SFD Report

Nuba
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 Nuba, World Waternet (WWn), and Joint Service council for water and wastewater (JSC).

Date of production: 12/12/2023

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SFD Report Nuba, Palestinian Territories, 2024

Produced by:

Toqa Qadi (WWn)
Dua'a Matar (WWn)
Loay Alatrash (WWn)
Khaled Sa'ad (WWn)
Adrien Azé (Waternet)
Reeta Abed (JSC)
Ahed Dabbas (Municipality of Nuba)
Tahane Sarahna (Municipality of Nuba)

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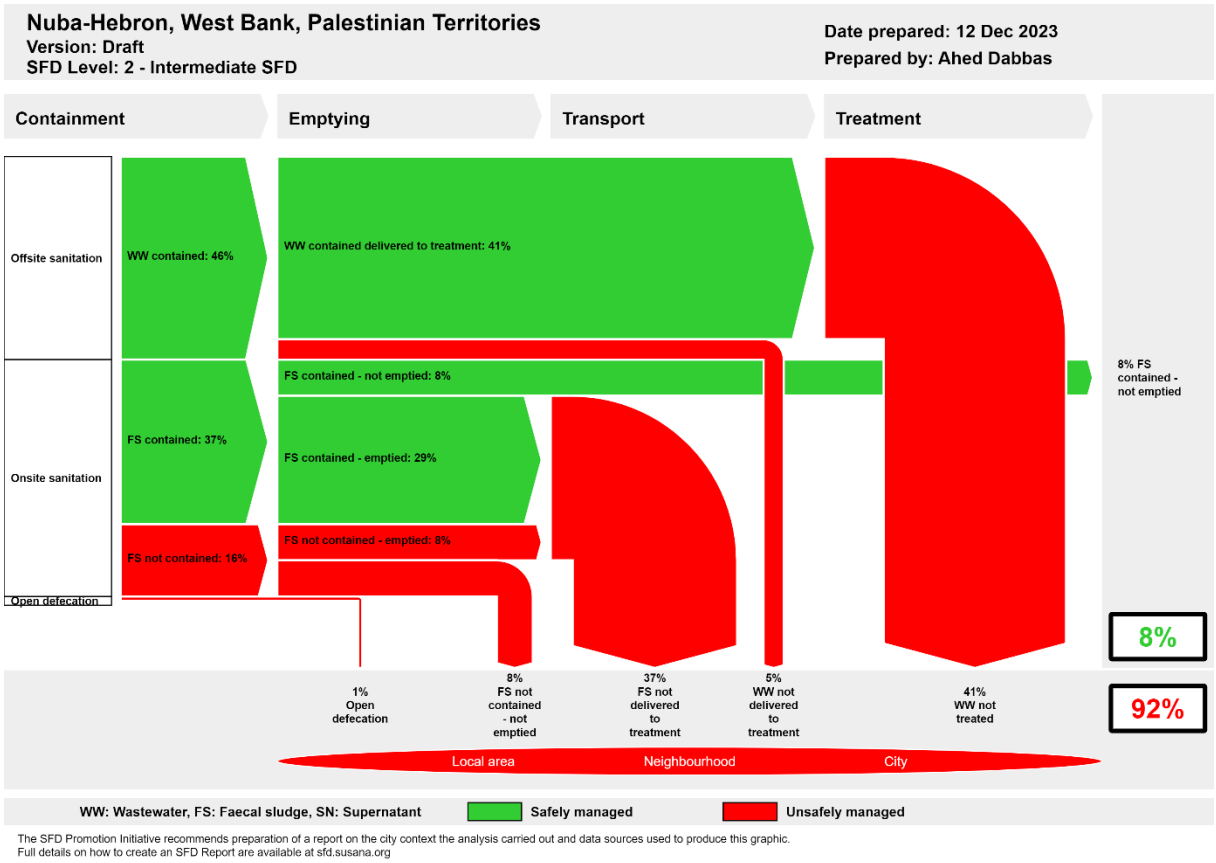
1. The SFD Graphic



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:

Municipality of Nuba, World Waternet and Joint Services Council for water and wastewater in North Hebron (JSC).

Collaborating partners:

Municipality of Nuba and Joint Services Council for water and wastewater in North Hebron (JSC) and PWA.

Status:

Final SFD report.

Date of production: 12/12/2023

3. General city information

Nuba is a Palestinian village in Hebron Governorate, located 12 km northwest to Hebron city, in the south of the West Bank. The village is located within the southern Palestinian mountains, that are descending from east to west, with an average altitude of 550 m above sea level. It is bordered by Halhul village to the east , Kharas to the north, Beit Ula to the south and the Green Line to the west.

Prior to 1948, the total area of the village was 22,286 sq.km. During the 1948 war, Israel occupied and confiscated 10,424 sq.km., approximately half of the village area.

The population in 2021 was nearly 7,400 inhabitants (PC0BS, 2021) with a population growth rate of 0.19%.

The climate is generally Mediterranean, hot and dry in the summer, with mild winters. While the quantity of rainfall varies from year to year, the mean annual rainfall is 484 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.

A UASB and wetland wastewater treatment plant was constructed in 2000 and commissioned in 2005. It was rehabilitated in 2013 and ran at full capacity until 2015 when it stopped.

Figure 1. WWTP out of service.

The village is partially served by sewer systems that covers 46% of the inhabited areas. The number of sewer network subscribers at the beginning of 2021 reached 663.

Currently there are three sanitation technologies in place. 46.1% of the population have flush or pour-flush toilets that discharge directly into a centralized sewer system where wastewater is contained.

From the 53.8% not connected to the sewer system, it is estimated that 32.8% have a septic tank or fully lined tank connected to soak pits that seep into the groundwater, and 21.0% have fully lined tanks without outlet that need to be regularly emptied.

At the end of 2023, the sewer network should cover 80% of the population. The Municipality of Nuba has a good data-registration system and knows which household is connected and which ones will be connected to the sewer network. However, it is challenging to have an overview of the last percentage of the population that is not yet connected or will not be connected in terms of the wastewater network.

All the collected Faecal Sludge is disposed of untreated into the environment.

Additionally, according to the master plan of the Palestinian Water Authority, the entire village of Nuba will be connected (estimated 2030) to a treatment plant currently under development in the nearby region of Kharas.

