Aqaba Amman Water Conveyance and Desalination (AAWDC) Project
Draft Biodiversity Action Plan Framework

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1 Introduction

1.1 Framework BAP for the AAWDCP

This document is a Framework for the development of a Biodiversity Action Plan (BAP) for the Aqaba Amman Water Conveyance and Desalination (AAWDC) Project (hereafter called "the Project"). It summarises the current status of biodiversity studies and findings on potential residual impacts of the Project on Natural Habitat, Critical Habitat and Priority Biodiversity Feature values, outlines the steps that will be necessary to achieve a potential No Net Loss or Net Gain for these values, and presents the initial options for offsets.

The purpose of this document is to:

- Summarise the biodiversity context and findings of the Marine and Terrestrial Critical Habitat Assessment
- Summarise the findings of the ESIA for biodiversity and provide a concise description of the residual impacts to Priority Biodiversity Features (including Natural Habitat) and Critical Habitat
- Summarise the Lender requirements
- Provisionally identify the Jordanian stakeholders that will support the BAP
- Outline a strategy for achieving No Net Loss/Net Gain of biodiversity and supporting next steps
- Provide the necessary steps for developing further stages of the Project's Biodiversity Action Plan.

1.2 The Project

The proposed Project is designed to generate 300 million cubic metres (MCM) of desalinated water per year, supplying Amman (250 MCM per year) and Aqaba (50 MCM per year) from a new desalination plant located near Aqaba. An overview of the Project area is shown in Figure 1-1.

The Project components include:

Desalination plant: A new desalination plant will be situated on the coast of the Gulf of Aqaba, within the Aqaba Special Economic Zone (ASEZ), a highly developed industrial area. New facilities to be built include:

- An intake pipeline to extract seawater from the Aqaba Sea, delivering the extracted seawater to a desalination plant
- A desalination plant and supporting water pumping facilities to enable the extraction of seawater, treatment of the seawater according to national and international drinking water quality standards, and pumping of the treated water via the conveyance system
- A pipeline to discharge desalination treatment by-products (e.g. brine), that will be pre-treated prior to discharge to comply with applicable environmental standards

Conveyance System: A new buried pipeline approximately 438 km in length, from the desalination plant to existing reservoirs at Abu Alanda and Al Muntazah in Amman. Sections of the pipeline will follow the existing Disi pipeline and Desert Highway. To support the pumping of water and control the pressure within the pipeline, there are:

- Three pumping stations

- Three tank facilities that regulate pressure

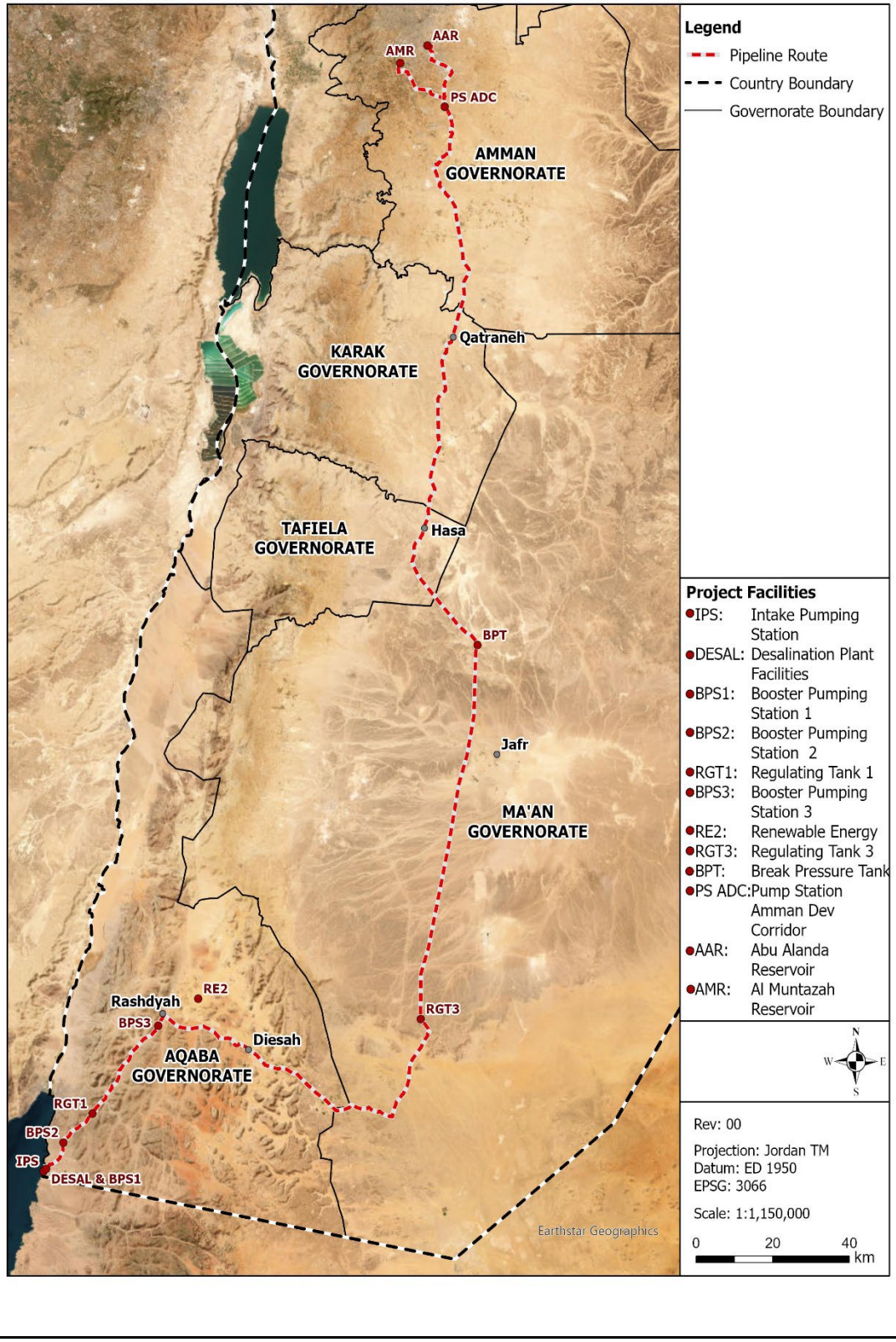
Renewable energy facility: A new renewable photovoltaic solar power plant and supporting electrical substation will be constructed, less than 5 km to the east of Qweirah. The Project will use electricity from this solar power plant, as well as from the national electricity transmission and generation companies (National Electrical Power Company (NEPCO), Jordanian Electrical Power Company (JEPCO) and Electricity Distribution Company (EDCO)) through long-term power purchase agreements.

