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# ENVIRONMENTAL DOCUMENTATION AND REVIEW REPORT

HEBRON WWTP ACCESS ROAD & UTILITIES

**21 MAY 2014**

This publication was produced for review by the United States Agency for International Development. It was prepared by Black & Veatch.

# **ENVIRONMENTAL DOCUMENTATION AND REVIEW REPORT**

## **HEBRON WWTP ACCESS ROAD & UTILITIES**

### **DISCLAIMER:**

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.



## Environmental Documentation

### A. Applicant information

Contractor/grantee(organization)    Black & Veatch	Parent grant or project <b>Infrastructure Needs Program II (INP II)</b>
Individual contact and title  <b>Christian Decker</b>  <b>Chief of Party</b>	Address, phone & email (if available)  <b>Black &amp; Veatch</b> <b>West Bank / Gaza INP II Program Office</b> <b>Louis Building, Ras Al Tahuna Street,</b> <b>Al Bireh, West Bank</b> <b>Tel: 02 2947800</b> <b>Fax: 02 2402288</b>
Activity (brief description)  <b>The City of Hebron (City) is served by a combined sewer system with majority of the population connected to the system. Currently, most of the municipal sewage entering the system from the City and surrounding area is discharged directly to the Wadi as-Samen, south of the City.</b>  <b>Activities of this project will be divided into phases, as appropriate for sustainability of the project works, and are limited to:</b>  <ul style="list-style-type: none"> <li>• <b>Road work: Rehabilitation of the approach to the wadi route (existing local road off the Hebron – Yatta Road) to the WWTP fence-line.</b></li> <li>• <b>Water supply pipe: Installation of 4-inch water pipe within existing local road (for future PWA pipeline expansion) to a 2-inch pipeline at the wadi junction to the WWTP fence-line.</b></li> <li>• <b>Electrical supply: Installation of electrical line from the nearest high voltage tower to the WWTP fence-line with transformer according to WWTP’s required power needs.</b></li> <li>• <b>Main sewer pipeline: Extension of the existing main sewer pipeline from the last manhole to reach the WWTP proposed site.</b></li> </ul>	Amount  <b>US \$</b>

Location of activity <b>Hebron Governorate</b>	Start and end date of activity <b>2014</b>
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## B. Activities, screening results, and recommended determination

TABLE I		Screening result (Step 3 of instructions)			Recommended Determinations (Step 6 of instructions. Complete for all moderate and high-risk activities)		
Project	Activity	Very Low Risk	Moderate Risk	High Risk	No significant adverse impact	mitigation, no significant adverse impact	Significant Adverse impact
Hebron WWTP Access Road & Utilities	1. Planning and design phase	X			X		
	2. Site preparation		X			X	
	3. Excavation		X			X	
	4. Rehabilitation of road access		X			X	
	5. Installation of water pipeline		X			X	
	6. Installation of electrical supply		X			X	
	7. Extension of sewer pipeline		X			X	

## C. Summary of recommended determinations (check all that apply)

The activity contains. . .	<i>(equivalent regulation 216 terminology)</i>
★ Very low risk sub-activities	<i>categorical exclusion(s)</i>
★ After environmental review, sub-activities determined to have <b>no significant adverse impacts</b>	<i>negative determination(s)</i>
★ After environmental review, sub-activities determined to have <b>no significant adverse impacts, given appropriate mitigation and monitoring</b>	<i>negative determination(s) with conditions</i>
<input type="checkbox"/> After environmental review, sub-activities determined to have <b>significant adverse impacts</b>	<i>positive determination(s)</i>

**D. Certification:**

I, the undersigned, certify that:

1. The information on this form is correct and complete
2. The following actions have been and will be taken to assure that the activity complies with environmental requirements established for the Infrastructure Needs Program under the Code of Federal Regulations 22 CFR 216:
  - These design elements and best practices will be followed in implementing this activity, except with the approval of USAID.
  - Any specific mitigation or monitoring measures described in the attached information will be implemented in their entirety.
  - Compliance with these conditions will be regularly confirmed and documented by on-site inspections during the activity and at its completion.

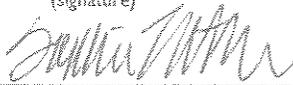
Chimya Santiago  
(Signature)

28 May 2012  
(Date)

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**BELOW THIS LINE FOR USAID USE ONLY**

**Approval**

USAID Project Officer	(print name)	(signature)	
<input checked="" type="checkbox"/> Approved	Sophie Tarntor		August 1, 2014
<input type="checkbox"/> Rejected			

USAID MEO	(print name)	(signature)	
<input checked="" type="checkbox"/> Approved	ANNA MARI		Aug. 1, 2014
<input type="checkbox"/> Rejected			

**USAID comments:** (if documentation is rejected, comments must be provided to applicant)

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# ENVIRONMENTAL REVIEW

## Hebron WWTP Access Road & Utilities

The City of Hebron (Hebron) is served by a combined sewer system with the majority of the population connected to the system. Currently, most of the municipal sewage entering the system from Hebron and surrounding area is discharged directly to the Wadi as-Samen, south of Hebron.

Hebron wastewater management project is one of the major projects funded by the World Bank and Agence Francaise de Developpement (afd). USAID has agreed to assist in the construction of the access road, including utilities.

A major benefit of this project is the separation of the raw sewer water from the storm water and the potential treatment of the municipal sewage, minimizing the impact of the eastern aquifer and communities along the wadi.<sup>1</sup>

## I. SUMMARY OF ACTIVITY AND ENVIRONMENTAL DETERMINATION

The proposed Hebron wastewater treatment plant (WWTP) access road and utilities project will start south of the Hebron Industrial Zone and Road 60, on the Hebron – Yatta Road, then west through the village of Halit Addar on the existing local road that leads to the village of Qelqes, and connecting at Wadi as-Samen at approximately 700 meters from the start of the local road (see Annex 1 for the project Key Map).

The WWTP access road will continue along Wadi as-Samen (wadi alignment), ending at the fence-line of the proposed WWTP. In addition, the wadi alignment will also act as the utility corridor and will accommodate the WWTP project utilities: water, sewer, and electric.

Activities of this project will be divided into phases, as appropriate for sustainability of the project works, and are limited to:

- Road work: Rehabilitation of the approach to the wadi route (existing local road off the Hebron – Yatta Road) and opening of the wadi alignment to accommodate future construction and operational traffic to safely access the WWTP.
- Water supply pipe: Installation of a water pipe to connect with existing water distribution network pipeline to the WWTP fence-line.
- Electrical supply: Installation of the electrical line, to be installed by the Hebron Electrical Distribution Company from the nearest high voltage tower to the WWTP fence-line.
- Main sewer pipeline: Extension of the existing main sewer pipeline from the last manhole to the WWTP fence-line.

*After environmental review, the sub-activities were determined to have no significant adverse impacts, given appropriate mitigation measures and monitoring to ensure compliance.*

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Environmental, Social, and Cultural Heritage Impact Assessment (ESCHIA) to Support the Hebron Governorate Wastewater Management Project, the World Bank and Agence Francaise de Developpement (afd), 28 May 2013. <sup>1</sup>

## 2. ACTIVITY DESCRIPTION

The proposed project is to provide an access road and all utilities: electricity, water supply and sewer main pipe from its existing source to the proposed Hebron wastewater treatment plant (WWTP) fence-line.

See Annex 1 for the key map of proposed project activities.

## 3. ENVIRONMENTAL INFORMATION AND FIELD INVESTIGATIONS

Information on potential impacts of project-work activities was gathered with a desk review and field investigation.

### Desk Review

An Environmental, Social, and Cultural Heritage Impact Assessment (ESCHIA) was completed by the World Bank and Agence Francaise de Developpement (afd) on 28 May 2013 (see Annex 2). This report encompassed all areas within the proposed WWTP and sewer system.

Per the ESCHIA desk review, these items were identified as potential issues of concern for the overall WWTP project and required further on-site investigation for the proposed road access and utilities project:

- Indigenous Palestinian plants: Hawthorn, pistachio, and olive trees, and
- Relic stone terraces and caves.

In addition, an Archaeology Assessment of the proposed WWTP project area was conducted by CH2MHILL in 2005 (see Annex 3). Three sites were identified that required further on-site investigation for the proposed road access and utilities project:

- Former stone structure and cistern,
- Recent circular stone enclosure above a cave, and
- Small natural rock niches.

### Field Investigation

In addition to the ESCHIA desk review, on 15 April 2014, a field survey of the system components was performed by the Black & Veatch (B&V) team and Hebron Municipality engineers to determine the existing environmental situation and evaluate the future impact of the work at the proposed project site.

The existing physical and natural environment was investigated for all project elements including, but not limited to: land use and land cover, biodiversity, hydrology and water resources, and archeology.

The following observations in Table 1 were made after conducting the necessary field investigations. Photographs from the field investigation can be found in Section 9.0 at the end of this report. And a discussion of the alternative project sites proposed by the Hebron Municipality (Municipality) is provided in Section 5.0.

**Table 1: Field Observations and Potential Environmental Impacts**

Potential Impact	Field Observation
Cumulative Impact	<ul style="list-style-type: none"> <li>• Currently there are no known projects that coincide with the proposed WWTP access road and utilities project activities</li> <li>• PWA plans to upgrade the existing water supply network in the area, but the project is currently on hold due to permitting issues</li> </ul>
Land Ownership and Land Use	<ul style="list-style-type: none"> <li>• Agricultural lands (limited: vegetables, grape vines and olive trees)</li> <li>• Residential homes</li> <li>• Small businesses</li> <li>• Stone quarry</li> </ul>
Existing Infrastructure	<p>Khalit Addar village utility lines:</p> <ul style="list-style-type: none"> <li>• Aboveground: electrical and telephone</li> <li>• Underground: water, sewer (non-municipal)</li> </ul>
Disturbances	<ul style="list-style-type: none"> <li>• Residences and small businesses</li> <li>• Local vehicle traffic</li> </ul>
Public health and Safety	<ul style="list-style-type: none"> <li>• Residents of Khalit Addar</li> <li>• Vehicle traffic (low-volume) on local existing road connecting Khalit Addar and Qelqes villages to Hebron and Yatta</li> </ul>
Groundwater Quality and Quantity	<p>Potential for contamination:</p> <ul style="list-style-type: none"> <li>• WWTP proposed location is part of the unconfined Western Mountain Aquifer Basin and is considered to have fissures or sinkholes or streams within the limestone ( ESCHIA 2013)</li> <li>• Wadi as-Samen currently receives the outflow of the municipal and surrounding villages’ sewer water</li> </ul>
Surface Water	<ul style="list-style-type: none"> <li>• Wadi as-Samen – natural open wadi channel that receives approximately 15,000 cubic meters of raw sewage discharge from Hebron and Qiryat Arab and industrial stone-cutting waste (ESCHIA 2013)</li> <li>• Stone terraces act to contain storm water for agricultural use</li> <li>• Functional water cistern (not within proposed alignment - see Archaeological and Cultural Heritage)</li> </ul>
Soil Quality and Quantity	<ul style="list-style-type: none"> <li>• Soil excavations shall be investigated for suitability for reuse or refill</li> <li>• Soil excavations within the wadi alignment shall remain in the same vicinity in case of contamination from the untreated raw sewer water</li> </ul>

<b>Flora and Fauna</b>	<ul style="list-style-type: none"> <li>• No Hawthorne or pistachio trees were observed</li> <li>• White Stork<sup>2</sup>, commonly referred to as Abu-Laban (non-endangered, common, migratory species), were seen flying above and landing within Wadi as-Samen</li> </ul>
<b>Archaeological and Cultural Heritage</b>	<ul style="list-style-type: none"> <li>• Stone structures and functional water cistern were identified opposite side of the proposed wadi access road and utilities alignment, approximately 700 meters from the wadi road junction</li> <li>• Stone niches or caves within the hillside west of the proposed access road were identified</li> </ul>
<b>Landscape and Aesthetic View</b>	<ul style="list-style-type: none"> <li>• Agricultural open lands and stone terraces</li> <li>• Stone-faced hillsides</li> <li>• Abu-Laban birds (see Flora and Fuana)</li> </ul>

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<sup>2</sup> [BirdLife International](#) (2012). "[Ciconia ciconia](#)". [IUCN Red List of Threatened Species](#). Version 2013.2. [International Union for Conservation of Nature](#). Retrieved 26 November 2013.

