



# UNIQUE INTERNATIONAL EXPORT LTD CO.

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Subject:

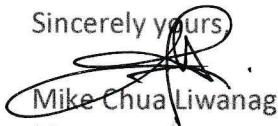
**Proposal for the Design, Supply, Installation and Commissioning of  
Sea Water Reverse Osmosis (SWRO) Plant for Brgy. Maniwaya, Sta. Cruz, Marinduque**

Dear Sir:

Please find attached our proposal on the **DESIGN, SUPPLY, INSTALLATION AND COMMISSIONING OF SEA WATER REVERSE OSMOSIS (SWRO) PLANT** with a total capacity of **6 Cubic Meters per Day (CMD)**. Should you have any questions or concerns, we would be glad to meet at your most convenient time.

Thank you very much for giving us the opportunity to quote and looking forward to your kind consideration and approval.

Sincerely yours,

  
**Mike Chua Liwanag**  
Manager

Noted by:

Mr. Hiranand Chotrani  
General Manager

  
**Nanik Chotrani**  
President

## TECHNICAL PROPOSAL

### **Design, Supply, Installation and Commissioning of Sea Water Reverse Osmosis (SWRO) Plant**

#### **I. DESIGN DATA**

##### **A. Introduction**

Media Filtration (MF) and Reverse osmosis (RO) are membrane process that use the differences in permeability of water constituents as a separation technique. The membrane is a synthetic material that is *semi permeable*; which is highly permeable to some constituents and less permeable to others. ~~To remove a constituent from the water, the water is pumped against the surface of a membrane resulting in a separation of product and waste stream.~~

Four types of pressure driven membranes are generally recognized: microfiltration (MF), ultrafiltration (UF), nanofiltration (NF), and reverse osmosis (RO). The hierarchy of the processes is identified by the types of materials rejected, operating pressures, and nominal pore sizes on an order-of-magnitude basis. Unlike NF/RO that are pressure driven, electro-dialysis (ED) and electro-dialysis reversal (EDR) processes are electrical voltage-driven.

The focus of our proposal is RO because they remove ions and have been used widely in softening and desalinating water. MF and UF separate suspended particles (colloidal matter, microorganisms, and viruses) from the water.

##### **B. Benefits**

Our system has these advantages:

- Proven performance and efficiency.
- Delivers high quality permeate water while optimizing CAPEX and OPEX.
- Offers the most effective cleaning performance, robustness and durability due to its widest cleaning pH range (1 – 13) tolerance and the support of our technical representatives.
- Equipped with *Clean – In – Place (CIP) System*.
- Designed with Programmable Logic Controls with TDS Monitor for Raw Water and Product Water.
- Modular type for easy transport.

### C. Design Basis

The process and equipment design of the proposed Seawater Reverse Osmosis (SWRO) plant using the data provided as presented in Tables 1 and 2.

**Table 1: Flow Statistics**

Total Daily Flow	6 m <sup>3</sup> /day
Hours of Operation	24 hours
Days in a Week Operation	7 days

**Table 2: Feed Water Characteristics**

Parameter	Value	Unit
pH	6.5 to 8.5	
Total Dissolved Solids	36,000 max	mg/L

With proper operation and maintenance, the proposed SWRO plant would meet the discharge standards shown in Table 3 or as stipulated in the Philippine National Standards for Drinking Water (PNSDW).

**Table 3: Product Water Guarantee**

Parameter	Value	Unit
pH	6.5 to 8.5	
Total Dissolved Solids	<600	mg/L

## II. PROCESS DESCRIPTION

- The proposed design, supply, installation and commissioning of sea water Reverse Osmosis (SWRO) plant is designed to treat 6 CMD of sea water consisting of the following treatment processes:

### A. Sea Water Reverse Osmosis 4" Elements

Sea Water Reverse Osmosis 4" Elements can separate salts from water and are produced with an automated fabrication process that ensures precision, consistency, and reliability. They are ideal for use in commercial, industrial and municipal water treatment systems that produce greater than approximately 1900 GPD of permeate. Our RO membranes build on a tradition of leadership in the thin-film composite membrane industry and meet today's challenges for higher rejection using less energy and resisting foulants in challenging waters.

