



# Developing Water and Sanitation Services in Refugee Settings from Emergency to Sustainability – The Case of Zaatari Camp in Jordan



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## INTRODUCTION

Zaatari camp in the Hashemite Kingdom of Jordan, opened on the 29th of July, 2012 and was initially designed to host approximately 22,000 Syrian refugees. The influx of refugees far exceeded the planned number almost immediately. Zaatari camp is one of the largest refugee camps in the world hosting around 82,000 Syrian refugees, now with a maximum hosting capacity of up to 100,000. It is situated in one of the most water scarce areas on earth and above the Amman-Zarqa groundwater basin with an abstraction of 156.3 Mm<sup>3</sup>/y in 2013, which is almost 30% of the total groundwater abstraction in Jordan (MWI, 2015). The objective of this poster is to describe the development of the water and sanitation infrastructures in Zaatari refugee camp, from the emergency phase towards an integrated sustainable solution that is currently under design and moving to implementation.

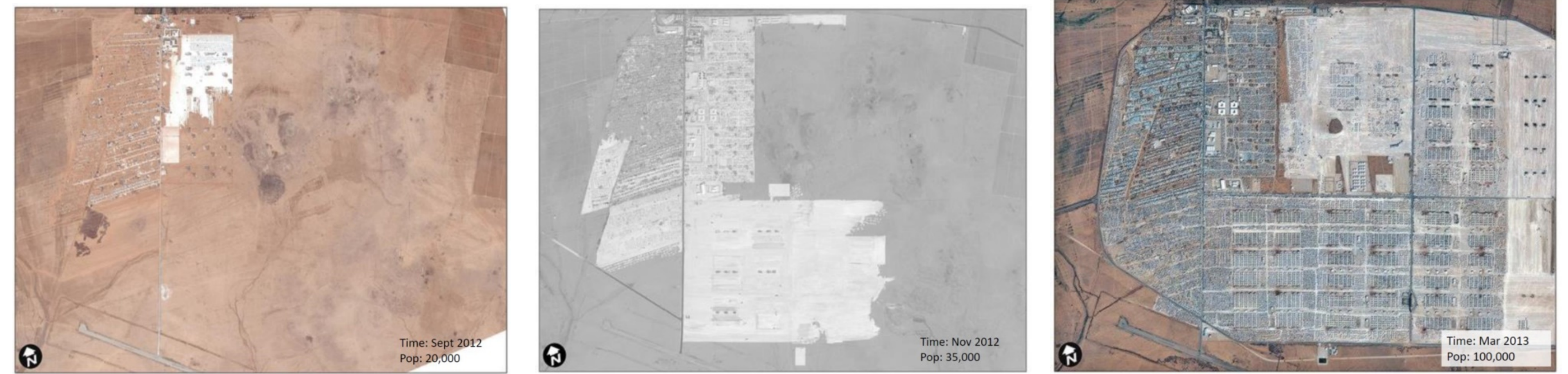


Fig. 1 Spatial development of Zaatari camp from September 2012 to March 2013

## Camp and population development

The size of a camp and area per capita are important factors in the planning of camps. The Zaatari and standard camp population density falls within the lower range of the world's 50 most dense cities ranging from around 17,000 capita per km<sup>2</sup> to 43,000 capita per km<sup>2</sup> (Wikipedia, 2015). Since it is not always possible to decrease density, sustainable services should be planned in comparison with dense urban settings. It should be noted that in Zaatari camp family density is not distributed evenly.

	Average camp area (m <sup>2</sup> /cap)	Population density (cap/km <sup>2</sup> )
Standard	45	22.222
Acceptable range	>= 35	<= 28.571
Unacceptable range	34-30	29.412 - 33.3333
Critical range	<= 29	>= 34.483
<b>Zaatari camp</b>		
Currently (ca. 82,000 cap)	57,3	17.447
Capacity (100,000 cap)	47,0	21.277

UNHCR considers the establishment of formal settlements as the last resort option to protect and assist people of concern effectively (UNHCR, 2015). However, the construction of refugee camps cannot always be avoided. When a camp is initially constructed, two phases are distinguished: the emergency phase and the post-emergency phase. In the emergency phase provision of essential services such as food, shelter, public health, water and sanitation need to be available immediately and contribute to protection and security. In the post-emergency phase in protracted situations, services and facilities need to be developed sustainably.

