste includes hazardous waste that is intermixed with a low-level radioactive source, special nuclear material, or byproduct material. Mixed waste is generated during routine maintenance activities, refueling outages, radiation and health protection activities, and radiochemical laboratory practices. Low-level radiological waste will be stored onsite until such time as an acceptable offsite storage facility is available; at that time, risks associated with offsite transportation and storage will be identified and assessed. Details will be provided in the Federal Authority for Nuclear Regulation (FANR) Operating License Application. The management of mixed waste will comply with the requirements established by FANR. Nuclear generating units, in general, are not significant generators of mixed waste, with quantities in the United States accounting for less than 3 percent of the annual low-level radioactive waste generated (NRC, 1999).	Small
	Irradiated Fuel Management	Irradiated fuel will be stored onsite for the life of the Project until final disposal to be determined at decommissioning in consultation with EAD and FANR.	Small

References:

Brungs, W.A., 1976, "Effects of Wastewater and Cooling Water Chlorination on Aquatic Life," Report No. EPA 600/3-76-098, United States Environmental Protection Agency, Washington, D.C.

EAD, 2008a, "Technical Guidance Document TG-0003R: Standards and Limits for Pollution to Air and Marine Environments, Occupational Exposure, Pesticides and Chemical Use," 2008, Environment Agency - Abu Dhabi.

NRC, 1999, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," United States Nuclear Regulatory Commission, NUREG-1555, Office of Nuclear Reactor Regulation, Washington, D.C., October 1999.

Transportation Research Board, 1985, "Highway Capacity Manual, Special Report 209," Transportation Research Board, Washington, D.C.

TABLE 6.1-3
RECEPTOR IMPACTS DUE TO DECOMMISSIONING OF THE PROJECT

RECEPTOR	DECOMMISSIONING ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Land Use	Demolition and removal of radioactive equipment and its disposal	There would be some land impact confined to the Site from the use of heavy equipment, set-up of staging areas for decontaminating, managing, and transporting the larger pieces of equipment. Disposal of contaminated radiological equipment that cannot be decontaminated or reused in another similarly radiologically-contaminated environment constitutes a permanent, irreversible, offsite, land use impact as permanently radiologically-contaminated equipment must be disposed in a permanently secure nuclear landfill site.	Large
	Demolition and removal of radioactive structures, inseparable associated structures, and their contents	There would be some land impact confined to the Site from the use of heavy equipment, set-up of staging areas for managing and transporting larger structures and pieces, cutting, sorting of metals, and recycling and disposal of scrap that can be decontaminated. Disposal of radiological-contaminated structures that cannot be decontaminated constitutes a permanent, irreversible, offsite, land use impact.	Large
	Irradiated fuel handling, conversion to dry storage, liquid and solid radiological waste inventory (e.g. closure of the irradiated fuel pool)	There would be a limited onsite land use impact confined to the Site from the use of heavy equipment and the set-up of storage and staging areas for managing and transporting dry fuel storage casks. Fuel pool water would require onsite ion exchange resin treatment. Spent resins, filters, and other non-fuel radiological waste would ultimately need to be disposed in a low-level radiological disposal site, which would constitute a regional, irreversible, permanent, and cumulative impact. There are few permanent radiological waste disposal facilities for irradiated fuel. Although some irradiated fuel is reprocessed, most irradiated fuel worldwide is stored in dry cask form, in temporary storages awaiting secure permanent disposal facilities. Permanent management and eventual disposal of radiological waste constitutes a potential terrestrial impact resulting from secure interim storage and permanent land disposal that is regional, permanent, irreversible, and cumulative.	Large

TABLE 6.1-3
RECEPTOR IMPACTS DUE TO DECOMMISSIONING OF THE PROJECT
(CONTINUED)

RECEPTOR	DECOMMISSIONING ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Land Use	Removal and disposal of non-radioactive hazardous waste: diesel fuel, chemicals, gases, shielding materials	The removal of these materials from the Site will comply with UAE disposal requirements for management of hazardous wastes. If these materials are not recycled, the result will be a regional cumulative impact on land resources that is permanent and irreversible while there is an ongoing need for waste management.	Moderate
	Final disposal of reactor vessel	Decommissioned nuclear reactors may be disposed of at only a very limited number of highly secure landfill sites around the world. The residual radioactivity level is high and the impact is permanent, irreversible, potentially cumulative, and regional.	Large
Terrestrial Ecology	Irradiated fuel handling, conversion to dry storage, liquid and solid radiological waste deinventory (e.g. closure of the irradiated fuel pool)	There would be a limited potential terrestrial ecology impact confined to the Site from the use of heavy equipment and the set-up of storage and staging areas for managing and transporting dry fuel storage casks. Fuel pool water would require onsite ion exchange resin treatment. Spent resins, filters, and other non-fuel radiological waste would ultimately need to be disposed in a low level radiological disposal site, which would constitute a regional and cumulative impact. There are few permanent radiological waste disposal facilities for irradiated fuel. Although some irradiated fuel is reprocessed, most irradiated fuel worldwide is stored in dry cask form, in temporary storages awaiting secure permanent disposal facilities. Permanent management and eventual disposal of radiological waste constitutes a potential terrestrial impact resulting from secure interim storage and permanent land disposal that is regional and cumulative.	Large
	Removal and disposal of non-radioactive hazardous waste: diesel fuel, chemicals, gases, shielding materials	The removal of these materials from the Site will comply with UAE disposal requirements for management of hazardous wastes. If these materials are not recycled, the result may be a potential regional cumulative impact on terrestrial ecology from land disposal.	Large

