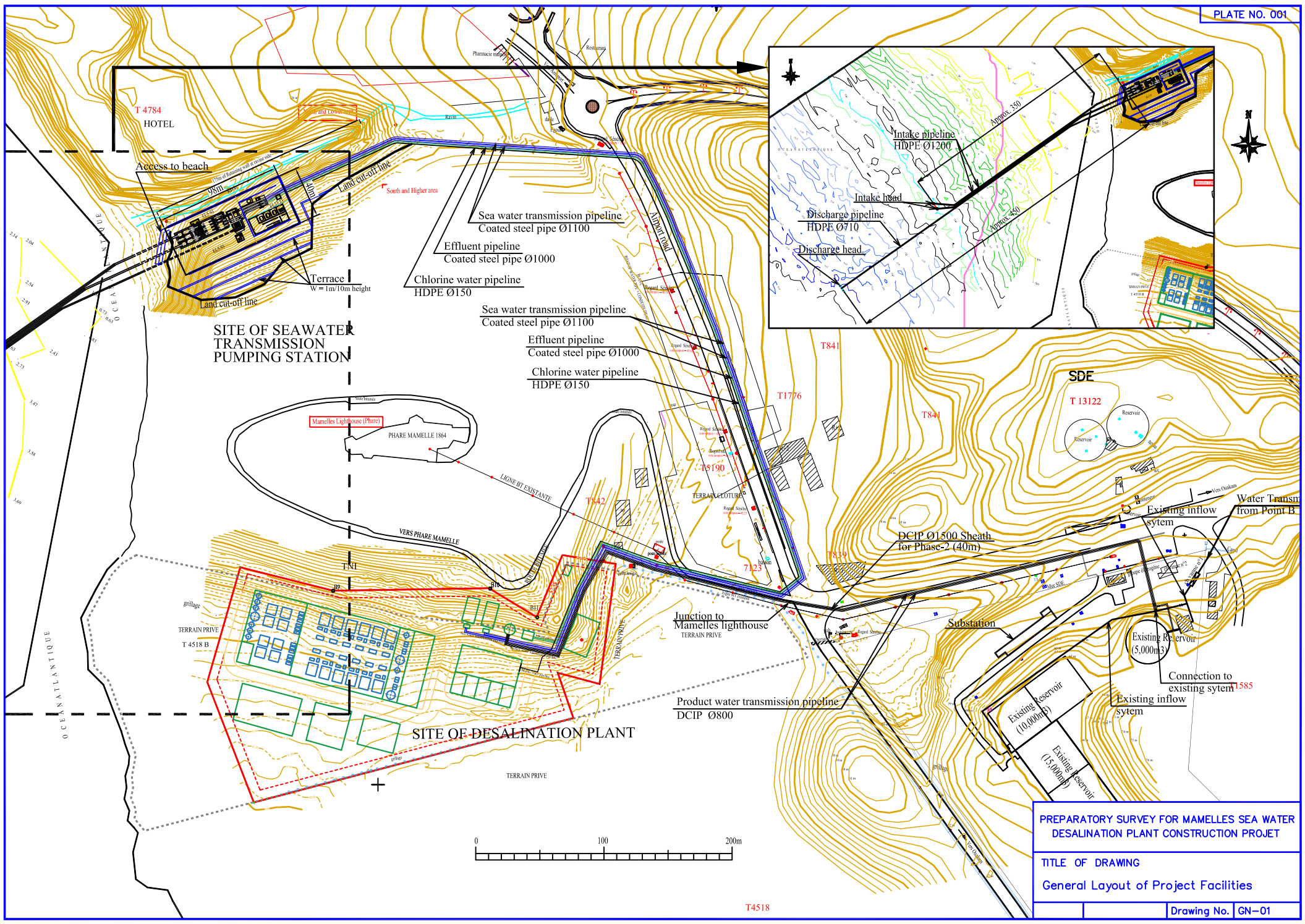


## Appendix 5

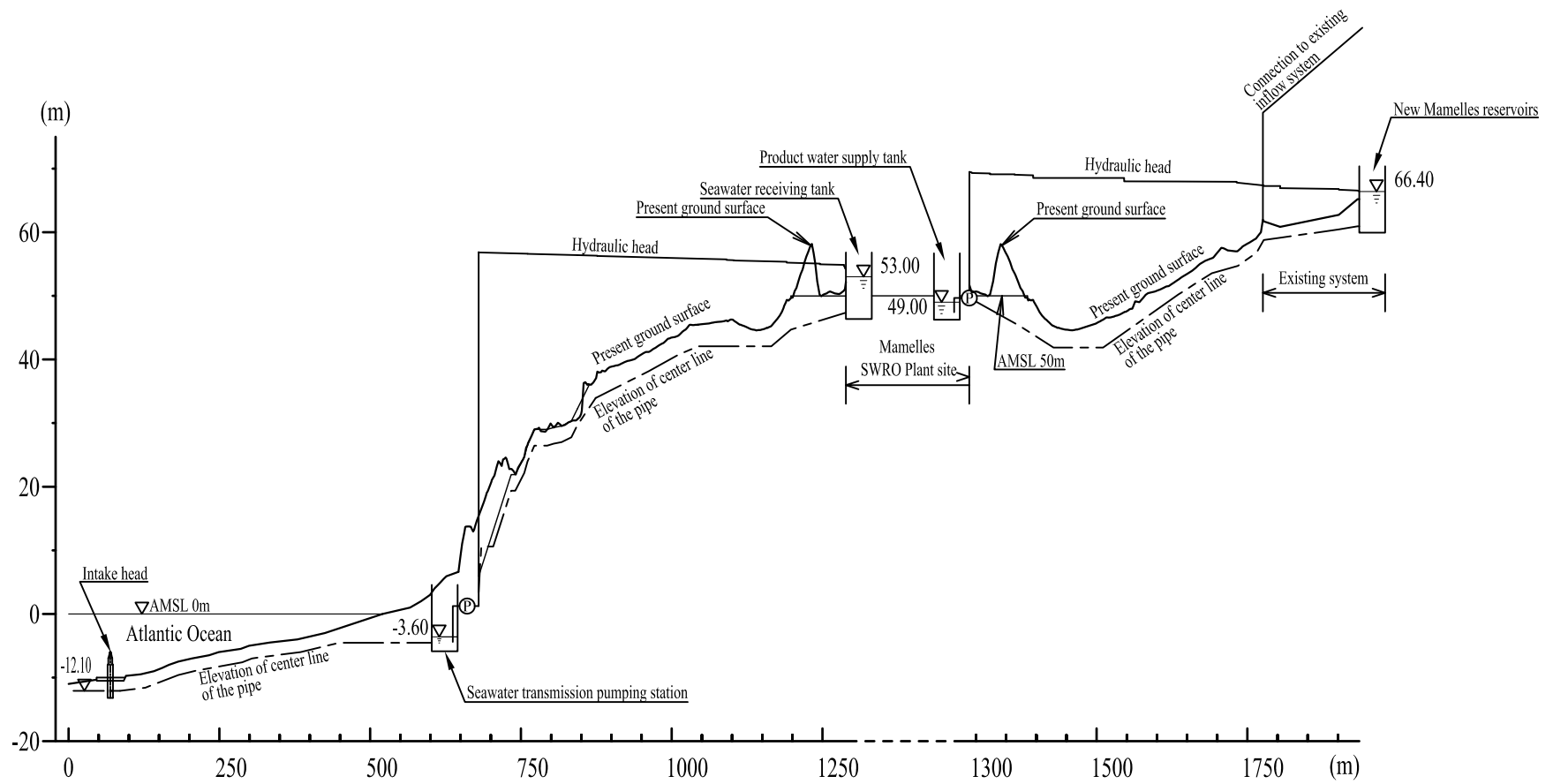
### Appendix 5-1 Drawings

#### List of Drawings

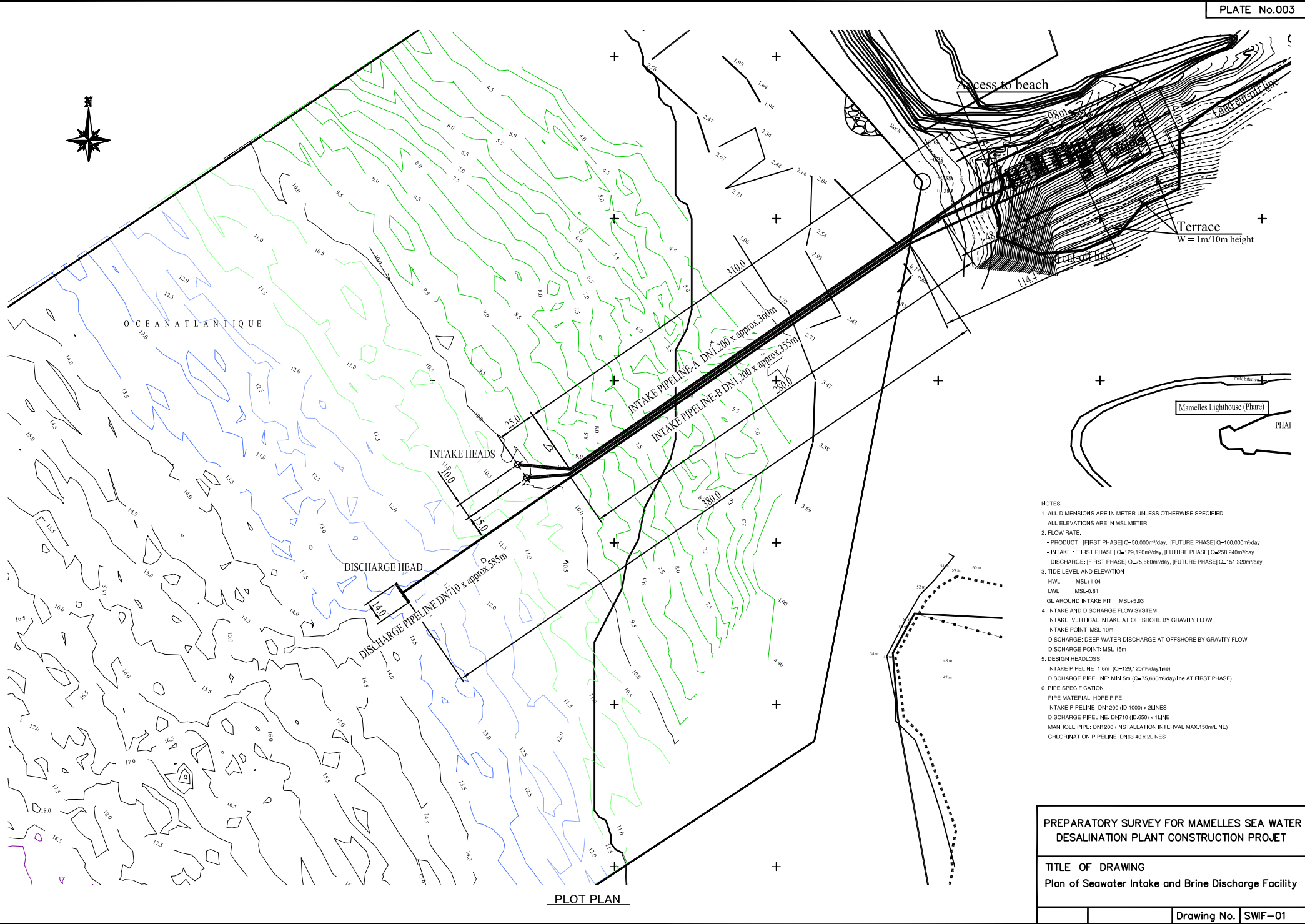
Plate No.	Drawing No.	Title
<b>A. GENERAL</b>		
001	GN-01	Layout of Project facilities
002	GN-02	Hydraulic Diagram
<b>B. Seawater Intake and Brine Discharge Facility</b>		
003	SWIF-01	Plan of Seawater Intake and Brine Discharge Facility
004	SWIF-02	Profile of Seawater Intake Pipeline
005	SWIF-03	Profile of Brine Discharge Pipeline (Seawater Transmission Pumping Station to Discharge Head)
<b>C. Seawater Transmission Pumping Station</b>		
006	SWTPS-01	Site plan of Seawater Transmission Pumping Station
007	SWTPS-02	Layout of Seawater Transmission Pumping Station
<b>D. Seawater Desalination Plant</b>		
008	SWDP-GN	Layout of Seawater Desalination Plant
009	SWDP-PFD-01	Process Flow Diagram (1/5): Pretreatment section
010	SWDP-PFD-02	Process Flow Diagram (2/5): Reverse Osmosis section
011	SWDP-PFD-03	Process Flow Diagram (3/5): Post-treatment section
012	SWDP-PFD-04	Process Flow Diagram (4/5): Waste water treatment plant
013	SWDP-PFD-05	Process Flow Diagram (5/5): Sewage treatment system
014	SWDP-LL	Land leveling
<b>E. Sea Water Transmission Pipeline</b>		
015	SWTP-P-01	Profile (1/4)
016	SWTP-P-02	Profile (2/4)
017	SWTP-P-03	Profile (3/4)
018	SWTP-P-04	Profile (3/4)
<b>F. Product Water Transmission Pipeline</b>		
019	PWTP-P-01	Profile (1/3)
020	PWTP-P-02	Profile (2/3)
021	PWTP-P-03	Profile (3/3)
<b>G. Brine Discharge Pipeline (Effluent Tank to Seawater Transmission Pumping Station)</b>		
022	BDP-P-01	Profile (1/4)
023	BDP-P-02	Profile (2/4)
024	BDP-P-03	Profile (3/4)
025	BDP-P-04	Profile (4/4)



PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJET	
TITLE OF DRAWING General Layout of Project Facilities	
Drawing No.	GN-01



PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJET	
TITLE OF DRAWING Hydraulic Diagram	
Drawing No.	GN-02

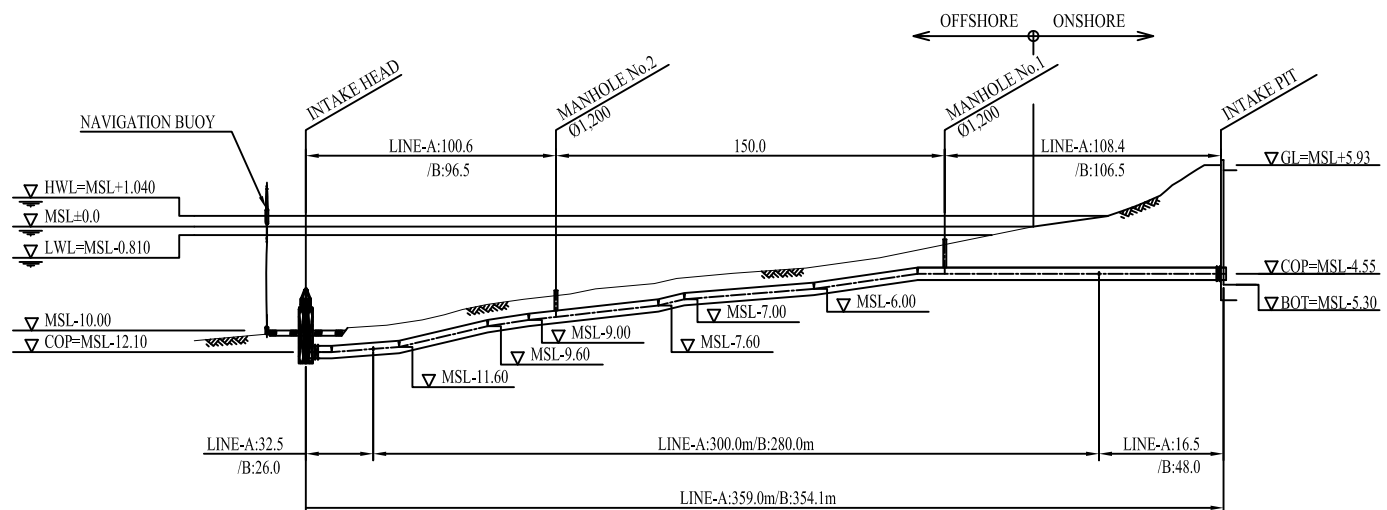
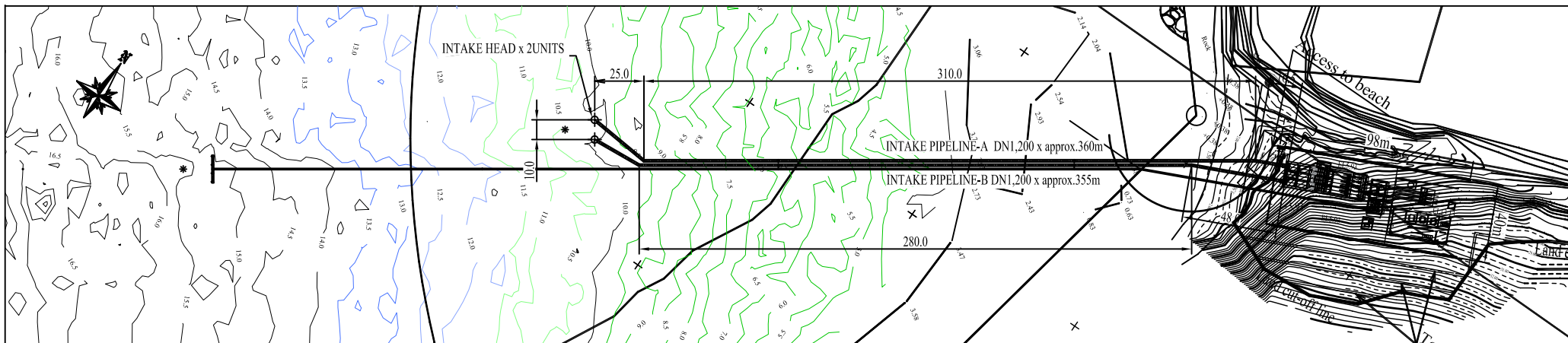