The primary challenge stems from the incomplete coverage of the sewer network throughout all areas of the village, compounded by the presence of an old and ineffective treatment plant. These factors pose a significant obstacle for the Municipality. Nevertheless, despite these complexities, the Municipality remains dedicated to a lofty objective: the connection of the largest feasible segment of the village to the sewer network by 2023. This endeavour forms part of a comprehensive strategy aimed at improving the village's sewer system, with the aim of alleviating the adverse environmental consequences and health-related concerns arising from the current wastewater disposal practices.

In addition, the transmission line transports untreated sewage water into the valleys, tracing their course until it reaches the opposite side. Along this trajectory, the likelihood of groundwater contamination rises, potentially harming plant life. Moreover, this contaminated water can also give rise to health issues among farmers and animals.

The water supply network was established in 1973 using galvanized iron pipes. In 2007, these were replaced with polyethylene pipes and the system fully rehabilitated by the Water Authority with funding from the World Bank. The present situation of the drinking water supply network is described as follows:

The percentage of losses in the network can reach 45%. Despite the fact that the network is new, it requires continuous maintenance due to pipe malfunctions, especially pipes with a diameter of 63 mm, 25 mm and 20 mm, and most of this loss is caused by excavations in roads projects and sewerage lines, or the increase in pressure that may occur for a specific emergency.

Nuba lacks a well-thought-out and integrated rain drainage system. There are seven infiltration drains and some open channels in the village. There is no rainwater harvesting system in the village.

The SFD graphic shows that 8% of the excreta or faecal sludge generated are safely managed while 92% are unsafely managed. The safely managed Faecal Sludge (FS) generated by 8% of the population is temporary as this FS is only contained. So, once the containment gets filled and the FS from the containment is emptied, the percentage of unsafely managed FS would increase.

5. Service delivery context

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 2030. The Palestinian Water Authority will establish regional water utilities which will be responsible for wastewater services. 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 water and wastewater services within a specified 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.

The Water Sector Regulatory Council is a national governmental organisation that has the objective to monitor 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.

Nuba Municipality is the service provider in Nuba village since the construction of the wastewater treatment plant and the sewer network. Service standards are part of the National water and wastewater policy. Nuba Municipality will include in their 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. Nuba Municipality does inform home-owners about the importance of emptying their septic tanks and using it properly, but still there is negative impact on the environment from open land flushing sewerage even there is a system for enforcement and regulation in place.

The Municipality applies one tariff for all its inhabitants. The village is small. An issue is the wastewater run through open land crossing the Green Line. This is a challenge for the municipality, and a political issue.

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 is to identify key stakeholders to facilitate improvements in cooperation on wastewater management and create an overview for the sanitation system in Nuba. The stakeholders that were classified fall within three broad categories, The broad categories include stakeholders at the local, national and international levels. At the local level, Nuba 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 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.

Table 1. Overview of stakeholders (Nuba Municipality, 2022).

Key Stakeholders	Institutions / Organisations
High influence/high interest	
Donor Agencies	Water Aid, Islmamic Development Bank, Kfw, The European Union Representative
Local Government	Joint services council for water and wastewater, Nuba Municipality
National Government	Ministry of Local Goverment, Palestinian of 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
Key Representatives of the society	NGOs/CBOs/Welfare groups, Media
Local Government	Local Municipal Authority
Donor Agencies	World Waternet
High influence / low interest	
National Government	Ministry of finance; Mincible Development and lending Fund
Low influence / low interest	
National Government	Ministry of education, Ministry of public work
City Services provides	Masons
Key Representative of the society	Poor household

7. Credibility of data

The SFD team (consisting of four Dutch professionals from World Waternet and one Palestinian professional from YEP/PWA, and Nuba Munipality) took the lead in filling in the SFD graphic and FSM stakeholder tools and writing the report.

The stakeholders were directly involved in the SFD project through (individual) meetings, workgroup discussions, sharing information, and reviewing the report. A fact sheet made in English and Arabic was produced 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 village.

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

Many stakeholders were indirectly involved in the project, including the Ministry of Health, Ministry of Finance, Ministry of Environment, farmers' associations, NGOs, and donors. Moreover, all those stakeholders participate in the project, which is valuable for developing the scientific base, training activities, research, making decisions, and pilot testing.

8. Process of SFD development

The representativeness of the data as of a high level. Data was actual and was delivered from the municipality of Nuba.

The major assumptions which have to be made regarding the population that are not connected to the sewerage system of the city (50%). A campaign of field visits was organized in order to identify the actual treatment of this 50%. After making this overview, advice and solution was provided in how to make sure those locations are safe for the users and the environment.

9. List of data sources

Sources to produce this executive summary include:

- Palestinian Central Bureau of Statistics, 2021. Projected Mid -Year Population for Nuba Governorate by Locality 2017-2026
- Palestinian Water Authority, 2014, Decree No.(14) for the year 2014 Relating to the Water Law
- Nuba Municipality, 2021. Interview with Municipality staff members, April-September 2021. 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)
- Humanitarian Affairs, 2018. Map of the area, showing the Israeli occupation arrangements in the governorate. (https://www.ochaopt.org/atlas2019/wbclosure.html)

SFD Nuba, Palestinian Territories, 2024

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Abbreviations

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

1. General city information

1.1. Population

Nuba 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, upon an east to west sloping plain. It is bordered by Halhul village to the east, Kharas to the north, Beit Ula to the south and the Green Line to the west.

Prior to 1948, the total area of Nuba village was 22,886 sq.km.. During the 1948 war, Israel occupied and confiscated about 10,424 sq.km., approximately half of the village area.

The 2021 population is nearly 7,400 inhabitants (PCBS, 2021) with a population growth rate of 0,19%.

1.2. Topography

Nuba village is located to the northwest of the city of Hebron, at the foot of a mountain that is descending from east to west, and it is interspersed with plains, mountains and valleys, and its altitude ranges from 550 m above sea level (Figure 1).

