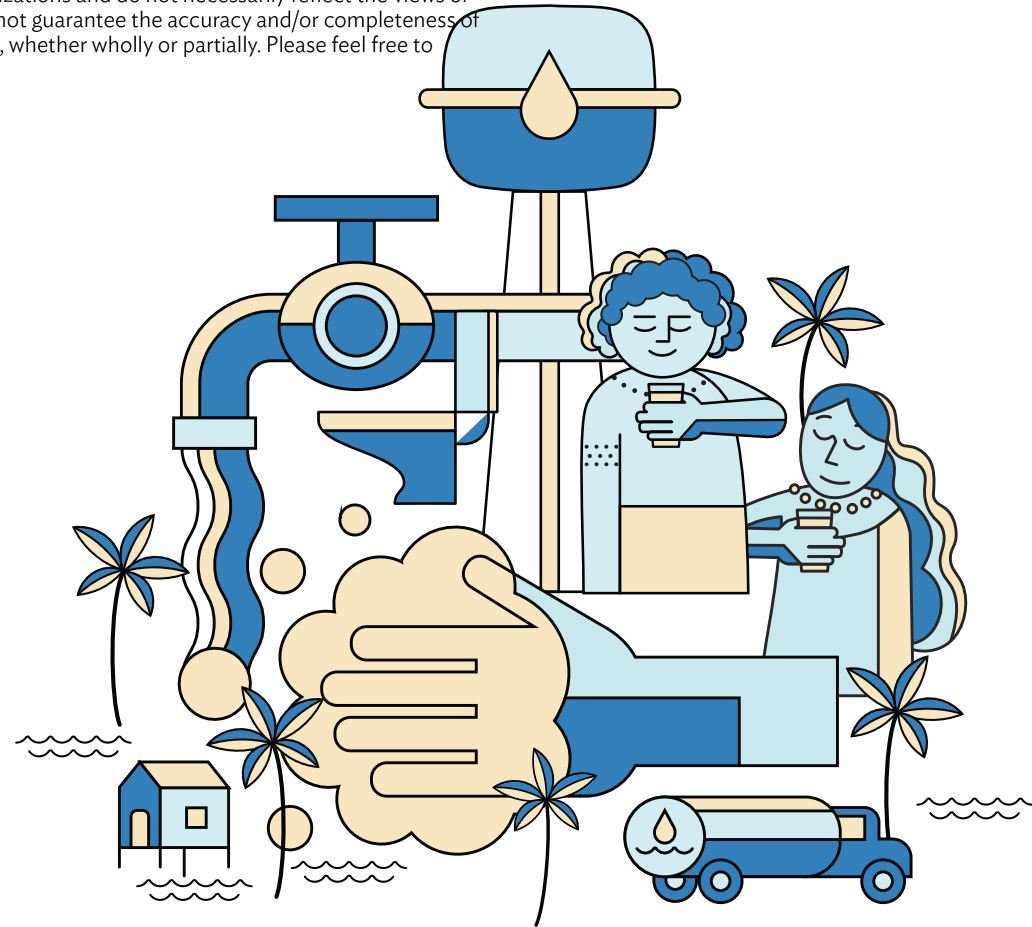


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Presentation 2 – Operational Considerations from Nauru

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Public Utilities Corporation





Background Water Resources Nauru

Nauru is a remote island country situated in the middle of the great pacific ocean with a land size not larger than an average sized city in a developed country around the world.

Since Nauru's independence in 1968, sustaining water security for the people has always been a challenge given the geography and the context of the island, whereby Nauru had to import water fresh water from neighboring countries in the region until desalination was introduce to Nauru in the mid 90's.