TABLE 6.1-3
RECEPTOR IMPACTS DUE TO DECOMMISSIONING OF THE PROJECT
(CONTINUED)

RECEPTOR	DECOMMISSIONING ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Marine Ecology	Discontinued use of cooling water intake and discharge system	The positive impacts of discontinuing the use of the cooling water intake and discharge system on marine ecology include the cessation of the intake of large quantities of Gulf water plus the elimination of impingement and entrainment impacts. In addition, the thermal discharge will be eliminated, thus adverse impacts to marine ecology will cease.	Large, Positive
Socioeconomics	Demolition and removal of radioactive equipment and its disposal	All construction and development type projects in general provide a positive socioeconomic benefit to the region. The types of projects and activities associated with decommissioning would be major in scope, employ a large workforce, and have a potentially regional influence. The net impact is beneficial and cumulative when combined with additional regional projects because of employment and the benefits to the local and regional economies as a result of the economic investment. Development projects tend to lead to infrastructure improvement and greater overall economic opportunity. The impact is temporary while the construction activities are ongoing. However, even though the impact is temporary, it is still a positive benefit. The impact is reversible when the Project is completed.	Large, Positive
	Demolition and removal of non-radioactive equipment and its disposal		
	Demolition and removal of radioactive structures, inseparable associated structures, and their contents		
	Demolition and removal of non-radioactive structures and their contents		
	Removal and disposal of fuel, and related materials		
	Removal and disposal of non-radioactive hazardous waste: diesel fuel, chemicals, gases, shielding materials		
	Site grading and restoration to original condition		
	Final disposal of reactor vessel		
	Housing and support of decommissioning workforce		

TABLE 6.1-3
RECEPTOR IMPACTS DUE TO DECOMMISSIONING OF THE PROJECT
(CONTINUED)

RECEPTOR	DECOMMISSIONING ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Waste Management	Demolition and removal of radioactive equipment and its disposal	Disposal of radiological contaminated equipment that cannot be decontaminated or reused in another similarly radiologically contaminated environment constitutes a permanent, offsite, waste management impact as radiologically contaminated equipment must be disposed of in a secure nuclear landfill site that will be regionally located or beyond.	Large
	Demolition and removal of non-radioactive equipment and its disposal	Larger units that could not be salvaged would be cut into manageable pieces. Units that have salvage value would be reused intact to the extent practical. Metals and salvageable materials would be sorted for recycling and disposal along with scrap that can be decontaminated. Disposal of non-radiological contaminated equipment and materials constitute a cumulative impact on waste management capacity that is reversible when demolition and disposal is completed. Much of the material should be manageable offsite and recyclable.	Small
	Demolition and removal of radioactive structures, inseparable associated structures, and their contents	Larger structures that could not be decontaminated and/or salvaged intact would be cut into manageable pieces. Metals and salvageable materials that are decontaminated would be sorted for recycling and disposal along with other clean scrap. Disposal of radiological contaminated structures and materials constitute a cumulative impact on waste management capacity that is reversible when demolition and disposal is completed. Radiologically-contaminated material would need to be managed regionally or beyond as it would require secure disposal in a low level radiological waste disposal facility. Disposal of radiologically-contaminated structures that cannot be decontaminated constitutes a regional, permanent, and cumulative waste management impact.	Large
	Demolition and removal of non-radioactive structures and their contents	Larger structures that cannot be salvaged or reused intact would be cut into manageable pieces. Metals and salvageable materials would be sorted for recycling and disposal, along with other clean scrap. Much of the material should be manageable offsite and would be recyclable.	Small

TABLE 6.1-3
RECEPTOR IMPACTS DUE TO DECOMMISSIONING OF THE PROJECT
(CONTINUED)

RECEPTOR	DECOMMISSIONING ASPECT	IMPACT	SIGNIFICANCE OF IMPACT
Waste Management	Irradiated fuel handling, conversion to dry storage, liquid and solid radiological waste deinventory (e.g. closure of the irradiated fuel pool)	Fuel pool water would require onsite ion exchange resin treatment. Spent resins, filters, and other non-fuel radiological waste would ultimately need to be disposed of in a low level radiological disposal site, which would constitute a regional, irreversible, permanent, and cumulative impact. There are few permanent radiological waste disposal facilities for irradiated fuel. Although some irradiated fuel is reprocessed, most irradiated fuel worldwide is stored in dry cask form, in temporary storages awaiting secure permanent disposal facilities. Permanent management and eventual disposal of high-level radiological waste constitutes a potential waste management impact resulting from secure interim storage and permanent land disposal that is regional, permanent, irreversible, and cumulative.	Large
	Removal and disposal of non-radioactive hazardous waste: diesel fuel, chemicals, gases, shielding materials	The removal of these materials from the Site will comply with UAE disposal requirements for management of hazardous wastes. If these materials are not recycled, the result will be a regional cumulative impact on land resources that is permanent and irreversible while there is an ongoing need for waste management.	Moderate
	Removal and disposal of nuclear reactor vessel	The removal of this unit from the Site will comply with UAE disposal requirements in place at the time of decommissioning for management of radiological waste. Since there are a very limited number of sites worldwide that receive such material and there are no options available for recycle, the impact of disposal of the reactor vessel is significant, regional, permanent, irreversible, and cumulative.	Large

