SFD Lite Report

Sharya Town
Kurdistan Region of Iraq

This SFD Lite Report was prepared by GOPA Infra

Date of production/ last update: 26/08/2021 – 16/09/2021

Cover Picture: Sharya Town – Centre left, with Sharya IDP camp centre right and Mosul Dam in the background. Source: Author

1 The SFD Graphic

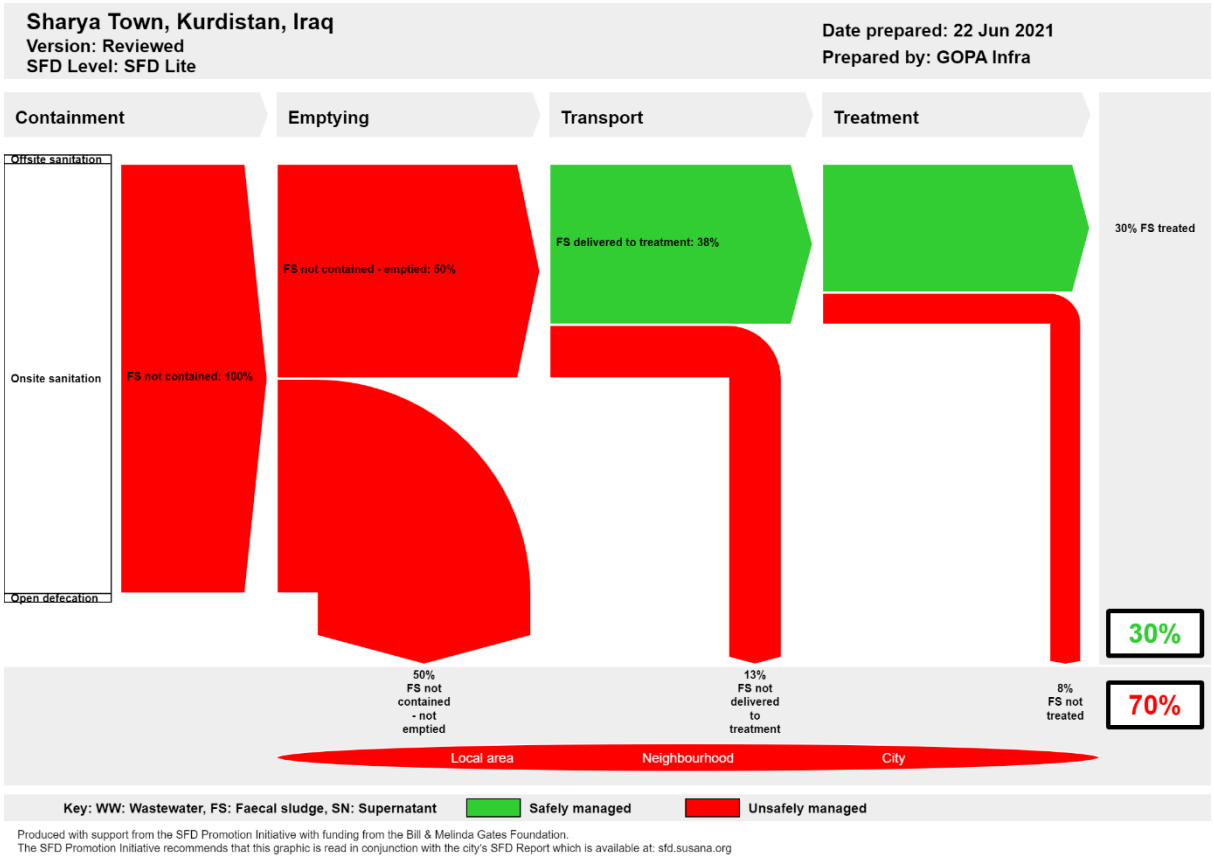

Figure 1 - SFD Graphic for Sharya Town

2 SFD Lite information

Produced by:

- GOPA Infra, Duhok, Kurdistan Region of Iraq
- GOPA Infra (GI) have been implementing a project through GIZ funding which is intended to provide technical assistance and programming to various Directorates in the Duhok area of the Kurdistan Region of Iraq (KRI). Part of this project is to assist in capacity development of key partner staff, who are tasked with the management and delivery of sanitation services, within these Directorates. Through these activities GIZ wishes to introduce the concept of smart sanitation to this capacity development and to introduce these staff to the SFD process.

  GI, in supporting GIZ in its efforts to introduce the concept of smart sanitation, is engaged in the development of three SFD Lite for the geographic target areas of Internally Displaced People (IDP) camps at Kabarto 1+2, plus the community of Sharya Town.

