Annex 3: Economic and Financial Analyses-

BRCCJ Funding Proposal- Jordan.

Building resilience to cope with climate change in Jordan through improving water use efficiency in the agriculture sector (BRCCJ)

Hashemite Kingdom of Jordan

GCF/FAO-DPI

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Content

List of tables

List of figures:

1. Introduction

The current appendix aims to summarize the main assumptions, hypothesis and results of the Building resilience to cope with climate change in Jordan through improving water use efficiency in the agriculture sector (BRCCJ) Project´s Economic and Financial Analysis.

The document summarizes the main assumptions, hypothesis and results of the Project´s economic and financial analyses. The profitability indicators are calculated taking into account the outcomes, phasing and expected beneficiaries for each type of activity beyond project lifetime. Sources of information combine specialized papers and references (see References), official data and field visits. The resulting figures were double-checked with technical specialist for each source of benefits. In addition to the estimates on main profitability indicators, a sensitivity analysis was conducted to test the results and a risk assessment matrix prepared to link the current risks and the EFA estimates. Finally, Cost-efficiency benchmarks are being provided.

2. Project Summary

2.1 Main assumptions

Costs and financiers. Total project costs are estimated at US$ 33.25 million. The total comprises a GCF grant of US$ 25 million (75% of total project cost). Government of Jordan contribution of US$ 6.2 million (19%), and FAO and UNDP co-financing of about 2.06 million (1 million and 1.06 million respectively, representing 6% of total costs). The beneficiaries are expected to provide USD 4.6 million, which is not accounted as co-finance.

Project implementation period. The Project will be executed during a 7-year period and is expected to begin during the first semester of 2021.

Project lifespan. The period for which project benefits will accrue is 30 years.

Methodology. Each activity presents a breakdown of tasks and items that were costed with unit costs and quantities year by year. Activities are aggregated by project´s outputs and outcomes.

Unit costs. Unit costs have been calculated in US dollars, excluding taxes and including price and physical contingencies, and they are based on field visits, consultations with FAOJO Procurement Office and other recent external funded project´s references (REGEP additional financing- IFAD) where FAO/DPI provided technical support. It is noted that all unit costs are indicative and are used for the purposes of estimating the overall project costs. These are, therefore, subject to verification during project implementation at the time of preparing Annual Work Plans and Budgets every year.

Exchange rate. The exchange rate of 0.71 JOD/USD has been used for costing, based on Central Bank of Jordan[1] current exchange rate and IMF forecast[2]. The Jordanian dinar (JOD) has been pegged to the USD since 1995, when the country adopted a fixed exchange rate system Dinar/US Dollar as the nominal pillar of the monetary policy[3].

2.2 Summary of Project costs

Total Costs. Total Project costs over the seven-year period are estimated at USD 33,25 million (JOD 23,57 million[4]), including contingencies and excluding taxes and duties.

Costs by Component/Outcomes. Component 1: Climate Resilient Water Systems, comprises 60% of total costs; Component 2: Climate change resilience for enhanced livelihoods and food security comprises

[1] http://www.cbj.gov.jo/
[2] IMF Country Report No. 19/127, May 2019.
[3] http://www.cbj.gov.jo/Pages/viewpage.aspx?pageID=260
[4] Considering a exchange rate of 0.71 USD/JOD as referred in the above in the assumptions.

24%; Component 3: Scaling-up climate adaptation is estimated at 11% of total project costs and Project Management comprises 5%. As there is one outcome per component, the same distribution applies to the Cost by Outcome.

Figure 1. Costs by Component (%)

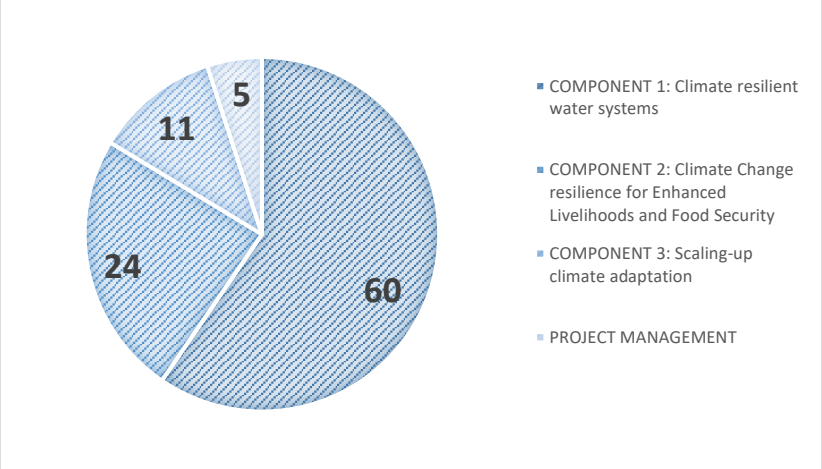
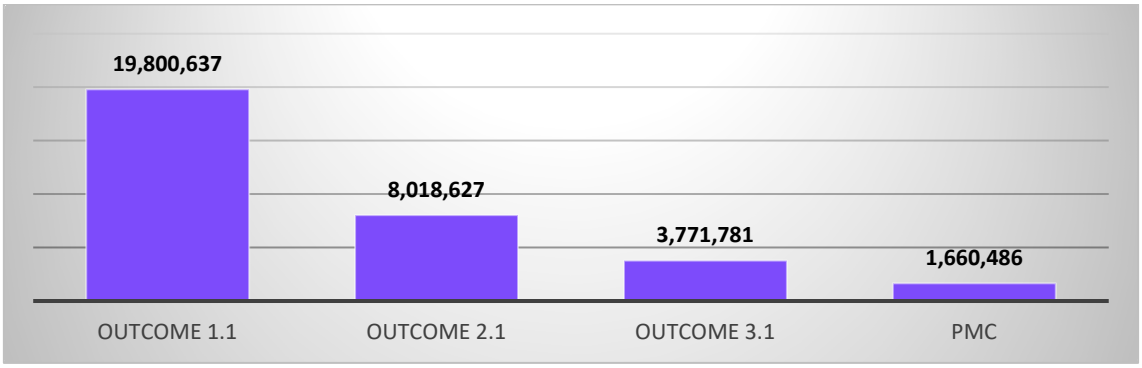


Table 1. Project Costs and Financing by Component and Output (GCF and Others[5])

Component	Output	Indicative cost USD	GCF financing		Co-financing		
			Amount USD	Financial Instrument	Amount USD	Financial Instrument	Name of Institutions
COMPONENT 1: Climate resilient water systems	Output 1.1.1 By year 7 at least 8250 buildings retrofitted with water harvesting structures	14,351,707	11,553,406	Grants	485,000	Grants	UNDP
					2,313,301	Grants	Government (MWI)
	Output 1.1.2 By year 7, reuse of reclaimed water from 3 Waste Water Plants is optimized	3,585,700	2,151,700	Grants	1,434,000	Grants	Government (MWI)
	Output 1.1.3 By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin	1,863,200	1,163,200	Grants	500,000	Grants	UNDP
					200,000	Grants	Government (MWI)
COMPONENT 2: Climate Change resilience for Enhanced Livelihoods and Food Security	Output 2.1.1 By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (1950)	5,466,027	3,900,427	Grants	275,000	Grants	FAO
					1,290,600	Grants	Government (MoA)
	Output 2.1.2 By year 7, 30 000 Farmers reached through e-extension	823,600	50,000	Grants	773,600	Grants	FAO
	Output 2.1.3 By year 3, 400 Women trained as Change Agents for Climate Adaptation	980,250	880,250	Grants	100,000	Grants	FAO
	Output 2.1.4 By year 7, 15.000 Persons sensitized for climate adaptive measures	748,750	748,750	Grants	-		
COMPONENT 3: Scaling-up climate adaptation	Output 3.1.1. By year 6, specific policy and regulatory bottlenecks are identified and reforms initiated	2,383,281	2,108,281	Grants	275,000	Grants	FAO
	Output 3.1.2 By year 6 at least 6 national curricula of vocational schools (masonry, plumbery and agriculture) and of specialized universities (agriculture, architecture, water engineering) are updated to include climate smart agriculture, water efficiency and precision agriculture.	625,000	550,000	Grants	75,000	Grants	FAO
	Output 3.1.3 By year 7 at least 6440 persons (4 governorates, 16 provinces, 324 municipalities) and private sector engaged in climate change adaptation practices	763,500	763,500	Grants	-		
Project Management		1,660,486	1,130,486	Grants	75,000	Grants	FAO
					75,000	Grants	UNDP
					380,000	Grants	Government (MoE)
Indicative total cost (USD)		33,251,501	25,000,000		8,251,501		

[5] BRCCJ Funding Proposal, Section C2.

Figure 2. Costs by Outcome (USD)



Costs by Output. Project costs are divided in ten outputs. Three in Component 1, four in Component 2 and other three in Component 3. The following list shows the Outputs per component:

Table 2. List of outcomes, outputs and indicators

Component	Outcome	Output	Indicator	
Component 1	1.1	**Output 1.1.1**	By year 7 at least 8250 buildings retrofitted with water harvesting structures	**43%**
Component 1	1.1	**Output 1.1.2**	By year 7, reuse of reclaimed water from 3 Waste Water Plants is optimized	**11%**
Component 1	1.1	**Output 1.1.3**	By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin	**6%**
Component 2	2.1	**Output 2.1.1**	By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (6000)	**16%**
Component 2	2.1	**Output 2.1.2**	By year 7, 30 000 Farmers reached through e-extension	**2%**
Component 2	2.1	**Output 2.1.3**	By year 3, 400 Women trained as Change Agents for Climate Adaptation	**3%**
Component 2	2.1	**Output 2.1.4**	By year 7, 15.000 Persons sensitized for climate adaptive measures	**2%**
Component 3	3.1	**Output 3.1.1**	By year 6, specific policy and regulatory bottlenecks are identified and reforms initiated	**7%**
Component 3	3.1	**Output 3.1.2**	By year 6, at least 6 national curricula of vocational schools and specialized universities updated to include climate smart agriculture, water efficiency and precision agriculture	**2%**
Component 3	3.1	**Output 3.1.3**	By year 7 at least 6440 persons (4 governorates, 16 provinces, 324 municipalities) and private sector engaged in climate change adaptation practices	**2%**
PMC	PMC	**PMC**	**PROJECT MANAGEMENT**	**5%**

Figure 3. Costs by Output (%)

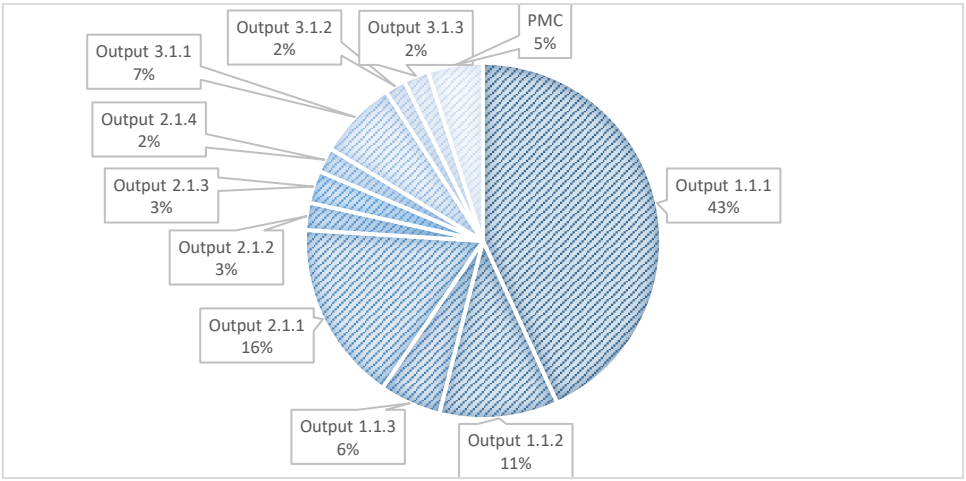
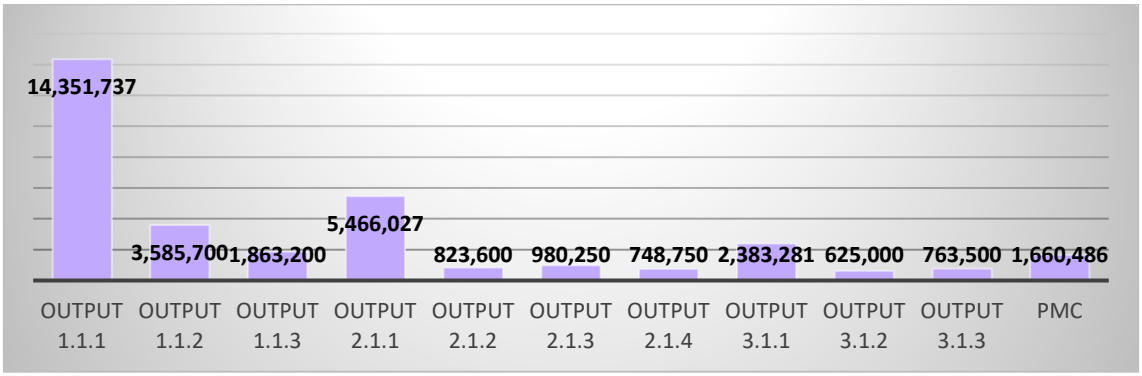


Figure 4.Costs by Output (USD)



Costs by Expense Account. Project expense accounts are being aligned between financiers as it was shown in Table 1. The following graphics shows the distribution among expenses accounts (excluding FAO and UNDP financing).

Figure 5. Costs by Expense Account (%)

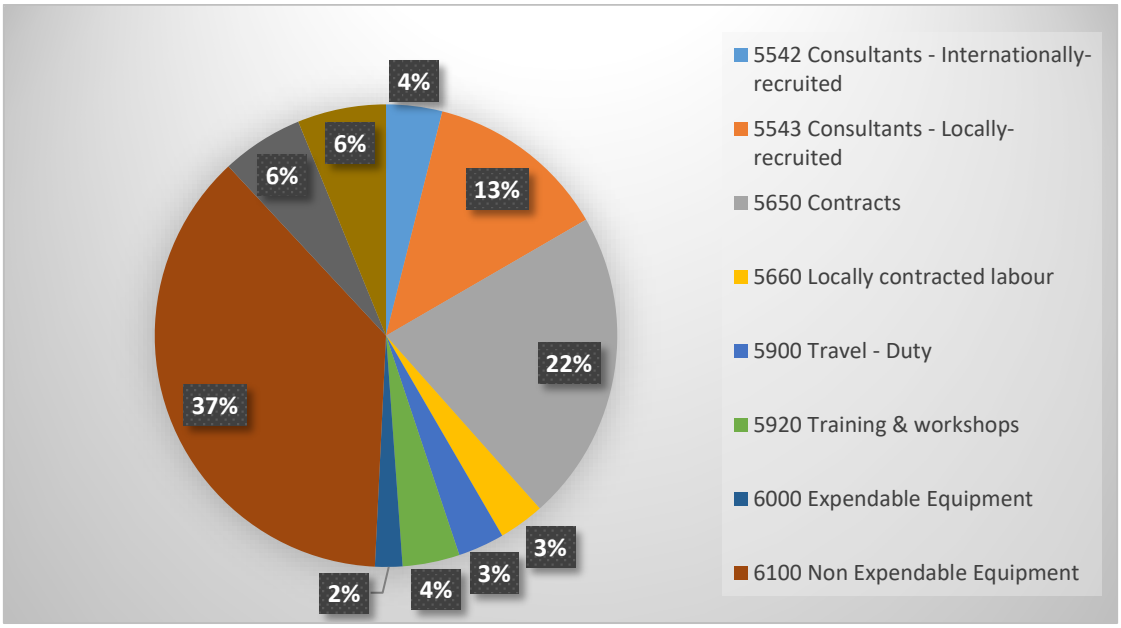
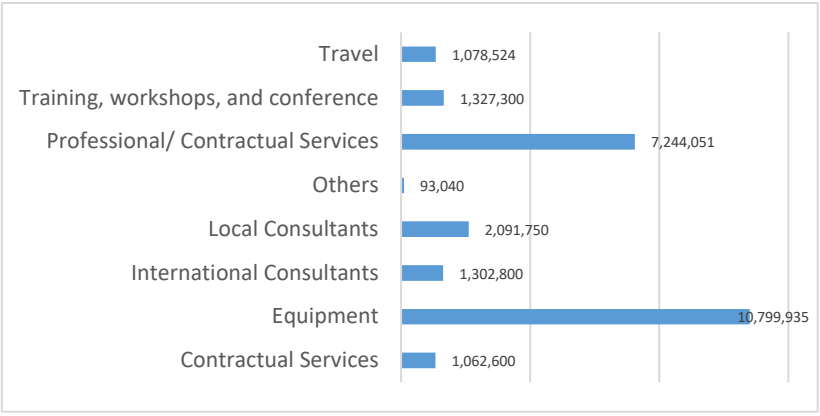


Figure 6. Allocation of GCF financing among GCF cost categories (USD)



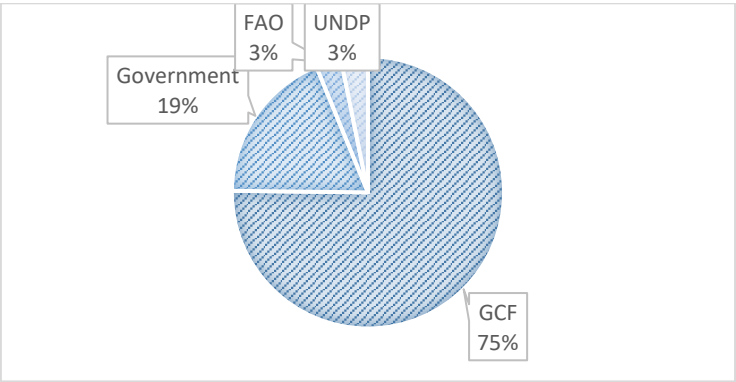
Project Financing

The current project is based on a request for a grant from the GCF. Total project costs are estimated at USD 33.25 million. The budget for the project comprises a GCF grant of US$ 25 million (75% of total project cost), Government of Jordan contribution of US$ 6.2 million (19%), and FAO and UNDP co-financing of USD 2.06 million (1 million and 1.06 million respectively, representing 6% of total costs). Beneficiaries are expected to provide USD 4.6 million (as an investment in roof-top water harvesting systems and water saving devices and gadgets for domestic water conservation) which is not accounted as co-finance in in the project budget.

Government will be providing use of its staff and facilities for the implementation of project activities as well as budget support for some of the roof-top harvesting from its Capital Investment Plan. The Government will also exempt all purchased goods and services, even those directly imported such as vehicles and equipment from taxation for the project. This exemption, that is not considered as co-finance in the project budget, is estimated at USD 4.14 million. On an annual basis the MWI invests around JOD 29 million (USD 40.84 million) as its capital investment in the water sector, some of it will be for direct investments in capital investments in the selected project Governorates.

It is expected that all participating households will contribute by purchasing gadgets and water saving devices for domestic use valued at close to USD 785,000 as well as direct contribution for roof top water harvesting at around USD 3.83 million.[6]. This is a key element to ensure sustainability and ownership among targeted beneficiaries. Total beneficiary contribution is expected at around USD 4.62 million.

Figure 7. Costs by Financer (%)



There are other Investments in the area of adaptation by several donors in the country complementing the project interventions, such as:

- FAO and UNDP both have on-going projects which are making climate adaptation investments through the MADAD project, investments in aquaponic and hydroponics, etc.
- UNDP is assisting the Government with developing plans for drought management.
- The Adaptation Fund of the UNFCCC (2016-2020) is investing USD 9.2 million in substitution of fresh water with wastewater for specific purposes. It is also assisting in developing and testing innovative solutions to implement participatory water management.
- IFAD is investing (2021- 2025) USD 15.2 to integrate climate resilient agriculture in selected value chains.
- AFD and KFW are investing Euro 450 million in a Water Sector Policy Loan which includes diffusion of water harvesting and distribution technology.
- GIZ is investing USD 2 million for removing barriers to Climate Change Adaptation in the water and agriculture sector. Thus, there is considerable parallel financing for climate adaptation.

[6] The average cost for a household to install the water efficient devices is expected to be USD 100 per hh (7,850) and for public buildings (400) it is expected that the cost will be USD 200.

