SFD Lite Report

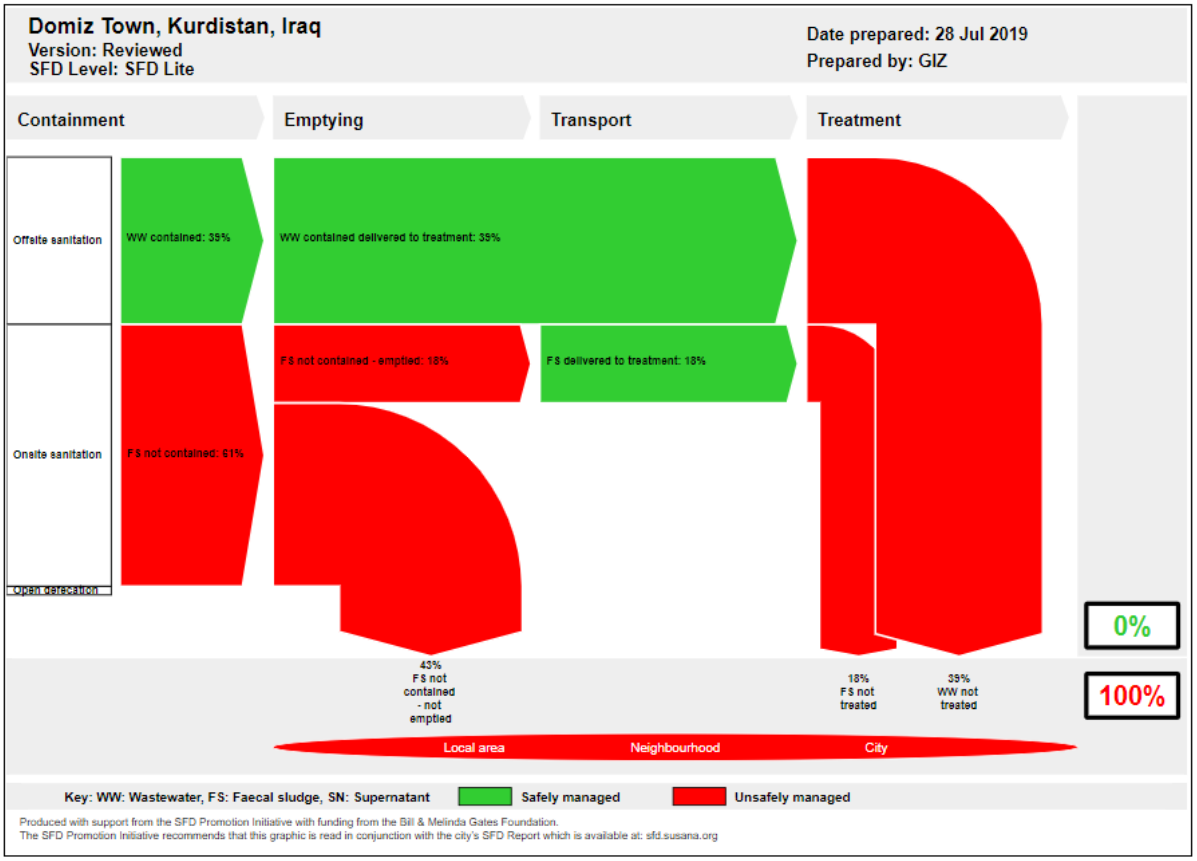
Domiz Town
Kurdistan Region of Iraq

Final Report

This SFD Lite Report was prepared by GIZ.

Date of production/ last update: 29 July 2019/
07 September 2021

1 The SFD Graphic



2 SFD Lite information

Produced by:

- GIZ (Martin O' Malley, who was deployed to UNHCR Duhok by RedR Australia, under funding from GIZ)

Collaborating partners:

- Engineer Falah at the Maintenance and Operation Centre, Sewerage Department, Domiz.
- Engineer Sinan Shaba from the Directorate of Sewerage, Duhok.

