5.3.6 Dabose Water Supply Scheme

(1) System Development Plan

a. Expansion of Treatment Plant

The PWD has put out a tender for the augmentation of the water treatment plant to increase its capacity by 10,000 m^3/day by January 2006. This section discusses the expansion of the treatment plant for the Dabose WSS in light of this decision.

According to Goa's Department of Water Resources (as mentioned in section 5.2.1), there are no constraints on the raw water source availability for the Dabose WSS, which sources raw water from the Manderi River.

Expansion of the water supply capacity of the Dabose WTP will be implemented as shown in Figure 53.26.

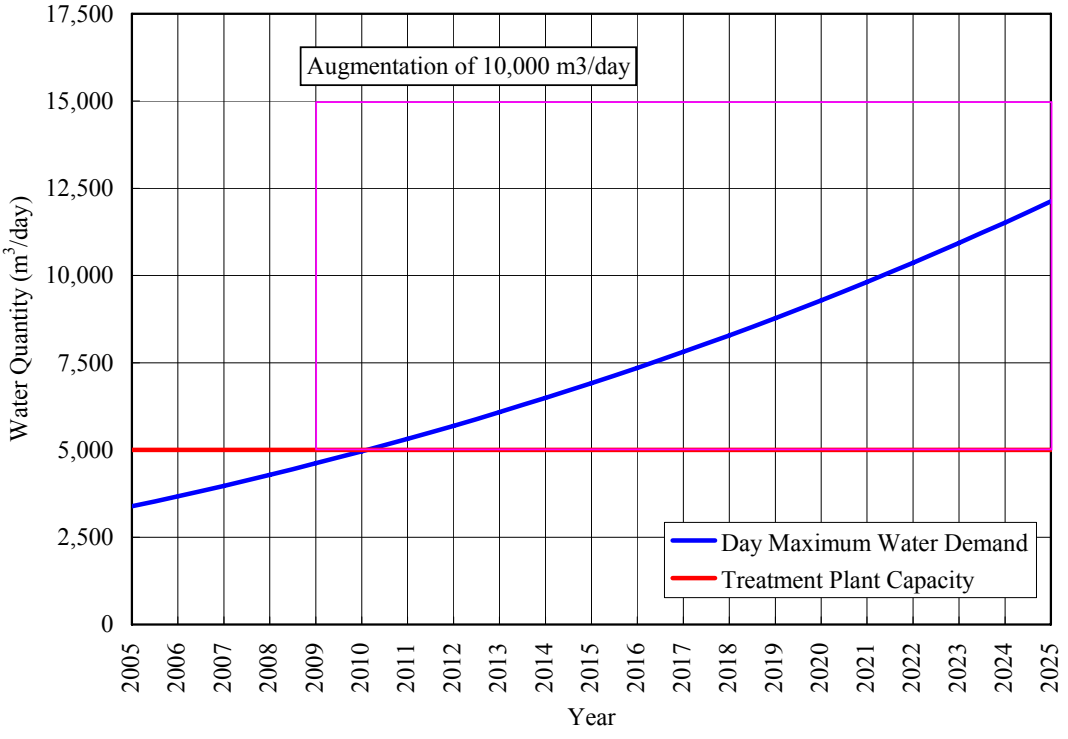

Figure 53.26 Development Plan for the Dabose WSS

b. Transmission Plan

As mentioned in section 5.2, the Dabose WSS supplies only the Satari Taluka. However, part of the Satari Taluka is supplied from the Podocem WTP within the Sanquelim WSS. Figure

53.27 shows the transmission plan for the Dabose WSS.