  Through this work, GI have recognised the importance of involving Directorate staff in the process of creating the above mentioned SFDs, which will give them familiarisation with, and experience in the use of SFD tools and templates, as well as producing the SFD based on their direct input. These Directorate staff are key stakeholders in collecting and refining the information used in creating the SFD Lite and GI wishes to acknowledge their time and support in participating in the process.

- The GI contributing team were Dr Lück, Andreas H., Mr Hameed Doski, Mr Ibrahim Dana, Mr Mustafa Abdulkhaliq, Mr Aza Hani Shukri, Dr Nashwan Shawkat, Mr Maen Quda and Mr Martin O'Malley.

Collaborating partners who attended the Stakeholder Workshop on 22 June 2021:

- General Directorate of Municipalities in Duhok (GDoMs) – Mr John Shamoon, Mr Waheed Jameel, Mr Heeve Ali, Mr Majid Ali, Mr Dilovan Farid, and Mr Kamiran Mohammed.
- Directorate of Water Outskirt Duhok (DoDOW) – Mr Khalid.
- Directorate of Migration and Crisis Response (DMCR) – Ms Jowan Naif.
- Environmental office in Duhok (EoD) – Mr Hassan Mohammed.
- Directorate of Sewerage (DoS) – Mr Younis Jano, Mr Sinan Shaba, Mr Haval Ezat and Ms Avin Kamal.
- General Directorate of Water and Sanitation (GDoWS) - Erbil – Mr Imad Omer and Mr Hawkar Azeez.
- Sharya Municipality – Mr Ismail and Mr Nazar.
- University of Duhok (Guest) – Dr Shawkat Ahmed Yaseen.

This workshop was held after the initial round of Key Informant Interviews, data collection online and review of the various reports available on the Kabarto 1 & 2 camps. Not much online information was available on Sharya Town. The workshop provided the opportunity to get all the stakeholders together to work through the information collected on Sharya Town and Kabarto 1. Through the information collected prior to the workshop, it was clear that Kabarto 1 & 2 were reasonably similar and so in the interests of saving time at the workshop, which was for 3.5 hours, only the information on Kabarto 1 was presented and discussed. The intention being that GOPA Infra would then update the SFD for Kabarto 2 and share this with the attendees for confirmation, which subsequently happened. Therefore, while only Kabarto 1 and Sharya Town were discussed on the day, the agreed intent was to use as much of the same information as possible in order to develop the Kabarto 2 SFD.

The second purpose of the workshop was to use the agreed information in order to work with the stakeholders through the SFD process, introducing the SFD Users Guide and online tools and aiming to give confidence in using these tools later by working through the two examples well known to the attendees. It provided the stakeholders with a forum in which to discuss the usefulness and relevance of the smart sanitation and the SFD to their own situation and how it can be used to highlight the need for funding or other assistance through the visual representation of the SFD.

Date of production: 22/06/2021

3 General city information

3.1 Location

Sharya town is situated in the KRI and located in the Sumel District, which is part of the Duhok Governorate administration, and it lies approximately 15km south of Duhok, as per Figure 2.

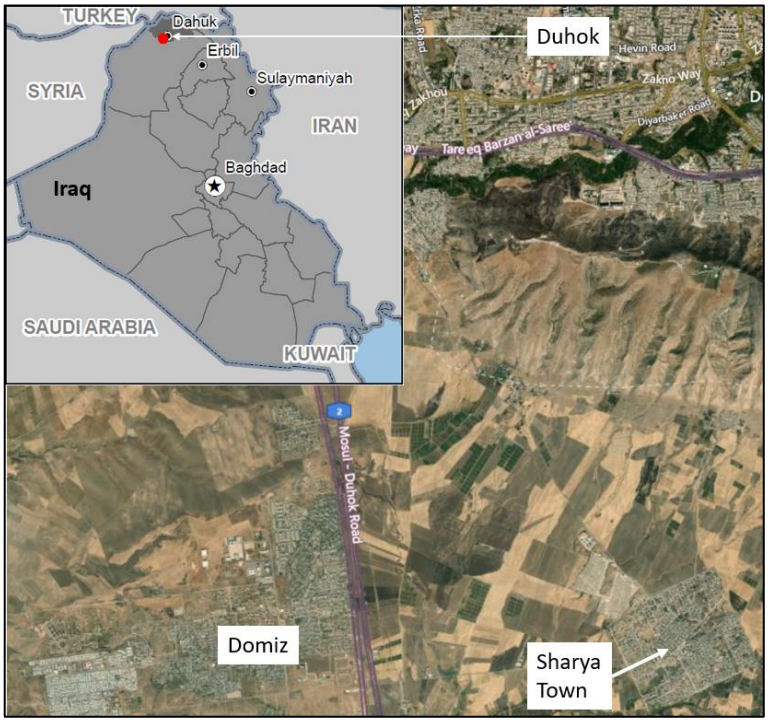

Figure 2 - Sharya Town Location (Source: Bing Maps 2021 & REACH CCCM Cluster Iraq, 2019)