Up until today therefore, the island continues to grow in reliance on desalinated water besides other water sources such as the following:

- Rainwater
- Imported Bottled Water
- Brackish Water (bore hole)
- Seawater

Thermal Desal Plant 1993 -2002
(1200 m³/d)



3 x 20 ft Containerized RO
plant 2003 (360 m³/d)



New RO plant 2021 to
date (1800 m³/d)



20+ years Desalination Transformation NUC



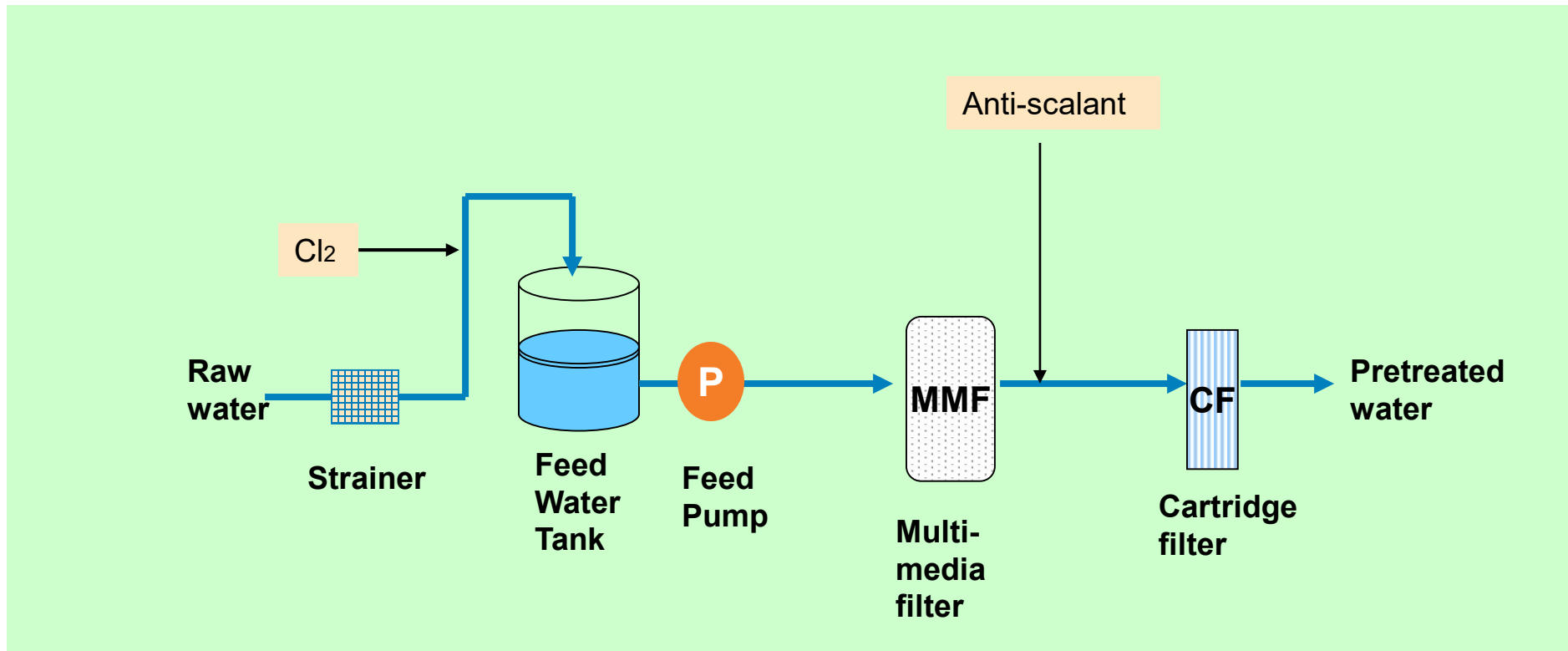
Means and Strategies

Goal		Objective	Strategy (Focus Areas)	Means (Strengths)	Outcomes
Improved Strategic Business Unit – Water Operations.		To improve cost effectiveness and efficiency of the Water Business of NUC, whereby operating and maintaining optimum productivity. Customer Satisfaction gains.	<ul style="list-style-type: none"> Capacity Building Integrated Projects Performance Delivery & Control 	<ul style="list-style-type: none"> Good Team Work Experienced Team NUC Policy, Procedures & Systems Accountable Leadership Stakeholder Involvement Professional & Commitment Availability of Technical assistance Accepting of change for improvement. 	