DESIGN OF THREE INTERMEDIATE FECAL SLUDGE TRANSFER NETWORK

Date- 30-12-2020
Venue – CIC conference room, Camp 26 .

Presented by -
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PHE- Team Leader
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Objective of the project

- To survey and develop detailed engineering designs and BoQs for three faecal sludge transfer networks (IFSTS) which will be cost effective and durable to cover long-distance sludge transfer for a period of 10 years. These will be designed to deliver 100% of the sludge produced in the following systems to their respective FSTPS.

Intake FSTP's	Network coverage
Camp 4 FSTP,	camps 3, 4, 5 (part of), 4X and 17 (part of).
Kutupalong FSTP	1E, 1W, 2E, 2W, KRC and the host community (to be defined).
Teknaf FSTP	camps 26, 27 and NRC and the host community (to be defined).

Existing potential FSTP's will be also connected with the network as backup

Common Practice in 2017/18

Emptying latrine containment

Pumping into 60 or 80 L blue barrel

Transportation with vacutug / customized truck with plastic tanks

Manual loading at FSTP

Manually carry to nearest FSTP

Why we have thought of IFSTS back in 2017?

Transportation of fecal sludge from pit to FSTP has a great impact in FSM chain

- To get rid of manual desludging which induces public health risks for desludging volunteers who carries 60L blue barrel in their shoulder.
- Reduce OPEX of desludging operation hence
- Increase desludging frequency to cope with the demand of the camp.
- A system that can operate where accessibility is challenging.
- Most of the camps are in high – low terrain with rapid slope ,undulation where movement is difficult.

