

APPENDIX – A77.1

Proposed Water Supply System and Flow Diagram

A77.1 Proposed Water Supply System and Flow Diagram

This appendix shows the stage-wise development plan (2016, 2021 and 2025) of water supply system prepared for the master plan.

The main purpose of each development stage was set as follows in preparing the stage-wise development plan:

- By 2016: To transform the current water supply system in Karachi into the proposed zone-wise water supply system by installing facilities least-required for the transformation.
- By 2021: To strengthen the existing water distribution networks in populated built-up areas by installing new trunk distribution mains and replacing old trunk distribution mains.
- By 2025: To expand water supply areas and distribution networks while populated areas expand, especially in the outer three towns

Figures A77.1.1 to A77.1.3 show the water supply areas of the proposed water supply system of each stage. These future water supply areas were prepared in consideration of elevation, other topological conditions, capacities of related facilities and current water supply areas. The alternative studies shown in **Appendices A73.1 to A73.4** were conducted based on the boundaries of some of these water supply areas. **Figures A77.1.4 to A77.1.6** show the proposed water supply system of each stage (2016, 2021 and 2025) which were prepared through the alternative studies and the stage-wise hydraulic analysis of proposed water supply system. The flow diagrams of the proposed systems in 2016, 2021 and 2025 are shown in **Figures A77.1.7 to A77.1.9**.

The main results of the stage-wise hydraulic analysis, such as the total lengths of the proposed transmission mains and trunk distribution mains in 2025, are shown in **Chapter 7** of the main report. **Table A77.1.1** only summarises the planned explanation of reservoirs in accordance with increasing water demand and the results of hydraulic analysis on water pressure within the proposed distribution network (trunk distribution mains) connected to each reservoir.

Figure A77.1.10 shows the proposed area for the expansion of University Reservoir. The capacities of planned facilities for the expansion of NEK-New and COD were decided to fit the expansions to the remaining spaces within their current site boundaries. The proposed expansion of NEK-Old will take place at the adjacent area of its existing site. **Figure A77.1.11** shows main locations of the roads and their satellite imageries where five or more trunk distribution and transmission mains (including existing and new pipes) will lie in 2025 in the proposed master plan. Although the roads shown in this figure look wide enough for installing 5 or 6 trunk mains without difficulty, except for the one leading to Orangi Reservoir, the feasibilities of installing pipes in these roads should be checked through field surveys before implementation. Other locations where installation of pipes may have difficulties should also be checked prior to pipe installation.

Table A77.1.1 Expansion of Reservoirs and Pressure within Trunk Distribution Mains

Zone	Service Reservoir	Water Level (m)		Year	Volume (mg)	Node Elevation (m)			Node Pressure (m)			Demand (mgd)
		HWL	LWL			Max.	Ave.	Min.	Max.	Ave.	Min.	
West	Hub	+103.63	+99.36	2016	48.0	84.5	59.2	13.0	67.9	25.3	-6.1	111.06
				2021	48.0	88.5	58.6	8.5	63.8	22.0	-18.0	127.41
				2025	48.0	88.5	57.4	8.5	63.3	23.3	-19.4	132.98
	Orangi	+76.20	+71.32	2016	-	-	-	-	-	-	-	-
				2021	-	-	-	-	-	-	-	-
				2025	20.0	48.0	15.7	0.0	60.5	28.6	2.3	60.27
	West	+95.00	+90.00	2016	-	-	-	-	-	-	-	-
				2021	50.0	79.5	56.1	21.0	59.1	27.9	6.1	121.84
				2025	70.0	79.5	56.1	21.0	57.4	26.6	4.5	130.57
	W01	+125.00	+120.00	2016	-	-	-	-	-	-	-	-
				2021	2.5	105.0	72.5	58.0	41.4	34.9	18.2	2.08
				2025	7.5	105.0	75.1	58.0	49.6	33.4	5.2	18.07
	COD	+45.72	+40.23	2016	32.0	38.0	19.1	0.0	31.1	15.7	1.5	21.58
				2021	32.0	38.0	17.7	0.0	20.9	8.3	-2.3	31.47
				2025	32.0	-	-	-	-	-	-	-
	NEK Old	+79.25	+74.37	2016	76.5	76.0	55.8	22.0	43.2	13.2	-8.5	111.86
				2021	76.5	-	-	-	-	-	-	-
				2025	76.5	-	-	-	-	-	-	-
Central	NEK Old	+79.25	+74.37	2016	76.5	62.0	43.9	18.5	39.1	26.5	4.7	101.86
				2021	76.5	62.0	43.4	18.5	36.1	23.6	7.2	130.74
				2025	76.5	63.0	44.5	18.5	33.7	20.0	2.7	153.65
	COD	+45.72	+40.23	2016	32.0	35.5	12.5	1.0	31.9	22.8	8.4	157.77
				2021	32.0	35.5	12.2	1.0	28.8	21.8	7.2	172.15
				2025	32.0	35.5	12.2	1.0	28.5	22.0	7.5	184.02
	University	+67.06	+62.18	2016	30.0	45.0	35.6	30.5	31.2	22.1	7.9	75.95
				2021	30.0	45.0	35.9	30.5	30.5	20.2	7.5	83.95
				2025	30.0	45.0	35.8	30.5	30.0	18.4	4.9	90.18
	HSR	+45.72	+40.84	2016	20.0	26.5	16.7	10.5	21.6	17.5	14.7	26.04
				2021	20.0	26.5	16.7	10.5	19.6	14.7	10.3	29.75
				2025	20.0	26.5	16.7	10.5	18.1	12.0	6.3	32.88
	C01	+110.00	+105.00	2016	10.0	86.5	67.8	58.5	47.4	38.7	21.5	24.42
				2021	15.0	86.5	66.8	49.0	42.0	31.4	12.8	47.49
				2025	25.0	97.0	68.8	49.0	63.8	27.8	1.9	73.51
East	Gharo	+47.24	+45.72	2016	8.0	43.0	35.5	30.5	12.8	7.8	0.3	50.8
				2021	8.0	32.5	32.5	32.5	13.9	13.9	13.9	18.96
				2025	8.0	32.5	32.5	32.5	13.8	13.8	13.8	19.69
	Pipri	+76.20	+71.32	2016	35.0	57.0	29.8	11.0	21.4	-18.2	-39.4	121.73
				2021	70.0	57.0	30.5	11.0	43.1	25.4	6.8	200.48
				2025	80.0	57.0	30.8	11.0	40.9	21.4	2.6	235.44
	East	+95.00	+90.00	2016	-	-	-	-	-	-	-	-
				2021	12.0	59.0	59.0	59.0	20.2	20.2	20.2	1.21
				2025	24.0	59.0	59.0	59.0	14.3	14.3	14.3	1.45
	E01	+115.00	+110.00	2016	-	-	-	-	-	-	-	-
				2021	12.5	75.5	60.0	50.0	50.0	43.4	24.7	28.68
				2025	12.5	75.5	60.0	50.0	48.5	37.8	16.1	35.24
	E02	+125.00	+120.00	2016	-	-	-	-	-	-	-	-
				2021	-	-	-	-	-	-	-	-
				2025	2.5	77.0	77.0	77.0	22.9	22.9	22.9	6.54
	E03	+150.00	+145.00	2016	-	-	-	-	-	-	-	-
				2021	-	-	-	-	-	-	-	-
				2025	2.5	200.0	160.0	120.0	39.7	31.2	22.8	6.54

