SECONDARY TOWN URBAN DEVELOPMENT PROJECT (42229-016)

Technical Appendix

Contents

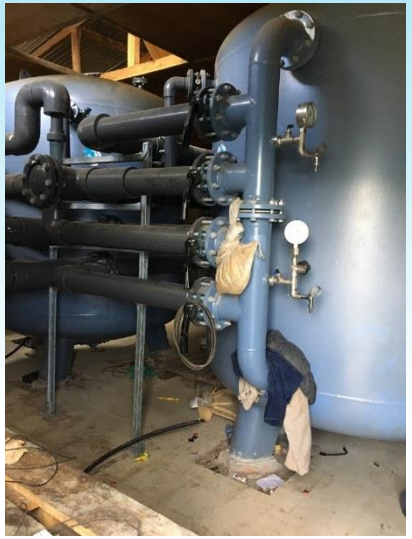
Secondary Towns Urban Development Project (STUDP)

- STUDP will invest in three selected strategic secondary towns based on their economic potential – Samdrup Jongkhar, Sarpang and Trashigang.

- STUDP will support improved service levels in these towns and expand infrastructure to the planned town extension areas to accommodate growing urbanization needs.

STUDP- Salient features

- Filling critical infrastructure gaps complementing ongoing Royal Government of Bhutan and Asian Development Bank (ADB) investments
- Continuous pressurized metered water supply provided to beneficiaries in project area (household connections funded by loan)
- Expansion of services to newly planned town areas – enabling sustainable town growth
- Fully serviced plots made available in new planned satellite town of Shechamthang - removing development constraints to building new housing
- Intake and raw water transmissions designed for enhanced resilience from landslides.



Sarpang Project Subcomponents

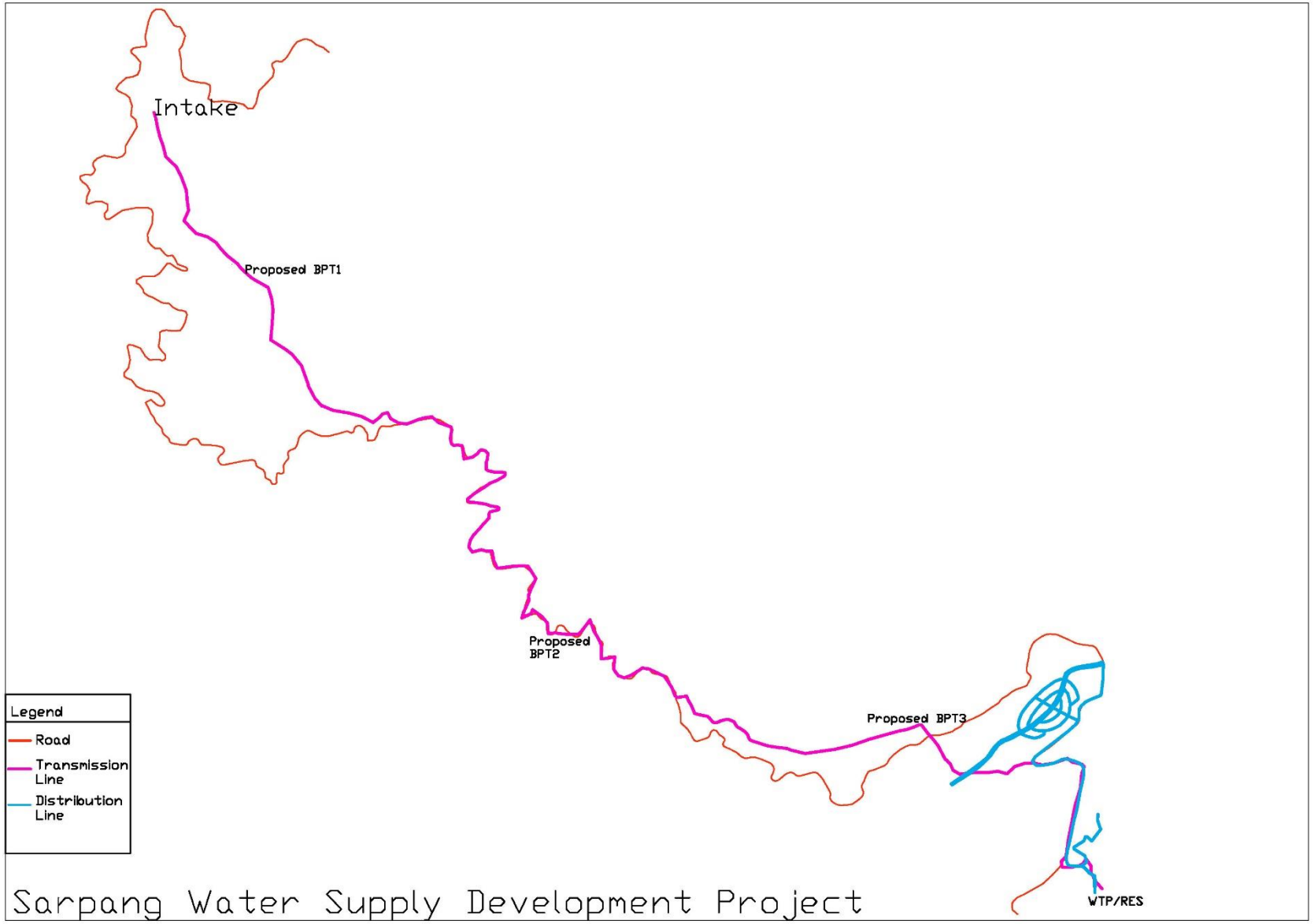
Sarpang Project Subcomponents

I. Sarpang Water Supply Development Project

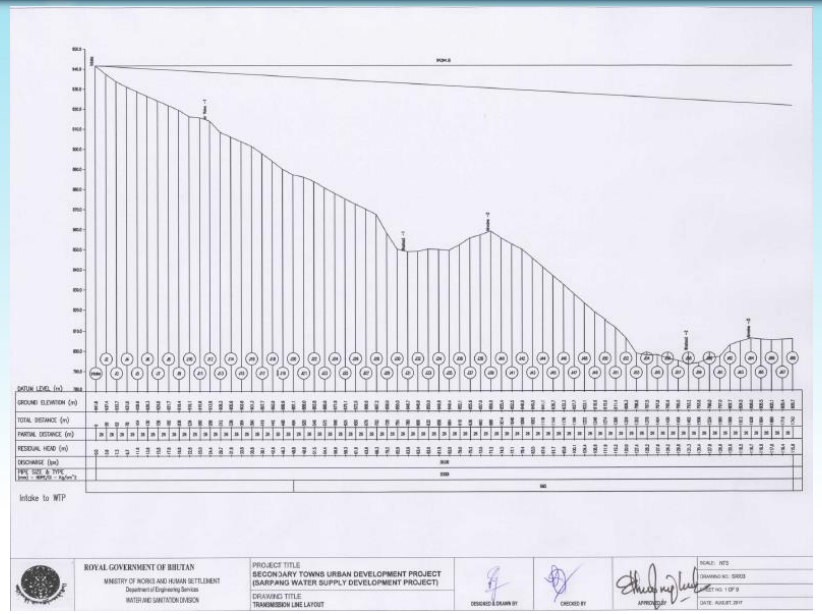
- Design year - 2035
- Design Discharge - 35 lps