### B. Chemical Dosing

Chemicals will be dosed to condition and protect the RO membranes. This will effectively inhibit corrosion, fouling and scaling within the system.

### C. Media filtration

Media Filtration will be utilized to remove suspended solids, iron, manganese\ and other particulate matter prior to the SWRO process. This pre-treatment will help prolong the service life of our SWRO Membranes. It is rigid and easy to operate and maintain.

### D. Clean In Place (CIP) System

CIP System offers fast, efficient and reliable cleaning of all equipment in the SWRO plant. It's a method which cleans complete items of plant equipment or pipelines circuits without dismantling the equipment.

### E. Disinfection

Post treatment thru chlorination will be implemented to ensure that the product water is safe to drink and within the parameters set by Philippines National Standards for Drinking Water (PNSDW).

## III. SCOPE OF WORKS AND SUPPLY

### A. Scope of Works

Description	Client	Unique
1. Process and equipment design of the Water Treatment Plant which is capable of consistently reducing Total Dissolved Solids (TDS) conforming to Philippine National Standard for Drinking Water (PNSDW).		<input checked="" type="checkbox"/>
2. Supply, Delivery and installation of one (1) set of Seawater Desalination Equipment with Disinfection System with a capacity of 6 cubic meter per day in modular set for easy transport		<input checked="" type="checkbox"/>
3. Commissioning and testing of the Sea Water Reverse Osmosis Plant including supply of chemicals and training of personnel for a week.		<input checked="" type="checkbox"/>
4. Interconnection of pipes and fittings from the proposed SWRO Plant within water station area from Raw tank to Product Tank		<input checked="" type="checkbox"/>
5. Supply, delivery, installation and commissioning of one (1) set of Surface Type feed pump and motor complete		<input checked="" type="checkbox"/>

with electrical wires, float switches , foot valve, controls and stand with enclosure for Raw water supply from well to plant site		
6. Provision for Operation and Maintenance Manual including as-built drawings of the SWRO Plant		<input checked="" type="checkbox"/>
7. After-sales service and equipment warranty for one year after turn-over.		<input checked="" type="checkbox"/>
8. Securing of local permits such as barangay clearance, excavation/restoration/construction and other necessary government permits , if necessary	<input checked="" type="checkbox"/>	
9. Disposal of wastewater (reject and CIP) generated from the SWRO Plant.	<input checked="" type="checkbox"/>	
10. Provision of raw water source (Beach/Shallow Well) as feed intake for the proposed SWRO Plant.	<input checked="" type="checkbox"/>	
11. Supply, delivery and installation of uninterrupted power supply for the desal ro system.		<input checked="" type="checkbox"/>
12. Supply, delivery, and installation of PE Storage Tanks with 4000 liters for Raw Water Tank and Product Water Tank		<input checked="" type="checkbox"/>
13. Provision of Electrical Supply , 220V, 60Hz, 1 phase with breaker	<input checked="" type="checkbox"/>	
14. Operation and maintenance after turn-over.	<input checked="" type="checkbox"/>	
15. Provision for foundation pads, roofing , counter, sink and other necessary civil works for the proposed SWRO Plant.	<input checked="" type="checkbox"/>	
16. Any works and supply not indicated in this proposal but where deemed necessary during the start of this project.	<input checked="" type="checkbox"/>	
17. Supply, delivery and installation of Oxtube Gas Dissolving device to reduce hydrogen sulfide and to oxidize iron and manganese present in the water before the raw water tank and increases the dissolved oxygen of the water		<input checked="" type="checkbox"/>

#### B. Scope of Supply

Item	Description	Quantity	Unit
<b>1. PRE-TREATMENT UNIT for SWRO</b>			
1.1. Raw Feed Pump	Type: Multi stage centrifugal pump Material: SS2205 Capacity: Q= 1m3/hr ; H= 40m , 1HP 220V, 60Hz, 1phase	1	Set
1.2. Media Filter Tank	Size: 334mm x 1400mm Material: Fiber Reinforced Plastic <b>Filter Media:</b>	1	Set