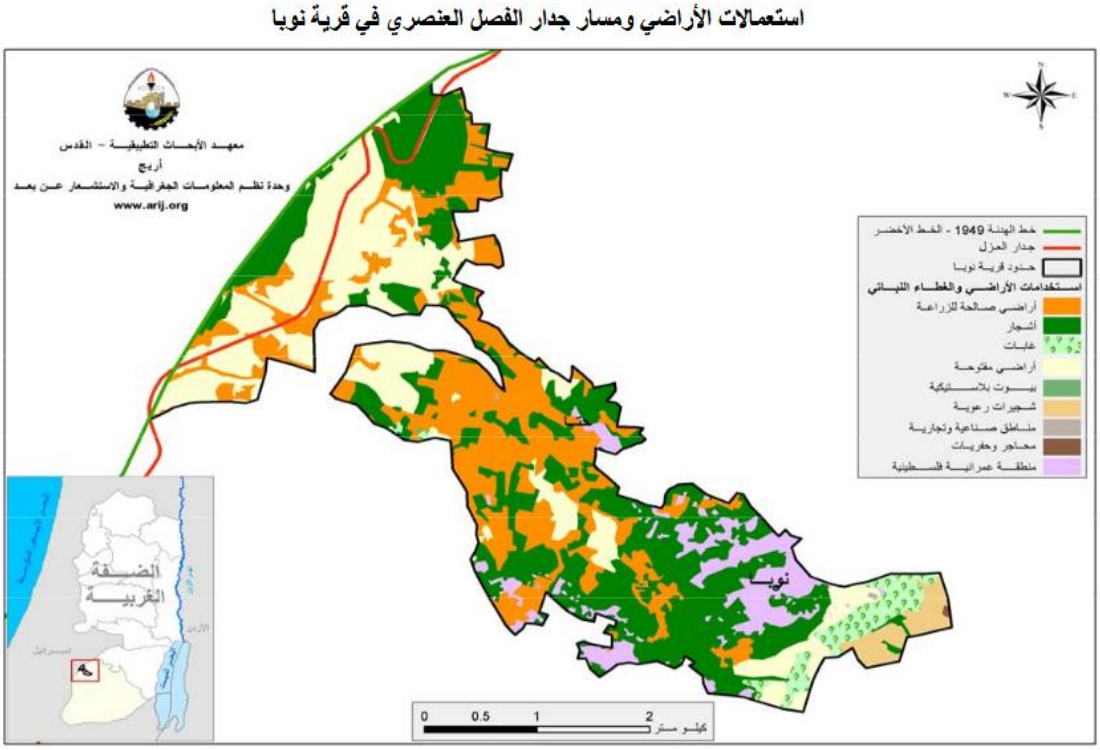

Figure 1: Land uses and the route of the apartheid wall in Nuba village.

1.3. Climate

Nuba's climate is generally the Mediterranean, hot and dry in the summer, with mild winters. While the quantity of rainfall varies from year to year, the mean annual rainfall is 484 mm. the average annual temperature is 17 °C, and the average annual humidity is 60 % (Figure 2). Moreover, the average humidity is 60% as recorded by the Palestinian Meteorological Department.

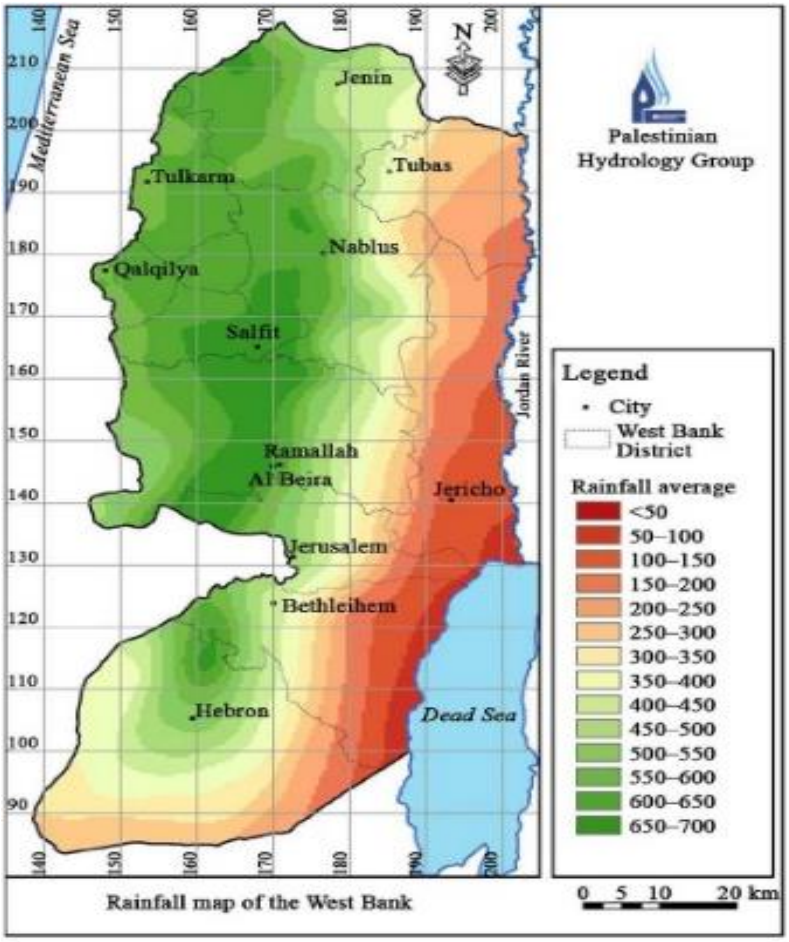

Figure 2: Rainfall map of the Palestinian Territories (Amr et al., 2018).

1.4. City context

Despite being hemmed in by illegal Israeli apartheid wall, Nuba has managed to build a sewerage network that serves 50% of the population, but there is a need to cover the whole village with the sewerage system. That includes new treatment plants and lines to cover areas that are not served. Nuba is planning to develop the agriculture sector within the municipality, providing fruit and vegetables to the surrounding villages and towns. Consequently, there was an urgent need to establish the wastewater treatment plant.

2. Service Outcomes

2.1. Overview

Data on sanitation situation were collected through meetings and discussions with key stakeholders such as the local government (Nuba 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.

Sanitation technologies and methods used 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				T1A1C4	Significant risk of GW pollution / Low risk of GW pollution					Not Applicable
Septic tank					T1A2C3 / T1A2C5					
Fully lined tank (sealed)					T1A3C8 / T1A3C9					T1A3C10
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 percentage of the population connected to the various technologies are outlined in Figure 4. The city has a old sewage system used by 46.1% of the population while onsite sanitation systems are used by 53.8% of the population. The remaining 0.1% corresponds to people practising open defecation. The two types of onsite systems are septic tanks or cesspit connected to a soak pit (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.

