

The Hashemite Kingdom of Jordan
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
(ESIA final Report)
FOR
THE HYDROPONICS FARM IN TANNUR – WADI AI HESSA,
JORDAN



Submitted to:
Ministry of Agriculture

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Amman-Jordan
December, 2019

TEMPLATE

Version 2, July 2019

**Government of Jordan/ Ministry of Agriculture
“Exploring high-value, socially-inclusive, and
water-efficient agriculture project in Jordan”**

**ENVIRONMENTAL and SOCIAL
COMMITMENT PLAN (ESCP)**

March 2020

ENVIRONMENTAL AND SOCIAL COMMITMENT PLAN

1. 1. Government of Jordan/Ministry of Agriculture *will implement* Exploring high-value, socially-inclusive, and water-efficient agriculture project in Jordan”, with the involvement of the following Ministries/agencies/units: Ministry of Finance (MoF), Ministry of Planning and International Cooperation (MOBIC), Jordan Cooperative Corporation (JCC,)Private sector, farmers, local beneficiaries and NGOs. The *International Bank for Reconstruction and Development/International Development Association*] (hereinafter the [Bank/the Association) is providing financing for the Project.
2. Ministry of Agriculture will implement material measures and actions so that the Project is implemented in accordance with the Environmental and Social Standards (ESSs). This Environmental and Social Commitment Plan (ESCP) sets out material measures and actions, any specific documents or plans, as well as the timing for each of these.
3. Ministry of Agriculture will also comply with the provisions of any other E&S documents required under the ESF and referred to in this ESCP, such as Environmental and Social Management Plans (ESMP), Resettlement Action Plans (RAP), Indigenous Peoples Plans (IPPs), and Stakeholder Engagement Plans (SEP), and the timelines specified in those E&S documents.
4. Ministry of Agriculture is responsible for compliance with all requirements of the ESCP even when implementation of specific measures and actions is conducted by the Ministry, agency or unit referenced in 1. above.
5. Implementation of the material measures and actions set out in this ESCP will be monitored and reported to the [Bank/Association] by Ministry of Agriculture as required by the ESCP and the conditions of the legal agreement, and the [Bank/Association] will monitor and assess progress and completion of the material measures and actions throughout implementation of the Project.
6. As agreed by the [Bank/Association] and Ministry of Agriculture, this ESCP may be revised from time to time during Project implementation, to reflect adaptive management of Project changes and unforeseen circumstances or in response to assessment of Project performance conducted under the ESCP itself. In such circumstances, Ministry of Agriculture will agree to the changes with the [Bank/Association] and will update the ESCP to reflect such changes. Agreement on changes to the ESCP will be documented through the exchange of letters signed between the [Bank/Association] and the Ministry of Agriculture. The Ministry of Agriculture will promptly disclose the updated ESCP.
7. Where Project changes, unforeseen circumstances, or Project performance result in changes to the risks and impacts during Project implementation, the Ministry of Agriculture shall provide additional funds, if needed, to implement actions and measures to address such risks and impacts, which may include improper pest management, and other project-related environmental, health, and safety impacts, labor influx and gender-based violence.

MATERIAL MEASURES AND ACTIONS		TIMEFRAME	RESPONSIBLE ENTITY/AUTHORITY
MONITORING AND REPORTING			
A	REGULAR REPORTING Regular monitoring reports on the implementation of the ESCP as part of the project's progress report.	Every 6 months as part of the technical progress report	Ministry of Agriculture / funding from the Project budget
B	INCIDENTS AND ACCIDENTS Promptly notify any incident or accident related or having an impact on the Project which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers. Provide sufficient details regarding the incident or accident, indicating immediate measures taken to address it, and include information provided by any contractor and supervising entity, as appropriate.	Notify the Bank maximum within 48 hours after taking notice of the incident or accident .	Ministry of Agriculture
ESS 1: ASSESSMENT AND MANAGEMENT OF ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS			
1.1	ORGANIZATIONAL STRUCTURE Assign a team from the Ministry of Agriculture to oversee the ESMP implementation and maintained throughout the project implementation.	By Project effectiveness. The organizational structure, including the specialists, should be maintained throughout Project implementation]	Ministry of Agriculture
1.2	ENVIRONMENTAL AND SOCIAL ASSESSMENT Implement the Environmental and Social Impact Assessment that has been prepared for the Project, in a manner acceptable to the Bank.	All mitigation measures contained in the ESIA will be implemented throughout the Project implementation.	Ministry of Agriculture
1.3	MANAGEMENT OF CONTRACTORS Incorporate the relevant aspects of the ESCP, including the relevant E&S documents and/or plans, and the Labor Management Procedures, into the ESHS specifications of the procurement documents with contractors. Thereafter ensure that the contractors comply with the ESHS specifications of their respective contracts.	Each contract will include a contract specific Environmental and Social provisions -including Occupational Health and Safety- which will be included as part of the contract prior to contract signing and monitored through the contract period.	Ministry of Agriculture
ESS 2: LABOR AND WORKING CONDITIONS			
2.1	LABOR MANAGEMENT PROCEDURES Implement the Labor Management Procedures (LMP) that have been developed for the Project.	Each contract will include a contract specific LMP. The LMP will be included as part of the contract prior to contract signing and monitored through the contract period.	Ministry of Agriculture
2.2	GRIEVANCE MECHANISM FOR PROJECT WORKERS Establish, maintain, and operate a grievance mechanism for Project workers, as described in the LMP and consistent with ESS2.	The grievance mechanism will be operational prior to engaging Project workers and maintained throughout Project implementation.	Ministry of Agriculture
2.3	OCCUPATIONAL HEALTH AND SAFETY (OHS) MEASURES [OHS measures, including emergency preparedness and response measures, can be set out in a separate E&S document (e.g. ESMP) already mentioned in the section under ESS1 above. In that case, the commitment can refer to that document. See an example below]. Implement occupational, health and safety (OHS) measures specified in the ESMP as well as construction contract	Implement measures and procedures to maintain safe working environment throughout project life cycle, including through requiring the contractor to implement OHS provisions in contract	Ministry of Agriculture

MATERIAL MEASURES AND ACTIONS		TIMEFRAME	RESPONSIBLE ENTITY/AUTHORITY
ESS 3: RESOURCE EFFICIENCY AND POLLUTION PREVENTION AND MANAGEMENT [the relevance of ESS3 is established during the ESA process. ESS3 may require the adoption of specific measures to cover energy, water and raw materials use, management of air pollution, hazardous and nonhazardous wastes, chemicals and hazardous materials and pesticides. Depending on the project, these measures may be set out in an E&S document (e.g. ESMP) already mentioned in the section under ESS1 above or as a stand-alone document or a separate action. Indicate whether ESS3-related measures are covered under an existing document or as stand-alone actions. See <u>examples</u> below].			
3.1	Adhere to the commitment of the pest management plan (PMP): Implement the PMP that has been prepared as part of the Environmental and Social Impact Assessment which set out actions, responsibilities, and timeframe to manage environmental and social risks and impacts associated with the transportation, storage and use of pesticides	Within the specific timelines specified in the PMP	Ministry of Agriculture
ESS 4: COMMUNITY HEALTH AND SAFETY [the relevance of ESS4 is established during the ESA process. As with ESS3, ESS4 may require the adoption of specific measures that may be set out in an E&S document (e.g. ESMP) already mentioned in the section under ESS1 above or as a stand-alone document or a separate action. Indicate whether ESS4-related measures are covered under an existing document or as stand-alone actions. See <u>examples</u> below].			
4.1	COMMUNITY HEALTH AND SAFETY: Implement measures and action to manage risks and impacts to the community arising from Project activities as specified in the ESIA, LMP in a manner acceptable to the Bank.	Throughout construction phase	Ministry of Agriculture
4.2	GBV AND SEA RISKS: Prepare, adopt, and implement a stand-alone Gender-Based Violence Action Plan (GBV Action Plan), to assess and manage the risks of gender-based violence (GBV) and sexual exploitation and abuse (SEA).	Submit the GBV Action Plan for the Bank's approval before construction works begin. Once approved, the GBV Action Plan is implemented throughout Project implementation.	Ministry of Agriculture
ESS 5: LAND ACQUISITION, RESTRICTIONS ON LAND USE AND INVOLUNTARY RESETTLEMENT NOT APPLICABLE			
ESS 6: BIODIVERSITY CONSERVATION AND SUSTAINABLE MANAGEMENT OF LIVING NATURAL RESOURCES. NOT APPLICABLE			
ESS 7: INDIGENOUS PEOPLES/SUB-SAHARAN AFRICAN HISTORICALLY UNDERSERVED TRADITIONAL LOCAL COMMUNITIES NOT APPLICABLE			
ESS 8: CULTURAL NOT APPLICABLE			
ESS 9: FINANCIAL INTERMEDIARIES NOT APPLICABLE			
ESS 10: STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE			
10.1	STAKEHOLDER ENGAGEMENT PLAN PREPARATION AND IMPLEMENTATION Implement the Stakeholder Engagement Plan (SEP).	Throughout project implementation	Ministry of Agriculture
10.2	PROJECT GRIEVANCE MECHANISM: Maintain and operate a grievance mechanism, as described in the SEP.	Throughout project implementation	Ministry of Agriculture
CAPACITY SUPPORT (TRAINING)			

CS1	<p>Training to be provided for all PIU staff, stakeholders and communities For example, training may be required for [e.g. PIU staff, stakeholders, communities, Project workers] on:</p> <ul style="list-style-type: none"> • stakeholder mapping and engagement • specific aspects of environmental and social assessment • emergency preparedness and response • community health and safety. • Gender based violence – sexual exploitation and abuse (SEA) • Grievance redress mechanism for communities 	Throughout project implementation	Ministry of Agriculture
CS2	<p>Require the contractor to provide training to project's workers on the following aspects:</p> <ul style="list-style-type: none"> - Toolbox talks on OHS related to the construction site - On-site risk identification and mitigation - Use of PPEs - Emergency Prevention and Preparedness <p>Provide training to the project's workers on:</p> <ul style="list-style-type: none"> – Seed selection, planting and farm maintenance – Harvesting and post harvesting practices – Make detailed observations on risks related to pest and the use of IPM methodologies – Grievance redress mechanism for workers – Gender based violence – sexual exploitation and abuse (SEA) 	Throughout project construction and operation phases	Ministry of Agriculture

Table of Contents

TEMPLATE.....	2
Executive Summary	12
i. Project Background:	12
ii. Project Objective and Justification:	12
iii. Methodology:	15
iv. Description of the Project Area (See Appendix 2 land Map):.....	15
v. Stakeholder Engagement:	17
vi. Assessment of Potential Impacts (Positive and Negative):	18
vii. Proposed Mitigation Measures and Environmental and Social Management Plan:	19
viii. Conclusions and Recommendations:	22
Environmental Social Impact Assessment Report.....	24
Chapter 1: Introduction	24
1.1. General Overview:	24
1.2. Project Background:.....	24
1.3. Project Description:	25
1.4. Project Justification:.....	25
1.5. Objectives and Structure of the ESIA:	27
1.6. The ESIA Key Stakeholders:.....	28
1.7. Study Methodology:	29
1.8. Limitations and Constraints	29
Chapter 2: Administrative and Legal Framework	30
2.1. Legal Framework (including social and labor laws such as child labor prevention)	30
2.2. Institutional Framework:	33
2.3. International Guiding Principles, Relevant Conventions and Treaties:.....	33
Chapter 3: Environmental and Social Baseline Data	34
3.1. Description of Project Area(See Appendix 2 land Map)	34
3.2. Physical and Biological Environment (Geological, Hydrological, Hydrogeological, Climatic, Flora, Fauna, etc.).....	36
3.3. Social and Economic Environment (health, poverty, employment, access to services, demographics, gender, disadvantaged or vulnerable groups, conflict, etc.)	39
Chapter 4.0: Environmental and Social Impacts	46
4.1. General Background.....	46
4.2. Areas of Influence and Main Impacts Significance	46
4.3. Impacts Identification	46
4.3.1. Potential Environmental Impacts (Negative and Positive)	46
4.3.2. Potential Social Impacts (Negative and Positive).....	47
4.3.3. Impact Mitigationat Various Phases of the Project (Construction and Operation)	48
4.4. Enhancement of Positive Impacts at Various Phases	50
Chapter 5: Analysis of Project Alternatives	50
5.1. Background	50
5.2. Alternative Project Location and Alternative Farming Methods	50
5.3. Comparison of Alternatives	51
Chapter 6.0: Environmental and Social Management Plan (ESMP)	52
6.1. Background	52
6.2. ESMP Responsibilities.	52
6.3. Environmental Management Matrix Table.....	52
6.4. Social Management Matrix Table	52
6.5. Monitoring the ESMP (including frequency and indicators throughout project life-cycle)	53
6.6. Training and Awareness Creation	56
6.7. ESMP Monitoring and Evaluation\.....	57
Chapter 7: Integrated Pest Management Plan.....	57
7.1. IPM Plan	57
Chapter 8: Labor Management Procedures	58
Chapter 9: Stakeholder Engagement(see Annex_No_8_ESS10)	58
9.1. Background	58
9.2. Objective of the Public Consultations	59
9.3. Stakeholder Identification.....	59
9.4. Participatory Meetings and Public Sensitization.....	59
9.5. Stakeholders Consultative Meetings	59

9.6.	Stakeholder Engagement Plan for project implementation phase	60
9.7.	Grievance Redress Mechanism	60
<i>Chapter 10: Conclusion and Recommendations</i>		<i>60</i>
10.1.	Conclusion.....	60
10.2.	Recommendations	60
Annex No. (1): Project, General Lay-out.....		62
Annex No. (2): LABOR MANAGEMENT PROCEDURES (LMP).....		66
Annex No. (3): INTEGRATED PEST MANAGEMENT PLAN		80
Annex No. (4): Legal and Institutional Framework		87
Annex No. (5): Concept of project Study Alternatives		99
Annex No. (6): Site visit Report		105
Annex No. (7): Final ESMP Mitigation Plan.....		111
Annex No. (8): Stakeholder Engagement Plan (SEP)		115
Annex No. (9): Jordan EIA Regulation.....		123
Appendix No. (1): Land Ownership Documentation		129
Appendix No. (2): Public Consultation Report.....		134
Appendix No. (3): Grievance form.....		142
Appendix No. (4): Documentation sit		144
Appendix No. (5): Criteria For Selecting The Trainees And Workers.....		146

List of Tables:

Table 1 : Environmental impacts and mitigation measures during construction phase.....	19
Table 2 : Social impacts and mitigation measures during construction phase	20
Table 3 : Environmental impacts and the mitigation measures during operation phase	20
Table 4 : Social impacts and the mitigation measures during operation phase	22
Table 5 : Comparison of costs between conventional greenhouse and high-tech hydroponics.....	29
Table 6 : Maximum limits of the equivalent volume level (dB A)	31
Table 7 : Maximum allowable limits set by JS 1140/2006	32
Table 8 : Maximum allowable limits set by JS 1189/2006	32
Table 9 : Water uses and resources in 2017 (MCM).....	38
Table 10 : Main demographic indicators of Tafileh Governorate	40
Table 11 : Population growth rates, natural increase and net migration in Jordan, year 2012, by DOS	40
Table 12 : Poverty rate per Governorate, year 2010	40
Table 13 : Demographic indicators within the study area, DOS 2015	42
Table 14 : Number of Unemployment in Various Governorates, DOS 2015	42
Table 15 : Social positive and negative impacts during all project phases	47
Table 16 : Impacts and mitigation measures during construction phase	48
Table 17 : Impacts and mitigation measures during operation phase.....	49
Table 18 : Summary planned technologies activities	51
Table 19 : ESMP Monitoring during construction phase including frequency and indicators.....	53
Table 20 : ESMP Monitoring during operation phase including frequency and indicators	54

List of Figures:

Figure 1: Map of Project Area	35
Figure 2: Classification of Land Regions.....	36
Figure 3: Map of Rain Precipitation Rates	37
Figure 4: Percentage of Water Consumption by Main Economic Sectors	38
Figure 5: Statistics of Jordan's Population, year 2018 and Distribution by Governorates.....	41
Figure 6: The pockets of Poverty year 2009	44
Figure 7: Classification of Poor Communities Distributed by Districts year 2009	45

List of Acronyms:

CBD	Convention on Biological Diversity
DOA	Department of Antiquities
ESIA	Environmental and social Impact Assessment
ESMP	Environmental and Social Management Plan
ESP	Environmental & Social Plan
EIA	Environmental Impact Assessment
EHS	Environmental Health and Safety
EHD	Environmental Health Directorate
ERC	Energy Regulatory Commission
ESS1	Environmental & Social Risks Guidance notes #1
ESS2	Environmental & Social Risks Guidance notes #2
ESS3	Environmental & Social Risks Guidance notes #3
ESS4	Environmental & Social Risks Guidance notes #4
ESS10	Environmental & Social Risks Guidance notes #10
EMRRC	Energy & Mineral Resources Regulatory Commission
DOA	Department of Antiquities
DOS	Department of Statistics
FOA	Food and Agriculture Organization
GCF	Green Climate Fund
GDP	Gross Domestic Product
GBV	Gender Based Violence
IDECO	Irbid District Electricity Company
IPM	Integrated Pest Management
JS	Jordan Standards
JISM	Jordan Institute for Standard and Metrology
JVA	Jordan Valley Authority
JOHUD	Jordanian Hashemite Fund for Human Development
JSC	Joint Services Counsel
LMO	Living Modified Organisms
LMP	Labor Management Plan
MEMR	Ministry of Energy and Mineral Resources
MLEA	Multi-lateral Environmental Agreements
MOL	Ministry of Labor
MOH	Ministry of Health
MoMA	Ministry of Municipalities Affairs
MoEnv	Ministry of Environment
MoSD	Ministry of Social Development
MOA	Ministry of Agriculture
MWI	Ministry of Water and Irrigation
NDA	National Designated Authority
NGO	Non-governmental Organization
NBSAP	National Biodiversity and Action Plan
NES	National Environmental Strategy
OHD	Occupational Health Directorate
OHS	Occupational Health and Safety
PPE	Personal Protection Equipment
PPP	Public Private Partnership
PPM	Part Per Million
PM2	Particulate Matter 2 microns
RSS	Royal Scientific Society
RO	Reverse Osmosis
RSCN	Royal Society for the Conservation of Nature
SEA	Sexual Exploitation and Abuse
SEP	Stakeholder Engagement Plan
SE	Safety Equipment
TDS	Total Dissolved Solids
UNFCCC	UN Framework Convention on Climate Change
UNCCD	UN Convention to Combat Desertification
WB	World Bank
WAJ	Water Authority of Jordan
WWTP	Waste Water Treatment Plant

Acknowledgement:

The ESIA team would like to express their appreciation for all the efforts and support provided by the distinguish experts and representatives who's contributions were deemed vitally beneficial for the preparation and submission of this ESIA study. The expert contributions were considered to be extremely helpful in enhancing the technical content of this study which expedited the process of preparation. In this regard the ESIA team express their sincere appreciation to the following:

- Eng. Mahmoud Al-Jamani, Secretary General of the Ministry of Agriculture
- Eng. Awni Shdeifat, general manager of the Jordanian cooperative corporatin.
- Mr. Arafat Oqalah Al Murayat, head of the Agriculture Committee in the Decentralization Council / Tafila Governorate
- Dr. Imad Balsamah University of Science and Technology
- Eng. Imad Alawad Plant Protection & phytosanitary Directorate.
- Eng. Mamoun Adayleh, Director of Al Mazar Al Janobi Directorate
- Eng. Rayid Abed Alsalam Irbihat, Director of Tafileh Cooperative Directorate.
- Eng. Huseen Hawileh, Head of the Production Chain Development Department.
- Eng. Ahmed Al-Riffo, Head of the Forestry Department
- Eng. Muhannad Al-Amayreh, Head of the Plant Department
- Eng. Mustafa Bazza from the private sector (hydroponic suppliers)
- Eng. Muhammad Bashabashh Protected Agriculture Society

Executive Summary

i. Project Background:

The project is based on supporting the establish, installation and initial operations of a pilot hydroponics unit (e.g. computer-based humidity control systems, heat control systems and processing/packing equipment). The pilot high-tech hydroponic farm will be constructed within the boundary of the village of Al Al Burbaitah in the Wadi Al Hessa area located near the city of Tafileh, on the Land plot no.(3) parcel no. (5), in the Tafileh Governorate, on a land surface area of 1.5 Hectare or 15 (Dunoms). The Ministry of Agriculture has formed a team to carry out an Environmental and Social Impact Assessment (ESIA) study for the design, establish, installation and initial operations of a pilot hydroponics unit and to compare the Low - tech to the high - tech options unit. In addition, this project will also support the provision of the technical assistance, training and business management skills required to ensure the pilot project is managed as effectively as possible.

This ESIA focuses on the environmental and social risks and impacts of Hydroponic farming including a general economic analysis and possible alternatives. Furthermore it highlights the pros and cons as well as the mitigation procedures needed to minimize the environmental and social negative impacts. This study also clearly identifies the potential social and environmental impacts and proposes mitigation measures which have been prepared to be presented to decision-makers for review. The ESIA team carried out the ESIA study and produced the ESIA report following the format suggested in the contexts of the project terms of reference and incorporates all elements required by the World Bank and MoA, accordingly.

ii. Project Objective and Justification:

This project is intended to demonstrate and implement new entrepreneurial farm in rural areas, generally explain the economic benefits of hydroponics to the farming community, comparing three models? of farming options, High-tech multi-span hydroponics, High-tech Hydroponic single greenhouse and with low-tech Hydroponics greenhouse, educate the public through training and outreach programs and introduce training-for-employment opportunities. In terms of hydroponics, this will help the target groups (unemployed Women, youth and vulnerable people) to secure better jobs, given that the nature of work in hydroponics system does not require difficult agricultural work, but rather high skills that the trainees will acquire through the project to continue the training of the target groups, as well as taking the job opportunities that government will create in promoting the spread of hydroponics system in the farms around the project. Hydroponics will enhance the entrepreneurial spirit among farmers, given the saving of water in agriculture, the increase in productivity and subsidized loans allocated

by the Agricultural Credit Corporation to adopt this technology. The project will be implemented on one and half hectare owned by MoA See Appendix 1, land ownership documentation.

Jordan's agriculture is currently the largest use/consumers of water. While farmers irrigate about 46% of the total agricultural land (Department of Statistic (DOS), 2017)¹ agricultural water requirements represent around 52% of total national water supply (Ministry of Water and Irrigation)². Jordan's system of subsidies affects the use of irrigation water, which necessitates strict rationing to allocate the remaining water resources for other economic and social sectors i.e. industrial municipal and commercial. Needless to say, due to the severe water shortage challenge this rationing becomes more extreme during the hot summer months when the demand on water increases.

This project will promote water-efficient agriculture and efficient use of land through the demonstration of hydroponic production technologies. The proposed model will not only improve the quality of locally grown fruits and vegetables such as tomatoes, cucumbers, lettuce, strawberries and red rose but also helps diffuse potential tensions around use of scarce water resources in highly populated areas. It will help spread efficient farming systems in the use of irrigation water, which save about 60% of irrigation water. The project is also expected to build agricultural skills in the field of modern technologies and high technology in agriculture for the targeted groups of the unemployed, which helps them work in the project or the agricultural labor market or create their own projects.

The project will also promote the inclusion and active participation of women, youth, in the training activity and job opportunities that the project will generate. Syrian refugees in Tafileh Governorate will also participate in these activities and contribute to strengthening social cohesion, thus the private sector needs to be engaged in a meaningful way in finding solutions to a more sustainable and nutritious food system. The food industry is a key stakeholder and a major catalyst for change. This system was newly introduced to Jordan, there are private sector initiatives in northern Jordan and around Amman, but there are no initiatives in southern Jordan. This is due to the expertise requirement and high investment needed. Moreover, Jordan's youth unemployment increased from an already high starting point to reach 34 percent in 2016. One of the most important factors hindering the inclusion of young people in the society is limited access to employment, particularly decent jobs..

Jordan's climate is almost entirely semi-arid, or arid, receiving an annual average rainfall of less than 200mm per annum on 91.4% of the total land area. The water crisis has been aggravated by a local population increase and the acceptance of record numbers of

¹ http://www.dos.gov.jo/owa-user/owa/FOCAL_AGR.agr_kk?LANG=A&dis=0

² <http://waterjo.mwi.gov.jo/Ar/NewsCenter/Pages/2018-المياه-تصدر-مواز-نتها-المائية.aspx>

refugees fleeing political unrest, wars and social strife in neighboring countries for the last two decades alone.

The Jordan's labor market has been severely impacted facing significant vulnerabilities. The unemployment rate in Jordan remained elevated from 15% in 2010 to 18.5% in the Q4-2017, while the men's workforce participation rate in Jordan is roughly 87%, the rate for women is only 22%. Pay inequality is one major factor that leads Jordanian women to drop out of the labor force³. It is also important to underscore Jordan's dire water situation, as its water availability per capita is less than 90 m³/ year⁴. from annual renewable water sources, significantly below the global average of 500 m³/ capita/year. According the MWI, before the refugee crisis Jordan's total national water supply equated to 147 m³ /capita/year but today it is less than 97 m³/capita⁵. Climate change is expected to exacerbate challenges facing Jordan's natural resource endowment in years to come. With annual precipitations decreasing at a rate of 1.2mm per year an average of 20% according to Jordan's 3rd National Communication Report⁶ submitted the UNFCCC and temperatures increasing by an average 0.03 degrees per year, Jordan will most likely experience periods of severe droughts with longer periods of dry days, which will directly affect the agriculture sector and leave the country to deal with serious and complex environmental problems.

In irrigated agriculture the Jordan Valley Authority (JVA) allocates water 3 days per week for farmers through a public water network which is pumped to the individual farms and stored in cisterns (for summer shortages) prepared by the farmers either galvanized metal tanks or earth ponds and all municipal water extraction is metered by the water authority.

Therefore, Jordan's agriculture sector is well positioned to maximize the economic, social and environment benefits of advanced agriculture technologies. Hydroponics allows farmers to grow vegetables and fruit crops (tomatoes, cucumbers, strawberries, lettuce) faster than traditional field-based agriculture. Moreover, Hydroponic farming presents a viable economic and social solution for Jordan. Approximately, 16 to 20 % of Jordan's active population are involved in the agriculture and food sectors. While the primary share of agriculture in the gross national product GDP is relatively small (accounts for 5.5 percent of Gross Domestic Product (GDP) 16-20% GDP with indirect contributions (the food sector⁷), it consumes approximately 25% of the non-renewable freshwater sources.

The primary justification for executing such a project is to give specific attention to the inclusion of alternative water-efficient practices and to provide skills that women and youth can work with.. For example, the business model for the project may include a

³ 2000 - 2018 | Quarterly | % | Department of Statistics

⁴ Ministry of water and Irrigation

⁵ Water shortage in Jordan —Sustainable solutions

⁶ MoENV

⁷ policy reform Matrix for growth balanced 2018-2025

range of incentive schemes designed specifically for women (example of the schemes may include; skilled/non-skilled training, flexible working hours, paid incentives linked to production and performances, in addition to the standard wages, Labor Law (No. 8 for 2002).

The Hydroponics farming systems are not dependent on large volumes of water or land availability, and these systems also provide job opportunities for skilled and semi-skilled workers for both genders. These farming systems can be implemented in both rural and urban areas. Farms can be established closer to markets (providing fresh food directly to consumers) and multiple Hydroponic farms can allow farmers to produce almost all year long thus insuring consumers benefit from low cost of high valued fruits and vegetables, but this system needs high skills and high-cost investment this lead to prevent it from being expanded

iii. Methodology:

The methodology pertaining to the development of the ESIA involved multiple visits to the project area and meetings with relevant stakeholders, i.e. farm owners, managers, labors, Agricultural cooperative and women committees as well as the analysis and incorporation of other related studies conducted on similar projects in Jordan. Additionally, potential beneficiaries in the vicinity were identified prior to the commencement of the impact assessment. These include; Al Burbaitah Village, Jeser El-Shohada Village Shaidham village, Tafileh city among and the villages of Qasabat Al Tafileh District (See Appendix 2 land Map), also cooperative societies and committees present in them. The team then identified the impacts of each of the relevant activities during construction, operation, taking into account local laws and regulations, World Bank and MoA requirements as well as the outcomes of the baseline studies and data collection.

This ESIA is prepared in compliance with (MoEnv) Regulation no. (37), for year 2005) and World Bank environmental and social standards (under the new Environmental and social Framework). It aims to provide a description of the baseline conditions related to the project so as to provide a reference point for the environmental and social impacts caused by the project throughout its life cycle. Furthermore, it aims to identify and assess potential environmental and social impacts induced by the project and recommends the relevant mitigation measures as well as an Environmental and Social Management Plan (ESMP). The analysis is based on existing available information and best professional judgment.

iv. Description of the Project Area (See Appendix 2 land Map):

The project is located in the southern part of the Jordan in Wadi Al Hessa, Tafileh Governorate, near the village of Al Burbaitah 180 km South-West of the capital Amman, approximately 400 m above sea level. , The drive to the farm location in Al Burbaitah

will take about 1.5 hour depending on the weather and traffic. The project area is by far one of the most fertile regions due to the rich soil, high rate of rainfall in winter and suitable weather yearlong.

The project will be implemented on Government land (up to one and half hectare) owned by MoA (Appendix 1, land ownership). The site is located about 1.8 km to the south of the Karak – Tafileh street. The Tannur Dam it will be the water source for the project, its located adjacent to the planned Hydroponic farm on the eastern and western boundary of the plot. Located directly to the east of the Hydroponics farm are fruit and vegetable farms. The Tannur Dam is a storage water system carrying 12.5 million cubic meters of surface water from the Wadi Alhessa on the southern Badia through the east Jordan until the Wadi Araba. The nearest housing settlement identified is the village of Jeser El-Shohada, which is located to the east of the site about 1.8 km from the site, while Al Burbaitah village is located about 4.6 km to the west, Shaidham village is located about 10.5 km to the south and Tafileh city is located about 16.5 km to the south of the project site. The plot land is surrounded by agricultural farms. To the north east of the farm lies the Alaanh about 5 Km and Al Mazar Aljanobi about 13 km which is considered outside the project influence area.

The one and half hectare of farm land provided by the Ministry of Agriculture requires only minor preparation i.e. leveling and grading of top soil in order to get it ready to erect the two pilot hydroponics units including the utility buildings, Cooler Container, treatment facility, control room (e.g. computer-based humidity control systems, heat control systems and processing/packing equipment) and the required loading/ unloading area and living quarters.

In the 1970's and in order to increase local investments in the agricultural sector, the Government of Jordan through Jordan Valley Authority (JVA) began to allocate and appropriate agriculture land in the Wadi Al Hessa to local Farmers maintaining ownership in certain land plots for future government development purposes. This proposed project is one such a plot that remained under the ownership of the Government. All lots adjacent to the proposed project site are privately owned farms consisting of fruit plantations, and traditional open field farming of vegetables.

The average summer temperature in the western Wadi Al Hessa from July to September is between 30 and 40 degrees Celsius with no precipitation and in the winter months from November to March the average temperature ranges between 1 and 9 degrees Celsius and rainfall is frequent.

The Karak – Tafileh street lies 1.8 km west of the farm location and is linked via a well paved service farm road to the proposed project location (Appendix 1, landownership documentation).

v. Stakeholder Engagement:

For the purpose of preparing this ESIA study, the ESIA team carried out the Public Consultation as required by the MoA ToR, pursuant to ESS10 (see Annex no.(8). Stakeholder Engagement and Information Disclosure) taking into consideration the Regulation of Environmental Impact Assessment No. (37), year 2005.

The public consultation meeting took place on Wednesday the 11th of December, 2019 at premises of The Professional Associations Complex, located in Tafileh city. The number of participants were (51) including the ESIA team (See Appendix 2, page no.11), and a copy of the meeting agenda is on page no.12 (including a list of attendance). The local representatives and stakeholders participated in the meeting in response to written request sent by the ESIA team on the 3rd, of December to Tafila Agriculture Directorate.

Participation of all attendees was documented on a registration sheet. A list of the stakeholders and individuals attending the meeting were duly registered (See appendix 2, page no, 12), thus the list with full contact details is annexed to the public consultation report. The women attending the meeting constituted about 50% of participants and expressed their enthusiasm and interest in developing their experience in such a project.

The ESIA team explained to the audience all project Phases including; construction, operation, the project scope of work, the hydroponic technology, site location, the potential socio-economic benefits that the community gains from the project as well as the Grievance Mechanism.

The Public Consultation meeting provided the participants with the opportunity to provide their comments, ask questions and express their concerns. The ESIA team mediated the meeting and took the notes by documenting all raised questions, remarks and comments of all parties in order to be reflected in the study. The main concerns and feedback of the participants were collected in form, of Questions, Comments, Objections and Answers.

The following were the main concerns as concluded from the session:

Noting that the local community in the Tafileh Govrenorate historically are a well-established farming community with wide knowledge and experience in agriculture sector and best practices.

- Their priority concern for the communities lies in ensuring sustainable job opportunities in the agriculture sector.
- Local communities did not expect to have any serious problems in implementation of this type and size of project.

- The people are willing and eager to learn new technologies such as hydroponics farming.
- The community is interested in applying a grievance mechanism and considers it a priority. They insisted that the role of the MoA and the Jordanian cooperative Cooperation (JCC) be in resolving grievances in which friendly solutions to any complaint in the future would not work.
- Participants expressed their confidence in the work of local NGOs in the project area and suggested that government lands be allocated to local associations and supported it by similar projects
- The attendees expressed the need of the Ministry of Agriculture to set criteria for selecting the trainees and workers for the project (see appendix 5). They also expressed that the ministry has good experience and transparency in deals in previous employment projects. On the other hand, the local community is consisted of different tribes.

The attendees strongly suggested that any hiring of employees and workers in the project should be carried out by the MoA and not the NGO.

The ESIA team prepared and formulated the report according to the requirement of the World Bank Environmental and Social Standards "ESS10: Stakeholder Engagement and Information Disclosure", see Annex no. (8).

vi. Assessment of Potential Impacts (Positive and Negative):

The Potential Impacts of the planned project were evaluated considering the entire three phases of the project life cycle, construction, operation, which is shown in the ESIA report, chapter 4, paragraph 4.3.1.

All the impacts are classified either as positive or negative impacts depending on the potential effects. The positive impacts of the project are clearly dominant, while the negative impacts are seen to be minor.

Among the positive impacts of the project are the following:

- Water consumption for irrigation in the Advanced Hydroponic Farm is 90% less than traditional Farming in herbal crops and between 40-60% in other vegetable crops, That increases the efficiency of irrigation water use and release extra water for agricultural expansion .
- 50% less land is needed to grow the same amount of crops, especially crops grown in layers such as lettuce and strawberries.
- Enable the use of any kind of land available. no need of soil, no weeds and effective use of nutrients.
- land is used more effectively.
- Increase the cultivated area
- Produce much safe products
- - Higher productivity.60% less fertilizer is required
- Less pesticide use: Since plants are growing indoors.
- By eliminating soil (there's no need for toxic pesticides to protect plants)
- IPM applied reduce chemicals
- The project will secure permanent and seasonal job opportunities for local residents.
- The employees will have training opportunities offered to them and gain skills in the new high technology farming.

While the negative impacts include:

- Possibility of exposure to dust and toxic substances, ((volcano tuff and perlite) and pesticide
- Possibility of exposure workers to accidents during construction phase.
- Possibility of exposure to harmful algae and fungus growth.
- Generation of solid waste and probably hazardous wastes (). (if volcano tuff and perlite are used). And generate of organic waste such as unused plants which that volumes of waste are likely to be small.
- Hazardous waste management will incur additional cost of waste management
- Discharges of Reverse Osmosis reject water and wastewater with high content of salts.
- Possibility contamination by hazardous materials may occur due to improper transportation, storage and use of pesticides including impacts on; workers, air and soil.
- Possibility contaminate soil, source of odor, breeding of insects and reptiles, and harm birds
- Possibility of power outage, causes decline in crops yield due to these shortage
- Clogging in drip irrigation of Hydroponics leads to severe economic losses
- Possibility of technology failure, resulting in disruption of technical processes controlling the hydroponic high tech system; i.e, irrigation, nutrition, ventilation, climate control which could lead to loss of revenues for the farmer.
- Illness, cost for health treatment, less of working ability and productivity.
- water contamination in the dam if put in it dispose leftover dissolved fertilizers and pesticides

vii. . Proposed Mitigation Measures and Environmental and Social Management Plan:

The impacts and mitigation measures are summarized in the following tables which should be implemented during construction and operation. Since the day-to-day operational activities will be managed by the Project Owner, most of the responsibilities are designated to the Project Owner, in addition to the third part assessor (RSS), Municipality, and MoEnv. For (ESMP), refer to Annex no. (7), tables 20, 21 and 22.

Table 1 : Environmental impacts and mitigation measures during construction phase

Impact/ Issue	Mitigation Measure	Monitoring Measure	Implementation Responsibility	Supervision Responsibility
Solid Waste	Disposal of construction wastes at the site designated by the local authority.	Log sheet for weekly waste quantities	Contractor	Municipality
Public health	Strictly comply with the local regulations regarding the working hours and the levels of noise	Worker daily log-in/out sheet	MoA	MoA
	Removal and disposal of top surface soil resulting from leveling and grading the site.	Visual inspection	Contractor	Municipality/
Occupational safety and Health	Assign a Health, Safety and Environment Officer	Daily inspection by Safety Officer / Supervision Consultant Team	Contractor	MoA
	Provision of First aid kit			
	Identify closest Medical center/hospital for emergency cases			
	Enforce use of safety personal equipment, gloves, Helmets, Glasses, boots			
	sun exposure durations for work within acceptable limits			
	Meet all hygiene and sanitary needs of workers			

	with separate facilities for males and females. Report and investigate any accident Avoid working in dusty, raining, and strong windy weather Provide proper signage Securely pack and cover trucks with loose material Provide vehicles equipped with seats and barriers for the transportation of workers			
Disturbance of biodiversity	Avoid damaging and removal of fauna and crops in adjacent plots	Visual observation	MoA	MoA
Flood Occurrence	Design and implement measures to control seasonal floods	Visual observation	MoA	MoA
Increase in water demand and generation of waste water	Waste water generated during the construction phase should be collected in proper sealed septic tank and disposed to the nearest treatment plant.	Installing temporary waste water collection tank on-site	Contractor	MoA
	Provide an adequate source of water from available and approved off-site sources and encourage the reuse of treated water when possible.	Visual observation, recording	Contractor	MoA
	Conserve water use and restrict the use of groundwater in construction activities for human purposes	Visual observation	Contractor	MoA/ Traffic Department
	Hazardous Materials should be managed properly to prevent groundwater and surface water contamination (oil spills and fuel from vehicles)	Water samples tests, visual observation	Contractor Contractor	MoA/ Traffic Department MoA

Table 2 : Social impacts and mitigation measures during construction phase

Impact/ Issue	Mitigation Measure	Monitoring Measure	Implementation Responsibility	Supervision Responsibility
Employment	The employment of workers from local communities mainly for unskilled works and skilled workers if they are available	Registration and logs	Contractor	MoA/community
Training and skills	Training of the unemployed in the local communities on the financial management and business model	Trainees record	Technical officer	MoA/community
Community development	Increasing awareness in the local community of project planning, environmental issues and workers' rights	Awareness and workshop report	Technical officer	MoA
Gender consideration	Women's participation in project activities with more than 20% of total permanent workers and not less than 60% of temporary workers. Without any discrimination by gender.	Workers record	Technical officer	MoA

Table 3 presents the mitigation measures that should be implemented during operation. Since the day-to-day operations activities will be managed by the Project Owner, most of the responsibilities in this mitigation table are designated to the Project Owner, in addition to the third part assessor, Municipality, and MoEnv.