For the potential concerns observed and anticipated, it is foreseen that short-term impacts will occur during the project-work activities as identified in Section 4.0; these and other potential pre-, construction, and post-construction impacts are manageable and can be mitigated with the proper measures listed in Section 8.0.

However, the long-term beneficial impact shall be with the separation of the sewage from the storm-water outflow into the wadi, and potentially treated, for the overall health of humans and the environment.

A summary of the potential impacts and their significance after proper mitigation measures and actions are performed can be found in Annex 4. A complete table of the Mitigation and Monitoring Plan (MMP) can be found in Annex 5.

## **4. EVALUATION OF POTENTIAL ENVIRONMENTAL IMPACT**

The impacts summarised hereinafter include those that would potentially occur during the construction phase and contracting activities, and may extend to some impacts that need to be considered when put into operation (see Annex 4 for Potential Impact Significance table).

### Land Ownership

The PWA provided a letter to the World Bank stating ownership of the land for the WWTP (Annex 6). In addition, the Municipality has acquired signatures from the landowners within the wadi alignment for its use as a WWTP access road and utility corridor (Annex 7).

Impacts from these project activities will be long-term for changes in land ownership and of low significance after proper mitigation measures and actions are performed. However, project activities will have a long-term, beneficial impact on a regional level with the operation of the WWTP.

### Current Land Use Conditions

The proposed access road will start south from the Hebron Industrial Zone and Road 60 on the Hebron – Yatta Road, then west through the village of Khalit Addar on the existing local road (local road) that leads to the village of Qelqes, and connecting at the wadi at approximately 700 meters from the start of the local road.

The village of Khalit Addar is a small rural community with residential homes, concrete walls and metal barriers, small businesses, and open agricultural areas on both sides of the local road for approximately 200 meters from the turn-off of the Hebron – Yatta Road. It then opens up to rocky and agricultural lands with mainly vegetables, grape vines, and olive trees dispersed along the landscape, in addition to stone quarry cuts within the hillsides and residential homes.

Approximately 700 meters from the Hebron – Yatta Road turn-off, a dirt road crosses over to the wadi. The wadi is dirt-filled, for agricultural use, until the first manhole of the existing main sewer line, then the storm water and sewage flows openly into the wadi channel. There is evidence of stone-cutting slurry from past overflow along its banks.

This then reaches to the proposed WWTP site fence-line, which is marked by the start of a patch of olive trees.

Impacts from these project activities will be short-term, during pre- and construction activities and of low significance after proper mitigation measures and actions are performed. However, project activities will have a long-term, beneficial impact on a regional level with the operation of the WWTP.

#### Existing Utilities and Proposed Utility Project Works

The proposed water and electrical line will extend from existing sources in Khalit Addar to the fence-line of the proposed WWTP site (see Annex 1). The proposed water line will be a 4-inch pipe from the village to the wadi access road junction to anticipate for PWA's future pipeline extension plans. At the wadi access junction, the pipe will be a 2-inch line to accommodate the potable water needs of the WWTP.

The village of Khalit Addar has non-municipal sewer lines that connect to the main municipal sewer line. Since these sewer lines are non-municipal, it is assumed that cesspits may be associated with some of the residential homes in the village (see Groundwater Quality).

The main sewer line will connect from the last manhole within the wadi, also to the fence-line of the proposed WWTP site (see Surface Water for description of Wadi as-Samen).

Impacts from these project activities will be short-term, during pre- and construction activities and of medium significance after proper mitigation measures and actions are performed. However, project activities will have a long-term, beneficial impact on a regional level with the operation of the WWTP.

#### Groundwater Quality and Quantity

##### Groundwater Quality

Per the 2013 ESCHIA, it is reported that:

...7 groundwater wells [are] located 3.5 to 4.5 km south and south-west of the proposed site, [4] of which are used for pumping water for domestic use...The HWWTP site is located in the Western Mountain Aquifer Basin (WMAB)...HWWTP is located within the south-eastern unconfined part of the WMAB. The formations that are outcropping in the plant site are classified as recharge areas for the aquifer...The WMAB is considered as a highly karstic aquifer; with a general thickness ranging between 600 and 1000 meters.

Since the WMAB is considered to be "karstic" or with fissures or sinkholes or streams within the limestone, and the proposed site location is part of an unconfined aquifer basin that contains raw sewage flow, it is important that water quality testing be performed on the domestic water supply prior to discharge into the network system. In addition to the complete water quality suite of tests, fecal coliform and arsenic needs to be tested.

To ensure that the groundwater quality provided is within PWA's and World Health Organization's standards, the PWA informed B&V that the PWA, with its associated partners: WBWD and Ministry of Health (MoH), has a monitoring program process in place to: 1) test and confirm the water quality and 2) address the community's concerns.

In addition to PWA's monitoring program, it is important that the community draft and implement a water safety plan specific for the area and address the potential project impacts during construction and operation of the system.

Spillage of raw sewage and oil from the construction site and construction equipment may impact the groundwater systems if continuous or in large quantities, during the construction phase, if not properly managed and disposed at an approved location.

Currently, there is a non-municipal sewer network within Khalit Addar village. Since this is not an official municipal line, it can be assumed that some existing residential homes may still be connected to cesspits. Therefore, prior to excavation, it needs to be identified if cesspits are within the project-site work activities. Damaging cesspits during construction is a major environmental concern, typically regarding groundwater quality and public health.

If cesspits are located, special consideration must be taken during excavations for the installation of the water pipeline and electrical line, to avoid damaging potential domestic cesspits. Cesspits do already impact the water quality due to raw sewage infiltration; however, damage maybe a cause of unpredicted accelerated infiltration rate and thereafter an expedited impact on groundwater quality, and therefore public health.

Installation of the water pipeline should be safely away and uphill from any identified cesspits or sewer lines in case of aging and corrosion of pipes and/or illegal connections damaging the water pipeline.

#### Groundwater Quantity

PWA, and the WBWD, states the quantities from the available water well source are sufficient for the current residents and the proposed WWTP potable use. The water source is the Bani Naim loop, which is a 20-inch trunk line that is owned by PWA and WBWD. The trunk line is supplied by the PWA ground wells and reservoir.

According to the Hebron WWTP design assumptions of 14 on-site staff utilizing 100 liters per capita per day, the minimum required demand for potable water will be approximately 1.5 m<sup>3</sup>/day, to not exceed 7 m<sup>3</sup>/day for future plant use.

Potable water demand for the WWTP will be low because potable water is needed only for personal use of the plant facility staff. It is anticipated that the quantity is similar to other places with no greater load than the other domestic demands anticipated along a 2-inch network.

However, the plant will be still able to function if no potable water is supplied to the plant through the installed water pipes. Potable water can be trucked and placed in water holding tanks for the plant's domestic needs.

In addition, for facility functions that do not require potable water, such as toilet water, re-circulated, treated effluent water can be used.

Temporary high water consumption during construction for soil conditioning and compaction and filling the structures for testing will be supplied by the contractor through tanker trucks and other temporary sources. Once completed, a plant water system using plant effluent will provide for all process water and plant operational needs.

It should be noted that future demand may require additional supply, along with the WBWD managing the supply and the demand. The ESCHIA identified the "western part of Hebron Governorate is located in a

recharge area of the WMAB which characterized by high sustainable yield” (see Groundwater Quality above), but “the groundwater wells in the area are very limited due to Israeli constraints on the Palestinian water resources.”

Impacts to the groundwater are to be short-term during construction activities with regional, low significance after proper mitigation measure and actions are taken, but long-term, regional, benefit once wastewater is properly treated.

### Surface Water

The main surface water within the proposed project location is Wadi as-Samen.

A preliminary drainage study was conducted by B&V for a 100-year storm. The preliminary results indicate that the 100-year flood elevation is approximately 1 to 2.5 meters above the lowest surveyed data, which is the top of the narrow channel and outwards from that point up the hillside. The potential impacts to the road will primarily be near the existing roadway (to the north) because it might be close to the flood elevation. Downstream towards the WWTP proposed site, it will be above the flood elevation as the proposed wadi access road alignment runs up the side of the hillside on the east side of the wadi.

Currently, 15,000 cubic meters of the municipal sewage from the city of Hebron and the surrounding area, in addition to industrial stone-cutting waste, is estimated to be discharged directly to the wadi (ESCHIA 2013).

The flow can be seen after the last sewer manhole within the wadi. Where the main sewer pipeline is laid, the land dries up and becomes available for agricultural use. Since the Abu-Laban are migratory, they will move to the next shallow water source.

It is anticipated that water resources should improve or not further deteriorate with the implementation of this project in coordination with the WWTP and sewer system. Therefore, providing a healthier environmental for all that are impacted by the wastewater and storm water streams.

In addition, stone terraces in the surrounding area are acting as retaining structures to capture the storm water for agricultural use.

Impacts are short-term, during construction work activities, and medium significance, especially working within and around open wastewater after mitigation and monitoring actions are performed. With proper design, drainage to anticipate for a 100-year flood elevation can be implemented. Long-term benefit will be once the storm water is separated from the wastewater. Agricultural land will become available, and the Abu-Laban should have a clean, downstream, shallow water source.

### Soil Quantity and Quality

Since Wadi as-Samen receives raw sewage discharge from Hebron and Qiryat Arab (see Surface Water), the soils within, and in close proximity to, the wadi are potentially contaminated from untreated raw sewer water. Therefore, excavated soil from the wadi access road alignment shall remain in the same vicinity. However, excavation performed outside the wadi access road alignment shall be investigated for suitability for reuse or refill.

Potential impacts are short-term, during construction work activities. Low significance for soils outside the vicinity of the wadi and medium significance for soils within the wadi vicinity, after mitigation and monitoring actions are taken.

#### Flora or Fauna

It is anticipated that no flora will be affected during construction of the proposed facilities in this project. No Hawthorn or pistachio trees were observed during the field investigation. Local community member mentioned that these trees may be at higher elevations than the proposed project site.

No other biological resources were identified in the ESCHIA; however, during the site visit, white storks, or commonly called Abu-Laban were seen flying and landing within Wadi as-Samen. These birds may use the wadi as a nesting area.

Building the sewer line may potentially dry out the wadi channel, potentially causing the Abu-Laban to migrate further down the wadi or to another location that will provide shallow water for its nesting needs.

However, the development of the proposed project site should not disturb or interfere substantially with the movement of other native resident wildlife species, when mitigation measures have been included if potential issues arise during construction work activities.

Therefore, impacts are to be short-term, during construction work activities and of low significance after mitigation and monitoring actions are performed. And a long-term benefit, especially for the Abu-Laban, and all species that interact or use the wadi, when the sewage water is separated from the storm water.

#### Historical and Cultural Heritage

As noted in the CH2MHILL 2005 Feasibility Study (see Annex 3), former stone structures and a functional cistern were identified on the opposite side of the proposed wadi access road and utilities alignment, approximately 700 meters from the wadi road junction. In addition to small natural rock niches or caves on the hillside, northwest of the proposed WWTP site location. The recent circular stone enclosure above the cave was not identified within the proposed access road and utilities project site vicinity, but described by the Municipality to be on the hillside southeast of the proposed WWTP site location, and away from the proposed wadi access road.

With the proposed wadi access road and utilities alignment on the opposite side of the sites identified and outside the vicinity of the circular stone enclosure, impacts will be of low significance after proper mitigation and monitoring actions are performed.

It was stated in the ESCHIA that are potentially historical or cultural stone relics. Agricultural-terraces can be seen throughout the landscape; however, these were noted by the Hebron Archeological Department to be agricultural and not historical or cultural relics (see Annex 8).

No other special considerations were identified in the Feasibility Study and ESCHIA, or during the site visit.

However, mitigation measures have been included if potential issues arise during construction work activities. If archaeological sites are uncovered, construction shall cease immediately in the area until the Hebron Archeological Department and Ministry of Tourism and Antiquities is contacted and the site is evaluated.

Therefore, impacts are to be short-term, during construction work activities and of low significance after mitigation and monitoring actions are performed.

## **5. PROJECT SITE ALTERNATIVES**

### Technically-Viable Road-Access Route and Alternatives

Throughout the scoping of the project, the B&V team considered technically-viable alternatives provided by the Municipality for the road access route. Finalizing the access road then allowed for the utilities route to be identified by the Municipality.

