E4755

محافظتي الخليل - بيت لحم
Hebron & Bethlehem Governorates

المجلس المشترك لإدارة النفايات الصلبة
Joint Service Council For Solid Waste Managment

Addendum to the Environmental & Social Impact Assessment (ESIA) (Original date: April 2009)

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The Joint Services Council for Solid Waste Management of Hebron and Bethlehem Governorates (JSC-H&B)

Sanitary Closure and Rehabilitation of Yatta Dumpsite

Executive Summary

The aim of this study is to prepare an updated Environmental & Social Impact Assessment (ESIA) study dated April 2009 addressing the sanitary closure and rehabilitation of Yatta dumpsite. Hence, this study is considered as an addendum to the original ESIA, which was prepared as part of the Southern West Bank solid Waste Management Project (SWB SWMP) in which all the random dumpsites including the Yatta dumpsite were addressed albeit not comprehensively as the design details for closure and rehabilitation of Yatta were not known at the time of drafting the project ESIA. The project was classified as A category following the WB OP 4.01 and 4.12. The SWB SWMP aimed to close and rehabilitate all random dumps in both governorates: Hebron and Bethlehem. The project progressed well, and all the random dumps (excluding Yatta) were gradually closed by December 2014. Yatta dumpsite is the largest dumpsite in both governorates and its area reaches 16 hectares.

Yatta dumpsite has been open since the early 1980's to serve the municipalities of Yatta and Hebron. It was used for co-disposal of all wastes. At an earlier stage, burning of the waste was the common practice up to the end of the 1990's where technical improvements were applied. After 2005, the service area of the Yatta dumpsite was extended to include most of the cities and village in the Hebron and Bethlehem governorates. Since the 2011, the JSC-H&B managed operation of the site. Since then, the Yatta dumpsite has been managed in a more sanitary way, and waste burning was eliminated.

This addendum to the ESIA was prepared in November 2014 to identify and evaluate the potential environmental impacts, propose mitigation measures and monitoring system for the closure, rehabilitation and aftercare of the Yatta dumpsite. The study relies on the environmental baseline data regarding air quality, climate, noise, roads and traffic, land use, soil and geology, hydrology and hydrogeology, fauna and flora. The public and stakeholder consultation was carried out in accordance with the Palestinian environmental policy. Several meetings were held with the concerned municipalities' representatives (the land owners; the meeting with Hebron municipality was held on November 12th, 2014 in the presence of 5 participants, and the meeting with Yatta Municipality was held on November 13th, 2014 in the presence of 3 participants), and with the nearby community to identify areas of concerns (meeting was on November 16th, 2014 in the presence of 7 participants).

The impact assessment analysis showed that the key potential impacts of the rehabilitation works include:

- Odor impacts from site Rehabilitation activities
- Equipment/Vehicle exhaust emissions on-site
- Dust and emissions from Rehabilitation activities
- Noise arising from Rehabilitation activities
- Noise from equipment/Vehicle Movement
- Littering during Rehabilitation activities

- Contamination of water resources from project leachate emissions
- Risk of landfill gas fire
- Loss of agricultural land
- Impacts on local employment
- Impacts on cultural heritage

The key potential impacts of the aftercare phase of the project relate to the risk of groundwater contamination by leachate, and the risk of landfill gas migration, burning or explosion.

The identified negative impacts that need to be mitigated include: odor impacts from site activities, dust and emissions from rehabilitation works, noise from vehicle movement, contamination of water resources from leachate emissions, littering during waste excavations and transfer inside the dumpsite, impacts on cultural heritage.

The study stipulates a number of mitigation measures that should be applied to eliminate or reduce environmental impacts. The mitigation measures address specific environmental impacts identified during both the rehabilitation works and the aftercare phase. In addition, this addendum to ESIA sets monitoring system to ensure compliance of works with the mitigation measures.

Table ES1 below is the Environmental and Social Management Plan for the closure, rehabilitation and aftercare of the Yatta dumpsite. It presents the key impacts identified, mitigation measures, mitigation responsibilities, monitoring arrangements and responsibilities and estimated costs of mitigation measures and monitoring. The bulk of the mitigation and monitoring costs is envisaged during the rehabilitation works. The total estimated cost of mitigation measures during the rehabilitation works phase is estimated to reach **765,500** USD**.** The total estimated costs of monitoring arrangements during the rehabilitation works is expected to reach **27,000** USD.

Table ES1. Environmental and Social Management Plan (ESMP).

Project Phase	Potential Impact	Proposed Mitigation measure	Responsibility of implementation	Monitoring responsibility	Monitoring Frequency	Monitoring method	Mitigation and monitoring costs
Rehabilitation Works Phase	Odor impacts from site activities	Use of personnel protective equipment and wear.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Logbook, on site observations	Mitigation included in the works contract costs (USD15,500.0) Monitoring: one full time environmental engineer (Supervision Engineer team) the cost is USD 27,000.0 for the whole period and for monitoring all measures.
		Make venting of the site from different locations before commencing the Rehabilitation activities.	Rehabilitation works Contractor	Supervision engineer, JSC-H&B	Weekly	Site observations	
	Dust emissions from Rehabilitation activities	Covering of stockpiles of friable materials in order to reduce the potential for windblown dust.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations	Mitigation included in the works contract costs (USD 4,000.0). Monitoring: one full time environmental engineer (Supervision Engineer team).
		Wetting the excavated surfaces.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations log book	
		Covering truck loads.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Random observations	
	Dust emissions during transporting of	Covering the trucks with special taint fiber.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Random observations	Environmental engineer (Supervision Engineer team).

Project Phase	Potential Impact	Proposed Mitigation measure	Responsibility of implementation	Monitoring responsibility	Monitoring Frequency	Monitoring method	Mitigation and monitoring costs
	cover materials						
	Littering due to the wind action	Avoid waste transfer during strong winds.	Rehabilitation works Contractor	Supervision engineer	During strong winds	Logbook, observations	Mitigation included in the works contract costs (USD 2,000.0). Environmental engineer (Supervision Engineer team).
		Collect any littering on daily base and cover it by soil inside the dumpsite.	Rehabilitation works Contractor	Supervision engineer	Daily	Observations	
	Groundwater contamination	Installing low permeability sealing cover to prevent rainwater infiltration.	Rehabilitation works Contractor	Supervision engineer	Weekly	Site observations	Mitigation included in the works contract costs (USD 231,000.0 for low permeable soil, and USD 500,000.0 for gas venting system) Monitoring: one full time environmental engineer (Supervision Engineer team).
	Landfill gas accumulation and explosion	Install passive gas venting system.	Rehabilitation works Contractor	Supervision engineer	Weekly	Site observations	
	Safety impacts	Use safety gear such as vests, shoes …etc. in accordance with OHS regulations.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Logbook, observations	Mitigation included in the works contract costs (USD 500.0 for safety wear, USD 1,000.0 for training, and 1,000.0 for signs). Monitoring: one full time environmental engineer
		Prevent smoking and any fire lighting onsite to prevent the possibility of fire.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations	
		Ensure sufficient quantity of water and cover materials onsite to fight any potential fire incidents.	Rehabilitation works Contractor	Supervision engineer	Weekly	Site observations	

Project Phase	Potential Impact	Proposed Mitigation measure	Responsibility of implementation	Monitoring responsibility	Monitoring Frequency	Monitoring method	Mitigation and monitoring costs
		Training of workers on landfill gas risks prior to commencing onsite activities.	Rehabilitation works Contractor	Contractor, Supervision engineer	Weekly	Photos, progress reports	(Supervision Engineer team).
		Use personnel protective equipment such as masks, glove ...etc. in accordance with OFS regulations.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Logbook, observations	
		Venting of the work face before commencing work.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations	
		Maintain adequate slopes to prevent landslide due to high elevations	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations	
		Use of traffic signs.	Rehabilitation works Contractor	Contractor, Supervision engineer	Weekly	Observations	
	Impacts on cultural heritage sites	Protect the existing archeological place through cleaning the surrounded waste.	Rehabilitation works Contractor	Supervision engineer	Daily	Site observations	Mitigation included in contract costs (USD 2,000.0). Monitoring: one full time environmental engineer (Supervision Engineer team).
		Stop work immediately following the discovery of any materials with possible archeological, historical or other cultural value; announce findings to project manager and notify relevant authorities.	Rehabilitation works Contractor	Contractor, Supervision engineer	When issue arises	Logbook, site observations	

Project Phase	Potential Impact	Proposed Mitigation measure	Responsibility of implementation	Monitoring responsibility	Monitoring Frequency	Monitoring method	Mitigation and monitoring costs
		Protect artifacts as well as possible using plastic covers; implement measures to stabilize the area, if necessary, to properly protect	Rehabilitation works Contractor	Supervision engineer	Daily (when issue arises)	Site observations	
		Prevent any unauthorized access to the archaeological site and artifacts.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Logbook, site observations	
		Restart Rehabilitation works only upon the authorization of the relevant authorities.	Rehabilitation works Contractor	Supervision engineer, JSC-H&B	When issue arises	Logbook, Inspection report	
	Loss of agricultural land	Prevent any use of soil taken from agricultural land.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations	Mitigation included in contract costs. Monitoring: one full time environmental engineer (Supervision Engineer team).
		Use of materials from the crushing stone plants.	Rehabilitation works Contractor	Contractor	Weekly	Logbook, observations	
		Use of excavation residues from other development sites.	Rehabilitation works Contractor	Contractor, Supervision Engineer	Weekly	Logbook, observations	
Aftercare Phase	Groundwater contamination	Maintaining low permeability sealing cover.	JSC-H&B	EQA & JSC-H&B	Biannually	Site inspection	Mitigation included in contract costs (USD 4,000.0). Short-term input of environmental engineer (JSC H&B)
		Surface water diversion from entering the dumpsite.	JSC-H&B	EQA& JSC-H&B	Biannually	Site inspection	

Project Phase	Potential Impact	Proposed Mitigation measure	Responsibility of implementation	Monitoring responsibility	Monitoring Frequency	Monitoring method	Mitigation and monitoring costs
	Public health and safety due to landfill gas emissions	Monitoring and maintaining passive gas venting system.	JSC-H&B	EQA & JSC-H&B	Quarterly	Site inspection	Ad hoc input of Environmental engineer of JSC H&B
		Install and maintaining gas flaring units when needed.	JSC-H&B	EQA & JSC-H&B	Quarterly	Site observation	Cost of flaring units is included in the gas venting system. Ad hoc input of Environmental engineer of JSC H&B
		Monitor landfill gas emission readings.	JSC-H&B	EQA & JSC-H&B	Biannually	Data reading and analysis	Training two staff members (USD 1,000) Annual cost of gas analysis (USD 1,600)
		Maintaining no access warning signs.	JSC-H&B	EQA& JSC-H&B	Quarterly	Site inspection	Ad hoc input of Environmental engineer of JSC H&B

List of Acronyms:

ARAP: Abbreviated Resettlement Action Plans
DEEP: Deprived families Economic Empowerment Program
ESIA: Environmental and Social Impact Assessment
ESMP: Environmental and Social Management Plan
EQA: Environmental Quality Authority
JSC-H&B: Joint Services Council for Hebron and Bethlehem
MoLG: Ministry of Local Government
MSW: Municipal Solid Waste
NSR: Noise Sensitive Receivers
RCV: Refuse Collection Vehicle
SWB SWMP: Southern West Bank Solid Waste Management Project
TOU: Technical Operation Unit
WB: West Bank
UNDP: United Nations Development Program

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1. Introduction

1.1 Background

The uncontrolled disposal of solid waste in the West Bank (WB) has led to environmental problems, and the environmental protection became one of the top priorities of the Palestinian National Authority to stop natural resources degradation. In response to that, the Southern West Bank Solid Waste Management Project (SWB SWMP) was initiated supported by the World Bank and other donors. The program consisted from four major components: Institutional Strengthening, Implementation of Solid Waste Management Investments, Innovation Window for Waste Recycling and Composting, Project Management including incremental operating costs. Within the framework of component two, all random dumping sites shall be closed and rehabilitated in an acceptable manner to reduce the environmental and social impacts. In the current phase, 18 dumpsites are to be closed and rehabilitated; meanwhile 17 small dumpsites are already completely closed and rehabilitated, while the largest dumpsite "locally called Yatta Dumpsite" is still in the planning phase.