- NOTES:
- ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE SPECIFIED.  
ALL ELEVATIONS ARE IN MSL METER.
  - FLOW RATE:
    - PRODUCT : (FIRST PHASE) Q≈50,000m<sup>3</sup>/day, [FUTURE PHASE] Q≈100,000m<sup>3</sup>/day
    - INTAKE : (FIRST PHASE) Q≈129,120m<sup>3</sup>/day, [FUTURE PHASE] Q≈258,240m<sup>3</sup>/day
    - DISCHARGE : (FIRST PHASE) Q≈75,660m<sup>3</sup>/day, [FUTURE PHASE] Q≈151,320m<sup>3</sup>/day
  - TIDE LEVEL AND ELEVATION
    - HWL MSL+1.04
    - LWL MSL-0.81
    - QL AROUND INTAKE PIT MSL-5.93
  - INTAKE AND DISCHARGE FLOW SYSTEM
    - INTAKE: VERTICAL INTAKE AT OFFSHORE BY GRAVITY FLOW
    - INTAKE POINT: MSL-10m
    - DISCHARGE: DEEP WATER DISCHARGE AT OFFSHORE BY GRAVITY FLOW
    - DISCHARGE POINT: MSL-15m
  - DESIGN HEADLOSS
    - INTAKE PIPELINE: 1.6m (Q≈129,120m<sup>3</sup>/day/line)
    - DISCHARGE PIPELINE: MIN.5m (Q≈75,660m<sup>3</sup>/day/line AT FIRST PHASE)
  - PIPE SPECIFICATION
    - PIPE MATERIAL: HDPE PIPE
    - INTAKE PIPELINE: DNI 200 (ID.1000) x 2LINES
    - DISCHARGE PIPELINE: DNI 10 (ID.650) x 1LINE
    - MANHOLE PIPE: DNI 200 (INSTALLATION INTERVAL MAX.150m/LINE)
    - CHLORINATION PIPELINE: DN63-40 x 2LINES

PLOT PLAN

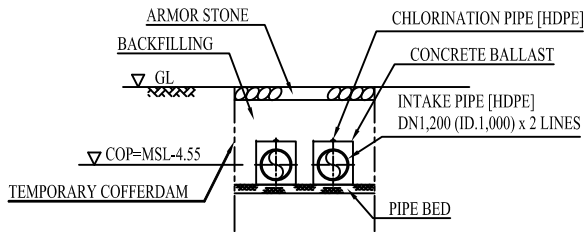
PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJ	
TITLE OF DRAWING Plan of Seawater Intake and Brine Discharge Facility	
Drawing No.	SWIF-01



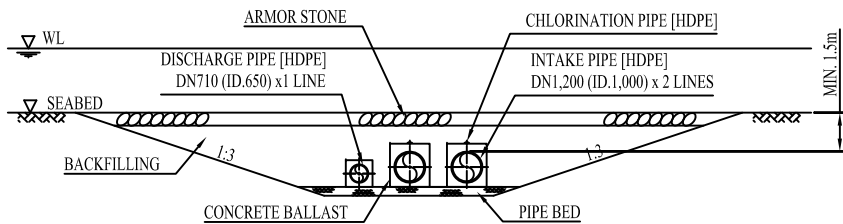


LONGITUDINAL SECTION

- NOTES:
1. ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE SPECIFIED.
  2. ALL ELEVATIONS ARE IN MSL METER.
  3. FLOW RATE:
    - INTAKE (FIRST PHASE) Q=129,120m<sup>3</sup>/day, (FUTURE PHASE) Q=258,240m<sup>3</sup>/day
  4. TIDE LEVEL AND ELEVATION
    - HWL    MSL+1.04
    - LWL    MSL-0.81
    - GL AROUND INTAKE PIT    MSL+5.93
  5. PIPE SPECIFICATION
    - PIPE MATERIAL: HDPE PIPE
    - INTAKE PIPELINE: DN1200 (ID.1000) x 2 LINES
    - MANHOLE PIPE: DN1200 (INSTALLATION INTERVAL MAX.150m/LINE)
    - CHLORINATION PIPELINE: DN63-40 x 2 LINES

