HITACHI
Inspire the Next

Membrane Bioreactor System (MBR) And Water Recycle System

HITACHI PLANT TECHNOLOGIES, LTD.

7th Feb., 2010

I. Corporate Introduction

II. Hitachi's Advance Solutions – MBR, RO & IMS

III. New Business Model of Water Re-use Market

HITACHI
Inspire the Next

I. Corporate Introduction

Major Business Line Up

HITACHI
Inspire the Next

Social Infra & Industrial Machinery System





Mechatoronics



Industrial Plant System




Air Conditioning & Electrical System



Energy System



Global Network – Office and Sites

HITACHI
Inspire the Next

Company Profile

HITACHI
Inspire the Next

Hitachi Plant Technologies, Ltd.

Established	:	June 1929
Head Office	:	5-2, Higashi-Ikebukuro 4-Chome, Toshima-ku, Tokyo, Japan
Paid-in Capital	:	120Million US$
Turn Over	:	4,000Million US$ (2008 year ended March 31)
Employee	:	7,487 (Consolidated)

Regional Office (Dubai, UAE)

Established	:	Sep 2005
Territory	:	Middle East (Focus G.C.C)
Major Activities	:	MEP Works, Water Treatment system, Transportation system
Turn Over	:	150 M US$/ Yr (TARGET)
Work Force	:	280Staff (Incl. 25 Japanese). Total 1000 (Incl. Labor)

Abu Dhabi Branch Office

Abu Dhabi Office	:	Flat No. 503, Al Khaily Building, Salaam Street, Abu Dhabi

Saudi Arabia Branch Office

Saudi Arabia Office	:	Al Olaya Center Office No. 102, Makkah Road, Al-Khobar

Other MENA Branch Offices

Qatar Office	:	Atrium Design Building, 2nd Floor, Al Salwa Road, Doha
Egypt Branch Office	:	1 Fakher Tower, Cornishe El-Nile Maadi, Cairo

Major On-Going Projects in MENA

HITACHI
Inspire the Next

Iraq

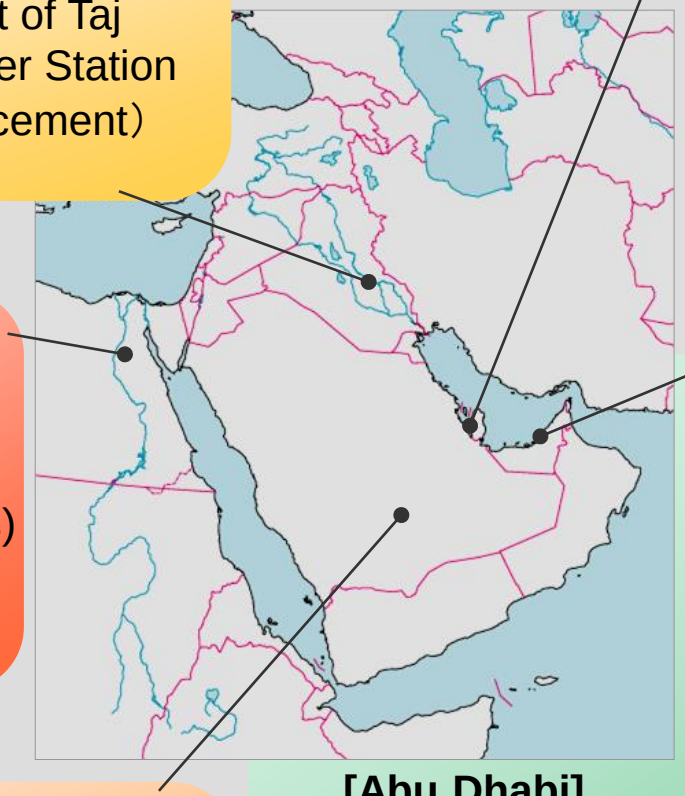
- Rehabilitation & Replacement of Taj Mosle Thermal Power Station
- Oil/Gas Compressors（Replacement）

Egypt

- Mubarak Pumping Station （O&M）
- Japan Embassy Project (PFI) (D&B MEP Works) (O&M)
- LNG Compressors

Saudi Arabia

- Rabigh Refinery Project （Utility Facility,Sub-Station）
- LNG Plant Compressors



Qatar

- Emiri Terminal , Doha Airport (HVAC)
- Qatar Petroleum (Pumping Station) (Compressors)

UAE

[Dubai]

- Burj Dubai Project (MEP)
- Almas Tower Project (MEP)
- Princess Tower Project (MEP)
- Palm Jumeirah Monorail (MEP for 4 stations) (Depot & Power)
- MBR Compact Units (+32)
- Burj Dubai (IMS)

[Abu Dhabi]

- MEP Works on YAS Island
- Ruwais MBR Compact

HITACHI
Inspire the Next

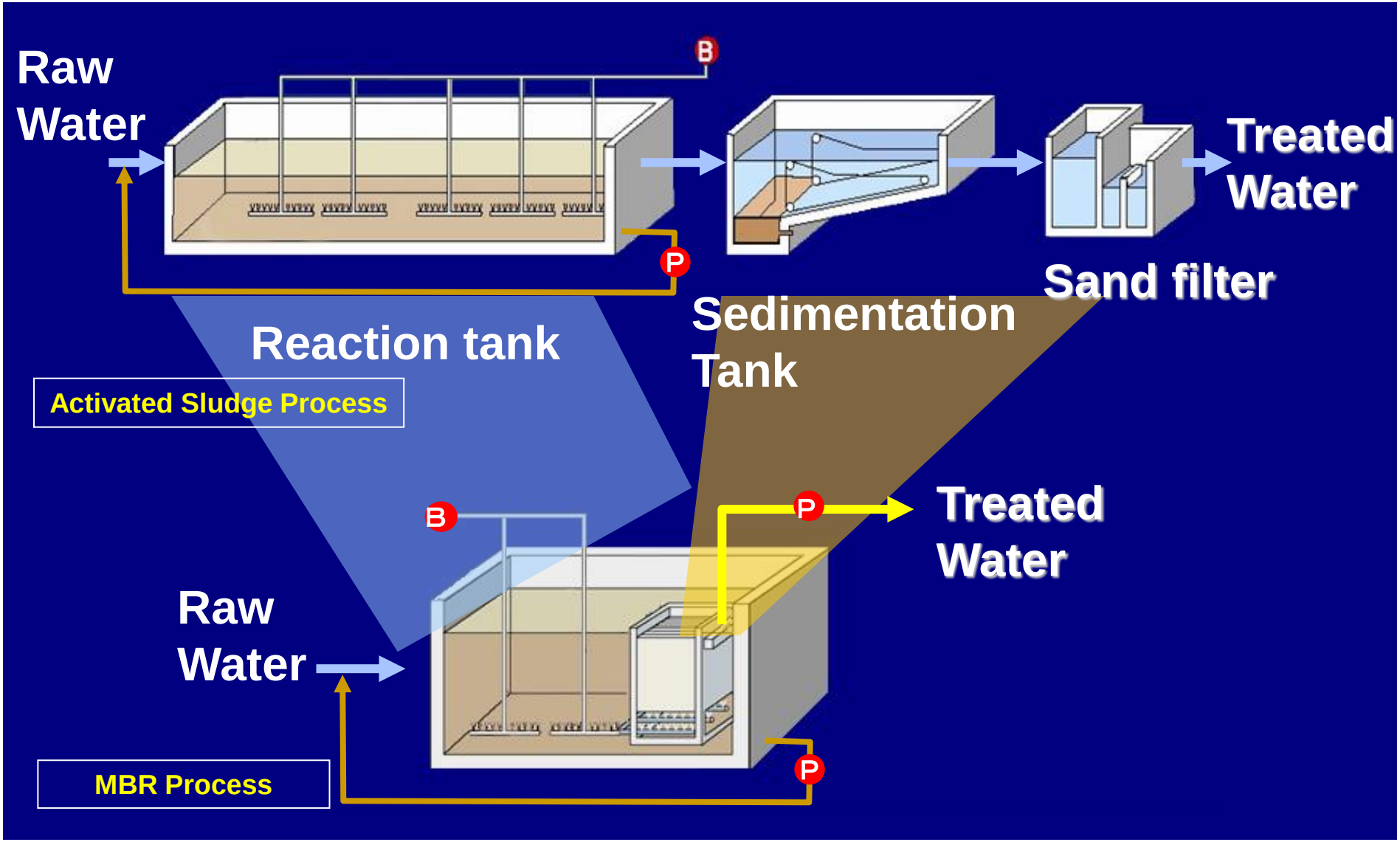
II. MBR, RO System & IMS (**I**ntegrated **M**embrane **S**ystem)

