SFD Report

Kharas
Palestinian territories

Final Report

This SFD Report - SFD level 2 - was created through desk-research and interviews by the Palestinian Water Authority (PWA), the Municipality of Kharas, World Waternet (WWn), and Joint Service Council for water and wastewater (JSC).

Date of production: 04/08/2022

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SFD Report Kharas, Palestinian territories, 2024

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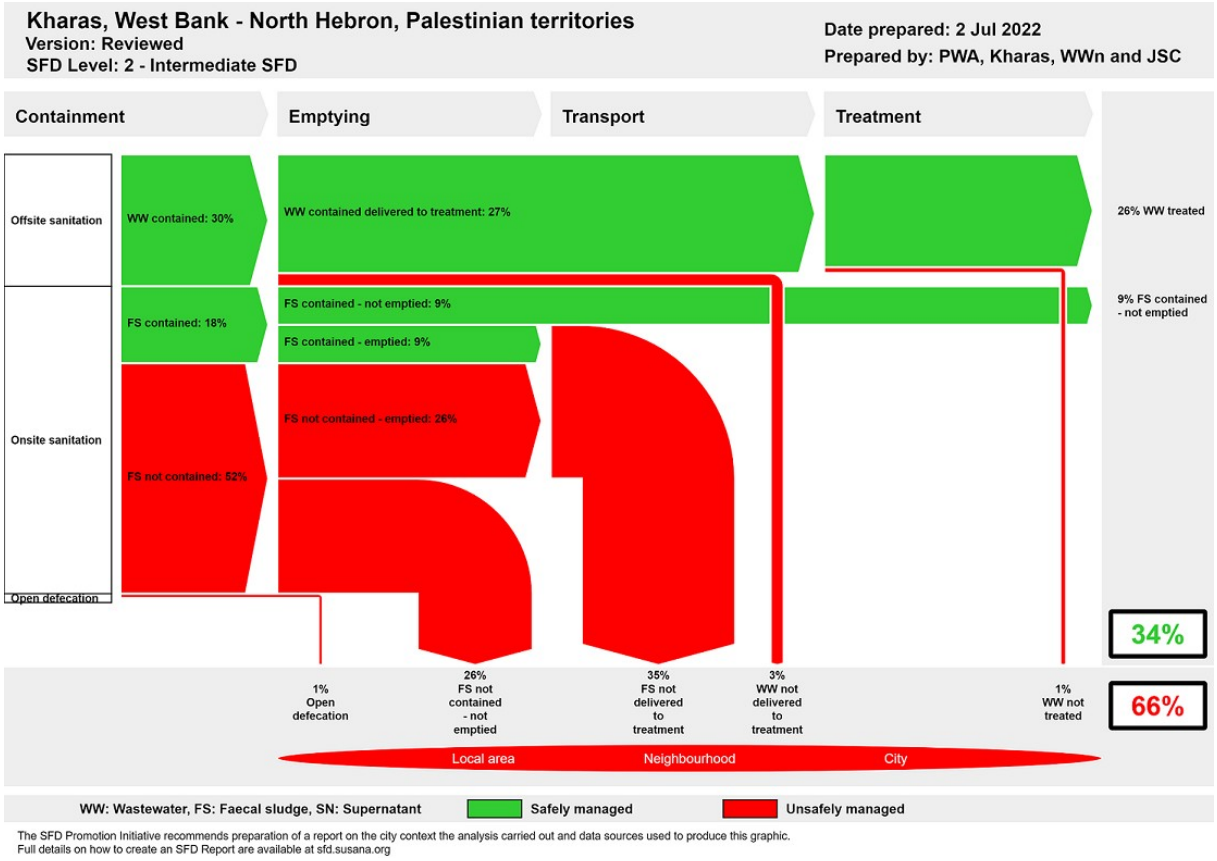
1. The SFD Graphic



The SFD Promotion Initiative recommends preparation of a report on the city context the analysis carried out and data sources used to produce this graphic.
Full details on how to create an SFD Report are available at sfd.susana.org

2. Diagram information

SFD Level:

Intermediate-Level 2 report.

Produced by:

Palestinian Water Authority (PWA) and World Waternet (WWn).

Collaborating partners:

Municipality of Kharas and Joint Services Council for water and wastewater in North Hebron (JSC)

Status: Final SFD report.

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3. General city information

Kharas is a Palestinian village in Hebron Governorate, located 12 km northwest Hebron city, in the south of the West Bank. The village is located within the southern Palestinian mountains, to the north of Wadi Arab. The village is surrounded by Halhul to the east, Nuba and Beit Ula to the south, Surief to the north and the Green Line to the west.

The village has a population of 10,400 inhabitants in 2021 (PCBofS).

The total area of the village counts around the 7,000 dunums (7 km^2). The landscape varies between flat, mountainous and valleys. The average altitude of the village is around 550 m above sea level.

The economy of the village depends mainly on agriculture. Kharas has a Mediterranean climate, that is hot and dry in the summer, with mild winters. The quantity of rainfall varies from year to year, the mean annual rainfall is 480 mm. The average annual temperature is 17 °C, and the average annual humidity is 60 %.

4. Service outcomes

The overview of different sanitation technologies across the sanitation value chain in the Municipality is briefly explained in this section. The Municipality of Kharas has a good registration data system and knows which household is connected and which ones will be connected to the sewer system in the future.

Currently there are three wastewater collection systems used in place:

- ✓ Off-site sanitation: 30% of the population have flush or pour-flush toilets that discharge directly into a central sewage system where wastewater is contained. The collected wastewater flows directly to the new Wastewater treatment Plant (WWTP), treated by activated sludge methodology and reused for agricultural uses. Kharas wastewater collection network with 20 km length covers around 40% of the village area, and the municipality hopes to extend the network to cover all of area town.
- ✓ Onsite sanitation: 70% of the population has a local sanitation system. The two types of onsite systems are septic tanks connected to a soak pit (35%) or to open ground (34.9%). All the emptied faecal sludge is disposed of unttreated into the environment.
- ✓ Open defecation is practised by 0.1% of the population.

The internal water network was established in 1975 from iron. Later, Kharas municipality established new water network polyethylene pipes (plastic pipes) of different diameters.

Due to huge elevation differences, high velocities (and subsequent high pressures) are expected in the systems that cause different problems such as leakages. Percentage of non-revenue water in Kharas is 48%.

The SFD graphic shows that 34% of the excreta generated are safely managed while 66% are unsafely managed. The safely managed excreta generated by 9% of the population is temporary since these onsite systems (septic tanks) will require emptying services as they fill up.

5. Service delivery context

The Water Sector Regulatory Council has the objective to monitor all aspects related to the operation of service providers, with the aim of ensuring services of good quality and efficiency for customers. The Council reports directly to the Cabinet of Ministers. In the present situation there are 300 service providers active in the Palestinian territories. According to the Water Sector Reform Plan, those service providers should merge to form between 10 to 15 Regional Water Utilities by 2030. The Palestinian Water Authority will establish those regional water utilities which will be responsible for drinking and wastewater services in their regions. The establishment will be conducted in line with a regulation issued by the Cabinet of Ministers. Each utility will be responsible for the provision of wastewater services within a specific administrative and geographical scope. The utilities are expected to provide services following sustainable economic, social and environmental principles, as well as implement the required measures and develop the plans and programs to develop these services.

Kharas Municipality is the main service provider in Kharas town since the construction of the wastewater treatment plant and the sewerage network. Service standards are part of the National Water and Wastewater Policy. Kharas Municipality will include in its legislation that a connection to the sewer system, if technically possible, is mandatory. There is no awareness program in place, but this will be developed in the future. Kharas Municipality does inform households about the importance of emptying and discharging their septic tanks properly. Yet, there is still no full commitment to the municipal regulations, which means that collected wastewater is still discharged to the open environment, causing health and environmental problems. An additional problem caused by this behavior is the transboundary wastewater that crosses the Green Line; this is a huge challenge for the municipality and considered as a national political issue for the Palestinian government.