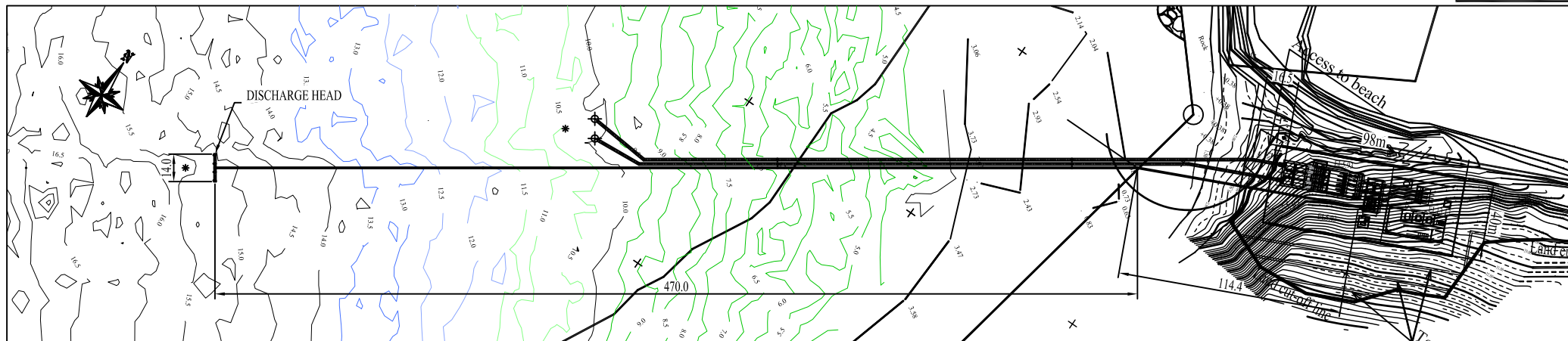


TYPICAL SECTION AT ONSHORE

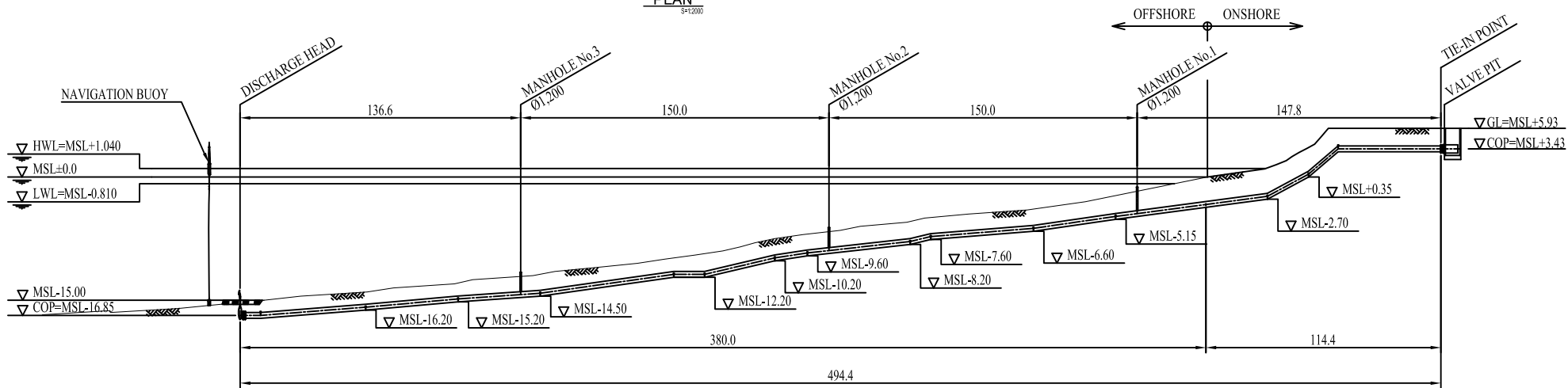


TYPICAL SECTION AT OFFSHORE

PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJCT	
TITLE OF DRAWING Profile of Seawater Intake Pipeline	
Drawing No.	SWIF-02

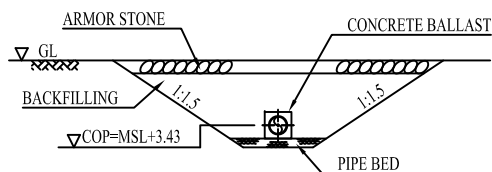


PLAN  
SP1/200

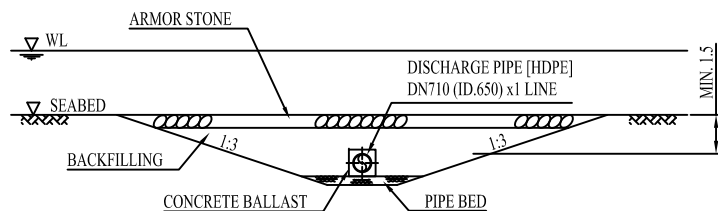


LONGITUDINAL SECTION

- NOTES:
- ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE SPECIFIED.  
ALL ELEVATIONS ARE IN MSL METER.
  - FLOW RATE:  
- DISCHARGE: (FIRST PHASE)  $Q=75,660\text{m}^3/\text{day}$ , (FUTURE PHASE)  $Q=151,320\text{m}^3/\text{day}$
  - TIDE LEVEL AND ELEVATION  
HWL MSL+1.04  
LWL MSL-0.81  
GL AROUND VALVE PIT MSL+5.93
  - PIPE SPECIFICATION  
PIPE MATERIAL: HDPE PIPE  
DISCHARGE PIPELINE: DN710 (ID.650) x 1 LINE  
MANHOLE PIPE: DN1200 (INSTALLATION INTERVAL MAX.150m/LINE)