Table 3 : Environmental impacts and the mitigation measures during operation phase

Impact/ Issue	Mitigation Measure	Monitoring Measure	Implementation Responsibility	Supervision Responsibility
Occupational Health and Safety	Protect the workers while handling and disposal of volcano tuff and pearlite whenever used as culture media, having workers trained properly.	Periodic health test every 6 month	Safety/Social Officer	MoA & JCC
	Protect workers against pesticide spraying, provide the Safety equipment (masks, gloves, goggles, etc.) and enforce	Continuous visual check for using of Safety Equipment (SE)	Safety Officer	MoA & JCC

	Secure health insurance and health care for employees in accordance to Jordan Labor law	In a yearly basis	Safety Officer	MoA & JCC
	Available of separated sanitary facilities for men and women First aid and training of staff			
Disturbance of biodiversity	Avoid damaging and removal of fauna and crops in adjacent plots	Visual observation	MoA & JCC	MoA & JCC
	Design and implement measures to control seasonal floods	Visual observation	MoA & JCC	MoA & JCC
Accidents	Immediate reporting of fires to local fire-fighting offices	Record the occurrences of all accidents	MoA & JCC /Safety officer	MoA & JCC
	Regular check of electric systems is critical due to the interaction with water			
	Provision of Proper fire extinguishers and getting the staff trained on using them			
Protection of water resources	Protection of surface water, water in dam ground water from the rejected RO water it will be disposed in specific places owned by the municipality.	Surface, water in dam and groundwater water sample tests.	MoA & JCC / Safety officer	Municipality / MOENV
	Protect the water bodies from high nutrient content discharges they will be disposed in specific places owned by the municipality.	Placing underground collection tank for R.O. Reject water		
	Domestic waste water generated during the operation phase should be collected in proper sealed septic tank and disposed to the nearest waste water treatment plant.	Visual observation And records		
Solid and Hazardous Wastes	Collect and dispose various types of solid waste generated during operations regularly, residues of plants, damaged polystyrenes boxes, packaging material, empty containers, etc. they will be disposed in municipality landfill.	Visual observation And records	MoA & JCC / Safety officer	Municipality / MOENV
	Collect and removal of plastic clips and the hanging threads used for supporting the plants stem they will be disposed in municipality landfill.	Visual observation And records	MoA & JCC / Safety officer	Municipality / MOENV
	Separate and disposal of hazardous waste materials such as of volcano tuff and perlite, contaminated empty pesticides containers and other chemicals, they will be disposed in hazard materials municipality landfill.	Visual observation	Safety Officer	MoA & JCC / MoEnv.
Changes of Visual character	Ensure pleasant appearance of the site by possibly vegetating the surrounding area	Visual observation	MoA & JCC	
Shortages in Water Irrigation during the peak summer between late August and October.	Install a suitably sized water storage tank during in case of power outage. The water requirement is about 16000 m ³ and dam storage at least 1.8 million m ³ and it is available for the whole year. The project will be provided with solar energy .	Visual observation	MoA & JCC / Technical officer	MoA & JCC

Table 4 : Social impacts and the mitigation measures during operation phase

Impact/ Issue	Mitigation Measure	Monitoring Measure	Implementation Responsibility	Supervision Responsibility
Employment	Employment of trainees in project activities	Workers record	Technical officer	MoA & JCC
Training and skills	Training of the unemployed in the local communities on the hydroponics system	Trainees record	Technical officer	MoA & JCC
Community development	Increasing awareness in the local community of project planning, environmental issues and workers' rights	Awareness and workshop report	Technical officer	MoA & JCC
Gender consideration	Women's participation in project activities with more than 20% of total permanent workers and not less than 60% of temporary workers. Without any discrimination by gender	Workers record Trainees record	Technical officer	MoA & JCC

viii. Conclusions and Recommendations:

Conclusions:

According to the previous discussions and the outcomes of this ESIA, it can be concluded that the Project is not expected to cause any significant adverse environmental or social impacts in the project area and surrounding vicinity during construction or operation and impacts identified can be managed with good planning and demonstrated operational procedures. In fact, it is expected that the overall positive impacts will prevail by applying the sustainable development methodology of economic, environmental and social inclusion, for the local community which will ultimately bring significant benefits to the local community by achieving high productivity, minimizing land use and conserve irrigation water. These benefits will be evident to all stakeholders and will strongly encourage other farmers in the area to replicate this pilot project on a larger scale thus spreading the gained scientific knowledge to other farmers countrywide. However, the proper implementation of the ESMP is essential to ensure that any negative impacts are minimized and mitigated adequately and in a timely fashion and that the environmental performance is being monitored throughout the construction, operation phases of the project. Moreover, based on the conclusions of the public consultation meeting, it is important that all hiring of employees be done in a transparent manner through the project owner and offers gender balanced employment.

Recommendations:

The ESIA team based on its experience, public consultations, feedback, and peer expert review is recommending the following procedures, actions and measures to be taken to minimize the environmental and social risks and to safeguard the sustainability of the project. Only the most important recommendations are presented below. The complete and detailed recommendations are included in context of the full ESIA report, chapter 10, paragraph no. 10.2,

1. It is strongly recommended to apply a fully automated solution for control of the High-Tech hydroponic operation in order to achieve the best results and to establish the project as a training center, and to achieve a better comparison with both low-tech hydroponic and the traditional of greenhouse farming models.

2. Provision of an adequate Reverse Osmosis (R.O). system for irrigation in the hydroponic system, to meet the standards for water and nutrient within the irrigation system,.
3. Commitment to implement occupational health and safety procedures and provide occupational health and safety equipment, first aid kit and tools for project personnel during the stages of its implementation. Carrying out occupational safety training for contractors, work and staff on the project.
4. Implementing the labor law regarding working hours, working conditions, and working age. The provision of health facilities in the project for males and females separately.
5. Safe disposal of solid, hazardous and non-hazardous waste from the project in its landfills. Safe disposal of reverse wastewater in water treatment plants.
6. Ensure the implementation of the IPM plan and the application of legislation for the purchase, storage, transport and use of pesticides. And holding courses for workers in the project on IPM methods during the stages of plant growth.
7. Ensure implementation of the plan for the conservation of biological diversity and the prevention of exposure to wild animals in the project area.
8. Ensure that grievance mechanisms are applied and that female workers are not subjected to sexual harassment.
9. It is recommended to properly address the food-water-energy Nexus by addressing the use of renewable energy sources such as solar PV energy as a primary source of heating and cooling.
10. Recommend the implementation of the stockholders engagement plan for the in the project, whether direct or indirect, to reduce the negative effects such as competition for jobs and work in the project and ensure the transfer of lessons learned and skills acquired from the project to the stakeholders and their participation in the anticipation implementation of the environmental and social impact plan
11. Assign a safety/social officer to oversee and supervision the Environmental and Social Mitigation Plans (ESMP); to disseminate knowledge, awareness campaigns, liaise with local farmers and community.

Environmental Social Impact Assessment Report

Chapter 1: Introduction

The ESIA team on the bases of specific terms of reference to undertake an environmental and social impact assessment (ESIA) for a Hydroponics Farm near the Al Burbaitah village in the Wadi Al Hessa, Tafileh -Governorate. The project will support the design, establish , installation and initial operations of a pilot hydroponics unit. In addition, this component will support the provision of the technical assistance, training and business management skills required to ensure the pilot is managed as effectively as possible.

The scope of work of the T.O.R is to provide the project ESIA team with direction and a standard framework for preparing an ESIA study for a Hydroponics Farm in Al Burbaitah Area in the Wadi Al Hissa. This study will identify the potential social and environmental impacts and propose mitigation measures which have to be clearly and concisely presented to decision-makers for review. The ESIA team carried out the ESIA study and produced the ESIA report following the format which is suggested in the contexts of these terms of reference and incorporated all elements requested by MoA, accordingly.

In order to accomplish the reporting requirements, the ESIA study underlines the social and environmental impacts of the project and deals with the concerns of stakeholders, project proponent, executing companies, including the public sector and NGOs. The outcome of the ESIA covers all phases of the project life-cycle and will be in English.

1.1. General Overview:

According to the World Health Organization, Jordan is considered to have one of the lowest levels of water security in the world. As the population and also the number of refugees increases due to regional instability, the demand on water is also increasing. A recent study prepared by the Ministry of Environment indicated that a reduction in the amount of precipitation of 20%⁸ is due to the effects of Climate Change. As such, water scarcity is an issue affecting all walks of life and economic sectors in Jordan, and requires advanced, practical and low-cost solutions across a number of sectors to overcome this challenge. One important sector that is highly dependent on potable drinking water is the agricultural sector which is also identified as one of Jordan's 6 Green Economy sectors. Strategic changes are needed in the agricultural sector in particular in order to mitigate the effects of water shortage, which consumes approximately 50% of Jordan's water supply while contributing only 5.5% of the GDP⁹.

1.2. Project Background:

The highly developed Hydroponic farming (it's a modern system of green house with full automated and control and without soil system). is a viable alternative to the currently used conventional open field and greenhouse farming. The proposed Hydroponic project being discussed in this ESIA report is based in the Wadi Al Hessa, the heartland of Jordan fruit and vegetable production. The project will be implemented on MoA land (up to one and half hectare) (Appendix 1, land ownership).

⁸ NATIONAL COMMUNICATION report TO THE UNFCCC

⁹ USAID HYDROPONIC GREEN FARMING INITIATIVE (HGFI)

In addition to increasing revenues, hydroponic techniques also provide a platform to increase economic opportunity and provides new competitive skill sets to members of underserved communities. Introducing hydroponic systems to small and medium scale farmers also helps vulnerable groups, such as women and youth, harness and develop vital workforce skills and vocational training despite of its economically for small and medium scale farmers but it requires a high expertise and high investment. The total area of land owned by the Ministry of Agriculture (MoA) in the area is 700 hectares, but only 1.5 hectare (15 dunums) has been allocated to the local project Owner/NGO for the purpose of developing this project. The Ministry of Agriculture (MoA) strategy, in partnership with private operators and non-governmental organizations is to bolster job creation, reduce poverty, and foster women participation in the workforce.

This ESIA study will focus on the environmental and social impacts of Hydroponic farming including a general analysis of the economic costs and alternatives, and highlight the pros and cons as well as the mitigation procedures and IPM schemes needed to minimize the negative impacts. The Study will be condensed and focused due to the time constraints allowed in the TOR's to submit the final report.

1.3. Project Description:

The Project aims to test and promote a commercially viable, socially-inclusive, and water-efficient agriculture production systems in Jordan through comparison of three intensively managed covered farming units (see annex 1 Plan Lay-out). The project will: (i) compare the low technology hydroponic production system against high technology hydroponic production system; (ii) identify which of these systems is commercially and environmentally viable; and (iii) identify environmental and social challenges and propose mitigation measures; (iii) draw and disseminate lessons learned from the project and identify avenues for economically feasible investment and the future replication and scaling up possibility. The study seeks to inform future (public and/or private) investors in the Wadi Al Hessa and beyond.

This assessment covers various production systems i.e. low - tech Hydroponic and high-tech Hydroponic systems that are suited to produce cherry tomatoes, and cucumbers, strawberries, lettuce, Red Gori rose. These are considered high value vegetables and will bring in higher values in the local and regional markets. The aim is to maximize the high-end domestic market opportunities in Jordan and the wider region.

1.4. Project Justification:

This project is important for the private sector which is keen in exploring innovative, reasonable economic solutions and to identify a more sustainable and nutritious food production system. The food industry is a key stakeholder and a major catalyst for change. Moreover, Jordan's youth unemployment increased from an already high starting point to reach 34 percent in 2016. One of the most important factors hindering the inclusion of young people in society is due to limited access to employment, particularly decent jobs. When they are employed, they are more likely to work in precarious jobs that provide neither social protection nor opportunities for training and career progression. In contrast, Hydroponics could offer youth a safe and sustainable income that is in accordance with the national labor law, especially in this part of the Jordan Valley where Jobs are quite limited and farmers are

facing financial losses due to many driving factors for decades. Among these challenges is the shortages in water quantity and quality, taking in to consideration that Jordan's climate is almost entirely semi-arid, or arid, receiving an annual rainfall of less than 200mm per annum on 91.4% of the total land area. The water crisis has been aggravated by a local population increase and the acceptance of record numbers of refugees fleeing political unrest, wars and social strife in neighboring countries for the last two decades alone.

As a result, Jordan's labor market has been severely impacted and is facing significant vulnerabilities. The unemployment rate in Jordan remained elevated from 12.5% in 2010 to 18.5% in the Q4-2017, while the male workforce participation rate in Jordan is roughly 87%, the rate for women participation is only 22%. Pay inequality is one major factor that leads Jordanian women to drop out of the labor force¹⁰. It also is important to underscore Jordan's dire water situation, as its water availability per capita is less than 90 m³/ year of annual renewable water resources, significantly below the global average of 500 m³/ capita/year. Its total national water supply equated to 147 m³ /capita/year before the refugee crisis in 2012, is today less than 97 m³/capita¹¹. Climate change is expected to exacerbate challenges facing Jordan's natural resource endowment in years to come. With annual precipitation decreasing at a rate of 1.2mm per year at an average rate of 20% according to Jordan's 3rd National Communication Report submitted to the UNFCCC and a temperature increasing by 0.03 degrees per year, Jordan will most likely experience periods of severe droughts with longer periods of dry days, which will directly affect the agriculture sector and place the country in a very precarious situation to deal with serious and complex environmental problems.

Jordan's agriculture is currently the largest user of water in the Kingdom. While farmers irrigate about of 46% of the total agricultural land and irrigation water requirements represented around 50% of total national water supply. Jordan's system of subsidies affects the use of irrigation water, which necessitates strict rationing to allocate the remaining water resources. The Water Authority allocates irrigation water 3 days per week (with shortages reported during the hot summer months from August to October) for farmers through a public water network which is pumped to the individual farms and stored in cisterns prepared by the farmers either in galvanized metal tanks or lined earth ponds / lagoons, all municipal water extraction is metered by the JVA.

Therefore, Jordan's agricultural sector is well positioned to maximize the economic, social and environment benefits of advanced agriculture technologies. Hydroponics, allows farmers to grow vegetables and fruit crops (tomatoes, cucumbers, strawberries, lettuce) faster than traditional field-based agriculture. Moreover, Hydroponic farming presents a viable economic and social solution for Jordan. Approximately, 20 to 25 % of Jordan's active population are involved in the agriculture and food sectors. While the primary agriculture share of the national GDP is relatively small (only the accounts for 5.5 percent of Gross Domestic Product (GDP) 16-20% GDP

with indirect contributions (the food sector). One quarter of the total agricultural exports are vegetables and fruits, which are mainly exported to other countries in the MENA region. In contrast, other crops (excluding vegetables and fruits) constitute the highest share of

¹⁰ 2000 - 2018 | Quarterly | % | Department of Statistics

¹¹ Water shortage in Jordan —Sustainable solutions

agricultural imports, making up 46 percent of all agricultural products imported. Hydroponic farming provides a viable solution for farmers to move agricultural production towards high value crops, thereby increasing labor productivity and improving socio-economic conditions while reducing the agriculture's demand on water resources and increasing the land available for farming.

The objective of this project is to give specific attention to the inclusion of alternative water-efficient practices and to provide skills that women and youth can work with. For example, the business model for the project may include a range of incentive schemes designed specifically for women (example of the schemes may include; skilled/non-skilled training, flexible working hours, paid incentives linked to production and performances, in addition to the standard wages).

Jordan is located in one of the highest levels of sunshine days in the world, where the sun shines approximately 330 days a year¹². Consequently possibilities of utilizing solar energy as a substitute to conventional fossil fuel as a source of electrical supply is highly recommended. These advanced farming systems are not dependent on large volumes of water or land availability. Hydroponic farming systems also provide decent job opportunities for skilled and semi-skilled workers for both genders. The farming systems can be implemented in both rural and urban areas. Farms can be established closer to markets (providing faster access to fresh food) and allows farmers to produce approximately 300 days a year.

1.5. Objectives and Structure of the ESIA:

The ESIA will provide the baseline environmental and socioeconomic context for the project and recommend appropriate measures to avoid, reduce, and mitigate environmental and social risks. The ESIA study will also present a Stakeholder Engagement Plan (SEP) for the implementation/operational phase of the project in accordance with the Environmental and Social Framework ESS10 “Stakeholder Engagement and Information Disclosure”. The ESIA study will also include Labor Management Procedures (LMP) following the ESS2 “Labor and Working Conditions” which will set out the way in which the project workers will be managed during the implementation phase in accordance with the requirements of the related national laws and the ESS2 guidelines. The ESIA also address pest management and potential disease occurrence following the ESS and includes an Integrated Pest Management Plan. The ESIA will assess and determine relevant national and international, environmental and social legal and administrative requirements applicable to the project. This includes: a) the Legal Framework i.e. applicable national laws, legislations and policies, and international guidelines and practices including applicable World Bank Environmental and Social Standards and guidelines on Occupational Health and Safety (OHS), child labor prevention and non-discrimination and equal opportunity, public consultations, grievance redress mechanism, gender-based violence (GBV), sexual exploitation and abuse (SEA); and other relevant aspects, conventions and treaties; and b) The Institutional Framework including arrangements and responsibilities for the project coordination, implementation and monitoring.

The main objectives of the ESIA report are summarized as follows:

- Compliance with the Jordan Environmental law and EIA regulation.

¹² MEMR

- Compliance with applicable World Bank Environmental and Social Standards and guidelines.
- Ensures proper environmental and social management of the proposed Project.

1.6. The ESIA Key Stakeholders:

For Preparation of this ESIA, targeted groups such as community members, local NGOs, public officials and stakeholders were recommended, identified and contacted by MoA including:

- Farm owner(s)
- Municipal and other government officials
- Business owners
- community members
- Stakeholder groups, i.e. women's groups
- Concerned individuals
- Regulatory agencies
- Institutional representatives
- NGO representatives

The public consultation meeting is a formal presentation covering all phases of project (i.e. construction, operation). The community consultation meeting provides participants the opportunity to present their comments and ask questions and to hear feedback from other participants and to inform project owners of any concerns during early stages of project, as well as during project implementation.

The ESIA team previously carried out several site visits to the proposed location in preparation of the project ESIA TOR. On several occasions the ESIA team also met with local official representatives and prospective stakeholders and provided them with a general overview of the planned pilot Hydroponic Farm in the designated location.

In preparation for the Public consultation Meeting in December 2019, the MoA/ project owner called up stakeholders from the Al Burbaitah village, south of Amman about 180 Km and surrounding areas with an invitation to attend the public consultation meeting. Invitees included the same stakeholders and farm owners and officials previously encountered by the ESIA team and other stakeholders from surrounding villages.

Individual stakeholder meeting attendees:

- Government agencies responsible for authorizing, implementing or monitoring project activities
- Businesses potentially affected by construction or operation
- Community members
- NGO representatives including youth and women NGOs

Arrangements for the Public Consultation Meeting were discussed and agreed upon with the representative of the Tafileh Agriculture Directorate and covered the following points:

- Date, location and time of meeting
- Proposed project title and short description
- Name of the project owner and primary contact persons, including address and telephone numbers
- Purpose of community consultation meeting: to inform the public and stakeholders, obtain input and answer questions.

The main actor or entity identified as responsible for implementing the ESIA are:

- The client/project owner i.e. the MoA
- The Local execution partner NGO/Society.

1.7. Study Methodology:

The ESIA team started their work by reviewing the TOR provided by the project owner, the MoA, Informal meetings and consultations were conducted during the early stage to set up the scope of study. The ESIA team commenced by identifying all the project activities. The ESIA team then began to collect information related to the technologies on hydroponics farming and technologies used to operate such farms through desk reviews including the analysis of processes and incorporated other related studies carried out on similar projects in the Jordan.

Thus, in order to complete the development of the environmental and social components and baseline studies, multiple visits to the project area and formal meetings were held with relevant stakeholders, i.e. farm owners, managers, labors and ESIA team. As a step towards conducting the scoping process and public consultation. The Public Consultation meeting took place on Wednesday the 11th of December, 2019 at premises of The Professional Associations Complex, located in Tafileh City, South of Jordan.

Taking into account national laws and regulations, World Bank and MoA requirements as well as the baseline studies and data collected including the outcomes of the consultation meeting, the team identified the main environmental and social impacts and assessed their impacts throughout the project life cycle. The all mitigation measures were set forth accordingly. Furthermore, mitigation and the management method were developed to be included in the ESIA final report.

1.8. Limitations and Constraints

There were some limitations and Constraints facing the ESIA team while carrying out this project, which can be summarized as follow:

The project TOR called for the presentation of cost estimates on various technology options which is generally applicable for projects with existing feasibility studies and not commonly requested in ESIA reports according to the Jordanian Environmental Law and will be unreasonable in this project due to the small scale of the project. Thus no detailed economic cost estimates will be presented, only a general cost estimates is provided in the table no. (4) below which shows a cost comparison between conventional greenhouse and hydroponics, assuming that the land area varies slightly in each alternative, while land cost, pest control, fertilizers / nutrients and water costs differ fundamentally between the two systems..

Table 5 : Comparison of costs between conventional greenhouse and high-tech hydroponics

No.	Fixed Cost	Conventional Greenhouse of 360 m ² (40 m X 9 m)	Hydroponics Unit of 360 m ²
1	Construction, trays, culture media and climate control	6.9 JD/ m ² (2480 JD)	19.3 JD/ m ² (6930 JD)
2	Reverse Osmoses Unit (RO) Capacity of 10 m ³ /day	none	6000 JD
3	Generator	none	2000 JD
4	Running Cost (for Tomato cop)	1627	1058
5	Electricity	negligible	60 JD/Month
6	Diesel	None	20 JD/Month
7	Water consumption m ³	250	135
8	Production \ton	8	15

Chapter 2: Administrative and Legal Framework

This project is developed by MOA and will be managed by Establish a cooperative association of direct beneficiaries, which is designated by MoA as a competent cooperative association operated under the umbrella of Jordan Cooperative Foundation, also in cooperation with a competent Jordanian non-profit Company operated under the umbrella of Ministry of Industry, Trade and Supply, to implement component business model so it is quite important that the non-profit company be aware of the administrative, institutional laws and regulations that they will have to deal with in the future. Therefore, during the first phase of the project will be directly supervised by the Ministry of Agriculture of Jordan and the cooperative cooperation on the work of the project until the gaining of the experience and skills sufficient to manage the project which is expected to take one year. The Ministry of Agriculture will continue to provide the extension services required by the project in subsequent phases, the Jordan Cooperative Cooperation will monitor the activities of the association in accordance with the cooperation law and statute of the association

For this purpose this section gives a brief description of each of the institutions and entities relevant to the Project.

2.1. Legal Framework (including social and labor laws such as child labor prevention)

This ESIA report was done in accordance with the Jordanian Environmental Impact Assessment Regulation No. 37 for the year 2005. This section aims to identify the applicable regulatory framework in Jordan as relevant to the project. The MoA team prepared detailed regulatory framework list which includes relevant laws, regulations and standards related to environmental, social, health and safety, labor and planning issues. (Refer to Annex no. (4)).

Legal requirements have been reviewed and applicable laws and regulations have been identified and summarized below is a list for some national legal requirements that have been identified:

Laws:

- Environment Protection Law No. (52) for the year 2006
- Water Authority Law No. 18 for the year 1988
- Ministry of Agriculture Law No. 13 for the year 2015
- Public Health Law No. 47 for the year 2008
- Labor Law No. (8) for the year 1996 Archaeology Law (No. 21 for 1988)
- Planning of Towns and Villages and Buildings Law (No. 79 for 1966)
- General Electricity Law (No. 64 for 2003)
- Renewable Energy and Energy Conservation Law (No. 13 for 2012)
- Ministry of Social Development applicable laws are;
 - o Ministry of Social Development Affairs and Labor Law No. (14) of (1956) and amendments
 - o Societies Law No. (51/2008) and amendments
 - o Minors Law No. (32) of 2014
 - o Protection of Family in cases of Violence Law Nr. (6) of 2008

Regulations and By-laws:

- ESIA Regulation (No. 37 for 2005)
- Regulation for the Prevention of Health Nuisances (No. 72 for 2009)
- Regulation for the Protection and Safety of Workers from Machineries and Workplaces (No. 43 for 1998)
- Regulation of Preventive and Therapeutic Medical Care for the Workers in Establishments (No. 42 for 1998)
- Soil Protection Bylaw (No. 25 for 2005) Regulation of Land Use for 2007
- Environmental Monitoring and Inspection Regulation (No. 65 for 2009)
- Regulation for Protecting the Environment from Pollution in Emergency Situation (No. 26 for 2005)
- Air Quality Protection Regulation (No. 28 for 2005)
- Solid Waste Management Bylaw (No. 27 for 2005)
- Regulation for the Management of Hazardous and Dangerous Materials (No. 24 for 2005)
- Water Protection Regulation of 2004
- Underground Water Regulation (No. 85 of 2002)
- Sewerage System Regulation (No. 66 for 1994)
- Regulation for the Formation of Committees and Moderators of Occupational Safety and Health (No 7 for 1998)/Arabic

Instructions:

- Instructions for the Protection of Workers and Institutions from Workplace Risks and Hazards for 1998
- Instructions for Preliminary Medical Testing of Workers for 1998 Instructions for Regular Medical Testing of Workers for 1998
- Instructions for Wastewater and Treated Wastewater Use in Agriculture Instruction for the Management and Handling of Consumed Oil for 2003 Instruction for Management and Handling of Hazardous Waste for 2003
- Instruction for Regulating the Transport, Storage, Manufacture, Trade and Use of Compost for 2003
- Instructions for Noise Prevention for 2003

Standards:

- Ambient Air Quality Standards (No. 1140/2006) Water Quality Standards (JWQS) (2008)
- JISM Jordanian Standards for Treated Sludge and Sludge Disposal (JS 1145/2006) Standards for the prevention and elimination of noise (2003)
- Standard for the Maximum Allowable Limits of Air Pollutants Emitted from Stationary Sources (JS 1189/1998).

The table (5) below displays the allowable maximum limit of the equivalent acoustical volume level (dB A) per area Classification, Article 6 of Jordanian Instructions for Noise Prevention.

Table 6 : Maximum limits of the equivalent volume level (dB A)

Classification of the Area	The allowable maximum limit of the equivalent volume level (dB A)	
	Day	Night
Residential areas in cities	60	50
Residential areas in the suburbs	55	45
Residential areas in villages	50	40
Residential areas that have some workshops, simple crafts or business and commercial and administrative areas and center of the city	65	55
Industrial areas (heavy industries)	75	65
Education, worship and treatment places and hospitals	35	45

Ambient Air Quality Standards (JS 1140 for 2006)

These standards provide definitions of ambient air pollutants in addition to the maximum allowable concentration for each of those pollutants in the atmosphere, in addition to approved methods of measurement

The table (6), shows the allowable maximum limits for some of the pollutants listed in JS 1140/2006. The project should comply with these limits during construction. During the operation of the Project, the pollutants generated should also comply with limits detailed hereunder.

Table 7 : Maximum allowable limits set by JS 1140/2006

Pollutant	Averaging Period	Maximum Limit	Number of Times Limit is Allowed to be Exceeded
Sulphur Dioxide (SO ₂)	1 hour	0.3 ppm*	3 times in any 12-month period
	24 hours	0.14 ppm	Once a year
	Annual	0.04 ppm	-
Carbon Monoxide (CO)	1 hour	26 ppm	3 times in any 12-month period
	8 hours	9 ppm	3 times in any 12-month period
Nitrogen Dioxide (NO ₂)	1 hour	0.21 ppm	3 times in any 12-month period
	24 hours	0.08 ppm	3 times in any 12-month period
	Annual	0.05 ppm	-
Ozone (O ₃)	1 hour	0.12 ppm	-
	8 hours	0.080 ppm	-
Particulate Matter 10 (PM ₁₀)	24 hours	120 µg/m ³ **	3 times in any 12-month period
	Annual	70 µg/m ³	-
Particulate Matter 2.5 (PM _{2.5})	24 hours	65 µg/m ³	3 times in any 12-month period
	Annual	15 µg/m ³	-
Total Suspended Particulates (TSP)	24 hours	260 µg/m ³	3 times in any 12-month period
	Annual	75 µg/m ³ (geometric average)	-

*ppm: parts per million ** µg/m³ : microgram per cubic meter

Air Emissions from Stationary Sources (JS 1189 for 2006)

These standards provide definitions of stationary sources of air pollutants in addition to the maximum allowable concentration for each of those pollutants in the atmosphere. They also define approved methods of measurement. Furthermore, MoEnv has the legal mandate to oblige entities with an expected risk of exceeding permissible air emission levels to install the required equipment to make air emissions fall within standards. The table (7) shows the allowable maximum limits for some of the pollutants listed in JS 1189/2006.

Table 8 : Maximum allowable limits set by JS 1189/2006

Pollutant	Maximum Limit µg/ m ³
Sulphur Dioxide (SO ₂):	
Combustion of petroleum products	6500
Non-ferrous metal industries	3000
Sulfuric acid industries	1500
Sulfur trioxide (SO ₃), Sulphur Dioxide particulates	150
Nitrogen Dioxide (NO ₂):	
Combustion processes under 1200o C	200
Combustion processes above 1200o C	1500
Non-combustion Industrial processes	300
Volatile organic compounds	20
Lead (Pb)	0.5

Lead compounds	20
Cadmium (Cd)	0.05
Cadmium compounds	10
Chlorine (Cl ₂)	30
Hydrogen Chloride (HCl)	10
Hydrogen Fluoride (HF)	15
Copper (Cu)	1
Nickel (Ni)	2
Fluorine (F ₂)	5
Ammonia	50
Dioxin	1x 10 ⁻⁶

2.2. Institutional Framework:

The ESIA team prepared a comprehensive list of relevant institutions with detailed information related to the project activities (Refer to annex no. (4)), which were identified and are summarized in the list below:

- Ministry of Environment (MoEnv)
- Ministry of Water and Irrigation (MWI)
- The Water Authority of Jordan (WAJ) Jordan Valley Authority (JVA)
- Ministry of Social Development Ministry of Health (MOH)
- Ministry of Agriculture (MOA)
- Ministry of Municipal Affairs (MOMA)
- Jordan Electricity Company (NEPCO)
- Ministry of Labor (MOL)
- Ministry Of Industry and Trad and Supply (MIT)
- Jordan Cooperative corporation (JCC)
- The General Directorate of Jordan Civil Defense
- Jordan Institute for Standard and Metrology (JISM)
- The Royal Society for the Conservation of Nature (RSCN)

2.3. International Guiding Principles, Relevant Conventions and Treaties:

UN Framework Convention on Climate Change (UNFCCC)

In 1992 the framework set non-binding limits on greenhouse gas emissions for individual countries and contained no enforcement mechanisms. In 2015 the Paris Agreement was adopted, governing emission reductions from 2020 on through commitments of countries in Nationally Determined Contributions, lowering the target to 1.5 °C. Jordan adopted The Paris Agreement and entered into force in November 2016.

World Bank Environmental and Social Framework, in particular ESS1, ESS2, ESS3, ESS4, ESS10 and the WB General EHS Guideline which include standards on child labor prevention, forced labor, non-discrimination and equal opportunity, public consultations, grievance redress mechanism, gender-based violence (GBV), sexual exploitation and abuse (SEA), gender based aspects, code of conduct, Labor Management Procedures (LMP).

Jordan Labor Law of 1996, regards to term and conditions of work, and how national legislation applies to different categories of workers identified in Section 1. The overview focuses on legislation which relates to the items set out in ESS2, paragraph 11 (i.e. wages, deductions and benefits).

National labor legislation; Occupational Health and safety, regarding the right of the laborer not to work more than six hours per day. Furthermore, Article 73 of this law bans the employment of individuals less than 16 years of age. The Law also outlines that the Project shall comply with article 78 related to occupational health and safety, and provides essential precautions and arrangements to protect the workers from the risk of hazards and supply Personal Protective Equipment

Social Security Law (No. 1 for 2014) regarding the right to obtain social security insurance for workers subject to the Labor Law.

Chapter 3: Environmental and Social Baseline Data

3.1. Description of Project Area(See Appendix 2 land Map)

The project is located in the Wadi Al Hessa within the administrative authority of the Al Burbaitah village, near the village of Jeser El-Shohada, both villages are part of the Qasabat Al Tafileh District, Tafileh Governorate. The nearest housing settlement identified is village of Jeser El-Shohada, which is located to the east of the site about 1.8 km, while Al Burbaitah village is located about 4.6 km to the west and Shaidham village is located about 10.5 km to the south and Tafileh city is located about 16.5 km to the south of the project site, the plot land is surrounded by agricultural farms..

The site is about 180 km south West of the capital Amman, the drive from Amman to the farm location in Jeser El-Shohada will take about 1.3 hour depending on the weather and traffic conditions. The elevation at the farm location is approximately (400) meters above sea level. The upper Jordan valley area is by far one of the most fertile regions in Jordan due to the rich soil, high rate of rainfall and suitable weather yearlong.

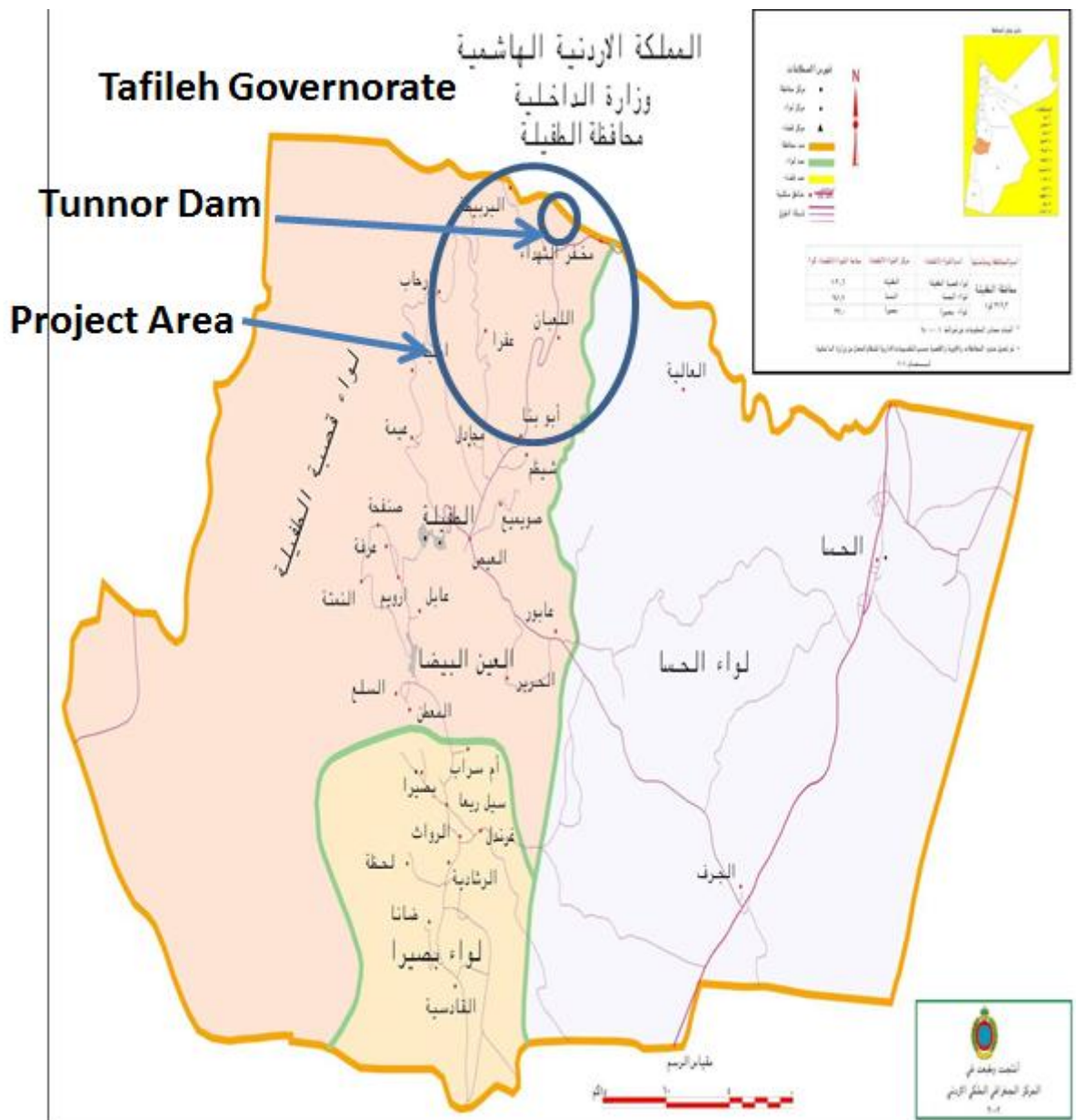
The site is located about 1.8 km to the south of the Karak – Tafileh street and is linked via a well paved service farm road.

The Tannur Dam adjacent to the planned Hydroponic farm location on the western side boundary of the plot. To the East of the Hydroponics farm are fruit and Vegetable farms. All adjacent lots are privately owned farms consisting of citrus plantations, traditional open field farming of Vegetable and fruit.

The Tannur Dam is a storage water system carrying about 12.5 millions of cubic meters of surface water from the Wadi Alhessa on the southern Badia, through the east Jordan until the Wadi Araba, this dam is the main source of water of the project .The nearest housing settlement identified is village of Jeser El-Shohada, which is located to the east of the site about 1.8 km, while Al Burbaitah village is located about 4.6 km to the west and Shaidham village is located about 10.5 km to the south and Tafileh city is located about 16.5 km to the south of the project site, the plot land is surrounded by agricultural farms. To the north east of the farm lies the Alaanah about 5 Km and Al Mazar Aljanobi about 13 km which is considered outside our influence area.

The project will be implemented on Government land (up to one and half hectare in the first Phase, with a provision of future expansion up to 4 hectares) The one and half hectare of farm land provided by the Ministry of Agriculture requires only minor preparation in order to get it ready to erect the two pilot hydroponics units including the utility buildings, Cooler Container and treatment facility, control room (e.g. computer-based humidity control systems, heat control systems and processing/packing equipment) and the required loading area and living quarters . Documentation photos are presented in Appendix (1).