The area around the town is generally arable land, growing one grain crop per year, mainly wheat. In some localised areas the land may be irrigated from wells/bores, allowing more than one crop per year. Grazing of the land occasionally occurs by nomadic herds of goats and sheep, that are controlled by a shepherd. As stated by the Head of Municipality (HoM) in Sharya, some use of chemical fertiliser occurs, but mostly it is "organic fertilisers" that are used to improve the soil. By organic fertilisers, Gopa Infra (GI) infers that this means that untreated faecal sludge (FS) which is removed from the containment systems is discharged by the emptying trucks, as described later in this report.

The topography of the area generally slopes from the Zawa Mountain to the immediate north of Sharya, southwest towards the Mosul Dam, with the land being reasonably flat, but with wadis (dry creeks) that take the runoff from the surrounding land during rain events. Generally, there is no flooding in the area, but in 2019 the nearby village of Gre Pane experienced flooding, according to the HoM.

3.2 Background

According to the HoM, the town was established in 1987, serving the combined populations of six small agricultural villages, from the nearby area, that were demolished in that year. The town is mainly populated by Yazidis, he said.

Most employment in the town is from local agriculture, hospitality businesses in the town and employees that travel to Duhok or the surrounding towns for employment. There are no significant industrial or commercial activities, most commercial activity is limited to hospitality, such as cafes and restaurants. There are no hospitals in the town, but the Sharya Public Health Centre provides health services for the population.

3.3 Population

Sharya Town is currently hosting large numbers of IDP's, both in and out of camps. Figures received from the HoM, relating specifically to the town in 2021, state that there are 7,254 individuals in the hosting community and 6,023 IDP's within the town boundaries, that are out of camps, giving a total figure for the town of 13,277 individuals for Sharya Town (This is the figure that is used for the SFD as it relates specifically to population within the town boundaries, rather than all the municipality area).

According to the "Report on the IDP Camps in Duhok, June 2015 by Board of Relief and Humanitarian Affairs (BRHA)", the large number of IDP's in the area is mainly owing to the origin of the displaced people, being from the Sinjar district in the Nineveh Governorate of Iraq, where the people are mostly Yazidis. Most of the IDP's have been in the Sharya area since approximately 2014, following persecution in their homeland of Sinjar from the so called "Islamic State of Iraq and the Levant". Sharya town and its surrounds has also been an area historically populated by Yazidis and therefore the IDP's came to seek refuge with them, in, what was then, one of the only secure places within northern Iraq. As the security situation in Sinjar continues to be volatile, the displaced people are likely to stay for the foreseeable future and recent return surveys carried out for the Inter-Cluster Coordination Group (ICCG), indicate that people have no immediate plans to return, citing security concerns in their place of origin as the single biggest deterrent to returning (Source: Situation and Needs Monitoring – Report #1 ICCG).

The population number within the town is relatively stable in 2021 and since the initial influx of those displaced in 2014, when the population doubled in a relatively short time. Those who farm or work in the nearby areas return at night. On the weekends there is not much change in population, as people who visit the original villages in the mountains usually return at night. The main variation in population occurs during the "Karajal" religious festival, where many Yazidis come to Sharya to celebrate. It is not currently clear, owing to the large numbers of IDP's present, whether that is a current issue, or more historical when relatives friends lived in other parts of the country and travelled to Sharya.

3.4 Spatial & Boundary Information

Based on the Duhok Spatial Masterplan 2010, residential plots in the town are generally 200m^2, which is the standard within the Duhok Governorate for urban settlements and in many cases the dwelling takes up most of the plot space. As Sharya is a relatively new town, the layout has been planned such that these plots are laid out in blocks, with the dwellings generally back-to-back and facing in opposite directions onto the access road, in a typically modern urban layout, as shown in figure 3.

Figure 3 - Sharya Town Boundaries (Source: Bing Maps)

The average occupancy per household is 5 people, based on feedback from the Municipality.

The growth rate of the community is 2.9% per annum, according to the Municipality and confirmed by the Directorate of Statistics in June

2021. The already mentioned influx of IDPs in 2014 swelled the population, but no assessment has been made yet of the growth rate within the displaced population out of camps.