TYPICAL SECTION AT ONSHORE

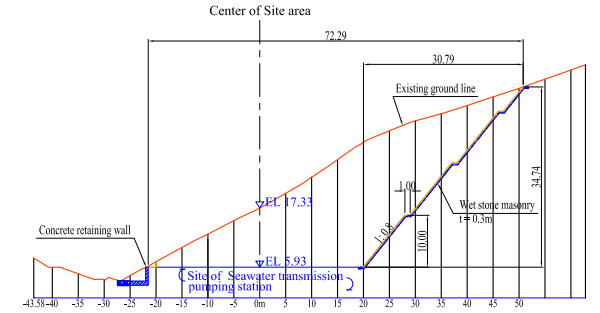
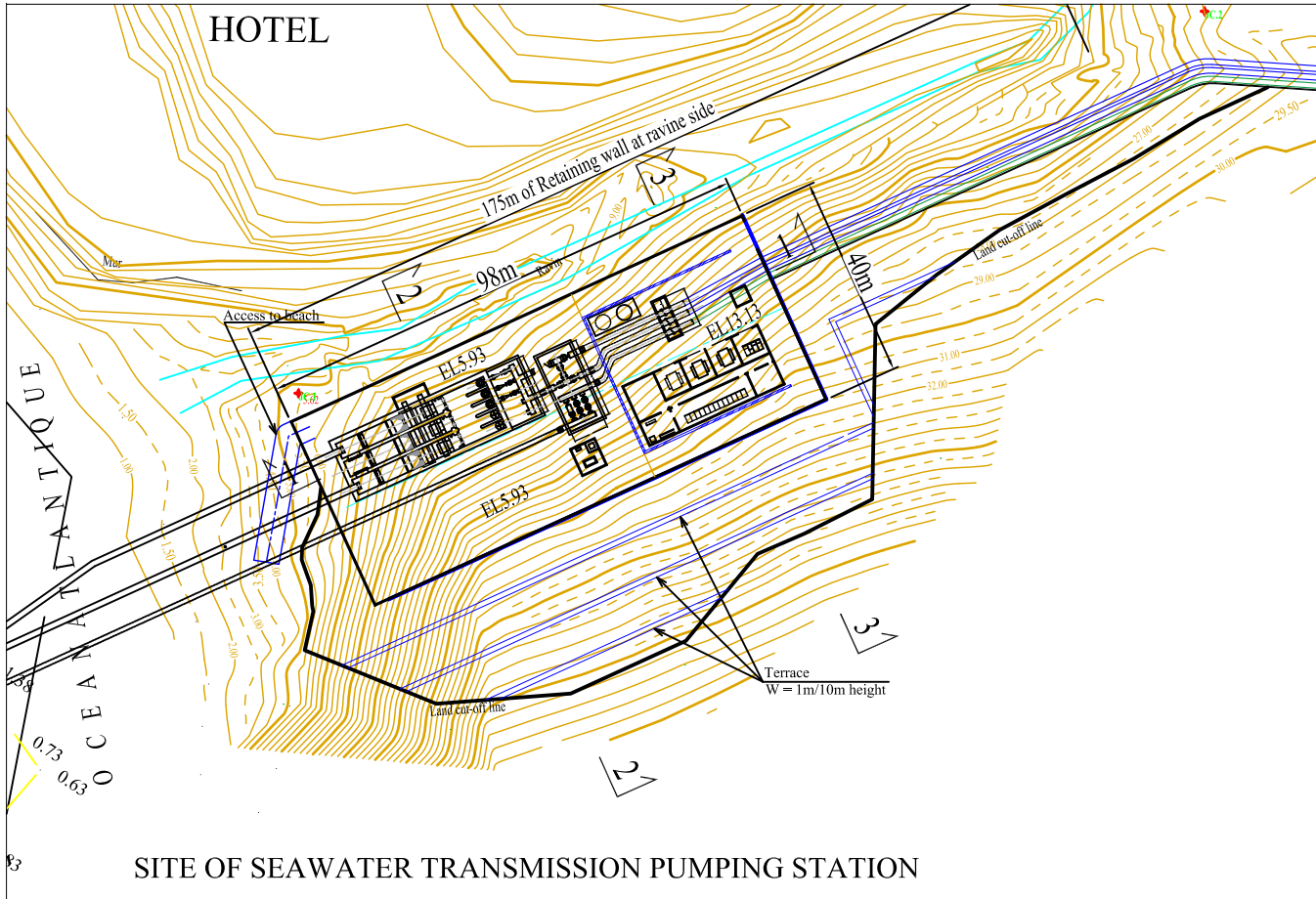


TYPICAL SECTION AT OFFSHORE

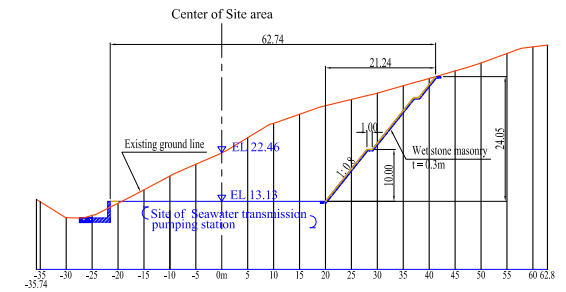
PREPARATORY SURVEY FOR MAMELLES SEA WATER  
DESALINATION PLANT CONSTRUCTION PROJET

TITLE OF DRAWING  
Profile of Brine Discharge Pipeline  
(Seawater Transmission Pumping Station to Discharge Head)