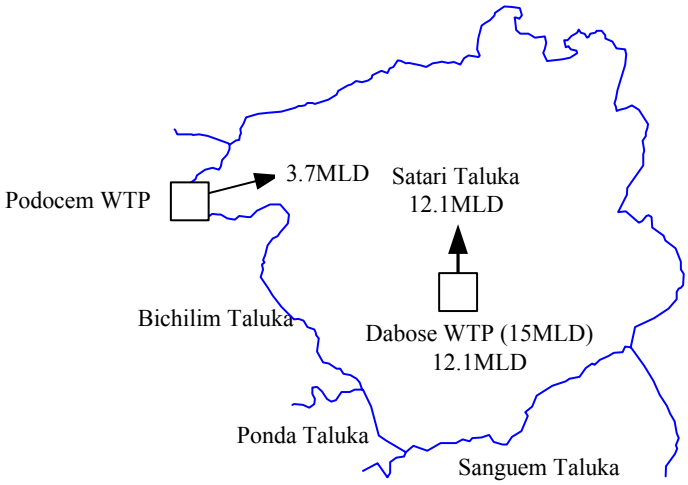

Figure 53.27 Transmission Plan for the Dabose WSS

(2) Treatment Plant

a. Water treatment Plant Capacity

The PWD is currently tendering to expand this capacity by 10 MLD. Therefore, the plant capacity will increase to 15 MLD in 2009.

b. Proposed Water Treatment process

Although the PWD is currently tendering for the augmentation of the treatment plant, the master plan has made some recommendations about the treatment process. These recommendations were based on the above raw water information and the water treatment process studies. The recommended water treatment process for the new plant is shown in Figure 53.28 (this is the same proposed for the other WSSs).

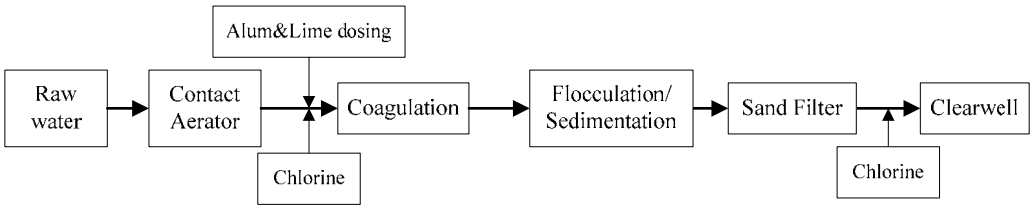

Figure 53.28 Proposed Water Treatment Process at the Dabose WTP

c. Implementation Schedule

The timeline for the implementation schedule of WTP is shown in Table 53.33. Rehabilitation

and improvement of the existing water treatment plant will be conducted during Stage I. During this stage, the installation of chlorine safety equipment, replacement of equipment that has exceeded its design life, and installation of a generator and flow meters will be conducted. A new treatment plant with a capacity of 10 MLD will be constructed during Stage I.

Table 53.33 Implementation Schedule for Dabose WTP

Stage		Existing Plants	New Plants
Stage I	Components	- Installation of safety equipment - Replacement of raw water pumps and backwash pumps - Installation of generator and flow meters - Modification of coagulation process	Expansion of 10 MLD plant

(3) Transmission System

a. Proposed Transmission System

To supply water to future service areas and to meet the increase in demand, the transmission system shown in Figure 53.29 and summarised in Table 53.34 is proposed. Calculations using WaterCAD are attached in Volume IV Appendix M53 Results of Hydraulic Analysis.

Table 53.34 Proposed Transmission Mains for the Dabose WSS

Material	Diameter (mm)	Length (km)
Ductile Iron	250	6.3
	200	6.0
	150	22.4
	100	15.3
Total		50.0

b. Rehabilitation of the Existing Transmission System

The master plan recommends that the existing A.C. pipelines installed in 1994 be replaced with ductile iron pipes. This is 10.6 km of pipleine, which represent about 30 % of the total transmission mains. In addition since the transmission line to Dabe Reservoir, 110PVC 3.4 km, has many problems recently, the master plan also recommends the replacement of this line with ductile iron pipes of 150 mm in diameter.