Associated facilities: These include:

- New Overhead Transmission Line (OHTL): to be built and operated by NEPCO. This new electrical transmission lines, including an overhead line and buried cables to connect the renewable energy facility to the desalination plant and one of the pumping stations
- Other associated facilities include the existing water storage reservoirs at Abu Alanda and Al Muntazah in Amman. The design of required upgrades on these reservoirs, if any, are still not finalised. However, it is most probable that at least the Al Muntazah storage reservoir will require expansion

Based on the current schedule, it is anticipated that AAWDC Project construction activities will commence in 2Q 2026.

Figure 1-1: Overview of AAWDC Project



1.3 Lender requirements

This document represents the first iteration of the BAP for Critical Habitat, Priority Biodiversity Features and Natural Habitat. It is designed to fulfil the requirements set out in Lenders Guidance as follows:

- IFC PS6: 'In areas of Critical Habitat…… the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve Net Gains of those biodiversity values for which the Critical Habitat was designated.'
- EBRD:(In areas of Critical Habitat) 'the project's mitigation strategy will be described in a biodiversity management plan or biodiversity action plan, wherever appropriate.'
- EIB: The EIB Standard does not prescribe the production of a stand-alone Biodiversity Action Plan for those areas of Critical Habitat affected by a project. Rather, there is a requirement for a broader-scale Biodiversity Management Plan

Based on baseline studies, Critical Habitat Assessments (both marine and terrestrial) and the Environmental and Social Impact Assessment (ESIA) conducted to date, the AAWDC Project may have residual impacts to Priority Biodiversity Features (including Natural Habitat) and Critical Habitat within the Project Area of Influence.

The development of this BAP is necessary to ensure that Net Gain (NG) and No Net Loss (NNL) targets are met for the relevant biodiversity values, in accordance with the Lender Policies described in the ESIA. Ultimately, for each NG and NNL action, detailed plans with appropriate quantitative metrics will be defined, and a monitoring mechanism will be implemented to demonstrate that:

- Offsets will achieve measurable Net Gain outcomes for residual impacts to Critical Habitat
- Mitigation and if required offsets will achieve No Net Loss for residual impact to Priority Biodiversity Features (including Natural Habitat)

The IFC PS6 defines Net Gains as follows: 'Net Gains are additional conservation outcomes that can be achieved for the biodiversity values for which the Critical Habitat was designated. Net Gains may be achieved through the development of a biodiversity offset and/or, in instances where the client could meet the requirements of (paragraph 17 of) this Performance Standard without a biodiversity offset, the client should achieve Net Gains through the implementation of programs that could be implemented in situ (on-the-ground) to enhance habitat, and protect and conserve biodiversity.'

1.4 Stakeholder Engagement

The Project Lender policies require that a BAP be developed through engagement with relevant experts and stakeholders to ensure it is widely supported and successfully implemented. To support the development of the BAP, the stakeholders in Table 1-1 will be consulted; this list is provisional, and additional stakeholders will be identified and consulted as the BAP is developed.

Table 1-1: Stakeholders to be Engaged with to Support Preparation of the BAP

Stakeholder	Key Function	Role to support the BAP development and implementation
Ministry of Environment (MoEnv)	The national authority responsible for environmental policy, regulation, and enforcement, including protection of natural	Ensuring the BAP complies with national environmental laws and biodiversity protection requirements.

Stakeholder	Key Function	Role to support the BAP development and implementation
	resources, biodiversity, and environmental quality.	Reviewing and endorsing the BAP as part of the ESIA and environmental permitting process. Overseeing the implementation of biodiversity mitigation and monitoring commitments throughout construction and operation. Ensuring alignment with national biodiversity strategies, protected area regulations, and wildlife protection bylaws. Providing access to national biodiversity databases or guidance on species of conservation concern. Intervening if project activities violate environmental or biodiversity protections and ensuring necessary measures are undertaken to rectify any non-compliance Ensuring the project supports national commitments under the Convention on Biological Diversity (CBD) and the National Biodiversity Strategy and Action Plan (NBSAP). Act as the lead entity coordinating joint measures required by the national government and non-government organisations
Aqaba Special Economic Zone Authority (ASEZA) / Wadi Rum Protected Area	Within their jurisdictions, Regulate land-use planning, development, and environmental management within the SEZ, including terrestrial habitats. Enforce environmental permits, impact mitigation, and protected area regulations within its jurisdiction.	Ensuring the BAP complies with national environmental laws and biodiversity protection requirements. Ensure terrestrial BAP measures are aligned with land-use plans, infrastructure development, and industrial projects. Reviewing and endorsing the BAP as part of the ESIA and environmental permitting process. Work with RSCN, MoEnv, and local municipalities to manage biodiversity in protected and unprotected areas within ASEZA jurisdiction. Track implementation of biodiversity measures (e.g., habitat restoration, wildlife corridors) and enforce compliance. Facilitate biodiversity management in terrestrial and marine reserves and buffer zones within ASEZA jurisdictions, including ecological monitoring and habitat protection programmes.
Royal Society for Conservation of Nature (RSCN)	To protect Jordan's wildlife and Natural Habitats by managing nature reserves and leading conservation, environmental law enforcement, and community-based eco-development.	Provide ecological expertise on species, habitats, and sensitive areas along the pipeline and conveyance corridor. Review and validate biodiversity baseline data, especially for protected or threatened species. Support monitoring programmes, including field surveys and post-construction biodiversity monitoring.

