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# POTABLE WATER NETWORK DESIGN CRITERIA

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DUBAI DESIGN MANUAL



JANUARY 1, 2024

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## Storage Reservoirs:

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### Bulk Storage for DEWA system:

DEWA policy for System's potable bulk storage is aiming to maintain a potable water bulk storage that is equivalent to **two days of Water System's peak demand**.

### Customers storage:

The local storage for individual premises should be sufficient to cover **at least 24 hours of average demand**.

## Transmission Pipelines:

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- DEWA's water transmission system consists of pipelines with diameters ranging from **600 mm to 1200 mm**.

The approved pipe materials currently used by DEWA for the water transmission network are:

- **Glass fibre Reinforced Epoxy (GRE) PN10** (subject to DEWA's approval)
- All fittings (including; bends, tees, reducers and flanges) used with GRE water pipelines shall be of **GRE material** complying with DEWA specifications.

Development of water transmission pipelines requires a lead-time of 3-4 years before completion (depending on the length and complexity of proposed network). Therefore, developers and their consultants should submit projects Master Plan and design details, including the internal network layout and design well ahead of time, for DEWA's review and approval.

## Distribution Systems:

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- DEWA's water distribution system consists of pipelines with diameters ranging from **150 mm to 450 mm**.

New development projects submission reviewed and classified as Distribution Project will be forwarded to **Projects Water Distribution Section under PE (W) Department**, and the developer/consultant will be notified accordingly.

- Pipe material currently adopted is **GRE**, subject to DEWA's approval.

## System Monitoring:

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Depending on the nature and size of the project's network, **developers will be advised on the requirements for monitoring devices at main connections**, as per DEWA's specifications.

### Bulk Flow Metering

Bulk flow meters are essential for measurement and flow monitoring along the transmission and distribution systems. **Bulk flow meters shall be proposed at selected locations, as per DEWA's specifications.**

### Pressure Transmitters

Pressure gauges and transmitters may be required, as per DEWA's specifications, to monitor pressures at locations selected by DEWA.

### Water Quality Monitoring

Analyzer Stations consisting of transmitters and sensor assemblies for measuring pH, residual chlorine, conductivity and temperature shall be installed at specified locations as per DEWA's specifications.

### Water SCADA Requirements

DEWA's requirements for integrating newly developed network for new projects into DEWA's SCADA system should be discussed and agreed upon by DEWA's Projects Department, and Operations & Maintenance Department.

## Service Connections:

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- As per DEWA's policy, separate house connection pipes for each premise should be metered.
- In case of buildings, a main meter is installed on the main inlet pipe before the underground storage tank and sub-meters are installed on the roof of the building on the discharge side of the elevated storage tanks.
- Developers should provide house connections, proposed layouts and pipe materials proposed for DEWA's approval.

## Water Demand:

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### General

Project demand and its phasing represent the most critical elements for the whole water transmission network planning process, **developers are requested to provide the following information, for DEWA's review ahead of time in order to ensure timely provision of required water services:**

1. Projected Demand Figures (MIGD) along with yearly phasing up to ultimate build-up for each phase of the project as applicable.
2. Projected Yearly occupancy percentage rates until full capacity.
3. Detailed Land Use information and coloured land used layout

DEWA Reference Water Demand Categories: Developers are advised to map their project demand to the following DEWA established demand categories types as applicable.

- ❖ Residential
  - ❖ Commercial
  - ❖ Government & public premises
  - ❖ Industrial
  - ❖ Labour camps
  - ❖ District cooling (For reference purposes only)
  - ❖ Irrigation, (For reference purposes only)
  - ❖ Water features, if any.
4. Digital calculations worksheets based on information used to estimate the total water demands, such as population, land use and district cooling demands, etc.
  5. DEWA does not supply potable water for non-domestic purposes as per Executive Order No 27 for year 2008 including:
    - ❖ Construction purposes (particularly at projects' areas with No Existing network).
    - ❖ Water features without human contact (lagoons, fountains, etc. for landscaping and beautification purposes).
    - ❖ Irrigation / landscaping purposes.
    - ❖ District cooling purposes.
    - ❖ Firefighting (Except for initial filling of fire water tanks)
  6. DEWA encourages all developers to adopt innovative and sustainable solutions in all aspects of their development projects design.