Date of production: 29 July 2019

3 General city information

This SFD Lite relates to the older part of Domiz Town, rather than the newer developments, for which it is difficult to obtain any information for. Domiz town is located, near the city of the Duhok, in the Kurdistan Region of Iraq. It is approximately 16km to the south of Duhok, along the highway to Mosul, which is 65km further south. Based on an interview with Engineer Falah, Maintenance and Operation Centre, Sewage Department, Domiz, the planned for population in the older part of the town, which this SFD Lite relates to is 10,250 people. (Elaborated further below, in Table 1). According to Engineer Falah, no specific population growth statistics were found for Domiz Town, as it is generally included as part of the overall Duhok growth figures.

The location of the town is along the disputed boundary line pertaining to KRI and Iraq and up until 2003, the town was located on the Iraqi side of the border.

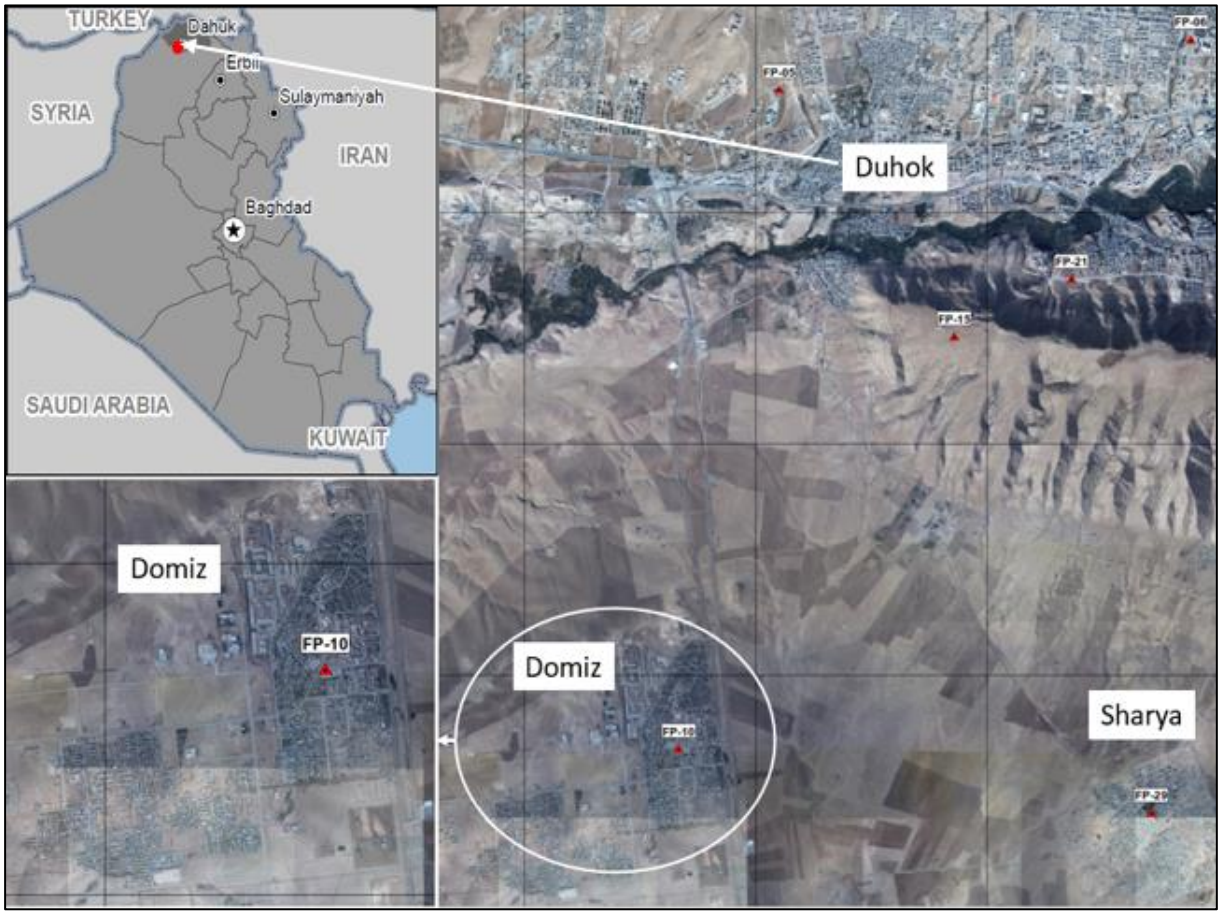


Figure 1: Domiz Town Location map. (Source: Author, 2019)

The town was established in 1989 as a housing base for officers in a nearby military camp. The original development was one of five carried out in Iraq by a French construction company and the later the town began to expand around this initial development. Because the town was originally within the Iraq borders, it was administrated from Mosul. In fact, it still is to this day, however there is no active management of the utilities from Mosul and the staff at the Sewage Department office in Domiz look after the sanitation, as there seems to be

confusion as to the administrative boundaries and responsibilities, because of the disputed border location.