Nuba-Hebron, West Bank, Palestinian Territories, 12 Dec 2023. SFD Level: 2 - Intermediate SFD
Population: 7400
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks: 1%

Containment						
System type	Population	WW transport	WW treatment	FS emptying	FS transport	FS treatment
	Pop	W4b	W5b	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 decentralised treatment plants	Proportion of wastewater delivered to decentralised 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
T1A1C4 Toilet discharges directly to a decentralised foul/separate sewer	46.1	90.0	0.0			
T1A2C5 Septic tank connected to soak pit	8.2			50.0	0.0	0.0
T1A3C10 Fully lined tank (sealed), no outlet or overflow	21.0			100.0	0.0	0.0
T1A3C5 Fully lined tank (sealed) connected to a soak pit	8.2			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	8.2			50.0	0.0	0.0
T2A3C5 Fully lined tank (sealed) connected to a soak pit, where there is a 'significant risk' of groundwater pollution	8.2			50.0	0.0	0.0

Figure 4: SFD matrix.

2.3. Sanitation technologies

Off-site sanitation:

- The municipality of Nuba had a Wastewater Treatment Plant (WWTP) based on Up-flow Anaerobic Sludge Blanket (UASB) reactor process followed by a wetland treatment. This plant was treating the wastewater of 250 houses in 2005 (Figure 5).

Figure 5: WWTP of Nuba.

- The WWTP of Nuba operated until 2015 and was shut down due to maintenance problem and clogged filters (wetland filters).
- Currently, 46.1% of the population have flush or pour-flush toilets that discharge directly into a sewer system, as shown in the SFD matrix. The sewer system is managed by the municipality of Nuba,
- This 46.1% of people are not connected any more to a WWTP and all wastewater is discharged untreated into the valley,
- The data received from Nuba Municipality in 2021 shows that the length of existing sewer network is nearly 43 km.
- Due to the untreated wastewater that is flushed into valleys, there is a risk of soil and groundwater contamination.

On-site sanitation:

- 53.8% of the population have flush or pour-flush toilets discharging to septic tanks and fully lined tanks connected to soak pits. Fully lined tanks without outlet are also found in Nuba.
- 16.4% of the population use flush or pour-flush toilets that discharge into a septic tank and thereafter in soak pits (Figure 6). 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 T1A2C5 (8.2%) and T2A2C5 (8.2%).

Figure 6: Soakpits.

- 21.0% of the population use flush or pour-flush toilets that discharge into fully lined tanks without outlet (Figure 7). According to the municipality, those tanks are all emptied when needed (when they get full). In the SFD matrix, this 21.0% has been modelled as system T1A3C10.

Figure 7: Septic tank en Cesspit zonder outlet.

- 16.4% of the population use flush or pour-flush toilets that discharge into a fully lined tank (sealed) called “cesspit” and thereafter in 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 T1A3C5 (8.2%) and T2A3C5 (8,2%).
- In the future, due to expansion of the central sewer systems, 25.0% of the 53.8% will be connected to the sewer system. Only 28.8% will remain connected to on-site sanitation.

- Most of the fecal sludge from the septic tanks is discharged unsafely to the environment with no treatment, most commonly it is dicharged into wadis[1], as shown in Figure 8.

Figure 8: Truck discharging faecal sludge from septic tanks into a wadi.

Open defecation:

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

2.3.1 Risk of Ground water contamination

100% of the drinking water is delivered from the Palestinian Water Authority through pipelines from the drinking water company Mekorot, from point of Jabaa.

However, most of sewerage drainage flows through open land which results in pollution of surrounding agricultural land that can infiltrate into the groundwater, leading to potential environmental disasters and contamination.

Despite the whole population relying on the piped drinking water supply, the fact that 50% of tanks connected to soak pits are not working properly and they can potentially pollute the environment and the groundwater sources, it has been considered that there is a potential risk of groundwater contamination. Thus, 50% of tanks connected to soak pits have been deemed to be located in areas of high risk of groundwater contamination (systems T2A2C5 and T2A3C5). these systems are used by 8.2% of the population, as explained in section 2.3.

[1] A wadi is the Arabic term traditionally referring to a river valley. In some instances, it may refer to a wet riverbed that contains water only when heavy rain occurs is a river or stream (Wikipedia, 2024).

2.3.2 Discussion of certainty/uncertainty level of associated data used for the SFD Matrix

The Municipality of Nuba has done a great work connecting almost 50% of the population to the sewer system. The Municipality has a good data registration system and knows which household is connected and which ones will be connected before the end of 2023.

However, it is not easy to have an overview of the last percentage of the population that is not yet connected or will not be connected (about 30%). It is not always clear which kind of treatment is in place. In the area, soak pits and cesspits are mostly installed. And it is not always clear if the treatment is working properly. Therefore, some assumptions were made based on field experience together with the Municipality of Nuba.

2.4. Summary of assumptions

Offsite sanitation systems:

✓ 46.1% of the population are connected to the sewer system. Since the wastewater treatment plant is out of work and the sewer network is old, variable W4b (proportion of wastewater delivered to treatment) has been set to 90% and variable W5b (proportion of wastewater delivered to treatment which is treated) has been set to 0% .

Onsite sanitation systems:

✓ The proportions of FS in septic tanks and fully lined tanks 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) for each sanitation system (T1A2C5, T1A3C5, T2A2C5 and T2A3C5) was set to 50%. 50% is an estimate who was made with the municipality. The household survey in Nuba was not always easy to follow. With the few data and field experience, 50% was chosen as representative enough for the situation. For system T1A3C10, variable F3 was set to 100%.

✓ Variable F4 (proportion of FS emptied which is delivered for treatment) for each sanitation system was set to 0%.

✓ Variable F5 (proportion of FS delivered to treatment which is treated) was set to 0% since the WWTP is out of work.

2.5. Shit Flow Diagram Graphic

Figure 9 shows the SFD graphic for Nuba where 8% of the excreta generated are safely managed and 92% are unsafely managed.