Stakeholder	Key Function	Role to support the BAP development and implementation
		Facilitate coordination with protected areas to ensure the project aligns with national conservation priorities.
UNESCO	Wadi Rum Protected Area is a UNESCO World Heritage Site, recognised for both its natural and cultural significance.	Check the implementation of terrestrial biodiversity measures in Wadi Rum to safeguard OUV. Ensure project activities do not negatively impact protected species, habitats, or landscapes.
Ministry of Agriculture (MoA)	Oversees forests, rangelands, and plant protection.	Approve activities involving tree removal, replanting, or habitat restoration. Support revegetation, native planting, and soil conservation programmes. Monitor impacts on rangeland ecosystems and grazing corridors.
Ministry of Water and Irrigation (MWI)	Lead authority for the project; responsible for water resource management.	Ensure integration of biodiversity requirements into project design and construction contracts. Facilitate access to land and oversee/verify the Project's environmental monitoring and reporting. Support water-related habitat assessments (wadis, springs, seasonal flows) and data provision.
Ministry of Local Administration (MoLA) / Municipalities	Local planning, land-use regulation, and community coordination.	Assist with local permits, access routes, and land-use compliance. Support engagement with local communities for habitat protection and restoration. Identify local ecological constraints and sensitive sites.
Local Subject Matter Experts	Biodiversity, ecology, and environmental science expertise.	Participate in field surveys for flora/fauna, avi-fauna, and habitats. Support long-term terrestrial biodiversity monitoring. Facilitate research internships and partnerships supporting the BAP.
Aqaba Marine Reserve (AMR)	Protected area management for marine habitats and species	Serve as recipient site for coral transplantation. Supervise relocation operations and ensure ecological suitability. Integrate post-relocation monitoring into AMR management plans.
Marine Science Station (MSS) / Local Marine Researchers and Experts	Scientific research institution of the University of Jordan (UJ) and Yarmouk University (YU). The station is recognised by ASEZA and the MoEnv as the primary reference body for marine scientific data, environmental baseline assessments, and long-	Marine research, monitoring, and technical expertise Conduct pre-construction, post-construction, and operational marine surveys and monitoring. Support the selection of coral relocation sites and post-transplant monitoring. Advise on transplantation methods, success criteria, and adaptive management.

Stakeholder	Key Function	Role to support the BAP development and implementation
	term ecological monitoring in the GoA.	Analyse monitoring data and recommend corrective measures if targets are not met.
The Royal Marine Conservation Society (JREDs)	Marine conservation NGO focused on protecting coral reefs, seagrass beds, fish, and other marine biodiversity in Jordan. Conducts research, awareness campaigns, and community-based conservation projects. Supports sustainable use of marine resources and promotes best practices for marine ecosystem protection.	Coordination, awareness, and promotion of BAP measures.

2 Biodiversity Context

2.1 Marine Environment

The Red Sea region (including the Gulf of Aqaba - GoA) is characterised by high spatial heterogeneity, which is a driving force of speciation, as species are naturally selected for their ability to adapt and diversify. Transitional environmental gradients, ecotones, are associated with speciation and high species and genetic diversity. For these reasons, there are high levels of unique biodiversity and endemism across the Red Sea and GoA region.

The GoA has warm water temperatures (for a high latitude basin) and is generally unaltered by freshwater runoff from the otherwise arid adjacent coastal lands. The high marine biodiversity value of the Red Sea region, including the GoA, reflects its pivotal location between Africa and Eurasia and its isolation due to global climatic changes since the last ice age. These characteristics have shaped distinct, evolutionarily unique, and often endemic marine species and habitats.

The GoA is located at the most north-eastern point of the Red Sea basin. It is a unique waterbody with a maximum depth of 1,830m. It reaches 200km in length and 25km at its widest point. It is semi-isolated at its westernmost extent by the 252m deep Sill of Tiran. The GoA is highly oligotrophic (nutrient-deficient, with high water clarity) due in part to low precipitation and the absence of major riverine inputs. These factors, coupled with its geographic position and climate, result in very high surface light penetration depths (Khalaf, 2005). Depth and light are two key biophysical limiting factors within marine environments. They are used to distinguish marine zones as they determine the ecological processes that can occur and, in turn, the abundance and distribution of species within them. The GoA is also characterised by both high temperatures (20.5°C – 27.3°C) and hyper-salinity (40.3-41.6 psu).

The GoA encompasses a range of complex, diverse marine and coastal habitats with high biological diversity, including endemic species. It generally has a low tidal range; consequently, the intertidal zone is relatively limited (Al-Zibdah, 2007). The Jordanian coastline extends south for about 27km from the most northeastern tip of the GoA. The northern coast is characterised by sandy flats that extend south for about 5km, beyond which fringing coral reefs begin, extending south to the border with Saudi Arabia (Khalaf, 2004).

Aqaba Marine Reserve (AMR) is the only Marine Protected Area (MPA) in Jordanian waters and forms part of the Jordan Protected Areas Network. The habitats it was selected to protect include extensive coral reef complexes and seagrass beds, as well as fish, invertebrates, marine mammals and turtles of high conservation value (UNDP, 2023). The AMR is over 2.5km from the Project, and no impacts to the AMR within the 2025 ESIA have been identified. The Marine Critical Habitat Assessment provides additional context on the AMR and other protected, designated and recognised sites within the Gulf of Aqaba, the Project components do not overlap with any.

In 2025, to support the ESIA and Critical Habitat Assessment, a baseline survey of the benthic habitats within the vicinity of the Project was completed, utilising ROV technology, drop-down video, and diver surveys to collect underwater imagery. The objective of the survey was to identify and classify major seabed types and to generate point-sample habitat distribution maps to inform subsequent detailed sampling and environmental assessments. The diver surveys enable a taxonomic inventory at the genus level and the calculation and reporting of the percentage cover of benthic taxa/lifeforms.

The survey results confirmed a ringing-reef system with clear spatial and depth-related structure. Habitats range from seagrass meadows and patchy coral in shallow water to well-developed coral reefs

on the mid-slope, and mixed coral-sediment habitats that transition to sandy seabed at depth. The bay exhibited a South to North Gradient:

- Southern bay: lower seagrass presence, moderate coral at depth
- Central bay: highest coral cover and most developed slope reef
- Northern bay: strongest shallow seagrass signal, coral increasing with depth

This gradient likely reflects wave exposure, sediment movement and basin morphology, with the northern shallows more sheltered and sediment-influenced. The bay also exhibited a depth trend, which is the dominating organising factor for flora and fauna. This is consistent with fringing-reef zonation and the optical and sedimentary gradients of the northern Red Sea.

Results from the habitat mapping to support the ESIA, show the area to have a fringing area of intertidal habitats and seagrass beds, with patch reefs occurring in the shallow sub-tidal environment. As the seabed deepens, coral cover increases, and a fringing coral reef extends along the length of the ESIA Study Area. Mixed reef and sediment habitats become more dominant as light levels decrease, with sediment and scattered reef areas becoming prevalent in deeper waters.