<ul style="list-style-type: none"> Acquire required Training Sufficient team numbers Staff potential released Improved competency levels Better system processes O&M programs in place Effective structure and communication lines Pro-active approach Improved productivity levels Controlled Overtime Water Management Guidelines and procedures in place. Improved billing & reporting systems (Water Module) Clear KPI's, Targets & Benchmarking Managed customer enquiry Budget controlled. Manage and control losses – technical & non technical
Target Group	Category		<p>Phase 1. Capacity Building</p> <p>Resourcing (Snapshot) TNA – Capacity Building Recruiting & Succession Planning Structure review O&M Planning & Monitoring Delivery Program (Water Module)</p>		
1	Production		Desalination		
2	Storage		Product		
3	Delivery	Service	<p>Phase 2. Integrated Projects</p> <p>Storage Management Standard compliance Customer/ Complaint Management (water module) Asset Management Demand Management (Drought/Tankers)</p> <p>Phase 3. Delivery & Control</p> <p>Delivery Monitoring (Water Module) Water Quality Awareness – Conservation and use KPI's and Targets Maintenance Plans Budget & Reporting</p>		



RO System Pre-Treatment

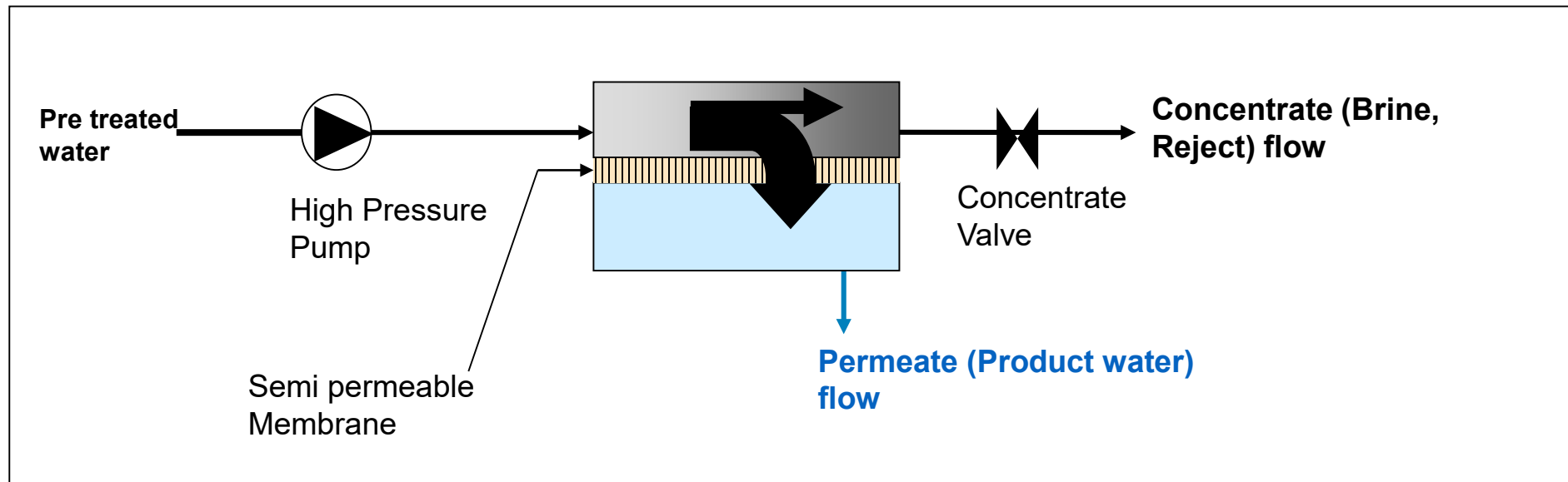
- A Typical Pretreatment Process





Reverse Osmosis Introduction

Basic Reverse Osmosis Process



$$\text{Recovery (\%)} = \frac{\text{Permeate Flow}}{\text{Feed Flow}} \times 100$$