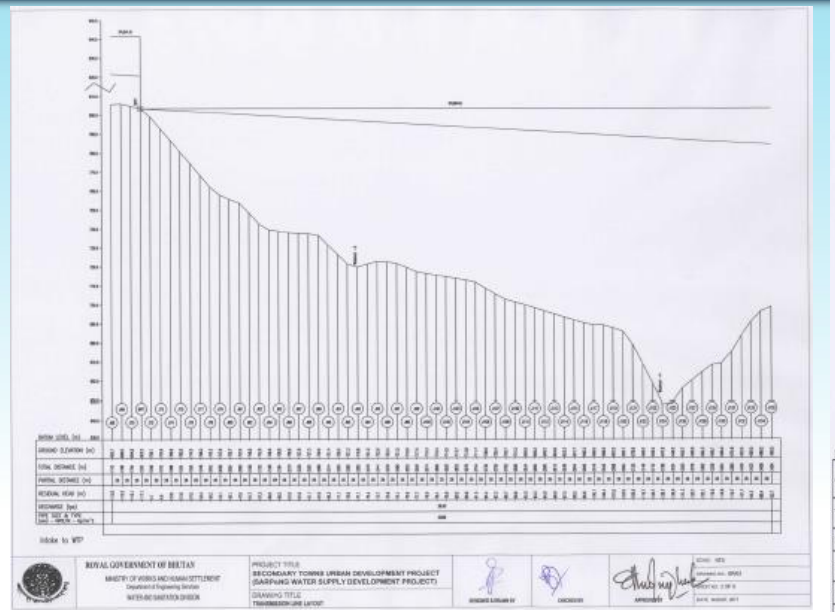
1	Construction of RCC Grit Chamber (Including dismantling of existing sedimentation tank) near intake at Lharing Chu- 35m away	1 nos
2	Providing & Laying of Raw Water DI Main from the Source to the existing Water Treatment Plant	16.053 km
3	Construction of 2 nos. RCC Break Pressure Tank using DI Pipes & Fittings with Barbed Wire Fencing and Gate and use existing tank (1 Nos.) with additional pipe and fittings	2 nos of 10 cum each and 1 existing
4	Construction of River Crossing (8m)	1

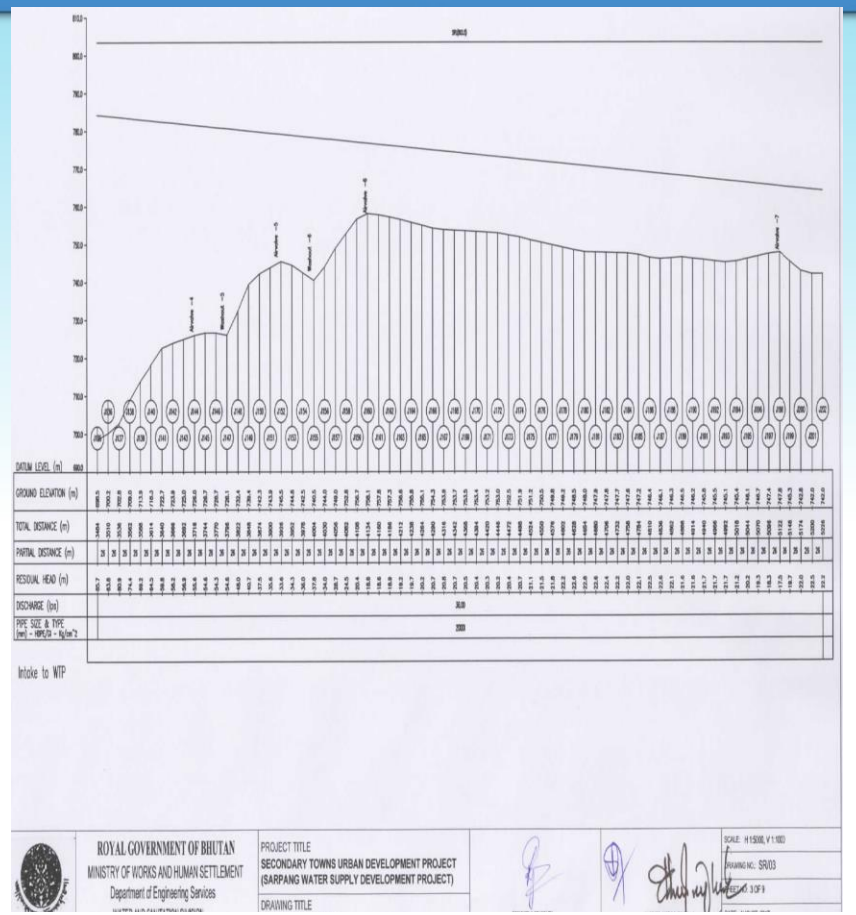
Sarpang Water Supply Development Project

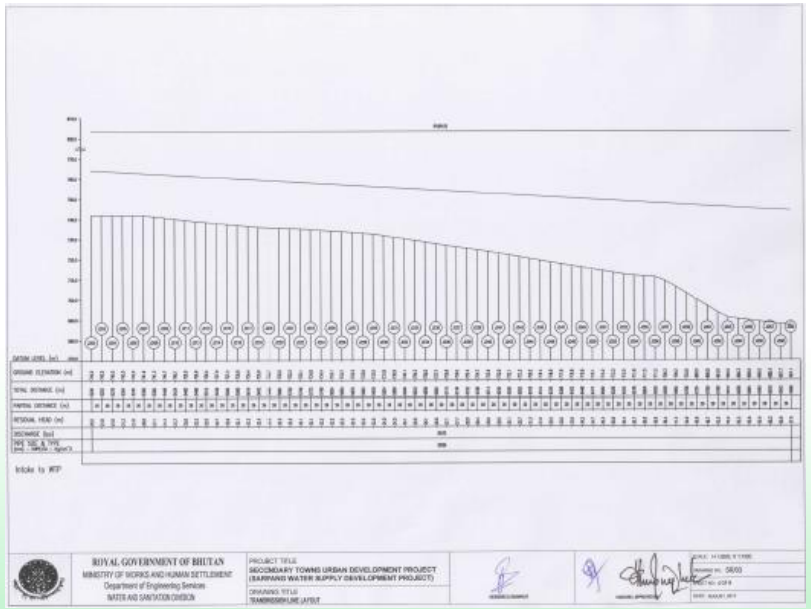


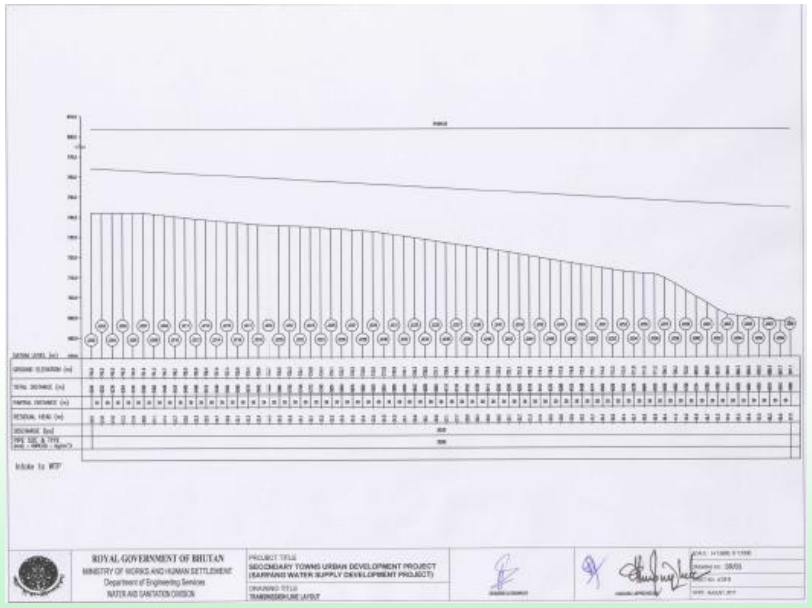
Sarpang Water Supply Development Project









