ABU DHABI EMIRATE HABITAT
CLASSIFICATION & PROTECTION GUIDELINE

هـيـئـة الـبـيـئـة - أبـوظـبـي
Environment Agency - ABU DHABI

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About EAD

Established in 1996, the Environment Agency – Abu Dhabi (EAD) is committed to protecting and enhancing air quality, groundwater as well as the biodiversity of our land and marine ecosystems. By partnering with other government entities, the private sector, NGOs and global environmental agencies, we embrace international best practices, innovation and hard work to institute effective policy measures. We seek to raise environmental awareness, facilitate sustainable development and ensure environmental issues remain one of the top priorities of our national agenda

FOREWORD

The Emirate of Abu Dhabi is blessed with a rich natural heritage and a variety of unique natural ecosystems. The Emirate's seas, coast and desert are home to over 3,600 known species, with more being discovered through ongoing research and monitoring Many of the Emirate's known species are facing visible pressure from urbanization and the rapid development of industry and infrastructure to support the Emirate's growing population and its demand for power, transport and land.

These pressures are not unique to the Emirate. Worldwide, biodiversity conservation efforts have focused on identifying solutions to unsustainable resource and land use, the underlying causes of species loss and decline. The government of Abu Dhabi has prioritized biodiversity conservation and set an ambitious goal of conserving at least %80 of the existing coverage (2014) of each of its natural terrestrial, coastal and marine habitat types. This goal is in line with the international target set by the single most important multilateral framework for the conservation of biodiversity, the Convention on Biological Diversity (CBD), ratified by the UAE in the year 2000.

The focus on conserving natural habitats has come from recognition and understanding that well-functioning natural ecosystems are vital to biodiversity. Although viable populations of some species can be maintained ex-situ either under cultivation, or in captivity, such methods are much less effective than in-situ conservation, and they are extremely costly. Conservation of species in their natural habitats is the most ideal and appropriate way of sustaining and conserving them. In-situ conservation responses in Abu Dhabi have included designating areas as protected sites, or restricting the type of activities that can occur at an environmentally critical or sensitive site. Protection may be offered at different levels, from complete protection and restriction of access, to various levels of permitted human use.

This guideline serves as a management tool to communicate the Emirate's habitat protection needs, in an effort to achieve this goal and protect natural heritage more effectively, and meet the Abu Dhabi Plan's objective of conserving biodiversity and ensuring sustainable and optimal natural resources use. It places emphasis on avoidance of environmental impact, before considering mitigation, through a firm belief that economic growth can continue alongside the preservation of our natural heritage. This, providing it is well-planned, balanced, and integrated with the long-term vision of the UAE to bequeath to future generations a legacy worthy of the nation's founders and forefathers, who understood that the wellbeing of the people and environment are linked hand in hand.

PURPOSE OF THIS GUIDANCE DOCUMENT

The Environment Agency–Abu Dhabi (EAD), as Competent Authority for environmental permitting in the environmental field in Abu Dhabi emirate, provides guidance in this document in respect of which habitats in the Emirate are classified as critical or environmentally sensitive, and the principles of protection and sustainable use governing the permitting of projects that are proposed to have an adverse environmental impact on these habitats.

TO WHOM IS THIS GUIDELINE ADDRESSED?

This Technical Guidance Document targets proponents of development projects (industrial and/or commercial) or their representatives, ecological and environmental consultancies, as well as urban planning and land use planning agencies in Abu Dhabi Emirate. It provides guidance on terrestrial and marine habitat protection, mitigation and monitoring for projects carried out in the marine and terrestrial environment of Abu Dhabi emirate. It provides information related to EAD's habitat protection and sustainable use principles, in order to inform project proponents and project consultants, and help limit habitat degradation, fragmentation and loss.

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LIST OF ABBREVIATIONS

CH	Critical Terrestrial or Marine Habitat
DPSIR	Drivers; Pressures; State; Impact and Responses
EAD	Environment Agency Abu Dhabi
EHSMS	Environmental Health and Safety Management System
EIA	Environmental Impact Assessment
ESH	Environmentally Sensitive Terrestrial or Marine Habitat
MOCCE	Ministry of Climate Change and Environment of the UAE
NOC	No Objection Certificate
PER	Preliminary Environmental Review
SEA	Strategic Environmental Assessment
UAE	United Arab Emirates

Arta (Calligonum comosum) in full bloom in sand sheet and dunes habitat within one of Abu Dhabi's protected areas

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DEFINITIONS OF TERMS

Biodiversity: The variability among living organisms from all sources, including, 'inter alia', marine, terrestrial, and other ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems.[1]

Conservation: The management of nature and of Earth's biodiversity with the aim of protecting species, their habitats, and ecosystems from excessive rates of extinction and the erosion of biotic interactions. It is an interdisciplinary subject drawing on natural and social sciences, and the practice of natural resource management.

Coral: Areas characterized by a substrate or environmental setting largely constructed by the reef-building activities of corals and associated organisms.

Critically endangered, endangered, threatened or vulnerable species: Refers to species' global extinction risk categories as determined by the International Union for Conservation of Nature's (IUCN) Red List assessments on www.iucnredlist.org

Critical marine or terrestrial habitats: are defined as an ecosystem type of high biodiversity value including:

- Habitat of significant importance to Critically Endangered and/or Endangered species;
- Habitat supporting globally or regionally significant concentrations of migratory species and/or congregatory species population
- Highly threatened and / or unique ecosystems; and /or
- Areas associated with key evolutionary processes.

The 12 critical marine, intertidal and terrestrial habitats in Abu Dhabi emirate include: Coral; Seagrass; Mangroves; Saltmarsh, Wadis and floodplains, Sand Sheets and Dunes with Tree Cover, Alluvial or Interdunal plains (gravel plains), Mountains, Burqas and Mesas, Northern alluvial or interdunal plains, Sand sheets and dunes with distinct shrub cover or dwarf shrub cover and Mudflats and Sands exposed at low tide.

Critical Projects: Strategic local transport, infrastructure, development, industrial or military projects as defined and determined by the General Secretariat for the Executive Council of Abu Dhabi Emirate

Environmental Impact: Positive or negative impact that occurs to an environmental component as a result of the proposed project. This impact can be directly or indirectly caused by the project's different phases (i.e., construction, operation and decommissioning).

Environmentally sensitive terrestrial, intertidal or marine habitats: are defined as ecosystem types that:

- Any further loss of its natural habitat or deterioration of condition in these habitat types could result in it becoming critical; and / or
- The ecosystem types are likely to have lost some of their structure and functioning, and will be further compromised if they continue to lose natural habitat or deteriorate in condition.

The 8 environmentally sensitive habitats in Abu Dhabi emirate are: Coastal sabkha, Intertidal flats with cyanobacterial mats, Coastal sand sheets and low dunes, Sand sheets and dunes with perennial herbs and graminoids, Islands and coastal rocky cliffs, Storm beach ridges, Beach rock and gravelly beaches, and Macroalgal communities.

Habitat[2]: An ecological or environmental area that is inhabited by a particular species of animal, plant, or other type of organisms. It is the natural environment in which an organism lives, or the physical environment that surrounds (influences and is utilised by) a species population.

[1]United Nations Earth Summit, 1992

[2]As defined in the Terrestrial Habitat Classification Manual Ver. 1 (EAD, 2015)

Intertidal Flats: Exposed intertidal substrates having greater than 25% cover of particles smaller than gravel.

Macroalgae communities: Seaweeds (macro algae) that are found either in combination with seagrass and reef communities or in a separate community aggregations.

Mangroves: Salt-tolerant trees that grow in the shallow tidal waters of some coastal areas. The naturally-occurring species of mangrove *(Avicennia marina)* found in Abu Dhabi, locally called 'Qurm', is the grey or white mangrove.

Migratory Species: Any species or lower taxon of wild animals, in which a significant proportion of the members of the entire population or any geographically separate part of the population cyclically and predictably crosses one or more national jurisdictional boundaries[3]

Mitigation: Mitigating ecological impacts refers to actions that minimize or reduce project impacts on natural ecosystems.

Protected Areas: A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values.

Relocation: To remove a habitat type or individuals of a species from one place and move it to another location.

Rocky shoreline: Exposed low-angle intertidal shoreline terrace characterised by bedrock or boulders which singly or in combination have an aerial cover of 75% or more.

Saltmarsh: Intertidal areas dominated by emergent halophytic herbaceous vegetation and shrubs.

Sandy coastline: Sediment beaches on both offshore and barrier islands that consist of carbonate sand largely of biological origin.

Seagrass: Subtidal benthic substrates, generally composed of unconsolidated sediments, and characterised by greater than 10% cover of rooted vascular seagrass species.

Threatened species: are any species (including animals, plants, fungi, etc.) which are vulnerable to endangerment in the near future. The status of a species is determined globally through the IUCN Red List or locally through assessments conducted by the relevant competent authority. In the context of Abu Dhabi, EAD determines and communicates which species are threatened and the status of the species.

Transplantation: To remove a plant (any tree species, seagrass or saltmarsh) from one place and plant it in another in such a manner that ensures its survival and growth in the long term.

[3]Adapted from the Convention on Migratory Species (CMS, 1979)

1. INTRODUCTION

Abu Dhabi's terrestrial and marine flora and fauna hold immense value. They are essential components of the Emirate's natural heritage, uniquely adapted to survive in its harsh environment.

This wildlife is reliant on the health and integrity of natural habitats for its survival, habitats which are today facing serious threats to their viability and sustainability due to anthropogenic (man-made) activities, with development pressure being one of the most significant threats.

In line with the Emirate's commitment to sustainable development and to implementing an ecosystem approach to biodiversity conservation, terrestrial and marine habitats and the species they support must be protected and preserved (Abu Dhabi Environment Policy Agenda, 2017). This international, regional and national commitment has been made clear through the ratification of multilateral environmental agreements such as the Convention on Biological Diversity (CBD, ratified in 2000) and Convention on Migratory Species (CMS) and development of the National Biodiversity Strategy and Action Plan (2014-2021) and the Abu Dhabi Plan (2016) (Goal: A sustainable environment and the optimal use of resources to preserve natural heritage).

EAD manages and regulates development pressure through its assessment and permitting process for industrial and commercial development projects. This process allows the evaluation of environmental impacts and potential mitigation and monitoring efforts associated with a proposed development project within the Emirate as specified in the EAD SOP document for the Permitting of Development and Infrastructure Projects in Abu Dhabi (Ref: EAD-EQ-PCE-SOP-02) available online at (Ref: https://www.ead.ae/Pages/our-services/business-and-industry.aspx).

This Technical Guidance Document targets proponents of development and industrial projects (or their representatives) and provides guidance on terrestrial and marine habitat protection, mitigation and monitoring for projects carried out in the marine and terrestrial environment of Abu Dhabi emirate. It provides information related to EAD's habitat protection and sustainable use principles, in order to inform project proponents and project consultants, and help limit habitat degradation, fragmentation and loss.

2. NATURAL HABITATS IN ABU DHABI EMIRATE

EAD regularly monitors and maps habitat health and extent, to identify trends and develop conservation actions and programs that help curb habitat loss, degradation and fragmentation. Recently, EAD mapped all of the natural habitats in Abu Dhabi, covering the entire Emirate.

This detailed mapping included habitat, land use and land cover layers at 1:10,000 scale, with an Abu Dhabi wide coverage of 50-centimetre resolution. This data is available publicly www.enviroportal.ead.ae where developers (or their representatives) are able to make use of it along with this guideline to identify where critical and environmental sensitive natural habitats are located, and plan projects in a manner that avoids impact to these habitats.

The classification codes associated with this up to date habitat map available online can be found in Appendix I. Terrestrial habitats were classified according to a priori classification schema, based on Brown and Boer's Interpretation manual of the major terrestrial natural and semi natural habitat types of Abu Dhabi Emirate v2.0 (2004). These categories have been expanded in 2015 to incorporate elements of land cover and land use in more detail.

Marine habitats were classified according to the Coastal Marine Resources Ecological Classification System (CMRECS), which represents a derivative of the US Federal Geographic Data Committee's Coastal and Marine Ecological Classification Standard (CMECS), refined with multi-spectral satellite imagery of the Emirate of Abu Dhabi.

Sand sheets and dunes with dwarf shrub cover

Clownfish and anemone in coral reef habitat off of Delma Island

2.1 Abu Dhabi Emirate's Biodiversity

Abu Dhabi Emirate's terrestrial environment is characterised by desert sands in the central and western region of the emirate; the Jebel Hafit mountain and wadi environment in the southern Al Ain region; alluvial and inter-dunal plains in the east near the Dubai border; and coastal sand dunes and sheets with shrub cover. Some 436 species of vascular plants, 51 mammal species, 427 bird species, 57 amphibian and reptile species, 2313 invertebrate species and 456 marine fish species have been identified (EAD, 2014).

These species include the IUCN listed critically endangered Sociable Lapwing *(Vanellus gregarius)* and endangered Arabian Tahr *(Arabitragus jayakari)*, Saker Falcon *(Falco cherrug)*, and Egyptian Vulture *(Neophron percnopterus)*.

They also includes species that are classified as near threatened or vulnerable globally, that are seriously at threat in Abu Dhabi Emirate, such as the Sooty Falcon *(Falco concolor)*, which has been reduced to five breeding pairs (EAD, 2014).

The marine environment of the Emirate is unique and is characterised by high salinity and seawater temperatures ranging from 16°C- 36°C, with many species, such as coral, living at the limit of their range. The marine environment is typically shallow with waters of less than 20 metres representing over 70% of Abu Dhabi's marine area. The offshore environment is generally flat, broken up by some 61 islands ranging from low lying sand shoals to volcanic salt domes. The structure that is characteristic of these islands provide habitat to some of the 456 marine fish species found in the UAE, and double as a nesting habitat for birds and turtles (EAD, 2014). The near shore environment is comprised of critical habitat assemblages of coral, seagrass, mangroves and saltmarsh, as well as environmentally sensitive marine habitats including macroalgal communities.

Key species are reliant on these individual and heterogeneous habitat types, including wading and migratory birds and the seagrass reliant Dugong *(Dugong dugon)*. The marine waters also provide habitat to the IUCN listed critically endangered Hawksbill Turtle (*Eretmochelys imbricata*) and endangered Green Turtle *(Chelonia mydas)*.

3. CRITICAL AND ENVIRONMENTALLY SENSITIVE HABITATS IN ABU DHABI EMIRATE

EAD has identified 12 critical habitats and 8 environmentally sensitive habitats within Abu Dhabi emirate.

These habitats have been defined on the basis of both the Systematic Conservation Planning Assessments and Spatial Prioritisations for the Emirate of Abu Dhabi, the UAE and the Arabian Peninsula, completed in 2013 by the Abu Dhabi Global Environmental Data Initiative (AGEDI); the recent habitat mapping exercise (EAD, 2015), the terrestrial baseline survey completed in 2015 and EAD's on-going terrestrial and marine monitoring, classification, and management programs. The classification of these habitats as 'critical' or 'environmentally sensitive' is based on the importance of the habitat for native species (supports key life cycle stages, supports the survival of these species), its importance for supporting globally significant concentrations of migratory species, as well as the estimated threat status of each habitat based and adapted from the IUCN Red List of Ecosystems Criteria (Bland et al; 2016) for assessing the risk of ecosystem collapse.

Figure 1: The IUCN Red List of Ecosystems Criteria (Bland et al; 2016)

Criterion	Purpose
A- Reduction in geographic distribution	Identifies ecosystems that are undergoing declines in area, most commonly due to threats resulting in ecosystem loss and fragmentation.
B- Restricted geographic distribution	Identifies ecosystems with small distributions that are susceptible to spatially explicit threats and catastrophes.
C- Environmental degradation	Identifies ecosystems that are undergoing environmental degradation.
D- Disruption of biotic processes or interactions	Identifies ecosystems that are undergoing loss or disruption of key biotic processes or interactions.
E- Quantitative analysis that estimates the probability of ecosystem collapse	Allows for an integrated evaluation of multiple threats, symptoms, and their interactions.

Critical habitats are defined as an ecosystem type of high biodiversity value including:

- Habitat of significant importance to endemic species, rare species, locally threatened species or globally critically endangered, endangered species or vulnerable species;
- Areas that are necessary for key stages of the life cycle of native species;
- Habitat supporting globally significant concentrations of migratory species and/or congregatory species; and/or
- Highly threatened and/or unique ecosystem, as per an assessment process based and adapted from the IUCN Red List of Ecosystems Criteria (Bland et.al, 2016).

The 12 Critical habitats in Abu Dhabi emirate include:

- Corals, Mangroves, Seagrass, Saltmarsh, Sand sheets and dunes with distinct dwarf shrub cover or shrub cover, Burqas and Mesas, Wadis and floodplains, Alluvial interdunal plains (gravel plains), Mountains and rocky terrains, Northern alluvial or interdunal plains with tree cover, Sand sheets and dunes with tree cover and Mudflats and sand exposed at low tide.

These habitats are identified as a priority ecosystem type:

- Any further loss or deterioration of condition in these habitat types could result in severe loss of endemic or threatened species and ecosystem function, and / or
- The ecosystem types are already under threat, likely to have lost some of their structure and functioning in the Emirate, UAE or region, and will be further compromised if they continue to lose natural habitat or deteriorate in condition.

Environmentally sensitive habitats are identified as an ecosystem type that:

- Any further loss of its natural habitat or deterioration of condition in these habitat types could result in it becoming critical; and / or
- The ecosystem types are likely to have lost some of their structure and functioning, and will be further compromised if they continue to lose natural habitat or deteriorate in condition.

The 8 Environmentally Sensitive habitats in Abu Dhabi Emirate include:

- Coastal sabkha, Intertidal flats with cyanobacterial mats, Coastal sand sheets and low dunes, Islands (Salt Dome) and coastal rocky cliffs, Storm Beach Ridges, Beach Rock and Gravelly Beaches, Sand sheets and dunes with perennial herbs and graminoids, and Macroalgal communities.
- These habitats hold value for their unique landscape features and natural carbon storage capability. They are ecosystem types that may also be facing threats from development, overgrazing, infrastructure and transport and recreational use (off-road driving).

Figure 2 presents the mosaic of critical and enviromentally sensitive habitat types in Abu Dhabi emirate.

Figure 2: Images of critical and environmentally sensitive habitat types in Abu Dhabi emirate

12 Critical Marine & Terrestrial Habitats

Coral Reefs

Saltmarsh

Mangrove

Seagrass

Wadis in open terrain & drainage channels

Alluvial or Interdunal Plains

Sand Sheets & Dunes with Trees

Northern Alluvial Plains

Sand Sheets and Dunes with Dwarf Shrubs

Burqas and Mesas

Mudflats

Mountain Slopes and Wadis

8 Environmentally Sensitive Marine & Terrestrial Habitats

Storm Beach Ridges

Sand Sheets/Dunes with perennial flora

Sandy Coastline

Island - Salt Dome

Coastal Sabkha

Intertidal flats

Algal Communities

Rocky Coastline

Coastal critical habitats such as mangroves act as nurseries for juvenile fish and provide food to migratory species of birds

Table 1: Critical and Environmentally Sensitive Habitats in Abu Dhabi

Habitat Type	Habitat Classification Manual Code (2015)	Definition
Critical Habitats (12)		
Coral Reef	11,000	Areas characterized by a substrate or environmental setting largely constructed by the reef-building activities of corals and associated organisms.
Seagrass	12,000	Subtidal benthic substrates, generally composed of unconsolidated sediments, and characterised by greater than 10% cover of rooted vascular seagrass species.
Mangroves	1040	Salt-tolerant trees that grow in the shallow tidal waters of some coastal areas. The naturally-occurring species of mangrove *(Avicennia marina)* found in Abu Dhabi, locally called 'Qurm', is the grey or white mangrove.
Salt Marsh	1030	Intertidal areas dominated by emergent halophytic herbaceous vegetation and shrubs.
Mountain slopes, screes and associated wadis	6100	Mountain terrain including rocky foothills, associated wadis. These areas support the highest level of floristic diversity. Mountain slopes have low vegetation cover but are species rich with trees, stem succulents, shrubs, dwarf shrubs and perennial grasses. Species supported include *Cenchrus ciliaris, Cymbopogon commutatus, Panicum turgidum; Pennisetum divisum; Blepharis ciliaris; Pulicaria glutinosa*
Wadis in open terrain & drainage channels	6320	Wadis, seen in close association with mountains are remarkably species rich. Species supported include *Acacia tortilis; Euphorbia larica; Lycium shawii; Moringa peregrine; Acridocarpus orientalis and Dodonaea viscosa*
Sand Sheets and Dunes with Tree Cover	4110	Areas of undulating sandy dunes with less than 20 m elevation and more than 1% of tree cover. Species of importance is the *Ghaf Prosopis cineraria.* Breeding birds include Collared Dove, Greater Hoopoe-lark, Crested Lark and Southern Grey Shrike. The trees are used for roosting, and, probably in a few cases for breeding, by Desert Eagle Owl.
Alluvial or interdunal plains (gravel plains)	5120 & 5130	Areas of substrate consisting of gravel, pebbles or gravel material supporting dwarf shrub and shrub vegetation. Alluvial plains are substrate consisting of gravels, pebbles and rocky materials. Interdunal plains consist of sandy-gravelly substrate or thin sheets of sand overlying gravelly deposits. These areas are important for the native *Haloxylon salicornicum* (locally known as Rimth).