6. Overview of stakeholders

The stakeholder engagement tool of Faecal Sludge Management (FSM) toolbox was the first step in the stakeholder analysis. The main objective of this stakeholder analysis was to identify key stakeholders to facilitate improvements in cooperation on wastewater and create an overview for the sanitation system in Kharas town. The stakeholders that

were classified fall within three categories, These categories include stakeholders at the national, local, and international levels. At the local level, Kharas Municipality is a pilot area for the SFD project.

The FSM tool maps all the stakeholders based on interest-influence using 6- levels: “unknown”, “Little or None”, “Some”, “Moderate”, “High” and “Crucial”. In this case, “Interest” reflects the needs, constraints and problems, which are a priority, and “Influence” is the power of the stakeholder, mainly in terms of the level of control on the decision-making process.

Table 1: Overview of stakeholders (Kharas Municipality, 2022).

Key Stakeholders	Institutions / Organizations
High influence/high interest	
Donor Agencies	Water Aid, Islamic Development Bank, JICA, KfW, The European Union Representative
Local Government	Joint Services Council for Water and Wastewater
National Government	Ministry of Local Government, Palestinian Water Authority
City services provides	Large business, Medium business, Sweepers
High interest / low influence	
City Service providers	Consultant, Mechanical, property developer
National Government	Ministry of Environment, Ministry of Agriculture, Ministry of Health, Water Sector Regulatory Council
Key Representatives of the society	NGOs/CBOs/Welfare groups, Media
Local Government	Local Municipal Authority
Donor Agencies	OXFAM, World Waternet
High influence / low interest	
National Government	Ministry of Finance; Municipal Development and lending Fund
Low influence / low interest	
National Government	Ministry of Education, Ministry of Public Works
City Services provides	Masons
Key Representative of the society	Poor households

7. Process of SFD development

The SFD team consists of four Dutch professionals from Waternet/World Waternet, a Palestinian professional from YEP/PWA, and the Kharas Municipality staff were involved in filling the SFD graphic forms and FSM stakeholder tools, and writing the report.

The stakeholders were directly involved in the SFD project through bilateral meetings, collective workshops, online and digital media platforms, as well as writing/reviewing this report. A factsheet was made in English and Arabic for communication with the stakeholders/partners. The meetings and discussions were used to identify the stakeholders' roles and interests in cooperation within the project and identify challenges facing wastewater in the town.

Data obtained from these meetings and documents review led to a good understanding of the wastewater situation in Kharas. The local government (Kharas Municipality), the national government (PWA), Local government (JSC) are the three governmental bodies that were identified as the important key players in the SFD process. Introductory meetings with these three stakeholders were organized online. The meetings with Kharas Municipality included the staff responsible for the wastewater services in the municipality. During the different sessions, the SFD matrix was explained and further completed based on their knowledge. In case of missing data, assumptions were made based on field experience of the staff of the municipality.

Many stakeholders were indirectly involved in the project, including the Ministry of Health, Ministry of Finance, Ministry of Environment, farmers associations, NGOs, and donors.

The contribution of all stakeholders was highly appreciated and considered of a high value for the content of this report.

8. Credibility of data

The data used to establish the SFD graphic and this report was reliable, complete and actual.

9. List of data sources

The list of data sources to produce this executive summary is as follows:

- Palestinian Central Bureau of Statistics, 2021. Projected Mid -Year Population for Kharas Governorate by Locality 2017-2026.

- Palestinian Water Authority, 2014, Decree No.(14) for the year 2014 Relating to the Water Law.
- Kharas Municipality, 2022. Interview with Municipality staff members.
- United Nations Office for the Coordination of Humanitarian Affairs, 2018. Map of the area, showing the Israeli occupation arrangements in the governorate. (https://www.ochaopt.org/atlas2019/wbclosure.html)

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Abbreviations

CBO	Community-Based Organization
FSM	Faecal Sludge Management
GIS	Geographical Information System
KfW	Kreditanstalt für Wiederaufbau
MACC	Masoud And Ali Contracting Company
NGO	Non-Governmental Organization
PCBS	Palestinian Central Bureau of Statistics
PWA	Palestinian Water Authority
SFD	Shit Flow Diagram
NWWP	National Water and Wastewater Policy
WWn	World Waternet
WWTP	Wastewater Treatment Plant
YEP	Young Expert Program
JSC	Joint Services Council for Water and Wastewater

1 City context

Kharas is located 12 km northwest from Hebron city, in the south of the West Bank (Figure 1). Urban development began Kharas about 300 years ago, around 1700. It was founded on the ruins of an older town that consisted of primarily olive trees and wells.

In ancient times, Kharas was called *Deir Harrach*. 'Deir' relates to an old monastery that stood there, and 'Harrach' to the large forest that surrounded the town. Over time the name transformed into Kharas. Kharas is located amidst a cluster of villages. To the south lies the village of Nuba, which shares borders with the town. On the eastern side, there is Halhul, situated approximately 8 km away. Similarly, to the north, we find Surif, also at a distance of 8 km. Finally, to the west, we have the occupied Palestinian territories.

Given the close proximity of Nuba and Surif to Kharas, it presents an opportunity to develop a collaborative Wastewater Treatment Plant (WWTP) that caters to the needs of all three villages.

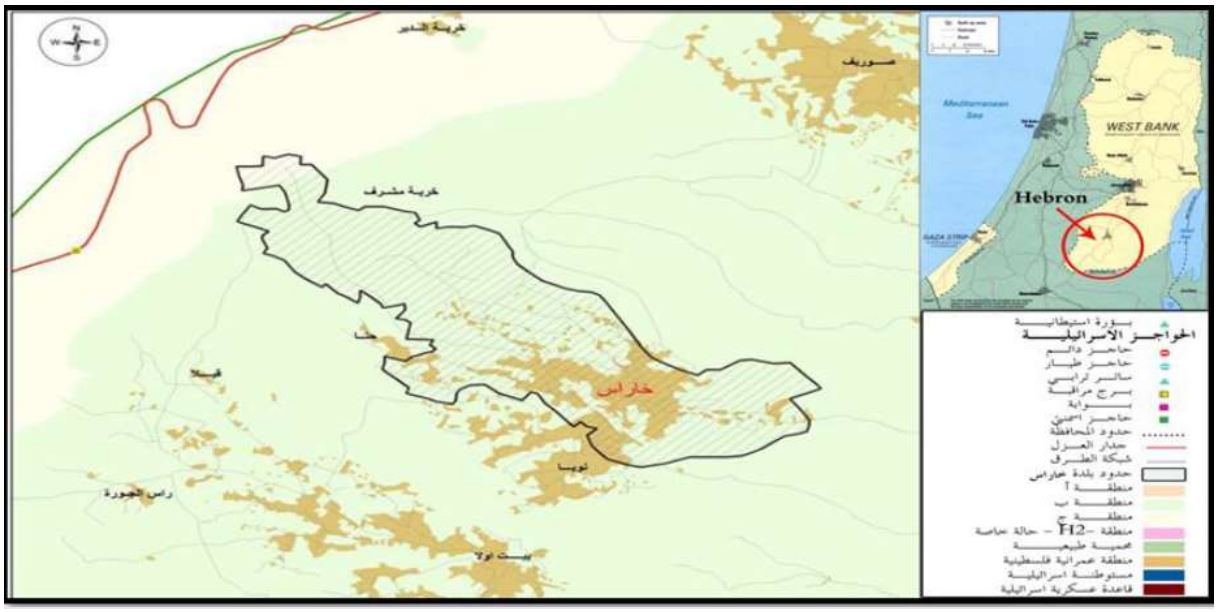

Figure 1: Map of the area, Kharas location and borders.

1.1. Topography and climate

The town of Kharas is located on a mountain range at an altitude of 500-730 m above sea level. The town's climate is characterized by being cold and rainy in winter and moderately hot in summer, while it is mild in spring. The annual average precipitation is 481 mm (Figure 2). The average annual temperature is 17 degrees Celsius, and the relative humidity is 60% (ARIJ Institute of Applied Research, 2009).