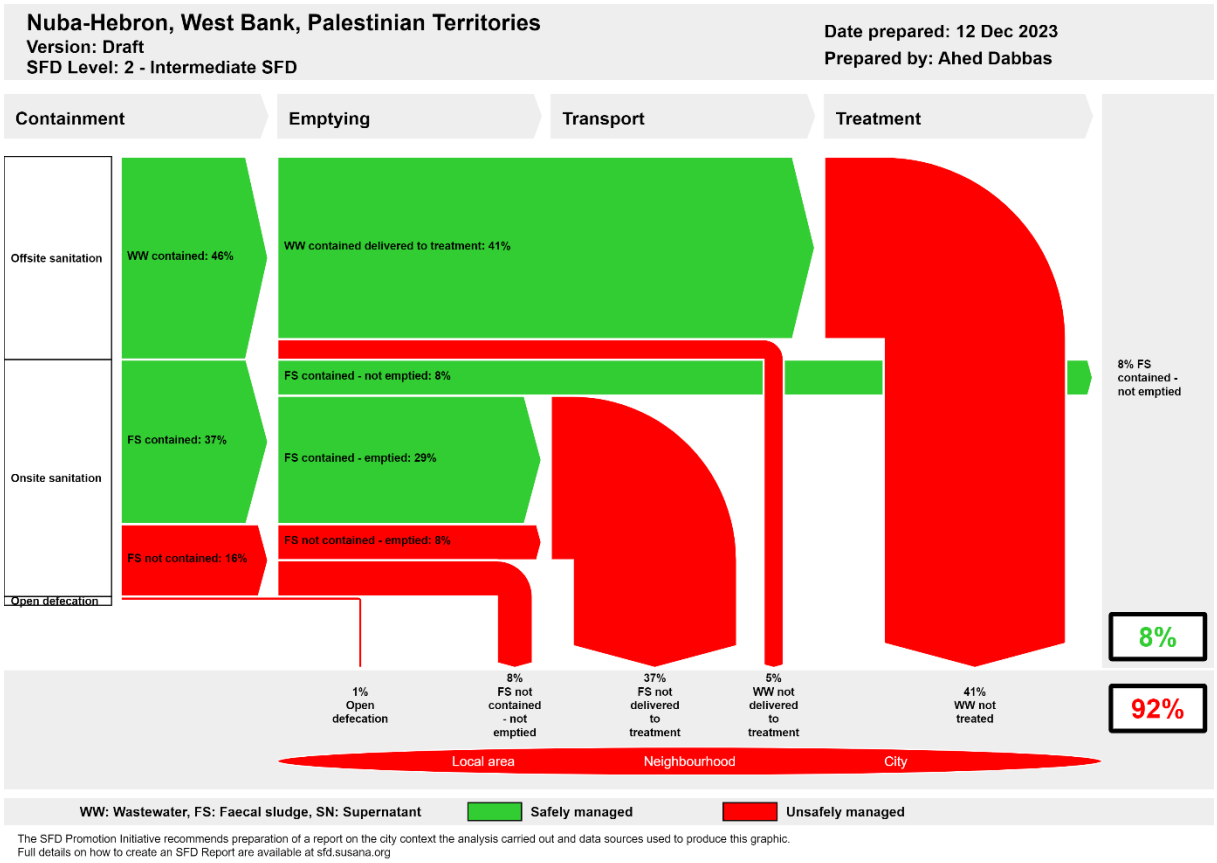

Figure 9: SFD Graphic.

The unsafely managed excreta originate from wastewater not delivered to treatment (5%), wastewater not treated (41%), Faecal Sludge (FS) both contained and not contained - not delivered to treatment (37%), FS not contained - not emptied (8%) and people practising open defecation.

The safely managed excreta originate from FS contained - not emptied (8%). However, this 8% resembles the FS stored in containments without significant risk to groundwater pollution. Thus, the safely managed percentage of FS generated by this 8% 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.

Two context-adapted SFD graphics representing possible future scenarios in Nuba are 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 provides an overview of the previous/underlying laws or regulations.

Table 1: Overview of water laws and regulations in the Palestinian Territories (Salfeet 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 to monitor all aspects related to the operation of service providers, with the aim of ensuring a 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 powers:

- 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 plan, those service providers will merge into 10 to 15 Regional Water Utilities by 2030. The Palestinian Water Authority will establish regional water utilities which will be responsible 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 specified 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 (PWA, 2014).

3.1.3 Service provision

Nuba Municipality is one of the municipalities that shaped part of the North Hebron Joint service council. The majority of the JSC area “include 15 municipalities” unfortunately did not have access to wastewater networks or treatment. Nuba is one of the lucky areas as they have a sewer network covering around 50% of the population but in the end this wastewater is discharged into a wadi and then crosses the border with the Israeli side which is causing the increase in the debt of the Palestinian Authority (PA) due to this transboundary water. The other 50% depends on private service providers to empty their septic tanks. There is no strict control of where the faecal sludge ends up. Part of the faecal sludge is disposed of to the manholes, so ends up in the sewer system, and finally to a wadi.

3.1.4 Service standards

Service standards are part of the National Water and Wastewater Policy (NWWP). Nuba Municipality charges a fee for connecting to the sewer network. On the other side, the population pays a yearly fee for the sewer connection, which is not met with the NWWP. Nuba Municipality with the Joint Service Council (JSC) are almost solely responsible for wastewater services.

3.2. Planning

3.2.1 Service targets

Nuba Municipality is working now on a plan to split the rainwater from the wastewater in the wadi for 500 metres long in the coming months and then gradually build a clean area from the wastewater “2.5-3 kilometres”. This would allow the farmers to use the rainwater and protect the land from pollution. The situation now is terrible. All the lands in the wadi are polluted with wastewater and that destroys the lands and prevents them from cultivating it.

3.2.2 Investments

Early water treatment plant

PA and Nuba municipality are looking for the transboundary as a priority, due to the fees paid by the PA to the Israeli side for treating the wastewater cross the border.

There are two scenarios now, the first one is protect the Palestinian lands from the wastewater by build clean area and transfer the wastewater to cross the border. The second one connects

to the wastewater treatment plant in Kharas, which is far from the end point on Nuba around "1.5-2 Kilometres". The second one is the most suitable one and saves the PA's money and uses it for another development.

3.3. Equity

3.3.1 Current choice of services for the urban poor

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

3.3.2 Plans and measures to reduce inequity

The municipality is working now to develop fair tariffs for all the categories of the population.

3.4. Outputs

3.4.1 Capacity to meet service needs, demands and targets

For now the municipality is unable to expand the sewer network due to the lack of financial resources. The board of directors made a decision that anyone who would like to connect to the sewer should pay 49% from the total amount of the budget and the other 51% would be covered by the municipality.

3.4.2 Monitoring and reporting access to services

Most of the data's are collected from municipal internal system services. Houses connected to the sewage system pay a fee of NIS 20 (USD 5.60) every month.

3.5. Expansion

3.5.1 Stimulating demand for services

Due to the lack of the financial resources, the support and encouragement of the citizens to connect to the sewer network is currently impossible. There is no awareness programs in place, but this will be developed in the future. Nuba Municipality does inform home-owners about the importance of emptying their septic tanks and using them properly, so there is no negative impact on the environment.