	<p><b>A. Silica Sand</b> with 2.65 Specific Gravity, Silica content of 94% , Chromic Oxide 0.11%, Alumina 2.11% , Moisture 0.56%, Magnesia 0.10% Loss of Ignition 0.090% , 0.4-0.7mm Effective Size, Uniformity Coefficient less than or equal to 1.5; 25kgs</p> <p><b>Manganese Dioxide</b> media: Bulk density 1800-1900kg/m<sup>3</sup> , Mesh Size: 20 x 40 mesh, Composition : Mn 52%, MnO<sub>2</sub> 79%, Fe<sub>2</sub>O<sub>3</sub> 4.6%; Al<sub>2</sub>O<sub>3</sub> 3.1% , SiO<sub>2</sub> 2.3% , Moisture 6.0% ;70kgs</p> <p>And <b>under gravel/pebbles</b> with bulk density of 1600kg/m<sup>3</sup> minimum , 25kgs</p> <p>Backwashing : Manual</p>		
<b>1.3 Pre Filter</b>	Material : Plastic PP Filter Housing Size: 20" Filter material: Polypropylene 10m nominal	1	Set
<b>1.4 Main Filter</b>	Material : Plastic PP Filter Housing Size: 20" Filter Material: Polypropylene 5m nominal	1	Set
<b>1.5 Gas Dissolving Device</b>	Reduction of Hydrogen Sulfide Increase Dissolved Oxygen Oxidize Iron and Manganese Removal of Radon and Carbon Dioxide Capacity: 2m <sup>3</sup> /hr	1	Set
<b>2.Sea Water Reverse Osmosis Unit</b>			
<b>2.1 High Pressure Pump</b>	Type: Axial Piston pump Material: Super Duplex SS2507 Min-Max Outlet Pressure: 20-80 barg Geometric displacement : 6.30cm <sup>3</sup> /rev. Min-Max Speed:700-3450 rpm Capacity: Q= 1m <sup>3</sup> /hr; H=60 bar Brand: Danfoss APP1.0	1	Set
<b>Motor with VFD</b>	Capacity : 3kW 220V,60Hz,1Phase Brand: ABB or equal	1	Set
<b>2.2 RO Skid</b>			
<b>SWRO Membrane</b>	Size: 4"x40", Brand: Toray/LG or equal	2	Pcs

	Material: Spiral Wound		
RO Vessels	Size: 4" x 40" No. of element: 1 Pressure: 1000 psi Material: FRP Brand: ROPV or equal	2	Pcs
Frames	Material: Carbon Steel or Stainless Steel Protection: Anti-corrosion paint, powder coating	1	Set
Pipes and valves	Material for High Pressure lines : SS2205,PN64 Material for Low Pressure lines : UPVC,PN10	1	lot
<b>3 Disinfection and Cleaning Unit</b>			
<b>3.1 Dosing System</b>		1	Lot
Dosing Tank for Disinfection	Capacity: 100L Material: PE	1	Pc
Dosing pump for Disinfection	Brand: Seko or equal Type: Solenoid Driven Diaphragm Capacity: 0.4lph, Material: PVDF	1	Pc
Pipes and valves	Material: Upvc Class: PN10	1	Set
<b>3.2 Clean In Place System</b>		1	Set
CIP Tank	Capacity: 40 L Material: PE	1	Pc
CIP Pump	Type: Multi-stage Centrifugal pump Casing/Impeller/Shaf: SS316, Capacity: 2m3/hr, @ 30m Rating: 1HP	1	Pc
CIP Filter	Material: PP 10"Sediment Filter	1	Set
Frames	Material: Carbon Steel Protection: Anti-corrosion paint	1	Pc
<b>4 Instrumentation and Control</b>			
<b>4.1 Instruments</b>			
Pressure Gauge	Range: 0~1 MPa Material: PP Diaphragm Anti-vibration	5	Pcs
Pressure Gauge	Range: 0~10/100 bar Material: 2205 Diaphragm Anti-vibration	1	pc
Electrical Pressure Gauge	Range: 0~10MPa Material: 2205 Diaphragm Anti-vibration	1	pc
Low Pressure Switch	Range: 1~10 bar	1	Pc