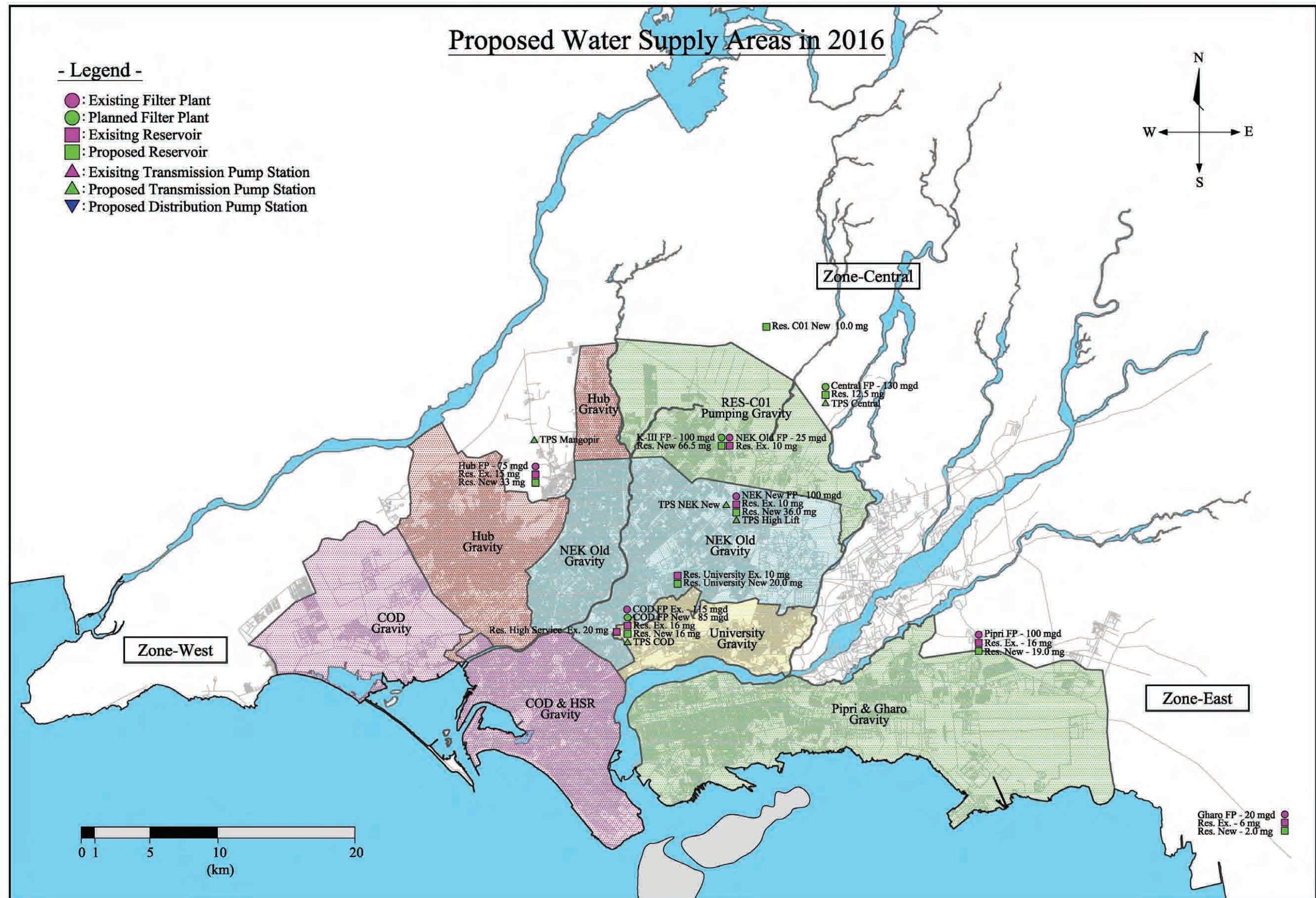


Figure A77.1.1 Proposed Water Supply Areas in 2016

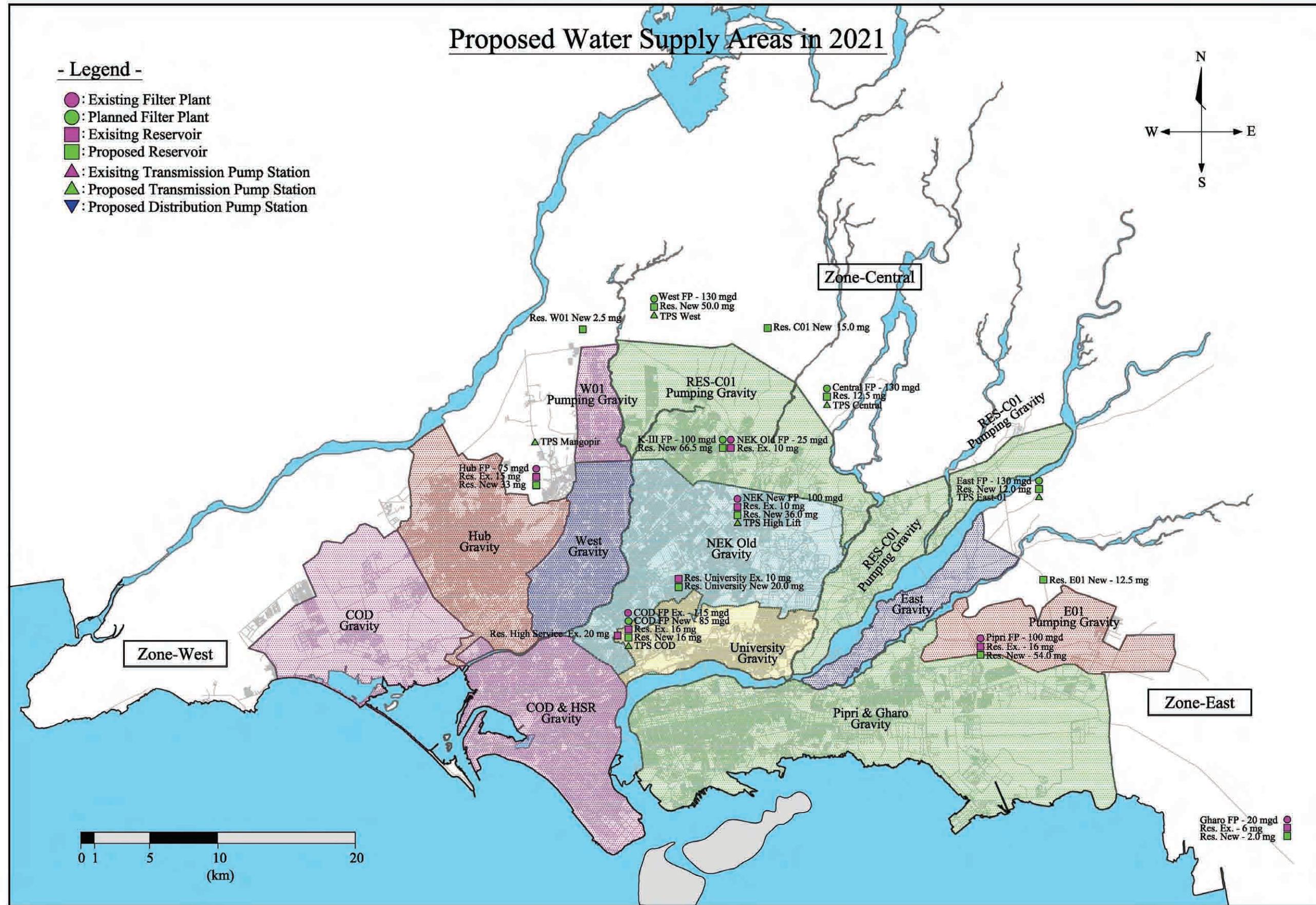