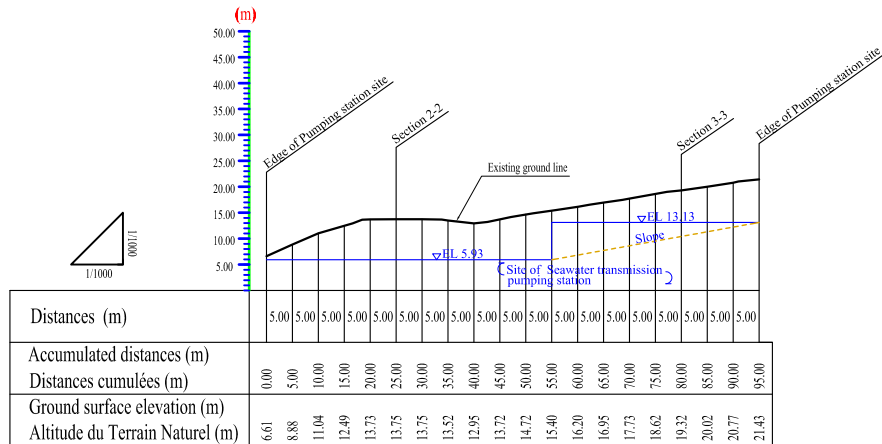
Drawing No. SWIF-03



Section 2-2



Section 3-3

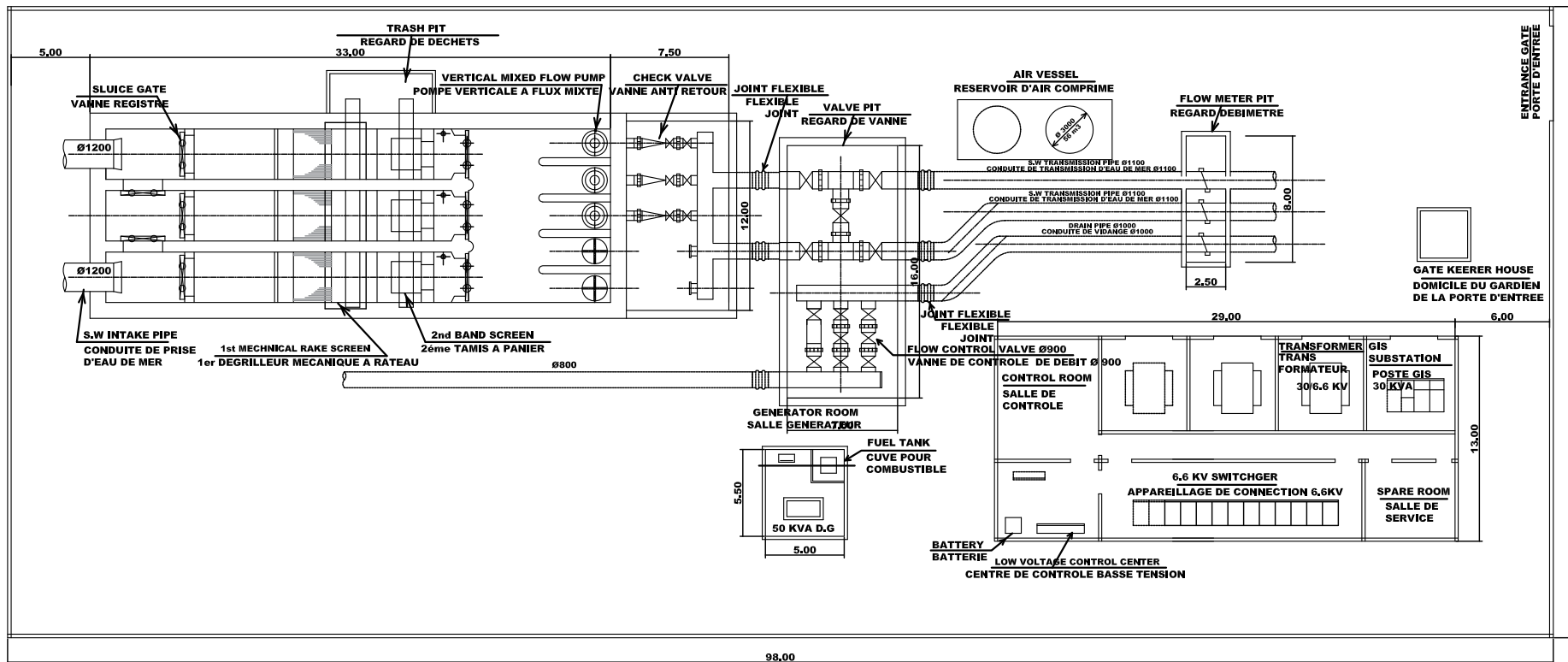


Section 1-1

PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJET

TITLE OF DRAWING  
Site plan of Seawater Transmission Pumping Station

Drawing No. SWTPS-01

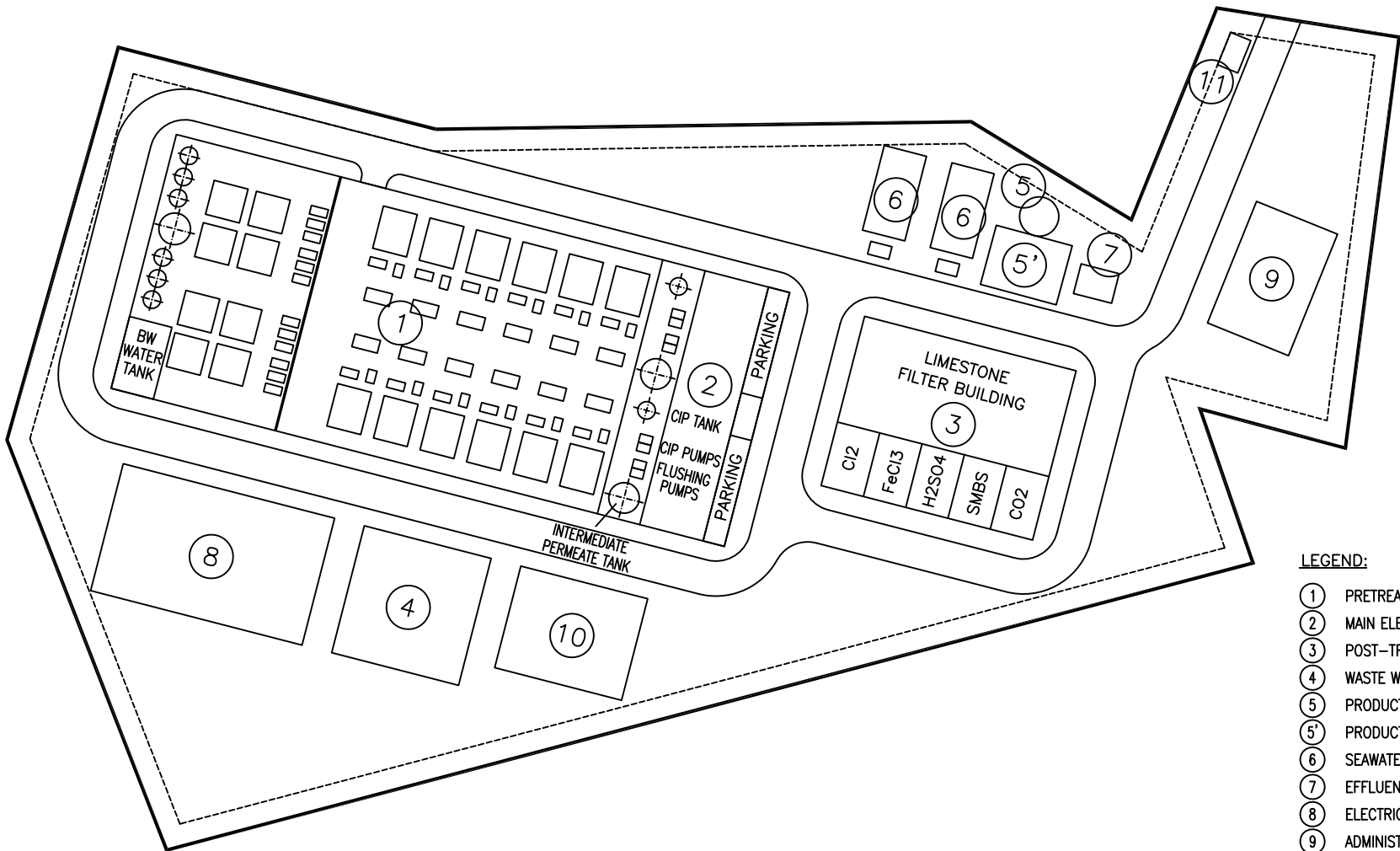


PREPARATORY SURVEY FOR MAMELLES SEA WATER  
DESALINATION PLANT CONSTRUCTION PROJCT

TITLE OF DRAWING  
Layout of Seawater Transmission Pumping Station

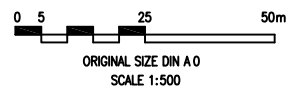
Drawing No. SWTPS-02





**LEGEND:**

- ① PRETREATMENT / RO-BUILDING
- ② MAIN ELECTRICAL BUILDING & CCR
- ③ POST-TREATMENT / CHEMICAL STORAGE