Northern Alluvial or interdunal plains	5110	This habitat category has been separate from the 'Alluvial or interdunal plains' due to its distinct importance for *Acacia tortillis* trees. This habitat is limited to the plains surrounding the Jebel Hafit area.
Burqas and Mesas	6210	Burqas and Mesas are the traditional local names for rocky outcrops and small jebels of the western region that have long had informal protection through the late Sheikh Zayed's verbal instructions. They are unique topographic features and prove a key ecological function as nesting and denning habitat for birds and bats, as well as holding significant cultural value.
Sand sheets and dunes with shrub or dwarf shrub cover	4120 & 4130	Areas of undulating sandy dunes with less than 20 m elevation and with significant shrub cover (i.e. woody plants). These areas are important for the native *Haloxylon salicornicum* (locally known as Rimth) and *Haloxylon Persicum* (locally known as Ghada).
Mudflats and sand exposed at low tide	1010	Coastal wetlands that form when mud is deposited by tides, mostly devoid of vegetation. Mudflats represent an important habitat for wading birds, especially migratory species in the plover and sandpiper families, which feed on benthic invertebrates.
Environmentally Sensitive Habitats (8)		
Macroalgal communities	13,010	Seaweeds (macro algae) that are found either in combination with seagrass and reef communities or in a separate community aggregations.
Coastal sabkha	3000	Coastal sediment flats at or just above the level of normal high tide which consists of sand, silt or clay and its surface is often covered with a salt crust formed by the evaporation of water drawn to the surface by capillary action or from occasional marine inundations.
Intertidal flats with cyanobacterial mats	1020	Thin mats of cyanobacteria overlying saline sand in sheltered coastal locations. These areas are very nearly flat, and are adjacent to and on the upper margin of intertidal flats. Usually devoid of higher plants, although some halophytes may occur. They are black in colour and often completely covered by cyanobacterial mats. They hold immense value as blue carbon storage.
Islands (Salt Dome) and coastal rocky cliffs	2030	Areas of elevated firm ground near the coast with halophytic flora. Includes low to high cliffs on the immediate coastline as well as salt domes located on islands.
Storm Beach Ridges	1050	Sandy, hummocky, vegetated ground parallel and above the high water mark, less than 1 m high, with more than 20% vegetation cover and occasionally getting overtopped by storms.
Beach Rock and Gravelly Beaches	1070	Exposed low-angle intertidal shoreline terrace characterised by bedrock or boulders which singly or in combination have an aerial cover of 75% or more.
Sand sheets and dunes with perennial herbs and graminoids	4140	Areas of undulating sandy desert with dunes less than 20 metres in elevation, and without significant cover of trees, shrubs and dwarf shrubs. Vegetated to non-vegetated sand and dune areas colonized by perennial herbs and/or graminoids.
Coastal sand sheets and low dunes	2020	Vegetated terrain on normally pale sand (mostly carbonate), with a coastal influence affecting the vegetation. Perennial grasses and dwarf shrubs are the most prominent elements of the flora. Has more than 3% vegetation cover.

4. PERMITTING & ASSESSMENT PROCESS

The proponent of a proposed industrial, commercial, infrastructure or development project (or their representative) is responsible for preparing and submitting an environmental permit application, which, as specified in federal and emirate laws and technical guidelines[4], may include the additional requirement of an environmental study. If required, an environmental study shall be completed by an EAD-approved and registered consultant operating within Abu Dhabi emirate.

4.1 Environmental Study Requirement

An environmental study is required in Abu Dhabi emirate to evaluate the environmental impacts and potential mitigation and monitoring efforts associated with a proposed project. The reports required as part of the development permitting and assessment process may consist of a Preliminary Environmental Review (PER), and Environmental Impact Assessment (EIA) or a Strategic Environmental Assessment (SEA), depending on the scale and location of the project. SEAs are required for large scale development or infrastructure programs and masterplans, while EIAs and other similar environmental studies are required for single projects. These studies support the requirements of the Abu Dhabi emirate Environment, Health and Safety Management System (EHSMS) Regulatory Framework (Decree 42 of 2009). An EIA report and an Environmental Monitoring Report may also be required after EAD's review of an environmental permit application, or following the completion and review of Strategic Environmental Assessment (SEA) or Preliminary Environmental Review (PER) reports. Environmental Permit Applications are submitted through EAD's E-services portal www.eservices.ead.ae. The full details of the process for obtaining an environmental permit is outlined in the SOP document Permitting of Development and Infrastructure Projects in Abu Dhabi available online on the EAD website (Ref:EAD-EQ-PCE-SOP-02).

An environmental study report (whether PER, EIA or SEA) clearly states the current environmental condition of the project site, provides details about the proposed development, provides an assessment of the potential and probable environmental impacts associated with the project, and recommends mitigation measures and monitoring efforts at a level of detail that satisfies EAD. The statement of commitments outlined in the study and the conditions of the Construction No Objection Certificate or the Operation Environmental Permit (OEP) serve as the binding agreement between EAD and the project proponent.

[4] Federal Law 24 (1999); Technical Guidance Document for Preliminary Environmental Review (EAD-EQ-PCE-TG-01 Rev No.01 (2014)); Technical Guidance Document for Environmental Impact Assessment (EAD-EQ-PCE-TG-02 Rev No.1 (2014)); Technical Guidance Document for Strategic Environmental Assessment (EAD-EQ-PCE-TG-03 Rev No.1 (2014)); Technical Guidance Document for Terms of Reference ((EAD-EQ-PCE-TG-03 Rev No.1 (2014)).

Wadis and rocky foothills support the highest level of floristic diversity in the Emirate

4.2 Objective of an Environmental Study

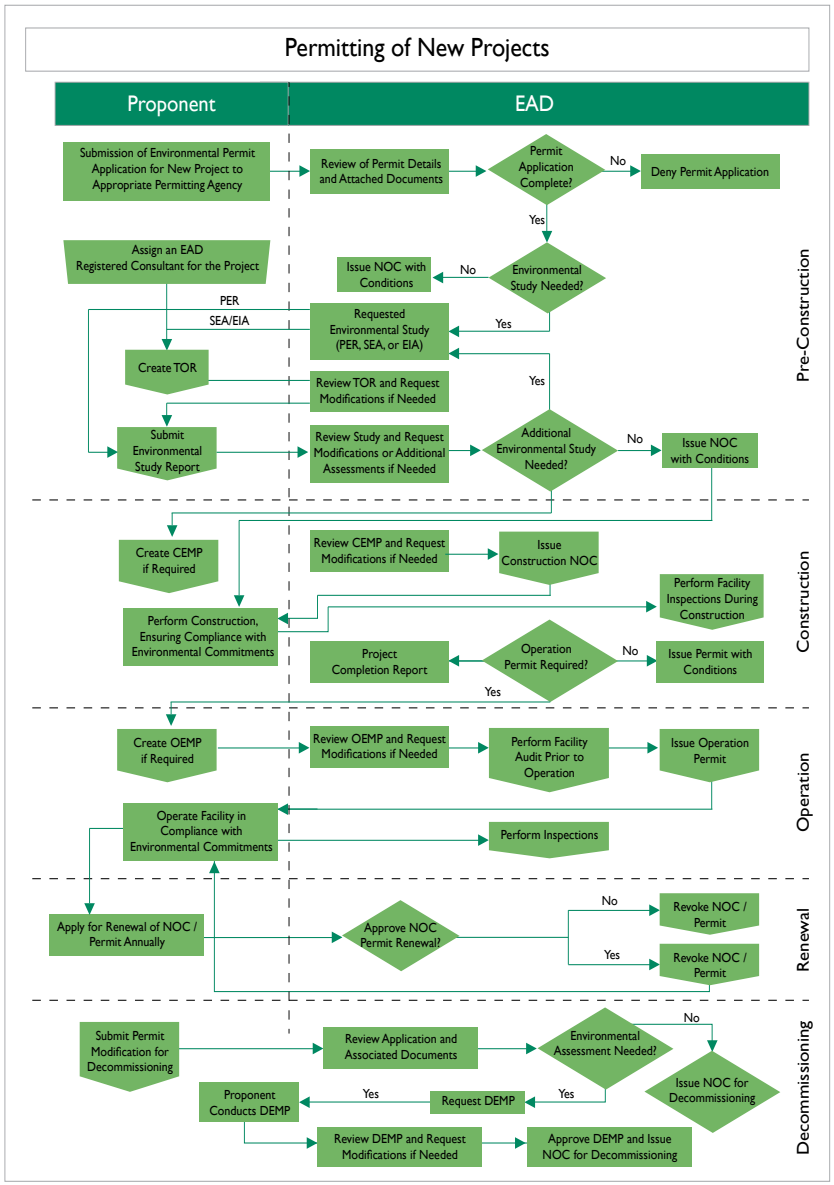
The objective of an environmental study is to provide EAD with a comprehensive description of the environmental baseline conditions, the probable impacts of the proposed project, and the potential mitigation and monitoring efforts, as required by EAD. The environmental study requested supports the goals of environmental protection and sustainable development; integrates environmental protection and economic decisions; predicts environmental, social, and economic consequences of a proposed activity and assesses plans to mitigate any adverse impacts resulting from the proposed activity;
and provides for the involvement of government and other agencies in the review of proposed activities.
The findings and recommendations of the EIA (or other environmental study) should be documented clearly and concisely in the report and any necessary technical details should be provided, especially those regarding baseline data. Raw ecological data must be submitted in the required format along with the study.

The usefulness of an EIA report is measured by how well the potential problems are foreseen, evaluated, and addressed with adequate and straightforward measures and proposed actions. Environmental monitoring reports, Construction Environmental Management Plans, Operation Environmental Management Plans and Decommissioning Environmental Management Plans help assess and report compliance with mitigation measures implemented to protect natural habitats and species.

4.3 Permitting & Assessment Process

A summary of the permitting and assessment process is provided in Figure 3.

Figure 3. Permitting & Assessment Process for New Projects



Source: EAD. Permitting of Development and Infrastructure Projects in Abu Dhabi (Ref: EAD-EQ-PCE-SOP-02 (Rev April 2014)).

4.4 Abu Dhabi Emirate Habitat Protection Principles

This section details where the Critical Habitat and Environmentally Sensitive Habitat protection hierarchy fits within EAD's development permitting & assessment framework.

4.4.1 Critical Habitat Protection Principles

EAD's critical habitat protection principles are stated below:

Critical Habitat Principle 1:

There shall be no loss of critical habitat within protected areas; and critical habitat loss outside of protected areas will only be approved for critical national projects and plans, with EAD approved appropriate mitigation, compensation and monitoring measures.

Critical Habitat Principle 2:

Any project that may have an adverse effect on critical habitat shall follow a protection and mitigation hierarchy of 'research and avoid; mitigate and/or compensate'.

It is anticipated that proposed environmental permit applications for critical national projects or plans affecting critical marine or terrestrial habitat will only be received from government entities or their nominated consultant. An EIA or SEA will be required for these projects to obtain a construction NOC or an operation environmental permit (OEP).

When completing a Preliminary Environmental Review (EAD-EQ-PCE-TG-01), a Strategic Environmental Review (Ref: EAD-EQ-PCE-TG-03), and/or an EIA report (Ref: EAD-EQ-PCE-TG-02), the applicant shall follow the guidance specified within Figures 3 & 4 of this Technical Guideline.

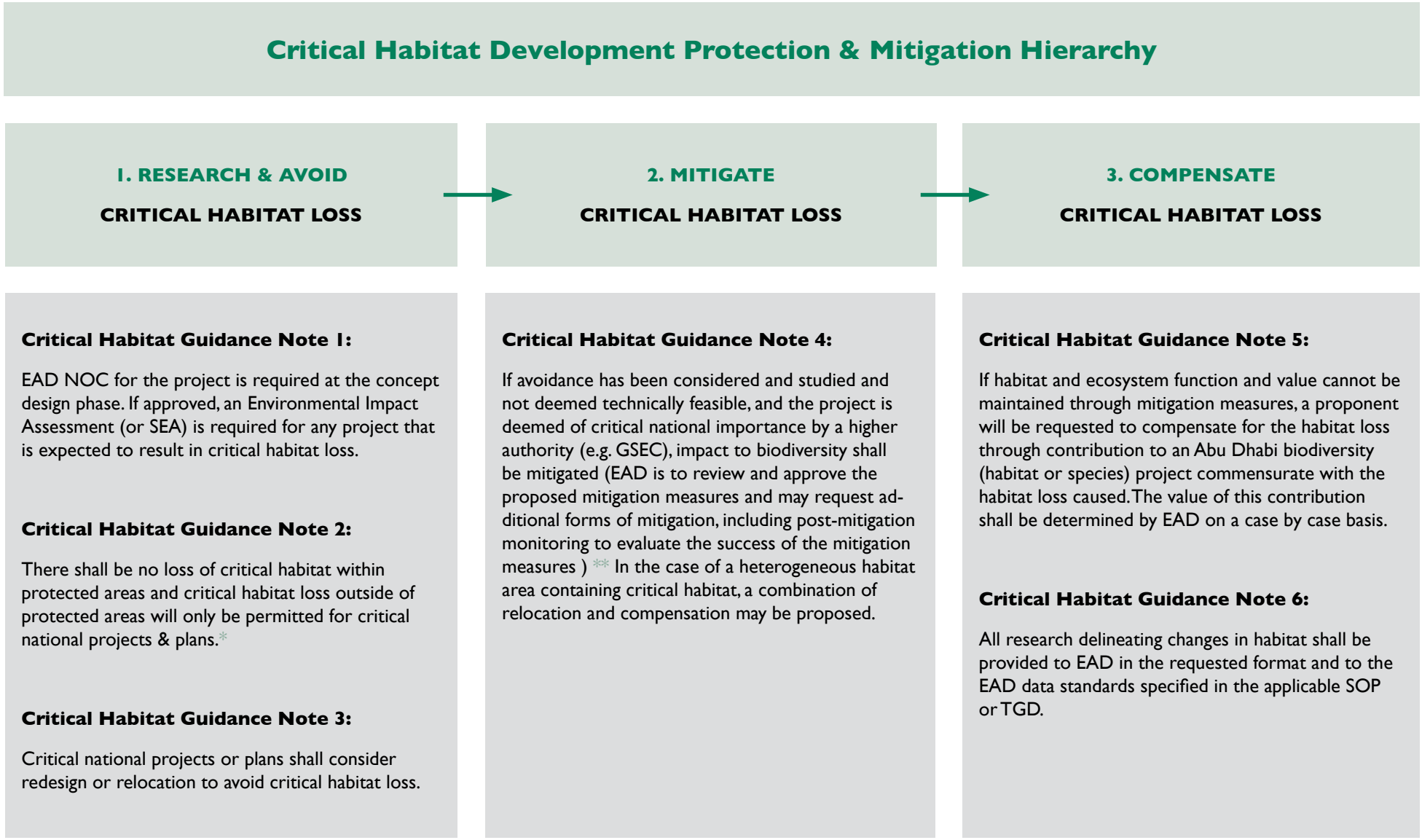
Within the EIA (or SEA for large scale projects and masterplans), a detailed baseline survey is required which will canvas the requirements specified in EAD's Technical Guidance document for Environmental Impact Assessment (Ref: EAD-EQ-PCE-TG-02). Multiple ecological baseline surveys, which account for seasonal changes, are often required.

EAD recognises that many terrestrial or marine areas in Abu Dhabi emirate are heterogeneous habitat areas, with one or more critical and /or environmentally sensitive habitat types forming part of the same assemblage or community. In these situations, when proposing mitigation, EAD encourages the adoption of an 'ecosystem approach' that emphasises the protection of ecological functioning and helps sustain native species of flora and fauna. The ecosystem approach is defined by the Convention on Biological Diversity (CBD) as a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.[5]

To achieve this, the cumulative impact of various activities and projects in interconnected and adjacent habitats must be assessed as part of the EIA and SEA.

[5]CBD Secretariat (2000) Decision V/6 Ecosystem approach. Document UNEP/CBD/COP/56/. Secretariat of the Convention on Biological Diversity, Nairobi, Kenya

Figure 4: Critical Habitat Development Protection & Mitigation Hierarchy



* A project is to be defined as nationally critical at the level of the General Secretariat for the Executive Council of Abu Dhabi Emirate.
** CH Guidance Note 4: Corals, Multi- stemmed trees and flora with deep root systems, and other flora or fauna species may not be possible to relocate successfully and therefore compensatory programs may be required and specified by EAD on a case by case basis. Seagrass is the only critical marine habitat type that may be considered for relocation (in the case of a project that is not a critical national project).

4.4.2 Environmentally Sensitive Habitat Protection Principles

EAD's environmentally sensitive habitat protection and development mitigation principles are stated below:

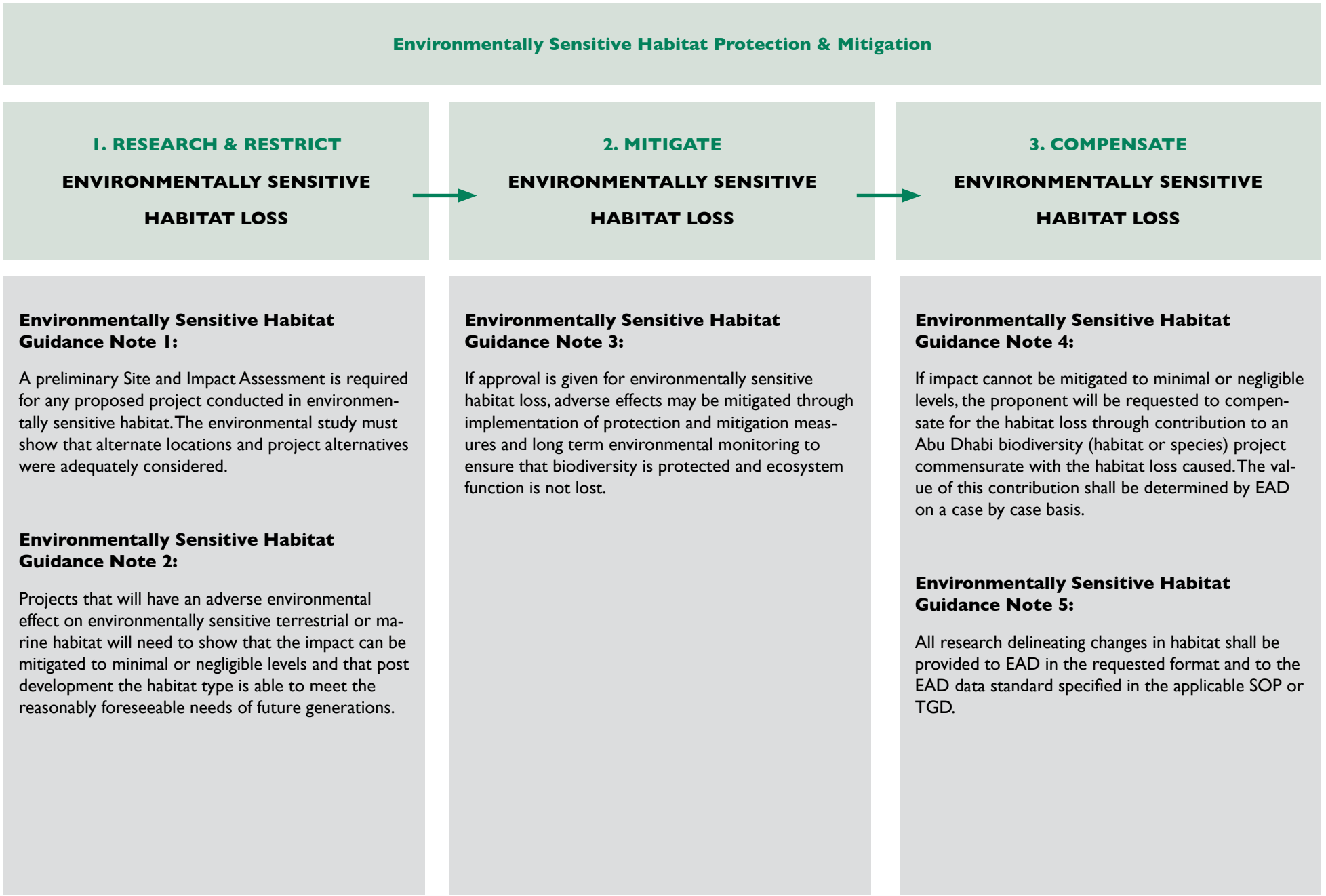
Environmentally Sensitive Habitat Principle 1:

Projects that will have an adverse environmental impact on Environmentally Sensitive Habitat within Abu Dhabi emirate are restricted activities, and will only be permitted if; post development and within Abu Dhabi emirate; the impact can be mitigated to minimal or negligible, allowing the environmentally sensitive habitat type to meet the reasonably foreseeable needs of future generations, taking into account magnitude, permanence, reversibility and cumulative extent.