References:

DOE, 2004, "Study of Construction Technologies and Schedules, O&M Staffing and Cost, Decommissioning Costs and Funding Requirements for Advanced Reactor Designs, Application of Advanced Construction Technologies to New Nuclear Power Plants," Volume 2, Paper NP2010, 27 May 2004, United States Department of Energy, Website: <http://www.ne.doe.gov/np2010/reports/mpr2610Rev2Final924.pdf>, Accessed: 16 October 2009.

DOE, 2005, "Cost Estimating Guidelines for Generation IV Nuclear Energy Systems," Rev. 2.02 Final, United States Department of Energy, 30 September 2005, Website:http://nuclear.inl.gov/deliverables/docs/emwgguideleins_rev2.pdf, Accessed: 16 October 2009.

6.2 CUMULATIVE IMPACTS

Most adverse Project impacts will be confined to and directly mitigated at the Site. Therefore, Project contributions to adverse cumulative impacts within the Vicinity and Region are anticipated to be small after applying avoidance, minimization, and compensatory mitigation measures. In contrast, cumulative socioeconomic impacts are expected to be significant and positive within the Vicinity. The Project will benefit local communities in the form of jobs, infrastructure improvements, and enhanced community services. The Project will also provide reliable power to the electric grid, which will in turn support regional industry and commerce.

Proposed waste management solutions have been developed to minimize adverse cumulative impacts. The solid municipal waste and construction debris will be handled at a temporary transfer station onsite. It will be brought to an onsite location for sorting and recycling purposes. Materials not recycled onsite will be sent offsite for recycling or disposal. Solid and hazardous waste will be collected and stored in compliance with appropriate local and national regulations. It is anticipated that hazardous waste of all types will be sent offsite to an approved waste handling facility for treatment and disposal.

Offsite infrastructure improvements stimulated by the Project will consist of access roads, telecommunications upgrades, transmission lines, and the Operators Village. These improvements will generate positive and potentially cumulative impacts. Environmental impacts associated with implementation of the pending Plan Al Gharbia 2030 are under the authority of the Abu Dhabi UPC and separate from the Project.

Long-term pressures may be applied to marine resources from increased boating and recreational and commercial fishing from an increasing human population and recreation. However, the required establishment of a Project security zone, including areas offshore, will provide a marine refuge from recreational fishing and boating. The expansive Al Yasat (MPA) will be a mitigating factor against adverse regional cumulative impacts to terrestrial and marine ecology.

ADDITIONAL INFORMATION: Additional detailed discussion of impacts is located in ***Volume 2, Chapter 6.0***. The environmental baseline is presented in ***Volume 2, Chapter 5.0*** and in ***Volume 2, Annex 1***.

7.0 MITIGATION MEASURES

Mitigation measures to avoid, minimize, and compensate Project impacts are proposed in ***Volume 2, Chapter 7.0*** of the EIA. Most estimated impacts of construction will be mitigated by implementation of best management practices (BMPs). BMPs and other similar environmental mitigation measures will be described in detail in the CEMP to be prepared by the PC for EAD review and approval. Operational impacts will be mitigated by adhering to applicable EAD environmental regulations, environmental protection standards, and permit terms and conditions. Operational mitigation measures will be included in a developed OEMP to be submitted as part of the CLA.

7.1 TERRESTRIAL ECOLOGY MITIGATION

The terrestrial ecology baseline studies did not report finding any rare or protected species at the Site or in the Vicinity which would require mitigation.

7.2 MARINE ECOLOGY MITIGATION

The placement of jetties to support the intake and discharge of cooling water and the construction of a marine wharf to facilitate materials delivery to the Site will, over time, develop a hard surface marine ecological community that will provide increased diversity and abundance to the marine waters near the Site. The hard surface riprap that will cover the slopes of the constructed jetties from the bottom of the water column to the high tide line will provide the hard substrate to allow for the development of a productive reef-like marine plant and animal community.

In addition to the hard surface habitat provided by the riprapped jetties, ENEC proposes to enhance the hard surface habitat available for colonization by locating designed and fabricated artificial structures to specified locations adjacent to the riprapped jetties, arranged to create several reef-like habitat structures. The intent is to increase the diversity of the marine community. The development of site-specific plans and methods for creation of the reef-like structures would involve consultations between ENEC and EAD. EAD would be consulted to provide expert input based on their experience with the creation of artificial reef development and hard-surface habitat enhancement. The PC would provide input into the equipment, material

characteristics, timing, and methods that could practically be utilized during the construction of the jetties to construct the reef-like marine ecology enhancement structures.