2.2 Terrestrial Environment

Jordan is located within the eastern margins of the eastern Mediterranean. Much of Jordan can be classified as semi-desert, with the western highlands experiencing a Mediterranean climate. Several diverse and distinct biotopes exist in Jordan. Based on phytogeography, annual rainfall and soil types, Jordan is divided into four main biogeographical regions:

- The Mediterranean region extends from the northern mountains to the south near Petra. It is characterised by its distinctive terra rosa and rendzina soil types. Annual rainfall ranges between 400 and 600 mm. The vegetation within this region includes Oak (*Quercus* sp.), juniper (*Juniperus phoenica*) and pine forests (*Pinus halepensis*), which occur in these more montane areas
- The Irano-Turanian region extends over about the lower half of the Jordan valley and reaches Ras An Naqab in the south. The annual rainfall varies between 150 and 250mm. The soil is loess and/or calcareous and supports poor scattered steppe vegetation including arid shrubs such as *Artemesia herba-alba, Anabasis* sp. and *Retama raetam*
- The Saharo-Arabian region occupies the largest portion of the Country. The soil is extremely poor and comprises Hamada, saline, sandy loam or mud flats. The surface is covered by sand dunes, gravel or pebbles and black lava rocks. The annual rainfall is 50-100 mm. *Artemesia herba-alba*, *Achillea fragrantissma* and *Trigonella* sp. are among the most common plant species
- The Sudanian penetration covers Wadi Araba, the eastern borders of the southern end of the Dead Sea and southern Jordan. In Wadi ‘Araba, altitudes range from 400 m below sea level to sea level near Aqaba and 200 m above sea level at Ar-Rishah. Soil is predominantly alluvial, saline sand with scattered sand-dunes, lisan marls and others. The annual rainfall ranges 50-100 mm. Vegetation is exemplified by species such as *Haloxylon persicum*, *Acacia* sp., *Calotropis procera* and *Nitraria retusa*

The majority of the pipeline route falls within the Saharo-Arabian biogeographical region, though the southern end falls within the Sudanian region, and the northern end falls within the Irano-Turanian region (Taifour et al. 2022).

Within this broad region, plant cover is typically sparse, ranging from 1–15%. Early successional grasses (e.g., *Stipellula capensis*) and sedges (*Carex divisa*) yield to dune-binding shrubs, such as *Panicum turgidum* and *Zilla spinosa*, with a climax vegetation dominated by *Haloxylon persicum*. Frequent associates include Retama raetam, *Hammada salicornica*, *Anabasis articulata*, and *Caroxylon tetrandrum*; characteristic annuals include *Neurada procumbens*. *Haloxylon* and *Retama* serve as nurse shrubs, enhancing microsite moisture and supporting the presence of other species.

The upper layers of vegetation are typically sparse, with shrub and annual layers responding to episodic rainfall pulses. Dominant trees are *Vachellia tortilis* subsp. *tortilis* and *V. tortilis* subsp*. raddiana*. Frequent shrub/herb associates include *Hammada salicornica*, *Anabasis articulata*, *Senna italica*, and *Asteriscus graveolens*. Where groundwater is accessible, *Phoenix dactylifera* and *Tamarix* spp. may be present. The presence of annual species is tightly linked to the occurrence of years with higher than average rainfall. Grazing pressure and fuelwood cutting reduce sapling survival.

The region is interspersed with salt flats composed of fine-grained silt and clay pans with saline–alkaline tendencies, often inundated after major storms and desiccating to form polygonal crusts. Vegetation, where present, is typically limited to the edges of the pans and to micro-elevations.

Halophytic shrubs and subshrubs dominate edges and hummocks. Common large shrubs include C*apparis ovata*/*leucophylla, Nitraria retusa*, and *Tamarix* spp.; smaller halophytes include *Frankenia hirsuta* and *Suaeda* spp.; *Aeluropus littoralis* may form grass dominated patches.

Halophytic communities occupy saline alluvium and sabkha margins within halophytic and thermophilous enclaves of the Dead Sea-Araba Corridor with *Tamarix* spp., *Atriplex* spp., *Suaeda fruticosa*, and *Nitraria retusa*. Thermophilous enclaves—Ziziphus *spina-christi*, *Balanites aegyptiaca*, *Calotropis procera*, and *Moringa peregrina*—occur in warm wadis and south-facing slopes, particularly toward Aqaba.

The southern desert habitats host specialised xerophytes and several regionally significant taxa. Indicator species include *Haloxylon persicum* and *Retama raetam* for stabilised dunes; *Vachellia tortilis* (s.l.) for desert woodlands; *Frankenia hirsuta* and *Suaeda* spp. for saline pans; and *Ziziphus spina-christi* and *Balanites aegyptiaca* for thermophilous enclaves. Local endemics and Mediterranean relicts persist in granite–sandstone refugia.

Habitats in the Project's Area of Influence (AoI) include Natural Habitat (as defined by IFC PS6), comprising desert (bare/sparse vegetation) and some patches of grassland. There are also areas of Modified Habitats in the form of built-up areas (primarily roads, roadsides and settlements) and some patches of cropland.

Project components overlap the buffer zone for the Wadi Rum World Heritage Site, as well as two Internationally Recognised Areas (IRAs):

- Aqaba Coast and Mountains Key Biodiversity Area (KBA) and Important Bird Area (IBA), which was designated due to a migratory population of 3,000 Levant Sparrowhawks (*Accipiter brevipes*). This represents up to 30% of the global population estimate of 10,000 individuals
- Hisma Basin – Rum KBA. A total of 34 bird, reptile and plant species are listed on this KBA's webpage as KBA triggers. However, the assessment was undertaken in 2016, and therefore, it is not confirmed if these meet the global KBA criteria

2.3 Summary of Critical Habitat, Priority Biodiversity Features and Natural Habitat

2.3.1 Marine Environment

The following table (Table 2-1) lists those taxa which have been identified as Critical Habitat or Priority Biodiversity Features (including Natural Habitat). These data have been derived from the Marine Critical Habitat Assessment.

It also identifies additional survey and assessment requirements for each taxa to confirm or refute their status within the Study Area and to determine whether the EAAA is likely to directly or indirectly affect the feature.