Figure A77.1.2 Proposed Water Supply Areas in 2021

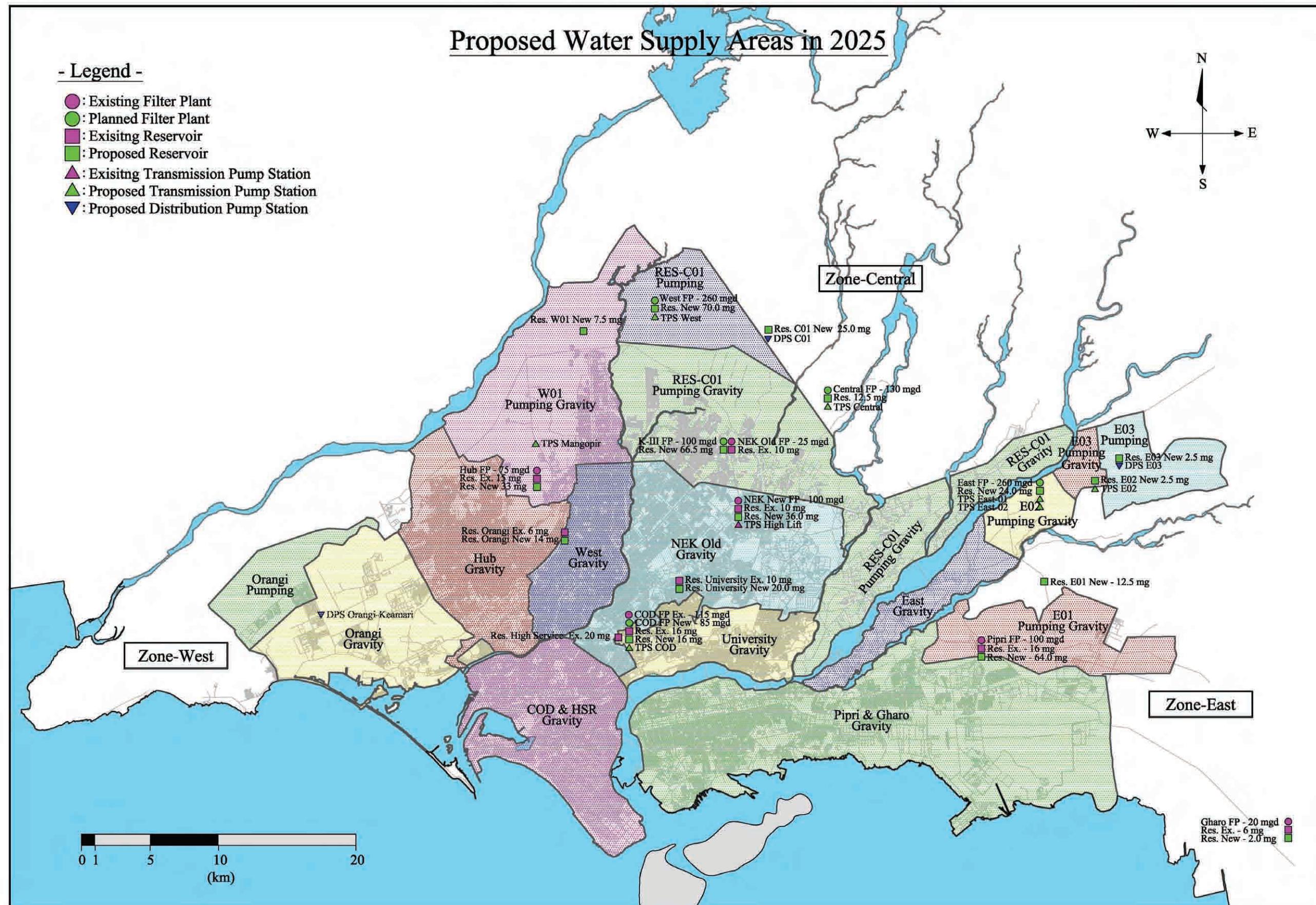


Figure A77.1.3 Proposed Water Supply Areas in 2025

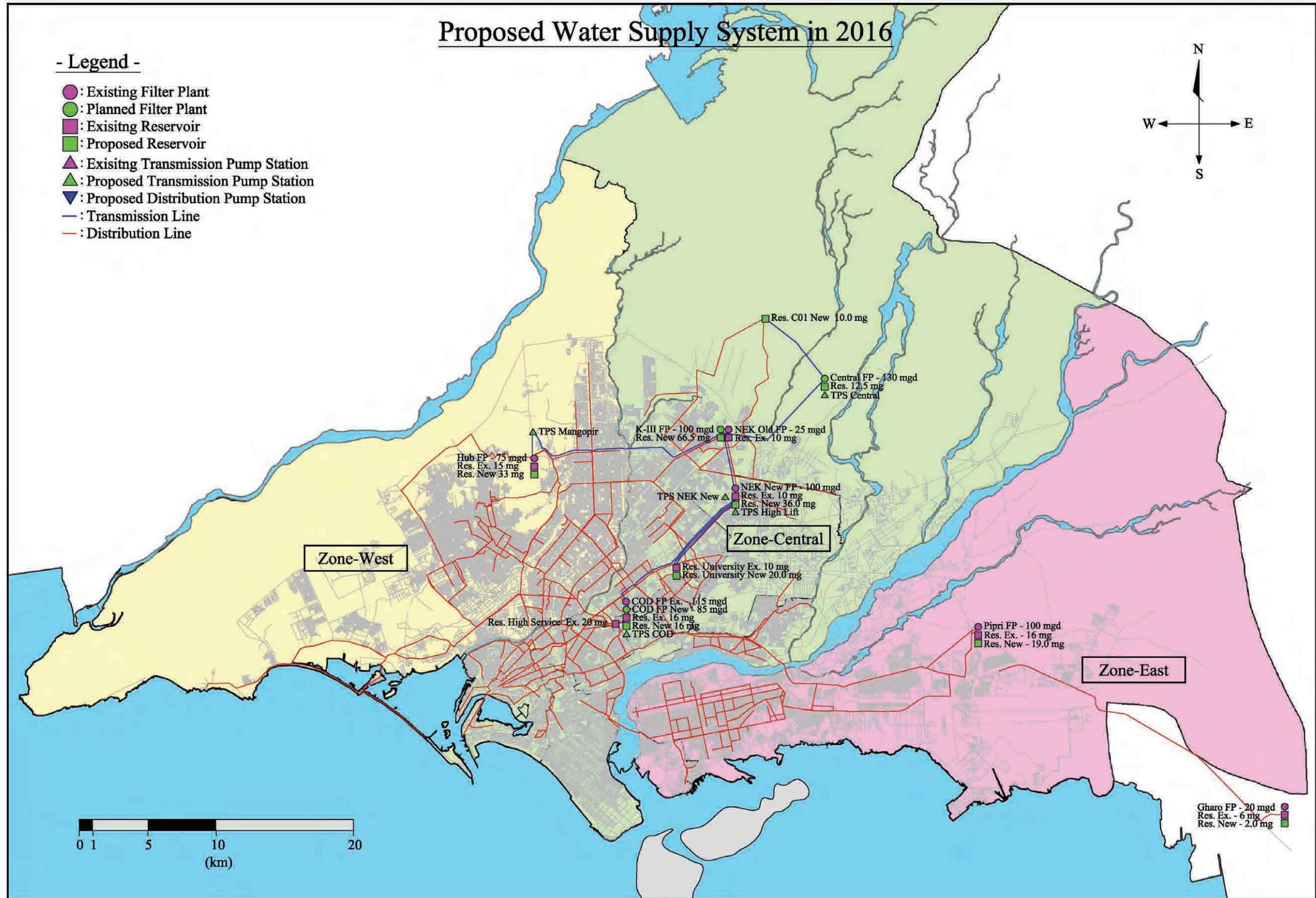