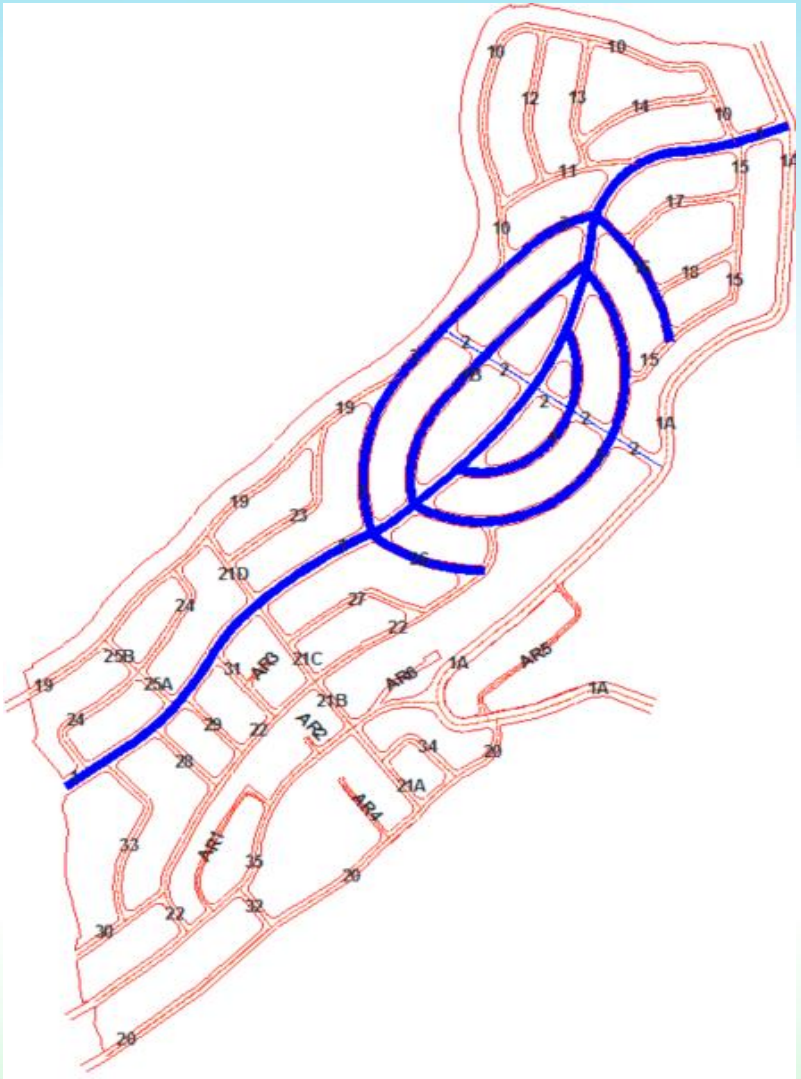


Sarpang Project Subcomponents

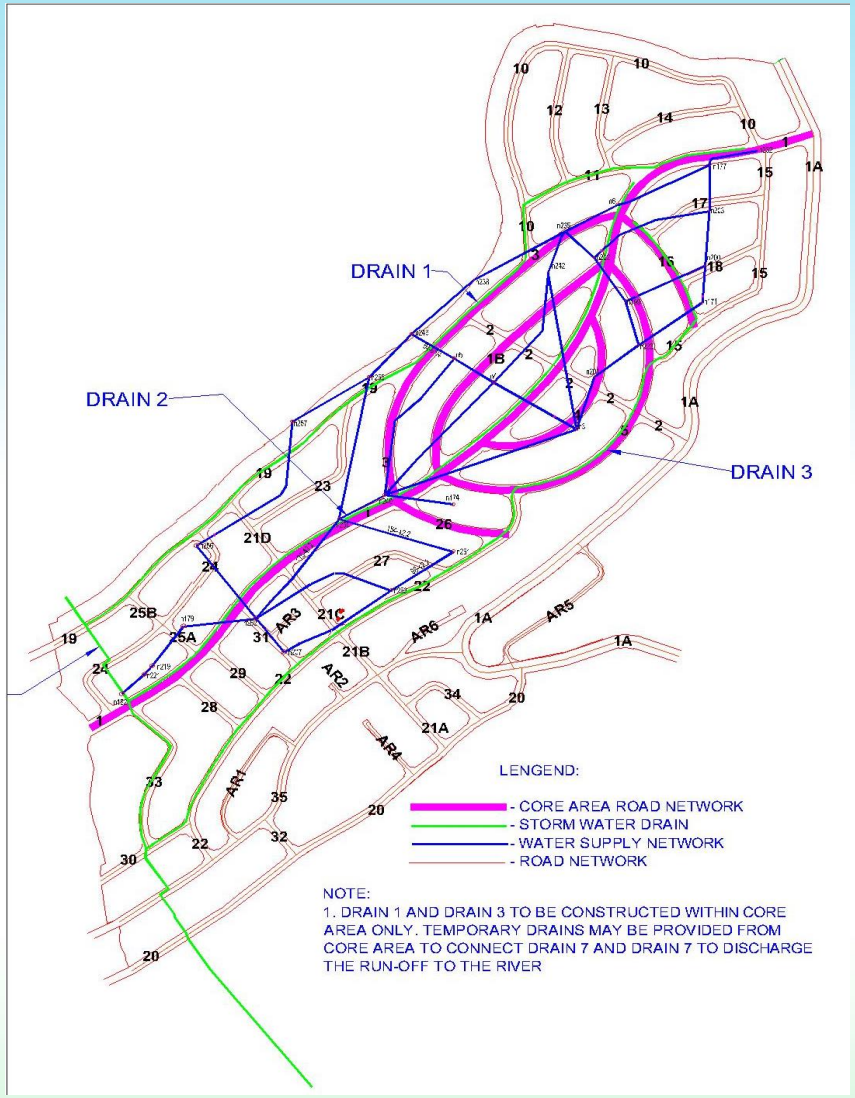
II. Development of Sarpang Satellite town (Shechamthang Infrastructure)

1	Water transmission line from WTP to Shechamthang	2.98 km
2	Water transmission line from WTP to Sarpang Bazaar	0.882 km
3	Water distribution network in Shechamthang	5.676 km
4	Development of Roads, drains in Shechamthang/ Ranibagan LAP	
	i. Primary Road	1.3 km
	ii. Secondary Road	2.44 km
	iii. Road side drains along primary road	1.30 km
	iv. Road side drain along secondary road	4.88 km
	v. Storm water drain	3.00 km
	vi. off-road footpath	0.350 km
	vii. Off-road Parking	2800 sqm

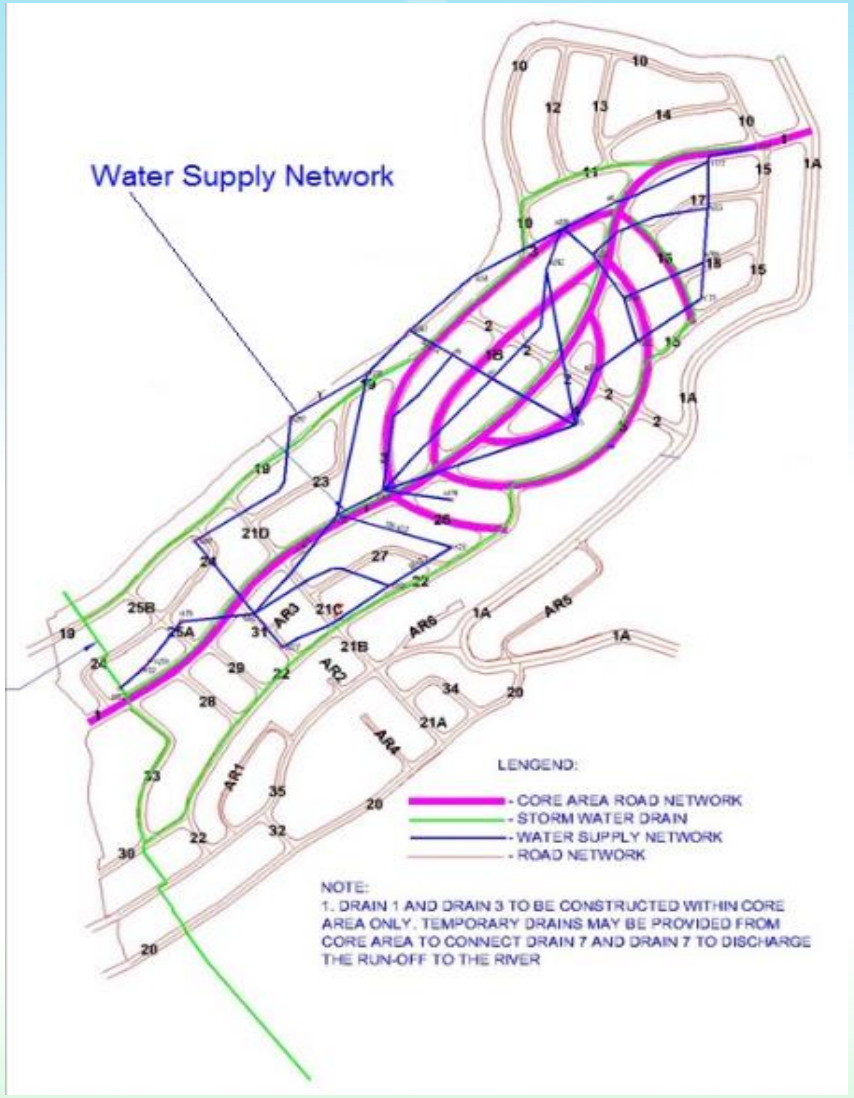
Development of Shechamthang local area plan Infrastructure