In addition, the feasibility study and the environmental and social impact assessment (ESIA) were carried out for the project. The study gave small margin to Yatta Dumpsite, and did not provide enough information about the site in order to design appropriate closure plan. However, in accordance with the Palestinian environmental policy, any planned project that could cause environmental impacts should be subjected to the preparation of an ESIA that would anticipate these impacts and allow provision of mitigation measures to minimize the significance of these impacts, or even eliminate their likelihood.

Based on the above mentioned, this addendum to the original ESIA study is carried out for Yatta Dumpsite. It is considered as complimentary to the environmental and social impact assessment that made for the major parts of the West Bank SWM project.

1.2 Objectives

This study aims to identify, define and evaluate:

- Any significant environmental and social impacts likely to arise during the closure and rehabilitation of the site, and after care;
- Appropriate measures to minimize any adverse environmental or social impacts;
- An environmental and social management plan (ESMP) to mitigate negative environmental impacts;
- An appropriate compensation for impacts that cannot be mitigated.

2. Project Description

2.1 General Description

The site is located at grid reference (l66833E, 95929N) based on the mapping co-ordinates adopted by the Ministry of Planning. The site is lies at 25km to the south- east of Hebron city and 10km to the northeast of Yatta. Site location map is provided as Figure 1. The topographical appearance of the site is of a large slightly east sloping valley area with gradual slopes. The site elevation is 666m above sea level. The valley area around the dumpsite site is located within a local drainage catchment. As is common throughout the West Bank the site is drained by a sporadically flowing ephemeral surface water course. The site is surrounded by mountainous areas commonly used as grazing land for herders and cultivated by barely rain-fed. At the south of the dumpsite, few olive trees cultivation is existed.

The nearest Palestinian residential area is located 2km to the east of the site and called "Al-Deirat" and 2km to the west of the site and called "Al-Zwidein".

Figure 1 shows the site location, and Figure 2 provides aerial view of the Yatta dumpsite.

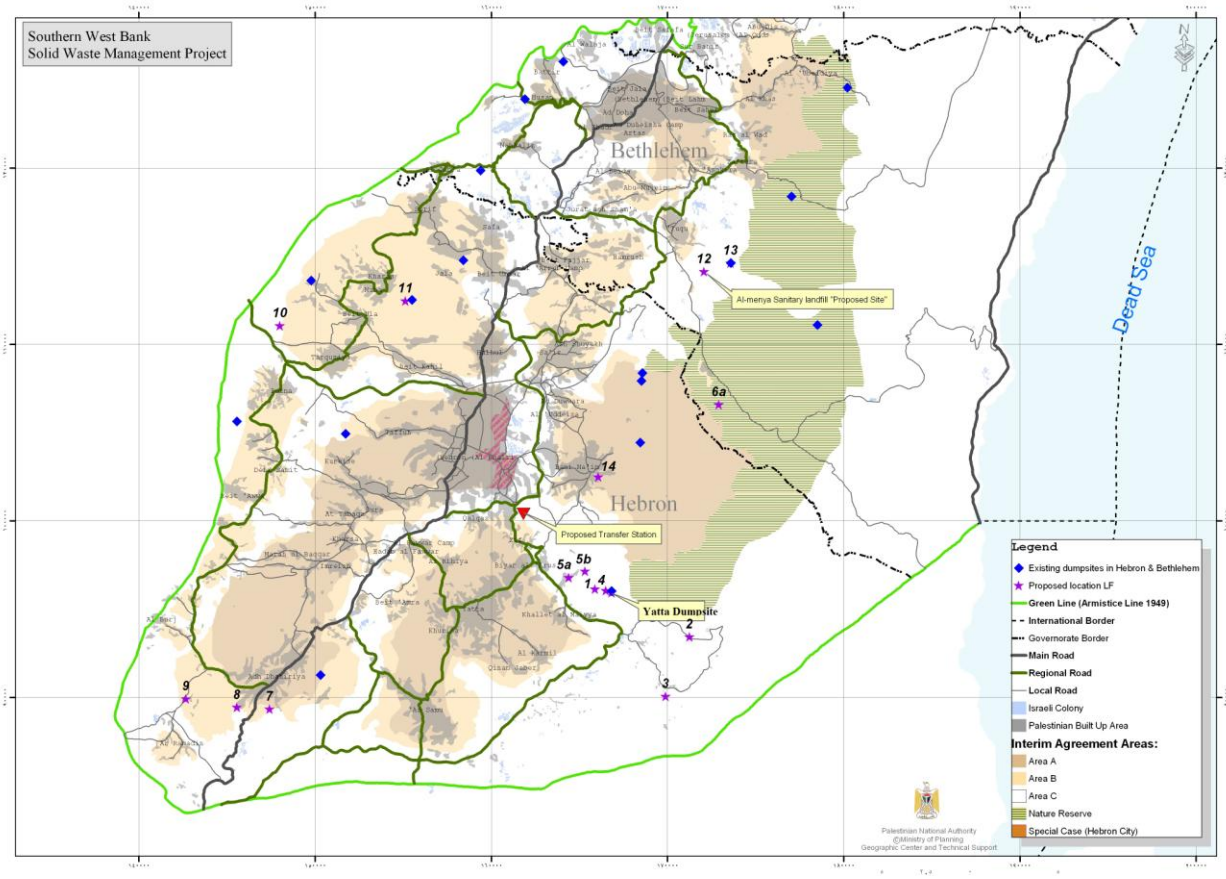


Figure 1: Location of the project site

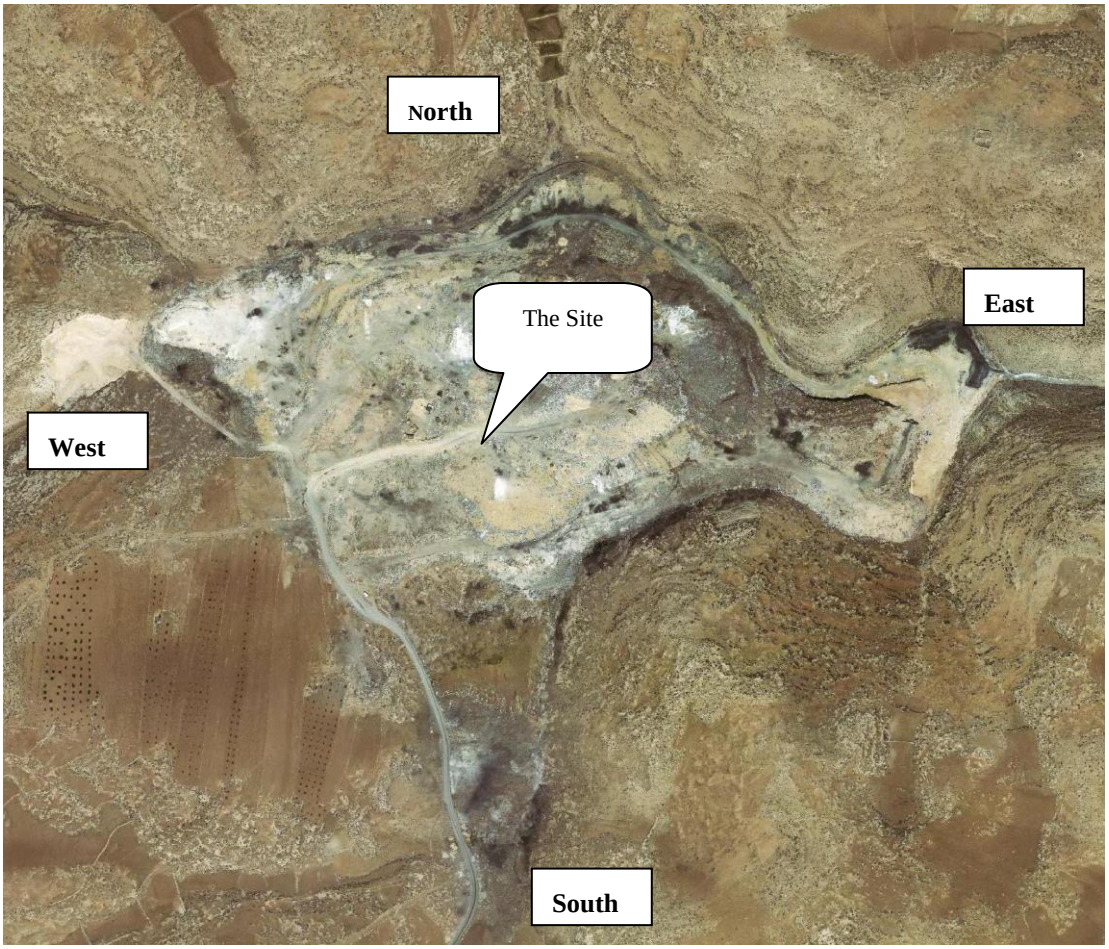


Figure 2: Aerial view of the Yatta dumpsite.

Source: Yatta Municipality

The site does not host any structures nor facilities. Since its opening in early 1980s, municipal waste has been the main type of waste disposed at this site. In 2013 and through USAID financing, slurry from stone manufacturing in Hebron industrial zone (15 km away) has been disposed at the edge of the site. The site has been completely closed in September 2014.

