Water Quality from New Sources for the Greater Beirut Mount Lebanon Region

- *Greater Beirut Mount Lebanon (GBML) needs an additional 345 Million Cubic Meter (MCM) of water by 2035 to meet the demands of residents and to stop the depletion and deterioration of groundwater.*
- *The Bisri Dam and the Awali conveyor are essential to meet the additional water needs*
- *The water quality from Bisri Dam and Awali conveyor will be safe to drink.*

Sources of water at the Joun Lake are mix of water including water from Bisri

The water transferred to GBML will be from the Joun Regulation Structure (Joun Lake) (see Annex 1 and Table below). The water in the Joun Lake is a mix of various sources: (i) spring water coming from springs of Ain Zarqa and Jezzine; (ii) Awali River, and (iii) Lake Qaraoun. Depending on the year (whether it is a wet, average or dry year), the amount of water from the various sources is:

Awali River	Ain Zarqa Spring	Jezzine Springs	Lake Qaraoun
60- 100 MCM	14 – 41 MCM	5– 17 MCM	60 MCM

Wardanieh Water Treatment Plant will ensure safe water to the residents of GBML

GBML residents will receive water from the Joun Lake after it is treated at the Wardanieh Water Treatment Plant (WTP) (see Annex 2). The WTP will be located 30km south of Beirut and will connect to a transfer pipeline that takes the water to the Beirut distribution system. The WTP will be built in two phases: the first one under World Bank financing and supervision, and the second financed by the Islamic Development Bank. The Government conducted public consultations during Bisri dam project preparation. These consultations included discussions with the communities about water quality. The consultant provided all the information related to the water quality of the water sources, and how the modern conventional surface water treatment process in the WTP will treat Lake Joun water to be safe to drink. The WTP uses conventional surface water treatment (see description in Annex 3) to treated Joun Lake water to Lebanese (LIBNOR NL 161) or EU (98/83/EC) drinking standards[1], whichever are most stringent.

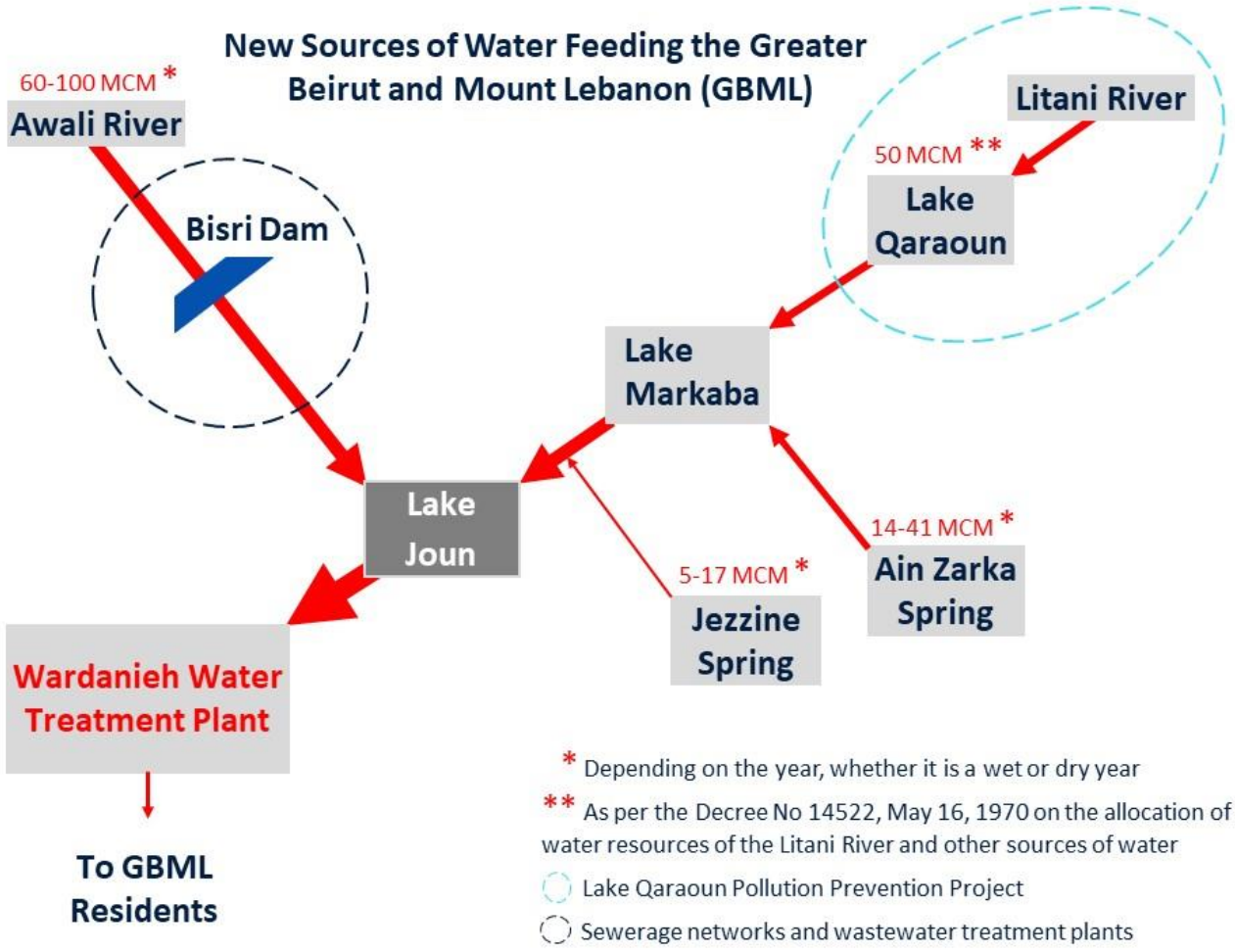
Transition from intermittent to continuous water supply so citizen have access to safe and affordable water.