HITACHI
Inspire the Next

HITACHI
Membrane Type
Sewage Treatment System

Outline of MBR System

HITACHI
Inspire the Next



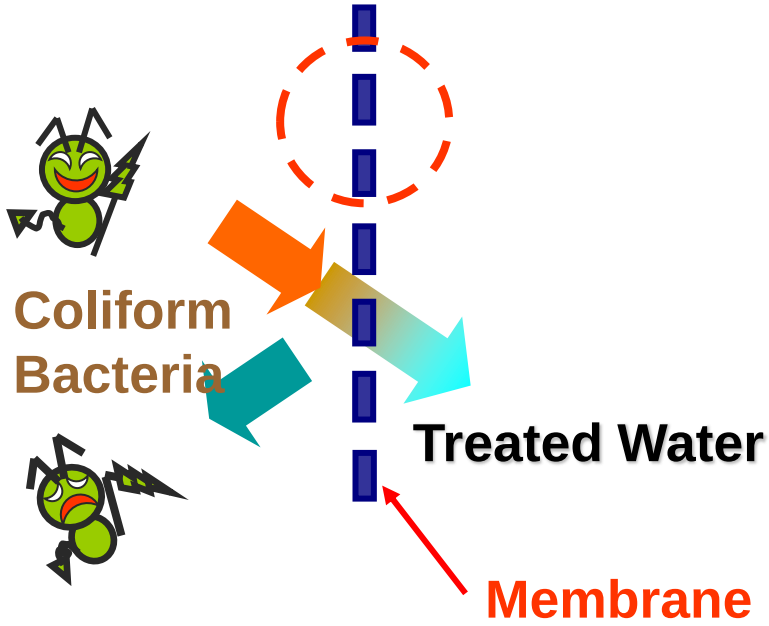
Feature

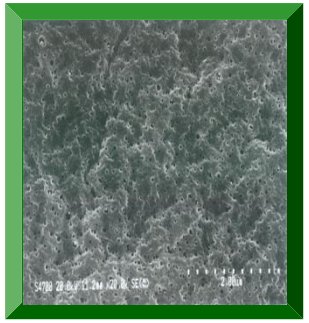
HITACHI
Inspire the Next

Micro filtration Membrane removes SS and also colon bacillus, therefore treated water is hygiene and clear to recycle

Also achieve space saving, since biological reactor is built in the Unit

Highly concentrated activated sludge makes biological treatment time shorter





Membrane Surface

Details of Development

HITACHI
Inspire the Next

■ Introduction of New type membrane (PVDF type)

Bench Scale Test

- Period : Nov,2001～Oct,2003
- Place : HPT Laboratory, Sewage Treatment Plant
- Purpose : Performance comparative evaluation of Old type and New type

	Old type	New type
Shape of Membrane		
Material	Chloride Polyethylene	PVDF
Pore size	0.4	0.1
Area	20m^2	10m^2

Flux (Daily Ave.)