Environmentally Sensitive Habitat Principle 2:

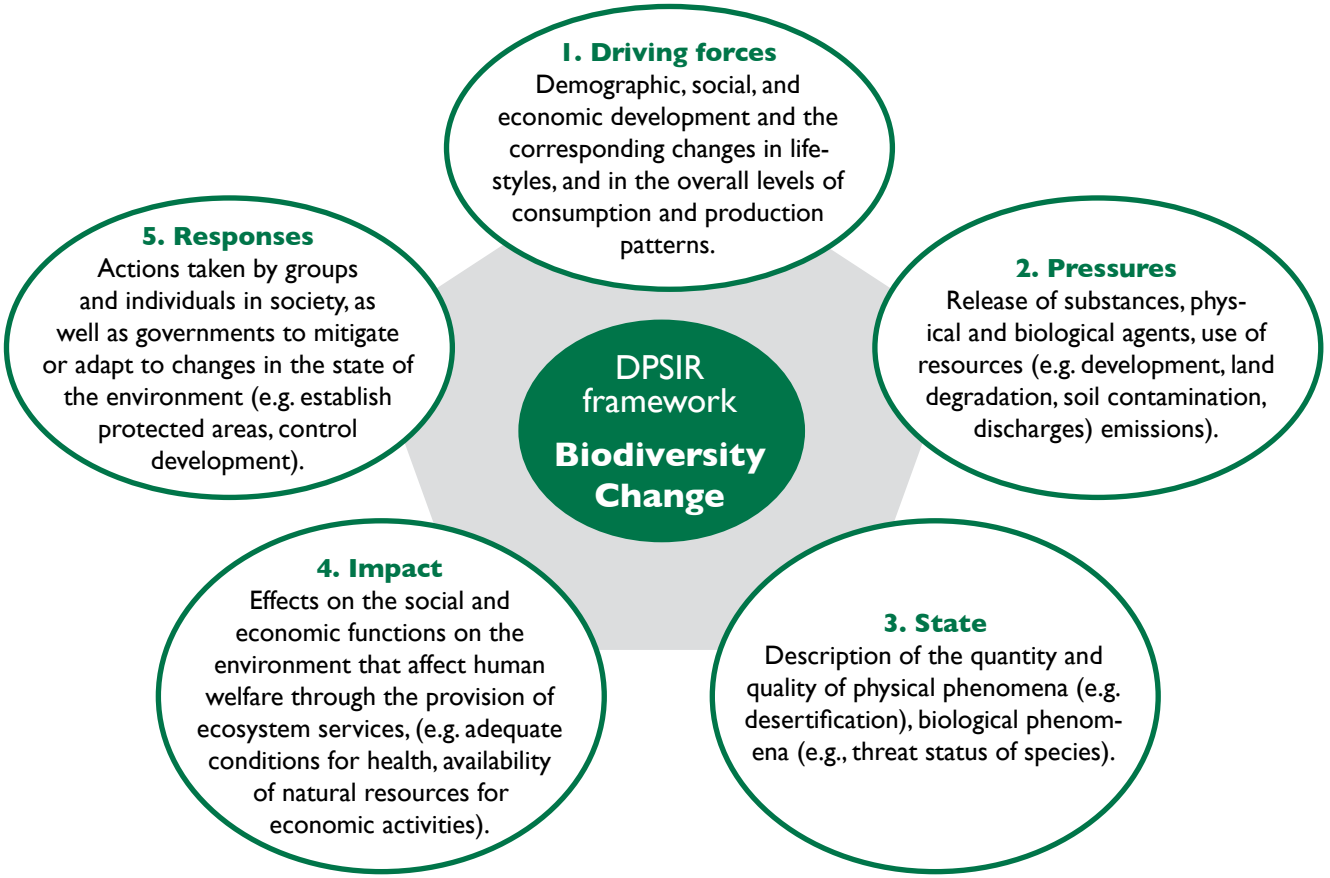
Any project that may have an adverse effect on environmentally sensitive habitat shall follow a protection and mitigation hierarchy of 'research and restrict; mitigate and / or compensate'.

Figure 5: Environmentally Sensitive Habitat Protection & Mitigation Hierarchy



5. CRITICAL HABITAT – PRESSURES AND RESPONSE

Within the Drivers; Pressures; State; Impact and Responses Biodiversity Change Framework (DPSIR), this section describes each habitat type, identifies the pressures on that habitat type, EAD's response to those pressures, and proposes further guidance on mitigation for any future development proposing to have an adverse effect on that habitat type. A snapshot of the current known distribution of each habitat type is also provided, while the www.enviroportal.ead.ae provides the full geographical extent of these habitats on an interactive and up to date platform.



Source: EAD Biodiversity Strategy (2015-2020)

5.1 Wadis and Flood plains

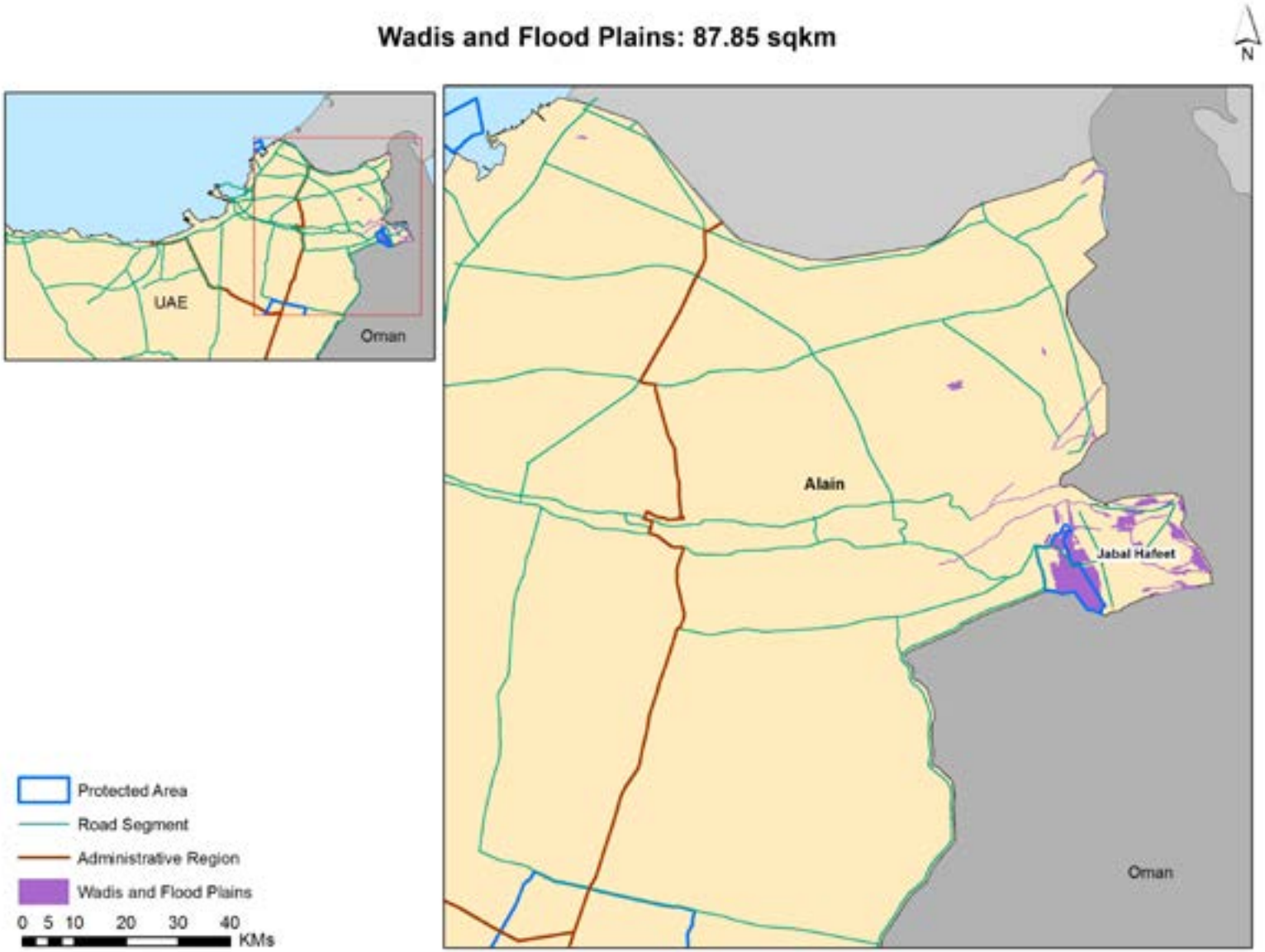
Table 2 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this critical habitat type.

Table 2: Wadis and Flood plains: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Wadis in open terrain & drainage channels (Flood plains, Jebel Hafeet region) **Status:** "Critical" Habitat within Abu Dhabi Emirate. **Location:** The wadis and floodplains found around Jebel Hafit (not including Jebel Hafit) in Al Ain in the Eastern Region of Abu Dhabi Emirate. **Description:** These wadis and floodplains are characterised by temporary water flow, seasonal pools and a small number of permanent pools. This habitat tends to support a high diversity of flora and fauna due to periodic flooding , with typical plant species recorded here including the Samar / Umbrella Thorn Acacia Tree (*Acacia tortilis*), Ra'a / Desert Cotton (*Aerva javanica*), Harmal / Dogbane (*Rhazya stricta*), Harm / Saltwort (*Salsola imbricate*) and Mali / Bristle Grass (*Pennisetum divisum*). Species supported include *Acacia tortilis; Euphorbia larica; Lycium shawii; Moringa peregrine; Acridocarpus orientalis and Dodonaea viscosa*	Development pressure. Road construction Tourism pressure Agricultural use Habitat modification Non-native species introduction.	**Protection Level:** This habitat is considered a critical habitat in Abu Dhabi Emirate. As of 2015, 40.35% of this habitat is protected within the Jebel Hafeet Protected area. Within this area, 12.7 sqkm is in a natural state; 13.6 sqkm is in a poor / transformed state, and 2.4 sqkmis in a degraded state. **Future Response:** Of the remaining 12.7 sqkmin natural state, protection of 6.35 sqkmwould meet the 50% protection target for terrestrial critical habitat under the Biodiversity Strategy (2020). **Applicable habitat principles and guidance notes for protection and mitigation:** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 3;* *CH Guidance Note 4;* *CH Guidance Note 5; and* *CH Guidance Note 6.*	

Figure 7 presents the current known distribution of wadis and flood plains in Abu Dhabi emirate, although it is not intended to be indicative of all wadis and flood plains– the baseline survey and impact assessment of the proposed development site will identify any additional locations.

Figure 7: Wadis and Flood Plains Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.2 Alluvial or Interdunal plains (gravel plains)

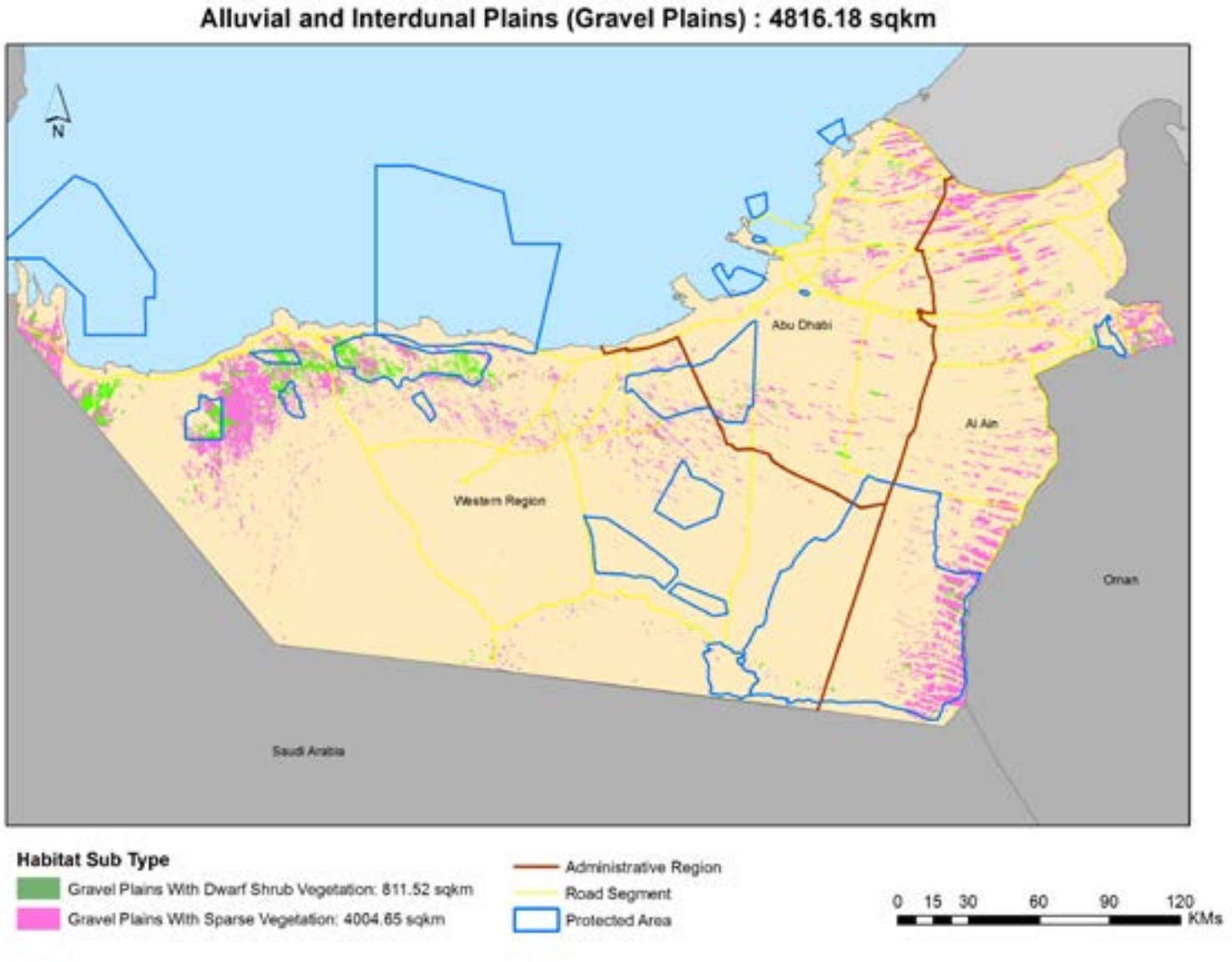
Table 3 presents details on the status, location, pressures, EAD response and protection and mitigation guidance specific to this critical habitat type.

Table 3: Alluvial or Interdunal plains: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Alluvial or Inter-dunal Plains (gravel plains). **Status:** Critical Habitat **Location:** This habitat is distributed north of Abu Dhabi / Al Ain E22 highway to the Abu Dhabi / Dubai border. South of the Abu Dhabi / Al Ain E22 highway, the habitat is distributed to the south east, and can be found south of Al Ain, between the Abu Dhabi / Oman border and Abu Dhabi's most south easterly point. Small areas of this habitat are also found in the Western Region, towards the Saudi Arabia border. **Description:** This habitat consists of substrates varying from sand to gravel, resulting in gravel or inter-dunal plains. In alluvial plains of this habitat type, the dominant plant species tends to be *Haloxylon salicornicum* and *Rhazya stricta*. Within inter-dunal plains, the dominant floral species tend to be *Haloxylon salicornicum* or *Zygophyllum qatarense*. Faunal species include the Red Fox (*Vulpes vulpes*), Baluchistan Gerbil (*Gerbillus nanus*), Arabian Sand Gazelle (*Gazella subgutturosa*), Dhub Lizard (*Uromastux aegyptia*), Desert Monitor (*Varanua griseus*), and Darkling Beetle (*Tenebrionidae*).	Development pressure. Overgrazing Off-road driving Transportation railway, road infrastructure Climate Change	**Protection Level:** This habitat is considered a critical habitat in Abu Dhabi Emirate. As of 2015, only 37.52% of this habitat lies within protected areas. **Future Response:** An additional 192.96 sqkm is required to reach the NBSAP (2021) 12% representative habitat protection target. **Applicable habitat principles and guidance notes for protection and mitigation:** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* *CH Guidance Note 5; and* *CH Guidance Note 6.*	

Figure 8 presents the current distribution of alluvial and interdunal plains with dwarf shrub cover in Abu Dhabi Emirate although it is not intended to be indicative of all alluvial and interdunal plains– the baseline survey and impact assessment of the proposed development site will identify any additional locations.

Figure 8: Alluvial Interdunal plains with dwarf shrub cover Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.3 Sand Sheets and Dunes with Distinct Shrub or Dwarf Shrub Cover

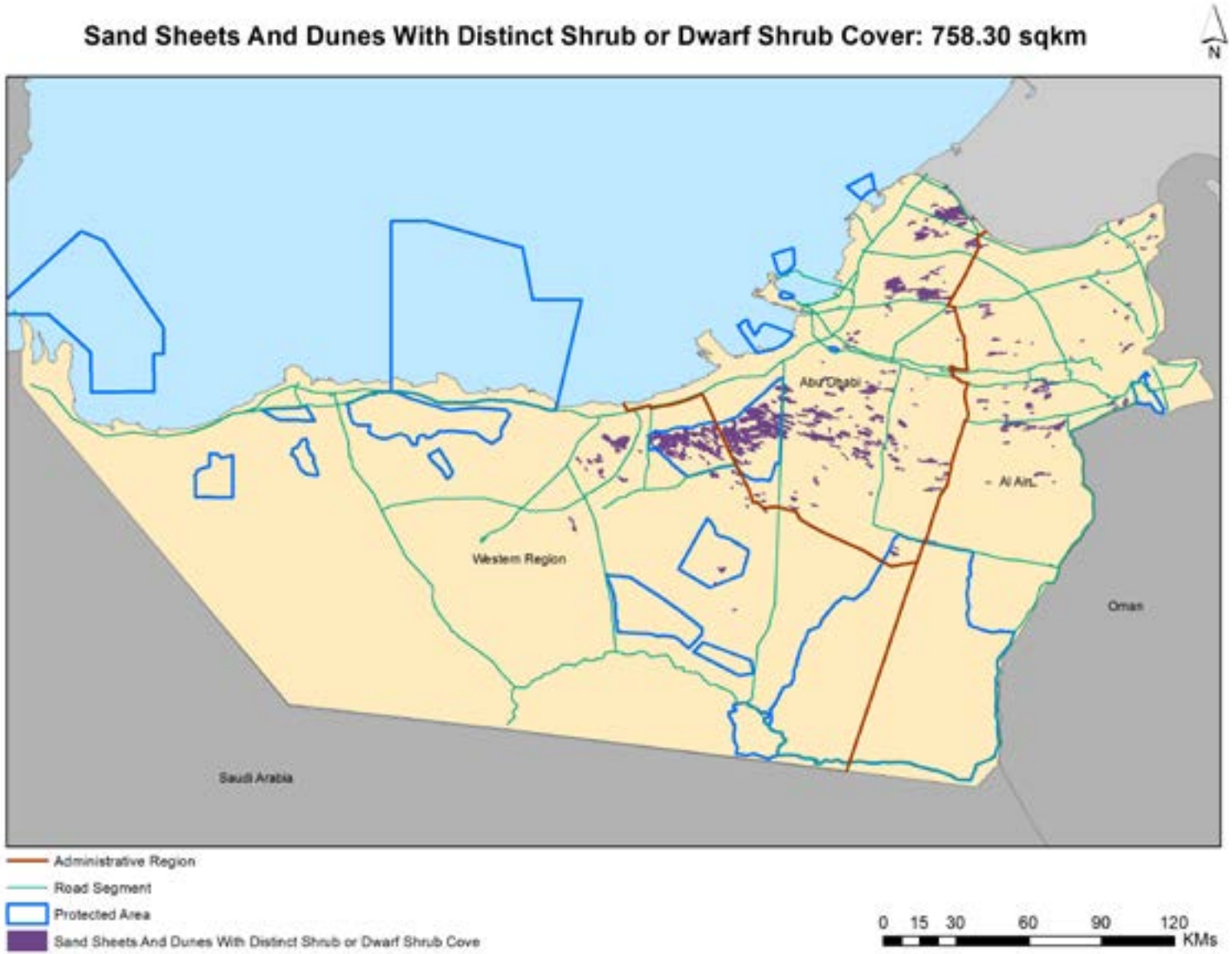
Table 4 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this critical habitat type.