Below is a summary of the road access route and alternatives:

#### *Road Access Route and Alternatives Summary*

Three access routes to the WWTP was assessed: 1) municipal-planned road that goes through a village and open agricultural lands, with some residential homes; 2) Wadi as-Samen alignment, which goes through open land from an existing road south of the Hebron Industrial Zone and Road 60; and 3) main Qelqes road from Road 60, southwest from the proposed WWTP site.

All three options faced land ownership approval issues. However, the access road that was chosen by the Municipality, with land ownership agreement, was Option #2: Wadi as-Samen.

Reasons remaining routes were not chosen:

- Municipal-planned agricultural road was met with disapproval from the local residents on 14 November 2013; therefore, this option was removed at USAID and Municipality's decision.
- Approximately 500 meters from Road 60 on the main Qelqes road is within Area C. On 30 March 2014 a meeting was held with the Israeli Civil Administration (ICA) for approval of the road design within Area C. The ICA stated that since the section of the road is not within a master plan, it will not consider any design until a master plan is completed.

## **6. MONITORING**

The ENGINEER responsible for managing this program (construction management contractor) will be responsible for periodic monitoring of the environmental aspects and compliance with the mitigation measures of this program.

## **7. RESPONSIBLE PARTIES**

It is the CONTRACTOR's responsibility to take into account all the construction-related mitigation measures listed in this report: pre-construction and during construction. And it is the ENGINEER's responsibility to monitor and document any departure changes in scope of this project from any of the terms and conditions stated in this report. Both CONTRACTOR and ENGINEER are the primary responsible parties for the mitigation and monitoring tasks; however, both shall adhere to informing and coordinating with all applicable stakeholders with relevance to their corresponding mandates.

## **8. MITIGATION MEASURES AND MONITORING PLAN (MMP)**

The CONTRACTOR shall read, consider, and comply with the Mitigation and Monitoring Plan (MMP) for this project. The CONTRACTOR shall act responsibly to provide notification of CONTRACTOR'S schedule to enable the ENGINEER to carry out his responsibilities.

The CONTRACTOR shall designate an environmental coordinator. This individual(s) shall have knowledge of environmental issues that include, but not limited to: biology, cultural resources, soil erosion, dust control, topsoil preservation, topsoil restoration, biological and cultural sensitivity training.

This individual(s) shall be responsible to:

- Coordinate the CONTRACTOR'S work related to compliance with environmental mitigation measures.
- Work closely with the ENGINEER to ensure that the CONTRACTOR thoroughly understands the mitigation and monitoring requirements for implementation.
- Work closely with the ENGINEER to ensure that the CONTRACTOR modifies or incorporates necessary mitigation actions and monitoring plans to reflect on-site field conditions.

The mitigation measures, monitoring plan, frequency and responsible party is identified in the sections below and summarized in an MMP table (see Annex 8).

## 8.1 PRE-CONSTRUCTION PHASE

### **8.1.1 Land Ownership**

*Potential Impact:* Construction works could potentially be on private land

*Mitigation Measures:*

- Conduct village meetings informing right-of-way activities
- Use planning maps and protected zones to mark right-of-way
- Address and resolve village concerns before physically widening the road
- Locate or obtain land ownership and approvals to land acquisition

*Monitoring Action:*

- Record comments or issues provided by the community and resolution
- Document and record land ownership and approvals

*Monitoring Responsibility:*

- Monitoring – CONTRACTOR
- Oversight – ENGINEER, in coordination with local authority

*Monitoring Frequency:* As needed

## **8.1.2 Current Land Use Conditions**

*Potential Impact:* Agricultural and residential lands; small businesses and start of stone quarry

*Mitigation Measures:*

- Conduct meeting with Municipality to ensure compliance with local plans and land categories
- Delineate and preserve land use categories to avoid a major shift in land use patterns
- Conduct meeting and walk-through with village residents and landowners to ensure they are informed of the project
- Identify right-of-way with municipality, residents, and landowners and address and resolve village concerns
- Inform landowners if private property is within right-of-way or obstructs project-site construction activities and Municipality to open the road to designated right-of-way
- Preserve original site characteristics, agricultural patterns and practices, whether irrigated or rain fed, in the areas where they are practiced
- Protect trees and plants (including root system). However, if it is necessary to uproot any plant or tree, then it should be replanted in a location that is agreed upon by the appropriate authorities and landowners and that would not be affected by the projects at any stage (construction, operation and maintenance).
- Filling, excavating, trenching, or stockpiling of materials shall not be permitted in the private vegetation areas, except as approved by the landowner
- Minimize excess dust to avoid damage to property, cultivated vegetation, or domestic animals, or cause a nuisance to persons living in or occupying buildings in the vicinity of the site.
- Utilize truck covers over loads to prevent dust migration from loads in transit
- Dust control measures, such as wetting, should only be used if it becomes a nuisance to persons or a thick film of dust covers private property
- Restore to original site characteristics after the projects are completed as much as practical

*Monitoring Action:*

- Document consultation with landowners and/or local council prior to removal of any object and its resolution
- Verify and document land for construction activities using land use and planning maps, as well as design alignments
- Monitor and document dust generation and actions taken when dust begins to cover private property – include photographs before and after clean up
- Take same-point vantage photographs to ensure site restoration back to original characteristics as much as practical

*Monitoring Responsibility:*

- Monitoring – Municipality Contractor
- Oversight – Municipality Engineer, in coordination with local authority

*Monitoring Frequency:* Daily

### **8.1.3 Cumulative Effect of the Proposed Action**

*Potential Impact:* Continuous public and worker health and safety and environmental impacts, along with destruction to completed project(s)

*Mitigation Measures:*

- Conduct meetings with local authorities to understand the strategic developmental vision of the area
- Collect information about projects that may coincide with the proposed project in hand
- Prepare integrated development plans so that projects integrate seamlessly and contribute to one another. This would eliminate redundant facilities and provide mechanisms to avoid or mitigate impacts
- Coordinate all development actions and construction efforts with local authorities in order to minimize the impacts of each project and create synergistic benefits
- Coordinate amongst the various construction crews if two or more projects involve excavation in the same area to minimize environmental disturbances. This also applies to activities of multiple projects that may require the use of similar local resources or use of energy

*Monitoring Action:*

- Conduct project scope review and report on type, location, time, duration, and overlaps of project activities
- Meet and document stakeholders proposed or current project activities

*Monitoring Responsibility:*

- Monitoring and Oversight – ENGINEER, in coordination with local authority

*Monitoring Frequency:*

- One-Time – Pre Construction
- As-needed – Coordination activities through life of the project

## 8.2 CONSTRUCTION PHASE

### 8.2.1 General Health and Safety

*Potential Impact:* Health and safety of residents, public and construction workers

*Mitigation Measures:*

- Prepare and submit a safety plan for Engineer's approval – submit plans as part of the bid proposal
- Provide measures to define and isolate construction zones by using warning signs, pylons, fencing, and ribbon barriers
- Take appropriate measures to prevent unauthorized persons from entering the work area
- Implement safety measures to protect people from injury and adjacent property from damage
- Provide temporary bridges, safe pathways, handrails and any other safety measure during the road construction to protect the road users from injuries as appropriate and needed
- Provide temporary shoring as appropriate and needed.
- Inform residents of work schedules as well as with the management plans prepared by the contractor
- Identify locations of the hospitals and clinics nearest to the construction site, in case of illness or a construction accident.
- Provide adequate hearing protection, hard hats, safety goggles, brightly colored vests, and other appropriate safety equipment to protect workers and visitors from injury
- Maintain portable toilet, with hand washing area, to avoid leaks or spills to the surrounding area
- Dispose of waste and refuse properly

Wadi as-Samen and open raw sewer water

- Avoid or minimize physical contact and/or construction
- Ensure workers have proper vaccinations required when working in raw sewer (consult health professional)
- Provide workers with appropriate “water-proof” personal protective safety equipment (PPE) that at a minimum covers: eyes, mouth, hands, feet, and body that potentially will be in contact with the raw sewer water
- Instruct and train all workers to safely remove equipment and to securely wrap and properly dispose prior to leaving the construction site
- Clean carefully machinery and/or tools used within the open raw sewer water prior to leaving the construction site
- Follow these activities to not spread the raw sewer water and/or contaminate soil

*Monitoring Action:*

- Record when the public was informed of work schedules and management plans
- Document any concerns and its resolution with work schedules and management plans
- Conduct and document with checklists site inspections
- Document and report potential health and safety concerns

### **8.2.1 General Health and Safety (Continued)**

Wadi as-Samen and open raw sewer water

- Record vaccinations taken by workers
- Conduct site visits and document that workers are properly wearing their PPE
- Document the removal of PPE and its disposal
- Document any complaints and resolutions working near or within Wadi as-Samen

*Monitoring Responsibility:*

- Monitoring – CONTRACTOR
- Oversight – ENGINEER, MoL, MoH, EQA, and MoPWH

*Monitoring Frequency:* Daily

### **8.2.2 Private Property**

*Potential Impact:* Agricultural lands: vegetable, grape vines, olive tree; residential homes, small business and start of stone quarry

*Mitigation Measures:*

- Utilize Municipality designated right-of-way identified and opened in pre-construction phase
- Protect trees and plants (including root system). However, if it is necessary to uproot any plant or tree, then it should be replanted in a location that is agreed upon by the appropriate authorities and landowners and that would not be affected by the projects at any stage (construction, operation and maintenance).
- Filling, excavating, trenching, or stockpiling of materials shall not be permitted in the private vegetation areas, except as approved by the landowner. Whenever possible, excavated materials should be reused as fill, re-shaping, or restoration purposes within the same vicinity
- Minimize excess dust to avoid damage to property, cultivated vegetation, or domestic animals, or cause a nuisance to persons living in or occupying buildings in the vicinity of the site
- Cover over loads in haul trucks to prevent dust migration from loads in transit
- Use dust control measures, such as wetting, only if dust becomes a nuisance to persons or a thick film covers private property
- Maintain portable toilet to ensure no leaks or spills to the surrounding area
- Dispose of waste and refuse needs to be properly disposed
- Store construction materials, equipment, and waste in approved and designated area
- Restore original site characteristics after the project activities are completed as much as practical

### **8.2.2 Private Property (Continued)**

#### *Monitoring Action:*

- Document consultation with landowners and/or local council prior to removal of any object
- Monitor dust generation and actions taken when dust begins to cover private property –include photographs prior to and after clean-up
- Take same-point vantage photographs prior, during, and post-construction to ensure site restoration back to original characteristics as much as practical

#### *Monitoring Responsibility:*

- Monitoring - CONTRACTOR
- Oversight – ENGINEER, in coordination with local authority

#### *Monitoring Frequency:*

- Daily – Work activities in close proximity to private property
- Periodically – Same-point vantage photographs

### **8.2.3 Soil Quantity and Quality**

*Potential Impact:* Soil will be disturbed, potentially causing erosion and contamination during construction work activities, especially while working within Wadi as-Samen

#### *Mitigation Measures:*

- Take pictures before excavation to restore the original site characteristics, as much as practical
- Install and maintain soil erosion and sediment control measures, such as swales, grade stabilization structures, dikes, waterways, filter fabric fences, and sediment basins, until erosion concerns are eliminated
- Use of topsoil for compaction during or after replacement over the retaining walls and any graded areas, except where necessary to prevent erosion, is not allowed
- Store and replace, in its original locations, topsoil from all graded or excavated areas that support or could support vegetation
- Prevent fuel and oil leaks by continuous check of their sources
- Provide well-maintained construction vehicles and machinery, in order to minimize pollutant emissions
- Control the movement of machinery within the project boundaries
- Abide by the local laws concerning weights and speeds of vehicles that transport construction materials to and from construction and storage sites, in order to minimize environmental hazards or excess dust generation
- Ensure no sanitary, oil, hazardous materials, and any other possible contaminants will be spilled or buried in the sites areas in order to protect from soil contamination.
- Ensure staging areas used in this project are fenced and clearly marked by the contractor prior to construction activities.
- Clean the storage and staging areas and restore them to the original conditions.