The following table shows GCF financing per Component:

Figure 8. GCF contribution by Component (USD million)

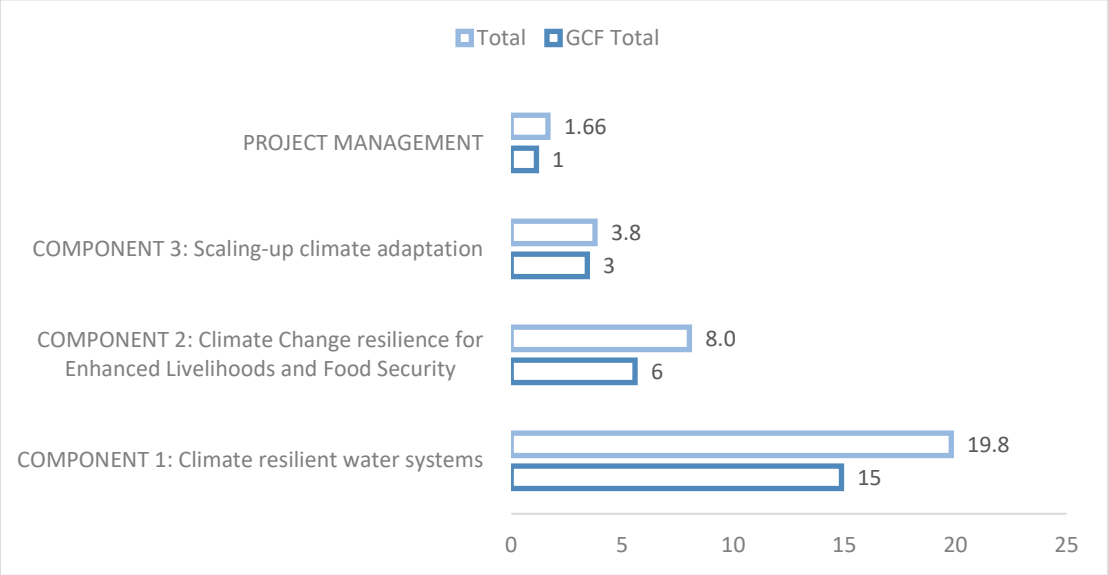
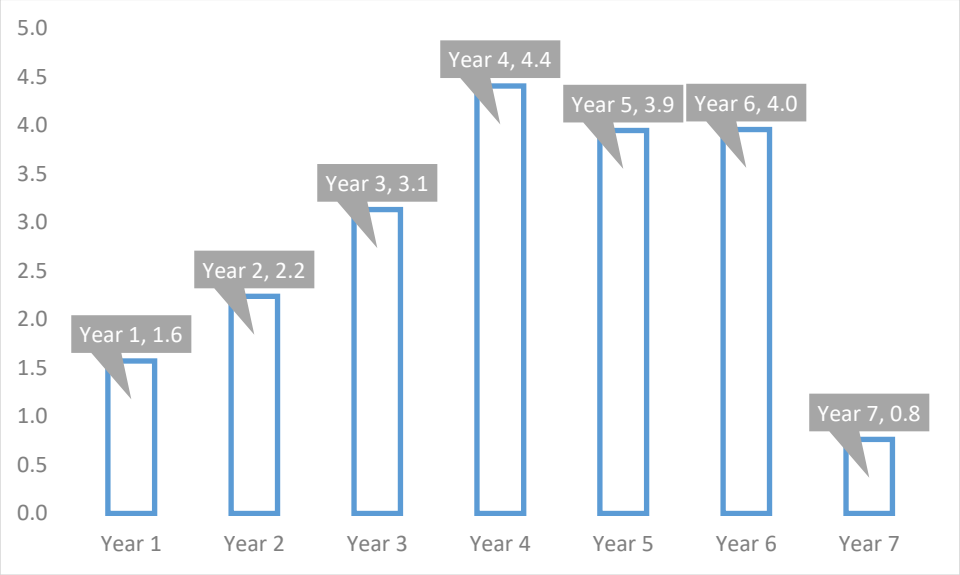


Table 3. Project Costs and Financing by Component and Output

Preliminary Costs per Component per financier	GCF		Government		FAO		UNDP		Total	
	USD MM	%	USD MM	%	USD MM	%	USD MM	%	USD MM	%
COMPONENT 1: Climate resilient water systems	14.9	75	3.9	20	-	-	1.0	5	19.8	60
Output 1.1.1 By year 7 at least 8250 buildings retrofitted with water harvesting structures	11.6	81	2.3	16	-	-	0.5	3	14.4	72
Output 1.1.2 By year 7, reuse of reclaimed water from 3 Waste Water Plants is optimized	2.2	60	1.4	40	-	-	-	-	3.6	18
Output 1.1.3 By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin	1.2	62	0.2	11	-	-	0.5	27	1.9	9
COMPONENT 2: Climate Change resilience for Enhanced Livelihoods and Food Security	5.6	70	1.9	23	0.6	7	-	-	8.0	24
Output 2.1.1 By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (1950)	3.9	71	1.3	24	0.3	5	-	-	5.5	68
Output 2.1.2 By year 7, 30 000 Farmers reached through e-extension	0.1	6	0.6	70	0.2	24	-	-	0.8	10
Output 2.1.3 By year 3, 400 Women trained as Change Agents for Climate Adaptation	0.9	90	-	-	0.1	10	-	-	1.0	12
Output 2.1.4 By year 7, 15.000 Persons sensitized for climate adaptive measures	0.7	100	-	-	-	-	-	-	0.7	9
COMPONENT 3: Scaling-up climate adaptation	3.4	91	-	-	0.4	9	-	-	3.8	11
Output 3.1.1. By year 6, specific policy and regulatory bottlenecks are identified and reforms initiated	2.1	88	-	-	0.3	12	-	-	2.4	63
Output 3.1.2 By year 6 at least 6 national curricula of vocational schools (masonry, plumbery and agriculture) and of specialized universities (agriculture, architecture, water engineering) are updated to include climate smart agriculture, water efficiency and precision agriculture.	0.6	88	-	-	0.1	12	-	-	0.6	17
Output 3.1.3 By year 7 at least 6440 persons (4 governorates, 16 provinces, 324 municipalities) and private sector engaged in climate change adaptation practices	0.8	100	-	-	-	-	-	-	0.8	20
PROJECT MANAGEMENT	1.13	68	0.38	23	0.1	5	0.1	5	1.66	5
Total	25.0	75	6.2	19	1.0	3	1.1	3	33.25	100

Costs by year. The following chart illustrate the expected project costs by year.

Figure 9. Project Costs by year (USD million)



3. Project Economic and Financial Analysis

3.1 Introduction to EFA analysis

The economic and financial analyses consist of comparing the resources required for the project implementation (represented in overall costs) with the expected impacts, calculated as benefits for the main promoted activities. It is done from the point of view of each participant (financial analysis) but also aggregating beneficiaries per model and estimating economic benefits of key investments (such as rainwater harvesting systems) for the entire project.

The methodology used follows the guidelines to measure Economic Analysis in Agricultural projects (Gittinger;1985) applying the requirements and steps proposed for Economic and Financial Analysis by different donors as ADB (2013), IFAD (2019) for Volume 2 and IFAD (2015) for Volumes 1 and 3.

The financial analysis provides further understanding of beneficiaries' motivations, based on hypothesis and parameters. It permits to figure out if targeted farmers would be able to take the risks that the project requires. This exercise implies to simulate benefits at the individual level but also make sure that they will have the means to implement project investments, taking into account assumptions on the delays in adopting technologies and reaching full development.

The economic analysis takes into account all the costs and benefits of the Project. It will allow to evaluate the global efficiency in management resources for the government and the society as a whole. The analysis aggregates the farm models using economic prices and adding other source of benefits due to the water savings for Component 1 activities.

Both in the financial and economic analyses, each initiative will be considered profitable if cash flow´s additional benefits, over a 20-year period for financial models and 30-year period for the economic analysis, surpass investment and recurrent costs at a cut-off rate. As a result, profitability indicators will be the Net Present Value (NPV, economic and financial), the Internal Rate of Return (IRR, economic and financial-when applicable-) and the Benefit-costs ratio (B/C) and increase in returns to family labor (for the financial

analysis). The sensitivity analysis will test vulnerability or robustness of obtained results for the economic profitability indicators.

A 20-year timespan is considered for the stream of benefits from climate change adaptation activities involving agricultural techniques and practices in Component 2 and a 30-year timespan was selected for water access infrastructure in Component 1 based on Abdulla (2019) for Water Harvesting Systems and Albert, J et Al (2013) where it is being mentioned that *"water infrastructure projects are designed to deliver services and associated benefits for 20 to 50 years…"* (analyzing the investments in Wastewater Treatment Plants). While financial benefits are calculated using a time-span tailored to each type of financial, Economic benefits and aggregation were calculated taking into consideration the longest timespan period of economic models (and farming models benefits are being considered only in a 20-year timespan in order to be aligned with financial estimates).

The following chart illustrates the EFA Roadmap where financial models are then converted into economic models and, together with water saving investments, aggregated to get total expected additional benefits of the project.

Table 4. EFA roadmap

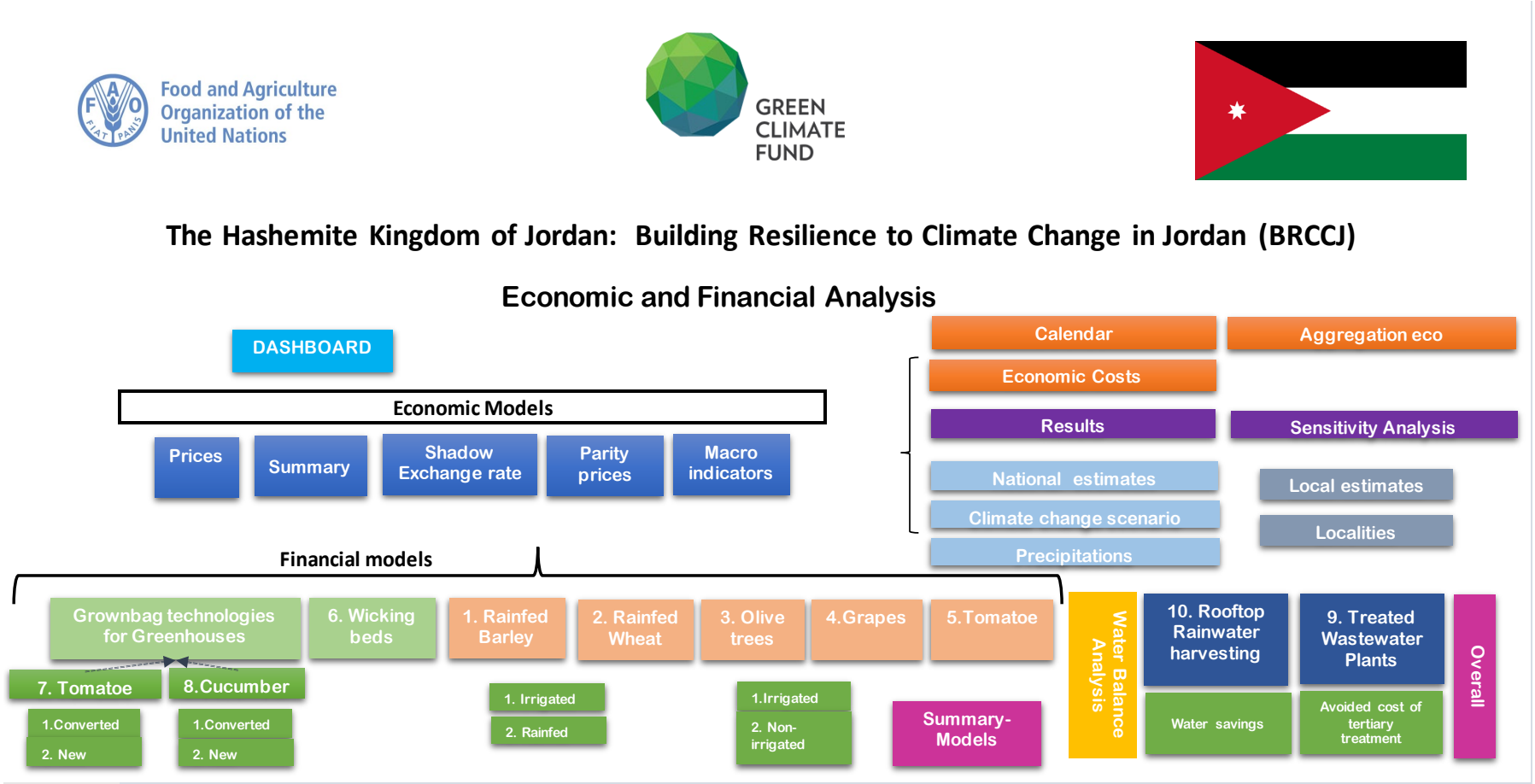
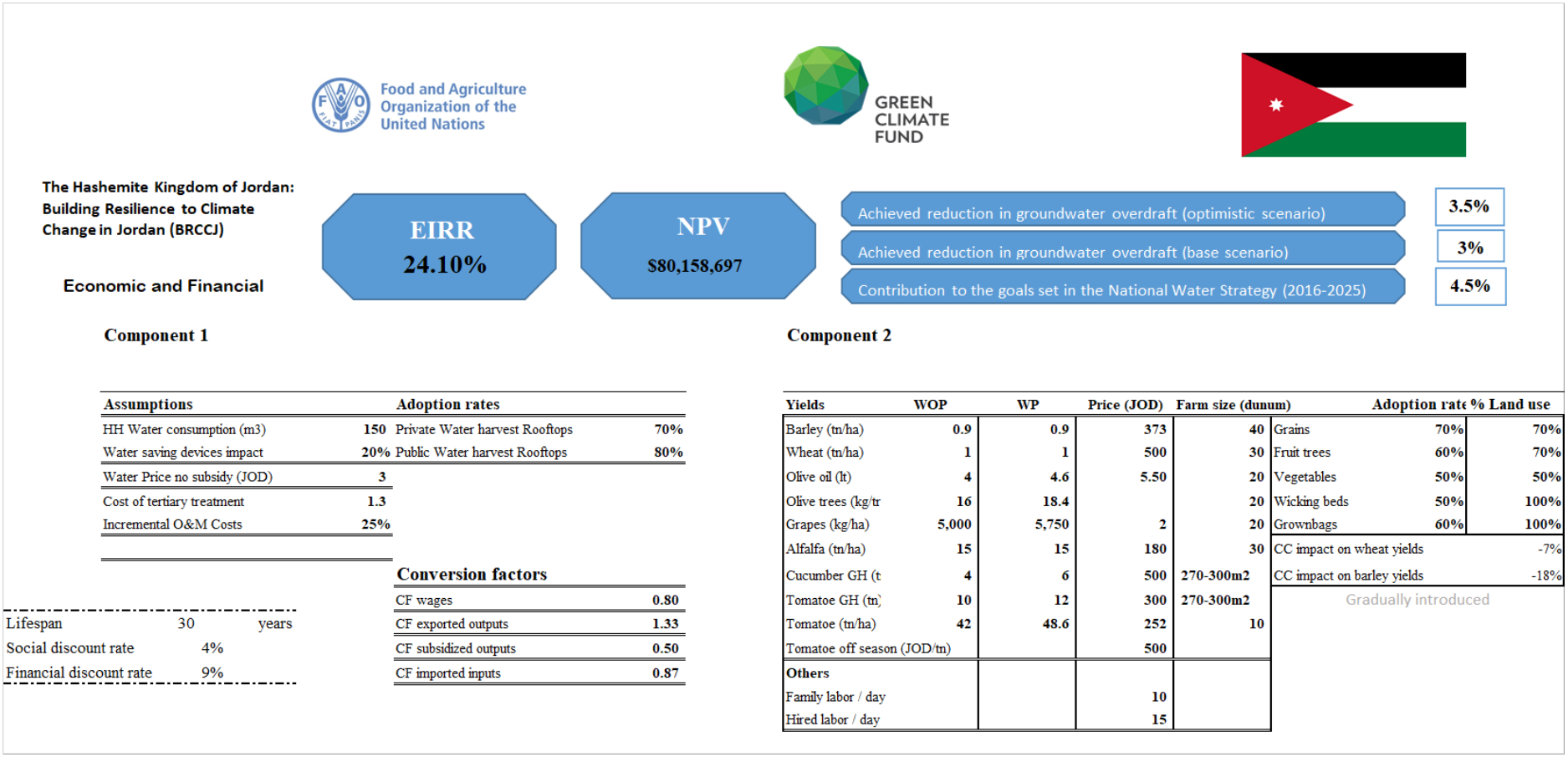


Table 5. EFA Main Results and Assumptions- Dashboard



Food and Agriculture Organization of the United Nations

GREEN CLIMATE FUND

The Hashemite Kingdom of Jordan: Building Resilience to Climate Change in Jordan (BRCCJ)

Economic and Financial

EIRR	NPV
24.10%	$80,158,697

Achieved reduction in groundwater overdraft (optimistic scenario)	3.5%
Achieved reduction in groundwater overdraft (base scenario)	3%
Contribution to the goals set in the National Water Strategy (2016-2025)	4.5%

Component 1

Assumptions		Adoption rates	
HH Water consumption (m3)	150	Private Water harvest Rooftops	70%
Water saving devices impact	20%	Public Water harvest Rooftops	80%
Water Price no subsidy (JOD)	3		
Cost of tertiary treatment	1.3		
Incremental O&M Costs	25%		

Lifespan	30	years
Social discount rate	4%	
Financial discount rate	9%	

Conversion factors	
CF wages	0.80
CF exported outputs	1.33
CF subsidized outputs	0.50
CF imported inputs	0.87

Component 2

Yields	WOP	WP	Price (JOD)	Farm size (dunum)
Barley (tn/ha)	0.9	0.9	373	40
Wheat (tn/ha)	1	1	500	30
Olive oil (lt)	4	4.6	5.50	20
Olive trees (kg/tr	16	18.4		20
Grapes (kg/ha)	5,000	5,750	2	20
Alfalfa (tn/ha)	15	15	180	30
Cucumber GH (t	4	6	500	270-300m2
Tomatoe GH (tn)	10	12	300	270-300m2
Tomatoe (tn/ha)	42	48.6	252	10
Tomatoe off season (JOD/tn)			500	
Others				
Family labor / day			10	
Hired labor / day			15	

Adoption rate	% Land use
Grains 70%	70%
Fruit trees 60%	70%
Vegetables 50%	50%
Wicking beds 50%	100%
Grownbags 60%	100%
CC impact on wheat yields	-7%
CC impact on barley yields	-18%
Gradually introduced	

The first part of the document summarizes the impact potential, sources of project´s benefits. Therefore, financial analysis will analyze assumptions and hypothesis of the proposed models and the corresponding expected benefits. In the end, economic analysis assumptions will be described and aggregated benefits (with externalities included) will determine the overall profitability and the sensibility of results in face of negative shocks affecting costs, prices and yields such as floods and draughts.

3.2 Impact potential, key activities and sources of benefits

The project will make vulnerable households who suffer from water scarcity and livelihood vulnerability more resilient in facing the negative impacts of climate change. In particular, the project will focus on women and help to empower them to deal with climate risks and leverage their role as agents of change. The project has the potential to achieve two of the most significant fund level impacts namely; (i) increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions; and (ii) increased resilience of health and well-being, and food and water security.

The project's specific outreach and fund level impacts are expected to include the following;

- 212.416 people-of which 47% will be direct and indirect women beneficiaries made aware of climate threats and related appropriate responses.
- In the project area, the project is expected to benefit about 10% of the target population in the selected Governorates in the Dead Sea Basin and 2.1% of Jordan's total population (PMF-A Core 1).
- 20.550 men and 9.220 women benefitting from the adoption of diversified, climate resilient livelihood options (PMF.A.1.2)
- 57.910 men and 28.212 women with year-round access to reliable and safe water supply despite climate shocks and stresses (PMF A 2.3)

The Fund Level Outcomes Expected from the project include the following;

- At least six discrete policy and regulatory measures introduced for the water and agriculture sectors which provide an incentive for climate resilience from which about 167.818 people (82.902 women) nation-wide are expected to benefit (PMF-A.5.1).
- Increased use of climate information in water and agriculture sectors (PMF-A.6.1).
- 30.000 household use climate smart mobile application or Information Communication Technology for Climate Adaptation (ICT4CA) (PMF-A..1)
- 94.943 men and 39.914 women from vulnerable households, communities, businesses and public-sector services use Fund-supported tools instruments, strategies and activities to respond to climate change and variability (PMF-A.7.1).
- 135.623 men and 57.020 women made aware of climate threats and related appropriate responses (PMF-A.8.1).
- At least 6 technologies introduced for climate adaptation of which 5 are useful for women. (PMF-ACrC1).

Other project level impacts are the following:

- 54.143 people will have enhanced water availability to address climate change risks (outcome 1) and 55.050 people with enhanced capacity to deal with climate change (outcome 2)
- At least 50.000 of the most vulnerable people will have increased resilience and enhanced livelihoods will have increased resilience and food security
- 6.000 farmers trained in climate resilient practices in the project area (output 2.1)
- At least 10.600 hectares of agricultural land will be strengthened with climate-adaptive measures in the project area.
- 30.000 farmers reached through e-extension with climate-smart solutions and weather forecast (output 2.2) and 15.000 people will be sensitized for climate adaptive measures (output 2.4)
- 194.258 people will be benefited from the mainstreaming in the institutional and regulatory systems of resilient tools and practices to adapt to water scarcity. This includes national and local policy, administrative, educational and social frameworks.

At least 400 climate wise-women trained as change agents for climate adaptation to involve in innovate adaptation practices and run their own businesses or being employed in the future (as (e-)extensionists or agricultural inputs and service providers among other possible business opportunities emerging from their involvement in FFS and their collaboration with private sector.

The current analysis builds-up on the impact potential of key activities and technologies to be scaled-up in the project area. The following table presents the EFA models prepared per activity, given the proven impact potential. The next table provides more detail on models and references used to build main hypothesis and assumptions.

Table 6. Summary of Key activities and climate change adaptation impacts

Level	Activity	Impact potential	Baseline	Impact	EFA models
Household level	Activities 1.1.1.3 1.1.1.5	Household massive adoption of water saving technologies	Low use of water saving technologies technologies at the household level Low investment in water harvest infrastructure at the household level	• Water deficit reduction (national and per governorate) • Reduction in Public Bill related to water subsidies • Reduction in household expenses / Increase in water consumption in households • Economic empowerment of women • Improved food security in home-gardens	10
Farm level	Activities 2.1.1.6 2.1.1.7	Farmer´s adoption of climate resilient practices and NARC proven technologies	Low understanding of climate change patters, impacts and adaptation measures Extended use of chemical fertilizers and/or pesticides/fungicides Over-water of crops, low knowledge of water saving techniques	• Better understanding of how temperature increase and uncertain rainfall patterns, affect the growing season and how to adjust cropping practices by shifting the crop planting and harvesting calendars • Use of draught-resistant seed varieties • Water saving technologies for Greenhouses (Grown-bags) • Tailored technologies to promote women economic empowerment and their involvement in agriculture such as Wicking beds techniques for Vegetable production. • Reduced use of chemical fertilizers and pesticides	1,2,3a,3b, 4, 5, 6, 7a, 7b, 8a, 8b
	Activity 1.1.2.1		Use of groundwater / purchases of water for agricultural irrigation	• Encourage use of reclaimed water for irrigation of fodder and limited crops.	9.1 9.2
Landscape level	Activities 1.1.3.1 1.1.3.2 1.1.3.3	Key investments in reduction of floods, maximizing ground water recharge, reduction in soil erosion	Low capacity to identify key investment areas to enhance resilience to extreme climate events Lack of understanding of suitable sites and lack of strategic planning	• Promote the use of landscape investment plans • Enhance capacity of planning at the level of the hydrological basin with benefits to the downstream areas	-

The following table presents the breakdown of expected direct beneficiaries per component per activity.

