Aqaba Amman Water Desalination and Conveyance (AAWDC) Project
Draft HIA Scoping Report

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Executive Summary

Chronicle Heritage Arabia (CH Arabia) has been commissioned by Eco Consult to produce a Heritage Impact Assessment (HIA) for the Aqaba Amman Water Desalination and Conveyance (AAWDC) Project (the Project) where it passes through and close to the Wadi Rum Protected Area (WRPA), in the Aqaba Governorate of the Hashemite Kingdom of Jordan. The HIA process consists sequentially of a Screening Report, a Scoping Report and an HIA Statement. This report constitutes the Scoping Report.

The Scoping process has identified, described, and assessed the heritage baseline for the Project Area and Area of Influence (AOI). It has identified that Wadi Rum's heritage values are multidimensional, encompassing both tangible and intangible attributes. Tangible components include extensive rock art, inscriptions, and archaeological sites that illustrate over 12,000 years of human occupation and cultural evolution. Intangible cultural heritage, equally significant, reflects the living traditions of the Bedouin communities whose customs, oral traditions, and desert knowledge form an integral part of the area's Outstanding Universal Value (OUV). These cultural expressions are recognised by UNESCO as the *Cultural Space of the Bedu in Petra and Wadi Rum*, highlighting the strong interdependence between people and landscape. Any development within or adjacent to this setting therefore requires careful consideration of potential direct and indirect impacts — including changes to landscape character, access, and the continuity of traditional practices.

This Scoping Report has been prepared to define the scope, key issues, and methodological approach for the Heritage Impact Assessment (HIA) of the Aqaba–Amman Water Desalination and Conveyance Project (AAWDCP), with particular focus on potential impacts to the OUV of the Wadi Rum Protected Area, a UNESCO World Heritage property inscribed for its outstanding combination of natural and cultural values. The project, which involves the construction of a desalination plant at Aqaba and an underground northward water conveyance system, Overhead Transmission Line (OHTL) and solar photovoltaic (PV) plan, partially encroaches upon the WRPA landscape. The HIA Scoping process has been undertaken in accordance with UNESCO's 2021 Guidance and Toolkit for Heritage Impact Assessments for World Heritage Properties, ensuring that the assessment framework meets both international conservation standards and Jordanian national heritage legislation under the Law of Antiquities No. 23 of 2024 and the Regulations for Archaeological Projects (2015).

The HIA assessment will apply the mitigation hierarchy — avoidance, minimisation, restoration, and offsetting — to ensure that heritage values of WRPA are not compromised. The Scoping phase establishes the foundation for a transparent, evidence-based evaluation and impact assessment of the project in the WRPA.

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1 Introduction

Chronicle Heritage Arabia (CH Arabia) has been commissioned by Eco Consult to produce a Heritage Impact Assessment (HIA) for the Aqaba Amman Water Desalination and Conveyance (AAWDC) Project (the 'Project') where it passes through and close to the Wadi Rum Protected Area (WRPA), in the Aqaba Governorate of the Hashemite Kingdom of Jordan. The HIA process consists sequentially of a Screening Report, a Scoping Report and a HIA Statement. This report constitutes the Scoping Report and will inform the final HIA Statement in due course. The findings of the HIA process and an associated Intangible Cultural Heritage (ICH) report will be integrated into the Environmental and Social Impact Assessment (ESIA) for the Project.

1.1 Aims and Objectives

The purpose of an HIA is to assess the impact (whether negative, positive, or neutral) that a project is likely to have on all relevant cultural heritage resources and to provide recommendations (where relevant) on how to mitigate, avoid, or reduce negative impacts to an acceptable level and comply with all relevant heritage legislation.

The aim of the HIA Scoping Report is to provide a specific framework for the preparation of the HIA Statement and to agree on the scope of work needed to inform the Statement through an appraisal of existing data and a gap analysis. The scoping process is also intended to ensure that the views of the client and all relevant stakeholders inform the preparation of the HIA Statement, ensuring the Statement is a focused, high-quality document detailing correct information and impacts to the Area of Influence (AOI), defined below.

If possible, the Scoping Report will also make a preliminary assessment of the Project's impact based on the information available and initial recommendations to inform the project design and avoid and minimise identified potential impacts. This Scoping Report also contains mapping of known heritage assets using geographic information system (GIS) software and was informed by a site visit.

In accordance with UNESCO's HIA Toolkit (UNESCO 2022), the results of the scoping process should be shared with the UNESCO World Heritage Centre. UNESCO's HIA Toolkit also defines the specific aims of a Scoping Report in a World Heritage Context as follows:

- Define an appropriate Study Area (or AOI) for the assessment which is proportionate to the type and scale of development proposed and the types of assets and their settings likely to be affected.
- Explain the development works proposed and any justified need for the Project; identify possible alternatives, including the option not to proceed (the 'no project' option).
- Identify the policy and legislative context for the Project.
- Identify relevant right-holders, local communities, and stakeholders; define their relationship to the Project and any specific requirements to allow their full participation.
- Identify existing data sources that can be used to inform the assessment.
- Identify data gaps and define any further data required/site investigation work needed to address those gaps.
- Identify the Outstanding Universal Value (OUV) and other heritage values of the AOI and preliminarily identify the tangible and intangible attributes that convey that OUV and those values.

- Define the methodology that will be used to assess potential heritage impacts.
- Preliminarily assess and identify potential impacts on the World Heritage (and other) attributes and on relevant right-holders, local communities, and stakeholders. To include the early identification of whether a project is incompatible with World Heritage.

1.2 Report Terminology

For this report, the following terminology is used:

- **Project Area**: refers to the area designated for development;
- **Area of Influence (AOI)**: comprises the wider 1 km heritage data search around the Project Area and the area that is the subject of investigation;
- **WHS buffer zone**: the UNESCO applied area surrounding World Heritage Sites which has complementary legal and/or customary restrictions placed on its use and development to give an added layer of protection to the site.

1.3 Project Area and AOI

The Project Area is depicted in Figure 1-1 and lies within the Aqaba Governorate of the Hashemite Kingdom of Jordan, approximately 60 kilometres (km) northeast of Aqaba. The Project Area is centered on Universal Transverse Mercator (UTM) coordinates 36N 734386 E/3276139 N and comprises the footprint of the proposed works where they run through the buffer zone of the WRPA and near the boundary of the WRPA's buffer zone to the northwest.

It was decided that the HIA would be limited to this area because its purpose is to assess the impact of the works upon the heritage significance of the WRPA specifically. The proposed pipeline is confidently assessed to have no further impact upon the WRPA where it passes out of the WRPA buffer zone in the east, as it will be installed underground (therefore having no associated setting impacts) and will be entirely outside both the WRPA and its buffer zone. Although outside the WRPA buffer zone, the PV plan and part of the OHTL to the northwest of the WRPA are included in the Project Area as they have the potential to be visible from parts of the WPRA. The remainder of the OHTL line, i.e., where it runs further south through Wadi Yutum, is not included in the Project Area as, given its position within the base of the low wadi, it will not be intervisible with the WRPA.

A wider AOI covering 1 km around the Project Area was also defined and is the area subject to a heritage data search. This was considered proportionate to the Project and appropriate for gathering sufficient information to provide context to the heritage resource within the Project Area itself.

The WRPA itself is a UNESCO Protected Area, designated in 2011, and is home to unique and internationally significant natural and cultural heritage features, both tangible and intangible. The designated area consists of a core area (the area of highest significance and most strictly protected) and a buffer zone, which is still subject to significant constraints to preserve its significance, as well as the setting and integrity of the core area. The WRPA represents Jordan's largest protected area, covering almost one percent of the country's land. It lies in east of the Jordan Rift Valley and south of the central Jordanian plateau, forming an important part of Southern Jordan's Hima Desert. Most of the WRPA is undeveloped and natural in character, although some established villages and minor infrastructure areas (e.g., village access roads) exist across the buffer zone's northern extent (United Nations Educational, Scientific and Cultural Organization [UNESCO] 2025b).

For the purposes of this report, the WRPA core area and buffer zone are as defined in Figure 1-1; however, it is important to note that there are discrepancies concerning the size and shape

of the core area and buffer zone in several sources. The core area and buffer zone of the WRPA as currently recognised by UNESCO is that depicted on UNESCO's 2011 inscription map (UNESCO 2025b). This defines the core area of the WRPA as 733.00 square kilometres (km^2) and excluding the village of Rum and its associated road (Figure 1-2). The same map defines the WRPA's surrounding buffer zone as 591.66 km^2 (Figure 1-3). Protected Planet's website depicts the core area with a slightly different boundary that includes the village of Rum and its road within the designated area (Figure 1-2) (Protected Planet 2025).

The Aqaba Special Economic Zone Authority (ASEZA) manages the WRPA and has different boundaries for the core area. The ASEZA designates the core area of the WRPA as 744.75 km^2 (Figure 1-2). ASEZA sources also depict a significantly expanded buffer zone at 1,353.66 km^2 (Figure 1-3) (Tetra Tech International Development 2022b). The ASEZA has proposed this (over 200 percent) expansion of the WRPA's buffer zone in response to recommendations made by the World Heritage Committee. They intend to submit these new regulations to UNESCO (ASEZA 2024).

This enlarged buffer zone and changed core area have not yet been officially accepted or approved by UNESCO. As such, this report's assessment will use that version of the WRPA's core and buffer zone recognised by UNESCO. While UNESCO does not currently recognise the new buffer zone proposed by ASEZA, it is important to note that this buffer zone may be accepted in the future; this is considered within this report. However, the significance of impact in this proposal is reduced.

1.4 Proposed Works

The Project is for the construction of a pipeline and related infrastructure to move desalinated water extracted from the Red Sea near Aqaba to Amman, where it will be used as part of the city's water supply. The Project includes proposals for a desalination plant at Aqaba and a 1 km offshore pipeline. The HIA assesses only that part of the Project which passes through and near to the WRPA. This includes approximately 38 km of the pipeline where it will run through the WRPA buffer zone as well as part of an overhead transmission line (OHTL) and one solar photovoltaic (PV) installation—which will be constructed to the northwest, outside but close to the boundary of the WRPA buffer zone. Figure 1-4 provides an overview of those aspects of the development that are subject to this HIA.

Figure 1-4 also depicts the line of an indicative re-route that is being considered for the Project. However, this is not discussed further within the report since no information about this possible alternative route has been provided.

The larger AAWDC Project was launched by the Ministry of Water and Irrigation (MWI) on February 26, 2020 in response to an ongoing and worsening water crisis within the country. Due to the country's scarce surface and groundwater sources and an increasing demand for safe drinking water, Jordan has one of the lowest levels of water availability per capita in the world. The gap between water supply and demand is also increasing every year and has been significantly exacerbated by the Syrian refugee crisis. In recent decades, the Jordanian government has invested billions of dollars trying to resolve this issue (Tetra Tech International Development 2022b).

The desalination and transport of Red Sea seawater across the country to Amman (proposed by the Project) should generate 300 million cubic metres of drinking water per year and help reduce the country's crucial water resource deficit by providing a safe and reliable water supply for Amann and other Jordanian governates and areas along the pipeline route. The Project will involve the construction of various desalination and water conveyance infrastructure between the Southern Red Sea coast in Aqaba and Amman; however, only those subject to the HIA are

described in greater detail below. The information is sourced from the Project's ESIA reports (Tetra Tech International Development 2022b, 2025) and .kmz files provided by the client.

It is important to note that the AZEZA representative for UNESCO has confirmed in a stakeholder meeting on October 14, 2025 that they do not have any objections to the Project since it lies entirely outside of the WRPA's core area.

1.4.1 Conveyance Pipeline

The conveyance pipeline will move freshwater through the WRPA buffer zone. Through the WRPA buffer zone, the diameter of the pipe will be 2,200 to 2,500 millimetres (mm). It will be buried along its length, although no details regarding the width or depth of the required trench have been provided. The pipeline route through the WRPA buffer zone will largely be adjacent to an existing east-west road, although it will diverge from this road in some places (Figure 1-4). It is likely that spoil heaps up to 2 m high will be created during the construction phase for the excavation of the pipeline.

1.4.2 Solar PV Plant

A solar PV plant (i.e., the Renewable Energy site at al-Quweira) is also proposed: to supply renewable energy in the form of electricity to the Sea Water Reverse Osmosis (SWRO) desalination plant and pump stations within Aqaba Governorate during daylight hours. This plant is proposed to span approximately 500 hectares (ha) and will sit outside and to the northwest of the northern boundary of the WRPA buffer zone (Figure 1-4).

A detailed design drawing of the PV plant (Tetra Tech International Development 2025) indicates that a large array of solar panels will occupy the majority of the 500 ha development area. A 2.4 ha substation and an "Operation and Maintenance building" will also be constructed in the southwest corner of the development area, while four basecamp and storage areas (each between 1,000-2,500 m^2) will be constructed at each corner of the development area. Finally, six weather stations, 18 pyranometers, a network of access roads, water tanks, and a drainage system are also proposed within and across the development area. Based on discussions with the client, it has been assumed that the panels within the PV plant will be 2 m above ground level once installed.

An existing PV plant, about two thirds the size of that proposed, already exists to the south of the location proposed for the new PV plant. This existing plant lies almost entirely within the northern buffer zone of the WRPA and sits between the site of the proposed plant and the WRPA proper.

1.4.3 Overhead Transmission Line

Limited information is currently available regarding the construction of the proposed OHTL; however, it is proposed to run on a southwest–northeast orientation between the solar PV plant and the SWRO desalination plant in Aqaba. Its impacts will be assessed as part of this HIA where it runs along, and just outside of, the northwestern boundary of the WRPA buffer zone. Two existing OTHLs already run north–south to the northeast of, and partially overlapping with, the WRPA buffer zone; the proposed OHTL would sit beyond these lines at a greater distance from the WRPA itself.

According to information provided by the client (ECO Consult 2025), the OHTL between the main substation in Aqaba and the new PV plant will consist of 210 towers over a length of between 63 and 70 km. This means that pylons will be constructed between every 300 m to 333 m where it passes through the Project Area. Where the OHTL passes through the Project Area, it will supply 132 kilovolts (kV) of power.

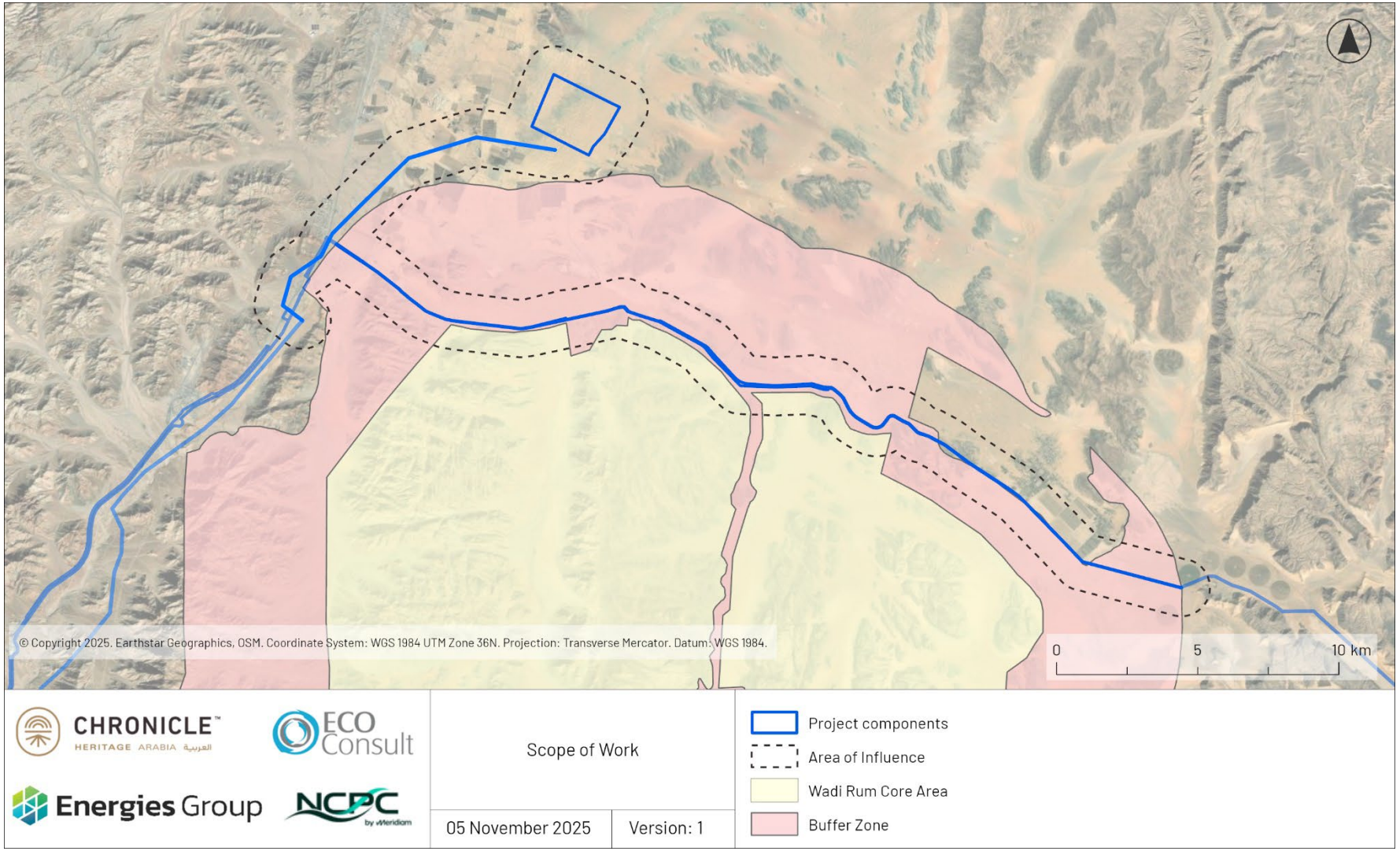

Figure 1-1. Project Area and AOI.

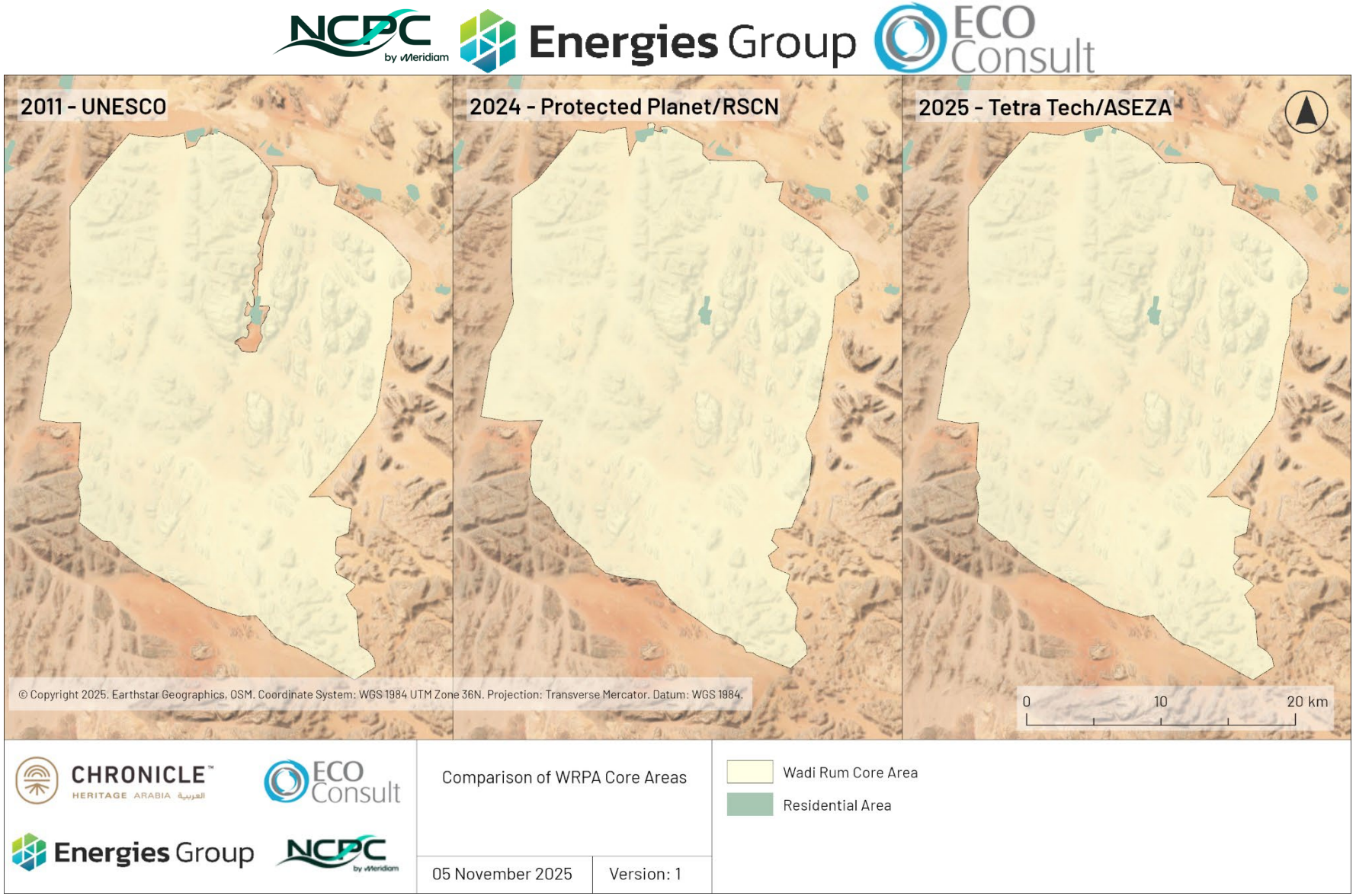

Figure 1-2. WRPA core area source discrepancies.

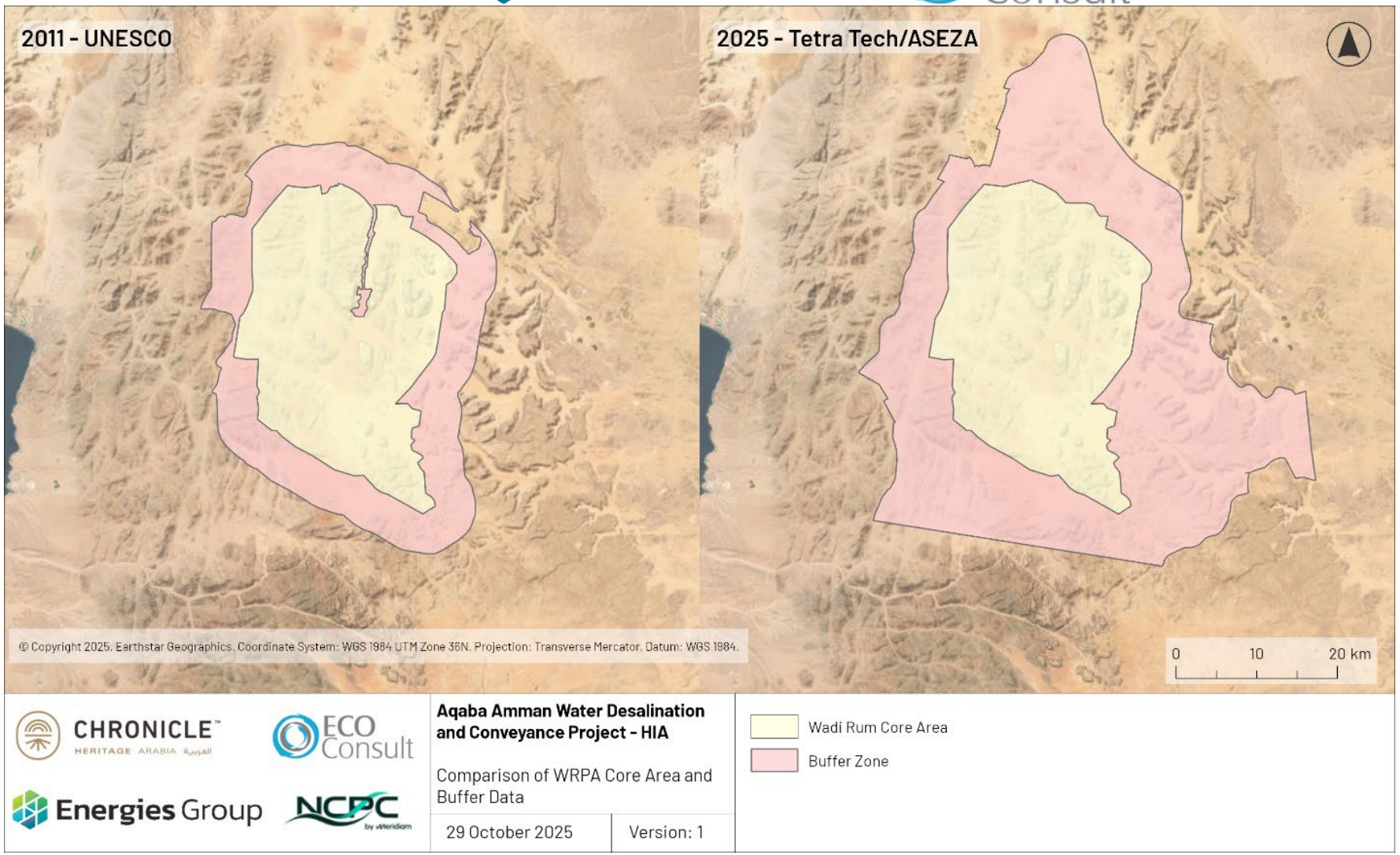

Figure 1-3. WRPA buffer zone source discrepancies.