Process of IFSTS

MANUAL STIRRING WITH BAMBOO STICK

DESLUDGING OF LATRINES

PUMPING TO NEAREST TRANSFER STATION

Transfer Pit/ Box

Transfer Station

PUMPING TO NEXT TRANSFER STATION

Pumped sludge received at FSTP intake

Videos

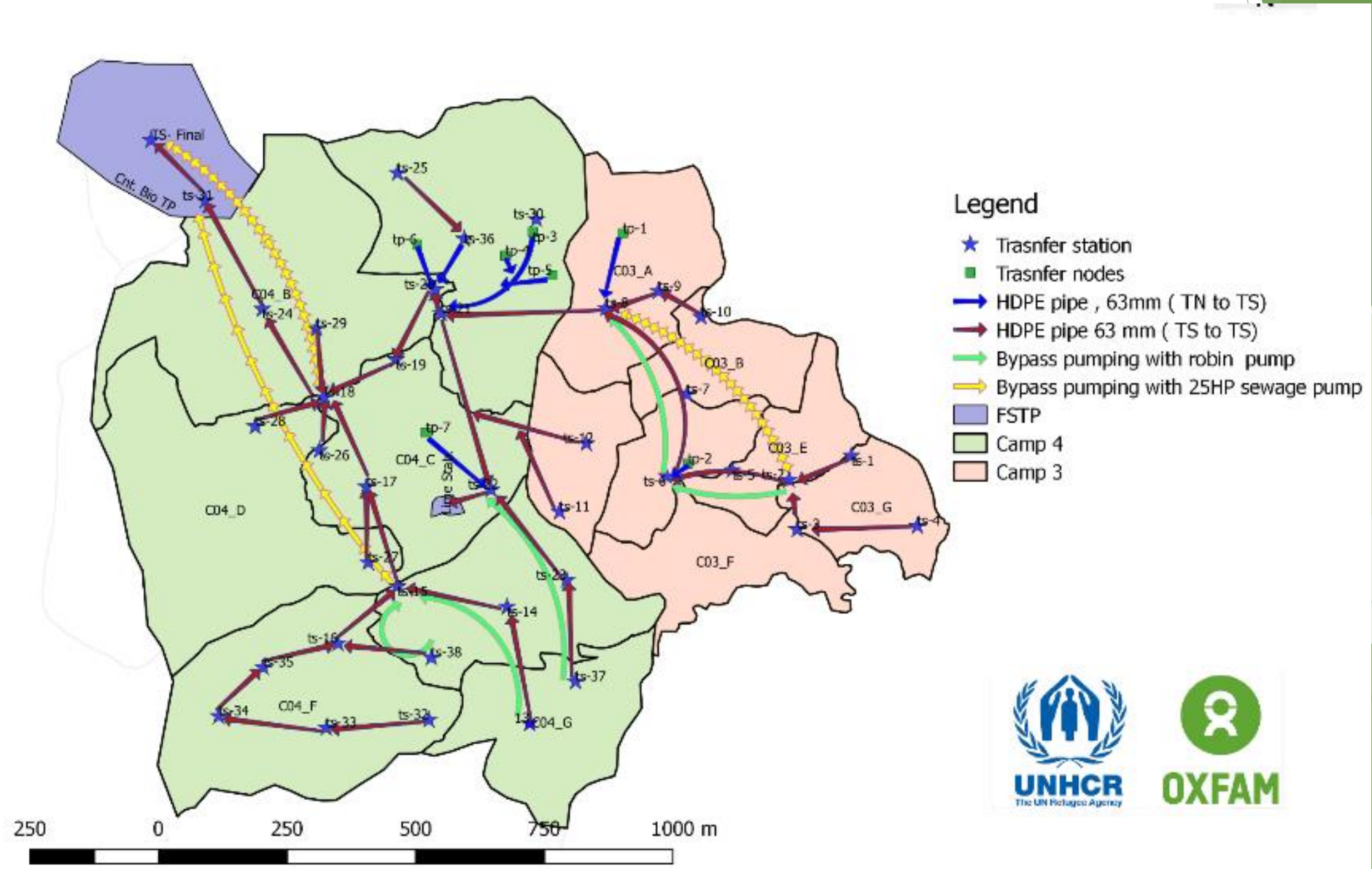
MANUAL STIRRING WITH BAMBOO STICK

DESLUDGING OF LATRINES

PUMPING TO NEAREST TRANSFER STATION

PUMPING TO NEXT TRANSFER STATION

Map of camp 3 and 4 IFSTS



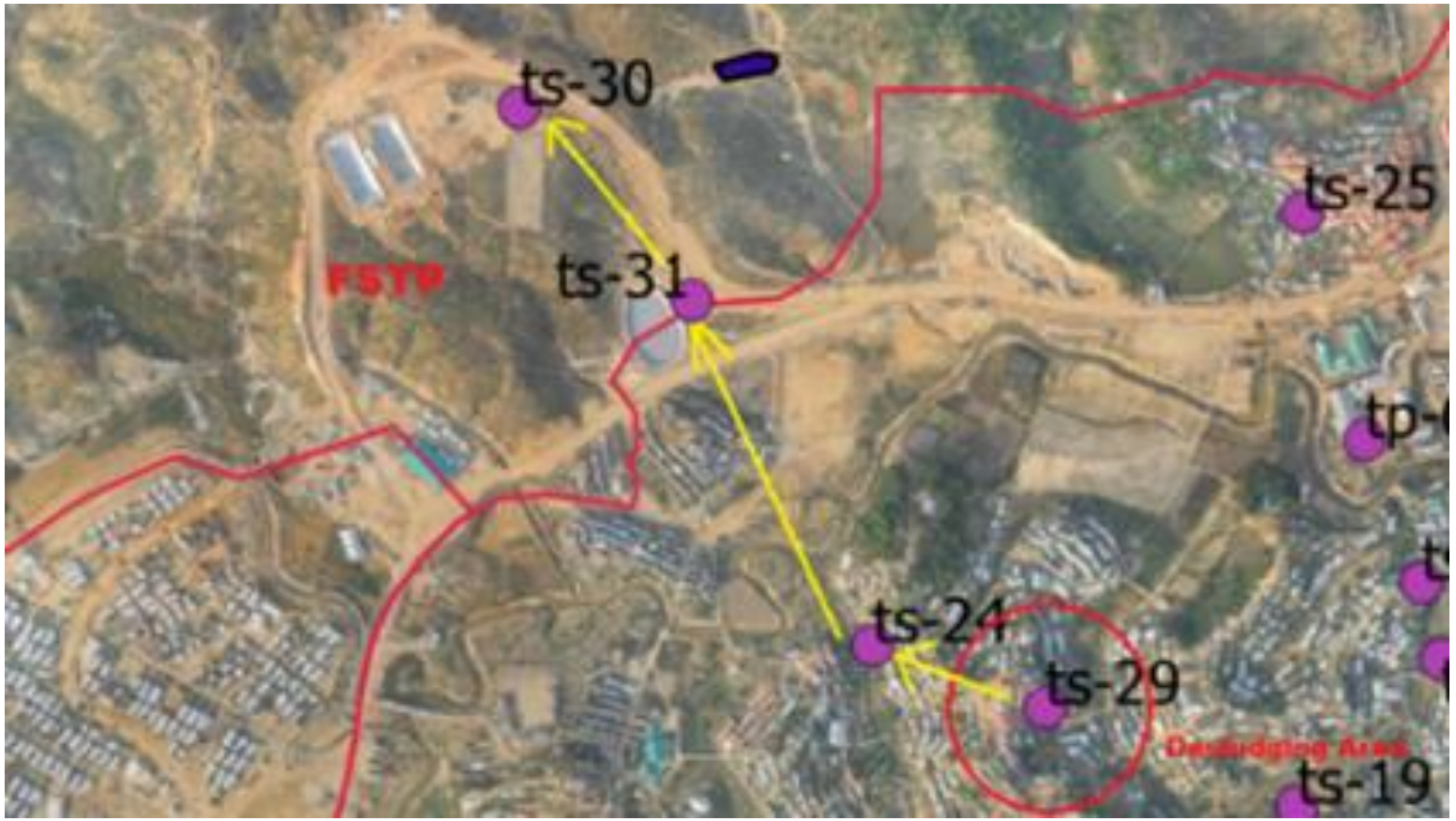
Overview of Camp 3 ,4 the system

	Camp 3	Camp 4	Total
Camp Area	453,561 sq.m	1,155,140sqm	1,608,701sqm
Population	39,659	32,389	72,048
Total Latrine	1614	2665	4279
Transfer Stations	12	23	35
Transfer Points	4	3	7
Total Pipeline length,rough			6000meter
Total sludge holding capacity	200m3	460m3	660m3