Road Layout



Layout of Storm water drains



Water distribution network

Samdrup Jongkhar Project Subcomponents

Samdrup Jongkhar Project Subcomponents

I. Rehabilitation of Samdrup Jongkhar (SJ) Water Supply System Improvement

- Design Population - 20,433
- Design year - 2048

1	Construction of 410 cumecs reservoir tank	1 nos
2	Transmission trunk main from Water Treatment Plant to reservoir	3.40 km
3	Water distribution system (for supply to Zones 1-4)	17.00 km

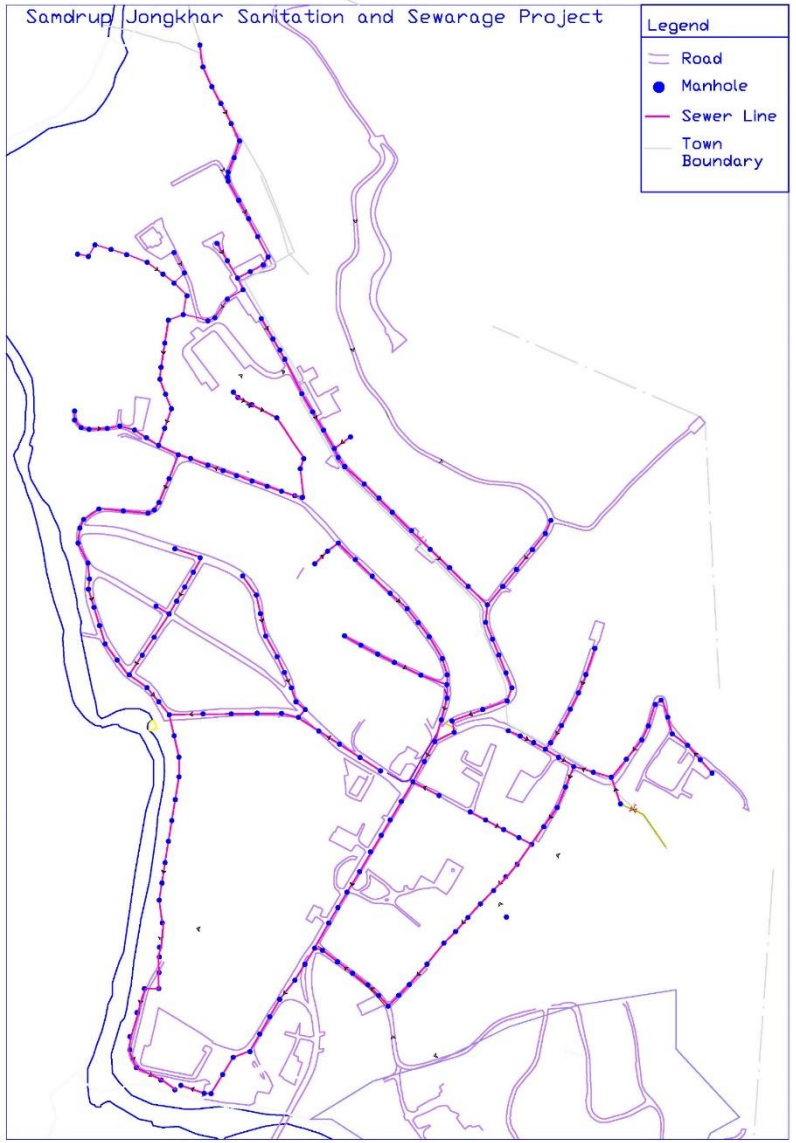
Rehabilitation of SJ Water Supply System Improvement

Samdrup Jongkhar Project Subcomponents

II. Samdrup Jongkhar Sanitation and Sewerage Project

1	Construction of sewerage system with manholes, etc. to connect 250 households to thromde WWTP (to serve LAP 2 and 3)	4.50 km
2	Construction of access roads, fencing, drainage, operator's quarters, etc	1 nos