3.5.2 Strengthening service provider roles

Nuba Municipality is the main service provider and works in collaboration with the municipality of Kharas. Nuba and Kharas municipalities provide this service for the citizens, and they are working to improve wastewater services with the following purposes:

Proposed location for the Wastewater Treatment Plant

1- Under framework PWA, studies are being done for the wastewater of the all area in North Hebron in order to expand the WWTP (Figure 10).

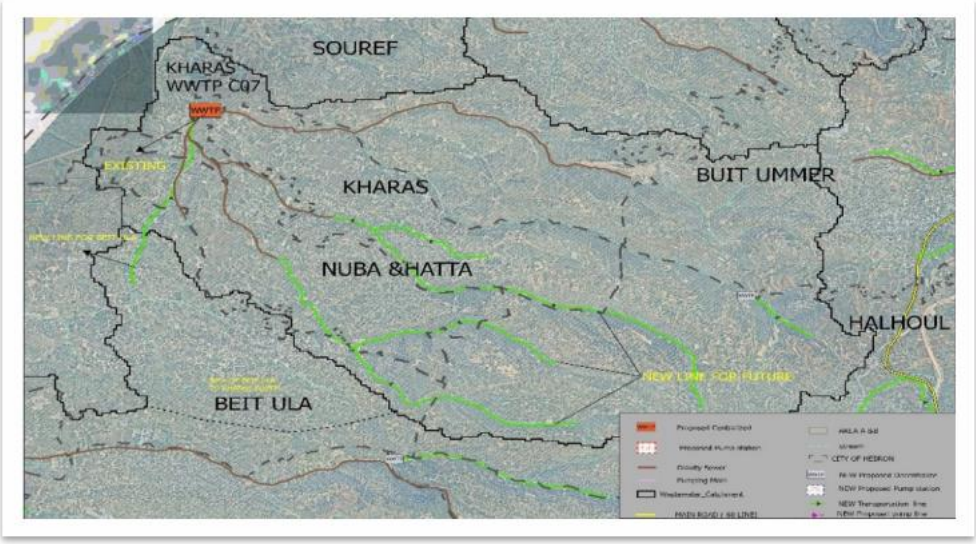

Figure 10: Catchment C7 - Kharas/Beit Ula boundaries.

2- The proposed location of C7 WWTP is located 1.3 km to the east of the Green Line and 2 km to the north west of Kharas village at an elevation of 360 m above sea level, It is the same site as it is now. The co-ordinates of the site are 116143 Northing and 1509623 Easting. The land is agricultural land and part of a wide wadi flood plain. The land is currently allocated for the construction of the new Kharas WWTP. More land will be needed to construct additional trench of the existing wastewater treatment to treat wastewater from the other villages (Figure 11).

		Year 2045							
Centralized WWTP	Communities attributed	% attribution	Collection type	Population covered	Average Water Demand*	Wastewater generation*	Percentage network connection	Population sewered	Average 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 11: Communities served by C7.

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

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

5- Improve treated water reuse: The current situation is that there is 50mm polyethylene irrigation line with length of 1,000m. The proportion of agricultural area covered by gravity is little compared with available agricultural areas. It will be improved as follows:

- Making agreement with farmers to agree for reuse water .
- Contact with donors to provide irrigation network to support farmers.
- Contact with donors 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 is to identify key stakeholders to facilitate improvements in cooperation on wastewater management and to create an overview for the sanitation system in Nuba. 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).

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	Ministry of finance	Ministry of Finance and Planning
	The Municipal Development and Lending Fund (MDLF)	The Municipal Development and Lending Fund (MDLF)

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 Council	Water Sector Regulatory Council (WSRC)
Donor Agencies	World Waternet	World Waternet

		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

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
City service providers	Potential end users - farmers/industries	farmers
	Landlords	Landlords
	Large business owners & industrialists (general)	Large business owners & industrialists
	Medium business owners (general)	Medium business owners
	Sweepers/sanitation laborers	Sweepers/sanitation laborers
Donor Agencies	WATER AID	GIZ West Bank and Gaza - US Agency for International Development
	Islamic Development Bank	Islamic Development Bank
	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
	local municipal authority	Nuba Municipality
National Government	Ministry of Local Government	Local Government
		Directorate - Hebron /Government Organization (MOLG)
	Palestinian Water Authority	Palestinian Water Authority (PWA)

The stakeholders that were classified fall within three broad categories. The main categories include stakeholders at the national, local, and international levels. At the local level, Nuba Municipality, and Joint Services Council for water and wastewater (JSC) 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 fact sheet made in English and Arabic, was produced for the communication with the stakeholders/partners. The fact sheet includes 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 Nuba which is relevant to the SFD graphic.

Besides creating a useful fact sheet to use in the communication consultations, individual meetings, and working group discussions were held. 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 Nuba.

The local government (Nuba Municipality) and the national government (PWA), Joint services council for water and wastewater (JSC) 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 both PWA and Nuba Municipality, JSC, with a lot of content-based meetings with Nuba Municipality to fill in the SFD matrix.

Nuba Municipality has a database with all the information about the sanitation within Nuba. 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 Nuba Municipality involved the people responsible for this data. During the session, the SFD matrix was explained and further completed based on their knowledge.

Meantime, many stakeholders were 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 12).

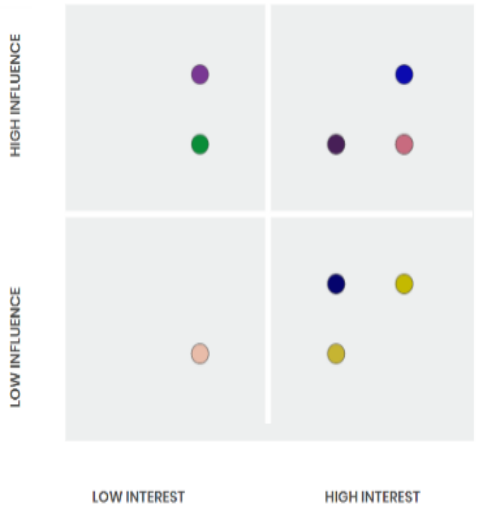

Figure 12: Graph with interest versus influence of various stakeholders, (FSM toolbox, 2021).

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 Nuba Municipality and PWA. We would like to thank the staff members of Nuba Municipality as well as PWA for being available and providing necessary information for the assessment.