ADDITIONAL INFORMATION: Additional information on mitigation plans is provided in ***Volume 2, Chapter 7.0***.

8.0 SELECTION OF PROJECT ALTERNATIVES

Analyses were performed to assess UAE's current and projected future power requirements and options for meeting those needs. As discussed below, it was concluded that nuclear power was the best option. The siting of an NPP requires extensive consideration of safety and environmental factors. The process utilized to evaluate both power alternatives and siting alternatives are described in this section.

8.1 NEED FOR POWER

The need for additional power in UAE to meet forecasted base-load requirements is well documented. Studies conducted by a UAE interagency group of experts demonstrated that electricity demand is out-pacing generation, which recently resulted in temporary shortages in some Emirates (Policy, 2008). In particular, the Dubai and Abu Dhabi Emirates are experiencing unprecedented growth. The rapid population growth and infrastructure development are projected to continue as the nation modernizes and expands.

A Demand Side Management (DSM) program to improve energy conservation efforts has been implemented in UAE. The DSM program addresses the following issues:

- Reducing cooling degree requirements
- Increasing efficiency and establishing labeling standards for cooling equipment
- Improving information and educational programs
- Building efficiency codes
- Energy efficiency assistance
- Implementing electricity tariff adjustments to reflect the economic value of consumed energy

These and other conservation efforts, the results of which are being measured annually, should begin to reduce electricity demand. The results of these conservation efforts will be factored into future demand forecasts. Nevertheless, energy conservation efforts and the current power capacity are unable to meet the projected demand. New electricity generation must be planned and built to add the required additional capacity. A decision not to increase electricity generation

would limit economic growth in UAE and have adverse consequences on social development and long-term prosperity.

ADDITIONAL INFORMATION: A detailed and independent review of the need for power is located in ***Volume 2, Chapter 4.0.***

8.2 EVALUATION OF FUEL ALTERNATIVES

Alternative fuels were evaluated to determine if other fuel sources can provide the required capacity when considering technology, environmental impact, and cost. The fuel choice analysis considered a wide range of options, including fossil fuels (natural gas, crude oil, diesel fuel, and coal), renewable sources (solar, bio-fuels, wind, and municipal solid waste), and nuclear.

The decision to use nuclear fuel to meet the future base-load demand for electricity was based on the same study identified above in ***Section 8.1*** (Policy, 2008). The study determined that known volumes of natural gas that could be made available to the nation's electricity sector would be insufficient to meet future demand, the burning of fossil liquids (crude oil or diesel) was logistically viable, but would divert this fuel stream away from commercial markets and exert extremely high economic costs, and widespread use of coal would cause major adverse impacts to air quality. While UAE continues to evaluate the use of renewable energy (solar, bio-fuels, and wind power), an aggressively-applied renewable energy program could supply only a small fraction of peak electricity demand by 2020 using currently proven renewable technologies.

Nuclear fuel offers environmental benefits. Uranium fuel has an energy concentration nearly 200,000 times greater than coal and requires correspondingly less volume to provide the same amount of energy. Nuclear fuel is delivered infrequently, in small volumes, and could be delivered economically by barge, rail, or truck, which would avoid fuel transport and supply interruptions. It does not contribute to carbon emissions and substitutes for other thermal power generation options that are large carbon emitters. The study panel concluded that nuclear fuel was an environmentally promising, safe, reliable, and cost-effective approach for powering a base-load power plant intended to supply large amounts of electricity.

ADDITIONAL INFORMATION: A detailed and independent review of alternative fuel sources is located in ***Volume 2, Chapter 8.0***.

8.3 SITE SELECTION

A site selection study was conducted to identify and evaluate alternatives to the Proposed Site that meet safety criteria (primarily seismic) and are among the best in terms of minimizing environmental impacts for the construction and operation of the Project in UAE. The selection process applied in UAE was based on guidance from the International Atomic Energy Agency (IAEA), United States Nuclear Regulatory Commission (NRC), and United States-based Electric Power Research Institute (EPRI) (IAEA, 2002; EPRI, 2002; NRC, 2007).

Potential areas were evaluated according to exclusionary, avoidance, and suitability criteria. Exclusionary criteria represent fatal flaws that, if present, eliminate a site from further consideration. Avoidance criteria are generally unfavorable but could be overcome by engineering, environmental, or cost interventions. Suitability criteria are site characteristics that can be made more favorable by relatively minor engineering, environmental, or cost adjustments. In terms of site selection, suitability criteria are used to compare among environmentally suitable sites that are fairly similar in potential.

The site selection process is shown on ***Figure 8.3-1***. The evaluation process began with designating the Region of Interest as the entire UAE. Next, physically unsuitable regions were eliminated, resulting in candidate areas that might contain candidate sites. Candidate sites were selected after further evaluation of candidate areas.

When applied to UAE, it was determined that two sites in the Western Region were environmentally suitable for construction of the Project. The Site, which is the subject of this SEA and EIA, is approximately 53 km west-southwest of the Town of Ruwais in the Western Region. The Site location is shown on ***Figure 8.3-2***. ENEC is seeking EAD permits to proceed with plans to initiate construction at this Site.