$$(33\text{m}^3 / 90\text{m}^3) \times 100 = 36\%$$

RO Plant Annual Preventative Maintenance Schedule

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Mon					1							
Tue					2			1	1			1
Wed			1		3	1		2	2			2
Fri	2		3	1	5	3		4	4	1		4
Sat	3		4	2	6	4	1	5	5	2		5
Sun	4	1	5	3	7	5	2	6	6	3	1	6
Mon	5	2	6	4	8	6	3	7	7	4	2	7
Tue	6	3	7	5	9	7	4	8	8	5	3	8
Wed	7	4	8	6	10	8	5	9	9	6	4	9
Thu	8	5	9 B1	7	11 B1	9	6	10 B2	10	7	5	10
Fri	9 B1	6	10	8	12	10 B2	7	11	11	8	6	11
Sat	10	7	11	9	13	11	8	12	12	9	7	12
Sun	11	8	12	10	14	12	9	13	13	10	8	13
Mon	12 Filter	9 B2	13 Filter	11 B2	15 Filter	13	10 B1	14	14 B1	11	9	14
Tue	13	10	14	12	16	14	11	15	15	12	10	15
Wed	14	11	15	13	17	15	12	16	16	13	11	16 B2
Thu	15	12	16	14 Filter	18 Filter	16 Filter	13	17 filter	17	14 B2	12	17
Fri	16 Filter	13 Filter	17 Filter	15	19	17 Filter	14	18 Filter	18	15	13	18
Sat	17	14	18	16	20	18	15	19	19	16	14	19
Sun	18	15	19	17	21	19	16	20	20	17	15	20
Mon	19	16 Filter	20	18 Filter	22 Filter	20	17 Filter	21	21 Filter	18	16 B1	21
Tue	20	17	21	19	23	21	18 Filter	22	22 Filter	19	17	22
Wed	21	18	22 Filter	20	24	22	19	23	23	20	18	23 Filter
Thu	22	19	23	21	25	23 Filter	20	24 Filter	24	21 Filter	19	24 Filter
Fri	23 Filter	20	24	22 Filter	26	24	21	25	25	22 Filter	20	25
Sat	24	21	25	23	27	25	22	26	26	23	21	26
Sun	25	22	26	24	28	26	23	27	27	24	22	27
Mon	26	23 Filter	27	25	29	27	24 Filter	28	28 Filter	25	23 Filter	28
Tue	27	24	28	26	30	28	25		29	26	24 Filter	29
Wed	28	25	29	27		29	26		30	27	25	30 Filter
Thu	29	26	30	28		30	27		31	28 Filter	26	
Fri	30	27		29		31	28			29	27	
Sat	31	28		30			29			30	28	
Sun		29		31			30				29	
Mon		30					31				30 Filter	
Tue												
Wed		31									31	

480 RO

#	Tasks	Frequency
1	RO Readings (Log sheet)	Daily
2	Back wash	1/2 Daily
3	Filter change	Monthly
4	CIP	Quarterly
5	Membrane change	2 Yearly

800 RO

#	Tasks	Frequency
1	RO Readings (Log sheet)	Daily
2	Back wash	1/2 Daily
3	Filter change	Monthly
4	CIP	Quarterly
5	Membrane change	2 Yearly

900 RO

#	Tasks	Frequency
1	RO Readings (Log sheet)	Daily
2	Back wash	1/2 Daily
3	Filter change	Monthly
4	CIP	Quarterly
5	Membrane change	2 Yearly

Basket Filters Service

#	Tasks	Frequency
1	B1 Service	Monthly
2	B2 Service	Monthly

Storage Analyser

#	Tasks (Analyse & Record)	Frequency
1	Chlorine	Daily
2	pH	Daily
3	Temp	Daily
4	Conductivity	Daily
5	Turbidity (Ctanks)	Daily
5	Turbidity (Break Tanks)	Daily