Figure 1: Map of Project Area



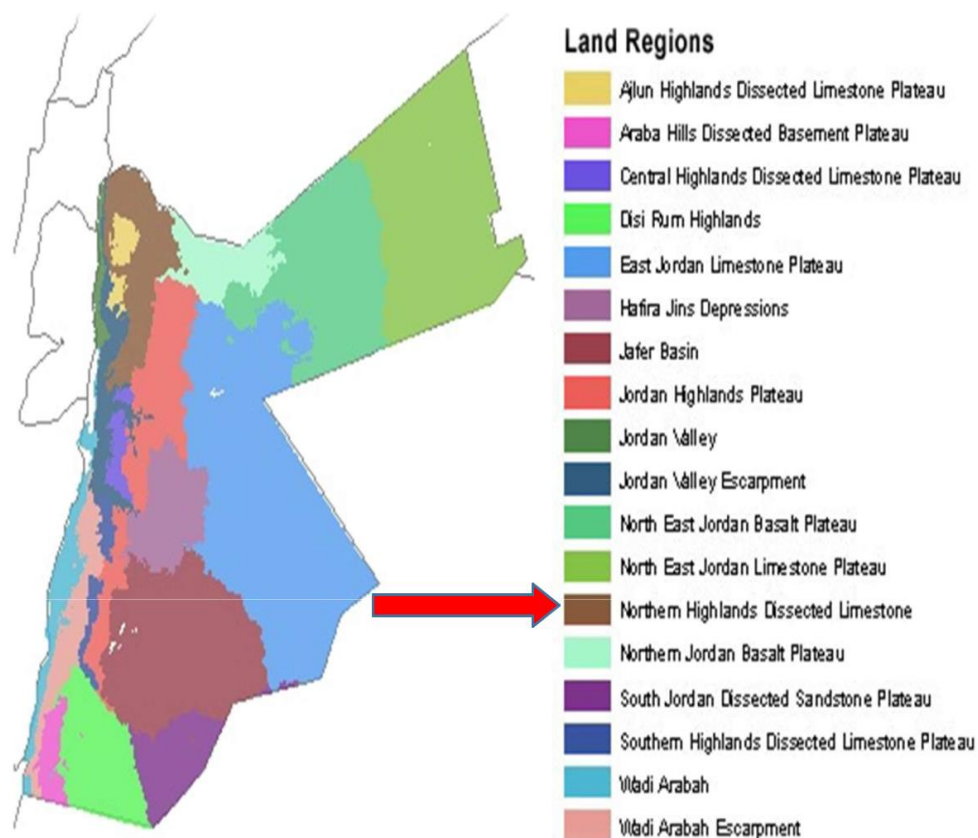
3.2. Physical and Biological Environment (Geological, Hydrological, Hydrogeological, Climatic, Flora, Fauna, etc.)

Physical Environment:

Geology

The Geological, and Hydrogeological status of the general project location is characterized by the following thematic Map, figure no. (4), source Jordan Environmental Restoration Programme, Ministry of Environment. Geologically, the farm is located directly on the Great Rift Valley fault line which extends from Ethiopia in the south 4000 Km to Turkey in the north and is considered a major migratory path for birds between Europe and Africa. The project area falls completely within the so called Irano-Turanian climatic vegetation Zone.

Figure 2: Classification of Land Regions



Temperature

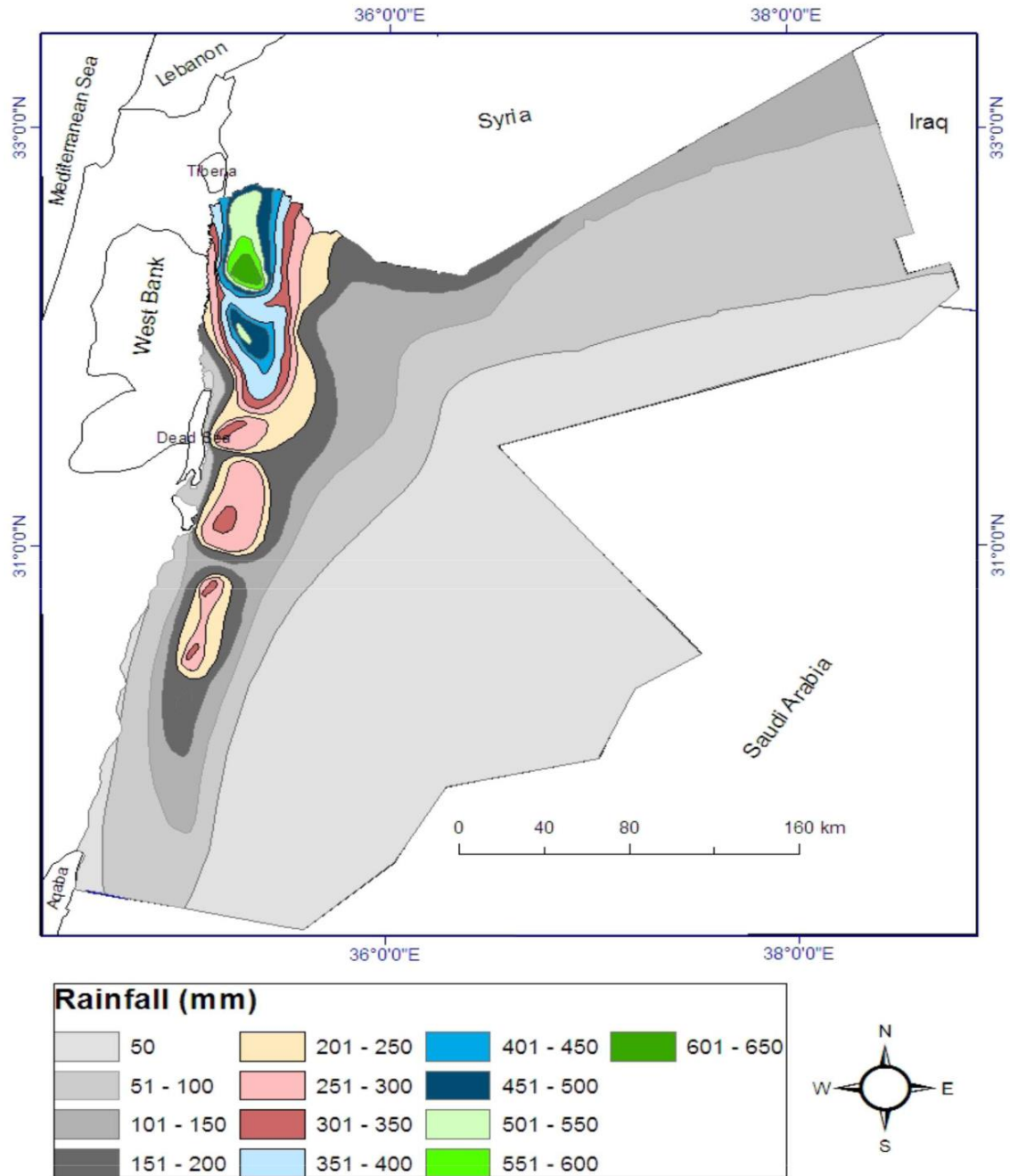
Temperature

The average summer temperature from July to September is between 40 and 45 degrees Celsius and in the winter months from November to March the average temperature ranges between 1 and 9 degrees Celsius and rainfall is frequent during these months.

Rainfall

The rainfall in the location is characterized by the following thematic Map, figure no. (5), source Jordan Environmental Restoration Programme, Ministry of Environment. The average rain fall is about 350-400 mm.

Figure 3: Map of Rain Precipitation Rates



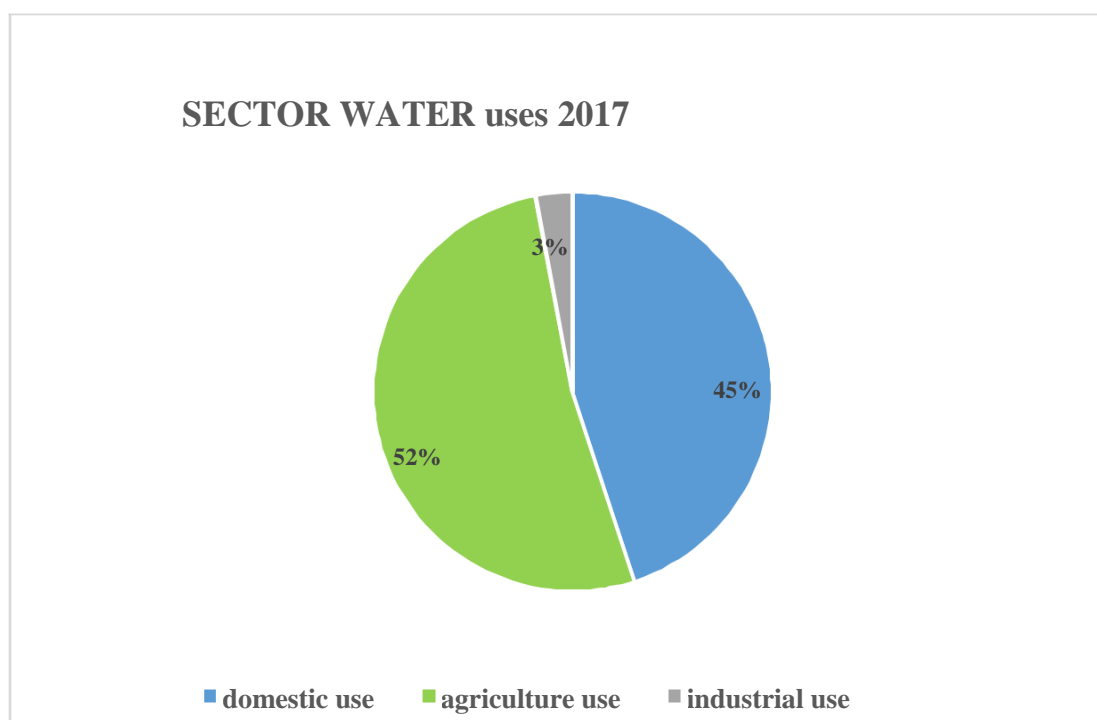
Water Resources in Jordan

The water shortage in Jordan is extremely severe due to the nature of the area and due the transboundary water resources, which are shared with neighboring countries who face similar water shortage problems. More than 90% of Jordan land receives less than 100 mm per annum of rainfall. The table below no. (8), source Ministry of Water and Irrigation, shows the share of water consumptions in various economic sectors with agriculture sector using the highest amount followed by domestic sector.

Table 9 : Water uses and resources in 2017 (MCM)

Uses/Resources (MCM)	Surface Water	Ground water	Treated Water	Total
Domestic	131.3	338.4	0	400.7
Agriculture	154.4	253.2	144.2	551.8
Industry	2.4	27.2	2.5	32.1
Total	288.1	618.8	146.7	1053.6

Figure 4: Percentage of Water Consumption by Main Economic Sectors



Air Quality and Ambient Noise

There are no economic activities in or near the project area that make noise or affect air quality. In addition, during the construction and operation stages, the project does not produce any sources of air pollution or sources of noise. Therefore, the ESIA study did not address these aspects.

Biological Environment

The project is located near the Tannur Dam in the area of Wadi Al-Burbita, which is part of Wadi Al-Hasa, seasonal rain water flows in winter, from the southern Badia region to Wadi Araba, through the course of the valley. There are many springs on which agriculture is based,

in the Wadi Al-Burbita, there are also hot springs and many Roman baths as baths of Burbita and baths of Afra.

The project will not have a negative impact on the biodiversity in the project area. However, it requires that the hunting of wild birds and animals, or the cutting of wild plants in the project area, be prohibited, whether from the project workers or people who visit the project from stakeholders.

To improve the biological diversity of the project area, the Ministry of Agriculture is currently planting about 30 hectares of forest trees to increase the area of vegetation.

The project area is not a nature reserve. But it is rich in biodiversity, where there are many wild plants such as grass grass (Gramineae). Wild merriment plant (*Salvia officinalis*) and wild onions (*Drimia maritima*). On both sides of the valley, the Sidr trees (*Ziziphus spina-christi*) and the Retama trees grow, but they are not at a high density. Along the valley, the trees of the Halfa (*Cladium mariscus*) and the Tarafa (*Tamarix jordanis*) and the Dulfla (*Nerium oleander*) are grown at a high density. There are also some palm trees. These trees constitute habitats for the wild animals that live in the area¹³

Mammals, Birds and Reptiles

Many wild animals live in the area, such as red fox, badger, mountain rabbit, and some predatory animals such as hyena and Ibn Awi. There are some reptiles such as snakes, lizards and frogs.

There are many types of wild birds, such as black eagle, partridge (*Perdix*), undulating skylark, Bulbul (*pycnonotidae*), and hoopoe (*upupa*). And A periodic bird (*Passer*)¹⁴.

3.3. Social and Economic Environment (health, poverty, employment, access to services, demographics, gender, disadvantaged or vulnerable groups, conflict, etc.)

The Socio-Economic Conditions:

It is important to note that due to political reasons the Government is reluctant to release any statistical data related to levels of unemployment, family income, poverty levels in the Kingdom. Therefore, our study relied on the latest data released by the Department of Statistics (DOS). Tafileh Governorate is located to the far south of the Kingdom, and the borders with Palestine from the West. The Wadi Araba from the west, Maan Governorate from the east, and Maan and Aqaba from the south, Karak Governorate from the north. The proposed land site is currently designated by the government for Ministry of Agriculture to be used as agricultural rehabilitation and research center.

According to DOS (2017) statistics, table no. (11), the total population of the governorate of Tafileh reached 67.7 thousand, while in 2010 the population was estimated 101.6 thousand people which accounts for 1% of Jordan's overall population.

¹³ Shatha AL-Rwashdeh, Taleb Masarwah & Ayed Taran, Morphometric and Hydrological Characteristics of Wadi Hasa Basin Using GIS & DEM. An-Najah University Journal for Research (Humanities) Volume (31,6), 2017.

¹⁴ Adel Al-Qatameen, Saleh Al-Kasasbeh, 2007. The Status of Tourism in Tafila Governorate, Master Thesis, Mu'tah University, Karak, Jordan

The total area of Tafileh Governorate is estimated at about 2209 km² which accounts for 2.5% of Jordan's total geographic area. Due to its unique geographic location Tafileh is positioned at the vicinity of the borders with Palestinian territories, Tafileh is also considered one of the most important trading centers in south Jordan, and is considered a major ground transportation hub between Aqaba and Amman to the north.

The official statistics about unemployment in Tafileh shows that the unemployment rate in Tafileh Governorate reached 2% in year 2016 (1.8% among males and 2.5% among females) compared to Jordan's 13.4% unemployment rate.

Latest official statistics on poverty indicators published by the Department of Statistics, based on the Household Income and Expenditure Survey in 2010, show that the poverty ratio in Tafileh has reached 17.2% which is slightly higher than the Kingdom's average of 14.4%. The number of the 'poor' in Irbid Governorate is 14244 people, accounting for 1.6% of the total number of the 'poor' in Jordan. The government is expected soon to release new poverty indicators prepared 2017, the poverty rate is expected to increase dramatically.

The table no. (11) Shows the main demographic indicators of Tafileh Governorate, and Districts; Population, Dependency Rate Area (Km²) for the Year 2016, by DOS.

Table 10 : Main demographic indicators of Tafileh Governorate

Districts	Population	Dependency Rate	Area km	Population Density	Less than 15 years old	15-64 years old	65+ years old
Governorate Tafileh (Total)	99000	65.3	2209	44.8	37.8	58	4.2
Jordan Total (Kingdom Level)	9,798,000	61.4	88794	11	32.2	61.2	6.6

Table 11 : Population growth rates, natural increase and net migration in Jordan, year 2012, by DOS

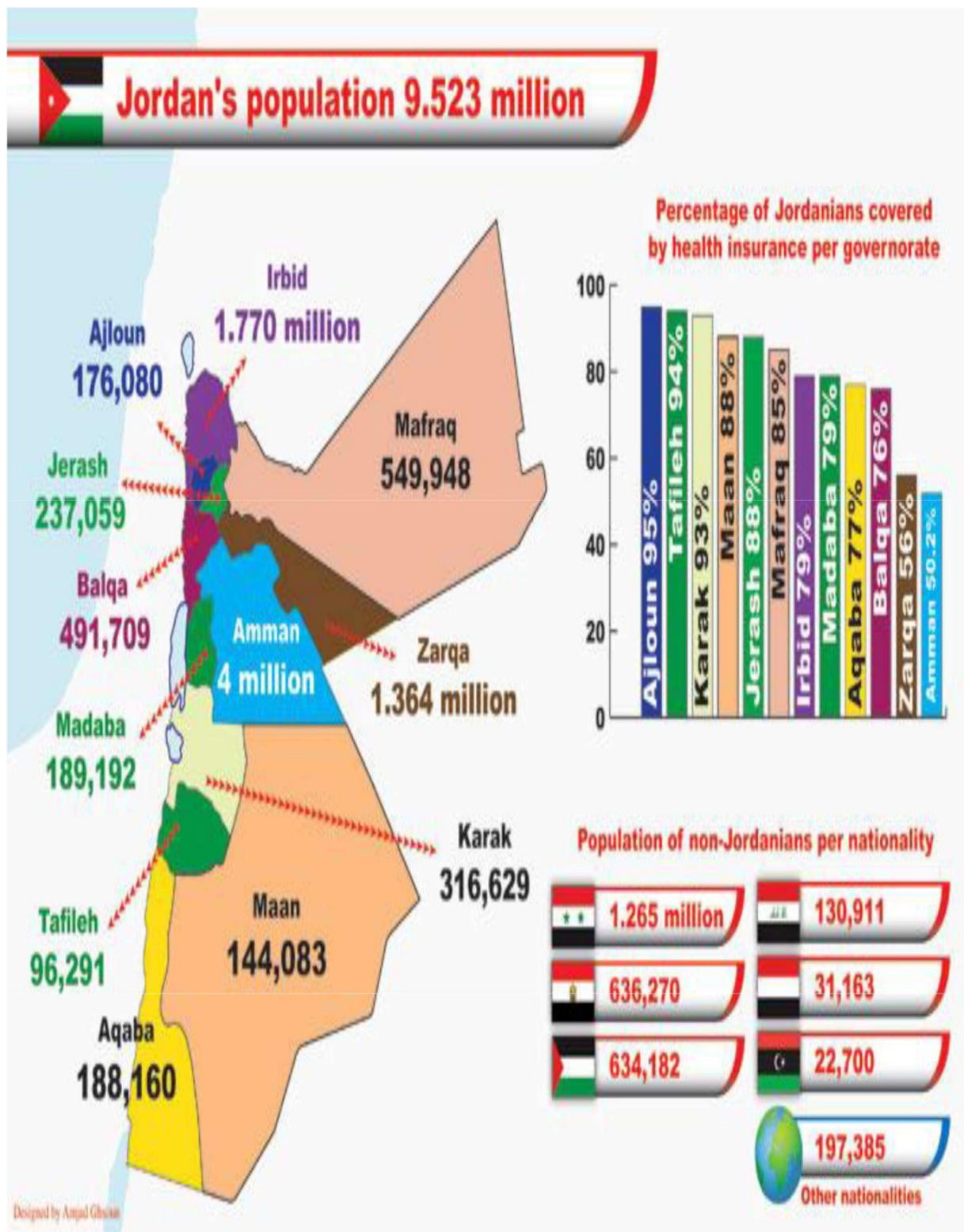
Period	Population Growth Rate	Natural Increase Rate	Net Migration %
1952-1961	4.8%	3.2%	1.6%
1961-1979	4.8%	3.6%	1.6%
1979-1994	4.4%	3.6%	0.8%
1994-1999	3.3%	2.7%	0.6%
1999-2004	2.6%	2.2%	0.4%

Table 12 : Poverty rate per Governorate, year 2010

Governorate	Poverty Rate %
Tafileh	17.2
Jordan	14.4

The figure no. (5) below shows the latest Jordan's population statistics, year 2018 and distribution among governorates. Tafileh population amount 96291 thousand, and also shows the percentage of Jordanian covered by health insurance per governorates, 94% of population in Tafileh are covered by health insurance.

Figure 5: Statistics of Jordan's Population, year 2018 and Distribution by Governorates



The population within the adjacent communities in the District & Sub District are described in the Table below no. (12), shows Population, households and gender in Tafileh Qasaba communities.

Table 13 : Demographic indicators within the study area, DOS 2015

District	locality	عدد الاسر Households	المجموع Total	اناث Female	ذكور Male	التجمع locality	اللواء District
Tafileh Qasaba	Ain El-Baidha	2074	10448	5019	5429	العين البيضاء	قصة الطفيلة
	Ies	2104	9787	4402	5385	العيص	
	Aimeh	463	2582	1251	1331	عيمه	
	Sanfahah	84	454	231	223	صنفحه	
	Namteh	12	62	20	42	المنته	
	Abu Banna	266	1247	626	621	اوبنا	
	Shaidham	208	946	469	477	شيدهم	
	Erhab	136	708	350	358	ارحاب	
	Dhba'ah	12	49	13	36	اضباعه	
	Majadel	175	855	381	474	مجادل	
	Swaimie	157	771	398	373	صويمع	
	Afra	9	39	14	25	عفرا	
	Aboor	19	69	14	55	عابور	
	Tal'et Hussain	93	453	195	258	تلعة حسين	
	Barbietah	32	175	83	92	البربيطة	
	L'iban	5	43	17	26	اللعيان	
	Harier	6	42	0	42	الحرير	
	Ezhaigah	6	15	3	12	ازحيفه	
	Zabdah	11	65	24	41	زبد	
	Sirah	16	255	7	248	الصيره	
	Jeser El-Shohada	32	161	87	74	جسر الشهداء	
	Nokhah	58	292	136	156	نوخه	
	Arafah	212	1098	542	556	عرفه	
	Abel	162	747	344	403	عابل	
	Mitan	2	15	6	9	المعطن	
	Erwayyem	354	1866	940	926	ارويم	
	Tafiela	5773	57559	13208	14351	الطفيلة	
Total District		12481	60803	28780	32023	مجموع قصة الطفيلة	
Total Governorate		63490	316629	151208	165421	مجموع محافظة الطفيلة	

The unemployment indicators by governorate shown in the Table below no. (13), by DOS 2015. The number of unemployed persons in the Tafileh Governorate is about 6652 persons, and the percent between male and female unemployment almost equal, While the level at Jordan, is 70 percent males and 30 percent females.

Table 14 : Number of Unemployment in Various Governorates, DOS 2015

Governorate	Male No.	Female No.	Total No.
Amman العاصمة	91,062	32,574	123,637
Balqa البلقاء	13,839	5,578	19,418
Zarqa الزرقاء	37,099	9,772	46,871
Madaba مادبا	7,198	2,350	9,549
Irbid اربد	34,185	22,715	56,900
Mafrq المفرق	9,904	5,280	15,184
Jerash جرش	5,460	3,677	9,136
Ajloun عجلون	4,765	3,755	8,520
Kerak الكرك	8,298	4,074	12,372
Tafileh الطفيلة	3,222	3,430	6,652
Maan معان	5,704	2,393	8,097
Aqaba العقبة	4,975	1,674	6,649
Overall total	225,711	97,272	322,983

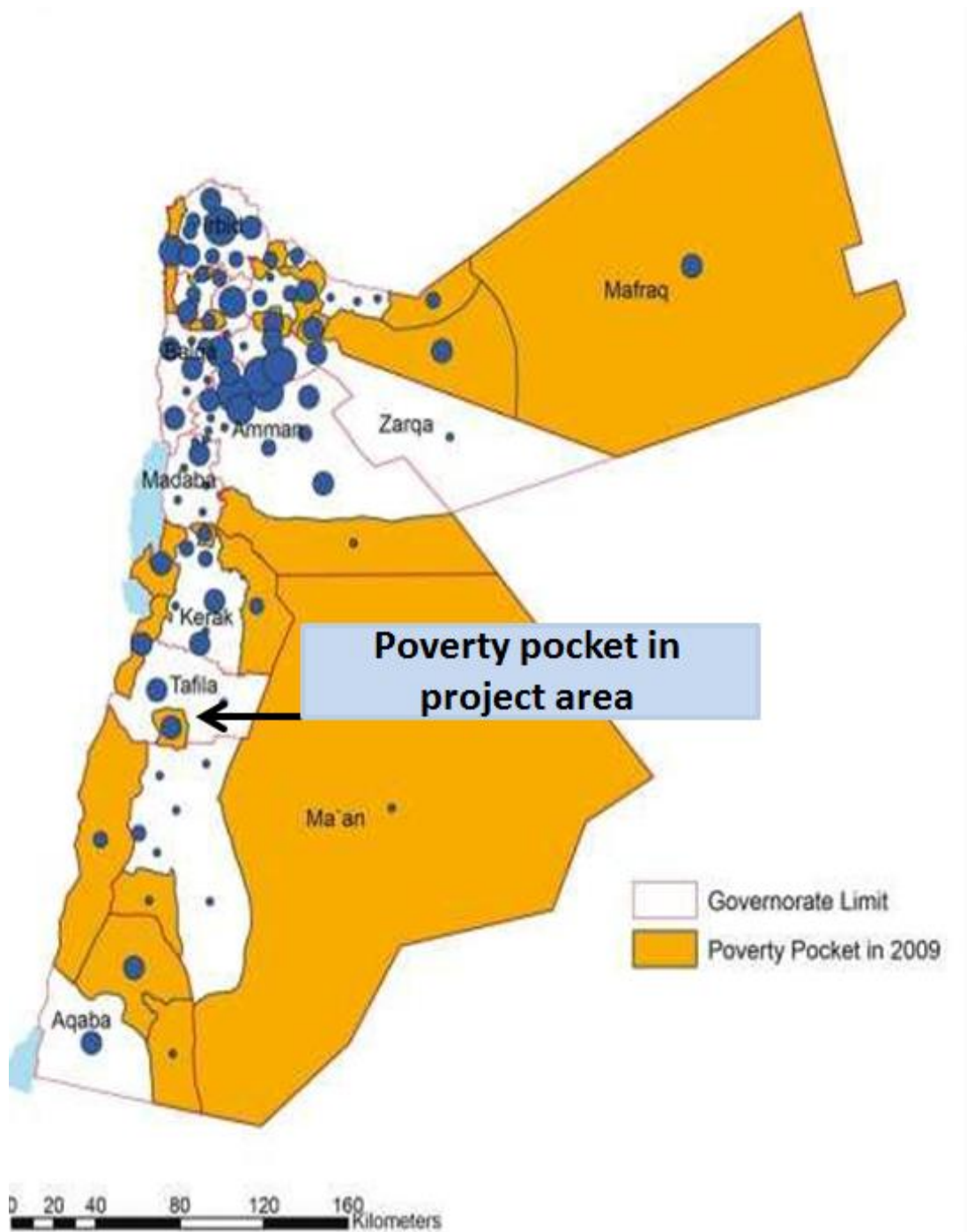
The unemployment indicators by governorate shown in the figure below no. (6), by DOS 2010. The percent of unemployed in the Tafileh Governorate is increase at the time, the figure

shows that the percent rises from 19.1 percent in 2006 to 21.1 percent in 2008. This result due to the fact that Tafila Governorate is one of the country wide, which lacks public and private sector projects that generate jobs.

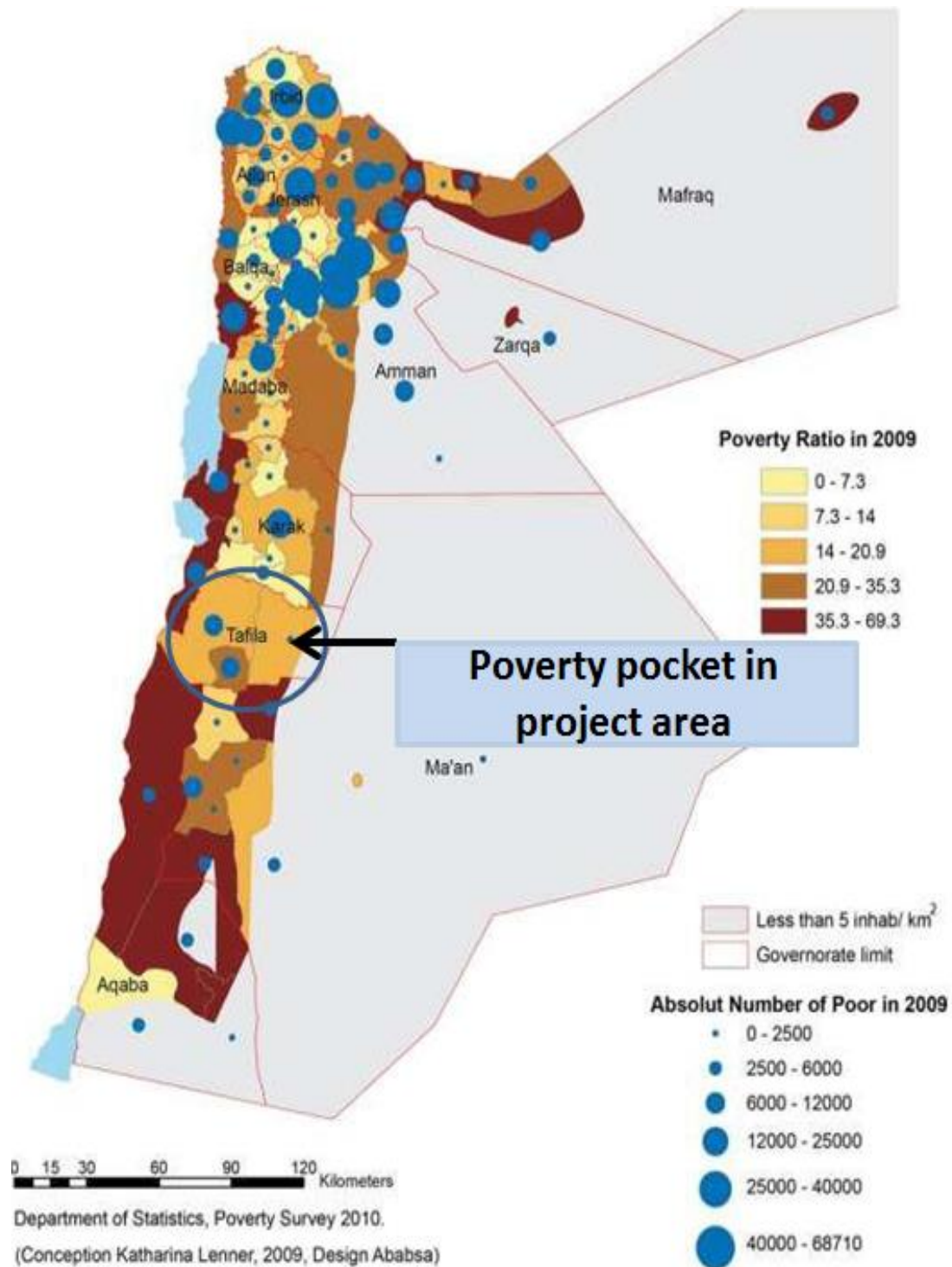
However, it is true that rural areas face employment challenges more than urban areas, despite the fact that Tafila Governorate is considered one of the agricultural areas in Jordan. Where the estimated number of agricultural holders working in plant wealth is 2198 and about 67.3% of them possess holdings of less than 1 hectare. The total cultivated area in the governorate is estimated at 2.34 thousand hectare (Department of Statistics, 2017) of which 1.29 thousand hectare are planted with field crops such as wheat, barley, lentils and chickpeas, and about 150 hectare planted with vegetables such as tomatoes, potatoes, melons, melons, zucchini and cucumbers, and about 900 hectare planted with fruit trees. Such as olives, grapes and guava, in addition to the production of livestock. There is also high competition among local workers who work in the agricultural sector and the imported workforce in addition to the recent impact of Syrian refugees as the number of Syrian refugees is estimated at 1172 refugees (Department of Statistics 2015), which led to a high rate of unemployment among local men and workers within the study areas.

The poverty rate in Tafila Governorate also increases, as the poverty rate reached about 17.2%, which is higher than the poverty rate in Jordan, which is estimated at 14.42%, and the number of poor families is estimated at 17.7 thousand families. Likewise, also, in Tafila Governorate, there is one of the poverty pockets in Jordan (Department of Statistic, 2010). The project will contribute to creating job opportunities for the poor family and unemployed youth and women in the project area, as well as training the poor family and unemployed in agricultural skills, especially in the field of hydroponics, which helps them to find jobs in the private sector or create their own projects.

Figure 6: The pockets of Poverty year 2009



Sources : World Bank and Department of Statistics, Hashemite Kingdom of Jordan Poverty Update, 2009
(Conception Katharina Lenner, 2009, Design Ababsa)

Figure 7: Classification of Poor Communities Distributed by Districts year 2009**Archaeological Baseline Conditions:**

The field survey and investigations revealed that no adjacent archaeological sites within the influence project area are identified.

Chapter 4.0: Environmental and Social Impacts

4.1. General Background

As the area surrounding the proposed Hydroponic farm is strictly agricultural from all directions; Moreover there are no protected areas (environmental and archeological) or parks in the immediate two Kilometers radius and all agricultural and IPM procedures will be applied as such no negative impacts are perceived. The Tannur Dam lies twenty meters to the West of the Farm separated by a 500 meter agricultural service road which forms a buffer area between the farm and the Dam. It is strongly advised to take necessary precautionary measures to avoid any cross contamination with the Dam.

4.2. Areas of Influence and Main Impacts Significance

Although the project is classified as a medium risk, the small size of the project will not have a significant negative impact on environmental and social issues, the following areas of influence are to be mentioned:

- Occupational Health and safety.
- Public Health.
- Employment opportunities.
- Socio-economic influence.
- Impacts on surrounding farms.
- Solid and Hazardous Wastes Water Resources.

4.3. Impacts Identification

4.3.1. Potential Environmental Impacts (Negative and Positive)

The Potential Impacts of the planned project it is evaluated considering the whole three phases of the project life cycle, construction, operation, which is summarized below which shows in detail the potential Environmental and social effects and positive and negative impacts.

However, the impacts are classified positive and negative impacts depending in their potential effects, the positive impacts of the project are clearly dominated, while the negative impacts are minor.

Among the positive impacts of the project are the following:

- Water consumption for irrigation in the Advanced Hydroponic Farm is 90% less than traditional Farming in herbal crops and between 40-60% in other vegetable crops, That increases the efficiency of irrigation water use and release extra water for agricultural expansion .
- 50% less land is needed to grow the same amount of crops, especially crops grown in layers such as lettuce and strawberries.
- Enable the use of any kind of land available. no need of soil, no weeds and effective use of nutrients
- land is used more effectively.
- Increase the cultivated area
- Produce much safe products
- - Higher productivity.
- 60% less fertilizer is required
- Less pesticide use: Since plants are growing indoors.
- By eliminating soil (there's no need for toxic pesticides to protect plants)
- IPM applied reduce chemicals
- The project will secure permanent and seasonal job opportunities for local residents.

- The employees will have training opportunities offered to them and gain skills in the new high technology farming.

While the negative impacts include:

- Possibility of exposure to dust and toxic substances, ((volcano tuff and pearlite) and pesticide
- Possibility of exposure workers to accidents during construction phase.
- Possibility of exposure to harmful algae and fungus growth.
- Generation of solid waste and probably hazardous wastes (). (if volcano tuff and pearlite are used). And generate of organic waste such as unused plants which that volumes of waste are likely to be small.
- Hazardous waste management will incur additional cost of waste management
- Discharges of Reverse Osmosis reject water and wastewater with high content of salts.
- Possibility contamination by hazardous materials may occur due to improper transportation, storage and use of pesticides including impacts on; workers, air and soil.
- Possibility contaminate soil, source of odor, breeding of insects and reptiles, and harm birds
- Possibility of power outage, causes decline in crops yield due to these shortage.
- Clogging in drip irrigation of Hydroponics leads to severe economic losses
- Possibility of technology failure, resulting in disruption of technical processes controlling the hydroponic high tech system; i.e, irrigation, nutrition, ventilation, climate control which could lead to loss of revenues for the farmer.
- Illness, cost for health treatment, less of working ability and productivity.
- water contamination in the dam if put in it dispose leftover dissolved fertilizers and pesticides

4.3.2. Potential Social Impacts (Negative and Positive)

The Potential Impacts of the planned project is evaluated considering the three phases of the project life cycle, construction, operation, which is summarized in the table (15), below which shows in detail the potential social effects and positive and negative impacts.

However, the impacts are classified positive or negative impacts depending on their potential effects, the positive impacts of the project are clearly dominated, while the negative impacts are minor.

Table 15 : Social positive and negative impacts during all project phases

Topic	Potential Effect	Positive Impact	Negative Impact
Socio - economic	Employment during construction and operation phases	The project will secure about 15 permanent and seasonal job opportunities for local residents	<ul style="list-style-type: none"> - As this project is small with a possibility to hire 13 full time employees and 12 part time workers, the heightened expectations for employment opportunity may result in disappointment. - Risks of non-compliance with codes of conduct, especially those related to sexual harassment among workers. - Risks of not complying with codes of conduct and labor law
	Training and skills	The employees will have training and gain skills in new field and technology	
	Knowhow transfer	The 40 trained and skilled staff who have been trained for 75 days are expected to transfer their knowledge to other communities as trainers.	
	Community development	The project is expected to contribute to direct community development through supporting the municipality, the youth activities, women groups and cultural events.	
		The project is expected to contribute to business prosperity through creation of direct & indirect businesses (groceries, food suppliers, maintenance workshops, transportation ...etc.)	
	Employment at the operation phase	The trained and skilled employees will have the opportunity to join other similar projects or establish their own cooperatives if they can be supported.	<ul style="list-style-type: none"> - Qualified staff, technicians, and workers can lose their Jobs - They will lose security insurance and health care insurance
	Gender consideration	The nature of project activities, particularly in the seasonal activities will be quite convenient for	

		both women & youth take advantage of employment in (i.e. crop harvesting and grading)	
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4.3.3. Impact Mitigation at Various Phases of the Project (Construction and Operation)

Table 16 : Impacts and mitigation measures during construction phase

Impact/ Issue	Mitigation Measure	Monitoring Measure	Implementation Responsibility	Supervision Responsibility
Solid Waste	Disposal of construction wastes from the site into the designated landfill by the local authority.	Keep monthly log of disposed quantities	Contractor	Municipality
Public health	Strictly comply with the local regulations regarding the working hours and the	Timesheet log	MoA	
	Cover tightly fertilizer tanks	visual	MoA	MoA
Occupational safety and Health	Assign a Health, Safety and Environment Officer	Daily inspection by Safety Officer / Supervision Consultant Team	Contractor/ Jordan Technical officer	MoA
	Provision of First aid kit			
	Identify closest Medical center/hospital for emergency Cases			
	Training the contractor and workers ON OHS requirements			
	Enforce use of safety personal equipment, gloves, Helmets, Glasses, boots			
Occupational safety and Health	sun exposure durations for work within acceptable limits.	visual	Contractor/ Jordan Technical officer	MoA
	Meet all hygiene and sanitary needs of workers including provision of separate sanitary facilities for males and females.			
	Report, investigate and take timely actions on any accidents.			
	Avoid working in dusty, raining, and strong windy weather.			
	Provide proper signage.	Weekly report of traffic Accidents speed limit signage on access road are installed	Contractor	Traffic Department /Project owner
	Securely pack and cover trucks with loose material.			
	Insure vehicles carrying workers are equipped with seats and are in compliance with public transport general safety regulation.			
Disturbance of biodiversity	Ban workers from trapping or hunting any existing fauna species in the project or neighboring area and restrict removal during construction	Visual observation	MoA	MoA RSCN
	Conserve the flora and fauna when found nearby.			
Flood Occurrence	Design and implement flood control measures	Gabions are properly installed on the southern border of the farm	Contractor	MoA
Increase in water demand	Waste water generated during the construction phase should be collected in properly sealed septic tank and disposed to the nearest treatment plant.	Visual observation, Log recording	Contractor	MoA
	Provide an adequate source of water from available and approved off-site sources and encourage the gray water reuse for	Secure on site storage tank for RO reject and grey water collection.	Contractor	MoA

	dust control when possible.			
	Conserve water use and restrict the use of groundwater in construction activities for human purposes.		Contractor	MoA/ Traffic Department
	Hazardous Materials should be managed properly to prevent groundwater and surface water contamination (oil spills and fuels from vehicles) and ensure an action plan is present if such contamination takes place	Visual observation, water samples tests	Contractor	MoA
Employment	The employment of workers from local communities	details of the employees and their attendance	Contractor	MoA
Training and skills	Training of the unemployed in the local communities on the financial management and business model	Trainees record	Technical officer	MoA
Community development	Increasing awareness in the local community of project planning, environmental issues and workers' rights	Awareness and workshop report	Technical officer	MoA
Gender consideration	Women's participation in project activities with more than 20% of total permanent workers and not less than 60% of temporary workers. Without any discrimination by gender.	Workers record	Technical officer	MoA

The following table no. (17), presents the ESMP that should be implemented during operation. Since the day-to-day operations activities will be managed by the project Owner, most of the responsibilities in this ESMP are designated to the Project Owner, in addition to the third part assessor (SGS, RSS) and Municipality, MoEnv

Table 17 : Impacts and mitigation measures during operation phase

Impact/ Issue	Mitigation Measure	Monitoring Measure	Implementation Responsibility	Supervision Responsibility
Occupational Health and Safety	Protect the workers while handling and disposal of rock wool whenever used as culture media, having workers trained properly on the use and actions to be taken if exploded	Periodic health test (semi- annual)	Safety/Social Officer	Owner
	Protect workers against pesticide spraying, provide the Safety equipment (masks, gloves, goggles, etc.) and enforce	Continuous check for using of Safety Equipment (SE) (continues)	Safety Officer	
Accidents	Immediate reporting of accidents to local civil defense offices	Record the accidents occurrences (immediately)	Project Owner/ Safety officer	Project Owner General Directorate of Civil Defense
	Avoid access of people especially children to water lagoons by fencing.			
	Provision of proper fire extinguishers and getting the staff trained on using them			
	Monthly check of electric equipment to ensure no leakages			
Protection of water resources	Safe disposal of reverse osmosis (RO) water in the treated water plant	Undertake surface and groundwater water sample tests (monthly)	MoA/ Safety officer	Municipality / MOENV
	Safe disposal of high nutrient content discharge into the treated water plant			
	Domestic waste water generated during the operation phase should be collected in properly sealed septic tank and disposed to the nearest waste water treatment plant.			
Solid and Hazardous Wastes	Collect various types of solid waste generated during operations regularly, residues of plants, damaged polystyrenes boxes, packaging material, empty containers, etc. Collect and removal of plastic clips and the hanging threads used for supporting the plants stem.	Visual observation (daily)		
	Separate and disposal of hazardous waste materials such as rock wool, contaminated empty pesticides containers and other chemicals,	Visual observation (Seasonally)	Safety Officer	MoA/ MoEnv.