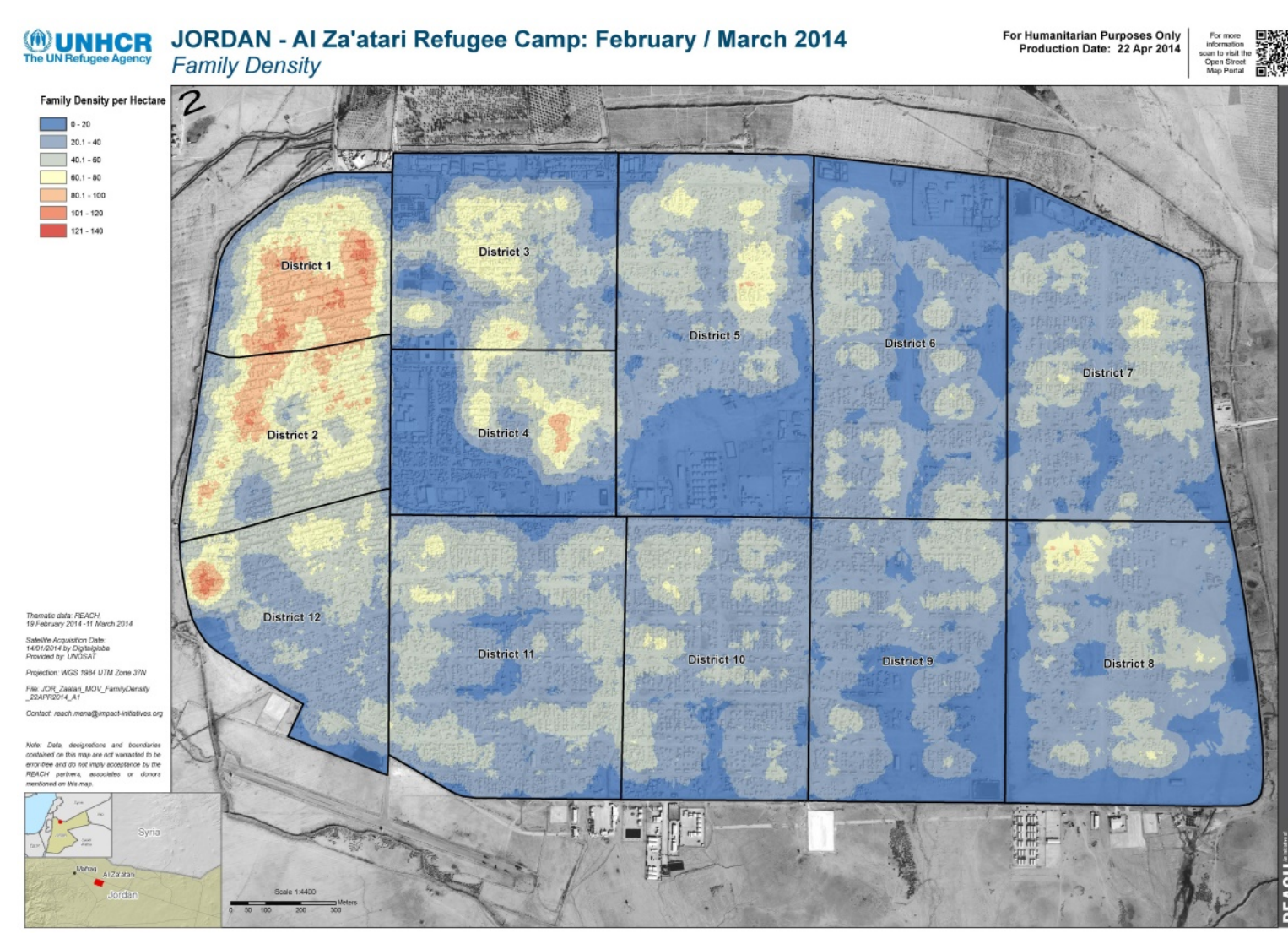


Fig. 2 Zaatari camp family density Feb/March 2014 (Reach, 2014)