Figure A77.1.4 Proposed Water Supply System in 2016

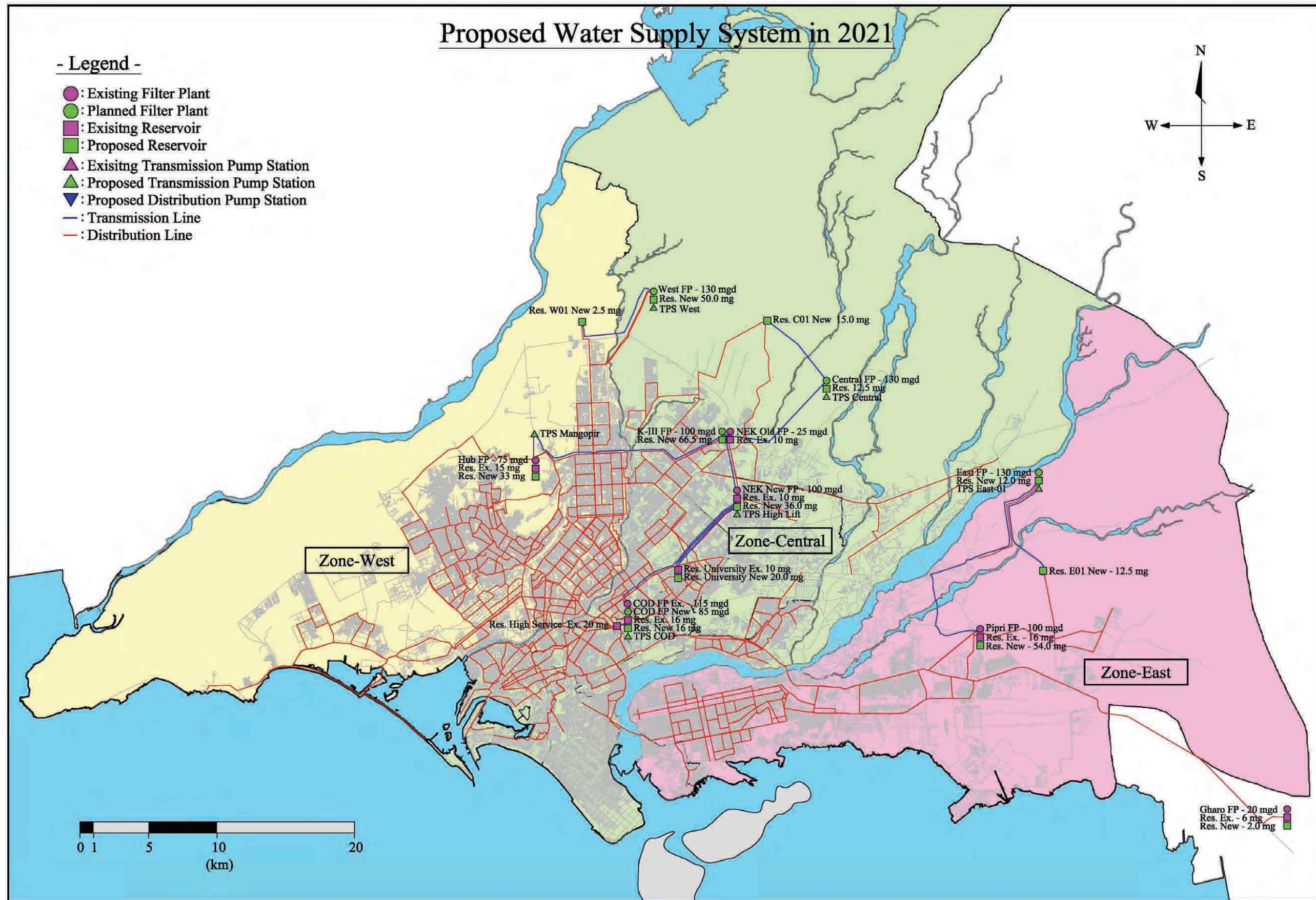


Figure A77.1.5 Proposed Water Supply System in 2021