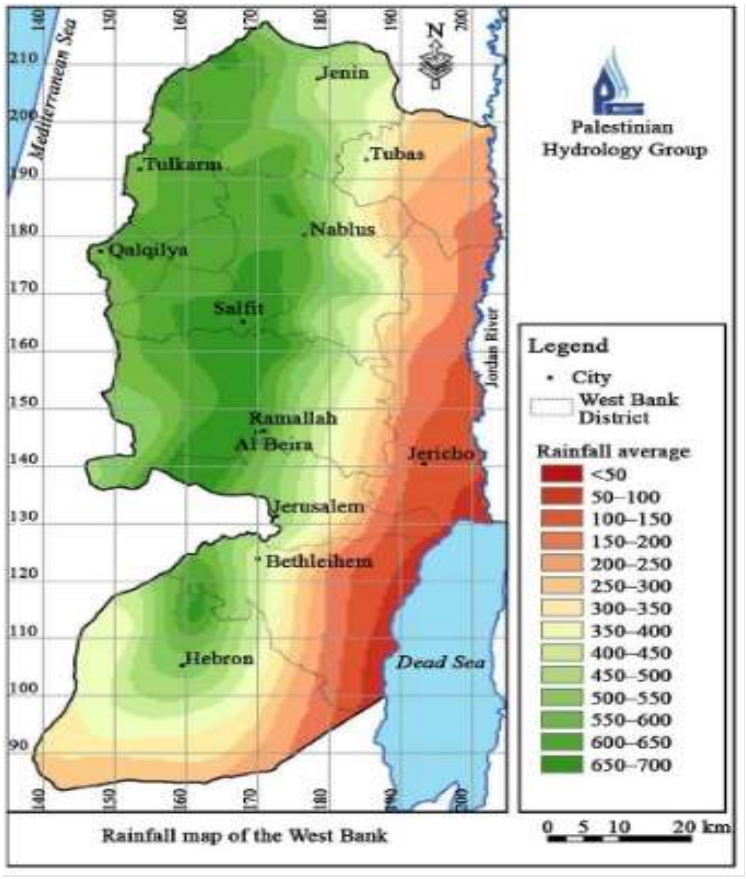

Figure 2: Rainfall map of the Palestinian territories (Amr et al. 2018).

1.2. Town demography

The population of Kharas town for the year (2021) was 10,308 people, 52.4% of them was male, 47.6% was female. As for the distribution of age groups, the community of Kharas is relatively young, as the proportion of individuals under the age of 15 is estimated at 41.5% of the total population of the town in 2017.

2 Service Outcomes

2.1 Overview

Data on sanitation situation were collected through a household survey and meetings and discussions with key stakeholders such as the local government (Kharas Municipality), the national government (PWA), Local government (JSC). other stakeholders were indirectly involved in the project, including Ministry of Health, Ministry of Finance, Ministry of Environment, farmers associations, NGOs, and donors.In case of missing data, assumptions were made based on field experience of the staff of the Municipality.

The sanitation services used in Kharas are a combination of onsite and off-site solutions. Figure 3 shows the sanitation system selection grid.

List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?)	List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?)									
	to centralised combined sewer	to centralised foul/separate sewer	to decentralised combined sewer	to decentralised foul/separate sewer	to soakpit	to open drain or storm sewer	to water body	to open ground	to 'don't know where'	no outlet or overflow
No onsite container. Toilet discharges directly to destination given in List B		T1A1C2			Significant risk of GW pollution Low risk of GW pollution					Not Applicable
Septic tank					T2A2C5 T1A2C5			T1A2C8		
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution					
Lined tank with impermeable walls and open bottom	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution					Significant risk of GW pollution Low risk of GW pollution
Lined pit with semi-permeable walls and open bottom	Not Applicable									Significant risk of GW pollution Low risk of GW pollution
Unlined pit										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied but abandoned when full and covered with soil										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil										
Toilet failed, damaged, collapsed or flooded										
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded										
No toilet. Open defecation	Not Applicable							T1B11 C7 TO C9		Not Applicable

Figure 3: SFD selection grid.

2.2 SFD Matrix

The city has a dedicated sewerage system used by 30% of the population while onsite sanitation systems are used by 69.9% of the population. The remaining 0.1% corresponds to people practising open defecation. The two types of onsite systems are septic tanks connected to a soak pit or to open ground (Figure 4).

Figure 4 also summarizes the sanitation systems in use, as well as estimates of the population connected to each system. For the onsite sanitation systems, it shows the proportions of each from which faecal sludge is then emptied, transported to treatment and

treated. For the offsite systems (toilet discharging to a centralised sewer), it shows the proportion of wastewater delivered to treatment and treated.

Kharas, West Bank - North Hebron, Palestinian territories, 2 Jul 2022. SFD Level: 2 - Intermediate SFD
Population: 10308
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks: 100%

Containment						
System type	Population	WW transport	WW treatment	FS emptying	FS transport	FS treatment
	Pop	W4a	W5a	F3	F4	F5
System label and description	Proportion of population using this type of system (p)	Proportion of wastewater in sewer system, which is delivered to centralised treatment plants	Proportion of wastewater delivered to centralised treatment plants, which is treated	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated
T1A1C2 Toilet discharges directly to a centralised foul/separate sewer	30.0	90.0	95.0			
T1A2C5 Septic tank connected to soak pit	17.5			50.0	0.0	0.0
T1A2C8 Septic tank connected to open ground	34.9			50.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	0.1					
T2A2C5 Septic tank connected to soak pit, where there is a 'significant risk' of groundwater pollution	17.5			50.0	0.0	0.0

Figure 4: SFD Matrix.

2.3 Sanitation technologies

Off-site sanitation:

30% of the population has flush or pour-flush toilets that discharge directly into a centralized sewerage system where wastewater is contained. As shown in the SFD matrix. The sewer system at the moment is the responsibility of the Municipality of Kharas. This percentage is expected to increase up to 45% in 2023, once the municipality finishes several wastewater infrastructure projects.

According to data received from the municipality in 2021, the sewerage network has a total length of 20 km (see Figure 5 for a overview of the sewage system of the city of Kharas).

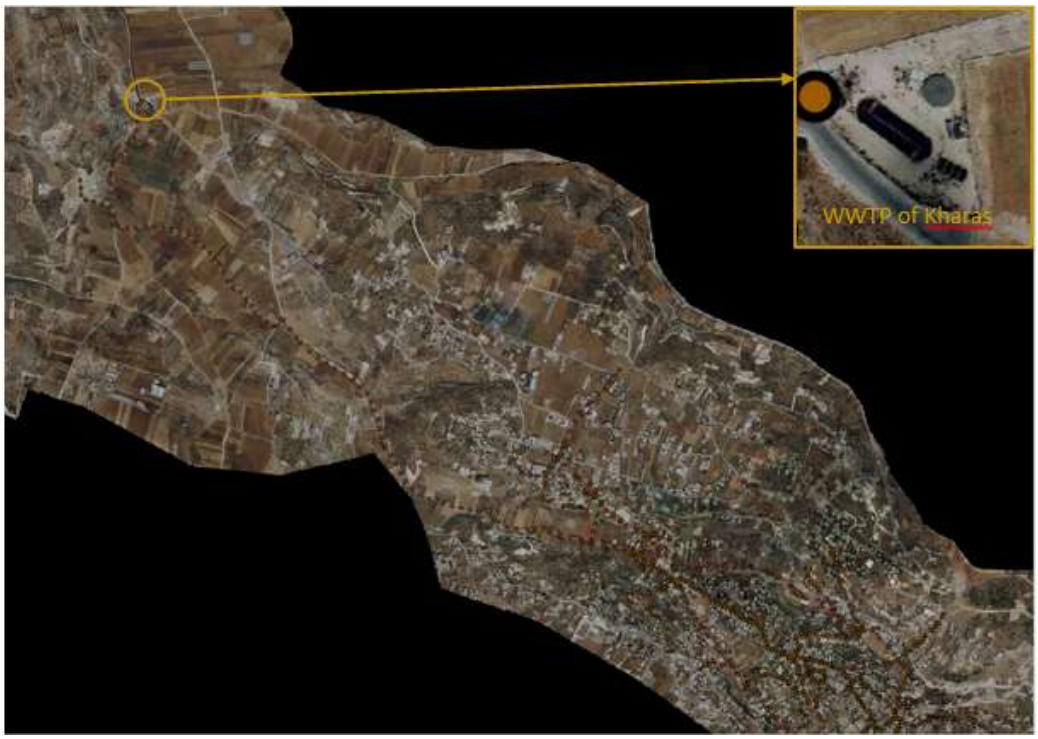

Figure 5: GIS view of the sewage network and the WWTP of Kharas.