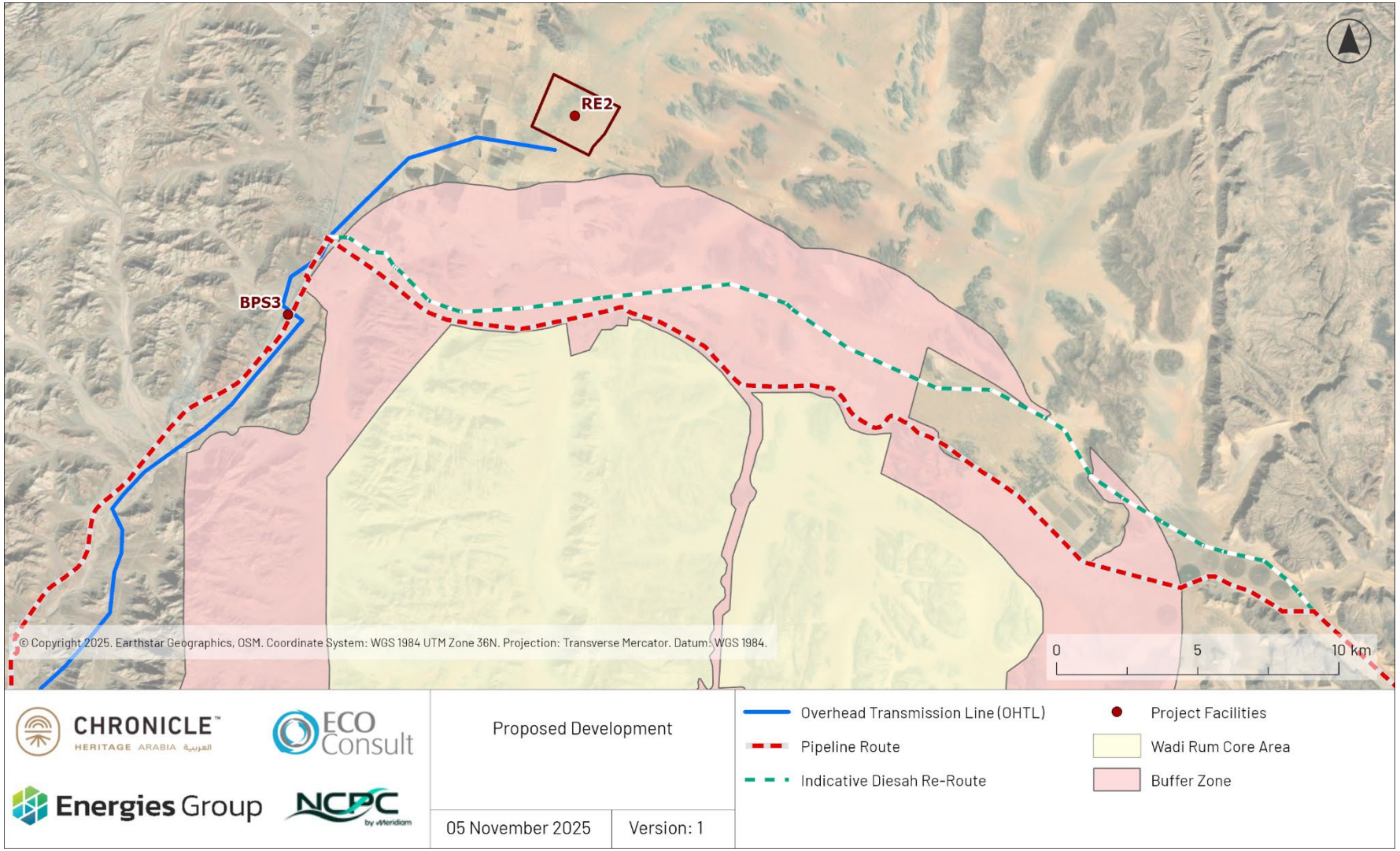

Figure 1-4. Proposed Development.

The client has also provided drawings (Electromontaj S.A. 2019d, 2019a, 2019b, 2019c) depicting the design for 132 kV pylons. These show four possible design options, all employing steel pylons. While the design of each option is similar and typical for a large electrical pylon, the final height of the pylons may vary depending on the final option chosen. Depending on the design chosen, the pylons' final height will vary between 45.35 m and 58.9 m. The size of the base of the pylons would also vary depending on the option chosen. The largest base (i.e., the total area between the pylon legs) would be 17.32 m x 17.32 m, while the smallest possible base would be 5.58 m x 4.43 m. No details have been given regarding the below-ground foundations or required excavation footprints for the pylons.

1.4.4 Other Development

It is expected that the development will also involve a number of other development aspects, including access roads during construction and/or maintenance, stockpile areas, workcamps, etc. However, no locations or other details of these have been provided to date.

1.5 Alternatives

Project alternatives were also assessed within the Project's ESIA report (Tetra Tech International Development 2022b, 2025). These alternatives include a "do nothing" approach (i.e., no project to address the water scarcity); this was determined to be an untenable approach, since it was assessed to lead to a number of significant consequences including health risks for parts of the population; the continued overexploitation and depletion of existing groundwater resources; and adverse effects on livelihood conditions and public health (Tetra Tech International Development 2022b).

Two alternative sites were evaluated for the PV plant: the Wadi Araba Site and the Al-Mudawara Site. However, both were rejected due to security concerns, the site's proximity to the international border and location within a nature reserve (Wadi Araba Site) and the cancellation of an associated pump station at the site (Al-Mudawara). (Tetra Tech International Development 2025)

Other explored alternatives included different infrastructure locations and alternative pipeline routes; however, these mostly concerned alternatives around Amman and the intake area and not within the Project Area. An OHTL route through the WRPA buffer zone was originally proposed but has since been discarded following discussions with ASEZA to avoid considerable predicted impacts upon the OUV of the Protected Area. It is unknown whether any further alternative routes in the vicinity of the WRPA have been assessed or investigated (Tetra Tech International Development 2022b).

1.6 Limitations

The Project is described above in as much detail as possible based on the information received. However, it is important to note that Project design details are limited at this time. This is in regard to details of both the proposed infrastructure's physical attributes (e.g., the depth and width of pipeline trenching; the final height and size of the OHTL pylons; the size and depth of excavations required for pylon foundations and the PV Project) and its visual attributes (e.g., the final design and appearance of the OHTL and PV Project). There is also a lack of detail regarding the proposed management and routing of construction vehicle traffic or the potential construction of enabling aspects such as stockpile areas, workcamps, access roads, etc.

This HIA Scoping Report is also based on a limited amount of information regarding the heritage assets in and around the Project Area. This is partly due to the lack of published investigations in the area and the lack of a complete heritage inventory for it. Although a site visit was undertaken to inform this Scoping Report, it was non-intrusive and limited to observations of the historic landscape character and heritage assets surviving on the ground surface.

Although this HIA will assess impacts against the UNESCO-approved boundaries for the WRPA, it should also be noted that Project impacts would differ, if the ASEZA's proposed boundaries (as discussed within Section 1.3 above) are eventually accepted and ratified by UNESCO.

1.7 International Legislation

The Project must adhere to the various legislative and regulatory provisions summarised below.

1.7.1 UNESCO

The Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention) was adopted by the General Conference of UNESCO on November 16, 1972. The World Heritage Convention sets out the duties of States Parties in identifying potential sites and their role in protecting and preserving them. The World Heritage Convention also defines the kind of sites that can be considered for inclusion in the World Heritage List. By ratifying the World Heritage Convention, each country pledged to conserve World Heritage Sites within their territory and to protect national heritage. The States Parties are encouraged to integrate the protection of cultural and natural heritage into regional planning programs, set up staff and services at sites, undertake scientific and technical conservation research, and adopt measures that ensures heritage activities in the day-to-day life of communities (UNESCO 1972). Furthermore, during the 2003 General Conference of UNESCO in Paris, the committee agreed on the World Heritage Convention to safeguard and raise awareness and appreciation of intangible cultural heritage.

The committee periodically publishes operational guidelines (e.g., United Nations Educational, Scientific and Cultural Organization [UNESCO] 2024) to explain the criteria under which OUV is assessed and to describe the required procedures for the protection, conservation, and management of World Heritage Sites.

According to Paragraph 118bis of the *Operational Guidelines for the Implementation of World Heritage Convention*, an HIA is to be carried out as a prerequisite for development projects and activities planned for implementation within or around a World Heritage Site (United Nations Educational, Scientific and Cultural Organization [UNESCO] 2024). The HIA should serve to identify development alternatives and potential positive and negative impacts and recommend mitigation measures against degradation or other negative impacts to the cultural or natural heritage within the property or its wider setting, thus ensuring the long-term safeguarding of the OUV and strengthening of heritage resilience (UNESCO 2022).

UNESCO HIA Toolkit

The *Guidance and Toolkit for Impact Assessments in a World Heritage Context* is relevant to the current report (UNESCO 2022). The Guidance and Toolkit is a joint publication of UNESCO and the Advisory Bodies to the World Heritage Committee. The World Heritage Committee's three Advisory Bodies are the International Council on Monuments and Sites (ICOMOS), the International Union for Conservation of Nature (IUCN), and the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM). The Guidance and Toolkit is informed by and replaces

the *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* previously published by ICOMOS (ICOMOS 2011).

The Guidance and Toolkit aims to guide users with required steps to carry out HIAs for projects of all types and scopes at all World Heritage Sites—cultural, natural, or mixed—using the same adaptable framework. This guidance explains how HIAs can be used to protect the OUV of World Heritage Sites to manage continuity and change by informing good decision-making in the context of UNESCO's World Heritage Convention (UNESCO 1972).

1.7.2 International Finance Institutions

As part of their due diligence, the client is also committed to adhering to the regulations of various financial institutions that aim to ensure the ethical treatment of local and Indigenous communities, cultural heritage, and cultural landscapes that will experience potential impacts from the development. Compliance with the standards of these institutions is also required by the development's Lender Environmental and Social Advisors (LESA) IFC and EBRD.

The Lenders' Environmental and Social Standards applicable to this project are detailed in Table 1-1 and Table 1-2 below. Table 1-1 lists the relevant financial institutions and their environmental social policies and standards, before summarising those policies and standards that relate directly to cultural heritage. Table 1-2 summarises those policies and standards that relate to other matters, but which will be highly relevant to cultural heritage and the current Project.

Cultural Heritage Policies

Table 1-1. The Environmental and Social Standards of Relevant Financial Institutions and their Cultural Heritage Policies

Institution	Relevant Policy or Standards	Cultural Heritage Policy	Other Policy Requirements relating to Cultural Heritage
European Bank for Reconstruction and Development (EBRD)	*Environmental and Social Policy* (EBRD 2024)	**Environmental and Social Requirement (ESR) 8** *General Requirements* Applies to all forms of tangible and intangible cultural heritage. Requires the developer to identify and assess any potential impacts to cultural heritage at an early stage of environmental and social assessment (required by ESR1). This should inform the adoption of a mitigation hierarchy that identifies and implements measures to (in order of preference) avoid, minimise, mitigate, or offset adverse impacts. The development and implementation of these measures should be integrated as part of the ESMS (required by ESR1) and a Cultural Heritage Management Plan (CHMP) for the project and in accordance with good international practice. This process should also involve the involvement of cultural heritage experts and meaningful consultation with all key stakeholders. The developer is also required to ensure that: ▪ Appropriate provisions for managing chance finds are in place; ▪ Any previous access to cultural heritage is safe and sustained or alternatively provided for; ▪ The awareness, appreciation, and enhancement of cultural heritage is undertaken; and ▪ The development complies with specific requirements and constraints surrounding the use, including the commercial use, of cultural resources and the equitable sharing of benefits from its use. *Specific Requirements* ESR 8 also provides specific requirements for the treatment of different types of cultural heritage (archaeological sites, built heritage, cultural landscapes with natural features, moveable cultural heritage,	**Environmental and Social Exclusion List** In addition to the ESRs, the EBRD's Environmental and Social Exclusion List defines projects that the Bank will not knowingly finance, directly or indirectly. These include Exclusion (m): "any projects that impact UNESCO Natural and Mixed World Heritage Sites" (EBRD 2024: 27). **Annex B** Annex B of the Policy defines this Project as a Category A project, i.e., one that could result in potentially significant environmental or social impacts. This is because it involves the construction of a pipeline with a length of more than 40 km. The Policy requires that all Category A projects are subject to an ESIA.

Institution	Relevant Policy or Standards	Cultural Heritage Policy	Other Policy Requirements relating to Cultural Heritage
		and underwater cultural heritage), details of which can be found in the document. ESR8 also contains specific requirements regarding projects that have the potential to adversely impact cultural heritage that is legally protected and/or internationally recognised (such as the WRPA). In such cases, the developer should seek to avoid such impacts, wherever viable. If impacts to legally protected or internationally recognised cultural heritage cannot be avoided and no alternatives are feasible, the developer will proceed with the development only if the project: ▪ Meets local, national, and international requirements pertaining to the cultural heritage concerned; ▪ Demonstrates that the proposed development is legally permitted through an assessment of project-related impacts on the protected area; ▪ Complies with the provisions of relevant government management plans through the preparation and implementation of a cultural heritage impact assessment and associated management plan; ▪ Consults protected area regulators, relevant authorities, local communities and other stakeholders on the proposed project; Explores opportunities and implements programs to promote the conservation mandate of the protected area and contributes to the socioeconomic development of local communities, in accordance with the management plan of the protected area (EBRD 2024: 93).	
International Finance Corporation (IFC)	Performance Standards (IFC 2012)	**Performance Standard (PS) 8** *General Requirements* The IFC's PS8 is largely comparable, and specifies the same general requirements, as the EBRD's ESR8 (see above). There are nevertheless some differences between the IFC's PS8 and the EBRD's ESR8:	**N/A**

Institution	Relevant Policy or Standards	Cultural Heritage Policy	Other Policy Requirements relating to Cultural Heritage
		PS8 applies to all forms of tangible cultural heritage but only to instances of intangible cultural heritage that are proposed to be used for commercial purposes. PS8 does not require the development and implementation of a CHMP; instead, it requires that the development and implementation of mitigation measures be integrated as part of the ESMS. *Specific Requirements* PS8 also provides specific requirements for different types of cultural heritage (replicable, non-replicable, and critical cultural heritage). Critical cultural heritage includes that which is legally protected and would include the WRPA. PS8 states that the developer should not remove, significantly alter, or damage any critical cultural heritage. In exceptional circumstances, where such impacts are unavoidable, the developer must use a process of Informed Consultation and Participation (ICP) of the Affected Communities which uses a good faith negotiation process, retains external experts, and results in a documented outcome. PS8 also specifies additional constraints and requirements for projects that will take place within a legally protected area or a legally defined buffer zone. To qualify for financing, any development in these areas must: ▪ Comply with national and local cultural heritage regulations or the protected area's management plans ▪ Consult the area's sponsors and managers, local communities, and other key stakeholders on the proposed project; and **Implement additional programs, as appropriate to promote and enhance the conservations aims of the protected area (IFC 2012: 3).**	
European Investment Bank (EIB)	Environmental and Social Standards (EIB 2022)	**Standard 10** *General Requirements* The EIB's Standard 10 is largely comparable, and specifies the same general requirements, as the EBRD's ESR8 (see above).	**N/A**

Institution	Relevant Policy or Standards	Cultural Heritage Policy	Other Policy Requirements relating to Cultural Heritage
		Standard 10 applies to both all forms of cultural heritage, both tangible and intangible, as well as any natural heritage that is recognised by local communities or peoples as part of their history or traditions (EIB 2022). *Specific Requirements* Standard 10 also specifies additional constraints and requirements for projects that will take place within a legally protected area or a legally defined buffer zone. For such projects, Standard 10 requires developers to meet the following additional requirements: ▪ Ensure compliance with international, national, and/or local cultural heritage regulations or the protected area's management plans; ▪ Conduct meaningful consultation with the protected area's sponsors and managers, local communities, and other key stakeholders on the proposed project; **Implement additional programs, as appropriate, to reduce the project's impacts, including visual impacts, and to promote and enhance the conservation aims of the protected area (EIB 2022: 80).**	
World Bank Group (WBG)	Environmental and Social Framework (The World Bank Group [WBG] 2017)	**Environmental and Social Standard (ESS) 8** *General Requirements* The WBG's ESS8 is largely comparable, and specifies the same general requirements, as the EBRD's ESR8 (see above). There are nevertheless some differences between the WBG's ESS8 and the EBRD's ESR8: The WBG's ESS8 applies to all forms of tangible cultural heritage but only applies to aspects of intangible cultural heritage if a Project will have a material impact upon that aspect of if the project intends to use it for commercial purposes. *Specific Requirements* ESS8 specifies additional constraints and requirements for projects that will take place within a legally protected area or a legally defined buffer zone (WBG 2017). To qualify for financing, any development in these areas must:	**N/A**

Institution	Relevant Policy or Standards	Cultural Heritage Policy	Other Policy Requirements relating to Cultural Heritage
		▪ Comply with national and local cultural heritage regulations and the protected area's management plans ▪ Consult the area's sponsors and managers, project-affected parties (both individuals and communities) and other interested parties on the proposed project; and **Implement additional programs, as appropriate, to promote and enhance the conservations aims of the protected area (WBG 2017: 87).**	
Environmental, Health, and Safety (EHS) Guidelines (IFC and WBG	*General Guidelines* (IFC and WBG 2007a) *Industry Sector Guidelines*	The EHS Guidelines constitute a series of technical reference documents that contain examples of Good International Industry Practice (GIIP) with regards to the environment, health, and safety. They are applied to a project when one or more members of the World Bank Group are involved in financing that project. The General EHS Guidelines (IFC and WBG 2007a) apply to all projects. There are also Industry Sector EHS guidelines relevant to specific industries. Those relevant to this project include the EHS Guidelines for Electric Power Transmission and Distribution (IFC and WBG 2007b) and the EHS Guidelines for Water and Sanitation (IFC and WBG 2007c). **Although the General Guidelines do provide guidance on how to minimise development impacts that could have an impact upon cultural heritage (e.g., noise and vibrations), they do not deal with cultural heritage specifically. While all aspects of the guidelines should thus be fully complied with, they are not discussed in further detail here.**	**N/A**
National Environmental, Social, Health, and Safety (EHS) Guidelines (Jordan)	**N/A**	Jordan has also established national Environmental, Social, Health and Safety (ESHS) guidelines. While a single comprehensive document detailing these guidelines does not appear to exist, Jordan does make a commitment to many existing international guidelines, including the EHS Guidelines specified by the IFC and WBG (see above). It additionally specifies some of its own national policies and strategies concerning health, safety, and the environment. **All guidelines relating specifically to cultural heritage and adopted by Jordan have already been discussed within the sections above.**	**N/A**

Table 1-2. Other Relevant Policies of the Financial Institutions

Institution	Risk and Impact Assessment Policy	Land Acquisition Policy	Stakeholder Engagement Policy
European Bank for Reconstruction and Development (EBRD)	**ESR1** This policy recognises the importance of, and requires: an integrated assessment to identify all environmental and social risks and impacts of a project; and an Environmental and Social Management System (ESMS) to mitigate, manage, monitor, and report environmental and social performance throughout the life of the project. Both the required assessment and ESMS should be commensurate to the nature and scale of the project and its level of environmental and social impacts. Both processes should also involve meaningful communication and consultation between the developer, workers, affected communities and, where relevant, other stakeholders (EBRD 2024).	**ESR5** This policy relates to any land acquisitions that will either physically displace people or economically displace them by restricting their use of land or their access to assets and resources. The ESR refers specifically to such land acquisitions in which the affected persons or communities do not have the right to refuse these actions. This policy requires that the developer identifies and assesses potential physical and/or economic displacements at an early stage of the environmental and social assessment required by ESR1. If identified, the developer should consider feasible alternative project designs and sites to avoid or minimise land acquisition. Where displacement cannot be avoided by design, it should be minimised and appropriate mitigation measures carefully planned and implemented. This process should include meaningful consultation with affected persons and pay particular attention to gender impacts and effects on vulnerable people. Although mitigation should be a last-case choice, recommendations on suitable mitigation are provided within the document (EBRD 2024).	**ESR10** This policy requires the design and implementation of a Stakeholder Engagement Plan (SEP), initiated at an early project stage and continuing throughout the project cycle. Further details may be found in the document although it should be noted that there are specific requirements for stakeholder engagement on Category A projects (EBRD 2024).

Institution	Risk and Impact Assessment Policy	Land Acquisition Policy	Stakeholder Engagement Policy
International Finance Corporation (IFC)	**PS1** The IFC's PS1 is comparable, and specifies the same general requirements, as the EBRD's ESR1 (see above).	**PS5** The IFC's PS5 is comparable, and specifies the same general requirements, as the EBRD's ESR5 (see above). In addition, this policy also requires that avoidance, minimization, or mitigation of identified impacts are managed through the developer's ESMS. Recommendations on suitable mitigation are provided within the document (IFC 2012).	N/A
European Investment Bank (EIB)	**Standard 1** The EIB's Standard 1 is comparable, and specifies the same general requirements, as the EBRD's ESR1 (see above). In addition, this standard requires that the assessment of environmental and social impacts and risks is carried out in the form of an EIA or ESIA for some Projects. The requirement for an EIA or ESIA will be made by the EIB in accordance with the considerations listed in Annex I and II of the EIB's Environmental and Social Standards document (EIB 2022).	**Standard 6** The EIB's Standard 6 is comparable, and specifies the same general requirements, as the EBRD's ESR5 (see above). Recommendations on suitable mitigation, including compensation, are provided within the document (EIB 2022).	**Standard 2** The EIB's Standard 2 is comparable, and specifies the same general requirements, as the EBRD's ESR10 (see above).
World Bank Group (WBG)	The WBG's ESS1 is comparable, and specifies the same general requirements, as the EBRD's ESR1 (see above).	The WBG's ESS5 is comparable, and specifies the same general requirements, as the EBRD's ESR5 (see above).	The WBG's ESS10 is largely comparable, and specifies the same general requirements, as the EBRD's ESR10 (see above).

Institution	Risk and Impact Assessment Policy	Land Acquisition Policy	Stakeholder Engagement Policy
	The major difference is that the WBG requires the production of an Environmental and Social Commitment Plan (ESCP) rather than an ESMS; although the general purpose and scope of these two systems are the same (WBG 2017).	Recommendations on suitable mitigation, including compensation, are provided within the document (WBG 2017).	
Environmental, Health, and Safety (EHS) Guidelines (IFC and WBG	N/A – see Table 1-1 for a summary of these guidelines.		
National Environmental, Social, Health, and Safety (EHS) Guidelines (Jordan)	N/A – see Table 1-1 for a summary of these guidelines.		
Development Finance Corporation (DFC)	N/A – see Table 1-1 for a summary of these guidelines.		
European Union (EU)	N/A – see Table 1-1 for a summary of these guidelines.		
PROPARCO	N/A – see Table 1-1 for a summary of these guidelines.		
The Association of European Development Finance Institutions (EDFI).	N/A – see Table 1-1 for a summary of these guidelines.		

1.8 National Legislation

The Project must adhere to the various legislative and regulatory provisions summarised below.

1.8.1 Antiquities Law No. 23

In 2004, the Jordanian Ministry of Tourism and Department of Antiquities developed the Law of Antiquities No. 23 (General Department of Antiquities 2024) to amend and replace the 1988 Law of Antiquities No. 21. The Law of Antiquities No. 23 sets out the responsibilities, actions, and prohibitions deemed necessary to protect and conserve Jordan's cultural heritage, including archaeology.

The law specifically prohibits any destruction, disfiguration, transformation, removal, or damage to antiquities or their features (Article 9) or any antiquities trading (General Department of Antiquities 2024). Articles 26 through 28 set out the penalties associated with the violation of these provisions. This law also acknowledges how developments can damage cultural heritage and seeks to address this risk by prohibiting heavy or dangerous industries within 1 km of antique sites. The law also prohibits the construction of any new structures (including buildings and walls) within 5–25 metres (m) of antiquities (or greater if deemed necessary by the Minister of Tourism and Antiquities) (General Department of Antiquities 2024).

1.8.2 Protection of Architectural and Urban Heritage Law No. 5

In 2005, the Jordanian Ministry of Tourism and Department of Antiquities also developed the Protection of Architectural and Urban Heritage Law No. 5 (General Department of Antiquities 2005). This law outlines the responsible parties and procedures for identifying, documenting, and protecting Jordan's architectural and urban heritage, including significant buildings and historic districts. It also defines penalties for the unauthorised alteration or destruction of such assets and promotes public participation in built heritage conservation.

1.8.3 Regulations for Archaeological Projects in Jordan

The Regulations for Archaeological Projects in Jordan (2015) set out the procedures and standards for conducting archaeological work in Jordan, including excavation, survey, and documentation. They define the permitting process administered by the Department of Antiquities and establish requirements for managing and protecting archaeological materials encountered during project activities. The regulations also recognise both tangible and intangible heritage values, ensuring that archaeological projects consider associated cultural practices and knowledge linked to sites.

1.9 Local Legislation

The Project must adhere to the various legislative and regulatory provisions summarised below.

1.9.1 The Aqaba Special Economic Zone Authority

The Aqaba Special Economic Zone Authority (ASEZA) is a government entity established in 2001 to govern the Aqaba Special Economic Zone (ASEZ), an area of 37,500 ha around the city of Aqaba. The ASEZA was established to attract and facilitate investment in the area (including within the tourism, utilities, infrastructure, and services sectors) and deliver social, economic, and environmental benefits to the population. ASEZA is in charge of economic permitting and has sole jurisdiction over environmental regulation within the ASEZA (Tetra Tech International

Development 2022b). ASEZA has developed various regulations to facilitate this process, some of which are specifically concerned with the protection of heritage.

Regulation No. 24 for the Development of the Wadi Rum Protected Area (ASEZA)

In 2001, the ASEZA developed Regulation No. 24 for the development of the WRPA (ASEZA 2001), which was issued in accordance with Articles (11) and (56) of the ASEZ Law No. 32 (2000). The regulation requires the ASEZA to develop the area in a sustainable fashion which includes the promotion of tourism, the development of basic services, the improvement of life conditions for inhabitants, and the preservation of its natural, cultural, and heritage environment and unique landscapes. The regulation includes the facilitation of access to, and provision of necessary information about, historical places within the ASEZA. The Wadi Rum Area Committee was developed to administer ASEZA developments and improvements, including establishing policy for its administration; drafting technical instructions; and enforcing legislation (ASEZA 2001).

Regulatory Provisions for the Wadi Rum Protected Area Buffer Zone (ASEZA)

The ASEZA has also developed a suite of regulatory provisions concerning work and activities within the buffer zone of the WRPA (ASEZA n.d.a) to protect the special significance of this area and its natural, cultural, and social assets in a balanced and complementary manner. The regulatory provisions aim to do this through the regulation of all new developments, construction, and other activities within the buffer zone (Article 3); this includes all new (temporary or permanent) work and activities as well as the expansion or alteration of any existing structures or sites (Article 7). The ASEZA board of commissioners is the entity responsible for enforcing the provisions and for granting construction, occupancy, activity, and work permits in line with the regulations (Article 4).