4 Service outcomes

The sanitation service chain in Sharya is based on the onsite sanitation system and full and detailed explanation of each part is provided, as follows:

4.1 Collection

The HoM stated that generally, collection of toilet waste is via a squat toilet, see figure 4, which is based on the principle of using water to flush the toilet contents and providing a water seal to prevent odour from the containment system. Though toilet seats are becoming more popular for the elderly or those with disabilities, but only in a small number of cases. This collection system collects faeces, urine, water for anal cleansing and flush water, which collectively are called blackwater. The typical figure that is used per person for blackwater is 20 - 25l per day, which is generally the accepted figure for black water production in the area and is supported by assessments carried out in the Domiz 1 Refugee camp, nearby. (Ref – Sanitation Assessment & Concept Options Report, 04 June 2019).

It is worth pointing out that waste from kitchens, showers, wash hand basins and baths, called greywater, are all directed away from the onsite containment system and to the nearest surface water route, whether that is a kerbside drain in a road or directly to ground, outside of the residential plot. The practice is that the greywater uses the rain and stormwater system to be removed from the vicinity of the plot on which it originated. This is standard practice in all the towns and cities in Kurdistan and has been observed by the author to be the case in all areas visited in the Duhok area.

Figure 4 - Squat Toilet used in KRI (Source: Author, 2018)

There is no reliable information on the greywater volumes produced by the host community. The wastewater (combined black and grey water) production figure used by the Directorate of Sewage in Duhok is 350l per person per day in the design of the Duhok sewerage masterplan. This figure is based on bulk water metering and dividing this by the number of people connected to the water supply and it therefore does not allow for non-revenue water, so there is a potential that it is conservative.

No open defection occurs in the town, according to the Head of Municipality.

4.2 Containment

As previously mentioned, greywater is diverted off the residential plot and only the blackwater is held/contained on site. Locally the containment method is referred to as holding or septic tanks. As observed by the author and confirmed by GOPA colleagues, these structures are built within the plot, as per figure 5, but are often constructed under the building itself, where the building takes up most of the plot and includes a garage at the ground floor level, see also figure 5.

The containment system consists of a blockwork wall, constructed directly on the ground, without any base slab or foundation. A concrete slab is poured over the top of the “tank”, so that this area can be

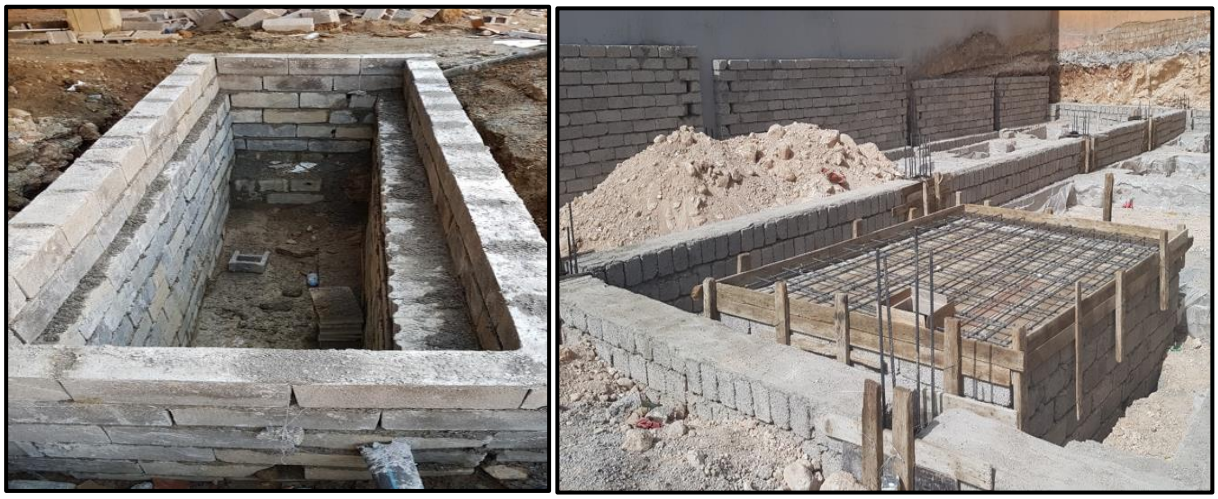

Figure 5 - Onsite Containment on the Plot (Source: Author, 2019)

used for whatever purpose the homeowner wants, usually a garage. The intention is to let as much liquid as possible infiltrate into the ground, through the walls and the open bottom. When the sludge layer builds up over time, usually 5-10 years for a single dwelling, based on discussions with stakeholders, it can then be emptied via the access opening that is left in the top slab. According to the stakeholders interviewed, this system seems to work reasonably well from the homeowner’s perspective, as it reduces the amount of desludging that must happen, thereby minimising the cost. However, it does mean that untreated or partially treated liquid is permeating into the ground from every individual containment system, which creates a potential risk for groundwater.

