

PLANT CAPACITY

Pre-treatment System (Silica reduction)

S. No	Description	Unit	Value
1.	Service flow rate	m ³ / hr	89.0

Ultra-Filtration system

S. No	Description	Unit	Value
1.	Feed	m ³ /Day	2026.1
2.	Filtrate Flow rate	m ³ /Day	1826.1
3.	Recovery	%	90.1

High TDS Reverse Osmosis System

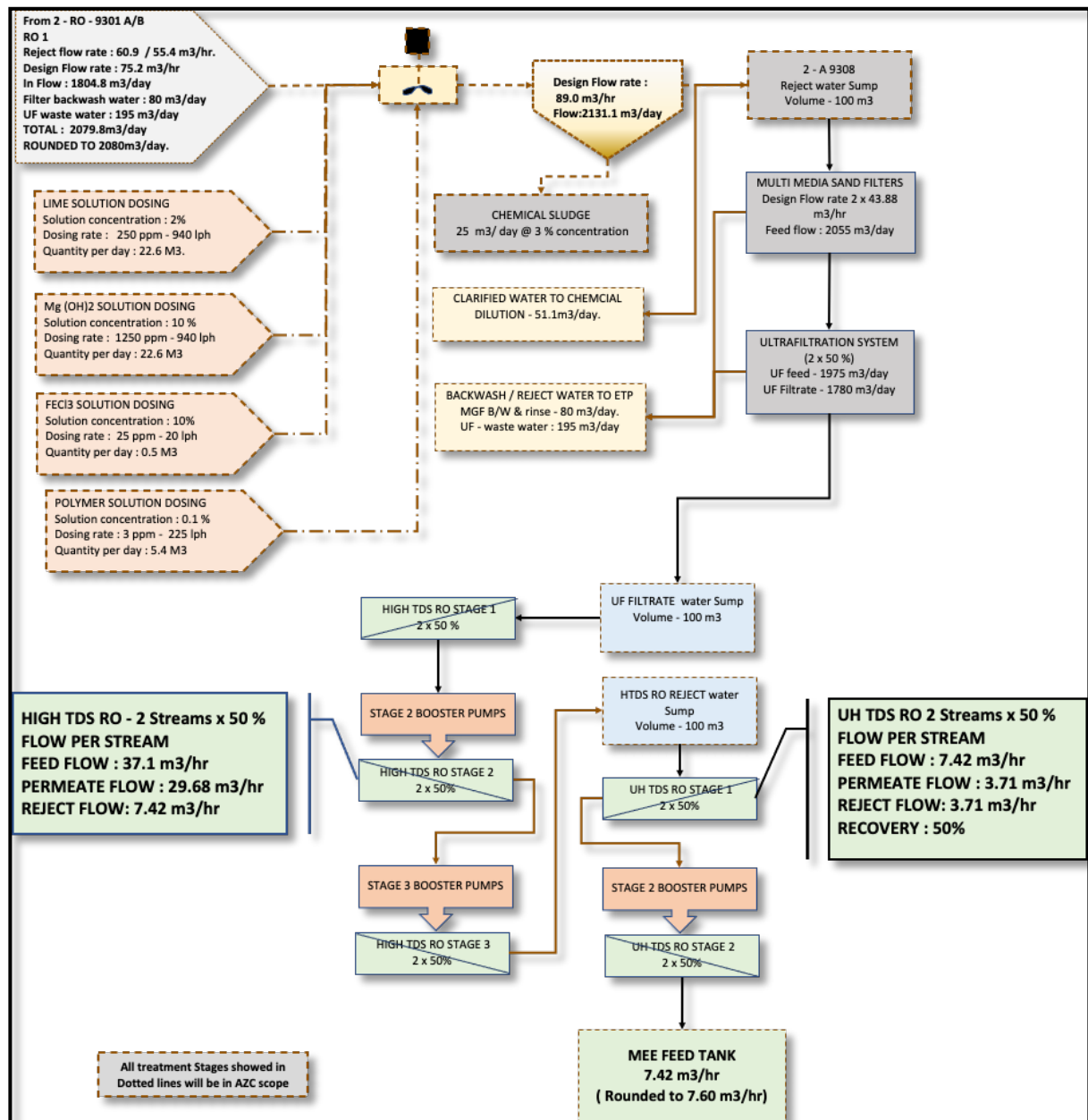
S. No	Description	Unit	Value
1.	Feed flow rate	m ³ /Day	1826.1
2.	Permeate Flow rate	m ³ /Day	1460.9
3.	Reject	m ³ /Day	365.2
4.	Recovery	%	80

Ultra-High TDS Reverse Osmosis System

S. No	Description	Unit	Value
1.	Feed flow rate	m ³ /Day	365.2
2.	Permeate Flow rate	m ³ /Day	182.6
3.	Reject	m ³ /Day	182.6
4.	Recovery	%	50

CONVENTIONAL PRE-TREATMENT STEP, AN AMX RO + NEW AMX UHPRO + AN EVAPORATOR [CONCENTRATOR]

BLOCK DIAGRAM



Note: UHTDS RO feed has been taken as 7.6 m3/hr for design for balancing the RO feed flow.