Seawater Intake Pumps

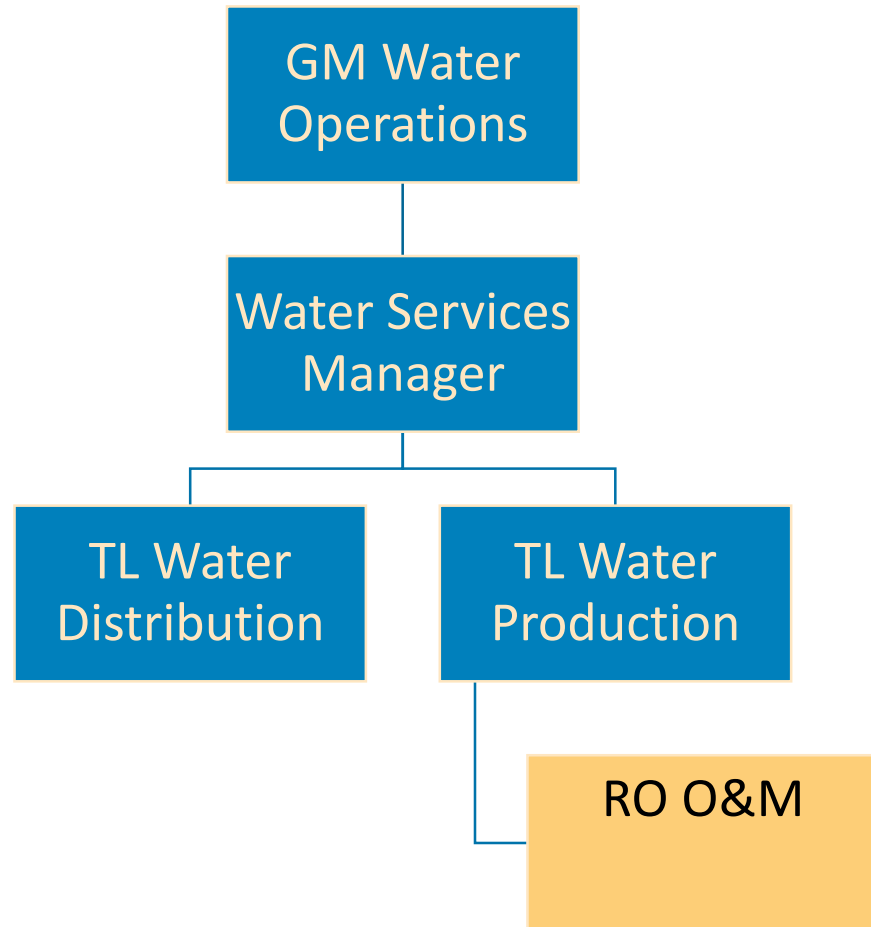
#	Tasks	Frequency
1	Pump 1 Checks (Pressure/Flow)	Daily
2	Pump 2 Checks (Pressure/Flow)	Daily
3	Pump 3 Checks (Pressure Flow)	Daily
4	Pump 4 Checks (Pressure Flow)	Daily

2022-2023 Water Production, Storage and Distribution KPI's

Monthly Report 2022/23: Water Production, Sales & Delivery														
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Water Production														
Osmoflow 900	Litres	503,000	1,947,000	1,579,000	5,227,000	6,289,000	5,688,000	4,840,000.00	1,919,000	3,669,000	2561000	4775000	1,310,000	40,307,000
Avenale 800	Litres	12,013,000	14,389,000	13,788,000	12,752,000	14,642,000	14,944,000	13086000	14,612,000	15,506,000	11925000	8193000	9,967,000	155,817,000
Avenale 480	Litres	8,354,000	5,413,000	6,775,000	7,708,000	4,296,000	4,375,000	5,665,000	6,229,000	6,791,000	5929000	4613000	3,040,000	69,188,000
Hitachi 110	Litres	303,000	2,742,000	2,871,000	3138000	2,947,000	3,054,000	3001000	1,525,000	3,126,000	2883000	3,248,000	1,838,000	30,676,000
TOTAL PRODUCTION		22,246,000	22,246,000	25,013,000	28,825,000	28,174,000	28,061,000	26,592,000	24,285,000	29,092,000	23,298,000	20,829,000	16,155,000	295,988,000
RO Availability														
Osmoflow	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Avenale 800	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Avenale 480	%	100%	100%	100%	100%	100%	87%	100%	100%	100%	100%	100%	97%	99%
Hitachi	%	13%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	93%
Monthly Average	%	78%	100%	100%	100%	100%	97%	100%	100%	100%	100%	100%	99%	98%
Water Storage (Month end)														
Storage Inc (+)/ Dec (-)	Litres	4,548,750	3,994,300	4,918,000	4,484,000	4,147,500	5,593,000	5,539,000	4,999,000	5,107,000	3,026,000	459,000	783,000	
	Litres	52,830	- 554,450	923,700	- 434,000	- 336,500	1,445,500	- 54,000	- 540,000	108,000	- 2,081,000	- 2,567,000	324,000	
Water Delivery														
MTC	Litres	3666000	3632000	4167000	4359000	6363000	4480000	3627000	3004500	3853500	3085000	3668000	2449000	46,354,000
NUC	Litres	14619000	18939000	17692000	20159000	17225000	19046000	17620000	17480003	21541000	18460000	16833000	11237000	210,851,003
TOTAL DELIVERY		18,285,000	22,571,000	21,859,000	24,518,000	23,588,000	23,526,000	21,247,000	20,484,503	25,394,500	21,545,000	20,501,000	13,686,000	257,205,003
Electricity Usage														
DIBP Plants	kWh	110250.00	123791.00	120443.00	134816.00	125940.00	126660.00	141368.00	119160.00	141836.00	92670.00	95268.00	73,292.00	1,405,494
Hitachi	kWh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	-
Sea Water Intake Pump	KWh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	-
Electricity for B13 Depot	KWh	192.00	198.00	156.00	138.00	120.00	110.00	124.00	110.00	104.00	165.00	377.00	146	1,940
Electricity for Meneng RO	KWh	14123.00	10151.00	9828.00	10610.00	11239.00	9,192.00	10662.00	6314.00	10776.00	9737.00	10850.00	7350	120,832
Total Electricity Usage		124,565.00	134,140.00	130,427.00	145,564.00	137,299.00	135,962.00	152,154.00	125,584.00	152,716.00	102,572.00	106,495.00	80,788.00	1,528,266