The town consists of several different areas that were built at different times over the years. The original development that was constructed includes a gravity sewer collection system, which is still operating to this day, with two pump stations that move the sewage along towards the town of Fayda, where it is then discharged through an open pipe to a wadi. This drainage eventually enters Mosul Dam.

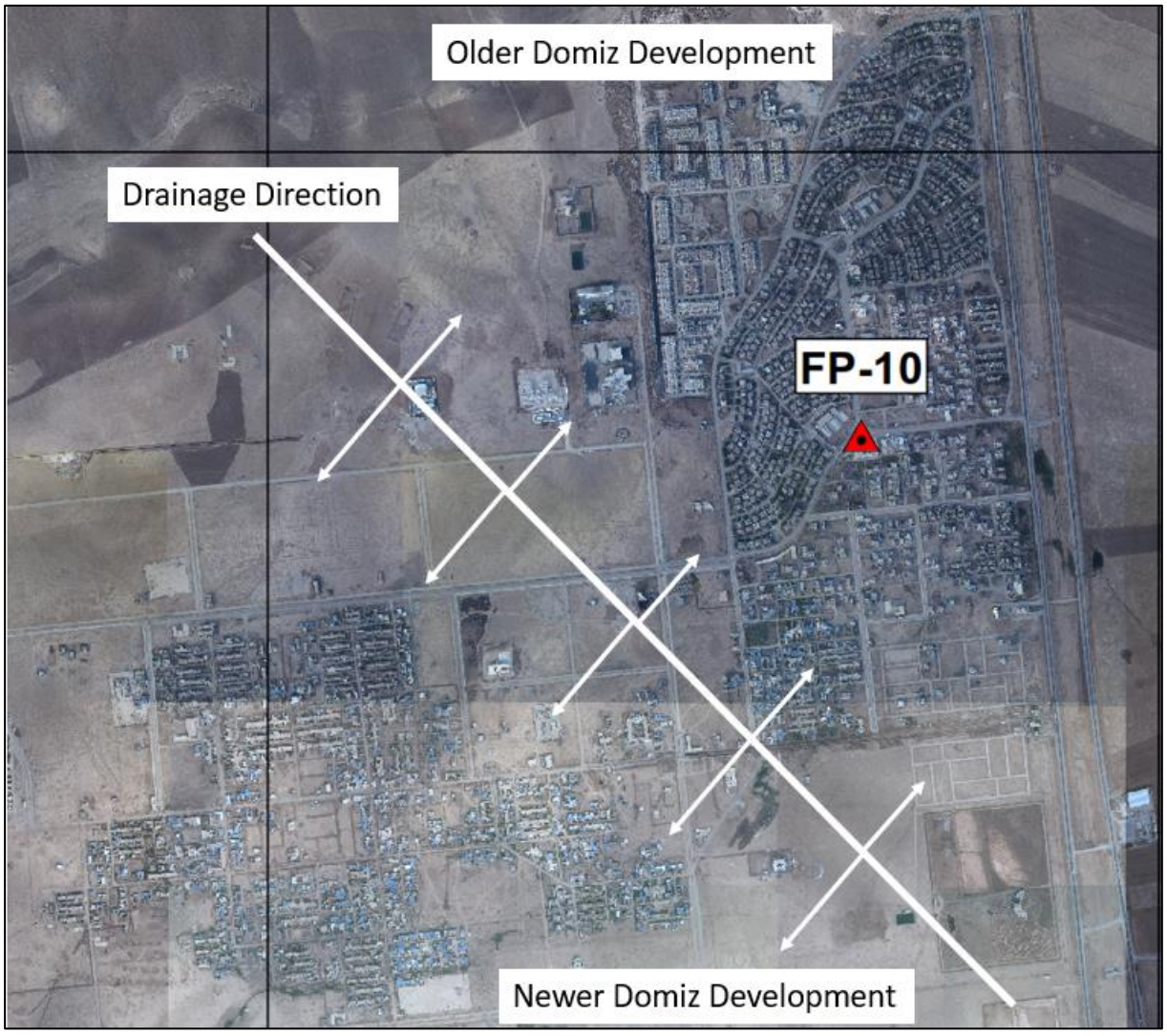


Figure 2: Domiz Town Old and New Districts, with drainage direction. (Source: Author, 2019)

The more recently constructed houses in the Domiz town are generally to the southwest of the older part of town, as indicated in figure 2, above. This also marks a natural change in the drainage as in the older parts of the town, where the ground generally falls to the northeast.

The information that has been collected as part of this report relates to the older part of the town, as it seems the administrative processes are still somewhat uncertain for the newer areas and the author was unable to determine exactly how this administrative overlap is dealt with.

The older part of the town has three distinct areas relating to sanitation, as follows:

Domiz Quarter	No. HH's	Estimated Population	Black Water Route	Grey Water Route
Original Development	800	4,000	Original Sewer	Original Sewer
First Expansion	750	3,750	Unlined tanks at each HH level.	Open channel to original sewer
Current Expansion	500	2,500	Unlined tanks at each HH level.	Open channel to original sewer

Table 1: Domiz Town Quarter details. (Engineer Falah, Sewage Department, Domiz., 2019)

This detail is elaborated further in figure 3, below:

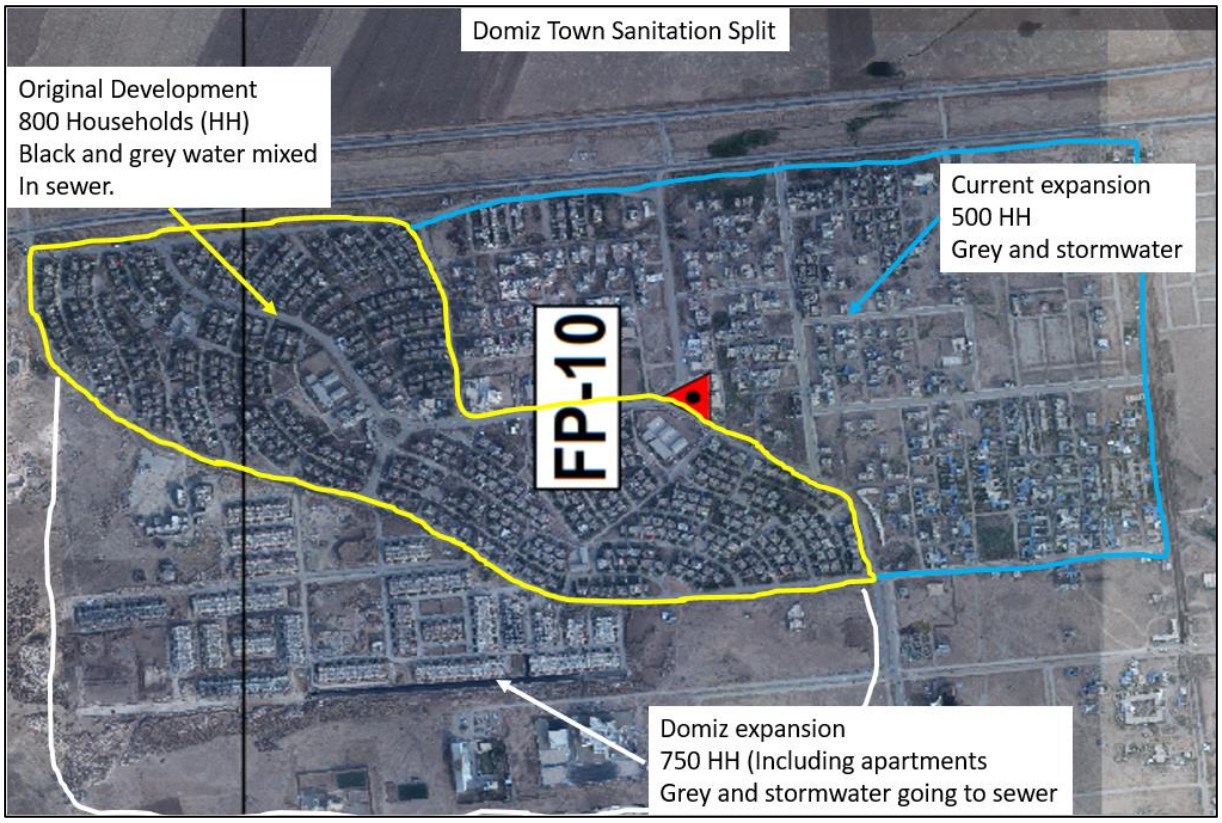


Figure 3: Domiz Town, older district with Sanitation split. (Source: Author, 2019)

The original part of the town is more densely concentrated with dwellings than the new areas and from discussion with Engineer Falah, this is understood to be based on the fact that it was done as a development project for the nearby military base and the project included the servicing and sewering of the area. This would likely have influenced the density of housing in order to bring the cost benefits of services to reality. In the newer areas, where there is no sanitation or water servicing, the development of dwellings is much more sporadic and spread out.

Figure 4: Domiz Town, older district showing dense spatial filling. (Source: Author, 2019)

Figure 5: Domiz Town, newer district showing less dense spatial filling. (Source: Author, 2019)

The less dense filling of the newer areas will pose challenges for any upgrade in services, as it is not clear that the dwellings have been laid out in a manner that is conducive to sensible or cost-effective servicing. The current layout suits the onsite sanitation arrangement, with property plots laid out so as to make the best use of the plot size, while allowing for containment on site. With housing layouts that are designed to be sewered, the layout is more structured so that all houses face the same direction and have a similar floor level to accommodate best for the installed sewer.

Furthermore, from observations conducted during the assessment in Domiz, in many areas the roads, which would be the natural conduit for water services, are often at a higher level than the surrounding houses, meaning sewers would have to be installed very deep to accommodate gravity flow. It would be still physically possible, but just more expensive to construct and maintain when the sewer is deep.

4 Service outcomes

Owing to the administrative issues related above, there are no sewer construction plans or as built drawings available for the underground assets. Instead, there is a working knowledge from the operators based in Domiz and the description of the system that follows is based on the interviews with them.

As detailed in Table 1, above, the town is broken down into three distinct physical areas, with the older part of the town having a gravity sewer collection system in place. This collects the wastewater (grey and black water) from each of the households within its boundaries. This wastewater is then pushed, via two pumping stations, to a discharge point at the nearby town of Fayda, as demonstrated in figure 6, as follows:

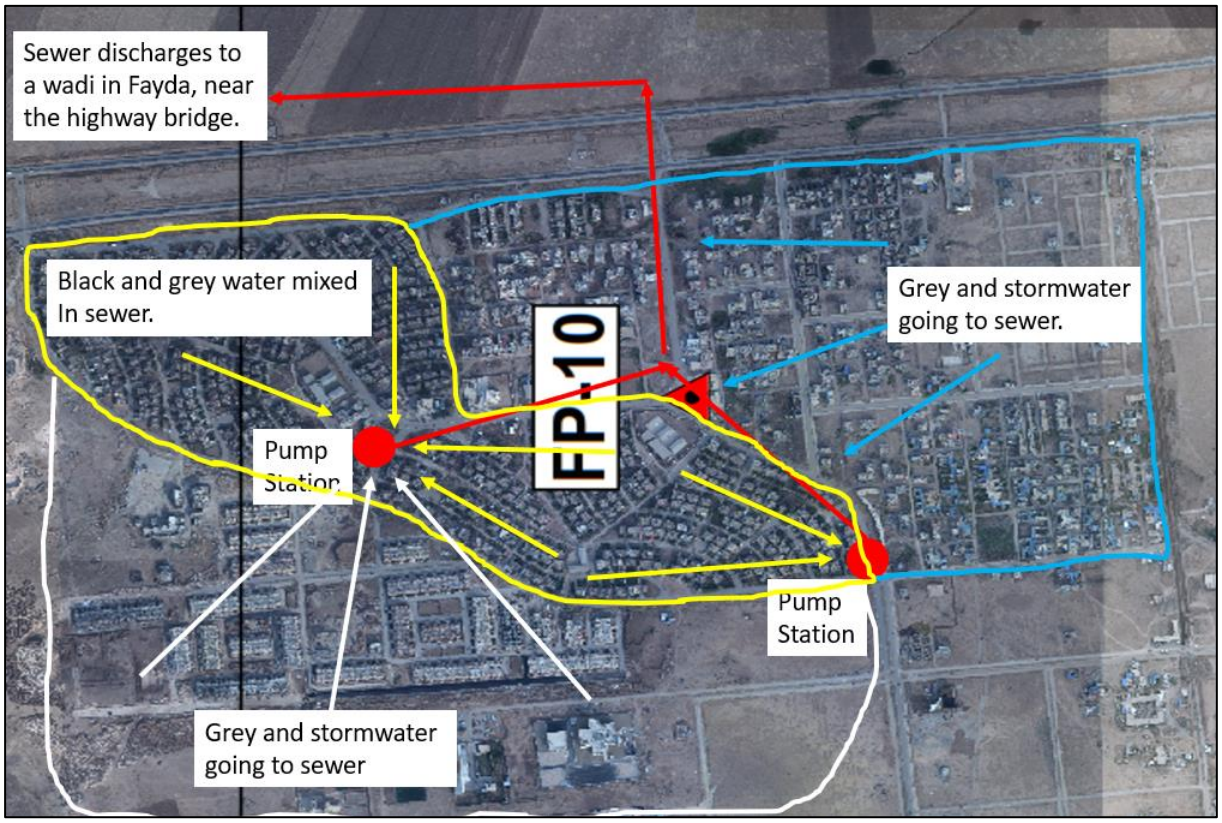


Figure 6: Domiz Town, wastewater & grey water collections system. (Source: Author, 2019)

The sewer size in the residential areas of the original development, highlighted with the yellow line in figure 6, above, is reported as being 200mm diameter and the collector sewers reported as being 800mm diameter. The reason behind these large diameter collector sewers could not be determined with confidence, but after discussion with Engineer Falah, it is believed that it is to allow stormwater drainage into the system as well. This seems logical, given that the system is discharging into an open drain at the end and mixing of storm and wastewater would occur anyway.

Both other residential areas, shown in figure 6 to the northeast and southwest of the older, sewered area, contribute grey water and storm water to the sewer system, but not black water. This is due to the fact that the typical containment construction method for houses is to build a black water holding tank (local terminology), containment system, within the house

basement. This “tank” has permeable block walls and no base, which allows the liquid from the tank to permeate into the surrounding soils and away from the tank (in the SFD Manual this is termed a “lined pit with semi permeable walls and open bottom). This reduces the need for desludging and most households in the area desludge these tanks from five to ten years, according to Engineer Falah. This can be achieved because each tank that is constructed is usually catering for a family of 5, on average. Therefore, even in relatively low permeability areas, there is usually sufficient soakage to deal with a single family for a relatively long period of time, based on Engineer Falah’s experience.

The tank is desludged through an opening that is left in the roof slab of the tank. The typical method of construction is using concrete blocks, unlined, with an open base as per figure 7.

Figure 7: Typical holding tank arrangement in household construction. Permeable walls and no concrete slab in the base. (Source: Author, 2019)

The grey water from the two other areas, that were developed later, is discharged directly to the roadside channels that serve as grey and storm water collection channels. This is typical of most cases around the nearby area of Duhok, where the grey water then makes its way via the storm water collection system, into the natural drainage and the water bodies. In the two newer parts of Domiz the grey water and storm water are collected in the sewer system and pushed, as already described, to a discharge point in Fayda.