In 2021 Kharas Municipality finished constructing a Wastewater Treatment Plant (WWTP) to improve service for existing and new customers and enhance the effect of wastewater on agriculture and groundwater and eliminate of the problem of wastewater discharge in the nature.

The WWTP of Kharas is using activated sludge method that contains 3 stages (Figure 6 to Figure 10):

1. The primary treatment: This stage aims at removing the coarse wastes by using coarse screen and mechanical screen.
2. The secondary treatment (biological treatment): The wastewater in this stage is treated by using aerobic bacteria and mechanical aerator are used to provide bacteria with oxygen. A concrete aeration tank with 1,000 m^3 is used in this stage. The last step into the biological treatment is the sedimentation process: circular clarifier tank is used. After that, the treated water is pumped into a sand filter tank, as a tertiary treatment to improve water quality.
3. The disinfection stage: The treated wastewater is disinfected by chlorination. The disinfected water is then stored in a 500 m^3 irrigation tank. This tank provides the local farmers with water for agricultural use.

Figure 6: Picture of the WWTP of Kharas town (aeration tank for the biological treatment).

Figure 7: Picture of the WWTP of Kharas town (screening and sludge line).

Figure 8: Picture of the WWTP of Kharas town (mechanical aerator).

Figure 9: Picture of the WWTP of Kharas town (general view).

Figure 10: Picture of the WWTP of Kharas town (Clarifier).

The effluent quality is continuously monitored. Recently a new laboratory has been added to the WWTP to facilitate the monitoring process.

Onsite sanitation:

69.9% of Kharas Municipality is unsewered. All the inhabitants are using septic tanks as onsite collection systems.

35% of the population use flush or pour flush toilets that discharge into a septic tank and thereafter in a soak pits. According to the municipality staff, 50% of those soak pits are working properly and 50% are not working properly (clogged). They have been modelled respectively as system T1A1C5 (17.5%) and T2A1C5 (17.5%).

34,9% are flush or pour flush toilets that discharge in septic tanks and thereafter into the ground. They have been modelled as system T1A1C8.

Figure 11: Septic tank being emptied and an example of dumping the faecal sludge (Wadii) (Municipality of Nuba).

The emptied faecal sludge from the septic tanks is disposed of untreated into the environment by places called Wadii's. Figure 11 shows a septic tank being emptied and an example of dumping the faecal sludge (Wadii).

Open defecation:

0.1% of the population practise open defecation (T1B11C7TOC9).

2.3.1 Risk of groundwater contamination

PWA in the West Bank use groundwater as the main source of water, representing more than approximately 90% of the total water supply. Groundwater, in the form of wells and springs, comprises the main sources of water in the West Bank, the land of which is limestone with karstic characteristics (Zohud and Alam, 2022).

Spring water is naturally found where groundwater emerges from the Earth's surface in a defined flow. While water from natural spring represents an important source of drinking water, its quality is currently being seriously threatened by microbiological and chemical contamination. Spring water can be described as any natural occurrence where water flows onto the surface of the Earth from below. Springs are key elements of the natural environment that respond sensitively to any changes occurring in natural ecosystems and can therefore be classified as important hydrogeological indicators. However, this form of groundwater is incredibly vulnerable to pollution given the karstic nature of the aquifer and due to various human activities resulting in untreated wastewater, pesticides, chemical fertilizers, livestock farm waste, and unsanitary landfills. Importantly, an increase in any one of the physico-chemical and biological parameters in groundwater beyond the permissible limits indicated by the World Health Organization (WHO) guidelines and the Palestinian National Standards (PSI) may result in damage to human health (Zohud and Alam, 2022).

Since there is no specific data on the groundwater characterization in the area and for the purposes of creating the SFD graphic, clogged septic tanks connected to a soak pit were assumed to have the potential of contaminating the groundwater. Therefore, half of the septic

tanks were assumed as located in areas of high risk of groundwater contamination (T1A2C5, 17.5%) while the other half were considered to be located in areas of low risk of groundwater contamination (T2A2C5, 17.5%).

2.4 Summary of Assumptions

Offsite sanitation systems:

- ✓ 30% of the population is connected to the sewer system. Since the wastewater treatment plant is new but the sewer network a bit older, variables W4a (proportion of wastewater delivered to treatment) has been set to 90% and W5a (proportion of wastewater delivered to treatment which is treated) has been set to 95% (COD removal is 93,5 %, BOD removal 96,3% and TSS removal is 95,5%).

Onsite sanitation systems:

- ✓ The proportions of Faecal Sludge (FS) in septic tanks and fully lined tanks, lined tanks with impermeable walls and open bottom and all pits were set to 100% according to the relative proportions of the systems in the municipality, as per the guidance given in the Frequently Asked Questions (FAQs) in the Sustainable Sanitation Alliance (SuSanA) website.
- ✓ Variable F3 (proportion of FS which is emptied was set to 50%). 50% is an estimation made by the municipality. The household survey in Kharas was not always easy to follow. With the available data and field experience, 50% was chosen as representative percentage for the situation.
- ✓ Variable F4 (proportion of FS emptied which is delivered for treatment) was set to 0% because the faecal sludge is not delivered to treatment but released into the environment untreated by places called Wadii's.
- ✓ Variable F5 (proportion of FS delivered to treatment which is treated) was set to 0%.

2.5 SFD Graphic

The outcome of the SFD graphic shows that 34% of the excreta flow is classified as safely managed, and the remaining 66% is classified as unsafely managed (Figure 12).

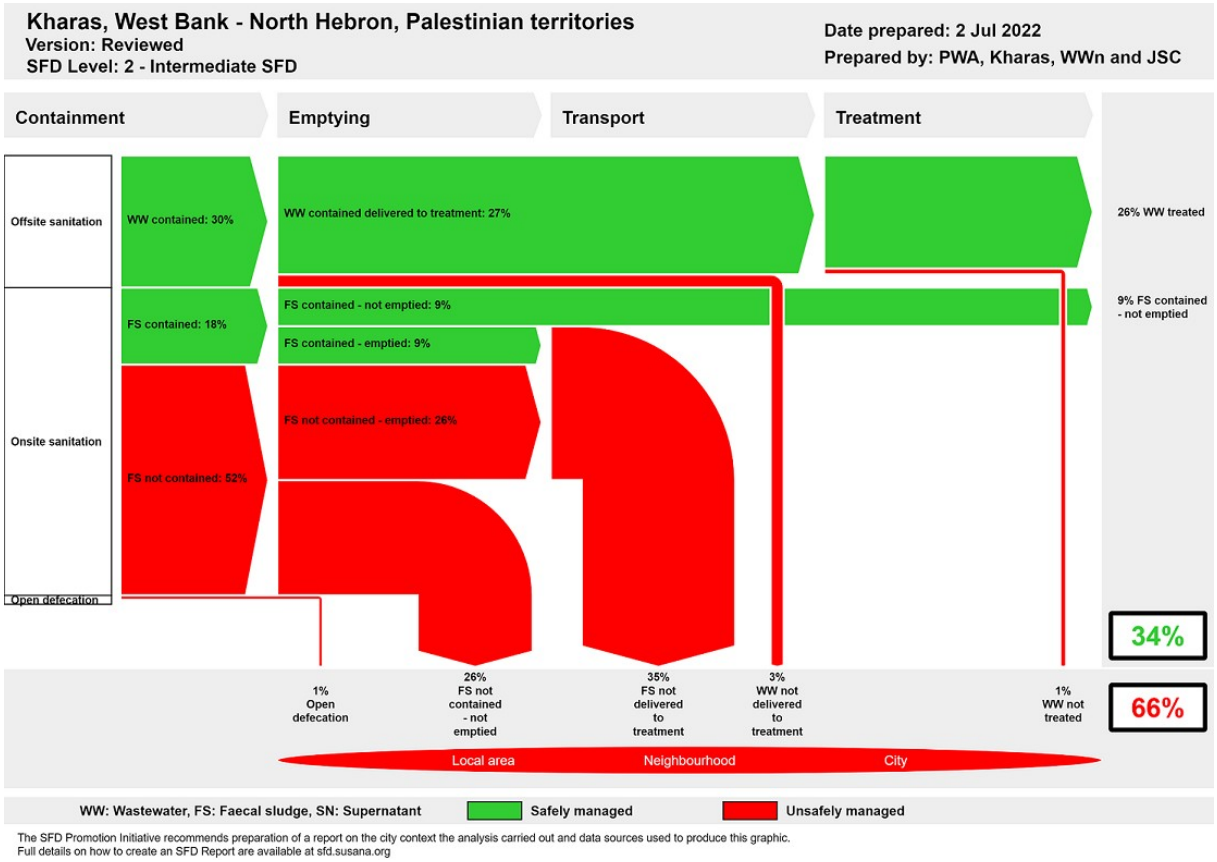

Figure 12: SFD Graphic.