2.2 Proposed Activities

The project aims at closure and rehabilitation of the Yatta dumpsite. It consists of two phases: rehabilitation works phase, and aftercare phase. The rehabilitation works phase will involve the following activities:

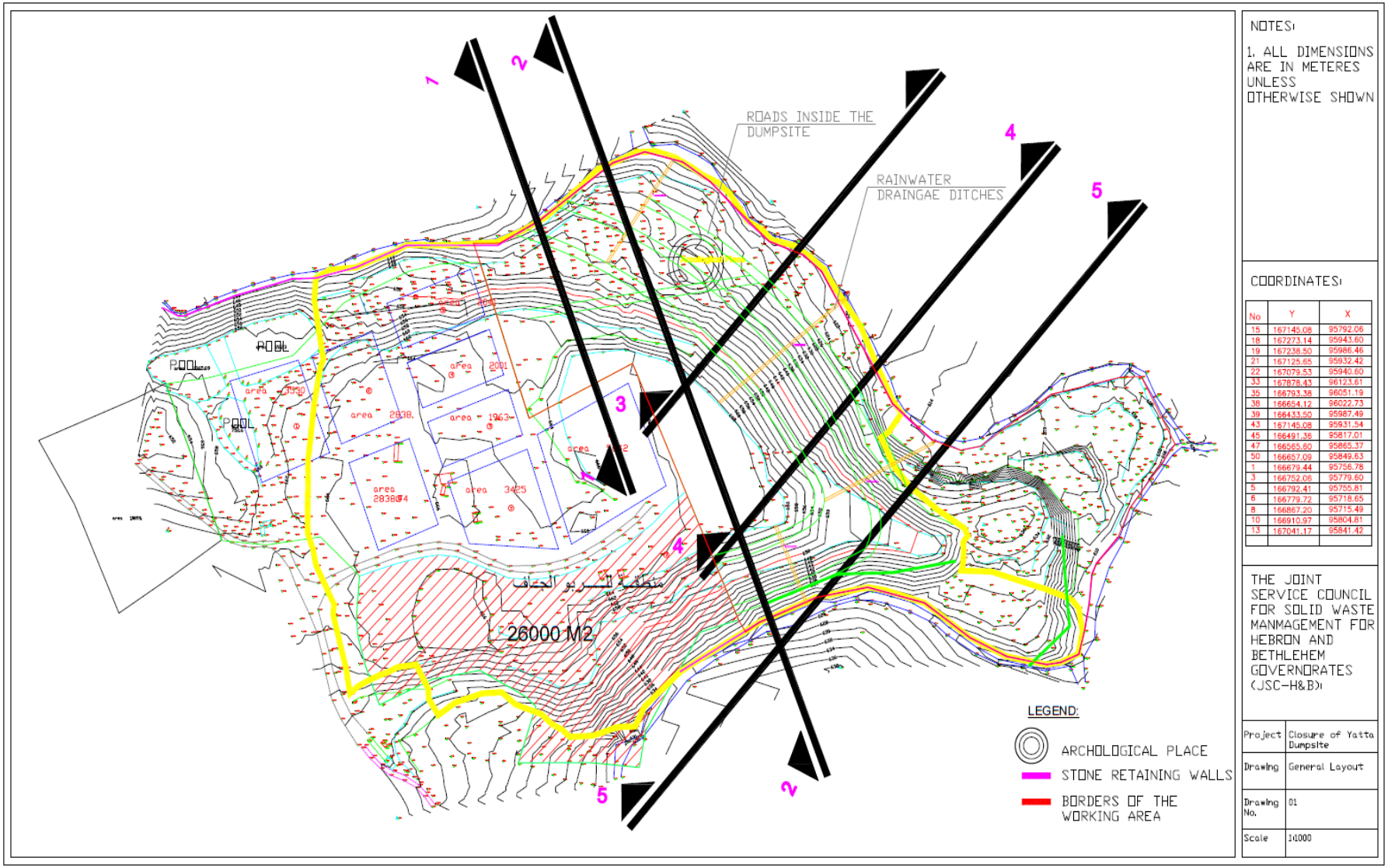
- Excavations and backfilling in the waste body to reduce the slopes and provide access to all parts of the site. The site will be divided into levels as shown in Figures 3 and 4, and a road will be constructed to access the different levels. Also there will be a road of width 6m to add more stability of the dumpsite and enable access to the different parts during monitoring and emergencies;
- Cleaning of the valley from all waste and building stone blocks retaining walls along the valley abutments to prevent waste sliding into the valley. This also prevents rainwater contamination that runs through the valley during winter.

- Proper covering of the waste by soil layer of not less than 50cm in depth. The cover will be applied on two stages: the first stage will be 20cm in depth where the cover materials will be spread over the waste surface on plain and sloping areas and compacted up to 95% of max dry density of modified proctor; the second stage will be 30cm in depth and to be spread over the first layer on plain and sloping areas. This layer is considered as vegetation layer to support site planting.
- Reinforced concrete ditches to divert rainwater from the site into the valley to prevent soil erosion;
- Install gas venting system for safe release of the gas to prevent any explosion in the future as shown in Figure 5.
- The aftercare phase of the project will involve monitoring activities of the landfill gas and corrective maintenance of the dumpsite to ensure mitigation of all potential environmental and social impacts.

The above-mentioned described the closure steps to be performed within the framework of this phase, while the environmental controls and monitoring arrangements are described in the ESMP in Section 12. However, the future plans are shown in Section 5.1 Stakeholder Consultation, where several options have been highlighted for potential future use of the site, but due to the limited financial resources available at the JSC-H&B and member municipalities no actions will be taken beyond the sanitary closure and monitoring. Any future activity will be based on a detailed feasibility and environmental/social studies to be conducted then.

Furthermore, the time schedule for both phases of the project are: Phase 1 (rehabilitation phase) will be over 6 months starting April 2015 followed by Phase 2 (aftercare phase) that will be an ongoing monitoring of the site over the next 30 years.

Figure 3: Design sketch of the site – plan view



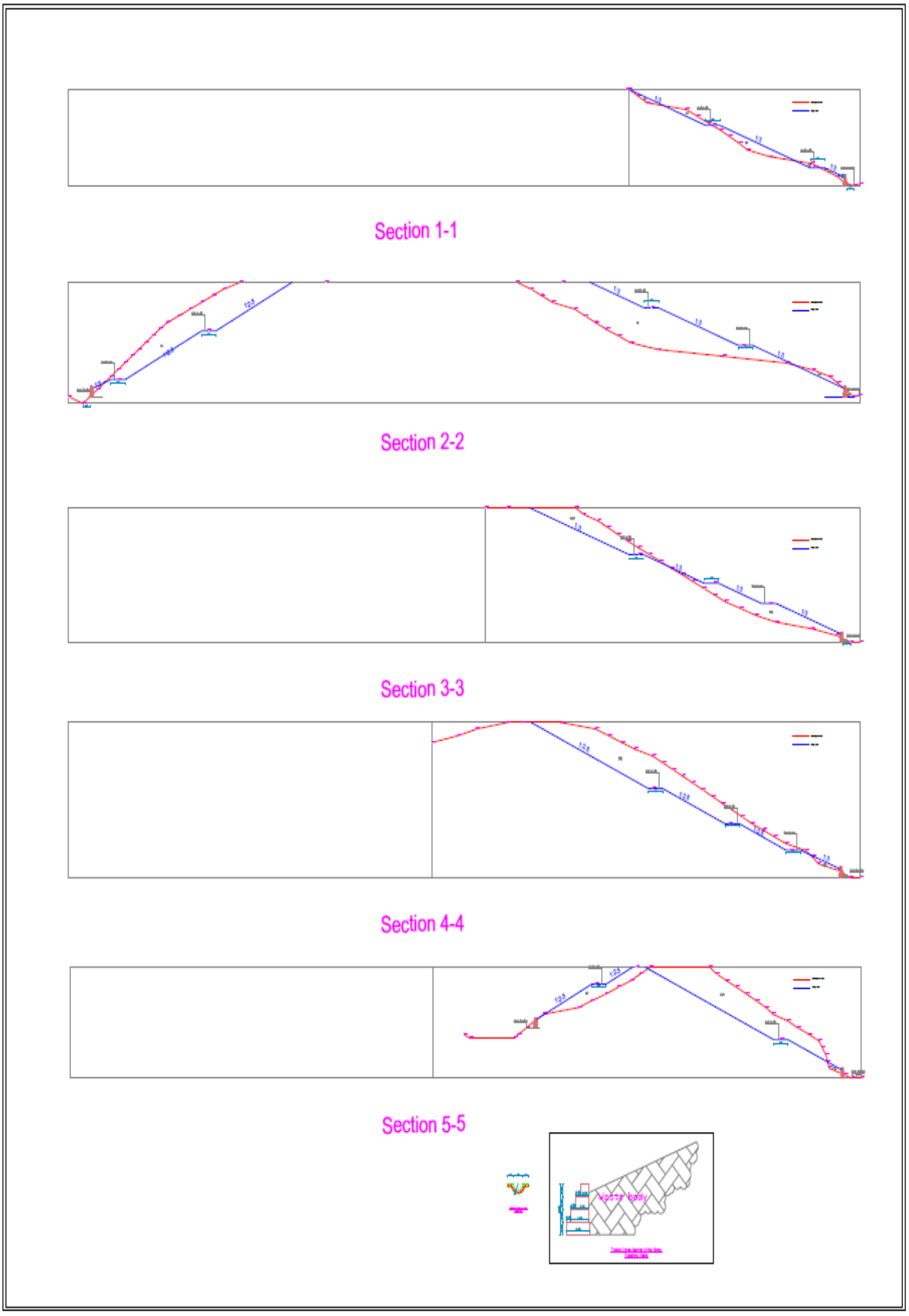


Figure 4: Design cross sections.

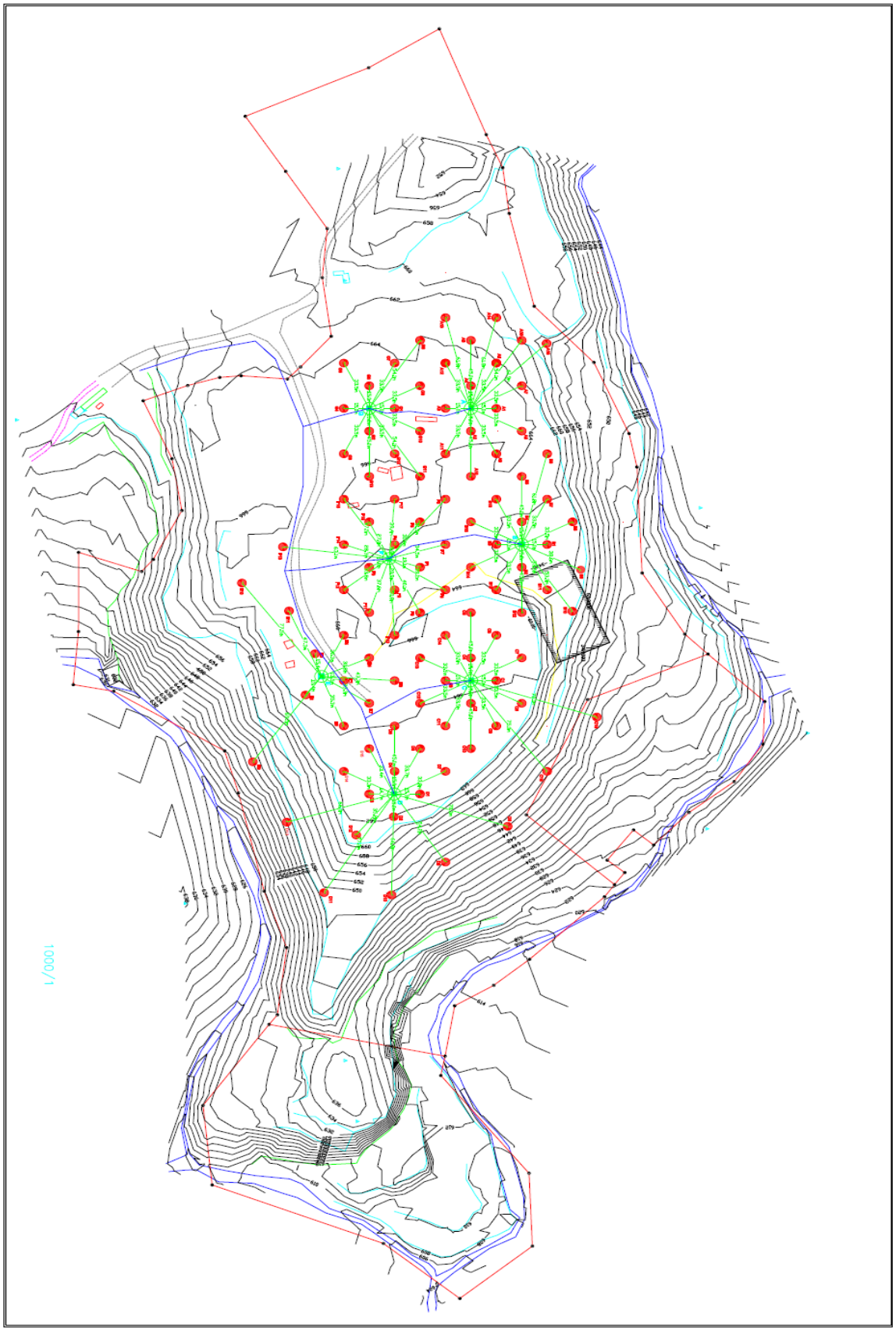


Figure 5: Proposed landfill gas venting system.