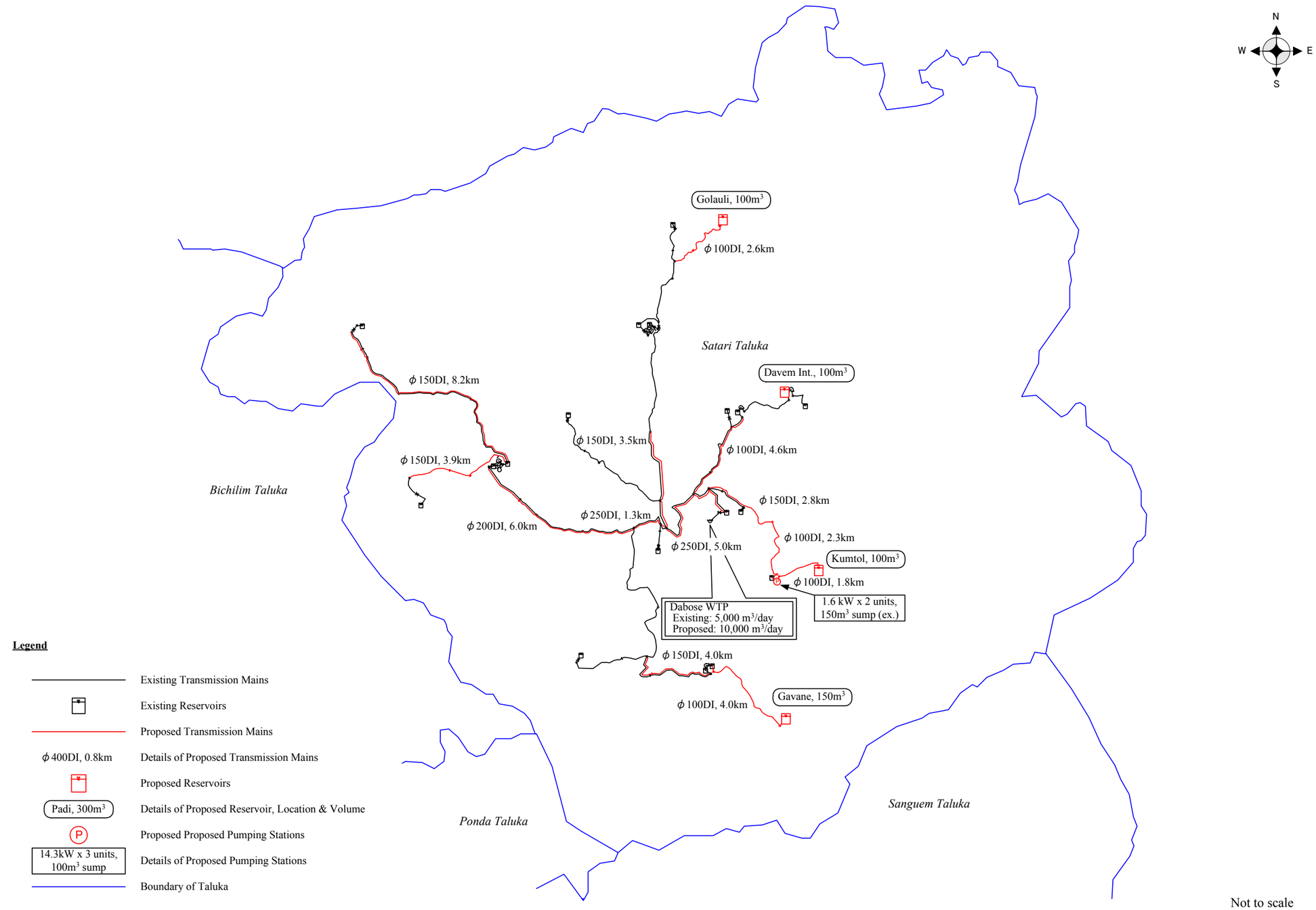

Figure 53.29 Proposed Transmission System of the Dabose WSS in 2025

(4) Reservoir

a. Proposed Reservoirs

To supply treated water to an expanded service area, construction of four reservoirs (as listed in Table 53.35) is proposed. Locations and volumes of the proposed reservoirs are shown in Figure 53.29.