In the SFD manual, this type of containment is referred to as “Lined pit with semi-permeable walls and open bottom”. During the workshop with stakeholders in which the SFD graphic was created, there was much discussion in relation to the type of containment, but in the end, all agreed that the lined pit was the most appropriate, based on the descriptions in the SFD manual.

4.3 Emptying

This is carried out by 10,000l vacuum trucks, one from the municipality (which was out of service at the time of the interview with HoM) and two provided by private contractors. When residents need their pit emptied, they call the contractor and request the emptying. Feedback from the HoM is that the service provided is reliable and the residents can get this service easily by calling the contractors directly. With the recent move to have the material transported to the new wastewater treatment plant (WWTP) (section 4.5) 30km away, rather than dumping locally, there is a concern in the municipality that the increase in cost for transportation will result in a reduction of use of these services and continued illegal discharges to land.

Figure 6 - 10,000l Contractor Vacuum Truck (Source: Author, 2018)

These vacuum trucks are widely used in the area and they come with a flexible suction hose that is inserted into the containment pit in order to vacuum the FS out. There is difficulty in completely emptying the pit, owing to the narrow opening in the roof slab and the flexible hose, which often results in solids being left in the corners of the pit, away from the opening in the roof slab, reducing the working volume and thus increasing the frequency of desludging.

4.4 Transportation

The same vehicles that are used for emptying the onsite containment systems are also used for transporting the FS to either the treatment or discharge sites. In the Dohuk area, where there has been no WWTP until 2018, the desludged material was generally discharged to farmland, at the request of the farmers. This practice was never in favour with the municipalities, but in the absence of any alternative, the practice was tolerated. As a result, the desludged material was transported to various locations where it was then discharged onto farmland, and this is the organic fertiliser mentioned previously. With the construction of the new WWTP, the contractors who empty and transport the FS are encouraged by the municipalities to take it to the WWTP when it is operating and in 2021, there is a more concentrated effort by officials to get the material taken for treatment. This is being monitored at the WWTP also, with the plant operators recording deliveries from each area.

4.5 Treatment

The WWTP constructed in 2019, which is near Domiz 2 Syrian Refugee camp is the location to which the FS is brought from Sharya Town. The treatment process is Waste Stabilisation Ponds (WSP), which is a passive system, using a series of ponds, as indicated in figure 7 below, to do the treatment.

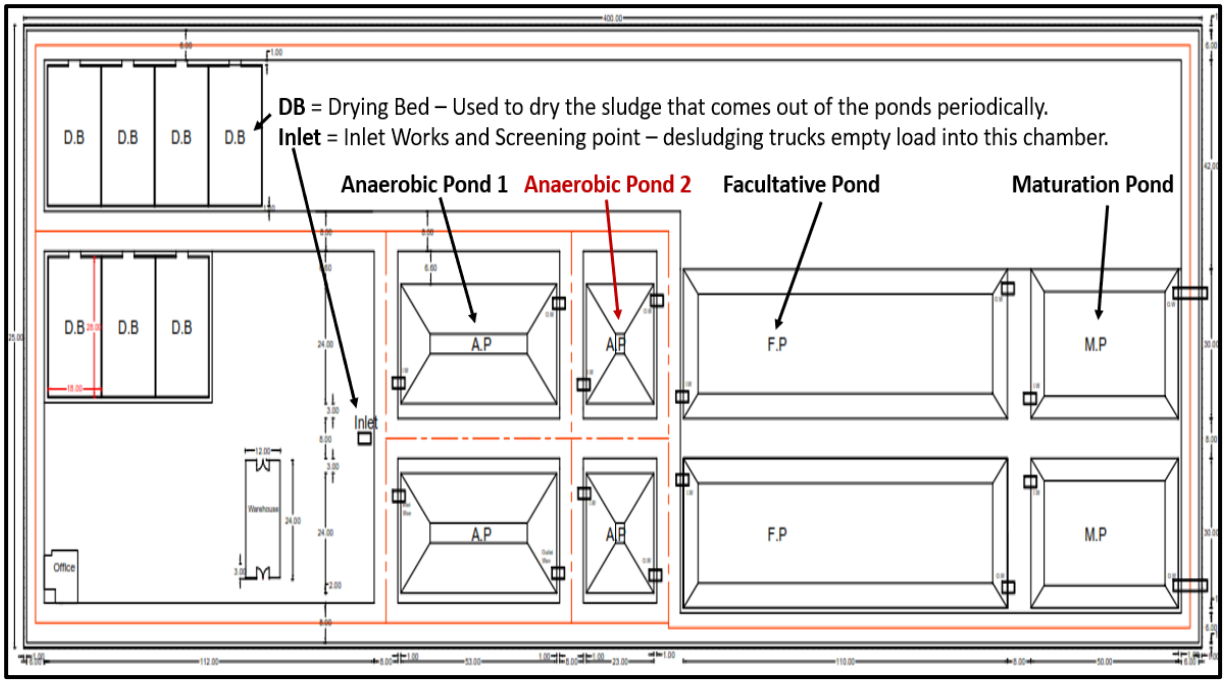

Figure 7 - Waste Stabilisation Ponds Layout (Source: Dr Nashwan Shawkat, 2019)