Team composition to run IFSTS

- **Desludging Team** :This team works in the front line of the operation. They are mobilized in the blocks where its been reported of having filled up latrines. They work in 3 different team in different blocks or same block base on need , each team consist of 6 person. Each team carries desludging pump, 100 to 120 meter flexible hose or canvas pipe with necessary connectors with them. Their main job is to pump the sludge directly from pit to nearest transfer station either directly or via transfer boxes.
- **Transfer Team:** this team have in total 4 to 6 person and divided in 2 to 3 group. Their work is to keep the network traffic free meaning pumping the sludges from one transfer station to another and reach up to FSTP. When desludging team works in a particular block this transfer team ensures that their destined transfer station is free and ready to take the sludges.

Synchronization between two team



Materials Used

Item Name	Specification / Remarks	Capacity ,Dia
Tank Base preparation	Earth filled Geotext bag with reinforced lining, plastic fencing.	
PVC Transfer Tanks	Can resist 70°C temperature -Double Layer -U.V stablilized in outer layer -Food Graded plastic in inner layer -Threaded & airtight lid	5000L and 10000L
HDPE Pipes for network	PN-10,PE-100	Dia -63mm,
Desludging Pump	Make-Robin Model Number: PT 305 Use: Water pump Engine: Robin EY20 Engine Type:4-stroke petrol, single-cylinder, air-cooled Engine Power:5.0 HP Inlet Size (inches)-2 Outlet size (inches)-3 Max Solid Size (mm)-30 Total Head (m)-22 Suction Lift (m)-8 Maximum Capacity (m3/hr)-60	Used for latrine to tank transfer and tank to tank transfer
Desludging pump	Make:Robin Model Number: PST80 - Trash pump Use:Slurry, sludge & sewerage Engine: Robin EY20 Engine Type:4-stroke petrol, single-cylinder air-cooled Engine Power:3.7kw (5.0HP) Inlet Size (inches):3 Outlet size (inches):2 Max Solid Size (mm):30 Total Head (m):22 Suction Lift (m):8 Maximum Capacity (m3/hr):38	Used for latrine to tank transfer and tank to tank transfer
Desludging pump	Heavy duty clay pump , Engine - 26HP, Suction X Delivery-3”X3” , Total Head 30m	Stationary base pump for long distance tank transfer with higher flowrate .
Fitting and accessories	Necessary GI and HDPE compression fittings are needed to connect tank , pump and pipes.	