The provisions include several general regulations relevant to all areas of the buffer zone. Of particular importance to heritage are the provisions within Article 13,which specifically forbid "any construction and/or activities within archaeological sites and [their] surroundings" and "any activity that is incompatible with the culture and heritage of the area or any other way that would cause its destruction" (ASEZA n.d.a: 10, 13). Article 13 also prohibits any mining, quarries, crushers, sand and gravel plants, or industry plants of any kind within the buffer zone. Article 13 also makes specific provisions regarding the undertaking of agricultural and pastoral activities; landscaping; and the construction of roads, paths, and infrastructure within the buffer zone. Of particular relevance to this Project is the requirement that "infrastructure facilities and services shall be underground so that they cannot be seen" (ASEZA n.d.a: 11). Also relevant are the provisions regarding the management of construction and other activities; these include a specific prohibition on noise levels exceeding 45 decibels (dB) or vibrations lasting more than three minutes if they are strong enough to be felt by humans.

The regulations also provide certain allowances for the local community in Article 11, including those related to the construction within existing residential areas; setting up traditional tents in natural areas; grazing; hosting tourists; and carrying out handicrafts, heritage, and traditional industries (ASEZA n.d.a).

Finally, the regulations refer to the strategic plan for land use planning in the WRPA buffer zone (ASEZA n.d.b) (Figure 1-5), which defines different "land use areas" within the buffer zone and lists a number of specific provisions to be adhered to within each area. The land use areas include four main character areas (Borda, Sabet, Marsad, and Kharzah) as well as the existing Disi Agricultural Area and a social corridor that connects existing settlements across the northern extent of the buffer zone. The Project would mainly extend through the social corridor but would also extend through the Disi Agricultural Area. The strategic plan allows for low development within the social corridor (except within regulated urban settlement) and medium

development within the Disi Agricultural Area, although this is limited to existing agricultural use (ASEZA n.d.a).

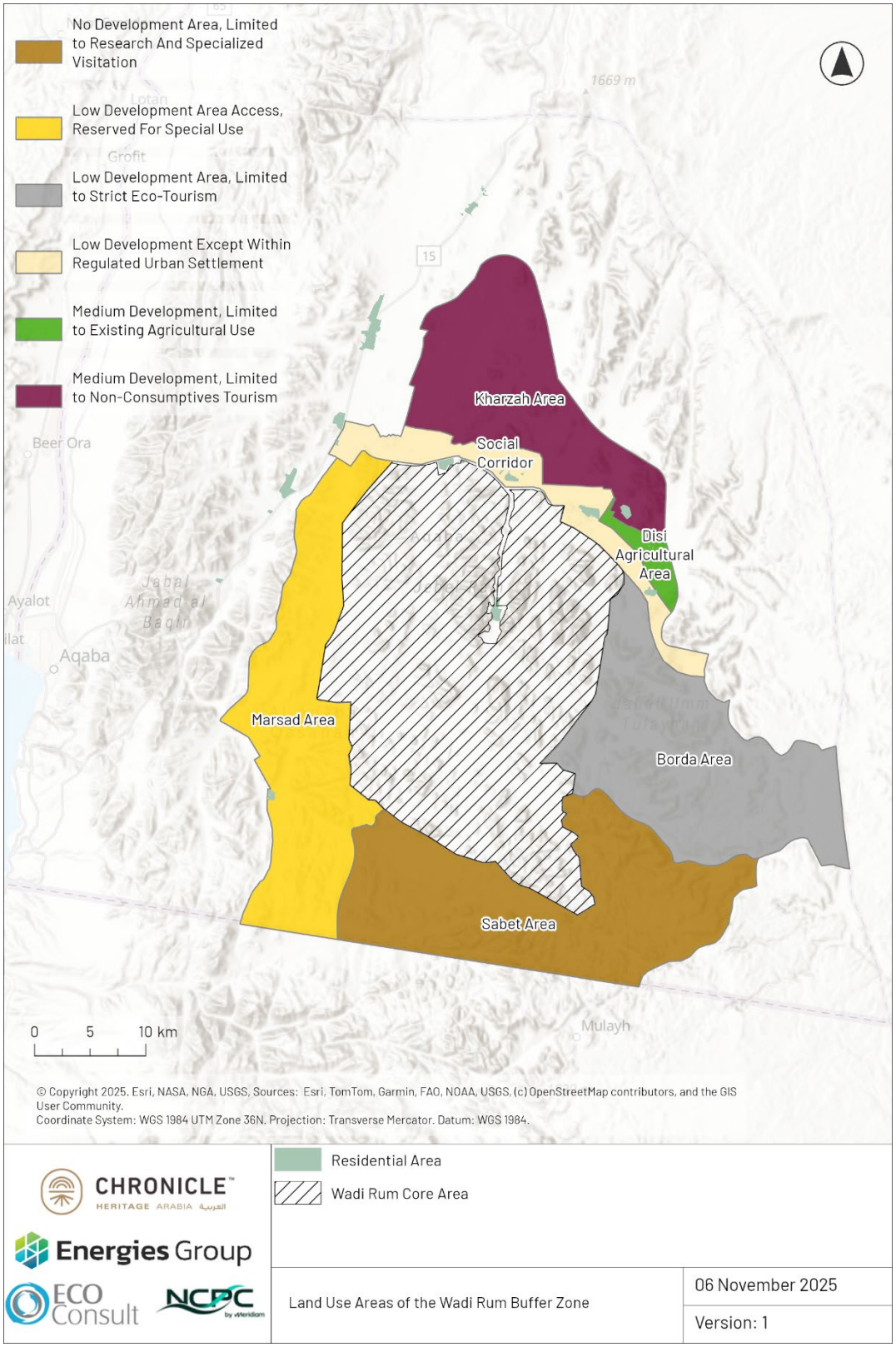

Figure 1-5. Established land use areas of the WRPA buffer zone, as defined by ASEZA.

2 Data Sources and Methodology

2.1 Existing Data

Chronicle Heritage Arabia performed a desktop review of readily available historical, archaeological, and cultural heritage information pertinent to the AOI. Identified and consulted information sources pertinent to this HIA Scoping Report are included in Table 2-1.

Table 2-1. Sources of Information

Source	Type	Description
Eco Consult	Various	Shapefiles, documents, drawing, and other correspondence detailing the proposed works and assessment undertaken so far
DoA	Consultation	CH Arabia consulted with the DoA throughout the HIA process
ASEZA	Consultation	CH Arabia consulted with ASEZA throughout the HIA process
UNESCO	UNESCO World Heritage Site	Descriptions and assessment of the Outstanding Universal Value (OUV) of the WRPA and the Cultural Space of the Bedu in Wadi Rum
UNESCO	UNESCO World Heritage Site	WRPA State of Conservation reports and 2003 Management Plan
MEGAJordan	Online GIS	Online GIS repository of site data, published by the Department of Antiquities and the Getty Institute
Google Earth	Satellite imagery	Information on topography and geology of the AOI
USAID	HIA	Previous HIA undertaken in 2025 to assess the Disi-Aqaba Pipeline
Various	Research papers, journal articles, books	Various sources found online and as hard copies

2.1.1 USAID HIA

One of the data sources used to inform the HIA (as noted in Table 2-1) was a Heritage Impact Assessment (HIA) prepared in 2025 under USAID's *Building Water Infrastructure Activity* for the proposed Disi–Aqaba Water Transmission Pipeline (United States Agency International Development [USAID] 2025). The assessment was undertaken by CDM International Inc. (CDM Smith) as Task WA-14 and submitted to USAID/Jordan in July 2025. The study examined the potential impacts of a 68 km transmission pipeline designed to increase water supply to Aqaba by approximately 12 million m^3 per year from the Disi Aquifer. The study is highly important to this HIA since the proposed Disi-Aqaba Pipeline (never constructed) runs along almost exactly the same alignment as the pipeline proposed by this Project. It was approved in principle by AZEZA.

The Disi Pipeline HIA was implemented in accordance with the *UNESCO–ICCROM–ICOMOS–IUCN Guidance and Toolkit for Impact Assessments in a World Heritage Context* (2022). The assessment was structured as a standalone study aligned with the Environmental and Social Impact Assessment (ESIA). The methodology included a literature review, review of the 2019–2023 *Integrated Management Plan for WRPA*, delineation of a 250 m study corridor, systematic field investigations, community consultations, and stakeholder engagement with the DoA, ASEZA, and local Bedouin communities.

The Disi Pipeline HIA concluded that no registered archaeological sites fall within the proposed pipeline footprint. Five unregistered archaeological features, consisting of cisterns, milestones, and structural remnants from the Nabataean, Roman, and Byzantine periods, were documented outside of the pipeline footprint but within the defined 250 m study corridor. Meanwhile, a further nine sites were identified outside the study corridor but within the wider general area. No direct impacts to known sites were identified, although potential indirect impacts from construction activities were acknowledged (USAID 2025).

An assessment of the findings of this HIA, and its limitations, is provided in Table 2-2.

Table 2-2. Findings and Limitations of Previous HIA

Aspect / Theme	Findings or Limitations in 2025 HIA
Scope of Assessment	Focused primarily on archaeological and natural attributes; limited treatment of intangible heritage and living cultural practices.
Methodological Framework	Followed 2022 UNESCO Guidance but applied heritage criteria mainly as an adjunct to the ESIA.
Field Verification	Limited on-site verification; reliance on existing inventories and secondary data.
Community Participation	Consultation limited to single stakeholder workshops; no structured community engagement.
Institutional Coordination	Coordination between ASEZA, DoA, and WRPA Management Unit was informal.
Cumulative Impact Assessment	Identified but not quantified; no integrated evaluation of concurrent projects.
Monitoring Framework	Recommended generic monitoring without performance indicators or assigned responsibilities.
Mitigation Planning	Standard avoidance and chance-find procedures; minimal linkage to management planning.
Legal and Policy Alignment	Based on 2019–2023 IMP and pre-amendment ASEZA frameworks.
Reporting and Documentation	Narrative presentation without tabulated sensitivity or significance matrix.
Scope of Assessment	Focused primarily on archaeological and natural attributes; limited treatment of intangible heritage and living cultural practices.
Methodological Framework	Followed 2022 UNESCO Guidance but applied heritage criteria mainly as an adjunct to the ESIA.
Field Verification	Limited on-site verification; reliance on existing inventories and secondary data.
Community Participation	Consultation limited to single-stakeholder workshops; no structured community engagement.
Institutional Coordination	Coordination between ASEZA, DoA, and WRPA Management Unit was informal.

2.2 Site Visit

A site visit was also undertaken to inform this Scoping Report and the following HIA Statement. The visit was non-intrusive and involved a walkover of the Project Area and parts of the WRPA to gain familiarity with the areas of potential impact, existing heritage assets, and the historic landscape character. Records of the visit were created in the form of photographs and written records.

2.3 HIA Methodology

The UNESCO HIA Toolkit (UNESCO 2022) sets out the methodology that should be used to undertake a HIA Scoping for Projects that have the potential to impact a UNESCO site. Most importantly, it requires that UNESCO World Heritage Sites and Protected Areas are assessed according to their OUV, integrity, and authenticity rather than general heritage values used for non-UNESCO sites.

2.3.1 Assessing the Significance of World Heritage Sites

OUV is a set of criteria that is used to define and assess both designated and tentative World Heritage Sites and Protected Areas, as defined by the 1972 UNESCO World Heritage Convention. To be included on the World Heritage List, properties must meet at least one of ten criteria of Outstanding Universal Value (Table 2-3) as well as UNESCO's stated requirements for authenticity, integrity, and protection and management (Table 2-4). This HIA Scoping Report will use these criteria and requirements to assess the significance and impacts of the Project upon the significance of the WRPA.

Table 2-3. The Ten Criteria of Outstanding Universal Value

OUV Criteria	Explanation
i	The property should represent a masterpiece of human creative genius.
ii	The property should exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning, or landscape design.
iii	The property should bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living, or which has disappeared.
iv	The property should be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history.
v	The property should be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change.
vi	The property should be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria).
vii	The property should contain superlative natural phenomena or areas of exceptional beauty and aesthetic importance.
viii	The property should be an outstanding example representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features.
ix	The property should be an outstanding example representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal, and marine ecosystems and communities of plants and animals; and/or
x	The property should contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of Outstanding Universal Value from the point of view of science or conservation.

Note: OUV = Outstanding Universal Value.
Source: UNESCO (2022: Box 3.1).

Table 2-4. The Requirements for Authenticity, Integrity, and Protection and Management

Requirement Type	Explanation of Requirement
Authenticity	**Authenticity** applies to cultural heritage, and refers to the degree to which knowledge and understanding of the property's heritage values are understood and believed to be credible: whether their cultural values are truthfully and credibly expressed through attributes including form and design; materials and substance; use and function; traditions, techniques and management systems; location and setting; language and other forms of intangible heritage; spirit and feeling; and other internal and external factors.
Integrity	**Integrity** is a measure of the wholeness and intactness of the natural and/or cultural heritage and its attributes: the extent to which the property includes all elements necessary to express its Outstanding Universal Value; whether it is of adequate size to ensure the complete representation of the features and processes which convey the property's significance; and whether it has been protected from adverse effects of development and/or neglect.
Protection and Management	**Protection and Management** relates to how a property's Outstanding Universal Value, including its integrity and/or authenticity, are sustained and enhanced over time.

Source: UNESCO (2022: Box 3.2).

2.3.2 Undertaking a Scoping Report

As previously discussed, the UNESCO HIA Toolkit (UNESCO 2022) notes that the purpose of an HIA Scoping Report is to agree on the scope of work needed to inform the HIA Statement. This is achieved through an appraisal of existing data and a gap analysis. The Scoping process should also be informed by a meaningful, early, and proportionate program of stakeholder engagement.

If possible, the Scoping Report will also make a preliminary assessment of the Project's impact based on the information available, including, if relevant, the identification of expected significant impacts. If possible, the report will also provide initial recommendations to inform the project design and avoid and minimise identified potential impacts. Nevertheless, it is important to note that such recommendations made at the scoping stage would not carry the weight or significance of those made as part of a full HIA statement process.

The UNESCO HIA toolkit provides helpful recommendations on how to carry out this process and suggests it is undertaken using two steps, which are detailed in the following sections.

Step 1: Assess Significance

The World Heritage Site's Statement of OUV (as defined by UNESCO) should be analysed to identify the property's particular values and attributes. Heritage or conservation values are defined as the reason why a World Heritage property is considered exceptional, interesting, different, or special. Its attributes are defined as those (tangible or intangible) elements of the property that convey and contribute to those values. It is recommended that the results of this assessment are tabulated for ease of reference.

Step 2: Assess Impact

The elements of the Project that have the potential to cause an impact should be listed. The likely impact of each of these elements should then be assessed with regard to each of the property's identified attributes. The quality of the impact (whether it is positive, negative, or neutral) should also be assessed. It is recommended that the results of this assessment are also tabulated for ease of reference.

The final HIA Statement will also assess the characteristics of any identified impacts, including their reversibility (reversible/irreversible); longevity (temporary/permanent); degree of change (none/negligible/some/large); and, finally, the magnitude of that impact (neutral/minor/moderate/large). In accordance with UNESCO's HIA Toolkit (UNESCO 2022), the magnitude of an impact upon an attribute of a World Heritage Site or Protected Area should be assessed in accordance with Table 2-5.

Table 2-5. Heritage Impact Assessment for UNESCO World Heritage Properties

Attributes That Convey OUV	Degree of Change (Either Adverse or Beneficial)			
	None	Negligible Change	Some Change	Large Change
	Magnitude of Impact (Either Adverse or Beneficial)			
	Neutral	Minor	Moderate	Major

Note: OUV = Outstanding Universal Value.

The Scoping Report will undertake a preliminary assessment of the characteristics and magnitude of identified impacts where possible. However, this assessment may be limited if there are gaps within the baseline data. The identification of these gaps (as part of this Scoping Report) and their resolution should, however, allow for a comprehensive and accurate assessment of impacts as part of the final HIA Statement.

Step 3: Recommend Mitigation

Finally, where negative impacts are identified, appropriate measures should be recommended to mitigate those impacts or, where relevant, address data gaps that need to be resolved before production of the HIA Statement. These recommendations should be used by the developer to revise and refine the Project design, thereby allowing its impacts to be re-assessed as part of the HIA Statement. In this way, the HIA should be an iterative process.

The recommendation of mitigation should be conducted in accordance with UNESCO's mitigation hierarchy (UNESCO 2022) (Figure 2-1) which sets out the preference that should be given to different mitigation measures. It requires that preference always be given to measures that avoid impacts altogether. Only if avoidance is not viable should measures be recommended which (in decreasing preference) minimise, rectify, reduce, and finally offset that impact.

While this hierarchy can be used to guide the recommendation of impact mitigation at any heritage site, it is important to note that the hierarchy applies slightly differently to World Heritage Sites and Protected Areas, given their international and irreplaceable significance. While the full range of mitigation measures may be applied to other heritage sites, the HIA Toolkit requires that mitigation of impacts to the OUV of World Heritage Sites and Protected Areas is limited to the two most preferable mitigation measures (avoidance or minimisation), wherever possible. It is also important to note that the OUV of a World Heritage Site or Protected Area is considered irreplaceable and thus cannot be offset. As such, mitigation measures that propose to offset impacts are not permissible in a World Heritage context.

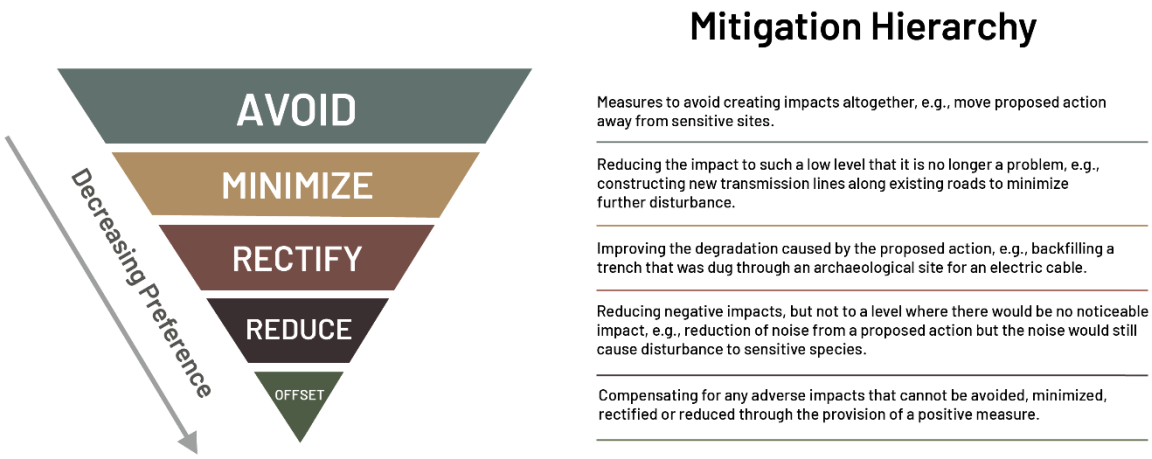

Figure 2-1. The mitigation hierarchy after UNESCO (2022: toolkit Paragraph 6.10).

2.3.3 Assessment Criteria for other Heritage Sites

The proposed work will take place outside the WRPA core area and partially outside its buffer zone. As such, the Project may also have an impact upon heritage assets that are not protected by the UNESCO designation. Impacts to these heritage assets will nevertheless be assessed in accordance with the UNESCO methodology and guidance described above. This is to ensure consistency across the assessment. This will also ensure that, if the enlarged buffer zone of the WRPA (as proposed by ASEZA) is approved by UNESCO, the assessment will still apply.

The only difference between the assessment methodology for non-UNESCO and UNESCO sites will be the particular matrices that are used to assess heritage significance and impacts (Steps 1 and 2). For non-UNESCO sites, the heritage significance and impact assessment matrices shown in Table 2-6 and Table 2-7 will be used. The use of two different heritage impact assessment matrices reflects the difference in heritage significance between UNESCO and non-UNESCO sites.

Table 2-6. Cultural Heritage Site Significance

Site Type	Low Importance	Moderate Importance	Major Importance
Archaeological Site	Limited information value and/or cultural significance based on content and condition of site.	Moderate informational value and/or cultural significance based on content and condition of site.	High informational value and/or cultural significance based on content and condition of site.
Historic Monument	Limited visual, commemorative or art historical interest based on architectural style or degree of preservation.	Moderate visual, commemorative or art historical interest based on architectural style or degree of preservation.	High visual, commemorative or art historical interest based on architectural style or degree of preservation.
Site with Intangible Heritage Value	Limited cultural or religious significance to site users based on user criteria.	Moderate cultural or religious significance to site users based on user criteria.	High cultural or religious significance to site users based on user criteria.

Table 2-7. Heritage Impact Assessment Matrix for non-UNESCO sites

Significance of Heritage Asset	Magnitude of Impact (either adverse or beneficial)				
	No Change	Negligible Change	Minor Change	Moderate Change	Major Change
Exceptional* (Category A)	Neutral	Slight	Moderate/Large	Large/Very Large	Very Large
Considerable (Category A)	Neutral	Slight	Moderate/Slight	Moderate/Large	Large/Very Large
Some (Category B)	Neutral	Neutral/Slight	Slight	Moderate	Moderate/Large
Low (Category C)	Neutral	Neutral/Slight	Neutral/Slight	Slight	Moderate/Slight

*Excluding UNESCO World Heritage Properties.

2.4 Stakeholder Engagement

Stakeholder engagement has been undertaken (see Social ESIA chapter) where there were only two issues raised. One issue concerned the visual impact of the OHTL; the second issue concerned the project's potential impact upon an endurance horse racing event held every November under the patronage of the Royal Equestrian Federation at Al-Shakeriyah. The visual impact of the OHTL has been addressed in Section 5 of this report. The construction program will avoid any activities associated with the horse racing event.

Additionally, the ASEZA representative for UNESCO requested that a CFP is implemented and that all ground breaking activities are monitored by archaeologists for chance finds.

3 Heritage Baseline

3.1 Archaeological and Historic Background

3.1.1 Early Prehistoric, Chalcolithic, and Bronze Age

During the Lower Palaeolithic there is limited evidence for human occupation in Jordan. Surveys in the al-Jafr basin, which is along the path of the Project, have identified a number of sites in the vicinity of a paleolake that would have provided a rich lacustrine environment for human occupation (Quintero & Wilke 1998). Finds in the area include Acheulian hand axes that connect the area to other sites with similar materials in the broader Levantine area (Rollefson et al. 2005). During the subsequent Middle Palaeolithic , there is more evidence for the continued occupation of lacustrine zones in eastern Jordan (Kadowaki et al. 2021; Cordova et al. 2013). Well-documented sites in the Jebel Qalkha area highlight that populations in that time likely engaged in transhumant behaviour that included activities in the Hisma Basin, the Ma'an plateau and the Wadi Araba (Henry 1995; Kadowaki & Henry 2019), including areas that will be traversed by the Project. During the Upper Palaeolithic site locations are noted across a wide geographic area that includes many sites in eastern, arid areas within Jordan (Henry 1995). In Jordan surveys have identified Upper Palaeolithic sites in the area or Azraq, Wadi Hasa and Jebel Qalkha (Coinman 1997). The sites now include what are thought to have been lacrustrian environments, but also desert, marsh and steppe. The principal stone tool tradition of this period, Ahmarian, is predominantly blade-oriented and likely reflects the ecological variability of habitation areas utilised during this period. Into the EpiPalaeolithic there is more variety in tool traditions that exist contemporaneously both inter- and intra-regionally (Olszewski 2001). That variability in reduction sequencing suggests that there are different culturally determined

practices that develop during this time and which are reflected in the choices of raw material sourcing as well. Towards the end of the EpiPalaeolithic , with the onset of the warmer and more humid Bølling-Allerød interstadial, a large core area of Early Natufian settlement has been evident beyond the Mediterranean zone to include Eastern Arid areas that will be impacted by the Project and also included more sites in the highlands that were likely occupied year round (Henry 1995; Richter et al. 2017). This was a result of an increased reliance on the production of foodstuffs from cereals and the progression towards formal agriculture.

The end of the Palaeolithic and the start of the Neolithic is marked by the end of the dry Younger Dryas leading into the wetter start to the Holocene period (Stein et al. 2025). That environmental shift is thought to have facilitated the development of more permanent settlements that relied more heavily on agricultural production as a mode of subsistence. In Jordan, the overall range of sites contracts during the first stage of the Neolithic, the Pre-Pottery Neolithic A, where only a few settlements are known from the period: el-Hemmeh, WF16 and Zahrat adh Dhra 2 (Finlayson et al. 2024). During this period there is evidence for new forms of free-standing architecture and the start of the exploitation of domesticated animal resources (Finlayson et al. 2014). The increased reliance on both horticultural and agricultural products also led to a greater investment in settlement construction, which required significantly more maintenance and planning.

The subsequent Pre-Pottery Neolithic B (PPNB) is marked by the appearance of larger settlements spread over a larger area that include features of intra-site ranking. In Jordan, important PPNB sites include Ayn Ghazal, Basta, Baj'a and Beidha (Rollefson 2001). At smaller sites like Ayn Abu Nukhayla, in Wadi Rum, very close to the Project route, there is clear evidence for differentiation of space for both household and community activities related to the processing of agricultural materials (Portillo et al. 2009). The changes the structure of domestic space are also noted in other aspects of daily life, including the advent of complex systems of exchange and highly symbolic behaviour (Ibáñez et al. 2016; Simmons & Najjar 2006; Rollefson 2001, 1992). Additionally, forms of settlement appear in the arid periphery that distinguish that area from less arid regions in the western part of the country. Long-term research, especially in the Jafr Basin, which will be passed by the Project, has produced enough data to support alternative chronological systems for the arid peripheries beginning in the PPNB (Rosen 2025; Fujii 2013). At these arid sites transhumant pastoralism was likely practised, along with intensive hunting and limited horticulture (Fujii 2013; Abu Azizeh et al. 2021; Nadel et al. 2024). Over the course of the Neolithic, burial monuments become the primary archaeological remains from populations living in these arid areas as the range of movement of pastoralists increases (Rollefson 2011). The larger sites traditionally associated with the PPNB settlement pattern are eventually abandoned in favour of resettlement at other sites in new locations and at a smaller scale compared with the sites of the PPNB (Rowan & Golden 2009). The period that follows, the Pottery Neolithic, is generally not well documented except for isolated sites primarily in the northern Jordan Valley (Rollefson 2001).