Water Operational Structure NUC



	RO Operation & Maintenance Team
1	Team Leader
2	RO Technicain
3	Assistant RO Technician
4	Trainee RO Technician
5	RO Operator
6	Trainee RO Operator
7	Tradesman Mechanic



Training and Capacity Building

One of the most important factor in having a good and committed team is identifying and empowering the right individuals internally or externally who are keen, willing to learn and contribute to serving the people to which one of NUC's core value.

Below are some recommended training package for RO Technicians which NUC Technicians have acquired

- Certificate IV Plant Maintenance Engineering – Fiji National University
- Certificate III Water Industry, Online - Simmonds & Bristow
- AMS Training & Solutions, RO Specialist Training



Seawater Intake Pumps

1800 RO Plant MMF

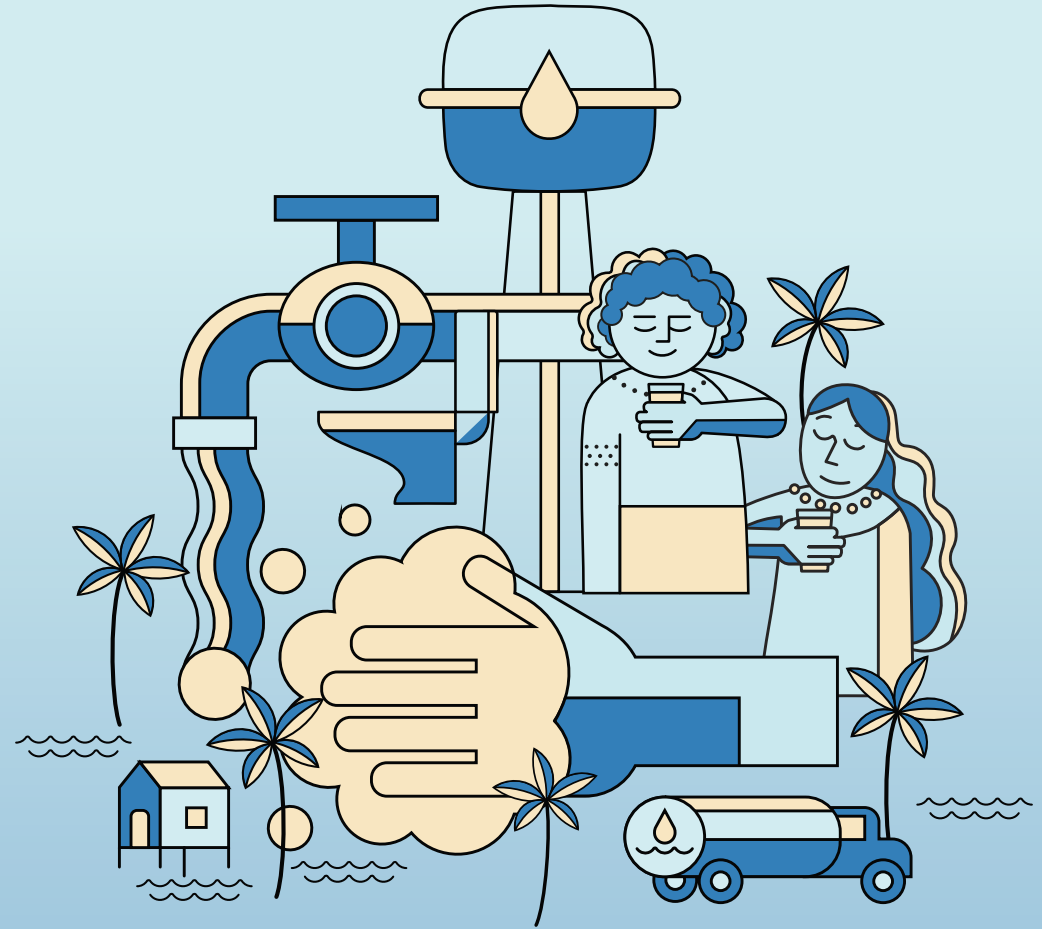
6 x Storage tanks 270kL each



Tubwa Kor !