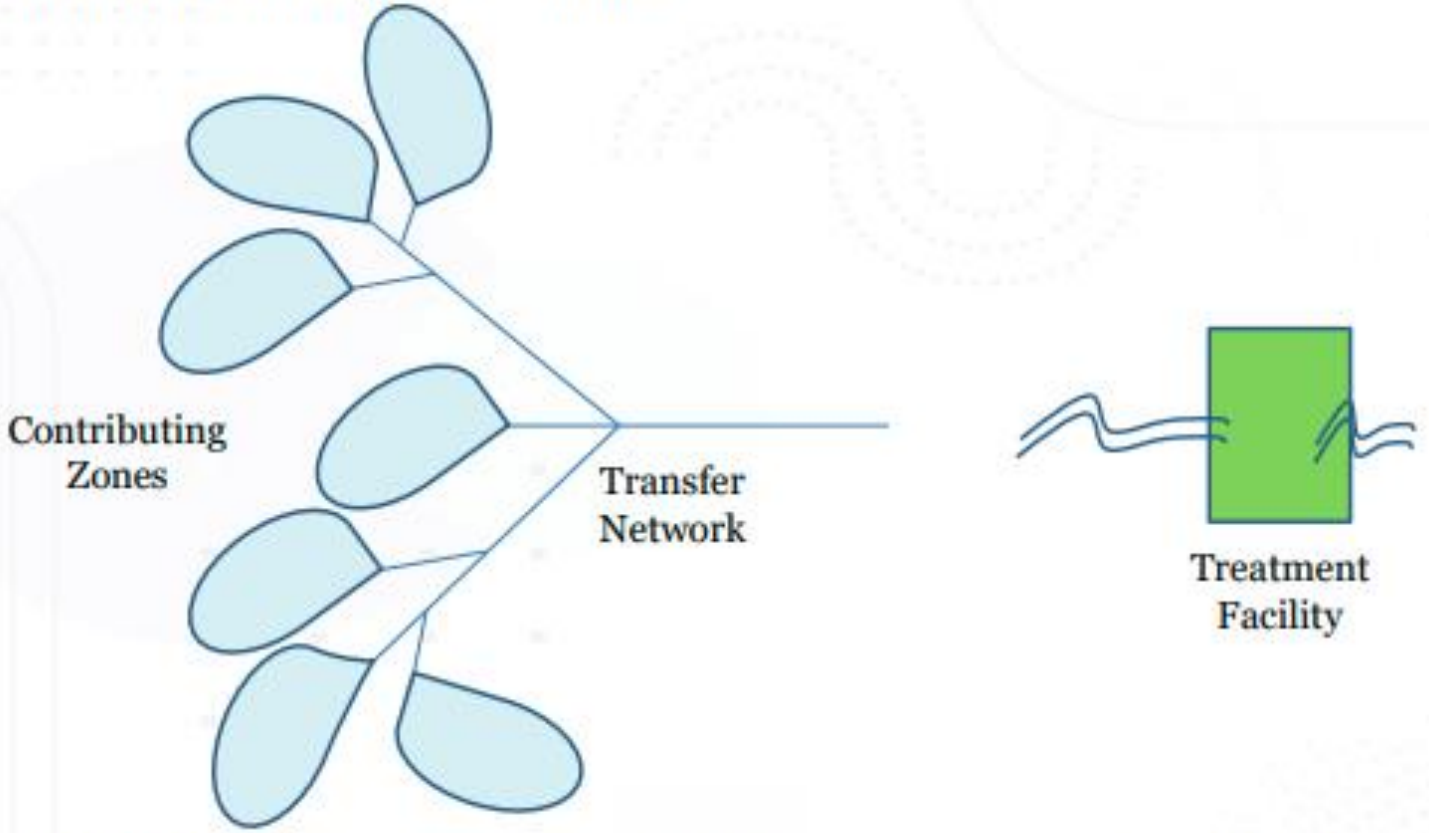
Key design criteria

- All design work must be within capacity of partners to conceptualize and repeat. Don’t over intellectualize the problem, meet the capacities of the operators, designers and partners.
- It is a key design principle that ease and cost of O&M is prioritized over CAPEX

Guidelines for the Design of Intermediate Faecal Sludge Transfer Systems (IFSTS) using Pressurized and Gravity Sewers in Urban Slum or Large Refugee Camp Contexts in Bangladesh.

- This documents is prepared jointly by OXFAM and UNHCR to guide the designer for achieving most contextual and optimum route of sludge transfer network. Contents -
  - **Define the Problem.**
  - **Design Parameters**
  - **Calculating Total Network Storage Capacity**
  - **Design Principals**
  - **Tank Design**
  - **Desludging Strategy**
  - Others detailed sections related to network design