To prevent water contamination in the distribution network and to reduce water losses, the World Bank funded the rehabilitation of network, and investments and technical assistance to the Beirut Mount Lebanon Water Establishment (BMLWE) to reduce the leakages and improve the quality of water supply to GBML.

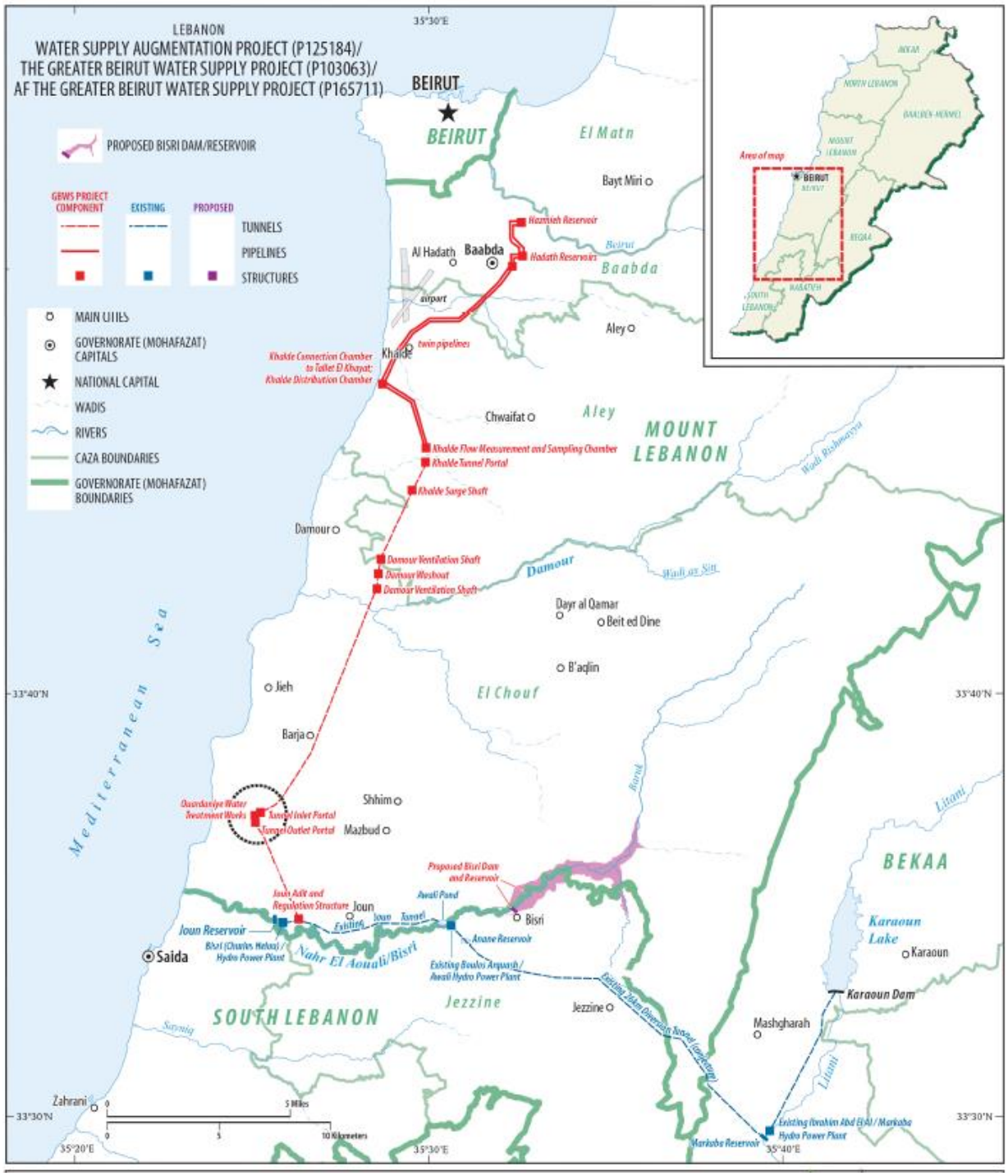
Based on global experience, continuous water supply is safer for consumers. The water remains safe in the distribution system when the pipes remain full. Under intermittent service, when pumping stops and the pressure in the pipes drops, groundwater from the surrounding areas can be sucked in, bringing with it wastewater from homes, and drains. As GBML transitions to continuous water supply, the water quality will improve.