### **8.2.3 Soil Quantity and Quality (Continued)**

#### *Mitigation Measures (Continued):*

- Replace excavated materials for back filling would be conducted in a manner that restores the ground surface to its original elevation and that the top 0.6 meter of any excavated trench is filled with original materials. In addition, no new soil should be brought to the site which may change the characteristics of the top soil, hence influencing the flora and fauna
- Moving or using soil for construction activities taken from Wadi as-Samen exposed to open raw sewer water is prohibited

#### *Monitoring Action:*

- Take same-point vantage photographs prior, during, and post-construction to ensure site restoration back to original characteristics as much as practical
- Document soil placement if moved from original site

#### *Monitoring Responsibility:*

- Monitoring – CONTRACTOR
- Oversight – ENGINEER

#### *Monitoring Frequency:*

- Daily – Work activities
- Periodically – Same-point vantage photographs

### **8.2.4 Existing Infrastructure**

*Potential Impact:* Damage to aboveground and underground utilities

#### *Mitigation Measures:*

- Conform to site survey results, predicted and plotted utilities structures as provided in the design. Where unpredicted utility structures emerge during the course of work, proper mitigation measures shall be applied to avoid damage as practical as it can be. If not possible, suggest new locations or routes in coordination with the design team and local authorities
- Abide by the local laws concerning weight and speed of vehicles that perform the construction and transport of materials to and from the construction, storage and quarry sites.
- Work efficiently and within an expedited schedule for implementation and rehabilitation. In addition, coordinate with the relevant authorities and local residents
- Damage done to existing facilities (especially cesspits) during construction would be the responsibility of the contractor for repair or replacement to previous conditions
- Coordinate with the relevant authorities and local residents if damage to existing utilities occur
- Provide emergency services for the residents in association with local municipalities/councils if any accidental damaged in public utilities and services occurs

#### **8.2.4 Existing Infrastructure (Continued)**

*Monitoring Action:*

- Consult site survey results and design layout for existing utilities
- Document on-site checks on potential hazards where fragile infrastructure utilities exist
- Document accidents and their resolutions

*Monitoring Responsibility:*

- Monitoring – CONTRACTOR
- Oversight – ENGINEER, in coordination with local authority

*Monitoring Frequency:*

- Daily – Work activities
- Periodically – Consult survey results and design layout
- As-needed – Repair or replacement of damage facilities

#### **8.2.5 Surface Water and Water Bodies**

*Potential Impact:* Project work activities, storage close to the wadi, or improper disposal of construction materials may block natural flow of Wadi as-Samen

*Mitigation Measures:*

- Provide approved designated protected areas for storage of spoil and excavated materials
- Remove and transport waste materials that are not suitable for reuse to designated and approved disposal sites in an environmentally safe manner
- Identify all agricultural wells and protect from project work activity, storage, and materials
- Do not burn waste materials of any type
- Minimize project work activities that will create stagnant water bodies. Address stagnant water bodies if created
- Ensure no sanitary, oil, hazardous materials, and any other possible contaminants will be spilled or buried in the sites areas in order to protect the ground water or surface water

*Monitoring Action:*

- Document any potential concerns for spills and stagnant water body creation and its resolution
- Take photographs prior, during, and post-construction to ensure site restoration back to original characteristics as much as practical.

*Monitoring Responsibility:*

- Monitoring – Contractor
- Oversight – ENGINEER

### **8.2.5 Surface Water and Water Bodies (Continued)**

#### *Monitoring Frequency:*

- Daily – Work activities
- Periodically – Same-point vantage photographs

### **8.2.6 Ground Water Quality and Quantity**

*Potential Impact:* Construction spills or leaks and potential population and industrial growth

#### *Mitigation Measures:*

- Ensure all necessary equipment is available and in good working condition, along with back-up power
- Ensure that a qualified operator is available at all times of the project activities
- Store construction materials properly and clean site areas
- Construct temporary septic tank when needed
- Empty septic tank when full and dumping it at an official nearby treatment site

#### *Mitigation Actions:*

- Maintain a log of all equipment and its condition
- Maintain licenses of all operators
- Document safe storage of any toxic materials

#### *Monitoring Responsibility:*

- Monitoring – CONTRACTOR
- Oversight – ENGINEER, in coordination with local authority and PWA

#### *Monitoring Frequency:*

Daily – Work activities

### **8.2.7 Use of Toxic and Hazardous Materials**

*Potential Impact:* Workers and residents exposed to toxic and hazardous materials such as: asphalt and paint

#### *Mitigation Measures:*

- Submit Material Safety Data Sheets (MSDS) and chemical mixture data sheets to the engineer for approval
- Provide a copy of licenses and insurance of any toxic and hazardous transport company and its driver
- Storage and disposal of residual hazardous material must be conducted by an experienced professional, in coordination with local and competent authorities to identify appropriate disposal site

### **8.2.7 Use of Toxic and Hazardous Materials (Continued)**

*Monitoring Action:*

- Document and maintain chemical transport and storage log sheets, including MSDS and chemical mixture data sheets
- Document actual practices by checking and signing log sheets

*Monitoring Responsibility:*

- Monitoring – CONTRACTOR
- Oversight – ENGINEER, in coordination with local authority and EQA

*Monitoring Frequency:* As needed—work activities involving hazardous chemical material

### **8.2.8 Vehicle Traffic**

*Potential Impact:* Health and safety of residents, public and construction workers

*Mitigation Measures:*

- Prepare and submit a traffic plan for the Engineer's approval
- Organize and manage construction activities, so that traffic disruption and delays within construction zones are minimized
- Provide temporary alternative lanes and routes shall be managed to allow traffic to pass through or around construction zones with minimal disruption
- Use flagmen and other appropriate means shall be used to direct traffic safely through and around construction zones, and to minimize conflicts between local traffic and construction vehicles
- Inform residents and the public of work schedules as well as with the management plans prepared by the Contractor

*Monitoring Action:*

- Document when the public was informed of work schedules and management plans
- Review and sign engineer approved Traffic plan and document compliance and on-site changes
- Document potential health and safety concerns and resolutions

*Monitoring Responsibility:*

- Monitoring – CONTRACTOR
- Oversight – ENGINEER

*Monitoring Frequency:*

- Daily – Work activities
- Periodically – Review of traffic plan

### **8.2.9 Noise, Air, and Light Pollution**

*Potential Impact:* Health and safety of residents, public and construction workers

*Mitigation Measures:*

- Provide well-maintained construction vehicles and machinery, in order to minimize noise and air pollution
- Maintain noise levels below 70 dB surrounding sensitive receptors within 50 meters of noise source
- Install and maintain mufflers on construction equipments
- Provide the workers with protective hearing devices and face mask.
- Control the movement of machinery within the project boundaries
- Use of heavy or noisy machinery shall be prohibited between the hours of 6:00 pm (18.00) and 6:00 am during working days and all day during Fridays or designated local holidays (unless the public and workers will be best served during these hours and approval has been provided by local government and surrounding residents)

*Monitoring Action:*

- Document baseline noise and air emission during the start and end of the work
- Log noise and air emission
- Document complaints and how it was resolved

*Monitoring Responsibility:*

- Monitoring – CONTRACTOR
- Oversight – ENGINEER

*Monitoring Frequency:*

- Daily – Maintenance of vehicles and worker and public safety
- Start of project – Baseline noise and air emission
- Weekly – Log noise and air emission
- As needed – Work complaints and resolution

### **8.2.10 Heavy Equipment**

*Potential Impact:* Health and safety of residents, public and construction workers

*Mitigation Measures:*

- Minimize the use of heavy machinery in residential areas and close proximity to the open raw sewer water within Wadi as-Samen
- Control the movement of machinery within the project boundaries
- Use of heavy machinery shall be prohibited when working near residential area between the hours of 6:00 pm (18.00) and 6:00 am during working days and all day during Fridays or designated local holidays (unless the public and workers will be best served during these hours and approval has been provided by local government and surrounding residents)
- Abide by the local laws concerning weights and speeds of vehicles that transport construction materials to and from construction and storage sites, in order to minimize safety hazards, such as traffic accidents

*Monitoring Action:*

- Document complaints and how it was resolved.

*Monitoring Responsibility:*

- Monitoring – CONTRACTOR, in coordination with local authority
- Oversight – ENGINEER, in coordination with local authority and MoPWH

*Monitoring Frequency:*

- Daily – Heavy equipment use
- As needed – Work complaints and resolution

### **8.2.11 Flora or Fauna**

*Potential Impact:* Disruption or interference of biological resources may occur during construction work activities

*Mitigation Measures:*

- Minimize amount of dust generated through construction works activity
- Work within the existing road and proposed road alignment as practical as possible
- Limit working hours to daytime hours only (if work is scheduled during the night, confirm with EQA or Ministry of Agriculture (MoA) no biological species will be affected)
- Install proper fencing or other suitable protection during project activities to prevent the exposure of wild and domestic animals to construction hazards
- Restore original site characteristics after the project activities are completed, as much as practical, including maintaining the storm water open channel

### **8.2.11 Flora or Fauna (Continued)**

#### *Monitoring Action:*

- Log any presence of wild or domestic animals within the project site and action taken
- Take photographs prior, during, and post-construction to ensure site restoration back to original characteristics as much as practical

#### *Monitoring Responsibility:*

- Monitoring – CONTRACTOR
- Oversight – ENGINEER, in coordination with EQA and MoA

#### *Monitoring Frequency:*

- Daily – Work activities
- Periodically – Same-point vantage photographs
- As needed – Wild or domestic animals entry

### **8.2.12 Archaeological and Cultural Heritage**

*Potential Impact:* Damage of archaeological and/or cultural sites

#### *Mitigation Measures:*

- Keep access road alignment east of the proposed WWTP site to avoid the former stone structures and a functional cistern identified on the opposite side of the wadi
- Avoid large excavation activities northwest of the proposed WWTP site that might disturb the small natural rock niches or caves identified on the hillside
- Stop all work if archaeological sites are uncovered, contact the Hebron Archaeological Department and (HAD) Ministry of Tourism and Antiquities (MoTA) and evaluate the site

#### *Monitoring Action:*

- Utilize survey results, design drawings, and identified archaeological site locations to document construction activities does not impact the sites
- Keep documentation of HAD and MoTA official correspondences
- Document any archaeological findings and actions taken

#### *Monitoring Responsibility:*

- Monitoring – CONTRACTOR
- Oversight – ENGINEER, in coordination with HAD and MoTA

#### *Monitoring Frequency:*

- Daily – Work activities
- Periodically – Consultation of archaeological site locations to construction activities
- As needed – Findings and actions taken

## 8.3 POST- CONSTRUCTION PHASE

### 8.3.1 Sustainability of Project

*Potential Impact:* Failure to sustain or monitor constructed road and installation of associated infrastructure due to technical faults or damaged, misused, or unmaintained system

*Mitigation Measures:*

- Comply the design and implementation activities with the local and international codes
- Ensure that resources management plans and emergency provision schemes for the service area are being prepared and implemented by competent authorities
- Ensure technical sustainability by proper training and capacity building of relevant institutions
- Train operators to comply with operation and maintenance procedures
- Ensure financial sustainability by commitment of citizens to pay necessary fees
- Ensure industries have up-to-date approvals and permits in place
- Conduct awareness campaigns
- Enforce violations on infrastructure abuses
- Perform continuous check up maintenance for the system elements

*Monitoring Action:*

- Use facilitating checklists and monitoring tools for application of appropriate design, construction and operational best practices
- Document training and record attendees
- Identify capacity building needs for institutions and resource provision operators and document resolutions
- Conduct frequent checks on system conditions

*Monitoring Responsibility:*

- Monitoring and Oversight – local authority, PWA, WBWD, EQA, MoLG, MoPWH, MoE, MoH

*Monitoring Frequency:*

- Daily – During operation
- Periodically – System conditions check up
- As needed – System failure

## 9. SITE PHOTOGRAPHS

### Hebron WWTP Access Road & Utilities



Plate 1: Hebron – Yatta Road junction to existing local road (see red arrow pointing towards local road)



Plate 2: Power source for the WWTP at Hebron – Yatta Road junction



Plate 3: Local road and Khalit Addar village from Hebron – Yatta Road (red arrow points to sewer manhole)



Plate 4: Close-up of the sewer manhole from Plate 3 with land use being changed to agricultural