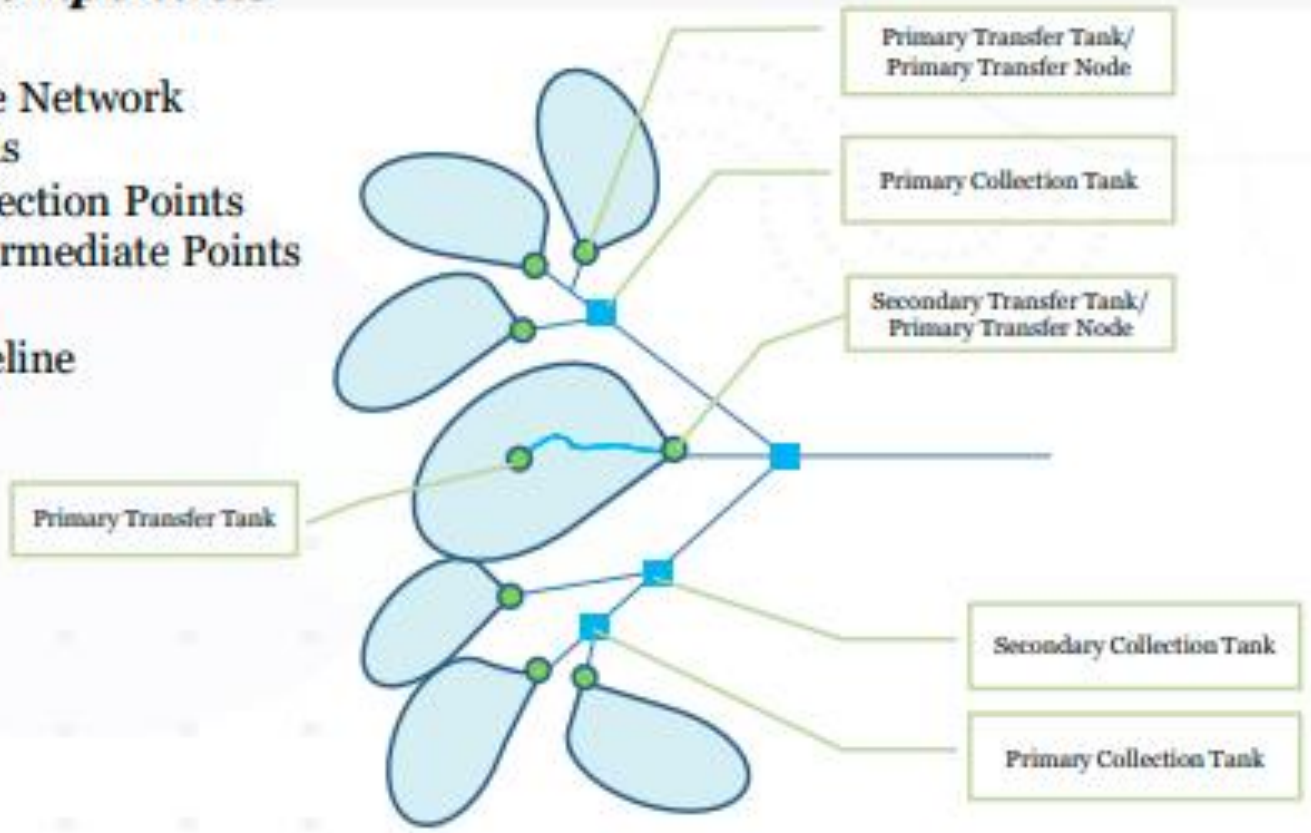
Preliminary Conceptual Design



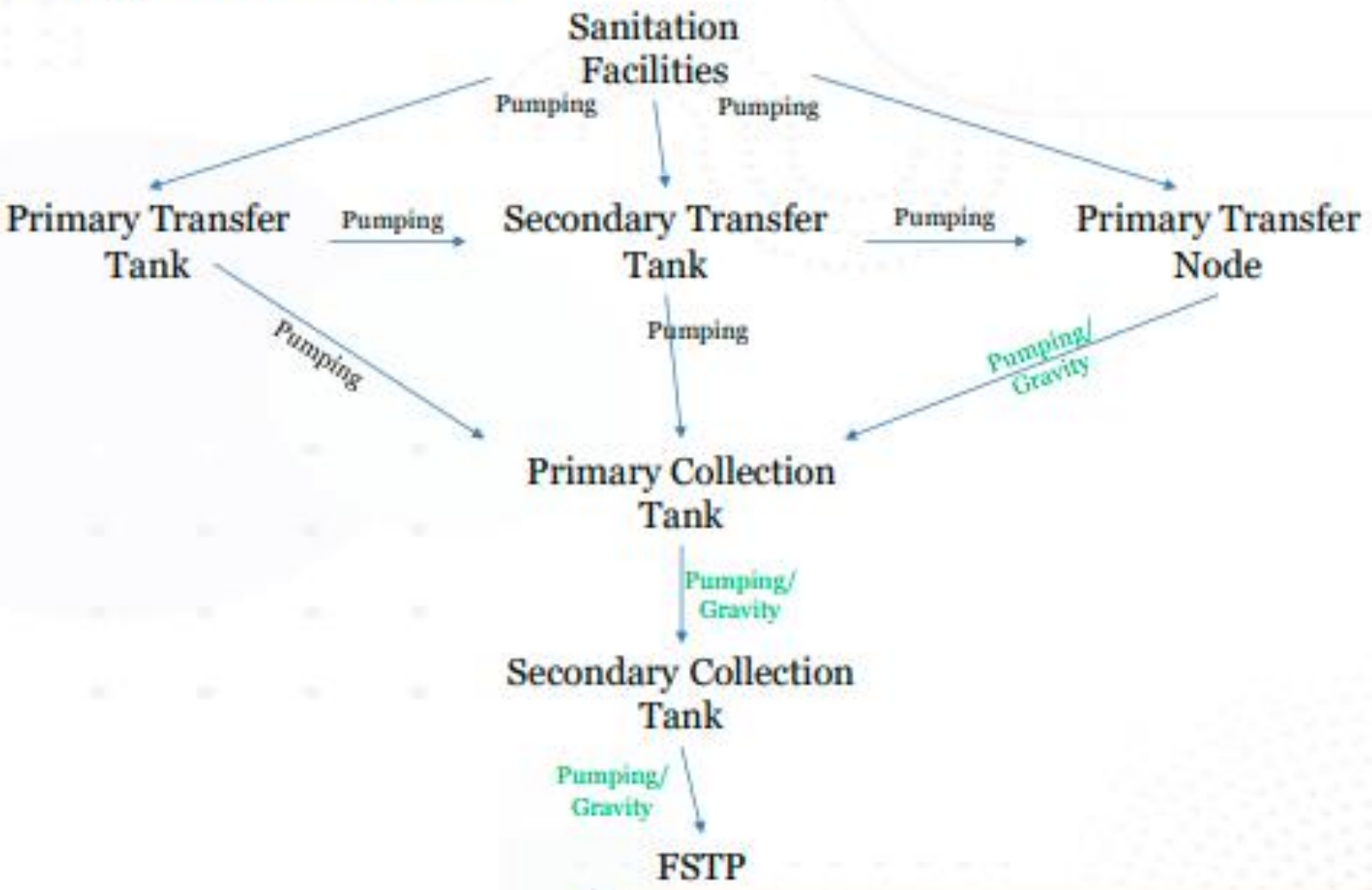
System Components

Conveyance Network

- ❑ Junctions
  - Collection Points
  - Intermediate Points
- ❑ Section
  - Pipeline