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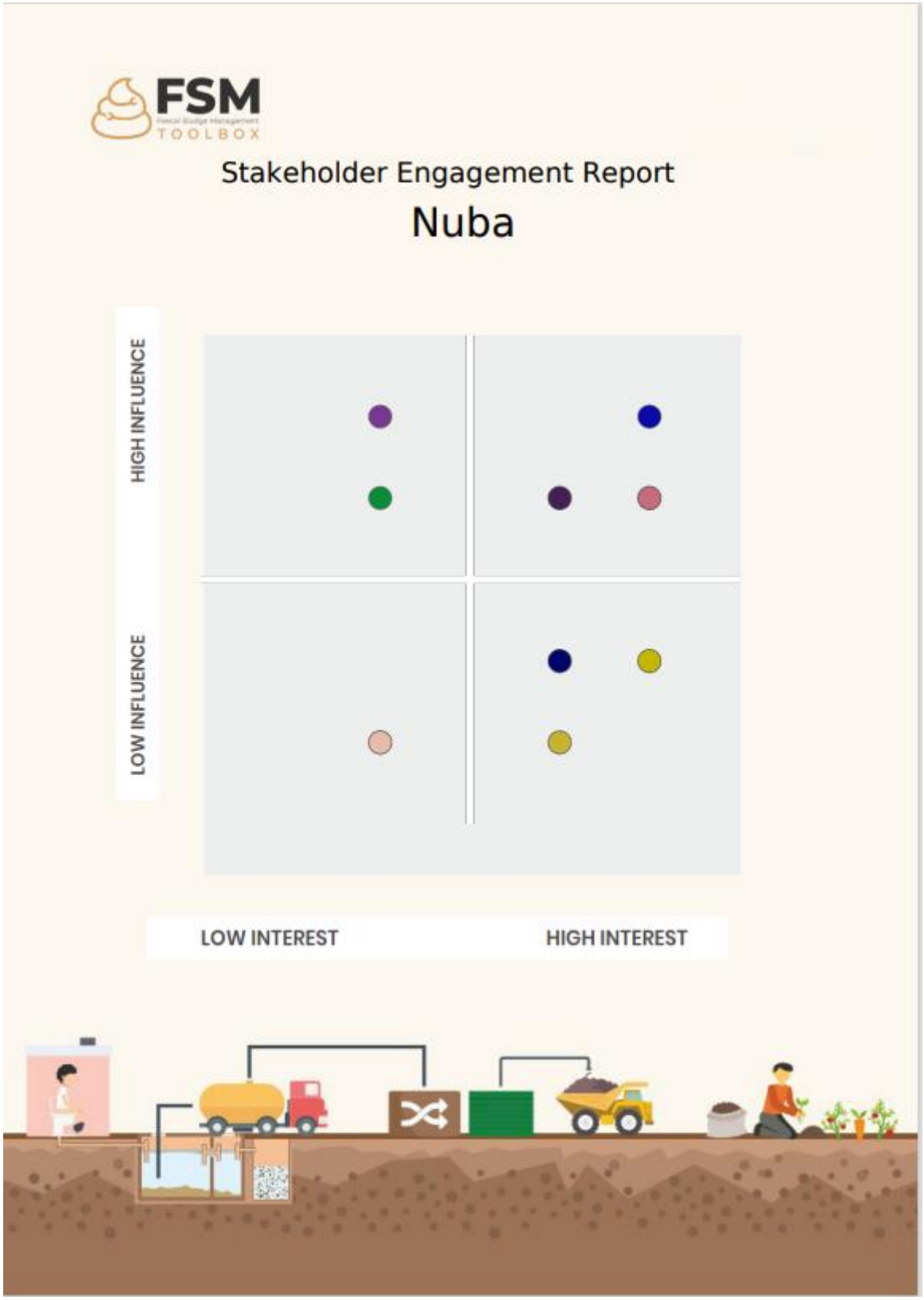
7 Appendix

7.1 Appendix 1: FSM Stakeholder Analysis



Stakeholder Engagement Report

Nuba

03 August 2022

Produced By: Ahed Dabbas, Nuba Municipality , Nuba, 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:** Nuba
- **State:** al-Khalil
- **Country:** Palestinian Territory Occupied
- **Total Population:** 7400

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)
	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	Nuba Municipality
	Joint Service Council	Joint Serves council for Water and Wastewater in North Hebron
Key Representatives of the society	Poor households	Poor households
	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	Masons	Masons
	Mechanical and manual emptiers	Mechanical and manual emptiers
	Consultants	Consultants
	Sweepers/sanitation laborers	Sweepers/sanitation laborers
	Medium business owners (general)	Medium business owners

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

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
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	Islamic Development Bank	Islamic Development Bank
	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
	local municipal authority	Nuba Municipality
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

		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..
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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

7.2 Appendix 2: Context-adapted SFD Graphic

Figure 13 shows the context-adapted SFD graphic, which represents the future situation in Nuba. By the end of 2023, the sewage network of Nuba will be extended and allow to cover 25% extra of the population. This extra sewer will be connected to the exciting network.

By the end of 2023, 71.1% of the population of Nuba will be connected to the sewage network and ensure that the wastewater is treated properly.

For the last 28.8% of the population that cannot connect to the sewage network for different reasons, 7% will be the next challenge for the municipality of Nuba. For this 7%, it should be investigated what type of treatment would be appropriate, and what capacity would be required. These different solutions could then be provided (a new individual system or optimization of the existing ones).