	Rigorously implement Integrated Pest Management Plan (IPM). Control all sources of dust generation to avoid insects attraction specially Spiders.	Visual observation (daily)	Safety Officer / MoA	MoA
Changes of visual character	Ensure pleasant appearance of the site by possibly vegetating the surrounding area	Visual observation (daily)	MoA	
Shortages in Water Irrigation during the peak summer between late August and October.	Create a metal or plastic tank to store enough water	Visual observation	MoA/ Technical officer	MoA
Employment	Employment of trainees in project activities	Workers record	Technical officer	MoA
Training and skills	Training of the unemployed in the local communities on the hydroponics system	Trainees record	Technical officer	MoA
Community development	Increasing awareness in the local community of project planning, environmental issues and workers' rights	Awareness and workshop report	Technical officer	MoA
Gender consideration	Women's participation in project activities	Workers record Trainees record	Technical officer	MoA

4.4. Enhancement of Positive Impacts at Various Phases

The following enhancement actions are proposed:

- Activation of the grievance mechanism for community and workers.
- Establishment of coordination procedures with local community and stakeholders.
- Set up well designed training programme and keep records of trained persons.
- Seeking high caliber experts for support of Hydroponics technical knowhow to grantee the success of the project and sustain management of hydroponics.
- Keep records of success stories to follow and incidents of failure to avoid in the future.

Chapter 5: Analysis of Project Alternatives

5.1. Background

This chapter deals with possible alternatives which can be implemented or adopted by project owner. The suggested alternatives compare three farming systems and provides an opportunity to choose the best technology in terms of water consumption, crop quality, productivity by using modern technologies to control the in house climate conditions in high-tech, low-tech and to a certain degree traditional farming. See, Annex no. (5), Concept of Project study alternatives.

5.2. Alternative Project Location and Alternative Farming Methods

There is no alternate location as this location was the only location provided by the project owner. In the case of the high-tech hydroponic farming any location would be suitable as this technology does not require or depend on soil fertility or specific ambient conditions in order to produce crops. The reason for choosing the current location were driven mainly by the following factors:

- It is located in heart of an agriculture area,
- The government has allocated lands to establish a pilot center for agriculture with the Hydroponics system.
- Availability of low cost irrigation water.

- The low cost of electricity for agriculture use.
- The availability of work force with agricultural experience.

As for the analysis without the project, it will be the alternative to traditional greenhouses. The conventional system requires higher operating costs than the hydroponics system, since the cultivation takes place in the soil and therefore in every season the soil needs to be sterilized, it is more susceptible to agricultural pests and soil deaths, this results in more use of insecticides and fungicides. Also, agriculture in traditional greenhouses requires more use of chemical and natural fertilizers, as a result of the loss of many elements during the soil. The important point is water consumption as the hydroponics system is more efficient in water consumption, where it consumes 90% less water in herbal crops and between 40% -60% in other vegetable crops.

There are several farming systems for hydroponics, they differ among themselves by the type of covers used. Where the cost of the system covered with polycarbonate and an area of 350 square meters is estimated at about 20,000 Jordanian dinars, while the cost of the system covered with polyethylene 200 micron treated against ultraviolet radiation is about 7000 Jordanian dinars. The project adopted the second system in which the cost of investment is reduced.

5.3. Comparison of Alternatives

The concept of the project that was planned to be implemented within the designated land identified by the MoA, for more detailed information, see Annex (5), Concept Project Study Alternative, for Soilless / Hydroponic Systems:

The project concept aims to compare three farming systems and to identify the best alternative in terms of water consumption, crop quality, production quantities and economic viability.

The possibility of using solar energy as an alternative energy source can be investigated further in a separate study. The use of alternative modern techniques such as; low-tech and high –tech hydroponic farming, in controlling in-door weather conditions is recommended as a viable alternative to traditional farming and provides greater opportunities for expanding agriculture activities into regions not suitable for conventional farming.

The purpose of this particular project to conduct a comparison of various variables; i.e. Energy consumption, water consumption, crop yield, running cost on three separate agricultural models:

- Low-tech: Using simple hydroponic techniques under traditional plastic houses.
- Mid -tech: Advance hydroponic technology under a modern green houses with full control of irrigation, fertilization, pest and climate control conditions.
- High-tech: Advance hydroponic technology under a modern multi-span green houses with full control of irrigation, fertilization, pest and climate control conditions.

The summary of the planned alternatives are described in the following Table no. (19) as a comparison between the three farming models.

Table 18 : Summary planned technologies activities

Type of Technology	Water use efficiency	Energy efficiency	Production	Construction cost	Product Marketing	Adoption by farmer
Low- tech	low	high	Traditional production by season	low	Local marketing	high

Mid- tech	High	medium	Continues production throughout the year	Acceptable to small farmers	High Possibility of export marketing	Mid for small farmers
High- tech	High	low	Continues production throughout the year	Acceptable to large scale farmers	High Possibility of export marketing	High for large scale farmers

Chapter 6.0: Environmental and Social Management Plan (ESMP)

6.1. Background

The project owner carried out several field visits prior to the Public Consultation Meeting in May and during the early preparation stage. Many of the stakeholders and local community members were informed of the project objectives and proposed technologies and presented their concerns directly to the project owner and presented their suggestions during that time. Thus the ESIA report is prepared to express comments and suggestions taking in to consideration all comments and suggestions regarding the environmental impacts, a social concerns and propose the mitigation measures for the negative impacts and to respond to all social concerns and interests, in addition to identification of the responsible parties and individuals.

6.2. ESMP Responsibilities.

The Responsibilities are distributed jointly or separately among the following actors:

- Supervision team on implement project (STIP) in all environmental, social and administrative aspects.
- Local committee consists of government institutions and NGOs concerned with development and the environment.
- Construction Contractor
- Safety officer
- Project Owner
- Municipality /
- Traffic Department /Project owner
- Royal Society for the Conservation of Nature (RSCN)
- General Directorate of Civil Defense
- MoEnv.
- Jordan Cooperative Corporation (JCC)

For detailed responsibility see tables no. (16, 17, 18) Of Chapter 4

6.3. Environmental Management Matrix Table.

The environmental management matrix table is shown in tables no. (16, 17, 18) Of Chapter 4

6.4. Social Management Matrix Table

The social management matrix is presented in table no.15.

6.5. Monitoring the ESMP (including frequency and indicators throughout project life-cycle)

The following impacts were identified at various phases of the project life –cycle (Construction, Operation). Meanwhile, the following table no. (20), presents the ESMP that should be implemented during construction phase and must be managed by the contractor and project Owner most of the responsibilities in this ESMP are designated in this phase to the contractor, in addition to the third part assessor (RSS) and Municipality, MoEnv.

Table 19 : ESMP Monitoring during construction phase including frequency and indicators

Impact/ Issue	Mitigation Measure	Monitoring Measure	frequency	indicator	Implementation Responsibility	Supervision Responsibility
Solid Waste	Disposal of construction wastes from the site into the designated landfill by the local authority.	Keep monthly log of disposed quantities	monthly	Wight of wastes in m ³	Contractor	Municipality
Public health	Strictly comply with the local regulations regarding the working hours and the levels of noise	Timesheet log	Continuous during working hours	No. of complains No. of committed workers	MoA	MoA
Occupational safety and Health	Assign a Health, Safety and Environment Officer	Daily inspection by Safety Officer / Supervision Consultant Team	Continuous during working hours	Percentage. of committed workers No. of accidents	Contractor/ Lead Technical officer	MoA
	Provision of First aid kit		Once provided Listed and Documented	availability of the 1 st aid kit and the documented lists	Contractor	MoA
	Identify closest Medical center/hospital for emergency cases					
	Enforce use of safety personal equipment, gloves, Helmets, Glasses, boots		Periodically provided	Percentage. of committed workers		MoA
	sun exposure durations for work within acceptable limits.		continuous			
	Meet all hygiene and sanitary needs of Workers with separate facilities for males and females.		continuous	No. of illness cases related		
	Report and investigate any accidents.		continuous	No. of accidents		
	Avoid working in dusty, raining, and strong windy weather.		During the occurrence	Percentage of committed workers		
	Provide proper signage.	Weekly report of traffic Accidents speed limit signage on access road are installed	Once provided	Sufficient Signage installation	Contractor	Traffic Department /Project owner
	Securely pack and cover trucks with loose material.		continuous	Percentage of committed trucks		

Grievances redress management (GRM) and Gender Based Violence (GBV)	Ensure that the grievance system and codes of conduct are applied to workers and surrounding communities	Grievance record	continuous	No. of grievance	Contractor	MoA/ Local committee
Disturbance of biodiversity	Conserve the flora and fauna when found nearby.	Visual observation	continuous	No. of violent events	Contractor	MoA, RSSCN
Flood Occurrence	Design and implement flood control measures	Gabions are properly installed on the southern border of the farm	Once provided	Existence of the Gabions	Contractor	Project Owner
Increase in water demand	Waste water generated during the construction phase should be collected in properly sealed septic tank and disposed to the nearest treatment plant.	Visual observation, Log recording	continuous	wastewater quantities in m ³ received	Contractor	MoA
	Provide an adequate source of water from available and approved off-site sources and encourage the gray water reuse for dust control when possible.	Secure on site storage tank for RO reject and grey water collection.	Continuous	Reject and grey water quantities in m ³ used	Contractor	Project Owner
	Conserve water use and restrict the use of groundwater in construction activities for human domestic purposes.			Quantity in m ³ of ground water illegally used	Contractor	MoA/ Traffic Department
	Hazardous liquid materials should be managed properly to prevent groundwater, water in dam and surface water contamination (oil spills and fuels from vehicles)	Visual observation, water samples tests		No. of non-compliance events	Contractor	MoA/ Traffic Department

The follow in table no. (21), presents the ESMP which should be implemented during operation. Since the day-to-day operations activities will be managed by the project Owner, most of the responsibilities in this ESMP are designated to the Project Owner, in addition to the third part assessor (RSS) and Municipality, MoEnv.

Table 20 : ESMP Monitoring during operation phase including frequency and indicators

Impact/ Issue	Mitigation Measure	Monitoring Measure	frequency	indicator	Implementation Responsibility	Supervision Responsibility
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Occupational Health and Safety	Protect the workers while handling and disposal of volcano tuff and pearlite whenever used as culture media, having workers trained properly.	Health test (semi- annual)	Periodic	No. of non – compliance events detected	Safety/Social Officer	MoA & JCC
	Protect workers against pesticide spraying, provide the Safety equipment (masks, gloves, goggles, etc.) and enforce	check for using of Safety Equipment	Continuous	No. of related illness cases detected	Safety Officer	
Accidents	Immediate reporting of fiers to local civil defense offices	Record the accidents occurrences	immediately	No. of accidents	MoA & JCC / Safety officer	MoA & JCC /General Directorate of Civil Defense
	children entry into fertilizer tanks.		Continuous	No. of accidents		
	Regular check of electric systems is critical due to the interaction with water		Periodically	Dates of renewals and maintenance		
	Provision of proper fire extinguishers and getting the staff trained on using them					
Protection of water resources	Protection of surface water and ground water from the rejected RO water it will be disposed in specific places owned by the municipality	Undertake surface and groundwater Water sample tests	Semi-annual	Concentration of chemicals mg/l	MoA & JCC / Safety officer	Municipality / MOENV
	Protect the water bodies from high nutrient content discharges they will be disposed in specific places owned by the municipality					
	Domestic waste water generated during the operation phase should be collected in properly sealed septic tank and disposed to the nearest waste water treatment plant.	Visual Observation	Periodically upon filling	Quantities transported and disposed m ³	MoA & JCC / Safety officer	
Solid and Hazardous Wastes	Collect and dispose various types of solid waste generated during operations regularly, residues of plants, damaged polystyrenes boxes, packaging material, empty containers, etc. they will be disposed in municipality landfill.	Visual Observation	Daily	Transported quantities in kg	MoA & JCC / Safety officer	Municipality / MOENV
	Collect and removal of plastic clips and the hanging threads used for supporting the plants stem.	Visual Observation	Daily	Transported quantities in kg		

	Separate and disposal of hazardous waste materials such as of volcano tuff and perlite, contaminated empty pesticides containers and other chemicals, they will be disposed in hazard materials municipality landfill.	Visual Observation	Seasonally	Percentage of removed and disposed hazardous material	Safety Officer	Project Owner/ MoEnv.
Changes of visual character	Ensure pleasant appearance of the site by possibly vegetating the surrounding area	Visual Observation	Daily	Percentage of greened areas within the site No. of trees planted	MoA & JCC	
Shortages in Water Irrigation during the peak summer between late August and October.	Establish ample water storage tank during in case of power outage. The water requirement is about 16000 m3 and dam storage at least 1.8 million m3 and it is available for the whole year The project will be provided with solar energy .	Visual Observation (seasonal)	Seasonal	No. of programmed maintenance or rehabilitation events	MoA & JCC / Technical officer	MoA & JCC
Grievance Redress Mechanism (GRM)	Create a grievance record, record grievances and actions taken to address grievances Follow-up cases of gender based violence	Record the grievance occurrences	Continuous	No. of record grievances	MoA	JCC/ Local committee

6.6. Training and Awareness Creation

Awareness and training programs aimed at training 40 unemployed trainees on hydroponics should be prepared and include theoretical training in a hall inside the city of Tafileh and practical training at the project site. As well as educating the trainees about the importance of occupational safety and health in the project and issues related to grievance and decent work and workers' rights according to the Labor Law. As well as making the community aware of the importance of the project in development, and the participation of society and civil society organizations in the consultation sessions related to the completion of the project stages, and designed taking into consideration the following points:

- The needs assessment
- Training conducted in both theoretical and practical practices on hydroponics system.
- Identifying the adequate training tools
- Selecting of qualified trainers, who have the knowledge and the training techniques.
- Setting a criteria for selection of trainees
- Identifying the appropriate timing for carrying out the training, considering the key activities.
- The trainees should be motivated through granting training certificates, etc.
- Training in financial management, agricultural business models and agricultural product marketing..

- Awareness sessions must be designed to trainees on occupational safety and health in the project and issues related to grievance and decent work and workers' rights according to the Labor Law. Also to local community and NGOs on the project planning and environmental issues, this will strengthen the cooperation between project and the community, which leads to the reduction of the number of grievant and complaints.
- The local community through awareness will know more about the benefits they may obtain from the project, and enhance knowledge transfer.
- Include training on IPM and GRM processes among the other training themes.

6.7. ESMP Monitoring and Evaluation

The project owner and partners have to follow up rigorously the ESMP according to the applicable WB environmental and social standards and EHS guidelines.

The ESIA is prepared to express the environmental impacts, social concerns and to propose the mitigation measures for the negative impacts and to respond to social concerns and interests, in addition to identification of the individual and institutional responsibilities. Refer to Table no.15.

Chapter 7: Integrated Pest Management Plan

Complete IPM report is prepared addressing all points 7.1, 7.2, 7.3, 7.4 (see, Annex no. (3)).

7.1. IPM Plan

The Project will assist and train the workers and employees in the project to be able to develop their IPM approaches to achieve the sustainable non-toxic management of pests and diseases. This will be a holistic approach from seed selection, growing medium preparation, planting and farm maintenance to harvesting and post harvesting issues. Workers and employees in the project will be trained and encouraged to make detailed observations in their fields regularly so that they can detect early infestations and make the appropriate management decisions. The general approach to deal with any infestation should be to immediately, once the pest or disease has been identified in the cultivation areas is to enact the agricultural mechanical control measure which should be considered as the first option and if this approach is not successful then biological measures should be applied. Chemical non-toxic pesticides should be taken as a last resort and only when all other control measures have failed and the pest/disease damage exceeds the economic threshold. When chemical pesticides are applied, attention must be given to select pollution-free pesticides to reduce the chemical resistance of the pests and avoid pollution to the environment. Consequently, every IPM program is designed based on the pest prevention goals and eradication needs according to the situation.

The objective of the Integrated Pest Management Plan is to promote the use of a combination of environmentally and socially friendly practices (hygienic, cultural, biological or natural control mechanisms and the cautious use of chemicals) and reduce reliance on synthetic chemical pesticides and ensure that health, social and environmental hazards associated with pesticides are minimized, and ensure the pesticide purchase, transport, use, storage and disposal are based on national legislation and WB EHS guidelines

Training of employees and relevant daily workers on IPM and safe use of pesticides will be conducted within the following areas:

- Detrimental effects of pesticide use to human health/environment

- Decision making in the use of pesticides
- Safe storage and handling of pesticides
- Safe application of pesticides
- Risks of handling and use of pesticides
- Managing risks and pesticide poisoning via the Green Mechanisms which can be found in annex no. 3.
- Integrated Pest Management

Chapter 8: Labor Management Procedures

The purpose of the LMP is to facilitate planning and implementation of the project. The LMP identifies the main labor requirements and risks associated with the project (refer to ESS2 annex no.2) and helps the project owner to determine the resources necessary to address project labor issues. The LMP is a living document which is reviewed and updated throughout development and implementation of the project. These procedures are designed to help project owner identify key aspects of labor planning and management. The proposed LMP will enable different project-related parties, for example, staff, contractors and sub-contractors and project workers, to have a clear understanding of what is required on a specific labor issue. The ESIA will contain the Project Level Grievance Redress Mechanism for all phases of the project; including multi-level arrangements for registering and addressing grievances and complaints from project-affected people (Workers and laborers). In general, the affected person should register his/her grievance in writing to the project officer or Atafilah Agricultural Directorate, by phone call (+96232241023, +962799059084), by Facebook link <https://www.facebook.com/groups/207233332651059/> or the Ministry website (www.moa.gov.jo) in person to the concerned employee (Supervision team on implement project (STIP), Technical officer), the numbers will be identified and announced as the project begins implementation, in accordance with ESS10 and ESS2 guidelines or submit a written message to the Project Officer via WhatsApp mobile application, which is widely used in Jordan (refer to Annexes no. (2) and (8)).

The ESIA team prepared the complete report as an annex, addressing this chapter, Annex no. 8, ESS10 Stakeholder Engagement Plan, also refer to annex no. (2) for (ESS2) on labor and working conditions and for preparing the Labor Management Plan (LMP). The ESS2 located in annex no. 2 contains detailed information related to the mentioned chapter:

Chapter 9: Stakeholder Engagement(see Annex_No_8_ESS10)

9.1. Background

For the purpose of preparing this ESIA report, the ESIA team carried out the Public Consultation meeting as required by the MoA ToR's, ESS10 (Stakeholder Engagement and Information Disclosure) taking into consideration the Regulation of Environmental Impact Assessment No. (37), year 2005.

The public consultation took place on Wednesday the 11th of December, 2019 at the premises of The Professional Associations Complex, located in Tafileh City, South Tannur Dam. The number of participants were fifty five (55) within 26 women (refer to appendix no. 2 page no.8 & 9). The local representatives and stakeholders participated in the meeting in response to an invitation issued by the Tafileh Agriculture Directorate, an invitation was made verbally by phone to all relevant stakeholders.

9.2. Objective of the Public Consultations

The scope of the public consultation meeting are summarized as follows;

Ensure stakeholders and experts issues of concern are taken into consideration while preparing the ESIA report (ESIA TOR)

Affirm integration of the ESIA valued environmental and social Components (VEC's)

Affirm compliance with relevant legislation to the proposed project

While the objectives are summarized as follows;

- Ensuring environmental and social concerns are considered in the decision-making process.
- Ensuring that all possible adverse environmental impacts are identified and avoided or minimized
- Informing the public about the proposed project Modify and improve design
- Ensure efficient resource use Enhance social aspects
- Identify key impacts and measures for mitigating them Inform decision-makers
- Avoid serious and irreversible damage to the environment

9.3. Stakeholder Identification

The identification of local representatives and stakeholders participating in the meeting was done in response to a verbal invitation made through a phone conversation by the ESIA team in close coordination with the representative of the Tafileh Agriculture Directorate. The ESIA team and the Tafileh Agriculture Directorate representative identified all related stakeholders and community members near the proposed project site and in other nearby villages.

9.4. Participatory Meetings and Public Sensitization

The ESIA team also outlined all related guidelines and standards applied by the World Bank and informed the participants that these standards were being applied in order to safeguard the rights of the stakeholders and local communities to prevent any negligence or abuse of their welfare during the preparing, construction and operation phases of this project.

9.5. Stakeholders Consultative Meetings

It was revealed through the Public Consultation Meeting that the Project Owner conducted many meetings and ESIA team with stakeholders and local community representatives, in the process of preparing the project ToRs, the main concerns of the participants were that the size of the project be greater in order to benefit more unemployed people, as well as a greater number of local associations benefiting. The interest of women was to secure transportation to the project site, and that the training be carried out through training for cash. There was agreement among the participants, whether women or young people, about the grievance mechanism for achieving justice. While the ESIA team also carried out three field visits during which they inspected and assessed large, well established high tech hydroponics projects in the Maro village in order to gain an in-depth perspective needed to evaluate the environmental and social risks for this proposed project. The ESIA team also carried out a peer review of the findings with academia, ESIA team and farmers to ensure and validate the study outcomes.

9.6. Stakeholder Engagement Plan for project implementation phase

The main entities identified as responsible for implementing the ESIA study are:

- The client/project owner (MoA)
- The Local execution partner NGO

9.7. Grievance Redress Mechanism

The ESIA team elaborated the Grievance & Redress Mechanism in a separate annex (See Annex No. 2, ESS2, labor management procedures and working conditions). One Grievance Mechanism for labor and workers was prepared for any person who may be affected as a result of implementing this project. A grievance redress mechanism for both public and workers will also be put in place by the project manager based on the mutual agreed grievance mechanism as described in the above mentioned annex no.(2).

In general, the project management must announce the means of communication for the authorities responsible for considering grievances, such as the Ministry of Agriculture and the Jordanian Cooperative Corporation and project management. The aggrieved person must register his complaint / write it in the grievance form at the project management office on the site, according to ESS10 and ESS2 guidelines or by phone, call (+96232241023, +962799059084), or on the complaints page on the website of the Ministry of Agriculture or sent on the Ministry of Agriculture page on the Facebook link <https://www.facebook.com/groups/207233332651059/> or the Ministry website (www.moa.gov.jo) (see Appendices No. 2) And (8).

Chapter 10: Conclusion and Recommendations

10.1. Conclusion

According to the previous discussions and the outcomes of this ESIA, it can be concluded that this project is not expected to cause significant adverse environmental or social impacts on the project area during construction or operation. In fact, the overall positive impacts through providing an integrated economic, environmentally friendly and social approach to this proposed project that it can present a sustainable development solution, for the local community at Tafileh and will bring the affected community significant benefits by insuring high productivity, saving land area and the irrigation water. This will undoubtedly encourage other farmers in the area to replicate this pilot project on a larger scale and disseminate scientific knowledge to other farmers countrywide. However, the proper implementation of the ESMP is essential to ensure that any negative impacts are immediately minimized and avoided and that the environmental and social performance is being closely monitored throughout the construction, operation and closure phases of the project.

10.2. Recommendations

The ESIA team based on his experience, public consultations feedback, and peer expert review is recommending the following procedures, actions and measures to be taken in to consideration to minimize the environmental and social risks and to safeguard the sustainability of the project:

1. Tech hydroponic operation in order to achieve the best results and to establish the project as a training center, and to achieve a better comparison with both low-tech hydroponic and the traditional of greenhouse farming models.
2. Commitment to implement occupational health and safety procedures and provide occupational health and safety equipment, first aid kit and tools for project personnel during the stages of its implementation. Carrying out occupational safety training for contractors, work and staff on the project.
3. Assign a safety/social and environmental officer to implement and supervise the Environmental and Social Mitigation Plans (ESMP) in order to effectively disseminate knowledge, awareness campaigns and liaise with local farmers and community
4. Implementing the labor law regarding working hours, working conditions, and working age. The provision of health facilities in the project for males and females separately.
5. Take measures to protect the soil and project assets from flooding
6. Safe disposal of solid, hazardous and non-hazardous waste from the project in its landfills. Safe disposal of reverse wastewater in water treatment plants.
7. Provision of an adequate Reverse Osmosis (R.O). system for irrigation in the hydroponic system, to meet the standards for water and nutrient within the irrigation system
8. Ensure the implementation of the IPM plan and the application of legislation for the purchase, storage, transport and use of pesticides. And holding courses for workers in the project on IPM methods during the stages of plant growth.
9. Ensure implementation of the plan for the conservation of biological diversity and the prevention of exposure to wild animals in the project area.
10. Ensure that grievance mechanisms are applied and that female workers are not subjected to sexual harassment.
11. It is recommended to properly address the food-water-energy Nexus by addressing the use of renewable energy sources such as solar PV energy as a primary source of heating and cooling.
12. Recommend the implementation of the stockholders engagement plan for the in the project, whether direct or indirect, to reduce the negative effects such as competition for jobs and work in the project and ensure the transfer of lessons learned and skills acquired from the project to the stakeholders and their participation in the anticipation implementation of the environmental and social impact plan
13. It is recommended to properly address the food-water-energy Nexus by addressing the use of renewable energy sources such as geo-thermal or solar PV energy as a primary source of heating and cooling.
14. It is expected that the running cost for crops grown hydroponically will likely be less costly than traditionally grown counterparts (The annual running cost of tomatoes in the hydroponic system is about 1075 JoD, while in traditional greenhouse about 1657 JoD), but it is expected that the total cost for crops grown hydroponically will likely be more costly than traditionally grown counterparts (The annual total cost of tomatoes in the hydroponic system is about 2197 JoD, while in traditional greenhouse about 1940 JoD) but market prices for such produce will be much higher, due to the high quality of the product. Therefore it is recommended to find ways to reduce the cost of investment in these technologies to make them more adaptable for small farmers. And study securing high-end markets such as hotels and large malls with products of Hydroponics projects.

Annex No. (1): Project, General Lay-out

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Project, General Lay-out

February 12, 2020

Ministry of Agriculture \ ESIA Team

P.O. Box 961044

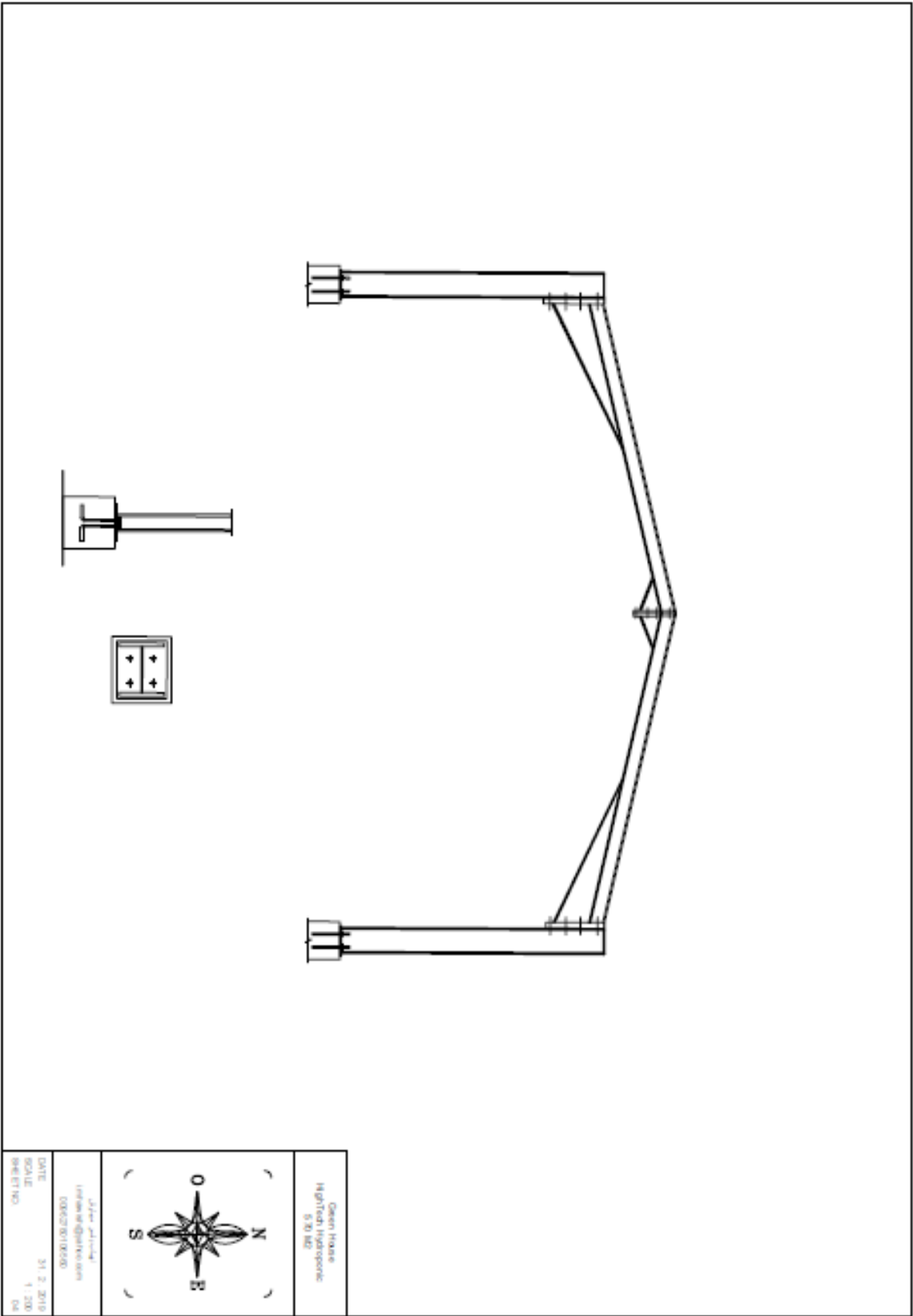
Tel +96265686151

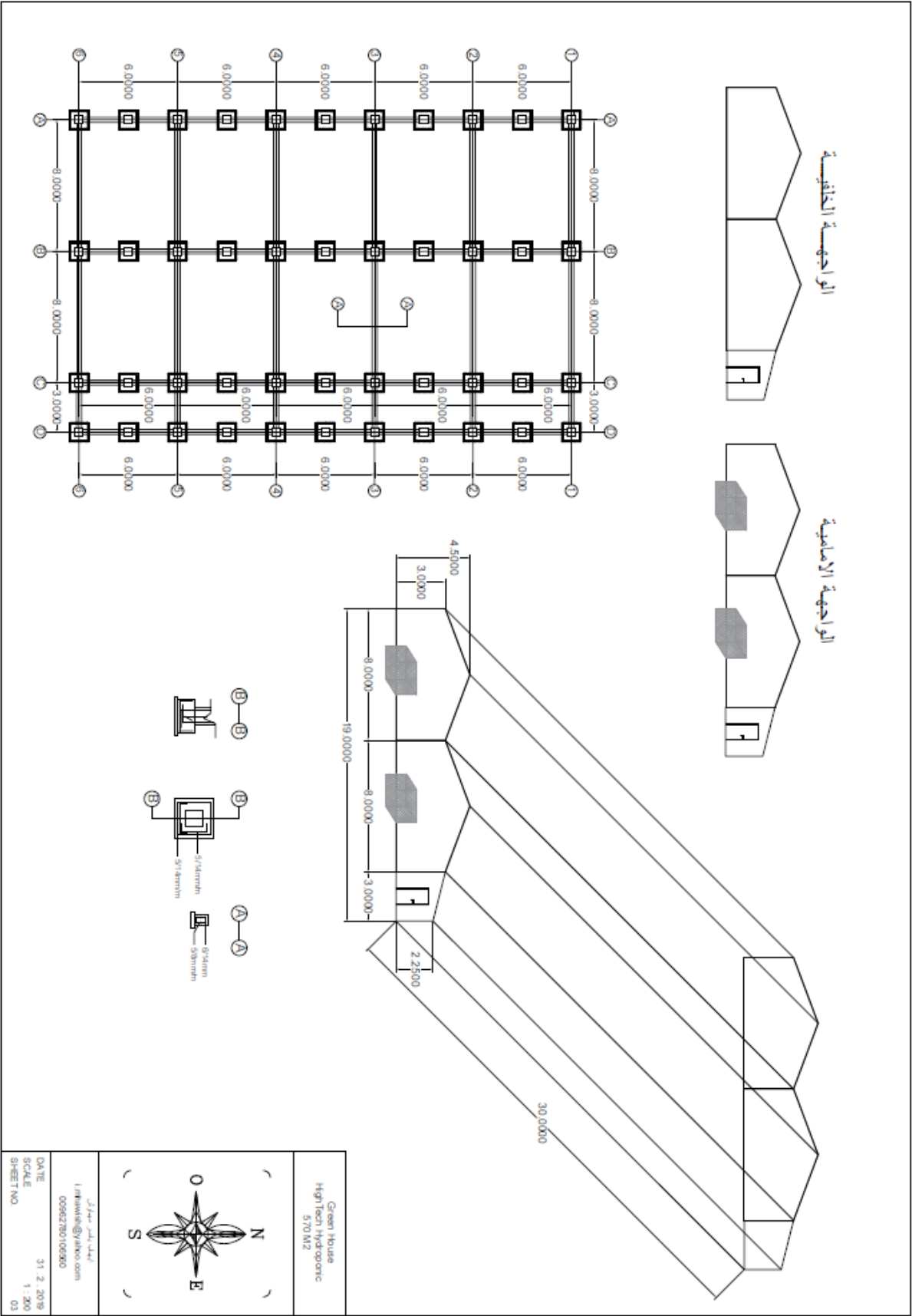
Fax +96265686310

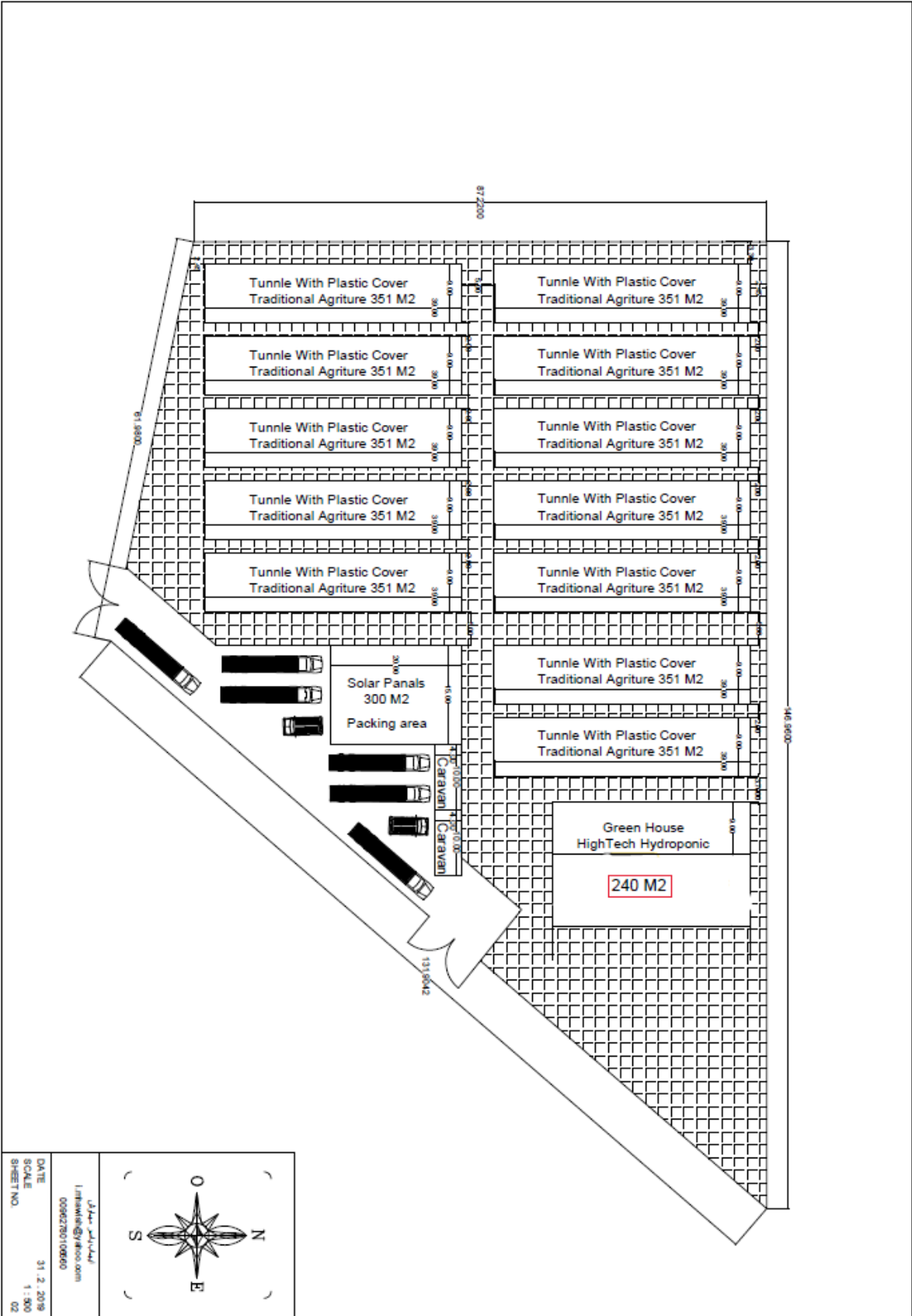
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Annex No. (2): LABOR MANAGEMENT PROCEDURES (LMP)

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

LABOR MANAGEMENT PROCEDURES (LMP)

February 12, 2020

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1 Forward:

Under ESS2 on Labor and Working Conditions, Borrowers are required to develop labor management procedures (LMP). The purpose of the LMP is to facilitate planning and implementation of the project. The LMP identifies the main labor requirements and risks associated with the project and help the Borrower to determine the resources necessary to address project labor issues. The LMP is a living document, which is initiated early in project preparation, and is reviewed and updated throughout development and implementation of the project. These procedures are designed to help Borrowers identify key aspects of labor planning and management. The content is indicative: where the issues identified are relevant in a project, Borrowers should capture them in the LMP. The national law addresses requirements of ESS2 this can be noted in the LMP, and there is no need to duplicate such provisions. The LMP may be prepared as a stand-alone document, or form part of other environmental and social management documents. A concise and up to date LMP will enable different project-related parties, for example, staff of the project implementing unit, contractors and sub-contractors and project workers, to have a clear understanding of what is required on a specific labor issue. Where relevant information is not available, this should be noted and the LMP should be updated as soon as possible. In preparing and updating the LMP, Borrowers refer to the requirements of national law and ESS2 and the Guidance Note to ESS2 (GN). These procedures includes references to both ESS2 and the GN.