### **Peak Factor**

A peak factor value in the range of **1.25 - 1.30** should be used while designing the water network in order to accommodate the daily variation in demand.

## **Consumption Rates**

<b>Demand Use Category</b>	<b>Demand rates Range (L/Cap. Day)</b>
Based metal chemical zone	100
Day Clinic (per medical practitioner)	300 - 450
Clubhouse/recreation	100
Commercial buildings	60-100
Entertainment & leisure	60
Events	10-50
Guardhouse	60-75
Headquarters	60-80
Hotels (per employee)	60-80
Hotels (per guest)	200-300
Laboratory	60-80
Labour accommodation / Workers	80-150
Local plaza	60-82
Logistic, academic & business zone	60-75
Manufacturing	60-80
Medical (per bed)	350-450
Minerals	80
Mixed used commercial	60-80
Mixed used residential	250-350
Mosques	10 - 60
Nursery / Child Care Centre	50-70
Offices	45-60
Public amenities	10 - 50
Residential buildings (flat)	225-300
Restaurant (per meal)	10-15 l/d per meal
Retail	60-80
Schools	40-60
Shops	45-60
Theatre	10-50
Town Center	60-80
University	45-60
Villas	250-350
Visitors	14-40
Workshops/ Machinery/Warehouse	60-80
Source: Standard Practices & Submitted Master Plans for New Development Projects.	

# Network Design Criteria and Hydraulic Modelling:

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The following criteria should be considered by developers during their network design:

- Maximum Pipeline Velocity is:
  - ❖ **1.0 m/s for Distribution** lines
  - ❖ **1.5 m/s for Transmission** lines.
- Pressure:
  - ❖ Transmission lines
    - The **minimum pressure at the connection points of DEWA transmission network** is around **1.5 Bar** and this should be initially assumed (subject to DEWA confirmation) for the design of the distribution network.
    - **Maximum** pressure is around **4 Bar** at lowest point within the Transmission network.
  - ❖ developer distribution network:
    - Minimum expected pressure is around **1.0 Bar within the developer distribution network**.
- Tie in connection:
  - ❖ **A minimum of two connections to the water transmission system should be considered for better network management.** Pressures assumed at each connection points should satisfy the design criteria above for the adopted network layout. However, these pressures will be reviewed by DEWA and changes, if necessary, will be recommended as appropriate, including additional pumping or pressure reduction controls.
- Depending on the size of the development project, zoning should be considered in the design, as applicable subject to DEWA's approval.
- Hydraulic Model demands should correspond to the Demand figures submitted in the demand calculation sheets.
- The developer/ consultant should submit peak conditions Network Models for each main phase of the development as applicable.
- **Models should be created using DEWA's adopted software (InfoWorks) or any EPANET compatible software.**
- Network Models should be geo-referenced to the actual physical Geographic location's based on Dubai standard DM coordinate system known as "DLTM".
- If the new development project expands through major phases, it is required to submit separate models representing each phase, as well as one overall network model for the whole project as appropriate.

- **The network design layout should consider looping of the system**, wherever possible, **for better water circulation and increased system reliability**.
- DEWA will review the models in contrast with its requirements and planning criteria, as required, and make recommendations for changes accordingly.

Design Criteria	Transmission	Distribution
Peak Factor	1.25-1.3	
Pipeline Diameters (mm)	(1200mm, 900mm, 600mm, 450mm, 300mm, 225mm and 150mm)	
Pipelines and Fittings Material	Glass Reinforced Epoxy (GRE) PN10 / PN16 (subject to DEWA's approval)	
Maximum Velocity (m/s)	1.5	1.0
Minimum Pressure in water network (Bar)	1.5	1.0
Working Pressure in water network (Bar)	1.5 – 4.0	1.0 – 1.5
Pressure at Connection Point (Bar) (subject to DEWA confirmation)	1.5	
Minimum Number Connection Points (subject to DEWA confirmation)	2	
Hydraulic Model	Present peak condition	
	Geo-referenced to "DLTM" (Dubai Local Transverse Mercator)	
	Looping of the system, wherever possible	
	Zoning of the system, depending on the coverage area and pressure requirements	
	Info Works or any EPANET compatible software.	