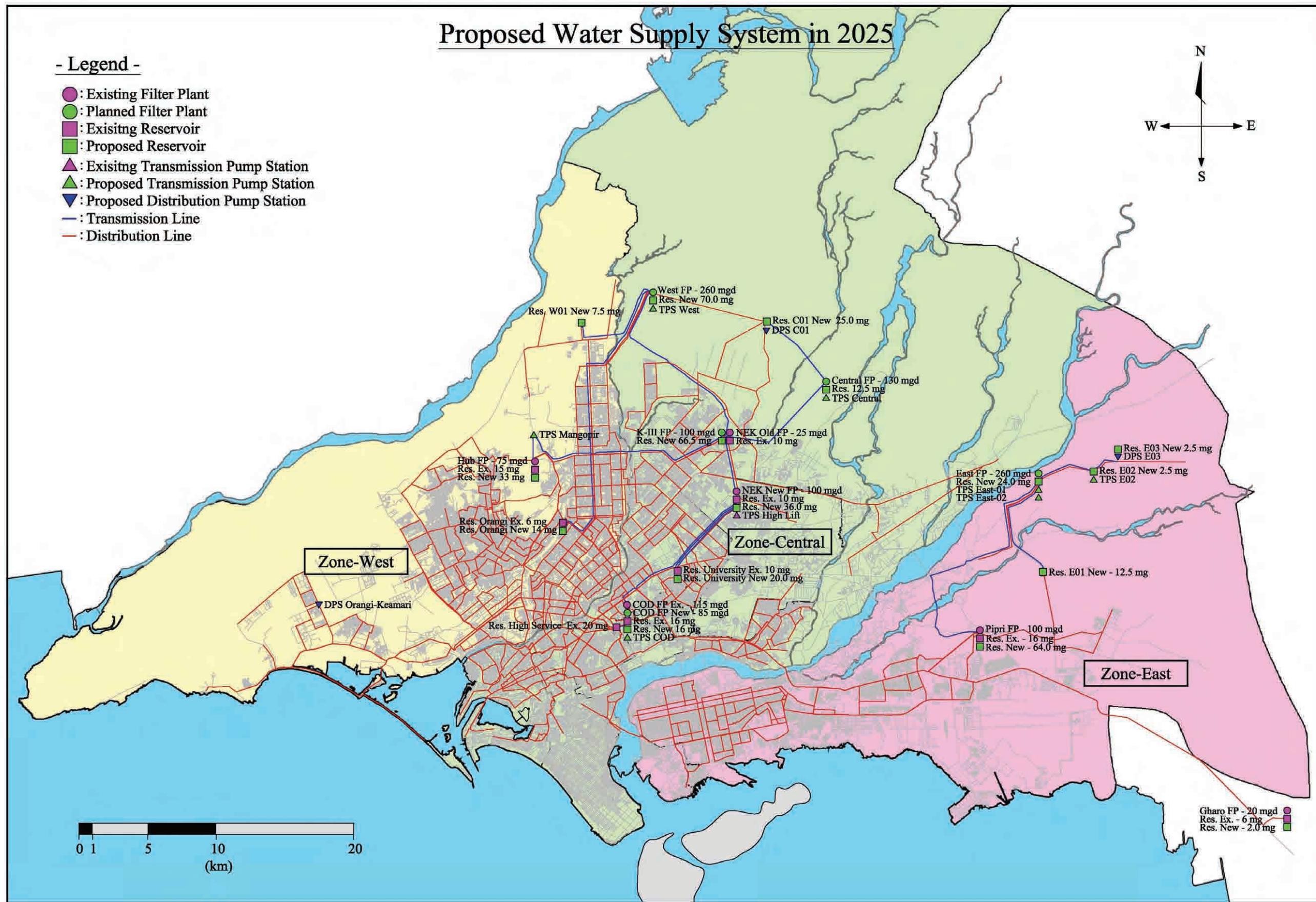


Figure A77.1.6 Proposed Water Supply System in 2025

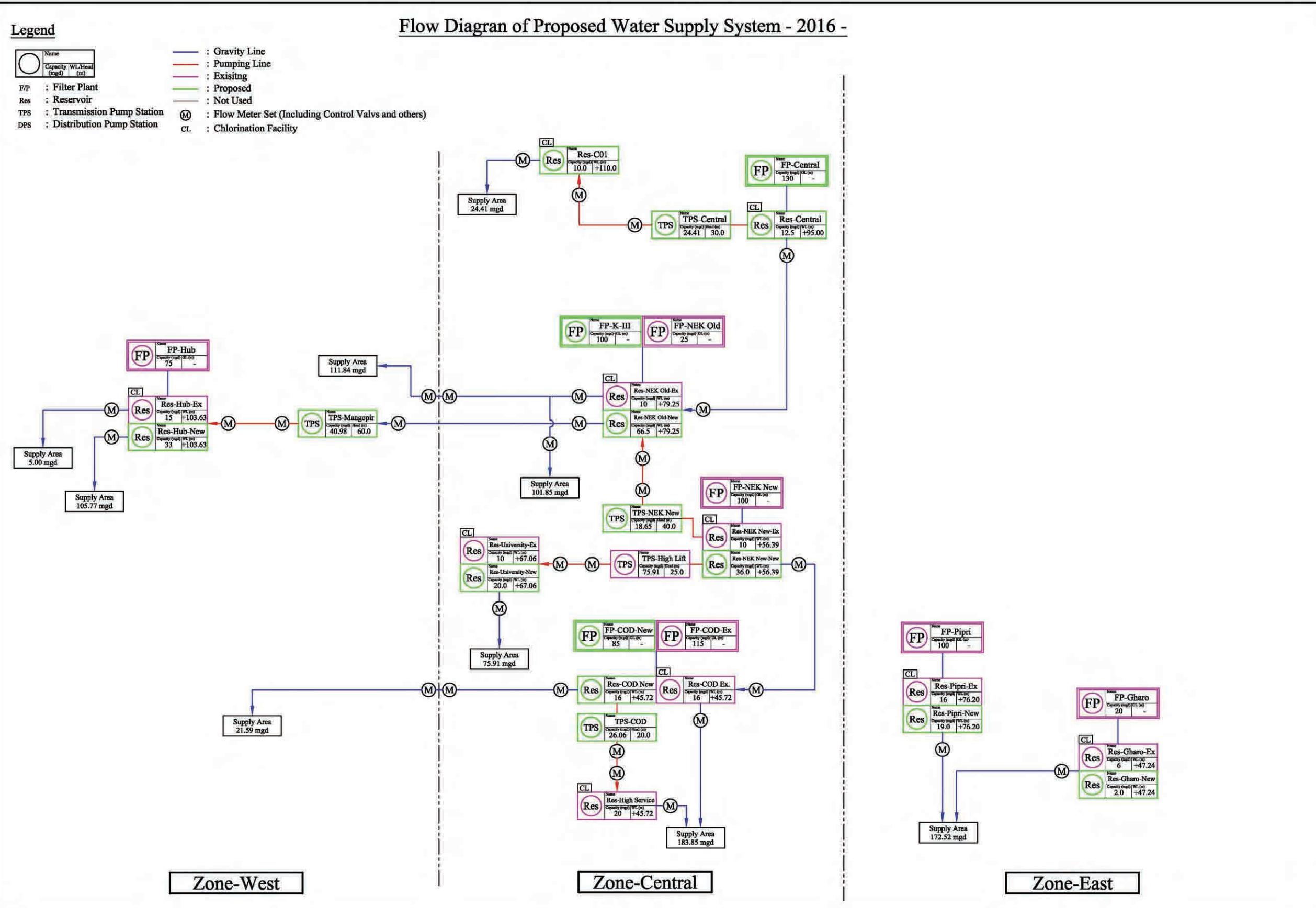