Table 4: Sand sheets and dunes with distinct shrub or dwarf shrub cover: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Sand Sheets and Dunes with Distinct Shrub or Dwarf Shrub Cover **Status:** Critical Habitat within Abu Dhabi emirate. **Location:** Generally in the northern, eastern, southern and central parts of the Emirate. *Haloxylon* persicum is confined to an area between Medina Zayed and Wathba. **Description:** Areas of undulating sandy desert with dunes less than 20 metres in elevation, and with significant cover of dwarf shrubs (i.e. woody perennials less than 1 m high, usually less than 50 cm). Dwarf shrub species are *Zygophyllum qatarense, Haloxylon salicornicum and Siedlitzia rosmarinus*. Other species likely to be present are *Cyperus conglomeratus, Dipterygium glaucum, Moltkiosis ciliata, Eremobium aegyptiacum, Silene villosa and Limeum arabicum*. Breeding birds include Crested Lark, Greater Hoopoe-lark and Southern Grey Shrike. Shrub species (woody perennials more than 1m high) are *Leptadenia pyrotechnica, Calotropis procera, Calligonum comosum and Haloxylon Persicum* These areas are important for the native *Haloxylon salicornicum* (locally known as *Rimth*) and *Haloxylon Persicum* (locally known as *Ghada*). Stands of the shrub *Haloxylon Persicum* occupy a geographically distinct and well-delineated area south of Abu Dhabi City, where they form a characteristic species-poor plant assemblage (*Haloxylon persicum*-community) on low dunes. Frequent fogs in the region facilitate the growth of lichens on the bark of H. persicum. The fine branches of the shrubs comb out droplets of water from the atmosphere, a feature that has led Aspinall & Hellyer (2004) to describe this vegetation as a 'dew forest'. The stands of *Haloxylon persicum* are of outstanding conservation value because this is the only natural occurrence in the UAE and in eastern Arabia in general.	Overgrazing Drought Urban expansion Road and railway construction Off-road driving	**Protection level:** Sand Sheets and Dunes with distinct shrub or dwarf shrub cover in Abu Dhabi emirate are a protected critical habitat. As of 2015, 78.18% of this habitat is represented within protected areas. **Applicable habitat principles and guidance notes for protection and mitigation:** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* *CH Guidance Note 5; and* *CH Guidance Note 6.*	

Figure 9 presents the current known distribution in Abu Dhabi emirate, although it is not intended to be indicative of all sand sheets and dunes with distinct shrub or dwarf shrub cover– the baseline survey and impact assessment of the proposed development site will identify any additional locations.

Figure 9: Sand Sheets and Dunes with Distinct Shrub or Dwarf Shrub Cover Distribution (EAD, 2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.4 Mountains

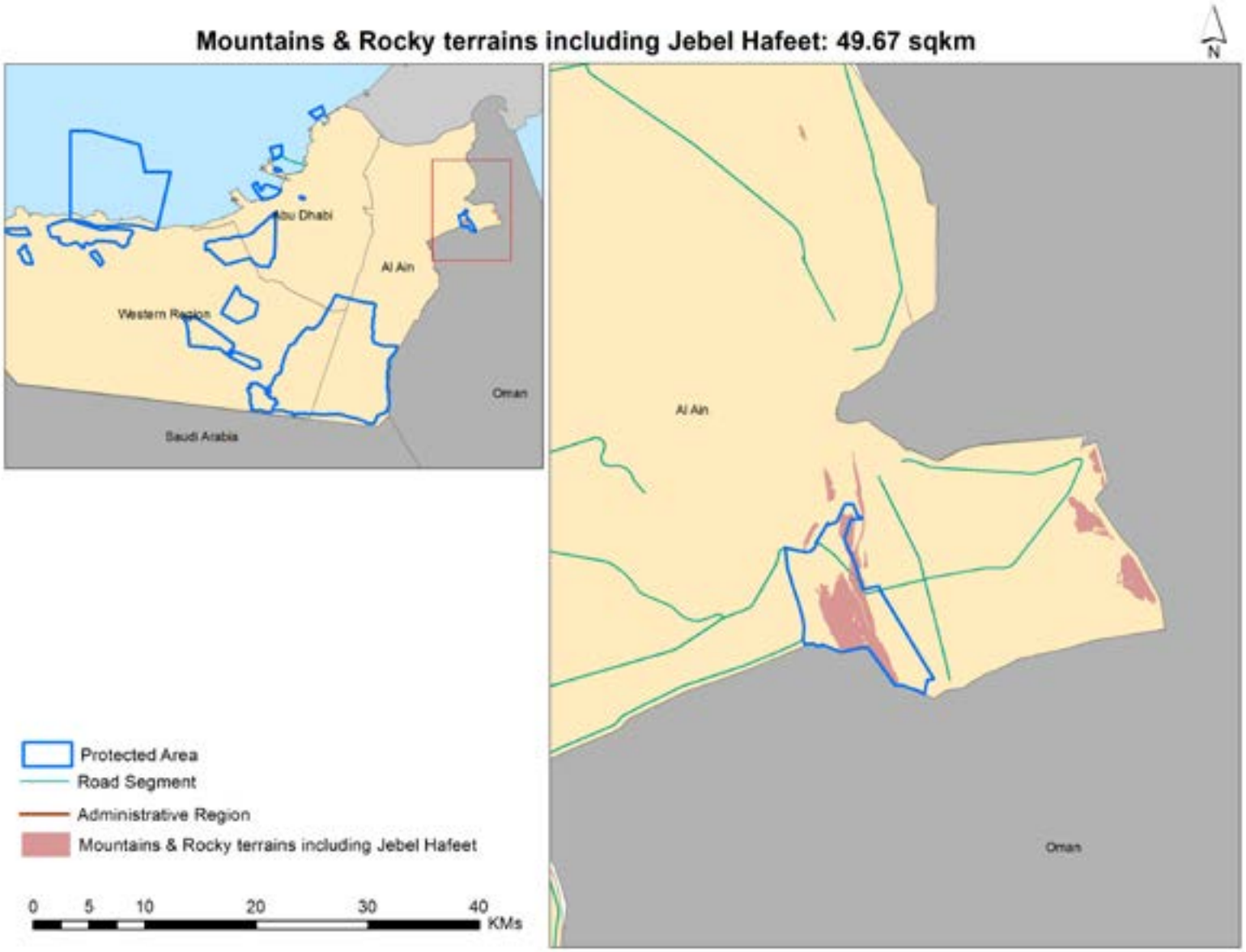
Table 5 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this critical habitat type.

Table 5: Mountains: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Mountain slopes, screes and associated wadis **Status:** Critical Habitat within Abu Dhabi emirate. **Location:** Confined to Jebel Hafeet and adjacent foothills. **Description:** Mountain terrain including rocky foothills, associated wadis and temporary water courses. Wadis refer to the upper and middle reaches of the wadi system, before it merges into the flood plain and open terrain. Trees and shrubs at lower levels are *Ziziphus spina-christi, Prosopis juliflora, Acacia tortilis and Lycium shawii*, with several other woody species at higher altitudes, such as *Moringa peregrina, Peripolca aphylla and Ephedra foliata*. Shrubs and dwarf shrubs include *Acridocarpus orientalis*, *Capparis cartilaginea*, *Euphorbia larica, Pergularia tomentosa, Gaillonia aucheri and Ochradenus arabicus*. Breeding birds include Barbary Falcon, Liechtenstein's Sandgrouse, Sand Partridge, Little Owl, Pale Crag Martin, Hume's Wheatear, Hooded Wheatear, Desert Lark, and White-spectacled Bulbul. Mammals include Arabian Tahr, Blanford's Fox and Egyptian Spiny Mouse. Mountain slopes are with low vegetation cover but species rich with trees, stem succulents, shrubs, dwarf shrubs and perennial grasses. Species supported include *Cenchrus ciliaris, Cymbopogon commutatus, Panicum turgidum; Pennisetum divisum; Blepharis ciliaris; Pulicaria glutinosa*.	Recreational developments, irrigation. Road construction Introduction of non-native species Feral animals	**Protection level:** Mountains in Abu Dhabi emirate are a protected critical habitat. 99.82% of this habitat is protected within the Jebel Hafeet Protected Area. **Applicable habitat principles and guidance notes for protection & mitigation:** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* *CH Guidance Note 5;* *CH Guidance Note 6.*	

Figure 10 presents the current known distribution in Abu Dhabi emirate, although it is not intended to be indicative of all mountain habitats– the baseline survey and impact assessment of the proposed development site will identify any additional locations.

Figure 10: Mountain Habitat Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.5 Sand Sheets and Dunes with Tree Cover

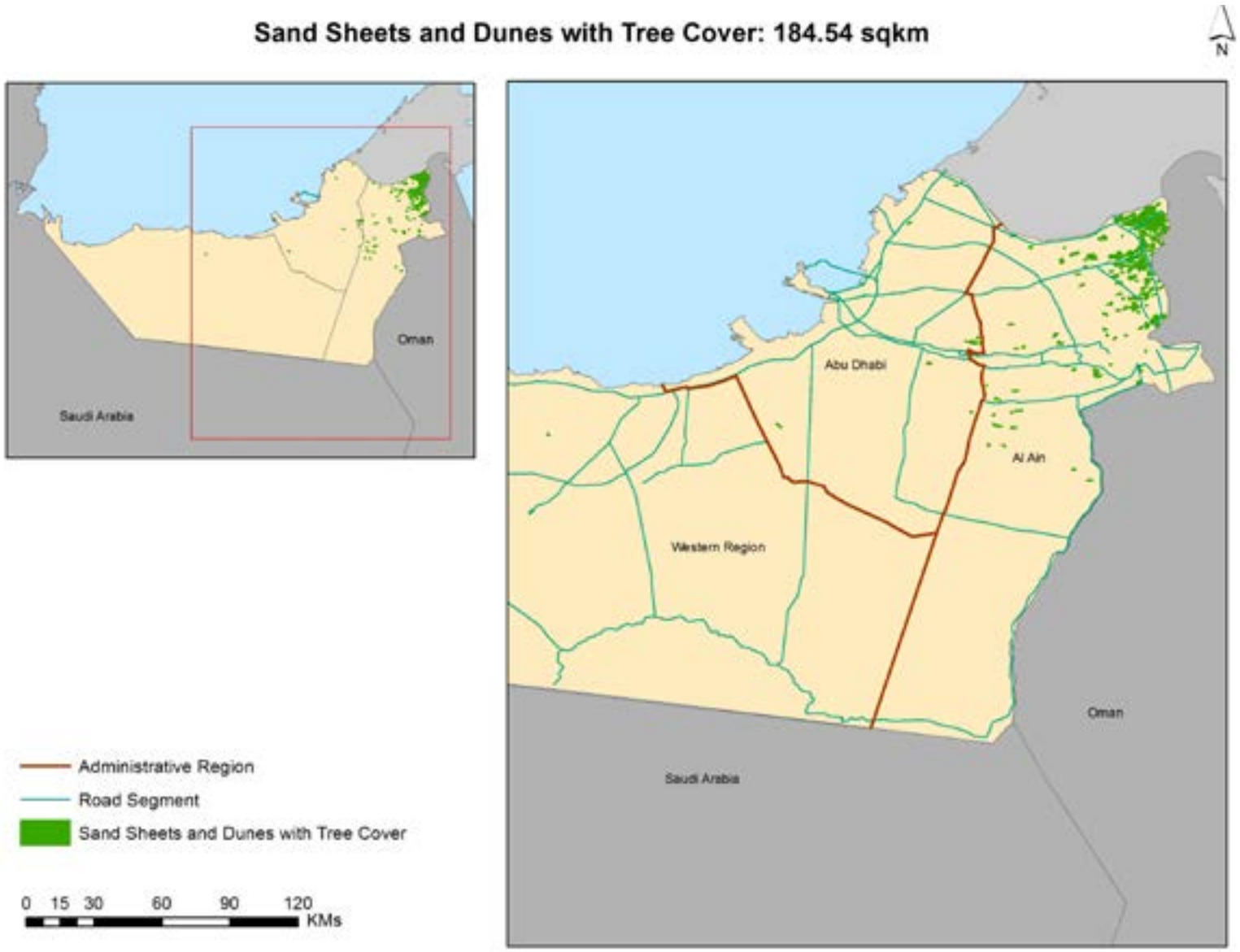
Table 6 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this critical habitat type.

Table 6: Sand Sheets and Dunes with Tree Cover: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Sand Sheets and Dunes with Tree Cover **Status:** Critical Habitat within Abu Dhabi emirate. **Location:** Confined to the east of the Emirate, particularly around Al Ain, but extending westwards to within 50 km of Abu Dhabi Island. **Description:** Areas of undulating sandy desert with dunes less than 20 metres in elevation, and with more than 1% tree cover. The only tree species is the Ghaf *Prosopis cineraria*. Other plant species likely to be present are *Zygophyllum qatarense, Calligonum comosun, Leptadenia pyrotechnica, Cyperus conglomeratus, Dipterygium glaucum, Limeum arabicum*. Breeding bird species include Collared Dove, Greater Hoopoe-lark, Crested Lark and Southern Grey Shrike. The trees are used for roosting, and, probably in a few cases for breeding, by Desert Eagle Owl	Development Overgrazing Climate Change Overextraction of groundwater	**Protection level:** Sand sheets and dunes with tree cover are considered critical habitats in Abu Dhabi Emirate. Only 1.24% of this habitat is represented within protected areas (2015 figure). **Applicable habitat principles and guidance notes for protection and mitigation:** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* *CH Guidance Note 5;* *CH Guidance Note 6.*	 

Figure 11 presents the current known distribution in Abu Dhabi emirate, although it is not intended to be indicative of all sand sheets and dunes with tree cover habitats– the base-line survey and impact assessment of the proposed development site will identify any additional locations.

Figure 11: Sand Sheets and Dunes with Tree Cover Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.6 Northern Alluvial and Interdunal Plains

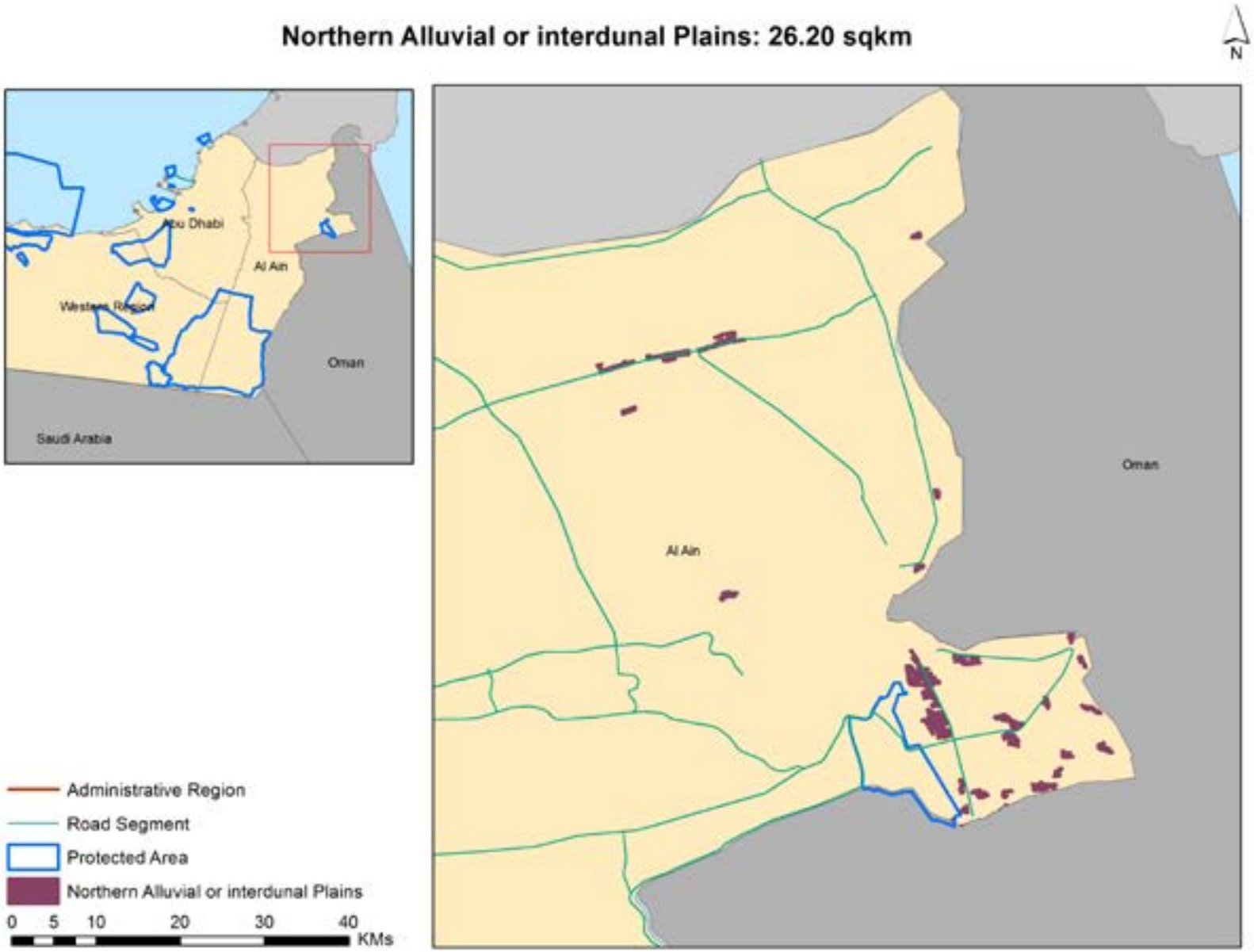
Table 7 presents details on the status, location, pressures, EAD response and development mitigation guidance specific to this critical habitat type.