**Plate 5: Exposed 2" water pipeline (see red arrow)**



**Plate 6: Khalit Addar village: steep slope, residential homes, stone walls, underground (non-municipal) sewer line, cesspits (assumed if not connected to sewer line), aboveground utility lines**



**Plate 7: Khalit Addar stone walls, agricultural lands adjacent to the local road**



**Plate 8: Local road going through Khalit Addar: residential homes and concrete walls**



**Plate 9: Local road through Khalit Addar: residential homes, concrete walls, small businesses**



**Plate 10: Leaving Khalit Addar: metal barriers, agricultural land, and aboveground utilities**



**Plate 11: Local road from Khalit Addar towards the wadi junction**



**Plate 12: Local road: single-lane paved road, rock-face terrain, open agricultural land, and stone quarry (see red arrow)**



**Plate 13: Local road looking towards Khalit Addar and stone quarry (see red arrow and Plate 12)**



**Plate 14: Local road with rock shelters potentially used by animal herders (see red arrow)**



**Plate 15: Residential homes uphill from the local road to the wadi junction**



**Plate 16: Agricultural stone walls**



**Plate 17: Agricultural land, grape vines, and stone-face terrain (rock shelter from Plate 14) adjacent to local road**



**Plate 18: Agricultural land, olive trees adjacent to local road**



**Plate 19: Local road and stone barrier within the Wadi as-Samen for agricultural purposes**



**Plate 20: Wadi junction from local road (see red arrow) – start of proposed wadi access road**



**Plate 21: Proposed wadi access road coming from local road passing through Wadi as-Samen – wadi has been sectioned for agricultural use**



**Plate 22: Close-up of agricultural use of the wadi from Plate 21**



**Plate 23: Proposed wadi access road**



**Plate 24: Open wadi channel after the last manhole (proposed wadi access road will not cross-over the wadi)**



**Plate 25: Former stone structures and functional cistern approximately 700 meters from wadi and on opposite side of proposed wadi access road (see red arrows and Plates 26 and 27)**



**Plate 26: Close-up of former stone structures**



**Plate 27: Close-up of functional cistern (see red arrow for wadi)**



**Plate 28: Rock-face with natural niches or caves northwest of the proposed WWTP site location (see red arrow and Plate 28)**

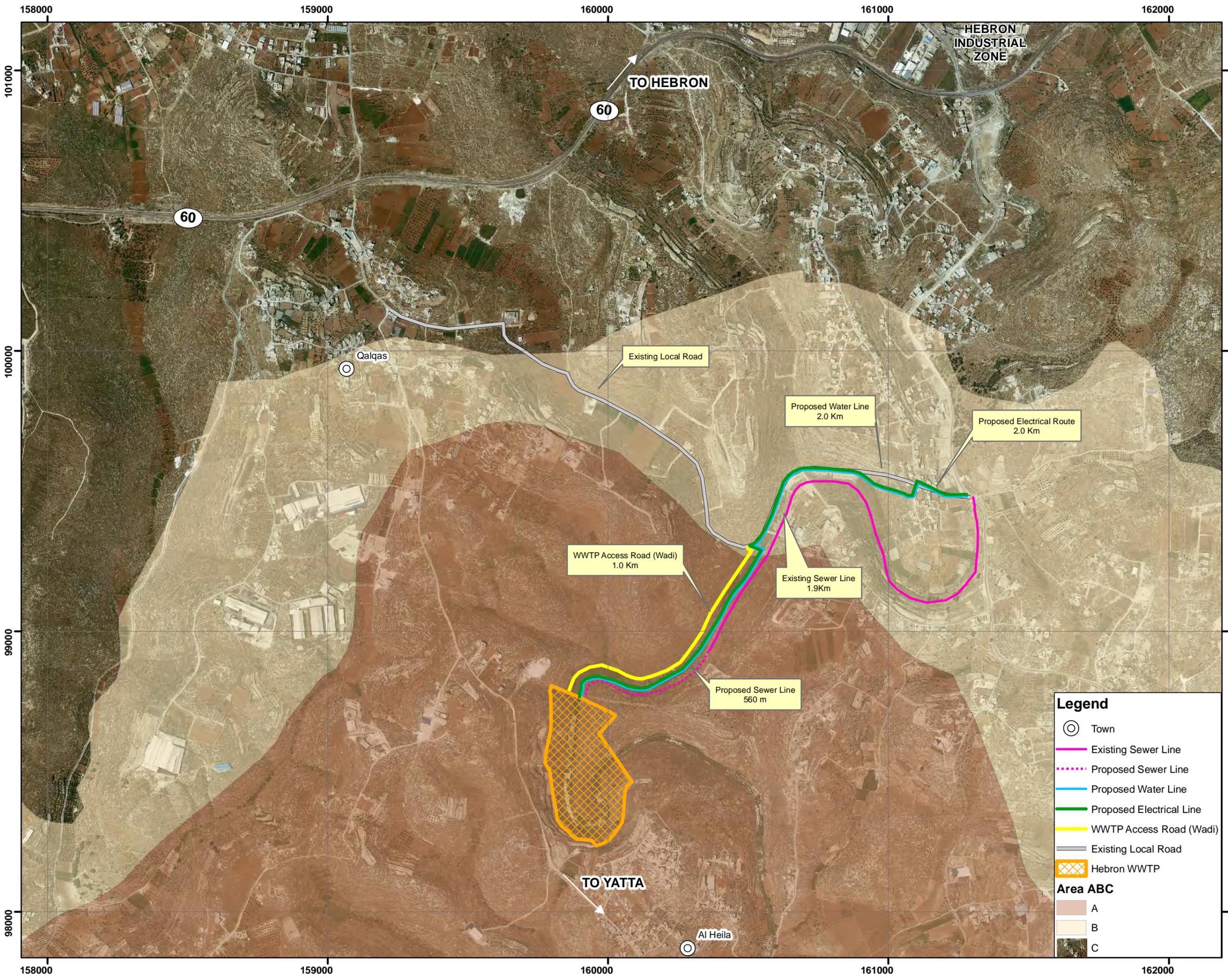


**Plate 29: Close-up of rock niche or caves from Plate 28**



**Plate 30: Abu-Laban (stork family) observed flying above and landing within wadi**

## **ANNEX I: Project Key Map**

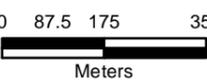


**Legend**

- Town
- Existing Sewer Line
- ⋯ Proposed Sewer Line
- Proposed Water Line
- Proposed Electrical Line
- WWTP Access Road (Wadi)
- Existing Local Road
- ▨ Hebron WWTP

**Area ABC**

- A
- B
- C

 Building a world of difference.	 سلطة المياه الفلسطينية PALESTINIAN WATER AUTHORITY
 من الشعب الأمريكي	PALESTINIAN WATER AUTHORITY PROGRAM FUNDED BY THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID) INFRASTRUCTURE NEEDS PROGRAM PHASE II
<b>KEY MAP</b>	<b>HEBRON WWTP ACCESS ROAD &amp; UTILITIES</b>
	
	
PROJECT NO. 42230	
FIGURE 1	

## **ANNEX 2: ESCHIA, 28 May 2013 - CD**

### **Environmental, Social, and Cultural Heritage Impact Assessment (ESCHIA), World Bank and Agence Francaise de Developpement (afd)**

PDF Environmental Review version -  
ESCHIA complete report at end of Annexes

## **ANNEX 3: Archaeology Assessment, CH2MHILL, 2005**

## 9.0 Archeological Assessment

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Following the selection of the Hebron Regional Wastewater Treatment Facilities (HRWWTF) site in Wadi Es-Sammen northeast of Yatta and south of Hebron, an archeological (cultural heritage) study was authorized by CH2M HILL under the USAID WRP3 program. Additional regional information is documented in the April 2002 and May 2003 documents both entitled “Environmental Assessment for Storm Water and Domestic Wastewater Master Plan for Hebron”.

The conclusion of the archeological assessment is that no archeological sites are directly impacted by the proposed construction or operation of the HRWWTF.

Figure 9-1 is a map of the areas assessed. Figures 9-2 to 9-5 are photographs of the sites. The area was visited and investigated on 4, 5, and 6 November 2004 and 8 April 2005. The areas investigated include:

- The proposed Hebron Wastewater Treatment Plant Site
- The wadi upstream of the site to the Qilqis-Khallit Ad Dar junction
- The wadi downstream to the Heela junction
- The effluent storage reservoir site

The wadi was and is still partially cultivated by terracing. There are numerous stonewalls along and across the wadi. These stonewalls are normal agricultural stonewalls of the type found throughout the West Bank.

The primary archeological findings are stated below.

1. There are no archeological sites within the boundaries proposed plant site.
2. There are no archeological sites within the wadi bed in the investigated areas both upstream and downstream the plant site.
3. Three archeological sites were found upstream the proposed Wastewater Treatment Plant site. The Storage Reservoir site was also visited.

Archeological Site No. 1: This site is a small complex of three stone enclosures and a cistern on the gentle rocky slope about 15 to 20 meters distance from the edge of the wadi bed at coordinates 209,920 E and 598,900 N.

Two enclosures are rectangular stone structures 5 meters by 4 meters and 4 meters by 4 meters. A third smaller enclosure is 1.5 meters by 2 meters.

The cistern is about 10 m to the north of the enclosures; it is currently being rehabilitated by the land owners there.

The three structures have 2 to 3 lines of stones still standing (about 1 meter high). The structures may be originated from the Byzantine era.

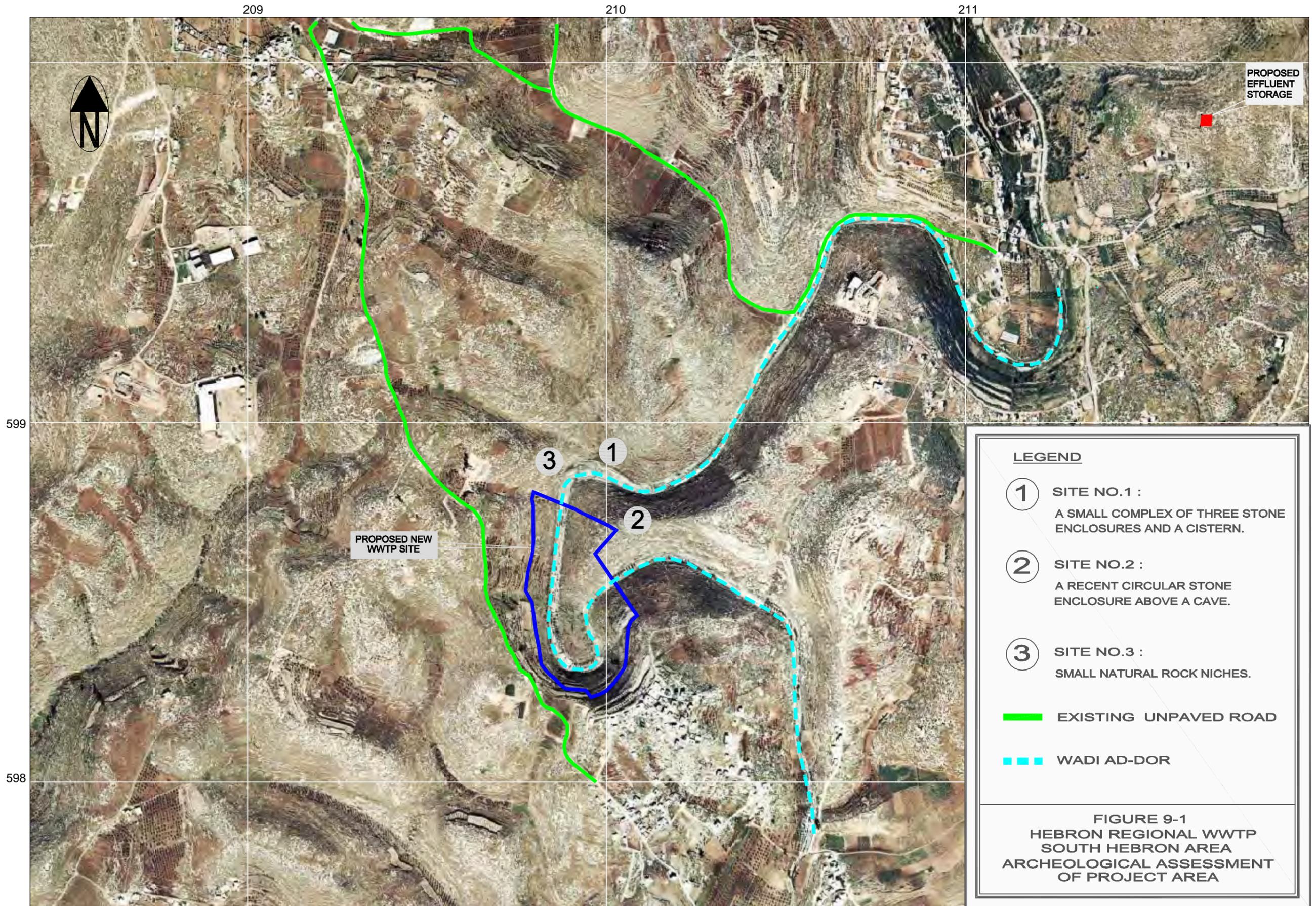
Archeological Site No. 2: This site is a recent circular stone enclosure of about 10 meters diameter and of heights up to 70 cm in the west side. The entrance is about 2 meters wide in the southern side. This enclosure encircles a natural cave of about 9 meters length (east-west) and 5 meters wide (north-south) and about 2 meters high in its center. The entrance to the cave is about 1.2 meters by 1.5 meters. Inside the

west part of the cave is a raised area 3 meters by 4.5 meters, 70 cm above the lower eastern part of the cave. This raised part may have been used for human use.