The following are important favorable characteristics of the Site which contributed to its selection:

- No plate boundaries or capable faults
- Low seismicity
- Rough grazing; no irrigated farming
- Isolated from settled cities – 53 km from Ruwais and 48 km from Sila'a

- Distant from industrial facilities – 41 km from Shuweihat Power Project
- Barren land surface; only very sparse vegetation
- Satisfactory distance to major road system
- Close to 400-kV transmission line

A field reconnaissance and desktop review of available literature was conducted to develop information to evaluate candidate areas and subsequent candidate sites. Where broad areas of the country were very similar, there was no compelling reason to conduct more detailed studies within candidate areas to select candidate sites.

Initially, exclusionary criteria were applied to the entire UAE to eliminate areas that posed a safety concern or were otherwise not feasible. East coast sites were unsuitable due to proximity to a tectonic plate boundary and presence of capable faults. Next, most of the country was found to be unsuitable because of insufficient cooling water. The remaining candidate sites were near the Gulf on the west coast of Abu Dhabi Emirate, a region with no tectonic plate boundaries or capable faults, having low seismicity and sparse populations.

Within acceptable candidate areas, identification of potential candidate sites was made through field reconnaissance and review of available literature data relating to avoidance criteria. Since there was little variation, sites were selected that varied with respect to highly weighted criteria, particularly distance to acceptable cooling water. For the Gulf, this meant that the distance to a sufficient depth of water was an important criterion in selecting candidate sites.

Four candidate sites were selected for evaluation against criteria. Candidate sites were then subjected to further evaluation using available literature and ranked with respect to the degree that it met each criterion. The ranking was multiplied by the weighting factor to obtain a score for each criterion per site. Scores were summed to obtain a total score for each site. Two candidate sites, the one that is the subject of this SEA/Non-nuclear EIA and another site along the coast north of Sila'a, had very similar scores, and both were found to be suitable for the construction and operation of an NPP. The decision to select a site for development from among the candidate sites found to be suitable for construction and operation of an NPP was made with regard to environmental, technical, and business considerations. Upon review of the suitable sites with respect to these considerations, ENEC has decided to develop the subject site at this time.

ADDITIONAL INFORMATION: A more detailed description of the site selection process is located in ***Volume 2, Chapter 8.0*** and in ***Annex 6***.

9.0 MONITORING MEASURES

Monitoring programs will be developed based on guidance from the EAD, FANR (when available), NRC, and the IAEA.

9.1 ENVIRONMENTAL MANAGEMENT SYSTEM

The PC will institute an EMS to implement the required environmental mitigation and monitoring during Project construction and operations. The EMS will be comprised of MMPs and implementation plans corresponding to environmental receptors potentially impacted by construction or operations.

Each MMP will establish the overall goals, scope, and approach for managing a group of environmental aspects. Each MMP will then be executed through one or more implementation plans directing the application of specific mitigation measures and monitoring activities. The construction and operations MMPs and implementation plans will be documented in a CEMP and an OEMP, respectively. Appropriate decommissioning MMPs will be established during the decommissioning planning process in the future.

9.2 RADIOLOGICAL ENVIRONMENTAL MONITORING PLAN (REMP)

A Radiological Environmental Monitoring Plan (REMP) will be implemented at the Site to verify that doses to the public resulting from radiological releases from normal operations of the Project remain small and below regulatory limits, which are established to protect the health of members of the general public. The REMP will be detailed in the Nuclear EIA and have the following basic objectives:

- Survey the radiological conditions in the Vicinity of the Project before initial reactor operation to establish the baseline radiological conditions.
- Measure the levels of radiation and radioactive materials in the local environment during the lifetime of the Project.

- Determine if any measurable levels of radiation or radioactive materials in the local environment are attributable to Project operations.
- Determine if measurable levels of routine project-related radiation and radioactive releases to the local environment are within regulatory limits.

ADDITIONAL INFORMATION: Monitoring programs are discussed in greater detail in ***Volume 2, Chapter 9.0.***

10.0 SUMMARY

The UAE has proposed that the projected future base-load electric needs of the nation be met in part by constructing and operating a four-unit NPP in the Western Region of Abu Dhabi Emirate on the southern Gulf coastline. The Project will be designed and built by KEPCO and owned by ENEC, a government-owned company.

This SEA is provided as Volume 1 of a three-volume set, which includes the Non-Nuclear Construction EIA and its Annexes in Volumes 2 and 3, respectively. The purpose of an SEA is to conduct a comprehensive early analysis with existing environmental and design information relative to the Project's compatibility with environmental protection and sustainability goals. The SEA focuses on the Project's most significant environmental construction and operational impacts with analysis details provided in the accompanying EIA. ENEC has coupled the SEA and EIA into a single document to facilitate the CEP process for the non-nuclear construction phase. Prior to nuclear construction and Project operations, a Nuclear EIA will be prepared based on PC final designs. The Nuclear EIA will incorporate the SEA and EIA, but will focus on detailing operational impacts and mitigation including radiological issues.