Table 2-1: Marine Critical Habitat and Priority Biodiversity Features within the scope of this Framework BAP

Biodiversity Value	Species
Turtles (PBFs)	Hawksbill (*Eretmochelys imbricata*) Green (*Chelonia mydas*)
Marine Mammals (PBFs)	Indian Ocean humpback dolphin (*Sousa plumbea*) Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) Pantropical spotted dolphin (Stenella attenuate (subspecies: *S. attenuata attenuata*))
Elasmobranchs (PBFs)	Spotted eagle ray (*Aetobatus ocellatus*) Coach whipray (*Himantura uarnak*) Spinetail devil ray (*Mobula mobular*) Oceanic manta ray (*Mobula birostris*) Panther torpedo (*Torpedo panthera*) Pink whipray (*Himantura fai*) Shortfin Mako (*Isurus oxyrinchus*) Tiger shark (*Galeocerdo cuvier*)
Teleosts (Bony fish) (CH)	Humphead wrasse (*Cheilinus undulatus*) Sky emperor (*Lethrinus mahsena*) Red Sea coral grouper (*Plectropomus marisrubri*)
Clams (CH)	Giant clam (*Tridacna squamosina*)
Coral habitat (CH)	All coral reef habitat
Seagrass habitat (CH)	All seagrass habitat

2.3.2 Terrestrial Environment

The following table (Table 2-2) lists species identified as confirmed or possible Critical Habitat or Priority Biodiversity Features (including Natural Habitat). These data have been derived from the Terrestrial Critical Habitat Assessment.

Possible Critical Habitat is defined as 'if the range overlap is close to at least one threshold, or potential for the EAAA to have a higher proportion of the population than average (e.g. based on publicly-available data or expert consultation').

Table 2-2: Terrestrial Critical Habitat and Priority Biodiversity Features within the scope of this Framework BAP

Biodiversity Value	Species
Plants (CH)	*Artemisia jordanica* *Hyoscyamus muticus* *Calligonum comosum* (Possible) *Stipagrostis* spp. (Possible)
Plants (PBF)	*Cleome droserifolia*
Avifauna (CH)	Levant sparrowhawk *Accipiter brevis* Sooty Falcon *Falco concolor* (Possible) Steppe Eagle *Aquila nipalensis* (Possible)
Avifauna (PBF)	Eastern Imperial Eagle *Aquila heliaca* Verreaux's Eagle *Aquila verreauxii* Greater Spotted Eagle *Clanga clanga* Peregrine Falcon *Falco peregrinus* Griffon Vulture *Gyps fulvus* Egyptian Vulture *Neophron percnopterus* Buff-rumped Wheatear *Oenanthe moesta* Grey Plover *Pluvialis squatarola* Syrian Serin *Serinus syriacus* European Turtle Dove *Streptopelia turtur*
Mammals (PBF)	Nubian Ibex *Capra nubiana*
Reptiles (PBF)	Spur thighed tortoise *Testudo graeca* Egyptian spiny tailed lizard *Uromastyx aegyptia*

3 Residual Impact Summary

The ESIA provides a detailed assessment of mitigation and residual impacts, including Critical Habitat and Priority Biodiversity Features (including Natural Habitat). The tables in this section provide a summary of the Project's potential impacts on Critical Habitat and Priority Biodiversity Features (including Natural Habitat). It adopts a precautionary approach and assumes that all listed Critical Habitat and Priority Biodiversity Features (including Natural Habitat) are present and will be affected by the project's impacts. Tables are presented for:

- Table 3-1: Marine Environment Residual Impact Summary: Construction impacts from installation work
- Table 3-2: Marine Environment Residual Impact Summary: Construction and operational impacts from underwater sound and disturbance
- Table 3-3: Marine Environment Residual Impact Summary: Operational Phase Discharges from the Desalination Plant
- Table 3-4: Marine Environment Residual Impact Summary: Operational Phase Seawater Abstraction
- Table 3-5: Terrestrial Environment Residual Impact Summary: Temporary construction impacts, permanent habitat change and operational impacts

It should be noted that this represents the worst-case scenario based upon existing data; the quantification will be detailed once the detailed design is confirmed.

Table 3-1: Marine Environment Residual Impact Summary: Construction impacts from installation work

Critical Habitat: Coral, Giant Clam, Seagrass and Teleost Fish		
Impact mechanism	**Proposed mitigation**	**Residual impact and offset summary**

Construction phase trenching, outfall installation, anchor and jetty construction:
• Loss/damage of habitat
• Loss/damage of individual colonies
• Loss/damage by physiological stress
• Behavioural change
• Reduced reproductive/ settlement success
Impacted area:
• 2,646m2 coral habitat, which includes 19% patch reef and shallow seagrass habitat
	Avoidance:
	• Reduced project physical footprint and micro-siting
	• Coral translocation
	• Consideration of seasonal restrictions during seasonal reproductive periods
	• Use of silt curtains and other turbidity controls
	Management:
	• ESMMP and supporting ESMS
	• Construction management, including pollution prevention, marine construction operational controls
	• Environmental monitoring and reporting program to support adaptive management during construction
	Restoration:
	• Physical reinstatement of impacted areas and creation of suitable seabed substrate
	• Biorestoration via transplanting of coral colonies
		Mitigation quantification:
		• The translocation of coral and giant clams to depths less than 35m
		  ○ Restoration planned of 1,641 m2 (representing 62%) of the impacted seabed, which includes 491m2 of patch reef and shallow seagrass habitat
		  ○ The Jordan Marine Reserve has reported a survival rate of 80% for translocated coral
		• Coral translocation deeper than 35m is considered non-viable due to the water depths preventing access by divers
		  ○ No restoration viable for 1,005m2 of the impacted seabed
		• The outfall, the concrete collars, the lagoon seawall and the concrete mattress to protect the outfall to a depth of 10m, will create an estimated 1,500m2 of new suitable substrate for coral, giant clam (will require further study) and fish habitat
		Residual impact on Critical Habitat:
		• 1,313 m2 coral and patch reef and shallow seagrass habitat
		• The residual impact will affect 0.35% of the total coral and patch reef and shallow seagrass habitat in the Study Area
		Offset summary
		• Net Gain required to Critical Habitat: Reef habitat to support coral, giant clam, seagrass and teleost fish

Table 3-2: Marine Environment Residual Impact Summary: Construction and operational impacts from underwater sound and disturbance