2.3 Site History and Waste Quantities

The site was opened as a dumpsite since the early 1980-ies, and it was used for receiving waste from the municipalities of Yatta and Hebron. The waste delivery is expanded to include several municipalities in Hebron and Bethlehem governorates, especially after the year 2005. Since September 2014, the site was closed and waste is no longer delivered there. There are no studies regarding the waste quantities delivered to the site during the operational phase of the dumpsite. But the estimated waste quantities predicted by previous studies showed that the waste quantities are around 1.4 million cubic meters. The highest waste depth at the site derived from contour maps is around 40 meters.

The common practice of waste disposal was burning at the site. This practice continued up to the end of 1990s, and then the practice got improvements through landfilling of the waste onsite. So the waste was being spread and covered by soil from time to time. This practice hasn't completely eliminated the waste burning, so sudden events of waste burning was taking place from time to time because the site was not completely controlled where more than 80 waste pickers were working there illegally with different individual behavior. In addition, the gas emissions and the higher temperatures in the summer period lead to self ignition of the landfill gas.

In 2011 and up to September 2014, the JSC-H&B took the lead of the site operation and management. Many technical improvements were applied during since then. Waste burning was stopped. The JSC-H&B started spreading the waste in specific locations within the dumpsite, and apply soil cover on daily basis. In addition, the JSC-H&B started regulating the work of the waste pickers in accordance with the resettlement action plan to reduce to the minimum the waste picking practices.

3. Environmental Legislation

3.1 The National Environmental Legislation

The governing environmental law in the Palestine is the Palestinian Environment Law published in October 1999 by the Ministry of Environmental Affairs (MEnA) covers the political and social context, the legal and institutional framework, the environmental driving forces, the environmental themes and strategy elements. Solid waste generation, collection and disposal are discussed as driving forces.

Solid waste management has been regulated by two articles only: Article 7 of the law provided that "*The Ministry, in coordination with other specialized agencies, shall set a comprehensive plan for solid waste management on the national level, including the ways and the designation of sites for solid waste disposal as well as the supervision to implement this plan by the local councils*"; while Article 23 said that "*It is forbidden to deduct, treat or incinerate garbage and solid waste, that is only authorized in the sites designated for this purpose in compliance with the conditions determined by the ministry to ensure the protection of the environment"*. Furthermore, Article 45 concerning the Environmental Impact Assessment and 47 concerning Licensing, which stipulated that the ministry in coordination with other responsible agencies will specify the projects which need environmental impact assessment and the procedures for that; and the projects that perquisite environmental approval for licensing. However, solid waste management project should undergo the requirements of these articles.

Further, the Palestinian Environmental Assessment Policy was issued in 2004 in order to support the sustainable economic and social development of the Palestinian people through assisting in meeting the life standards adequacy, conserving the natural environment, conserving biodiversity and natural resources, and avoid irreversible environmental damage and minimize the reversible damages from development activities. The goals of Palestinian Environmental Assessment Policy are as follows:

- To conserve the social, historical and cultural values of the Palestinian people and their communities;
- To ensure an adequate quality of life, health, safety and welfare for the Palestinian people;
- To preserve natural processes;
- To maintain the sustainable use and the long-term ability of natural resources to support human, plant and animal life;
- To conserve bio-diversity and landscapes;
- To avoid irreversible environmental damage from development activities; and
- To ensure that the basic needs of the people affected or likely to be affected by a development activity are not jeopardized.

3.2 World Bank environmental and social safeguards and policies

The World Bank has ten operational safeguard policies, which apply to various development projects that the Bank is either implementing or funding. The purpose of these policies is to ensure that social and environmental risks are prevented or at least minimized while increasing socio-economic benefits of approved projects in addition to preserving the environment. These policies have been a means to increase the effectiveness and positive impacts of development projects supported by the Bank.

The World Bank Safeguard Policy triggered by this proposed Project is the Environmental Assessment OP 4.01.

Table 1: World Bank Safeguard Policies Triggered for the GPOBA project

	Policy	Reference	Applicability
1	Environmental Assessment	OP 4.01	Yes
2	Involuntary Resettlement	OP 4.12	No
3	Natural Habitats	OP 4.04	No
4	Physical Cultural Resources	OP 4.11	No
5	Pest Management	OP 4.09	No
6	Indigenous Peoples	OP 4.10	No
7	Forests	OP 4.36	No
8	Safety of Dams	OP 4.37	No
9	Projects in Disputed Areas	OP 7.60	No
10	Projects on International Waterways	OP 7.50	No

This document is an addendum to the ESIA and ESMP for the West Bank SWMP. Consequently, it is also classified as “A” category under the Bank Safeguards Policy on Environmental Assessment OP 4.01.

The Environmental Assessment takes into account the natural environment (air, water, and land); human health and safety; and social aspects (involuntary resettlement, physical cultural resources, etc.) in addition to trans-boundary and global environmental aspects.

The World Bank will not finance projects or investments that cause any involuntary resettlement for community groups in conflict with the involuntary resettlement policy (OP 4.12). In other words, financing should not be provided to projects that result in direct economic and social impacts through the: (1) involuntary taking of land resulting in relocation or loss of shelter, loss of assets or access to assets, or loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or (2) involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

The project does not involve any resettlement and therefore in full compliance with the involuntary resettlement policy (OP 4.12). In addition, the project is respecting the revised Palestinian Basic Law of 2003, the Jordanian Law No. 79 of 1966 The Cities, the Villages and Buildings Regulating Law, and the Buildings and Regulation Bylaw for Local Authorities No. 5 for 2011.

4. Description of the Environment

4.1 Air Quality

There is no available monitoring data on air quality at the site, but at the earliest age of the dumpsite, waste burning was taking place, which released considerable amount of carbon dioxide, carbon monoxide, dioxins and other gases. However, in the last few years, the operational conditions of the site have been improved through continuous covering of the waste, which led to significant improvement in the air quality. Lately, at the beginning of 2014, the Joint Service Council for Solid Waste Management for Hebron and Bethlehem Governorates (JSC-H&B) quit using the site and shifted into the new sanitary landfill at Al-Menya, the matter that created some accidental fire events onsite due to gas release and uncontrolled access by any third party.

The closure of the site will eliminate the fire accidents thus contributing to improvement of air quality in the area, but the release of carbon dioxide and methane will continue as a normal condition of any other landfills.

4.2 Climate

Key features of the climate around the site are presented in Figure 3. The rainy season lasts from December to April with an average daily temperature of around 14ºC. The dry season extends from May to November with an average daily temperature of 28ºC reaching a maximum of 35ºC in July and August. Annual rainfall is ranging between 200 to 300 mm.

The prevailing wind over the Hebron District comes from the southwest and northwest, being more northerly and stronger in the summer months. Mean wind speeds are lowest in October (5.4 km/h and 7.7 km/h respectively) and strongest in July (9.7 km/h and 12.4 km/h, respectively). The 'Khamaseen' winds from the Arabian Desert Area may occur during the period from April to June and these characteristically cause a rise in temperature and a decrease in humidity. The occurrence of these winds is limited and takes place in few cases but there is no data regarding the air quality during these events. Humidity ranges from approximately 39 % during the 'Khamaseen' period to an average of around 84 % in winter.

The evaporation rate is relatively high during the summer season due to higher temperatures. The potential evaporation rate in the study area averages around 1700 mm per year.

The water quantity infiltrating the soil strata into the aquifer depends on many factors such as the topography, soil type, rainfall quantity and intensity. The infiltration rate in the location of the project is too low (≤5mm/h).

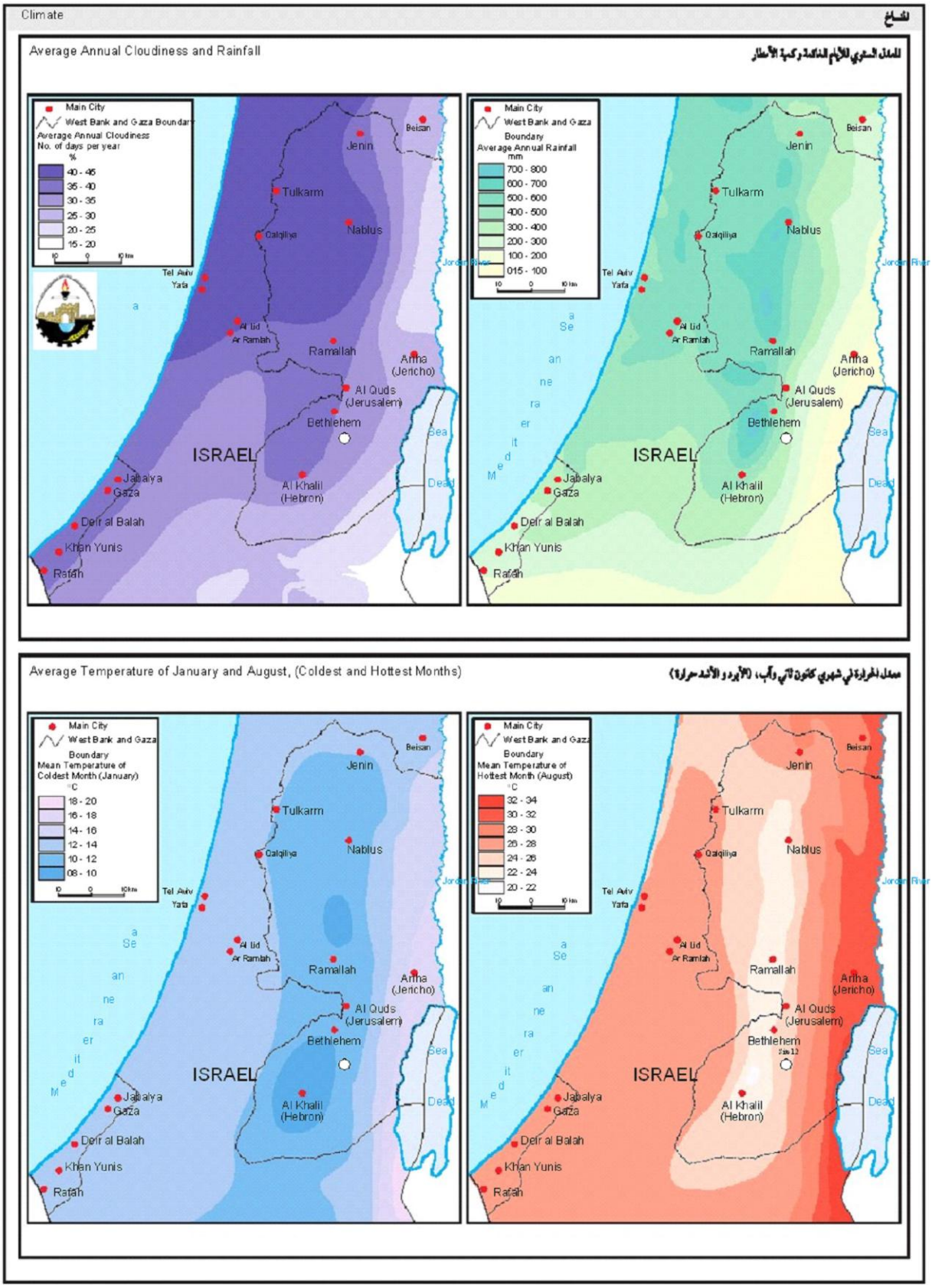


Figure 6: Maps showing the clamatic conditions in the project area.