The unsafely managed excreta originate from wastewater not delivered to treatment (3%), wastewater not treated (1%), Faecal Sludge (FS) both contained and not contained - not delivered to treatment (35%) and FS not contained - not emptied (26%).

The safely managed excreta originate from wastwater delivered to treatment and treated (26%) and FS contained - not emptied (9%). However, this 9% resembles the FS stored in containments without significant risk to groundwater pollution. Thus, the safely managed percentage of FS generated by this 9% of the population is temporary until the FS from the containments is emptied. Therefore, these systems will require emptying services in the short and medium term as they fill up.

It is expected that 15% of the population using onsite sanitation systems (septic tanks) will be connected to the sewerage system before the end of 2023.

The context-adapted SFD graphic, which represents the future situation in Kharas, has been included in section 7.2 (Appendix 2).

3 Service delivery context

3.1 Policy, legislation and regulation

3.1.1 Policy

The main documents relating policy and legislation are

- ✓ The National Water and Wastewater Policy, 2013-2032.
- ✓ The Water Law, 2014.
- ✓ Water Users Association Regulation, 2018.

Table 1 shows an overview of the previous/underlying laws or regulations.

Table 1: Overview of water laws and regulations in the Palestinian territories (Kharas Municipality, 2012).

Policy	Year	Law or regulation
National Water and Wastewater Policy 2013-2032	1995	National Water Policy
	1997	Draft Water Resource Management Strategy
	1999-2004	Coastal and Aquifer Management Plan (CAMP)
	2000	Water Sector Strategy Planning Study (WSSPS)
	2000	Water National Plan (NWP)
	2011-2013	Strategy for the Water and Wastewater Sector
Water Law 2014	1997	Palestinian Local Government Law
	1999	Environmental Law No 7 and amendments
	2002	Water Law
	2003	Basic Law and amendments
	2003	Agricultural law
Water Users Association Regulation 2018	2003	Basic Law
	2014	Water Law

3.1.2 Institutional roles

The Water Sector Regulatory Council

The Council has the objective of monitoring all aspects related to the operation of service providers, with the aim of ensuring good quality and efficiency for customers. The council reports to the Cabinet of Ministers in a semi-annual report. The council has the following responsibilities and authorities:

- ✓ Monitoring operational processes of wastewater management.
- ✓ Ensuring that wastewater treatment costs take into consideration the interests of all concerned parties.
- ✓ Monitoring the compliance of the National Water Company and service providers with the adopted standards for the provision of water and sanitation services.

Regional Water Utilities and Water Users Associations

At the moment there are 300 service providers active in the Palestinian territories. According to the Water Sector Reform plans, those service providers will merge into 10 to 15 Regional Water Utilities by the year 2030. The Palestinian Water Authority will establish regional water utilities which will be responsible, among others, for wastewater services. The establishment will be regulated in line with a regulation issued by the Cabinet of Ministers. Each utility will be responsible for the provision of wastewater services within a specific administrative and geographical region. The utilities are expected to provide services following sustainable economic, social and environmental principles, as well as implement the required measures and develop the plans and programs to develop these services (PWA, 2014).

3.1.3 Service provision

Kharas Municipality is the main service provider in Kharas since the construction of the wastewater treatment plant and the sewerage network. Currently 30% of the town is connected to the main sewer. The other 70% depend on private service providers to empty their septic tanks. The FS of septic tanks is emptied to the environment (Waddi's).

3.1.4 Service standards

Service standards are part of the national water and wastewater policy. Kharas Municipality will include in the legislation that a connection to the sewer system, if technically possible, is mandatory. Kharas Municipality and Joint Service Council will be solely responsible for wastewater services. Kharas Municipality charges a fee to connect to the sewer network. On the other side, the inhabitants pay a yearly fee for the sewer connection, which is not met with the National Water and Wastewater Policy (NWWP). The wastewater treatment plant is just operational, so it is possible that certain hitches need to be fixed until the desired service standard is reached.

There is no tariff for emptying the septic tanks used in Kharas; the fixed price paid by the citizens equals to 56 US$ for 5 m^3 capacity of vacuum trucks.

Also, as mentioned, not all citizens in Kharas have sewer services, so on the other hand, the citizens who have wastewater services pay the following:

- The water subscription fee is 1.5 "Jordanian dinar" (US$ 2.1) per 1 m^2.

- Fixed price every month is US$ 7.

There is partnership between World Waternet and the Palestinian Water Authority (PWA) for the application of the tariff (Government decision to apply uniform tariff, as stated by the Unified Water and Wastewater Tariff System Decree No. (4) of 2021).

3.2 Planing

3.2.1 Service targets

Kharas Municipality is in the process of extending its main sewerage system with 9 km, which will result in a coverage of 50% by the end of the year 2023. The priority now is for 3 Km, since it will cover a distinct area with high pollution. However, Kharas Municipality is still looking for a donor to support and fund this project.

3.2.2 Investments

The old water treatment plant

In 2003, the municipality built a small WWTP with a capacity of 100 m^3/day funded by the OXFAM, including a 2 km sewer line.

Due to population growth and spread, the old WWTP became close to residential areas and broke down as a result of overload due to the extension of the wastewater collection network to cover more areas in the town. At this time, the wastewater flowed to the valley, this resulted in risks for health and affected agriculture activities and the groundwater quality. Therefore the town needed a new WWTP to solve this problem.

Current water treatment plant (2020-until now)

In 2020, the organization Doofish company built the new wastewater treatment plant (the present WWTP).

The project was funded by OXFAM, the Economic and social Development Centre in Palestine (ESDC) and Kharas Municipality.

3.3 Equity

3.3.1 Current choice of services for the urban poor

Kharas Municipality applies one tariff for all its inhabitants connected to the sewage system.

3.3.2 Plans and measures to reduce inequity

Currently there are no plans to implement a system to categorize the tariffs.

3.4 Outputs

3.4.1 Capacity to meet service needs, demands and targets

Due to the geographical constrains, 5% of the population will not be able to connect to the sewer system. The wastewater treatment plant should be sufficient for 95% of the Kharas area that can be connected.

3.4.2 Monitoring and reporting access to services

The WWTP and sewerage network are relatively new and there is no monitoring and thus reporting yet in place. The monitoring and reporting access to services will be developed in the future.

3.5 Expansion

3.5.1 Stimulating demand for services

There is no awareness program in place, but this will be developed in the future. Kharas Municipality does inform homeowners about the importance of emptying their septic tanks and using them properly, so there is no negative impact on the environment. There is a system for enforcement and regulation in place.

3.5.2 Strengthening service provider roles

Kharas Municipality is the main service provider and works in collaboration with the municipality of Nuba.

Kharas and Nuba provide this service for the citizens, and they are working to improve wastewater services with the following purposes:

1- Under framework PWA, studies have been done for the wastewater of the all area in North Hebron in order to expand the WWTP.