The cave is natural but appears modified for human use and for animal keeping as well. The use of the cave may extend back to the Canaanite era.

Archeological Site No. 3: This site is a set of six small natural rock niches with dimensions of about 1.0 meters height, 70-80 cm deep called Khuzuq Al Ghouleh. No archeological significance was observed at these niches.

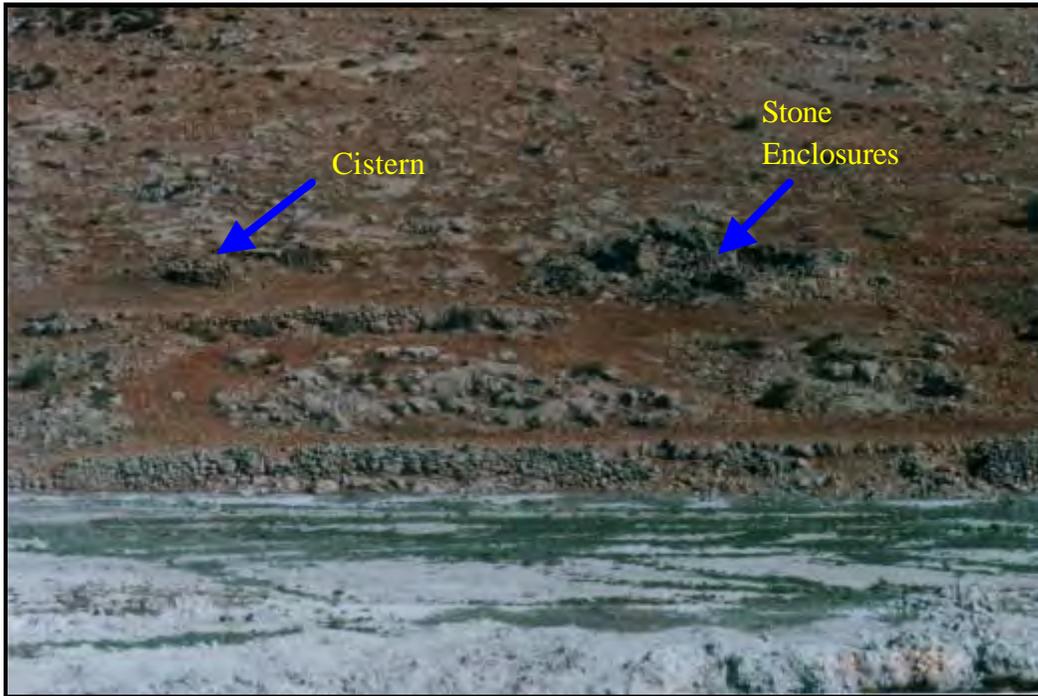
Storage Reservoir Site: The site was visited on 8 April 2005. The site is a typical degraded slope with broken stone agricultural terraces. The site is free of any archaeological remains; no structures, raised areas or pottery shards were detected.



**LEGEND**

- 1** SITE NO.1 :  
A SMALL COMPLEX OF THREE STONE ENCLOSURES AND A CISTERN.
- 2** SITE NO.2 :  
A RECENT CIRCULAR STONE ENCLOSURE ABOVE A CAVE.
- 3** SITE NO.3 :  
SMALL NATURAL ROCK NICHES.
- EXISTING UNPAVED ROAD
- - - WADI AD-DOR

**FIGURE 9-1  
HEBRON REGIONAL WWTP  
SOUTH HEBRON AREA  
ARCHEOLOGICAL ASSESSMENT  
OF PROJECT AREA**



ARCHEOLOGICAL SITE NO. 1:  
A small Complex of Three Stone Enclosures and a Cistern



ARCHEOLOGICAL SITE NO. 2:  
A recent Circular Stone Enclosure



**ARCHEOLOGICAL SITE NO. 3:**  
**Small Natural Rock Niches**



**RECLAIMED WASTEWATER STORAGE RESERVOIR SITE**

## **ANNEX 4: Potential Impacts Significance Table**

## POTENTIAL IMPACT SIGNIFICANCE <sup>1</sup>

Potential Impact	Affected	Timescale	Magnitude	Impact Significance after Mitigation <sup>2</sup>
Land ownership	Landowners	Long term; change in ownership Long term; change in land use (benefit)	Local	Low
<b>Cumulative Effect of the Proposed Action</b>	Public; workers and local environment	Short term; construction phase	Local	Low
<b>Land Use and Agriculture</b>	Public; workers and local environment	Short term; pre and construction phase	Local	Low
<b>Existing Infrastructure (Water, Wastewater, Roads and Electricity)</b>				
Damage to existing infrastructure and supporting services	Public; workers and local environment	Short term; construction phase Long term; operational phase	Regional	Medium
Operation and maintenance of new and improved services	Public and local environment	Long term; operational phase	Regional	Medium
<b>Disturbances (Noise and Light)</b>	Public; workers	Short term; construction phase	Local	Medium; congested areas Low; open areas
<b>Air Quality</b>	Public; workers	Short term; construction phase Long term; operational phase	Local	Low
<b>Public Health and Safety</b>	Workers; public	Short term; construction phase	Local	Medium
<b>Use of Toxic and Hazardous Materials</b>	Workers	Short term; construction phase	Local; may extend to final disposal destination	Medium

## POTENTIAL IMPACT SIGNIFICANCE <sup>1</sup>

Potential Impact	Affected	Timescale	Magnitude	Impact Significance after Mitigation <sup>2</sup>
<b>Soil Quantity and Quality</b>	Workers; public; local environment	Short term; construction phase	Local; may extend to final disposal destination	Low; not near wadi Medium; near the wadi
<b>Flora and Fauna</b>	Local environment	Short term; construction phase Long term; operational phase (benefit)	Local	Low
<b>Solid Waste Management</b>	Public; workers	Short term; construction phase Long term; operational phase	Local	Low
<b>Groundwater Quality and Quantity</b>				
Spills from construction vehicle motor oils and portable sanitary buildings and damage to cesspits	Public; local environment	Short term; construction phase	Regional	Low
Water provision services – improvement	Public	Long term	Regional	Not applicable (beneficial)
<b>Surface Water</b>	Workers; public	Short term; construction phase Long term; operational phase (benefit)	Local	Low; non-open wastewater Medium; open wastewater

## POTENTIAL IMPACT SIGNIFICANCE <sup>1</sup>

Potential Impact	Affected	Timescale	Magnitude	Impact Significance after Mitigation <sup>2</sup>
<b>Piped Water Quality</b>				
Aging and corrosion of pipelines	Public; local environment	Long term; operational phase	Regional	Low
Corroded pipelines placed near cesspits	Public; local environment	Long term; operational phase	Regional	Low
<b>Historical and Cultural Heritage</b>	Local environment	Short term; construction phase	Local	Low
<b>Sustainability of the Project</b>	Public; local environment	Long term; operational phase	Regional	Low

Notes:

1. See Section 4.0: Evaluation of Environmental Impact Potential of report for detail analysis of impacts.
2. See Section 8.0 and Annex 5 for Mitigation Measures and Monitoring Plan (MMP) required to minimize the potential impacts.

# ANNEX 5: Mitigation and Monitoring Plan

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<b>PRE-CONSTRUCTION PHASE</b>				
<p><u>Land Ownership</u></p> <p>Construction works could potentially be on private land</p>	<ul style="list-style-type: none"> <li>• Conduct village meetings informing right-of-way activities</li> <li>• Use planning maps and protected zones to mark right-of-way</li> <li>• Locate or obtain land ownership and approvals to land acquisition</li> <li>• Address and resolve village concerns before physically widening the road</li> </ul>	<ul style="list-style-type: none"> <li>• Record comments or issues provided by the community and resolution</li> <li>• Document and record land ownership and approvals</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring – CONTRACTOR</li> <li>• Oversight – ENGINEER, in coordination with local authority</li> </ul>	As needed
<p><u>Current Land-Use Conditions</u></p> <p>Agricultural lands, small businesses and start of stone quarry</p>	<ul style="list-style-type: none"> <li>• Conduct meeting with Municipality to ensure compliance with local plans and get informed of land categories</li> <li>• Delineate and preserve land use categories to avoid a major shift in land use patterns- comply with local plans, laws and local regulations</li> <li>• Conduct meeting and walk-through with village residents and landowners to ensure they are informed of the project -address and resolve village concerns</li> <li>• Identify right-of-way with municipality, residents, and landowners and address and resolve village concerns</li> </ul>	<ul style="list-style-type: none"> <li>• Document consultation with landowners and/or local council prior to removal of any object and its resolution</li> <li>• Verify and document land for construction activities using land use and planning maps, as well as design alignments</li> <li>• Monitor and document dust generation and actions taken when dust begins to cover private property – include photographs before and after clean up</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring – Municipality Contractor</li> <li>• Oversight - Municipality Engineer, in coordination with local authority</li> </ul>	Daily

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Current Land-Use Conditions</u></p> <p>Agricultural lands, small businesses and start of stone quarry</p> <p>(Continued)</p>	<ul style="list-style-type: none"> <li>• Inform landowners if private property is within right-of-way or obstructs project-site construction activities</li> <li>• Preserve original site characteristics, agricultural patterns and practices, whether irrigated or rain fed, in the areas where they are practiced</li> <li>• Open road through the Municipality to designated right-of-way</li> <li>• Protect trees and plants (including root system). However, if it is necessary to uproot any plant or tree, then it should be replanted in a location that is agreed upon by the appropriate authorities and landowners and that would not be affected by the projects at any stage (construction, operation and maintenance).</li> <li>• Filling, excavating, trenching, or stockpiling of materials shall not be permitted in the private vegetation areas, except as approved by the landowner</li> <li>• Minimize excess dust to avoid damage to property, cultivated vegetation, or domestic animals, or cause a nuisance to persons living in or occupying buildings in the vicinity of the site.</li> <li>• Haul trucks shall utilize covers over loads to prevent dust migration from loads in transit</li> </ul>	<ul style="list-style-type: none"> <li>• Take same-point vantage photographs to ensure site restoration back to original characteristics as much as practical</li> </ul>		