Table 7. Breakdown of project beneficiaries

Component 1	Units	People	Women
Roof-Top water harvesting public buildings	municipal staff and students	10.000	5.000
Roof-Top water harvesting at homes	citizens	43.175	21.328
Waste Water Treatment plants	farmers	968	
		54.143	**26.328**
Component 2			
FFS Climate -Smart	farmers	4.050	1.200
Persons reached through E extension	farmers	30.000	10.000
Farmer Field Days	farmers	6.000	1.800
Climate Wise Women	women		400
Persons sensitized to climate adaptive measures	people	15.000	10.500
		55.050	**23.900**
Component 3			
Policy in the agriculture sector	farmers	167.818	82.902
Climate Smart Agriculture in Universities	students	5.000	1.500
Climate Smart Agriculture in Vocational Institutes	students	14.000	4.200

Local Engagement and Dissemination	citizens	4.800	2.400
Engagement of Local administration	municipal staff	640	192
Engagement of private sector	private sector	1.000	100
Civil Society Organizations	CSO staff. CBOs and Community Members	1.000	500
		194.258	**91.794**
	Total	**303.451**	**142.023**
Reduced by 30% to compensate for double counting	Adjusted total	**212.416**	**99.416**

Table 8. Activities, EFA models, targets and sources of benefits

	Activity	*Intervention*	Model	Targets (# farmers)	Targets (ha)	Source of benefit	References
Component 1	**Activity 1.1.1.3 Construction of Rooftop rainwater harvesting system in public buildings**	Water harvest Rooftops Systems and saving devices in Public Buildings (per Governorate)	10. Water Harvest Rooftops in Public and Private Buildings per Governorate	400		a. Value of water harvested from the rooftop b. Value of saved water due to the introduction of water saving devices c. Value home-garden production / Avoided expenses on vegetables	Abdulla (2019) Double-checked with DPI water engineer specialists
	Activity 1.1.1.5 Construction of Rooftop rainwater harvesting system in households	Water harvest Rooftops Systems and saving devices in Private Buildings (per Governorate)		7850		a. Value of water harvested from the rooftop b. Value of saved water due to the introduction of water saving devices	
	Activity 1.1.2.1 Build storage and distribution infrastructure to maximize reuse of reclaimed water from existing WWT plants	Optimizing wastewater treatment plants to increase reuse of reclaimed water	9.1. WWTP Farm 9.2 Reclaimed water Plants	176	528	a. Avoided cost of tertiary treatment b. Increased production of irrigated Alfalfa c. Avoided contamination in the rivers (not monetized)	Kelpasaite (2016) Albert, J., et al (2013) Hunter (2019) Analyzed with DPI water engineer specialists Massimi (2017)
Component 2	**Activity 2.1.1.6 Conduct Climate Smart FFS**	Promotion of Growbag technologies in Greenhouses	7.1 Converted GH- tomatoes	428	12	a. Increased resilience / increased productivity b. Reduced use of pesticides/fertilizers c. Reduced use of water	NARC Regional offices field visits consultations-2020.
			7.2 New GH- tomatoes	285	8		
			8.1 Converted GH- cucumber	428	12		
			8.2 New GH- cucumber	285	8		
		Promotion of Wicking bed technologies for Women and youths	6. Wicking beds	525	-	a. Additional value of production	NARC: Directorate of Socio-Economic Studies: Al Hiary (2020) Document shared for the DPI/GCF mission
		Promotion of climate adaptation technologies for Fruit trees	3.1 Irrigated Olive trees	517	1033	a. Increased yields b. Improved water management c. Cost savings in inputs	Al Hiary et al (2019) MoA consultations[7]
			3.2 Non-irrigated Olive trees	706	1411		
			4. Irrigated grapes	38	76		
		Promotion of climate adaptation technologies for Vegetables	5. Tomatoes	840	840		Hamdan, H (2018). NARC. FFS Component Report REGEP/IFAD
	Activity 2.1.1.7 Field demonstration of tested climate-adaptive innovation and practices	Promotion of climate adaptive seed varieties for Grains	1. Rainfed Barley	975	3900	a. Increased resilience / Stabilization of production	Al Hiary et al (2018) Al Hiary (2015)
			2. Rainfed Wheat	975	2813		

[7] Studies and Development of Production Chains Directorate, Documents shared by Director Mahmoud Rabai, February-2020

3.3 Financial Analysis

Intro. Financial profitability was assessed using twelve financial models developed taking into account the cropping pattern relevant for the project area and based on crop distribution and average size of farms per Governorate in the Agricultural Census (DoS, 2017) double-checked with Studies on the farm-types and production prevailing in the area (FAO; 2015). The analysis relies both on water saving technologies and impacts in Component 1 and improvements in climate adaptation for family farming in Component 2. The selection of crops was confirmed after consultations with NARC and MoA national and regional representatives.

Agricultural sector. As 75% of the country presents less than 200mm rain annually and only 5% to 6% of the land considered arable, the agricultural potential is limited. Primary Agriculture in Jordan represents from 3 to 4% of the GDP and crop production represents 40% of the total agricultural share. Export of agricultural products represent 25% of total Jordan´s exports[8].

The four Governorates in the project area (Madaba, Ma´an, Tafilah and Karak) are located in the Dead sea basin. They represent 8% of the total population and register 107.707 agricultural holdings (21% of the country´s total) in 64.216 hectares (23% of the country´s total). Size of farms ranges from 1.6 ha per farmer in Madaba to 5.3 ha per farmer in Ma´an. Average size is 2.8 ha. 17% of the population considers agriculture as the main source of income.

Table 9. Land use per governorate and average size of farm[9]

Source:	Population	Agricultural Holdings (ha)	Av. Size farm (ha)	N° Agricultural holdings	Crop area (ha)	Livestock area (ha)	Livestock&Crop area (ha)	Ag. Main Source Income
Madaba	204,300	7,928	1.6	4,899	65,845	3,790	9,645	356
Ma´an	171,100	23,452	5.3	4,406	169,069	411	65,040	408
Tafilah	104,000	5,726	1.9	3,026	36,691	591	19,976	298
Karak	341,900	27,111	2.7	10,225	162,439	2,281	106,385	1,761
Subtotal	821,300	64,216	2.8	22,556	434,044	7,073	201,046	2,823
Country	10,309,000	281,860	2.6	107,707	2,204,111	61,705	552,781	16,477
%	8%	23%		21%	20%	11%	36%	17%

Source: Agricultural Census 2017 Tables 1.1, 1.2, 2.16 and 2.17 (DoS; 2017)

Selection of Crops. Field crops represent 70% of total Land use in the four Governorates, followed by Fruit trees (19%) and vegetables (11%). Almost 68.4% of fruit trees area is irrigated. Crops selection was made taking into consideration the economic competitiveness[10] of related agri-food value chains (based on high-yield revenue crops and high crop water productivity) and the availability and scalability of climate-adaptive technologies for the main existing crops in the region. The distribution of models was made given their importance in the total area and production per governorate. Wheat and Barley were selected for the open field crops, Olive trees (irrigated and non-irrigated) and grapes for fruit trees, and tomatoes for vegetable production. Finally, Tomato and Cucumber were selected for the Greenhouses. The following table present the share of those crops per Governorate based on the Agricultural Census (DoS; 2017) and MoA official data:

[8] Leeters et al (2016). Export Value Chain Analysis Fruit and Vegetables Jordan. Netherlands Enterprise Agency.
[9] www.dos.gov.jo/dos_home_e/main/agriculture/census/
[10] FAO (2015) Water along the food chain in Jordan. FAO Investment Centre. FAO/EBRD Cooperation.

Table 10. Key crops area per governorate (I)[11]

Governorate	Share of Wheat and Barley / Total Field Crops			Share of Olives and grapes / Fruit trees			Share of Tomato and Cucumber / Vegetables		
	Area	Production (tn)	Av. Yield (tn/ha)	Area	Production	Av. Yield (trees/ha)	Area	Production	Av. Yield (tn/ha)
Madaba	99%	73%	0.9	94%	85%	176	46%	71%	45
Karak	97%	67%	0.81	90%	64%	186	60%	62%	37
Ma´an	95%	20%[12]	1	57%	8%[13]	277	57%	53%	43
Tafilah	100%	100%	0.9	94%	91%	151	60%	65%	44

Source: Agricultural Census 2017 Tables 6.1, 6.4, 6.5 (DoS; 2017)

Table 11. Key crops area per governorate (II)[14]

	Barley (ha)		Wheat (ha)		Olive trees				Grapes	Dunum
Governorate	Irrigated	Non-I	Irrigated	Non-I	Irrigated area	Non-I area	Irrigated trees	Non-I trees	Irrigated	Non-I
Madaba	41	1,837	98	1,327	322	1,796	44,533	328,334	125	587
Ma´an	184	4,506	535	2,165	1,172	48	329,484	9,460	438	2
Tafilah	125	1,552	32	248	304	471	57,779	58,974	239	442
Karak	563	14,188	9	2,847	795	1,471	159,659	261,980	885	192
Subtotal	913	22,083	674	6,587	2,592	3,786	591,455	658,748	1,687	1,223
Country	2,086	54,372	1,640	10,551	21,382	34,832	5,466,894	5,067,468	23,084	5,855
%	44%	41%	41%	62%	12%	11%	11%	13%	7%	21%

Source: Agricultural Census 2017 Tables 6.1, 6.4, 6.5 (DoS; 2017)

EFA Models. EFA models also considered the need of a rational allocation of water resources for agricultural production and increasing pressure on groundwater resources. Consequently, the expected solutions (with-without) were driven by the impact on crop water values (promoting cropping with greater returns per unit of water used and transforming agriculture with high water demand and low value). Several studies analyzed this issue[15] with recommendations on reducing water allocation in open field crops or tree crops with low water value rates. Besides, prices are highly subsidized for those crops. At the same time, they suggest that water-efforts should be focused on allocating water for vegetables production (mainly off-season / winter months, when water values are higher).

Out of the twelve models developed, four of them represent a new technology to be introduced in the Greenhouses (new/converted and tomato /cucumber). Three of them are related to fruit trees (Olive trees-irrigated and non-irrigated and irrigated grapes) and tomatoes are considered for vegetable production. One model of a micro-basket container of mixed vegetables is developed for the wicking bed technology (specially for women) and one additional model was developed for the reclaimed water farmers that turns their rainfed barley farms with irrigated alfalfa (with reclaimed water). Only two models represent wheat and barley production (highly predominant within the farmers) aiming to reduce the water stressors and not necessarily increasing yields.

Concerning wastewater use for farming, reclaimed water can be only used for Category C crops in accordance with Jordanian standards. Category C crops include field crops, industrial crops and forest trees. No fruit trees will be grown because the effluent does not meet the standard for category B crops. The Ministry of Agriculture, Ministry of Health and MWI conduct random inspections at the wastewater treatment plants to check this. The selected crop for modelling (Alfalfa) is based on consultations during field visits. Farmers insights on profitability and returns were verified comparing a model of rainfed barley with wastewater irrigated alfalfa (as it is the most profitable option allowed among crops in Category C). Market opportunities can be found in selling alfalfa for livestock farmers.

[11] www.dos.gov.jo/dos_home_e/main/agriculture/census/
[12] A cluster of 300ha of Clover, trifoliate explains 76% of total production
[13] A cluster of 500 ha of apples (big-scale farms) explains 71% of total fruit trees production
[14] www.dos.gov.jo/dos_home_e/main/agriculture/census/
[15] Mourad et al (2010) and USAID (2010)

Climate risks and models. The project proposal in models expect to address the following climate change impacts identified on the agricultural sector:

Table 12. Climate risks and selected Crops in the EFA

Crops	Current risk	Level of risk	Consequence	Baseline/Quantified impact
Wheat and Barley	Increase in temperatures and decrease in rainfall patterns	High	Reduction in time available for assimilation of dry matter and lower water availability	decrease in yield varying from 7% to 21% for wheat and from 18% to 35% for barley due to shorter duration of crop growth [16]
Olive production		Medium	Reduction in oil quality	from 5% to 10% with high evidence on the oil quality reduction
Vegetables		Medium	Decrease in yields	by 5 and 10%, respectively [17]
Orchards		High	Less flower bud induction, higher fruit drop, faster volume growth of fruit, earlier maturation, less total soluble solids and fruit reaches insipid and dry states earlier	-

The following quantitative benefits can be summarized:

- 1.425 farmers benefiting with a 30% increase in return to family labor due to the implementation of water saving and climate-adaptive technologies (improving yields and reducing the use of water and fertilizers);
- 525 women being reached to generate at least USD 130 additional value per year through the use of the new wicking beds technologies to produce herbs and vegetable beds in small- irrigated containers;
- 1260 farmers being trained to apply improved water management and climate adaptive techniques on 2520 hectares of fruits trees with between 22% to 63% additional profit margins per hectare; and
- 1950 farmers trained to apply improved water management and climate adaptive techniques on 6713 hectares of land funder fruits trees that reports between 7% to 16% additional margins per hectare.

Over 90% of farmers sell directly to a wholesaler which is concentrated in Amman and seven municipality wholesale markets (Leeters; 2016). There are no restrictions of minimum quantity to be purchased so they are accessible also to final consumers. All the products selected under the current analysis present well-established traders and mechanisms. This partially mitigates market risks for the products that will be promoted.

Other assumptions. Financial prices were considered in the analysis. It includes government subsidies for Wheat and Barley and Water prices. Other assumptions concerning the financial analysis include the financial discount rate at 9% based on the average financial interest rates of the Central Bank of Jordan on Loans and Advances. Financial costs were also included in models. Yields were double-checked with national and regional averages (FAOSTAT and MoA data).

[16] Al- Bakri J.T. et al (2010), FAO (2020) and MoE (2019).
[17] FAO, 2012. Assessment of the risks from climate change and water scarcity on food productivity in Jordan.

Table 13. Technical specifications of crops and assumptions without and with project

Model	Main Assumptions	Project support	Baseline	With project
1.Rainfed Barley. 2.Ranfed Wheat	Av. Size of farm: 3 ha (wheat) and 4 ha (barley) Land use: 70% Outputs: Barley and Hay (1) and Wheat and Hay (2)	Technical assistance with field days and trainings	-Reduction in yields in the mid-term (18% for Barley and 7% for wheat) -Low knowledge of cost saving techniques and practices. -High rate of expected losses due to climate stress.	More stable production, evolutionary Plant Breeding allows to introduce drought-resistant seed varieties, contributing to counter the expected reduction in yields due to climate change and increasing the efficiency in the use of fertilizers in the mid-term. Conservative estimate (no increase in yields per hectare)
6. Wicking beds (micro vegetable containers)	Micro beds with 0.15 m3 per year of water requirement/ for 2 Seasons Outputs: tomato, eggplant, lettuce, mint, corn, watermelon, melon.	Promotion of Wicking bed technologies for Women and youths in FFS (Containers, pipes, elbows, fibers and mulch)	Opportunity cost of time / Other farming activities	New income generating activity with less water consumption and reduced evaporation. Rather than having to irrigate by watering from above (via drip irrigation, a hose, watering can etc.), the water literally *wicks* up into the soil from below, via a process called capillary action keeping it nice and moist[18] (50% less water than traditional irrigation). Low requirement of maintenance; the problems of the undesired herbs are less because the surface of the soil is drier. It provides a source of organic and healthy food-basket at home and several crops can be planted together
7.1/7.2 and 8.1/8.2 New/Converted Greenhouses with Grow-bag technologies	Size: 270-300m2. Water requirement per year: 360m3. Land use: 100% Seasons: 2 (tomato) and 4 (cucumber) Full development in year 4 5% post-harvest Losses[19]	Promotion of Growbag technologies to convert / introduce Greenhouses (Iron GH bodies, Pumps, ventilation, tanks, pipes)	Traditional Greenhouse with higher water consumption and extended use of fertilizers and pesticides Opportunity cost of time / Other farming activities	Ventilation reduce impact of frosts. Major impacts in reducing water consumption (90%) and fertilizers and pesticides used (50%)[20] . Yield increase at 20% (from 4 to 6 tn/ha for cucumber and 10 to 12 tn/ha in tomato)
3.1/3.2/4/5 Olive trees irrigated (3.1) and non-irrigated (3.2), Grapes (4) and Tomato (5)	Size: 2 ha (fruit trees) 1ha (tomato) Land use: 70% (fruit trees), 50% (tomato) Outputs: olive oil, grapes and tomato	Promoting FFS and e-extension to implement climate adaptation measures and practices	Conventional techniques, high dependence on external inputs and weak management of water consumption.	Improved techniques and inputs, promoting cost savings between 10% and 30% and 15% increase in yields[21]. (from 5 to 5.75 tn/ha in grapes 4 to 4.6 tn/ha in olives (irrigated) and 16 to 18 kg/tree (non-irrigated).
9.1 Irrigated alfalfa	Size: 3 ha. Land value analysis is not included Outputs: rainfed Barley to irrigated Alfalfa	Training and improved access to finance for ice-cost reduction and increase in value -addition	Climate change impacts negatively affect yields for rainfed fodder. Farmers already have ponds and in-farm infrastructure to receive reclaimed water.	No need of fertilizers with reclaimed water use. Salinization causes a 2% loss in production each year. Groundwater contamination through excess nutrients and heavy metals cancels out effect of avoided downstream contamination-15tn/ha of alfalfa

[18] NARC working paper; 2020.

[19] NARC Tafilah, Extension Staff consultations.

[20] NARC Tafilah Extension Staff, Field tests, DPI Mission- February 2020

[21] Al Hiary (2019), REGEP FFS Report (2018) and MoA assessment and field consultations

Financial Results. Profitability results can be found in the table below. Overall, all models show positive Net Present Values (NPV) and Financial Internal Rate of Return (FIRR) ranging from 17.5% to 63.9% and net present values (NPV) that vary from JOD 179 to JOD 14,668 (USD 252 to USD 20.659). Consequently, all models are considered profitable, Additionally, expected increases in returns to family labour range from 19% to 317%.

Table 14. Financial Profitability indicators per model

Item	FIRR %	NPV JOD	(%) incremental Returns to Family Labour
Rainfed Barley	17.5%	205	162%
Rainfed Wheat	18.7%	212	85%
Olive trees irrigated	n/a	4,594	317%
Olive trees non-I	n/a	3,139	35%
Grapes irrigated	n/a	10,346	25%
Tomatoes	n/a	12,945	26%
Wicking beds	21.9%	179	61%
Grow-bag GH Tomatoes converted	48.0%	11,666	19%
Grow-bag GH Tomatoes (new)	30.3%	6,807	46%
Grow-bag GH Cucumber converted	63.9%	14,668	37%
Grow-bag GH Cucumber (new)	36.4%	7,558	45%
Alfalfa	n/a	3,844	243%

Table 15. Financial Results per model

Item	Unit	Models											
		Rainfed Barley	Rainfed Wheat	Olive trees irrigated	Olive trees non-I	Grapes irrigated	Tomatoes	Wicking beds	Grownbag GH Tomatoes conv	Grownbag GH Tomatoes new	Grownbag GH Cucumber conv	Grownbag GH Cucumber new	Alfalfa
Without Project													
Costs	JOD												
Sales	JOD	282	419	3,563	2,614	7,929	7,850		4,917		7,085		282
Margins	JOD	351	600	3,850	2,944	10,000	10,651		5,700		7,600		345
With Project	JOD	***69***	***182***	***287***	***330***	***2,071***	***2,801***	***-***	***783***	***-***	***515***	***-***	***63***
Costs	JOD												
Sales	JOD	274	390	3,573	2,621	8,127	7,850	6	8,449	7,589	9,896	7,664	1,595
Margins	JOD	393	600	3,985	3,025	11,500	12,249	97	11,400	11,400	11,400	11,400	2,700
%		***119***	***210***	***411***	***404***	***3,373***	***4,399***	***92***	***2,952***	***3,812***	***1,504***	***3,736***	***1,105***
FIRR	%	72	16	43	22	63	57	n/a	277	n/a	192	n/a	1,655
NPV	JOD	17.5%	18.7%	n/a	n/a	n/a	n/a	21.9%	48%	30%	64%	36%	n/a
% Increase in Return on family labor	N°	205	212	4,594	3,139	10,346	12,945	179	11,666	6,807	14,668	7,558	4,004

Impacts on household incomes. Baseline annual income of the targeted HHs is presented in the following table per Governorate:

Table 16. Average total income by source per HH per year per Governorate (JOD)

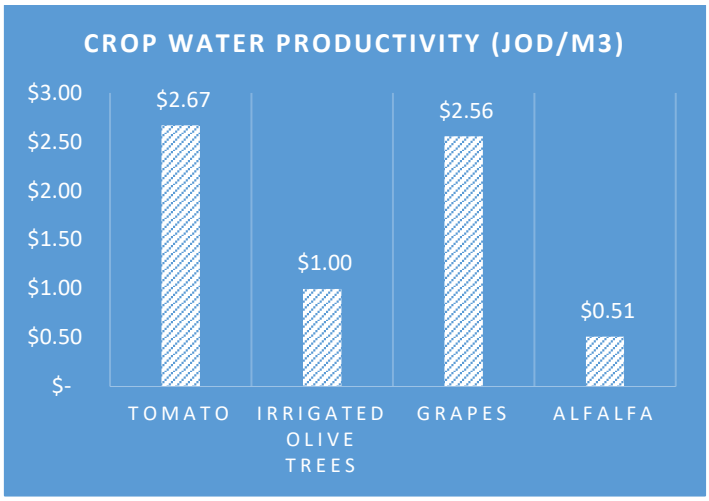
Governorate and Urban\ Rural	Source of Income					
	Average Total Income	Transactions Incomes	Property Incomes	Rentals Incomes	Incomes from Own Private	Income from Employment
Madaba	10413.9	3710.1	6.0	1558.3	736.0	4403.4
Karak	11755.3	4877.3	9.8	1230.1	785.7	4828.1
Tafiela	10133.2	3414.6	36.7	1245.4	514.8	4921.7
Ma'an	9575.9	3374.8	50.9	1299.8	515.1	4334.5
Urban\ Rural						
Urban	11406.1	3817.5	104.1	1936.9	1020.0	4525.9
Rural	9951.5	3780.4	15.9	1268.8	668.2	4211.8
Kingdom	11241.9	3813.3	94.1	1861.5	980.3	4490.5

Source: Amer (2020) and Department of Statistics\ Household Expenditures & Income Survey (2017)

However, focus will be made on poor and vulnerable households. Household incomes poverty line is estimated at JD 800 per person per year maximum and JD 67 per month (and the av. size of HH is 5.5-5.67). This gives a poverty line below 5000 in all cases. Expected increases in HH incomes are estimated between 15% for the average total incomes and 35% on average for the vulnerable HH.

Crop water productivity measures. The following graphic presents the project´s estimates of Crop Water Productivity (CWP) measures as defined by Van der Berg (2016).

Table 17. Crop water productivity measures



Source: Own elaboration based on EFA models and double-checked with Haddadin (2010) parameters for m3 required per crop

3.4 Economic Analysis

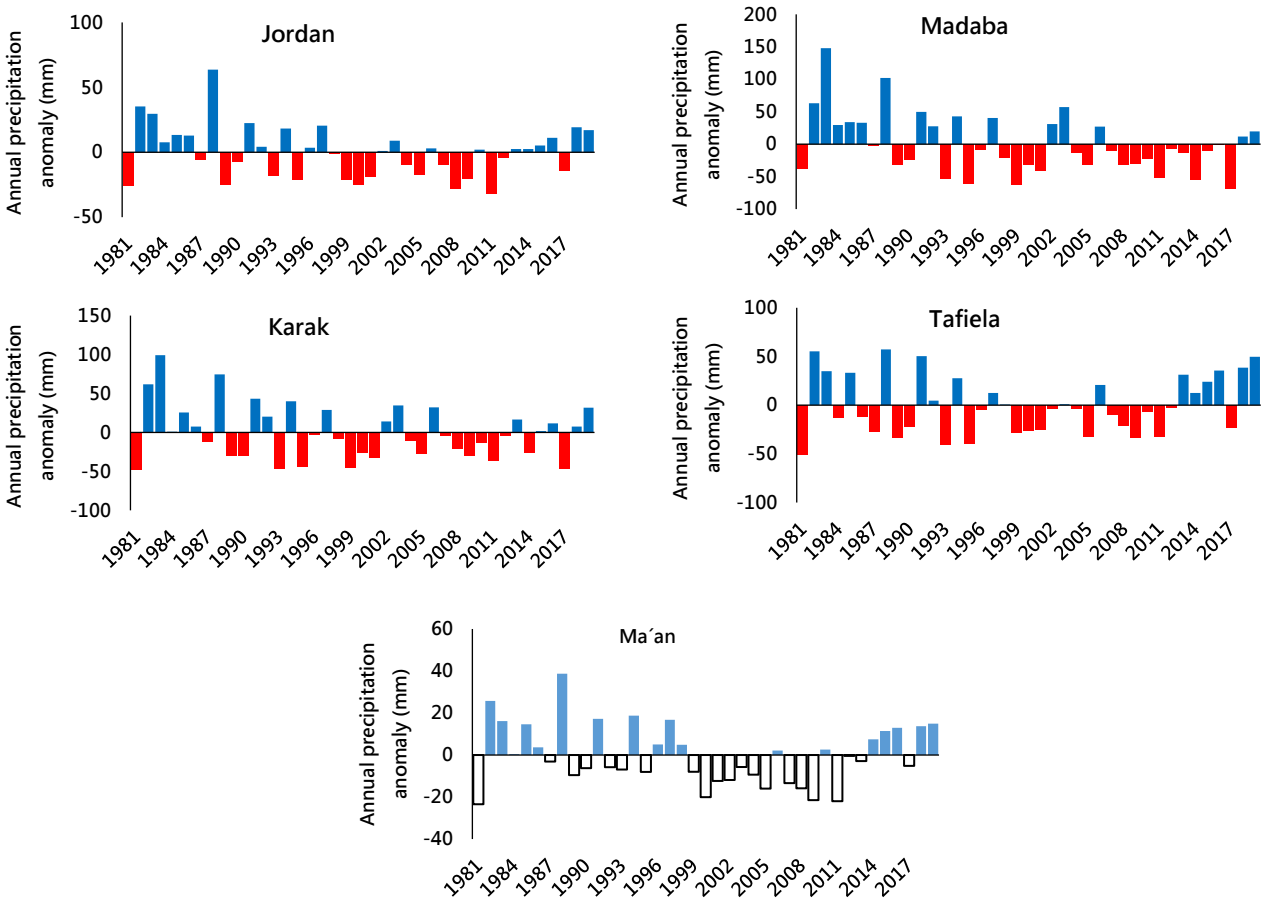
Intro. The economic analysis aggregates the farm models using economic prices and adding other source of benefits due to the water savings for Component 1 activities. The following section describes the assumptions for Component 1 models and the aggregation, to get the economic profitability results.