Old : 0.6 m^3/m^2/d

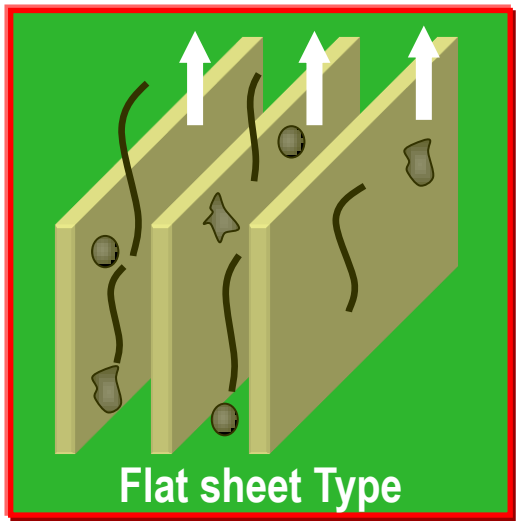
New : 0.8m^3/m^2/d

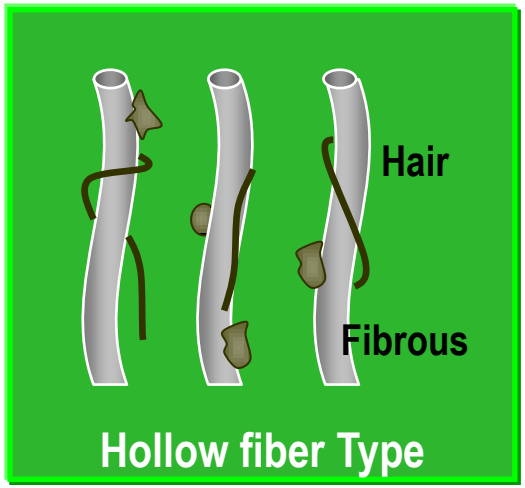
Higher Flux rate

Flat sheet Type

HITACHI
Inspire the Next

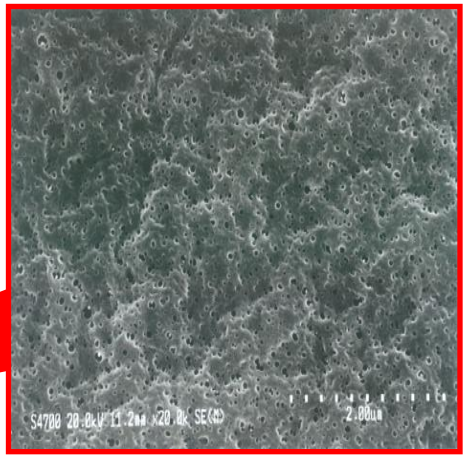
Flat sheet type
Less clogging



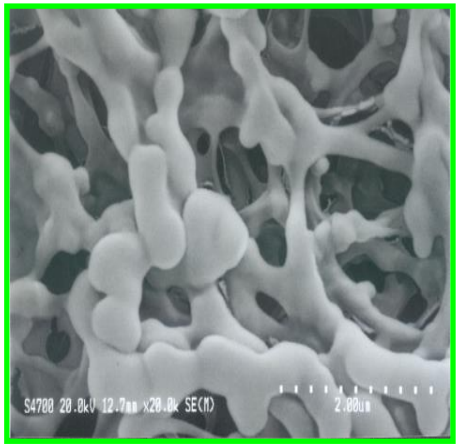


PVDF: Poly-Vinylidene Fluoride

PVDF membrane
Smooth surface



PVDF / 0.1μm



Chlorinated Polystyrene
0.4μm

HITACHI
Inspire the Next

■ High Quality Treated Water

Items	Unit	Raw water	Treated water	Eff. Regulation In Dubai
pH	-	7.4	7.4	---
BOD	mg/L	250	5	20~10
SS	mg/L	220	<1	50~10
Turbidity	NTU	---	<1	---
Coliform	CFU/100mL	4 x 10^7	No detection	5

***Giardia Lamblia is completely removed from treated water by MBR system**

Application :
Irrigation & Landscaping, Concrete Mixing & Curing, Industrial water

■ High Quality Treated Water –

- Treated Water test effects on Mixing & Curing of concrete in Dubai

الحاي والمقدم لاعمال فحص التربة (ذ.م.م.)
AL HAI & AL MUKADDAM
For Geotechnical Works (L.L.C.)

3. CONCLUSION:

Based on the above test results, it can be concluded that using RO or MBR water in either mixing or curing of concrete, does not have any negative effects on the behavior of the concrete. Moreover, the samples comply with BS 5328: 1997 specifications, for the tests that have a reference standard.

Hope that the above is to your satisfaction. If you have any enquiries regarding this report, please do not hesitate to contact us at any time.

Respectfully Yours,

Ahmed Hussam
Technical Manager

Dubai - U.A.E.
Al Hai & Al Mukaddam For Geotechnical Works (L.L.C)

Feature
- NOC from Dubai Municipality to install MBR units -

HITACHI
Inspire the Next

GOVERNMENT OF DUBAI

DUBAI MUNICIPALITY

Ref: 812/02/02/1/807758

29 APR 2008

M/s HITACHI Plant Technologies Ltd, Dubai Branch.
P.O. BOX : 62438
Fax : 04 355 8177
Tel. : 04 355 8113
DUBAI

SUBJECT : NOC for Installation of compact STP (MBR)

With reference to your letter dated 17 March 2008, regarding the above subject. Please be informed that we have no objection to install your compact STP (MBR) system to treat the sewage for Humaid Al Suwaidi Real Estate L.L.C Labor Camps in AL Quoz. So, you can use it as you ensured that no environment problems and no risk would be developed upon the use (MBR) technology on the reuse of water and sludge.

This for your information and action.

Regards,

MOHAMMED ABDULAZIZ NAJEM
Director of STP Department
Tel.: 04 333 1379
MANAJEM@dm.gov.ae

DUBAI MUNICIPALITY

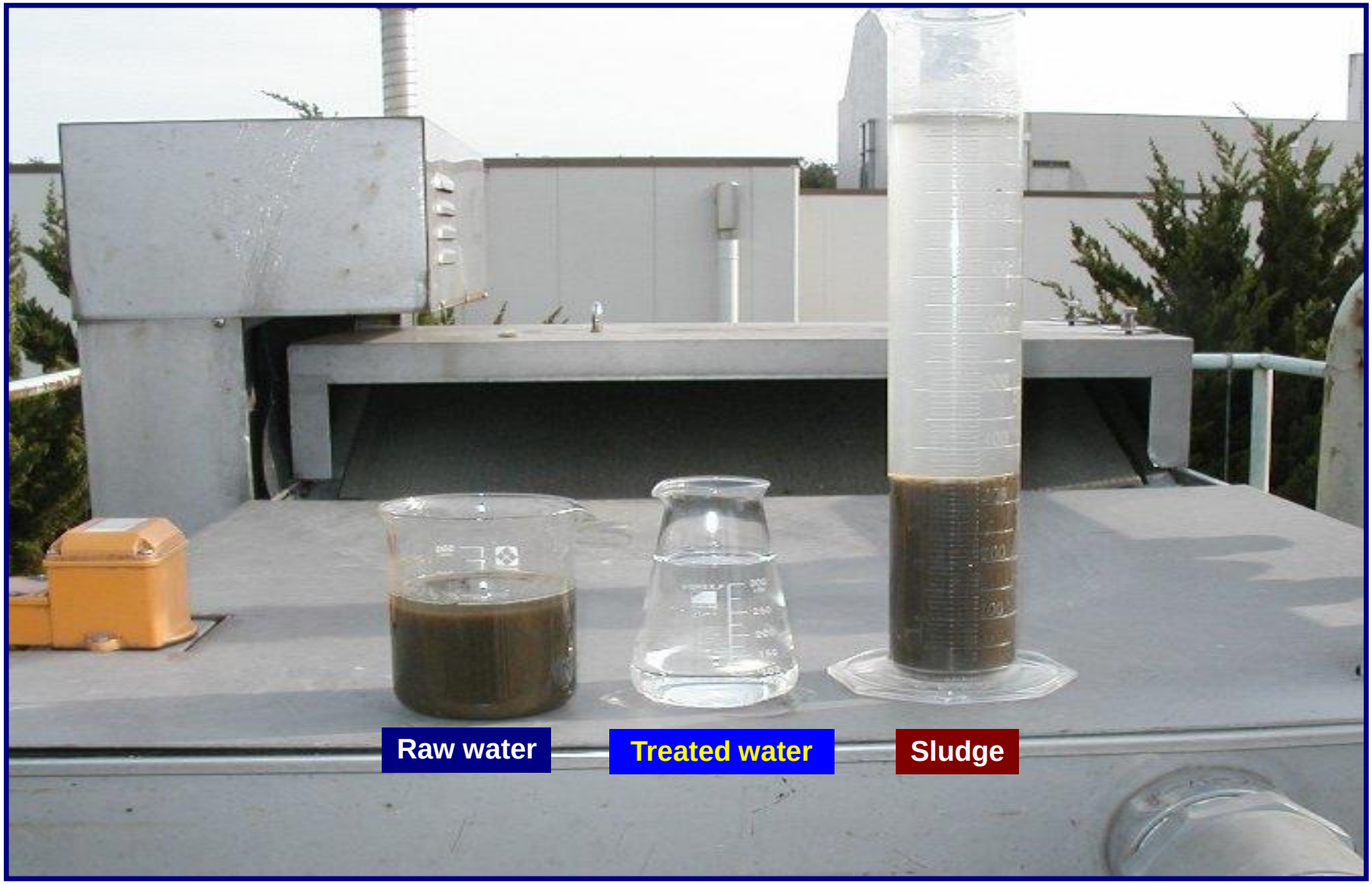
Copy to : ADGE&PH Affairs
Head of Operation
File (Ref:186/1/1/075)

رؤيتنا : بناء مدينة متميزة تتوفر فيها رفاهية العيش و مقومات النجاح.
Our Vision : To create an excellent city that provides the essence of success and comfort of living.