2 Background and Objectives

The World Bank is providing support to the Jordanian government in preparing an hydroponics farm in Tannur-Wadi Al-Hessa project. The aim of this project is to use the treasury lands to promote self-employment and entrepreneurship as a way out of poverty and unemployment into the labor market for vulnerable individuals in rural areas. The project is in line with the strategies of the Jordanian government, the Ministry of Agriculture and the Ministry of Water and Irrigation in using modern agricultural technology to increase the efficiency of irrigation water utilization and increase agricultural productivity, which contributes to enhancing the effectiveness of interventions that support entrepreneurship and self-employment.

The Project is being prepared under the World Bank's new Environment and Social Framework (ESF), which came into effect on October 1, 2018, replacing the Bank's Environmental and Social Safeguard Policies. Under the ESF, all World Bank Borrowers have agreed to comply with ten Environmental and Social Standards (ESSs) applied to investment project lending financed by the Bank. The project recognizes the significance of, and adopts the ESSs, for identifying and assessing as well as managing the environmental and social risks and impacts associated with this investment project. The Ministry of Agriculture (MoA) as an implementing agency, has developed several key instruments to address such risks. One of the Standards – ESS2 relates to Labor and Working Conditions and expects the Borrowers to develop labor-management procedures (LMP). The LMP identifies the main labor requirements and risks associated with the project and helps the Borrower to determine the resources necessary to address labor issues. The LMP is a living document, which is initiated early in project preparation and is reviewed and updated throughout the development and implementation of the project. Accordingly, these document details are the type of workers likely to be deployed by the project and the management thereof.

The aim of the project development is to improve the access of vulnerable groups and the unemployed to sustainable employment opportunities and income generation in Jordan. This will be achieved through (1) capacity building and improving the skills of the unemployed in the field of modern agricultural technology (2) enhancing the ability to implement modern agricultural technology projects (3) enhancing agricultural entrepreneurship and enabling the unemployed and vulnerable to manage their own projects. The project will be implemented through the following component:

Component 1 - Supply, Installation, and Operations:

This component will include the design, acquisition, installation and operations associating with pilot hydroponic technology that is appropriate to the climatic and social conditions of the target area. The Ministry of Agriculture will be responsible for a) selecting the appropriate technology, b) establishing and managing the production unit, c) collecting data on productivity, profitability, and environmental impact, producing high quality communication materials detailing impact (for example, production results and social/environmental impact) , d) ensuring the effective project administration and management and e) producing regular monitoring and evaluation (M&E) reports.

Component 2- Business Model Development:

This component will focus on creation and management of an innovation platform that will focus on the development of hydroponics business model (including access to finance, registration, access to services, etc.). The model will be designed to attract private investment, it should include features specifically enable women

and youth to obtain access to hydroponics units and/or the related services (e.g. technical support, logistic, packaging, etc.) required for sustainability and commercial viability of the hydroponic units. Special emphasis will be given to maximizing the use of digital solutions. The platform will require the include technical experts, civil society, universities, chambers of commerce, specialists in digital solutions and private sector. The Ministry of Agriculture will seek an independent agency to manage this platform. The selection criteria for this firm will include: a) strong connections with key decision makers in Government, Civil Society and Universities, b) proven track record in advocating for social inclusion and c) a network into the relevant sections of the private sector.

Component 3: Dissemination and Training

Key areas for this component include the design, organization and implementation of a campaign to generate awareness of production systems and to train targeted communities in the technology and/or business models. The campaign will specifically focus on the sharing the lessons on the social, economic and environmental benefits of the production systems. The target audience for the campaign will be local communities, regional governates, chambers of commerce, national government Ministers (Agriculture, Labor, Social Development, Industry and Trade), universities, Non-Governmental Organizations and private investors. Ministry of Agriculture will be responsible for managing this campaign appropriate entity of this component..

3 OVERVIEW OF LABOR USE ON THE PROJECT

Number of Project Workers

The expected total number of workers according to the project ToR's is 28 workers as follow:

- Three skilled workers to build facilities and install equipments
- One resident agriculture engineer
- Six resident workers
- One expert qualified as environmental safety/ social officer expert
- Two short term experts in Hydroponics plantation and management
- 15 temporary seasonal labors

Characteristics of Project Workers:

- Estimated 3 male temporary skilled workers will construct facilities and install equipment, they will work on the project for two months.
- Estimated 8 workers are permanent staff: One Male\female national agriculture engineer, six Male\female expatriate farm workers, those all are resident in the farm.
- One Male/Female national expert qualified as environment safety/ social officer expert to oversee the project and carry out tasks described in the ESIA.
- Two Male/Female national /international expert in Hydroponics plantation, to provide technology transfer, consultancy services, on-job training staff, directing, inspecting, and following all issues to ensure best technical and management practices of the High –Tech Hydroponic unit with special capability in applying (IPM) and to backstopping the resident engineer.
- 15 male\female temporary workers, working in daily bases wages, 50% bare national and the others either expatriate or emigrants, the work frequency one every two days to; collect the crops, sort and packaging, clean the hydroponics and the Traditional greenhouses during the production season.

Only workers over 18 years are allowed to work in this project, despite the fact that workers less than 16 are commonly practiced driven by temptation of winning money to support family, especially during the schools holidays. it s local traditions in Wadi Al Hessa.

Timing of Labor Requirements:

According to the labor law the working hours for staff are limited to 8 hours, while for permanent and temporary workers having working programme between 6:00 AM- 12:00 PM (total working hours not to exceed 6 hours) and it can be less, too.

- Three skilled workers, full time during construction phase
- One resident agriculture engineer, full time during operation phase
- Six resident workers, full time during operation phase

- One expert qualified as environment safety/ social officer expert, part-time during operation phase
- Two short term expert in Hydroponics plantation and management, part-time during operation phase
- 15 temporary community labors, the employee's work period is estimated to be for two months, part-time during operation phase

Contracted Workers:

The project will contract workers directly and indirectly.

- Hiring workers indirectly, this aspect includes workers who are employed by contracting companies to create or download hydroponics units. Where the labor contracts will be between workers and contracting companies. It is expected that the number of workers will reach about 3 workers for two month.
- Hiring workers directly, this aspect includes the following types of work:
 - The workers who will be trained in the project, it is expected that there will be 40 trainees, the contracts will be between the workers and the Ministry of Agriculture.
 - The permanent workers, it is expected that they will be 10 workers, the contracts will be between the workers and the association that will be established to manage the project.
 - The seasonal workers, expected to number 15, will be the contracts between the workers and the association that will be established to manage the project.

All workers, whether contracting with them are direct, indirect, permanent or seasonal, written contracts will be signed with them that includes the duration of work, wages, workers' rights according to the Jordanian labor law, and the conditions of decent work that workers must obtain.

Migrant Workers:.

- –1-2 seasonal workers, who are Syrian refugees, in the project area. The required works will be according to the production season and include the harvest, packing, grading and other seasonal work needed by the project. Employment priority will be given to women heads of household. Wages and working conditions will not differ between Syrian and Jordanian workers.

4 ASSESSMENT OF KEY POTENTIAL LABOR RISKS

This section describes the following, based on available information:

Project activities: The type and location of the project, and the different activities the project workers will carry out.

Project Type and Location:

The project is located in the southern part of the Jordan in Wadi Al Hessa, Tafileh Governorate, near the village of Al Burbaitah 180 km south West of the capital Amman. This is high-tech agriculture project for vegetables production will support the acquisition, installation and initial operations of a pilot hydroponics unit (e.g. computer-based humidity control systems, heat control systems and processing/packing equipment). In addition, this component will support the provision of the technical assistance, training and business management skills required to ensure the pilot is managed as effectively as possible.

The goal is for the pilot to become fully operational within 8 months. The unit should be projected to become profitable after two years of production. Any of the unit's profits will be re-injected into further operation and maintenance of the greenhouse. (See site lay-out at Appendix 1)

The site lay-out shows positions of four type of agriculture's structures with total area 1.5 hectare, the first structure is tow is High-tech Hydroponics with surface area of 970 m², while the second structure is for mid-tech hydroponic farming with total surface area of 2106 m², and the third structure is for low-tech hydroponic farming with total surface area of 2106 m²..

Different activities the project workers will carry out:

The workers will perform the following main activities:

- Prepare the Hydroponics for agriculture culture
- Clean the inside the hydroponics regularly.
- Spray pesticides whenever is needed.
- Prepare the agriculture land for culture.
- Rise the plants stem and support it

- Moving the plants and supporting the plants stem with Clips and threads.
- Inspect the drip irrigation system
- Prepare and fill the disbursement tanks with nutrients.
- Repair minor drip failures.
- Load & off-load provisions of raw materials and products.
- Tilling the soil and soil softening
- Distribute and spread fertilizers
- Raise side terraces.
- Install drip irrigation pipes
- Cultivate plant nurses.
- Irrigate the plants
- Collect the crops and products
- Operate air pumps
- Clean the inside the pool regularly
- Pond water replacement
- Assist and supervise the temporary community workers.
-

Key Labor Risks: The key labor risks which may be associated with the project include, for example:

- The conduct of hazardous work, such as working at heights or in confined spaces, use heavy machinery, or use of hazardous materials
- Likely incidents of child labor or forced labor,
- Risks of sexual exploitation and abuse (SEA) which is induced by labor influx
- Possible accidents or emergencies, with reference to the sector or locality
- General understanding and implementation of occupational health and safety requirements

The specific Potential labor risks related to this project were assessed and summarized as follow:

Work Accidents:

- Falling from high places,
- Hit by flying objects,
- Electric shock,
- Negligence to use safety equipment Exposure to emissions,
- Work injuries by machinery, etc. Animal and snakes bite
- Car and traffic injuries Fall in water lagoons
- Attack by wild animals such as dogs, foxes and wild pigs.

Risks can be caused by poor accommodation and sanitation facilities:

Food and water toxicities

- Bad ventilation of premises condition
- Poor hygiene of the sanitary facilities.
- Low lighting of premises
- Absence of cooling and/or heating system
- Improper proper pavement of paths and sidewalks.

Exposure to Hazardous substances:

- Un controlled contact with, rock wool,.
- Inhalation of toxic chemicals, pesticides

Exposure to severe weather condition:

- Sun, cold , windy, rainy, high whether temperatures, flood conditions

5 BRIEF OVERVIEW OF LABOR LEGISLATION: TERMS AND CONDITIONS

This section sets out the key aspects of national labor legislation with regards to term and conditions of work, and how national legislation applies to different categories of workers identified in Section 1. The overview focuses on legislation which relates to the items set out in ESS2, paragraph 11 (i.e. wages, deductions and benefits).

Jordan Labor Law of 1996

Article 2

Employment contract: an explicit or implicit oral or written agreement, whereby the worker undertakes to work for the employer under his supervision or administration in exchange for wages, the employment contract is for a limited or unlimited period, or for a specific or unlimited job.

Wage: All that the worker deserves in exchange for his work in cash or in kind, in addition to all other benefits of any kind. If the law, the labor contract, or the internal system stipulates that the transaction is settled for payment, with the exception of wages owed for overtime.

Article 15

a . The contract of employment shall be organized in the Arabic language and in at least two copies. Each of the parties shall keep a copy of it, and the worker may prove his rights by all legal proofs if the contract is not written in writing.

B. An employee appointed for an unlimited period is considered to be continuing with his work until his service is terminated in accordance with the provisions of this law. Either in cases where the worker is employed for a limited period, he is considered to be continuing his work during that period.

C. If the work contract is for a limited period, then it ends automatically on its own, with the end of its term.

D. A worker who is regularly employed in the workplace or who performs a series of work in a piece is considered to be an unlimited worker.

E.1. The contractor's workers who work in the implementation of a contract shall file a lawsuit directly against the project owner to claim what he is entitled to before the contractor, within the limits of what is due to the contractor on the project owner at the time of filing the lawsuit.

2. The sub-contractor's workers may file a claim directly with the original contractor and the owner of the project within the limits of the due on the project owner to the original contractor and due to the original contractor of the sub-contractor at the time the lawsuit is filed.

2. The workers mentioned in the previous two paragraphs may fulfill their rights by concession over the sums due to the original contractor or sub-contractor and fulfill their rights when they compete with the percentage of their right.

Article 16

The employment contract remains in effect regardless of the change of the employer due to the sale of the project or its transfer by way of inheritance or merging the institution or for any other reason. That time, the new business owner will be held solely responsible.

Article 17

The worker is not obligated to perform work that differs markedly from the nature of the work agreed upon in the work contract, unless necessary to prevent an accident or to repair what resulted from it or in the case of force majeure, and in other cases provided for by law, this should be within the limits of his energy and the circumstance that required this work.

Article 18

The worker is not obligated to work in a place other than the place designated for his work if this leads to changing his place of residence, unless explicit text is provided authorizing this in the work contract.

Article 19

The worker:

a . Carrying out the work on his own, and in his stewardship, he should take care of the ordinary person and abide by the orders of the employer related to the implementation of the work agreed upon within the limits that do not endanger him or violate the provisions of the applicable laws or public morals.

B. Preserving the industrial and commercial employer's secrets and not disclosing them in any way, even after the expiry of the work contract, according to what is required by the agreement or custom.

C. Take care to save the things delivered to him in order to perform the work, including work tools, materials and other supplies related to his work.

D. Undergo the necessary medical examinations that require the nature of the work to be performed before joining the work or afterwards to verify that it is free from occupational and applicable diseases.

Article 20

a . The intellectual property rights of the employer shall be if the worker invented them, and they related to the business of the employer, or if the worker used the employer's experiences, information, tools, machinery, or raw materials in arriving at this innovation unless he agreed in writing otherwise.

B. The intellectual property rights of the worker shall be if the intellectual property right invented by him does not relate to the business of the employer and did not use the employer's experiences, information, tools or raw materials in arriving at this innovation unless he agreed in writing otherwise.

Article 21

The employment contract ends in any of the following cases:

- a . If the two parties agree to end it.
- B. If the work contract period has expired or the work itself has ended.
- C. If the worker dies or is sickened by sickness or incapacity to work, and this is proven by a medical report issued by the medical reference.

Article 22

The employment contract does not end due to the death of the employer unless the employer's personality is taken into account in the contract.

Article 23

- a . If one of the parties wishes to terminate the contract of work that is not of limited duration, he must notify the other party in writing of his desire to terminate the contract at least one month in advance, and the notice may not be withdrawn without the consent of the two parties.
- B. The employment contract remains in effect for the duration of the notice and the notice period is considered a service period.
- C. If the notification is made by the employer, he may exempt the worker from work during his period, and he may employ him except in the last seven days of it, and the worker shall be entitled to his wages for the notice period in all these cases.
- D. If the notification is made by the worker and he leaves work before the notice period expires, he is not entitled to a wage for the period he left the work and he must compensate the employer for that period with the equivalent of his wages for it.

Article 24

Subject to what is stated in Article (31) of this law, it is not permissible to fire the worker or take any disciplinary measure against him for reasons related to complaints and claims submitted by the worker to the competent authorities relating to the application of the provisions of this law to him.

Article 25

If it appears to the competent court in a lawsuit filed by the worker within sixty days from the date of his dismissal that the dismissal was arbitrary and contrary to the provisions of this law, it may issue an order to the employer to return the worker to his original work or pay compensation to him in addition to the notice allowance and other entitlements stipulated in Articles (32) , (33) of this law, provided that the amount of this compensation is not less than three months' wages and not more than six months, and compensation is calculated on the basis of the last wage the worker charges.

Article 26

- a . If the employer ends the fixed-term work contract before its term ends or the worker terminates it for one of the reasons mentioned in Article (29) of this law, the worker has the right to fulfill all rights and benefits stipulated in the contract as he deserves the wages that are due until the end of the remaining period of the contract unless he terminates The employment contract is a chapter under Article (28) of this law.
- B. If the termination of the contract for a specified period is issued by the worker in cases other than those stipulated in Article (29) of this law, the employer may request him for what arises from this termination of damages and damage. Half a month for each month of the remainder of the contract.

Article 27

- a . Subject to the provisions of Paragraph (b) of this Article, the employer may not terminate the service of the worker or give notice to him to end his service in any of the following cases:
 - 1. A pregnant working woman starting from the sixth month of her pregnancy or during maternity leave.
 - 2. The worker in charge of the flag or backup service while performing that service.
 - 3. The worker during his annual or sick leave or the leave granted to him for the purposes of labor culture or pilgrimage, or during his vacation agreed upon between the two parties to devote himself to union work or to join a recognized institute, college or university.
- B. The employer becomes dissolved from the provisions of Paragraph (A) of this Article if the worker uses another employer during any of the periods stipulated in that paragraph.

Article 28

The employer may fire the worker without notice, in any of the following cases:

- a . If the worker impersonates another person's identity or identity, or submits false certificates or documents with the intent to bring benefit to himself or harm others.
- B. If the worker fails to fulfill his obligations under the work contract.

- C. If the worker commits a mistake that results in a serious material loss to the employer, provided that the employer informs the agency or the competent authorities of the accident within five days of the time he became aware of his occurrence.
- D. If the worker violates the internal system of the institution, including conditions for the safety of work and workers, despite his warning in writing twice.
- E. If the worker absent without legitimate cause more than twenty intermittent days during one year or more than ten consecutive days, provided that the chapter is preceded by a written warning sent by registered mail to his address and published in a local daily newspaper once.
- F. If the worker discloses work secrets.
- G. If the worker is convicted by a judicial ruling, he obtained the final degree of a felony or misdemeanor that violates honor and public morals.
- H. If he is found, during work, in a state of drunkenness or is affected by the drug or psychotropic substance he used, or if he committed an act that violates public morals in the workplace.
- I. If the worker assaults the employer, the responsible manager, one of his superiors, or any worker, or against any other person during the work or because of it, by beating or belittling him.

Article 29

The worker has the right to leave work without notice while retaining his legal rights for the termination of service and the resulting compensation for damages and holidays, in any of the following cases:

- a . Its use in work differs significantly in its type from the work in which it was agreed to use it according to the work contract, provided that the provisions of Article (17) of this law are observed.
- B. Use it in a manner that calls for permanent change of residence unless it is stipulated in the contract that it is permissible.
- C. Transfer him to another job in a lower degree than the work in which it was agreed to use it.
- D. Reducing his wages, provided that the provisions of Article (14) of this law are observed.
- E. If it is proven by a medical report issued by a medical reference that his continued work would threaten his health.
- F. If the employer or his representative assaults him during the work or because of it, by beating or belittling him.
- G. If the employer fails to implement any of the provisions of this law or any regulation issued pursuant thereto, provided that he has received a notice from a competent authority in the ministry requesting compliance with those provisions.

Article 29

The employer must give the worker, upon the end of his service, upon his request, a service certificate stating the name of the worker, the type of his work, the date of joining the service, and the date of the end of service, and the employer is obliged to return the papers deposited with him by the papers or tools.

Article 31

- a . If the employer's economic or technical circumstances require reducing the workload, replacing another production system or stopping work altogether, which may result in the termination or suspension of work contracts of unlimited duration, in whole or in part, he must inform the Minister in writing, supported by the justifications for that.
- B. The Minister shall form a committee from the three production parties to verify the integrity of the employer's procedures and submit its recommendations thereon to the Minister within a period not exceeding fifteen days from the date of submitting the notification.
- C. The Minister shall issue his decision regarding the recommendation, within seven days from the date of its submission by approving or reviewing the employer's procedures.
- D. If the minister decides in light of the recommendations of the committee that the employer has to return a number of workers to their sites and that the circumstances of the employer tolerate this, the employer may appeal the minister's decision before the Appeals Court within ten days from the date of notification of this decision and the court will consider it in an urgent manner so that a decision is made on the appeal Within a period not exceeding a month, and its decision is final.
- E. Workers whose services have been terminated in accordance with paragraph (a, b) of this article shall be entitled to return to work within one year from the date they left work if the work returned to normal and they could be employed by the employer.
- F. A worker who has suspended his employment contract in accordance with paragraph (a) of this article has the right to leave work without notice while retaining his legal rights to end the service.

Article 32

Subject to the provisions of Article (28) of this law, the worker who works for an unlimited period and is not subject to the provisions of the Social Security Law and whose services end for any reason shall have the right to obtain an end-of-service gratuity at the rate of one month's wages for each year of his actual service and a relative reward is given for the year. The reward is based on the last wage he received during the period of his use. Either if all or part of the wage is calculated on the basis of commission or part, then the monthly average of what the worker actually received during the twelve months prior to the end of his service is paid, and if his service does not reach this limit, the monthly average of the total of his service is considered to be. Pray that lies between the work of another and not more than a month as if for use when connected to the bonus account.

Article 33

- a . In addition to the end-of-service gratuity, a worker who is subject to special regulations for the institution in which he works has the right to savings, savings, or retirement funds, or any other similar fund, is entitled to all the benefits granted to him under these regulations in the event of service termination.
- B. The regulations pertaining to the funds stipulated in Paragraph (a) of this Article shall be approved by the Minister or his authorized representative.
- C. The regulations of any of the funds stipulated in Paragraph (A) of this Article may stipulate that the investment of its funds be wholly or partly in the shares or shares of the company in which that fund was established.
- D. The funds provided for in Paragraph (a) of this Article shall have an independent legal personality and the rules of any of them shall include matters related to the management of the fund, including the following:
 1. The presence of a general fund for the fund consisting of all the members of the fund that meet at least once a year to approve the fund accounts, discuss administrative and financial matters, and elect their representatives in the fund management committee.
 2. The fund's funds and investments are managed by a committee whose members are employees of the institution that is a member of the fund.

Article 34

If the worker dies, all his rights prescribed under the provisions of this law shall be transferred to his legal heirs in addition to his rights in any of the funds stipulated in Article (33) of this law.

Article 35

- a . The employer may use any worker under trial in order to verify his competence and capabilities to perform the required work, provided that the duration of the trial in any case does not exceed three months and that the wage of the worker in the trial is not less than the minimum set for the wages.
- B. The employer has the right to terminate the use of the worker under trial without notification or remuneration during the trial period.
- C. If the worker continues to work after the end of the trial period, the contract is considered an employment contract for an unlimited period, and the trial period is counted within the employee's service period with the employer.

Article 73

Subject to the provisions concerning vocational training, the juvenile who has not attained the age of 16 years may not be employed in any form.

Article 74

The juvenile who has not completed 18 years of age may not be employed in hazardous, burdensome or harmful work, and such acts shall be determined by decisions issued by the Minister after consultation with the competent official authorities.

Article 75**Event is prohibited:**

- More than six hours per day to be given a period of rest not less than one hour after working four hours continuous.
- Between 8 pm and 6 am.
- In the days of religious holidays, public holidays and weekly holidays.

Article 76

The employer shall, prior to the operation of any event, request him or his guardian to submit the following documents:

- A certified copy of birth certificate.
- B. Certificate of fitness for the health event for the required work issued by a competent doctor and certified by the Ministry of Health.

- The guardian's approval of the written event of the work in the institution, and these documents are kept in a special file of the event with sufficient data. His place of residence, the date of his employment, the work he used, his wages and his leave.

Article 77

The employer or the director of the institution shall be punished for any violation of any of the provisions of this chapter or any order or decision issued pursuant to which a fine of not less than one hundred dinars and not more than five hundred dinars. The penalty shall be doubled in case of repetition.

6 OVERVIEW OF LABOR LEGISLATION: OCCUPATIONAL HEALTH AND SAFETY AND INSURANCES

This will be according to Jordan Labor Law (No. 8 for 2002), Regulation for the Protection and Safety of Workers from Machineries and Workplaces (No. 43 for 1998) and Regulation of Preventive and Therapeutic Medical Care for the Workers in Establishments (No. 42 for 1998) and as follows

a. National labor Legislation; Occupational Health and safety

Labor Law (No. 8 for 2002)

The key component of this Law is stated by Article 56 paragraphs (A) and (B) regarding the right of the laborer not to work more than six hours per day. Furthermore, Article 73 of this law bans the employment of individuals less than 16 years of age. The Law also outlines that the Project shall comply with article 78 related to occupational health and safety, and provides essential precautions and arrangements to protect the workers from the risk of hazards and supply Personal Protective Equipment (PPE).

Regulation for the Protection and Safety of Workers from Machineries and Workplaces (No. 43 for 1998)

The provisions of this regulation obligate any institution to take precautions and procedures to ensure prevention of occupational accidents. It identifies all types of safety risks at work sites, including mechanical, chemical and electrical machinery and industrial equipment.

Regulation of Preventive and Therapeutic Medical Care for the Workers in Establishments (No. 42 for 1998)

The provisions of this regulation obligate any institution to ensure the medical capability of workers via preliminary and regular medical examinations.

b. Social Security Law (No. 1 for 2014)

The key component of this law is stated by Article (4) paragraphs (A) and (B) regarding the right to obtain social security insurance for workers subject to the Labor Law, the worker who has reached the age of 16, and the temporary worker who works for 16 consecutive working days during the month. Moreover, Chapter Four shows the services of work-related injuries, hospitalization and compensation in the event of total or partial disability.

7 RESPONSIBLE STAFF

This section identifies the functions and/or individuals within the project responsible for (as relevant):

- Project owner/ MoA for engagement and management of contractors.
- A cooperative society established by the beneficiaries will be responsible for the all staff in the project (This association will be established by the trainees who will work in the project and will participate in the project management during the implementation of the project, which is expected to last for a period of one year. This association will manage the project after the project is completed)
- Resident agriculture Engineer is responsible for engagement and management of project workers
- Jordan Programme Officer, environmental expert, Safety /social officer for occupational health and safety (OHS)
- Agriculture engineer and safety/Social officer for training of workers
- Safety /social officer for addressing worker grievances

8 POLICIES AND PROCEDURES

This section sets out information on OHS, reporting and monitoring and other general project policies. Where relevant, it identifies applicable national legislation. and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. This section provides guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety. Although

the focus is placed on the operational phase of projects, much of the guidance also applies to construction and operation activities. MoA will appoint contractors with the technical capability to manage occupational health and safety issues for their employees, and expand the scope of application of risk management activities through formal procurement agreements in implementing the construction of hydroponics units. The Ministry will implement the Department of Occupational Health and Public Safety Issues during the training and employment stages of the project after its operation. Preventive and protective measures should be introduced according to the following order of priority:

- Eliminating the hazard by removing the activity from the work process. Examples include substitution with less hazardous chemicals, using different manufacturing processes, etc;
- Controlling the hazard at its source through use of engineering controls. Examples include local exhaust ventilation, isolation rooms, and machine guarding, acoustic insulating, etc;
- Minimizing the hazard through design of safe work systems and administrative or institutional control measures. Examples include job rotation, training safe work procedures, lock-out and tag-out, workplace monitoring, limiting exposure or work duration, etc.
- Providing appropriate personal protective equipment (PPE) in conjunction with training, use, and maintenance of the PPE.
- The application of prevention and control measures to occupational hazards should be based on comprehensive job safety or job hazard analyses. The results of these analyses should be prioritized as part of an action plan based on the likelihood and severity of the consequence of exposure to the identified hazards. An example of a qualitative risk ranking or analysis matrix to help identify priorities is described in Table 2.1.1.

Where significant safety risks have been identified as part of Section 2, this section outlines how these will be addressed. Where the risk of forced labor has been identified, this section outlines how these will be addressed (see ESS2, paragraph 20 and related GNs). Where risks of child labor have been identified, these are addressed in Section 7.

The employer should establish procedures and systems for reporting and recording:

- Occupational accidents and diseases
- Dangerous occurrences and incidents
- Grievances and sexual harassment

These systems should enable workers to report immediately to their immediate supervisor any situation they believe presents a serious danger to life or health.

Where the Borrower has stand-alone policies or procedures, these can be referenced or annexed to the LMP, together with any other supporting documentation.

9 AGE OF EMPLOYMENT

This section sets out details regarding:

- The minimum age for employment on the project is 18 Years.
- The process that will be followed to verify the age of project workers:
- National identification card /Original
- Passport/original
- Obtaining written confirmation from the applicant or their guardian of their age
- Where there is any reasonable doubt as to the age of the applicant, requesting and reviewing available documents to verify age (such as a birth certificate, medical or school record, or other document or community verification demonstrating age).

The procedure that will be followed by the MoA / project owner if it is found that underage workers working in the project:

If a child under the minimum age is discovered working on the project, measures will be taken to terminate the employment or engagement of the child in a responsible manner, taking into account the best interest of the child. Possible measures will be outlined in the labor management procedures

The procedure for conducting risk assessments for workers aged between the minimum age and 18:

Child over the minimum age and under the age of 18 may be employed or engaged in connection with the project only under the following specific conditions:

- (a) The work does not fall within paragraph 19 below;
- (b) An appropriate risk assessment is conducted prior to the work commencing; and

(c) The Borrower conducts regular monitoring of health, working conditions, hours of work and the other requirements of this ESS

10 TERMS AND CONDITIONS

This section sets out details regarding to the employment terms and conditions applying to HAFT project employees. These labor law rules will apply to all HAFT project employees who are assigned to work on the project (direct workers), also part-time direct workers by their individual contracts.

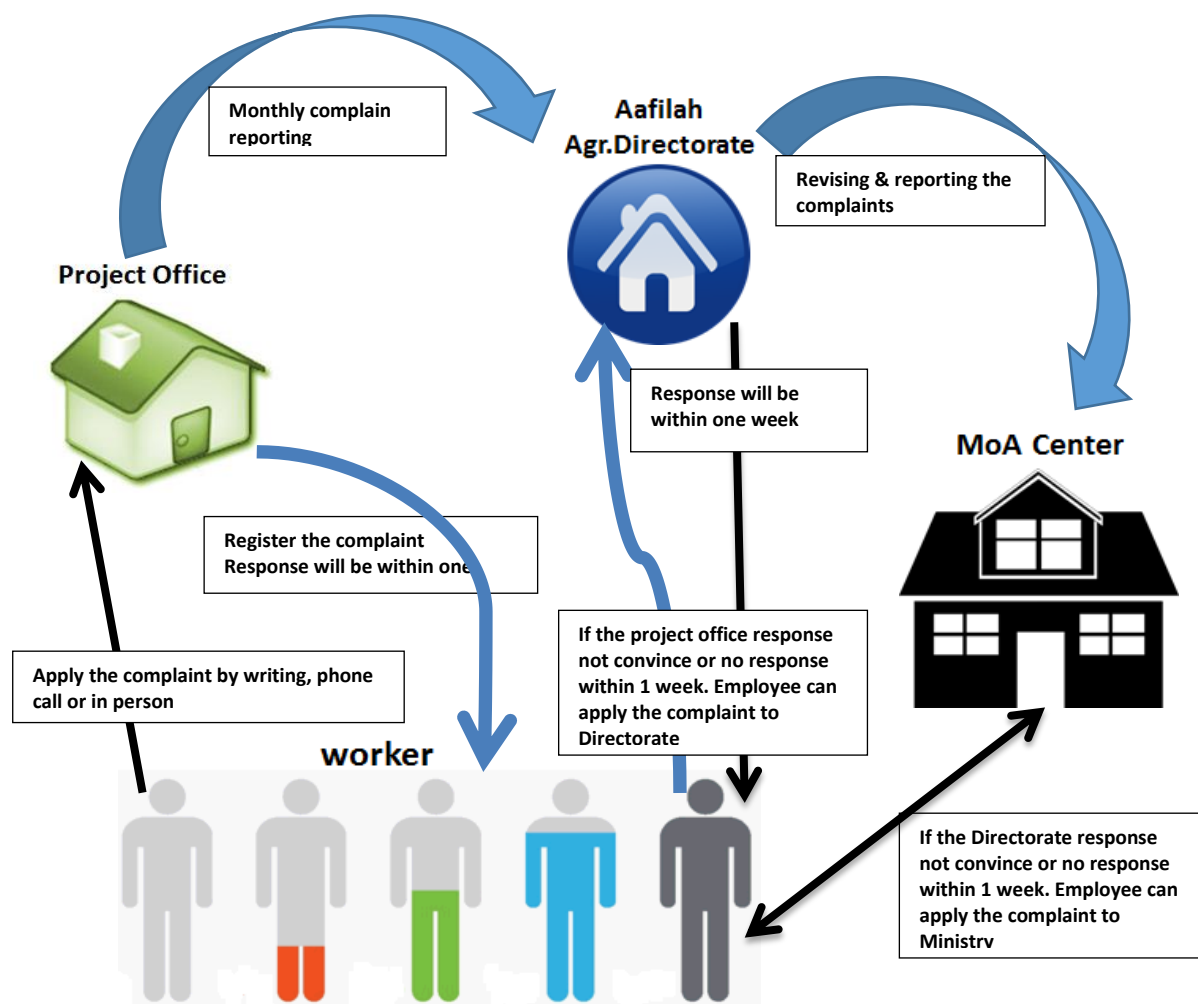
- The Tannur project applies two types of employment contract: a 75 days employment agreements and contracts on implementation of specific works. Majority of staff are permanent staff with fixed monthly wage rates (cash for training) as the same ILO paid for cash for training (US\$ 20 per day) and there will no differences among Syrian and Jordanian workers. All the recruiting procedures are documented and filed in the folders in accordance to the requirements of labour legislation of Jordan. Monthly timesheets are also filed and kept accurately. Forty Eight hour per week employment is practiced and recorded on paper. In line with the Labour law in agreement with employer direct workers of project owner will receive rest time in one day in week.
- The work hours for Tannur project workers are 48 hours per week, eight hours per workday. It is noted the Labor Code provides for a work week of 48 hours but allows six-day weeks and this may be required for some project workers. Duration of workday during a six-day week should not exceed 8 hours to meet the 48-hour weekly legal provisions. All project workers will receive at least one rest day (24 hours) after six consecutive days of work.
- The contractors' labor management procedure will set out terms and conditions for the contracted workers. These terms and conditions will be in line, at a minimum, with this labor management procedure, the Jordan Labor law and specified in the standard contracts to be used by the Tannur project, which will be provided in Project Operations Manual.
- Inclusion of workers in social security in accordance with the Social Security Law No. 1 of 2014 Other specific terms and conditions

11 GRIEVANCE MECHANISM

Back ground:

The project will include multi-level arrangements for registering and addressing grievances and complaints from project-affected people. The primary purpose of the project grievance redress mechanism is to provide clear and accountable means for affected persons to raise complaints and seek remedies when they believe they have been harmed by the project. An effective and responsive GRM also facilitates project progress, by reducing the risks that unaddressed complaints eventually lead to construction delays, lengthy court procedures, or adverse public attention. In general, the affected person should register his/her grievance in writing to the project officer or Atafilah Agricultural Directorate, by phone call (+96232241023, +962799059084), by Facebook link <https://www.facebook.com/groups/207233332651059/> or the Ministry website (www.moa.gov.jo) in person to the concerned employee (Supervision team on implement project (STIP), Technical officer), the numbers will be identified and announced as the project begins implementation. Regular meetings and discussions should be held with the Public and private stakeholders within a specified period (based upon agreement with local community leaders), and a response should be given by the end of this agreed upon period.

If the aggrieved person does not receive a response within the specified period or is dissatisfied with the outcome, the complaint should be escalated to the next identified level (Minister of Agriculture). The GRM will be implemented with continuous monitoring to ensure that all grievances are adequately addressed. All grievances will be documented in the form of a log throughout the project life-cycle. A grievance redress mechanism for workers will also be put in place by the project manager based on the mutual agreed upon grievance mechanism with the workers in the project site. It will follow a similar approach to the public GRM, whereby the responsible persons for documenting and addressing complaints will be clearly communicated to the workers. An adequate timeline to respond to the complaints of the workers will also be included as part of this GRM. So that if the grievance is not answered and action is taken within one week, the intervention is carried out by the MoA /project owner to take the necessary measures regarding the grievance. The figure below shows the flow chart of grievance mechanism:



A grievance mechanism will be provided for all direct workers and contracted workers (and, where relevant, their organizations) to raise workplace concerns. Such workers will be informed of the grievance mechanism at the time of recruitment and the measures put in place to protect them against reprisal for its use. Measure will be put in place to make the grievance mechanism easily accessible to all such project workers, where it will be available through written complaint, direct contact with the mobile, and the WhatsApp application.

The project Owner and Partner should inform direct and contracted workers, respectively, about the available grievance mechanisms, and how they work. The relevant information will be made available throughout project duration in a manner that is clear, understandable, and accessible to workers.

The labor management procedures include reasonable measures so that direct and contracted workers are not subjected to any form of retaliation as a result of any grievance raised. Such measures will include the need for confidentiality.

The grievance mechanism will be designed to address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned in the Arabic language.

An effective and appropriate grievance mechanism operates with independence and objectivity, informs workers of the steps being taken to address their concerns, and allows for feedback about the response, within the time frames specified in the grievance mechanism procedure. The grievance mechanism will be accessible

to all direct and contracted workers, taking into account their different characteristics, including female workers, migrant workers, or workers with disabilities. Where appropriate, consideration can be given to allowing concerns to be raised anonymously and/or to a person other than Supervision team on implement project (STIP), this situation is required by the nature of the conservative community in the project area, and to empower women in particular to file a grievance.

The grievance mechanism will not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.

The project Owner their obligations and commitment related to (GRM) summarized as follow:

1. The Project Owner will apply the proposed grievance mechanism, process, procedure to receive and facilitate resolution of stakeholders' concerns and grievances about their environmental and social performance.
2. The grievance mechanism is scaled to the risks and potential adverse impacts of this project.
3. The grievance mechanism, process, or procedure addresses concerns promptly and effectively, using an understandable and transparent process that is culturally appropriate and readily accessible to all segments of the affected communities, at no cost and without retribution.
4. The mechanism, process or procedure will not impede access to judicial or administrative remedies.
5. The project owner and Partner will ensure that there is an independent, objective appeal mechanism.
6. The project owner and Partner informed the affected communities about the grievance process in the course of its community engagement meeting, and will report regularly to the public on its implementation, protecting the privacy of individuals and report regularly to the public on its implementation, protecting the privacy of individuals.
7. Grievance mechanisms for workers will be separate from public grievance mechanisms.