Economic Benefits in Component 1.

Three additional flow of economic benefits taken from key activities in Component 1 are incorporated to the financial model´s aggregation from Component 2 interventions. The project will carry out the installation of rooftop rainwater harvesting structures and water saving devices for households and public buildings. This activity will build climate resilience through improved access to water and efficient water use at the household level and in selected public buildings such as schools, mosques, municipalities for wider dissemination and awareness of the technology at the local community level. It is expected that 400 public buildings and 7,850 households will be fitted with the roof top water harvesting structures. The households which benefit from the investment will be expected to contribute part of the costs based on criteria that favours women-headed households, refugee and poor households, those reliant solely on agriculture, hhs with a person with disability and more than six dependents. Women will be consulted on designing water outlets as the primary users of domestic water.

Economic benefits are obtained from valuating water savings estimates considering a) official rainfall estimates[22] and b) different tank and rooftop sizes per Governorate. The following assumptions were considered:

Graphic 1. Rainfall historical ranges (Earthmap)



[22] Earthmap

Table 18. Runoff estimates, roof areas and rainfall harvested per governorate (Source: Abdulla; 2019 and Earthmap)

Madaba		**Karak**		**Tafielah**		**Maan**	
Rainfall [mm]	**Runoff [m]**	**Rainfall [mm]**	**Runoff [m]**	**Rainfall [mm]**	**Runoff [m]**	**Rainfall [mm]**	**Runoff [m]**
218.90	0.18	183.2	0.1	162.4	0.1	84.0	0.1
320.3		349		242		43	
Roof Areas	Rainfall harvested [m3]	Roof Areas	Rainfall harvested [m3]	Roof Areas	Rainfall harvested [m3]	Roof Areas	Rainfall harvested [m3]
25	4.38	25	3.7	25	3.2	25	1.7
50	8.76	50	7.3	50	6.5	50	3.4
75	13.13	75	11.0	75	9.7	75	5.0
100	17.51	100	14.7	100	13.0	100	6.7
150	26.27	150	22.0	150	19.5	150	10.1
175	30.65	175	25.7	175	22.7	175	11.8
200	35.02	200	29.3	200	26.0	200	13.4
225	39.40	225	33.0	225	29.2	225	15.1
250	43.78	250	36.6	250	32.5	250	16.8
275	48.16	275	40.3	275	35.7	275	18.5
300	52.53	300	44.0	300	39.0	300	20.1
325	56.91	325	47.6	325	42.2	325	21.8
350	61.29	350	51.3	350	45.5	350	23.5
375	65.67	375	55.0	375	48.7	375	25.2
400	70.05	400	58.6	400	52.0	400	26.9
425	74.42	425	62.3	425	55.2	425	28.5
450	78.80	450	66.0	450	58.5	450	30.2
475	83.18	475	69.6	475	61.7	475	31.9
500	87.56	500	73.3	500	65.0	500	**33.6**

Under this basis, water saving estimates are the following:

Table 19. Tank sizes and potential water savings per system (household and public buildings) per Governorate (Source: Abdulla; 2019 and Earthmap)

Tank size and potential saving per Roof Area		***Madaba***	***Karak***	***Tafilah***	***Maan***	
Private	**Tank size for a Rooftop of 100m2**	**15**	**15**	**10**	**5**	**60%**
	Potential saving (m3)	32	34	25	22	
	Tank size for a Rooftop of 200m2	**30**	**30**	**25**	**10**	**40%**
	Potential saving (m3)	45	47	36	30	
Public	**Tank size for a Rooftop of 500m2**	**88**	**73**	**65**	**34**	
	Potential saving (m3)	**130**	**137**	**102**	**86**	

Two sizes of Rooftop were considered for the household rainwater harvest systems and the distribution is 60% for the lower tank size and 40% for the higher tank size. Implementation of water saving devices contribute with an additional water saving of 20% of the Household average consumption per year (estimated at 150m3).

All systems were considerably profitable given the economic price of water at 3 JOD/m3[23]. The following results were obtained per system:

Table 20. Profitability results per system per Governorate

Ma´an	NVP @4%	$3,625
	EIRR	78.5%
	Ratio B/C	8.54
	NVPVc	$481
	NPVb	$4,105
	breakeven benefits	-88%
	breakeven costs	754%
	NVP @4%	$3,776
	EIRR	34.0%
	Ratio B/C	4.93
	NVPVc	$962
	NPVb	$4,737
	breakeven benefits	-80%
	breakeven costs	393%
	NVP @4%	$4,207
	FIRR	15.5%
	Ratio B/C	2.63
	NVPVc	$2,583
	NPVb	$6,790
	breakeven benefits	-62%
	breakeven costs	163%

Karak	NVP @4%	$4,700
	EIRR	29.6%
	Ratio B/C	4.43
	NVPVc	$1,370
	NPVb	$6,070
	breakeven benefits	-77%
	breakeven costs	343%
	NVP @4%	$4,789
	EIRR	18.8%
	Ratio B/C	3.08
	NVPVc	$2,308
	NPVb	$7,096
	breakeven benefits	-67%
	breakeven costs	208%
	NVP @4%	$2,912
	EIRR	6.8%
	Ratio B/C	1.37
	NVPVc	$7,904
	NPVb	$10,816
	breakeven benefits	-27%
	breakeven costs	37%

Tafilah	NVP @4%	$3,905
	EIRR	34.2%
	Ratio B/C	5.06
	NVPVc	$962
	NPVb	$4,867
	breakeven benefits	-80%
	breakeven costs	406%
	NVP @4%	$4,156
	EIRR	19.4%
	Ratio B/C	3.16
	NVPVc	$1,923
	NPVb	$6,079
	breakeven benefits	-68%
	breakeven costs	216%
	NVP @4%	$2,168
	EIRR	6.8%
	Ratio B/C	1.37
	NVPVc	$5,885
	NPVb	$8,053
	breakeven benefits	-27%
	breakeven costs	37%

Madaba	NVP @4%	$4,542
	EIRR	28.6%
	Ratio B/C	4.31
	NVPVc	$1,370
	NPVb	$5,912
	breakeven benefits	-77%
	breakeven costs	331%
	NVP @4%	$4,631
	EIRR	18.3%
	Ratio B/C	3.01
	NVPVc	$2,308
	NPVb	$6,939
	breakeven benefits	-67%
	breakeven costs	201%
	NVP @4%	$5,212
	EIRR	11.4%
	Ratio B/C	2.03
	NVPVc	$5,051
	NPVb	$10,264
	breakeven benefits	-51%
	breakeven costs	103%

[23] Abdulla (2019).

Table 21. Expected expected incremental econmic benefits per Governorate for C1- Activities 1.1.1.4/5

																				Madaba																
Roof area m2	Tank Size																																			
	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
HH Rooftops 100m2 (60%)	Inflows	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.8
	Water harvest	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.4
	Value of prod	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5
	Water saved	126.9	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	126.9
	Outflows	1425																																	
	Cashflow	-1108.24	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.76	316.8
	30																																		
HH Rooftops 200m2 (40%)	Inflows	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.8
	Water harvest	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.35	190.4
	Value of prod	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5
	Water saved	126.9	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	126.9
	Outflows	2400																																	
	Cashflow	-2028.25	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.75	371.8
	88																																		
Public Buildings	Inflows	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9
	Water harvest	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9
	Outflows	5253.4964																																	
	Cashflow	-4703.596	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9	549.9
																				Karak																
Roof area m2	Tank Size																																			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
HH Rooftops 100m2 (60%)	Inflows	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.2
	Water harvest	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.82	143.8
	Value of prod	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5
	Water saved	126.9	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	126.9
	Outflows	1425																																	
	Cashflow	-1099.78	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.22	325.2
	0																																		
HH Rooftops 200m2 (40%)	Inflows	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.2
	Water harvest	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.8
	Value of prod	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5	54.5
	Water saved	126.9	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	126.9
	Outflows	2400																																	
	Cashflow	-2019.79	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.21	380.2
Public Buildings	Inflows	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.5
	Water harvest	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.5
	Outflows	8220																																	
	Cashflow	-7640.49	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.51	579.5
																				Tafilah																
Roof area m2	Tank Size																																			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
HH Rooftops 100m2 (60%)	Inflows	232.65	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.3
	Water harvest	105.75	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.36	135.4
	Water saved	126.9	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	126.9
	Outflows	1000																																		
	Cashflow	-767.35	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.26	262.3
	0																																			
HH Rooftops 200m2 (40%)	Inflows	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.7
	Water harvest	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.81	198.8
	Water saved	126.9	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	126.9
	Outflows	2000																																		
	Cashflow	-1674.29	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.71	325.7
	0																																			
Public Buildings	Inflows	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.5
	Water harvest	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.5
	Outflows	6120																																		
	Cashflow	-5688.54	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.46	431.5
																				Maan																
Roof area m2	Tank Size																																			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
HH Rooftops 100m2 (60%)	Inflows	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	220
	Water harvest	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06	93.06
	Water saved	126.9	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	126.9
	Outflows	500																																		
	Cashflow	-280.04	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	219.96	220
	0																																			
HH Rooftops 200m2 (40%)	Inflows	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8
	Water harvest	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9	126.9
	Water saved	126.9	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	126.9
	Outflows	1000																																		
	Cashflow	-746.2	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8	253.8
	150 mm																																			
Public Buildings	Inflows	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.8
	Water harvest	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.8
	Outflows	2686.6341																																		
	Cashflow	-2322.854	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.78	363.8

The distribution between Governorates was selected under the basis of the total population per Governorate for Households and the total number of Schools for Public Buildings. The calendar is the following. Additional benefits are calculated aggregating the economic incremental benefits per system and considering adoption rates at 70% for private buildings and 80% for public buildings under a lifespan of 30 years, with a economic discount rate at 4%[24].

Table 22. Calendar for Private and Public Water Harvest Systems

	1	2	3	4	5	6	7	Total
Private WH-Rooftops								
Madaba		73	269	466	516	639	0	1963
Karak		117	431	745	825	1022	0	3140
Tafilah		44	162	279	309	383	0	1178
Ma´an		59	216	373	413	511	0	1570
Total		293	1078	1863	2063	2555	0	7850
Public WH-Rooftops								
Madaba		16	24	32	8	0	0	80
Karak		32	48	64	16	0	0	160
Tafilah		11	16	21	5	0	0	53
Ma´an		21	32	43	11	0	0	107
Total		80	120	160	40	0	0	400

Wastewater Treatment Plants. The second group of activities in Component 1 (linked to Output 1.2) comprises regulation, storage and distribution of hydraulic structures to be built to maximize use of reclaimed water from the Wastewater Treatment Plants in Madaba, Karak, and Tafilah. This will enhance climate resilience at the farm level by providing additional water to grow crops in accordance with Jordan's Water Substitution and Reuse Policy (2016) and will reduce the impacts of wastewater treatment effluents on the ecosystem. MWI has certified its commitment to undertake the operation and maintenance of the storage and distribution infrastructure that will be built to maximize the use of the reclaimed water. The project will assist the MWI and the MoA in establishing / strengthening WUAs among farmers that are or will be connected to reclaimed water sources. WUAs will be supported in establishing key administrative task as well as clear O&M plans and costing among users. The project will also support WUAs in ensuring transparency and rational water sharing rights among farmers and in establishing rules and applications forms to allow possible enlargements of the network to additional subscribers.

[24] Considering the average rate between the Jordan´s 10yr bond yields (at 5.5%) and the current official interest rate referred by the Central Bank of Jordan (2.5%)

Economic benefits were calculated considering the following sources: a) Avoided cost of tertiary treatment of reclaimed water (based on methodology and calculations for the As Samra Wastewater Treatment Plant Feasibility Study and other sources[25]), b) additional value of production per Plant.

WWTP	Design capacity (m^3/d)	Type of treatment	Effluent [m3/day]	Storage (m3)	Assumption	Construction Costs (JOD)	O&M per year (JOD)
Al Tafila	7,500.00	Trickling filters	3083.62	90,000	30 days of effluent go unutilized in the winter and can be stored	$520,035	$159,688
Al Karak	1,600.00	Trickling filters	780.525	25000	30 days of effluent go unutilized in the winter and can be stored	$391,950	$27,375
Madaba	7,600.00	Activated sludge	2189	30000	Size determined by land available on site	$369,362	$36,500

Cost of tertiary treatment was considered 30% more expensive than the cost of wastewater treatment (0.25 USD/m3). This was aggregated considering the additional amount of water provided. Investment costs were assessed by water engineer specialists and Incremental Operation and Maintenance costs were considered at 25% of total O&M costs. O&M costs vary widely depending on treatment system used. For example, for As-Samra, Kelpasaite (2016) reports recurring costs of 0.08 JD/m3, while ACWUA gives a range between 0.03 to 0.68 JD/m3, with an average of about 0.2 JD/m3 (ACWUA, 2011). For this study, we use an average cost of 0.25 JD/m3, which was given during our field visit to the Madaba WWT Plant.

Three wastewater treatment plants are considered to upgrade the storage and distribution capacity:

Table 23. Wastewater Treatment Plants

Additional value of production is estimated under the basis of the aggregation of additional farms expected to take profit of new access to reclaimed water for irrigation. One farming model was developed under the basis of a Madaba WWT Plant field visits were farmers having access to reclaimed water changed the cropping pattern from rainfed Barley to irrigated Alfalfa (Model 9.1).

Given the potential number of farmers to be reached with the current investments and the amount of water stored, the following profitability results were obtained per WWT Plant (and then aggregated).

[25] Kelpasaite (2016), Albert et al (2013) and Hunter et al (2019)

Table 24. Profitability results per WWT Plant

Tafilah WWTP	
Discount rate	4%
NVP @4%	$91,166
EIRR	6.1%
Ratio B/C	1.09

Madaba WWTP	
Discount rate	4%
NVP @4%	$1,408,560
EIRR	20.5%
Ratio B/C	1.43

Karak WWTP	
Discount rate	4%
NVP @4%	$725,541
EIRR	14.6%
Ratio B/C	1.85

Summary. Under Component 1: Climate Resilient Water Systems, the following quantitative benefits can be pointed out:

Output 1: a) 7850 private households saving USD 127 per year (30 m3 saved per HH) after implementing water saving devices and gadgets for home-consumption; b) 7,850 private households saving between USD 93 and USD 200 on purchasing water tankers in the absence of harvested rainwater (between 22 m3 and 47m3 saved per HH), depending on the rooftop area, tank size and rainfall levels; and c) 400 Public buildings saving between USD 363 and USD 585 of expenditure on purchased water in the absence of the harvested rainwater (between 87 m3 and 137 m3 saved).

Output 2: a) 176 farmers generating around USD 620 per year of incremental income after benefiting from additional reclaimed water for agricultural production; and b) USD 210,000 saved per year due to the avoided cost of tertiary treatment of additional water storage in 3 Water Treatment Plants

Table 25. Profitability indicators for Component 1 interventions

	Model	EIRR	NPV (USD)	B/C Ratio
C1.1.1	**Madaba**			
	HH Rooftops 100m2 (60%)	28.6%	4,542	4.3
	HH Rooftops 200m2 (40%)	18.3%	4,631	3.0
	Public Buildings	11.4%	5,212	2.0
	Karak			
	HH Rooftops 100m2 (60%)	84.9%	12,717	4.4
	HH Rooftops 200m2 (40%)	11.3%	543	3.1
	Public Buildings	6.8%	2,912	1.4
	Tafilah			
	HH Rooftops 100m2 (60%)	34.2%	3,905	5.1
	HH Rooftops 200m2 (40%)	19.4%	4,156	3.2

	Public Buildings	6.8%	2,168	1.4
	Ma´an			
	HH Rooftops 100m2 (60%)	78.5%	3,625	8.5
	HH Rooftops 200m2 (40%)	34.0%	3,776	4.9
	Public Buildings	15.5%	4,207	2.6

Model		EIRR	NPV (JOD)	B/C Ratio
C1.1.2	Tafilah WWTP	6.1%	91,166	1.1
	Karak WWTP	14.6%	725,541	1.9
	Madaba WWTP	20.5%	1,408,560	1.4

Aggregation / Calendar. Benefits mentioned were considered together with the Component 2 aggregated models. The following table presents the expected beneficiaries per activity in Component 2

Table 26. Calendar of beneficiaries' incorporation

# Model	Models	Unit	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Total	Adop
1	Rainfed Barley	*#HH*	0	98	195	195	293	195	0	0	975	
		Agg.	0	98	293	488	780	975	975	975		
		Ha	0	390	780	780	1170	780	0	0	3900	70
2	Rainfed Wheat	*#HH*	0	98	195	195	293	195	0	0	975	
		Agg.	0	98	293	488	780	975	975	975		
		Ha	0	281	563	563	844	563	0	0	2813	
3.1	Olive trees irrigated	*#HH*	38	105	105	105	105	57	0	0	517	
		Agg.	38	144	249	354	459	517	517	517		
		Ha	77	210	210	210	210	115	0	0	1033	
3.2	Olive trees non-I	*#HH*	52	144	144	144	144	78	0	0	706	
		Agg.	52	196	340	483	627	706	706	706		
		Ha	105	287	287	287	287	157	0	0	1411	
4	Grapes irrigated	*#HH*	3	8	8	8	8	4	0	0	38	
		Agg.	3	11	18	26	34	38	38	38		
		Ha	6	15	15	15	15	8	0	0	76	
5	Tomatoes	*#HH*	62	171	171	171	171	93	0	0	840	
		Agg.	62	233	404	576	747	840	840	840		
		Ha	62	171	171	171	171	93	0	0	840	50
6	Wicking beds	*#HH*	39	107	107	107	107	58	0	0	525	50

		Agg.	39	146	253	360	467	525	525	525	
7.1	**Grownbag GH Tomatoes conv**	*#HH*	32	87	87	87	87	48	0	0	428
		Agg.	32	119	206	293	380	428	428	428	
		Ha	1	2	2	2	2	1	0	0	12
7.2	**Grownbag GH Tomatoes new**	*#HH*	21	58	58	58	58	32	0	0	285
		Agg.	21	79	137	195	253	285	285	285	
		Ha	1	2	2	2	2	1	0	0	8
8.1	**Grownbag GH Cucumber conv**	*#HH*	32	87	87	87	87	48	0	0	428
		Agg.	32	119	206	293	380	428	428	428	
		Ha	1	2	2	2	2	1	0	0	12
8.2	**Grownbag GH Cucumber new**	*#HH*	21	58	58	58	58	32	0	0	285
		Agg.	21	79	137	195	253	285	285	285	
		Ha	1	2	2	2	2	1	0	0	8
											10,111
	GH Size (ha)	0.027									6000

60

Component	Activity	Hectares
Component 1	WWTP beneficiaries	528
Component 2	See Calendar	10,111
Total		**10,639**

Economic prices. In the economic analysis conversion factors were applied to obtain economic prices. Selected conversion factors were calculated for family labor costs (based on official unemployment rates[26] for rural areas and youth), tradable goods as exported outputs[27] (Tomato), imported outputs[28] (Barley) and Urea (imported inputs[29]), based on World Bank´s Commodity Outlook for international prices, discounting subsidies, taxes and tariffs and the cost of Water (discounting subsidies). No conversion factors were applied to non-tradable goods and project costs as costing was made without considering taxes and duties. Detailed calculations can be found in Annex 3 EFA Spreadsheet.

[26] Department of Statistics, Yearbook 2018
[27] CF: 1.33
[28] CF: 0.5
[29] CF: 0.88

A sensitivity scenario is being included for the economic price of water, describing the systems where water harvesting systems profitability would be at risks.

Economic profitability indicators. An analysis of the Value for Money Metrics of the Project shows that the project investment is highly justified based on both financial and economic analysis. The project investments have an Economic Rate of Return of 24.1% after applying a standard conversion factorto obtain economic prices, incorporating economic models for benefits of water saving interventions and aggregating economic incremental benefits to be compared with total project costs (excluding investment costs already considered in the models in order to avoid double-counting. Recurrent costs of operation and maintenance were included after year 7 to represent the minimum required investment needed to ensure the sustainability of benefits. The Net Present Value was estimated to be US$ 80.16 million with a benefit- cost ratio of 2.95, and a social discount rate estimated at 4% over the period of 30 years for the economic analysis. The economic discount rate is based on the average rate of a 10yr Bond yield in Jordan (at 5.5%) and the Central Bank of Jordan´s official reference interest rate (at 2.5%)[30].

Other aggregated quantitative benefits.

Avoided losses due to climate change are estimated at USD 333.000 after year 10 due to the promotion of local seed varieties and adaptive technologies to reduce climate change impact on wheat and barley yields in the project area (affected by increased temperatures and decreased precipitations) (Wheat: 177 tons/year in total and Barley: 727 tons/year). This could go beyond this number considering that the Project will impact people directly in the project area and indirectly through its engagement at the national level through dissemination of information through smart applications and its work with policy and regulatory reform. In addition to this, the project is expected to achieve 3% to 3.5% reduction in groundwater overdraft and to contribute up to 4.5% to the water management goals in the National Water Strategy. Cumulative water savings are estimated at around 1.83 MCM in a 10yr period and 5.49 MCM for the project´s lifespan (30 years). Detailed calculations are being presented in Annex 3 (EFA Spreadsheet) based on the expected amount of water saved per governorate due to Component 1 interventions. Finally, 10,600 hectares of agricultural land area will be made more resilient with climate-adaptive measures in the project area.