Treatment is carried out as the FS travels through the series of ponds, starting with initial screening, to remove any large solids. The first ponds are anaerobic, followed by a facultative and maturation pond, that are aerobic in nature. The sludge that settles out in the anaerobic ponds is removed by pump to the drying beds when the sludge level in the ponds builds up past an established operational point and starts to impede the treatment capacity, through diminished treatment time.

Apart from the sludge pumps, the process is entirely passive (not requiring mechanical or electrical assistance), with the flow moving through the ponds, receiving treatment at each stage and the final effluent is then discharged into a wadi beside the pond's location. It is intended that at some point, when the treated effluent is at an acceptable level, the final effluent can be used for irrigation in the surrounding area. This would add a final stage of treatment, where the nutrients in the treated effluent would be taken up by the soil and plants and therefore using them beneficially.

4.6 Disposal/Reuse

As mentioned by the HoM, there has been a practice of some farmers using the FS as a fertiliser, which was spread directly onto the land from the transportation vehicle for growing crops of wheat, the main crop planted. The FS material, because of its age, will be reasonably inert, but still potentially contains pathogens and other harmful contaminants from the blackwater. This practice is now on the decrease, as authorities wish to stop it entirely from a health and hygiene perspective. Where the material is not treated or reused, it is discharged directly to the environment, usually to wadis, in locations that are determined by the municipality.

One of the questions that was asked during the interview with the HoM was whether people may be interested in reusing greywater for irrigation of gardens or crops, but the answer was negative on that. This corresponds to the authors experience in the nearby Domiz 1 & 2 refugee camps, where several projects were established to reuse greywater for irrigation, but these never succeeded, and the greywater was quickly replaced by clean water from the camp supply, and this continues still.

4.7 SFD Matrix

The SFD graphic for Sharya Town was compiled at a stakeholder workshop held on 22 June 2021, and through an interview with the deputy manager of the Sharya Municipality. At the workshop, there was a lot of discussion about the percentages relating to the matrix and clarifying that these relate to the population, rather than the amount of FS produced, being emptied, or transported. The following are the steps undertaken and the reason for selecting them: -

- For Step one in the graphic, the participants used the selection grid and chose “Lined pit with semi-permeable walls and open bottom”. The next task is to determine the “risk of groundwater pollution”, based on a series of questions in the SFD tool. At the workshop and, following the guidance from the online tool, the participants selected the “low risk of groundwater pollution” option. This was based on answering the questions relating to depth of groundwater, soil type and proximity to containment systems. In the Sharya area the boreholes are between 134m and 237m deep, therefore very much greater than the maximum 10m in the tool. Fine sand, silt and clay was selected as the soil type by the participants. Based on the same feedback, there are no water sources close to the camp. When all of these are entered into the online tool, the output was that the overall risk to groundwater was low.
- After the workshop, some more detailed observation of borehole logs for the area was carried out and these indicate that the ground water is reasonably shallow around Sharya Town and surrounding area. While the bores themselves are quite deep in the 7 bore logs observed, the Static Water Level across all of them is between 5m and 17m below ground, with the Dynamic Water Level ranging from 70m to 142m below ground. This indicates that there is significant potential for any contaminants entering the shallow groundwater to be drawn deeper through the pumping of water. Because of this, the author considers the more prudent approach is to use the high-risk category, therefore selection of option T2A5C10.
- In Step two, the correct onsite container must be selected, and the percentage estimated to be FS. Using Information button that opens another interactive Help Tool to help select the % of FS in the pit, this indicated that 100% could be used. However, the participants also state the pits are designed to allow active permeation of the supernatant from the container. These pits tend to be emptied every 5-10 years according to the participants and therefore the liquid from the pits is clearly percolating into the ground on an ongoing basis. It has not been established clearly just how much is infiltrating to the ground, so the SFD manual guidance was used.
- As a result of this, Variable group: S4 on page 106 of the SFD manual is considered to be more applicable and thus 50% of tank is FS emptied and 50% FS not contained and not emptied, infiltrate to ground.
- The Proportion of the Population using this type of system was agreed at 100%. It may be known by different names, but for the SFD completion, it’s established as the lined pit with semi permeable walls and open bottom for all the community.
- Proportion of this type of system from which FS is emptied was also agreed at 100% of the population, as all these tanks have been emptied at some point.
- Proportion of FS emptied which is delivered to treatment plants. The workshop participants agreed that because all pits are emptied at some point, it then follows that all are transported, whether it is to land or to treatment. However, the question is specific about what is delivered

to treatment plants and so the group felt that 75% of the material being transported is being brought to the treatment plant, with the balance still being illegally discharged to land.