Table 7: Northern Alluvial and Interdunal Plains: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Status: Critical Habitat within Abu Dhabi emirate. **Location:** Eastern/Northern Abu Dhabi, in the surrounding plains of Jebel Hafit. **Description:** Areas of substrate consisting of gravel, pebbles or rocky material covered with distinct tree vegetation. Plants: The tree species are Acacia tortilis and Prosopis cineraria. Other woody plants are *Haloxylon salicornicum, Lycium shawii, Calotropis procera.* Animals: Dhub (*Uromastyx aegyptius and U. leptieni*). Breeding birds can include Arabian Babbler. This habitat category has been separate from the 'Alluvial or interdunal plains' due to its distinct importance for *Acacia tortillis* trees. This habitat is limited to the plains surrounding the Jebel Hafit area.	Road construction Introduction of non-native species Feral animals Overgrazing Drought Development Recreational activities	**Protection level:** Critical habitat. As of 2015, only 0.67% of this habitat is represented within protected areas. **Future conservation response:** Additional protected areas to protect this habitat type and expansion of existing protected areas. **Applicable habitat principles and guidance notes for protection & mitigation:** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* *CH Guidance Note 5;* *CH Guidance Note 6*	

Figure 12 presents the current known distribution in Abu Dhabi emirate, although it is not intended to be indicative of all northern alluvial and inter-dunal plains habitats– the base-line survey and impact assessment of the proposed development site will identify any additional locations

Figure 12: Northern Alluvial and Interdunal Plains Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.7 Burqas and Mesas

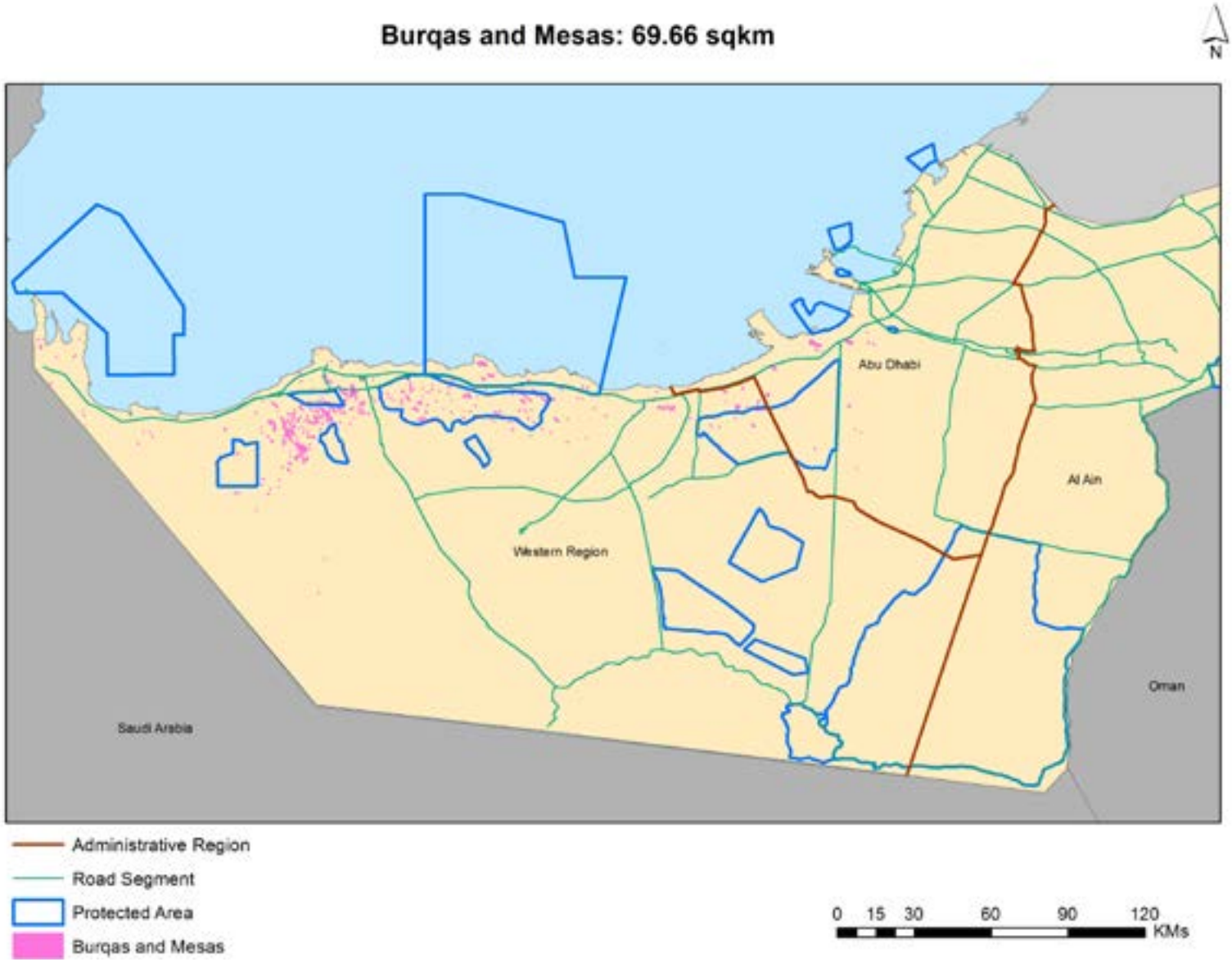
Table 8 presents details on the status, location, pressures, EAD response and protection and mitigation guidance specific to this critical habitat type.

Table 8: Burqas and Mesas: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Burqas and Mesas **Status:** Critical habitat within Abu Dhabi emirate. **Location:** Confined to the outcrop of Miocene aged rocks, which extends from Abu Dhabi Island westwards to Sila'a, and generally within 50 km of the coastline, but extending further south in the west. **Description:** Burqas and Mesas are the traditional local names for rocky outcrops and small jebels of the western region that have long had informal protection through the late Sheikh Zayed's verbal instructions. They are unique topographic features and prove a key ecological function as nesting and denning habitat for birds and bats, as well as holding significant cultural value. Flat-topped hills, generally 5 to 15 metres high that are protected from erosion by a hard layer of Miocene age, overlying softer sediments beneath. Island-like rocky exposures particularly occurring in coastal areas. Can also be occasionally found further inland. These exposures can be nearly barren to well-vegetated, with halophytic and non-halophytic vegetation. *Haloxylon salicornicum, Salsola cyclophylla, Cornulaca monacantha, Calligonum comosum, Helianthemum lippii*. Birds, mammals and reptiles use the holes that develop beneath the outer edge of the protective layer. Birds include Desert Eagle Owl, Barn Owl and Lilith Owlet. Mammals include Red Fox.	Quarrying and development for Recreational driving.	**Protection level:** Considered critical habitat in Abu Dhabi Emirate, with informal verbal instruction for protection passed by the late Sheikh Zayed. As of 2016, 28.19 % of this habitat is situated in protected areas. **Applicable habitat principles and guidance notes for protection and mitigation:** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* *CH Guidance Note 5;* *CH Guidance Note 6.*	

Figure 13 presents the current known distribution in Abu Dhabi emirate, although it is not intended to be indicative of all burqas and mesas– the baseline survey and impact assessment of the proposed development site will identify any additional locations.

Figure 13: Burqas and Mesas Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.8 Mudflats and Sands Exposed at Low Tide

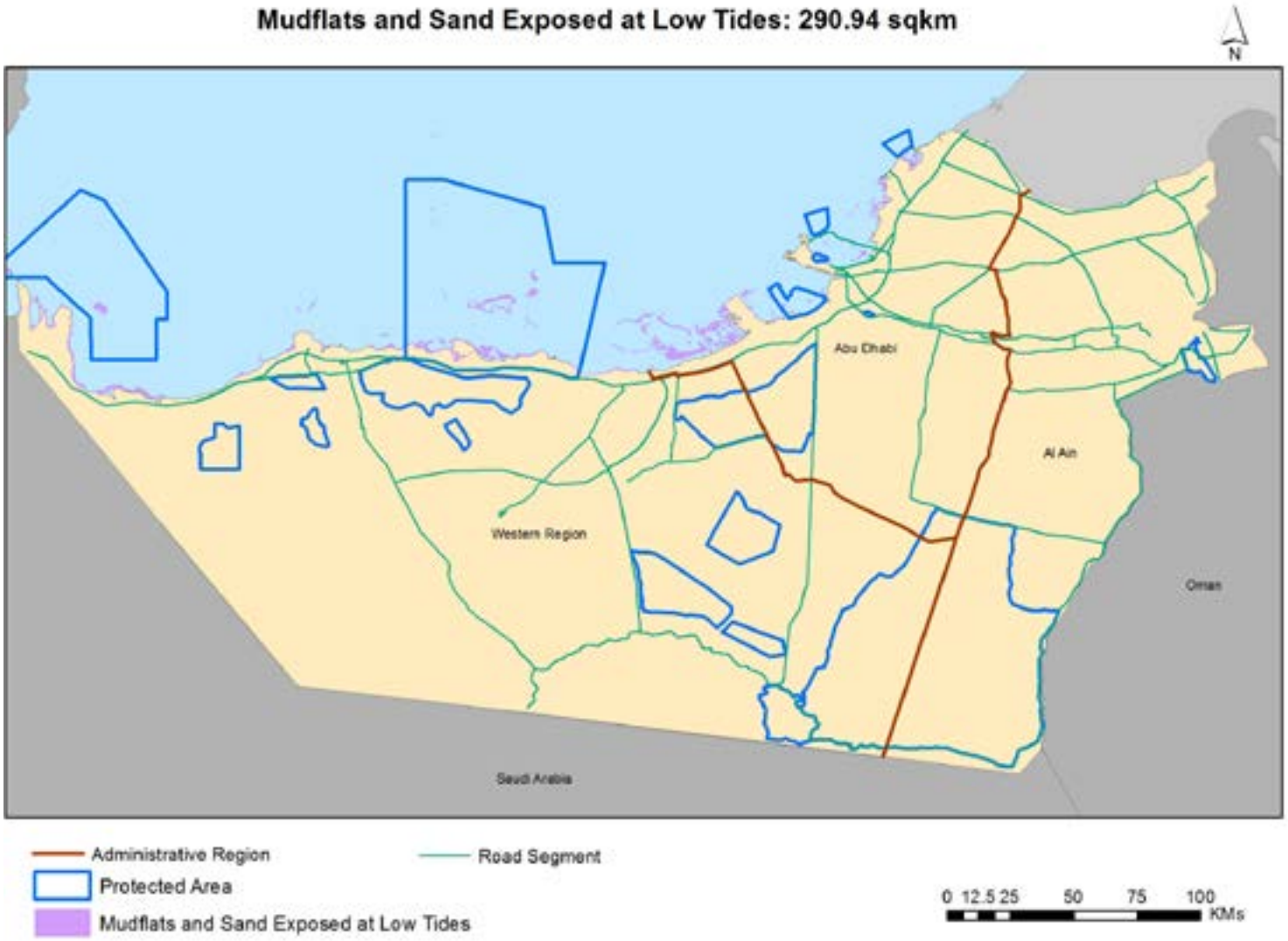
Table 9 presents details on the status, location, pressures, EAD response and protection mitigation guidance specific to this critical habitat type.

Table 9: Mudflats and sands exposed at low tide: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Mudflats and sands exposed at low tide **Status:** Critical coastal habitat within Abu Dhabi emirate. **Location:** Widespread along most of the mainland coast and islands of Abu Dhabi. **Description:** Coastal wetlands that form when mud is deposited by tides. These are often devoid of vegetation but can also be found with less than 10% vegetation cover. No plants, with the exception of one species of seagrass, *Halodule uninervis*, which can be exposed at low tide (usually sparse). No growing macroalgae (broken-off pieces can be present). This is an important habitat for wading birds, especially migratory species in the plover and sandpiper families, which feed on benthic invertebrates. Herons (mainly Striated Heron and Western Reef Heron) feed on tidal flats at low tide.	Development pressure Dredging and infilling Mangrove Plantations	**Protection level:** Protected through the mangrove planting permitting requirement. Considered a critical habitat in Abu Dhabi Emirate. Currently 32% of this habitat is protected within established and proposed protected areas. **Applicable habitat principles and guidance notes :** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* *CH Guidance Note 5;* *CH Guidance Note 6.*	

Figure 14 presents the currently known mudflat distribution in Abu Dhabi emirate; although it is not intended to be indicative of all mudflats in the Emirate– the baseline survey and impact assessment of the proposed development site will identify any additional locations.

Figure 14: Mudflats and Sands Exposed At Low Tide Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.9 Coral Reefs

Table 10 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this critical habitat type.

Table 10: Coral Reef: status, pressures and response

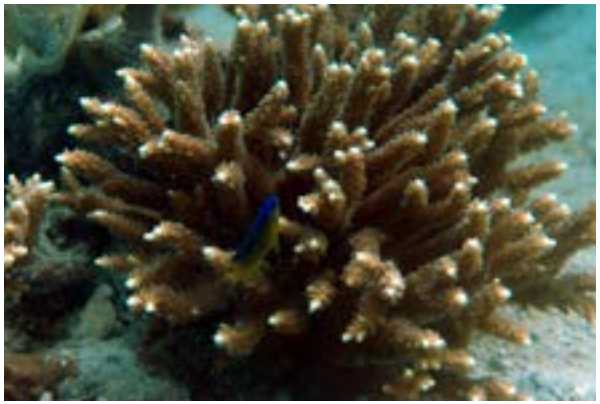
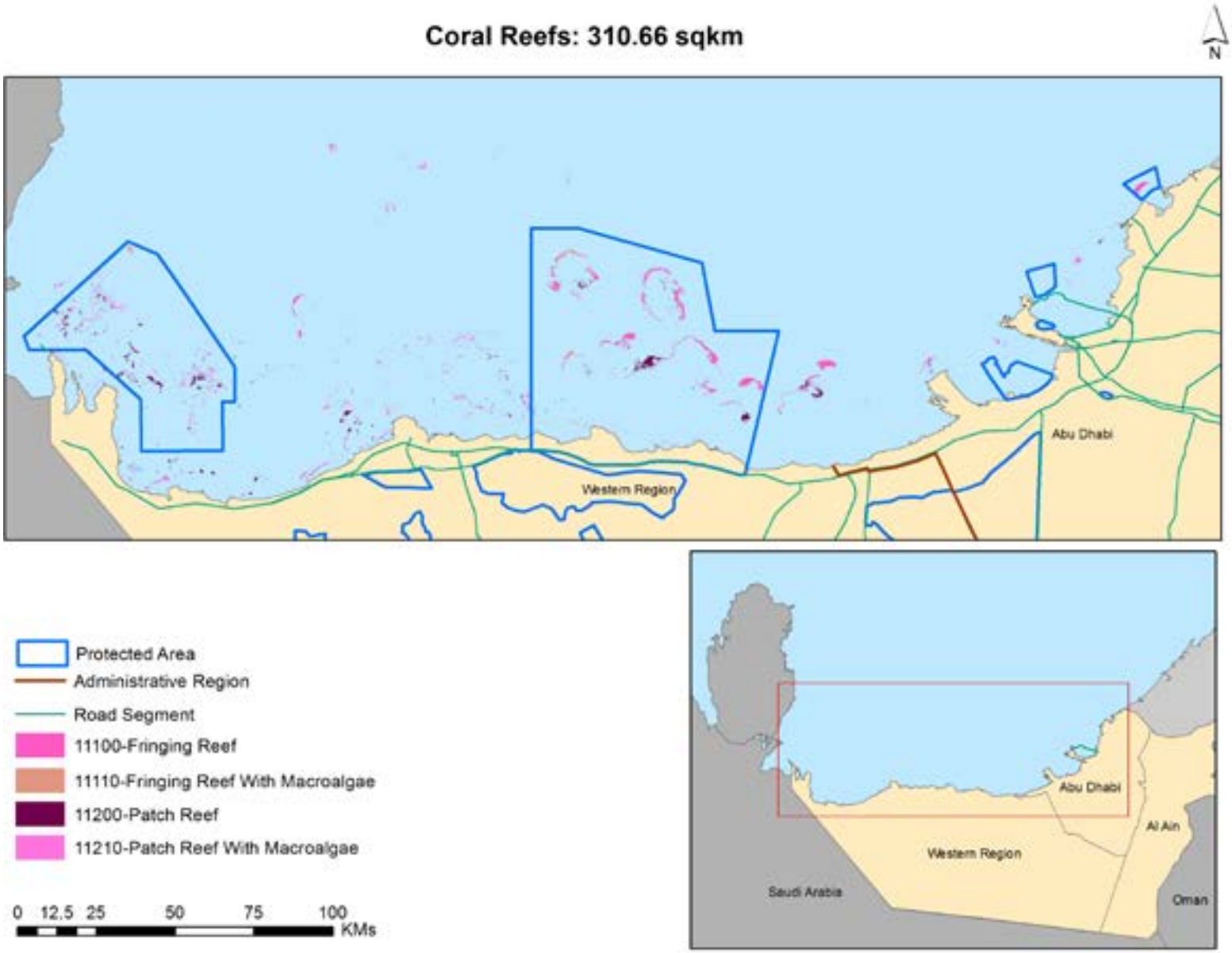
Status, Location and Description	Pressures	Response	Illustration
Coral Reef **Status:** Critical Habitat within Abu Dhabi emirate. **Location:** This habitat type is mainly found in shallow water surrounding the islands of Abu Dhabi emirate. One stand is found in the east at Khalifa Port, while larger areas of coral reef are found around the islands of the western region. This includes Abu Al Abyadh, Bu Tinah, Mubarraz, as well as the islands within the Al Yasat Marine Protected Area. Species diversity increases across a west-east gradient. **Description:** The corals of the Arabian Gulf are a unique community, existing in an environment with stressors including extreme fluctuations in water temperature and high salinity. There are 44 coral species listed as either Near Threatened or Vulnerable with either decreasing or unknown population trends on the IUCN Red list for the UAE. Predominant species include the Boulder coral *(Porites spp)*, and Branching coral *(Acropora coral*). Corals form critical habitat for many species including reef dwelling fish species and the critically endangered Hawksbill Turtle. Unfortunately, with all the pressures they face less than half the coral reefs in the waters of Abu Dhabi contain living corals, the total estimated area of corals in Abu Dhabi emirate being estimated at 310.66 km^2.	Coastal Development Decreased Marine Water Quality Dredging and Landfilling. Climate Change Invasive Species	**Protection level:** Coral reefs in Abu Dhabi emirate are a protected critical habitat. **Applicable habitat guiding principles and guidance notes for protection and mitigation:** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* Under CH Guidance Note 4, coral relocation shall be considered and compulsory where avoidance is not deemed appropriate. Under CH Guidance Note 4, monitoring shall be quarterly or as determined by EAD and include collection of physico-chemical and chemical water quality, temperature via fixed loggers, photo quadrats, video, coral health chart and any other additional requirement specified by EAD. Reporting shall be quarterly or as determined by EAD. *CH Guidance Note 5; and* *CH Guidance Note 6.*	 

Figure 15 presents the current known coral reef distribution in Abu Dhabi emirate, although it is not intended to be indicative of all coral – the marine baseline survey and impact assessment of the proposed development site will identify any additional coral reef locations.



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.10 Seagrass

Table 11 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this critical habitat type.

Table 11: Seagrass: status, pressures and response

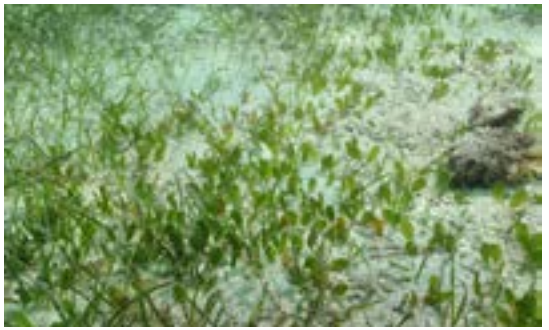
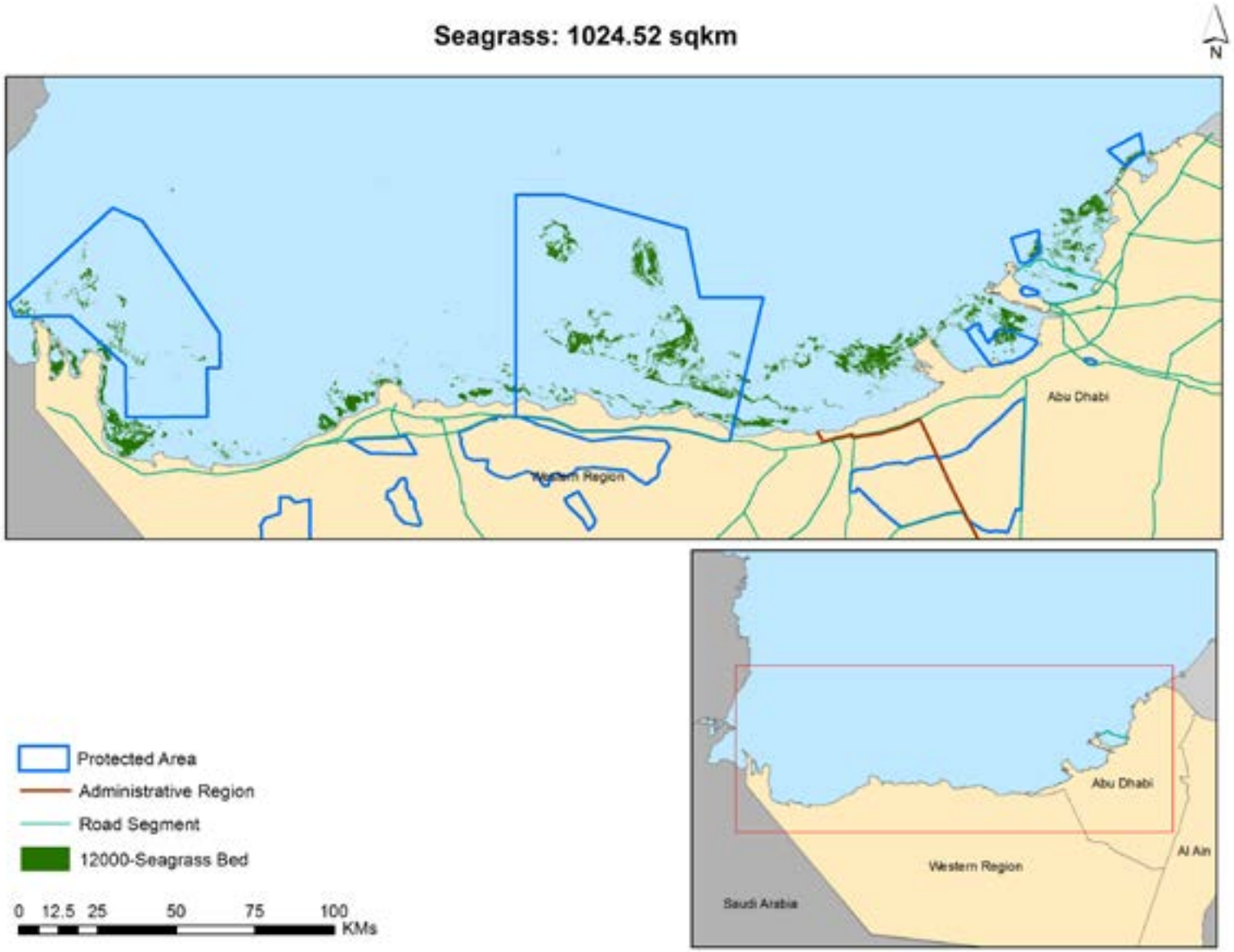
Status, Location and Description	Pressures	Response	Illustration
Seagrass. **Status:** Critical Habitat within Abu Dhabi emirate. **Location:** In Abu Dhabi emirate, this habitat type is distributed from west to east from the Saudi Arabia border to the Dubai border, along the coast line and around the islands. **Description:** This marine habitat consists of subtidal benthic substrates, generally composed of unconsolidated sediments, and characterised by greater than 10% cover of rooted vascular seagrass species. Seagrass species in Abu Dhabi consist of *Halodule uninervis, Halophila stipulacea and Halophila ovalis*. Seagrass is a critical habitat because of the ecosystem services it provides to fish species, but also as the main food source of the Dugong (*Dugong dugon*). Seagrass is also considered a "Blue Carbon" habitat type because it is a coastal and marine habitat that is able to sequester and store carbon.	Coastal Development Decreased Marine Water Quality. Dredging and Landfilling Climate Change	**Protection level:** Seagrass in Abu Dhabi emirate is a protected critical habitat. **Applicable habitat guiding principles and guidance notes for protection & mitigation:** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* Under CH Guidance Note 4, seagrass transplantation shall be considered compulsory where avoidance is not deemed appropriate. Under CH Guidance Note 4, monitoring shall be quarterly for a specified period or as determined by EAD and include collection of physicochemical, and chemical water quality, temperature via fixed loggers, photo quadrats, video, seagrass survival and any other additional requirement specified by EAD. Reporting shall be quarterly or as determined by EAD. *CH Guidance Note 5; and* *CH Guidance Note 6.*	 

Figure 16 presents the current known seagrass distribution in Abu Dhabi emirate, although it is not intended to be indicative of all seagrass – the marine baseline survey and impact assessment of the proposed development site will identify any additional seagrass locations.