Qualitative Benefits. The increased availability of water from roof-top harvesting structures is expected to also generate co-benefits in terms of improved health and sanitation. The lack of water and secondary effects of these changes are considered as one of the highest threats to health in Jordan. In 2005, a WHO/UNEP project determining minimum water requirements for health in Jordan showed a linkage between the per capita water consumption and the incidence of diarrhea. The importance of washing hands to avoid the menace of coronavirus is a testament to the health impacts of increased water supply. The increased water availability from RWH is likely to generate improved health status of households, enhance hygiene – with subsequent reduction in the risk of disease transmission, reduce their health costs and reduce the pressure on Government health facilities. Other co-benefits will be generated in terms of increased business opportunities for entrepreneurs trained in installing RWH and the increased employment opportunities for the youth for employment in these enterprises. improved access to water harvested from the rooftop and reclaimed water: (i) economic impact of improved nutrition, health and food security; (ii) water subsidies public bill reduced; (iii) avoided downstream contamination from discharge of reclaimed water which has not undergone tertiary treatment, (iv) the economic benefits of additional employments generated through the backward and forward multiplier effects in the project area.

[30] As of April 2020: www. http://www.cbj.gov.jo/.

3.5 Sensitivity Analysis and Risk assessment

A sensitivity test was developed using different risk-occurrence scenarios. These included increase in project costs (10% and 20%), a reduction in project benefits (10% and 20%), and combined scenarios (of both benefits reduced by 10%, 20% and 30% and costs increased by 10% or 20%). Additionally, a delay in project benefits (1 and 2 years) and the reduction in benefits by 50% every 2 and 3 years due to the occurrence of climate change shocks were considered. NPV remains positive so the project is still considered to be profitable under the tested scenarios. Detailed assumptions and calculations are attached in Annex 3. Table 38 below presents the main results of the sensitivity test. The analysis shows that the project is most sensitive to reduction in benefits.

Table 27. Sensitivity Analysis

Sensitivity Analysis							
	Δ%	Risk				EIRR	NPV (US$)
Base scenario						24.10%	80,158,697
Benefits	-10%	Combined risks on sale prices, yields, adoption rates				21.70%	68,026,928
	-20%					19.18%	55,895,159
Costs	10%	Increase in expenses, input prices and unit costs				21.92%	76,042,797
	20%					20.03%	71,926,898
Delay 1yr in Benefits		Adoption rate / delays				20.02%	74,855,244
Delay 2yr in Benefits						17.23%	69,755,771
External Shock every 2 yr	50% Benefits	External shock (prices, quantities, climate)				20.56%	40,879,216
External Shock every 3 yr	50% Benefits					21.75%	66,196,887
Mixed Scenarios		Costs	10%	Benefits	-10%	19.64%	63,911,028
			10%		-20%	17.24%	51,779,259
			20%		-20%	15.55%	47,663,360
			20%		-30%	8.77%	15,383,952
			20%		-10%	17.86%	59,795,129

Additional sensitivity scenarios. The economic price of water at 3 JOD/m3 is considered based on the economic price selected by Abdulla (2019) for calculating economic benefits, taking into consideration the price of water from tankers during the dry season, without distortions and public subsidies. While a lower economic price of water would have negative implications for the water harvesting systems stream of benefits (negatively affecting a few models for selected size of tanks and governorates), it would have a slightly positive side for Component 2 models where lower economic costs of water would lead to lower costs and increased margins. The following table present the sensitivity test of changes in the economic price of water.

Table 28. Additional Sensitivity Scenarios with different economic prices of water

Economic Price of water	**0.5 JOD/m3**	**1 JOD/m3**	**2 JOD/m3**	**3 JOD/m3 (Base case)**

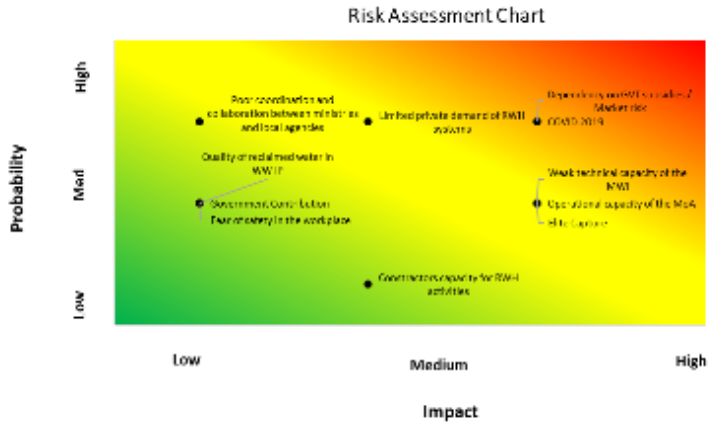
Overall EIRR	20.28%	21.05%	22.58%	24.1%
Overall NPV	USD 60.6 million	USD 64.5 million	USD 73.3 million	USD 80.16 million

Risk assessment chart. The following risk assessment chart was prepared to link the identified risks (with hypothetical scoring for probability and impact) and the EFA impacts (given the possible cost and benefit scenarios.).

Table 29. Link between risks factors and the EFA Analysis

#	Risk Factor	Impact	Probability	Risk Type	Impact on the EFA: Impact type	EIRR (%)	NPV (USD M)
			BASE			24.10%	80,158,697
RF1	Government Contribution	1	2	Governance	Reduction in Benefits 20%	19.18%	55,895,150
RF2	Weak technical capacity of the MWI	3	2	Technical and operational	Delay in benefits 2 years	17.23%	69,455,471
RF3	Operational capacity of the MoA	3	2	Technical and operational	Combined Benefits -20% / Costs +10%	17.24%	51,779,259
RF4	Constructors capacity for RWH activities	2	1	Technical and operational	Reduction in Benefits 20%	19.18%	55,895,150
RF5	Quality of reclaimed water in WWTP	1	2	Technical and operational	Reduction in Benefits 10%	21.70%	68,026,928
RF6	Elite Capture	3	2	Governance	Combined Benefits -10%/ Costs +10%	19.64%	63,911,028
RF7	Fear of safety in the workplace	1	2	Other	Reduction in Benefits 10%	21.70%	68,026,928
RF8	Limited private demand of RWH systems	2	3	Technical and operational	Reduction in Benefits 20%	19.18%	55,895,150
RF9	Poor coordination and collaboration betwee	1	3	Governance	Delays in benefits 1 year	20.02%	74,855,244
RF10	Dependency on GVT subsidies / Market risk	3	3	Other	Reduction in Benefits 50%	10.38%	19,499,802
RF11	COVID 2019	3	3	Technical and operational	Delay in benefits 3 years	15.15%	64,852,131

Figure 10- Risk assessment chart



This type of Assessment situates COVID-2019 and Market risks in the upper-side (high probability and high impact) whereas Government Contribution or the quality of reclaimed water in WWTP are situated in the low/medium range side for example.

3.6 Benchmarks

The following table compares BRCCJ Project´s cost-effectiveness indicators with other GCF funded rural development projects in the region. GCF Cost per beneficiary is estimated at 117.7 US$ and it is aligned with cost-effectiveness indicators of rural adaptation projects in the region.

Table 30. Project Cost Effectiveness Comparisons

Projects	**BRCCJ**	**CFAVCP**	**WBAACC**	**BRCRN**	**BRCRN**	**ECCANCN**
	Jordan	**Cambodia**	**Palestine**	**Nepal**	**Pakistan**	**Egypt**
Date of approval		March 2018	December 2019	December 2019	July 2019	March 2018
Direct Beneficiaries	212,416	390,000	223,553	200,681	1.3 million	768,164
EIRR	24.1%	16.13%	-	20%	18.8%	20.2%
NPV	US$ 80.16 Million	US$ 133,543	-	US$ 40.9 million	US$ 15.78 million	US$ 124.76 million
Effectiveness of GCF Adaptation Investment (USD GCF/Beneficiary)	USD 117.7/beneficiary	USD 102/beneficiary	EUR 106/beneficiary	USD 195/beneficiary	USD 27/beneficiary	USD 41/beneficiary
Effectiveness of total Investment (USD/Beneficiary)	156.5 USD/beneficiary	362 USD/beneficiary	200 EUR/beneficiary	236 USD/beneficiary	37 USD/beneficiary	137 USD/beneficiary
Total Cost (USD millions)	33.25	141.39	44.7 (MM Eur)	47.3	47.7	105.2
GCF funding (USD Million)	25 Million grant	10 Million loan	23.7 Million grant ((MM Eur)	39.3 Million grant	35 Million grant	31 38 Million grant

4. Annexes

1.1 Annex 1. Detailed cost tables

Table 31. Component 1.

COMPONENTS, SUB-COMPONENTS, OUTPUTS AND ACTIVITIES	UNIT	Years							Final target	Unit cost (USD/unit)	Total Cost (USD)	Funding Sources				Share of funding sources (%)			
		1	2	3	4	5	6	7				Green Climate Fund (Grant)	Government	FAO	UNDP	Green Climate Fund (Grant)	Government	FAO	UNDP
COMPONENT 1: Climate resilient water systems											**19,800,607**	**14,868,306**	**3,947,301**	**-**	**985,000**				
Outcome 1.1 Enhanced water availability to address climate change risks											**19,800,607**	**14,868,306**	**3,947,301**	**-**	**985,000**				
Output 1.1.1 By year 7 at least 8250 buildings retrofitted with water harvesting structures											**14,351,707**	**11,553,406**	**2,313,301**	**-**	**485,000**				
Activity 1.1.1.1 Provide Technical assistance and oversight for water resilient systems									0		-	-	-	-	-				
Water Engineer Specialist	month	12	12	12	12	12	12	12	84	3,500	**294,000**	294,000	-	-	-	100%			
Allowances Water engineer Specialist	pers.day		120	120	120	120	120	120	720	261	**187,920**	187,920	-	-	-	100%			
M&E officer	month	12	12	12	12	12	12	12	84	2,000	**168,000**	168,000	-	-	-	100%			
M&E Specialist	month	12	12	12	12	12	12	12	84	3,000	**252,000**	252,000	-	-	-	100%			
Technical Advisor- Focal Point from MoE	month	12	12	12	12	12	12	12	84	3,000	**252,000**	252,000	-	-	-	100%			
Allowances M&E Officer and Specialist	days	60	60	60	60	60	60	60	420	90	**37,800**	37,800	-	-	-	100%			
Mid-term and final surveys	lumpsum				1			1	2	40,000	**80,000**	80,000	-	-	-	100%			
Knowledge management products and studies	units					1	1		2	20,000	**40,000**	40,000	-	-	-	100%			
Vehicle	unit	1							1	45,000	**45,000**	45,000	-	-	-	100%			
Vehicle O&M	ls/unit	1	1	1	1	1	1	1	7	3,860	**27,020**	27,020	-	-	-	100%			
Monitoring equipment	Set	2			1				3	3,800	**11,400**	11,400	-	-	-	100%			
IT / Software equipment and trainings	lumpsum	1	1	1	1	1	1	1	7	6,111	**42,780**	42,780	-	-	-	100%			
Communication campaigns, traslations and multimedia	lumpsum	1	0.2	0.2	0.5	0.2	0.2	0.2	2.5	15,000	**37,500**	37,500	-	-	-	100%			
Office utilities O&M	lumpsum	0.25	0.25	0.25	0.25	0.25	0.25		1.5	13,000	**19,500**	19,500	-	-	-	100%			
Contingencies	lumpsum	1			1				2	74,506	**149,011**	149,011	-	-	-	100%			
Activity 1.1.1.2 Selection of public buildings and awareness on water conservation schools and municipal officials																			
Contracting a service provider for the awareness campaign in schools, selection of public buildings and trainings		0.2	0.2	0.2	0.2	0.2			1	231,801	**231,801**	231,801	-	-	-	100%			
Activity 1.1.1.3 Construction of Rooftop rainwater harvesting system in public buildings											-	-	-	-	-	100%			
Construct Rooftop rainwater harvesting systems in public buildings	Buildings	0	80	120	160	40	0	0	400	3,867	**1,546,890**	1,546,890	-	-	-	100%			
Water saving equipments and devices	Kit		80	120	160	40	0	0	400	100	**40,000**	-	40,000	-	-		100%		
Staff time (MWI)	month		24	24	24	24			96	900	**86,400**	-	86,400	-	-		100%		
Activity 1.1.1.4 Select beneficiaries, provide orientation on water conservation to households																100%			
Contracting a service provider for identification, sensitization and training	lumpsum		4	4	4	4	4		20	90,000	**1,800,000**	1,800,000	-	-	-	100%			
UNDP site manager and operational support		1	1	1	1	1	1	1	7	69,286	**485,000**	-	-	-	485,000				100%
Activity 1.1.1.5 Construction of Rooftop rainwater harvesting system in households											-	-	-	-	-				
Construct Rooftop rainwater harvesting systems in households	Households	0	293	878	1463	1463	1755	0	5850	1,039	**6,080,785**	6,080,785	-	-	-	100%			
Government Scaling-up Construction of Rooftop rainwater harvesting systems in households	Households	0	0	200	400	600	800	0	2000	1,039	**2,078,901**	-	2,078,901	-	-		100%		
Staff time (MWI)	month		24	24	24	24	24		120	900	**108,000**	-	108,000	-	-		100%		
Activity 1.1.1.6 Independent Impact assessment for C1											-	-	-	-	-	100%			
Contracting a service provider to conduct the independent impact assessment	lumpsum				-			1	1	250,000	**250,000**	250,000	-	-	-	100%			
Output 1.1.2 By year 7, reuse of reclaimed water from 3 Waste Water Plants is optimized											**3,585,700**	**2,151,700**	**1,434,000**	**-**	**-**				
Activity 1.1.2.1 Build storage and distribution infrastructure to maximize reuse of reclaimed water from existing WWT plants											-	-	-	-	-	100%			
Storage and distribution capacity maximiized Madaba WWTP	Plant			1					1	733,250	**733,250**	733,250	-	-	-	100%			
Storage and distribution capacity maximiized Karak WWTP	Plant				1				1	552,650	**552,650**	552,650	-	-	-	100%			
Storage and distribution capacity maximiized Tafilah WWTP	Plant					1			1	520,800	**520,800**	520,800	-	-	-	100%			
Operation and Maintenance cost by the MWI	lumpsum			0.16	0.18	0.22	0.22	0.2197	1	1,434,000	**1,434,000**	-	1,434,000	-	-		100%		
Activity 1.1.2.2 Technical assistance to MWI and Ministry of Health to assure compliance with environmental standards												-	-	-	-				
Contracting a service provider to test water and soil quality to assure environmental compliance	lumpsum			0.50	1.00	1.50			3	15,000	**45,000**	45,000	-	-	-	100%			
Activity 1.1.2.3 Technical assistance to promote demand and safe reuse of reclaimed water, including building local capacity of farmers and Water User Associations									0		-	-	-	-	-				
Contracting a service provider to build local capacity of farmers and WUA	Lumpsum		1	1	1				3	100,000	**300,000**	300,000	0	-	0	100%			
Output 1.1.3 By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin											**1,863,200**	**1,163,200**	**200,000**	**-**	**500,000**				
Activity 1.1.3.1 Establish plan objectives and criteria									0		-	-	-	-	-				
Contract with service provider	lumpsum	1							1	100,000	**100,000**	100,000	-	-	-	100%			
Staff time (MWI)	lumpsum	0.5	0.5						1	100,000	**100,000**	-	100,000	-	-		100%		
Water Specialist to advice and provide oversight	days	60	60	60	60				240	500	**120,000**	120,000	-	-	-	100%			
Travel and allowances Water specialist	trip	1	1	1	1				4	10,800	**43,200**	43,200	-	-	-	100%			
UNDP support to the landscape resilience investment plan	lumpsum	0.2	0.4	0.4					1	500,000	**500,000**	-	-	-	500,000				100%
Activity 1.1.3.2 Execute technical, economic, environmental and social feasability studies											-	-	-	-	-				
Contract with service provider to prepare the feasability studies	lumpsum		0.33	0.33	0.33				1	800,000	**800,000**	800,000	-	-	-	100%			
Staff time (MWI)	lumpsum		0.25	0.25	0.25	0.25			1	100,000	**100,000**	-	100,000	-	-		100%		
Activity 1.1.3.3 Disseminate and validate investment Plan									0		-	-	-	-	-				
Contract with service provider to validate list of investments	lumpsum				1				1	100,000	**100,000**	100,000	-	-	-	100%			

Table 32. Component 2.

COMPONENTS, SUB-COMPONENTS, OUTPUTS AND ACTIVITIES	UNIT	Years							Final target	Unit cost (USD/unit)	Total Cost (USD)	Funding Sources				Share of funding sources (%)			
		1	2	3	4	5	6	7				Green Climate Fund (Grant)	Government	FAO	UNDP	Green Climate Fund (Grant)	Government	FAO	UNDP
COMPONENT 2: Climate Change resilience for Enhanced Livelihoods and Food Security											**8,018,627**	**5,579,427**	**1,864,200**	**575,000**	**-**				
Outcome 2.1. Enhanced capacity of households to deal with climate change											**8,018,627**	**5,579,427**	**1,864,200**	**575,000**	**-**				
Output 2.1.1 By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (1950)									0		**5,466,027**	**3,900,427**	**1,290,600**	**275,000**	**-**				
Activity 2.1.1.1 Provide Technical assistance and oversight for climate change adaptation																			
Agronomist and Climate change adaptation Specialist	month	12	12	12	12	12	12	12	84	3,500	**294,000**	294,000	-	-	-	100%			
Allowances Agronomist and Climate change adaptation Specialist	pers.day		180	180	180	180	180	180	1080	261	**281,880**	281,880	-	-	-	100%			
Social inclusion and gender Specialist	lumpsum	1	1	1	1	1	1	1	7	25,000	**175,000**	-	-	175,000	-			100%	
M&E officer	month	12	12	12	12	12	12	12	84	2,000	**168,000**	168,000	-	-	-	100%			
Allowances M&E Officer	days	60	60	60	60	60	60	60	420	70	**29,400**	29,400	-	-	-	100%			
Mid-term and final surveys	lumpsum				1			1	2	40,000	**80,000**	80,000	-	-	-	100%			
Knowledge management products and studies	unit					1	1		2	20,000	**40,000**	40,000	-	-	-	100%			
Vehicle	unit	1							1	45,000	**45,000**	45,000	-	-	-	100%			
Vehicle O&M	ls/unit	1	1	1	1	1	1	1	7	3,860	**27,020**	27,020	-	-	-	100%			
Monitoring equipment	Set	1			1				2	3,800	**7,600**	7,600	-	-	-	100%			
Communication campaigns, traslations and multimedia	lumpsum	1	0.2	0.2	0.5	0.2	0.2	0.2	2.5	15,000	**37,500**	37,500	-	-	-	100%			
Office utilities O&M	lumpsum	0.25	0.25	0.25	0.25	0.25	0.25		1.5	13,000	**19,500**	19,500	-	-	-	100%			
Contingencies	lumpsum	1			1				2	138,064	**276,127**	276,127	-	-	-	100%			
Activity 2.1.1.2 Design appropriate modules for Climate Smart FFS	Modules	4			2														
Local Consultant expert on FFS	pers.day	120			60				180	250	**45,000**	45,000	-	-	-	100%			
International Consultant expert on FFS and Climate change	pers.day	120			60				180	500	**90,000**	90,000	-	-	-	100%			
Travel International Consultant	Trip	4			2				6	10,800	**64,800**	64,800	-	-	-	100%			
Travel Local Consultant	Trip	4			2				6	7,100	**42,600**	42,600	-	-	-	100%			
Traslations/Developing communication material	lumpsum	1			0.5				1.5	15,000	**22,500**	22,500	-	-	-	100%			
Activity 2.1.1.3 Training a team of Master Trainers/Facilitators	Master trainer	40			40														
Local Consultant trainer of trainers	pers.day	90			90				180	250	**45,000**	45,000	-	-	-	100%			
International Consultant trainer of trainers	pers.day	90			90				180	500	**90,000**	90,000	-	-	-	100%			
Trainings of trainers	Sessions	30			30				60	2,200	**132,000**	132,000	-	-	-	100%			
International Consultant travel	Trip	1			1				2	29,100	**58,200**	58,200	-	-	-	100%			
National consultant travel	Trip	1			1				2	11,400	**22,800**	22,800	-	-	-	100%			
FAO support to the training of FFS master trainer		1			1				1	100,000	**100,000**	-	-	100,000	-			100%	
Activity 2.1.1.4 Identify target groups in Project Area	Group	20	55	55	55	55	30		270										
Local consultant to develop the targeting criteria and identify groups in Project Area	days	200	550	550	550	550	300		2700	30	**81,000**	-	81000	-	0		100%		
Allowances local consultant	Group	20	55	55	55	55	30		270	100	**27,000**	27,000	-	-	-	100%			
Activity 2.1.1.5 Scaling-up FAO collect mobile geo-referenced monitoring application of adoption rates			1						1										
International Consultant to develop the monitoring system and App	days	120	10	10	10	10	30		190	500	**95,000**	95,000	-	-	-	100%			
Travel International Consultant	Trip	1					1		2	10,800	**21,600**	21,600	-	-	-	100%			
Trainings of M&E experts, Extensionists and Farmers groups on the use of the App	Sessions	6					6		12	2,200	**26,400**	26,400	-	-	-	100%			
Equipping the extension Staff with smart devices and software	Units	60			60				120	300	**36,000**	36,000	-	-	-	100%			
Communication, traslations and multimedia	lumpsum	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.7	15,000	**10,500**	10,500	-	-	-	100%			
Activity 2.1.1.6 Conduct Climate Smart FFS	Group	20	55	55	55	55	30		270										
Extensionists mobilized	Group	20	55	55	55	55	30	0	270	4,480	**1,209,600**	-	1209600	-	0		100%		
FFS kit	Production pa	20	55	55	55	55	30	0	270	2,000	**540,000**	540,000	0	-	0	100%			
FFS sessions	FFS	20	55	55	55	55	30	0	270	2,500	**675,000**	675,000	0	-	0	100%			
Activity 2.1.1.7 Field demostration of tested climate-adaptive innovation and practices																			
Field day visits	Sessions		50	100	100	150	100		500	600	**300,000**	300,000	0	-	0	100%			
Activity 2.1.1.8 Independent Impact assessment for C2																			
Contracting a service provider to conduct the independent impact assessment	lumpsum				0			1	1	250,000	**250,000**	250,000	0	-	0	100%			
Output 2.1.2 By year 7, 30 000 Farmers reached through e-extension											**823,600**	**50,000**	**573,600**	**200,000**	**-**				
Activity 2.1.2.1 Developing climate-smart IT solutions for smart devices																			
Developping the e-system and application	lumpsum	1							1	50,000	**50,000**	50,000	0	-	0	100%			
FAO support to the Innovation hub for climart smart agriculture and water scarcity management and development		0.25	0.25	0.25	0.25				1	200,000	**200,000**	-	-	200,000	-			100%	
Activity 2.1.2.2 Disseminating climate smart-solutions and weather forecast through smart devices																			
Staff time (MoA)	month	48	48	48	48	48	48	48	336	900	**302,400**	-	302400	-	0		100%		
Studio	Set	1							1	120,000	**120,000**	-	120000	-	0		100%		
System O&M	lumpsum		1	1	1	1	1	1	6	25,200	**151,200**	-	151200	-	0		100%		
Output 2.1.3 By year 3, 400 Women trained as Change Agents for Climate Adaptation											**980,250**	**880,250**	**-**	**100,000**	**-**				
Activity 2.1.3.1 Technical assistance in climate adaptive agriculture		1							1										
National Consultant	days	15							15	250	**3,750**	3,750	-	-	-	100%			
International Consultant Expert on Gender and Climate adaptive agriculture	days	90							90	500	**45,000**	45,000	-	-	-	100%			
Allowances Gender and climate adaptation Specialist	Trip	1							1	10,800	**10,800**	10,800	-	-	-	100%			
Communication, traslations and multimedia	Lumpsum	0.5							0.5	15,000	**7,500**	7,500	-	-	-	100%			
Activity 2.1.3.2 Development of training manuals and certification requirements									0										
Contract with the University	Lumpsum	0.5	0.5						1	30,000	**30,000**	30,000	-	-	-	100%			
Activity 2.1.3.3 Scolarship for young trainers	20% drop off		10						10										
Travel allowances for participants	Workshop		6						6	800	**4,800**	4,800	-	-	-	100%			
Trainers Kit / inputs	Kit		10						10	1,000	**10,000**	10,000	-	-	-	100%			
Training of trainers	Workshop		6						6	8,400	**50,400**	50,400	-	-	-	100%			
Activity 2.1.3.4 Competitive selection of candidates for climate wise-women									0										
Local service provider communicating and selecting climate wise-agents competitively	Lumpsum	1	1						2	35,000	**70,000**	70,000	-	-	-	100%			
FAO support to the competitive selection of candidates		0.5	0.5						1	50,000	**50,000**	-	-	50,000	-			100%	
Activity 2.1.3.5 Trainings developed for climate wise-women									0										
Contract for trainings, kit and stipends (Madaba, Tafilah)	Contract			0.3	0.3	0.3	0.1		1	324,000	**324,000**	324,000	-	-	-	100%			
Contract for trainings, kit and stipends (Karak, Ma´an)	Contract			0.3	0.3	0.3	0.1		1	324,000	**324,000**	324,000	-	-	-	100%			
FAO Support to climate wise women trained				0.3	0.3	0.3	0.1		1	50,000	**50,000**	-	-	50,000	-			100%	
Output 2.1.4 By year 7, 15.000 Persons sensitized for climate adaptive measures											**748,750**	**-**	**-**	**-**	**-**				
Activity 2.1.4.1 Conducting Community dialoques for gender sensitive climate adaptation measures																			
Contracting a service provider to Conduct Community Dialogue in Madaba	Contract		0.25	0.25	0.25	0.25			1	179,688	**179,688**	179,688	-	-	-	100%			
Contracting a service provider to Conduct Community Dialogue in Ma´an	Contract		0.25	0.25	0.25	0.25			1	179,688	**179,688**	179,688	-	-	-	100%			
Contracting a service provider to Conduct Community Dialogue in Tafilah	Contract		0.25	0.25	0.25	0.25			1	179,688	**179,688**	179,688	-	-	-	100%			
Contracting a service provider to Conduct Community Dialogue in Karak	Contract		0.25	0.25	0.25	0.25			1	179,688	**179,688**	179,688	-	-	-	100%			
Activity 2.1.4.2 Organizing multi-stakeholder climate-wise women forums																			
Climate-wise women forum	Forum				1	1	1		3	10,000	**30,000**	30,000	-	-	-	100%			

Table 33. Component 3 and PMC.