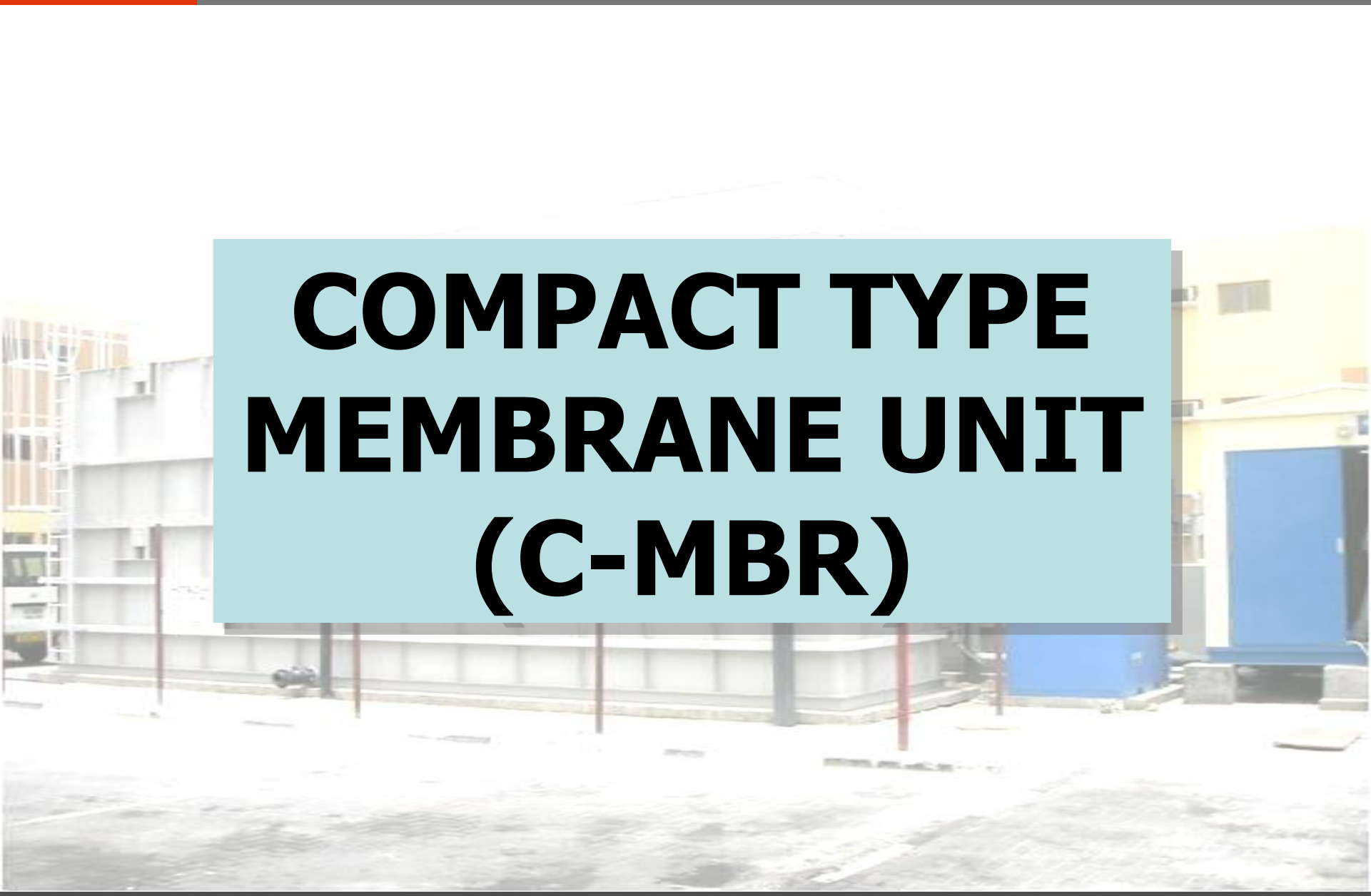
Telex: 45688 Baladya EM تلكس: 45688 بلدية إم ، Fax: +9714 224 6666 فاكس: ، Tel: +9714 221 5555 هاتف : Dubai, UAE دبي، إ.ع.م ، P.O. Box 67 ص.ب.
E-mail : info@dm.gov.ae / Website : www.dm.gov.ae

Water Quality

HITACHI
Inspire the Next



HITACHI
Inspire the Next



COMPACT TYPE MEMBRANE UNIT (C-MBR)

Sewage Treatment System
HPT's Technologies : Membrane System

HITACHI
Inspire the Next

Compact Type Membrane Unit

- Capacity : 250;500;750 m^3/day
- Substance treated : BOD,SS
- Application:

  - Labor camps, Small community, Compound, Resort Hotel

  - Less Civil work
  - Easy to Displacement
  - Easy to Dismantle

Components of MBR Compact Unit

HITACHI
Inspire the Next

Fine screen

Solids in raw water are removed by an automatic screen to extend membrane life.

MBR tank

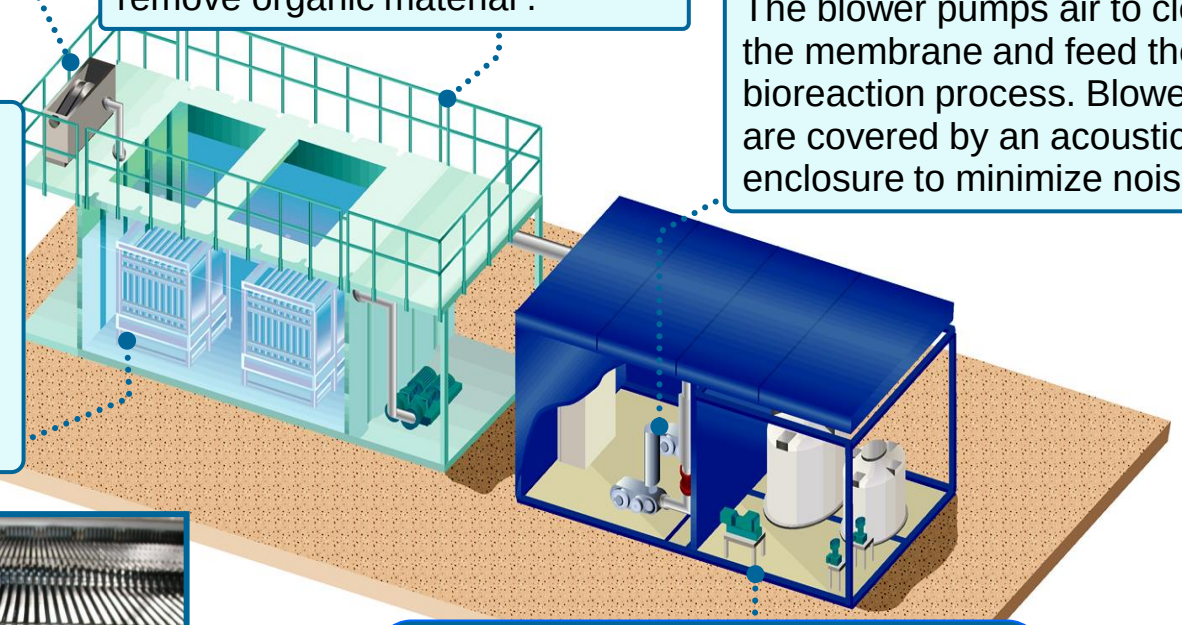
The membrane is immersed in activated sludge in the aeration tank. Microorganisms in the activated sludge digest and remove organic material .