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Current Land-Use Conditions</u></p> <p>Agricultural lands, small businesses and start of stone quarry</p> <p>(CONTINUED)</p>	<ul style="list-style-type: none"> <li>Dust control measures, such as wetting, should only be used if it becomes a nuisance to persons or a thick film of dust covers private property</li> <li>Restore to original site characteristics after the projects are completed as much as practical</li> </ul>			
<p><u>Cumulative Effect of the Proposed Action</u></p> <p>Continuous public and worker health and safety and environmental impacts, along with destruction to completed project(s)</p>	<ul style="list-style-type: none"> <li>Conduct meetings with local authorities to understand the strategic developmental vision of the area</li> <li>Collect information about projects that may coincide with the proposed project in hand</li> <li>Prepare integrated development plans so that projects integrate seamlessly and contribute to one another. This would eliminate redundant facilities and provide mechanisms to avoid or mitigate impacts</li> <li>Review or prepare integrated development plans if not existing, so that projects integrate seamlessly and contribute to one another</li> <li>Coordinate all development actions and construction efforts to minimize the impacts of each project and create synergistic benefits</li> </ul>	<ul style="list-style-type: none"> <li>Conduct project scope review and report on type, location, time, duration, and overlaps of project activities</li> <li>Meet and document stakeholders proposed or current project activities</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring and Oversight – ENGINEER, in coordination with local authority</li> </ul>	<ul style="list-style-type: none"> <li>One-Time – Pre Construction</li> <li>As needed - Coordination activities, through life of the project</li> </ul>

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Cumulative Effect of the Proposed Action</u></p> <p>Continuous public and worker health and safety and environmental impacts, along with destruction to completed project(s)</p> <p>(CONTINUED)</p>	<ul style="list-style-type: none"> <li>Coordinate amongst the various construction crews if two or more projects involve excavation in the same area to minimize environmental disturbances. This also applies to activities of multiple projects that may require the use of similar local resources or use of energy</li> </ul>			

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<b>CONSTRUCTION PHASE</b>				
<p><u>General Health and Safety</u></p> <p>Health and safety of residents, public and construction workers</p>	<ul style="list-style-type: none"> <li>• Prepare and submit a safety plan for Engineer’s approval – submit plans as part of the bid proposal</li> <li>• Provide measures to define and isolate construction zones by using warning signs, pylons, fencing, and ribbon barriers</li> <li>• Take appropriate measures to prevent unauthorized persons from entering the work area</li> <li>• Implement safety measures to protect people from injury and adjacent property from damage</li> <li>• Provide temporary bridges, safe pathways, handrails and any other safety measure during the road construction to protect the road users from injuries as appropriate and needed</li> <li>• Provide temporary shoring as appropriate and needed</li> <li>• Inform residents of work schedules as well as with the management plans prepared by the contractor</li> <li>• Identify locations of the hospitals and clinics nearest to the construction site, in case of illness or a construction accident</li> </ul>	<ul style="list-style-type: none"> <li>• Record when the public was informed of work schedules and management plans</li> <li>• Document any concerns and its resolution with work schedules and management plans</li> <li>• Conduct and document with checklists site inspections</li> <li>• Document and report potential health and safety concerns</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring – CONTRACTOR</li> <li>• Oversight – ENGINEER, MoL and MoPWH</li> </ul>	Daily – All activities

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>General Health and Safety</u></p> <p>Health and safety of residents, public and construction workers</p> <p>(CONTINUED)</p>	<ul style="list-style-type: none"> <li>• Provide adequate hearing protection, hard hats, safety goggles, brightly colored vests, and other appropriate safety equipment to protect workers and visitors from injury</li> <li>• Maintain portable toilet, with hand washing area, to avoid leaks or spills to the surrounding area</li> <li>• Dispose of waste and refuse properly</li> </ul>			
<p><u>General Health and Safety</u></p> <p>Work near or within Wadi as-Samen raw sewer water</p>	<ul style="list-style-type: none"> <li>• Avoid or minimize physical contact and/or construction</li> <li>• Ensure workers have proper vaccinations required when working in raw sewer (consult health professional)</li> <li>• Provide workers with appropriate “water-proof” personal protective safety equipment (PPE) that at a minimum covers: eyes, mouth, hands, feet, and body that potentially will be in contact with the raw sewer water</li> <li>• Instruct and train all workers to safely remove equipment and to securely wrap and properly dispose prior to leaving the construction site</li> <li>• Clean carefully machinery and/or tools used within the open raw sewer water prior to leaving the construction site</li> </ul>	<ul style="list-style-type: none"> <li>• Record vaccinations taken by workers</li> <li>• Conduct site visits and document that workers are properly wearing their PPE</li> <li>• Document the removal of PPE and its disposal</li> <li>• Document any complaints and resolutions working near or within Wadi es-Samen</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring – CONTRACTOR</li> <li>• Oversight – ENGINEER, MoL, MoH, and EQA</li> </ul>	Daily

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>General Health and Safety</u></p> <p>Work near or within Wadi es-Samen containing raw sewer water</p> <p>(CONTINUED)</p>	<ul style="list-style-type: none"> <li>Follow these activities to not spread the raw sewer water and/or contaminate soil</li> </ul>			
<p><u>Private Property</u></p> <p>Right-of-way may potentially contain private property</p> <p>Agricultural lands: vegetable, grape vines, and olive tree</p> <p>Residential and businesses: small stores and stone quarry</p>	<ul style="list-style-type: none"> <li>Utilize Municipality designated right-of-way identified and opened in pre-construction activities</li> <li>Protect trees and plants (including root system). However, if it is necessary to uproot any plant or tree, then it should be replanted in a location that is agreed upon by the appropriate authorities and landowners and that would not be affected by the projects at any stage (construction, operation and maintenance)</li> <li>Filling, excavating, trenching, or stockpiling of materials would not be permitted in the private vegetation areas, except as approved by the landowner. Whenever possible, excavated materials should be reused as fill, re-shaping, or restoration purposes within the same vicinity</li> </ul>	<ul style="list-style-type: none"> <li>Document consultation with landowners and/or local council prior to removal of any object</li> <li>Monitor dust generation and actions taken when dust begins to cover private property –include photographs prior to and after clean-up</li> <li>Take same-point vantage photographs prior, during, and post-construction to ensure site restoration back to original characteristics as much as practical</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring - CONTRACTOR</li> <li>Oversight – ENGINEER, in coordination with local authority</li> </ul>	<ul style="list-style-type: none"> <li>Daily – Work activities in close proximity to private property</li> <li>Periodically – Same-point vantage photographs</li> </ul>

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Private Property</u></p> <p>Right-of-way may potentially contain private property</p> <p>Agricultural lands: vegetable, grape vines, and olive tree</p> <p>Residential and businesses: small stores and stone quarry</p> <p>(CONTINUED)</p>	<ul style="list-style-type: none"> <li>Minimize excess dust to avoid damage to property, cultivated vegetation, or domestic animals, or cause a nuisance to persons living in or occupying buildings in the vicinity of the site</li> <li>Cover overloads haulage trucks to prevent dust migration from loads in transit</li> <li>Use dust control measures, such as wetting, only if dust becomes a nuisance to persons or a thick film covers private property</li> <li>Maintain portable toilet to avoid leaks or spills to the surrounding area</li> <li>Dispose of waste and refuse properly</li> <li>Store construction materials, equipment, and waste in approved and designated area</li> <li>Restore original site characteristics after the projects are completed as much as practical</li> </ul>			
<p><u>Soil Quantity and Quality</u></p> <p>Soil will be disturbed, potentially causing erosion and contamination during construction work activities, especially while working within Wadi as-Samen</p>	<ul style="list-style-type: none"> <li>Take pictures before excavation to restore the original site characteristics</li> <li>Install and maintain soil erosion and sediment control measures, such as swales, grade stabilization structures, dikes, waterways, filter fabric fences, and sediment basins, until erosion concerns are eliminated</li> </ul>	<ul style="list-style-type: none"> <li>Take photographs prior, during, and post-construction to ensure site restoration back to original characteristics as much as practical</li> <li>Document soil placement if moved from original site</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring – CONTRACTOR</li> <li>Oversight – ENGINEER</li> </ul>	<ul style="list-style-type: none"> <li>Daily – Work activities</li> <li>Periodically – Same-point vantage photographs</li> </ul>

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Soil Quantity and Quality</u></p> <p>Soil will be disturbed, potentially causing erosion and contamination during construction work activities</p> <p>(CONTINUED)</p>	<ul style="list-style-type: none"> <li>• Control the movement of machinery within the project boundaries</li> <li>• Use of topsoil for compaction during or after replacement over the retaining walls and any graded areas, except where necessary to prevent erosion, is not allowed</li> <li>• Store and replace, in its original locations, topsoil from all graded or excavated areas that support or could support vegetation</li> <li>• Prevent fuel and oil leaks by continuous checks and maintenance</li> <li>• Provide well-maintained construction vehicles and machinery, in order to minimize pollutant emissions</li> <li>• Abide by the local laws concerning weights and speeds of vehicles that transport construction materials to and from construction, storage and quarry sites, in order to minimize environmental hazards or excess dust generation</li> <li>• Ensure that no sanitary, oil, hazardous materials, and any other possible contaminants will be spilled or buried in the sites areas in order to protect from soil contamination</li> <li>• Ensure staging areas used in this project are fenced and clearly marked by the contractor prior to construction activities</li> </ul>			

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Soil Quantity and Quality</u></p> <p>Soil will be disturbed, potentially causing erosion and contamination during construction work activities</p> <p>(CONTINUED)</p>	<ul style="list-style-type: none"> <li>Clean the storage and staging areas and restore them to the original conditions</li> <li>Backfilling and replacement of the excavated materials would be conducted in a manner that restores the ground surface to its original elevation and that the top 0.6 meter of any excavated trench is filled with original materials</li> <li>Changes to characteristics of the top soil, hence influencing the flora and fauna, by bringing new soil to the site is prohibited</li> <li>Moving or using soil for construction activities taken from Wadi es-Samen exposed to open raw sewer water is prohibited</li> </ul>			
<p><u>Existing Infrastructure</u></p> <p>Damage of existing above and underground utilities</p>	<ul style="list-style-type: none"> <li>Conform to site survey results, predicted and plotted utilities structures as provided in the design. Where unpredicted utility structures emerge during the course of work, proper mitigation measures shall be applied to avoid damage as practical as it can be</li> </ul>	<ul style="list-style-type: none"> <li>Consult site survey results and design layout for existing utilities</li> <li>Document on-site checks on potential hazards where fragile infrastructure utilities exist</li> <li>Document accidents and their resolutions</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring – CONTRACTOR</li> <li>Oversight – ENGINEER, in coordination with local authority</li> </ul>	<ul style="list-style-type: none"> <li>Daily – Work activities</li> <li>Periodically – Consult survey results and design layout</li> <li>As-needed – Repair or replacement of damage facilities</li> </ul>

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Existing Infrastructure</u></p> <p>Damage of existing above and underground utilities</p> <p>(CONTINUED)</p>	<ul style="list-style-type: none"> <li>• Suggest new locations or routes in coordination with the design team and local authorities if unpredicted utility structures are identified</li> <li>• Abide by the local laws concerning weight and speed of vehicles that perform the construction and transport of materials</li> <li>• Work efficiently and within an expedited schedule for implementation and rehabilitation. In addition, coordinate with the relevant authorities and local residents</li> <li>• Damage done to existing facilities (especially cesspits) during construction would be the responsibility of the contractor for repair or replacement to previous conditions</li> <li>• Coordinate with the relevant authorities and local residents if damage to existing utilities occur</li> <li>• Provide emergency services for the residents in association with local municipalities/councils if any accidental damaged in public utilities and services occurs</li> </ul>			

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Surface Water and Water Bodies</u></p> <p>Project work activities, storage close to the wadi, or improper disposal of construction materials may block natural flow of Wadi as-Samen</p>	<ul style="list-style-type: none"> <li>• Provide approved designated protected areas for storage of spoil and excavated materials</li> <li>• Remove and transport waste materials that are unable to be used for fill to a designated and approved disposal sites in an environmentally safe manner</li> <li>• Identify all water-harvesting wells and surface water catchment systems and be clear of any project work activity, storage, and materials</li> <li>• Do not burn waste materials of any type</li> <li>• Modify project work activities to minimize stagnant water bodies to be formed</li> <li>• Enusre that no sanitary, oil, hazardous materials, and any other possible contaminants will be spilled or buried in the sites areas in order to protect the ground water or surface water</li> </ul>	<ul style="list-style-type: none"> <li>• Document any potential concerns for spills and stagnant water body creation and its resolution</li> <li>• Take photographs prior, during, and post-construction to ensure site restoration back to original characteristics as much as practical.</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring – CONTRACTOR</li> <li>• Oversight – ENGINEER</li> </ul>	<ul style="list-style-type: none"> <li>• Daily – Work activities</li> <li>• Periodically – Same-point vantage photographs</li> </ul>