# Guidelines For Domestic Water Meter Installation In Villas & Sheds On Wall:

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**For individual consumer premises such as villas, sheds, etc., Domestic water meters shall be installed vertically on the compound wall.**

## Domestic Water Meter Installation Standard

1. Meter location:

- ❖ Water meter shall be located on the outer side of compound wall of the premises facing towards the road where regular access is permitted.
- ❖ Water meter location and its access should be free from any obstruction such as signboards, barriers, plants, garden etc., and minimum 2mtr. clearance away from any electrical services.
- ❖ Water meter should not be installed in the basement of building, pump room or in underground meter chambers.
- ❖ No cabinet or protection cover of any type shall be installed that may obstruct communication signals from wireless meters.

**2. Supply line, 32mm dia. LDPE pipe shall be routed through a 75mm dia. protection tube from ground level to the bottom of the Water meter installed on the periphery of the wall.**

3. The meter shall be fixed at a standard height of 1200mm for easy reading and maintenance of the meter and fittings. The minimum clearance between the back plate of meter and the wall plane shall be 100mm.
4. Pipes, valves and all other fittings used for the meter connection shall be high quality, heavy duty, non-toxic and non-corrosive material.
5. Pipe size for ½" meter installation shall be ½" to 1" maximum and for 1" meter installation shall be 1" to 2" maximum.
6. ½" meter can deliver up to 5,000 gallons of water in 24 hours and 1" meter can deliver up to 10,000 gallons in 24 hours, approximately.
7. Consumer must have a water storage tank equivalent to 24 hours' consumption for residential premises and storage equivalent to 48 hours' consumption for labor accommodation and other high consumption premise.



8. The storage tank should be located on the ground or underground, without any elevation.
9. The consumer pipe towards the storage tank shall be routed to the other side of the wall and connected to the meter through the wall.
10. The supply line from the meter shall be routed directly to the Ground or an Underground tank without any Bib taps or bypass connection.
11. Isolation valves shall be installed upstream and downstream the meter to stop water flow from both directions and a stopcock shall be installed prior to the meter for locking/disconnection of supply to the meter.
12. A threaded joint/union shall be provided after the meter to make length adjustments for meter connection in accordance with the meter length.
13. Both valves shall be fully open while the meter is in service and no control of flow shall be made by regulating the inlet and outlet valve.
14. The pipework at the meter position should be securely fixed to support the weight of the water meter and to resist any torsion during the installation and removal of the water meter.
15. The Meter shall be protected from the risk of damage from shock or vibration induced by the surroundings.
16. The water meter and its associated fittings/pipes shall not be part of electrical earthing.
17. Detailed shop drawing shall be submitted for DEWA approval before commencement of work.
18. No water pump shall be installed upstream or downstream the meter.
19. Maximum pressure at the meter inlet shall not exceed 2bar, PRVs shall be installed, at least 1mtr before the meter, to achieve the required pressure.
20. Meter installation guidelines shall strictly be followed while installing the meter.
21. Meter shall be installed in accordance with the arrows shown on the body of the meter and register shall be arranged in the most convenient position for reading.
22. The meter should not be allowed to fall or receive impact damage as this may affect the operation and accuracy of the meter.
23. All connections shall be checked thoroughly for leak after installation of the meter.

24. An Engraved Label with 'Water Meter' and 'Plot Number' shall be affixed to the wall adjacent to the meter.
25. DEWA is responsible for the supply and installation of water meters for new connections. Meters are installed, either by DEWA staff or Contractors acting on behalf of DEWA. Customers and property developers are responsible for the supply and installation of all ancillary fittings and pipework beyond the meter in accordance with relevant DEWA specifications and standard drawings.
26. As-built drawings showing the pipelines to the meter and after meter to the customer pipe connection to their storage tank shall be prepared and submitted to DEWA.