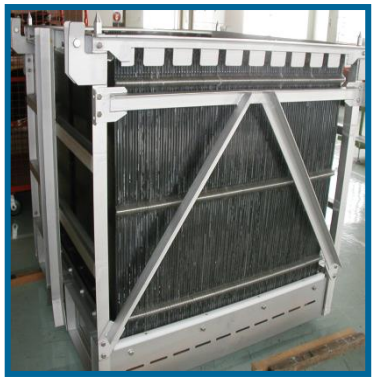
Membrane unit

Activated sludge is filtered using a flat sheet membrane and the extracted treated sewage effluent is pumped to tanks prior to disposal. The membrane is produced in Japan by Hitachi using patented manufacturing techniques.

Blower

The blower pumps air to clean the membrane and feed the bioreaction process. Blowers are covered by an acoustic enclosure to minimize noise



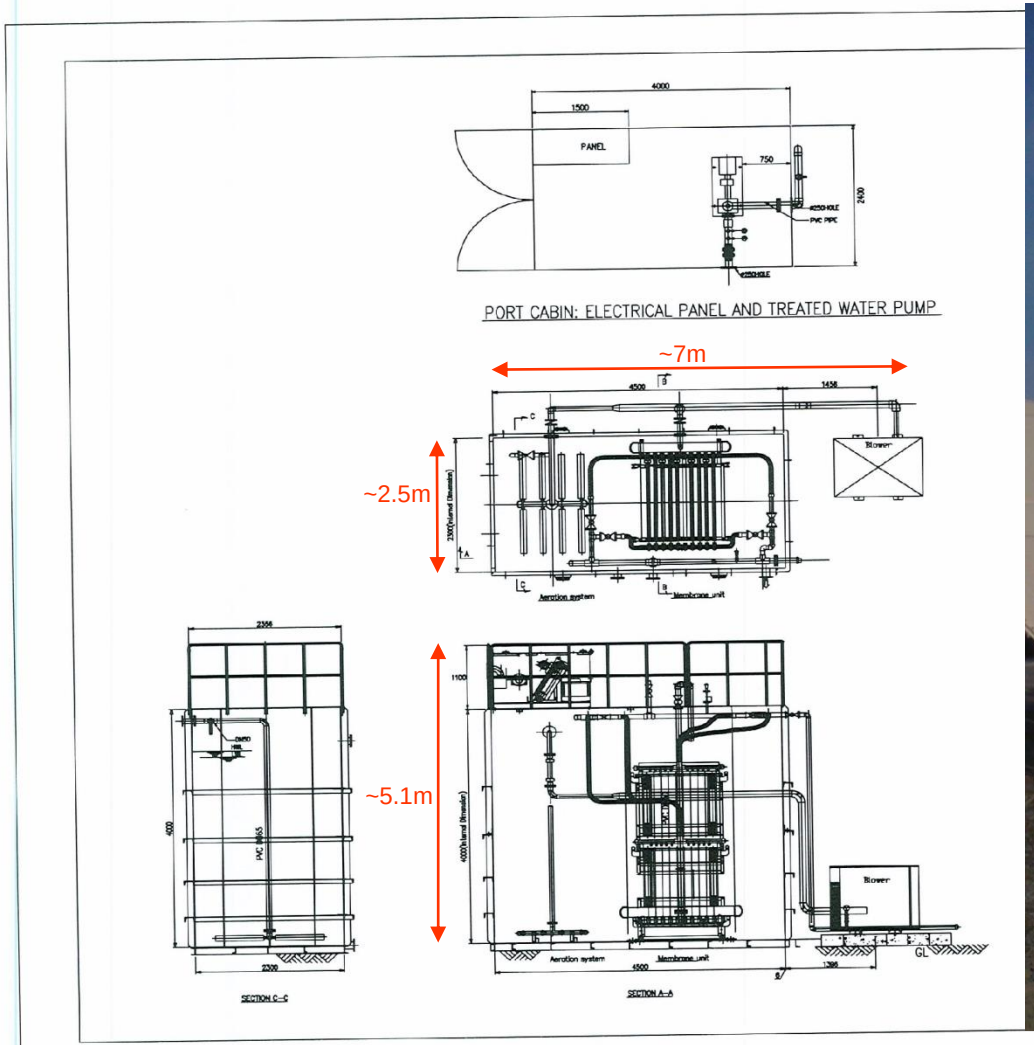


Chemical cleaning unit

A dosing chemical (Sodium hypochlorite) is used for membrane cleaning. Dosing frequency is approx once per 2 to 3 months, depending on the condition of the raw water and the throughput volume.