Figure A77.1.7 Flow Diagram of the Proposed System in 2016

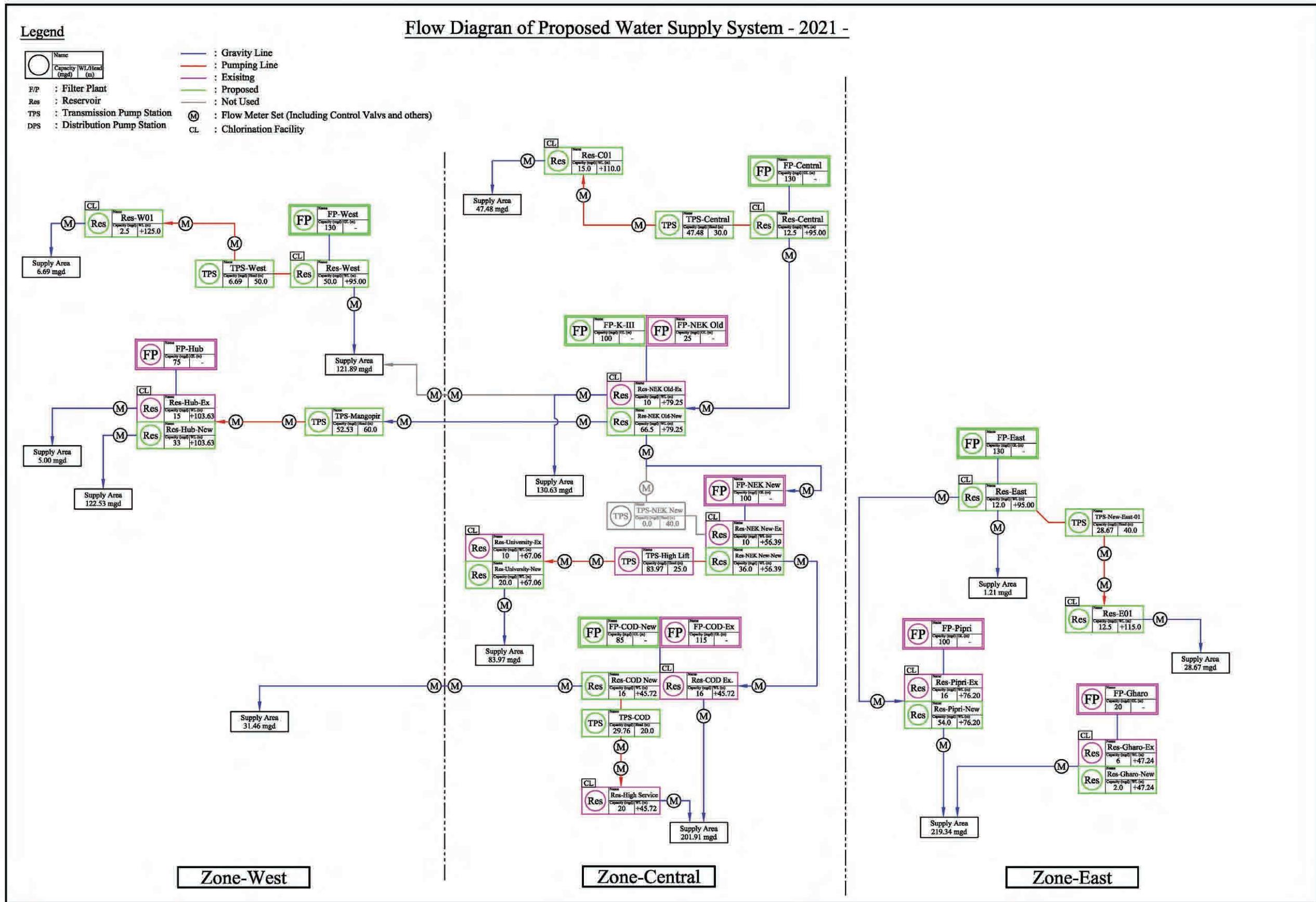


Figure A77.1.8 Flow Diagram of the Proposed System in 2021