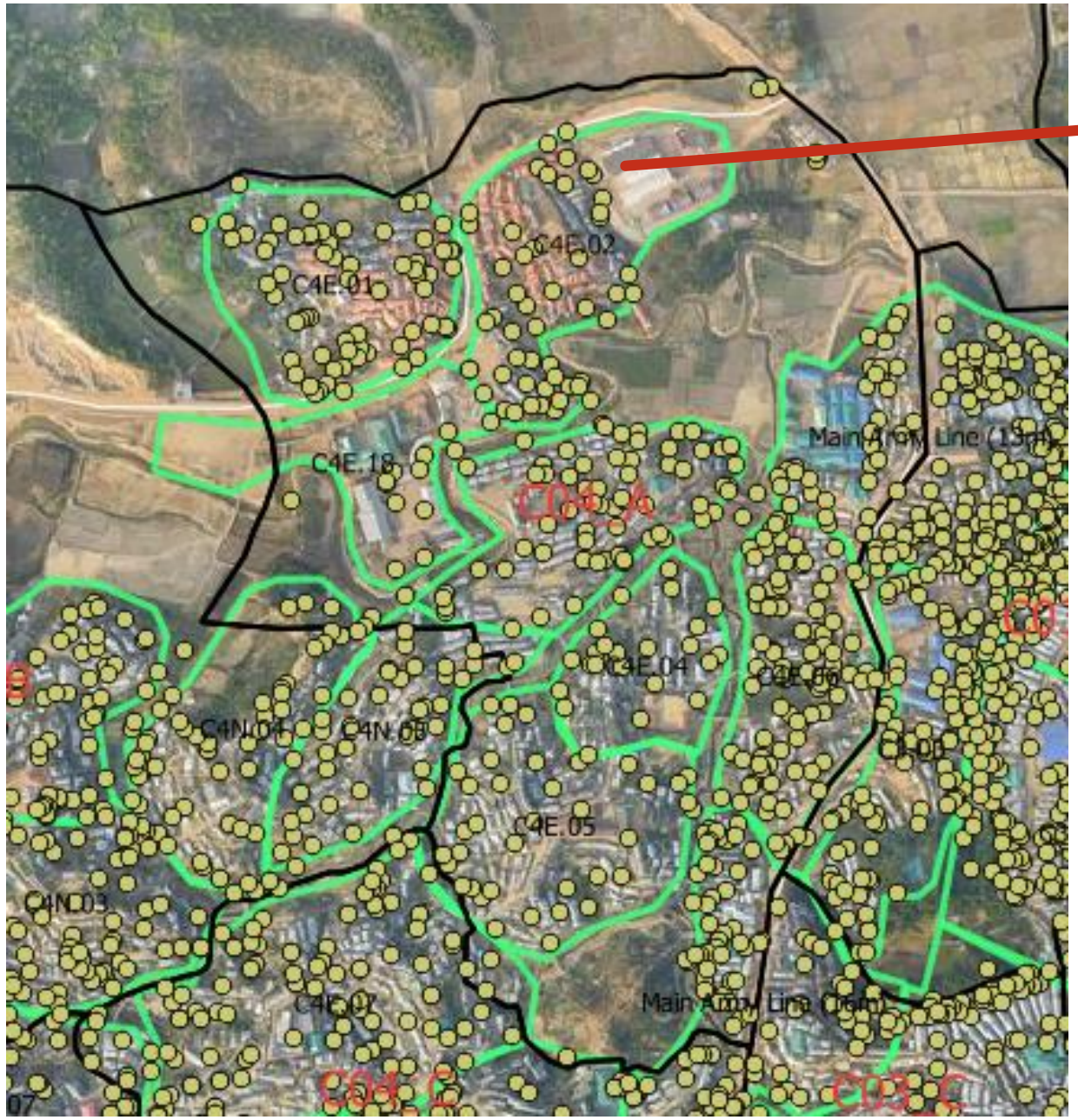


Section Design Considerations

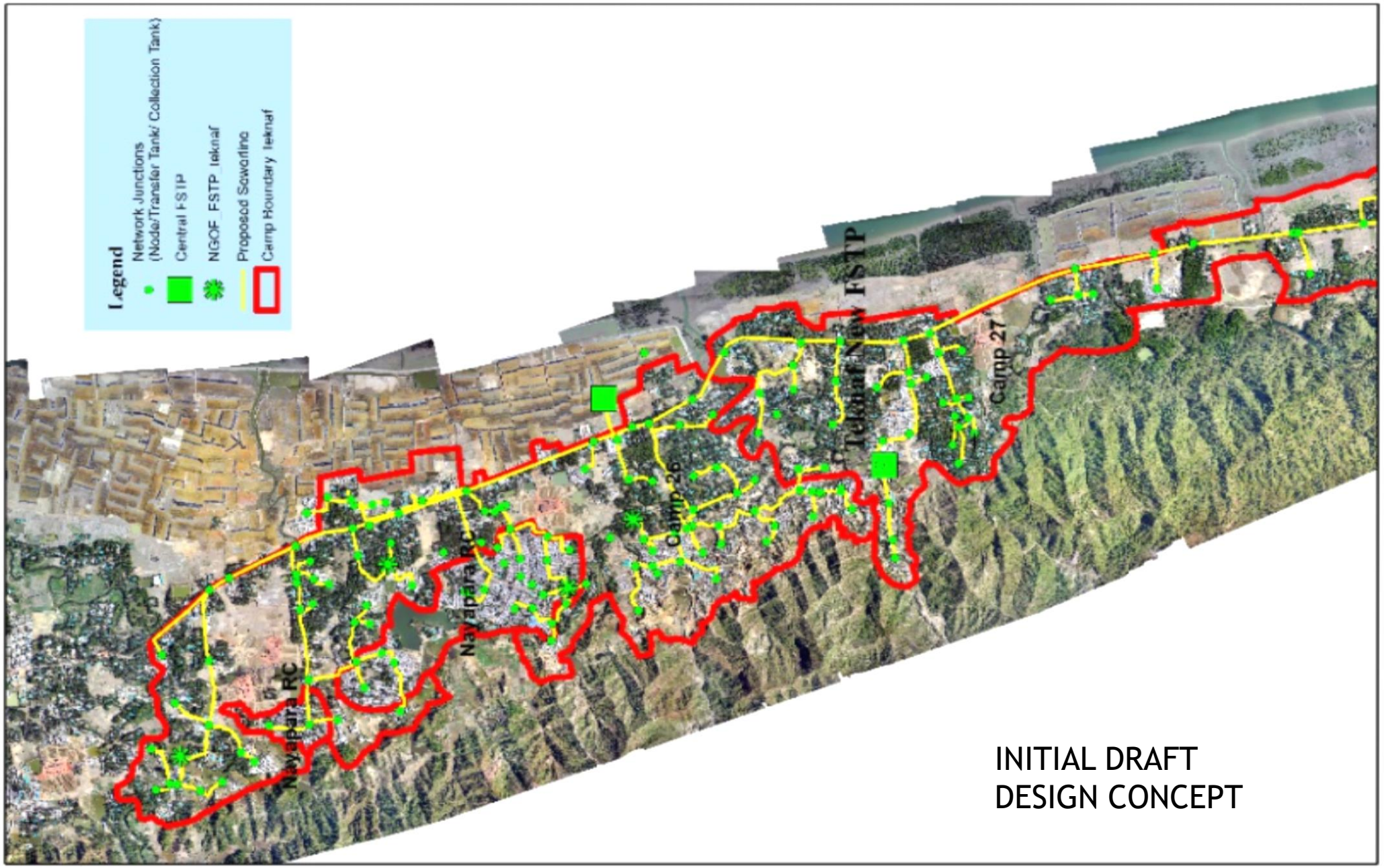


Design Order

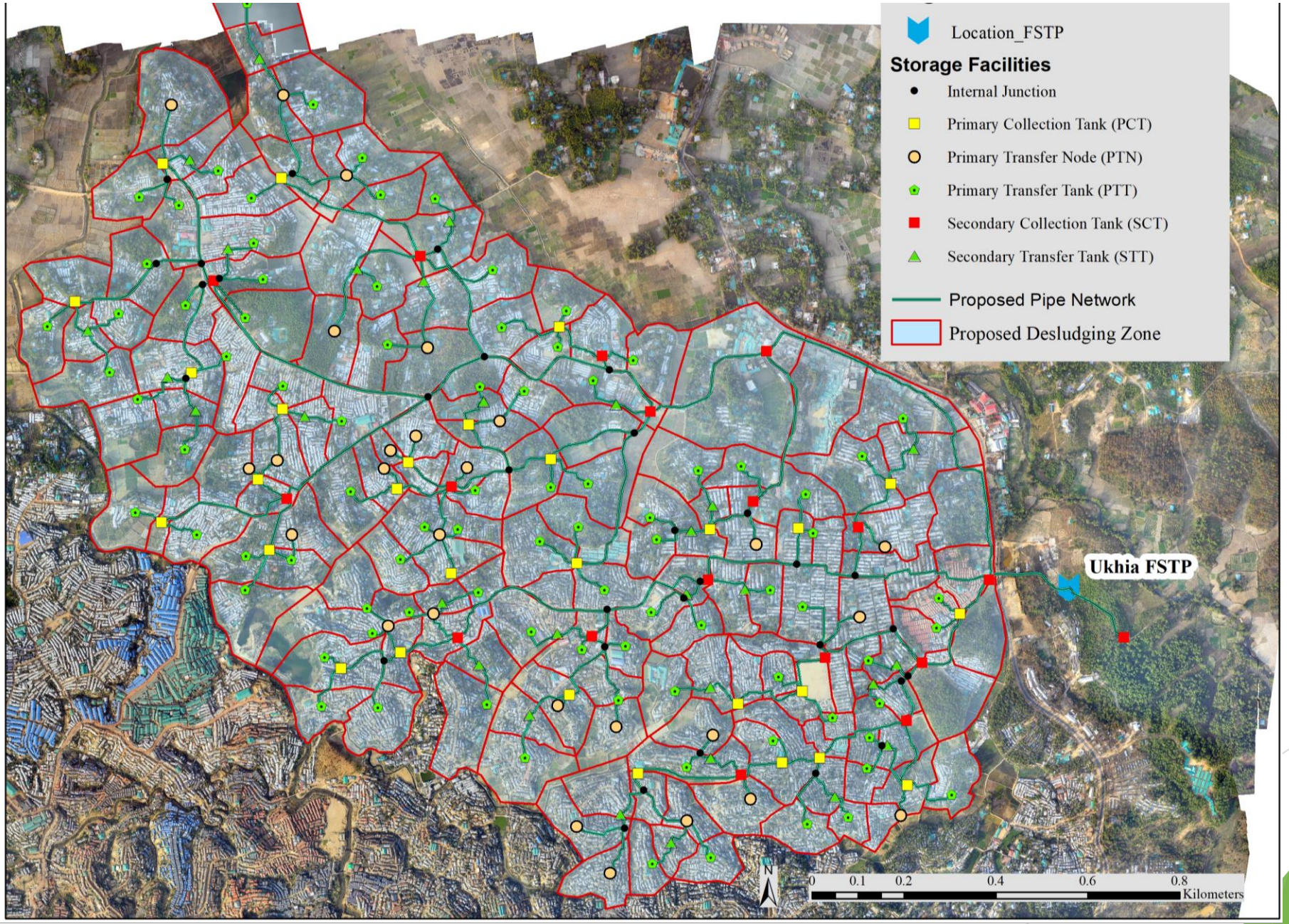
- Define logical desludging areas (DSZs).
- Place the storage tanks based on guidelines. Within those areas, locate tanks in best most central and accessible location using 100m as a guide (not limited to), from the furthest containment.
- Define potential routes for mainlines to the FSTPs based upon maximizing gravity flow and minimizing the use of pumps.
- Review options and variations to optimize.
- Calculate detailed BoQs.