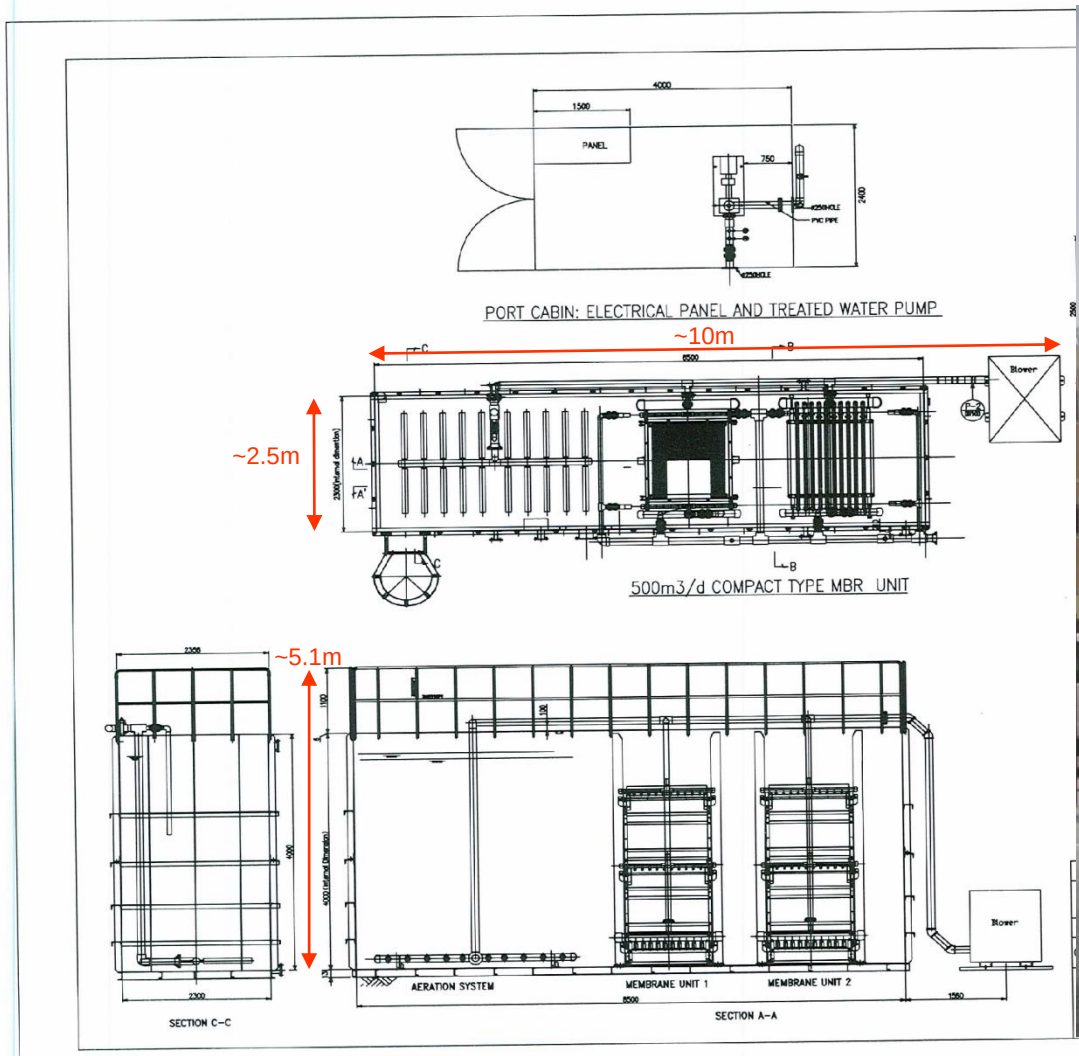
Compact MBR: 250 m3/day-Lay Out Plan

HITACHI
Inspire the Next



Compact MBR: 500 m3/day-Lay Out Plan

HITACHI
Inspire the Next



Compact MBR: 750 m3/day-Lay Out Plan

HITACHI
Inspire the Next

PORT CABIN: ELECTRICAL PANEL AND TREATED WATER PUMP

~10m

~2.5m

~6.4m

750m3/d COMPACT TYPE MBR UNIT

SECTION C–C

SECTION A–A

TREATED WATER TANK
10,000 GALLON

TREATED WATER TANK
10,000 GALLON

TREATED WATER TANK
10,000 GALLON

SLUDGE STORAGE TANK
5,000 GALLON

DWN	–	12.06.08	PROJECTION	TITLE: 750m3/day MBR SEWAGE TREATMENT PLANT GENERAL LAYOUT PLAN HRM – SARCO M&E CAMP JABEL ALI
CHKD	–	–		
APPD	–	–	SCALE 1:30	REGD.
CONT. No.		PAGE		REV
Hitachi Plant Technologies Tokyo Japan			DWG.NO. FOR REFERENCE	PAGE –

AL SUWAIDI Labor Camp - AL QUOZ

HITACHI
Inspire the Next

500 m3/day x 3 units

AL SUWAIDI SYSTEM Labor Camp - AL QUOZ

HITACHI
Inspire the Next

AL SUWAIDI FARHAN Labor Camp - AL QUOZ

HITACHI
Inspire the Next

SAMSUNG Labor Camp – Jebel Ali

HITACHI
Inspire the Next

250 m3/day x 1 unit

Water Reclamation Plant in Al Quoz, Dubai

HITACHI
Inspire the Next

Plant treatment capacity:
- MBR 1500m³/day
- RO 700m³/day (Product)
----Integrated Membrane System

750 m3/day x 2 units

What is “IMS” ?

HITACHI
Inspire the Next

Sewage

IMS Plant

MBR

RO

Treated Water

Agricultural Water

Landscaping Water

Industrial Water

-Make Up Water
Cooling towers
-Construction Use
-Concrete curing

Removals

SS, Virus, Bacteria, Coli form,
Agricultural chemicals, Organism, Ions

Excess sludge

Sludge Compost

RO Product Profile

HITACHI
Inspire the Next

High-quality treated water

Typical Salt Rejection for an MBR RO System

Ion	Concentration (ppm)		Ion	Concentration (ppm)	
	Feed	Product		Feed	Product
Ca	63.9	0.41	HCO3	193	6.3
Mg	18.2	0.12	SO4	235	1.96
Na	415	9.6	Cl	530	10.8
K	10.2	0.27	F	0.2	0.0028
Ba	0.0	0.0	NO3	17.5	1.03
Sr	0.0	0.0	SiO2	3.9	0.18
NH4	5.4	0.36			
TDS	1493	31.1	pH	6.1	5.5

Assumptions: 1). Recovery: 70%. 2). Feed water temperature: 25°C.

Why "IMS" ?

HITACHI
Inspire the Next

Merits of IMS

- High Quality Effluent
- Small Footprint
- No Odour, No Colour
- High Efficiency, Energy & Cost Saving
- Easy Operation & Maintenance