Figure 16: Seagrass Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.11 Mangroves

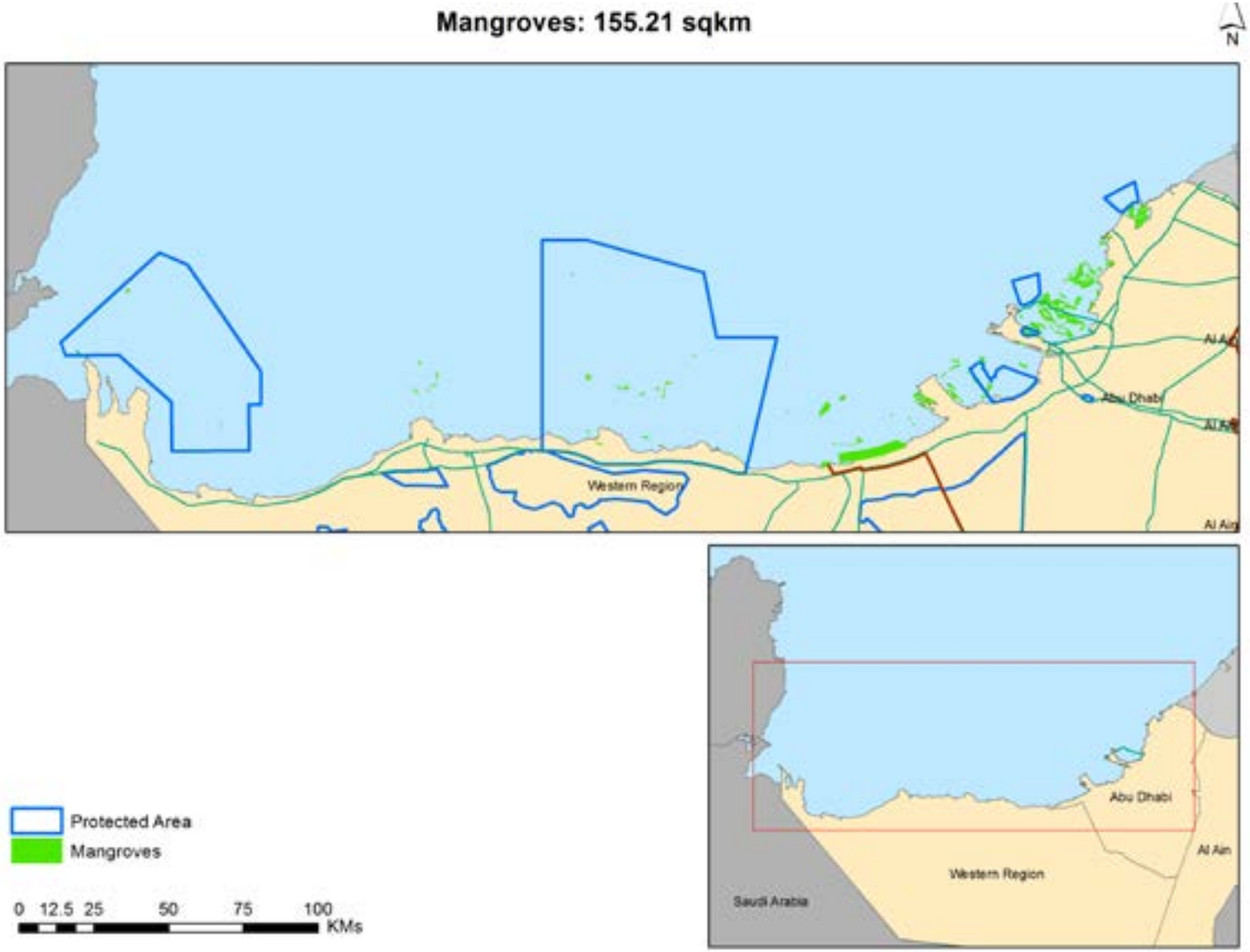
Table 12 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this critical habitat type.

Table 12: Mangroves: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Mangroves. Status: Critical Habitat within Abu Dhabi emirate. Location: Within Abu Dhabi emirate, the distribution of this habitat type from east to west is from near Khalifa Port, with higher densities of this habitat around the islands to the east and west of Abu Dhabi Island. Mangrove habitats are also found along the coast heading westward, with a gradual decline in density. This habitat is also found in intertidal areas on islands such as Abu Al Abyadh, Marawah, Bu Tinah and Sir Bani Yas. Description: This habitat consists of inter-tidal areas dominated by the Grey Mangrove (*Avicennia marina*), and includes both natural and planted mangrove sites. It is a critical habitat for many bird, and fish species, acting as a nursery for the juvenile fish, as well as providing other ecosystem services such as coastal protection and aesthetic value. The mangrove root systems stabilise the underlying sediment, which is rich in nutrients from decaying leaves and wood, and home to sponges, worms, crustaceans, molluscs and algae. The habitat is home to small crabs; fish species; and bird species operating on the periphery of the mangroves including the migratory Greater Flamingo (*Phoenicopterus roseus*). Mangroves are considered a "Blue Carbon" habitat type because it is a coastal and marine habitat that is able to sequester and store carbon.	Coastal Development Dredging and Landfilling Climate Change	Protection level: Mangroves in Abu Dhabi emirate are a protected critical habitat. Applicable habitat guiding principles and guidance notes for protection & mitigation: *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* Under CH Guidance Note 4, mangrove transplantation shall be considered for saplings up to 1m in height where avoidance is not deemed appropriate. Mangroves above 1m are protected trees. Under CH Guidance Note 4, EAD's Mangrove Planting Permitting Technical Guideline (Ref: EAD-TMBS-TG-01) shall be applied. Project proponents (or their representative) should monitor and assess the plantation site in the short term every 6 months for a minimum of 2 years and submit the reports to EAD. Monitoring reporting shall be consistent with monitoring events. *CH Guidance Note 5; and* *CH Guidance Note 6.*	 

Figure 17 presents the current known mangrove distribution in Abu Dhabi emirate, although it is not intended to be indicative of all mangrove – the marine baseline survey and impact assessment of the proposed development site will identify any additional mangrove locations.

Figure 17: Mangrove Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

5.12 Saltmarsh

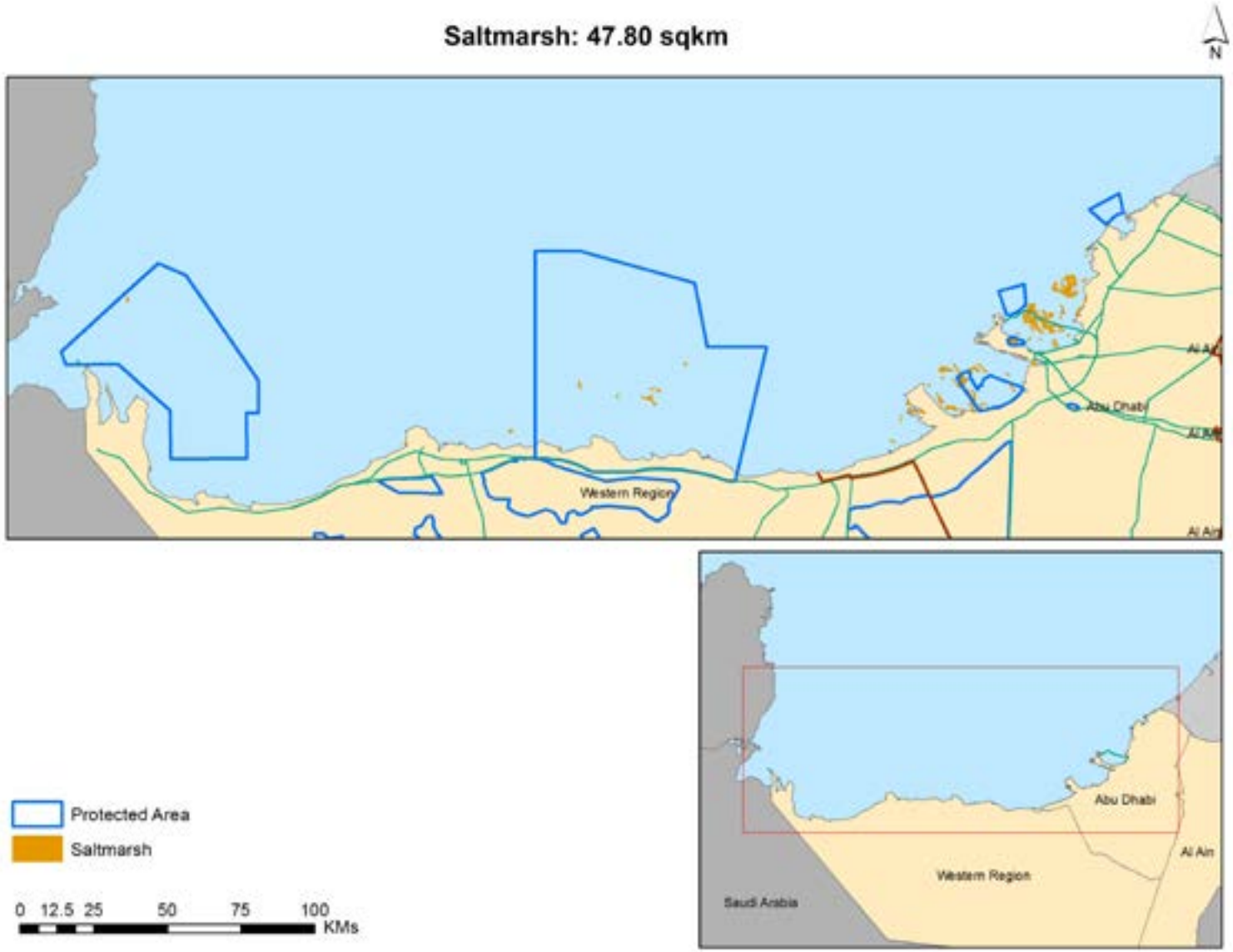
Table 13 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this critical habitat type.

Table 13: Saltmarsh: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Intertidal Saltmarsh. Status: Critical Habitat within Abu Dhabi emirate. **Location:** This habitat type is distributed east to west along the coast and islands from Khalifa Port to the Saudi Arabia border, within Abu Dhabi emirate. There is a higher concentration of this habitat type around the islands to the east and west of Abu Dhabi Island. **Description:** This habitat consists of intertidal areas dominated by emergent halophytic herbaceous vegetation and shrubs. The grasses, herbs and dwarf shrubs that are the flora species associated with this habitat type coexist with mangroves, with salt marshes typically occurring at slightly higher elevations than mangroves. Salt-tolerant chenopods are predominant near the shoreline as are mat-forming grasses and dwarf shrubs such as *Limonium axillare*. Organisms include crabs; gastropods; and polychaetes. Saltmarsh is considered a "Blue Carbon" habitat type because it is a coastal and marine habitat that is able to sequester and store carbon.	Coastal Development Dredging and Land-filling Climate Change	**Protection level:** Saltmarsh in Abu Dhabi emirate is a protected critical habitat. **Applicable habitat guiding principles and guidance notes for protection & mitigation:** *CH Principle 1;* *CH Principle 2;* *CH Guidance Note 1;* *CH Guidance Note 2;* *CH Guidance Note 3;* *CH Guidance Note 4;* Under CH Guidance Note 4, transplantation shall be considered where avoidance is not deemed appropriate. Monitoring and Reporting shall be determined by EAD on a case by case basis. *CH Guidance Note 5;* Under CH Guidance Note 5, creation of saltmarsh habitat will be considered as a compensation measure where avoidance and transplantation is not appropriate; and *CH Guidance Note 6.*	 

Figure 18 presents the current known saltmarsh distribution in Abu Dhabi emirate, although it is not intended to be indicative of all saltmarsh – the marine baseline survey and impact assessment of the proposed development site will identify any additional saltmarsh locations.

Figure 18: Saltmarsh Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

6 ENVIRONMENTALLY SENSITIVE HABITAT: PRESSURES & RESPONSE

6.1 Sand sheets and dunes with perennial herbs and graminoids

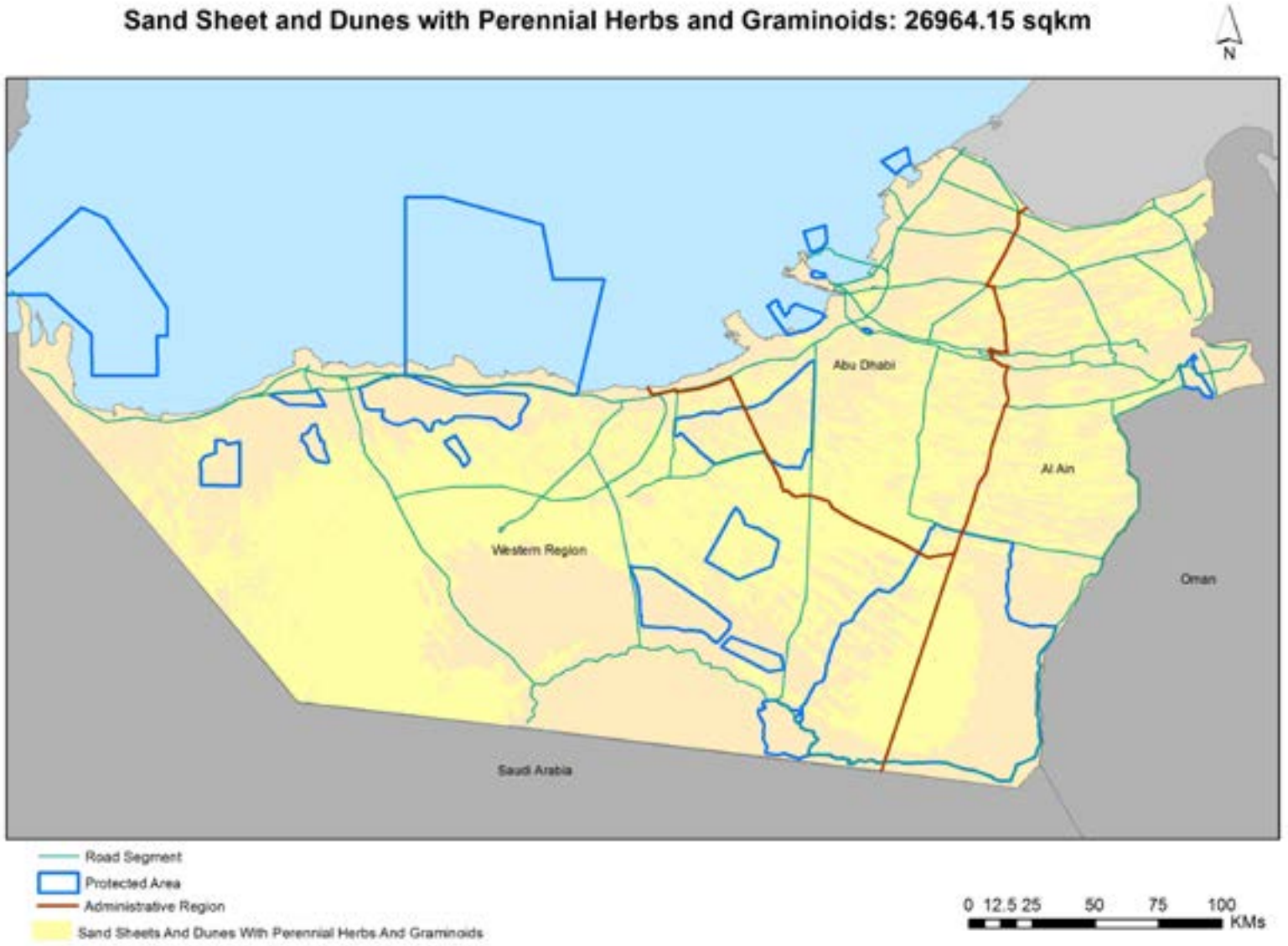
Table 14 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this environmentally sensitive habitat type.

Table 14: Sand sheets and dunes with perennial herbs and graminoids: status, pressures & response

Status, Location and Description	Pressures	Response	Illustration
Sand Sheets and Dunes with perennial herbs and graminoids **Description:** Areas of undulating sandy desert with dunes less than 20 metres in elevation, and without significant cover of trees, shrubs and dwarf shrubs. Vegetated to non-vegetated sand and dune areas colonized by perennial herbs and/or graminoids. The most characteristic plant species are *Cyperus conglomeratus, Panicum turgidum, Pennisetum divisum, Stipagrostis plumosa, Tribulus spp., Dipterygium glaucum, Eremobium aegyptiacum.* Several reptile and invertebrate species may be supported by these habitats when in good condition. Breeding species include Greater Hoopoe-lark, resident species may include Crested lark. **Distribution:** Widespread in the Emirate, particularly to the east of Tarif to Liwa road.	Overgrazing Urban expansion Road and railway construction	**Protection level:** Currently 14.4% of this habitat is protected within proposed or established protected areas. **Applicable habitat guiding principles and guidance notes for protection and mitigation:** *ESH Principle 1;* *ESH Principle 2;* *ESH Guidance Note 1;* *ESH Guidance Note 2;* *ESH Guidance Note 3;* *ESH Guidance Note 4; and* *ESH Guidance Note 5.*	

Figure 18 presents the current known saltmarsh distribution in Abu Dhabi emirate, although it is not intended to be indicative of all saltmarsh – the marine baseline survey and impact assessment of the proposed development site will identify any additional saltmarsh locations.