COMPONENTS, SUB-COMPONENTS, OUTPUTS AND ACTIVITIES	UNIT	Years							Final target	Unit cost (USD/unit)	Total Cost (USD)	Funding Sources				Share of funding sources (%)			
		1	2	3	4	5	6	7				Green Climate Fund (Grant)	Government	FAO	UNDP	Green Climate Fund (Grant)	Government	FAO	UNDP
COMPONENT 3: Scaling-up climate adaptation																			
Outcome 3.1 By year 7 Gender sensitive resilience tools and practices to adapt to water scarcity are mainstreamed into the national policy/educational/administrative/social frameworks											**3,771,781**	**3,421,781**	**-**	**350,000**	**-**				
Output 3.1.1. By year 6, specific policy and regulatory bottlenecks are identified and reforms initiated											**2,383,281**	**2,108,281**	**-**	**275,000**	**-**				
Activity 3.1.1.1 Technical assistance to the Ministry of Environment, the Ministry of Agriculture and the Ministry of Water and Irrigation to initiate the process of policy reform																			
Local Technical assistance	month/person		36	36	36	36	36		180	2,500	**450,000**	450,000	-	-	-	100%			
International Technical assistance	month/person	12	12	12	12	12	12	12	84	11,700	**982,800**	982,800	-	-	-	100%			
Field visits and travel for Local and ITA	Trip	6	4	4	4	4	4	4	30	500	**15,000**	15,000	-	-	-	100%			
Allowances for LTA and ITA	Days	52	72	72	72	72	72	52	464	261	**121,104**	121,104	-	-	-	100%			
Communication campaigns, traslations and multimedia	Lumpsum	0.5	0.5	0.5	0.5	0.5	0.5		3	15,000	**45,000**	45,000	-	-	-	100%			
Contingencies	Lumpsum	1			1				2	83,822	**167,643**	167,643	-	-	-	100%			
FAO technical assistance	lumpsum		0.2	0.2	0.2	0.2	0.2		1	100,000	**100,000**	-	-	100,000	-			100%	
ES safeguard specialist	lumpsum	1	1	1	1	1	1	1	7	25,000	**175,000**	-	-	175,000	-			100%	
Allowances of ES safeguard specialist and others	days	42	42	42	42	42	42	42	294	261	**76,734**	76,734	-	-	-	100%			
Activity 3.1.1.2 Technical Assistance to support the MWI in strenghtening the enabling environment for promotion of reuse of reclaimed water																			
Contract with service provider to support MWI	Lumpsum	0.2	0.2	0.2	0.2	0.2			1	250,000	**250,000**	250,000	-	-	-	100%			
Output 3.1.2 By year 6 at least 6 national curricula of vocational schools (masonry, plumbery and agriculture) and of specialized universities (agriculture, architecture, water engineering) are updated t											**625,000**	**550,000**	**-**	**75,000**	**-**				
Activity 3.1.2.1 Technical Assistance to the Ministry of Education and main Universities to update the national curricula																			
Contract with service provider to support the national curricula updating	Lumpsum				0.25	0.25	0.25	0.25	1	250,000	**250,000**	250,000	-	-	-	100%			
FAO support to the national curricula updating					0.25	0.25	0.25	0.25	1	75,000	**75,000**	-	-	75,000	-			100%	
Activity 3.1.2.2 Training for teachers and professors to enable the teaching and practice of the new curricula																			
Contract with service provider to provide training for teachers and professors	Lumpsum				0.25	0.25	0.25	0.25	1	300,000	**300,000**	300,000	-	-	-	100%			
Output 3.1.3 By year 7 at least 6440 persons (4 governorates, 16 provinces, 324 municipalities) and private sector engaged in climate change adaptation practices											**763,500**	**763,500**	**-**	**-**	**-**				
Activity 3.1.3.1 Local engagement and dissemination process									0		**-**	**-**	**-**	**-**	**-**				
Conference	Conference	1			1			1	3	7,500	**22,500**	22,500	-	-	-	100%			
Workshops	Workshops	8	8	8	8	8	8	8	56	625	**35,000**	35,000	-	-	-	100%			
Publications	Lumpsum	1			1			1	3	15,000	**45,000**	45,000	-	-	-	100%			
Public consultations	Meetings	8	8	8	8	8	8	8	56	1,000	**56,000**	56,000	-	-	-	100%			
Contract with service provider for raising awareness and communication	Lumpsum	1	1	1	1	1	1	1	7	15,000	**105,000**	105,000	-	-	-	100%			
Activity 3.1.3.2 Technical Assistance to enhance local administration's and private sector actors' capacities to ensure compliance with national green construction and wate									0		**-**	**-**	**-**	**-**	**-**				
Contract with service provider for capacity development to ensure abidance to national green cons	Lumpsum		0.2	0.2	0.2	0.2	0.2		1	300,000	**300,000**	300,000	0	-	0	100%			
Activity 3.1.3.3 Technical assistance and training to civil society organizations									0		**-**	**-**	**-**	**-**	**-**				
Contract with service provider to provide training to local institutions and civil society	Lumpsum		0.25	0.25	0.25	0.25			1	200,000	**200,000**	200,000	-	-	-	100%			
PROJECT MANAGEMENT											**1,660,486**	**1,130,486**	**380,000**	**75,000**	**75,000**				
Project Management Unit (PMU) in operation									**1**		**1,660,486**	**1,130,486**	**380,000**	**75,000**	**75,000**				
Investment Costs																			
Office equipment	lumpsum	1	1	1	1	1	1	1	7	5,000	**35,000**	35,000	-	-	-	100%			
FAO technical assistance to the PMU		1	1	1	1	1	1	1	7	10,714	**75,000**	-	-	75,000	-			100%	
UNDP technical assistance to the PMU	lumpsum	1	1	1	1	1	1	1	7	10,714	**75,000**	-	-	-	75,000				100%
Salaries																			
Project Manager	month	12	12	12	12	12	12	12	84	4,500	**378,000**	378,000	-	-	-	100%			
Procurement Specialist	month	12	12	12	12	12	12	12	84	2,750	**231,000**	231,000	-	-	-	100%			
Finance Manager	month	12	12	12	12	12	12	12	84	3,000	**252,000**	252,000	-	-	-	100%			
Administrative Assistance	month	12	12	12	12	12	12	12	84	1,300	**109,200**	109,200	-	-	-	100%			
Support Staff	month	12	12	12	12	12	12	12	84	1,100	**92,400**	92,400	-	-	-	100%			
Operating costs																			
Travel-Field per diems PMU key Staff	days	18	18	18	18	18	18	18	126	261	**32,886**	32,886	-	-	-	100%			
Office rent and utilities	lumpsum	1	1	1	1	1	1	1	7	14,000	**98,000**	-	98,000	-	-		100%		
Operating support MoE	lumpsum	1	1	1	1	1	1	1	7	40,286	**282,000**	-	282,000	-	-		100%		
TOTAL											**33,251,501**	**25,000,000**	**6,191,501**	**1,000,000**	**1,060,000**				

Table 34. FAO and UNDP Contribution per activity.

FAO Contribution

Outcome	Output	Activity	Item	Total
Outcome 2.1. Enhanced capacity of households to deal with climate change	Output 2.1.1 By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (1950)	Activity 2.1.1.1 Provide Technical assistance and oversight for climate change adaptation	Social inclusion and gender Specialist	$ 175,000
		Activity 2.1.1.3 Training a team of Master Trainers/Facilitators	FAO support to the training of FFS master trainer	$ 100,000
	Output 2.1.2 By year 7, 30 000 Farmers reached through e-extension	Activity 2.1.2.1 Developing climate-smart IT solutions for smart devices	FAO support to the Innovation hub for climart smart agriculture and water scarcity management and development of smart extension applications	$ 200,000
	Output 2.1.3 By year 3, 400 Women trained as Change Agents for Climate Adaptation	Activity 2.1.3.4 Competitive selection of candidates for climate wise-women	FAO support to the competitive selection of candidates	$ 50,000
		Activity 2.1.3.5 Trainings developed for climate wise-women	FAO Support to climate wise women trained	$ 50,000
Outcome 3.1 By year 7 Gender sensitive resilience tools and practices to adapt to water scarcity are mainstreamed into the national policy/educational/administrative/social frameworks	Output 3.1.1. By year 6, specific policy and regulatory bottlenecks are identified and reforms initiated	Activity 3.1.1.1 Technical assistance to the Ministry of Environment, the Ministry of Agriculture and the Ministry of Water and Irrigation to initiate the process of policy reform	FAO technical assistance	$ 100,000
			ES safeguard specialist	$ 175,000
	Output 3.1.2 By year 6 at least 6 national curricula of vocational schools (masonry, plumbery and agriculture) and of specialized universities (agriculture, architecture, water engineering) are updated to include climate smart agriculture, water efficiency and precision agriculture.	Activity 3.1.2.1 Technical Assistance to the Ministry of Education and main Universities to update the national curricula	FAO support to the national curricula updating	$ 75,000
PROJECT MANAGEMENT			FAO technical assistance to the PMU	$ 75,000
Total				$ 1,000,000

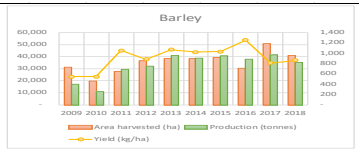
UNDP Contribution

Outcome	Output	Activity	Item	Total
Outcome 1.1 Enhanced water availability to address climate change risks	Output 1.1.1 By year 7 at least 8250 buildings retrofitted with water harvesting structures	Activity 1.1.1.4 Select beneficiaries, provide orientation on water conservation to households	UNDP site manager and operational support	$ 485,000
Outcome 1.1 Enhanced water availability to address climate change risks	Output 1.1.3 By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin	Activity 1.1.3.1 Establish plan objectives and criteria	UNDP support to the landscape resilience investment plan	$ 500,000
PROJECT MANAGEMENT			UNDP technical assistance to the PMU	$ 75,000
Total				$ 1,060,000

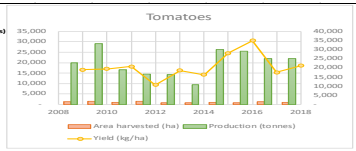
1.2 Annex 2. Additional tables – EFA

Table 35. National Production (with FAOSTAT)

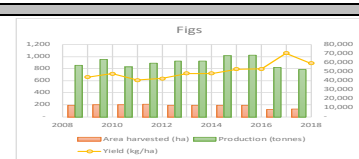
Crop	Barley		
Yr	Area harvested (ha)	Yield (kg/ha)	Production (tonnes)
2009	31,263	546	17,062
2010	19,502	547	10,659
2011	27,794	1,054	29,285
2012	36,342	882	32,050
2013	38,382	1,066	40,915
2014	38,139	1,019	38,873
2015	39,297	1,030	40,486
2016	30,235	1,255	37,929
2017	50,812	811	41,200
2018	40,843	861	35,173
		907	



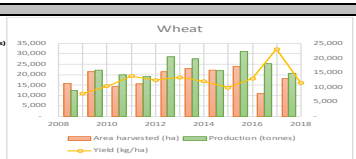
Crop	Tomatoes		
Yr	Area harvested	Yield (hg/ha)	Production (tonnes)
2009	12,394	527,922	654,306
2010	14,189	519,600	737,261
2011	12,954	600,448	777,820
2012	12,345	597,997	738,227
2013	15,434	563,132	869,138
2014	14,564	511,262	744,602
2015	12,887	675,112	870,017
2016	12,336	678,779	837,342
2017	12,195	645,462	787,141
2018	12,909	649,961	839,052



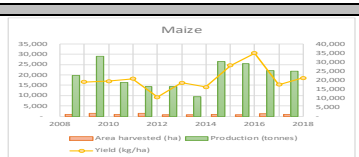
Crop	Figs		
Yr	Area harvested (ha)	Yield (hg/ha)	Production (tonnes)
2009	195	43,949	857
2010	200	47,650	953
2011	204	40,686	830
2012	209	42,488	888
2013	193	48,031	927
2014	193	48,031	927
2015	193	52,746	1,018
2016	193	53,057	1,024
2017	116	70,259	815
2018	132	59,229	785



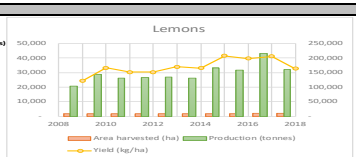
Crop	Wheat		
Yr	Area harvested	Yield (hg/ha)	Production (tonnes)
2008	15,878	7,862	12,484
2010	21,466	10,307	22,125
2011	14,330	13,818	19,801
2012	15,499	12,391	19,205
2013	21,379	13,339	28,517
2014	23,018	11,926	27,452
2015	22,255	9,852	21,925
2016	24,088	12,932	31,150
2017	10,972	23,031	25,270
2018	18,049	11,451	20,668



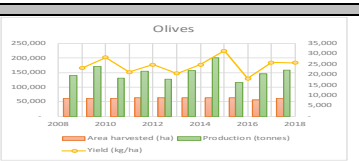
Crop	Maize		
Yr	Area harvested (ha)	Yield (hg/ha)	Production (tonnes)
2009	1,043	18,940	19,754
2010	1,496	19,389	29,006
2011	796	20,678	16,460
2012	1,361	10,571	14,387
2013	768	18,533	14,233
2014	585	16,183	9,467
2015	940	28,045	26,362
2016	730	34,877	25,460
2017	1,262	17,468	22,044
2018	1,033	21,221	21,914



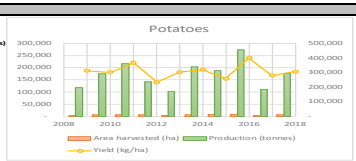
Crop	Lemons and limes		
Yr	Area harvested	Yield (hg/ha)	Production (tonnes)
2009	1,714	121,354	20,800
2010	1,734	165,738	28,739
2011	1,739	151,162	26,287
2012	1,755	151,179	26,532
2013	1,582	169,539	26,821
2014	1,582	164,855	26,080
2015	1,596	207,500	33,117
2016	1,599	198,249	31,700
2017	2,090	205,196	42,886
2018	1,960	163,772	32,093



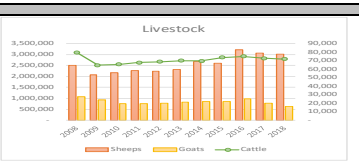
Crop	Olives		
Yr	Area harvested (ha)	Yield (hg/ha)	Production (tonnes)
2009	60,660	23,198	140,719
2010	60,879	28,199	171,672
2011	62,088	21,236	131,847
2012	62,687	24,828	155,640
2013	62,390	20,546	128,186
2014	62,656	24,860	155,764
2015	63,883	31,447	200,896
2016	63,963	18,106	115,813
2017	56,214	25,807	145,073
2018	61,628	25,648	158,064



Crop	Potatoes		
Yr	Area harvested	Yield (hg/ha)	Production (tonnes)
2008	3,800	312,382	118,705
2010	5,797	301,761	174,931
2011	5,885	367,856	216,483
2012	6,038	234,470	141,573
2013	3,403	303,332	103,224
2014	6,389	319,430	204,084
2015	7,256	359,545	188,326
2016	6,839	400,507	273,907
2017	4,008	278,825	111,753
2018	5,795	306,204	177,431



Crop	Livestock		
Yr	Sheeps	Goats	Cattle
2008	2,493,360	1,083,330	79,380
2009	2,070,940	919,740	64,520
2010	2,175,690	751,730	65,390
2011	2,264,600	752,230	67,600
2012	2,233,980	791,980	68,510
2013	2,311,149	836,473	69,738
2014	2,680,261	857,729	69,408
2015	2,596,400	860,200	73,600
2016	3,198,925	977,755	74,742
2017	3,057,948	770,771	72,644
2018	3,022,882	641,977	71,648



Source: Prepared under the basis of FAOSTAT.

Illustration 1. Wicking bed technologies

Source: NARC; 2020.

Table 36. Financial Model 1. Rainfed Barley (per hectare)

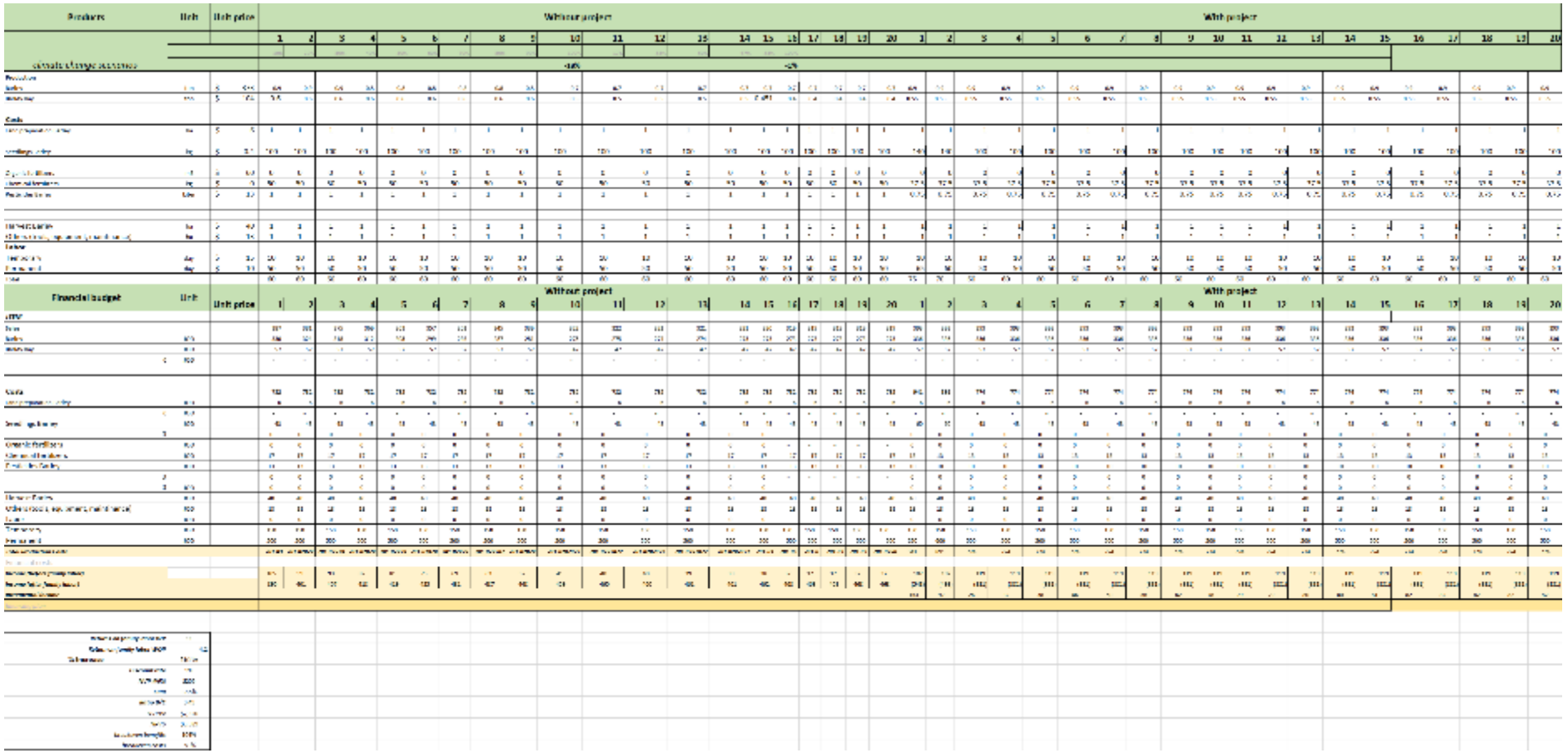


Table 37. Financial Model 2. Rainfed Wheat (per hectare)