Core Technologies of IMS : "HITACHI MBR" System

HITACHI
Inspire the Next

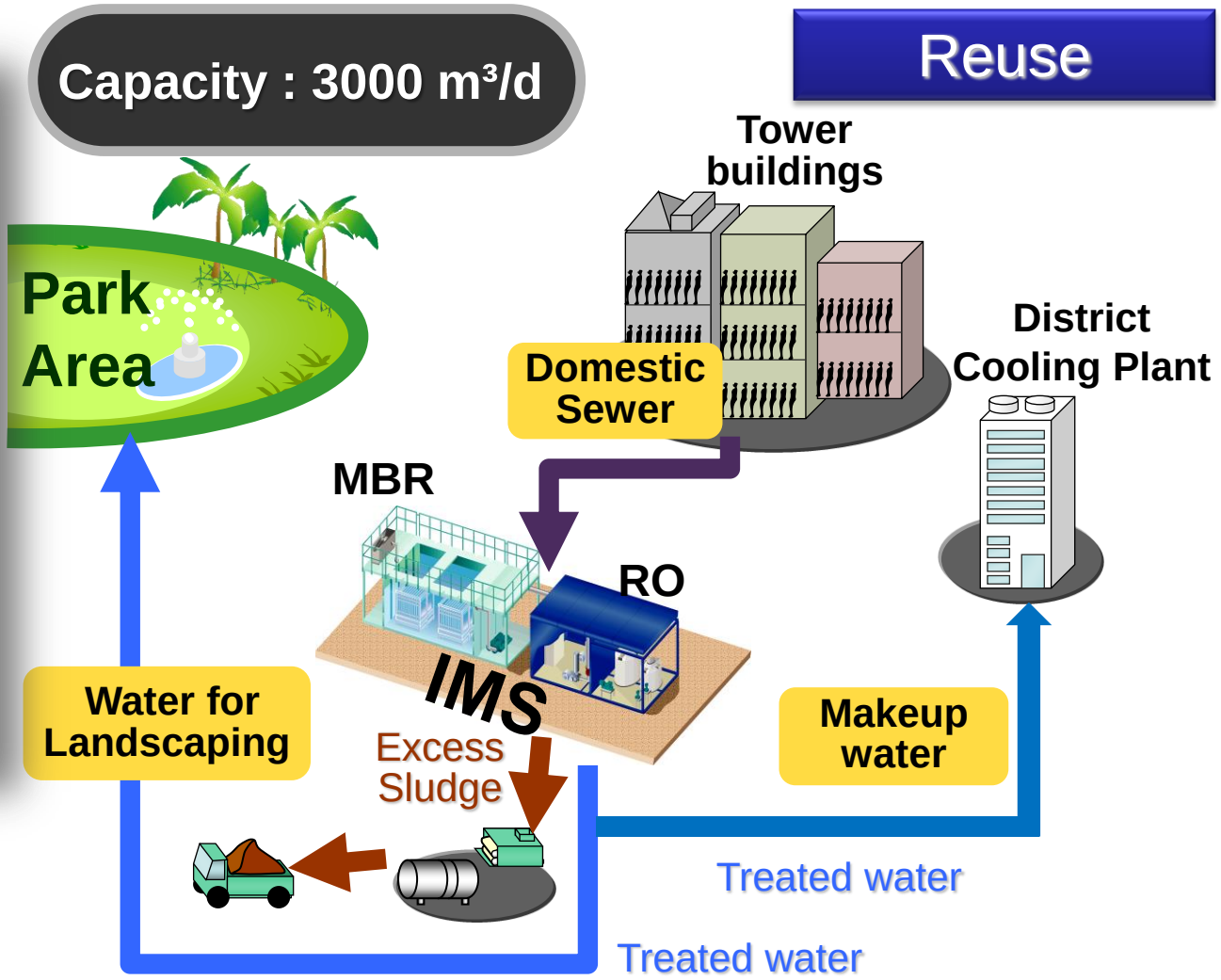
III. New Business Model of Water Re-use (Dubai Case)

IMS Experiences in Dubai, UAE

HITACHI
Inspire the Next

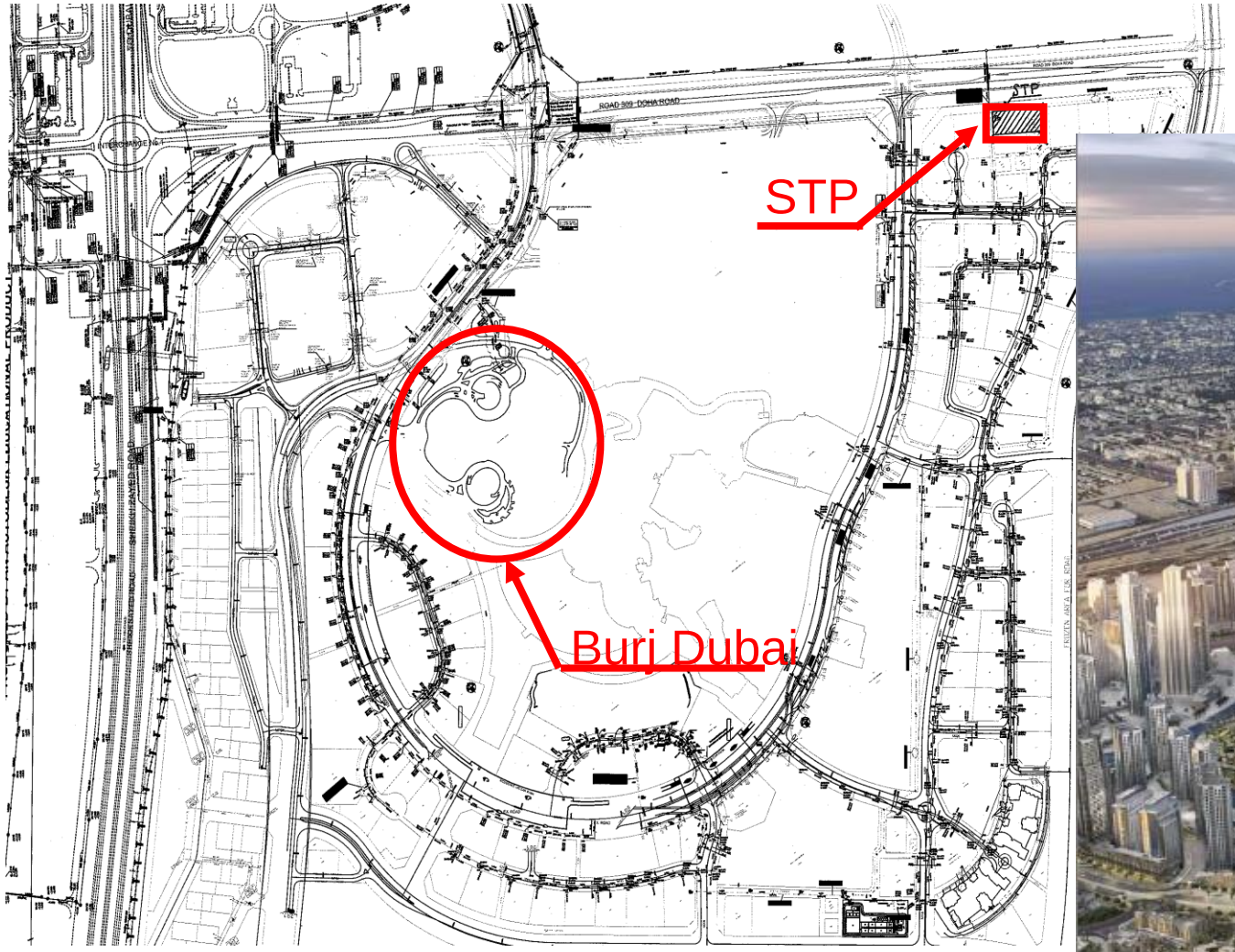
Make up Water for District Cooling and Landscaping for Burj Dubai

Burj Dubai



Burj Dubai Development

HITACHI
Inspire the Next



Burj Dubai Development-Site pictures

HITACHI
Inspire the Next

Burj Dubai Development-Site pictures

HITACHI
Inspire the Next

Burj Dubai Development-Site pictures

HITACHI
Inspire the Next

MBR TANK ASSEMBLY

AIR DIFFUSION PIPE

FINE SCREEN (DRUM TYPE)