Critical Habitat: Turtles, Marine mammals, Elasmobranchs (sharks & rays), Seabirds		
Impact mechanism	**Proposed mitigation**	**Residual impact and offset summary**
Construction and operations phase: • Behavioural changes in response to underwater sound during construction • Temporary physical presence of construction vessels and equipment • No operational phase activities considered significant Impacted area: • No potential for mortality or injury at distances greater than 76m • Potential for temporary disturbance and behavioural changes in fish up to 684m and in cetaceans within 500m	Avoidance: • Marine mammal and turtle observer program • Soft start and a stop work protocol in the event that underwater sound receptors are observed Management: • ESMMP and supporting ESMS • Marine Construction Works Management Plan, including an underwater sound adaptive management and reporting system Restoration: • Not required/applicable	Residual impact on Priority Biodiversity Features and Natural Habitat: • No residual impact predicted Offset summary: • No offset required

Table 3-3: Marine Environment Residual Impact Summary: Operational Phase Discharges from the Desalination Plant

Critical Habitat: Coral and Teleost fish		
Impact mechanism	**Proposed mitigation**	**Residual impact and offset summary**
Operations phase discharge from the desalination plant: • Seawater quality impacts Impacted area: • Water column impacts not considered significant • 9,076m2 of seabed habitat with <15% coral cover impacted by the increase in salinity of 0.82 psu (defined by the 2% threshold)	Avoidance: • Desalination water treatment process controls to neutralise biocide and chlorine to reduce effluent toxicity and suspended solids • Reverse osmosis technology to reduce the increase in effluent temperature • Diffuser design Management: • ESMMP and supporting ESMS • Operations and maintenance (O&M) controls and procedures • Comprehensive discharge monitoring, including continuous online monitoring and regular sampling • Environmental monitoring and reporting system to support adaptive management	Residual impact on Critical Habitat: • 9,076 m2 of coral habitat • The residual impact will affect 1.2% of the total coral habitat in the Study Area Offset summary: • Net Gain required to Critical Habitat: Reef habitat to support coral and teleost fish

Table 3-4: Marine Environment Residual Impact Summary: Operational Phase Seawater Abstraction

Critical Habitat: Coral, Giant Clam, Seagrass and Teleost Fish		
Impact mechanism	**Proposed mitigation**	**Residual impact and offset summary**
Operations phase abstraction of seawater: • Reduced reproductive/ settlement success Impacted area: • 3,500m2 of intertidal coral habitat, with 2% coral cover, the lowest within the Study Area	Avoidance: • Abstraction of water from within a lagoon • Fish recovery and return system • Continuous operation of a bubble curtain at the mouth of the lagoon • Consideration of an additional bubble curtain during periods of intense planktonic larval spawning/reproduction Management: • ESMMP and supporting ESMS • Settlement monitoring from within the lagoon to confirm effectiveness to support adaptive management	Residual impact on Critical Habitat: • 3,500m2 of intertidal coral habitat • The residual impact will affect 4.2% of the total coral habitat in the Study Area Offset summary: • Net Gain required to Critical Habitat: Reef habitat to support coral, giant clam, seagrass and teleost fish

Table 3-5: Terrestrial Environment Residual Impact Summary: Temporary construction impacts, permanent habitat change and operational impacts

Natural Habitat: Potential Critical Habitat and Priority Biodiversity Feature triggering flora, fauna and birds		
Impact mechanism	**Proposed mitigation**	**Residual impact and offset summary**

Construction phase site / ROW preparation (including vegetation removal, topsoil stripping):
• Loss/damage of habitat
• Loss/damage of individual flora, fauna and birds
Operational phase OHTL impacts
Impacted area:
• 1,534 hectares of natural and degraded habitat
• Flora:
  ○ Potential Critical Habitat plant species: 4
  ○ Potential Priority Biodiversity Feature species: 1
• Fauna:
  ○ Potential Priority Biodiversity Feature species: 1 mammal, 2 reptile species,
• Birds:
  ○ Potential Critical Habitat species: 3
  ○ Potential Priority Biodiversity Feature species: 10
	Avoidance:
	• Pre-construction surveys to confirm the presence of important biodiversity values to enable:
	  ○ Planning of seed collection and translocation of all tiggering/important flora and fauna before construction
	  ○ Planning of seasonal breeding bird avoidance measures
	  ○ Installation of bird diverters on OHLT and design of wildlife-friendly pylons
	Reduce and control project's physical footprint and maximise avoidance through micro-siting of temporary facilities Management:
	• ESMMP and supporting ESMS, including Biodiversity Sensitivities and Constraints Assessment
	• Construction management, focusing on erosion control, wildlife interaction, nesting bird avoidance and reinstatement planning
	• Environmental monitoring and reporting program to support adaptive management during construction, including OHTL post fatality monitoring (PCFM)
	Restoration:
	• Physical reinstatement of impacted areas and creation of suitable soil/ground conditions
	• Biorestoration via replanting of vegetation or broadcasting of recovered seed
		Mitigation quantification:
		• Pre-construction avoidance via translocation and seed collection and restoration of the right of way (assuming a 20% residual impact from temporal loss) and restoration of 70% of the renewable energy site will reduce residual impact by 1,166 hectares
		Residual impact on Natural Habitat:
		• 368 hectares of natural and degraded habitat
		  ○ A total 162 of hectares of natural and degraded habitat will be permanently lost due to the presence of permanent facilities, via habitat conversion
		  ○ A total of 205 hectares of natural and degraded habitat will be impacted, assuming a 20% residual impact from temporal loss, following reinstatement of the pipeline right of way
		Offset summary:
		• No Net Loss required for potential Priority Biodiversity Features: Desert habitat to support flora, fauna and birds

4 Offset Strategy

4.1 Key principles

This section of the Framework BAP provides key principles for biodiversity offset selection, development and implementation. Offsets will only be considered as a last resort and will align with the Convention of Biological Diversity to account for an ecosystem approach, and the following 10 principles based on the Business and Biodiversity Offsets Programme, Biodiversity Offset Design Handbook (BBOP 2009) and guidance notes (BBOP 2012):