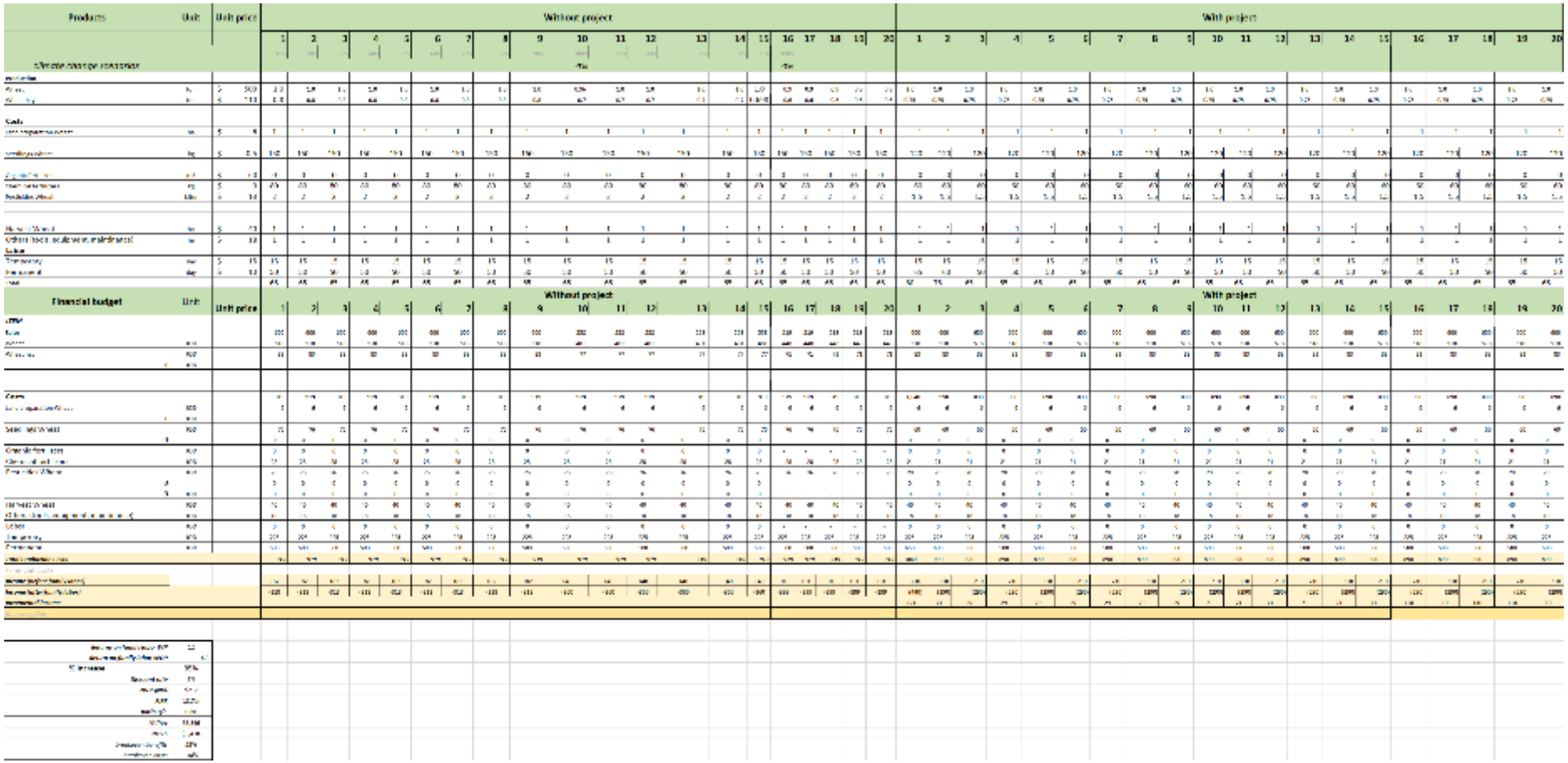


Table 38. Financial Model 3.1 Olives irrigated (per hectare)

Products	Unit	Unit price	Without project																			With project																	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
												0%						0%					90%	95%	100%	100%																
Production																																									
Olive oil	kg/ha	$ 6	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700.0	700	724.5	764.8	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0	805.0
Operational Cost																																									
Establishing Cost	ha	$ 169	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Building and other maintenance	ha	$ 191	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Irrigation access maintenance	ha	$ 159.9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Machinery maintenance	ha	$ 155	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Family labor	days	$ 10	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Land rent	ha	$ 140	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Maintenance	ha	$ 140	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Interest rate on operational costs	ha	$ 85	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Variable Cost	ha		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Plowing	ha	$ 113.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ammonia	ha	$ 34.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Organic matter	ha	50.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Urea	ha	$ 10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Macro and Micro element	ha	$ 34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Herbicides	ha	$ 32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Insecticide	ha	$ 13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Labor	days	$ 10	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Irrigation water	ha	$ 560	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Frield container	ha	$ 42	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Harvesting	ha	$ 15	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Transporting	ha	$ 13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Oil container	ha	$ 85	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Milling Cost		10%																																								
Fuel	ha	$ 14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Interest rate on variable costs	ha	$ 103	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Financial budget	Unit	Unit price	Without project																			With project																	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ITEM																																									
Sales	JOD		3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	####	3,850	3,850	3,850	3,985	4,206	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428
Olive oil	JOD		3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	####	3,850	3,850	3,850	3,985	4,206	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428	4,428
0	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operational Cost			4,193	4,193	4,193	4,193	4,193	4,193	4,193	4,193	4,193	4,193	4,193	4,193	4,193	4,193	4,193	4,193	####	4,193	4,193	4,193	4,195	4,199	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203	4,203
Establishing Cost	JOD		169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Building and other maintenance	JOD		191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191
Irrigation access maintenance	JOD		160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160	160
Machinery maintenance	JOD		155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155
Family labor	JOD		600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
Land rent	JOD		140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Maintenance	JOD		140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Interest rate on operational costs	JOD		85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Variable Cost	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plowing	JOD		113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
Ammonia	JOD		34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Organic matter	JOD		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Urea	JOD		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Macro and Micro element	JOD		34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Herbicides	JOD		32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Insecticide	JOD		13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Labor	JOD		30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Irrigation water	JOD		560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560
Frield container	JOD		42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
Harvesting	JOD		1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	####	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350
Transporting	JOD		13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Oil container	JOD		85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	80	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Milling Cost	JOD		70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	72	76	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Fuel	JOD		14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
Interest rate on variable costs	JOD		103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103
Total Production Costs			4192.9	4192.9	4192.9	4,193	4192.9	4192.9	4192.9	4192.9	4192.9	4192.9	4192.9	4192.9	4192.9	4192.9	4192.9	4193	4193	4193	4192.9	4192.9	4195	4199	4203	4203	4203	4203	4203	4203	4203	4203	4203	4203	4203	4203	4203	4203	4203	4203	4203	4203
Financial costs																																									
Income (before family labor)			287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	419	637	854	854	854	854	854	854	854	854	854	854	854	854	854	854	854	854	854	854
Income (after family labor)			-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	-343	(231)	7	224	224	224	224	224	224	224	224	224	224	224	224	224	224	224	224	224	224
Incremental income																							132	350	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567	567
Discounted																																									

Returns on family labor WP	19
Return on family labor WOP	5
% Increase	317%
Discount rate	9%
NVP @9%	$4,594
FIRR	#VALUE!
Ratio B/C	1.04
NVPc	$38,360
NPVb	$39,824
breakeven benefits	-4%
breakeven costs	4%

1,980
47%

Table 39. Financial Model 3.2 Olives non-irrigated (per hectare)

Products	Unit	Unit price	Without project																			With project																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
												0%						0%					90%	95%	100%	100%																
Production																																										
Olive oil	kg/ha	$ 6	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478.3	478	495.0	522.5	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0
Operational Cost																																										
Establishing Cost	ha	$ 169	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Building and other maintenance	ha	$ 191	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Family labor	days	$ 10	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Land rent	ha	$ 140	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Maintenance	ha	$ 140	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Interest rate on operational costs	ha	$ 68	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Variable Cost	ha		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Plowing	ha	$ 113.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ammonia	ha	$ 34.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Organic matter	ha	50.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Urea	ha	$ 10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Macro and Micro element	ha	$ 34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Herbicides	ha	$ 32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Insecticide	ha	$ 13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Labor	days	$ 30	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Frield container	ha	$ 42	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Harvesting	days	$ 15	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Transporting	ha	$ 13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Oil container	ha	$ 85	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Milling Cost		10%																																								
Interest rate on variable costs	ha	$ 82	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Financial budget	Unit	Unit price	Without project																			With project																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ITEM																																									
Sales	JOD		2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	#####	2,630	2,630	2,630	2,722	2,874	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025
Olive oil	JOD		2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630	#####	2,630	2,630	2,630	2,722	2,874	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025	3,025
0	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operational Cost			2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	#####	2,944	2,944	2,944	2,948	2,949	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951
Establishing Cost	JOD		169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169
Building and other maintenance	JOD		191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191
0	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Family labor	JOD		300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Land rent	JOD		140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Maintenance	JOD		140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Interest rate on operational costs	JOD		68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
Variable Cost	**JOD**		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plowing	JOD		113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
Ammonia	JOD		34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Organic matter	JOD		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Urea	JOD		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Macro and Micro element	JOD		34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Herbicides	JOD		32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Insecticide	JOD		13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Labor	JOD		30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
0	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Frield container	JOD		42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
Harvesting	JOD		1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	#####	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350	1,350
Transporting	JOD		13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Oil container	JOD		85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Milling Cost	JOD		48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	49	52	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
0	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest rate on variable costs	JOD		82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Total Production Costs			***2944.2***	***2944.23***	***2944.23***	***2944.23***	***2944.23***	***2944.23***	***2944.23***	***2944.23***	***2944.23***	***2944.225165***	***2944.23***	***2944.225165***	***2944.22517***	***2944.22517***	***2944.22517***	***2944.22517***	***2944***	***2944***	***2944***	***2944.2***	***2944***	***2944.23***	2946	2949	2951	2951	2951	2951	2951	2951	2951	2951	2951	2951	2951	2951	2951	2951	2951	2951	2951	2951
Production per hectare																																										
Income (before family labor)			16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	107	255	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404
Income (after family labor)			-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	-314	(223)	(75)	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
Incremental income																							90	239	387	387	387	387	387	387	387	387	387	387	387	387	387	387	387	387	387	387
Incremental income																																										

Returns on family labor WP	22
Return on family labor WOP	16
% Increase	35%
Discount rate	9%
NVP @9%	$3,139
FIRR	#(NUM!
Ratio B/C	1.01
NVPc	$26,935
NPVb	$27,208
breakeven benefits	-1%
breakeven costs	1%

1,680
57%

Table 40. Financial Model 4 Grapes (per hectare)

Products	Unit	Unit price	Without project																				With project																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
																							90%	95%	100%	100%																		
																		0%																										
Production																																												
Grapes	kg	$ 2	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	#####	5,000	####	5,000	#####	5,000	5175.0	5462.5	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0	5750.0
Costs																																												
Land preparation	ha	$ 12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Organic fertilizers	m3	$ 60.0	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3
Chemical fertilizers	Tun	$ 343	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Pesticides	Liter	$ 13	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
water irrigation	m3	$ 2	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Harvest	ha	$ 101	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Labor (temporary)	days	$ 15	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Labor (full)	days	$ 10	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
Others (tools, equipment, maintinance)	ha	$ 327.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
			300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300

Financial budget	Unit	Unit price	Without project																				With project																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ITEM																																											
Sales	JOD		10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	#####	#####	####	#####	#####	10,000	10,350	10,925	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500
Grapes	JOD		10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	#####	#####	####	#####	#####	10,000	10,350	10,925	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500
0	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Costs			7,929	7,929	7,929	7,929	7,929	7,929	7,929	7,929	7,929	7,929	7,929	7,929	7,929	7,929	7,929	7,929	####	7,929	7,929	7,929	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127	8,127
Land preparation	JOD		12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
0	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organic fertilizers	JOD		1,320	1,320	1,320	1,320	1,320	1,320	1,320	1,320	1,320	1,320	1,320	1,320	1,320	1,320	1,320	1,320	####	1,320	1,320	1,320	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518	1,518
Chemical fertilizers	JOD		189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189
Pesticides	JOD		780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780	780
water irrigation	JOD		1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	####	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
Harvest	JOD		101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101
Labor (temporary)	JOD		1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	####	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Labor (full)	**JOD**		**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**####**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**
Others (tools, equipment, maintinance)	JOD		327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327
0	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Production Costs			***7,929***	***7928.65***	***7928.65***	***7928.65***	***7928.65***	***7928.65***	***7928.65***	***7928.65***	***7928.65***	***7928.65***	***7928.65***	***7928.65***	***7928.65***	***7928.65***	***7929***	***7929***	***7929***	***7928.7***	***7929***	***7928.65***	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127	8127
Financial costs																																											
Income (before family labor)			3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	3871	4023	4598	5173	5173	5173	5173	5173	5173	5173	5173	5173	5173	5173	5173	5173	5173	5173	5173	5173	5173
Income (after family labor)			2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2071	2,223	2,798	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373	3,373
Incremental income																							152	727	1302	1302	1302	1302	1302	1302	1302	1302	1302	1302	1302	1302	1302	1302	1302	1302	1302	1302
Financing plan																																											

Returns on family labor WOP	22
Return on family labor WP	29
% Increase	25%
Discount rate	9%
NVP @9%	$10,346
FIRR	#¡NUM!
Ratio B/C	1.39
NVPVc	$74,184
NPVb	$103,439
breakeven benefits	-28%
breakeven costs	39%

Table 41. Financial Model 5 Tomato (per hectare)

Products	Unit	Unit price	Without project																			With project																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
																			90%	95%	100%	100%																				
												0%						0%																									
Production																																											
Tomatoe	tonne	$ 252	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42.3	42	43.7	46.2	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6	48.6
Costs																																											
Soil preparation	ha	$ 200	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Manure	ha	$ 600	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fertilizers	ha	750	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pesticides/Herbicides	ha	$ 900.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Irrigation water	ha	$ 250	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mulch	ha	$ 200	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Labor	days	$ 10	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
Boxes	ha	$ 1,750	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Harvesting/Handling/Packaging	ha	$ 15	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Transportation&Shipping	ha	$ 150.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fees and comissions	ha	$ 50.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Interests	ha	$ 450.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Seeds/Seedlings	ha	$ 300.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Land rent	ha	$ 150.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Financial budget	Unit	Unit price	Without project																			With project																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ITEM																																											
Sales	JOD		10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	#####	#####	#####	#####	#####	10,651	11,024	11,636	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249
Tomatoe	JOD		10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	10,651	#####	#####	#####	#####	#####	10,651	11,024	11,636	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249	12,249
0	JOD		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Costs			7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	####	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850	7,850
Soil preparation	JOD		200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Manure	JOD		600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
Fertilizers	JOD		750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
Pesticides/Herbicides	JOD		900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900
Irrigation water	JOD		250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Mulch	JOD		200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Labor	JOD		1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	####	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Boxes	JOD		1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	####	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750
Harvesting/Handling/Packaging	***JOD***		300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Transportation&Shipping	JOD		150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Fees and comissions	JOD		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Interests	JOD		450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Seeds/Seedlings	JOD		300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Land rent	JOD		150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Total Production Costs			***7,850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	***7850***	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850	7850
Financial costs																																										
Income (before family labor)			3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3101	3474	4086	4699	4699	4699	4699	4699	4699	4699	4699	4699	4699	4699	4699	4699	4699	4699	4699	4699	4699
Income (after family labor)			2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	2801	3,174	3,786	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399	4,399
Incremental income																							373	985	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598
Financing cost																																											

Returns on family labor WOP	230
Return on family labor WP	310
% Increase	26%
Discount rate	9%
NVP @9%	$12,945
FIRR	#¡NUM!
Ratio B/C	1.54
NVPVc	$71,659
NPVb	$110,176
breakeven benefits	-35%
breakeven costs	54%

Table 42. Financial Model 6 Wicking beds (per Household)

Products	Unit	Unit price	Without project	With project														
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Losses	5%		1 to 15															
Full development				20%	30%	40%	50%	60%	70%	100%								
Production																		
Tomatoe	kg	0.7		3	7	17	25	42	49	70	70	70	70	70	70	70	70	70
Eggplant	kg	0.7		3	7	15	22	38	44	63	63	63	63	63	63	63	63	63
Lettuce	kg	1		1	2	4	6	10	11	16	16	16	16	16	16	16	16	16
Mint	kg	0.15		2	3	8	11	19	22	32	32	32	32	32	32	32	32	32
Corn	kg	1		0	1	1	2	3	4	5	5	5	5	5	5	5	5	5
Water melon	kg	0.5		1	2	5	7	12	14	20	20	20	20	20	20	20	20	20
Melon	kg	0.5		1	2	5	7	12	14	20	20	20	20	20	20	20	20	20
Investments																		
Wicking bed(Container)	kit	15		1				1	0	0	0	1	0	0	0	1	0	0
Pipe	unit	4		1				1	0	0	0	1	0	0	0	1	0	0
Elbow	unit	1		1				1	0	0	0	1	0	0	0	1	0	0
Fiber or mulch	unit	3		1		1		1	0	1	0	1	0	1	0	1	0	1
Costs																		
Tomato(day)	ls	0.1		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Eggplant(day)	ls	0.1		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Lettuce(week)	ls	0.1		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Mint	ls	0.02		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Corn	ls	0.02		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Water melon	ls	0.02		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Melon	ls	0.02		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Water (harvested from the rooftop)	ls	2.40		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Labor	day	10.00		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total																		
Financial budget	Unit	Unit price	Without projec	With project														
			1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ITEM																		
Sales				7	15	33	49	83	97	139	139	139	139	139	139	139	139	139
Tomatoe	JOD			2	5	12	17	29	34	49	49	49	49	49	49	49	49	49
Eggplant	JOD			2	5	11	15	26	31	44	44	44	44	44	44	44	44	44
Lettuce	JOD			1	2	4	6	10	11	16	16	16	16	16	16	16	16	16
Mint	JOD			0	1	1	2	3	3	5	5	5	5	5	5	5	5	5
Corn	JOD			0	1	1	2	3	4	5	5	5	5	5	5	5	5	5
Water melon	JOD			0	1	2	4	6	7	10	10	10	10	10	10	10	10	10
Melon	JOD			0	1	2	4	6	7	10	10	10	10	10	10	10	10	10
Investments	JOD		0	23	0	3	0	23	0	3	0	23	0	3	0	23	0	3
Wicking bed(Container)	JOD		0	15	0	0	0	15	0	0	0	15	0	0	0	15	0	0
Pipe	JOD		0	4	0	0	0	4	0	0	0	4	0	0	0	4	0	0
Elbow	JOD		0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
Fiber or mulch	JOD		0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3
Costs			0	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Tomato(day)	JOD		0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Eggplant(day)	JOD		0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lettuce(week)	JOD		0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Mint	JOD		0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Corn	JOD		0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Water melon	JOD		0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Melon	JOD		0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Water (harvested from the rooftop)	JOD			2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Labor																		
Total Production Costs			0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Financial costs																		
Income (after family labor)			50	-22	9	25	43	55	92	130	133	110	133	130	133	110	133	130
Incremental income				-72	-41	-25	-7	5	42	80	83	60	83	80	83	60	83	80
Financing plan																		
					0	0	0	0	0									

Returns on family labor WP	16
Return on family labor WOP	10.0
% Increase	61%
Discount rate	9%
NVP @9%	$179
FIRR	21.9%
Ratio B/C	15.22
NVPVc	$45
NPVb	$242
breakeven benefits	-81%
breakeven costs	437%