10. CONTRACTOR MANAGEMENT

This section sets out details regarding to contracts will include provisions related to labor and occupational health and safety as provided in the Jordan Procurement Documents law.

MoA will manage and monitor the performance of contractors in relation to contracted workers, focusing on compliance by contractors with their contractual agreements (obligations, representations, and warranties) and labor management procedures. This may include periodic audits, inspections, and/or spot checks of project locations and work sites as well as of labor

MoA will monitor the performance of records and reports compiled by contractors. Contractors' labor management records and reports that may be reviewed would include: representative samples of employment contracts records relating to grievances received and their resolution, reports relating to safety inspections, including fatalities and incidents and implementation of corrective actions, records relating to incidents of non-compliance with national law,

MoA will monitor the performance of records of training provided for contracted workers to explain occupational health and safety risks and preventive measures

Annex No. (3): INTEGRATED PEST MANAGEMENT PLAN

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

INTEGRATED PEST MANAGEMENT PLAN¹⁵ (IPM)

February 12, 2020

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And Eng. Imad Alawad Plant Protection & phytosanitary Directorate

Introduction

Integrated Pest Management (IPM) is an environmentally friendly, common sense approach to controlling pests. The IPM principles and benefits described below apply to any type of structure and farm including hydroponic operations.

Pest control in Jordan is done by the Ministry of Agriculture through the Agricultural directorates in Governorates. Also pest management is controlled by regulations issued by the Ministry. These regulations can be summarized as following:

- Article No. (21) of Agricultural Law No. (13) of (2015).
- "Instruction of registration, manufacture, supply, import, circulation and trade in pesticides" No. (Ag./18) of (2018)
- "Instructions for licensing locations for selling agricultural pest control services, public health pests, warehouse pests, pesticides use, sterilization materials, fumigation, and licensing control workers instructions" No. (Ag./16) of (2016).
- "Instructions of Pesticide Residues in Fresh Vegetables and Fruits" No. (Ag./17) of (2017)
- "Instructions of registering, importing, trading and trading in biocides" No. (Ag./18) of (2018)

Ministry of Agriculture monitoring the vegetables and fruits by taking samples at farms and from the whole markets for inspection of pesticides residues.

Potential Problems/Pests Control Under the Project

The project will grow tomatoes, cucumbers, lettuce, strawberries and red rose. These crops face many diseases and insect pests, and the project will work to combat these evils and diseases through integrated control techniques to achieve the optimal use of pesticides that take into account the preservation of the environment and agricultural resources in the project area and the most important pests and diseases as:

Table (1): Tomato Pest

Scientific name	<i>Tuta absoluta</i>	<i>Liriomyza sativae</i>	<i>Phytophthora infestans</i>	<i>Bemisia tabaci</i>	<i>Botrytis cinerea</i>
Common name	tomato leafminer	leaf miner of vegetables	late blight of tomato	whitefly	
Hosts	peppers - tomato	<u>Solanaceae</u> - Peppers - melon cabbages - cauliflowers	Potato - solanum	Cucumber – cauliflower , cotton, tomato ...atc	More than 200 <u>dicotyledonous</u> plant species
Plant part attacked	Fruit - Leaves	Leaves	Fruit , Leaves, Vegetative	leaves	Fruit , Leaves, Vegetative
Symptoms	Fruit / obvious exit hole- leaves rolled or folded	necrotic areas – rot - wilting	Fruit: black or brown Leaves: fungal growth necrotic areas Vegetative: dry rot	Leaves / honeydew or sooty mould	soft rot that will have a collapsed and water soaked appearance on soft fruit and leaves
Control measures	Control program Spraying Trapping - Pheromones	Control program Spraying GAP	Control program Spraying GAP	Control program Spraying GAP	Control program Spraying GAP

Table (2): Strawberry pest

Scientific name	Tetranychus urticae	Botrytis cinerea	Verticillium albo-atrum	Sphaerothecae spp	Aphids spp
Common name	Two spotted red spider	Grey mold	Verticillium wilt	Poder midew	aphidis
Hosts	very wide host range	More than 200 dicotyledonous plant species	Most vegetables	Most vegetables	
Plant part attacked	Fruit - Leaves	Fruit- leaves	roots	leaves	Leaves - branches
Symptoms	Deformation of fruits and leaves	soft rot that will have a collapsed and water soaked appearance on soft fruit and leaves	Weakness and wilting plant	Leaves / honeydew or sooty mould	soft rot that will have a collapsed and water soaked appearance on soft fruit and leaves
Control measures	Control program Spraying GAP	Control program Spraying GAP	Control program Spraying GAP	Control program Spraying GAP	Control program Spraying GAP

- **Cucumber pest**

- Pseudoperonospora cubensis
- Botrytis cinerea -

- **Rose pest**

- Sphaerotheca pannosa
- Aphids
- Tetranychus sp

- **Lettuce pest**

- Fusarium sp,
- Pythium sp
- Phytophthora sp,
- Rhizoctonia sp

In IPM Program we can solve many problem that face the planting related to the insect, fungi, mites by applying pest management program by using biopesticides , traps , GAP .

Traditional pest control involves the routine application of pesticides. IPM, in contrast:

- Focuses on pest prevention.
- Uses pesticides only as needed.
- Also relies on a mix of chemical and non-chemical measures; relies on careful monitoring in the fields

These simple guidelines provide a more effective, environmentally sensitive approach. IPM is not a single pest control method but rather involves integrating multiple control methods based on site information obtained through:

- Inspection
- Monitoring
- and Reports

Before any IPM is planned for any farm, it is essential to identify the following:

- The kind of crop intended to be cultivated, (vegetable, fruit)
- The Area in which the farm is located (near community, agriculture land, rural desert, dry or humid ambient air condition)
- Type of soil, has the land has been farmed previously. (Historical data is necessary to know if there was any presence of viruses, nematodes, fungal outbreak in the past).
- Will the crop be cultivated using conventional (open air), covered, Hydroponic?

Remember every location is unique in terms of soil, atmosphere, surroundings and type of agriculture.



Suggested IPM Approach and Guidelines In the Tannur Hydroponics Farm Project:

According to the agricultural experts in MoA, has been farmed for many decades and it is most likely that viruses and nematodes (soil borne diseases) are present in the soil. It is therefore imperative that a soil sterilization process be performed on the area intended to be used for soil based agriculture as a preemptive approach to eradicating any soil based pests i.e., nematodes. Therefore, prior to commencing any planting in the traditional Green House, it must be:

- First sterilized by applying the Soil Solarization technique (Using the sun energy to sterilize and disinfect the soil).
- Plow the designated area and turning over the soil. Adding or spreading treated organic manure
- Covering the entire area with agricultural Mulch
- Soil sterilization will be complete depending on the number of sun days, soil type and ambient temperature.
- Immediately remove any plant debris and placing them in strong plastic sacks and transport to location designated by Municipality for disposal.
- Make sure all weeds and undesired shrubs are pulled out of the entire farm area and disposed of in the same manner.

After that the entire farm has been cleared of:

- All plant biotic factors-Weeds (grassy, parasitic weeds).
- All construction debris (organic or manmade) removed from site.
- All the existing weeds must be taken out and removed from the entire farm area and disposed in the designated area by the Municipality.

The construction of the farm facilities and erection of the Hydroponic Structure can begin.

The following simple and logical measures are strongly recommended in the design of the green houses and Hydroponic house:

Do not leave any vents, openings, windows or doorways on the outer covered structures without being securely covered by special Thrips Insect Screens designed to exclude Thrips and other air borne pests from entry into the covered agricultural area.

Plan on installing at the entrance of each individual covered agricultural structure a decontamination area.

The decontamination area consists of two opposing and revolving doors diagonally facing one another with a floor sanitation matt in between.

Decontamination area must be fully and securely screened off, not to allow any air born insects from entering cultivated area.

In some decontamination areas Trap plants (bait plants) are grown to draw any airborne insects on to them making it easier and economically cheaper to use organic pesticides on them rather than spraying the entire house. In some cases sunflowers are cultivated as trap plants.

Pesticides procurement policy ensuring pesticides procured in accordance with Bank EHSG and national regulations or that include active ingredient banned under international protocols

Storage, transport and disposal of pesticides to ensure safe handling

Disposal of pesticides and other agricultural chemicals in a proper way and according to regulations.

Provision of personal protective equipment and training for any staff or individuals handling pesticides.



Oversight of PMP by qualified specialist in Al Tafialh Agricultural directorate.

Make sure cultivated plant rows are well spaced and adequately separated not congested.

Make sure to control all kind of operations that may generate dust inside the Hydroponic structure and within the premises of the farm to avoid insects attraction especially Spiders.

All water irrigation hoses must be well secured. No leakage or seepage should be allowed away from the plants to keep humidity inside the covered farms at a minimum.

Strict adherence to wearing uniforms and gloves while in the cultivated houses must be enforced at all time by all laborers and staff (all these items included cost and quantity are mentioned in the construction budget..

If plants are infected at any time, immediate action must be taken in order to remove and isolate infected parts or plants (Roguing) and placing them in secured plastic bags to be disposed of at designated dump site.



The use of resistant or tolerant plant varieties are preferred. Locally adapted plant varieties produce stronger more pest tolerant crops.

The choice of healthy good quality seeds from reputable sources produce stronger more pest tolerant crops.

All pest organisms are in fact part of a more complex ecosystem and which also have natural organic enemies (beneficial organisms). Know what these beneficial organisms are and where to purchase them in the local market.

It is important to note that pesticides negatively affect beneficial organisms as well as pests.

It's also sensible and a good practice to Integrating the different available systems and methods (IPM).

The Hydroponics Farming Project will assist and train farmers from local community to be able to develop their IPM approaches to the management of pests and diseases. The project must applied three training course preplanting , planting period, In the mid of season , at the end of season and harvest time. We estimate the cost of the training courses about \$5764 and its allocated in the bussniss modle budget of the project. The training will be conducted by a trained staff member and be a comprehensive approach from seed selection, land preparation, planting and farm maintenance to harvesting and post harvesting issues. Local Farmers will be trained enough and encouraged to make detailed observations in their fields regularly using the IPM methodology so that they can detect early infestations and make the appropriate management decisions using sustainable farming techniques.

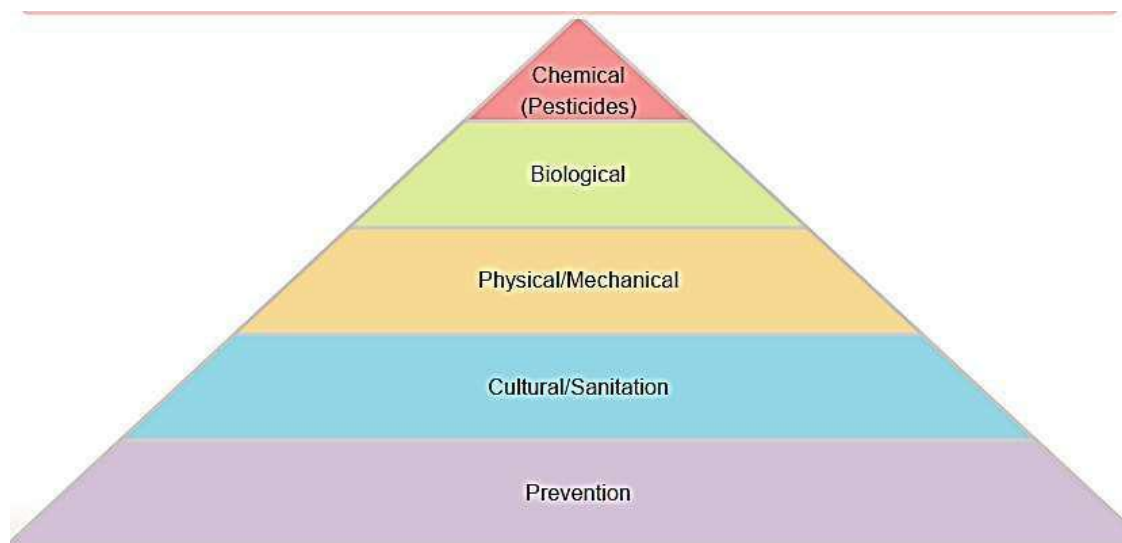
Table (3): IMP training budget - Estimated Budget

IMP training Activities	Quantity	Unit Cost (USD)	Total Cost (USD)
Trainers cost (3 days*4 hours*\$30)	4	360	1440
Travel expense for staff	4	150	600
Stationery, paper, pencils	4	200	800
Pastries, refreshments, coffee, Tea.	4	150	600
Hall	4	300	1200
Communications materials (pamphlets, posters, PR kits-including design)	4	150	600
Contingency	1	524	524
Total			5764

*Period of training course on IMP will be three days.

**number of trainees will be about 25

*** Number of courses will be four



Plant protection chart (sustainable pesticide use as last resort)

For additional information and assistance dealing with IPM processes and activities on farms and cultivated fields, contact the National Agricultural Research Center located in various Governorates around the country. Experts stand ready to identify local venders and assist farmers plan and apply IPM methods and suggest non-toxic and organic pesticides, pest tolerant seeds and many other useful information.

Annex No. (4): Legal and Institutional Framework

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Legal and Institutional Framework

February 12, 2020

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Legal and Institutional Framework:

1. REGULATORY FRAMEWORK

This ESIA is done in accordance with the Jordanian Environmental Impact Assessment Regulation No. 37 for the year 2005. This section aims to identify the applicable regulatory framework in Jordan as relevant to the project. It includes the laws, regulations and standards related to environmental, health and safety, labor and planning issues.

Laws:

Environment Protection Law (No. 52 for 2006)

In 2006, the Jordanian Law for Protection of the Environment was ratified. Article 5 of this law states that the Ministry of Environment (MoEnv) shall in cooperation and coordination with the authorities concerned with environmental affairs at the local, regional and international levels, assume supreme authority for the preservation and conservation of all the environmental elements and components from adverse effects and contamination.

To ensure that the MoEnv is able to achieve their objectives, a set of complementary regulations and instructions were issued pursuant to the Law.

According to Article 13 of the law, any companies, establishments or entities that conduct activities which negatively impact the environment should prepare an environmental impact assessment report for its projects and submit such report to the MoEnv to take the appropriate decision in its regard.

Public Health Law (No. 47 for 2008)

The Ministry of Health (MOH) is the entity responsible for applying the Public Health Law in Jordan. The Ministry is also authorized to take all necessary measures to protect public health. Article 47 considers activities that affect human health or cause a health nuisance by releasing solid or liquid waste or emitting gases. Article 48 states that entities responsible for creating health nuisance are given seven days' notice to apply corrective measures. If nothing is done, the ministry of health will carry out the required actions at the expense of the activity owner.

Archaeology Law (No. 21 for 1988)

Issued by the Ministry of Tourism / Department of Antiquities (DOA), the law details the main responsibilities of the DOA. These include but are not limited to determining the archaeological sites along with their importance, carrying out archaeological excavations, and maintenance, preservation and restoration of archaeological sites. Article 13 of this law bans construction of any structure within a distance of 5-25 m from an archaeological site. Article 15 states that any chance finds should be reported to DOA or the Public Security Directorate within 10 days. Article 27 sets the penalties for failing to report chance finds.

Water Authority Law (No. 18 for 1988)

The Water Authority Law and its amendments established the Water Authority of Jordan (WAJ) as an autonomous agency responsible for all water and wastewater related issues in the country. WAJ's mandate includes connecting the public to the water and sewer networks, as well as maintaining, operating, and managing these networks.

WAJ's mandate also includes the management of WWTPs, and thus it is concluded that WAJ's mandate also encompasses any product of WWTPs. However, the law does not include any explicit provisions regulating the means of sludge disposal and/or the production of biosolids for disposal or reuse.

Agriculture Law (No. 13 for 2015)

This law identifies the responsibilities of the Ministry of Agriculture (MOA) in regulating and developing the agricultural sector, in cooperation with the relevant authorities. In addition, Article 56 governs the protection of wild animals and birds and prevents the hunting, killing or capture of birds useful for agriculture as well as birds and animals of prey; the types and species subject to this regulation are specified by the Minister. The Law further governs the protection of agricultural land, forests and pastures.

Planning of Towns and Villages and Buildings Law (No. 79 for 1966)

By virtue of this law the Higher Planning Council is responsible for regional planning and planning zones. This law applies to all kinds of land uses including buildings and any construction works undertaken. It also applies to any reconstruction conducted by any governmental or local authority, public or private institution. The law provides many sections that regulate licensing, plans for land distribution, pollution prevention, solid waste disposal and sewage, as well as traffic control.

General Electricity Law (No. 64 for 2003)

By virtue of this law the Ministry of Energy and Mineral Resources (MEMR) is the responsible and governing entity for electrical energy generation and for the licensing of power-producing facilities. Article 4F of the law gives MEMR the mandate to promote the use of renewable energy for electricity generation.

This law clarifies the role and function of the Energy and Mineral Resources Regulatory Commission (previously known as the Electricity Regulatory Commission but changed by virtue of the Law for Restructuring of Governmental Organizations and Directorates (No. 17 for 2014) as an independent agency responsible for regulating the power sector in three areas: generation, transmission, and, distribution.

Article 7 of the law gives the mandate to license persons engaged in electricity generation, transmission, supply, distribution and system operation. It also gives the Commission the power to determine the electric tariff, subscription fees, service fees, disbursements, and the connection charges to the transmission and distributions systems. Additionally, the Commission has the mandate to participate in determining the necessary requirements for the implementation of the environmental standards to which electrical installations ought to conform in coordination with other concerned parties.

Renewable Energy and Energy Conservation Law (No. 13 for 2012)

This law defines renewable energy as “energy produced from inexhaustible natural resources”, and defines renewable energy sources as “natural renewable resources of energy including solar energy, wind energy, bio-energy, geothermal energy and hydropower”. However, there are no clear statements within the legislation in force that classify the generation of electricity from biosolids and sludge as renewable energy. Nevertheless, the legislation addresses bio-energy.

Labor Law (No. 8 for 1996)

The key component of this Law is stated in Article 56 paragraphs (A) and (B) regarding the right of the laborer not to work more than eight hours per day. Furthermore, Article 73 of this law bans the employment of individuals less than 16 years of age. The Law also outlines that the Project shall comply with article 78 related to occupational health and safety, and provides essential precautions and arrangements to protect the workers from the risk of hazards and supply Personal Protective Equipment (PPE).

Ministry of Social Development Affairs and Labor Law No. (14) of (1956) and amendments

Societies Law No. (51/2008) and amendments

Minors Law No. (32) of 2014

Protection of Family in cases of Violence Law Nr. (6) of 2008

These laws that the Ministry of Social Development are working with for promoting social development work and coordinating it among development partners in governmental and non-governmental sectors. Developing comprehensive and integrated policies to develop the society and ensure the provision of distinguished services that improve families and individuals quality of living through investing in human resources, developing their abilities, employing information and knowledge, establishing an equal development process in terms of social and economic dimensions. Preservation of the achieved gains. Organizing citizens' efforts and raise their awareness about using their abilities to improve their living standards. Providing citizens with social services, protecting society from social problems, and coordinating with relevant bodies that work in the social field

Bylaws and Regulations:

Environmental Impact Assessment (EIA) Regulation (No 37 for 2005)

The EIA regulation was issued to ensure that the anticipated impacts of any development project on the social, economic, and natural environment in Jordan are identified prior to carrying out any economic activity. Their aim is to limit these impacts in order to achieve sustainable development in

the country. The regulation applies to all industrial, agricultural, commercial, construction, residential, and tourism projects. The level and type of the EIA study is determined by the MoEnv and is included in the Law's annexes for the majority of projects. This regulation also states that the EIA review period for the MoEnv is 45 calendar days.

Regulation for the Prevention of Health Nuisances (No. 72 for 2009)

The provisions of this regulation prohibit anyone from causing any health nuisances within the municipal area. It identifies the types of nuisances and the measures required to be undertaken to prevent the occurrence of such health nuisances.

Regulation for the Protection and Safety of Workers from Machineries and Workplaces (No. 43 for 1998)

The provisions of this regulation obligate any institution to take precautions and procedures to ensure prevention of occupational accidents. It identifies all types of safety risks at work sites, including mechanical, chemical and electrical machinery and industrial equipment.

Regulation of Preventive and Therapeutic Medical Care for the Workers in Establishments (No. 42 for 1998)

The provisions of this regulation obligate any institution to ensure the medical capability of workers via preliminary and regular medical examinations.

Air Protection Bylaw (No. 28 for 2005)

This bylaw was issued in accordance with Article 23 of the Environmental Protection Law (No.1, 2003). The aim of the Air Protection Bylaw is to protect public health and the environment from pollution resulting from human activities by controlling air pollutants emitted from stationary and mobile sources. It states that for any facility that leaks or emits air pollutants should not exceed the maximum allowable limits. The MoEnv classifies the establishments according to the quality and quantity of air pollutants and contaminants resulting from their activities, and their effects on the environment and public health; consequently the appropriate location of the facility is determined. The MoEnv is responsible to detect any excesses and monitors the compliance with this regulation.

Solid Waste Management Bylaw (No. 27 for 2005)

The Ministry of Environment is responsible for enforcing this bylaw which aims to establish a solid waste management system that would protect the environment and the public health. Under this bylaw, the Ministry is responsible for assigning the appropriate dumping sites along with detailing the requirements of solid waste collection, transport, storage, recycling, treatment and disposal.

Soil Protection Bylaw (No. 25 for 2005)

The relevance of this bylaw is in Article 3-E, which states that the MoEnv, in coordination with the relevant authorities, is responsible for protecting the soil from the harmful effects of industrial dust, solid waste, industrial waste and untreated wastewater. The regulation further states that the Ministry in cooperation with MOA is responsible for studying the sites of development projects and their impact on land and natural resources as well as preparing the necessary programs for the rehabilitation and cultivation of waste dumping sites after their reclamation with the appropriate crops.

Environmental Monitoring and Inspection Regulation (No. 65 for 2009)

This regulation was issued pursuant to the Environmental Protection Law No. 52 for 2006. It categorizes three levels of operational facilities based on their level of risk to cause environmental pollution. This categorization is further reflected in the needed frequency of environmental inspections. In cases where environmental inspections carried out by the MoEnv reveal violation of stated environmental quality requirements, the MoEnv is authorized to request an environmental audit from the facility management and is obliged to submit its original audit reports to MoEnv. Article 9.

Regulation for Protecting the Environment from Pollution in Emergency Situation (No. 26 for 2005)

This regulation sets out the plan for "protecting the environment and controlling pollution in emergency situations and the methods of implementation thereof, subject to the specific international and regional protocols in this regard to which the Kingdom is party to". In addition, MoEnv is

responsible for managing the emergency plan and following up on its execution as well as identifying the necessary resources and conducting the required surveys and studies.

The Groundwater Control Regulation (No. 85 for 2002)

This regulation was issued pursuant to articles 6 and 32 of the Water Authority Law No. 18 for 1988. It governs groundwater extraction and marks groundwater as exclusive government property. The regulation additionally controls the drilling of wells and the licensing thereof as well as quality and pollution control and remediation. Furthermore, the Criminal Law No. 16 for 1960 stipulates the protection of water resources and sets out the penalties in the case of violations.

Water Protection Regulation of 2004

This regulation aims at protecting the water sources from pollution. It stipulates that the MWI sets the environmental conditions to be fulfilled if permission and authorization are to be given for the development projects covered by the environmental impact assessment regulation.

Additionally, Article 6 of the regulation states that no waste dump sites can be constructed without the Ministry's authorization and states that MWI in coordination with the concerned entities should set the environmental criteria, conditions and requirements for such a facility. Article 11 further highlights the role of MWI and other concerned entities in setting the environmental conditions for the collection, storage and transportation of all liquid and solid waste in order to prevent the pollution of water sources.

Regulation for the Exemption of Renewable Energy Systems, Devices, Equipment and Energy Conservation (No. 10 of 2013)

This regulation defines renewable energy as "energy produced from inexhaustible natural resources", and defines renewable energy sources as "natural resources of energy including solar energy, wind energy, bio-energy, geothermal energy and hydropower." As per Annex 1 of this regulation, bio-energy systems are to be considered tax exempt renewable energy sources, specifically "the biogas system for electric power generation and the system for direct waste incineration for electric power generation."

Regulation of Land Use for 2007

This regulation, which applies to all kinds of land uses including buildings and any construction works undertaken, makes the Higher Planning Council responsible for regional planning and planning zones. It sets out the different land use categories and defines the relevant allowable activities.

Sewerage System Regulation (No. 66 for 1994)

This regulation was issued pursuant to Article 32 of the Water Act No. 18 for 1988. It regulates the subscription in sewerage systems in Jordan, specifies the fees of the service and the terms of participation. It prohibits any disposal of wastewater in the public sewerage without permission. The regulation specifies the penalties that would be applied if the authority finds that the wastewater disposed to public sewerage contains any prohibited materials. The authority has the right to subject wastewater of any institute at any time to inspection.

Hazardous Materials and Wastes Management, Transfer and Circulation Regulation (No. 24 for 2005)

This regulation prohibits dealing with hazardous waste or dangerous substances unless a permit is obtained from MoEnv. As per this regulation, the Ministry should form a committee that classifies hazardous waste or dangerous substances, and prepare instructions to determine the basis and conditions for the handling, collection, storage and waste treatment and disposal of hazardous waste and dangerous substances.

Regulation for the Formation of Committees and Moderators of Occupational Safety and Health (No 7 for 1998)/Arabic

The provisions of this regulation obligates any institution that has more than 20 employees to form a functionally specialized committee for the occupational safety and health of the employees, which should be commensurate with the size of the institution. The regulation also specifies the responsibilities of this committee.

Instructions:**Instructions for the Protection of Workers and Institutions from Workplace Risks and Hazards for 1998**

These instructions specify all mitigation measures that should be taken within traits, industries and crafts to ensure the occupational safety and health of workers and reduce risk factors in the facilities.

Instructions for Preliminary Medical Testing of Workers for 1998

These instructions classify all types of industries where workers should be subject to a preliminary medical examination to check their capability to perform their assigned work.

Instructions for Regular Medical Testing of Workers for 1998

These instructions classify all types of industries where workers should be subject to certain medical examinations regularly.

Instructions for Wastewater and Treated Wastewater Use in Agriculture

These instructions identify all types of wastewater, treated wastewater and agricultural products. They also specify all the terms for reusing the treated wastewater in agricultural production.

Instruction for the Management and Handling of Consumed Oil for 2003

These instructions identify the oils that are refined from crude oil or synthetic oils and those that have been used and have become contaminated waste and therefore must be disposed of or treated to be reused. These instructions prohibit the discharge of these oils into sewage systems or septic tanks or surface water sources or groundwater or to the environment, and specify all the requirements for the proper handling and disposal of these oils.

Instruction for Management and Handling of Hazardous Waste for 2003

These instructions identify all types of hazardous wastes and prohibit the discharge of these wastes into sewage systems or surface water or groundwater or to the environment. They also specify all the requirements and steps for proper handling, storage, transportation and disposal of these wastes.

Instruction for Regulating the Transport, Storage, Manufacture, Trade and Use of Compost for 2003

These instructions are the basis for the establishment of a committee for the licensing of organic fertilizer factories. The duties of this committee is specified in this set of instructions, which specify all the requirements for the transport, storage, production, trade and use of compost.

Instructions for Noise Prevention for 2003

These instructions address ambient noise and were issued by the MoEnv in 2003. Article 6 of the instructions specifies the maximum allowable level of noise for the different types of areas, both during the daytime and at night. According to the Instructions for Controlling and Preventing Noise, construction works that use noisy equipment like mixers and shakers and any other similar equipment between 8 pm and 6 am is prohibited except for cases approved by the Ministry.

The table (1) below displays the allowable maximum limit of the equivalent volume level (dB A) per area Classification, Article 6 of Jordanian Instructions for Noise Prevention.

Table 1: Maximum Limits of the Equivalent Volume Level (dB A).

Classification of the Area	The allowable maximum limit of the equivalent volume level (dB A)	
	Day	Night
Residential areas in cities	60	50
Residential areas in the suburbs	55	45
Residential areas in villages	50	40
Residential areas that have some workshops, simple crafts or business and commercial and administrative areas and center of the city	65	55
Industrial areas (heavy industries)	75	65
Education, worship and treatment places and hospitals	35	45

Standards:

Ambient Air Quality Standards (JS 1140 for 2006)

These standards provide definitions of ambient air pollutants in addition to the maximum allowable concentration for each of those pollutants in the atmosphere, in addition to approved methods of measurement

The table (2), shows the allowable maximum limits for some of the pollutants listed in JS 1140/2006. The project should comply with these limits during construction. During the operation of the highway, the pollutants generated should also comply with limits detailed hereunder.

Table 2: Maximum Allowable Limits Set by JS 1140/2006

Pollutant	Averaging Period	Maximum Limit	Number of Times Limit is Allowed to be Exceeded
Sulphur Dioxide (SO ₂)	1 hour	0.3 ppm*	3 times in any 12-month period
	24 hours	0.14 ppm	Once a year
	Annual	0.04 ppm	-
Carbon Monoxide (CO)	1 hour	26 ppm	3 times in any 12-month period
	8 hours	9 ppm	3 times in any 12-month period
Nitrogen Dioxide (NO ₂)	1 hour	0.21 ppm	3 times in any 12-month period
	24 hours	0.08 ppm	3 times in any 12-month period
	Annual	0.05 ppm	-
Ozone (O ₃)	1 hour	0.12 ppm	-
	8 hours	0.080 ppm	-
Particulate Matter 10 (PM ₁₀)	24 hours	120 µg/m ³ **	3 times in any 12-month period
	Annual	70 µg/m ³	-
Particulate Matter 2.5 (PM _{2.5})	24 hours	65 µg/m ³	3 times in any 12-month period
	Annual	15 µg/m ³	-
Total Suspended Particulates (TSP)	24 hours	260 µg/m ³	3 times in any 12-month period
	Annual	75 µg/m ³ (geometric average)	-

*ppm: parts per million ** µg/m³: microgram per cubic meter

Air Emissions from Stationary Sources (JS 1189 for 2006)

These standards provide definitions of stationary sources of air pollutants in addition to the maximum allowable concentration for each of those pollutants in the atmosphere. They also define approved methods of measurement. Furthermore, MoEnv has the legal mandate to oblige entities with an expected risk of exceeding permissible air emission levels to install the required equipment to make air emissions fall within standards. The table (3) shows the allowable maximum limits for some of the pollutants listed in JS 1189/2006.

Table 3: Maximum Allowable Limits Set by JS 1189/2006

Pollutant	Maximum Limit µg/ m ³
Sulphur Dioxide (SO ₂):	6500
Combustion of petroleum products	3000
Non-ferrous metal industries	1500
Sulfuric acid industries	150
Sulfur trioxide (SO ₃), Sulphur Dioxide particulates	150

Nitrogen Dioxide (NO₂):	200
Combustion processes under 1200° C	1500
Combustion processes above 1200° C	300
Non-combustion Industrial processes	
Volatile organic compounds	20
Lead (Pb)	0.5
Lead compounds	20
Cadmium (Cd)	0.05
Cadmium compounds	10
Chlorine (Cl₂)	30
Hydrogen Chloride (HCl)	10
Hydrogen Fluoride (HF)	15
Copper (Cu)	1
Nickel (Ni)	2
Fluorine (F₂)	5
Ammonia	50
Dioxin	1x 10⁻⁶

Water-Sludge-Uses of Treated Sludge and Sludge Disposal (JS 1145 for 2006)

These standards regulate the entire cycle of biosolids production, transport, and eventually their reuse and/or disposal. As shown in this technical regulation defines three categories of biosolids and sludge, specifies allowable reuse options for the classes 1 and 2 biosolids and permits the landfilling of all three categories (Class 3 sludge cannot be reused for any purposes and should only be landfilled). As per the Technical Regulation, the requirement for Class 3 sludge is thickening with a minimum of 3% DS (dry solids) prior to landfilling. However, relevant EPA standards require the stabilization of all biosolids/sludge prior to landfilling. JS 1145/2006 also stipulates that the piling up of biosolids prior to reuse should be done in enclosed and lined areas away from locations prone to flooding or near water bodies; the period for biosolids piling should not exceed 3 years.

This regulation further stipulates that biosolids and sludge producers should prepare and present their biosolids management plan to the regulatory and monitoring bodies. In addition, Article 5-16 prohibits the disposal of any category of biosolids/sludge in water bodies, wadis, groundwater recharge locations and sewer networks. Regulatory and monitoring bodies are authorized to enforce more stringent restrictions to what is mentioned in this Technical Regulation. The respective bodies/authorities are responsible for overseeing the adoption review and monitoring of the implementation of these regulations. As per the JS 1145/2006 the normative reference for the application of this standard is the "Standard Methods for Testing Water and Wastewater" issued by the American Public Health Society and the Federal American Society for Water Research and Monitoring, 2001.

2. Institutional Framework:

Ministry of Environment (MoEnv)

MoEnv is the supreme authority accountable for protecting various environmental components across the Kingdom in addition to being responsible for environmental compliance. It aims to protect the environment, conserve Jordan's natural resources and achieve sustainable development.

MoEnv would be the entity responsible for reviewing this ESIA and granting the approval for the Project as well as being the entity ensuring and monitoring environmental compliance and protection of environmental components throughout the construction and operation of the Project. Furthermore MoEnv is the entity responsible for handling environmental complaints. The relevant MoEnv laws regulations and instructions to be complied with are shown in Section Two under the Regulatory

Framework. The Ministry is the national focal point for the Multi-lateral Environmental Agreements (MLEA's), the Rio's Conventions, Climate Change and National Designated Authority (NDA) for Green Climate Fund (GCF).

Ministry of Water and Irrigation (MWI)

MWI and its respective authorities (WAJ and JVA) are specifically responsible for the protection of water resources. The main objective of MWI is to maintain sustainable water resources with the purpose of achieving national water security and meeting the Ministry's development objectives.

The Water Authority of Jordan (WAJ)

WAJ is the entity that assumes all authority pertaining to water and wastewater in Jordan which includes the management of WWTPs. The role further involves the improvement of the relevant infrastructure for the purposes of preserving public health and the environment.

As relevant to the Project at hand, biosolids and sludge production falls under WAJ's umbrella. Even though the operation of a number of WWTPs has been delegated to private water companies through Public Private Partnerships (PPPs), the ultimate decision maker with regards to management of biosolids and sludge produced by WWTPs remains the mandate of WAJ. WAJ is responsible for the operation of WWTPs in Jordan; it thus controls the quality of biosolids and sludge produced and subsequently influences the appropriate final disposal method. WAJ is responsible for ensuring the proper disposal of biosolids and sludge.

Jordan Valley Authority (JVA)

The Jordan Valley Authority is a government agency in Jordan tasked with carrying out socioeconomic development of Jordan's side of the Jordan Valley. The agency was established in 1977. It was a successor to the Jordanian Valley Authority, the Jordan River Tributaries Regional Cooperation and several other government departments related to the Jordan Valley. The JVA became responsible for water supply to Jordan's urban areas and agriculture.

The duties of the Jordan Valley Authority under Article III of the development of the Jordan Valley law and its amendments No. 19 of 1988, including the following:

- 12 Develop the water resources and exploit them in the irrigated agriculture, domestic use, municipal and industrial affairs, electricity generation and other useful purposes
- 13 Protect and preserve the water resources and do all the required work to develop them.
- 14 Conduct the necessary studies to assess water resources, including hydrological and hydrogeological studies, Geological survey, drilling optional wells, and building monitoring stations.
- 15 Study, design, implement, operate and do the maintenance of irrigation projects and the projects' facilities and business.
- 16 Survey, classify and identify the lands appropriate for irrigated agriculture and reclaim and divide these lands into farm units.
- 17 Settle all the disputes arising from the use of water resources. Organize and direct the establishment of private and public wells.
- 18 Develop the environment in the valley, and protect, improve and implement all actions necessary to this end.
- 19 Design structural and detailed charts for the lands located outside organizational boundaries.
- 20 Study, design, construct and maintain the agricultural road networks in the valley.
- 21 Develop the tourism in the valley and appoint areas with relative features that can be exploited in tourist, develop these areas and establish tourist facilities.

Key services provided by the authority

The Jordan valley authority provides a number of services to citizens, especially the citizens of the Jordan Valley area, the total number of services provided is about 43, 31 of them are directed to serve the lands sector, and about 12 services to distribute the irrigation water to farmers in the valley, the most important ten services provided by the Authority in the areas of lands, maintenance and operation are mentioned in the following:

- Supply the agricultural units with water (irrigation order)
- Maintenance of agricultural units' irrigation sockets.
- Install irrigation system for the newly found agricultural units.

- Examine samples of water, soil, plants and fertilizers.
- Leasing and sale of lands to investors in the tourism sector.
- Sale of farm units with issued registration deed.
- Mortgage farm units that have issued registration deed to the Agricultural Credit Corporation
- Issue an approval for rental farm units.
- The issuance of construction license within the agricultural units.
- Give the approval to deliver electricity to the agricultural units.

It is worth mentioning that the Jordan Valley Authority as a public sector institution was established in order to achieve the comprehensive development in the Jordan Valley area and was not targeted to achieve business profits through its activities.

Ministry of Social Development

The Ministry leads the social work march in its official and national sectors, assisted in shouldering the responsibility by institutions and agencies that continue to play a critical and important role in the fields of social services, and turning the wheels of social development and construction, in order to attain the Jordanian society's objectives of development and achievement. It believes that the spirit of the present era and requirements of life require being up-to-date in the world of science and modernization, working towards success, and transferring the Jordanian citizen into a better future.

Ministry of Health (MOH)

MOH is the entity accountable and responsible for public health and safety monitoring and control and assumes the responsibility for all health affairs across the Kingdom.

Of particular relevance to this Project are the Occupational Health Directorate and the Environmental Health Directorate. The Occupational Health Directorate is responsible for ensuring the safety of the work environment from pollutants and occupational hazards in addition to the evaluation of the work environment. The Environmental Health Directorate is responsible for ensuring compliance with environmental health requirements and implementing the provisions of the Public Health Law through the relevant monitoring programs developed.

Ministry of Agriculture (MOA)

MOA is the entity responsible for regulating and permitting all agricultural activities in Jordan and has a particular mandate for regulating soil fertilizers and agricultural input material.

Part of MOA's role involves ensuring the sustainability of the agricultural use of natural resources without harming the environment in addition to creating the suitable atmosphere for investment in the agricultural sector as well as rural development and increasing the incomes of farmers and improving their lives.

Ministry of Municipal Affairs (MOMA)

MOMA's mandate includes a responsibility for public health and safety monitoring and control via the management and operation of solid waste collection and disposal. It carries out its duties through its implementing arms: the municipalities and the Joint Services Councils (JSCs). For this Project, the relevant municipality and implementing arm of MOMA would be Zarqa Municipality. Within its area of jurisdiction (which includes the project area), Zarqa Municipality is authorized to undertake the needed measures to prevent the occurrence of health nuisances.

Ministry of Energy and Mineral Resources (MEMR)

MEMR is the regulator and the entity that grants permits for power generation facilities. These mandates are further extended to the Energy and Mineral Resources Regulatory Commission (previously the ERC in issues relating to electrical energy).