Table 53.35 List of Proposed Reservoirs for the Dabose WSS

Location	Capacity (m^3)	Remarks
Golauli	100	Gravity fed from the existing Pile reservoir
Davem (intermediate)	100	at the existing Davem intermediate pumping station
Kumtol	100	with P/S at Carambolim BK reservoir (2 pump units of 1.6 kW)
Gavane	150	Gravity fed from the existing Cottorem MBR

b. Rehabilitation of the Existing Reservoirs

The Dabose WSS has 26 reservoirs, as summarised in Table 53.36. A detailed list of the reservoirs is attached in Volume IV Appendix M31 Existing Water Supply System. Table 53.36 also identifies the reservoirs that need to be rehabilitated.

Table 53.36 Number of Existing Reservoirs

Reservoir Volume (m^3)	Number of Reservoirs	
	Existing	to be rehabilitated
800	3	1
300	10	2
150	10	2
100 and less	3	0
Total	26	5

Note: not include the reservoirs at Dabose WTP

(5) Pumping Station

a. Proposed Pumping Station

It is planned to construct one pumping station associated with the proposed reservoir listed in Table 53.35.

b. Rehabilitation of the Existing Pumping Station

The design life of the pumping equipment is assumed to be 15 years. Therefore, the pumping equipment in all of the existing pumping stations should be replaced by 2025. Details are

shown in Table 53.37.

Table 53.37 Pumping Equipment Replacement Details

Name of Station	Pumping Unit (pump and motor)		Name of Station	Pumping Unit (pump and motor)	
	Rated Output (kW)	No. of Units		Rated Output (kW)	No. of Units
Cudcem	3.4	3	Hivre	2.7	2
Nagargao	3.4	2	Cottorem	5.8	3
Dabe	2.4	2	Padeli	3.7	3
Zarme	1.7	2	Bhuipal	22.9	3
Pali	11.0	3	Morley Colony	4.9	3
Davem I	3.8	2	Davem II	6.3	2

(6) Distribution Pipeline and House Connections

a. Proposed Distribution Pipeline and House Connections

The proposed length of distribution pipelines was calculated by multiplying the number of house connections to be installed (which reflects the increase in population served) by the unit pipeline length per connection (which is 14.26m as mentioned in section 5.1.2). Table 53.38 shows the proposed number of house connections and length of distribution pipelines.

Table 53.38 Proposed Number of House Connections and Length of Distribution Pipelines in the Dabose WSS (incremental basis)

Year	2007	2008	2009	2010	2011	2012	2013
Distribution Pipeline (m)	3,784	3,880	3,983	4,071	4,166	4,254	4,360
Number of House Connection	265	272	279	285	292	298	306
Year	2014	2015	2016	2017	2018	2019	2020
Distribution Pipeline (m)	4,443	4,550	4,644	4,747	4,840	4,928	5,028
Number of House Connection	312	319	326	333	339	346	353
Year	2021	2022	2023	2024	2025	Total	
Distribution Pipeline (m)	5,124	5,210	5,292	5,387	5,475	88,167	
Number of House Connection	359	365	371	378	384	6,183	

b. Rehabilitation of the Existing Distribution Pipeline and House Connections

The design life of the distribution pipelines is assumed to be 50 years. It is planned that 2 % of the existing 184 km of distribution pipelines will be replaced every year. This means 38 % of the existing pipelines will be replaced between 2007 to 2025. Therefore, the existing 70 km of distribution pipelines will be replaced with new pipelines during the 19 years from 2007 to 2025.

The design life of house connection water meters is assumed to be 10 years. It is planned that 7,280 existing water meters will be replaced within 10 years. Therefore, about 16,500 water meters will be replaced during the 19 years from 2007 to 2025.

(7) Summary of Planning

The components of the Dabose WSS master plan are summarized in Table 53.39. Figure 53.30 depicts the Dabose WSS in 2025.