Samdrup Jongkhar Sanitation and Sewerage Project

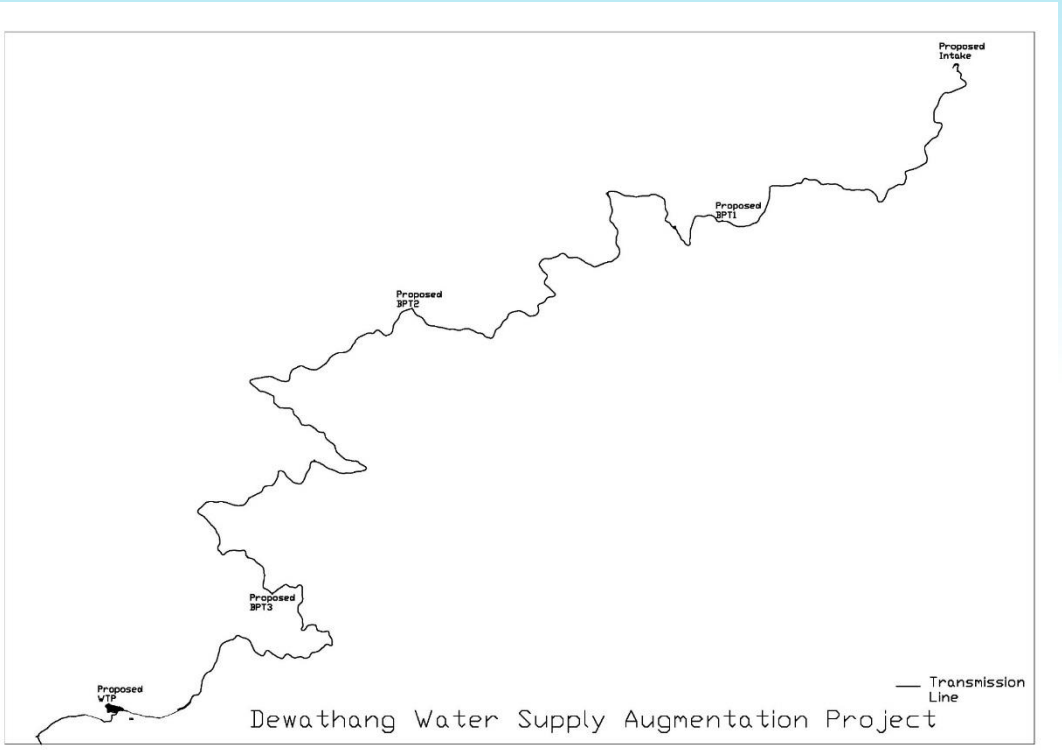


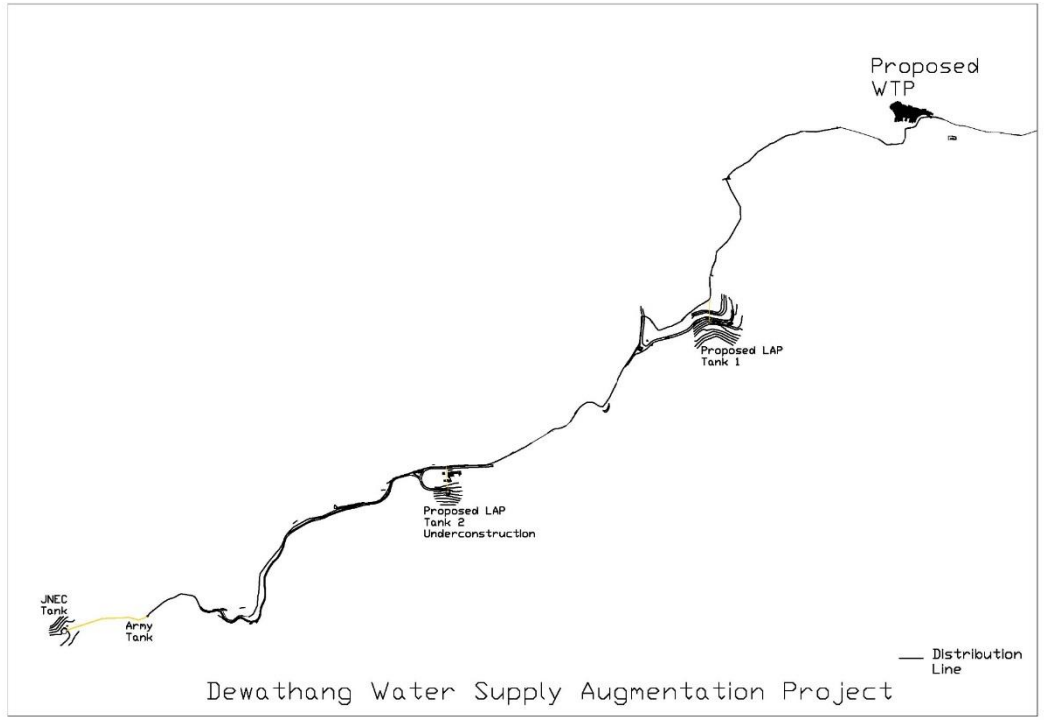
Samdrup Jongkhar Project Subcomponents

III. Dewathang Water Supply Augmentation Project

1	Construction of reinforced concrete (RCC) intake at Morong near the highway	1 nos
2	Construction of reinforced concrete (RCC) grit chamber near intake	1 nos
3	Construction of transmission main from Grit Chamber to Water Treatment Plant	19.00 km
4	Construction of RCC Break Pressure Tank using DI Pipes & Fittings with Barbed Wire Fencing and Gate	3 nos
5	Construction of compact water treatment plant (1.2 MLD), repurposing the existing clean water reservoir as a collection tank for the WTP	1 nos
6	Construction of a 250 cubic meters clean water reservoir (in Roshinangzor)	1 nos
7	Construction of service reservoirs	2 nos
8	Rehabilitation of existing water distribution mains from treatment plant to service reservoirs	1 nos

Dewathang Water Supply Augmentation Project





Trashigang Project Subcomponents

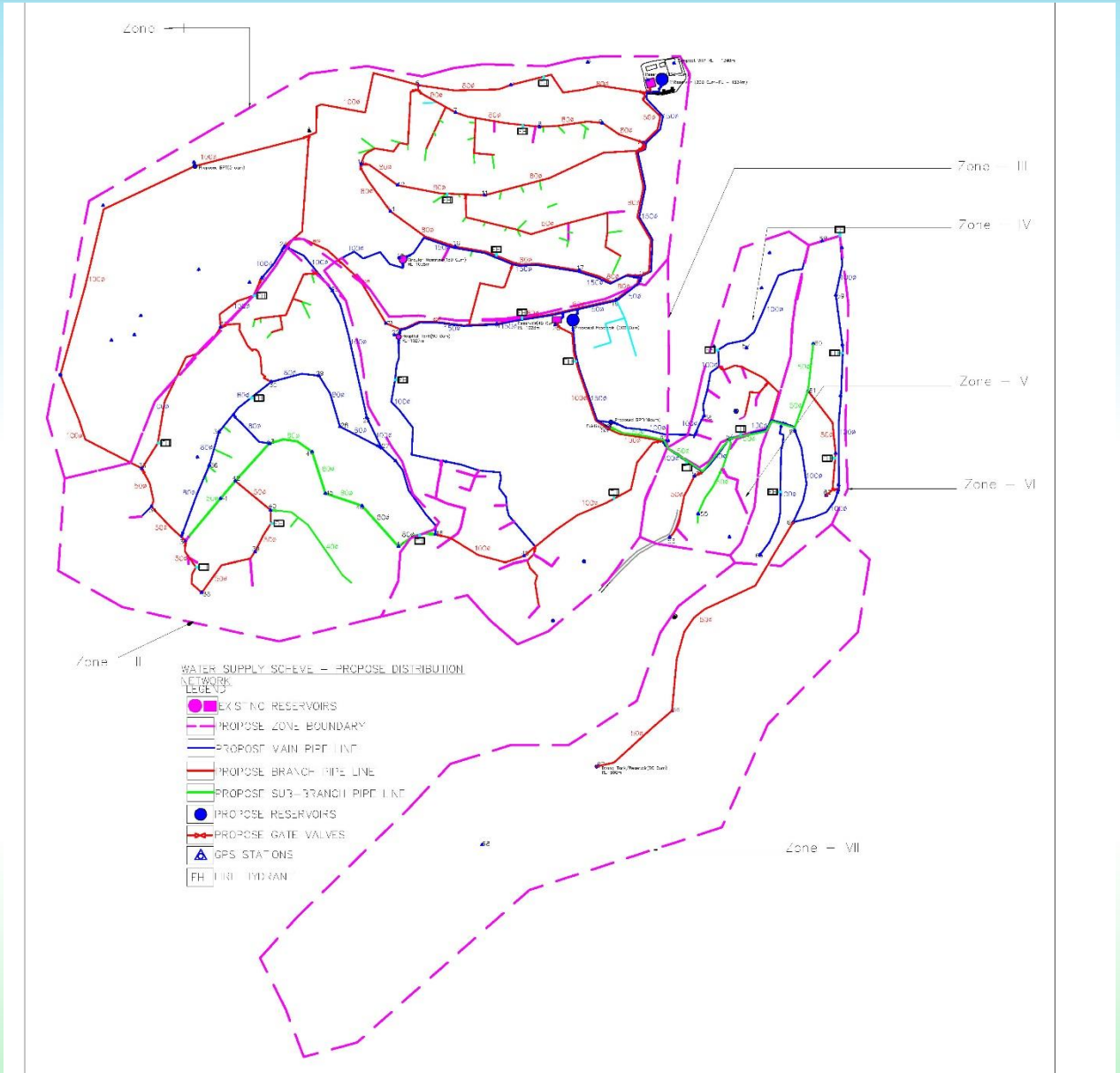
Trashigang Project Subcomponents

I. Trashigang Water Distribution Network Improvement

- Design Population - 4,431
- Design year - 2045

1	Water Distribution system	14.00 km
2	Construction of 200 cubic meters reinforced cement concrete (RCC) reservoir,	1 nos
3	Construction of RCC Break Pressure Tanks	2 nos
4	Reconstruction of V-shaped drain	0.70 km
5	Providing and fixing domestic water meters and construction of water meter chambers.	1 nos