4.3 Noise

The area is very quiet as it is open area like a desert and far away from human-made activities such as industrial activities. The only source of noise during operational phase was from the refuse collection vehicles. The closure and rehabilitation activities will generate noise due to the movement of heavy machinery. It should be mitigated to reduce its effect on the workers onsite.

4.4 Land Use

The surrounding land of the site is an agricultural land and used for rain fed crops cultivation. The south and west sides land is partially planted with olive trees; the land located at the north and east sides, and part of southwest is used for rain fed crops such as wheat and barley. The nearest residential house is located at 2000 meters to the west of the site.

4.5 Soil and Geology

The geological column of the Hebron District from oldest to youngest is summarized as follows:

- Limestone, dolomite and marl (Cretaceous);
- Chalk, limestone and chert (Tertiary);
- Metamorphic Rocks composed mainly of Calcsilicates (Miocene);
- Marl limestone with sandstone and conglomerates (Pliocene); and
- Chalk-Marl with conglomerates (Pleistocene to recent).

From a review of the identified geology the site area is noted to lie on Upper Cretaceous rocks of Turonian to Carnpanian age and is characterized by limestone and dolomites. The geological units in the site area have not been mapped to the extent that they can be classified as individual Formations and only broad grouping of the deposits has been completed. Little work was available on the detailed geology of the Hebron region.

Information on the general characteristics of the deposits indicated the geological units recorded at the site area are characterized by massive, bedded limestone, dolomite, and chalky limestone with local marls. There is no details about the geology of the site but the studies showed that the Yatta formation (Lower Cenomanian) is existed, where the thickness of Yatta Formation ranges between 40-135m, with a cocktail of mostly chalky limestone, marl, dolomite and chert and in many places with a prominent bottom clay member which therefore acts as a uniform aquitard on a regional scale.

The site area is located in a region characterized by thin soil cover and site walkovers confirmed that exposed bedrock is present on the valley flanks. Towards the center of the valley area the greatest extent of cover was noted and the soils have been prepared and used to support agricultural growth. The central valley area is characterized by reddish brown, slightly clayey soil. The soil thickness is not known, but it is not expected to be considerable. Figure 7 shows the geologic formation of the project area.

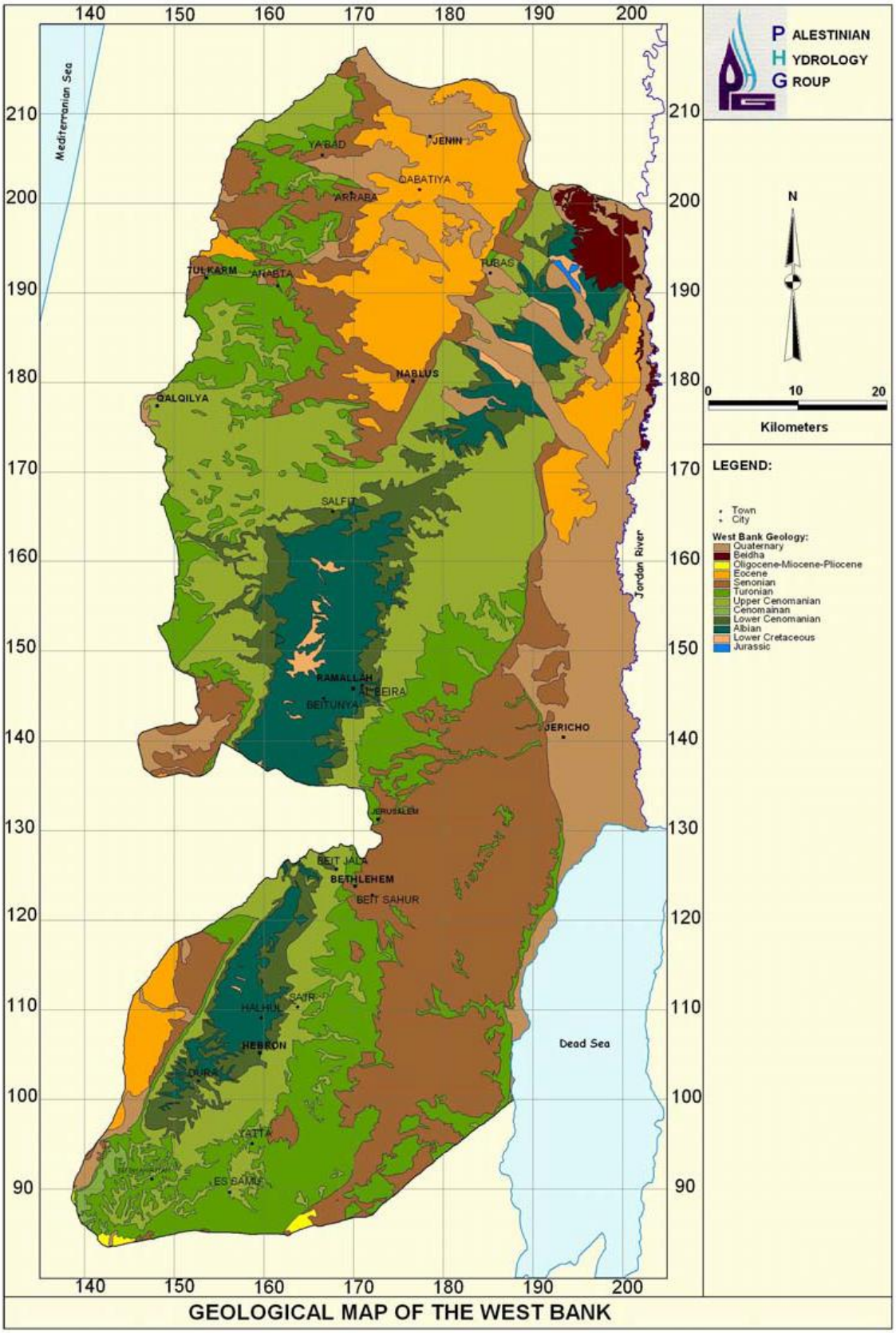


Figure 7: Geologic formations in the West Bank.

4.6 Hydrology and hydrogeology

As is common throughout the region, no permanent surface water courses are present in the vicinity of the site and no wadi or stream base-flow (water supplied by groundwater discharge) is evident in the site area. Also there is no rainwater flowing underneath the site as the site is located on mountainous areas and rainwater runs from the site and the surrounding areas into the wadis.

Surface flood run-off in the site area is expected to be sporadic and will occur only after significant rainfall events. The topography of the site area is such that provision for surface water flow events must be considered in the detailed design stage and any surface flow discharges occurring as local flood events must be taken into account at the detailed design stage.

Although limited information on the hydrogeological regime of the site area is available, a general hydrogeological interpretation has been determined from an appraisal of the published information, from the site geology, topography, climate and from discussions with representatives of appropriate institutions.

The nature of the site geology is one of the keys to determining the basis for the local hydrogeological conditions at the site. From the geological mapping the site is located on units characterized by limestone, dolomite and marls considered to be a major aquifer and known throughout the region as one of the most hydrogeologically sensitive groundwater recharge areas. MoPIC's Sensitive Aquifer Recharge Areas in the West Bank Directorates defines the site area as a region as "Sensitive'. It should be noted, however, that this classification should be treated as broad and regional, and not site specific.

Groundwater flow in these units is dominantly through fissures and fractures and the deposits are likely to have high 'secondary' permeability and fast groundwater travel times. The fissure and fracture system controls the groundwater flow routes and the deposits have little groundwater storage capacity. The groundwater regime is very vulnerable to contamination and the formation has little contaminant attenuation capacity. The geology of the site area is considered to be part of a large single system of aquifers, known as the Cenomanian-Turonian Aquifer System.

From the overall assessment of the data available on the geology of the site it is clear that on the regional basis the deposits recorded at the site are sensitive groundwater recharge areas. Further, it is expected that faults and fractures in site area may also provide additional contaminant and pollution pathways to the underlying groundwater regime.

Published information on the hydrogeology of the site area indicated that no springs or wells are located with the site boundary area and from discussions with local people in the vicinity the site it was confirmed that neither water source was located in the immediate vicinity of the site. In addition, there is no groundwater well in the area, and some studies considered that the groundwater level within the Upper Cenomanian-Turonian aquifer system is approximately 175 meter below the ground level.

Given the high depth of the groundwater level and formation of Yatta Aquiclude over the groundwater level as mentioned in section 4.5, this makes the chance of groundwater contamination very low to occur. Moreover, the proposed sanitary closure of the dumpsite will prevent the generation of more leachate due to i) the resumption of illegal dumping; and ii) rain water infiltrating into the dumpsite.

During the rehabilitation phase, the health impact of leachate on the workers will be minimal as machinery will be used for the rehabilitation process resulting in minimal contact between the workers and the leachate. In addition, all the workers will be equipped with personal protective equipment such construction boots, gloves, masks etc.

4.7 Fauna and Flora

Under studies conducted by MoPIC for the Emergency Natural Resources Protection Plan in 1996, all ecologically highly significant areas were identified and classified taking into account their value, importance, sensitivity and vulnerability. According to this study, the closest 'highly significant ecological area' to the site is approximately 650ha and is located at about 5kms away from the site.

The region contains a high density of species due to the meeting of three geographical plant regions, the Mediterranean Territory, the Irano-Turanian and the Saharo-Sindian. Palestine has 114 families of plants recorded and 2483 species. The Central Highlands Region on which the site is located is dominated by *Quercus calliprinos, Ceratonia eiliqua, Pistacia palestina, Pistacia letiicus, Sareapteriunt spinsuni, Prosopsis Jarcta, nula viscosa, Phragnites ausiralis, Morincandia nitens and Convonlvolus oleifolium*.

Fauna in the West Bank area is wide ranging in response to the considerable variation of natural habitats. Fauna in the region has been documented as having 67 families of birds of which 45 are local breeds, 33 families of mammals, 93 species and sub-species of reptiles, and 7 different species of amphibians.

The studies conducted by the Palestinian Institute for Arid Land and Environmental Studies (PIALES), which defined the protected national assets of Fauna and Flours, doesn’t considered the site of specific value with respect to “biodiversity” (either fauna or flora).

5. Public Involvement

5.1 Stakeholder Consultation

Public involvement[1] has started in 2008 during the preparation of the Environmental and Social Impact Assessment (ESIA) and Abbreviated Resettlement Action Plans (ARAP) for Waste Pickers and Landowners as well as the preparation of the project appraisal document of Southern West Bank solid waste management project (SWB SWMP). Two major meetings were held; the first of which was held at Hebron Municipality on March 8th, 2008 in participation of 19 participants; the second one was held at Bethlehem municipality on March 4th, 2008 in participation of 28 participants. The scoping phase was held according to the Palestinian environmental policy and the World Bank guidelines and safeguard policies. Several semi-structured interviews were conducted with the representatives of the communities, land owners (Hebron and Yatta municipalities) and interested groups and individuals.