- Proportion of FS delivered to treatment plants, which is treated. There was much discussion on the % of the FS that is being treated at the WWTP. Based on testing of the final effluent for June 2021, the percentage of BOD removed was 86% and the percentage of COD removed was 74%. Therefore, a figure of 80% treatment has been used. It is recognised that this is an estimated figure against the mass balance figures for BOD and COD in the treatment plant design, but it is only figure that is reliable for the period in question.

Table 1: SFD Matrix for Sharya Town (Source: GOPA Infra Stakeholder Workshop, June 2021)

Sharya Town, Kurdistan, Iraq, 22 Jun 2021. SFD Level: SFD Lite Population: 13277 Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks: 5				
Containment				
System type	Population	FS emptying	FS transport	FS treatment
	Pop	**F3**	**F4**	**F5**
System label and description	Proportion of population using this type of system (p)	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
T2A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	100.0	100.0	75.0	80.0

4.8 SFD Graphic

The graphic produced by the methods and information input described above is felt to be an accurate summary of the sanitary situation in Sharya Town. On an ongoing basis the blackwater that enters the lined pits is not contained and, in fact, these pits are designed specifically so as not to contain the liquid, but rather let it infiltrate into the surrounding soil through the semi-permeable walls and open bottom. The solids that get left behind build up over time and about every 5 – 10 years, this material is removed from the pit and transported to either the WWTP, a recent addition, or still in some cases discharged illegally on farmland.

Feedback at the stakeholder workshop confirmed that the figure of 37% of the faecal sludge being safely managed and 63% unsafely managed is felt to be an accurate assessment of the overall situation in Sharya Town.