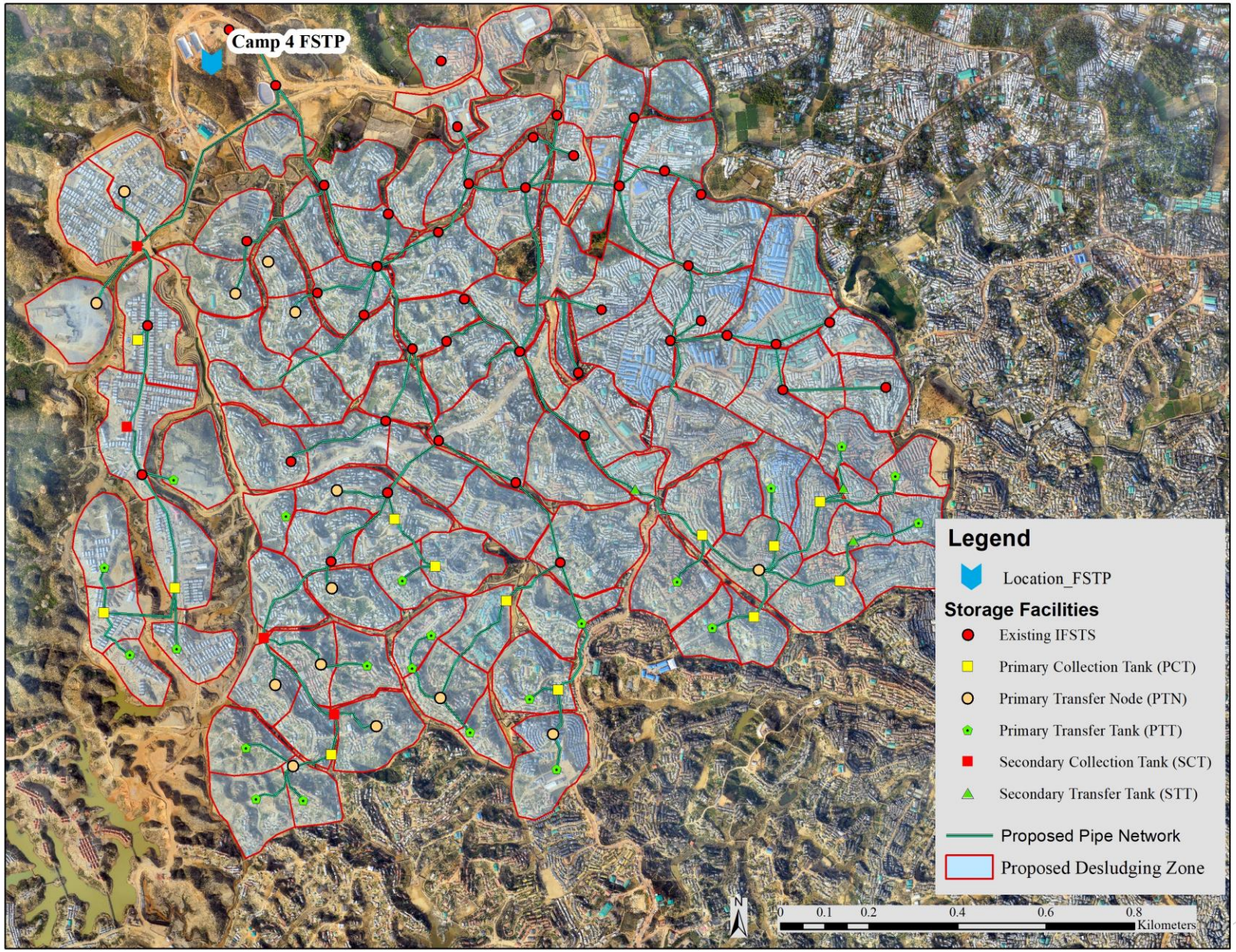
Desludging Zones



INITIAL DRAFT
DESIGN CONCEPT



INITIAL DRAFT DESIGN CONCEPT



INITIAL DRAFT DESIGN CONCEPT

THE END