Prior to project design and procurement, the stakeholders' consultation was updated through consultation meetings with the concerned municipalities (Hebron and Yatta) and some landlords (farmers) around the site on November 12, 13 and 16, 2014. The number of people who were involved in the consultation process is much less than those in 2008. The main reason is that the 2008 consultation included more people who were affected by the smoke generated by burning of waste, flies and littering from poorly managed waste transport trucks. In addition the 80 waste pickers that were at the site were also included in the consultation. At this stage, the only concerned people are mainly the landowners (farmers) nearby the dumpsite while the wastepickers have already benefited from the livelihood program. All interviewed farmers expressed their happiness of the dumpsite rehabilitation as this will reduce odors releases, flies and plastic bags that were affecting their livestock. Some of the neighboring landlords suggested constructing a public garden on the site. The site owners (Hebron and Yatta municipalities) suggested developing methane gas collection system and power generation as first priority, and establishing a public garden as a second priority. However, the JSC-H&B will consider power generation priority to supply the nearby communities with electricity unless otherwise a financial constraint will appear.

As the project will eliminate and overcome a lot of environmental and social problems through the closure and rehabilitation of the dumpsite, the surrounding communities expressed their happiness and there were no concerns from the landowners' side as the environmental conditions will significantly be improved.

In terms of waste pickers that were present at the site prior to the Project, an Abbreviated Resettlement Action Plan (ARAP) was prepared to ensure that all documented waste pickers would have sources of income prior to the closure of the site (disclosure date is April 2009) and their livelihoods are maintained. To this effect and over the course of the

[1] The consultation meetings/workshops are documented in detail in the ESIA and ARAP of April 2009

past 5 years, the JSC-H&B in cooperation with the World Bank, UNDP-DEEP (Deprived families Economic Empowerment Program) and other donors has secured source of income for all accounted for waste pickers. The Social Committee established by the JSC-H&B has the overall responsibility over the grievance mechanism. The social consultant led the consultation process and engaged UNDP to help implement the agreed livelihood measures as mutually identified with the waste pickers. This is already well identified and documented in the ARAP. Currently, there are no social concerns pending due to the Project.

5.2 Disclosure

The original ESIA and ARAP were disclosed to the public locally and in the InfoShop in April 2009. This Addendum to ESIA is planned to be disclosed in January 2015 at the World Bank InfoShop, and on the websites of the Joint Service Council for Solid Waste Management for Hebron and Bethlehem Governorates for public information and consultation.

6. Identification of Impacts

6.1 Causes of Impacts

The development of any activity could give rise in the environmental impacts due to the physical changes caused by this activity. The project will involve Rehabilitation activities such as earth works: excavations and backfilling, waste transfer from one location to another in the dumpsite, importing filling materials from outside the site, building of retaining walls, construction of drainage ditches, cleaning the wadi from installation of vertical gas venting system. In addition, post Rehabilitation activities (aftercare) could cause potential impacts due to the gas venting of the dumpsite. In summary, the potential impacts could rise from the following changes:

- Earth works: excavations, backfilling, waste transfer inside the site, importing covering materials (impacts such as: dust, land sliding, gas emissions, work accidents, littering, odor etc.);
- Movement of waste heavy machinery and trucks (traffic accidents, work accidents);
- Emissions from the dumpsite (leachate, odor, gas).

6.2 The receiving Environment

The changes in the physical environment result in environmental and social impacts depending on the existing characteristics of the area affected in terms of the land use, socio-economic status, ecology, hydrology and hydrogeology etc. The site has few environmental or social drawbacks. The site is located in a mountainous semi-arid area and there are few inhabitants around there. The nature of the site and the surrounding area as well is mostly rocky with topsoil at the wadis in the range of 20cm to 60cm depth. Surface water run-off during heavy rain events run through the wadis at the north, south and east of the site. The groundwater depth at the site is in excess of 175 m. The land area that is cultivated by olive trees is limited and located to the southwest of the site. The rest of the surrounding land is used grazing land and rain-fed crops for barley and straw production.

7. Assessment and Mitigation of Impacts

7.1 Impact scoping

The content and significance of the environmental and social issues, which needed to be addressed in this addendum to ESIA were identified through scoping. This helps to ensure that the environmental information used for decision-making provides a comprehensive picture of the effects of the project, including issues of particular concern to affected groups and individuals. Several meetings, special studies and consultation meetings were carried out to ensure that comprehensive information was available on the involved stakeholders and their interests in the project.

Impacts were evaluated as to their potential significance, and ranked in accordance with the anticipated degree of importance, as follows:

- Significant: The effect on a sensitive receptor is unacceptable (either because it breaches relevant norms, guidelines or policy, or causes damage to a valuable asset or resource);
- Moderate: Some effect on a sensitive receptor may be discernable, the effect is either very short-lived or within currently accepted norms etc., but will be mitigated unless no cost-effective measures are available; and;
- Slight or none: The effect is temporarily and of negligible concern.

Impacts have been assessed as to whether they are of short-term or long-term duration, whether they are reversible or irreversible, and whether they are positive or negative. Measures to avoid, reduce or compensate potentially significant negative impacts have been suggested in each case. Where impacts were predicted to be moderate and for positive impacts, mitigation measures have been suggested where these are cost-effective and in accordance with good practice. Summary of the impact scoping exercise is provided in table 2.

Table 2: Summary of potential impacts before mitigation

Impact Recipient	Potential Impact	Impact ranking
Air Quality	Odor impacts from site Rehabilitation activities	**-1**
	Equipment/Vehicle exhaust emissions on-site	**0**
	Dust and emissions from Rehabilitation activities	**-1**
Noise	Noise arising from Rehabilitation activities	**0**
	Noise from equipment/Vehicle Movement	**-1**
Aesthetic	Change in landscape character from site Rehabilitation	**0**
Roads and Traffic	Increased traffic flow and traffic congestion	**0**
	Traffic noise	**0**
	Littering and cleanliness during Rehabilitation activities	**-2**

Hydrogeology, Hydrology and Water Quality	Contamination of water resources from project leachate emissions	**-2**
	Alteration of surface water regime	**+1**
	Increased suspended sediment loading from site preparation activities	**-1**
Ecology	Loss of biological habitats	**+2**
	Severance of wildlife corridors	**0**
	Extension of habitats (buffer zones)	**0**
	Creation of new habitats (post-restoration)	**+2**
	Domestic animals and livestock	**+2**
Public health and safety	Direct exposure to hazardous materials	**-1**
	Contamination of potable water with leachate	**+1**
	Exposure to vermin acting as disease vectors	**+1**
	Risk of traffic accidents	**-1**
Social and socio-economic	Loss of agricultural land	**-2**
	Impacts on local employment	**0**
	Impacts on cultural heritage	**0**
	Impacts of induced development	**+1**
Impacts on natural resources	Loss of agricultural land	**-2**
	0 = negligible/slight; 1 = moderate; 2 = significant; - negative; + positive	

7.2 Key Predicted Impacts During Rehabilitation and Aftercare

Potential ground and surface water contamination: This study pays a great deal of attention to the movement of water above and below the surface and how the design of the project addresses these. The project is within an area with no surface water resources and limited groundwater resources. Surface water runs through the wadis only during heavy rain events. Currently, surface water contamination is taking place as the wadis contain considerable amount of waste. The leachate from the waste could represent a source of pollution and could have significant risk to the groundwater contamination. However, the aquifer is at the depth of 175m below surface, which substantially reduces the impact significance.

Socio-economic and cultural impacts: All former waste pickers are involved in other income generation activities. Hence, there will be no negatively affected group of the project in terms of economic. On the contrary, the project will overcome all environmental problems and therefore, the property values around the dumpsite will get improved. Furthermore, the grazing land around the site will also get improved due to overcome of littering of plastic bags that was negatively affecting the livestock. Cleaning of the wadis from the waste body will improve the quality of the surface water during winter, which could be used for livestock irrigation. In general, the project will positively affect the socio-economic conditions and no negative impacts are detected.

Traffic Impacts: The project entails movements of large vehicles during the transfer of the cover material that is expected to be brought from outside of the site, but the absolute volume of the traffic is not large. Moreover, the roads leading to the site are wide enough so there will be no potential for traffic congestion, excessive wear and tear on local roads and there will be no safety threats to other road users. The routes available to access the site are adequate to minimize adverse effects. In addition the site is away from the residential areas (the nearest community is around 2kms), which will ensure easy access and eliminate the possibility of traffic accidents.

General environmental quality: A major purpose of the project proposals will be to improve environmental quality. There will be effects in terms of odor and air quality impacts during the Rehabilitation phase (associated with waste decomposition as well as dust from the rehabilitation works and vehicle movements), noise (traffic and site operations), and the potential presence of windblown detritus/litter). There is also a potential impact from landfill gas emissions during the aftercare phase. Therefore, these issues are a key focus of the ESIA.

7.3 Other Impacts during Rehabilitation and Aftercare

Other potential impacts of the proposed project are not expected to cause significant impacts either because of the nature of the site or due to the relative ease with which they can be avoided or mitigated. Such issues have not been treated as key impacts unless they were identified as such by stakeholders. Nevertheless these have been subject to scrutiny during the ESIA, the impacts assessed against significance criteria and the necessary design or operational measures included in the ESMP. They include the following:

Impacts related to contamination of water resources by fuel spillage: Potential contamination exists for fuel/lubricant spillage during Rehabilitation from activities associated with equipment/vehicle refueling, repair and maintenance. These are readily minimal and controlled by good operational practices.

Impacts related to biodiversity and ecological habitats: As the project deals with rehabilitation of a dumpsite, and currently is completely devoid of natural vegetation, the environment of the site and the surrounding areas as well will become improved for natural vegetation and biodiversity after closure and rehabilitation. There are no important ecosystems recorded within or in the immediate vicinity of the site. Accordingly the development is likely to have positive impact on biodiversity or ecological habitats.

Impacts on the cultural heritage: The definition of physical cultural resources include any movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance.

Onsite, there is a known old place at the north side of the site which is considered as an archeological place and currently appear surrounded by waste body. Except this, there are no known places of archaeological, religious or cultural significance at the proposed site, nor have any artifacts been found or previous land uses been identified

that might suggest that there will be any impacts on cultural sites or property. In case of accidental findings of any antiquities or physical cultural resources that might occur during the implementation of the projects, the contractor must notify the JSC-H&B. According to the applicable Jordanian Heritage law No. 51 for the year 1966, Article 15 the JSC-H&B must stop the contractor and notify the related Authority (Ministry of Tourism and Antiquities) within 3 days to take the necessary actions.

8. Specific Impacts and Mitigation Measures during the Rehabilitation Activities

8.1 Odor

Currently, the site emits odors due the large volume of waste accumulated onsite. The project will reduce, to the large extent, odor release after rehabilitation. The odor will be strongly offensive at the rehabilitation phase since the old waste under decomposition will be excavated and considerable amount will be transferred to other location in the site in order to improve the slopes. Odors emissions will continue during the aftercare phase. The installed venting system will reduce the impact. There will be no impact on the surrounding communities due to the separation distance, but the workers onsite will be affected. Therefore, proper mitigation measures should be taken to reduce the impact of odor on the workers during Rehabilitation, which could include:

- Make venting of the site from different locations before commencing the Rehabilitation activities;
- Use of personal protective equipment such as masks.

8.2 Dust Emissions

Dust emissions from site earthworks, including excavation and backfilling works, the Rehabilitation of the retaining walls, transfer of covering materials …etc., and are all likely to impact ambient air quality. The dust may arise due to the wind action during loading and unloading of backfilling materials and during the movement of vehicles and equipment. However, there are no nearby buildings to be affected. The road users and the workers are most susceptible to the risk of the dust. Therefore, the measures required to reduce these potential impacts should include:

- Covering of stockpiles of friable materials in order to reduce the potential for windblown dust;
- Wetting the excavated surfaces;
- Covering truck loads.