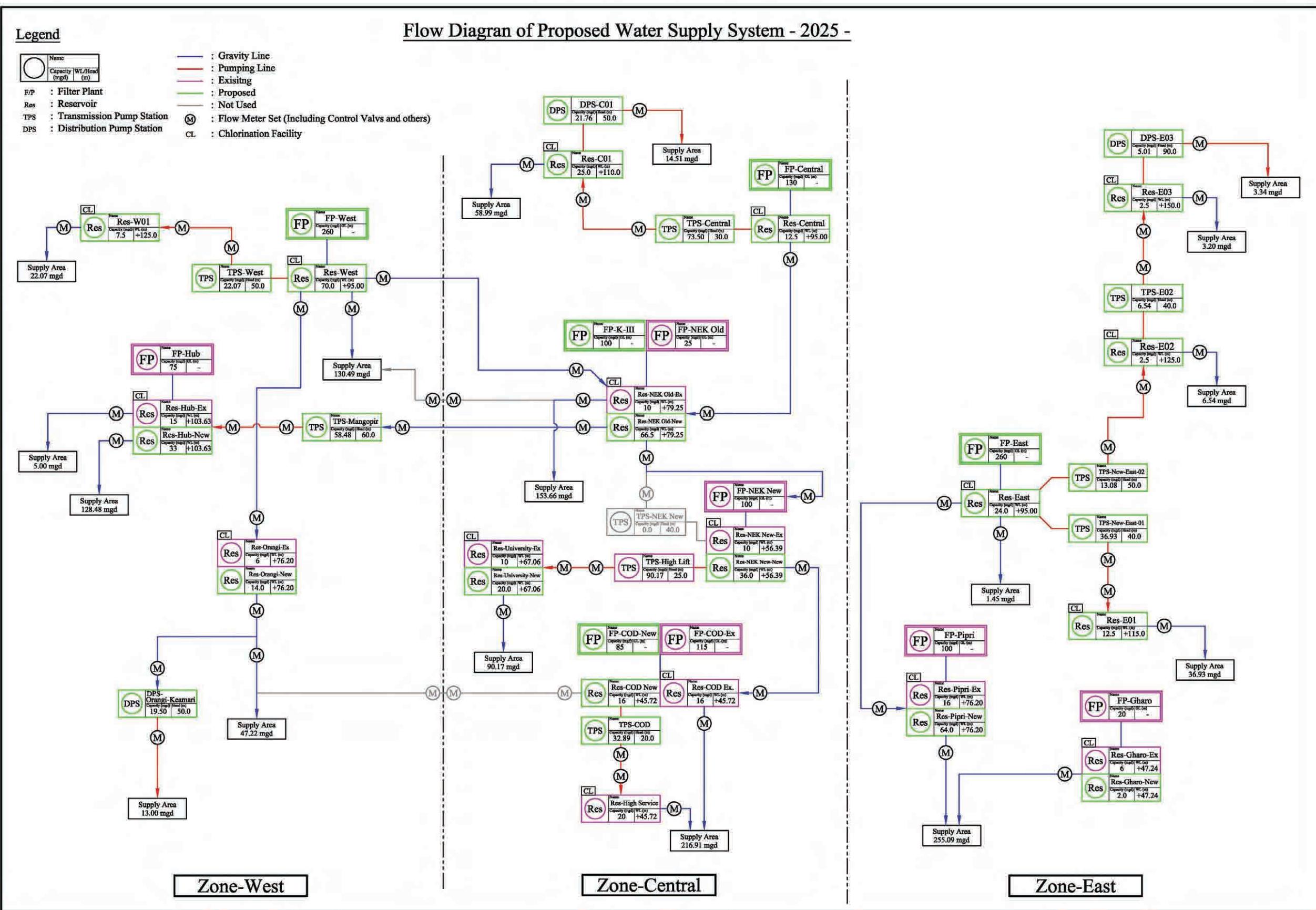


Figure A77.1.9 Flow Diagram of the Proposed System in 2025

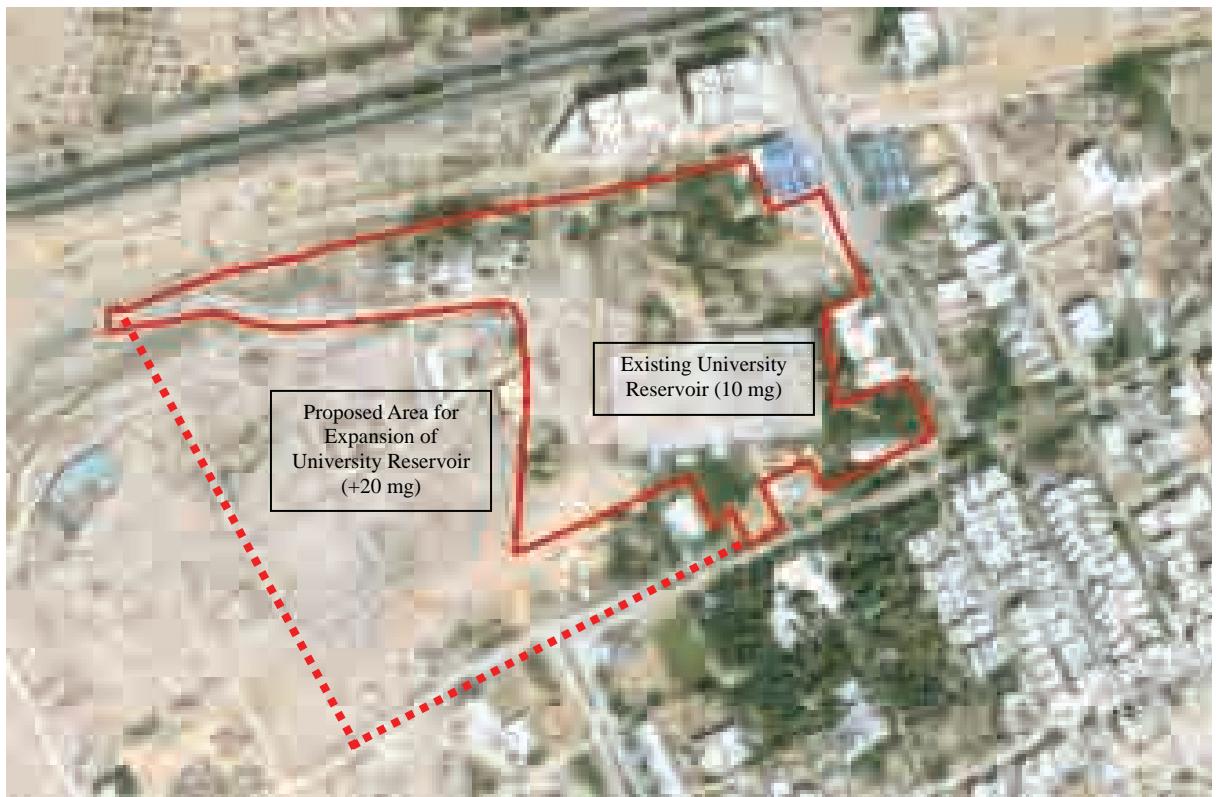


Figure A77.1.10 Proposed Area for