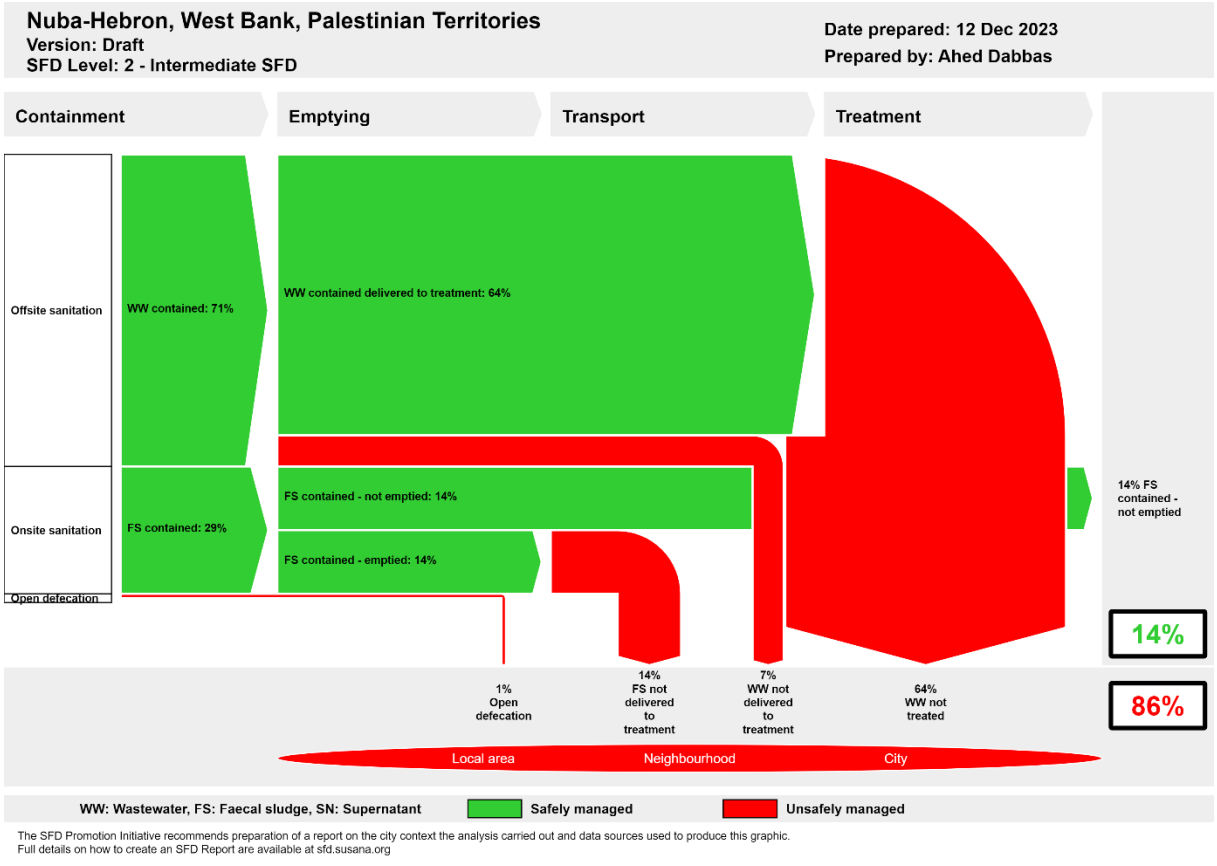

Figure 13: Context-adapted SFD Graphic Future 1.

As explained in 3.5.2., in the near future with a new WWTP built to treat wastewater from the municipalities around Nuba and Kharas it could be assumed that this will treat almost all the wastewater produced in the area, and potentially the SFD graphic would be as shown in Figure 14.

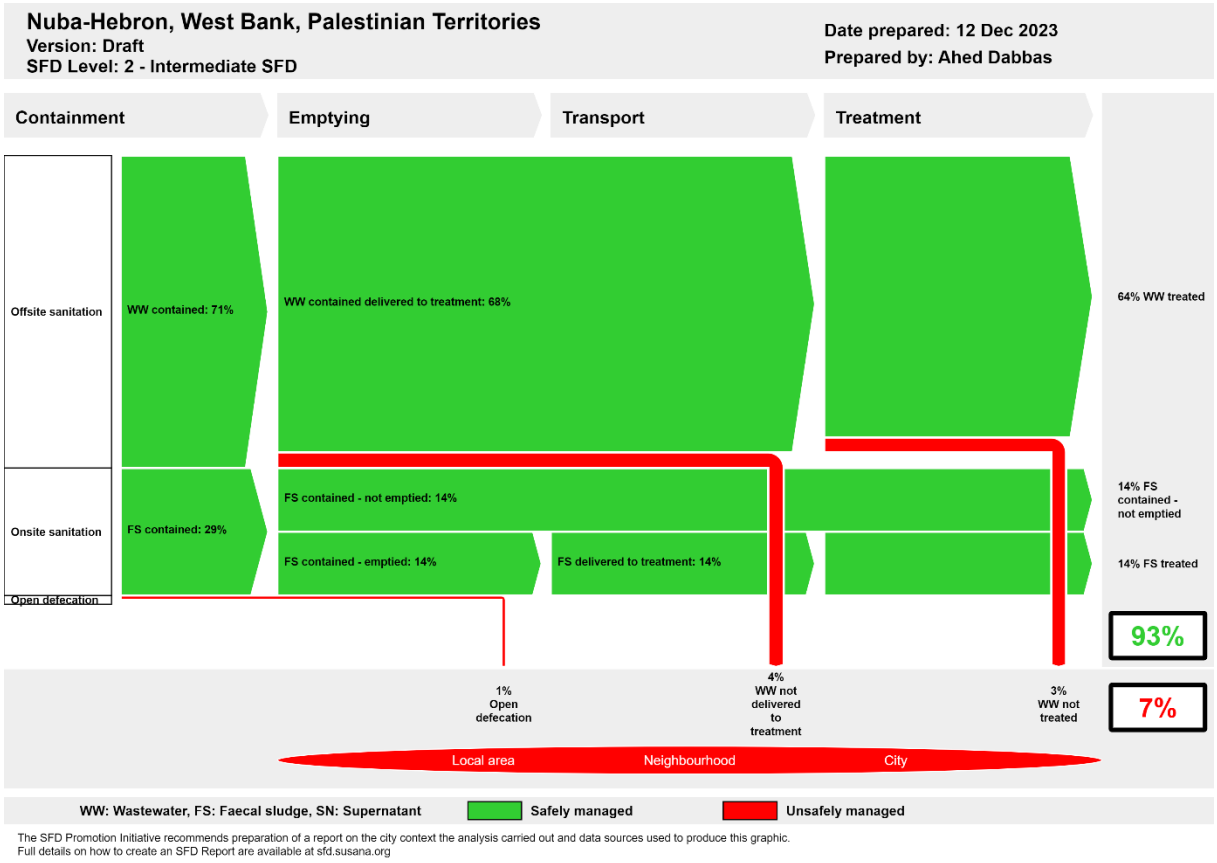

Figure 14: Context-adapted SFD Graphic Future 2.

SFD Nuba, Palestinian Territory, 2024

Produced by:

Toqa Qadi (WWn)
Dua'a Matar (WWn)
Loay Alatrash (WWn)
Khaled Sa'ad (WWn)
Reeta Abed (JSC)
Ahed Dabbas (Municipality of Nuba)
Tahane Sarahna (Municipality of Nuba)
Adrien Azé (Waternet)

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SFD Promotion Initiative