In the case of the project choosing to produce electricity from the collected gas, MEMR and the Commission should be informed of the expected power generation capacity. Accordingly, MEMR and the Commission have the mandate to require additional studies as they see needed. Furthermore, MEMR and the Commission are the governing entities and the ones responsible for setting the tariffs and regulating the selling of the produced power.

National Electricity Company (NEPCO)

The National Electric Power Company (NEPCO) is the national company responsible for generating, transmission and distribution of electricity in central and southern Jordan providing energy for 74%. NEPCO would be the entity supplying electricity to this project.

Ministry Of Labor (MOL)

MOL is the entity responsible for ensuring occupational health and safety as well as providing the indoor air quality requirements that need to be complied with, the ministry is responsible for enforcing legislations related to Child labor, foreign labor standards.

Ministry Of Industry and Trade and Supply (MIT)

MIT is the entity responsible for establishing non-profit companies. Ensure that non-profit companies adhere to the applicable laws and regulations, and implement the company's articles of association. The Ministry is responsible for complying with the accounting standards in the company's management and for the proper implementation by the company of the agreements signed with it..

Jordan Cooperative corporation (JCC)

JCC is the entity responsible for establishing cooperative societies. Ensure that associations comply with the applicable laws and regulations, and apply the association's statute. The institution is responsible for adhering to the accounting standards in the management of the association and the proper implementation by the association of the agreements signed with it.

The General Directorate of Jordan Civil Defense

The general directorate of Civil Defense in Tafileh is the entity to be contacted in the case of fires or accidents.

Jordan Institute for Standard and Metrology (JISM)

JSIM is the entity responsible for the issuance of specifications and technical regulations, their adoption, revision and the monitoring of their implementation for all services and products. However, despite being legally authorized to do so, JSIM delegates the responsibility of overseeing the implementation to the respective bodies, which are the relevant ministries. This includes the technical regulations and standard concerning biosolids and sludge disposal as is elaborated in Section Two "Regulatory Framework".

The Royal Society for the Conservation of Nature (RSCN)

RSCN is a non-profit, non-governmental organization which aims to conserve the Kingdom's natural resources. It is of particular relevance to the Project given the fact that the Project site has been designated as an Important Bird Area (IBA) and is subject to the RSCN's annual waterbirds' census.

3. International Guiding Principles, Relevant Conventions and Treaties

The Ministry of Environment is the focal point for all treaties, conventions and protocols related to environment and climate change, which mainly are:

The Convention on Biological Diversity (CBD)

Based on the National Environmental Strategy (NES) formulated in 1991 by the Ministry of Municipal, Rural Affairs and the Environment, Jordan then ratified the Convention on Biological Diversity (CBD) and the UN Framework Convention on Climate Change (UNFCCC) in 1993 during the Earth Summit. Two years later Jordan signed and then ratified the UN Convention to Combat Desertification (UNCCD).

National Biodiversity and Action Plan (NBSAP)

Implementation of the National Biodiversity and Action Plan (NBSAP)

It was developed around addressing the direct and indirect causes of biodiversity loss, with particular focus on the issues of governance as the backbone of a successful NBSAP implementation.

Cartagena Protocol on Bio-safety

The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international agreement which aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health. It was adopted on October 2000 and entered into force on February 9th, 2004.

Nagoya Protocol on Access and Benefit-sharing

The Nagoya Protocol under the Convention on Biological Diversity (CBD) was adopted in 2010 and entered into force in 2014. The Protocol sets up a new global regime that aims to promote research and innovation using genetic resources and traditional knowledge. It calls on these companies to share benefits fairly and equitably with the countries, indigenous peoples and local communities that have nurtured these resources through the ages.

UN Framework Convention on Climate Change

In 1992 the framework set non-binding limits on greenhouse gas emissions for individual countries and contained no enforcement mechanisms. In 2015 the Paris Agreement was adopted, governing emission reductions from 2020 on through commitments of countries in Nationally Determined Contributions, lowering the target to 1.5 °C. Jordan adopted The Paris Agreement and entered into force in November 2016.

World Bank Environmental and Social Framework, in particular ESS1, ESS2, ESS3, ESS4, ESS10 and the WB General EHS Guideline which include standards on child labor prevention, forced labor, non-discrimination and equal opportunity, public consultations, grievance redress mechanism, gender-based violence (GBV), sexual exploitation and abuse (SEA), gender based aspects, code of conduct, Labor Management Procedures (LMP).

Annex No. (5): Concept of project Study Alternatives

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Concept of project Study Alternatives

February 12, 2020

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Concept of project Study Alternatives¹⁶

Soilless / Hydroponic Systems

The purpose of the report is to compare farming systems and choose the best in terms of water consumption, crop quality, production quantities and other factors:

The possibility of using solar energy as an alternative energy source is studied, use of modern technology in controlling the weather conditions within the greenhouse:

1. Low-technology, using simple hydroponic technology under traditional plastic houses.
2. Mid-technology, using advance hydroponic technology under modern green houses with full automated control for cultivation, irrigation, fertilization and climate conditions inside the green house.
3. High-tech: Advance hydroponic technology under a modern multi-span green houses with full control of irrigation, fertilization, pest and climate control conditions

Table (1): Comparison of three agricultural systems of cultivation

Type of Technology	Water use efficiency	Production	Constructi on cost	Product Marketin g	Adoption by farmer
Low tech.	low	Traditional production by season	low	Local marketing	high
Mid tech.	High	Continues production	Acceptable to small farmers	The possibility of local and export marketing	Mid for small farmers
High tech.	High	throughout the year	Acceptable to large farmers	The possibility of local and export marketing	High for large farmers only

Ministry of Agriculture have implemented several soilless / hydroponic systems targeting small farmers. These systems van be manufactured from cheap local materials and have been proven to be economically viable and environmentally safe.

These systems are considered suitable for growing various crops such as lettuce, tomato, peppers and strawberries and when properly managed, can save 90% water irrigation in herbal crops and between 40-60% of irrigation water and also up to 40% of fertilizers in comparison to fertilizers applied by conventional farmers under plastic house.

These systems can be applied on land unsuitable for cultivation, soils containing hi salt concentration and even on rooftops of houses.

¹ As provided by MoA

Alternative Farming Methods

As for the analysis without the project, it will be the alternative to traditional greenhouses. The conventional system requires higher operating costs than the hydroponics system, since the cultivation takes place in the soil and therefore in every season the soil needs to be sterilized, it is more susceptible to agricultural pests and soil deaths, this results in more use of insecticides and fungicides. Also, agriculture in traditional greenhouses requires more use of chemical and natural fertilizers, as a result of the loss of many elements during the soil. The important point is water consumption as the hydroponics system is more efficient in water consumption, where it consumes 90% less water in herbal crops and between 40% -60% in other vegetable crops.

There are several farming systems for hydroponics, they differ among themselves by the type of covers used. Where the cost of the system covered with polycarbonate and an area of 350 square meters is estimated at about 20,000 Jordanian dinars, while the cost of the system covered with polyethylene 200 micron treated against ultraviolet radiation is about 7000 Jordanian dinars. The project adopted the second system in which the cost of investment is reduced.

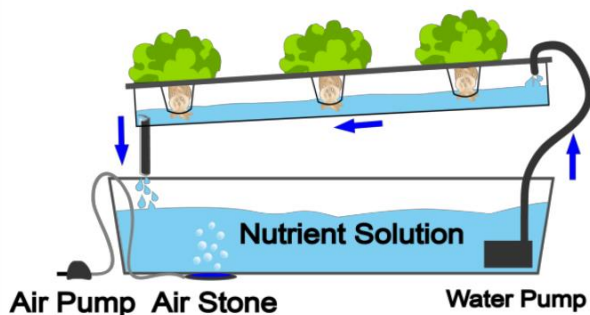
Low technology Soilless / Hydroponic Systems:

1. Nutrient Film Technique N.F.T.

Nutrient Film Technique N.F.T. systems incorporate a constant flow of nutrient solution which is pumped into the plastic channels (planting trough) and flows over the plant roots and then any excess liquid (overflow) drains back into the collection reservoir located in the farm and circulated once again to the plants. Low technology requires no climate control system .

These systems can be manufactured and assembled from materials locally available and suitable for cucumber, green peppers, tomato planting.

Nutrient Film Technique



Nutrient Film Technique N.F.T. systems (cucumber)



Roots in Nutrient Film Technique NFT

2. Planting in coconut fibber as a growing media for strawberry

This technique is suitable for small and large production projects in traditional plastic green houses in Jordan.

The plastic green house contains two levels of galvanized channels extending in rows the width of the green house and fixed on metal tubes installed on the iron structure typically found in the plastic green houses. Each level contains 6 rows of polystyrene boxes filled with compressed coconut fiber and planted with strawberry seeds.

Each polystyrene box is 10 cm high and of 10 cm wide with a length of 100 cm and each box can hold up to 11 plants.

The total number of strawberry plants in one plastic house could reach up to 6600 plants Compared with 3000 plants in a traditional green house. Drip irrigation hoses are placed above the polystyrene boxes to supply water and fertilizers directly to plants.

Excess water (overflow) from the planting troughs can be re-used, as it collects from drainage channels located under the trough into tanks (collection reservoir) to be reused and pumped back to plants after simple sand-filtration process, which can save more than 60 % of irrigation water.

- Strawberries should be planted during the beginning of September.
- Two harvest seasons, short one in early November, the second in March which will extend for two months or more depending on climatic conditions.



Polystyrene boxes in galvanized channels,



Strawberry Fruit in March

3. Planting in volcanic tuff as a growing media for (Tomatoes, Cucumber, Peppers, lettuce)

This technique is suitable for small and large production projects in traditional plastic greenhouses in Jordan. This system consists of five plastic channels placed directly on the surface of the soil with a slope of 1%. The thickness of this channels is between 100-800 microns, width 40 cm and the height of the sides is 20 cm and extends along the greenhouse floor. A plastic rope is used that connects the two sides of the channel to prevent its rupture. The channels are filled with volcanic tuff and fitted with surface drip

irrigation pipes to supply plants with water and fertilizer. Excess water is discharged at the end of the canals and collected in an underground tank for reuse.

- This system is easy to manage; crop based irrigation & fertilization adaptation; high water saving.
- Volcanic tuff is a natural material available in Jordan suitable for use and lasts for more than 15 years.



Pepper plants in soilless volcanic tuff (summer crops)



lettuce and peas ,planting in soilless volcanic tuff (winter crops)



General View of fenced Lagoons/ponds used for Irrigation

The summary of the planned alternatives are described in the following Table no. (19) as a comparison between the three farming models.

Table 2: Summary planned technologies activities

Type of Technology	Water use efficiency	Energy efficiency	Production	Construction cost	Product Marketing	Adoption by farmer
Low- tech	low	high	Traditional production by season	low	Local marketing	high
Mid- tech	High	medium	Continues production throughout the year	Acceptable to small farmers	High Possibility of export marketing	Mid for small farmers
High- tech	High	low	Continues production throughout the year	Acceptable to large scale farmers	High Possibility of export marketing	High for large scale farmers

Annex No. (6): Site visit Report

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Site visit Report

February 12, 2020

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Site Visit Report

Introduction

Based on the Ministry of Agriculture's assignment of teams of the Ministry's specialized staff. to implement the ESIA to establish a hydroponic farm in Tannur, Wadi Al-Hessa. The MoA team used the benefit of time to speed up the process of carrying out the said study. , The date for the start of the study was decided on 30th, November 2019. A field visit to the project site was organized on the same day.

Departure from Amman

The MoA team upon arrival at the MoA office and had a meeting with the Agriculture Minister to review the project idea and goals.

The trip from Amman to the proposed Hydroponic farm location took about 1 hour and 45 minutes, the distance travelled was approximately 180 Km South West of Amman.

Meetings carried out at the project planned site

Upon the arrival at the designated Hydroponic Farm site, the MoA team conducted the following meetings and activities:

- Meeting at the project site with representatives of the Tafileh Agriculture Directorate Eng. Hussien Al Qatameen, and the head of plant production department Eng. Muhannad Amayreh and the head of forestry department Eng. Ahmed Al-Riffa.
- Project boundaries were clearly identified on the planned project site. The land topography, surrounding economic activities, type of land cover (flora), available infrastructure (water, electricity, roads) on site and within the surrounding area of the site were identified. Official documentation of the Plot was obtained and photos were taken by the MoA team.
- Collecting copies and documentation of the necessary official documents from representatives of the Ministry of Agriculture i.e. land deed, proof of ownership and registration documents from the Department of Lands and Survey, the land plot total surface area, in addition to names of active NGOs in the Qasabat Tafileh District as well as other related documents were photocopied ..

The findings are as follow

- The total surface area of the land allocated by the MoA is 7000 Dunoms equal to 7000.000 sqm (700Hectars), but the first stage of the pilot project will be limited to only 15 dunoms (1.5 Hectar).
- The land plot is registered under the name of Ministry of Agriculture.
- The defined land use of the allocated plot is strictly for agricultural farming.

- The topography of the land is almost flat with a slight slope from South to North. No obstacles, construction derby or any construction was visible on the site.
 - No nearby houses or settlements around the land plot.
 - There are no serious risks of floods on or near the site, however some caution should be taken on the north boarder of the land plot as a natural boundary consisting of a seasonal watercourse runs from East to West.
 - The plot is separated from other farms in the eastern borders by an agriculture road and a valley respectively.
 - The land plot is surrounded by forest land from three directions (south, west and East).
 - The water source for irrigation of the planned hydroponics farm will be supplied from the adjacent Tannur Dam, water is pumped through 3 inch pipe diameter, by MoA.
 - Women and Youth laborers are culturally acceptable among the valley farming communities, such employment is commonly practiced to engage women and youth labor in agricultural activities, especially during harvesting and collecting vegetable products.
 - Dominant and prevail wind directions is northwesterly.
 - No archeological or natural reserve site was detected on the land plot.
 - An irrigation Dam is located approximately 200 m to the north of the land plot.
 - Precipitation in the Wadi Al Hessa is seasonal between December and March approximately 150 to 200 mm annually.
- Further documentation of the land plot location was done by the MoA team by accessing the Department of Lands and Survey website and making an official inquiry procedure to download the schematic diagram of the project land plot, coordinates and the land ID number.
 - The land plot boundaries were identified as follow:
 - To the South is a agricultural service road
 - To the North is Tannur Dam an agricultural service road. To the East are citrus and vegetables farms
 - In the east a barren forest lands forstey land valley running East to West which runs only during the raining seasons
 - To the West is a barren forest lands
 - Investigation of climate parameters in the area, such as av. max. Minimum temperatures, rain fall, run-off, site vulnerability of floods, wind direction and soil condition, but the MoA team was not able to obtain proven documents or figures during the site visit.
 - Collecting information about active cooperative and civil societies established within Qasabat Tafileh and in the nearby area of Tannur, whereas three agriculture cooperative societies were identified:

- Aldahl Agricultural Cooperative Society.
- Alnumtih Agricultural Cooperative Association
- Al-Hareth Bin Omair Al-Azdi Agricultural Cooperative Society.
- The MoA team visited the Director of Al Mazar Al Janobi Eng. Mamon Ataleh to clarify some important related issues, information & results of the meeting can be summarized as follow:
 - The average max. Temperature is 40 degrees Celsius during the month August while the lowest temperature is (1) degrees Celsius, while average rain precipitation is 250 mm/year amounts may vary depending on the elevation above or below sea level.
 - The most common agriculture plant diseases that lead to economic losses are caused by:
 - Viruses by the fungus Fuzarium.
 - Fruit Fly.
 - Thrips
 - Aphid
 - Spiders
- Labor Force Statistics as indicated by the Director of Tafileh Agriculture Directorate, is from the current population, but a higher percentage of the laborers are imported mainly from Egypt. Both whether local or imported consist of male and female laborers. Among the female laborers the imported female labor force have a higher percentage.
- The culture of people in this part of the Jordan valley encourages women to work in agriculture, children under 18 years of age are also commonly engaged in a variety of economic activities i.e. agricultural shops, Shepparding, etc. There are no taboos against women working in the agricultural field and it is in fact accepted as a means to increase the family's income and improve the livelihood of the family unit
- According to the Director of Tafileh Agriculture Directorate the farmers do not pay the price for the irrigation water used from the Tannur Dam or from Laayoune in the Wadi Al Hessa

To improve the biological diversity of the project area, the Ministry of Agriculture is currently planting about 30 hectares of forest trees to increase the area of vegetation.

The project area is not a nature reserve. But it is rich in biodiversity, where there are many wild plants such as grass grass (Gramineae). Wild merriment plant (*Salvia officinalis*) and wild onions (*Drimia maritima*). On both sides of the valley, the Sidr trees (*Ziziphus spina-christi*) and the Retama trees grow, but they are not at a high density. Along the valley, the trees of the Halfa (*Cladium mariscus*) and the Tarafa (*Tamarix jordanis*) and the Dulfla (*Nerium oleander*) are grown at a high density. There are also some palm trees. These trees constitute habitats for the wild animals that live in the area¹⁷

¹⁷ Shatha AL-Rwashdeh, Taleb Masarwah & Ayed Taran, Morphometric and Hydrological Characteristics of Wadi Hasa Basin Using GIS & DEM. An-Najah University Journal for Research (Humanities) Volume (31,6), 2017.

Many wild animals live in the area, such as red fox, badger, mountain rabbit, and some predatory animals such as hyena and Ibn Awi. There are some reptiles such as snakes, lizards and frogs.

There are many types of wild birds, such as black eagle, partridge (Perdix), undulating skylark, Bulbul (pycnonotidae), and hoopoe (upupa). And A periodic bird (Passer)¹⁸.

Extra visits to Inspect Alternatives

- The MoA team visited the farms along Wadi Al-Hessa, where it was found that most farmers grow vegetables such as tomatoes and peppers, as well as guava and citrus trees.
- The ESIA team interviewed some vulnerable families, some unemployed individuals, and a group of Syrian refugees in the Tafila Agriculture Directorate during the field visit. The expectations of the unemployed and the Syrian refugees were significant in the job opportunities generated by the project, whether seasonal or permanent. As for the vulnerable families, especially the poor, they had reservations about working on the project for fear of affecting the cash aid they get from the National Aid Fund

¹⁸ Adel Al-Qatameen, Saleh Al-Kasasbeh, 2007. The Status of Tourism in Tafila Governorate, Master Thesis, Mu'tah University, Karak, Jordan

Guava orchards in the Tannur



Preparing the ground for guava cultivation



Olive farms near the project site



Preparing the ground for vegetable cultivation



Agricultural road next to the project site



Alshuhada village near the project site



Annex No. (7): Final ESMP Mitigation Plan

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Final ESMP Mitigation Plan

February 12, 2020

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Monitoring the ESMP (including frequency throughout project life-cycle)

The following impacts were identified at various phases of the project life –cycle (Construction, Operation). Meanwhile, the following table no. (20), presents the ESMP that should be implemented during construction phase and must be managed by the contractor and project Owner most of the responsibilities in this ESMP are designated in this phase to the contractor, in addition to the third part assessor (RSS) and Municipality, MoEnv.

Table 1: ESMP during construction phase including frequency and indicators

Impact/ Issue	Mitigation Measure	Monitoring Measure	frequency	indicator	Implementation Responsibility	Supervision Responsibility
Solid Waste	Disposal of construction wastes from the site into the designated landfill by the local authority.	Keep monthly log of disposed quantities	monthly	Wight of wastes in m ³	Contractor	Municipality
Public health	Strictly comply with the local regulations regarding the working hours and the levels of noise	Timesheet log	Continuous during working hours	No. of complains No. of committed workers	MoA	MoA
Occupational safety and Health	Assign a Health, Safety and Environment Officer	Daily inspection by Safety Officer / Supervision Consultant Team	Continuous during working hours	Percentage. of committed workers No. of accidents	Contractor/ Lead Technical officer	MoA
	Provision of First aid kit		Once provided	availability of the 1 st aid kit and the documented lists	Contractor	MoA
	Identify closest Medical center/hospital for emergency cases		Listed and Documented			
	Enforce use of safety personal equipment, gloves, Helmets, Glasses, boots		Periodically provided	Percentage. of committed workers		MoA
	sun exposure durations for work within acceptable limits.		continuous			
	Meet all hygiene and sanitary needs of Workers with separate facilities for males and females.		continuous	No. of illness cases related		
	Report and investigate any accidents.		continuous	No. of accidents		
	Avoid working in dusty, raining, and strong windy weather.		During the occurrence	Percentage of committed workers		
	Provide proper signage.	Weekly report of traffic Accidents speed limit signage on access road are installed	Once provided	Sufficient Signage installation	Contractor	Traffic Department /Project owner
	Securely pack and cover trucks with loose material.		continuous	Percentage of committed trucks		
Grievances redress management (GRM) and Gender Based Violence (GBV)	Ensure that the grievance system and codes of conduct are applied to workers and surrounding communities	Grievance record	continuous	No. of grievance	Contractor	MoA/ Local committee
Disturbance of biodiversity	Conserve the flora and fauna when found nearby.	Visual observation	continuous	No. of violent events	Contractor	MoA, RSSCN
Flood Occurrence	Design and implement flood control measures	Gabions are properly installed on the southern border of the farm	Once provided	Existence of the Gabions	Contractor	Project Owner

Increase in water demand	Waste water generated during the construction phase should be collected in properly sealed septic tank and disposed to the nearest treatment plant.	Visual observation, Log recording	continuous	wastewater quantities in m ³ received	Contractor	MoA
	Provide an adequate source of water from available and approved off-site sources and encourage the gray water reuse for dust control when possible.	Secure on site storage tank for RO reject and grey water collection.	Continuous	Reject and grey water quantities in m ³ used	Contractor	Project Owner
	Conserve water use and restrict the use of groundwater in construction activities for human domestic purposes.			Quantity in m ³ of ground water illegally used	Contractor	MoA/ Traffic Department
	Hazardous liquid materials should be managed properly to prevent groundwater, water in dam and surface water contamination (oil spills and fuels from vehicles)	Visual observation, water samples tests		No. of non-compliance events	Contractor	MoA/ Traffic Department

The following table no. (21), presents the ESMP which should be implemented during operation. Since the day-to-day operations activities will be managed by the project Owner, most of the responsibilities in this ESMP are designated to the Project Owner, in addition to the third part assessor (RSS) and Municipality, MoEnv.

Table 2: ESMP during operation phase including frequency and indicators

Impact/ Issue	Mitigation Measure	Monitoring Measure	frequency	indicator	Implementation Responsibility	Supervision Responsibility
Occupational Health and Safety	Protect the workers while handling and disposal of volcano tuff and pearlite whenever used as culture media, having workers trained properly.	Health test (semi- annual)	Periodic	No. of non – compliance events detected	Safety/Social Officer	MoA & JCC
	Protect workers against pesticide spraying, provide the Safety equipment (masks, gloves, goggles, etc.) and enforce	check for using of Safety Equipment	Continuous	No. of related illness cases detected	Safety Officer	
Accidents	Immediate reporting of fiers to local civil defense offices	Record the accidents occurrences	immediately	No. of accidents	MoA & JCC / Safety officer	MoA & JCC /General Directorate of Civil Defense
	Cover tightly fertilizer tank.		Continuous	No. of accidents		
	Regular check of electric systems is critical due to the interaction with water		Periodically	Dates of renewals and maintenance		
	Provision of proper fire extinguishers and getting the staff trained on using them					
Protection of water resources	Protection of surface water and ground water from the rejected RO water it will be disposed in specific places owned by the municipality	Undertake surface and groundwater Water sample tests	Semi-annual	Concentration of chemicals mg/l	MoA & JCC / Safety officer	Municipality / MOENV
	Protect the water bodies from high nutrient content discharges they will be disposed in					

	specific places owned by the municipality					
	Domestic waste water generated during the operation phase should be collected in properly sealed septic tank and disposed to the nearest waste water treatment plant.	Visual Observation	Periodically upon filling	Quantities transported and disposed m ³	MoA & JCC / Safety officer	
Solid and Hazardous Wastes	Collect and dispose various types of solid waste generated during operations regularly, residues of plants, damaged polystyrenes boxes, packaging material, empty containers, etc. they will be disposed in municipality landfill.	Visual Observation	Daily	Transported quantities in kg	MoA & JCC / Safety officer	Municipality / MOENV
	Collect and removal of plastic clips and the hanging threads used for supporting the plants stem.	Visual Observation	Daily	Transported quantities in kg		
	Separate and disposal of hazardous waste materials such as of volcano tuff and perlite, contaminated empty pesticides containers and other chemicals, they will be disposed in hazard materials municipality landfill.	Visual Observation	Seasonally	Percentage of removed and disposed hazardous material	Safety Officer	Project Owner/ MoEnv.
Changes of visual character	Ensure pleasant appearance of the site by possibly vegetating the surrounding area	Visual Observation	Daily	Percentage of greened areas within the site No. of trees planted	MoA & JCC	
Shortages in Water Irrigation during the peak summer between late August and October.	Establish ample water storage pond / reservoir or during in case of power outage. The water requirement is about 16000 m3 and dam storage at least 1.8 million m3 and it is available for the whole year The project will be provided with solar energy .	Visual Observation (seasonal)	Seasonal	No. of programmed maintenance or rehabilitation events	MoA & JCC / Technical officer	MoA & JCC
Grievance Redress Mechanism (GRM)	Create a grievance record, record grievances and actions taken to address grievances Follow-up cases of gender based violence	Record the grievance occurrences	Continuous	No. of record grievances	MoA	JCC/ Local committee

Annex No. (8): Stakeholder Engagement Plan (SEP)

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Stakeholder Engagement Plan (SEP)

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1. Introduction and Project Description

Jordan's agriculture sector is well positioned to maximize the economic, social and environment benefits of advanced agriculture technologies. Hydroponics allows farmers to grow crops faster than traditional field-based agriculture while using a fraction of the water needed and allowed to produce vegetables by using the same water. Moreover, hydroponics can be fueled by solar energy and its crops can be grown in practically a pesticide free environment. The development and expansion of commercially viable business models based on hydroponic farm systems has huge potential in Jordan. These farming systems are not dependent on large volumes of water or land availability. Jordan's agriculture is currently the largest user of water. While farmers irrigate about 46% of the total agricultural land, agricultural water requirements represented around 50% of total national water supply. Jordan's system of subsidies affects the use of irrigation water, which necessitates strict rationing to allocate the remaining water resources.

The project will be based in the Wadi Al Hessa nearby the village of Al Burbaitah approximately 180 km south West of the capital Amman. Wadi Al Hessa lies in the heartland of Jordan smallholder agriculture experiencing high rates of poverty. The project will take place on Government land (one and half hectare) registered for Ministry of Agriculture.

The Project aims to test and promote a commercially viable, socially-inclusive, and water-efficient agriculture production systems in Jordan through comparison of intensively managed covered farming units (see Annex no. (5), MoA, Concept Project Study Alternatives). The project will: (i) be comparing traditional covered production system against high technology hydroponic production system; (ii) identify which of these systems is commercially and environmentally viable; and (iii) draw and disseminate lessons learned from the project and identify avenues for investment, replication and scaling up. Lessons learned would seek to inform future (public and/or private) investments in Wadi Al Hessa and beyond. (Appendix 1, land ownership documentation, general project lay-out, and supporting imagery file is provided)

Objectives of the Stakeholder Engagement Plan (SEP)

- Understand the stakeholder engagement requirements;
- Provide guidance for stakeholder engagement such that it meets the standards of International Best Practice;
- Identify key stakeholders that are affected, and/or able to influence the Project and its activities;
- Identify the most effective methods, timing and structures through which to share project information, and to ensure regular, accessible, transparent and appropriate consultation;
- Develop a stakeholders engagement process that provides stakeholders with an opportunity to influence project planning and design; Establish formal grievance/resolution mechanisms;
- Define roles and responsibilities for the implementation of the SEP;
- Define reporting and monitoring measures to ensure the effectiveness of the SEP and periodical reviews of the SEP based on findings

2. Brief Summary of Previous Stakeholder Engagement Activities

A public consultation meeting was organized on 11th, December 2019 by Tafileh Agriculture Directorate with all relevant stakeholders' i.e. local community -including women and youth-potential beneficiaries, relevant government officials, Civil Society Organizations (CSOs) and Non-Governmental Organizations (NGOs) and independent farm owners. All stakeholders were invited including fruit and vegetable retailers at the stakeholder's engagement meeting in order to understand their requirements and input for improving marketability of Hydroponic farm produce. The purpose of the community consultation meeting was to build the awareness of the

stakeholders on the social and economic opportunities and benefits envisioned in the development, management and production phase of the environmentally sustainable hydroponics farm unit. Due to the possibility of replication of the hydroponic farm in other communities and the need to explain the rational and the benefits of establishing this farm it was necessary , during the community engagement, to include farmers from other farming communities and villages in order to exchange views and experiences with them.

A project Grievance Redress Mechanism (GRM) was discussed and agreed upon during the community consultation meeting with the stakeholders. The proposed GRM was prepared collaboratively and transparently with the stakeholders and made available by the Ministry of Agriculture (MoA) to farm laborers working on site in the Arabic language as well as to all other stakeholders. Any amendments or updates to the GRM will be based on prior consultations and announced prior to implementation and presented in printed format in the Arabic language by the MoA.

All comments, endeavors and interventions by the invited stakeholders and response to the representative of the Ministry of Agriculture were documented. Jordanian TV covered the workshop on 11, December 2019 and broadcast it in the economic newsletter and link for the episode. https://www.youtube.com/watch?v=D_-rqk9IYA0.

3. Stakeholder identification and analysis

The section identifies the key stakeholders who will be informed and consulted about the project, including individuals, groups, or communities that:

- Are affected or likely to be affected by the project (project-affected parties); and
- may have an interest in the project (other interested parties);
- may be disadvantaged and/or vulnerable individuals or groups

3.1 Affected Parties

The main beneficiaries and stakeholders in this project will be the farming NGOs from Tafileh, cooperatives, local farm owners, women and youth laborers, farmers and farm owners from adjacent locations including Jeser El-Shohada, Al Burbaitah, and Shaidham, representatives from the Jordan Valley Authority and the Water Authority, the MoA, Ministry of Planning and International Cooperation (MOPIC), Ministry of Labor, Ministry of Environment, Ministry of Water and Irrigation and Tafileh Cooperation Directorate.

The ESIA team at the MoA has identified the interests of the project affected parties and their roles in project design, implementation and decision-making processes. The project activities will lead to the use of the same water sources that are used by farmers in Wadi Al-Birbita. The project produces small amounts of solid and liquid waste with an organic content. The project could potentially restrict hikers' access to the Tannur Dam.

Therefore, communication on the timing of project implementation and implementation of the Stakeholder Engagement Plan (SEP) will be a critical component in minimizing these impacts. The MoA will be responsible for the successful implementation of this plan.

3.2 Other interested parties

Other interested parties include individuals, groups, or organizations with an interest in the project. These groups of stakeholders will be interested on the Hydroponic project for variety of reasons. Their interest could be because of its location, its characteristics, and its impacts, or other matters related to the broader public interest. These parties may include regulators, government officials, the private sector, the scientific community, academics, unions, women's organizations, other civil society organizations, and cultural groups.

The project has and will continue to identify other interested parties' interest and roles in the project's design, implementation and decision-making process and will engage them in stakeholder consultations throughout project implementation.

3.3 Disadvantaged / Vulnerable individuals or groups

Disadvantaged / vulnerable individuals or groups are potentially disproportionately affected and less able to benefit from opportunities offered by the project due to specific difficulties to access and/or understand information about the project and its environmental and social impacts and mitigation strategies.

The project area includes a few villages that are classified as pockets of poverty in Jordan. Additional or disadvantaged / vulnerable individuals or groups in the project area include "those registered as poor in local social services; female-headed households; families headed by disabled persons, unemployed people, and Syrian refugees in the project area.

The ESIA team at the MoA interviewed some vulnerable families, some unemployed individuals, and a group of Syrian refugees in the Tafila Agriculture Directorate during the field visit to the project site on the 30th, November 2019. The expectations of the unemployed and the Syrian refugees were significant in the job opportunities generated by the project, whether seasonal or permanent. As for the vulnerable families, especially the poor, they had reservations about working on the project for fear of affecting the cash aid they get from the National Aid Fund.

As explained in the ESIA, "Even the minor impacts of the project can be important to some vulnerable people, especially the unemployed and the Syrian refugees, but the small project size does not meet the needs the large numbers of vulnerable groups in employment opportunities and improving their livelihoods. This SEP will ensure that these vulnerable and disadvantaged groups or individuals are consulted throughout project implementation.

3.4 Summary of Project Stakeholder Needs

Table 1. Summary of project stakeholder needs

Community	Stakeholder group	Key characteristics	Language needs	Preferred notification means (e-mail, phone, radio, letter)	Specific needs (accessibility, large print, child care, daytime meetings)
Qasabat Al Tafileh	Parents with young children	Approximately 180 households affected; 300 children	Official language	Written information, radio	Child care for meetings—late afternoon preferred timing
	Refugees	38 extended families, poverty level	Official language	Visit with translator and civil society representative	Graphics, education on process
	Tafileh Young Women Association	Approximately 35 Women member	Official language	phone	daytime meetings, transportation to the meeting site
	Alduhul agricultural cooperative association	Approximately 16 farmers member	Official language	phone	
	Alnumtih agricultural cooperative association	Approximately 23 farmers member	Official language	phone	
	Agriculture Committee / Decentralization Council in Tafileh Governorate	Committee elected at the level of Tafileh	Official language	Letter, phone	

	Agricultural Engineers Association	Approximately 230 agricultural engineers Of them, 60 are unemployed	Official language	Letter, e-mail	
	Farmers Union /Tafileh Governorate	Approximately 140 member	Official language	Letter, phone	
	Tafila Cooperation Directorate	Governmental institution	Official language	letter	daytime meetings

4. Stakeholder Engagement Program

4.1. Purpose and timing of stakeholder engagement plan (SEP)

The main goal of the SEP is to improve and facilitate decision making and create an atmosphere of understanding that actively involves project-affected people and other stakeholders in a timely manner, and that these groups are provided with sufficient opportunity to voice their opinions and concerns that may influence Project decisions. This SEP is a useful tool for managing communications between the project Owners and its stakeholders. The MoA funded Project will be based in Wadi Al Hessa, the heartland of Jordan smallholder agriculture experiencing high rates of poverty. The project will form a local committee at the project site from the stakeholders, this committee will meet once every month or whenever the need arises to discuss the tensions that may arise during the implementation of the project, and ways to address them. Therefore, the proposed model will also contribute to enhancing social cohesion.

4.2. Proposed strategy for information disclosure:

The project will discuss the technical reports and outcomes of the project's work progress and transfer the project's experience to the stakeholders and farmers in the region through direct interviews in workshops. Brochures will also be used to publicize the project's activities. Visits will also be organized for the media and electronic news agencies to the project site to inform the local communities in other regions of Jordan the importance of the project in introducing modern technologies used in agriculture.

4.3. Proposed strategy for consultation

Access and communication with project target groups will be secured through workshops and focus groups on specific topics associated with the project such as activities associated with the preparation and construction phases of the project and so on. The views and concerns of the stakeholder groups will be documented and addressed by the MoA and will be taken into consideration in the overall project implementation. The GRM will also play a vital role in ensuring the concerns and feedback of the stakeholders are captured and reflected in the overall project implementation.

Table 2 Project stakeholder consultations during implementation phase

Project stage	Topic of consultation group	Method used	Timetable location and dates	Target stakeholders	Responsibilities
Preparation and construction	Project design	Discussion with public meeting, Presentation	Professional Associations Complex, February 4, 11 a.m.	Agriculture Committee / Decentralization Council in Tafileh Governorate, Farmers Union /Tafileh, Agricultural Engineers Association, Tafila Cooperation Directorate,	Project owner
Operating	Project progress reports	Discussion with public meeting, Presentation, Brochure, Media	The project site, June 17, 11 a.m.	Tafileh Young Women Association, Alduhul agricultural cooperative association,	
Project Closure	Project final report and	Discussion with	Professional	Alnumtih agricultural	

	lessons learned	public meeting, workshop, Media	Associations Complex, November 10, 10 a.m.	cooperative association,	
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4.4. Proposed strategy to incorporate the view of vulnerable groups

Vulnerable or disadvantaged groups will be contacted via direct interviews to ensure that they are not discriminated against in permanent jobs or as seasonal workers in the project. Their views, opinions and concerns will be documented and addressed and taken into consideration in the project implementation as relevant.

4.5. Timelines

The time line for implementation of all phases including construction and operation is 8 months.. During the implementation stages, consultative meetings will be held with stakeholders covering all activities associated with preparation, construction, operation and closure of the project. Deadlines for comments will be two weeks after the proposed consultation meetings as outlined in Table 2.

4.6. Review of Comments

All comments, points and input provided during or immediately after the community consultation by the invited stakeholders will be documented and responded by the Tafileh Agriculture Directorate. If the answers cannot be made available for any reason to the requester during the consultation meeting, the MoA is committed to provide the written responses to the requester within 2 working days after the meeting.

The answers can also be provided verbally by phone but a written copy must be filed in the Farm office for future reference with all other questions and answers that were presented during the consultation meeting and made available to stakeholders if requested by them.

All comments made throughout project implementation will also be documented and addressed within a maximum of 1 week of the date of registration of the comment and this will be done verbally by phone.

4.7. Future Phases of Project

The Ministry of Agriculture / project owner will prepare semi-annual reports regarding environmental damage, grievances and project achievements. These reports will be presented to stakeholders from the meetings of the local committee for the project in Tafila Governorate, as well as the committee supervising the implementation of the project in the Ministry of Agriculture.

The Ministry of Agriculture will issue special reports, upon request, in the event of any unexpected environmental or social impacts. These reports will be shared with stakeholders through direct meetings and interviews..

5. Resources and Responsibilities for implementing stakeholder engagement activities

5.1. Resources

- The project owner representative, Tafila Agriculture Directorate, will be organizing the public consultation meeting through coordination with the MoA and will send out invitations to all relevant stakeholders, informing them of the time and place of the meeting and the objective of the meeting.
- It is the full responsibility of the MoA/project owner to ensure that all aspects of the SEP are implemented.
- The cost of the necessary logistics i.e. paper, pencils, projector and screen, refreshments, Electrical connections chairs, tables, flip chart will be the responsibility of the Tafileh Agriculture Directorate, these estimated expenditures will be approximately 6622 USD and

will be spent from the allocated budget in the business model of the project as outlined the table below:.

Table 3: Stakeholder Engagement Plan - Estimated Budget

Stakeholder Engagement Activities	Quantity	Unit Cost (USD)	Total Cost (USD)
Social media staff	3	200	600
Travel expense for staff	16	200	3200
Stationery, paper, pencils	3	75	225
Pastries, refreshments, coffee, Tea.	3	215	645
Hall	3	300	900
Communications materials (pamphlets, posters, PR kits-including design)	3	150	450
Contingency	1	602	602
Total			6622

- d. A list of the responsible staff at the MoA for this task can be contacted by phone, (+96232241023, +962799059084), or on the complaints page on the website of the Ministry of Agriculture or sent on the Ministry of Agriculture page on the Facebook link <https://www.facebook.com/groups/207233332651059/> or the Ministry website (www.moa.gov.jo), once the implementation of the project begins (Construction Phase).
- e. Documentation of meetings will be undertaken by Tafileh Agriculture Directorate incorporating a list of all participants and their contact information of the MoA team..