Burj Dubai Development-Site pictures

HITACHI
Inspire the Next

TSE WATER PUMP

MBR TNK and BLOWER

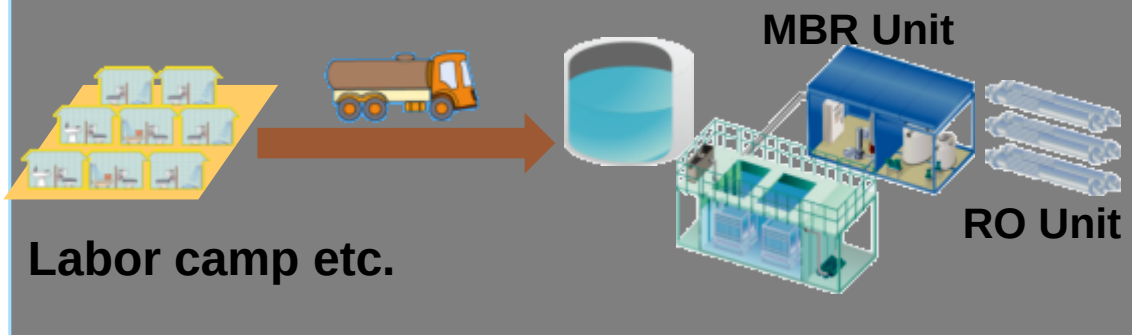
TSE WATER TANK

Water Re-Use Business in Dubai

HITACHI
Inspire the Next

❖Business Model

Wastewater collection → **Waste Water Treatment (IMS)** → **Sales of reuse water**



- MBR water: •Irrigation water •Make Up Water
- RO water: •Cement water •Industrial water

❖LLC Establishment (2008)

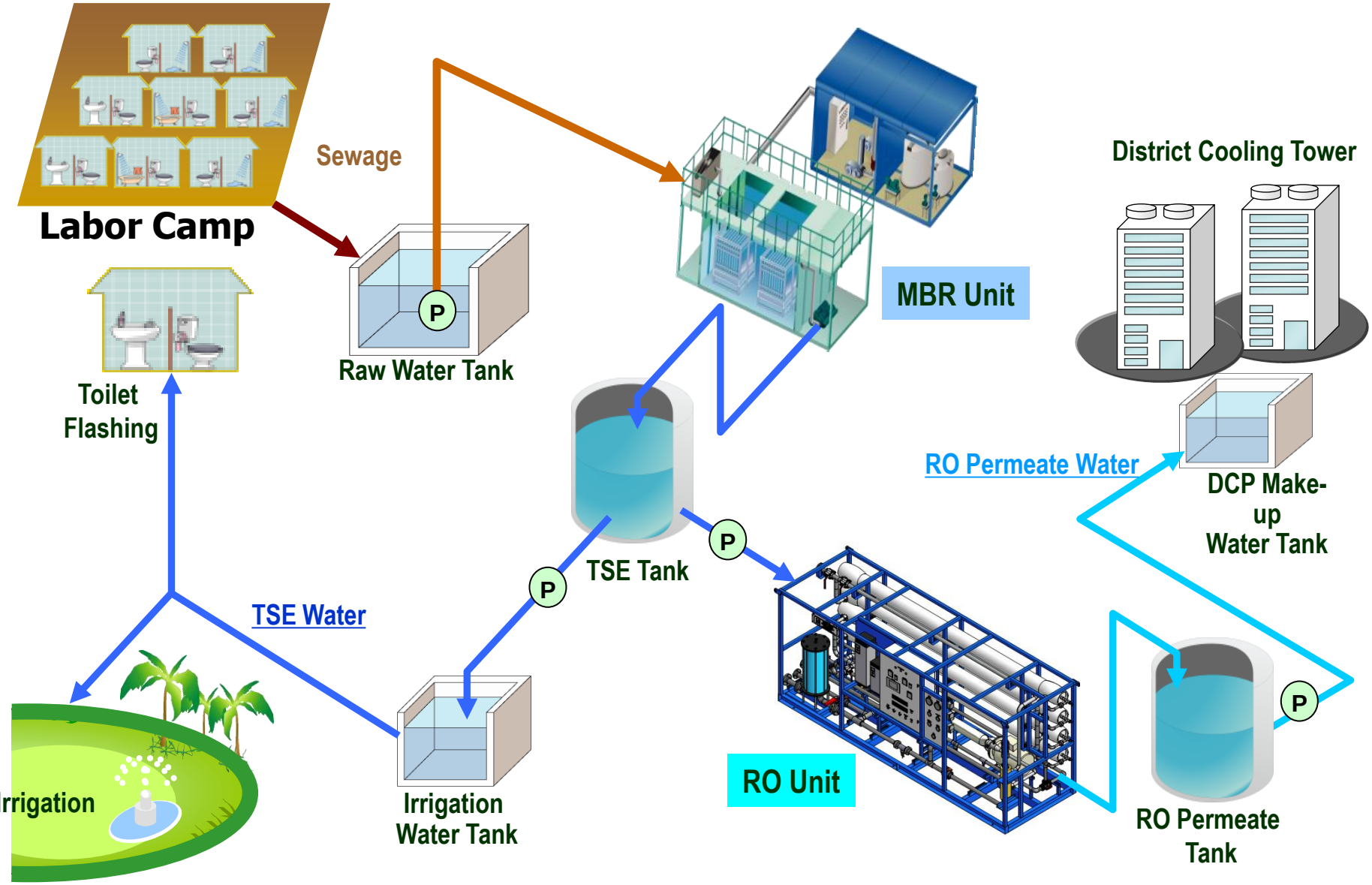
Hitachi Plant Technologies 49%

Al Ghurair Group 51%

"Hi Star Water Solutions LLC" (HSWS)

Application of MBR + Polished RO Plant

HITACHI
Inspire the Next



SUPPLY RECORD

HITACHI
Inspire the Next

Project	Client	Place	Capacity (m^3/d)
MBR Compact Unit + RO polishing Plant	Emaar	Burj Dubai	MBR 500 x 6 units RO 1000 x 3 units
MBR Compact Unit + RO polishing Plant	Hi Star Water Solution	Al Quoz	MBR 750 x 2 units RO 500 x 2 units
MBR Compact Unit for Labor Camp	Shimizu Corporation	Jebel Ali	250 x 1unit
O&M for MBR Compact Unit for Labor Camp	Humaid Al Suwaidi Real Estate (6500 m3/day plant in one location)	Al Quoz	500 x 17 units
MBR Compact Unit for Labor Camp	Humaid Al Suwaidi Real Estate	Al Quoz	500 x 10 units
MBR Compact Unit for Labor Camp	Samsung Corporation	Jebel Ali	250 x 1unit
MBR Compact Unit for Labor Camp	ETA – ASCON Group Co.	Jebel Ali	250 x 1unit
MBR Compact Unit for Labor Camp	Humaid Al Suwaidi Real Estate	Al Quoz	500 x 7 units
MBR Compact Unit for Labor Camp	Arabian Construction Company	Jebel Ali	250 x 1unit

250 m3/day : 4 units ; 500 m3/day : 40 units ; 750 m3/day : 2 units ; Total Capacity : 22,500 m3/day

HITACHI
Inspire the Next

Thank you