The EIA addresses the entire Project lifecycle in support of the SEA, but focuses on providing information in enough detail to support issuance of a CEP to initiate non-nuclear construction. Where precise information regarding a construction aspect is not known, conservative assumptions were developed, termed the bounding assumptions. The bounding assumptions were used to conduct the environmental analyses and estimate potential impacts. By using this approach, the EIA offers the worst-case report of potential environmental impacts. Validity of the bounding assumptions will be reviewed by the PC and confirmed in the Nuclear EIA. It is believed that most of the bounding assumptions in the EIA will be confirmed when a final design is developed, and that some of the worst case bounded impact predictions presented here might over-estimate actual impacts.

A site selection study was performed to identify and evaluate environmentally suitable candidate locations for the Project. The evaluation process began with designating the Region of Interest as the entire UAE. After applying environmental and other technical exclusionary, avoidance, and suitability criteria to each candidate site, the ranking scores were summed to identify

primary and secondary locations. The Site that is the subject of this EIA is located approximately 53 km west-southwest of the Town of Ruwais in the Western Region.

The habitats at the Site location are mostly in a natural condition, and the resident human population is small. The Site itself is unoccupied except along the shoreline where a few beach villas are used as second homes. The Project's primary environmental impact is to the marine environment, as the very harsh climate and the prevailing high levels of salinity in the soil limit the development of terrestrial wildlife. Both marine mammals and reptiles depend on seagrass meadows for nourishment; however, the relatively area of seagrass found within a 15-km radius (292 ha) is quite small compared to elsewhere in the Western Region. The low seagrass coverage would indicate that the Site Vicinity is not a major feeding and sheltering area for both marine mammals and reptiles. Approximately 118 ha of live coral reef communities were observed near the Site.

The No Action Alternative describes a scenario in which neither the Project nor any other electric-generating plant is constructed or operated on the Site. The terrestrial and marine ecology of the Site is not expected to change significantly without the proposed Project.

Construction impacts were judged to be Adverse and Moderate to Large for the following environmental receptors: Land Use (Moderate), Marine Ecology (Moderate), Waste Management (Moderate), and Water Quality (Moderate). Large Positive construction impacts were noted for Socioeconomics due to the economic increases from the large construction work force and the relatively long construction period.

Operation impacts were judged to be Adverse and Moderate for the following receptors: Marine Ecology (Moderate) and Water Quality (Moderate). Positive large impacts of operations were noted for Air Quality, since the use of nuclear fuel, as opposed to fossil-fuels, will provide significant air quality benefits to UAE over the 60-year life of the Project.

Most of the projected impacts of construction activities will be mitigated through the application of BMPs. BMPs and other similar environmental mitigation measures will be described in detail in the CEMP. Operational impacts will be mitigated by strict adherence to applicable EAD and UAE environmental regulations and issued permits. Compensatory mitigation measures have been suggested for both terrestrial and marine ecosystem residual impacts. KEPCO will institute an EMS to implement the required environmental mitigation and monitoring during Project

construction and operation. The EMS will be comprised of MMPs and implementation plans corresponding to environmental receptors potentially impacted by construction or operation of the Project.

In summary, the information presented in this SEA and accompanying EIA shows that the proposed Project can be constructed at the Site and operated safely within acceptable mitigated impact levels toward fulfillment of the nation's promised civil nuclear program.