[1] https://www.lenntech.com/applications/drinking/standards/eu-s-drinking-water-standards.htm

Annex 1 1- Schematic of New Sources of Water Feeding the Greater Beirut and Mount Lebanon Water Supply system from Joun Lake.



Annex 2- Map of the Greater Beirut Water Supply Project (Awali conveyor) and the Water Supply Augmentation Project (Bisri Dam)



Annex 3- Specification of the WTP.

The table below provides the WTP specifications:

	Phase 1 (World Bank funded-)	Phase 2 (Islamic Development Bank funed)
Connection to Raw water tunnel	2x DN1500	2x DN1800
Raw Water Flow metering	2x DN900 Magflow meters	2x DN900 Magflow meters
Cascade aeration	2 X 5 step by 17.7 m weirs	TBD
Coagulation	2 Mechanized	TBD
Flocculation	4 Mechanized	TBD
Clarification	4 Lamellar settlers	TBD
KMnO4 reactors (Mn removal)	2 basins	TBD
Filtration	12 rapid sand filters	TBD
Disinfection	9 chlorinators	9 chlorinators
Contact Chamber	2 basins (under filters)	TBD
Treated Water Flow metering	2 X DN1400 Magflow meters	No additional investment
Connection to Treated water tunnel	2 X DN2000	No additional investment
Sludge Thickening	4 Thickeners	4 Thickeners
Sludge Dewatering	2 Centrifuges	2 Centrifuges
Discharge/Overflow Channel	DN 1800	No additional investment
Overflow Retention structure	21 600 m3	No additional investment
Administration Building	3 floors	No additional investment
Chemical Building	Polymer, FeCl2, Caustic Soda, Milk of lime, other.	Polymer, FeCl2, Caustic Soda, Milk of lime & other.
Electrical Buildings	2 adjacent	No additional investment
Chlorination Building	Accommodate 18 chlorinators	No additional investment
Chlorine Cylinder Storage Building	38 one ton cylinders	38 one ton cylinders
Process Production Capacity	3.0 m3/s	6.0 m3/s
Hydraulic Production Capacity	4.5 m3/s	9.0 m3/s