## Water & sanitation services development

Since the establishment of Zaatari camp, drinking water has been delivered by trucks to 417 communal water, sanitation and hygiene (WASH) blocks spread out evenly across the camp, and wastewater is trucked out from these facilities. As Syrian refugees were used to in their place of origin, they demonstrated a strong desire for family water and sanitation facilities, so refugees almost immediately started to construct private showers and toilets at household level and currently wastewater is also collected from unregulated, self-constructed wastewater storages next to family households. In order to improve long-term sustainability in all aspects: equitable water and sanitation access, public health risks and environmental impact and operational costs, the service level of water and sanitation will be increased by implementing water and sewage systems with household connections. The major drivers for adaptation for integrated sustainable development of water and sanitation services for Zaatari camp are summarised as follows:

- Refugees: development of individualised coping mechanisms conflicting with humanitarian service mechanisms resulting in inequity, health and environmental risks, and unsustainable operation and maintenance (O&M) costs.
- Humanitarian organisations: risks to sustainable management of competing aspects such as health, environment, finance and peaceful coexistence.
- Local authorities: risks to political and socioeconomic stability and sustainable national resource and infrastructure management, due to unregulated wastewater disposal with potential risks to ground water contamination and limited capacity of existing nearby infrastructure.
- Donors: risks to funding uncertain and changing (increasing) O&M budget forecasts, expenditure deadlines, ability to respond to new emergencies, and type of funding that is accessible and available (emergency or development) at any particular time.