Figure 19: Current known distribution of Sand sheets and dunes with perennial herbs and graminoids



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

6.2 Coastal sand sheets and low dunes

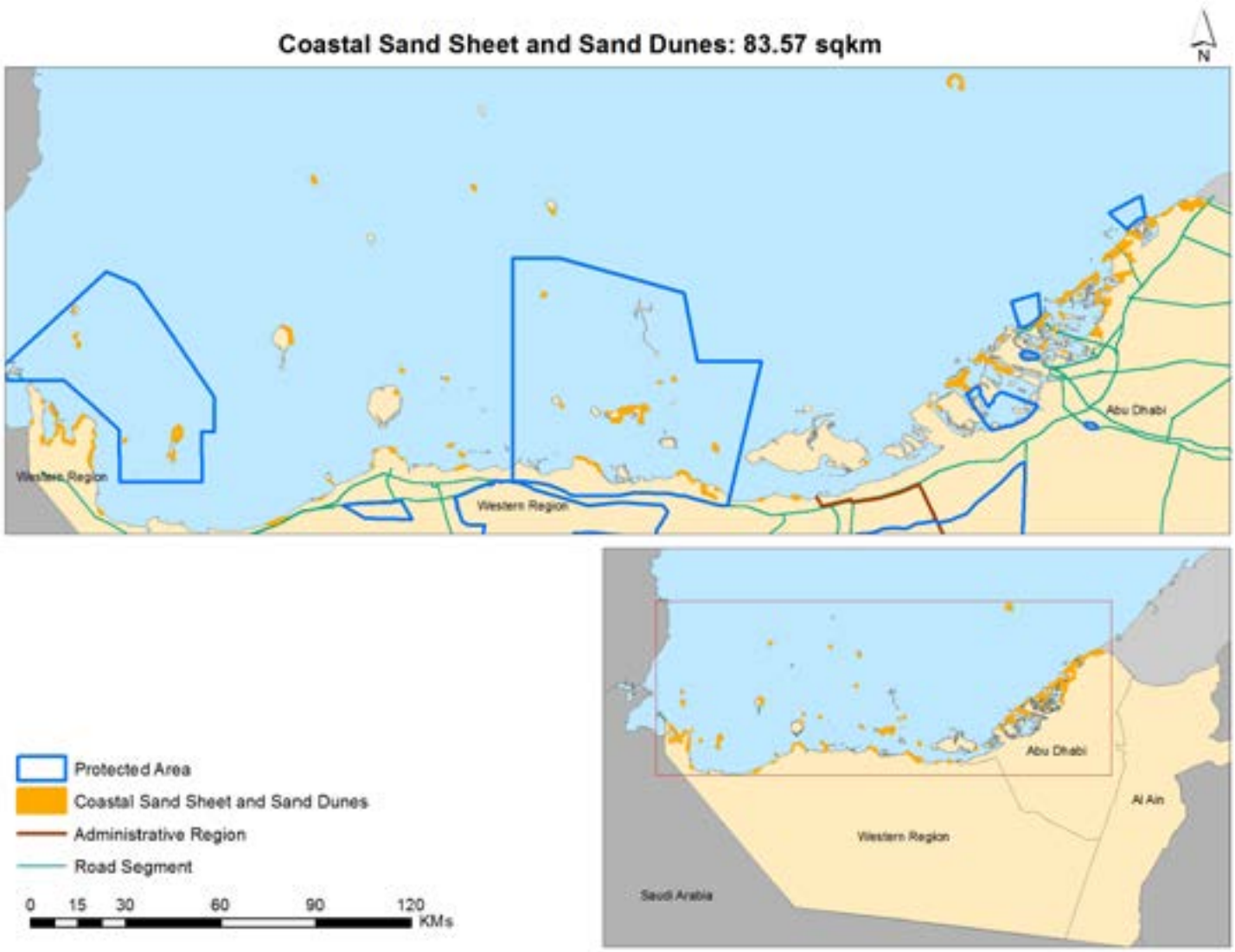
Table 15 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this environmentally sensitive habitat type.

Table 15: Coastal sand sheets and low dunes: status pressures & response

Status, Location and Description	Pressures	Response	Illustration
Coastal sand sheets and low dunes (Sandy coastline) **Status:** Environmentally sensitive in Abu Dhabi emirate **Location:** This habitat type has a patchy coastal distribution within Abu Dhabi emirate. Main areas within which the habitat is found include near Ghweifat along the Abu Dhabi / Saudi Arabia border from which it is sporadically distributed eastward to just east of Mirfa. Fragmented patches also occur between Mirfa and Abu Dhabi and from Yas Island along the coast to Khalifa Port. **Description:** Coastal white (*coralline*) sands with a relative profusion of perennial plant species and dense vegetation cover (up to ca. 15%). Perennial grasses and dwarf shrubs are the most prominent elements of the flora, including Ghada (*Haloxylon Persicum*) and the Arabian Primrose *(Arnebia hispidissima*).	Dredging Reclamation Coastal Development Marine Litter	**Protection level:** Approximately 23% of this habitat is currently protected within the boundaries of established protected areas. **Applicable habitat guiding principles and guidance notes for mitigation:** *ESH Principle 1;* *ESH Principle 2;* *ESH Guidance Note 1;* *ESH Guidance Note 2;* *ESH Guidance Note 3;* *ESH Guidance Note 4; and* *ESH Guidance Note 5.*	

Figure 20 presents the current known distribution in Abu Dhabi emirate, although it is not intended to be indicative of all coastal sand sheets and low dunes– the baseline survey and impact assessment of the proposed development site will identify any additional locations.

Figure 20: Current known distribution of Coastal sand sheets and low dunes



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

6.3 Macroalgae communities

Table 16 presents details on the status, location, pressures, EAD response and protection & development mitigation guidance specific to this environmentally sensitive habitat type.

Table 15: Coastal sand sheets and low dunes: status pressures & response

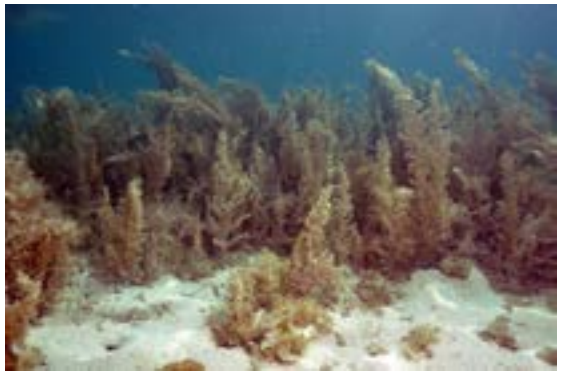
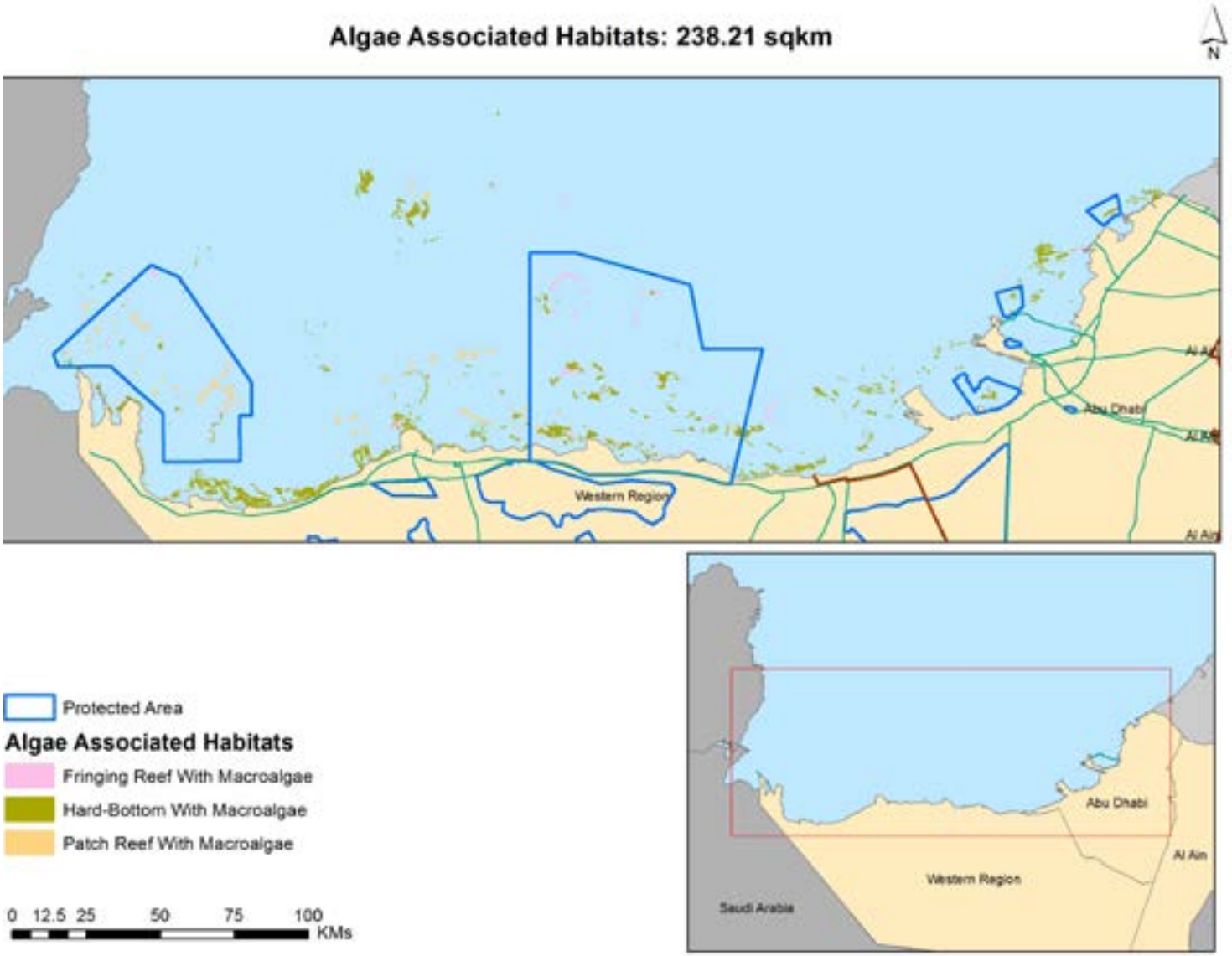
Status, Location and Description	Pressures	Response	Illustration
Macroalgae communities. **Status:** Environmentally sensitive within Abu Dhabi emirate. **Location:** In Abu Dhabi emirate, this habitat type is distributed from west to east from the Saudi Arabia border to the Dubai border, along the coast line and around the islands. **Description:** Thirty known seaweeds (macro algae) are found either in combination with seagrass and reef communities or in a separate community aggregations. They are characterised by greater than 10% cover of rooted vascular seaweed species. The most abundant species are *Phaeophyceae* (brown algae), with this habitat type providing a nursery for fisheries and juvenile turtles. It has also been identified as a marine habitat that sequesters carbon.	Coastal Development Dredging and Landfilling Climate Change	**Protection level:** Currently approximately 60% of this habitat type's distribution in Abu Dhabi is protected, where it is associated with coral reef communities. **Applicable habitat guiding principles and guidance notes for protection & mitigation:** *ESH Principle 1;* *ESH Principle 2;* *ESH Guidance Note 1;* *ESH Guidance Note 2;* *ESH Guidance Note 3;* *ESH Guidance Note 4; and* *ESH Guidance Note 5.*	

Figure 21 presents the current known macroalgae community distribution in Abu Dhabi emirate, although it is not intended to be indicative of all macroalgae communities – the marine baseline survey and impact assessment of the proposed development site will identify any additional macroalgae communities.

Figure 21: Macroalgae Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

6.4 Coastal sabkha

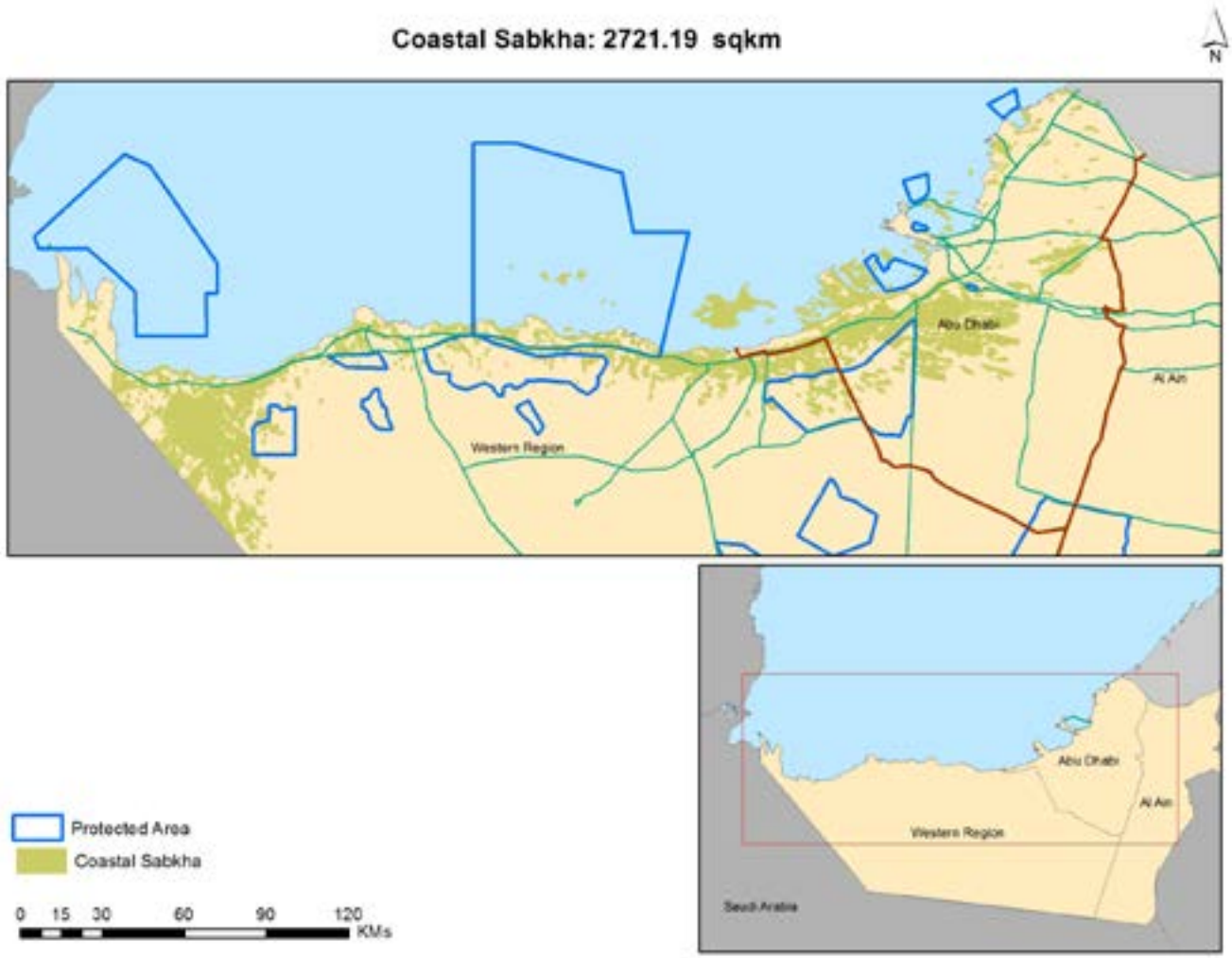
Table 17 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this environmentally sensitive habitat type.

Table 17: Coastal sabkha: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Coastal Sabkha. **Status:** Environmentally Sensitive within Abu Dhabi emirate. **Location:** The distribution of this habitat type can be found from the Western Region with the border of Abu Dhabi and Saudi Arabia, where it follows the coast to the Abu Dhabi / Dubai border. The largest, most continuous area of this habitat is found from Abu Dhabi city mainland, to Mirfa, however, other large expanses of this habitat type can also be found in the far Western Region, near the border with Saudi Arabia. **Description:** Coastal sabkha is salt-encrusted desert close to the coast covering wide expanses. It is devoid of vegetation due to the high salinity of the substrate. Halophytes, however, may occur where there is a thin carpeting of sand on the surface. Abu Dhabi's coastal sabkha are some of the best documented in the world, with the sabkha south of Al Dabbi'ya and Abu Al Abyadh Islands, the only complete sabkha in the world that represents the four main distinctive layers of sabkha, together in one site. While not a traditional Blue Carbon ecosystem, historic soil carbon stocks in Coastal sabkha are likely to have a Blue Carbon origin. When these ecosystems are destroyed, buried carbon can be released into the atmosphere, which subsequently contributes to global warming.	Coastal Development Agriculture	**Protection level:** Currently approximately 4.7% of this habitat type is protected in Abu Dhabi emirate. **Applicable habitat guiding principles and guidance notes for protection & mitigation:** *ESH Principle 1;* *ESH Principle 2;* *ESH Guidance Note 1;* *ESH Guidance Note 2;* *ESH Guidance Note 4; and* *ESH Guidance Note 5.*	

Figure 22 presents the current known coastal sabkha community distribution in Abu Dhabi emirate; although it is not intended to be indicative of all coastal sabkha communities – the marine or terrestrial baseline survey and impact assessment of the proposed development site will identify any additional sabkha communities.

Figure 22: Coastal Sabkha Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

6.5 Intertidal Flats

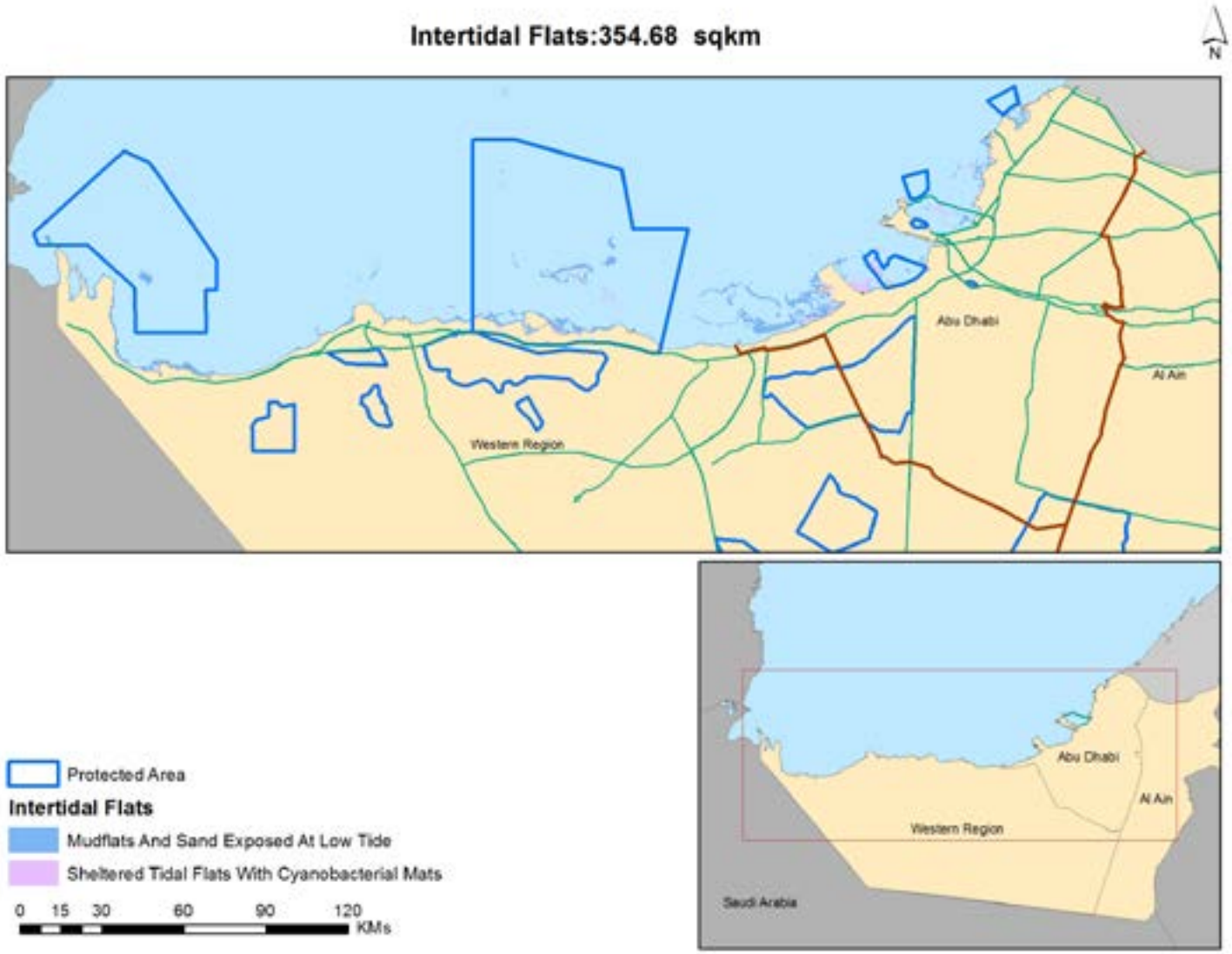
Table 18 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this environmentally sensitive habitat type.