- Adherence to the mitigation hierarchy: an offset is a commitment to compensate like-for-like or better for significant residual adverse impacts on biodiversity that are identified after appropriate avoidance, minimisation, and on-site rehabilitation measures have been taken according to the mitigation hierarchy
- Limits to what can be offset: there may be occasions where a biodiversity offset cannot fully compensate for residual impacts because the affected biodiversity feature is irreplaceable or vulnerable
- Landscape/Seascape context: biodiversity offsets should be designed and implemented in a landscape context to achieve the expected measurable conservation outcomes, taking into account the full range of biological, social, and cultural values of biodiversity and supporting an ecosystem approach
- No Net Loss/Net Gain: biodiversity offsets should be designed and implemented to achieve in situ, measurable conservation outcomes that can reasonably be expected to result in No Net Loss and, in the case of Critical Habitat qualifying features, a Net Gain of biodiversity
- Additionality and conservation outcomes: a biodiversity offset should achieve conservation outcomes above and beyond what would have occurred had the offset not been in place. In addition, biodiversity offset design and implementation should avoid displacing harmful activities to other areas outside of the offset site
- Stakeholder participation: in the areas affected by the project and in areas envisaged for the biodiversity offset, effective participation of stakeholders should be ensured in decision-making about biodiversity offsets. This should include participation in offset evaluation, selection, design, implementation, and monitoring. Stakeholders to engage include, among others, local authorities, protected area managers, and affected communities.
- Equity: biodiversity offsets should be designed and implemented in an equitable manner, which means sharing among stakeholders the rights and responsibilities, risks and rewards associated with a project and offset in a fair and balanced way. Respecting legal and customary arrangements
- Long-term outcomes: the design and implementation of a biodiversity offset should be based on an adaptive management approach, incorporating monitoring and evaluation, to secure outcomes that last at least as long as the project's impacts, and preferably in perpetuity
- Transparency: the design and implementation of a biodiversity offset, and communication of its results to the public, should be undertaken in a transparent and timely manner

- Science and traditional knowledge: the design and implementation of a biodiversity offset should be a documented process informed by sound science, including an appropriate consideration of traditional knowledge.

4.2 Preliminary Offset and Conservation Projects

Given the scale of the Project and the marine and terrestrial habitats it will encounter, a range of potential offset and conservation projects have been evaluated to address residual impacts on Critical Habitat and Priority Biodiversity Features (including Natural Habitat).

The primary focus of the marine offsets to achieve Net Gain will be enhancing shallow-water habitats < 35m, which also support seagrass habitats. Maintaining and enhancing coral cover and reef quality, especially in shallow reefs, will support the provision of ecosystem functions, biodiversity and services of benefit to both natural systems and human infrastructure and activities in the marine environment. Shallow reef systems (35m depth and shallower) are relatively accessible for monitoring and implementing conservation actions.

The terrestrial components of the Project are located in arid (water-scarce) desert ecosystems; the key priority of potential conservation efforts to achieve No Net Loss will be to capture and utilise limited water resources. Collecting and enhancing the availability of naturally occurring overland flow after infrequent rainfall is essential to encourage self-augmenting growth and higher plant density. This will also attract a wider range of fauna, including insects, reptiles, and mammals, thereby creating a healthy habitat that supports many ecosystem services.

Table 4-2 and Table 4-3 below provide a preliminary list of offset and conservation actions targeted on project residual impacts that could be complementary or stand-alone initiatives.

Table 4-1: Preliminary Identification of Offset Options

Action	Summary	Target species	Target outcome	Overlap with other programs
Coral farming	Support the establishment of a coral farming facility to support restoration of degraded sites. Establishing capacity to maintain and keep viable coral collected from impacted sites, collecting samples from healthy corals to grow-on, using settlement plates to recruit and grow-on coral larvae will provide develop a resource that can be used to assist the recovery of Jordanian coral reefs from natural and anthropogenic disturbances.	Coral species and colony lifeforms that are the principal reef builders from Jordan. A focus on corals that are resistant to environmental variables (e.g. temperature and salinity).	A reservoir of healthy and resilient replacements to replace lost individuals from future perturbations.	In Jordan experience of coral translocation and habitat enhancement exists. Aqaba Marine Reserve have completed programs to support port development .
Coral reef Habitat restoration and enhancement	Identify areas with existing impacts to coral that require intervention to support the recovery or establishment of coral. Develop capacity to re-establish the biophysical conditions and topography necessary to support a coral transplantation action (from coral farming supplied material). Also develop capacity to triage (involving identifying and	Coral reef habitat	Recreation of the biophysical conditions and topography at degraded locations to support restoration and natural recovery of impacted coral reef habitat.	

Action	Summary	Target species	Target outcome	Overlap with other programs
	treating high-risk corals post-impact by reattaching broken pieces, stabilising rubble, and moving vulnerable corals to better conditions to maximise survival and recovery).			
Seagrass habitat restoration and enhancement	Identify areas with existing impacts to seagrass that require intervention to support the recovery or establishment of seagrass. Develop capacity and facilities for establishing and managing seagrass beds in coastal areas and the transplanting of sods, plugs or seeds to sites requiring restoration.	Seagrass	A reservoir of healthy and resilient replacements to replace lost individuals from future perturbations.	Coral reef Habitat restoration and enhancement
Giant clam habitat restoration and enhancement	Establish facilities and capacity to establish nurseries (cages/trays) or land-based tanks, to collect broodstock/Larval Rearing and maintain in nurseries until at a suitable size (3-5cm) to grow out on reef habitats.	Giant clam (*Tridacna squamosina*)	Mariculture capacity to produce stock to replace in-situ lost individuals from natural perturbations or development activity, and/or to augment the existing population.	Coral reef habitat and seagrass restoration and enhancement
Teleost fish	Identify areas with existing impacts to CH teleost habitats, including those of value to all life history stages (from juveniles, to foraging and	• Humphead wrasse (*Cheilinus undulatus*) • Sky emperor (*Lethrinus mahsena*)	Population status improvement leading to a positive long-term population trend	Coral reef habitat and seagrass restoration and enhancement

Action	Summary	Target species	Target outcome	Overlap with other programs
	spawning adults) that require intervention to support population recovery/growth. Establish fishery controls to limit directed take and bycatch.	Red Sea coral grouper (*Plectropomus marisrubri*)		