In Jordan the majority of settlement during the Chalcolithic has been noted in the Jordan Valley. The most important site in the cluster of sites within the valley is Teleilat Ghassul, for which the Ghassulian lithic tradition is named (Bourke 2002). A key debate for this period is whether there is evidence for social stratification between sites, with the primary mechanism for determining that being access to exotic resources or technology (Rowan & Golden 2009). The most prominent of these models is the control of copper production by sites in the Beer Sheva valley using copper extracted from the Faynan region in Jordan (Levy 1998). There is also evidence for nascent copper production outside of that framework at the end of the Chalcolithic in the region of Aqaba, 8 km from the path of the project, at the sites Tall Hujayrat al-Ghuzlan and Tall al-Magass (Klimscha 2010). In the eastern desert areas of Jordan, including areas traversed by the project, there is a continued progression towards true pastoral nomadism with new forms of burials cairns appearing on the landscape (Fujii 2013). This is

evident in the Wadi Hisma region where there is evidence for connections to Sinai and the Negev in the form of a Timnian lithic tradition as distinct from the Ghassulian that dominates the main areas of settlement during the Chalcolithic (Henry 1995). Further to the east, in the more arid area, a second, distinct form of desert kite is more common and likely used by a population of mobile hunter-gatherers (Nadel et al. 2024). The transition from the Chalcolithic into the Bronze Age is marked clearly in some regions with the abandonment of sites very well defined, and noted only as a gradual change in other regions, especially the more arid areas (Rowan & Golden 2009). Many of the larger sites, like Teleilat Ghassul, are gradually abandoned and smaller peripheral sites, like aforementioned Tall Hujayrat al-Ghuzlan and Tall al-Magass, are continuously occupied into the start of the Bronze Age.

The key distinction between the settlements of the Chalcolithic period and the Bronze Age is the development of more clearly defined urbanised characteristics at Bronze Age sites. During the earliest period of the Bronze Age there is a small Egyptian colonial incursion into the southwestern Levantine region which likely would have been an important point of contact for economic activity for the Timnian pastoral populations in the southern Arid periphery (Yekutieli 2005). Around the time that the Egyptian incursion receded agglomerated settlements began to appear throughout the region, concentrated in areas with greater rainfall (Chesson 2018). In Jordan, major sites from this period include Bab edh-Dhra, Tell Iktanu, Tell el-Hammam, and Khirbet al-Batrawy (Rast et al. 2003; Prag 1991; Nigro 2012, 2015). In general, these sites have evidence for fortifications with elements of urban planning. Additionally, some have structures that have been described as "palaces" where elite goods like copper were likely being used as symbols of power (Nigro 2015). The major source of copper during this period was the region of Faynan in southern Jordan, where operations were likely facilitated by transhumant pastoralists (Gidding 2023). The copper trade was likely part of a larger trade network that involved pastoralists based in the arid eastern periphery including the Jafr Basin, which will be traversed by the Project, and also included specialised lithics and ground stone during the terminal phase of the Timnian (Fujii 2011, 2013; Abadi & Rosen 2008). This trade network collapses around the time of the 4.2 kbp event leading to another period of relatively small scale settlement (Kaniewski et al. 2018).

New and better-defined forms of urbanism arise during the subsequent Middle and Late Bronze Ages. During this period of time the evidence for occupation in the arid periphery generally disappears and does not return until the start of the Iron Age. The location of settlement in the region moves primarily towards the Jordan Valley with access to long-distance exchange routes based around the Mediterranean being very important. One of the most important sites for this trade was Pella, which was a "gateway" community that connected various parts of the region (Knapp 1993).This is supported by the presence of people from the larger Western Asia region in burials within the site (Stantis et al. 2022). In general, during the later part of the Bronze Age, the focus of settlement appears to be part of a developing Mediterranean exchange network with Egypt being the most important partner for Levantine sites (Cohen 2017). During this period there were multiple incursions by Egyptian pharaohs that were interested in the exploiting resources from the city-states that had formed along the Levantine Corridor, largely ignoring the arid periphery (Strange 2004). As a result Egyptian artefacts are commonly found in palatial centres of the larger cities of the time including Pella and Tall as Sa'diyya (Strange 2001). The major documented exception to the ignorance of the arid periphery was under the rule of Ramsses III, at the end of the Late Bronze Age, who led an incursion through southern Jordan en route to sites in Northwest Saudi Arabia likely to take advantage of copper resources in that area (Sperveslage & Eichmann 2012). The Bronze Age Mediterranean koine collapses around 1150 BCE and in the subsequent Iron Age, a number of smaller, locally ruled kingdoms replace the large polities that dominated the end of the Bronze Age.

3.1.2 Iron Age, Hellenistic and Nabataean Periods

Following the collapse of the Late Bronze Age Mediterranean koine, three kingdoms eventually emerge within Jordan: Ammon, Moab and Edom. Preceding the formation of those kingdoms in roughly the ninth century BCE, much of the settlement during the Iron Age is characterised by small domestic residences with large fortifications, but lacking much evidence for strong centralised authority (Porter 2013). Most of the early Iron Age settlements appear to be discontinuous from settlements of the Bronze Age and primarily located above the Wadi Hasa (Herr 2013). One exception for this is located in the area of the Wadi Faynan where a large copper industry developed with likely antecedents in the pastoral groups that occupied the arid periphery through the Bronze Age (Levy et al. 2008; Liss et al. 2020). During the ninth Century BCE more concrete evidence for the development of the three main kingdoms of Jordan appears, but in many places the evidence is fragmentary due to the Iron Age occupations being covered by later occupations, where it is noted key features include fortifications, monumental buildings and gates (Porter 2018). The northernmost kingdom was Ammon with notable sites: Safut, Amman, Sahab, Tall al-Umayri, Tall Jawa, Hesban, Madaba, and Jalul (Younker 2013). Moab was located around the Wadi Mujib and included the sites: Dhiban, Tell Madaba, Khirbat al-Mukkhayat, and Hesban (Steiner 2013; Porter 2018). Edom was located in the southern arid periphery and the most important sites include Tawilan, Busayra, and Umm al-Biyara (Bienkowski 2013). Additionally, there is the enigmatic Red Sea port site Tell el-Kheleifeh, near modern day Aqaba, which is assumed to have been connected to the Edomite kingdom, but it is far from the Edomite heartland making it difficult to determine a political affiliation (Pratico 1985; Bienkowski 2013). During the seventh Century BCE the Assyrian Empire asserted control over much of Jordan, with many sites showing Assyrian influence in the spatial organization of palaces (Strange 2004). Towards the end of the sixth Century the Babylonians briefly controlled the region before the Persians defeated the Babylonians and took control of administering the former Babylonian Empire. Through that turbulence the general settlement pattern of the region tends to favour the coast, with less evidence for large occupations within Jordan (Lehmann 2013). Nevertheless, there is evidence for continuity of settlement at some of the previous administrative centres, including Tall Saidiyya, Tall al-Umayri, Tall Jalul, Drayat and Busayra (Bienkowski 2001). The Persian period ends with the conquest of Alexander the Great and new Hellenistic cities appear in the north, highlighting discontinuity of settlement between the Iron Age and the subsequent periods.

Following the conquest, in 332 BCE, and death of Alexander the Great, in 323 BCE, the area of northern Jordan fell under the control of the Ptolemaic Dynasty in Egypt. However, the area was contested by the rival Seleucid Dynasty, and the five "Syrian Wars" were contested over the third Century BCE, after which the Seleucid Dynasty was able to extend control as far south as modern Amman. However, the Seleucid Dynasty weakened shortly afterwards, which created a power vacuum that was filled by other political entities: the Hasmoneans and the Nabateans. The political instability is one likely factor for a general lack of data regarding settlement in Jordan in association with Hellenistic rule. Additionally, the cities that would form the Decapolis administrative district were remodelled during later Roman rule and very little of their Hellenistic layers remain. There are written references to Gadara (Umm Qays), Gerasa (Jerash), and Philadelphia (Amman) suggesting the presence of administrators managing small-scale fortified settlements during this time (Berlin 2003). However, the absence of evidence for extensive settlement in the hinterlands suggests that there was an overall decline in population during this period.

In contrast, in southern Jordan the evidence suggests that what eventually becomes identified as Nabatean civilization is in its nascent stage. The first mention of the Nabataeans is by Diodorus describing an attempt by one of Alexander the Great's succeeding generals to conquer the Nabateans in 312 BCE. Recent excavations in Petra have focused on examining the occupation during the period of Ptolemaic rule and have identified pre-Hellenistic material

(Graf et al. 2022). The excavations in Petra identified Early Hellenistic foundations for architectural features and coins linking the site to third-century BCE occupations in northwest Saudi Arabia, as well as imitations of Athenian bronze tetradrachm. This suggests that from its establishment, Petra was an important trading centre connecting distant regions. However, the material culture that archaeologists have historically associated with the establishment of Nabatean identity is not widely noted until the first century BCE when it is assumed that the Nabateans began to establish more permanent infrastructure to maintain their control over trade networks (Schmid 2008). The initial lack of strongly identifiably Nabatean material culture might be a reflection of how Nabatean political authority evolved, developing as a series of tribal alliances held together by a dynasty centred at Petra (Graf 2004). This is echoed by the epigraphic evidence in important hinterland areas such as the Hisma desert. There Hawāra (Humayma) was established, potentially as an necessary agricultural support for the important port of Ayla (Oleson 2010; Twaissi 2007). In the surrounding area there are thousands of inscriptions in Hismaic that denote servitude to Nabatean rulers and deities. Many of the wadis where these inscriptions have been noted in survey are adjacent to the planned route of the Project. Alongside those inscriptions, but in fewer numbers are comparable Nabatean Aramaic inscriptions indicating Hismaic speaking tribes fit into the larger Nabatean political framework (Corbett 2012). While there is not convincing evidence that the Nabateans were descendants of the previous Edomite state that occupied the same region, they do appear to have adopted or co-opted some local traditions. The integration of local traditions was likely a key factor that enabled their ability to control the hinterland areas.

During the first century BCE Nabatean rulers expanded their authority through the construction of caravanserais and forts that protected major trading routes that likely traversed the area of the Project. Important components of those construction projects included the development of cisterns and aqueduct systems to support the settlements (Graf 1983; Oleson 1997). A secondary component was the integration of Arab tribes into Nabatean cultic practices through the placement of shrines in locations that already were connected to Arabian deities. For instance, the temple complex at Wadi Ramm, just south of the Project, was built over a previous temple complex dedicated to the Arabian goddess Allāt (Tholbecq 1998). In other instances it has been hypothesised that Nabatean shrines exhibit cultic practices autochthonous to the region as part of longstanding religious practices for the pastoralists of Jordan's arid periphery (Tebes 2020). At other temples, like the one at Hawāra (Humayma), the Nabateans appeared to have worshipped local or Nabatean gods, potentially contemporaneously (Corbett 2012). During the first century BCE and first century CE the Nabateans were able to maintain nominal independence from the Roman Empire despite increased Roman interest in the region. That included providing military aid in suppressing the Jewish Revolt in 70 CE. However, in 106 CE the Romans took control of the Nabatean Kingdom with the only contemporary account citing that the Roman governor of Syria subdued the Nabateans (Kennedy 2004). The Romans had already begun to establish Bostra, in southern Syria, as a new trading centre and Bostra was designated as the provincial capital of Roman Arabia.

3.1.3 Roman and Byzantine Periods

During the initial period of Roman control of Jordan much of the area experienced an expansion of settlement as a result of general prosperity. Once Jordan was fully under Roman control, previously mentioned Decapolis cities like Gadara (Umm Qays), Gerasa (Jerash), and Philadelphia (Amman) began to thrive and expand though major construction projects (Freeman 2001). One of the first major projects to be completed was the construction of the *Via Nova Traiana* as a new road connecting Bostra to Aila near modern day Aqaba, near the southern end of the Project area. This roadway effectively bypassed Petra which began the period of decline for the city. Throughout, the Romans co-opted the preexisting network of

forts and defensive stations along roadways that had previously been used by the Nabateans to protect trade routes (Corbett 2012). This is reflected at sites like the previously mentioned shrine at Hawāra (Humayma). There Roman soldiers deliberately disrupted its traditional use only to rebuild the shrine incorporating both Roman and local traditional elements (Reeves 2019). Other sites along the Vi*a Nova Traiana* that had small Nabatean origins were greatly expanded after the extension of Roman control (Al-Muheisen & Villeneuve 2005). Further to the east, the Roman army invested significant resources establishing and maintaining camps in the arid zone of Jordan in connection with trade routes to Arabia (Fradley et al. 2023). The Romans also reopened the copper mines in Faynan likely using slaves to process the raw material with the support of a strong military presence (Hauptmann 2007; Kennedy 2004). This phase of copper production was the most intense recorded in the Faynan area, and excavations at Aila, near the southern end of the planned Project area, suggest that much of it was being exported through that port (Parker 1997). The extraction of raw material was so great that there is evidence for copper production occurring also in the area of the port. A large earthquake in 323 CE disrupted many settlements and required large rebuilding projects, but also marks the beginning of a period of decline into the fourth century CE.

The start of the Byzantine period is marked not by local political changes but by changes in the broader organization of the Roman Empire. In 324 CE Constantine I moved the capital of the Roman Empire to Constantinople and began the process of turning the Roman Empire into a Christian, primarily Greek-speaking state. As noted above, initially this was a period of decline in the region. However, over time the transition to Christianity brought more attention to the broader Levantine region due to its connection with Christian history. The important Hellenistic cities again saw a revival and expansion with church building being a key component (Watson 2001). Further afield, in the aforementioned copper mining area of Faynan, Eusebius notes the mines as a site of martyrdom for Christians who had been sent to work as slaves. In the rural areas to the north, near the modern border with Syria, many sites exhibit signs of relative prosperity through the construction of churches with finely crafted mosaics (Rose et al. 2007). Other sites, including Umm al-Jimal, Umm el-Rasas and Rihab, were located along important trading routes and also appear to have functioned as important sites of hospitality for pilgrims visiting the area (Al-Shorman et al. 2017). The increase of settlement in the hinterland during the Byzantine Period was supported by favourable climatic conditions, which saw an increase in mean annual precipitation during the Byzantine Period (Izdebski et al. 2016). However, in the southern peripheral areas there appears to be a general decline in population density compared with the previous periods (Watson 2001). This is connected to changes in the organisation of trade as noted by the continued decline of Petra as a major urban centre and an increase in smaller agricultural settlements in the hinterland (Kouki 2009). While churches were constructed at the site its overall footprint is considerably smaller compared with its height at the end of the Nabatean Period and various natural disasters, especially earthquakes, are suspected to have facilitated the city's decline (Jones 2021). Over time, Byzantine control of the region weakened, and threats from Persia and eventually northern Arabia led to the end of Byzantine control of the region.

3.1.4 Early Islamic to Ottoman Periods

Byzantine control over Jordan ended after the Muslim conquest succeeded in 636 CE. The first major caliphate of the Islamic period was the Umayyad Empire, who had their capital in Damascus. One of the key features of Umayyad rule was the establishment of *qusour* or "desert palaces" in the remote areas of Jordan. These structures were built to establish control over key trade routes that extend from northern Jordan southwards, creating three arteries for transit, distinct from the routes established in previous periods (King 1987). The two most important routes followed the Wadi Sirhan to the southeast and the other closely follows the route of the future Hejaz Railway with important stops at Humayma and Aqaba (Ayla). The

qusour were carefully placed to take advantage of perennial water sources in order to better monitor and control transhumance through the area (Alhasanat et al. 2012). A powerful earthquake in 747 CE created large-scale destruction and has been suggested to be a contributing factor to the end of the Umayyad Empire in 750 CE. The historical narrative suggests that the Abbasids launched their campaign to overthrow the Umayyads from Humayma, although they did not make any efforts to invest in their former home (Schick 2007). Instead, the Abbasids established their capital in Baghdad, which has been suggested to lead to the marginalisation of Jordan geopolitically during their reign. That view has, however, been contested based on archaeological evidence at a number of sites in Jordan, including Gadara (Umm Qays), Gerasa (Jerash), and Philadelphia (Amman), that show continuity of occupation (Whitcomb 1992). While the *qusour* were abandoned, the local economy seems to have been reoriented to focus on the Jordan and Araba valleys and agricultural production.

The Fatimids of Egypt briefly succeeded the Abbasids in 969 CE. With the move of the imperial capital to Cairo, Red Sea trade became more important together with the port city of Ayla (Walmsley 2001). However, beginning 1096 CE the Crusader invasions began, and this initiated a kingdom centred around Jerusalem. In Jordan the Crusaders established a series of castles, most notably at Kerak and Shobak. However, the period is relatively poorly understood archaeologically due to a paucity of data. This issue is amplified by the lack of ceramic material that is tied to a narrow chronological period and the ubiquity of Hand-Made Geometrically Painted Ware, which lacks tight chronological control (Walmsley 2001). The crusaders were defeated in 1187 CE by the Ayyubid Caliphate who were followed by the Mamluks. During the period of Ayyubid and Mamluk rule there were considerable efforts to rebuild the region following Crusader rule. Unlike in previous periods, the old Hellenic Decapolis cities no longer featured as civic or political centres, and the rulers instead chose to build upon the fortresses at Kerak and Shobak (Milwright 2006). The government utilised that military infrastructure to support trade and pilgrimage through the region on routes that would cross the planned route of the Project. Especially during the Ayyubid period, the archaeological evidence supports a sense of prosperity through the expansion of rural production with the support of the government (Jones 2018). This placed Jordan as an important centre for agricultural production of cash crops like indigo and sugar until the end of Mamluk Caliphate. The emphasis of Ayyubid and later Mamluk control on the maintenance of primarily military installations highlights a progressive change of the settlement pattern from larger urban settlements to a predominantly agricultural or rural settlement pattern.

The Ottoman Empire took control of modern Jordan following its expansion southwards between 1516 and 1517. The main interest of the Ottomans in the region of Jordan was the maintenance of the Hajj route (McQuitty 2001). Instead of utilising the infrastructure of the Mamluks, the Ottomans set up a new hajj route with their own unique design of fortress to the east of the main trade routes used by the Ayyubid and Mamluk rulers (Petersen 2008). A total of ten fortresses was built within the borders of modern Jordan, utilising a unique square design, some of which are located along the planned route of the Project. Examples include Qasr al-Dab'a, Qasr Qatraneh, and Qal'at Hasa. Archaeologically, the data for the Ottoman Period is relatively sparse but the general trends highlight a transition towards more household-level production and fewer imported wares within stratigraphically defined assemblages (McQuitty 2001). This suggests the decreased importance of Jordan as a component of long-distance exchange networks. Later, in 1908, the Ottomans constructed the Hejaz Railway to connect Damascus to Makkah. The path of the railway also was moved west from the initial hajj route established with the square fortresses. Initially built to facilitate pilgrimage, it later also became an important conduit to move Ottoman armies and supplies during the First World War. As result the railway was a frequent target of attack by the Arab tribes fighting with the British against the Ottomans.

3.1.5 Modern and Contemporary Periods

Following the defeat of the Ottomans during World War I the British set the borders of modern Jordan and assigned Abdullah I Emir of Transjordan. Transjordan officially attained independence in 1946 with Abdullah the first King of the Hashemite Kingdom of Transjordan. One of the unique elements to the formation of the Jordanian state was its integration of the Bedouin tribal interests directly into the central government (Alon 2006). As a result, the interests of the Bedouin tribes have played an important role in the organisation of Jordanian society and politics ever since and have been wrapped up within the national narrative of Jordan. The Bedouin themselves generally see themselves as connected to the land that they inhabit and the cultural traditions that stretch back thousands of years and are evident in the landscape (Abu Hamdan & Mason 2025). That connection to the land had led to modern Bedouin traditions integrating elements of antiquity into modern day practice.

A key component of the landscape includes the tens of thousands of inscriptions and rock art that decorate the arid periphery. It has been documented that Bedouin directly interact with ancient rock art as a part of establishing territorial rights and concepts of land tenure (Eisenberg-Degen et al. 2016). The rock art and other markings recall past travellers, events and traditions common in the common narrative of Jordan's arid periphery. This is illustrated by the reuse of cairns that include various types of inscriptions and mark the landscape, in some cases over thousands of years (Kennedy 2012). One concrete example includes a motif that depicts past events with connections to continued traditional cultural expressions are the depictions of musicians with Safaitic inscriptions (al-Manaser 2018). These indicate a tradition of continued expression of ancient rituals into modern Bedouin customs that continue to be practised (Alghazawi & Al-Manaser 2024). These continued interaction with the past highlights how modern Jordanian society continues to directly engage with the thousands of years of heritage remains present within the country.

3.2 Known Heritage Assets

3.2.1 Wadi Rum Protected Area

The WRPA is a UNESCO World Heritage site combining remarkable geological landscapes with a rich cultural legacy extending over some 12,000 years. Among its most significant heritage assets are the vast numbers of rock inscriptions and petroglyphs, cultic and temple remains, and associated sites of human settlement and spiritual significance. These assets illuminate the evolving relationship among pastoralism, sacred practice, script and art, and human movement across desert terrain.

The UNESCO technical documentation notes that, although many of these assets are known and catalogued, there is no comprehensive, up-to-date conservation database covering all inscriptions, petroglyphs, and archaeological sites. Some key monuments (e.g., the Nabatean temple) are in only fair condition and lack regular maintenance. The landscapes and visual settings of many rock-art sites are vulnerable to erosion, vandalism, and infrastructure or tourism pressure. Key important sites in the WRPA are summarised in Table 3-1.

Table 3-1. Summary of Important Sites in the WRPA.

Site Name / Description	Period / Attribution	Protection Status	Excavation Status	Notes
Temple of Allat (Nabataean	Nabataean (built ca. 9 BC–AD 40), with later Roman usage;	Within WRPA, listed as protected under national antiquities law and WHC World	Partial excavation / survey; some archaeological work documented (including	Important cultic site; visual prominence;

Site Name / Description	Period / Attribution	Protection Status	Excavation Status	Notes
Temple, "Aramava")	cultic / sanctuary function.	Heritage inscription. Condition "fair"; not under immediate threat according to 2014 State of Conservation report.	structural recordings, inscriptions, and room complex). Not fully excavated.	linked to springs and water features (Ain esh-Shellaleh).
Khazali Canyon (Khazali Siq)	Multi-period: Stone Age petroglyphs, Thamudic / Nabataean / later inscriptions; human/animal motifs.	Within WRPA, protected under national laws (Antiquities Law + protected area regulations). Condition described as good but with "some concerns" (visitor pressure, erosion).	Documentation and survey work have been done; rock art recording by CB-RAER; limited conservation. Not large-scale excavation.	One of the most accessible petroglyph-rich canyons; popular with tourists; risk of wear.
Alameleh Inscription / Rock Art Clusters	Thamudic / Nabataean / Pre-Islamic inscriptions and petroglyph iconography.	Under WRPA protection, national antiquities laws apply; documentation less complete.	Survey / recording has been done (recent attention); conservation status less clear; little excavation.	Represents non-monumental rock art clusters; culturally important for symbolic mapping and local heritage.
Wadi Rum Protections / Ensemble (Rock Art & Inscriptions Overall)	Multiple periods: Prehistoric, Thamudic, Hismaic, Nabataean, Islamic.	Listed UNESCO World Heritage; national antiquities law; zoning under ASEZA/WRPA.	Largely non-excavated; survey, documentation, photo and epigraphic recording work has been ongoing; some local conservation/training programs.	Represents the cumulative heritage significance; key baseline for impact assessment; pressure from tourism, erosion, and development.

Protection and Management

Although it was not designated as a Protected Area by UNESCO until 2011, Wadi Rum has been protected and managed for its cultural and natural significance since 1978. It was first officially designated as an archaeological site under the Jordanian Law No. 21 of the Department of Antiquities in 1988 and has since also been established as a Protected Area under Cabinet Decision No. 27/11/3226 and a Special Regulation Area under the Administration of the ASEZ (UNESCO 2025b).

The primary plan currently guiding the WRPA's management is the area's strategic plan for land use planning (ASEZA n.d.b), as discussed in Section 1.9 and administered by the ASEZA. This

authority also has a newly revised and integrated management plan dated to 2019–2023, an effective management staff for the area, and financial resources (IUCN 2020).

The IUCN provided an assessment of the conservation status of World Heritage Sites and Protected Areas and has assessed the conservation status of the WRPA as "good with some concerns," which is the second highest of four possible evaluation categories. This status is particularly helped by the area's low population density, a lack of development impacts, and—until recently—a remote and relatively inaccessible character (IUCN 2020).

The current management plan is also assessed as "good," providing a strong legal and governance framework for the area and generally managing the conservation of the area's natural and cultural elements in a balanced and sustainable manner. The management plan's development and the area's ongoing management has also included local community involvement, with efforts made to maintain traditional Bedouin livelihoods and ensure tourism is benefitting local Bedouin communities (e.g., through employing Bedouin as park staff and through Bedouin involvement in ecotourism) (IUCN 2020; UNESCO 2025b).

However, there are growing concerns associated with the protection and management of the WRPA. The expanding tourism industry is considered the greatest risk factor of the WRPA. Current impacts associated with tourism that are envisioned to worsen with time include the following:

- Poorly regulated off-road driving by tour operators
- Construction of illegal campsites
- Resource damage by self-guided tourists
- Increased tourist infrastructure
- Tourist (and local waste) management issues

Other impacts, concerns, and risk factors include the following:

- Further encroachment of the village of Wadi Rum
- The effects of climate change on sensitive high-altitude fauna and flora
- Increasing local conflicts over scarce resources (particularly tourism-related resources)
- Increased levels of local poverty
- Groundwater exploitation and firewood collection (IUCN 2020; UNESCO 2025b).

The management of the WRPA (and its management plan) will need to be refined and revised going forward to address these issues. Current tourism and visitor management practices will need to be developed, particularly as the tourist industry is projected to grow. Other recommended actions include the undertaking of a comprehensive survey and inventory of the area's natural and cultural resources and a conservation and interpretation program (UNESCO 2025b). ASEZA has also recommended the following actions within their most recent state of conservation report (ASEZA 2024):

- Finalize the ongoing revision of the area's buffer area to properly reflect and capture the significance of the wider area
- Take actions to enhance the participation of local communities and stakeholders in decision making
- Regularly monitor management actions (e.g., the introduction and enforcement of new regulations to control desert camps) to evaluate progress

3.2.2 Cultural Space of the Bedu in Petra and Wadi Rum

The Project Area also lies in an area that, in 2008, UNESCO inscribed upon its Representative List of the Intangible Cultural Heritage of Humanity. This list highlights cultural areas, practices, and aspects across the world that are considered of global importance for the intangible cultural beliefs, practices, traditions, and values that they preserve and exhibit.