	Setting: 0.1 MPa Material: NBR/2205		
<b>Conductivity Meter</b>	Range: 0~2000mS/cm, 4-20mA output Material: PTFE	1	Set
<b>Flow Meter</b>	Type: Rotor Material: Plexiglass Range: 0.2-4m3/hr	3	Pcs
<b>Level Switch</b>	Type: Simple float	4	Pcs
<b>4.2 Electrical Control</b>		1	Set
<b>Main Cabinet</b>	Complete with Circuit breakers, magnetic contactors with overload relays, timers, pilot lights and switches	1	Set
<b>Cables</b>	For internal connection	1	Set
<b>5 Water Tanks</b>			
<b>5.1 Raw Water</b>	Material: PE Storage Tanks Capacity : 4000l	1	pc
<b>5.2 Product Water</b>	Material: PE Storage Tanks Capacity : 4000l	1	pc
<b>6. Shallow Well Booster Water Supply</b>			
<b>6.1 Shallow well Pump</b>	Rating: 1 Hp Centrifugal Pump and motor 220V,60Hz,1Phase Capacity: Q=2.8m3/hr , H=15m	2	pcs
<b>6.2 Wires and Cables</b>	Interconnection to plant site electrical wires and insulation	20	mts
<b>Wiring Insulation</b>	PVC Piping and Fittings	20	mts
<b>6.3 Auxillaries</b>	1 set of Foot Valve 1" with 50ft PVC pipe 1" and fittings for deep well; 20 m of PE Tubing and fittings from well to plant Site; 2 sets of Liquid Level Switch; 1 set Outdoor Type NEMA3R Weatherproof Control Panel complete with circuit breaker, magnetic contactor, overload relay, pilot lamps and switches; 1 set MS Skid Frame for Control panel and Booster Pump , epoxy painted	1	lot
<b>7. Distribution Product Water Supply</b>			
<b>7.1 Booster Pump</b>	Rating: 1/2 Hp Centrifugal Pump and motor 220V,60Hz,1Phase	1	pc

<b>7.2 Post Treatment</b>	1 set 20" Sediment Filter and 1 set 20"Carbon Filter with housings and 1 set 6 GPM Ultraviolet Water Sterilizer with 3pcs Stainless Steel Gooseneck faucets	1	lot
<b>8. Testing/Commissioning</b>		1	lot
<b>Commissioning Tools and consumables</b>	Unique	1	Lot
<b>Start-up</b>	Unique	1	Lot

#### IV. WARRANTY CONDITIONS

- A. Twelve (12) months equipment warranty from the date of acceptance and turn-over.
- B. Warranty does not include defects caused by willful damage, negligence, incorrect operations, or application movement, installation, or defects caused by wear and tear, and damages due to natural calamities.
- C. That our system is being used for the purpose intended and within specified limits based on your given requirement.
- D. That our system and equipment is maintained and operated according to the instructions in the Operations & Maintenance manual.
- E. Systematic maintenance and daily monitoring report listed in a logbook with the operator's signature and date.
- F. Any repair or changes on the system should be done by qualified personnel authorized by Unique International Export Co.
- G. Other parts not stated in this proposal that needs to be installed or replace at the time of installation will be an additional.

#### V. WORK SCHEDULE

- Delivery  
Four (4) to Five (5) months upon receipt of Notice of Award and Notice to Proceed
- Electrical and Mechanical Works  
Fifteen (15) working days
- Testing and Commissioning from start-up  
Seven (7) working days

Note: Assumed under normal working and weather conditions.

**FINANCIAL PROPOSAL**

**Design, Supply, Installation and Commissioning of  
Sea Water Reverse Osmosis (SWRO) Plant**

For and in consideration of the scope of work stipulated in the technical proposal, our company is pleased to submit our quotation on the above SWRO Plant electro-mechanical design, supply, installation and commissioning for the proposed **6 CMD SWRO Plant** as follows:

**TOTAL PROJECT COST:**

**TWO MILLION NINE HUNDRED NINETY-EIGHT THOUSAND NINE HUNDRED  
PESOS ONLY  
(Php 2,998,900.00)** 

**WARRANTY**

Equipment warranty                  One (1) year upon turn over

Note: 1) Filters, RO membranes, Media filters are not included.

**PRICE VALIDITY**

The prices and terms indicated in this proposal in its entirety are valid up to thirty (30) days from receipt of this proposal.