Table 4-2: Preliminary Identification of Conservation Projects

Action	Summary	Target species	Target outcome	Overlap with other programs
Turtle Conservation	Identify areas and activities that threaten turtles and their habitats, research and plan for protection and threat intervention to support population stability. Initiate outreach and capacity building and cooperate with relevant national organisations.	• Hawksbill turtle (*Eretmochelys imbricata*) • Green turtle (*Chelonia mydas*)	Populations remain stable	Coral reef habitat and seagrass restoration and enhancement Marine mammal, seabird and elasmobranch conservation
Shark and Ray Conservation	Identify areas and activities that threaten sharks and rays and their habitats, research and plan for protection and threat intervention to support population stability, with an especial focus on fisheries. Initiate outreach and capacity building and cooperate with relevant national organisations.	• Spotted eagle ray (*Aetobatus ocellatus*) • Coach whipray (*Himantura uarnak*) • Spinetail devil ray (*Mobula mobular*) • Oceanic manta ray (*Mobula birostris*) • Panther torpedo (*Torpedo panthera*) • Pink whipray (*Himantura fai*) • Shortfin Mako (*Isurus oxyrinchus*) • Tiger shark (Galeocerdo cuvier)	Populations remain stable	Coral reef habitat and seagrass restoration and enhancement Turtle and marine mammal conservation
Marine Mammal Conservation	Identify areas and activities that threaten marine mammals and their habitats, research and plan for	• Indian Ocean humpback dolphin (*Sousa plumbea*)	Populations remain stable	Coral reef habitat and seagrass

Action	Summary	Target species	Target outcome	Overlap with other programs
	protection and threat intervention to support population stability. Initiate outreach and capacity building, and cooperate with relevant national organisations. Promote responsible, sustainable tourism.	• Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) • Pantropical spotted dolphin (*Stenella attenuata*)		restoration and enhancement Turtle, seabird and elasmobranch conservation
Reducing collisions with power lines in the Aqaba Coast and Mountains IBA/KBA, Jordan	Installation of Bird Flight Diverters (BFDs) along existing powerlines (transmission or distribution) within the Aqaba Mountains and Coast IBA/KBA. Results from three years of Post-construction Fatality Monitoring will inform the extent of power line retrofits required to compensate for observed mortality.	All bird species, especially migratory soaring birds, including the Levant Sparrowhawk *Accipiter brevipes*, Steppe Eagle *Aquila nipalensis*, Eastern Imperial Eagle *Aquila heliacal*, Greater Spotter Eagle *Clanga clanga*, Egyptian Vulture *Neophron percnopterus*, White Stork *Ciconia Ciconia.*	Reduce bird collision fatality and injury	
Sooty falcon conservation actions	Contrary to other avian species that may trigger Critical Habitat, the Sooty Falcon *Falco concolor* breeds in Jordan, making it easier to implement meaningful in-country conservation actions. This species is undergoing a global and national decline, which has prompted the development of a single species action plan by the Convention of Migratory Species. This plan outlines a series of actions to reduce the risk of extinction of this species, by halting population declines. Engagement with relevant stakeholders will determine which of these actions should be prioritized in the Jordanian context and which are feasible for the Project to implement.	• Sooty falcon conservation actions	Support population stability and prevent decline	

Action	Summary	Target species	Target outcome	Overlap with other programs
Seabird conservation	Identify areas and activities that threaten seabirds and their habitats, research and plan for protection and threat intervention to support population stability. Initiate outreach and capacity building and cooperate with relevant national organisations. Promote responsible, sustainable tourism.	• Curlew Sandpiper (*Calidris ferruginea)* • Grey Plover (Pluvialis squatarola)	Populations remain stable	Turtle and marine mammal conservation
Plant habitat and biodiversity of desert areas	Micro habitat enhancement through the installation of mini-furrows against (at right angles to) the primary direction of surface water flow will help to retain water moisture in the soil and to capture native plant seeds which will encounter more favorable conditions to germinate and revegetate the impacted surface soils.	• Initially native species in the area • Secondarily native reptile and small mammals	A quick return to functioning native desert ecosystem after project completion.	
Plant habitat and biodiversity of smaller desert wadis	In areas with wadis where topography allows, create: i. low “mini” dams or “depressions” along wadi channel edges to retain water and encourage increased plant biodiversity. These structures should be small enough that water continues to flow downstream during larger rain events, but help to create “hotspots” where water is retained in the system for longer, encouraging natural plant colonization and water infiltration to deeper soil storage is encouraged, and ii. check-dams (with rock, e.g. gabion check dams or loose rock dams) at appropriate locations along wadi channels for flood mitigation but with a secondary benefit of water retention for plants and animals.	• Native wadi species including trees such as *Vachellia gerardii* • Associated animal species including lizards and mammals • Native wadi species including trees such as *Vachellia tortillis* • Mammalian species including hedgehogs, foxes, Ibex, etc	Increased vegetation diversity and cover along wadis. Improved seedbank for natural vegetation expansion. Increased habitat for fauna species Increased vegetation diversity and cover along wadis. Improved flood protection for downstream areas	Plant habitat and biodiversity of desert areas

Action	Summary	Target species	Target outcome	Overlap with other programs
				Plant habitat and biodiversity of desert areas
Egyptian Spiny-tailed Lizard	The Egyptian spiny-tailed lizard (IUCN Vulnerable) has very specific habitat requirements which will be near impossible to recreate during project reinstatement. Therefore, identify suitable habitat outside project area of impact and develop and implement a relocation plan (following assessment of carrying capacity) for individuals within the impact area including protection and cooperation with national organizations.	• Egyptian spiny-tailed lizard (*Uromastyx aegyptia*)	Support population stability and prevent decline	
Integrated pest management to increase bat populations	Bat populations appear to have decreased substantially, ascribed to the increased use of pesticides which make their way into the food sources (insects) of bats. Support outreach and education of farmers to reduce/plan/eliminate the use of pesticides through Integrated Pest Management systems with the added benefit of cost reduction and reduced pesticide load for the human population.	• All bat species (*Vespertilionidae, Rhinolophidae, Molossidae*, etc.) all of which are insectivorous • Human population	Support population stability and prevent decline Improve human health	

5 Next Steps

The potential Offset and Conservation Actions options presented in this Framework BAP will be further evaluated in the next revisions of this document. Subsequent revisions of this Framework BAP will be supported by:

- Progress in the Project design that will improve the quantification of the residual impacts
- Additional pre-construction surveys that are planned in 2026 to support the existing survey work completed and increase the Projects understanding of Natural Habitat, Critical Habitat and Priority Biodiversity
- Further development of the data quantification of impacts (loss) and the gain via Offsets and Conservation Actions, as well as a definition of monitoring indicators
- Stakeholder engagement

The development and finalisation of a BAP is an iterative process, progressing in increments as surveys, monitoring, and analysis are conducted, and results inform an adaptive management cycle, thereby refining the quantification of losses and gains and subsequent planning.