The Petra and Wadi Rum areas were inscribed on this list because they have been highly important places for both settled and nomadic Bedouin communities for millennia. The following description of the Cultural Space of the Bedu in Petra and Wadi Rum is informed by UNESCO (2025a). In these areas, according to UNESCO, the Bedouin continue to practise many aspects of their traditional lifestyle, including pastoral techniques and skills; a complex social and moral code (transmitted orally); and a rich local mythology (expressed as poetry, folktales, and songs).

According to UNESCO, the Bedouin communities of the area also have extensive knowledge and a highly integrated relationship with their natural environment, including a complex and specific knowledge of the local fauna and flora. Other traditional Bedouin skills and knowledge preserved in the area include camel husbandry and weaving (the two pillars of Bedouin culture), traditional medicine, tent-making, tracking, and climbing. Finally, the continued coexistence and complementary relationship of both settled and nomadic Bedouin communities in the area also attest to their interaction with the particular environmental background and the unique social developments of the community.

While of great importance, the intangible heritage of this area is nevertheless degrading and at severe risk of further loss from various factors; these include general factors such as globalisation and modernisation, as well as the impacts of desert tourism and the demand for an "authentic Bedouin culture," which is not always discerning of the authenticity of the true Bedouin experience. However, the greatest factor appears to be the movement of many Bedouin to more sedentary "modern" lifestyles, rendered more attractive by the increasing availability of modern housing, education, healthcare, and sanitation. These factors have severely impacted the integrity and authenticity of the Bedouin lifestyle in the WRPA, and actions will need to address this ongoing impact (Tarawneh 2009; UNESCO 2025a).

Protection and Management

The management strategy for the preservation and enhancement of the livelihood, traditions, and practices of the Bedouin in the WRPA are considered components of the area's current management plan (2019–2023). However, as highlighted within the management plan, there are many issues still facing the Bedouin, including competition for scarce resources, increasing poverty, and damage to their traditional landscape. The involvement of the Bedouin within the management of the WRPA is also still a matter to be addressed and ameliorated, as highlighted by the ASEZA's most recent state of conservation report (2024).

UNESCO (2025b) also records that an action plan was implemented for the cultural space of the Bedu in Petra and Wadi Rum from 2006 to 2009 by the Jordanian Hashemite Fund for Human Development. The aim of the action plan was to protect the main features of the Bedouin's traditional lifestyle in the area, specifically the collection and oral transmission of heritage and the transmission and adaptation of knowledge and skills related to camels and weaving.

3.2.3 Known Heritage Assets

MEGAJordan Data

A total of six undesignated heritage assets were previously identified and recorded within the AOI. These are listed and summarised in Table 3-2 and their locations are shown within Figure

3-1. All six sites are recorded in the MEGAJordan database; however, two (sites WR-14_19 and WR-14_22) were originally identified by the Wadi Ramm Project (2014 season) (Farès & Norris 2017). The remaining four were identified during the USAID survey for the proposed Disi pipeline (USAID 2025). Where no information is provided about a site within Table 3-2, it is because this information was not available within either the MEGAJordan database or other available sources.

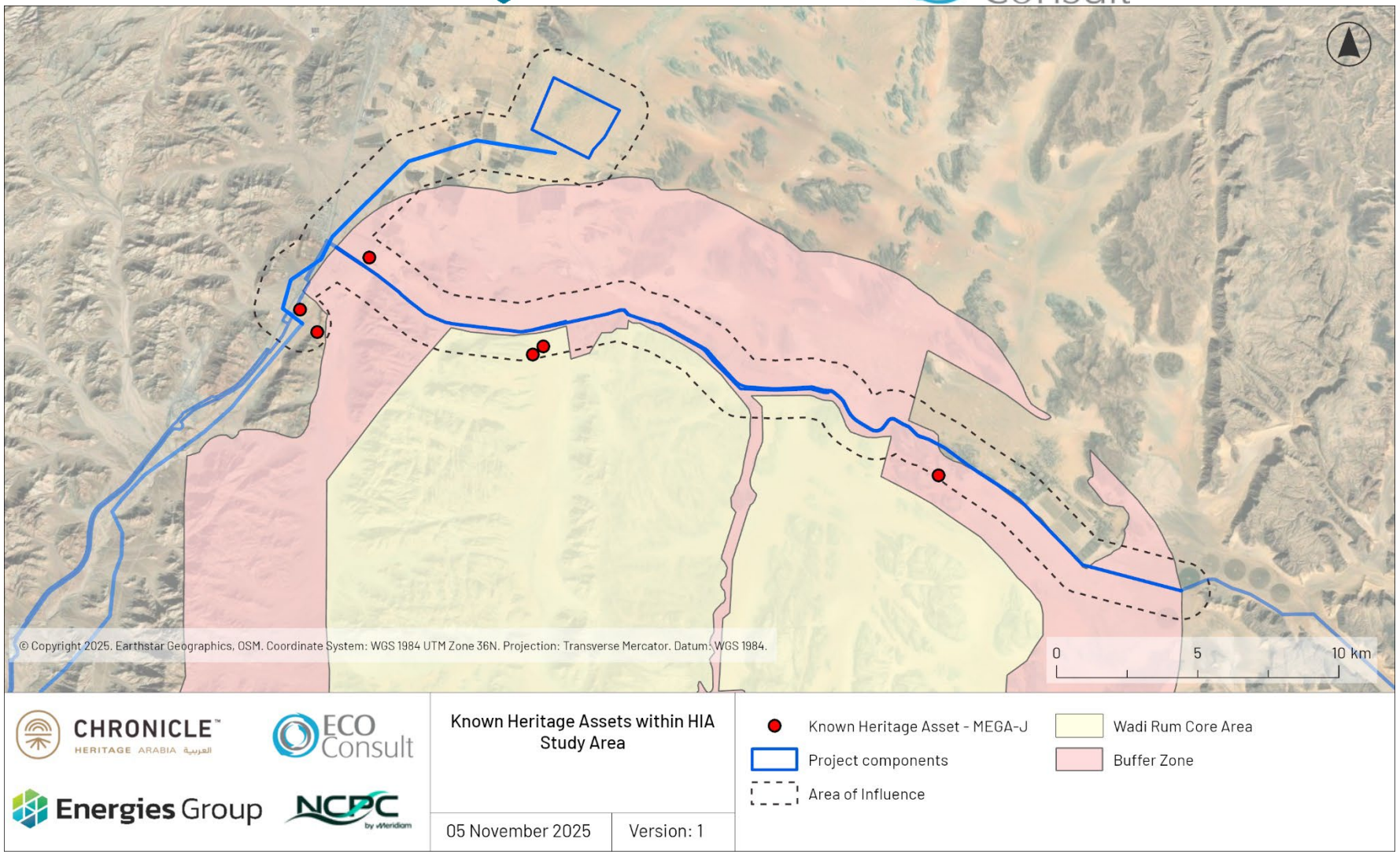

Figure 3-1. Previously Known Heritage Assets within the AOI.

Table 3-2. Known Heritage Assets

Site Name / Description	Period / Attribution	Condition and Protection Status	Excavation Status	Notes
NN/MA`AN DESERT SURVEY SITE 8	-	-	-	-
NN/RAIKES SITE A2	Unspecified/ Unknown	Washed Away; Not Protected	Not Excavated	-
MERSED	Nabataean, Roman	Good Condition; Not Protected	Not Excavated	Remains of a watch tower on top of a high mountain, possibly constructed during the building of the Via Nova Triana (Roman Road); associated sherd and flint surface scatter
NN/RAS AN-NAQB HIGHWAY SURVEY MILESTONE	Roman (early)	Relocated; Not Protected	Relocated	Latin inscribed milestone located near the road to Wadi Rum; removed by DoA for preservation; currently stored at Al-Mureigha Military School.
WR-14_19	Unspecified	-	-	Multicomponent site comprising three cairns and rock art featuring camel, ibex, dogs, and wasm.
WR-14_22	Unspecified	-	-	Rock art site featuring ibex, oryx, dogs, and wasm.

Wadi Ramm Project

The 2014 season of the Wadi Ramm Project involved the survey of Wadi Ramman, a distinct north-south wadi that lies within the northern end of the WRPA core zone and which had previously been only poorly investigated. The northern end of the wadi intersects with the AOI for the Project. The survey identified a total of 22 different sites including two within the Project AOI: sites WR-14_19 and WR-14_22.

The 2014 preliminary report describes site WR-14_22 as a rock art site featuring ibex, oryx, dogs, and *wusum*. Site WR-14_19 is described as a site with three cairns constructed from large blocks and small stones, as well as rock art featuring camel, ibex, dogs, and *wusum*. While the majority of cairns identified during the survey were found along the bases of jebels (rock outcrops), the cairns at site WR-14_19 (and site WR-14_18 just to the south and outside the AOI) were located on top of the stone cliffs (Farès & Norris 2017).

USAID Survey

The field survey undertaken for the USAID HIA for the proposed Disi pipeline identified a total of fourteen heritage sites, four of which also lie within the AOI for this Project. These are NN/Ma'an Desert Survey Site 8, NN/Raikes Site A2, Mersed, and the NN/Ras An-Naqb Highway Survey Milestone. All information recorded for these sites is already summarised in Table 3-2.

Aqaba Railway

The Aqaba Railway runs east-west through the northern buffer zone of the WRPA. An associated train station (Wadi Rum station) is also present along the line within the eastern half

of the WRPA's northern buffer zone. Although not identified within the MEGAJordan database as a heritage asset, it is considered likely to hold heritage significance. No data has yet been located about this asset. This will be flagged as a data gap and will be addressed ahead of the production of the final HIA Statement.

3.2.4 Other Archaeological Investigations

Although the Wadi Rum area is poorly investigated compared with some parts of Jordan, there have been more investigations than described within the USAID HIA and ESIA. These have found numerous heritage sites of different types and periods both in and around Wadi Rum; the major problem is that few have been fully published and only parts of the recorded data are thus available today. The preliminary reports that are available also do not tend to provide exact locations for the sites found and as such they have not been incorporated into the MEGAJordan database. As a result, it cannot be certain whether any are within the AOI for this Project.

A brief summary of discoveries within and around the Wadi Rum area is provided below, although this is limited since it is based on the preliminary reports that were available and could be found.

Aqaba-Ma'an Archaeological and Epigraphic Survey and Wadi Hafir Petroglyph Survey

The earliest investigation in the area was the substantial project undertaken by Professor William Jobling of the University of Sydney; Jobling led the Aqaba-Ma'an Archaeological and Epigraphic Survey between 1980 and 1990. Aimed at documenting exceptional landscape and archaeological remains, it also incorporated the Wadi Hafir Petroglyph Survey, which focused particularly on recording inscriptions and rock art in Wadi Hafir, a long, north–south canyon which lies approximately 15 km north of Disi village (Corbett 2011, 2015, 2025).

Although Wadi Hafir is outside the AOI for this Project, the investigations within it are useful to provide context to the Wadi Rum area and provide an idea of the type and density of remains that one may expect to find within similar canyons in the surrounds. As the results of the wider Aqaba-Ma'an Archaeological and Epigraphic Survey have not been fully published, it is also difficult to determine which finds from this might lie within the AOI. However, they too provide useful context for the area.

Following the death of Professor Jobling, the results of his work have never been fully published, although various preliminary reports for some seasons are available. Both the survey and the more focused Wadi Hafir Project have since been restarted, although it is unclear from the few preliminary reports available the full extent and date of these further investigations. The investigations appear to have taken place at least between 2005 and 2016, indicating a surprisingly large amount of research in the area, albeit mostly unpublished (Corbett 2011, 2015, 2025).

An available preliminary report from 1984 describes just one season (the fifth season) of fieldwork undertaken as part of the Aqaba-Ma'an survey. Despite describing only one season, the report does demonstrate both the scope and extent of the work, and the amount of heritage being found. The 1984 survey season involved traversing a huge area (over 5,000 km) between Mudawwara, Ma'an, and Aqaba, an area which includes the WRPA and its northern buffer area. Although the report did not locate each identified site, it did identify several new prehistoric sites (including lithic sites, ceramic scatters, stone circles, and cairns) and much epigraphic evidence (including a range of Thamudic and one new Nabataean inscription).

The report also made valuable observations about the landscape characteristics of the Wadi Rum area and the distribution of heritage sites across it. Specifically, it noted that the area's water sources and grazing have made it an important area for pastoral nomads in the past, and

that the location of sites found are indicative of human occupation of the high vantage points in the area (Jobling 1984).

Sources describing the survey program in general also confirm that each season has identified, documented, and mapped a large number variety of sites from multiple different periods, including desert settlements, prehistoric stone enclosures, rock shelters, an early Islamic village and open-air mosque, extensive wadi systems with springs, pools, wells, cisterns and dams; and thousands of boulders and rock faces featuring rock art and inscriptions (Corbett 2025).

It is clear from the available preliminary reports and webpages about the Wadi Hafir survey that this survey has also proved very fruitful. These sources note that thousands of Hismaic inscriptions and carvings have already been found throughout Wadi Hafir, as well as numerous examples of other rock art from the Neolithic to the Modern period. The 2005-6 season alone identified, recorded, and mapped 1,200 inscription and carving sites but, as discussed, these have not yet been entered on the MEGAJordan database. It is estimated that many thousands more still await discovery (Corbett 2011, 2015).

Wadi Judayid Epigraphic Survey

An epigraphic survey of Wadi Judayid was also conducted between 1986 and 1987. Wadi Judayid is once again north of the WRPA and its buffer, but close enough to provide important context to the AOI's archaeological resource. The survey identified and recorded 1,302 Thamudic inscriptions, one Nabataean text, and 586 drawings from various periods. Interestingly, no Arabic inscriptions were recorded (excluding modern graffiti) (King 1988), *perhaps indicating that the wadi was not used as intensively in later periods and possibly meaning its earlier remains will be better preserved*. The survey was conducted by Geraldine King, who is known to have undertaken further surveys and work in the area, including a 1990 doctoral thesis. Limited amounts of this work are, however, published or available and as such, the extent and findings of her remaining work is uncertain.

Prehistoric Aqaba Project and Wadi Ramm Epigraphic Survey

Other projects known to have been conducted in the area include the Prehistoric Aqaba Project (by the German Archaeological Institute and Department of Antiquities of Jordan) and the Wadi Ramm Epigraphic Survey (by CNRS, France and the Department of Antiquities of Jordan). Both projects are, again, only partially published and none of the extant interim reports could be located to inform this report.

Wadi Ramm Project

A preliminary report on the 2014 season of the Wadi Ramm Project was also located; however, it was unclear whether other seasons occurred or whether this may have been conducted as part of the wider Wadi Ramm Epigraphic Survey (discussed above).

The 2014 season involved survey of Wadi Ramman, a distinct north–south wadi that lies within the northern end of the WRPA and which had previously been only poorly investigated. The northern end of the wadi, and two of the sites located by this survey, lie within the AOI. These are sites WR-14_19 and WR-14_22. The inclusion of these sites (and the others from the 2014 survey) within the MEGAJordan database shows that the results of this survey were recorded and published to a sufficient degree to be incorporated within the national database.

The 2014 preliminary report describes site WR-14_22 as a rock art site featuring ibex, oryx, dogs, and *wusum*. Site WR-14_19 is a site with three cairns constructed from large blocks and small stones, as well as rock art featuring camel, ibex, dogs, and *wusum*. While the majority of

cairns identified during this survey were found along the bases of jebels (rock outcrops), the cairns at this site (and site WR-14_18 just to the south) were located on top of the stone cliffs.

The remainder of sites identified and recorded lie outside and south of the AOI. In total, the survey identified 22 different sites. These included a total of 18 structures (including stone circles and cairns), 164 examples of rock art, over 70 inscriptions (in Ancient North Arabian and Islamic Arabic texts), and associated ceramic and lithic scatters. As with many of the wadis investigated in the area, the corpus of rock art and inscriptions is the most striking aspect of the sites found.

The report also made a number of other interesting conclusions. It states that the evidence found during the survey indicates the wadi was permanently occupied from prehistory to the Islamic period. It may also have been an important communication axis but, surprisingly, not between the north and south as one might expect, given its orientation. Rather, the concentration of rock art and inscriptions in the wadi's western tributaries suggests it may actually have provided an important east-west route; although this theory does require further testing. Nevertheless, it is an important point to remember when analysing the area's wadis and both the opportunities and impediments they would have provided to ancient access and travel (Farès & Norris 2017).

3.2.5 Archaeological Potential

Although the known sites within the AOI are relatively few, it is important to examine this in the context of both the area's history and the amount and type of archaeological research it has been subject to. This is necessary to understand whether the current inventory of known sites is representative of the area's actual archaeological resource, or whether it may be an underestimation, leaving potential for further (buried and surface) sites to survive.

Wadi Yutum is the name of the wadi that runs north–south adjacent and to the west of the WRPA; the western end of the pipeline and the OHTL will pass through this wadi. Despite the relatively low number of sites recorded within it (e.g., Mersed, the Ras An-Naqb highway survey milestone, and the sites at Khaldi in the AOI; Jurf, Kithara, Qatra, etc. to the south; Humayma etc. to the north), it is likely to in fact have a relatively rich archaeological heritage. Not only did the area provide favourable conditions for settlement and other activities (i.e., lots of good, raised and sheltered ground adjacent to water sources), the stretch between Wadi Rum and Ras an-Naqab to the north has also been identified as the likely location of late Neolithic 'mega-sites,' such as those already investigated further north in the Greater Petra Area (Tetra Tech International Development 2022b, 2025; ECO Consult & Energies Group 2025; USAID 2025).

Wadi Yutum is also likely to have been an important north–south routeway since antiquity. This is supported by the presence of a number of infrastructure-related sites, both ancient (e.g., the Roman milestone at Ras An-Naqb) and modern (Highway 47). It is likely to have formed part of major caravan routes for the incense trade and would have become particularly important from the Islamic period for pilgrimage to the Holy Lands of Makkah and Madinah (ECO Consult & Energies Group 2025).

The paucity of sites recorded within Wadi Yutum, and the apparent disconnect between this and the area's historic importance, is likely to be a result of research bias. Historically, relatively limited attention has been paid to archaeological research within the area, and there has certainly never been a comprehensive survey or inventory created for it (Tetra Tech International Development 2022b).

The archaeological resource of the northern buffer zone of Wadi Rum, through which the remainder of the Project will pass, is also likely to be unrepresented by the current record. This is because previous archaeological surveys have also historically been lacking across both

Wadi Rum and its buffer zone and, like Wadi Yutum, it has never been subject to a comprehensive survey or inventory (Tetra Tech International Development 2022b).

The archaeological resource across the WRPA's northern buffer zone is expected to be greater than currently identified for a number of reasons. Firstly, investigation across South Jordan in general suggests that much of the country is "immensely rich in archaeological remains" (Tetra Tech International Development 2022b: 301), with most remains identified pre-Islamic and probably several thousand years old. An important archaeological resource within the Project Area is also considered likely, given the area's proximity to Wadi Rum which is itself the site of a wide range of different archaeological remains left behind by numerous different cultures over at least 12,000 years (Tetra Tech International Development 2022b).

Some studies, in some cases quite extensive, have in fact been conducted in both Wadi Yutum and across the WRPA's northern buffer zone (see Section 3.2.4); however, many have never been fully published. While these studies cannot be used to complete understanding of the area, preliminary published reports from the project do indicate the presence of numerous prehistoric and rock art sites in the area and may be an early indicator of the actual richness of the wadi's archaeological resource (ECO Consult & Energies Group 2025).

In summary, there is good potential for many, as yet unidentified, archaeological sites within both Wadi Yutum and the WRPA's northern buffer zone. These sites could be either above-ground or buried sites and are of as yet unknown significance. Considering the types of sites found across the region generally, they are likely to include all periods and many different site types, including flint and ceramic scatters, stone circles and enclosures; agricultural installations; towers; and graves and cemeteries (Tetra Tech International Development 2022a).

It is, nevertheless, important to note that this archaeological resource may have been subject to loss or physical impacts, either as a result of natural factors or, particularly as many sites have not been identified and protected, as a result of development or other activities. While both Wadi Yutum and the WRPA's northern buffer zone are generally undeveloped, previous disturbances are likely to include the construction of existing roads, OHTLS, power plants, settlements, houses, and associated services, and the conversion of large areas for agriculture and horticulture.

3.2.6 Historic Landscape Character, Setting, and Historic Views

Baseline Assessment

The scoping visit allowed for several observations to be made on to the condition and quality of the area's historic landscape character, important historic views, and the setting of the various heritage assets within the AOI. Observations made during the scoping visit are detailed below and will be used as the baseline for assessing impacts to these aspects of heritage significance.

Historic Landscape Character and Views from Development Area

Pipeline Route

The route of the proposed pipeline generally follows an existing road as it travels east–west through the WRPA's buffer zone, just north of the northern boundary of the WRPA's core area. Along this line, the existing road is an evident feature within all views and presents as a dark tarmacked surface with white and yellow road markings that stand out starkly against the orange-brown desert surrounds. An existing OHTL also runs along the side of the road, and some streetlights are present along the roadside towards the east (Figure 3-2).

Otherwise, beyond the road, views are dominated by a vast, largely flat, desert landscape with orange-brown sand stretching off into the distance and dotted in places by sparse, low, shrubs. On all sides, dark, rocky mountains and outcrops rise up above the desert sands and are dominant and impressive features within all views. The road passes close to some of these rocky massifs in places. Many form interesting formations (Figure 3-3) and provide the viewer with both impressive close-up views and expansive vistas that are both aesthetically pleasing and majestic (Figure 3-4 and Figure 3-5). The most impressive views are of course to the south, into the WRPA, as this is where the largest rock formations lie.

These aspects of the landscape, their relatively untouched condition, and the views they permit, are reflective of the historic situation, in which the landscape would have been traversed and used, but in a generally ephemeral way (e.g., pastoralism, camps), leaving the landscape predominantly natural and untouched. The road, OHTL, and streetlamps are existing modern developments that are intrusive within this landscape and views; however, the landscape is generally otherwise relatively untouched and is likely to look much as it has for eons past.

Although the Historic landscape character and historic views along the pipeline route are generally well-preserved, there are instances of intrusive modern development along its length. Spread across the central part of the route, there are a number of small villages and groups of buildings adjacent to the road that encroach locally upon the desert (Figure 3-6). The impact of these is relatively limited until the route passes into and east of Disi; from this point, the large village of Disi and large expanses of cultivated fields north of the road make the area rather more modern and urban/agriculture in character. At the western end of the route, a number of modern buildings, some agricultural fields, and a large substation (Figure 3-7) are also intrusive within historic views.

Where intrusive development does exist, it is generally to the north of the road, meaning that views southwards into the core area of the WRPA are generally undisturbed and largely preserved as they would have been in the past (Figure 3-8). As noted, agricultural fields lie to the north of the road along the eastern end of the route; some more distant OHTLs are also visible from the route in various locations looking north (Figure 3-9). While traffic along the road creates some amount of pollution, light, dust, and noise, this is relatively minimal and has a limited impact upon the setting of nearby heritage assets or the historic landscape character in general.

The only other notable visual impact appears to be dirt vehicle tracks which are visible in numerous places either side of the main tarmacked road (Figure 3-10) and which upset the pristine and aesthetic character of the desert sands. Some areas beside the road, particularly towards the eastern end of the route, were also noted to have been artificially truncated, flattened, or graded (Figure 3-11). The existing PV plant which lies to the north of the western end of the route cannot be seen from the pipeline route. Long-distance views are generally hazy due to the heat.

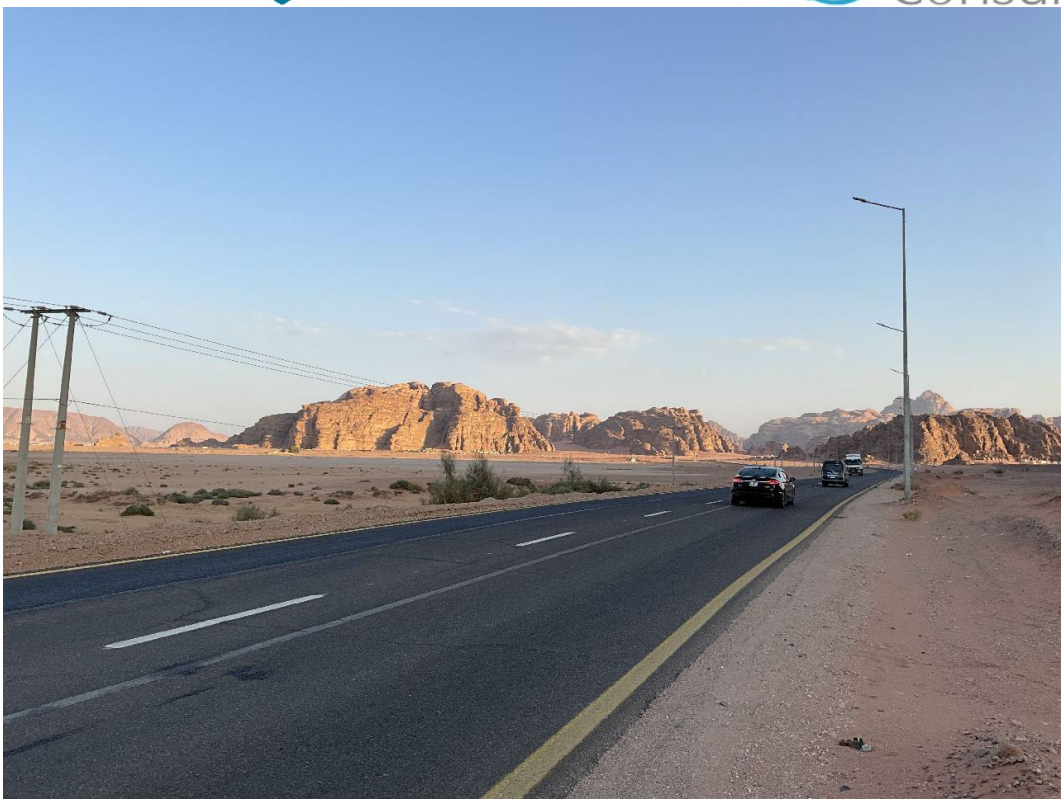

Figure 3-2: The existing road through the WRPA's buffer zone, looking southeast.