Proposed location for the Wastewater Treatment Plant

The proposed location of the new WWTP in catchment area C7 (Strategic Plan WW Management North Hebron, not issued yet), is located 1.3 km to the east of the Green Line and 2 km to the northwest of Kharas village at an elevation of 360 m above sea level. It is the same site as it is now. The coordinates of the site are 116143 Northing and 1509623 Easting (Figure 13). The land is agricultural land and part of a wide wadi flood plain. The land is currently allocated for the construction of New Kharas WWTP. More land will be needed to construct an additional trench of the wastewater treatment to treat wastewater from the other villages listed in Figure 14.

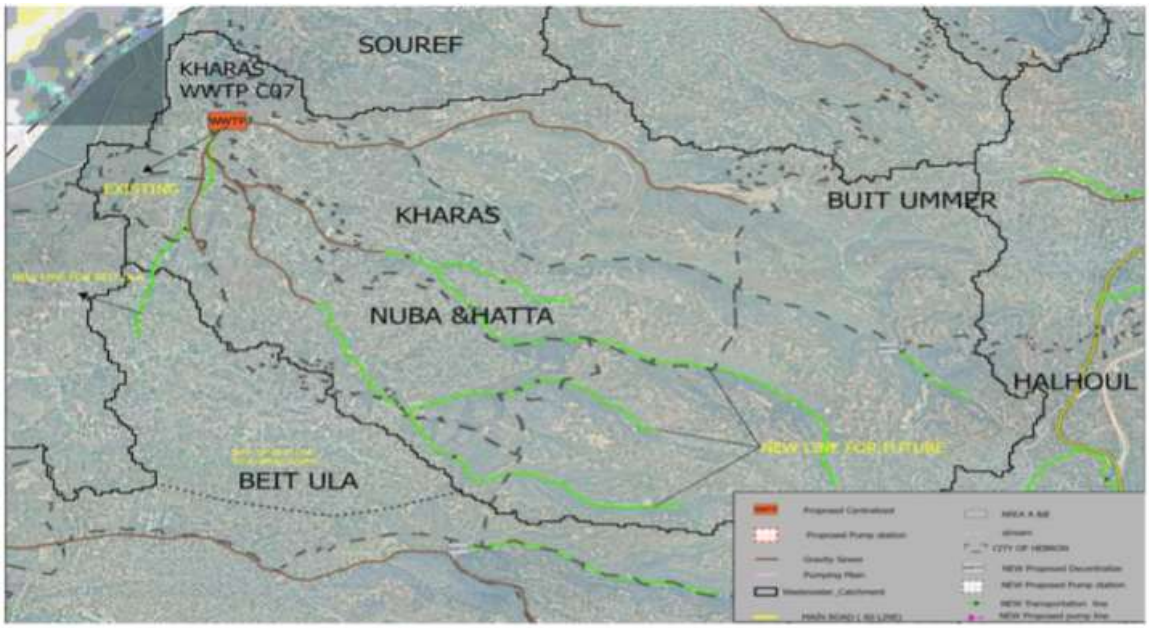

Figure 13: Catchment C7 - Kharas/Beit Ula boundaries.

		Year 2045							
Centralized WWTP	Communities attributed	% attribution	Collection type	Population covered	Average Water Demand*	Wastewater generation*	Percentage network connection	Population sewered	Average dry weather flow
Unit		%	/	inh	m3/d	m3/d	%	inh	m3/d
C7 - Kharas/Beit Ula	**Kharas**	**100**	Network	16,809	2,299	1,775	75%	12,607	1,553
	Nuba	**100**	Network	10,356	1,417	1,094	75%	7,767	957
	Beit Ummar	20	Network	6,245	854	659	75%	4,683	577
	Beit Ula	**96**	Network	25,666	3,511	2,710	75%	19,250	2,372
	Halhul	20	Network	9,943	1,360	1,050	75%	7,457	919
	Small scattered communities	100	Tanker	3,519	439	338	0%	0	17
Total C7 - Kharas/Beit Ula				**72,538**	**9,881**	**7,626**		**51,764**	**6,394**

Figure 14: Communities served by C7.

2- Under framework PWA, there is some ongoing working to make a new tariff for wastewater, since there is a legal tariff for wastewater in the Westbank: "The Unified Tariff System for Water and Wastewater No. (4) for the year 2021 AD" which is decided by the Council of Ministers.

3- Under framework PWA, February 2023, establishing a new Kharas laboratory for wastewater to monitor the quality of the treated wastewater at Kharas WWTP. This is the first laboratory in North Hebron, and in the future it will be the central lab for all areas in the region; it will provide services for more than 250,000 citizens covering an area of 500 square kilometres.

4- Improve treated wastewater reuse. The current situation is that there is a 50 mm polyethylene irrigation line with length of 1,000 m, and the proportion of agricultural area covered by gravity is little compared with the available agricultural areas. This improvement will be as follows:

- Making agreements with farmers for the the treated wastewater reuse.
- Contact with doners to provide irrigation network to support farmers.
- Contact with doners to provide irrigation pipes to cover most agricultural areas.

4 Stakeholder Engagement

After the establishment of the SFD team, a stakeholder analysis was carried out. The main objective of this stakeholder analysis was to identify key stakeholders to facilitate improvements in cooperation on wastewater management and to create an overview for the sanitation system in Kharas. The stakeholder engagement tool of the FSM (Faecal Sludge Management) toolbox was the first step in the stakeholder analysis.

The summary of the FSM tool is shown in Table 2. The full report is added in Appendix 1.

Table 2: Overview of stakeholders (FSM toolbox, 2021).

Typology	Stakeholder Types	Stakeholder Names
National Government	Ministry of public works	Minister of Public Works and Housing
	Ministry of finance	Ministry of Finance and Planning
	Ministry of Education	Directorate of Education/ North Hebron/Government Organization
	The Municipal Development and Lending Fund (MDLF)	The Municipal Development and Lending Fund (MDLF)
	- Municipal Development and Lending Fund (MDLF)	- Municipal Development and Lending Fund (MDLF)
	Water Sector Regulatory Council	Water Sector Regulatory Council (WSRC)
	Ministry of Health	North Hebron Health Directorate/Government Organization (MOH)

	Ministry of Agricultural	North Hebron Agricultural Directorate/Government Organization (MOA)
	Ministry of Local Government	Local Government Directorate - Hebron /Government Organization (MOLG)
	Ministry of Environmental Quality	Enviromental Quility Authority - Hebron /Government Organization (EQA)
	Palestinian Water Authority	Palestinian Water Authority (PWA)
Local Government	local municipal authority	Kharas Municipality
	Joint Service Council	Joint Serves council for Water and Waste water in North Hebron
Key Representatives of the society	Poor households	Poor households
	Better-off households	Better-off households
	NGOs/CBOs/welfare groups	Union of Agricultural Work Committees (UAWC) Palestinian Agricultural Relief Committees (PARC) Union of Palestnian Water Service Providers (U.P.W.S.P)
City service providers	Masons	Masons
	Consultants	Consultants
	Mechanical and manual emptiers	Mechanical and manual emptiers
	Sweepers/sanitation laborers	Sweepers/sanitation laborers
	Medium business owners	Medium business owners

	(general)	(general)
	Large business owners & industrialists (general)	Large business owners & industrialists (general)
	Landlords	Landlords
	Potential end users - farmers/industries	Potential end users - farmers/industries
	Property developers	Property developers
Donor Agencies	OXFAM	OXFAM
	The European Union Representative	The European Union Representative
	WATER AID	GIZ West Bank and Gaza US Agency for International Development
	KfW Development Bank	KfW Development Bank
	Islamic Development Bank	Islamic Development Bank
	JICA	JICA
	World Waternet	World Waternet

The stakeholdersvfall within three broad categories. The main categories include stakeholders at the national, local, and international levels. At the local level, Kharas Municipality, and Joint Services Council (JSC) for water and wastewater is a pilot area for the SFD project. At the national level, the Palestinian Water Authority (PWA), Ministry of Local Government, KFW, World Waternet, and WaterAid are considered at an international level. The previous stakeholders were directly involved in the SFD project, through meetings, discussion, sharing information and reviewing the report.