Table 53.39 Components of the Dabose WSS Master Plan

Facility	Proposed	Rehabilitation/ Replacement
Treatment Plant	10,000 m^3/day	5,000 m^3/day
Transmission Main	50.0 km	10.6 km
Reservoir	4	5
Pumping Station	1	12
Distribution Pipeline	88.2 km	69.7 km
House Connection	6,183	16,500

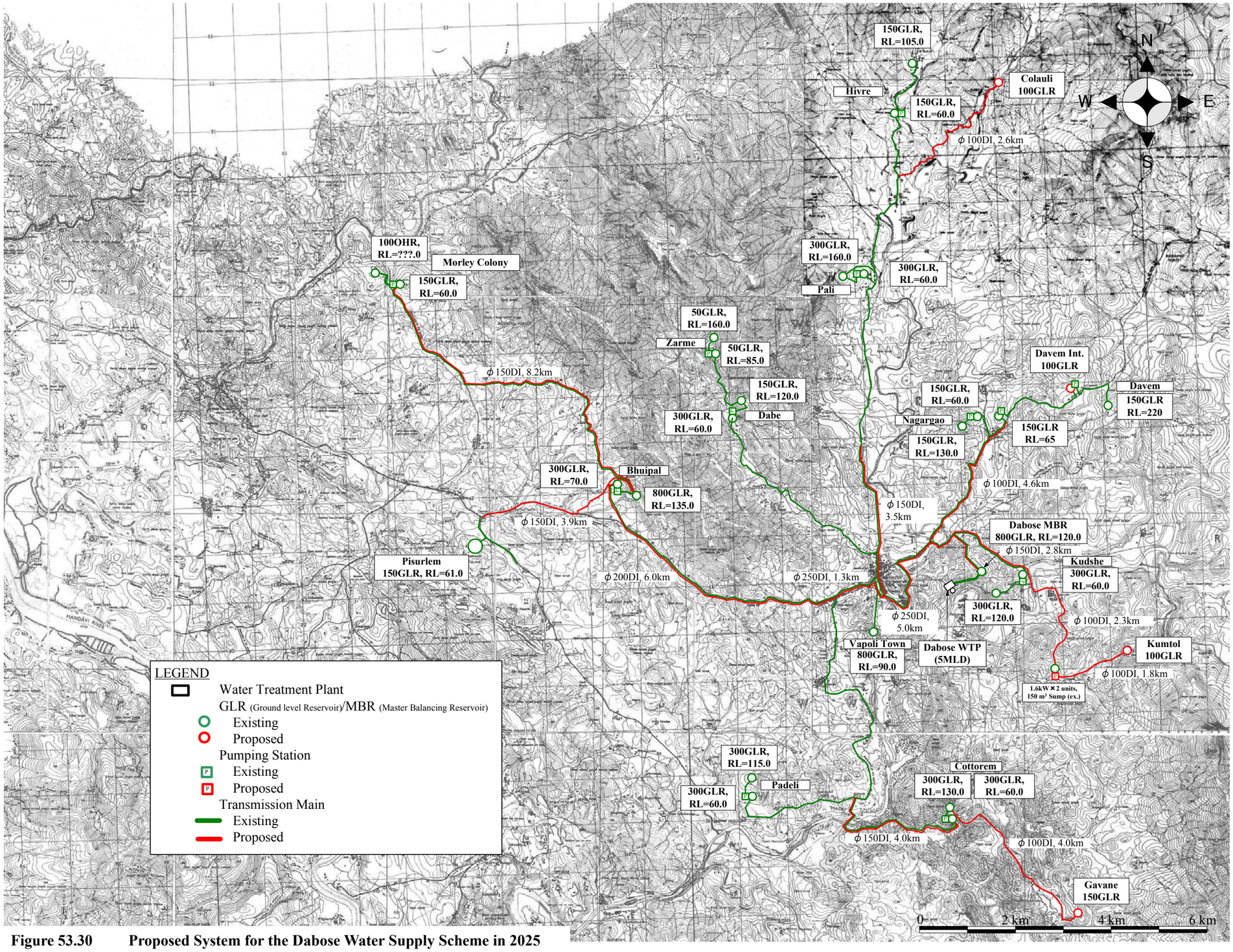

Figure 53.30 Proposed System for the Dabose Water Supply Scheme in 2025

5.3.7 Canacona Water Supply Scheme

(1) System Development Plan

a. Expansion of the Treatment Plant

In January 2006 the PDW began evaluating the results of a tender for a 10,000 m^3/day augmentation of the water treatment plant. This section discusses the expansion of the treatment plant for the Canacona WSS in light of this tender process.