Table 18: Intertidal flats: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Intertidal Flats with cyanobacterial mats **Status:** Environmentally Sensitive within Abu Dhabi emirate. **Location:** This habitat type can be found in Abu Dhabi distributed east to west along the coast and islands from Khalifa Port to the Saudi Arabia border. There is a higher concentration of this habitat type around the islands to the east Abu Dhabi Island and around the coastal areas and islands found between Mussafah and Sila. **Description:** This habitat consists of exposed intertidal substrates having greater than 25% cover of particles smaller than gravel. Species include a heterogeneous mix of those described in the Saltmarsh section.	Coastal Development Dredging and Landfilling Climate Change	**Protection level:** Currently approximately 28% of this habitat type's distribution in Abu Dhabi is protected. **Applicable habitat guiding principles and guidance notes for protection & mitigation:** *ESH Principle 1;* *ESH Principle 2;* *ESH Guidance Note 1;* *ESH Guidance Note 2;* *ESH Guidance Note 3;* *ESH Guidance Note 4; and* *ESH Guidance Note 5.*	

Figure 23 presents the current known intertidal flat community distribution in Abu Dhabi emirate, although it is not intended to be indicative of all intertidal communities – the baseline survey and impact assessment of the proposed development site will identify any additional intertidal communities.

Figure 23: Intertidal Flats Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

6.6 Islands & Coastal Rocky Cliffs

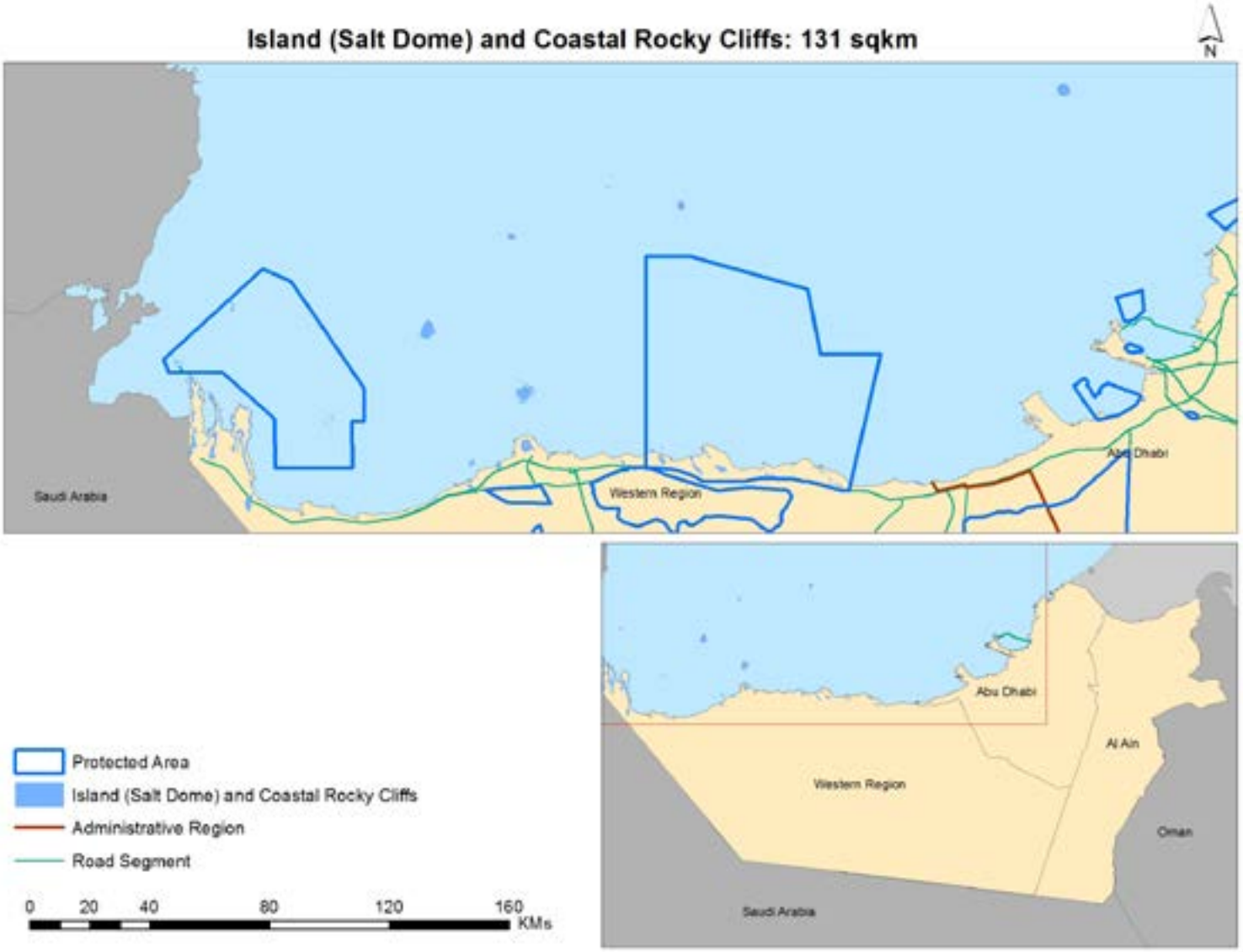
Table 19 presents details on the status, location, pressures, EAD response and protection & development mitigation guidance specific to this environmentally sensitive habitat type.

Table 19: Islands – Salt dome and coastal rocky cliffs: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Islands (Salt domes) & coastal rocky cliffs **Status:** Environmentally Sensitive within Abu Dhabi emirate. **Location:** Abu Dhabi's waters within the UAE's Exclusive Economic Zone. Islands of this habitat type include Sir Bani Yas, Delma Island, Qarnein and Zirku Island. **Description:** Includes low to high cliffs on the immediate coastline as well as salt domes located on islands. This habitat provides nesting habitat for seabirds including the White-cheeked Tern *(Sterna repressa)*, Bridled Tern (*Sterna anaethetus*), Lesser Crested Tern (*Thalasseus bengalensis)*, Greater Crested Tern Thalasseus bergii) Sooty Gull *(Larus hemprichii)*, Socotra Cormarant (*Phalacrocorax nigrogularis*), Sooty Falcon (*Falco concolor*) and the Hawksbill Turtle (*Eretmochelys imbricata)*.	Development pressure Dredging and Reclamation Climate Change	**Protection level:** Currently, 10% of this habitat is protected within declared protected areas. **Applicable habitat guiding principles and guidance notes for protection & mitigation.** *ESH Principle 1;* *ESH Principle 2;* *ESH Guidance Note 1;* *ESH Guidance Note 2;* *ESH Guidance Note 4; and* *ESH Guidance Note 5.* Note: Guidance for islands refers to habitat on islands, not the island itself.	

Figure 24 presents island and coastal rocky cliffs distribution in Abu Dhabi emirate; although it is not intended to be indicative of all coastal rocky cliffs and island habitats – the baseline survey and impact assessment of the proposed development site will identify any additional locations.

Figure 24: Islands (Salt Dome) and Coastal Rocky Cliffs) (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

6.7 Beach Rock and Gravelly Beaches

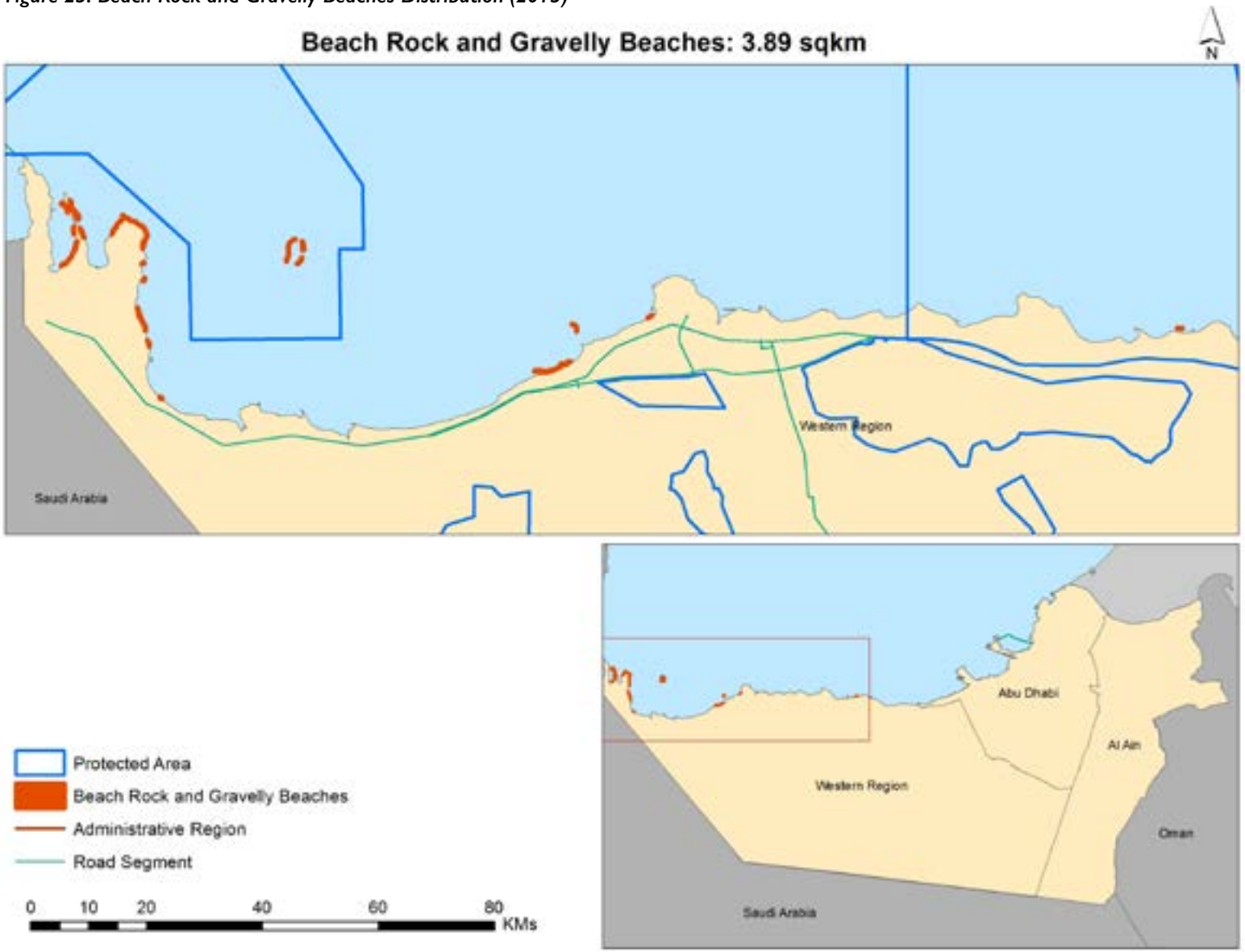
Table 20 presents details on the status, location, pressures, EAD response and protection and development mitigation guidance specific to this environmentally sensitive habitat type.

Table 20: Beach Rock and Gravelly Beaches: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Beach Rock and Gravelly Beaches **Status:** Environmentally Sensitive within Abu Dhabi emirate. **Location:** Generally in the Western Region of Abu Dhabi emirate. **Description:** Exposed low-angle intertidal shoreline terrace characterised by bedrock or boulders which singly or in combination have an aerial cover of 75% or more.	Coastal Development Dredging and Landfilling Climate Change	Protection level: Currently approximately 57% of this habitat type's distribution in Abu Dhabi emirate is protected. **Applicable habitat guiding principles and guidance notes for protection & mitigation:** *ESH Principle 1;* *ESH Principle 2;* *ESH Guidance Note 1;* *ESH Guidance Note 2;* *ESH Guidance Note 3;* *ESH Guidance Note 4; and* *ESH Guidance Note 5.*	

Figure 25 presents the current known beach rock and gravelly beaches distribution in Abu Dhabi emirate; although it is not intended to be indicative of all beach rock and gravelly beach habitat– the baseline survey and impact assessment of the proposed development site will identify any additional locations.

Figure 25: Beach Rock and Gravelly Beaches Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

6.8 Storm Beach Ridges

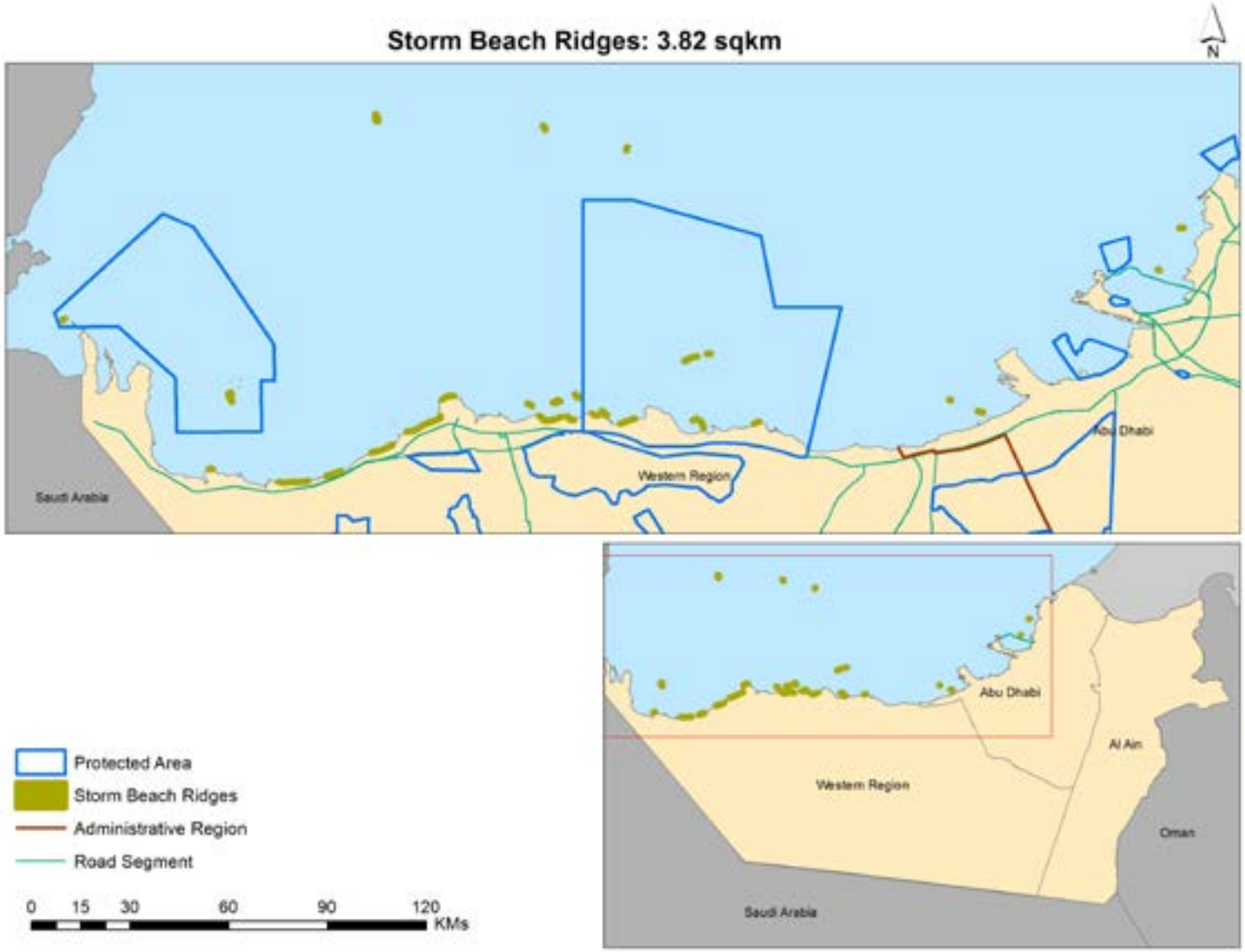
Table 21 presents details on the status, location, pressures, EAD response and protection and mitigation guidance specific to this environmentally sensitive habitat type.

Table 21: Storm Beach Ridges: status, pressures and response

Status, Location and Description	Pressures	Response	Illustration
Storm Beach Ridges Status: Environmentally Sensitive Description: Sandy, hummocky vegetated ground (More than 20% vegetation cover) above and parallel with the high water mark, less than 1 m high, occasionally overtopped by storms and traps sand blown inland from the intertidal zones. Several parallel ridges may be developed, with the older ones frequently showing dense cover of halophytic chenopods. The most characteristic species is *Sueda Vermiculata*. Kentish Plover and Saunder's Tern locally breed in storm beach ridges, while Hawksbill turtles use them for nesting Distribution: Formerly present along the majority of the mainland west coast of Abu Dhabi Island and on some barrier islands.	Coastal Development Dredging and Landfilling Climate Change Marine Debris & Litter	Protection level: Currently 28% of this habitat type's distribution in Abu Dhabi emirate is protected. Applicable habitat guiding principles and guidance notes for protection and mitigation: *ESH Principle 1;* *ESH Principle 2;* *ESH Guidance Note 1;* *ESH Guidance Note 2;* *ESH Guidance Note 3;* *ESH Guidance Note 4; and* *ESH Guidance Note 5.*	

Figure 26 presents the current known storm beach ridges distribution in Abu Dhabi emirate, although it is not intended to be indicative of all storm beach ridges– the baseline survey and impact assessment of the proposed development site will identify any additional locations.

Figure 26: Storm Beach Ridges Distribution (2015)



Source: EAD Habitat Map (2015). Please review EAD's www.enviroportal.ead.ae for electronic and the most up to date versions.

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Appendix I: Habitat Classification Codes (EAD, 2015)

Type no.	Sub-type no.	Habitat type	MMUs (ha)
1000		Intertidal habitats	
	1010	Mudflats and sand exposed at low tide	5
	1020	Sheltered tidal flats with cyanobacterial mats	5
	1030	Saltmarsh	5
	1040	Mangroves	5
	1050	Storm beach ridges	5
	1060	Sandy beaches	5
	1070	Beach rock and gravelly beaches	5
2000		Coastal plains, sand sheets and low dunes	
	2011	Coastal plains on well-drained sandy ground	25
	2012	Coastal plains on well-drained rocky or gravelly terrain	25
	2020	Coastal sand sheets and low dunes	5
	2030	Coastal cliffs, headlands, rocky slopes and wadis in coastal situations	5
3000		Coastal sabkha, including Sabkha Matti	
	3100	Coastal sabkha, including Sabkha Matti	25
4000		Sand sheets and dunes	
	4110	Sand sheets and dunes with tree cover	25
	4120	Sand sheets and dunes with shrub cover	25
	4130	Sand sheets and dunes with dwarf shrub cover	25
	4140	Sand sheets and dunes with perennial herbs and graminoids	25
	4200	Mega-dunes	25
5000		Gravel plains (alluvial and interdunal)	
	5110	Gravel plains with distinct tree vegetation	25
	5120	Gravel plains with dwarf shrub vegetation	25
	5130	Gravel plains with sparse vegetation	25
	5200	Inland sabkha	25
6000		Mountains, rocky terrain and wadis	
	6100	Mountain slopes, screes and associated wadis	25
	6210	Jebels (including mesas and burqas)	5
	6220	Escarpments, lithified sand dunes, rocky exposures	5
	6320	Wadis in open terrain, and drainage channels	25
7000		Inland standing water habitats and habitats of moist ground	
	7100	Semi-artificial lakes	1
	7200	Moist ground with Phragmites, Tamarix and grass mats	5
8000		Oases, Farmland and Forestry	
	8100	Date plantations	1
	8200	Farmland	1
	8300	Livestock areas	1

Type no.	Sub-type no.	Habitat type	MMUs (ha)
	8400	Forestry plantations	1
9000		Urban habitat types	
	9110	High density urban	1
	9120	Low density urban	1
	9210	Oil industry	1
	9220	Airports and Aerodromes	1
	9230	Port Areas	1
	9240	Other industry	1
	9300	Leisure areas	1
	9400	Paved roads	1
	9500	Pipelines infrastructure	1
	9600	Disturbed ground	1
		Marine Habitat types	
11,000		Coral Reef	
		Fringing Reef	
	11,110	Fringing Reef with Macroalgae	
		Patch Reef	
	11,210	Patch Reef with Macroalgae	
12,000		Seagrass Bed	
13,000		Hard-Bottom	
	13,010	Hard-Bottom with Macroalgae	
14,000		Unconsolidated Bottom	
15,000		Marine Construction	
	15,100	Rock Armouring/Artificial Reef	
	15,200	Marine Structure	
16,000		Dredged Areas	
	16,100	Dredged Sea Bed	
	16,200	Dredged Area Wall	
17,000		Deep Seabed	

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