the Expansion of University Reservoir

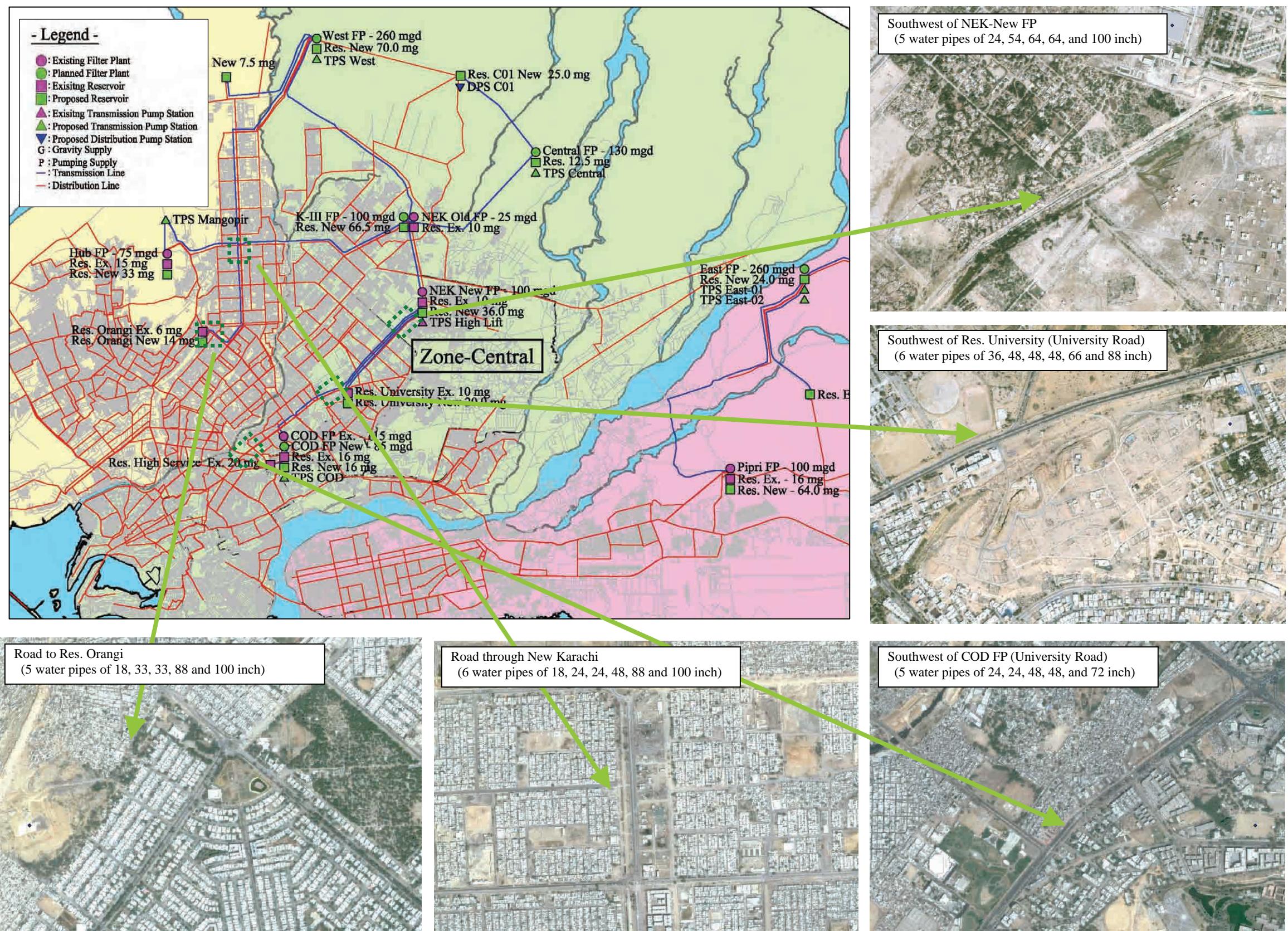


Figure A77.1.11 Roads with Five or More Large Water Pipes (more than 18 inch)