A factsheet made in English and Arabic, was produced for the communication with the stakeholders/partners. The factsheet included a detailed description of what a SFD graphic is and what the process of making a SFD graphic entails. Also included is general information about sanitation and specific information about Kharas which is relevant to the SFD graphic. Besides, creating a useful factsheet was helpful to use in the communication consultations, individual meetings, and working group discussions. These meetings and discussions were used to identify the stakeholders' roles and interests in cooperation within the project and

identify challenges facing wastewater in the city. Data obtained from these meetings and reviewing of documents led to a good understanding of the wastewater situation in Kharas.

The local government (Kharas Municipality) and the national government (PWA), Joint Services Council (JSC) for water and wastwater are the three governmental bodies that were identified as important key players in the SFD graphic process. Two introductory meetings were organised online. The objective of these meetings was mainly to share information and to inform on the current problem, what the SFD graphic entails, why to jointly make an SFD graphic and explain expectations within the process. The first session was with only PWA. However, the second session was held with PWA, Kharas Municipality and JSC, to as well to fill in the value of the variables in the SFD matrix.

Kharas Municipality has a database with all the information about the sanitation within Kharas. The normal process includes an obligatory 'prove of sanitation' when applying for a building permit. These documents are handed in on paper. The meetings with Kharas Municipality involved the people responsible for this data. During the session, the matrix was explained and further completed based on their knowledge.

Many stakeholders were also indirectly involved in the project, such as the Ministry of Health, Ministry of Finance, Ministry of Environment, NGOs and donors. Moreover, all those stakeholders participated in the project, which is valuable for the development of the scientific base, training activities, research, making decisions and pilot testing.

The FSM tool maps all the stakeholders based on interest-influence using 6- levels: unknown, little or none, some, moderate, high and crucial. In this case, interest is the needs, constraints and problems which are a priority and influence is the power of the stakeholder, mainly in terms of the level of control on the decision-making process (Figure 15).

Figure 15: Graph with interest versus influence of various stakeholders, (FSM toolbox, 2021).

5 Acknowledgements

This report was compiled as part of the SFD Promotion Initiative project, funded by the Bill & Melinda Gates Foundation. The field research to compile this report was carried out in collaboration with Kharas Municipality and PWA. We would like to thank the staff members of Kharas Municipality as well as PWA for being available and providing necessary information for the assessment.

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7 Appendix

7.1 Appendix 1: FSM Stakeholder Analysis

Stakeholder Engagement Report

Hebron

02 August 2022

Produced By: Ahad Halhala , Kharas Municipality , Hebron, al-Khalil, Palestinian Territory Occupied.

Stakeholder engagement planning helps you identify and classify stakeholders in the FSM ecosystem based on their level of interest and influence. It also provides broad guidelines for engagement for each category of stakeholders. Stakeholders offer value to their local FSM ecosystem in the following ways:

- Play a vital role across the FSM value chain (construction of toilets/desludging services/treatment/sale or safe disposal of treated sanitation products) such as infrastructure development, service delivery, planning, financing, regulation, capacity building, monitoring, IEC/BCC.
- Be a beneficiary at any part of the value chain.
- Learn/support/oppose the overall implementation of the FSM project.

Basic Information about your city:

- **City Name:** Hebron
- **State:** al-Khalil
- **Country:** Palestinian Territory Occupied
- **Total Population:** 10400

Typology	Stakeholder Types	Stakeholder Names
National Government	Ministry of public works	Minister of Public Works and Housing
	Ministry of finance	Ministry of Finance and Planning
	Ministry of Education	Directorate of Education/ North Hebron/Government Organization
	The Municipal Development and Lending Fund (MDLF)	The Municipal Development and Lending Fund (MDLF)
	- Municipal Development and Lending Fund (MDLF)	- Municipal Development and Lending Fund (MDLF)
	Water Sector Regulatory Council	Water Sector Regulatory Council (WSRC)
	Ministry of Health	North Hebron Health Directorate/Government Organization (MOH)

	Ministry of Agricultural	North Hebron Agricultural Directorate/Government Organization (MOA)
	Ministry of Local Government	Local Government Directorate - Hebron /Government Organization (MOLG)
	Ministry of Environmental Quality	Enviromental Quility Authority - Hebron /Government Organization (EQA)
	Palestinian Water Authority	Palestinian Water Authority (PWA)
Local Government	local municipal authority	Kharas Municipality
	Joint Service Council	Joint Serves council for Water and Waste water in North Hebron
Key Representatives of the society	Poor households	Poor households
	Better-off households	Better-off households
	NGOs/CBOs/welfare groups	Union of Agricultural Work Committees (UAWC) Palestinian Agricultural Relief Committees (PARC) Union of Palestnian Water Service Providers (U.P.W.S.P)
City service providers	Masons	Masons
	Consultants	Consultants
	Mechanical and manual emptiers	Mechanical and manual emptiers
	Sweepers/sanitation laborers	Sweepers/sanitation laborers
	Medium business owners	Medium business owners

	(general)	(general)
	Large business owners & industrialists (general)	Large business owners & industrialists (general)
	Landlords	Landlords
	Potential end users - farmers/industries	Potential end users - farmers/industries
	Property developers	Property developers
Donor Agencies	OXFAM	OXFAM
	The European Union Representative	The European Union Representative
	WATER AID	GIZ West Bank and Gaza US Agency for International Development
	KfW Development Bank	KfW Development Bank
	Islamic Development Bank	Islamic Development Bank
	JICA	JICA
	World Waternet	World Waternet

Interest-Influence Mapping

The scoring scale for Interest and Influence of FSM stakeholders consists of 6 levels - Unknown, Little or None, Some, Moderate, High and Crucial.

Interest is characterized by the stakeholders' needs, constraints and problems being a priority in the FSM strategy. **Influence** is the power that stakeholders have on the project i.e. in terms of controlling the decision-making process and facilitating the implementation

You can view the relative positioning of the stakeholders in the Interest-Influence Matrix based on the rating given online in the following figure.

Recommendations

The stakeholders are classified into four groups based on the positioning in the interest-influence matrix. A set of guidelines for collaboration for each category of stakeholder are provided below.

High Interest + High Influence

These stakeholders should be closely involved throughout the preparation and implementation of the project to ensure their support for the project. It is recommended that these stakeholders are utilized for Consultation, Collaboration & Delegation of responsibilities. In your local scenario, they are:

Typology	Stakeholder Types	Stakeholder Names
Donor Agencies	WATER AID	US Agency for International Development GIZ West Bank and Gaza
	Islamic Development Bank	Islamic Development Bank
	JICA	JICA
	KfW Development Bank	KfW Development Bank
	The European Union Representative	The European Union Representative
Local Government	Joint Service Council	Joint Serves council for Water and Wastewater in North Hebron
City service providers	Landlords	Landlords
	Large business owners & industrialists (general)	Large business owners & industrialists (general)
	Medium business owners (general)	Medium business owners (general)
	Potential end users - farmers/industries	Potential end users - farmers/industries
	Sweepers/sanitation laborers	Sweepers/sanitation laborers
National Government	Ministry of Local Government	Local Government

		Directorate - Hebron /Government Organization (MOLG)
	Palestinian Water Authority	Palestinian Water Authority (PWA)

High Interest + Low Influence

Stakeholders of low influence and high interest must be consulted and these stakeholders have the potential to be Empowered with responsibilities..
In your local scenario, they are:

Typology	Stakeholder Types	Stakeholder Names
Key Representatives of the society	Better-off households	Better-off households
	NGOs/CBOs/welfare groups	Palestinian Agricultural Relief Committees (PARC) Union of Agricultural Work Committees (UAWC) Union of Palestnian Water Service Providers (U.P.W.S.P)
City service providers	Consultants	Consultants
	Mechanical and manual emptiers	Mechanical and manual emptiers
	Property developers	Property developers
National Government	Ministry of Environmental Quality	Enviromental Quility Authority - Hebron /Government Organization (EQA)
	Ministry of Agricultural	North Hebron Agricultural Directorate/Government Organization (MOA)
	Ministry of Health	North Hebron Health Directorate/Government Organization (MOH)
	Water Sector Regulatory	Water Sector Regulatory

	Council	Council (WSRC)
Local Government	local municipal authority	Kharas Municipality
Donor Agencies	OXFAM	OXFAM
	World Waternet	World Waternet

High Influence + Low Interest

These stakeholders may be consulted, but must be well informed about project progress..
In your local scenario, they are:

Typology	Stakeholder Types	Stakeholder Names
National Government	- Municipal Development and Lending Fund (MDLF)	- Municipal Development and Lending Fund (MDLF)
	Ministry of finance	Ministry of Finance and Planning
	The Municipal Development and Lending Fund (MDLF)	The Municipal Development and Lending Fund (MDLF)

Low Influence + Low Interest

These stakeholders may be informed about the project progress at key stages of the project lifecycle..
In your local scenario, they are:

Typology	Stakeholder Types	Stakeholder Names
National Government	Ministry of Education	Directorate of Education/ North Hebron/Government Organization
	Ministry of public works	Minister of Public Works and Housing
City service providers	Masons	Masons

7.2 Appendix 2: Context-adapted SFD Graphic

Figure 16 shows the context-adapted SFD graphic, which represents the future sanitation situation in Kharas.