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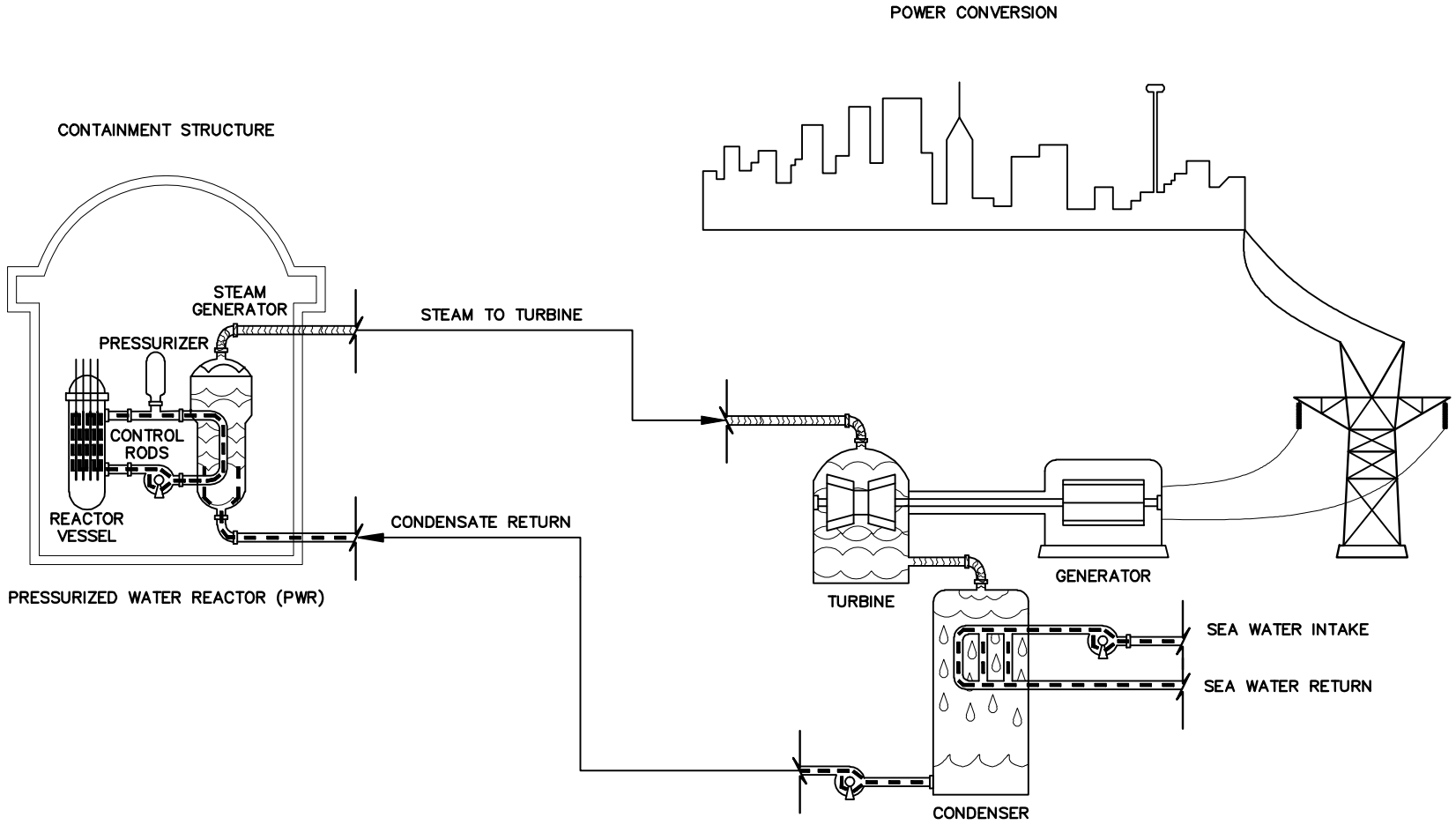
FIGURES

FIGURE 1.4-1
CONCEPTUAL NUCLEAR POWER PLANT (NPP) DESIGN

	DRAWN BY	RFT	CHECKED BY	APPROVED BY	
1		23 DEC 09	JJ	BGP	23 DEC 09



08-4075-CADD-A327
(SIGNATURES ON FILE)