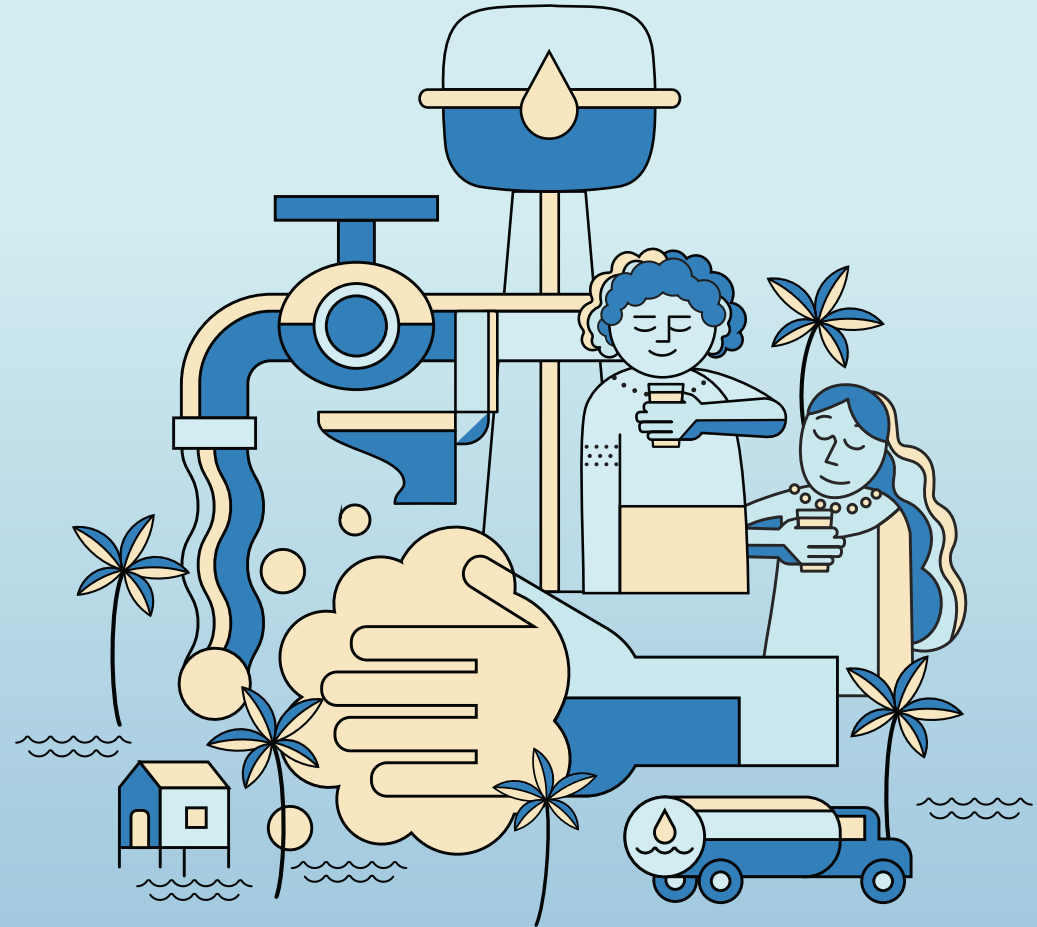


Q&A Discussion

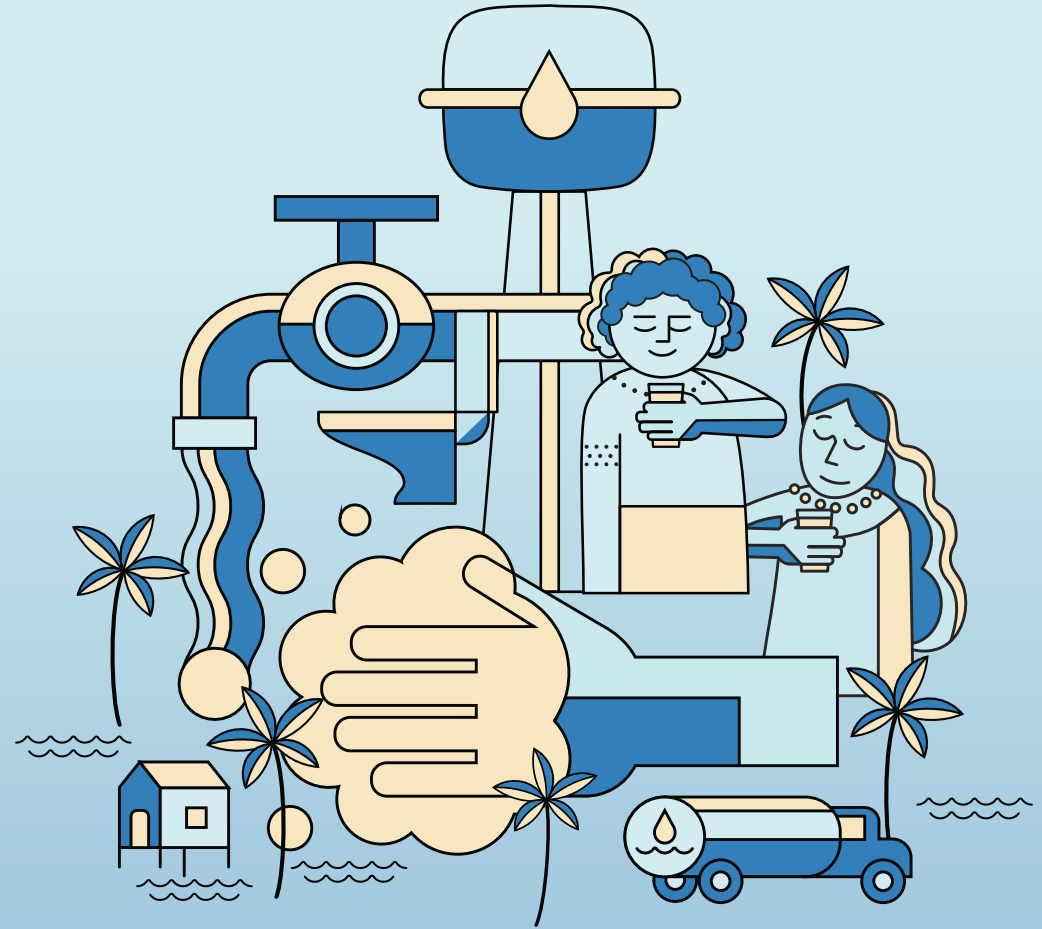


Poll

1. Did today's webinar expand your knowledge/skills on the topic discussed?
2. Did you learn something in today's webinar that you can use in your work?



Group photo



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