Figure 3-3: Impressive rock formations within the WRPA, looking south.

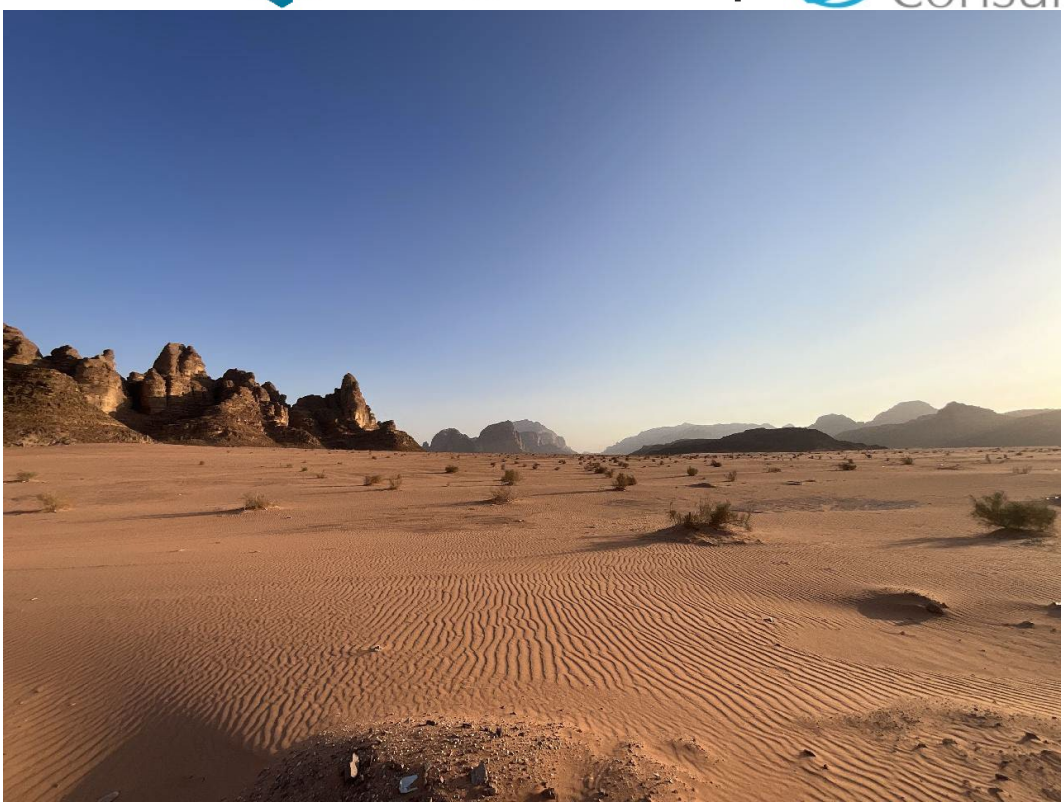

Figure 3-4: Expansive and majestic views into the WRPA, looking south.

Figure 3-5: Expansive and majestic views into the WRPA, looking south.

Figure 3-6: A small village on the edge of, just outside, the WRPA core zone, looking southeast.

Figure 3-7: Substation within the northern buffer of the WRPA, looking southwest.

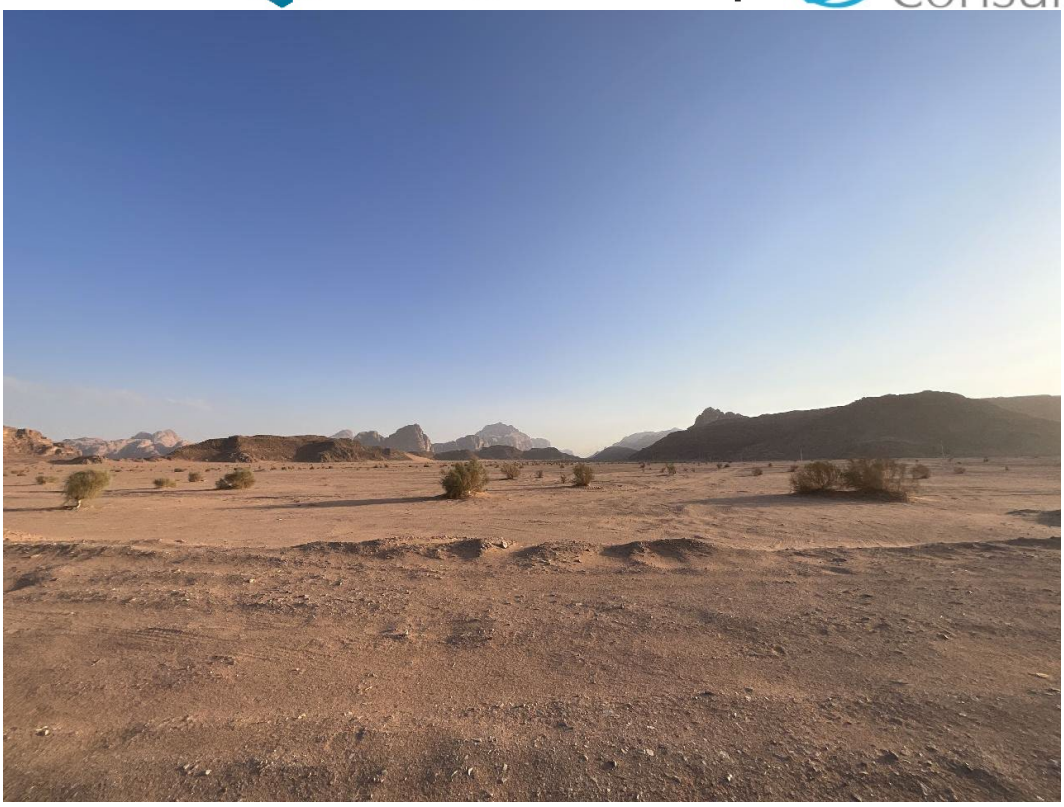

Figure 3-8: Well-preserved views into the WRPA, looking south.

Figure 3-9: Existing OHTLs visible within the WRPA buffer zone, looking north.

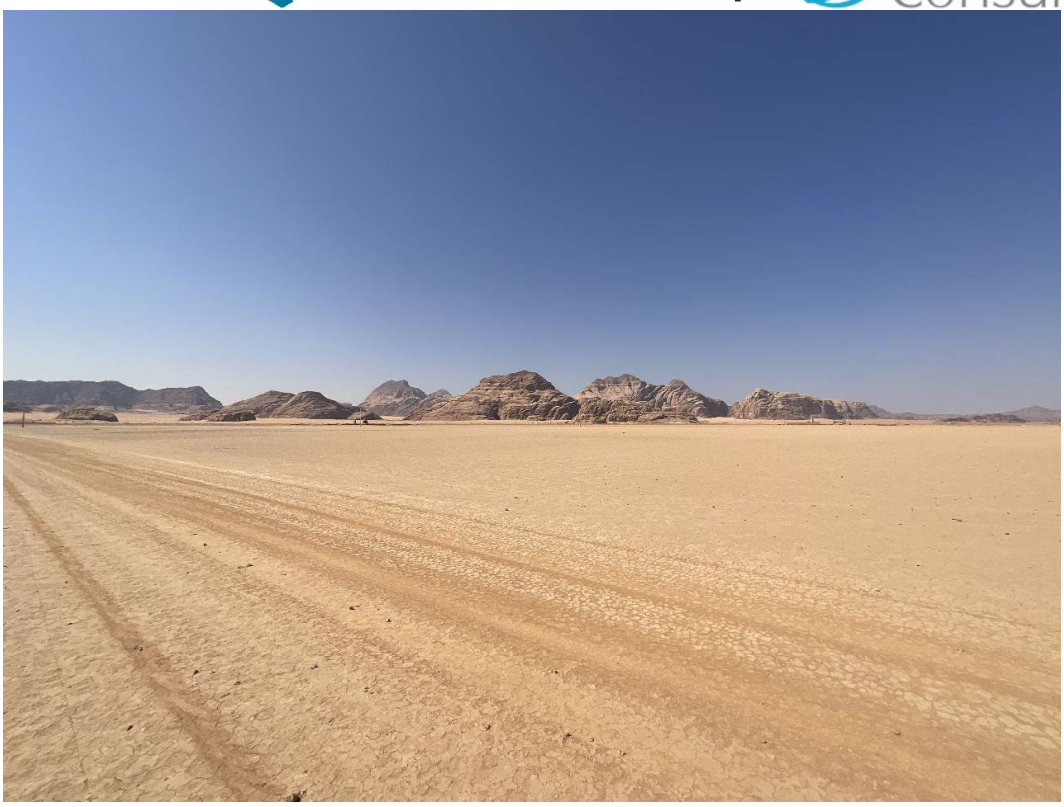

Figure 3-10: Dirt tracks across the desert, looking southwest.

Figure 3-11: Graded areas next to the existing road in the WRPA buffer zone, looking southwest.

OHTL Route

The route of the OHTL follows an existing north–south road along the west of the WRPA before departing to run through undeveloped and farmland to the north. In general, the historic landscape character is less intact, and preserved historic views more limited, along the route of the proposed OHTL when compared with the route of the pipeline. This is because it passes through an area of modern residential development and, in the north, through an area that has been partially developed for modern agriculture (plantations and fields and associated infrastructure, e.g. fencing). A number of existing OHTLS are also visible in this area in views to both the north and south (Figure 3-12).

Nevertheless, the route does pass through many areas of undisturbed desert and thus retains views that would be reflective of the situation in the past (Figure 3-13). Two mosques are present within the settlement which also provide points of cultural interest (Figure 3-14 and Figure 3-15).

Figure 3-12: Agricultural fencing and OHTLs visible along the new OHTL route, looking northeast.

Figure 3-13: Undisturbed desert landscape, looking west.

Figure 3-14: Mosque along the route of the new OHTL, looking southeast.

Figure 3-15: Mosque along the route of the new OHTL, looking northeast.

Location of Solar PV Plant

The location of the solar PV plant presents as an entirely undeveloped area of desert, apart from some minor vehicle tracks and a small, tarmacked road. Despite the relatively short distance between this site and the existing PV to the south, the existing plant cannot be seen in views to the south. The site thus retains intact, historic views towards the massifs of Wadi Rum, although these are distant and not highly visible (Figure 3-16). Nevertheless, the site preserves an important historic view towards the protected area that reflects what ancient and historic travellers would have seen and experienced as they approached the Wadi Rum area.

A closer inspection of the existing PV plant showed that this is likely difficult to see within longer views because it is actually relatively low to the ground. While its visibility may depend on which way the reflective panels are facing at the time, it is generally not greatly evident from surrounds, apart from in the immediate vicinity (Figure 3-17).

Figure 3-16: View from the Solar PV Plant site towards the WRPA, looking south.

Figure 3-17: The low-lying, existing Solar PV Plant, looking south.

Historic Landscape Character and Views from the WRPA

The WRPA core area has a largely undisturbed historic landscape character and for the most part presents as a natural area characterised by desert sands and rocky massifs. The sheer sides and sometimes unusual formations of the rock massifs dominate views and provide pleasing and impressive vistas (Figure 3-18). Often, the landscape allows vast vistas across the majestic landscape (Figure 3-19); within some wadis and areas enclosed by rocks, these views are more intimate and equally impressive (Figure 3-20).

The area's historic landscape character is best preserved towards the centre and south of the Protected Area which, with the exception of Wadi Rum village in the centre of the WRPA, lies furthest from surrounding modern development. Even close to Wadi Rum village, the dominance of the natural landscape and its historic character is well preserved, considering the small, low-key character of the settlement and contrasting majesty and magnitude of the surrounding rocky massifs and desert (Figure 3-21).

Historic landscape character is slightly more impacted by modern intrusive development towards the north of the WRPA core area. From the northern end of the core area, various power lines are intrusive within views northwards, as are the various settlements, groups of buildings, and large agricultural areas that exist along the northern edge of the WRPA and within its northern buffer zone. While evident within views, this infrastructure is limited and does not tend to interrupt the overall impression of the natural landscape; this is often thanks to the fact that the rock massifs in any case dwarf and remain prominent above the low, modern infrastructure (Figure 3-22).

Although the WRPA core area largely retains its historic landscape character, vehicles and vehicle tracks are having an increasingly important detrimental impact upon the natural, pristine character of the area (Figure 3-18 and Figure 3-23). The noise, pollution, and particularly the dust, caused by vehicles are also detrimental impacts. Modern structures (some abandoned), trash, camps, and scrap also exist in some places (Figure 3-24) and detrimentally impact the untouched natural beauty of the landscape.

Figure 3-18: Impressive vistas dominated by the vertical rock massifs, looking northwest.

Figure 3-19: Vast, majestic vistas across the WRPA, looking northeast.

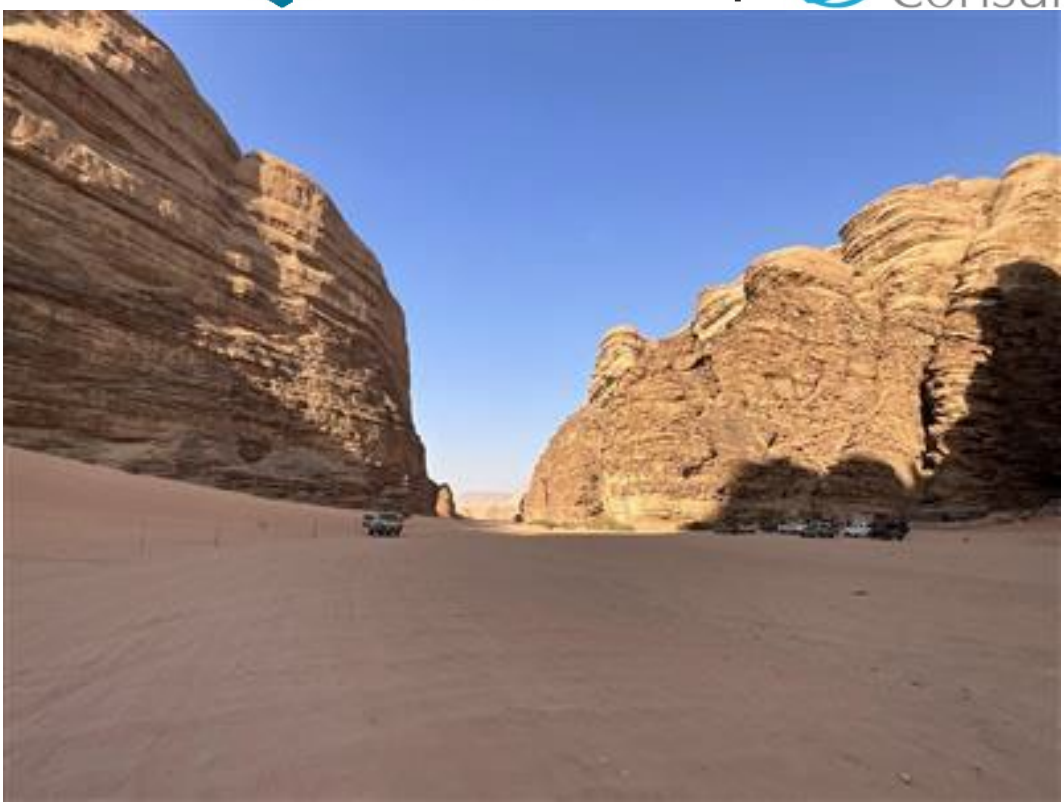

Figure 3-20: Equally impressive, intimate views within the WRPA, looking north.

Figure 3-21: Wadi Rum village, dwarfed by rocky massifs on either side, looking south.

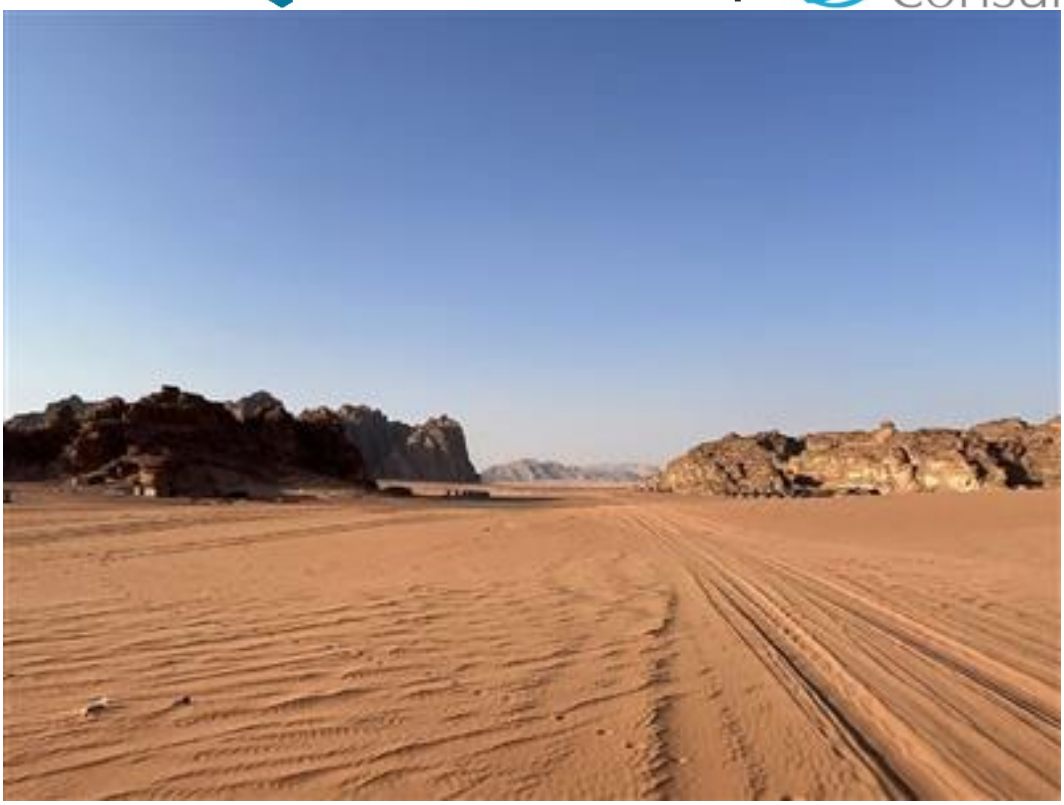

Figure 3-22: Modern buildings just visible below rocky massifs in the WRPA, looking northwest.

Figure 3-23: Dirt tracks, vehicles, and dust impacting the desert, looking northwest.

Figure 3-24: Abandoned structures, camps, and scrap within the WRPA, looking east.

Setting of Heritage Assets

A baseline understanding of the setting of heritage assets within the AOI will be important, such that impacts to these settings may be assessed. This will need to be assessed as part of detailed visits to the relevant sites. This is therefore flagged as a data gap and will be addressed ahead of the production of the final HIA Statement.

Key Historic Views and Significant Visual Receptors

A list of key historic views and significant visual receptors has also been identified, so that impacts to these significant aspects of the area's heritage significance can be assessed. As the number of possible views looking towards, out from, and around the WRPA are numerous, CH Arabia has identified those that are most significant. These include views that are best preserved, most representative of the historic situation, and/or those that convey important information about how the area would have been experienced and viewed in the past. Significant visual receptors are also identified below (Table 3-3).

Table 3-3. Key Historic Views and Significance Visual Receptors

Key Historic View/Significant Visual Receptor	Justification	Integrity	Level of Sensitivity
Key Historic Views			
Views towards Wadi Rum from relatively undeveloped areas to the north. These include the proposed site of the new PV plant and undeveloped areas to the north of the existing road but west of Disi.	These views have been identified as they preserve and convey an idea of how Wadi Rum would have been approached and seen in both the ancient and historic past.	Moderate (Modern infrastructure is intrusive within some of these views)	Moderate (Already partially impacted)

Key Historic View/Significant Visual Receptor	Justification	Integrity	Level of Sensitivity
Views either way along the length of the WRPA's various north-south wadis.	These views have been identified as they provide an idea of how past peoples travelling through Wadi Rum may have experienced it.	High (Largely unaffected by modern development and activity)	High (Generally pristine and unaffected)
Views either way along east-west tributaries within the WRPA.	These views have been identified as they provide an idea of how past peoples travelling through the wadi may have experienced it; especially considering evidence identified for important east-west travel routes cross Wadi Rum (Farès & Norris 2017).	High (Largely unaffected by modern development and activity)	High (Generally pristine and unaffected)
Views from accessible high points in the landscape, particularly those where cairns have been placed (e.g., site WR-14_19).	These views have been identified as they convey the views people would have experienced when accessing and using these high points, whether for burial, ritual, or travel purposes.	High (Modern OHTL lines and road visible but generally unobtrusive these long views)	Moderate (Already partially impacted)
Views from wadi beds within Wadi Rum towards cairn sites that sit on high points in the landscape.	These views have been identified as they show how people would have seen, experienced, and perceived of these funerary sites, which were intentionally placed on high points to be visible, dominant, and perhaps even to convey power or ownership over an area.	High (Largely unaffected by modern development and activity)	High (Generally pristine and unaffected)
Significant Visual Receptors			
Existing road through the WRPA buffer zone	Represents a highly frequented travel route that large numbers of people will experience the WRPA from	Moderate (Provides important views but is inevitably impacted by modern infrastructure)	Moderate
Road along Wadi Yutum where it passes through the Project Area	Represents a highly frequented travel route that large numbers of people will experience the WRPA from; and follows a long-used travel route through the region	Low (Provides important but distant views and is inevitably impacted by surrounding	Moderate (Already partially impacted)

Key Historic View/Significant Visual Receptor	Justification	Integrity	Level of Sensitivity
		modern infrastructure)	
Bedouin Camps (as identified on Figure 3-25)	Although often comprising modern structures, these camps reflect a traditional style of occupation across the landscape. The views from them are thus important to experiencing these camps and the traditional aspects of the landscape's occupation and use that they reflect.	High (The majority of camps retain a natural and predominantly undeveloped landscape setting)	High (Generally pristine and unaffected)

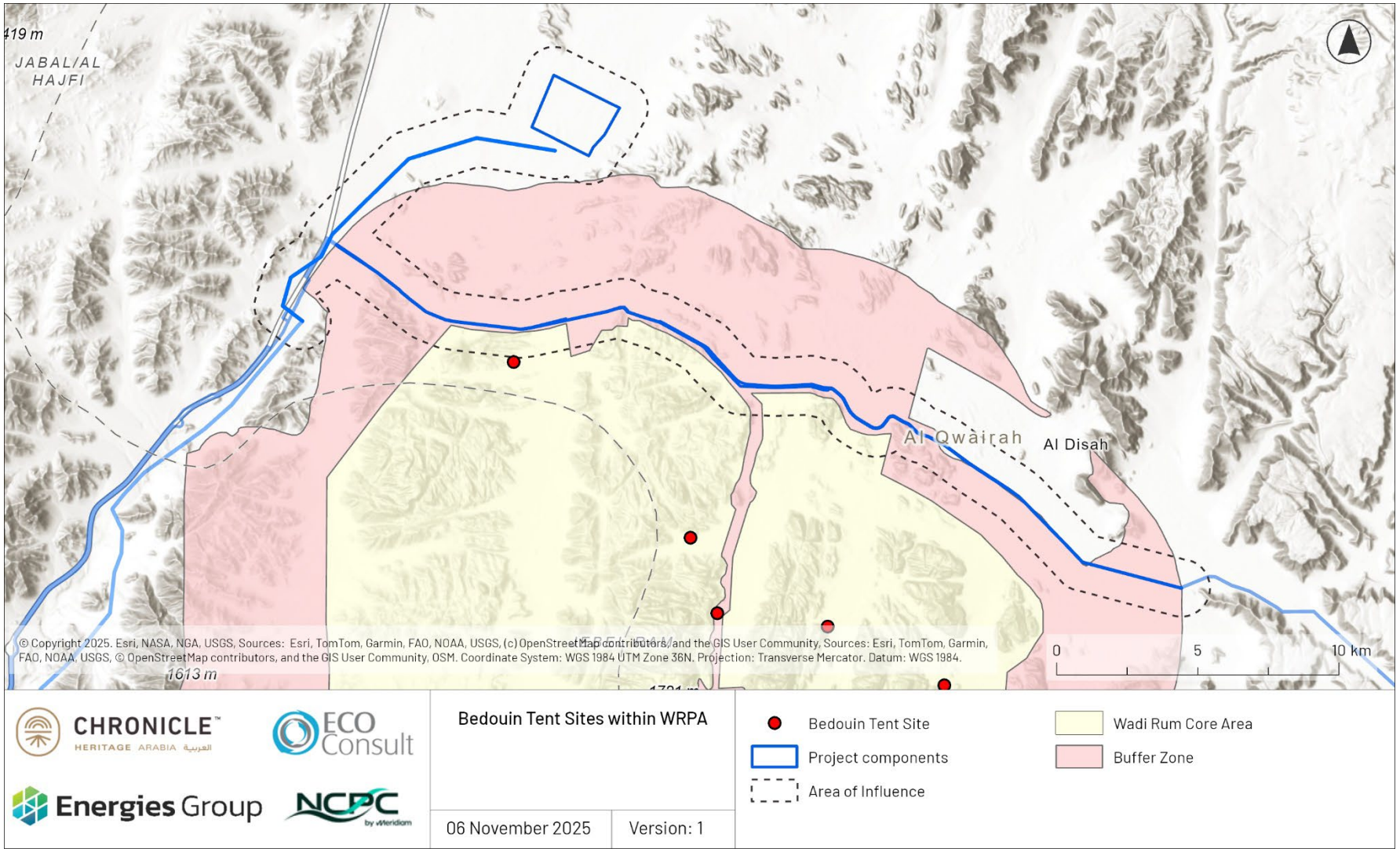

Figure 3-25. Identified location of existing Bedouin Tent Sites.

3.3 Intangible Cultural Heritage

The Wadi Rum landscape is not only an exceptional geological and archaeological setting but also the living cultural space of the Bedouin, whose traditions and practices are recognised by UNESCO on its Representative List of the Intangible Cultural Heritage of Humanity as the *Cultural Space of the Bedu in Petra and Wadi Rum*. The intangible cultural heritage (ICH) of the area is deeply embedded in the relationship between the Bedouin communities and their desert environment. This heritage encompasses pastoral techniques, oral traditions, poetry, and music that collectively form a system of knowledge and belief adapted to the desert's ecological constraints. Traditional practices such as camel husbandry, weaving, tent-making, tracking, and herbal medicine are not only livelihoods but also expressions of cultural identity, spirituality, and resilience that link the community to the landscape and its resources.