5.2. Management functions and responsibilities

- a. The MoA and the project owner representative, Tafila Agriculture Directorate will be responsible for carrying out each of the stakeholder engagements as indicated in Table 2 of this SEP. The allocated staff at both the MoA and the Tafila Agriculture Directorate have the relevant experience to conduct meaningful consultations with the stakeholders and document and address any concerns or comments accordingly. All stakeholders will be encouraged to be involved in the discussions and proposed solutions to issues that arise during the consultation session. Stakeholder participation in project management will be ensured through the project's local committee.
- b. It is imperative that all MoA team and Tafila Agriculture Directorate be present at planned public consultation meetings. Management will follow up closely on all the documented concerns and comments of the stakeholder engagement sessions and will ensure that these are addressed adequately.
- c. Minutes of the stakeholder engagements will be taken and documented after each consultation sessions (as laid out in Table 2) with a list of the attendees, a summary of the main concerns, and a detailed explanation of how these concerns and comments were addressed.

6. Grievance Mechanism

The Grievance Mechanism will be made with straightforward and clear procedures for the people who have any issues or grievances to be able to present them directly to management and responses to said issues or grievances can adequately be addressed in a timely manner. All grievances will be documented in a log of complaints. Any and all issues or grievances must be made in writing and deposited in the Grievance Box near the project manager's office on site; the fund will be available for people with special needs. Alternatively a text message with a description

of the Grievance at hand could be sent to the project officer or Tafilah Agricultural Directorate, to either of the following numbers: +96232241023, +962799059084, or it could be sent to the complaints page on the website of the Ministry of Agriculture (www.moa.gov.jo) or the Facebook link <https://www.facebook.com/groups/207233332651059/>. The complainant could also request for a direct meeting with the project officer

- All contact information will be made clearly visible on a sign at the main entrance of the farm or on the website or Facebook page of the Ministry of Agriculture
- In the event that the complainant does not know how to read or write, a phone call can be made directly to the following numbers: +96232241023, +962799059084. All complaints can be kept confidential and anonymous upon the request of the complainant
- A list of the grievances should be compiled on a monthly basis and provided to the MoA by the Cooperative association on site with the actions taken for each grievance, time of submission, and date of corrective action taken. If the grievance issue or complaint has not been mitigated within the time of the weekly or monthly report to the project manager or the Tafileh Agriculture Directorate, then a reason for not carrying it out must also be written in the report. The MoA has the responsibility to either accept or deny the reason and order an amicable solution. A solution must accordingly be found and if needed it should be escalated to the MoA management. A final report on the corrective action must be presented to the MoA within a mutually agreed time.

7. Monitoring and Reporting

7.1. Involvement of stakeholders in monitoring activities

The Hydroponics farm project will cover 15 dunoms (1.5 hectares) and there will be no need during this trial phase for any third party to monitor project impacts and mitigation programs as all monitoring activities will be undertaken closely by the MoA.

7.2. Reporting back to stakeholder groups

A weekly farm management and operations report should be sent to the MoA along with the quarterly financial report. These two reports are considered essential in identifying technical and financial issues related to the daily farm operations and its financial sustainability. Any stakeholder engagements and their outcomes should also be documented and shared with the MoA within these reports.

Stakeholders will always be reminded of the availability of the grievance mechanism. All recommendations and mitigation plans discussed and agreed upon in the community engagement meetings will be filed under the Community Grievance folder in the manager's office and a copy should be posted on the project manager Bulletin Board outside his office for any visitor to read.

Annex No. (9): Jordan EIA Regulation

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Jordan EIA Regulation

February 12, 2020

Ministry of Agriculture \ ESIA Team

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A-1. Environmental Impact Assessment (EIA) Regulation No.37 of 2005 of Jordan Regulation No. (37) of 2005

Environmental Impact Assessment Regulations Issued by Virtue of Sub-paragraphs 9 and 11 of Paragraph A of Article 23 of the Environmental Protection Law No. (1) of 2003

Article 1

These Regulations shall be cited as the Environment Impact Assessment Regulations of 2005, and shall be effective as of the date of their publication in the Official Gazette.

Article 2

- a. The following terms and expressions wherever appearing herein, shall have the meanings assigned to them hereunder unless the context provides otherwise:

The Ministry: The Ministry of the Environment.

The Minister: The Minister of the Environment.

Secretary General: The Secretary General of the Ministry.

Technical Committee: The committee formed by virtue of the provisions hereof and specialized in studying projects from the environmental aspect.

Environmental Approval: The approval given to the owner of a project to commence implementation of his project pursuant to the provisions hereof.

Significant Impact: An adverse change that affects the Environment whether this change is dangerous or potentially dangerous.

Terms of Reference: The bases submitted by the project owner prior to conducting the environmental impact assessment study for his project, provided that it is within the broad framework of environmental requirements adopted by the Ministry.

Environmental Impact Assessment Document: The report submitted by the project owner, prepared in accordance with the Terms of Reference.

- b. The definitions of the terms appearing in the Environmental Protection Law in force shall apply herein.

Article 3

The environmental impact assessment means any procedure that aims to identify the impact of all the phases of the establishment of a certain project, and describe and study this impact on the project and its impact from the social and economic aspects, and identify the methods for limiting any adverse impact on the Environment. The assessment shall be conducted during the preparation of the economic feasibility study, and planning, design, implementation, operation and removal of the project.

Article 4

- a. No industrial, agricultural, commercial, housing or tourism project or any construction development project or any of the projects specified in Annexes 2 and 3 of these Regulations may commence operations with the services relevant thereto, until it obtains the Environmental Approval required for this purpose from the Ministry.
- b. The Ministry, upon the recommendation of the Secretary General, may require the owner of the project not from among those specified in Annexes 2 and 3 of these Regulations to conduct an environmental impact assessment study based on the nature or location of the project, or the nature of the impact that may result therefrom.

Article 5

- a. A Technical Committee shall be formed at the Ministry, chaired by the Secretary General, and the membership of experienced and specialized persons from the following Ministries and entities:

The Ministry of the Environment.

1. The Ministry of Planning and International Cooperation.

2. The Ministry of Municipal Affairs.

3. The Ministry of Health.
 4. The Ministry of Agriculture.
 5. The Ministry of Industry and Trade.
 6. The Ministry of Energy and Mineral Resources.
 7. The Ministry of Water and Irrigation.
 8. The Ministry of Tourism and Antiquities.
 9. The Ministry of Public Works and Housing.
 10. Any other concerned entity specified by the Minister.
- b. The members representing the ministries referred to in Sub-paragraphs 1-10 of Paragraph A hereof shall be nominated by decision of the concerned minister. The member representing any other entity shall be nominated by that entity.
 - c. The Minister shall nominate from among the Committee members a vice-chairman to chair the Committee when the chairman is absent.
 - d. The Minister shall nominate from among the Ministry's officers a rapporteur who shall prepare the invitation to Committee meetings, keep its records and books and record the minutes of its meetings, and follow up on the implementation of its decisions.

Article 6

The Committee shall review the Terms of Reference submitted by the project owner, and review the Environmental Impact Assessment Document, and submit its recommendations to the Minister to make the required the decision with regard thereto.

Article 7

- A. The Committee shall meet whenever deemed necessary, upon the invitation of its chairman, or of the vice-chairman during his absence. Quorum for the meeting is met in the attendance of a simple majority of its members, provided that the chairman or the vice-chairman is in attendance. Its decisions are passed by a simple majority of the vote. In the event of a tie, the side with whom the meeting chairman voted shall prevail.
- B. The Committee may invite any person to a meeting for consultation purposes, but that person shall not be entitled to vote on its recommendations.

Article 8

- A. The project owner shall submit an application to the Ministry to obtain the Environmental Approval needed to establish his project, in accordance with the special form prepared for this purpose, and shall present with it all the necessary information and data, and attaching thereto the preliminary maps, designs and specifications referred to in Annex 1 of these Regulations.
- B. The project shall be classified in any of the following categories by decision of the Secretary General on the basis of the recommendations of the competent party at the Ministry:
 1. Category 1: includes the projects referred to in Annex 2 of these Regulations and which require a comprehensive environmental impact assessment.
 2. Category 2: includes the projects referred to in Annex 3 of these Regulations and which require a preliminary environmental impact assessment, based on which the need to conduct a comprehensive environmental impact assessment will be determined.
 3. Category 3: includes the projects that require neither a preliminary nor a comprehensive environmental impact assessment.

Article 9

- A. If a project is classified as Category 1, the Ministry shall advise the project owner in writing, requesting him to conduct a comprehensive environmental impact assessment for the project.
- B. The project owner shall submit a preliminary draft of the Terms of Reference for the environmental impact assessment study he intends to conduct after agreeing with the Ministry on the content of the draft, the general framework of the study, the scope of the study, the nature of anticipated Significant Impacts of the project, and the entities concerned with and affected by the project.

- C. The Ministry shall call the project owner and any concerned individual or representative of a public or private party that may be potentially affected by the project to participate in investigating the preliminary draft to identify the Significant Impacts of the project on the Environment. The Ministry and the project owner shall provide all the available information on the project and its surrounding Environment to all concerned entities within an appropriate time prior to the date of the meeting, in order to facilitate the identification thereof.
- D. The project owner shall submit a report to the Ministry including a summary of the meeting's discussions, the parties attending, and the Significant Impacts identified, and demonstrating the Terms of Reference for the environmental impact assessment study, the names of the experts responsible for preparation of the Environmental Impact Assessment Document, the required technical expertise, and the expected level of effort needed to prepare this document. The competent party at the Ministry shall submit this report to the Technical Committee.
- E. The Technical Committee shall review the Terms of Reference within one week from the date of receiving the report, and this period may be extended by agreement with the project owner. It shall submit its recommendations in this regard to the Minister to issue the appropriate decision in that regard, provided that the project owner shall be informed of this decision.

Article 10

If the Minister approves the Terms of Reference of the project, the project owner shall prepare the draft of the Environmental Impact Assessment Document, and he shall be responsible for the accuracy and authenticity of the contents thereof. This draft must include the significant environmental impact relevant to the project under review in the manner referred to in Annex 5 of these Regulations.

Article 11

- A. Upon the Ministry's receipt of the draft Environmental Impact Assessment Document, the Technical Committee shall review and analyze the draft to ascertain its compliance with the provisions of these Regulations. If it finds that the application fulfills the conditions and requirements thereof, the party making the submission is advised thereof. But if it finds that the application does not fulfill the conditions and requirements thereof, the Technical Committee shall require the project owner to provide any additional information needed to complete its analysis of the draft.
- B. If the draft Environmental Impact Assessment Document fulfills all of the requirements of the provisions of these Regulations, the Minister, upon the recommendation of the Secretary General that is based on the recommendation of the Technical Committee, shall issue his decision in this regard within 45 days after the date of receipt of the draft that is in fulfillment of the conditions and requirements thereof, in accordance with the following:
 - 1. Approving the draft and considering it the final Environmental Impact Assessment Document if it is shown that the project's environmental impacts are appropriately dealt with throughout the study including the plan for reducing adverse impacts. The approval shall be valid for one year from the date it is issued.
 - 2. Denial of Environmental Approval of the project if it is shown that its implementation would cause Significant Impact on the Environment and that the plan for reducing adverse impacts is inadequate for the purpose.
- C. If the Minister does not issue his decision with regard to the draft Environmental Impact Assessment Document within the period set in Paragraph B hereof, the project is considered as having been approved de jure.
- D. The decision related to the environmental impact assessment study shall be announced to the public in the manner that the Ministry deems appropriate.

Article 12

When launching his project and during all the implementation and operation phases, the project owner shall abide by the contents of the Environmental Impact Assessment Document and any other conditions issued by the Ministry when granting its approval.

Article 13

- A. If the project is classified as Category 2, the Ministry shall request the Project Owner to conduct a preliminary environmental impact assessment of the project, taking into account the criteria referred to in Annex 4 of these Regulations.
- B. If the preliminary environmental impact assessment reveals that the project has a potential Significant Impact on the Environment, the Minister shall request the project owner to conduct a comprehensive environmental impact assessment study in accordance with the provisions of these Regulations.
- C. If the preliminary environmental impact assessment reveals that it is not likely for the project to have a Significant Impact on the Environment, the project shall obtain the Ministry's approval in accordance with the provisions of these Regulations and instructions issued by virtue hereof, and the Ministry shall inform the project owner of this approval.

Article 14

If the project is classified as Category 3, the Ministry shall inform the project owner that his project does not require an environmental impact assessment study, and in this case, the project is considered approved in accordance with the provisions of these Regulations and instructions issued by virtue hereof.

Article 15

Any amendment to or expansion of a current project the establishment of which requires an environmental impact assessment and may impact the Environment in a significant way is considered a separate project, and shall be treated as a new project. In this case, the project owner must undertake all the measures referred to in these Regulations regarding environmental impact assessment.

Article 16

- A. The project owner may object before the Minister to the Minister's decision denying the Environmental Approval of his project within 15 days from the date the project owner is informed of such decision, and the Minister may appoint an independent panel of experts consisting of not less than three members with the appropriate technical experience, at the expense of the project owner, to review the objection submitted by the project owner, and submit its recommendations to the Minister in this regard.
- B. The Minister's decision regarding the objection is considered final and it is capable of being contested before the High Court of Justice.

Article 17

The Ministry shall regularly monitor the extent of the compliance of the project owner with all the conditions and requirements stipulated in the Environmental Approval during any of the activities of the project including its implementation, operation, and disassembling.

Article 18

The Ministry shall make available to the concerned entities and upon their request, the information and data related to the Environment provided by project owner during the phases of the environmental impact assessment study. In specific cases dictated by the public interest or the provider's own interest, the Ministry may consider some of the data or information provided as confidential.

Article 19

Annexes 1, 2, 3, 4 and 5 attached to these Regulations shall be considered part and parcel of hereof.

Article 20

- A. Upon the submission of the application, the Ministry shall charge the following:

1. Twenty-five Jordanian Dinars for projects that do not require an environmental impact assessment study.
 2. Fifty Jordanian Dinars for projects that require a preliminary environmental impact assessment study.
 3. Seven hundred and fifty Jordanian Dinars for projects that require a comprehensive environmental impact assessment study.
- B. Costs of experts and consultants who are assigned to review the environmental impact assessment study shall be borne by the project owner, provided that such costs shall be determined by decision of the Minister, upon the recommendation of the Secretary General.

Article 20

The Minister shall issue the instructions necessary for the implementation of the provisions of these Regulations.

15/3/2005

Faisal Bin Al-Hussein

Appendix No. (1): Land Ownership Documentation

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Land Ownership Documentation

February 12, 2020

Ministry of Agriculture \ ESIA Team

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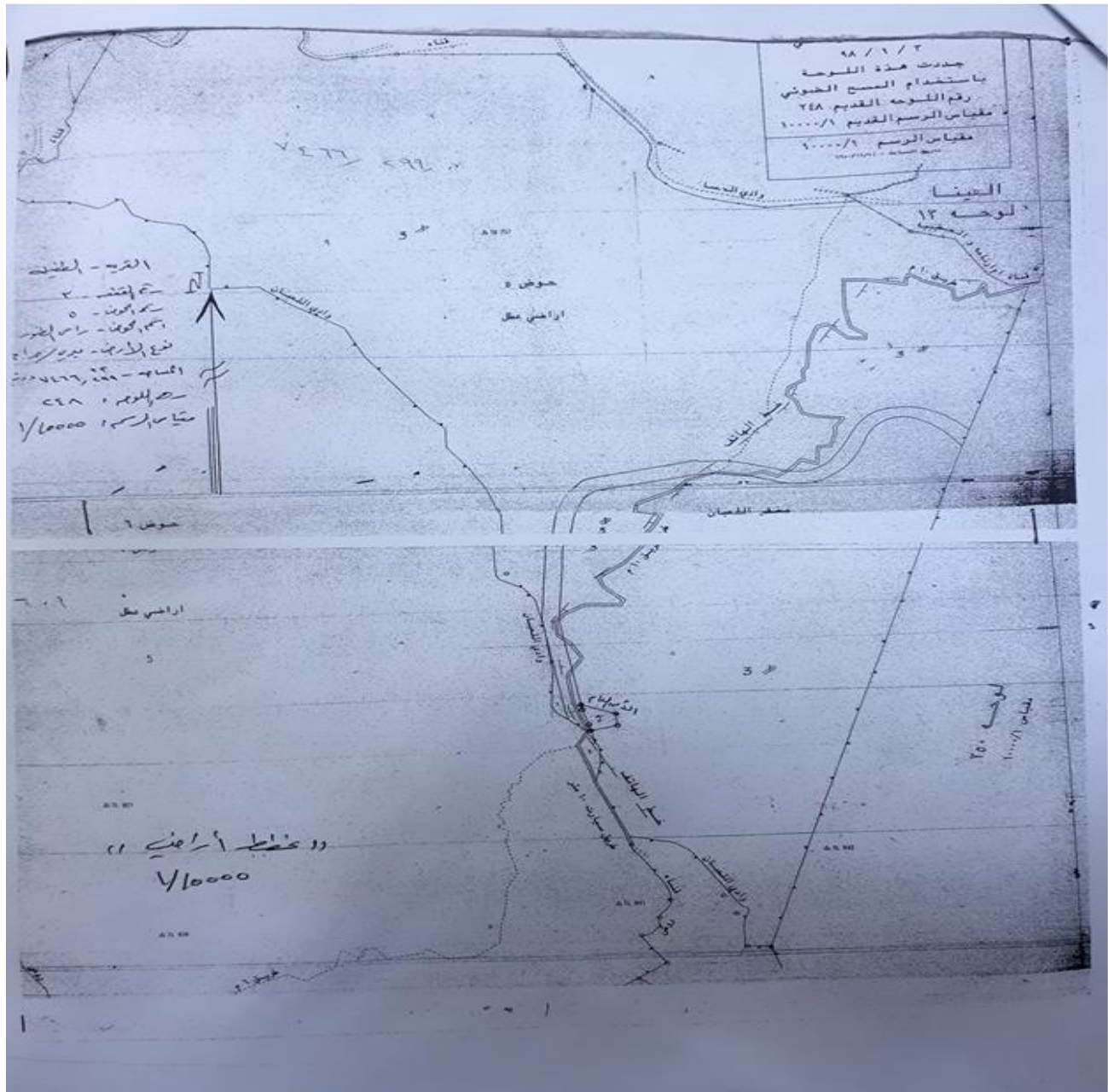
Physical Address

Amman

Queen Rania Al Abdullah Street - Building No. 39

Site Location Plan - Tafileh authority

scale 1:10000



The Owner; The Treasure of the Hashemite Kingdom of Jordan

Village: Tafileh

Plot no. : (5).

Ground no.: (3)

Site Name: Ras Atanour

Land Coordinates Survey

Department of Land and

12/15/2019

Print Preview Coordinate Boundaries



المملكة الأردنية الهاشمية
دائرة الأراضي والمساحة
إحداثيات النقاط المحيطة بالقطعة

المحافظة:	محافظة الطفيلة	الحوض:	راس الطنور 005
المديرية:	اراضي الطفيله	الحي:	جدول الأحياء 000
القرية:	الطفيلة 0602	رقم القطعة:	00003

	الوصف	إحداثي X	إحداثي Y
1	غير معرف	217587.974	1040060.865
2	غير معرف	217652.688	1039608.165

المساحة (المحسوبة و ليست التسجيلية):
التاريخ:

7917.1 متر مربع

15/11/2019

12/15/2019

مخططات الأراضي

(<http://www.infograph.com.jo/index.html>)



Google's Land Plot Details Survey

Department of Land and

Village: Tafileh

Surface area: (7465.014 m2)

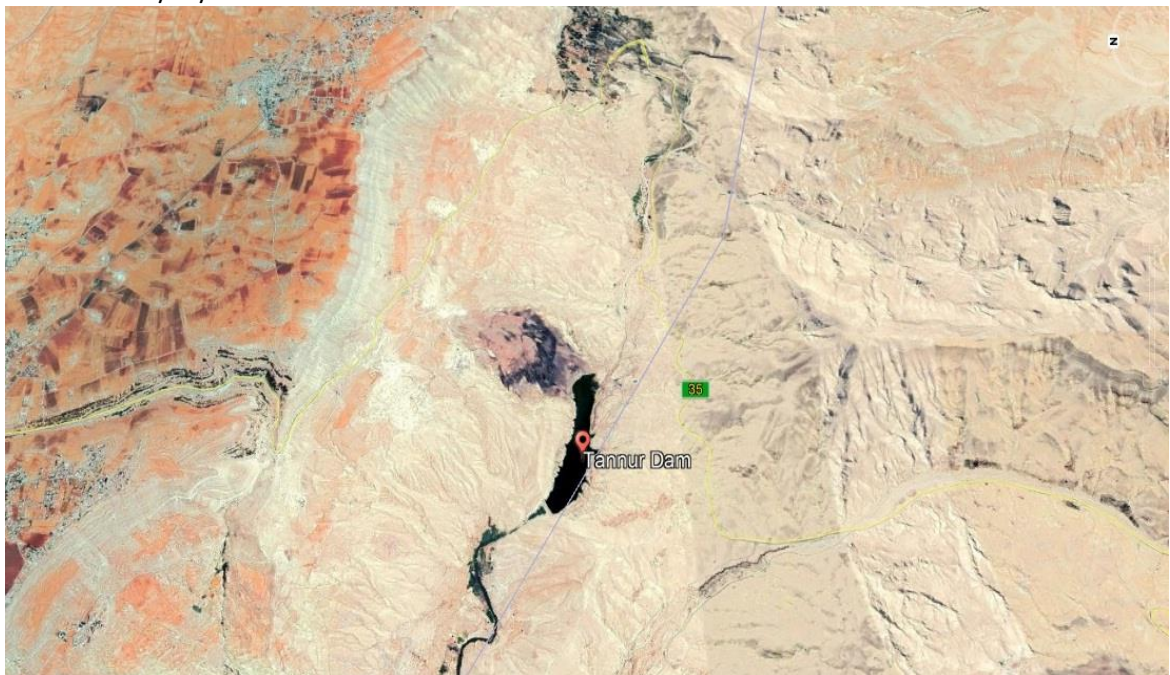
Plot no.: (5)

Site Name: Ras Atanour



Source: Google earth

Accessed: 15/12/2019



Appendix No. (2): Public Consultation Report

Hashemite Kingdom of Jordan Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Final Public Consultation Report Submitted to MINISTRY OF AGRICULTURE (MoA)



Prepared by
Dr. Mahmoud Rabai
Dr. Mahmoud Frihat

Amman-Jordan
December 11th, 2019

Ministry of Agriculture \ ESIA Team

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Public Consultation Report

1. Background

For the purpose preparing this ESIA report, the consultant carried out the Public Consultation as required by the World Bank ToR's, ESS10 (Stakeholder Engagement and Information Disclosure) taking into consideration the Regulation of Environmental Impact Assessment No. (37), year 2005.

The public consultation took place on Wednesday the 11th of December, 2019 at premises of Tafileh Governorate in Tafileh City. The number of participants was (55) (See page no.11 copy of meeting agenda and page no.12 list of attendances). The local representatives and stakeholders participated in the meeting in response to an phone call invitation made by the Tafileh Agriculture Directorate. The Public Consultation Meeting was organized by the Tafileh Agriculture Directorate to the representative of government institutions concerned with agricultural development and local NGOs active in Qasabat Tafileh District.

2. Public Consultation Session:

Eng. Hussein Al Qatameen Director of Tafileh Agriculture Directorate began the session by explaining the purpose and the objectives of the consultation workshop. This meeting was organized in order to receive feedback and review any comments or suggestions presented by the participants. These suggestions will integrate into the Environmental and Socio Study prepared by the MoA team. This study will be taken into consideration during the construction and production phases to eliminate or mitigate any negative impacts that may occur.

The floor was then given to the MoA team, Dr. Mahmoud Rabai explained to the audience the importance of this Hydroponics project on the community and the requirements of the Environmental Law no. 6. Also the Environmental Impact Assessment by-law regarding to all project Phases; construction, operation, including the project scope of work, the hydroponic technology, site location, the potential socio-economic benefits that may be offered to the community. The Grievance Mechanism was also presented to the participants and explained as a means to express any objection or discomfort during the various phases of the project for workers, laborers and community members affected by the project.

The MoA team presented the various project phases and highlighted the environmental and social impacts that could be raised by stakeholders during the course of implementation of the various project phases. Also the MoA team explained the proposed mitigation measures necessary to mitigate the negative impacts and also explained the advantages of having a high-tech agricultural hydroponics farming system in comparison to the traditional agricultural practices (open field and traditional greenhouse farming). The MoA team emphasized that this project is an excellent demonstration example for knowledge transfer and possesses a very high possibility for replication in other farms and could be carried out on land with low soil fertility. The principle distinction a Hydroponics farm offers is the significant water saving this advanced technology offers, as hydroponics farming by design addresses two of the most pressing challenges that face Jordan; water shortage and food security. At the end of the presentation the MoA team highlighted the fact that in order for this technology to achieve the planned results, it was crucial to give special attention in addressing the following issues:

- To have full automation of electronic control for operation of the high-tech hydroponics.
- Integrated Pest Management (IPM) program should be adopted rigorously.
- Knowledge transfer to locals by seeking regular supervision and backstopping from well experienced experts.

The community consultation session provided the participants with the opportunity to present their comments, ask questions, express concerns, and views. The MoA team (Dr. Mahmoud

Rabai, and Dr. Mahmoud Frihat) moderated the meeting and subsequent discussion among participants and took notes of all raised questions, remarks and comments of all attendees and reflect them in the report. The women attending the meeting constituted about 50% of participants and expressed their enthusiasm and interest in developing their experience in such a project.

The main concerns and feedback of the participants were collected in a Question and Answer form, which are summarized as follows:

Q1: By Mr. Yahiya Al-Frijat, A member of Tafileh Governorate Council for Un-centralization Committee. What type of cooperative will be, How and who will establish it, and when?

A1: Dr. Mahmoud Rabai , explained in details about the establishment of cooperative for this project and this cooperative will take the responsibility of leading the project in future. It will establish immediately when the phase one of project will start and exactly when the construction of houses of hydroponic will start. The MoA team will take the responsibility of establishment of cooperative in cooperating with the JCC (Jordan Cooperative Cooperation).

Q2: By Ms. Somia Abed Almajeed, Attendee, she asked about the cooperative. How the members will be chosen? What are the criteria for that? And how many members will be in cooperative?

A2: Dr. Mahmoud Rabai and Eng. Hussein Qatameen, said that the Tafileh Agriculture Directorate in cooperate with MoA team will design the criteria for choosing members and these criteria will come soon before the project start. The number of members will be 15 persons (women and men). But the number of trainees will be 30 – 40 persons.

Q3: Mr. Ali Almasri, Head of Agricultural Engineers Association in Tafileh governorate. Asked about the benefit will come from this project for the environment and social in Tafileh governorate? Also what is the benefit for the members?

A3: Dr. Mahmoud Rabai and Dr. Mahmoud Frihat, mentioned that this project will be safe for the environment by using water in efficient way, produce more per unit, we are not going to use pesticides or any harmful chemicals. The environment issues will be taken in our consideration during the project implementation. For the second part of the question, According to the studies the member will gain adequate amount of money if they take care of the project and make it succeed. After finishing the implementation of the project the revenue of selling products will be for the cooperative members.

Comment: By Eng. Hussein Qatameen, He encouraged the participants to enroll in this project. He said this project will be a real opportunity for participants to take it seriously and to do the best to success it.

Comment: Mr. Arafat Almrayat, Head of farmers Union in Tafileh Governorate, He is very exciting with this kind of project as it will be a new one and new fashion in the area. Also he emphasized that the farmers will be interesting to copy this technology in their farms.

Q4: By Ms. Rania Almarafi, Attendee, what kinds of agriculture products will grow in the project and how did you determine them?

A4: Dr. Mahmoud Rabai, said at the first time of project we will start with some crops like tomato, cucumber, lettuce and flowers. And these kinds of crops can be change according to

the area needs. MoA team determined these kinds of crops depending on previous successful experiments. Also these crops are needed in Tafileh governorate.

Regarding these questions, three main comments were elaborated:

By Dr. Mahmoud Rabai. He stated that the MoA has made a study for the justifications of the implementing of the project. Also he strongly emphasized that this project having a positive impact on environment and social in this area. This project is a unique opportunity to support the local community and the farmers in this area to enhance their technical skills, knowledge and to develop their hands on training on high-tech hydroponics. The efforts will focus on making this project a success story and the importance of disseminating the knowledge produced from this project as a center of excellence focusing on best practices in hydroponics applications.

By Eng. Hussein Qatameen emphasized that the all participants and the Tafileh agriculture directorate strongly support the project and they are very interesting in working to make it success. Mr. Ali Almasri, Head of Agricultural Engineers Association in Tafileh governorate mentioned that there are 80 agricultural engineers (men and women) without job and most of them are ready to involve in the project.

By Dr. Mahmoud Rabai. Explained that the Grievance Mechanism was introduced to make the choosing process of trainees and cooperative members will be done in a transparency way, all complaints or any objection will be easy to express them during the various phases of the project for workers, laborers and community members affected by the project.

3. Main Participants Concerns:

The MoA team summarized the main participants concerns concluded from this session as follows:

- The local community traditionally have a well-established farming community with a wide knowledge and experience in the agriculture sector and best practices.
- Their priority concern for the communities is having sustainable job opportunities in the agriculture sector.
- Local communities do not expect to have serious problems in implementation of this type and size of project.
- The people are willing and eager to learn new technologies such as hydroponics farming.
- The community is not concerned about applying any grievance mechanism, as it is not considered to provide any added value. They insist that a well-respected project manager would eliminate and expedite any grievance that may occur in the future.

4. Session Outcomes:

Summary of the public consultations outcomes:

- The participants do not expect that this project will encounter any significant negative impacts, but rather positive impacts are envisioned.
- The project is considered as a Center of Excellence and training center for disseminating best available agriculture practices in hydroponics farming.
- The project is considered a pioneer project aimed at building the capacities of local farming communities and the technology is considered excellent in addressing Jordan's future food and water challenges.
- The project is expected to be beneficial for all farming communities in the Wadi Al Hessa.

- The first phase is not considered either economically feasible unless it is applied on a larger scale.
- Transparent and professional selection criteria should be adopted for selection of the partner society implementing the project and employees in order to ensure success of the project.

Jordan TV team has recorded the meeting and made interviews with some stakeholders. Also the Jordan TV showed the meeting with some details about this workshop on local TV program in 11th Dec., 2019. https://www.youtube.com/watch?v=D_-rqk9IYA0

5. Main Participants:

The ministry team:

- Dr. Mahmoud Rabai / Director of Studies and Agricultural Value Chains Development in MoA
- Dr. Mahmoud Frihat / Director of Lands and Soil Directorate in MoA
- Eng. Hussein Qatameen / Director of Tafileh Agriculture Directorate
- Eng. Hussein Hawileh / Head of Study of Agricultural Value Chains in MoA

There were 51 attendees who attended the workshop and shared in the meeting and discussion including these stakeholders:

- Mr. Yahya Al-Frijat, A member of Tafileh Governorate Council for Un-centralization.
- Mr. Arafat Almrayat, Head of farmers Union in Tafileh Governorate.
- Mr. Ali Almasri, Head of Agricultural Engineers Association in Tafileh governorate.
- Mr. Raed Arbihat, Director of Jordan Cooperative Cooperation in Tafileh Governorate.
- Eng. Ahmad Arfoua, Head of Forest Division in Tafileh Agriculture Directorate.

Their names are attached with this document.

6. Photo's Documentation:

Documentations of the Public Consultation Workshop, held on the 12nd of December, 2019, in the Tafileh City, Tafileh Governorate.

7. Public Consultation Agenda:

ورشة العمل التشاورية حول مشروع الزراعة المائية والاكوابونيك
في التنور / لواء قصبة الطفيلة / محافظة الطفيلة

2019 /12/11

**Public Consultation Workshop for Hydroponics project in Tannur –
Qasabat Tafileh District / Tafileh Governorate**

11/12/2019

النشاط Activity	الوقت Time
التسجيل Registration	10:00 – 10:15
الافتتاح وكلمة ترحيبية Welcoming Speech and Opening	
تقديم عرض عن المشروع من قبل مديرية زراعة الطفيلة Presentation of Project by Tafileh Agriculture Directorate	10:30 – 10:15
استعراض القضايا البيئية والاجتماعية للمشروع بما فيها شرح آلية التظلم Overview of Main Environmental and Social Concerns including Grievance Mechanism \MoA team	10:45 – 10:30
جلسة نقاشية حول القضايا والآثار البيئية للمشروع Consultation Session about Environmental and Social Issues and impacts of the project	11:30 – 10:45
تلخيص نتائج الورشة Summary of the Consultation Outcomes	12:00 – 11:30
اختتام الورشة Closing the Workshop	12:00

Tables of Attendees Names

الرقم NO	الاسم Name	جهة العمل Organization	رقم الهاتف Phone number	المسمى الوظيفي / المهنة Position/ Job	البريد الإلكتروني E-mail
1.	ماجد زينة كسبر	الزراعة	٠٧٧٢٦٥٥٨٦٤	مهندس زراعي	abdul-sulayman@yahoo.com
2.	م. أحمد سمير القاسم الرضوي	الزراعة	٠٧٧٢٠٩٢٧١٨	مهندس زراعي	AbdulKader@yahoo.com
3.	علي عبد الله المصطفى	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	Ali-Masri@yahoo.com
4.	م. صبيح سالم الحوامدة	الزراعة	٠٧٧٢١٣٠٦٨٠	مهندس زراعي	
5.	م. رانيا كحمة الكوفالدة	الزراعة	٠٧٧٢١٤٤٣٥	مهندس زراعي	
6.	م. دلو. سكدة الحوامدة	الزراعة	٠٧٧٢١٩٣٣٤	مهندس زراعي	
7.	سعيدة عايد عوف الحوامدة	الزراعة	٠٧٧٢٠٩١٩٣	مهندس زراعي	
8.	م. عبد الحميد البدر	الزراعة	٠٧٧٢٠٦١٧	مهندس زراعي	
9.	سعيدة عبد الحميد الكوفالدة	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	
10.	عبد الله عبد الحميد البدر	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	
11.	رانيا عايد عوف الحوامدة	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	
12.	ربيعا حسان المراقدة	الزراعة	٠٧٧٢٠٦٥٧٧٣	مهندس زراعي	
13.	رائد حسان المراقدة	الزراعة	٠٧٧٢٠٦٥٧٧٣	مهندس زراعي	
14.	وسن عبد الحميد أحمد الحوامدة	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	
15.	إيمان جمال محمد الرضوي	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	emany/zaidneen35@gmail.com
16.	أسامة فتحي عيال عيالمان	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	
17.	م. م. فريد سلامة الرضوي	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	

18.	جمال فاعنة جمال محمد المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	
19.	نجاح محمد عبد الرواحنة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	
20.	سلمان محمد أحمد الحوامدة	الزراعة	٠٧٧٢٢٢٣٣٥٤	مهندس زراعي	
21.	غازية سالم المصطفى	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	
22.	دنيا خبيب المصطفى	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	
23.	رقية أحمد الرواحنة	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	
24.	اسماء سالم الحوامدة	الزراعة	٠٧٧٢٠٤٣٤٧٥	مهندس زراعي	
25.	عبد خيال المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	
26.	فرح خبيب عيال المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	
27.	سحر عاتق محمد المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	zaja.alhrashat@gmail.com
28.	هالة مكي جاد الله المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	halca.moh69@gmail.com
29.	هشام محمد المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	
30.	وفاء خبيب عيال المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	wafaa.roula@gmail.com
31.	رشاد عاتق المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	rasheed.99si123@gmail.com
32.	علياء محمد عيال المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	
33.	رايم محمد عيال المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	
34.	أحمد نايل عبد المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	ahmad.alrbehah@gmail.com
35.	أشرف أحمد المراقدة	الزراعة	٠٧٧٢٢٧٤٢٨٥٥	مهندس زراعي	ashraf.alrbehah@gmail.com

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Belal78@almarj.com	مهندس زراعي	0778695982	مهندس زراعي	بلال عبد الحميد	39
MohammadAlmarj@almarj.com	مهندس زراعي	0778695982	مهندس زراعي	محمد سليمان المصري	40
802011@almarj.com	مهندس زراعي	0778695982	باحث عن عمل	نور سالم القوي	41
	مهندس زراعي	0778695982	باحث عن عمل	محمد عصام الخراسيس	42
	مهندس زراعي	0778695982	باحث عن عمل	صليب سالم الحوافرة	43
	مهندس زراعي	0778695982	باحث عن عمل	يزن محمود القضايرة	44
	مهندس زراعي	0778695982	باحث عن عمل	عتبة راؤول الخريسات	45
Mohammad Al-Raqab	مهندس زراعي	0778695982	باحث عن عمل	محمد عبد الدواقة	46
	مهندس زراعي	0778695982	مهندس زراعي	محمّد تاجي الخلفا	47
	مهندس زراعي	0778695982	مهندس زراعي	محمد عبد الله السوالفة	48
	مهندس زراعي	0778695982	مهندس زراعي	محمد عبد النادر الفتيحات	49
	مهندس زراعي	0778695982	مهندس زراعي	رائد عبد السلام	50
	مهندس زراعي	0778695982	مهندس زراعي	رضا عبد الله الخريسات	51

Pictures from the workshops (The Attendees)



Appendix No. (3): Grievance form

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Grievance form

February 12, 2020

Ministry of Agriculture \ ESIA Team

P.O. Box 961044

Tel +96265686151

Fax +96265686310

Physical Address

Amman

Queen Rania Al Abdullah Street - Building No. 39



Ministry of Agriculture
Amman - Jordan
Tel: +962 6 5686151
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Email: moa.mail@moa.gov.jo

GRIEVANCE FORM
THE HYDROPONICS FARM IN TANNUR Project

(+96232241023), (+962799059084)

www.moa.gov.jo

<https://www.facebook.com/groups/207233332651059/>

Employee name:

Employee Mobile No.:

Complaint subject:.....

Complaint body:

Signature of The complainant

.....

Date:

Appendix No. (4): Documentation sit

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Documentation sit

February 12, 2020

Ministry of Agriculture \ ESIA Team

P.O. Box 961044

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Physical Address

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Queen Rania Al Abdullah Street - Building No. 39

Eastern Site View



Western Site View



Southern Site View



Northern Site View



General Site View



Entrance to the Site & Service Road - View



Wadi AL- Hessa View



AL- Shohada Village near the Project Area



Appendix No. (5): Criteria For Selecting The Trainees And Workers

Hashemite Kingdom of Jordan

Ministry of Agriculture

HYDROPONICS FARM IN TANNUR – WADI AI HESSA

Criteria For Selecting The Trainees And Workers

February 12, 2020

Ministry of Agriculture \ ESIA Team

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Ministry of Agriculture**Amman - Jordan****Tel: +962 6 5686151****Fax: +9620 6 5686310****Email: moa.mail@moa.gov.jo****Criteria For Selecting The Trainees And Workers**
THE HYDROPONICS & AQUAPONICS FARM IN TANNUR Project**(+96232241023), (+962799059084)****www.moa.gov.jo****<https://www.facebook.com/groups/207233332651059/>****Priorities for selecting the trainees and workers in the project**

- 1- Residents in Tafila Governorate.**
- 2- He must be over 18 years old**
- 3- Priority is given to widowed women**
- 4- He should not have a source of income.**
- 5- Priority is given to the heads of families who are married to youth and women**
- 6- His educational achievement should not be less than secondary**