8.3 Vehicle Exhaust Emissions from On-Site Vehicle Movements

Vehicles exhaust emissions from the equipment and vehicles have the potential to cause deterioration in local baseline air quality. Vehicle emissions from the development and the rehabilitation activities will have some impact on the ambient air quality at the site. However, the number of the equipment and vehicles is limited, such impacts will be so small as to be undetectable, and therefore its effect will be negligible.

8.4 Noise Impacts

The project will involve use of heavy equipment like excavators, dump trucks and loaders, which expected to release noise. The noise released will be relatively minor as the Rehabilitation phase is short. However, due to the nature of the soil, there will be no use of compressors or hammer excavators, so the noise impact will be negligible.

8.5 Roads and Traffic Impacts

Impacts from traffic congestion: the project site is located in uninhabited area where the nearest community is about 2kms from the site. In addition, the main road that leads to the site is wide enough and classified as first class highway, which will reduce the possibility of traffic congestion. Furthermore, the minor road that link between the main road and the site was used to high density of traffic flow during the operation of the site during the past few years and now an cope with the traffic movement during the closure process as the traffic flow during this phase is too low compared with that during the site operation. Therefore, no traffic congestion is expected during the Rehabilitation phase of the project.

Impacts from vehicle emissions and noise: The projected will increase temporarily traffic volume, and exhaust emissions and noise from waste vehicles and trucks conveying cover material to the dumpsite. Since the project proposals result in only very small increases in total traffic flows due to the limited number of trucks, the impact of vehicles emission and noise will be negligible.

Dust emissions during cover material transit: the project will involve transit considerable amount of covering materials to cover the waste body. It is expected that the windblown during transporting such materials will create a lot of dust emissions. Therefore, proper mitigation measures shall be applied to prevent dust emissions such as covering the trucks with special taint fiber.

8.6 Contamination of Water Resources by Fuel Spillage

The rehabilitation works phase is short. There will be no major maintenance workshops onsite, the possibility of water contamination by fuel spillage is insignificant, and therefore, no mitigation measures are needed.

8.7 Potential Aesthetic Impacts

Currently, the waste disposal at the dumpsite over the past years has created negative aesthetic views in the general seen of the site compared to the surrounding areas. The project will restore the general seen of the site throughout the rehabilitation works, thus creating positive change in terms of aesthetic views. However, the Rehabilitation activities could create waste littering during upgrading works in the waste body due to wind-blown and especially waste transfer from one location to another inside the dumpsite. This littering can be mitigated as follows:

- Avoid waste transfer during high speed wind;
- Collect any littering on daily base and cover it by soil inside the dumpsite.

8.8 Safety Impacts:

The potential safety impact is related to work accidents during the rehabilitation works. In addition, landfill gas release could cause fire beak, and diseases. Therefore, the following measures shall be applied to mitigate these impacts:

- Use of safety wear;
- Use of traffic signs;
- Prevent smoking and any fire lighting onsite to prevent the possibility of fire;
- Use personnel protective equipment such as masks; and
- Try to vent the work face before commencing work.

8.9 Impacts on Culturally Significant Sites:

One place in the north side of the dumpsite is considered as archeological site. This archeological site is currently surrounded by waste, and needs to be protected during the rehabilitation activities of the project through cleaning the surrounded waste and keeping the site as it is without any change. Except this, the literature review and interviews with local community confirmed that archeological materials had never been found at or near the proposed sites. A survey of the general layout of the project area and a careful site search found no evidence of any cultural heritage. There are no current sites of worship in the immediate vicinity of the sites. Nevertheless, the rehabilitation works contractor will be instructed to ensure there are pre-excavation checks for any cultural or archaeological artifacts. In case of "Chance Find" they will proceed as follows:

- Stop work immediately following the discovery of any materials with possible archeological, historical, paleontological, or other cultural value; announce findings to project manager; and notify relevant authorities;
- Protect artifacts as well as possible using plastic covers; implement measures to stabilize the area, if necessary, to properly protect artifacts;
- Prevent and penalize any unauthorized access to the artifacts; and
- Restart Rehabilitation works only upon the authorization of the relevant authorities.

8.10 Loss of agricultural land

The project will consume large quantities of filling materials to cover he waste body in order to overcome the environmental and social impacts. If these materials were taken from the agricultural lands, then large area of agricultural land would be deteriorated. Therefore, the project design took into account this potential significant impact, through design the cover on two layers: the first one should be around 15cm to be used from the waste of the crushing stone plants, known local as "absolute materials)". This material is available in huge quantities in the area and its use for such purposes will reduce the problem of its management. The second layer will be at least 30cm thick and made of excavation residues from other development sites. Therefore, the summary of mitigation measures of this impact is as follows:

- Prevent any use of soil taken from agricultural land;
- Use of absolute materials from the crushing stone plants;
- Use of excavation residues from other development sites.

8.11 Impact on local employment

Since all of the waste pickers were employed and have a source of income and the site is closed, the closure of the site will have no negative impact on local employment. On the contrary, during the rehabilitation works phase, the project will secure many temporary jobs thus contributing positively in local employment.

8.12 Summary of potential Impacts of Rehabilitation works

A summary of the potential impacts during the Rehabilitation phase arising from the project proposals is presented in Table 3.

Table 3: Summary of Rehabilitation phase impacts

Potential Impact	Mitigation/ Management Proposed	Positive or Negative	Residual Impact
Odor impacts from site activities	Yes	-	Slight
Vehicle exhaust emissions on-site	No	-	Negligible
Dust and emissions from Rehabilitation activities	Yes	-	Slight
Noise arising from Rehabilitation phase	No	-	Slight
Increased traffic flow and traffic congestion	No	-	Negligible
Air quality impacts from vehicle emissions	No	-	Negligible
Traffic noise	No	-	Negligible
Dust emissions during transporting of cover materials	Yes	-	Moderate
Littering due to the wind action	Yes	-	Minimal
Damage to landscape	No	+	Moderate
Safety impacts	Yes	-	Moderate
Impacts on cultural heritage	Yes	-	Moderate
Loss of agricultural land	Yes	-	Significant
Impact on local employment	No	+	Slight

8.13 Summary of Mitigation Measures during the Rehabilitation works phase

Summary of the proposed mitigation measures for the potential environmental and social impacts during the rehabilitation works are shown in Table 4.

Table 4: Proposed mitigation measures addressing the Rehabilitation phase impacts

Potential Environmental and Social Impact	Proposed Mitigation Measures
Odor impacts from site activities	- Make venting of the site from different locations before commencing the Rehabilitation activities. - Use of personal protective equipment such as masks.
Dust and emissions from Rehabilitation activities	- Covering of stockpiles of friable materials in order to reduce the potential for windblown dust. - Wetting the excavated surfaces. - Covering truck loads.
Dust emissions during transporting of cover materials	- Covering the trucks with special taint fiber.
Littering due to the wind action	- Avoid waste transfer during strong winds. - Collect any littering on daily base and cover it by soil inside the dumpsite.
Safety impacts	- Use of safety wear such as vests, shoes …etc. in accordance with the OHS regulations - Use of personnel protective equipment such as gloves, masks …etc. in accordance with the OHS regulations - Prevent smoking and any fire lighting onsite to prevent the possibility of fire. - Ensure enough quantity of water and cover materials onsite to fight any potential fire incidents. - Training of workers on landfill gas risks prior to commencing onsite activities. - Try to vent the work face before commencing work. - Maintain adequate slopes to prevent landslide due to high elevations. - Use of traffic signs.
Impacts on cultural heritage	- Protect the existing archeological place through cleaning the surrounded waste. - Stop work immediately following the discovery of any materials with possible archeological, historical, paleontological, or other cultural value; announce findings to project manager; and notify relevant authorities. - Protect artifacts as well as possible using plastic covers; implement measures to stabilize the area, if necessary, to properly protect artifacts. - Prevent and penalize any unauthorized access to the artifacts. - Restart Rehabilitation works only upon the authorization of the relevant authorities.

Loss of agricultural land	- Prevent any use of soil taken from agricultural land. - Use of absolute materials from the crushing stone plants. - Use of excavation residues from other development sites.

9. Specific Impacts and Mitigation Measures during the Aftercare Phase (Post construction)

9.1 Contamination of Water Resources from Leachate Emissions

The potential for groundwater contamination by leachate arises from the possibility that rainwater migration into the waste or leaching due to waste degradation. Therefore, the site will be covered during the rehabilitation works by low permeable layer to reduce the rate of percolation. Further, the surrounded runoff during winter season will be adequately diverted away from the site. The wadis will be properly cleaned from all waste streams to facilitate rainwater movement and prevent contamination. The key mitigation measures include:

- Maintenance of the low permeability layer applied during the rehabilitation works.
- Maintaining rainwater diversion from the site installed during the rehabilitation works.

9.2 Alteration of Surface Water Regime

The natural water channel during winter season is located out of the borders of the site, so there is no potential to disrupt the natural water regime. The wadis near the site will be cleaned from all waste to overcome the problem of surface water contamination.

9.3 Biological Habitats

The site is devoid of natural vegetation across the area. The review of ecological conditions at the site revealed no flora or floral assemblages that are unique to the site or are listed as protected species. Similarly the review revealed no fauna or faunal assemblages that are unique to the site or are listed as protected species. Also there are no important ecosystems recorded within or in the immediate vicinity of the project site so there is no potential for severance of wildlife corridors. So there are no potential significant impacts during the aftercare phase.

9.4 Safety and Public Health Impacts

The potential public health and safety impacts are related to the landfill gas emissions. The gas could cause uncontrolled fire or explosion if not managed in proper way. Further, the gas emissions will contribute to the global warming and climate change. Passive venting of the landfill gas introduced during the rehabilitation phase is a very effective mitigation measure to prevent any such impacts. The venting system should be maintained and monitored during the aftercare phase. The gas emissions should be monitored and flaring units should be installed during the aftercare phase.

9.5 Impact on induced development

The mitigation measures introduced during the closure and rehabilitation phase of the project will prevent or minimize all environmental and social problems like odors, mosquitoes, flies, wild animals, and the general view of the area. This will motivate the expansion of urbanization toward the area and the surroundings. Therefore, the project will have positive impact on induced development and urbanization.

9.6 Summary of Impacts during the Aftercare Phase

A summary of the potential impacts arising during Aftercare phase are presented in Table 5.

Table 5**:** Summary of potential impacts during the aftercare phase.

Potential Impact	Mitigation/ Management Proposed	Positive or Negative	Residual Impact
Groundwater contamination	Yes	-	Significant
Alteration of surface water regime	No	-	Negligible
Loss of biological habitats	No	+	Slight
Severance of wildlife corridors	No	+	Slight
Domestic animals and livestock	No	+	Significant
Public health and safety	Yes	-	Significant
Impact on induced development	No	+	Moderate

9.7 Summary of Mitigation Measures during the Aftercare Phase

Table 6 shows the proposed mitigation measures during the Aftercare Phase of the project.

Table 6: Summary of mitigation measures during the aftercare phase.

Potential Environmental and Social Impact	Proposed Mitigation Measure
Groundwater contamination	- Maintenance of low permeability cover. - Reducing leachate production through the diversion of rainwater from the site.
Public health and safety due landfill to gas emissions	- Maintenance of passive gas venting system. - Install and maintenance of flaring units when needed. - Monitor the gas emission readings. - Maintenance of no access warning signs.