Trashigang Water Distribution Network Improvement



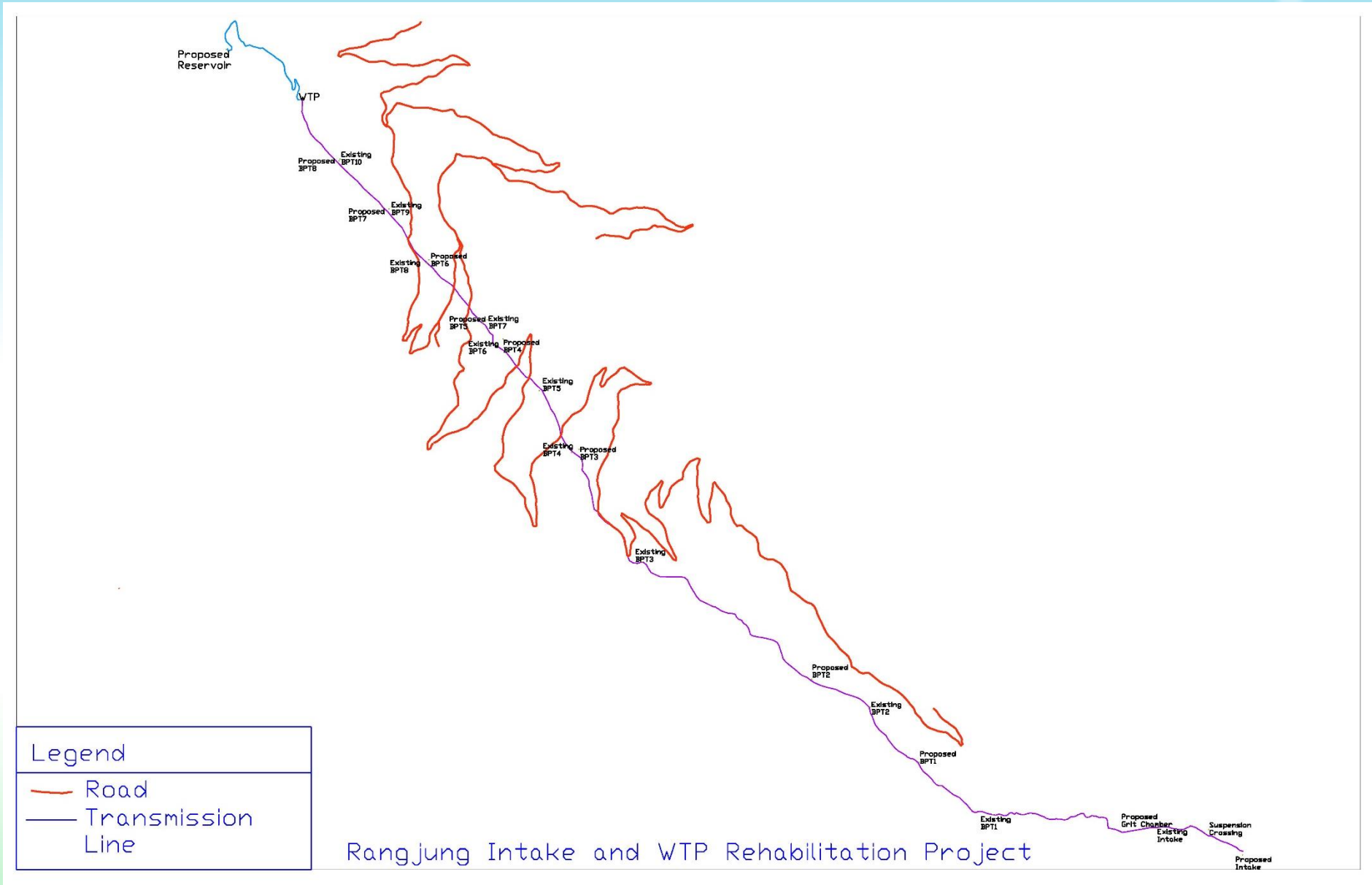
Trashigang Project Subcomponents

II. Rangjung Intake and WTP Rehabilitation Project

- Design discharge - 1 MLD

1	Construction of a permanent RCC intake at the Proposed location	1 nos
2	Construction of Grit Chamber with Sedimentation near existing collection tank	1 nos
3	Construction of transmission main (Consist of 150 mm and 100 mm dia DI Pipe)	8.10 km
4	Construction of RCC Break Pressure Tank using DI Pipes & Fittings	8 nos
5	Augmenting exisitng WTP to 1 MLD capacity	1 nos
6	Installation of Household meters	8 additional households and 5 Institutional connections
7	Construction of 200 cubic meters RCC clear water reservoir	1 nos

Rangjung Intake and WTP Rehabilitation Project



Technical Features of Water and Wastewater Projects

1. Intake
2. Transmission Lines and support structure
3. Water Distribution System
4. Sewerage Network

Intakes

- 3D model of Intake is used for design to be more accurate on estimation
- Intake mainly designed of RCC and anchored in rock to ensure climate change impact and ensured of leakages and seepage
- Adequate protection works in Intake
- Securing Transmission pipeline from flood by using suspension crossing structures with adequate height
- Intake sites are located in most appropriate and safe location by surveying upstream and downstream
- Rangjung intake is shifted upstream to minimize contaminations and safer location
- Sarpang intake is at present location because its safe and upstream locations are difficult
- Dewathang is in the safe location