Table 43. Financial Model 7.1 Growbags 1

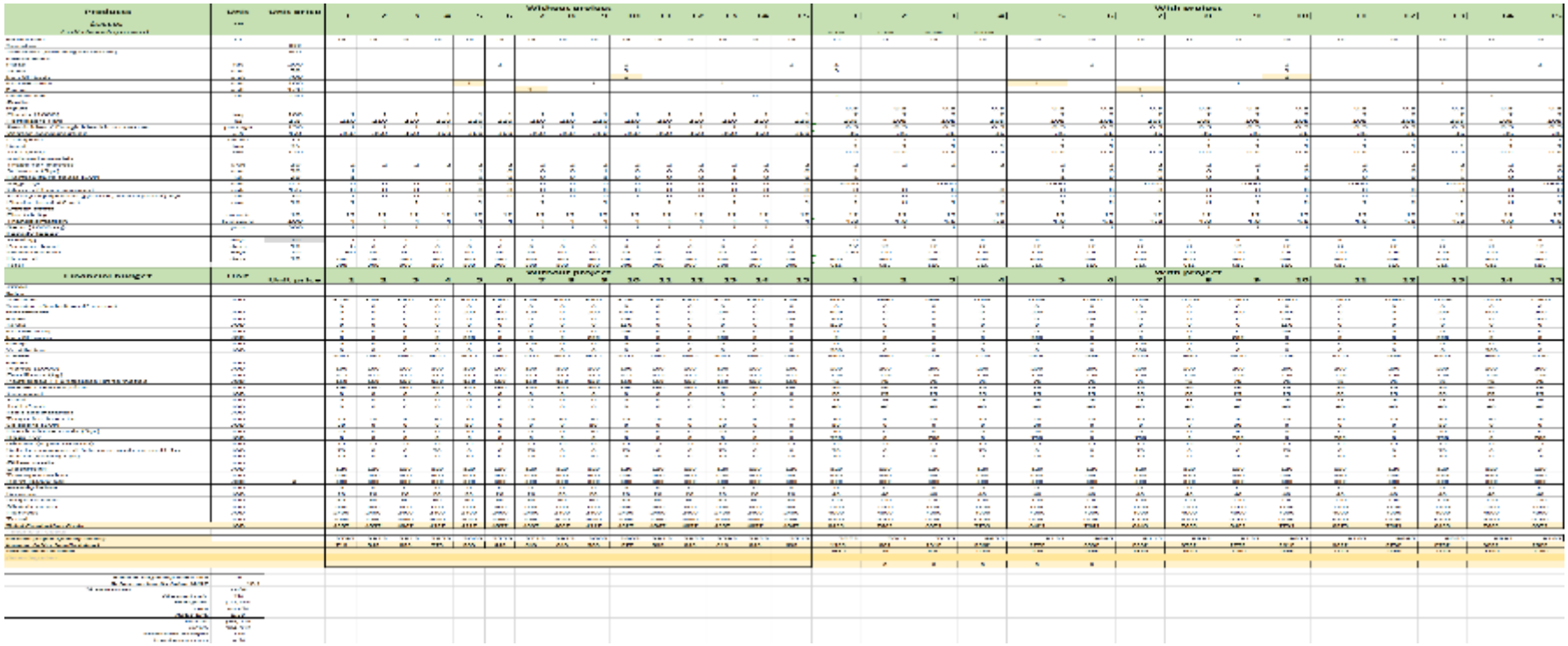


Table 44. Financial Model 7.2 Growbags 2

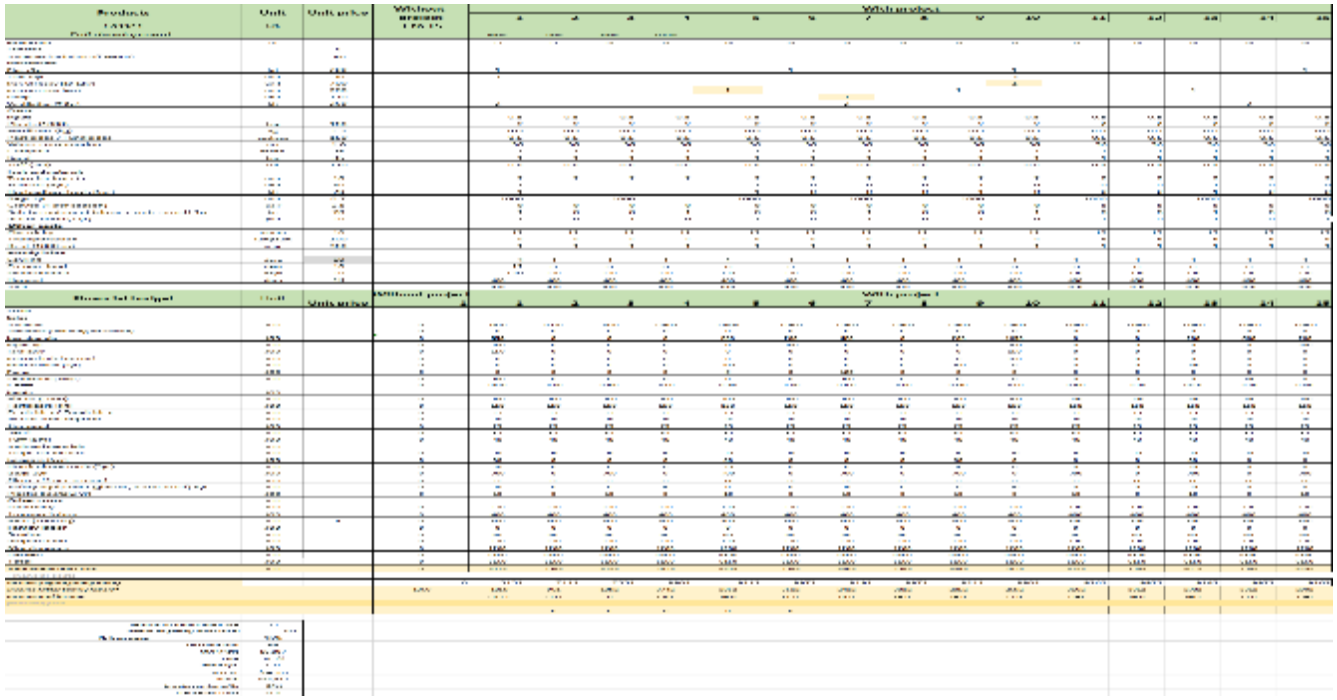


Table 45. Financial Model 8.1 Growbags 3

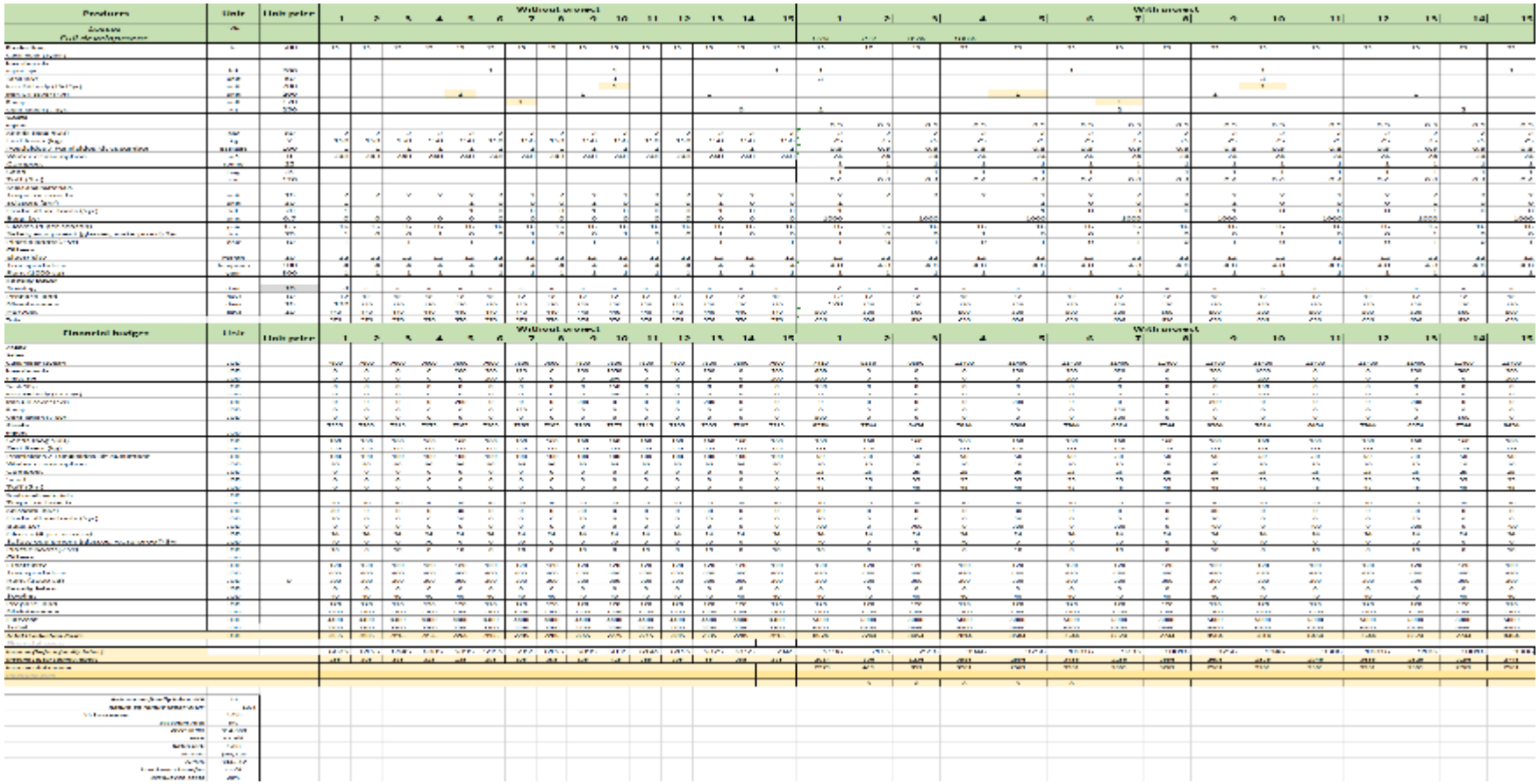


Table 46. Financial Model 8.2 Growbags 4

Products	Unit	Unit price	Without project	With project								
				1	2	3	4	5	6	7	8	9	10
Losses	5%		1to15										
Full development				65%	80%	95%	100%						
Production	tn	500		15	18	22	23	23	23	23	23	23	23
Cucumber (1year)													
Investments													
Pipes 5yr	kit	200		1					1				1
Tank 10yr	unit	50		3									3
Iron GH body (10-12yr)	unit	700											1
Iron GH cover (4yr)	unit	200						1				1	
Pump	unit	120								1			
Ventilation (7-8yr)	kit	250		2						2			
Costs													
Inputs				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Seeds (bag 500)	bag	80		2	2	2	2	2	2	2	2	2	2
Fertilizers (kg)	kg	2		75	75	75	75	75	75	75	75	75	75
Pesticides / Fungicides	package	100		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Water consumption	m3	0.4		24	24	24	24	24	24	24	24	24	24
Compost	tonne	25		1	1	1	1	1	1	1	1	1	1
Sand	bag	35		1	1	1	1	1	1	1	1	1	1
Tuff (5m)	set	120		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Tools and materials													
Traps for insects	unit	10		2	2	2	2	2	2	2	2	2	2
Scissors (5yr)	unit	30		1				1	0	0	0	1	0
Horticulture tools (5yr)	kit	20		1				1	0	0	0	1	0
Bags 1yr	unit	0.7		1000		1000		1000		1000		1000	
Gloves (4 per season)	pair	1.5		16	16	16	16	16	16	16	16	16	16
Safety equipment (glasses, waterproof) 3yr	kit	70		1			1	0	0	1	0	0	1
Plastic boots(2 yr)	pair	10		1	0	1	0	1	0	1	0	1	0
Others													
Electricity	month	10		12	12	12	12	12	12	12	12	12	12
Transportation	lumpsum	100		4	4	4	4	4	4	4	4	4	4
Rent (1000 sq)	year	300		1	1	1	1	1	1	1	1	1	1
Family labor													
Sowing	days	10		4	4	4	4	4	4	4	4	4	4
Prepare land	days	10		12	12	12	12	12	12	12	12	12	12
Maintenance	days	10		120	120	120	120	120	120	120	120	120	120
Harvest	days	10		500	500	500	500	500	500	500	500	500	500
Total				636	636	636	636	636	636	636	636	636	636

Financial budget	Unit		Without project	With project								
		Unit price	1to15	1	2	3	4	5	6	7	8	9	10
ITEM													
Sales													
Cucumber (1year)	JOD		0	7410	9120	10830	11400	11400	11400	11400	11400	11400	11400
Investments	JOD		0	850	0	0	0	200	200	620	0	200	1050
Pipes 5yr	JOD		0	200	0	0	0	0	200	0	0	0	200
Tank 10yr	JOD		0	150	0	0	0	0	0	0	0	0	150
Iron GH body (10-12yr)	JOD		0	0	0	0	0	0	0	0	0	0	700
Iron GH cover (4yr)	JOD		0	0	0	0	0	200	0	0	0	200	0
Pump	JOD		0	0	0	0	0	0	0	120	0	0	0
Ventilation (7-8yr)	JOD		0	500	0	0	0	0	0	500	0	0	0
Costs			0	8494	7664	8374	7734	8424	7664	8444	7664	8424	7734
Inputs	JOD												
Seeds (bag 500)	JOD		0	160	160	160	160	160	160	160	160	160	160
Fertilizers (kg)	JOD		0	113	113	113	113	113	113	113	113	113	113
Pesticides / Fungicides	JOD		0	50	50	50	50	50	50	50	50	50	50
Water consumption	JOD		0	10	10	10	10	10	10	10	10	10	10
Compost	JOD		0	25	25	25	25	25	25	25	25	25	25
Sand	JOD		0	35	35	35	35	35	35	35	35	35	35
Tuff (5m)	JOD		0	48	48	48	48	48	48	48	48	48	48
Tools and materials	JOD												
Traps for insects	JOD		0	20	20	20	20	20	20	20	20	20	20
Scissors (5yr)	JOD		0	30	0	0	0	30	0	0	0	30	0
Horticulture tools (5yr)	JOD		0	20	0	0	0	20	0	0	0	20	0
Bags 1yr	JOD		0	700	0	700	0	700	0	0	700	0	700
Gloves (4 per season)	JOD		0	24	24	24	24	24	24	24	24	24	24
Safety equipment (glasses, waterproof) 3yr	JOD		0	70	0	0	70	0	0	70	0	0	70
Plastic boots(2 yr)	JOD		0	10	0	10	0	10	0	10	0	10	0
Others	JOD												
Electricity	JOD		0	120	120	120	120	120	120	120	120	120	120
Transportation	JOD		0	400	400	400	400	400	400	400	400	400	400
Rent (1000 sq)	JOD	0	0	300	300	300	300	300	300	300	300	300	300
Family labor	JOD		0	0	0	0	0	0	0	0	0	0	0
Sowing	JOD		0	40	40	40	40	40	40	40	40	40	40
Prepare land	JOD		0	120	120	120	120	120	120	120	120	120	120
Maintenance	JOD		0	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
Harvest	JOD		0	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000

Table 47. Financial Model 9.1 Irrigated Alfalfa

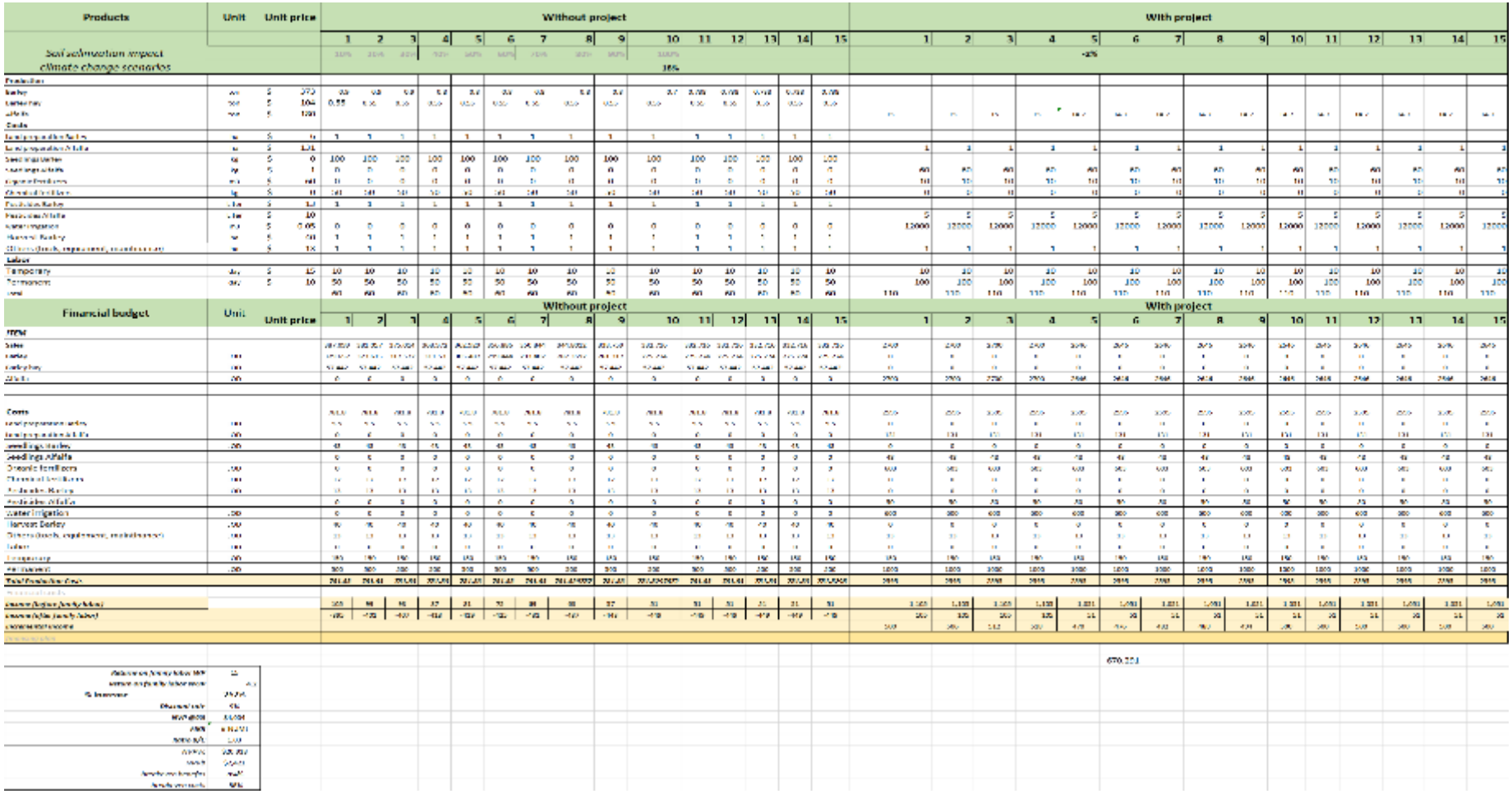


Table 48. Detailed sensitivity tables

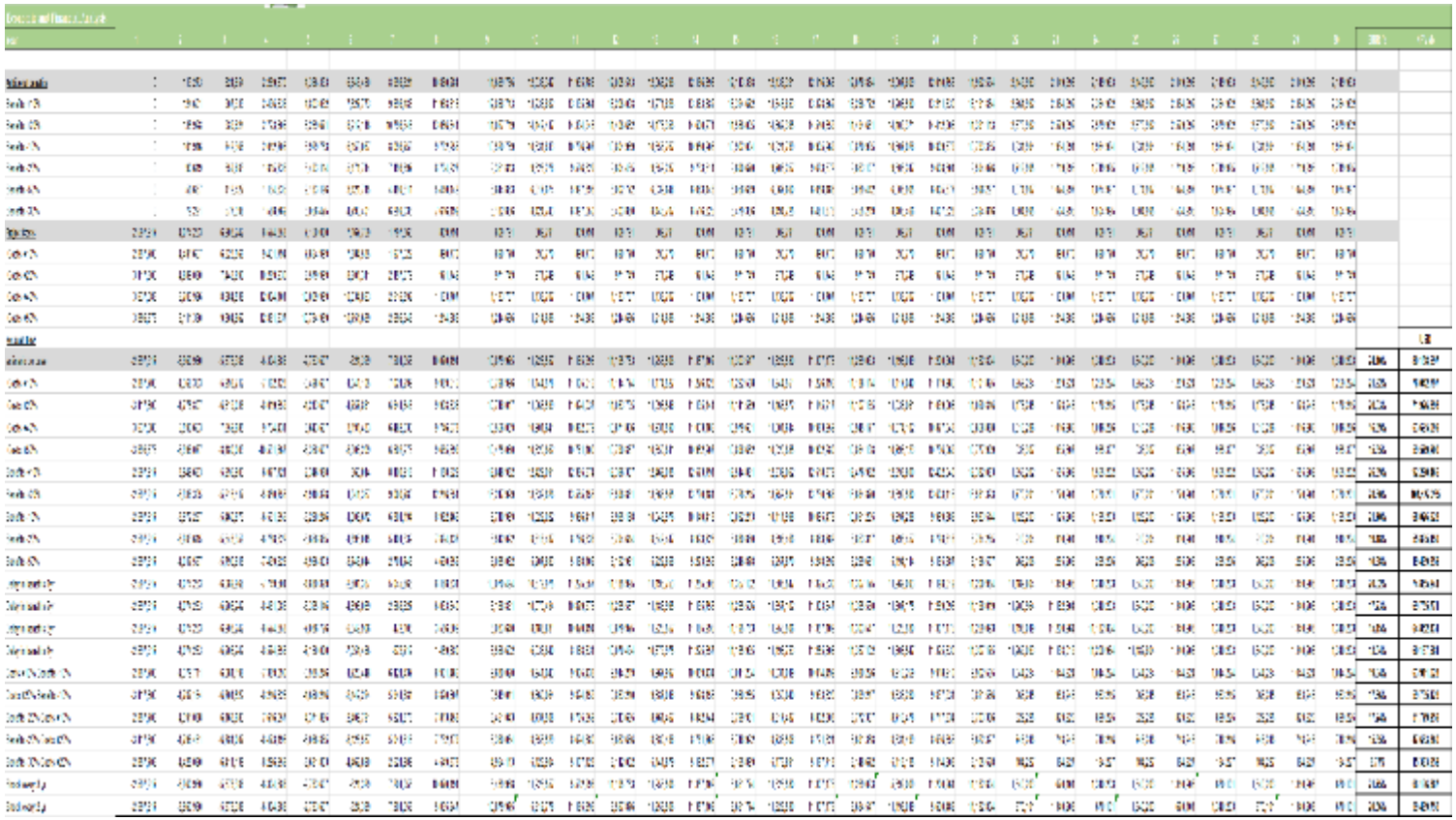
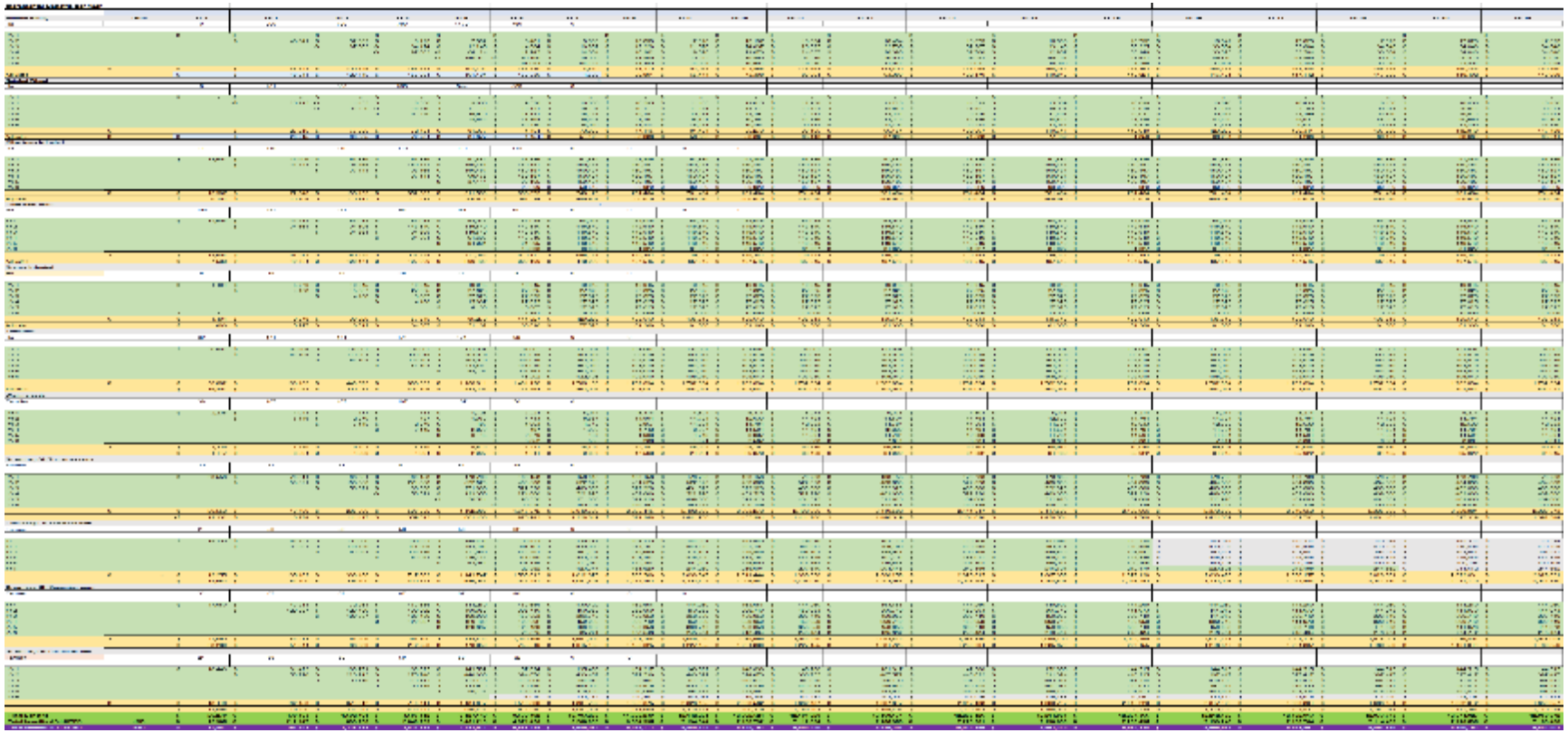


Table 49. Detailed aggregation tables



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