Before the end of 2023, the sewage network of Kharas will be extended and allow to cover 15% extra of the population. This extra sewer will be connected to the existing network and allow the wastewater to be treated at the WWTP of Kharas.

By the end of 2023, 45% of the population of Kharas will be connected to the sewage network and ensure that the wastewater is treated properly.

For the last 55% of the population that cannot connect to the sewage network for different reasons, 8% will be the next challenge for the municipality of Kharas. For this 8%, it should be investigated what kind of treatment is installed, if it is working properly and answers to the right capacity. Different solutions will be then provided (new individual system, reparation or other).

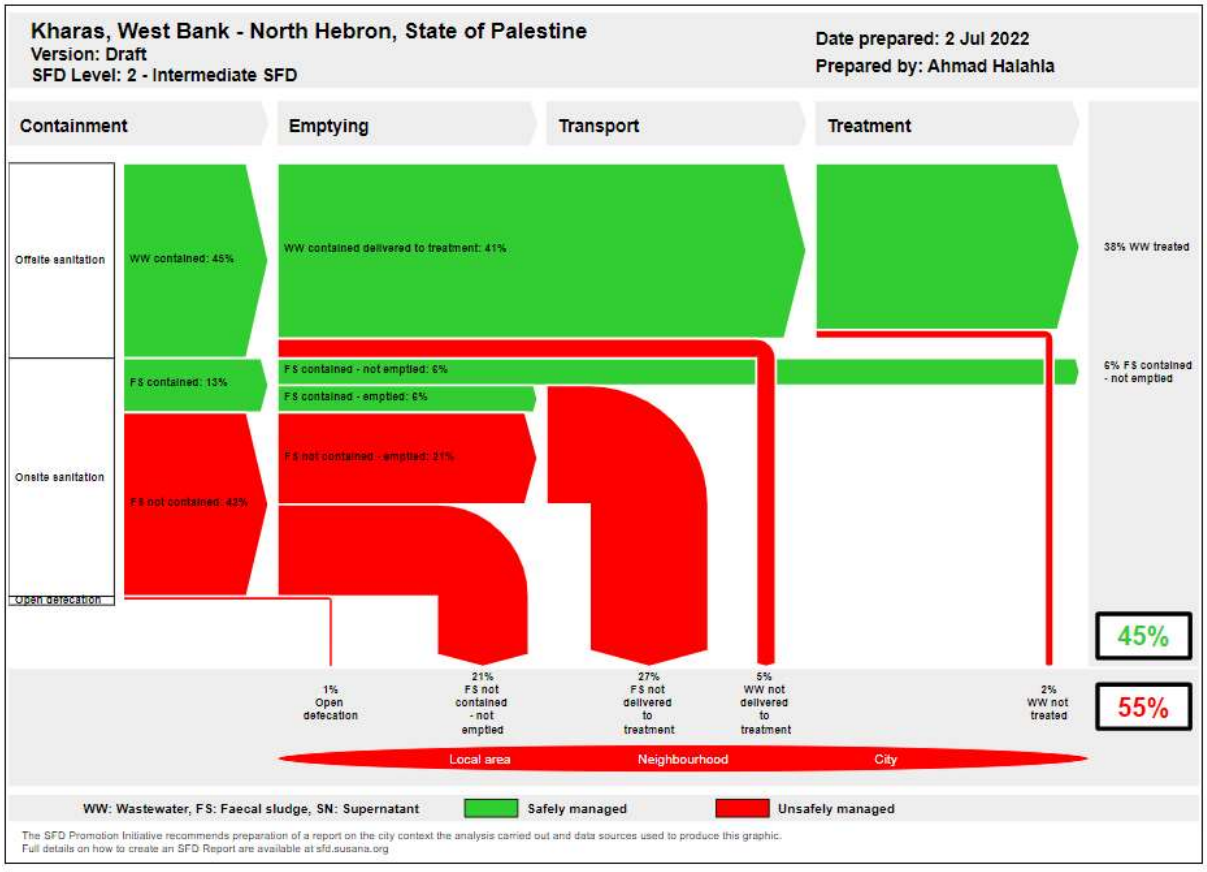

Figure 16: Context-adapted SFD Graphic.

7.3 Appendix 3: Household survey

Data for the production of the SFD report were obtained from a household survey extracted from the master plan for wastewater in Kharas. A brief summary of the master plan and the data published, in which this report is based on, is summarized as follows.

The population was officially adopted for the year 2021 based on the Palestinian Central Bureau of Statistics. In the northern Hebron area, which serves approximately a quarter of a million people. Only the Kharas and Tuba are the only areas with partial sewage networks. The rest of the population relies on septic tanks.

Palestinian Water Authority (PWA) is working towards developing the sewage infrastructure. This year, a master plan for wastewater was created for Kharas. This master plan was supported by the Dutch project: "*WaterWork and Blue Deal program of World Waternet*", which aims to exchange information and build capacities in collaboration with the PWA. One of the activities within the project is the establishment of an SFD report, where there was collaboration between World Waternet (WWn) employees, the Joint Water and Wastewater Services Council, employees of the municipality of Kharas, and the Palestinian Water Authority.

The collaboration involved holding regular meetings, as well as working in the municipality of Kharas in cooperation with the Dutch project coordinator, Toqa Qadi, and the municipality's sanitation employee, Ahmad Halahla. The main document of the master plan, which includes an overview of the sanitation situation in Kharas, was given from the financial department of the wastewater services of the municipality of Kharas. Each home connected to the sewage system pays for the wastewater services. This is done together with drinking water consumption payment. They could identify that 38% of the population is connected to the sewage system. The rest of the sanitation system on place where mostly assumption made from field employees of the municipality.

Kharas municipality has a 22 km wastewater network covering 38% of the Kharas area; wastewater is collected and treated in the WWTP depending on the activated sludge mechanism, which was built in 2021.

In the beginning and after the station's establishment, the municipality crews used to perform laboratory tests in laboratories outside the town, and they were performed at intervals due to the difficulty of conducting the tests. At the beginning of the year 2022, with generous funding from the Dutch government and in cooperation with the Palestinian Water Authority, a water testing laboratory was established at the site of the treatment plant. In this laboratory, basic and daily water tests are carried out during the treatment stages. Additional, on March 2023, in order to improve and build capacity, the WWn invited Ahmad Halhala to get a laboratory training in the Netherlands.

Agricultural as economy, is a major part of economic activity in Kharas, which is 40% of people are depending on it as a way to bring money and feeding the local market with human daily needs. Drinking water source in Kharas is Mekorot (Israeli water supplier), and related to occupation policies, municipalities prevented to explore for underground water. In the

other side, amounts of water feed to Kharas are not enough to cover the population demand. This created a real challenge in agricultural sector, where wide land areas are needed to be irrigated with water but the water amounts is limited, and so, reuse of treated wastewater can solve the problem of irrigation.

As mentioned above, WWTP was built, but to cover more and more agricultural areas, sewage network must extend as well as the WWTP. In order to extend the WWTP, Kharas municipality bought much land parcels around the existing one. The Kharas WWTP location was chosen in order to be able to collect and treat the wastewater of four cities (Kharas, Halhul, Nuba, and Beit-Aula).

Kharas SFD, Palestinian territories, 2024

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