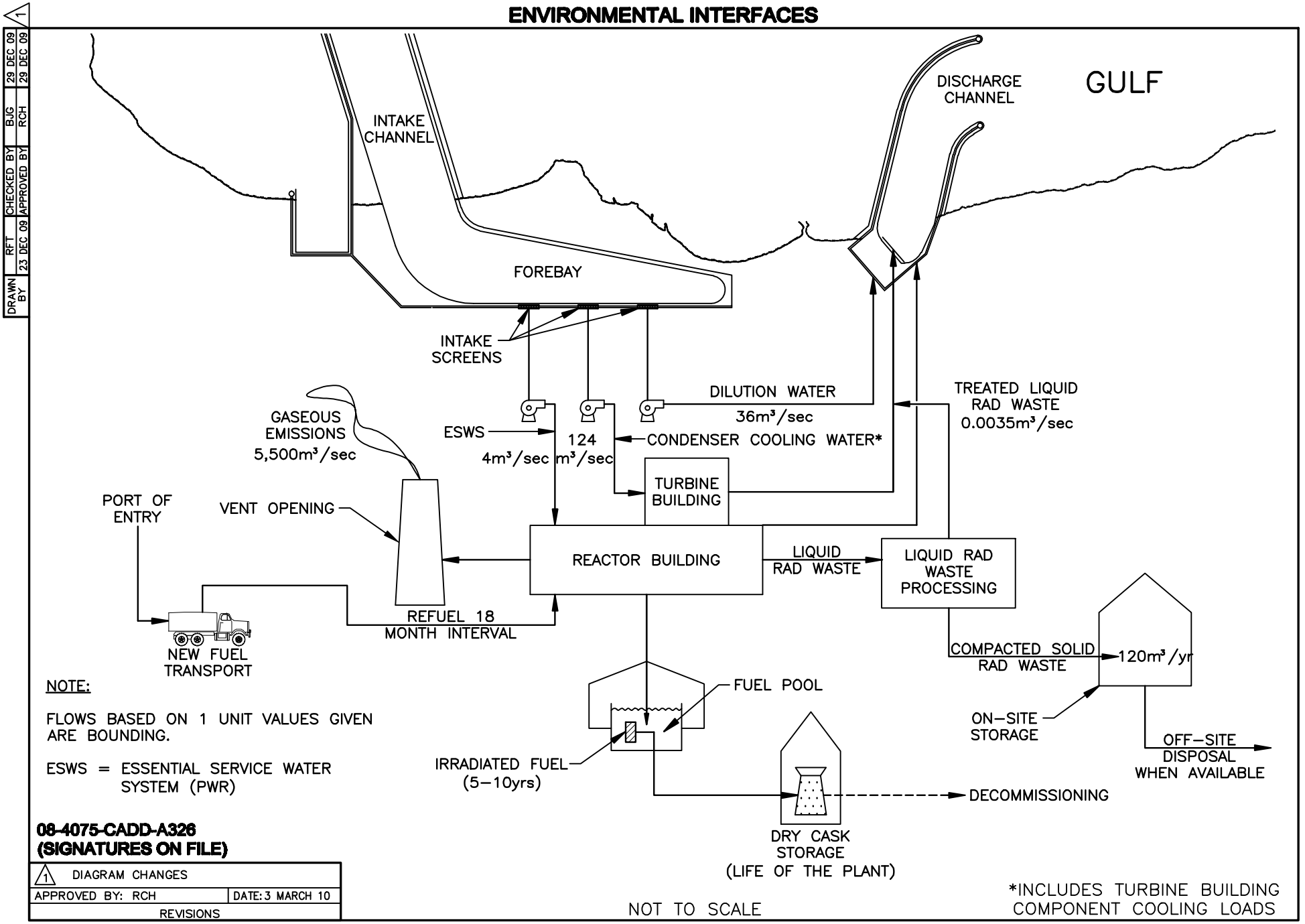
1	REVISED FIGURE	
APPROVED BY: RCH		DATE: 3 MARCH 10
REVISIONS		

NOT TO SCALE

REFERENCES:

U.S.NRC WWW.NRC.GOV/READING-RM/BASIC-REF/STUDENTS/REACTIONS.HTML ACCESSED 17 NOV 2009

FIGURE 1.4.5-1
ENVIRONMENTAL INTERFACES



NOTE:

FLOWS BASED ON 1 UNIT VALUES GIVEN ARE BOUNDING.

ESWS = ESSENTIAL SERVICE WATER SYSTEM (PWR)

NOT TO SCALE

*INCLUDES TURBINE BUILDING COMPONENT COOLING LOADS

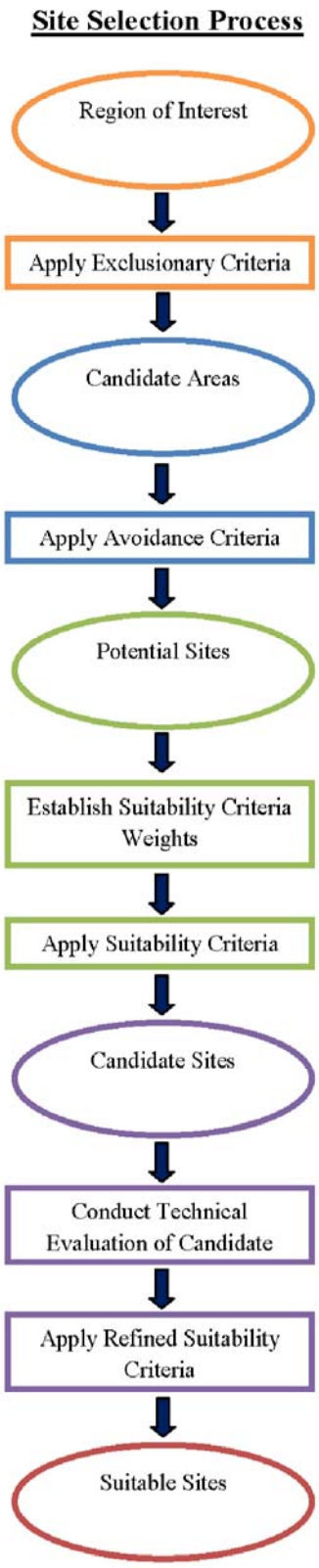
DRAWN BY	RFT	23 DEC 09
CHECKED BY	BJG	29 DEC 09
APPROVED BY	RCH	29 DEC 09

08-4075-CADD-A326
(SIGNATURES ON FILE)

1 DIAGRAM CHANGES	
APPROVED BY: RCH	DATE: 3 MARCH 10
REVISIONS	

FIGURE 8.3-1
SITE SELECTION FLOW DIAGRAM

1				
23 DEC 09	23 DEC 09			
JJ	BGP			
CHECKED BY	APPROVED BY			
RFT				
23 DEC 09				
DRAWN BY				



Notes

(All notes refer to ***Annex 6***)

See ***Figure 3.1-1***

See ***Figures 3.1.4-1 – 3.1.7-1***

Figure 3.1.8-1 illustrates the composite application of all Exclusionary Criteria. The non-shaded area represents the Candidate Area.

See ***Figures 3.2.2-1 – 3.2.5-1***

See ***Figure 3.2.5-2***

See ***Table 3.3-1***

See ***Figures 3.3.2-1 – 3.3.4-1*** and ***Table 3.3-2***

See ***Figure 3.2.5-2*** and ***Section 3.3***. Potential Sites I, II, and III were identified as Candidate Sites.

See ***Section 3.4***

See ***Table 3.5-1***

See ***Figure 3.2.5-2*** and ***Section 3.5***. Potential Sites II and III were identified as Suitable Sites.

08-4075-CADD-A328
(SIGNATURES ON FILE)

1	REVISED FIGURE NOTATION	
APPROVED BY:	RCH	DATE: 17 MARCH 10
REVISIONS		

REDACTED
PENDING REVIEW