The Bedouin's oral traditions — including storytelling, songs, and poetry — serve as a living archive of tribal histories, migration routes, moral codes, and cosmological beliefs associated with places throughout Wadi Rum. Many of these narratives are intimately tied to particular landmarks, rock formations, and wadis, which serve as mnemonic anchors for recounting genealogies and historic events. These cultural expressions form part of the area's *Outstanding Universal Value (OUV)* under UNESCO criteria (iii), (v), and (vi), illustrating an exceptional testimony to a living cultural tradition and its enduring connection with the desert environment. This interdependence of intangible traditions with the tangible landscape means that changes to access, land use, or visibility of traditional routes and spaces can directly affect the vitality of intangible heritage practices.

However, this cultural continuum faces increasing pressure. The intangible heritage of Wadi Rum has been gradually eroded by modernisation, sedentarisation, and tourism-related commodification. The migration of younger generations to urban centres, combined with declining reliance on pastoral livelihoods, has weakened the transmission of oral traditions, traditional crafts, and ecological knowledge. The growing tourism industry, while economically important, often promotes an idealised or commercialised version of Bedouin culture that risks diminishing its authenticity and replacing genuine traditions with staged experiences. These dynamics represent a serious risk to the integrity and continuity of the intangible heritage values that underpin Wadi Rum's UNESCO designation.

The rock art of Wadi Rum represents a powerful expression of intangible cultural heritage, serving as a visual record of human presence, belief, and communication across millennia. The thousands of petroglyphs, inscriptions, and carvings that adorn the sandstone cliffs and rock faces are not merely archaeological artefacts but are deeply connected to enduring oral traditions and collective memory among the Bedouin. These engravings — depicting humans, animals, hunting scenes, tribal symbols, and ancient scripts — continue to hold cultural and spiritual meaning, embodying narratives of ancestry, migration, and interaction with the desert environment. Local guides and elders often interpret particular panels as ancestral marks or messages left by forebears, integrating them into stories and moral lessons passed down through generations. Thus, the rock art acts as both a tangible manifestation and an intangible transmitter of cultural identity, bridging the past and present of Wadi Rum's communities. Protecting this dual heritage requires not only conservation of the physical engravings but also the safeguarding of the traditional knowledge and interpretive practices that keep their meanings alive within Bedouin cultural consciousness.

To preserve the intangible cultural heritage baseline, the Heritage Impact Assessment must ensure that project planning incorporates community consultation and participatory documentation of local traditions, rituals, and land-use practices prior to construction. It should identify culturally significant routes, gathering areas, and storytelling locations that may intersect with the project's area of influence, ensuring these are respected and protected. The

assessment should also recommend initiatives to strengthen intergenerational transmission, such as supporting cultural education programmes or recording oral histories in partnership with local Bedouin organisations and the Aqaba Special Economic Zone Authority (ASEZA). In doing so, the HIA will not only mitigate potential adverse effects of the project but also contribute to the safeguarding of living heritage—ensuring that the voices, knowledge, and traditions of the Bedouin remain integral to the evolving story of Wadi Rum.

3.4 Ecology

The Study Corridor passes through arid and largely disturbed environments, as discussed in more detail within the biodiversity chapter of the Project ESIA.

The WRPA is recognized for its outstanding natural heritage, including dramatic geological formations, distinct desert ecosystems, and significant biodiversity. These natural values form a key part of WRPA's inscription as a UNESCO World Heritage Site under both cultural and natural criteria.

Geologically, the WRPA is characterized by towering sandstone massifs, granite formations, narrow gorges, and extensive sand dunes. These diverse formations, such as Disi Sandstone, granite massifs, and volcanic outcrops, are distributed across the landscape and play a critical role in shaping its ecological diversity.

As a result of this diversity, the WRPA sustains remarkable biological diversity:

- 183 plant species, some of which are rare or endemic
- 26 recorded mammal species
- 34 reptile species
- 120 bird species.

4 Discussion of Significance

Per the methodology recommended by the UNESCO HIA Toolkit (UNESCO 2022), Table 4-1 provides an assessment of the significance of the heritage assets identified within the AOI. As a World Heritage Site, the WRPA is assessed according to its OUV; this should be read in reference to UNESCO's OUV criteria (Table 2-3) and requirements for authenticity and integrity (Table 2-4).

Table 4-1: Assessment of Significance of Heritage Assets Within the AOI

Level of Recognition	Heritage/Conservation Values	Attributes	Condition	Sensitivity
Wadi Rum Protected Area				
OUV	Exceptional testimony to the cultural traditions of the area's early inhabitants and evidence of continued habitation and land use for at least 12,000 years	Rock art, inscriptions, archaeological sites, features, and finds	Largely intact and well-preserved. Exhibits good **integrity** and **authenticity**, largely due to the area's management since 1879.	High
OUV	Evidence of long-term patterns of pastoral, agricultural, and urban human activity	Archaeological sites (n=154)		
OUV	Testimony to the widespread literacy among the area's pastoral societies	Thamudic, Nabataean, and numerous Arabic inscriptions in four different scripts (n=20,000 inscriptions)		
OUV	Illustration of deep, complex human interactions with the local environment, and the essential role of the landscape in fostering human settlement	A semiarid desert and a variety of natural landforms in combination with the rock art, inscriptions, water catchment systems, and other cultural sites imposed upon and around them.		
OUV	Illustration of the adaptability and ingenuity of human communities using scarce resources	The archaeological sites, rock art, and inscriptions that provide evidence of the continuum of settled and mobile lifestyles in the desert landscape		
OUV	Iconic desert landscape	A variety of natural landforms, but particularly their diversity and sheer size, mosaic of colours, vistas into both narrow canyons and very large wadis, and the scale of the cliffs		
OUV	An exceptional combination of landforms in a protected setting	The wide range of landforms created from different geological processes,		

Level of Recognition	Heritage/Conservation Values	Attributes	Condition	Sensitivity
		including the world's most spectacular networks of honeycomb weathering features		
OUV	Reputation as a classic desert landscape, both globally and within Arab states	Associations of the landscape with the writings of T.E. Lawrence		
		Cultural Space of the Bedu in Wadi Rum		
International	Rare and valuable illustration of ancient Bedouin cultural lifestyles and practices and their persistence into the modern day	Continued practice/knowledge/oral transmission of the following: Pastoral techniques Social and moral code Local mythology (poetry, folktales, songs) Medicine; tent-making; tracking; climbing; camel husbandry; and weaving	Poor, due to globalization, modernization, and the impacts of desert tourism.	High
International	Illustration of a highly integrated relationship with the natural environment and the environment's influence on settlement practices	The continued coexistence and complementary relationship of the area's settled and nomadic Bedouin communities and the local Bedouin's complex knowledge of local fauna and flora		
		Historic Landscape Character		
International	Illustration of a largely intact historic landscape which conveys how the WRPA would have appeared, and how it may have been experienced, for thousands of years in the past	Retention of large expanse of natural desert and rocky outcrops with relatively minor modern incursions, particularly within the WRPA itself and looking out of from it. Retention of numerous interesting rock formations which, set within the desert, provide both intimate and	Good: largely intact and well-preserved.	High

Level of Recognition	Heritage/Conservation Values	Attributes	Condition	Sensitivity
		expansive vistas of majestic form, particularly within the WRPA itself.		
International	Illustration of the inseparable interrelationship between the natural form and features of the land and the cultural activities and features that took place across it	Numerous rock art and illustration sites located on the natural rocky massifs of the area, and featuring desert fauna and flora (e.g., camels) Cairns lining the base of escarpments or located on high points in the landscape Water management structures exploiting springs and natural water sources Settlement and pastoral sites variously exploiting natural features, e.g., rock shelters	Good: largely intact and well-preserved.	High
The Aqaba Railway Line and Wadi Rum Train Station				
Data Gap to be resolved				
Undesignated Heritage Assets (Known and Newly Identified)				
Local	Illustration of range of human activities (water management, travel, tool production, occupation, metalworking) across a wide period of time (prehistoric to modern) and typical of the local area	The sites' surviving physical remains and their historic settings as far as preserved	Variable, as identified below. Good condition: ▪ Mersed Moderate condition (some erosion, collapse, loss, disturbance): ▪ Desert Survey Site 8 ▪ WR-13_19 ▪ WR-13_22 Considered lost:	Variable, as identified below. None (as already considered lost): ▪ NN/Raikes Site A2 ▪ NN/Ras An-Naqab Highway Survey Milestone High (as not protected): ▪ All remaining assets
Local	Evidential potential through further study and excavation	The sites' surviving physical remains		

Level of Recognition	Heritage/Conservation Values	Attributes	Condition	Sensitivity
			▪ NN/Raikes Site A2 (washed away) ▪ NN/Ras An-Naqab Highway Survey Milestone (relocated)	
Potential Heritage Assets (above or below ground)				
Currently Unknown	Currently Unknown	The surviving physical remains within their settings; possible other, as yet unknown, attributes	Currently Unknown. Condition of buried remains may be high.	Currently Unknown

5 Data Gap Analysis

An important part of the HIA Scoping Report is to identify data gaps that will limit the assessment of Project impacts during the HIA Statement stage. Table 5-1 describes the data gaps that have been identified for this Project, explains how they will limit the HIA assessment, and recommends actions to be taken to address these gaps ahead of the HIA Statement.

Table 5-1. Data Gaps Identified.

Data Gap Identified	Detail of Data Gap	How the Gap will Limit the HIA	Recommendations for Addressing Data Gap
Lack of detail of proposed works	Lacking detail, including final excavation footprint and depth; placement and size of pylon; final appearance of above-ground infrastructure; number and location of associated construction camps, stockpile sites, access roads, etc. Also, no assessments provided for Project's construction or operational effects (e.g., noise, vibration, flint, flare).	Inability to comprehensive or accurately assess impacts (both physical and setting-related) upon the significance of heritage assets, including the WRPA.	Client to provide outstanding data
Lack of comprehensive survey of, or complete heritage inventory, for AOI	There has historically been a lack of research across the AOI; where surveys have been conducted, few have been fully published.	Inability to accurately characterise the heritage resource of the Project Area, and thus assess the overall heritage significance.	Client to provide any further reports or data available to them CH Arabia to conduct a pedestrian survey of the Project Area
Lack of geo-referenced data set for rock art, despite known proliferation across the Project Area	Previous surveys demonstrate a large and varied corpus of rock art but there is no corresponding accurate data set for their location	Inability to accurately characterise the heritage resource of the Project Area, and thus assess the upon overall heritage significance.	Client to provide any further reports or data available to them CH Arabia to consult with researchers currently working in Jordan to determine whether any relevant data exists and can be supplied for the HIA. CH Arabia to conduct a pedestrian survey of the Project Area

Data Gap Identified	Detail of Data Gap	How the Gap will Limit the HIA	Recommendations for Addressing Data Gap
Ma'an-'Aqaba-Survey / Wadi Hafir Petroglyph Survey	Only limited preliminary reports available relating to these surveys (Jobling 1984; Corbett 2011)	Inability to accurately characterise the heritage resource of the Project Area, and thus assess the upon overall heritage significance.	Client to provide any further reports or data available to them
Prehistoric Aqaba Project	No reports found relating to this Project	As above	As above
Wadi Ramm Epigraphic Survey	No or limited reports available relating to this survey	As above	As above
Wadi Judayid Epigraphic Survey	Only limited preliminary reports available relating to this survey (King 1988)	As above	As above
2019-2023 Management Plan for WRPA	No access to this current management plan	Inability to assess the Project's impacts against the constraints and aims of the current management plan	Client to provide, if available to them
Lack of assessment of setting of known heritage assets in AOI	There has been no detailed or comprehensive assessment, to date, of the quality and condition of the setting of known heritage assets within the AOI	Inability to comprehensively assess the Project's potential impact upon the heritage significance of known heritage assets within the AOI (as setting contributes to overall heritage significance).	CH Arabia to assess and document the setting of these assets in combination with their pedestrian survey of the Project Area (recommended above)
Lack of information on Aqaba Railway	Limited details of this potential heritage asset have yet been found.	Inability to determine the nature and condition of this asset and its heritage significance, and therefore inability to accurately and comprehensively assess the Project's potential impact upon that significance.	CH Arabia to undertake further desk-based research and consult relevant stakeholders.

6 Potential Impacts and Recommendations

6.1 Impacts

Table 6-1 provides a preliminary assessment of the potential impact of the different elements of the Project upon the identified heritage attributes of the Project Area. Attributes are included in the table only if potential impacts to them are identified.

At this stage, the assessment is limited to identifying elements of the Project that could have impacts; identifying those heritage attributes that will potentially be impacted; describing that impact; and providing a preliminary assessment of the impact magnitude. A detailed and fully

informed evaluation of impact magnitude will be assessed as part of the HIA Statement, once as much additional data for the Project has been acquired.

Table 6-1: Identified Potential Heritage Impacts

Element of Proposed Action	Attribute	Description of Potential Impact	Preliminary Evaluation of Impact
Construction of New Infrastructure: Ground disturbing works within the physical footprint of the Conveyance Pipeline, OHTL, Solar PV Plant, and associated work compounds, stockpiles, access roads, etc.	Rock art, inscriptions, archaeological sites, finds, and features (**WRPA**) Palimpsest of semiarid desert, natural landforms, and cultural features (**WRPA**)	Direct physical impacts should generally be avoided to these attributes as no Project infrastructure is proposed within the WRPA core area (and natural and cultural features within the WRPA buffer zone do not contribute to the OUV of the WRPA). There is, however, potential for damage or loss of some of these attributes if any construction machinery were to be moved or used across or within the WRPA during the construction phase, or if any associated access roads, stockpile sites, etc. (the locations of which have not yet provided) are ultimately placed within the WRPA.	Moderate Negative
	Traditional pastoral techniques, skills, beliefs, and activities of the Bedouin (**Cultural Space of the Bedu**)	Potential disruption (e.g., to traditional camel husbandry, pastoral activities, etc.) if construction works involve temporarily blocking or altering access to traditional pastoral, habitation, or 'industrial' areas. Such disruption could also have the general effect of further divorcing and alienating local Bedouin communities from their traditional landscape and the practices, codes, and stories they tell about it. No details regarding Project access arrangements or changes have yet been provided.	Moderate Negative
	Coexistence and complementary relationship of settled and nomadic Bedouin communities (**Cultural Space of the Bedu**)	Potential disruption of relationships if construction works involve temporarily blocking or altering access to traditional resources and thereby lead to increased pressure and competition. No details regarding Project access arrangements or changes have yet been provided.	Moderate Negative

Element of Proposed Action	Attribute	Description of Potential Impact	Preliminary Evaluation of Impact
	Heritage sites specifically placed to exploit the area's natural characteristics and illustrating the inseparable relationship between the natural and cultural spheres (**Historic Landscape Character**)	A detrimental impact to this attribute could be experienced if any heritage sites contributing to it (e.g., as yet unknown and unrecorded sites) intersect with the Project's excavation footprint and are thus damaged or lost.	Slight Negative
	Aqaba Railway and Wadi Rum Train Station (**Undesignated Heritage Assets**)	Unknown: identified data gap	Unknown
	Potential surface or buried archaeological remains (**Potential Heritage Assets**).	Damage or loss of any potential sites or features (as yet unknown and unrecorded) that intersect with the excavation footprint of the proposed infrastructure or any associated enabling works (e.g. stockpile sites, work compounds, access roads, etc.).	Neutral-Negative Large (depending on significance of asset)
Construction Effects: Increased noise, dust, pollution, lighting, vibrations, and visual effects (e.g.,	Rock art, inscriptions, archaeological sites, finds, and features (**WRPA**)	Potential for indirect damage or loss of these attributes if they sit close to the northern boundary of the WRPA core area and if construction vibrations, dust, or pollution to have a detrimental impact upon their long-term preservation. Increased noise, dust, pollution, lighting, and visual effects (e.g., visible machinery, spoil heaps) could also detract from the largely undeveloped, natural setting of these assets,	Moderate Negative (physical impacts)

Element of Proposed Action	Attribute	Description of Potential Impact	Preliminary Evaluation of Impact
visible machinery, spoil heaps) associated with construction work.	Palimpsest of semiarid desert, natural landforms, and cultural features (**WRPA**)	especially those that sit along the northern border of the WRPA core area. These setting effects would be temporary, short-term, reversible, and during construction only.	Minor Negative (setting impacts)
	A wide variety of natural and spectacular landforms in a protected setting (**WRPA**)	Increased noise, dust, pollution, lighting, and visual effects (e.g., visible machinery, spoil heaps) could also detract from the aesthetic and appreciation of this attribute, especially along the northern border of the WRPA core area and will be closest to construction works. These setting effects would be temporary, short-term, reversible, and during construction only.	Minor Negative
	Large, preserved expanses of natural desert with relatively minor modern incursions (**Historic Landscape Character**)	Increased noise, dust, pollution, lighting, and visual effects (e.g., visible machinery, spoil heaps) also have the potential to detract from the largely undeveloped and natural historic landscape character. These setting effects would be temporary, short-term, reversible, and during construction only.	Slight Negative
	Aqaba Railway and Wadi Rum Train Station (**Undesignated Heritage Assets**)	Unknown: identified data gap	Unknown
	The setting of the surviving physical remains of Mersed, NN/Ma'an Desert Survey Site 8, WR-14_19, and	Increased noise, dust, pollution, lighting, and visual effects (e.g., visible machinery, spoil heaps) could also detract from the historic setting of these assets. These setting effects would be temporary, short-term, reversible, and during construction only.	Neutral/Negative Slight

Element of Proposed Action	Attribute	Description of Potential Impact	Preliminary Evaluation of Impact
	WR-14-22. (**Undesignated Heritage Assets**)		
	Potential surface or buried archaeological remains (**Potential Heritage Assets**)	Increased noise, dust, pollution, lighting, and visual effects (e.g., visible machinery) also has the potential to detract from the setting of any further (as yet unknown) heritage assets that may exist within or around the Project Area. These setting effects would be temporary, short-term, reversible, and during construction only.	Neutral-Negative Slight (depending on the significance of the asset)
Permanent Visible Infrastructure: Permanent infrastructure that remains visible and above-ground following construction. This includes the OHTL, Solar PV plant, and potentially other access roads, maintenance depots, etc. (not yet detailed)	Rock art, inscriptions, archaeological sites, finds, and features (**WRPA**) Palimpsest of semiarid desert, natural landforms, and cultural features (**WRPA**)	This new, visible, modern infrastructure has the potential to intrude upon the largely natural, undeveloped setting of these attributes, particularly where they lie close to northern border of WRPA and/or on high points in landscape. This risk is likely to be relatively low given the distance between the WRPA and the proposed OHTL and Solar PV plant; however, it is a potential risk that needs to be fully assessed.	Neutral
	Traditional pastoral techniques, skills, beliefs, and activities of the Bedouin (**Cultural Space of the Bedu**)	Potential permanent disruption or loss (e.g., to traditional camel husbandry, pastoral activities, etc.) if infrastructure or its operation permanently block or alter access to traditional pastoral, habitation, or 'industrial' areas. This could also have the general effect of further divorcing and alienate local Bedouin communities for their traditional landscape and the practices, codes, and stories they tell about it. No details regarding Project access arrangements or changes have yet been provided.	Negative Moderate
	Coexistence and complementary	Potential permanent disruption of relationships if infrastructure or its operation involves permanently blocking or altering access to traditional resources and thereby leads to	Negative Moderate

Element of Proposed Action	Attribute	Description of Potential Impact	Preliminary Evaluation of Impact
	relationship of settled and nomadic Bedouin communities (**Cultural Space of the Bedu**)	increased pressure and competition. No details regarding Project access arrangements or changes have yet been provided.	
	Large, preserved expanses of natural desert with relatively minor modern incursions (**Historic Landscape Character**)	The Project would increase the amount of modern visible infrastructure within the area, resulting in a potential detrimental impact upon the (generally undeveloped and natural) historic landscape character.	Negative Slight
	The setting of the surviving physical remains of Mersed and WR-14_19 (**Undesignated Heritage Assets**)	The introduction of new modern infrastructure could detract from the historic setting of these assets.	Neutral/Negative Slight
	Aqaba Railway and Wadi Rum Train Station (**Undesignated Heritage Assets**)	Unknown: identified data gap	Unknown
	Potential surface or buried archaeological remains	Large, visible infrastructure has the potential to detract from the setting of any further (as yet unknown) heritage assets that may exist within or around the Project Area.	Neutral-Negative Slight

Element of Proposed Action	Attribute	Description of Potential Impact	Preliminary Evaluation of Impact
	(**Potential Heritage Assets**)		
Operational Effects: Increased noise, dust, pollution, lighting, vibrations, and visual effects (e.g., maintenance machinery and works) associated with the Project's operation	Rock art, inscriptions, archaeological sites, finds, and features (**WRPA**) Palimpsest of semiarid desert, natural landforms, and cultural features (**WRPA**)	Operational effects (e.g., noise, dust, light, pollution) could be experienced intermittently within the setting some attributes along the northern boundary of the WRPA core zone; for instance, if maintenance works and machinery were required along the route of the pipeline.	Negative Minor
	Large, preserved expanses of natural desert with relatively minor modern incursions (**Historic Landscape Character**)	Operational effects (e.g., noise, dust, light, pollution) could potentially detract intermittently from the predominantly natural and undeveloped historic landscape character; for instance, if maintenance works and machinery were required along the route of the pipeline or around the OHTL and PV plant.	Negative Slight
	The setting of the surviving physical remains of Mersed, NN/Ma'an Desert Survey Site 8, WR-14_19, and WR-14-22. (**Undesignated Heritage Assets**)	Operational effects (e.g., noise, dust, light, pollution) could intermittently detract from the setting of these assets; for instance, if maintenance works and machinery were required along the route of the pipeline or around the OHTL and PV plant.	Neutral/Negative Slight

Element of Proposed Action	Attribute	Description of Potential Impact	Preliminary Evaluation of Impact
	Aqaba Railway and Wadi Rum Train Station (**Undesignated Heritage Assets**)	Unknown: identified data gap	Unknown
	Potential surface or buried archaeological remains (**Potential Heritage Assets**)	Operational effects (e.g., noise, dust, light, pollution associate with operational maintenance works) could potentially also intermittently detract from the setting of any further (as yet unknown) heritage assets (particularly surface assets) that may exist within or around the Project Area.	Neutral-Negative Slight (depending on the significance of the asset)
Maintenance and Repair Works: If such works require additional excavations that will exceed the construction excavation footprint, there is potential for destruction or damage to further sites or features.	Aqaba Railway and Wadi Rum Train Station (**Undesignated Heritage Assets**)	Unknown: identified data gap	Unknown
	Potential surface or buried archaeological remains (**Potential Heritage Assets**)	Damage or loss of any potential sites or features (as yet unknown and unrecorded) that intersect with any new or enlarged excavation footprint.	Neutral-Negative Slight (depending on the significance of the asset)

6.2 Recommendations

As noted within Section 5, there are a number of data gaps that need to be addressed in order to inform the HIA Statement. CH Arabia provides the following recommendations to address these gaps. Recommendations to mitigate the impact of the Project will be provided in the HIA Statement, once the impact of the Project can be fully and accurately assessed.

6.2.1 Request for Additional Information

To better characterise the archaeological resource of the Project Area, and enable the most comprehensive assessment of the Project's impact upon it, a request should be sent to the client for the following information:

- As much further detail of the Project design as possible.
- Any further available archaeological data (e.g., other survey reports, databases etc.) that they may have access to (see Table 5-1 for specifics)

Details of the Project should be both with regards to the physical impact of the Project (e.g., excavation depths and footprints) and the potential for the Project to impact setting and historic landscape character. Only with an accurate idea of the final appearance, height, and size of permanent visible infrastructure (i.e. the OHTL and Solar PV plant) will it be possible to carry out a full LVIA, informed by viewsheds–which map the visibility of the new infrastructure–and photomontages–which project the development infrastructure into the landscape.

6.2.2 Archaeological Survey

A detailed archaeological walkover survey should be conducted across the Project Area to identify any further heritage assets that may sit within the Project Area and could be at risk of impact as a result of the Project. This should address the lack of a previous comprehensive survey or database for the area. The walkover survey should also be combined with a detailed assessment and documentation of the setting of relevant heritage assets. CH Arabia has already been commissioned to carry out this survey and are in the process of conducting it.

6.2.3 Desk-Based Research and Consultation

There is currently a lack of understanding of the Aqaba Railway and its potential heritage significance. CH Arabia therefore recommend that a thorough desk-based assessment (employing online sources, reports, journals, and other relevant sources) is conducted to research this asset. Consultation with relevant stakeholders in Jordan should also be conducted, e.g., the DoA, ASEZA, local residents and tour guides, etc. CH Arabia has committed to undertaking this further work.

6.2.4 Consultation with Rock Art Specialists

There is currently a dearth of information regarding rock art and inscription sites within the AOI. It is known that a large number of rock art and inscription sites have been documented in the area; however, the results of most have never been published or mapped using GIS technology. CH Arabia therefore recommends that rock art researchers and specialists working in this area of Jordan are contacted and consulted with, to determine whether they may be able to supply any relevant additional data. This should include consultation with Mr. Glen Corbett, the current Project Director of the exceptionally productive Aqaba-Ma'an Archaeological and Epigraphic Survey and the Wadi Hafir Petroglyph Survey. CH Arabia have committed to undertaking this further work.

6.3 Further Work: HIA Statement

After addressing the recommendations above and as many of the data gaps as possible, CH Arabia will proceed to the next stage and prepare an HIA Statement. The proposed framework for the HIA Statement is described in Table 6-2 below.

Table 6-2. Proposed Framework for the HIA Statement

Chapter	Purpose
Introduction	To present project information; aims and objectives; design proposals; study and site descriptions; and legislation, guidance, and policies that will shape the assessment.
Methodology and Scope	To describe how the assessments were achieved, presenting all sources consulted or any limitations.
Heritage Baseline	To provide a historical background of the Heritage Assets; details of any heritage (intangible/archaeological) surveys undertaken as part of the assessment as well as previous works; and results of any consultations undertaken if relevant.
Assessment and Significance of Heritage Assets	An assessment of the archaeological, architectural, historical, or other significance of any relevant Heritage Asset and its boundary, protection zone, and setting; and an assessment of the views to and from the heritage assets and the wider setting.
Potential Impact and Recommendations	An assessment of the Project's impact upon heritage significance and detailed recommendations for mitigation. To include, where appropriate, assessment of residual and cumulative effects. Where necessary, proposed measures for monitoring and/or compensatory measures where impacts cannot be avoided or mitigated.