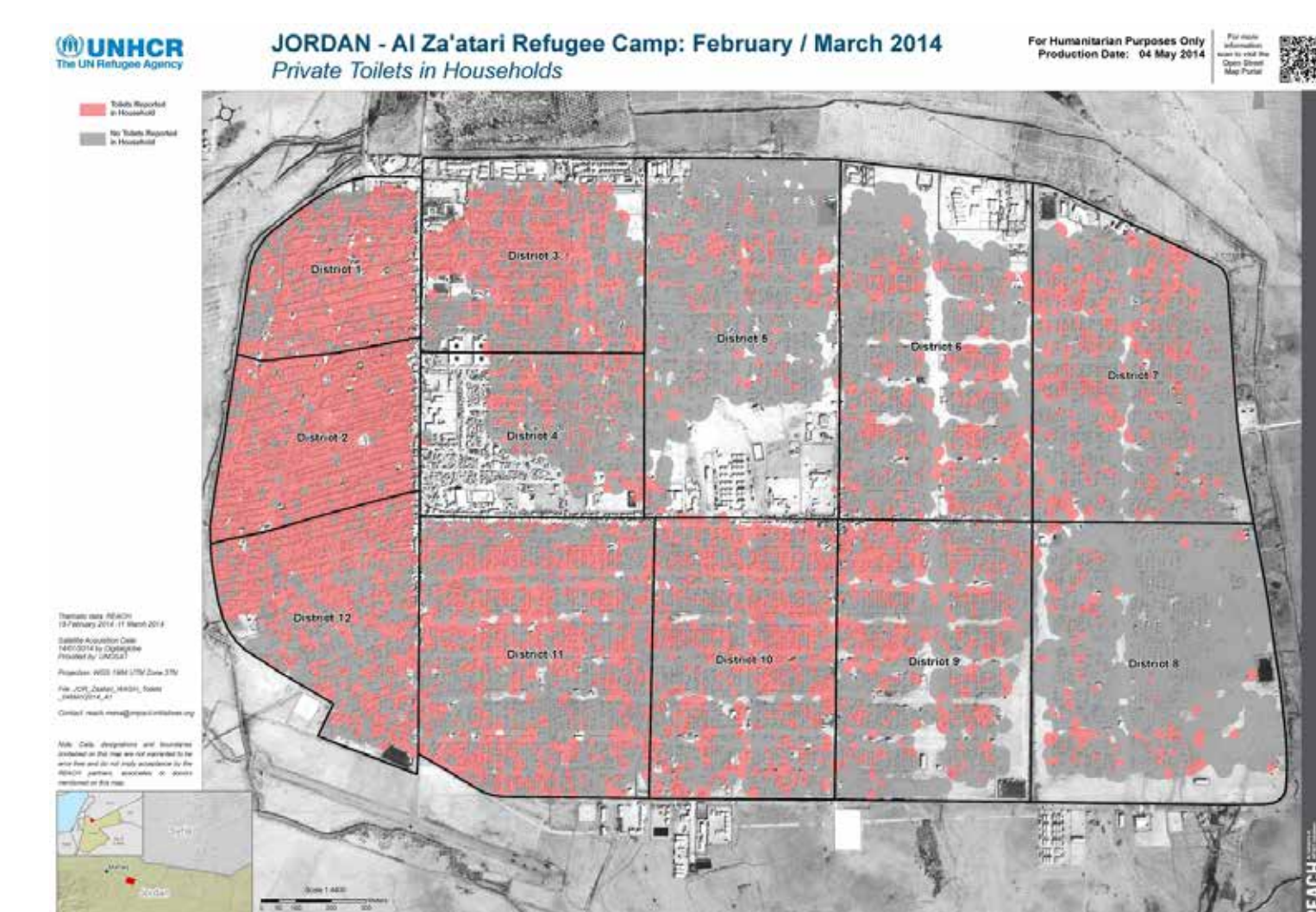


Fig. 3 Zaatari camp private toilets Feb/March 2014 (REACH, 2014)

## DISCUSSION

### Integrating services

Physical planning sectors should simultaneously and cooperatively develop sustainable designs to be integrated in an urban master planning, as recommended in the Global Strategy for Settlement and Shelter (UNHCR, 2014). Due to rapidly changing situation full integration is not possible but master planning objectives for the camp have been agreed and provide foundation for design of sustainable water and wastewater infrastructure.

	2012	2013	2014	2015				
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Wastewater treatment								
External treatment								
On-site treatment								
Conceptual study								
Wastewater collection								
Conceptual study								
Wastewater trucking								
Wastewater management								
Conceptual study								
Groundwater vulnerability study								
Topographic survey and design								
Interim wastewater system								
conceptual study								
pilot								
Detailed design								
contracting								
Sewage system								
conceptual study								
Detailed design								

Fig. 4 Timeline sanitation development in Zaatari camp

### Design paradigms and end value

Initial cost-benefit analysis, indicated a camp lifespan exceeding 5 years results in benefits from drinking water and wastewater infrastructure far greater than the costs and impacts of construction and O&M, due to savings of current operational expenditure alone. Therefore, regard-less of whether the camp is needed for refugee accommodation or not, in the long-term, the infrastructure remains as a legacy for the benefit of the authorities for a variety of possible land uses.

### Infrastructure management

Urban infrastructure master planning usually includes development of a legally binding service level agreement with responsibilities on the service provider and the customer, and clear distinctions in asset ownership. Further, there are significant resources dedicated to continuous monitoring and reviewing of the relationship between service providers and customers but also the wider factors that affect infrastructure planning and operation. Stakeholder, community and customer engagement is important for effective management of urban water and wastewater systems and will likewise be critical in Zaatari. For integrated development of water and sanitation services in refugee camps the following roles have been proposed as essential from an early stage:

- Development expert to further explore sustainability and integration options;
- Public engagement, social assessment, stakeholder management and communications expert to facilitate trust and goodwill in the process of developing service level and shared responsibility agreements;
- Infrastructure finance analyst to formulate budget forecasts for water and sanitation development and operations into the future.