Intake and Suspension Crossing

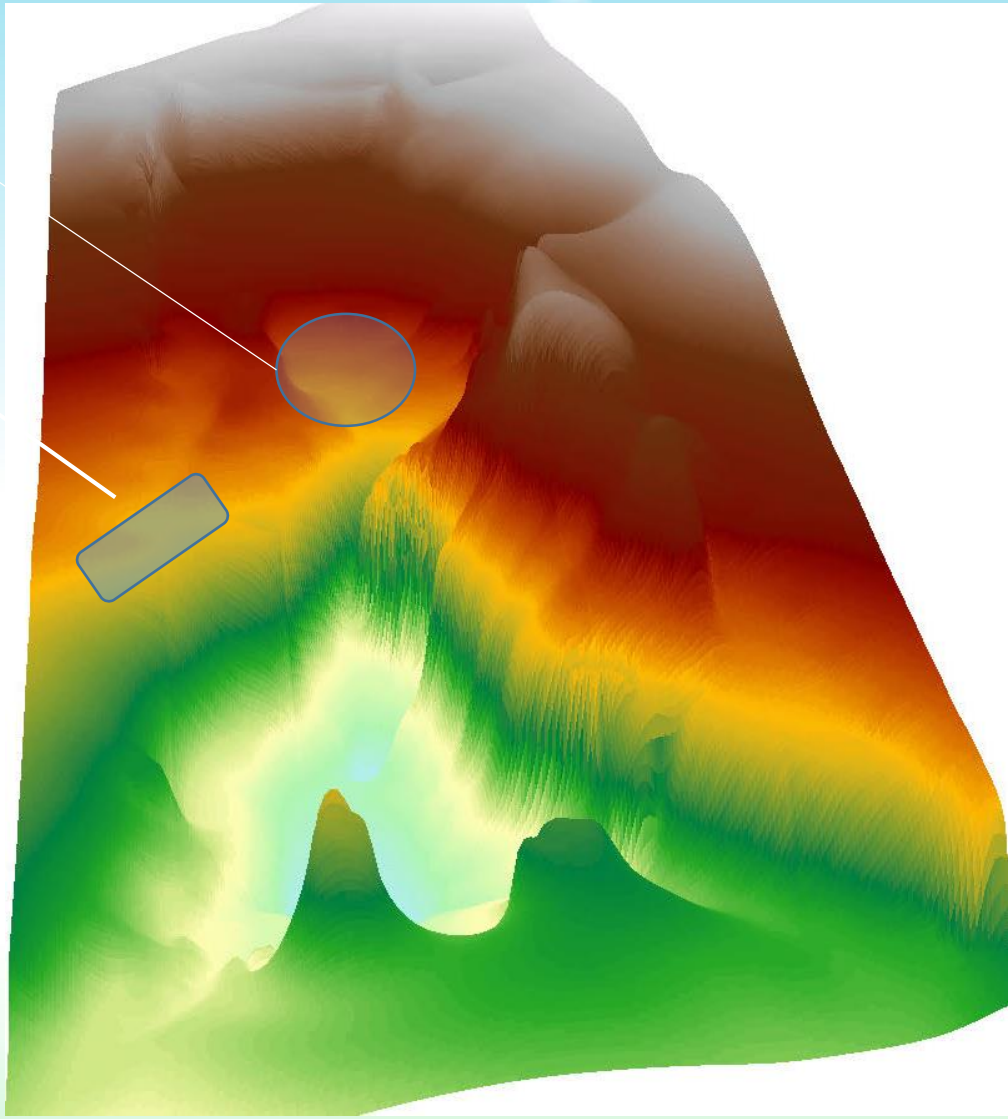
Proposed Intake

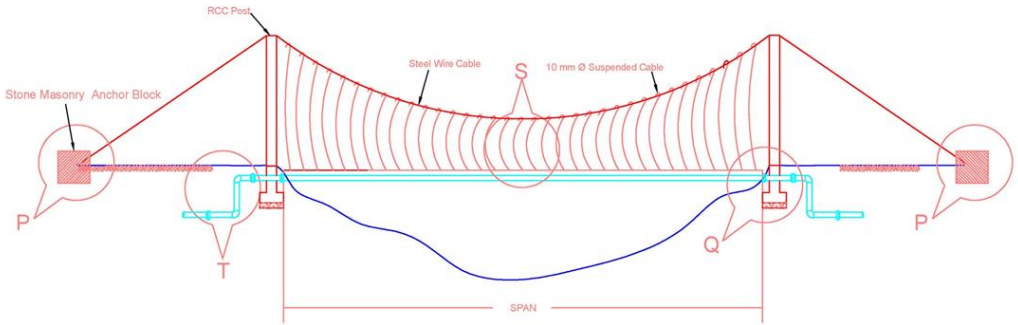
Proposed Collection Chamber

Protection Works

Intake anchored to Solid Rock

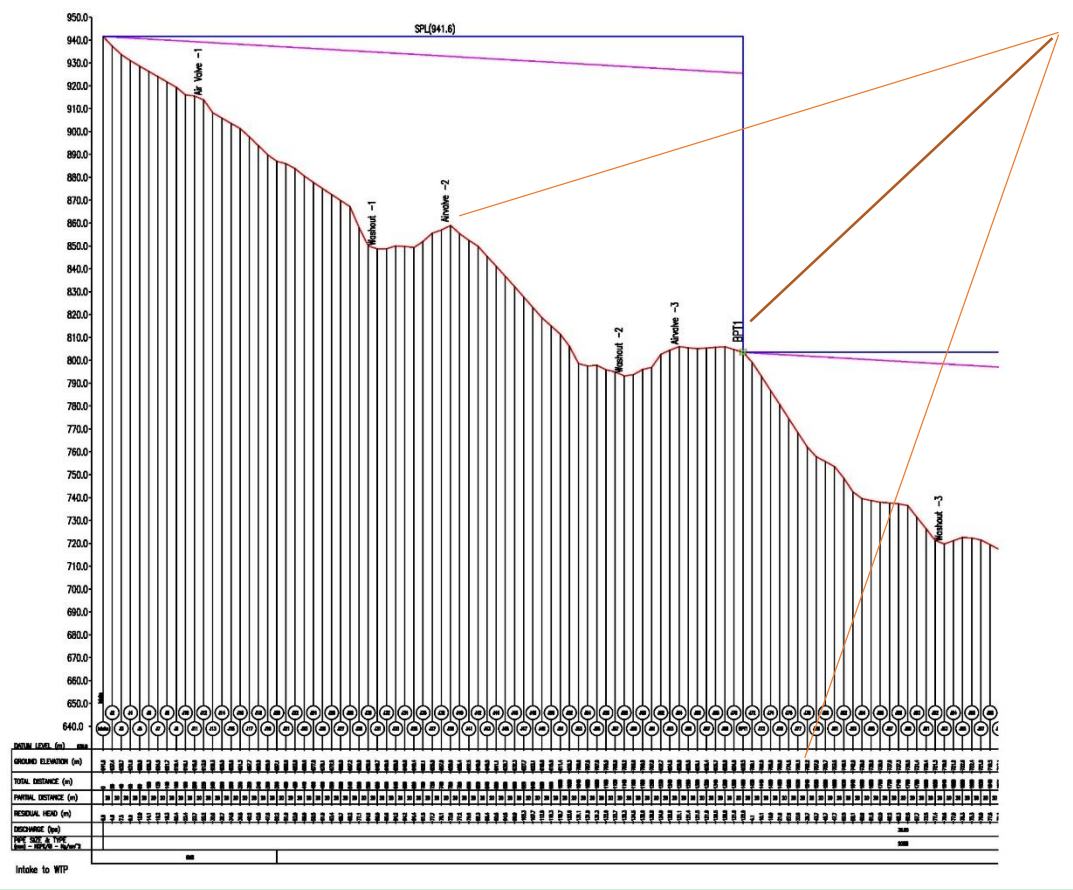
Suspension Crossing





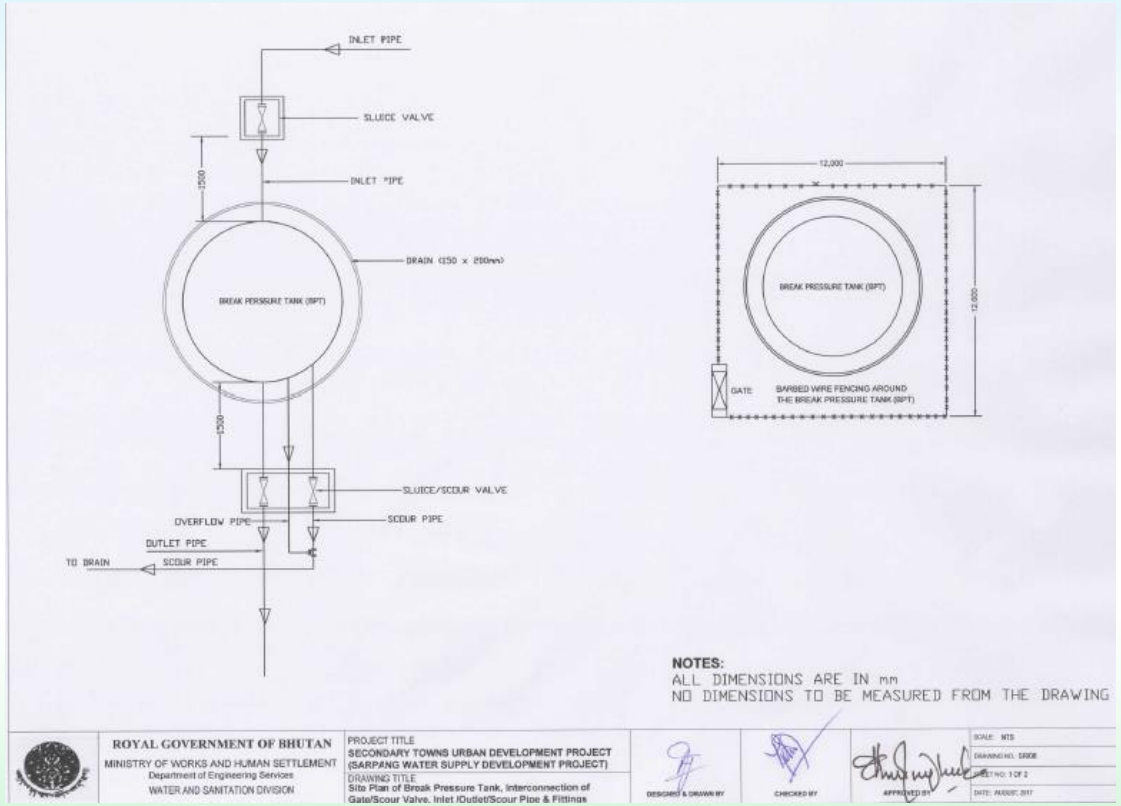
Transmission Lines

- Presented both in GIS and Google earth to help locate all components
- Adequate structures like pipe support pillars, thrust blocks, valves
- Adequate number of Break Pressure Tank to ensure safe head along pipeline