Based on the above-described system, the SFD Matrix for Domiz is as shown in Table 2, below, with the main features being: -

- 4,000 people, or 39% of the population, are connected to the gravity sewer system.
- 6,250 people, or 61% of the population, have onsite sanitation systems.
- Based on locally available information on the Domiz 1 Syrian Refugee camp, where the groundwater has been assessed as being contaminated, the assumption has been made here that there is significant risk. This is a different result than using the groundwater assessment tool on the SFD Graphic Generator but is felt to be more accurate, as it is based on data from testing.
- For clarity in the SFD, the sewer system is shown as 100% delivered to a treatment plant. This is not actually the case on the ground, as the discharge is to an open wadi. However, the wastewater is transported safely out of the residential area and so

to best reflect the safe transport of the sewer system, this is the approach that is taken in this case.

- At the time of carrying out the assessment, none of the faecal sludge being emptied from the onsite containment systems was being transported to a treatment plant, but to indicate that transportation is not a problem, 100% transportation is used, as per the sewered section.
- The treatment figure is zero, based on the fact that, at the time of writing, there is no operational treatment plant in the area.

Domiz Town , Kurdistan, Iraq, 28 Jul 2019. SFD Level: 3 - Comprehensive SFD
Population: 10250
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks: 30%

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
T1A1C1 Toilet discharges directly to a centralised combined sewer	39.0	100.0	0.0			
T2A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	61.0			100.0	100.0	0.0

Domiz Town , Kurdistan, Iraq, 28 Jul 2019. SFD Level: SFD Lite
Population: 10250
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks: 30%

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
T1A1C1 Toilet discharges directly to a centralised combined sewer	39.0	100.0	0.0			
T2A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	61.0			100.0	100.0	0.0

Figure 2: SFD Matrix for Domiz Town. (Source: Author, 2019)

Using the SFD Users Guide, and online tool the % faecal sludge removed that has been used is 30%. This is because the lined pits with semi permeable walls and open bottoms are designed specifically to allow the liquids in the blackwater to infiltrate out of the pit and into the ground. Considering that there is such a long period between desludgings, 5-10 years, according to Engineer Falah, it has been assumed that 70% of the liquid infiltrates the ground and that the remaining material amounts to 30% over that timeframe.

5 Data and assumptions

Because of the previous administrative history of Domiz, it has been extremely difficult to obtain any records of plans or maps and information has been collected by word of mouth. Furthermore, it seems that owing to the political sensitivity of the geographic location of Domiz, there are no efforts at present to resolve administrative boundaries.

The main assumptions used are as follows: -

- Based on discussions with Engineer Falah, all the containment systems are emptied at some point and therefore a 100% figure is used. This can be interpreted in different way, but this is the assumption here.
- 70% of the material that goes into the onsite containment system is infiltrated into the ground over the duration between desludgings and that when the pit is emptied, 30% of the material is removed.
- None of the material emptied from the containment systems is being delivered to a treatment plant. This material is transported to a dedicated disposal site, as determined by the Directorate of Municipalities. Transportation of the faecal sludge is not a problem in this camp, as there are enough vehicles currently allocated. To highlight that transportation is not a problem in this camp, it has been given 100%, even though it is not going to a treatment plant. The material is being taken to a dedicated dumping site and so it is controlled, to an extent. The use of 100% is used for consistency with the other SFDs produced in this area, as part of this exercise.
- Ground water is assumed to be at significant risk, despite the online tool indicating that the risk is low. This is because of the density of onsite systems and the fact that groundwater in the nearby Domiz 1 Camp was found to be polluted by nutrients.

No other significant assumptions have been made by the author in relation to the above, as the discussions with the representative from the Maintenance and Operation Centre, Sewerage Department, which is located in Domiz, were used as the basis of the information collected.

6 List of data sources

Key informant interviews: -

- Engineer Falah at the Maintenance and Operation Centre, Sewerage Department, was the main information source.
- Engineer Sinan Shaba from the Directorate of Sewerage was contacted regarding Domiz and provided the 2011 Aerial Survey of the town.
- The Directorate of Municipalities in Duhok was also contacted in relation to Domiz, but they referred us to Fayda.

SFD Promotion Initiative

SFD Domiz Town, Kurdistan Region of Iraq, 2019

Produced by:

GIZ (Martin O' Malley, who was deployed to UNHCR Duhok by RedR Australia, under funding from GIZ)

This Executive Summary and the SFD Report are available from:

www.sfd.susana.org