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Ground Water Quality and Quantity</u></p> <p>Construction spills or leaks and potential population and industrial growth</p>	<ul style="list-style-type: none"> <li>Ensure all necessary equipment is available and in good working condition, along with back-up power</li> <li>Ensure that a qualified operator is available at all times of the project activities</li> <li>Store construction materials properly and clean site areas</li> <li>Construct temporary septic tank when needed</li> <li>Empty septic tank when full and dumping it at an official nearby treatment site</li> </ul>	<ul style="list-style-type: none"> <li>Maintain a log of all equipment and its condition</li> <li>Maintain licenses of all operators</li> <li>Document safe storage of any toxic materials</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring – CONTRACTOR</li> <li>Oversight – ENGINEER, in coordination with local authority and PWA</li> </ul>	Daily – Work activities
<p><u>Use of Toxic and Hazardous Materials</u></p> <p>Workers and residents exposed to toxic and hazardous materials such as: asphalt and paint</p>	<ul style="list-style-type: none"> <li>Submit Material Safety Data Sheets (MSDS) and chemical mixture data sheets to the engineer for approval</li> <li>Provide a copy of licenses and insurance of any toxic and hazardous transport company and its driver</li> <li>Storage and disposal of residual hazardous material must be conducted by an experienced professional, in coordination with local and competent authorities to identify appropriate disposal site</li> </ul>	<ul style="list-style-type: none"> <li>Document and maintain chemical transport and storage log sheets, including MSDS and chemical mixture data sheets</li> <li>Document actual practice by checking and signing log sheets</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring – CONTRACTOR</li> <li>Oversight – ENGINEER, in coordination with local authority and EQA</li> </ul>	<ul style="list-style-type: none"> <li>As needed–work activities involving hazardous chemical material</li> </ul>

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Vehicle Traffic</u></p> <p>Health and safety of residents, public and construction workers</p>	<ul style="list-style-type: none"> <li>Prepare and submit a traffic plan for the engineer's approval for each road, especially within the villages and heavy-traffic areas</li> <li>Organize and manage construction activities, so that traffic disruption and delays within construction zones are minimized</li> <li>Provide temporary alternative lanes and routes shall be managed to allow traffic to pass through or around construction zones with minimal disruption</li> <li>Use flagmen and other appropriate means to direct traffic safely through and around construction zones, and to minimize conflicts between local traffic and construction vehicles</li> <li>Inform residents and public of work schedules as well as with the management plans prepared by the contractor</li> </ul>	<ul style="list-style-type: none"> <li>Document when the public was informed of work schedules and management plans</li> <li>Review and sign engineer approved Traffic plan and document compliance and on-site changes</li> <li>Document potential health and safety concerns and resolutions</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring – CONTRACTOR</li> <li>Oversight – ENGINEER</li> </ul>	<ul style="list-style-type: none"> <li>Daily – Work activities</li> <li>Periodically – Review of traffic plan</li> </ul>
<p><u>Nose, Air, and Light Pollution</u></p> <p>Health and safety of residents, public and construction workers</p>	<ul style="list-style-type: none"> <li>Provide well-maintained construction vehicles and machinery, in order to minimize noise and air pollution</li> <li>Maintain noise levels below 70 dB surrounding sensitive receptors within 50 meters of noise source</li> <li>Install and maintain mufflers on construction equipments</li> </ul>	<ul style="list-style-type: none"> <li>Document baseline noise and air emission during the start and end of the work</li> <li>Log noise and air emission</li> <li>Document complaints and how it was resolved</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring – CONTRACTOR</li> <li>Oversight – ENGINEER</li> </ul>	<ul style="list-style-type: none"> <li>Daily – Maintenance of vehicles and worker and public safety</li> <li>Start of project – Baseline noise and air emission</li> <li>Weekly – Log noise and air emission</li> </ul>

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Nose, Air, and Light Pollution</u></p> <p>Health and safety of residents, public and construction workers</p> <p>(CONTINUED)</p>	<ul style="list-style-type: none"> <li>Provide the workers with protective hearing devices and face masks</li> <li>Control the movement of machinery within the project boundaries</li> <li>Use of heavy or noisy machinery shall be prohibited between the hours of 6:00 pm (18.00) and 6:00 am during working days and all day during Fridays or designated local holidays (unless the public and workers will be best served during these hours and approval has been provided by local government and surrounding residents)</li> </ul>			<ul style="list-style-type: none"> <li>As needed – Work complaints and resolution</li> </ul>
<p><u>Heavy Equipment</u></p> <p>Health and safety of residents, public and construction workers</p>	<ul style="list-style-type: none"> <li>Minimize the use of heavy machinery</li> <li>Control the movement of machinery within the project boundaries and conform with the geotechnical survey for structural and stability of current site conditions</li> <li>Use of heavy machinery is prohibited between the hours of 6:00 pm (18.00) and 6:00 am during working days and all day during Fridays or designated local holidays (unless the public and workers will be best served during these hours and approval has been provided by local government and surrounding residents)</li> </ul>	<ul style="list-style-type: none"> <li>Document complaints and how it was resolved</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring – CONTRACTOR, in coordination with local authority</li> <li>Oversight – ENGINEER, in coordination with local authority and MoPWH</li> </ul>	<ul style="list-style-type: none"> <li>Daily – Heavy equipment use</li> <li>As needed – Work complaints and resolution</li> </ul>

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Heavy Equipment</u></p> <p>Health and safety of residents, public and construction workers</p> <p>(CONTINUED)</p>	<ul style="list-style-type: none"> <li>Abide by the local laws concerning weights and speeds of vehicles that transport construction materials to and from construction, storage and quarry sites, in order to minimize safety hazards, such as traffic accidents</li> </ul>			
<p><u>Flora or Fauna</u></p> <p>Disruption or interference of biological resources may occur during construction work activities</p>	<ul style="list-style-type: none"> <li>Minimize amount of dust generated through construction works activity</li> <li>Work within the existing road corridors as practical as possible</li> <li>Limit working hours to daytime hours only (if work is scheduled during the night, confirm with EQA or Ministry of Agriculture no biological species will be affected)</li> <li>Install proper fencing or other suitable protection during project construction to prevent the exposure of wild and domestic animals to construction hazards</li> <li>Restore original site characteristics after project completion, as much as practical</li> </ul>	<ul style="list-style-type: none"> <li>Log any presence of wild or domestic animals within the project site and action taken</li> <li>Take photographs prior, during, and post-construction to ensure site restoration back to original characteristics as much as practical</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring – CONTRACTOR</li> <li>Oversight – ENGINEER, in coordination with EQA and MoA</li> </ul>	<ul style="list-style-type: none"> <li>Daily – Work activities</li> <li>Periodically – Same-point vantage photographs</li> <li>As needed – Wild or domestic animals entry</li> </ul>

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<p><u>Archaeological and Cultural Heritage</u></p> <p>Damage of archaeological and/or cultural sites</p>	<ul style="list-style-type: none"> <li>• Keep access road alignment east of the proposed WWTP site to avoid the former stone structures and a functional cistern identified on the opposite side of the wadi</li> <li>• Avoid large excavation activities northwest of the proposed WWTP site that might disturb the small natural rock niches or caves identified on the hillside</li> <li>• Stop all work if archaeological sites are uncovered, contact the Hebron Archaeological Department and (HAD) Ministry of Tourism and Antiquities (MoTA) and evaluate the site</li> </ul>	<ul style="list-style-type: none"> <li>• Utilize survey results, design drawings, and identified archaeological site locations to document construction activities does not impact the sites</li> <li>• Keep documentation of HAD and MoTA official correspondences</li> <li>• Document any archaeological findings and actions taken</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring – CONTRACTOR</li> <li>• Oversight – ENGINEER, in coordination with HAD and MoTA</li> </ul>	<ul style="list-style-type: none"> <li>• Daily – Work activities</li> <li>• Periodically – Consultation of archaeological site locations to construction activities</li> <li>• As needed – Findings and actions taken</li> </ul>

## MITIGATION AND MONITORING PLAN

Potential Impact	Mitigation Measures	Monitoring Activity	Responsible Party	Frequency
<b>POST-CONSTRUCTION PHASE</b>				
<p><u>Sustainability of the Project</u></p> <p>Failure to sustain or monitor water provision due to technical faults or damaged, misused, or unmaintained system</p>	<ul style="list-style-type: none"> <li>• Comply design and implementation activities with local and international codes</li> <li>• Ensure that resources management plans and emergency resource provision schemes for the service area are prepared and implemented by competent authorities</li> <li>• Ensure technical sustainability by proper training and capacity building of relevant institutions</li> <li>• Train operators to comply with operation and maintenance procedures</li> <li>• Ensure financial sustainability by commitment of citizens to pay their utility bill fees</li> <li>• Ensure industries have up-to-date approvals and permits in place</li> <li>• Conduct awareness campaigns</li> <li>• Enforce violations on infrastructure abuses</li> <li>• Perform continuous check up maintenance for the system elements</li> </ul>	<ul style="list-style-type: none"> <li>• Use facilitating checklists and monitoring tools for application of appropriate design, construction and operational best practices</li> <li>• Document training and record attendees</li> <li>• Identify capacity building needs for institutions and resource provision operators and document resolutions</li> <li>• Conduct frequent checks on system conditions</li> </ul>	<p>Monitoring and Oversight - local authority, PWA, WBWD, EQA, MoLG, MoPWH, MoE, MoH</p>	<ul style="list-style-type: none"> <li>• Daily – During operation</li> <li>• Periodically – System conditions check up</li> <li>• As needed – System failure</li> </ul>

# ANNEX 6: WWTP Landownership Document



Date: 23/10/2013

**Att: Richard W. Pollard**  
**Senior Water Supply and Sanitation Specialist**  
**Water Unit, Sustainable Development Department**  
**Middle East & North Africa Region**  
**The World Bank**

**Project: West Bank Wastewater Management Project**

**Subject: Land Ownership of Hebron Regional Treatment plant Site**

**Dear Mr. Pollard,**

In reference to subject mentioned above, The PWA here confirms that all land within parcels no. 240, 241, 242, and 243 located in basin no. 8 named Wadi Ad-Dor ,and parcel no. 1151 located in basin no.2 named Khallet Al-Moghrabi is completely owned by the Palestinian Government and under PWA control for the benefit of constructing Hebron Regional Wastewater Treatment Plant in Hebron Governorate.

PWA also assures that all the land currently not used by other and only will be kept for this project, and will not be used for any other purposes.

Best regards,

**Dr. Shaddad Al Attili**  
**Minister**  
**Palestinian Water Authority**



Cc: Eng. Adel Yasin

# **ANNEX 7: Wadi Alignment Landowners' Approval**



## **ANNEX 8: Hebron Archeological Department**



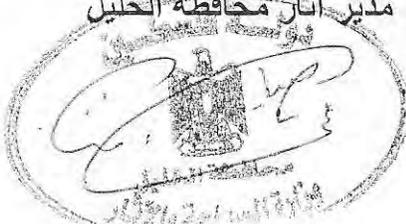
2014/2/16

سعادة الأخ / رئيس بلدية الخليل المحترم  
تحية طيبة ،،

الموضوع : كشف معاينة

نعلم حضرتكم لا مانع لدينا من استكمال أعمال الترخيص بعد إجراء  
الكشف الأثري على قطعة رقم 240، 241، 242، 243 حوض رقم 8  
موقع وادي الدور الخليل. علما أن السلاسل الحجرية القائمة هي زراعية  
وليست شواهد أثرية.

مع الاحترام

محمد صبارنه  
مدير آثار محافظة الخليل  


**State of Palestine**

**Ministry of Tourism & Antiques**

**Sector of Antiquities and Cultural**

**Heritage**

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**16/02/2014**

**Dear / Mayor of Hebron**

**Subject: Inspection Results**

We would like to inform you that we have no objection on continuing the licensing after the archaeological inspection on land no. 240, 241, 242, 243 parcel no. 8 in Wadi Al Dour Hebron. Knowing that, the existing terraces are agricultural and not archaeological.

**With Respect,**

**Mohammed Sabarneh**

**Hebron Archaeology Manager**

For more information, please visit  
[http:// www.usaid.gov/west-bank-and-gaza](http://www.usaid.gov/west-bank-and-gaza)