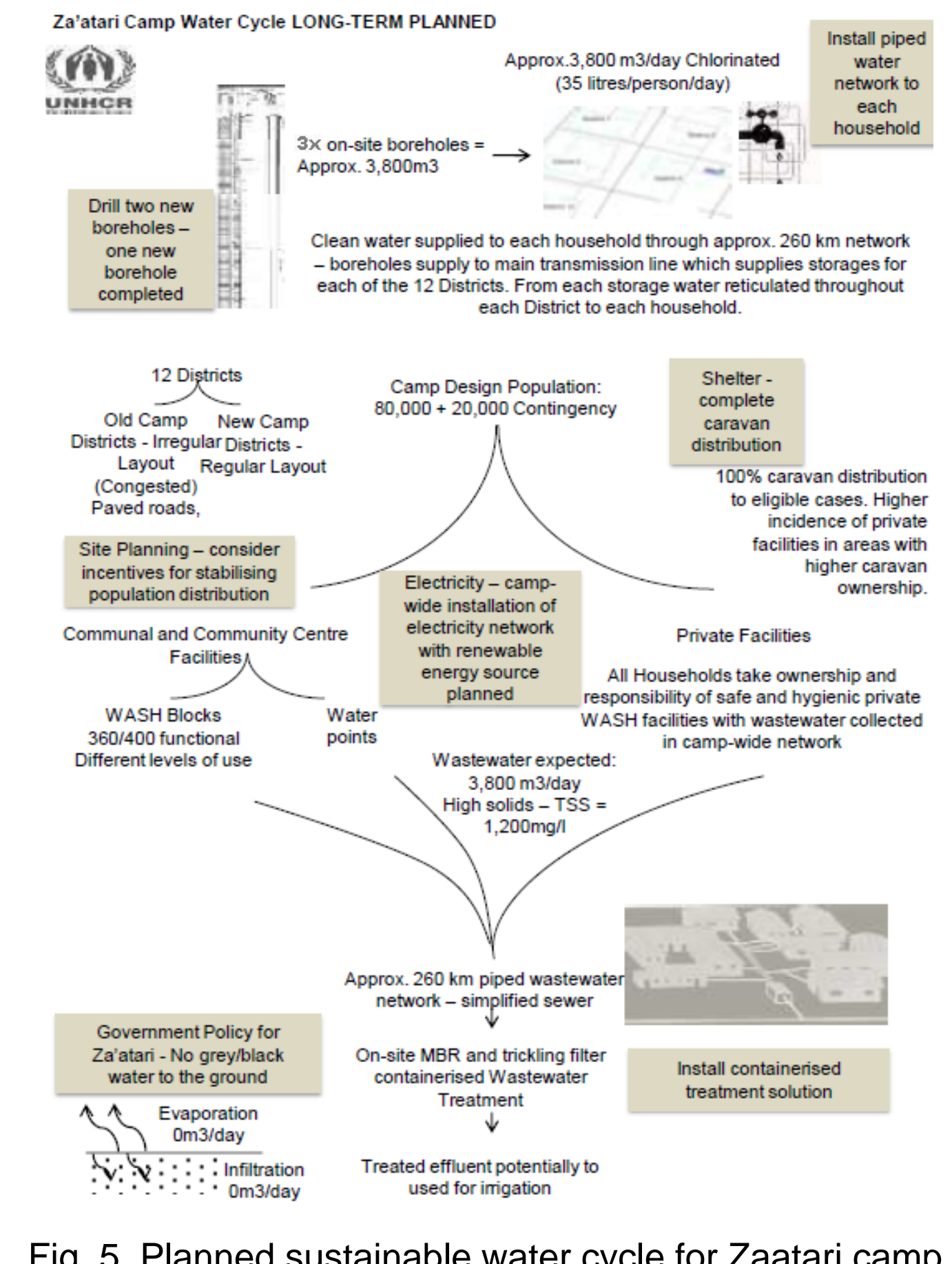


Fig. 5 Planned sustainable water cycle for Zaatari camp

## CONCLUSIONS

The perspective of urban development on water and sanitation is essential for an integrated transition from emergency phase to sustainability, while mitigating potential health, environmental and financial risks. Therefore, situational factors should be closely monitored and humanitarian agencies should budget for technical studies to assess the opportunity for, and prepare master plans, even though resources for projects may not be available immediately. Cost-benefit and sensitivity analysis should be undertaken as early as possible. A comprehensive socioeconomic and financial concept of integrating informal settlement infrastructure and local community infrastructure should be undertaken. For water and sanitation, the engagement of local, national and international water utilities and governments on water infrastructure development and O&M is beneficial in the transition from emergency water and wastewater trucking to operating and maintaining water and wastewater systems. It is important that urban infrastructure planning tools are adapted for application to the informal settlement to ensure technically, socially, economically and financially optimised solutions. Blending the experience, functions and organisational structures of humanitarian organisations with urban infrastructural organisations is an asset in transition from emergency phase toward sustainable solutions.

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