According to Department of Water Resources (as mentioned in section 5.2.1), the raw water availability of the Canacona WSS is 15,000 m^3/day. On the other hand, the raw water requirement of the Canacona WSS is 16,500 m^3/day because the total treatment plant capacity is 15,000 m^3/day (5,000 m^3/day existing and 10,000 m^3/day under tendering) and the plant loss is 10 % of the plant capacity (1,500 m^3/day). Against the demand in 2025 there will be no constraints on the amount of the raw water source for the Canacona WSS, but it is recommended that for using treatment plant effectively up to the maximum plant capacity in future, the PWD need to have the raw water sources of 16,500 m^3/day.

Expansion of the water supply capacity of the Canacona WTP will be implemented as shown in Figure 53.31.

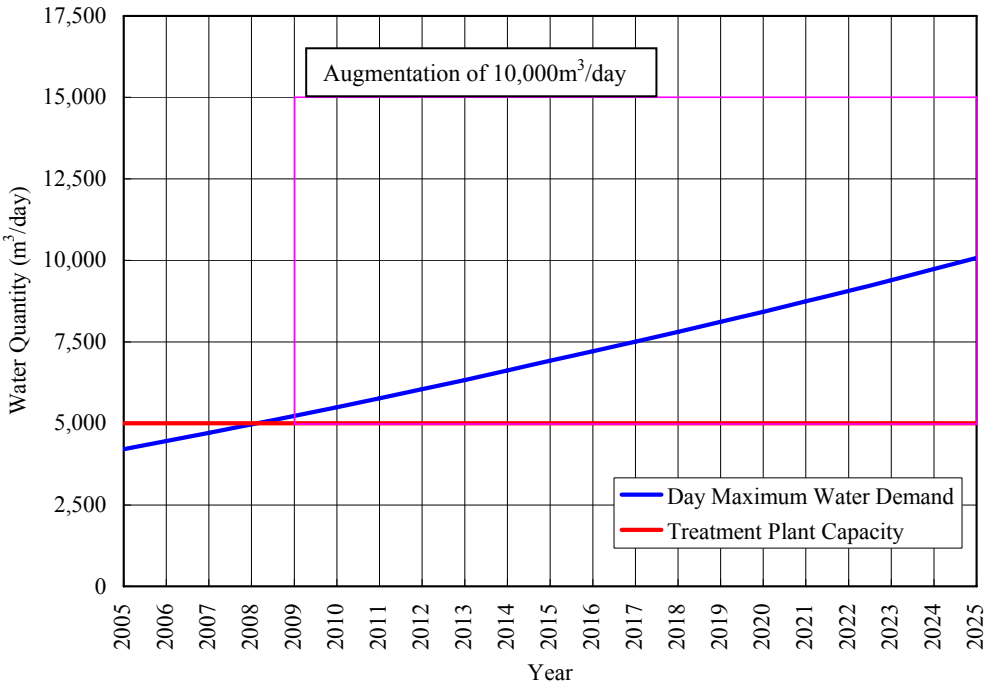

Figure 53.31 Development Plan for the Canacona WSS

b. Transmission Plan

As mentioned in section 4.2, the Canacona WSS only supplies water to the Canacona Taluka. The Canacona Taluka's water supply is provided exclusively by the Canacona WSS. Figure 53.32 shows a transmission plan for the Canacona WSS in 2025.