FEED WATER CHARACTERISTICS

FEED WATER TO PRE-TREATMENT SECTION

S NO	PARAMETER	UNIT	Values
1.	pH	-	7.5 to 9.5
2.	Temperature	°C	7 to 35
3.	Calcium	ppm	92.3
4.	Magnesium	ppm	21

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5.	Potassium	ppm	4.3
6.	Ammonium	ppm	99.6
7.	Barium	ppm	Max 0.001
8.	Strontium	ppm	Max 0.001
9.	Iron	ppm	Max 0.001
10.	Manganese	ppm	Max 0.001
11.	Aluminum	ppm	Max 0.001
12.	Zinc	ppm	Max 0.001
13.	Cu	ppm	Max 0.001
14.	Ni	ppm	Max 0.001
15.	Cr	ppm	Max 0.001
16.	Hg	ppm	Max 0.001
17.	Pb	ppm	Max 0.001
18.	As	ppm	Max 0.001
19.	Cd	ppm	Max 0.001
20.	Se	ppm	Max 0.001
21.	Phenol	ppm	Max 0.001
22.	Formaldehyde	ppm	1.5
23.	Carbonates	ppm	0.1
24.	Bicarbonates	ppm	1.6
25.	Sulfate	ppm	2022
26.	Chlorides	ppm	5254
27.	Fluorides	ppm	BDL
28.	Nitrites (NO ₂)	ppm	4.1
29.	Nitrates (NO ₃)	ppm	291
30.	Total PO ₄	ppm	291
31.	Silica	ppm	262
32.	Total Dissolved Solids	mg/l	12,336
33.	Total Hardness (as CaCO ₃)	mg/l	500
34.	BOD (3 Days @27°C)	mg/l	38
35.	COD	mg/l	145
36.	Suspended Solids	mg/l	130 to 250
37.	Total Silica (as SiO ₂)	mg/l	262
38.	Oil	mg/l	<1
39.	Urea	ppm	40
40.	Any Solvent	mg/l	BDL
41.	Any Oxidizing Agent	mg/l	BDL

NOTE:

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AFTER PRE-TREATMENT THE FOLLOWING PARAMETERS WILL HAVE TO BE WITHIN THE FOLLOWING LIMITS.

The pre-treatment recommended is for reducing these parameters. Some fine tuning of the chemicals added maybe needed during project execution.

S NO	PARAMETER	UNIT	Values
1.	pH	-	7.5 to 9.0
2.	Temperature	°C	7 to 35
3.	Total Hardness (as CaCO ₃)	mg/l	200
4.	BOD (3 Days @27°C)	mg/l	< 30
5.	COD	mg/l	< 100
6.	Suspended Solids	mg/l	< 20
7.	Total Silica (as SiO ₂)	mg/l	< 20
8.	Total PO ₄	ppm	<5

TREATED WATER QUALITY

Reverse Osmosis Permeate,

S. NO	PARAMETERS	UNIT	H TDS RO	UH TDS RO
1.	pH	-	5.5 - 6.5	5.5 - 6.5
2.	Calcium	ppm as CaCO ₃	< 30	< 30
3.	Magnesium	ppm as CaCO ₃	< 20	< 20
4.	Sodium	ppm as CaCO ₃	< 230	< 1000
5.	Chlorides	ppm as CaCO ₃	< 50	< 1000
6.	Sulfate	ppm as CaCO ₃	< 160	< 150
7.	Phosphate	ppm as CaCO ₃	Nil	< 1
8.	Nitrate	ppm as CaCO ₃	< 39.4	< 450
9.	Total Hardness	ppm as CaCO ₃	< 50	< 50
10.	Silica	ppm as CaCO ₃	< 37	< 10
11.	COD*	ppm	< 5	< 100
12.	Total Suspended Solids	ppm	< 1	< 2