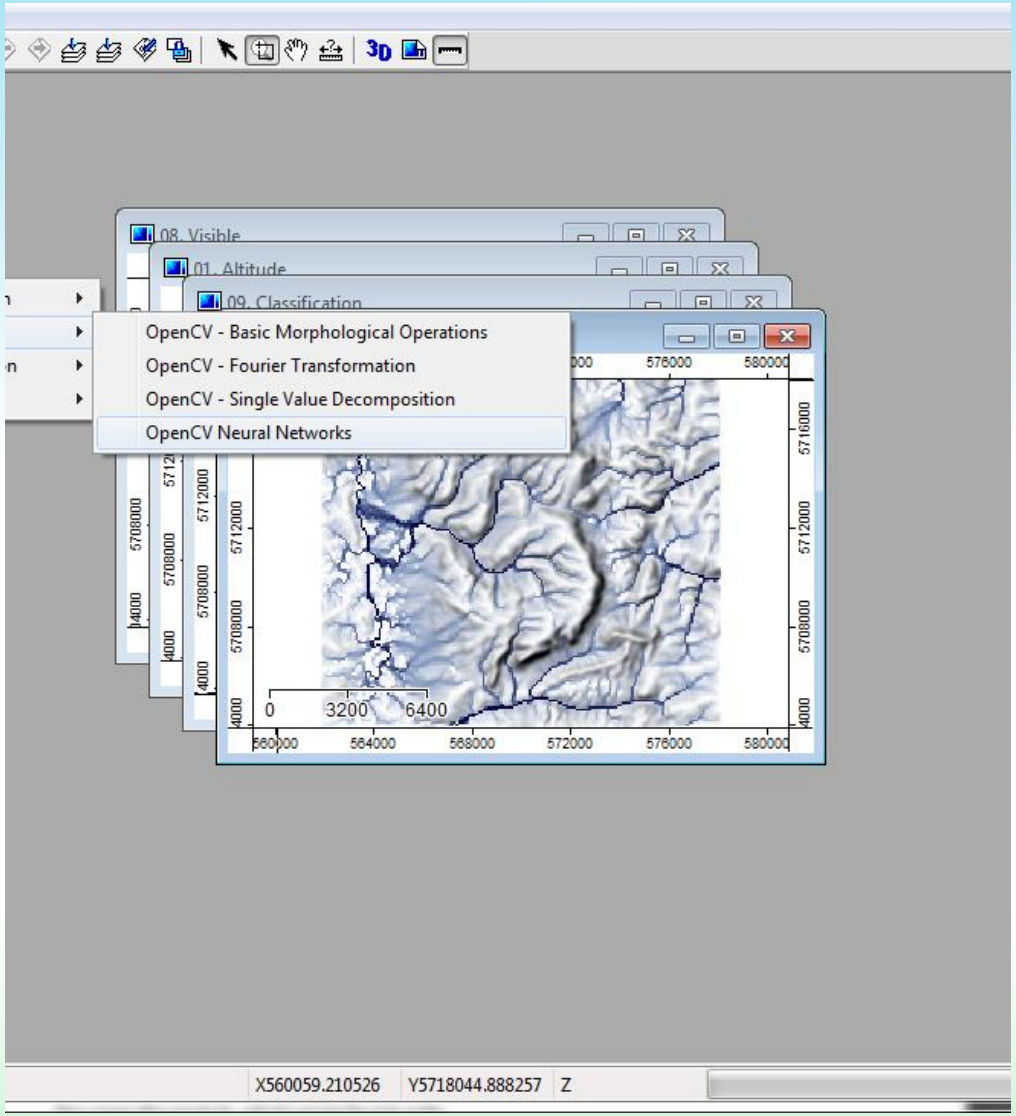
Component located according to map and chainage

Component, features located in map

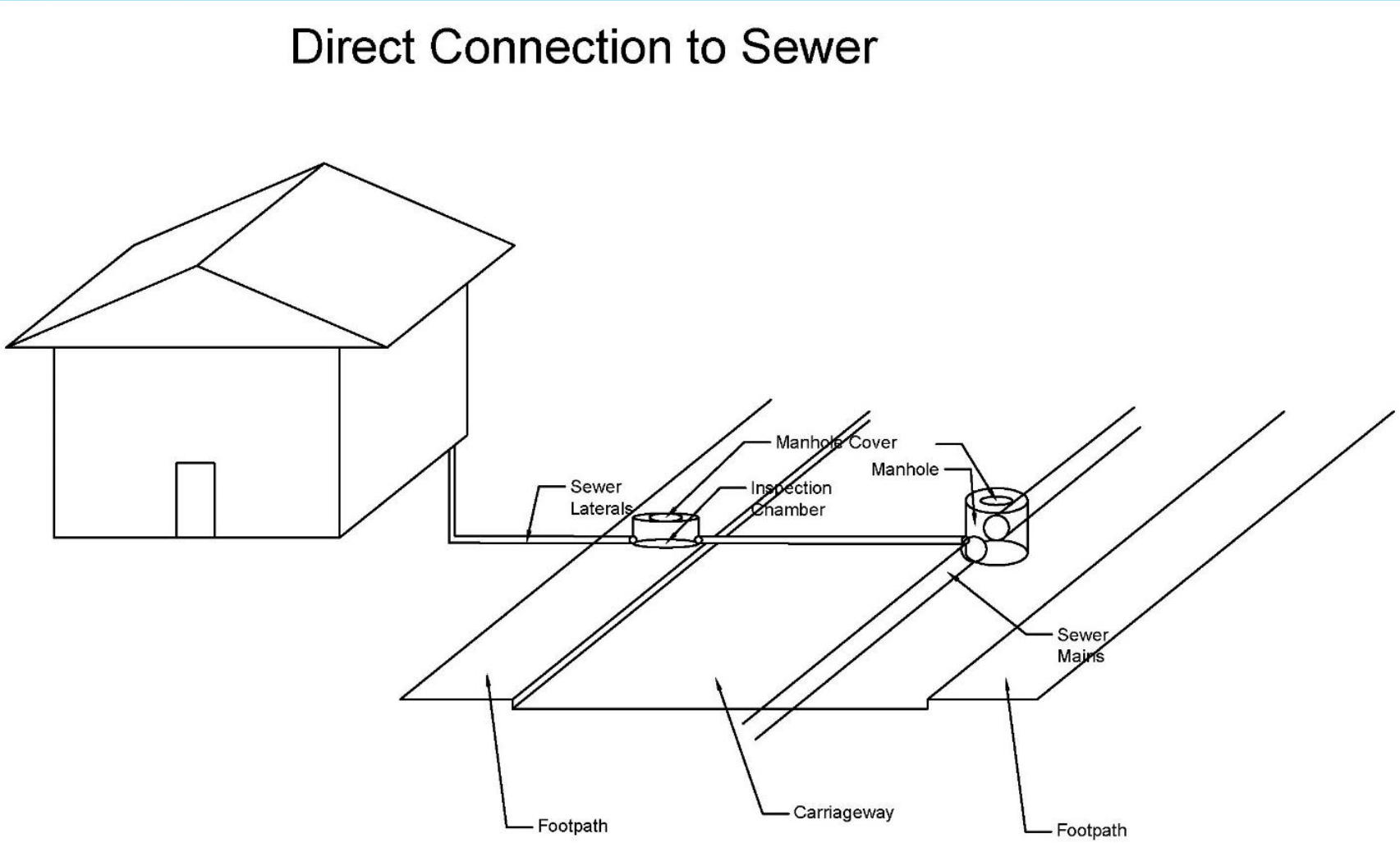


Water Distribution Systems

- Water distribution designed using both DI (high tensile strength compare to GI and HDPE for transmission line) and HDPE pipe for distribution because of good hydraulic flow efficiency
- Sufficient pipe support structure and valves
- System integrated with GIS – all the features located in map (which was not usually done for previous projects)



Sewerage Network Design



- Sewerage system in Sarpang Satellite town (Schehamthang) is not provided as the experience gained over years indicates that it takes long to achieve designed flow in the treatment plant and Schehamthang is a new greenfield development area which will take 8 to 10 years to get fully settled.

- Septage management practices in Trashigang and Sarpang are in place.