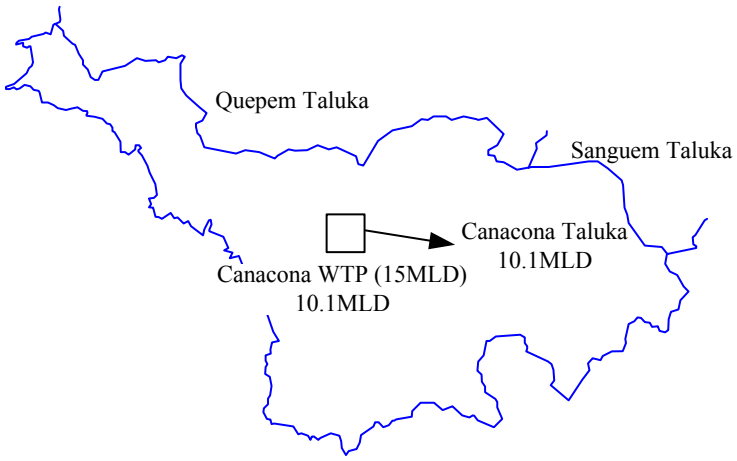

Figure 53.32 Transmission Plan for the Canacona WSS

(2) Treatment Plant

a. Water treatment Plant Capacity

The PWD is currently tendering for a capacity expansion of 10 MLD. Consequently, the plant capacity will increase to 15 MLD in 2009. The Canacona WSS presently has two water sources: the Chapoli Dam and the Talapona River, but in future available only one water sources from the Chapoli Dam according to the letter from the Water Resources Department.

b. Proposed Water Treatment process

The recommended water treatment process for the new plant currently under tender by the PWD, is shown in Figure 53.33 (this is the same proposed process as other WSSs). This recommendation was based on the above raw water information and the water treatment process studies.

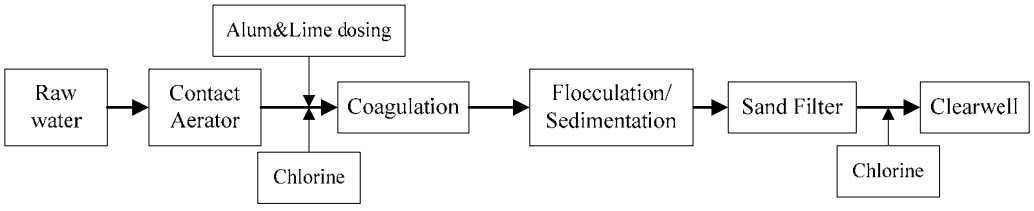

Figure 53.33 Proposed Water Treatment Process at the Canacona WTP

c. Implementation Schedule

The timeline for the implementation schedule of WTP is shown in Table 53.40. Rehabilitation and improvement of the existing water treatment plant will be conducted in two stages. Stage I consists of the installation of the chlorine safety equipment, replacement of equipment that has exceeded its design life. Stage II consists of replacing intake pumps and installing generators. A new treatment plant with a capacity of 10 MLD will be constructed during Stage I.

Table 53.40 Implementation Schedule for Canacona WTP

Stage		Existing Plants	New Plants
Stage I	Components	- Installation of safety equipment - Replacement of backwash pumps and other equipment - Installation of flow meters - Modification of coagulation process	Expansion of 10 MLD plant
Stage II	Components	- Replacement of raw water pumps - Installation of generator	

(3) Transmission System

a. Proposed Transmission System

To supply water to future service areas and to meet the expected demand increases, the transmission system shown in Figure 53.34 and summarised in Table 53.41 is proposed. Calculation performed using WaterCAD are attached in Volume IV Appendix M53 Results of Hydraulic Analysis.

Table 53.41 Proposed Transmission Mains for the Canacona WSS

Material	Diameter (mm)	Length (km)
Ductile Iron	250	2.95
	200	2.70
	150	26.45
	100	4.60
Total		36.70

b. Rehabilitation of the Existing Transmission System

The Canacona WSS has a total length of 1.85 km asbestos cement (AC) pipelines installed from 1982 to 1984 (Sector Status Study – WSS Goa, 2004) as the transmission mains to reservoirs. The Study proposes that this AC pipelines will be replaced with ductile iron pipes to secure the transmission system.