10. Monitoring and Reporting

The environmental monitoring is essential for ensuring that identified impacts are maintained within the acceptable levels, unanticipated impacts are mitigated at an early stage, and the expected project benefits are achieved.

During the rehabilitation works phase of the project, the monitoring of environmental and social safeguards will be within the responsibility of the supervision engineer and the works contractor. The JSC-H&B will recruit a supervision engineer. The supervision engineer team will include environmental engineer to follow up the rehabilitation activities and monitor the implementation of the mitigation measures. The works contractor will be responsible for complying with mitigation measures of this addendum to ESIA. The tools for monitoring will be the site observations (with photographic evidence) and logbook inspection. The supervision engineer will prepare monthly progress reports that will include environmental safeguards section. The JSC H&B will in turn prepare biannual progress reports and submit them to the World Bank for approval. The biannual report will include environmental safeguards part based on monthly observations and photographic evidence. The section should present any noncompliance with the environmental and social mitigation measures.

During the aftercare phase, the JSC-H&B will be responsible for monitoring the effectiveness of the mitigation measures, and if necessary take the corrective action to ensure that all environmental and social impacts are prevented or minimized. The EQA will be responsible for environmental monitoring and auditing through field visits during the aftercare phase to ensure the all significant environmental and social impacts are mitigated.

Summary of the Environmental and Social Management Plan presenting the key impacts, mitigation measures, mitigation responsibilities, monitoring arrangements, frequency and responsibilities are presented in Table 7. The bulk of the mitigation and monitoring costs is envisaged during the rehabilitation works. The total estimated cost of mitigation measures during the rehabilitation works phase is estimated to reach **27,000** USD**.** The total estimated costs of monitoring arrangements during the rehabilitation works is expected to reach **765,500** USD.

11. Complaints mechanisms

Public consultation and participation will play a key role in the process of improving the environmental behavior and addressing the third party complaints. The JSC-H&B will announce its openness to accept the local community suggestion and complaints through:

- Distribution of project information leaflets and complaints forms;
- Notice Boards;
- Interactive JSC-H&B website;
- Public Meetings.

The current complaint system will be used to receive complaints, which includes a drop box. The complaints are to be discussed and recorded by the JSC-H&B board members and the JSC-H&B social specialist.

The JSC-H&B will record complaints including detailed information about the social and/or environmental issue (key issues, complaint received date, addressed complaint, how it was resolved, etc.). The complaint should be archived and addressed within two weeks.

During the operation of the site, the JSC-H&B has sustained a Social Committee to address social issues associated with implementing the project. In addition and through the Citizen Engagement activities, affected people can easily communicate their concerns by calling 1-700 77 22 77 the number for Call Center contracted by the JSC-H&B for comments and complaints. This Center, operated by a private sector entity, passes on the complaints to the JSC-H&B executive unit for action

12. Environmental and Social Management Plan (ESMP)

The JSC-H&B will be responsible for the implementation of the project with close coordination with the Ministry of Local Government (MoLG) and the Environmental Quality Authority (EQA). Over the past five years of implementing the Southern West Bank Solid Waste Management Project, the JSC-H&B has acquired satisfactory knowledge[2] of the World Bank Safeguards policies especially OP4.01 (Environment Assessment) and OP4.12 (Involuntary Resettlement). It's monitoring and reporting on compliance with the measures delineated in the ESMP has been satisfactory. While its implementation of the grievance measures delineated in the Resettlement Action Plan related to wastepickers, owners of land needed for the new sanitary landfill and the herdsmen has been considered exemplary. Moreover, it developed an advance communication system through which it communicates with service recipients utilizing Information and Communication Technologies (ICT) such as Call Centers, free of charge 1-700 call-in number and mobile based Short text-Messaging-System (SMS) and social media such as Facebook and a specialized web page. The JSC-H&B plans to utilize such experiences, techniques and systems in supervising the safeguards

[2] Where necessary, the JSC-H&B contracted specialize international and local consultant to perform compliance monitoring on its behalf.

compliance associated with implementing the proposed activities described in Section 2.2 above.

Commonly, the project implementation will be contracted to local contractors. This addendum to the ESIA as well as the ESMP will form an integral part of the project tender documents. The awarded contractor will be the first responsible for the implementation of the ESMP to mitigate the rehabilitation phase impacts. The supervision engineer will act as progress monitor. The JSC-H&B will act as supervisor to ensure respecting of the ESMP by the contractor. Summary of the ESMP is presented in Table 7.

Table 7: Environmental and Social Management Plan (ESMP).

Project Phase	Potential Impact	Proposed Mitigation measure	Responsibility of implementation	Monitoring responsibility	Monitoring Frequency	Monitoring method	Mitigation and monitoring costs
Rehabilitation Works Phase	Odor impacts from site activities	Use of personnel protective equipment and wear.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Logbook, on site observations	Mitigation included in the works contract costs (USD15,500) Monitoring: one full time environmental engineer (Supervision Engineer team) the cost is USD 27,000 for the whole period and for monitoring all measures.
		Make venting of the site from different locations before commencing the Rehabilitation activities.	Rehabilitation works Contractor	Supervision engineer, JSC-H&B	Weekly	Site observations	
	Dust emissions from Rehabilitation activities	Covering of stockpiles of friable materials in order to reduce the potential for windblown dust.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations	Mitigation included in the works contract costs (USD 4,000). Monitoring: one full time environmental engineer (Supervision Engineer team).
		Wetting the excavated surfaces.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations log book	
		Covering truck loads.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Random observations	
	Dust emissions during transporting of cover materials	Covering the trucks with special taint fiber.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Random observations	Environmental engineer (Supervision Engineer team).

Project Phase	Potential Impact	Proposed Mitigation measure	Responsibility of implementation	Monitoring responsibility	Monitoring Frequency	Monitoring method	Mitigation and monitoring costs
	Littering due to the wind action	Avoid waste transfer during strong winds.	Rehabilitation works Contractor	Supervision engineer	During strong winds	Logbook, observations	Mitigation included in the works contract costs (USD 2,000). Environmental engineer (Supervision Engineer team).
		Collect any littering on daily base and cover it by soil inside the dumpsite.	Rehabilitation works Contractor	Supervision engineer	Daily	Observations	
	Groundwater contamination	Installing low permeability sealing cover to prevent rainwater infiltration.	Rehabilitation works Contractor	Supervision engineer	Weekly	Site observations	Mitigation included in the works contract costs (USD 231,000 for low permeable soil, and USD 500,000 for gas venting system) Monitoring: one full time environmental engineer (Supervision Engineer team).
	Landfill gas accumulation and explosion	Install passive gas venting system.	Rehabilitation works Contractor	Supervision engineer	Weekly	Site observations	
	Safety impacts	Use of safety wear such as vests, shoes …etc. in accordance with the OHS regulations	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Logbook, observations	Mitigation included in the works contract costs (USD 500 for safety wear, USD 1,000 for training, and 1,000 for signs). Monitoring: one full
		Prevent smoking and any fire lighting onsite to prevent the possibility of fire.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations	
		Ensure sufficient quantity of water and cover materials onsite to fight any potential fire incidents.	Rehabilitation works Contractor	Supervision engineer	Weekly	Site observations	

Project Phase	Potential Impact	Proposed Mitigation measure	Responsibility of implementation	Monitoring responsibility	Monitoring Frequency	Monitoring method	Mitigation and monitoring costs
		Training of workers on landfill gas risks prior to commencing onsite activities.	Rehabilitation works Contractor	Contractor, Supervision engineer	Weekly	Photos, progress reports	time environmental engineer (Supervision Engineer team).
		Use personnel protective equipment such as masks, gloves …etc. in accordance with OHS regulations	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Logbook, observations	
		Venting of the work face before commencing work.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations	
		Maintain adequate slopes to prevent landslide due to high elevations	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations	
		Use of traffic signs.	Rehabilitation works Contractor	Contractor, Supervision engineer	Weekly	Observations	
	Impacts on cultural heritage sites	Protect the existing archeological place through cleaning the surrounded waste.	Rehabilitation works Contractor	Supervision engineer	Daily	Site observations	Mitigation included in contract costs (USD 2,000). Monitoring: one full time environmental engineer (Supervision Engineer team).
		Stop work immediately following the discovery of any materials with possible archeological, historical or other cultural value; announce findings to project manager and notify relevant authorities.	Rehabilitation works Contractor	Contractor, Supervision engineer	When issue arises	Logbook, site observations	
		Protect artifacts as well as possible using plastic covers; implement measures to stabilize the area, if necessary, to properly protect artifacts.	Rehabilitation works Contractor	Supervision engineer	Daily (when issue arises)	Site observations	
		Prevent any unauthorized access to the archaeological site and artifacts.	Rehabilitation works Contractor	Contractor, Supervision	Daily	Logbook, site	

Project Phase	Potential Impact	Proposed Mitigation measure	Responsibility of implementation	Monitoring responsibility	Monitoring Frequency	Monitoring method	Mitigation and monitoring costs
				engineer		observations	
		Restart Rehabilitation works only upon the authorization of the relevant authorities.	Rehabilitation works Contractor	Supervision engineer, JSC-H&B	When issue arises	Logbook, Inspection report	
	Loss of agricultural land	Prevent any use of soil taken from agricultural land.	Rehabilitation works Contractor	Contractor, Supervision engineer	Daily	Site observations	Mitigation included in contract costs. Monitoring: one full time environmental engineer (Supervision Engineer team).
		Use of materials from the crushing stone plants.	Rehabilitation works Contractor	Contractor	Weekly	Logbook, observations	
		Use of excavation residues from other development sites.	Rehabilitation works Contractor	Contractor, Supervision Engineer	Weekly	Logbook, observations	
Aftercare Phase	Groundwater contamination	Maintaining low permeability sealing cover.	JSC-H&B	EQA & JSC-H&B	Biannually	Site inspection	Mitigation included in contract costs (USD 4,000). Short-term input of environmental engineer (JSC H&B)
		Surface water diversion from entering the dumpsite.	JSC-H&B	EQA& JSC-H&B	Biannually	Site inspection	
	Public health and safety due to landfill gas emissions	Monitoring and maintaining passive gas venting system.	JSC-H&B	EQA & JSC-H&B	Quarterly	Site inspection	Ad hoc input of Environmental engineer of JSC H&B
		Install and maintaining gas flaring units when needed.	JSC-H&B	EQA & JSC-H&B	Quarterly	Site observation	Cost of flaring units is included in the gas venting system. Ad hoc input of Environmental

Project Phase	Potential Impact	Proposed Mitigation measure	Responsibility of implementation	Monitoring responsibility	Monitoring Frequency	Monitoring method	Mitigation and monitoring costs
							engineer of JSC H&B
		Monitor landfill gas emission readings.	JSC-H&B	EQA & JSC-H&B	Biannually	Data reading and analysis	Training two staff members (USD 1,000) Annual cost of gas analysis (USD 1,600)
		Maintaining no access warning signs.	JSC-H&B	EQA& JSC-H&B	Quarterly	Site inspection	Ad hoc input of Environmental engineer of JSC H&B

ANNEXES

Annex 1. List of names of landowners (farmers) surrounding the project site.

1. Mahmoud Ibrahim Adrah
2. Issa Ibrahim Muhammad Rabai
3. Shihdeh Muhammad Sulaiman
4. Jumaa Ahmad Rabi Ali
5. Ahmad Muhammad Rabai
6. Mahmoud Ali Ibrahim Rabai
7. Salameh Silmi Salem Azazmeh
8. Ahmad Mahmoud Mahania
9. Najeeb Muhammad Jabari
10. Jamal tarayra