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13.	Make	Milton Roy
RO HIGH PRESSURE PUMPS		
1.	Quantity	3 Nos (2W One per stream + 1S)
2.	Liquid pumped	UF Filtered water
3.	Specific Gravity	1
4.	Solid handling capacity	Nil
5.	Temperature	25 °C
6.	Design temperature	55 °C
7.	Pump speed (rpm)	2900
8.	Type of pump	Horizontal Multistage
9.	Impeller	Closed
10.	Casing mounting	Inline
11.	Shaft	Monoblock
12.	Seal	Mechanical Seal
13.	Flange standard	ANSI B16.5 / 300#
14.	Discharge Capacity	38.0 m ³ /h
15.	Differential head	32.0 Bar
16.	MOC	Duplex SS
17.	Accessories	Companion flanges with nuts, bolts, gasket and common base plant, foundation bolts, coupling, coupling guard with bolts, canopy for motor.
18.	Motor starter	Star delta – linked to VFD
INTERSTAGE BOOSTER PUMP - STAGE 2		
1.	Quantity	3 Nos (2W One per stream + 1S)
2.	Liquid pumped	RO reject
3.	Specific Gravity	1
4.	Solid handling capacity	Nil
5.	Temperature	25 °C
6.	Design temperature	55 °C
7.	Type of pump	Horizontal Multistage
8.	Impeller	Closed
9.	Casing mounting	Inline
10.	Shaft	Monoblock
11.	Seal	Mechanical Seal
12.	Flange standard	ANSI B 16.5 / 300#
13.	Discharge Capacity	22.0 m ³ /h

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14.	Boost pressure	12 Bar
15.	Suction pressure	32.2 Bar
16.	MOC	Duplex SS
17.	Accessories	Companion flanges with nuts, bolts, gasket and common base plant, foundation bolts, coupling, coupling guard with bolts, canopy for motor.
18.	Motor starter	Star delta – linked to VFD
INTERSTAGE BOOSTER PUMP - STAGE 3		
1.	Quantity	3 Nos (2W One per stream + 1S)
2.	Liquid pumped	RO reject
3.	Specific Gravity	1
4.	Solid handling capacity	Nil
5.	Temperature	25 °C
6.	Design temperature	55 °C
7.	Type of pump	Horizontal Multistage
8.	Impeller	Closed
9.	Casing mounting	Inline
10.	Shaft	Monoblock
11.	Seal	Mechanical Seal
12.	Flange standard	ANSI B 16.5 / 600#
13.	Discharge Capacity	13.5 m ³ /h
14.	Boost pressure	18.0 Bar
15.	Suction pressure	43.6 Bar
16.	MOC	Duplex SS
17.	Accessories	Companion flanges with nuts, bolts, gasket and common base plant, foundation bolts, coupling, coupling guard with bolts, canopy for motor.
18.	Motor starter	Star delta – linked to VFD
REVERSE OSMOSIS BLOCK		
1.	No of streams	Two Nos (2 x 50%)
2.	Liquid Handled	UF filtered water
3.	Feed flow rate / stream	38.2 m ³ /h
4.	RO feed water temperature	25 °C
5.	Max recovery	80 %
6.	MOC of RO membrane	Polyamide thin film composite

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		foundation bolts, coupling, coupling guard with bolts, canopy for motor.
36.	Motor starter	Star delta – linked to VFD
INTERSTAGE BOOSTER PUMP - STAGE 2		
1.	Quantity	3 Nos (2W One per stream + 1S)
2.	Liquid pumped	High TDS RO reject
3.	Specific Gravity	1
4.	Solid handling capacity	Nil
5.	Temperature	25 °C
6.	Design temperature	55 °C
7.	Type of pump	Horizontal Multistage
8.	Impeller	Closed
9.	Casing mounting	Inline
10.	Shaft	Monoblock
11.	Seal	Mechanical Seal
12.	Flange standard	ANSI B 16.5 / 600#
13.	Capacity	5.55 m ³ /h
14.	Boost pressure	24.8 Bar
15.	Suction pressure	68.6 Bar
16.	MOC	Duplex SS
17.	Accessories	Companion flanges with nuts, bolts, gasket and common base plant, foundation bolts, coupling, coupling guard with bolts, canopy for motor.
18.	Motor starter	Star delta – linked to VFD
REVERSE OSMOSIS BLOCK		
1.	No of streams	Two Nos (2 x 50%)
2.	Liquid Handled	High TDS RO reject
3.	Feed flow rate / stream	7.6 m ³ /h
4.	RO feed water temperature	25 °C
5.	Max recovery	50 %
6.	MOC of RO membrane	Polyamide thin film composite
7.	Type of RO membrane	Spiral wound – Anti fouling High reject PRO series membranes
8.	Membrane make / model number	Hydranautics / PROLF1- PRO XP1
9.	Array	1:1

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