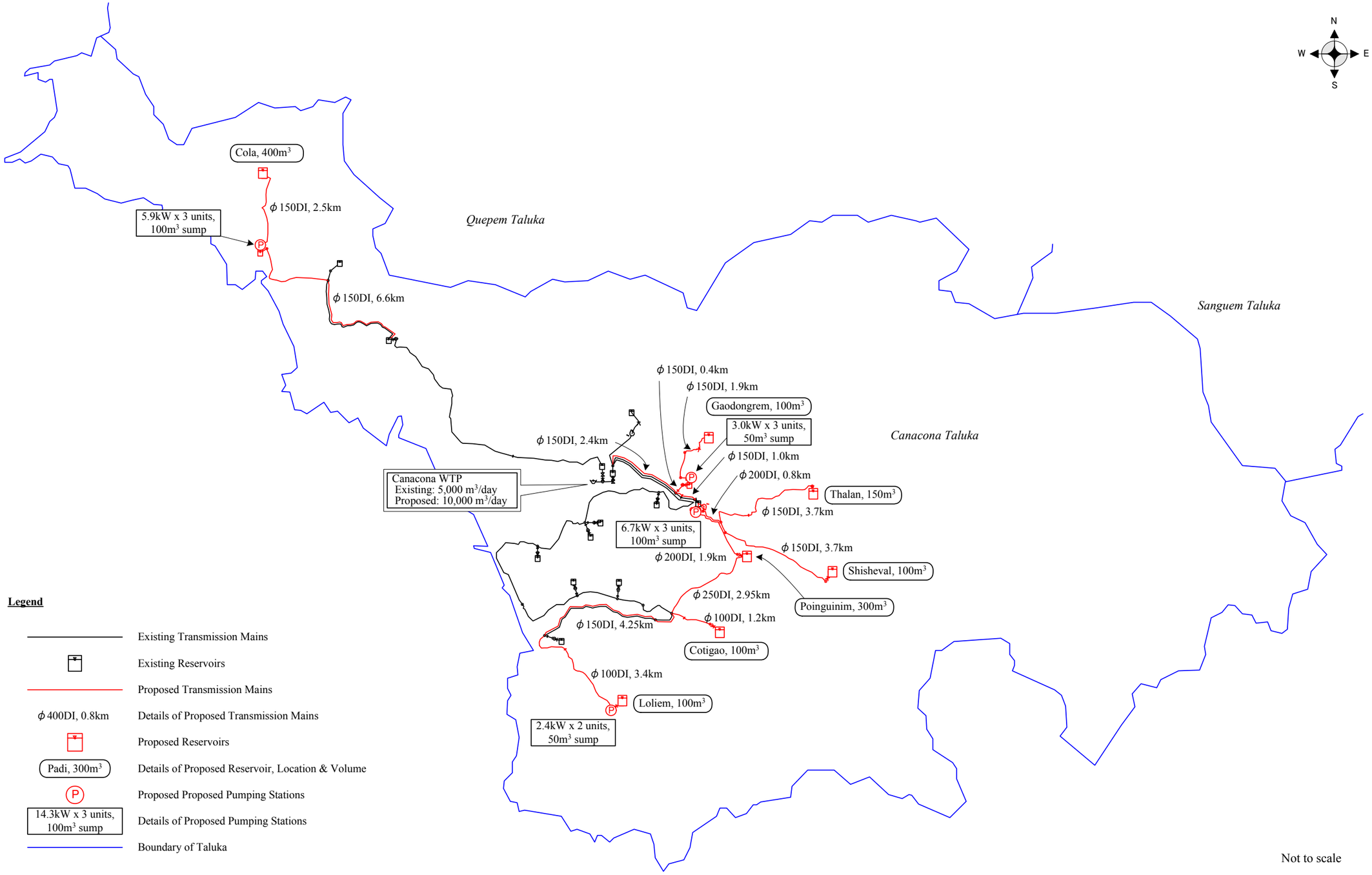

Figure 53.34 Proposed Transmission System for the Canacona WSS in 2025