







MARINE ECOLOGY



Marine ecology is the study of living things in the ocean and how they interact with their environment. It is an interdisciplinary science that combines biology with physical sciences (e.g. geology, chemistry, oceanography, geophysics, statistics).

The marine ecological condition in the surroundings of the project site was assessed through a combination of reviewing available data through a desktop-based study, detailed underwater surveys, and sampling sediment and seawater followed by laboratory analyses.

The marine environment is an essential component of the global life-support system. Oceans cover 71 per cent of the Earth's surface and provide us with food, oxygen and jobs. But they are probably the least understood, most biologically diverse, and most undervalued of all ecosystems



AVAILABLE DATA REVIEW



The erstwhile Supreme Council for Environment and Natural Reserves (now Ministry of Environment) undertook an extensive sensitivity mapping of the East Coast of Qatar in 2006 (CREOCEAN, 2006).

Qatar is surrounded by the Arabian Gulf with a shoreline of approximately 700 km. The Arabian Gulf is a shallow, sub-tropical and semi-enclosed sea surrounded by an extremely arid terrestrial environment.

The average water depth is 20 m along the coast of Qatar with an average tidal range of 1.4 m. About 950 species have been recorded in Qatar (NBSAP, 2004).



REGIONAL OVERVIEW



Cyphastrea sp.



Platygyra sp.



Porites harrisoni

The marine ecosystem is varied in the north around Fasht al `Arif. A 12-km long sand bank that extends northward up to Al Wakrah and hosts large beds of seagrass and massive coral formations of *Porites harrisoni*, *Platygyra daedalea* and *Cyphastrea* spp, covered with algal turf.



REGIONAL OVERVIEW +

Plankton Community : Plankton is formed by pelagic organisms drifting in the water column, and includes both phytoplankton (microalgae) and zooplankton (animals). Phytoplankton includes microscopic pelagic algae that are the primary producers in most aquatic systems and account for a significant portion of the global primary production.

Seagrass : According to the Canal (COWI, 2013) and the NPP EIAs (COWI, 2011a), dense seagrass beds were observed in shallow water offshore from the NPP site extending from the outer edge of the inter-tidal flat seawards to an approximate depth of 5 m from (and including the inner part of) Fasht al `Arif to the Um Al Houl mangrove stand to the north.

REGIONAL OVERVIEW +

Coral Reefs : Dead coral formations with very scattered patches of small live corals of between 1-5% coverage were observed at three locations in the NPP area and in the project area (COWI, 2011a and COWI, 2011b, respectively).

Seagrass Beds : Dense seagrass beds were observed in shallow water offshore the NPP site extending from the outer edge of the inter-tidal flat seaward to a depth of around 5 m from (and including the inner part of) Fasht al `Arif to the Um Al Houl mangrove stand to the north.

Macroalgae : Macroalgae beds are encountered at the Fasht al `Arif and offshore from the coastal lagoons. Benthic algae are important primary producers and, like seagrass, macroalgae provide food, substrate and shelter for a wide variety of organisms.

AVAILABLE DATA REVIEW

Seagrass Beds : Dense seagrass beds were observed in shallow water offshore the NPP site extending from the outer edge of the inter-tidal flat seaward to a depth of around 5 m from (and including the inner part of) Fasht al `Arif to the Um Al Houl mangrove stand to the north.

Sea turtles : Two species of sea turtles are found in Qatar waters: the critically endangered Hawksbill turtle (*Eretmochelys imbricate*) and the endangered Green turtle (*Chelonia mydas*) (SCENR, 2006; IUCN, 2008).

The green turtle (*Chelonia mydas*) feeds on vegetation. The seagrass and macroalgae offshore of the study area may provide feeding grounds for this species, so they may occasionally be feeding in the area.

BASILINE MARINE ECOLOGY



The baseline survey for the marine area adjacent to the project development area included zooplankton and benthic fauna sampling and analysis, underwater video assessment and analysis.

During the marine survey seagrass and seaweeds belonging to the following divisions have been identified:

- ✓ Tracheophyta (Seagrasses)
- ✓ Chlorophyta (Green Algae)
- ✓ Phaeophyta (Brown Algae)
- ✓ Rhodophyta (Red Algae)

MARINE FAUNA



The macro fauna encountered in sieved sediment samples that were collected at each of the monitoring stations were recorded, & the benthic organisms were classified taxonomically.

Species of Mollusca Phylum were the most abundant at 96% of the total taxa. A total of 1,945 Mollusca organisms per m² belonging to three classes were identified at all of the monitoring stations out of a total number of 2,008 organisms per m².

The remaining 4% of total taxa were identified as belonging to Porifera, Cnidaria, Crustacea, Annelida, and Echinodermata Phyla.

MITIGATION MEASURES FOR FLORA, VEGETATION & HABITATS



As a strategic measure, a Habitat Preservation Plan will be prepared for this project for compliance with the GSAS criteria.

As a general principle, avoid disturbance or damage to any vegetation.

Provide a minimum 200m buffer zone from the boundaries of sensitive ecological areas to ensure that natural habitats are not disturbed.

Individual Plots closer to the sensitive coastal shoreline must closely follow and implement provisions of the Project Habitat Preservation Plan.

Permanent and temporary construction activities should be developed within the project area to avoid or minimise destruction of habitats, vegetation or fauna.

MITIGATION MEASURES FOR FLORA, VEGETATION & HABITATS +



Physically define location for temporary offices, concrete batching plants and new access roads before the beginning of site preparation, avoiding excavation or levelling outside the defined area.

Provide a minimum 200m buffer zone from the boundaries of sensitive ecological areas to ensure that natural habitats are not disturbed.

Proper fencing, pathways and roadways should be designed and installed to protect sensitive or protected habitats from pedestrian and vehicle traffic.

The importance of vegetation in the area will be clearly communicated to all project personnel, establishing that no vegetation is to be disturbed except under exceptional circumstances as a general rule.



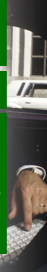
MITIGATION MEASURES FOR FLORA, VEGETATION & HABITATS +



Access roads through undisturbed areas should be diverted from patches of vegetation wherever possible to directly preserve flora and indirectly protect fauna and their habitats.

Driving outside the limits of the established access routes shall be prohibited to avoid collisions with fauna.

A suitable person (e.g., Site Environmental Manager) should be responsible for ensuring that vegetation is not damaged in areas outside the limits of the project site throughout the Construction Phase. If in doubt, specialist botanical A suitable person (e.g., Site Environmental Manager) should be responsible for ensuring that vegetation is not damaged in areas outside the limits of the project site throughout the Construction Phase.



MITIGATION MEASURES FOR FLORA, VEGETATION & HABITATS +



The deposition of dust on existing vegetation will be mitigated by observing the following measures:

- ✓ Minimise traffic on unpaved roads.
- ✓ Strictly enforce speed limits when driving on unpaved roads.
- ✓ Cover truckloads of earth or excavated materials.
- ✓ Minimise dust generating activities when conditions could intensify the impacts (e.g., during high winds).
- ✓ Avoid off-track driving.
- ✓ Minimise vehicle use.
- ✓ Dust suppression methods shall be applied. Water wise dust suppression methods will be chosen when possible. Marine water or groundwater usage will be minimised when possible.