The main purpose therefore of the HIA Statement is to seek avenues for avoiding or minimising harm to each asset. It also aims to offer advice for maximising the enhancement of the different sites and the modelling and assessment of impacts that the proposals may have on the sites. It should also consider the potential cumulative effects of the proposed development/change, which could be positive, negative, or neutral.

7 References

Abadi Y. & Rosen S.A. 2008. A Chip Off the Old Millstone: Grinding Stone Production and Distribution in the Early Bronze Age of the Negev. Pages 99–115 in *New Approaches to Old Stones: Recent Studies of Groundstone Artifacts*. London: Equinox

Abu Azizeh W., Tarawneh M., Crassard R., & Sánchez Priego J.A. 2021. Discovery and excavation of desert kites in the south-eastern Badia of Jordan. Pages 225- in *The gazelle's dream: game drives of the Old and New Worlds*. Sydney: Sydney University Press

Abu Hamdan T. & Mason O. 2025. Constructing citizenship and indigeneity in Jordan: The politics of Bedouin rights and identities in cultural heritage sites. *The Geographical Journal*: e70010.

Agence Française de Développement (AFD) Group. 2018. Environmental and social framework.

Alghazawi R. & Al-Manaser A. 2024. Unveiling Jordan's Rock Art Legacy: The Flute Player at the Jordan Museum as a Case Study. *Arqueología Iberoamericana* 54: 110–116.

Alhasanat M.B., Kabir S., Wan Hussin W.M.A., & Addison E. 2012. Spatial analysis of a historical phenomenon: using GIS to demonstrate the strategic placement of Umayyad desert palaces. *GeoJournal* 77/3: 343–359.

Al-Muheisen Z. & Villeneuve F. 2005. Arachaeological Research at Khirbat adh-Dharih. *Annual of the Department of Antiquities of Jordan* 49: 489–499.

Alon Y. 2006. Tribes and State-Formation in Mandatory Transjordan. *Civil Wars* 8/1: 66–82.

Al-Shorman A., Ababneh A., Rawashdih A., Makhadmih A., Alsaad S., & Jamhawi M. 2017. Travel and Hospitality in Late Antiquity: A Case Study from Umm el-Jimal in Eastern Jordan. *Near Eastern Archaeology* 80/1: 22–28.

Aqaba Special Economic Zone Authority [ASEZA]. 2001. Regulation no. (24) for the year 2001: regulation for the development of Wadi Rum Area: issued in accordance with articles (11) and (56) of the Aqaba Special Economic Zone Law no. (32) for the year 2000.

Aqaba Special Economic Zone Authority [ASEZA]. 2024. Wadi Rum Protected Area: state of conservation report.

Aqaba Special Economic Zone Authority [ASEZA]. n.d.a. General provisions and regulation of the buffer zone of Wadi Rum Protected Area.

Aqaba Special Economic Zone Authority [ASEZA]. n.d.b. Strategic plan for land use planning in the buffer zone of Rum Protected Area.

Berlin A. 2003. The Hellenistic Period. in Richard, S. (ed.) *Near Eastern Archaeology: A Reader*. Winona Lake, Indiana: Eisenbrauns

Bienkowski P. 2001. The Persian Period. in MacDonald, B., R. Adams, & P. Bienkowski (eds.) *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press

Bienkowski P. 2013. Edom During the Iron Age II Period. Pages 782–794 in Killebrew, A. E., & M. Steiner (eds.) *The Oxford Handbook of the Archaeology of the Levant*. Oxford University Press

Bourke S.J. 2002. The Origins of Social Complexity in The Southern Levant: New Evidence From Teleilat Ghassul, Jordan. *Palestine Exploration Quarterly* 134/1: 2–27.

Chesson M.S. 2018. The Southern Levant during the Early Bronze Age I–III. Pages 163–182 in Yasur-Landau, A., E. H. Cline, & Y. Rowan (eds.) *The Social Archaeology of the Levant*. Cambridge: Cambridge University Press

Cohen S.L. 2017. Reevaluation of Connections Between Egypt and the Southern Levant in the Middle Bronze Age in Light of the New Higher Chronology. *Journal of Ancient Egyptian Interconnections* 13: 34–42.

Coinman N.R. 1997. The Upper Palaeolithic in Jordan: Evidence from the Wadi al-Hasa and South Jordan. *Studies in the History and Archaeology in Jordan* 6: 209–217.

Corbett G.J. 2011. Preliminary report on the Wadi Hafir petroglpyh survey, 2005-2006, with special comment on the distribution of selected Thamudic E/Hismaic inscriptions and rock drawings. *Annual of the Department of Antiquities of Jordan* 55: 233–248.

Corbett G.J. 2012. Desert Traces: Tracking the Nabataeans in Jordan's Wādī Ramm. *Near Eastern Archaeology* 75/4: 208–219.

Corbett G.J. 2015. The Wadi Hafir petroglyph survey: shedding new light on Thamudic inscriptions2015. 17 October 2025. https://publications.acorjordan.org/2015/03/10/the-wadi-hafir-petroglyph-survey-shedding-new-light-on-thamudic-inscriptions/

Corbett G.J. 2025. Wadi Ramm survey archive finds new home at ACOR2025. 17 October 2025. https://acorjordan.org/2017/08/08/wadi-ramm-survey-archive-finds-new-home-acor/

Cordova C.E., Nowell A., Bisson M., Ames C.J.H., Pokines J., Chang M., & al-Nahar M. 2013. Interglacial and glacial desert refugia and the Middle Palaeolithic of the Azraq Oasis, Jordan. *Quaternary International* 300: 94–110.

DFC. 2024. Environmental and social policy and procedures.

EBRD. 2024. Environmental and social policy.

ECO Consult 2025. National Conveyor Details.

ECO Consult & Energies Group 2025. The Aqaba Amman water desalination and conveyance project (AAWDCP): detailed scope of work for the 2025 environmental and social impact assessment (ESIA). Draft: revision 2.

EIB. 2022. Environmental and social standards.

Eisenberg-Degen D., Nash G.H., & Schmidt J. 2016. Inscribing History: The Complex Geographies of Bedouin Tribal Symbols in the Negev Desert, Southern Israel. Pages 157–187 in Brady, L. M., & P. S. C. Tacçon (eds.) *Relating to Rock Art in the Contemporary World: Navigating Symbolism, Meaning, and Significance*. University Press of Colorado

Electromontaj S.A. 2019a. 132 kV tower type D1: general arrangement. Drawing no 14/18 EJ 2211.

Electromontaj S.A. 2019b. 132 kV tower type D3: general arrangement. Drawing no 14/18 EJ 2311.

Electromontaj S.A. 2019c. 132 kV tower type D9/DT: general arrangement. Drawing no 14/18 EJ 2511.

Electromontaj S.A. 2019d. 132 kV tower type DL: general arrangement. Drawing no 14/18 EJ 2111.

European Commission. 2019. European framework for action on cultural heritage.

European Commission. 2025. Environmental Impact Assessment: evaluating the effects of public and private projects on the environment2025. 9 October 2025. https://environment.ec.europa.eu/law-and-governance/environmental-assessments/environmental-impact-assessment_en

European Development Finance Institutions [EDFI] 2011. Harmonized EDFI Exclusion List.

European Development Finance Institutions [EDFI]. 2019. EDFI principles for responsible financing of sustainable development.

Farès S. & Norris J. 2017. The Wadi Ramm project. *Annual of the Department of Antiquities of Jordan* 58: 525–540.

Finlayson B., Makarewicz C., & Smith S. 2024. Cultural Hybridity in Central and Southern Jordan at the End of the Pre-Pottery Neolithic A. *Paleorient* 49/2: 149–164.

Finlayson B., Makarewicz C., Smith S., & Mithen S. 2014. The Transition from PPNA to PPNB in Southern Jordan. *Studies in the History and Archaeology in Jordan* 11: 105–109.

Fradley M., Wilson A., Finlayson B., & Bewley R. 2023. A lost campaign? New evidence of Roman temporary camps in northern Arabia. *Antiquity* 97/393: e15.

Freeman P. 2001. Roman Jordan. Pages 427–459 in *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press

Fujii S. 2011. 'Lost Property' at Wadi Qusayr 173: Evidence for the Transportation of Tabular Scrapers in the Jafr Basin, Southern Jordan. *Levant* 43/1: 1–14.

Fujii S. 2013. Chronology of the Jafr prehistory and protohistory: A key to the process of pastoral nomadization in the southern Levant. *Syria* 90: 49–125.

General Department of Antiquities 2005. *Protection of Architectural and Urban Heritage Law No. 5.*

General Department of Antiquities 2015. *Regulations for Archaeological Projects in Jordan.*

General Department of Antiquities. 2024. *Law of Antiquities: the amending Law No. 23 for the year 2024 promulgated in the Official Gazette, issue No. 4662 dated 1/6/2024*. : 16.

Gidding A.D. 2023. Cultural continuity and asymmetry through the Levantine Early Bronze Age: a view from the desert. *Levant* 55/1: 46–60.

Graf D.F. 1983. The Nabataeans and the Hisma: in the footsteps of Glueck and beyond. Pages 647–664 in Meyers, C. L., & M. P. O'Connor (eds.) *The Word of the Lord Shall Go Forth: Essays in Honor of David Noel Freedman in Celebration of His Sixtieth Birthday,*. Winona Lake, Indiana: Eisenbrauns

Graf D.F. 2004. Nabataean identity and ethnicity : the epigraphic perspective. *Studies in the History and Archaeology of Jordan* 9: 145–154.

Graf D.F., Sidebotham S., Dolinka B., Erickson-Gini T., & Wasse A. 2022. The Hellenistic Petra Project: Excavations along the Colonnaded Street. Preliminary Report of the Third Season 2007. *Annual of the Department of Antiquities of Jordan* 61: 437–472.

Hauptmann A. 2007. *The Archaeometallurgy of Copper Evidence from Faynan, Jordan*. Berlin: Springer

HCV Network. 2025. We work to protect nature and support local people where it matters most2025. 9 October 2025. https://www.hcvnetwork.org/

Henry D.O. 1995. *Prehistoric Culutral Ecology and Evolution: Insights from Southern Jordan*. New York: Springer Science + Business Media

Herr L. 2013. The Southern Levant (Transjordan) During the Iron Age I Period. Pages 649–659 in Killebrew, A. E., & M. Steiner (eds.) *The Oxford Handbook of the Archaeology of the Levant*. Oxford: Oxford University Press

Ibáñez J.J., Ortega D., Campos D., Khalidi L., Méndez V., & Teira L. 2016. Developing a complex network model of obsidian exchange in the Neolithic Near East: Linear regressions, ethnographic models and archaeological data. *Paléorient* 42/2: 9–32.

ICOMOS 2011. Guidance on heritage impact assessments for Cultural World Heritage Properties.

International Finance Corporation [IFC] 2012. Performance standards on environmental and social sustainability. IFC

International Finance Corporation [IFC]. & World Bank Group [WBG]. 2007a. Environmental, Health, and Safety (EHS) general guidelines.

International Finance Corporation [IFC]. & World Bank Group [WBG]. 2007b. Environmental, Health, and Safety (EHS) guidelines for electric power transmission and distribution.

International Finance Corporation [IFC]. & World Bank Group [WBG]. 2007c. Environmental, Health, and Safety (EHS) guidelines for water and sanitation.

International Union for Conservation of Nature [IUCN]. 2020. Wadi Rum Protected Area2020. 19 May 2025. https://worldheritageoutlook.iucn.org/explore-sites/wadi-rum-protected-area

Izdebski A., Pickett J., Roberts N., & Waliszewski T. 2016. The environmental, archaeological and historical evidence for regional climatic changes and their societal impacts in the Eastern Mediterranean in Late Antiquity. *Quaternary Science Reviews* 136: 189–208.

Jobling W. 1984. The fifth season of the 'Aqaba Ma'an survey 1984. *Annual of the Department of Antiquities of Jordan* 28: 191–202.

Jones I.W.N. 2018. Rural Communities and Labor in the Middle Islamic-Period Southern Levant. Pages 478–491 in Yasur-Landau, A., E. H. Cline, & Y. Rowan (eds.) *The Social Archaeology of the Levant*. Cambridge University Press

Jones I.W.N. 2021. The southern Levantine earthquake of 418/419 AD and the archaeology of Byzantine Petra. *Levant* 53/1: 107–121.

Kadowaki S. & Henry D.O. 2019. Renewed Investigation of the Middle and Upper Palaeolithic Sites in the Jebel Qalkha Area, Southern Jordan. Pages 23–41 in Nakamura, S., T. Adachi, & M. Abe (eds.) *Decades in Deserts: Essays on Near Eastern Archaeology in honour of Sumio Fujii*. Japan: Rokuichi Syobou

Kadowaki S., Suga E., & Henry D.O. 2021. Frequency and production technology of bladelets in Late Middle Palaeolithic , Initial Upper Palaeolithic , and Early Upper Palaeolithic (Ahmarian) assemblages in Jebel Qalkha, Southern Jordan. *Quaternary International* 596: 4–21.

Kaniewski D., Marriner N., Cheddadi R., Guiot J., & Van Campo E. 2018. The 4.2 BP event in the Levant. *Climate of the Past* 14/10: 1529–1542.

Kennedy D. 2004. *The Roman Army in Jordan*. London: Council for British Research in the Levant

Kennedy D.L. 2012. The Cairn of Hani: Significance, Present Condition and Context. *Annual of the Department of Antiquities of Jordan* 56: 486–505.

King G. 1988. Wadi Judayid epigraphic survey: a preliminary report. *Annual of the Department of Antiquities of Jordan* 32: 307–317.

King G.R.D. 1987. The distribution of sites and routes in the Jordanian and Syrian deserts in the early Islamic period. London: ArchaeoPress: 91–105.

Klimscha F. 2010. Long-range Contacts in the Late Chalcolithic of the Southern Levant. Excavations at Tall Hujayrat al-Ghuzlan and Tall al-Magass near Aqaba, Jordan. Prague: Charles University in Prague

Knapp A.B. 1993. *Society and Polity at Bronze Age Pella: An Annales Perspective*. Sheffield: Sheffield Academic Press

Kouki P. 2009. Archaeological Evidence of Land Tenure in the Petra Region, Jordan: Nabataean-Early Roman to Late Byzantine. *Journal of Mediterranean Archaeology* 22/1: 29–56.

Lehmann G. 2013. The Levant During the Persian Period. Pages 841–851 in Killebrew, A. E., & M. Steiner (eds.) *The Oxford Handbook of the Archaeology of the Levant*. Oxford: Oxford University Press

Levy T.E. 1998. Cult, metallurgy and rank societies—Chalcolithic period (ca. 4500–3500 BCE). Pages 226–244 in Levy, T. E. (ed.) *The archaeology of society in the Holy Land*. Leicester: Leicester Uniersity Press

Levy T.E., Higham T., Bronk Ramsey C., Smith N.G., Ben-Yosef E., Robinson M., Münger S., Knabb K., Schulze J.P., Najjar M., & Tauxe L. 2008. High-precision radiocarbon dating and historical biblical archaeology in southern Jordan. *Proceedings of the National Academy of Sciences* 105/43: 16460–16465.

Liss B., Howland M.D., Lorentzen B., Smitheram C., Najjar M., & Levy T.E. 2020. Up the Wadi: Development of an Iron Age Industrial Landscape in Faynan, Jordan. *Journal of Field Archaeology* 45/6: 413–427.

al-Manaser A. 2018. Traditional Music or Religious Ritual? Ancient Rock Art Illumined by Bedouin Custom. Pages 81–95 in Nehmé, L., & A. Al-Jallad (eds.) *To the Madbar and Back Again*. Leiden: Brill

McQuitty A. 2001. The Ottoman Period. Pages 561–594 in *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press

Milwright M. 2006. Central and Southern Jordan in the Ayyubid Period: Historical and Archaeological Perspectives. *Journal of the Royal Asiatic Society of Great Britain & Ireland* 16/1: 1–27.

Nadel D., Bar-Oz G., Perevolotsky A., & Malkinson D. 2024. The V-shaped desert kites and their contribution to the Timnian economy. *Journal of Arid Environments* 220: 105120.

Nigro L. 2012. Khirbet al-Batrawy: Rise, Flourish and Collapse of an Early Bronze Age City in Jordan. London: Harrassowitz Verlag: 609–628.

Nigro L. 2015. The Copper Axes Hoard in the Early Bronze Age IIIb Palace of Batrawy, Jordan. Pages 77–83 in Rosinska-Balik, K., A. Ochal-Czarnowicz, & M. Czarnowicz (eds.) *Copper and Trade in the Southeastern Mediterranean: Trade routes of the Near East in Antiquity*. Oxford: BAR Publishing

Oleson J.P. 1997. Landscape and Cityscape in the Hisma: The Resources of Ancient Al-Humayma. *Studies in the History and Archaeology of Jordan* 6: 175–188.

Oleson J.P. 2010. *Humayma Excavation Project, 1: Resources, history, and the water-supply system*. Boston: American Schools of Oriental Research

Olszewski D.I. 2001. The Palaeolithic Period, Including the Epiplaeolithic. Pages 31–66 in MacDonald, B., R. Adams, & P. Bienkowski (eds.) *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press

Parker S.T. 1997. Preliminary Report on the 1994 Season of the Roman Aqaba Project. *Bulletin of the American Schools of Oriental Research* 305: 19–44.

Petersen A. 2008. The Ottoman Hajj Route in Jordan: Motivation and Ideology. *Bulletin d'études orientales* Supplément LVII: 31–50.

Porter B.W. 2013. *Complex Communities: The Archaeology of Early Iron Age West-Central Jordan*. Tuscon: The University of Arizona Press

Porter B.W. 2018. Moving Beyond King Mesha: A Social Archaeology of Iron Age Jordan. Pages 324–336 in Yasur-Landau, A., E. H. Cline, & Y. Rowan (eds.) *The Social Archaeology of the Levant*. Cambridge University Press

Portillo M., Albert R.M., & Henry D.O. 2009. Domestic activities and spatial distribution in Ain Abū Nukhayla (Wadi Rum, Southern Jordan): The use of phytoliths and spherulites studies. *Quaternary International* 193/1: 174–183.

Prag K. 1991. Preliminary Report on the Excavations at Tell Iktanu and Tell al-Hammam, Jordan, 1990. *Levant* 23/1: 55–66.

Pratico G.D. 1985. Nelson Glueck's 1938-1940 Excavations at Tell el-Kheleifeh: A Reappraisal. *Bulletin of the American Schools of Oriental Research* 259: 1–32.

Protected Planet. 2025. Wadi Rum Protected Area2025. 22 May 2025. https://www.protectedplanet.net/555542337

Quintero L.A. & Wilke P.J. 1998. Archaeological Reconnaissance in the al-Jafr Basin, 1997. *Annual of the Department of Antiquities of Jordan* 42: 113–122.

Rast W.E., Schaub R.T., Maloney P.D., & Johnston R.H. 2003. *Bāb edh-Dhrāʿ : excavations at the town site (1975-81)*. Winona Lake, Ind: Eisenbrauns

Reeves M.B. 2019. A Nabataean and Roman shrine with civic and military gods at Humayma, Jordan. *Arabian Archaeology and Epigraphy* 30/1: 134–155.

Republique Francaise. & Agence Française de Développement (AFD) Group. 2022. Exclusion List: AFD Group.

Richter T., Arranz-Otaegui A., Yeomans L., & Boaretto E. 2017. High Resolution AMS Dates from Shubayqa 1, northeast Jordan Reveal Complex Origins of Late Epipalaeolithic Natufian in the Levant. *Scientific Reports* 7/1: 17025.

Rollefson G. 2001. The Neolithic Period. Pages 67–106 in MacDonald, B., R. Adams, & P. Bienkowski (eds.) *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press

Rollefson G.O. 1992. A Neolithic game board from ʿAin Ghazal, Jordan. *Bulletin of the American Schools of Oriental Research* 286: 1–5.

Rollefson G.O. 2011. The Greening of the Badlands: Pastoral Nomads and the 'Conclusion' of Neolithization in the Southern Levant. *Paléorient* 37/1: 101–109.

Rollefson G.O., Quintero L.A., & Wilke P.J. 2005. The Acheulian Industry in the al-Jafr Basin of Southeastern Jordan. *Journal of the Israel Prehistoric Society* 35: 53–68.

Rose J.C., El-Najjar M., & Burke D.L. 2007. Trade and the Acquistion of Wealth in Rural Late Antique North Jordan. *Studies in the History and Archaeology of Jordan* 9: 61–70.

Rosen S.A. 2025. The Timnian culture complex in the southern Levantine deserts: A rationale. *Journal of Arid Environments* 226: 105294.

Rowan Y.M. & Golden J. 2009. The Chalcolithic Period of the Southern Levant: A Synthetic Review. *Journal of World Prehistory* 22/1: 1–92.

Schick R. 2007. Al-Humayma and the Abbasid Family. *Studies in the History and Archaeology of Jordan* 9: 345–355.

Schmid S.G. 2008. The Hellenistic Period and the Nabateans. Pages 353–411 in Adams, R. (ed.) *Jordan: An Archaeological Reader*. London: Equinox

Simmons A.H. & Najjar M. 2006. Ghwair I: A Small, Complex Neolithic Community in Southern Jordan. *Journal of Field Archaeology* 31/1: 77–95.

Sperveslage G. & Eichmann R. 2012. Egyptian cultural impact on north-west Arabia in the second and first millennia BC. *Proceedings of the Seminar for Arabian Studies* 42: 371–384.

Stantis C., Maaranen N., Kharobi A., Nowell G.M., Macpherson C., Schutkowski H., & Bourke S. 2022. Jordanian migration and mobility in the Middle Bronze Age (ca. 2100–1550 BCE) at Pella. *International Journal of Osteoarchaeology* 32/2: 339–357.

Stein M., Goring-Morris N., Ben Dor Y., & Erel Y. 2025. Environmental setting of the Neolithic Agricultural Revolution across the Fertile Crescent. *Quaternary Science Reviews* 355: 109265.

Steiner M. 2013. Moab During the Iron Age II Period. Pages 770–781 in Killebrew, A. E., & M. Steiner (eds.) *The Oxford Handbook of the Archaeology of the Levant*. Oxford: Oxford University Press

Strange J. 2001. The Late Bronze Age. Pages 291–323 in *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press

Strange J. 2004. Jordan between Mesopotamia and Egypt in the Bronze and Iron Ages. *Studies in the History and Archaeology of Jordan* 8: 427–432.

Tarawneh M.S. 2009. *Sedentarization and tourism: the case of the Zalabia Bedouin tribe of the Southern Jordan*. Ph.D thesis Thesis, Montreal: McGill University

Tebes J.M. 2020. Beyond Petra: Nabataean Cultic and Mortuary Practices and the Cultural Heritage of the Negev and Edom. *Jordan Journal For History and Archaeology* 14/4: 333–347.

Tetra Tech International Development. 2022a. *Economic resilience initiative - infrastructure technical assistance TA2017141 R0 ERI: AAWDC project: executive summary of the ESIA*. Amsterdam, Netherlands: Tetra Tech International Development

Tetra Tech International Development. 2022b. *Economic resilience initiative - infrastructure technical assistance TA2017141 R0 ERI: task 1.14: AAWDC project environmental and social impact assessment report*.

Tetra Tech International Development. 2025. *Economic resilience initiative - infrastructure technical assistance AA-000907 - ERI-ITA. 21-MSK-JOR-ENV - preliminary risks assessment and ESIA for the Aqaba-Amman water desalination and conveyance (AAWDC) project (Jordan) - renewable energy component. Comprehensive environmental and social impact assessment*.

The World Bank Group [WBG]. 2017. The World Bank environmental and social framework.

Tholbecq L. 1998. The Nabataeo-Roman Site of Wadi Ramm (Iram): A New Appraisal. *Annual of the Department of Antiquities of Jordan* 42: 241–254.

Twaissi S. 2007. Nabataean Edom: a demographic and archaeological approach to modelling sedentarisation and regional dynamics. *Levant* 31/1: 143–163.

UNESCO 1972. Convention Concerning the Protection of the World Cultural and Natural Heritage. Paris, UNESCO. UNESCO

UNESCO 2022. Guidance and Toolkit for Impact Assessments in a World Heritage Context. UNESCO, ICCROM, ICOMOS and IUCN

United Nations Educational, Scientific and Cultural Organization [UNESCO] 2024. The operational guidelines for the implementation of the World Heritage Convention. Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage, World Heritage Centre, WHC.23/01. UNESCO, Paris

United Nations Educational, Scientific and Cultural Organization [UNESCO] 2025a. Cultural space of the Bedu in Petra and Wadi Rum2025. 19 May 2025. https://ich.unesco.org/en/RL/cultural-space-of-the-bedu-in-petra-and-wadi-rum-00122

United Nations Educational, Scientific and Cultural Organization [UNESCO]. 2025b. Wadi Rum Protected Area2025. 19 May 2025. https://whc.unesco.org/en/list/1377

United Nations Educational, Scientific and Cultural Organization [UNESCO], International Council on Monuments and Sites [ICOMOS]., International Centre for the Study of the Preservation and Restoration of Cultural Property [ICCROM]., & International Union for Conservation of Nature [IUCN]. 2022. Guidance and toolkit for impact assessments in a world heritage context. UNESCO, Paris

United States Agency International Development [USAID] 2025. *Task WA-14: ESIA for construction of Disi-Aqaba pipeline: Heritage Impact Assessment (HIA): USAID building water infrastructure activity*. Amman, Jordan: CDM International Inc.

Walmsley A. 2001. Fatamid, Ayyubid, and Mamluk Jordan and the Crusader Interlude. Pages 515–559 in *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press

Watson P. 2001. The Byzantine Period. Pages 461–502 in *The Archaeology of Jordan*. Sheffield: Sheffield Academic Press

Whitcomb D. 1992. Reassessing the Archaeology of Jordan of the Abbasid Period. *Studies in the History and Archaeology of Jordan* 4: 385–390.

Yekutieli Y. 2005. The desert, the sown and the Egyptian colony. *Ägypten und Levante* 14/1: 163–171.

Younker R.W. 2013. Ammon During the Iron Age II Period. Pages 757–769 in Killebrew, A. E., & M. Steiner (eds.) *The Oxford Handbook of the Archaeology of the Levant*. Oxford: Oxford University Press

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