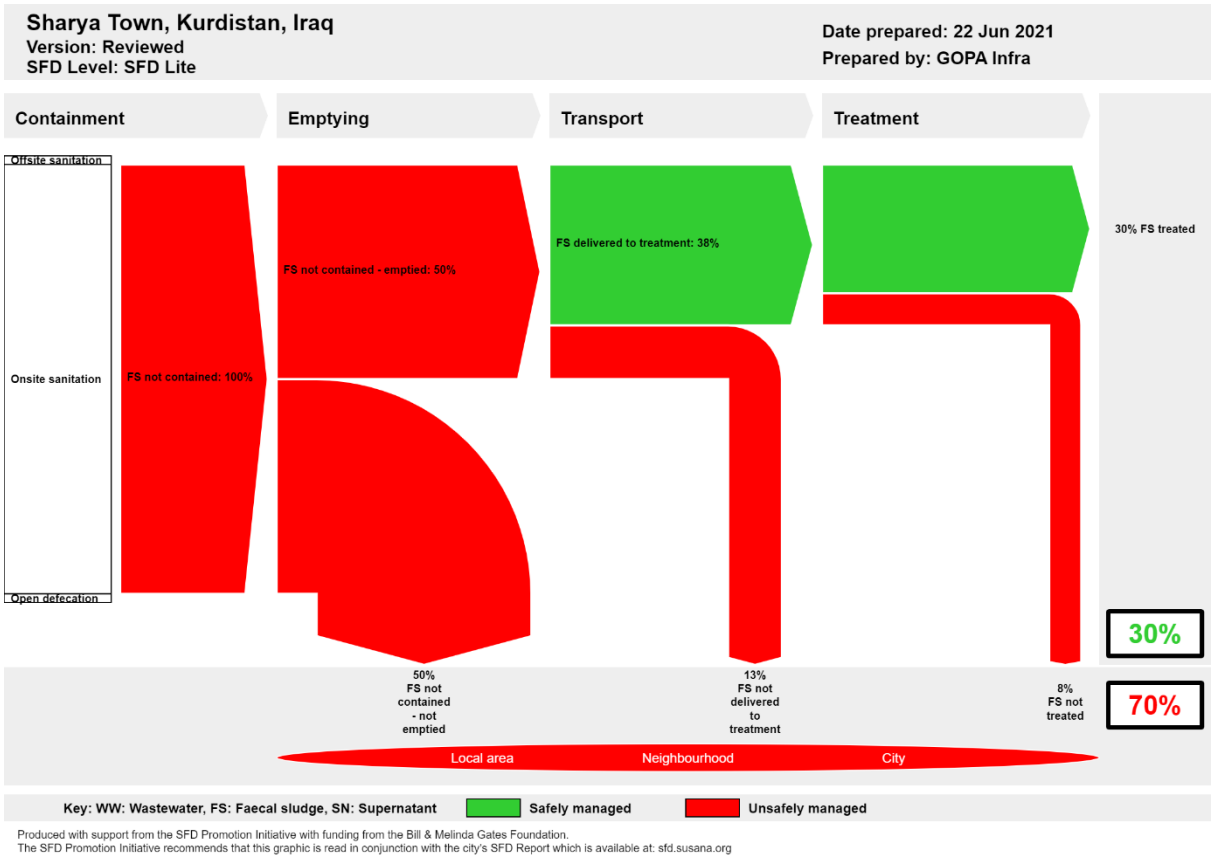

Figure 8: SFD Graphic for Sharya Town (Source: GOPA Infra Stakeholder Workshop, June 2021)

5 Data and assumptions

Availability and accessibility of data:

- It was not possible to get any of the original plans or layouts for Sharya Town. The plan that was received was part of the Duhok Land Use Master Plan, which shows Sharya Town details, and this is what has been used for this SFD completion.

Quality of data available and used:

- The information relating to population did not come with a certificate from where they originated, but rather came from KII with the HoM and Directorate of Statistics.

Identified data gaps:

- Limited information available on local Policy and Legislation around sanitation. The HoM provided information on some de facto and de jour rules that apply, but nothing else available.
- It was not possible during the creation of the SFD to get regional or national levels policies either.
- Information on boreholes within the Sharya Town could not be found and this would give a better understanding of the geology in the area.
- No water testing results from bores in the town was available to confirm water quality. It was stated by the HoM that there is testing done on the water supply system, but this is the one that comes from Duhok and so does not reflect the local conditions.

Major assumptions that were made:

- The assumption that there is a significant risk to the groundwater from the onsite sanitation systems in Sharya Town. There is no testing results or other data to support this but based on the limited information on boreholes available for the area and the fact that the containment systems are designed to infiltrate liquid from the pit, it was felt that this was a reasonable assumption.
- The assumption that 50% of the FS is removed and that 50% FS remains in the pit or is infiltrated into the ground. Again, as the design of these pits is to allow as much liquid as possible to escape the pit through the semi permeable walls and open bottom, this seems like a reasonable assumption.
- The assumption that 80% treatment occurs in the waste stabilisation ponds is a significant assumption but based on the best available data. The only testing being carried out at the time of the workshop was COD at the outlet of the ponds. From this figure the designer of the ponds, Dr Nashwan Shawkat, estimated the percentage of BOD and COD removed, using the mass balance figure that the design was based on. From this he provided the above quoted percentages from which 80% was estimated.

6 List of data sources

- Reports and literature
  - Domiz 1 Syrian Refugee Camp Sanitation Assessment & Concept Options Report – 04 June 2019
  - Domiz 1 Syrian Refugee Camp SFD Final Report – 14 August 2019
  - Domiz 2 Syrian Refugee Camp SFD Final Report – 14 August 2019
  - SFD Lite Report Domiz Town Final Report – 29 July 2019
  - SFD Lite Report Shariya IDP Camp Final Report – 14 August 2019
  - Report on the IDP Camps in Duhok, June 2015 by Board of Relief and Humanitarian Affairs (BRHA)
  - Considerations on Transitioning away from Emergency Shelter in IDP Camps in Duhok – July 2019 Shelter Cluster Iraq
  - SFD Manual Volume 1 & 2, Version 2.0, April 2018
  - SFD Preparation Workshop – Summary Report – 26 June 2021
  - Master Plan Duhok 2032 Land Use Plan – 16 January 2010
- Key informant interviews
  - Head of Sharya Municipality – Mr Ismail Suliman Abdulkareem
  - Sharya Municipality Employee - Mr Nazar Shukri Hasan
  - Assistant Governor of Duhok – Mr Ismail Mohamed Waisy
  - Directorate of Water Outskirt Duhok (DoDOW) – Mr Khalid
  - Directorate of Migration and Crisis Response –
    - Ms Manal Bamarny – Director Duhok Office
    - Mr Awaz Eskandar– Duhok Office
  - Directorate of the Environment – Mr Hassan - Engineer
  - Directorate of Underground Water – Engineer Mr Naji Ibrahim
  - Directorate of Statistics – Director – Mr Giyavan Abdulrazaq
  - Directorate of Water in Domiz – Mr Khalid
- Focus group discussions
  - SFD Preparation Workshop – Kabarto 1 and Sharya Town – 22 June. The attendees are listed on page 2 of this document.

Sharya Town, Kurdistan Region of Iraq, 2021

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