- ④ WASTE WATER & SLUDGE TREATMENT BUILDING
- ⑤ PRODUCT WATER SUPPLY TANK
- ⑤' PRODUCT WATER TRANSMISSION PUMPING STATION
- ⑥ SEAWATER RECEIVING TANK
- ⑦ EFFLUENT TANK
- ⑧ ELECTRICAL & SWITCHGEAR
- ⑨ ADMINISTRATION BUILDING
- ⑩ WORKSHOP & STORAGE BUILDING
- ⑪ MAIN GATE / GATE HOUSE



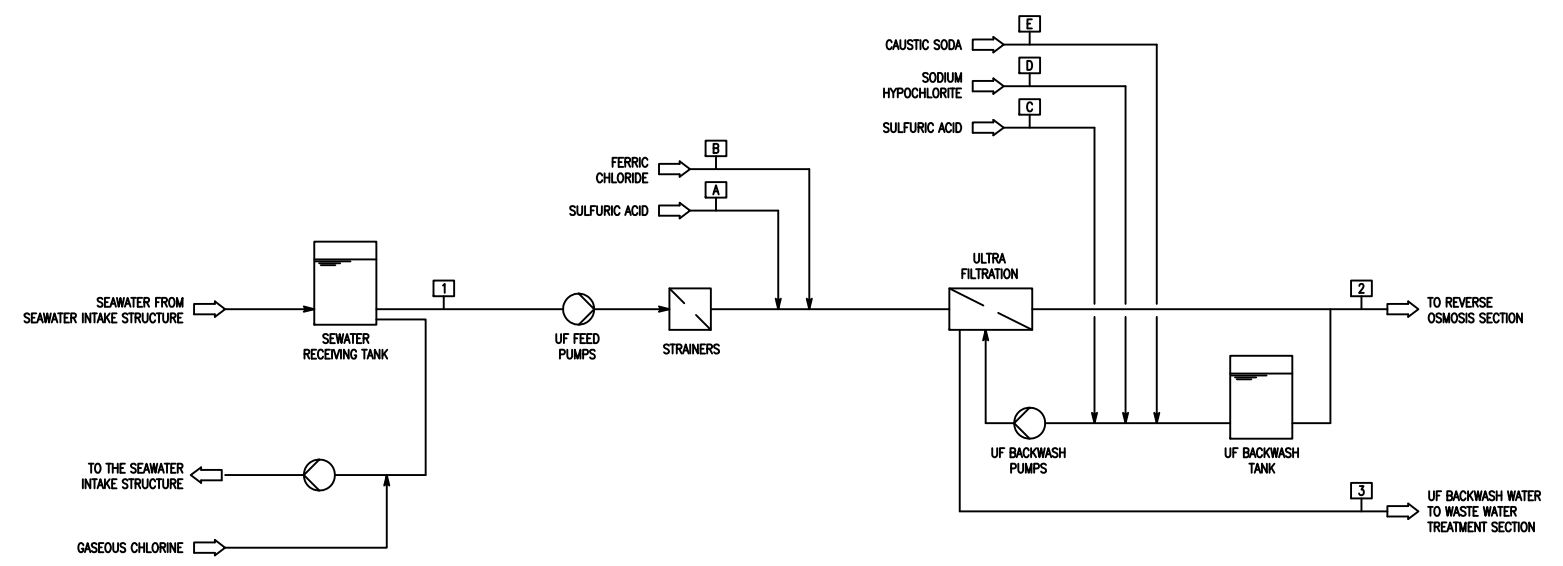
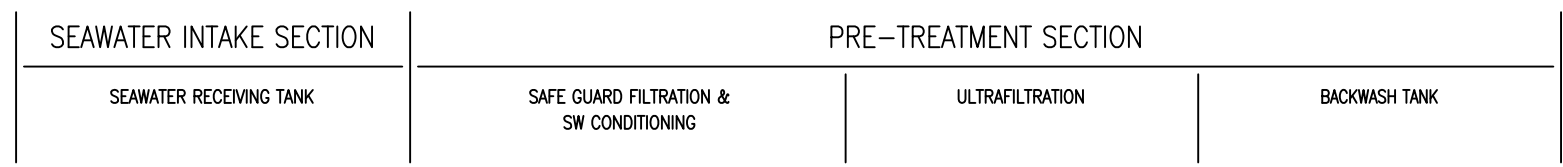
**NOTES:**

1. IF THE TREATED EFFLUENT IS IN ACCORDANCE WITH THE REQUIREMENTS IT WILL BE DISCHARGED TO THE SEA.
2. IF THE TREATED EFFLUENT IS NOT IN ACCORDANCE WITH IT WILL BE RETURNED TO THE PRE-TREATMENT SECTION.

PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJET

TITLE OF DRAWING  
Layout of Seawater Desalination Plant

Drawing No. SWDP-GN

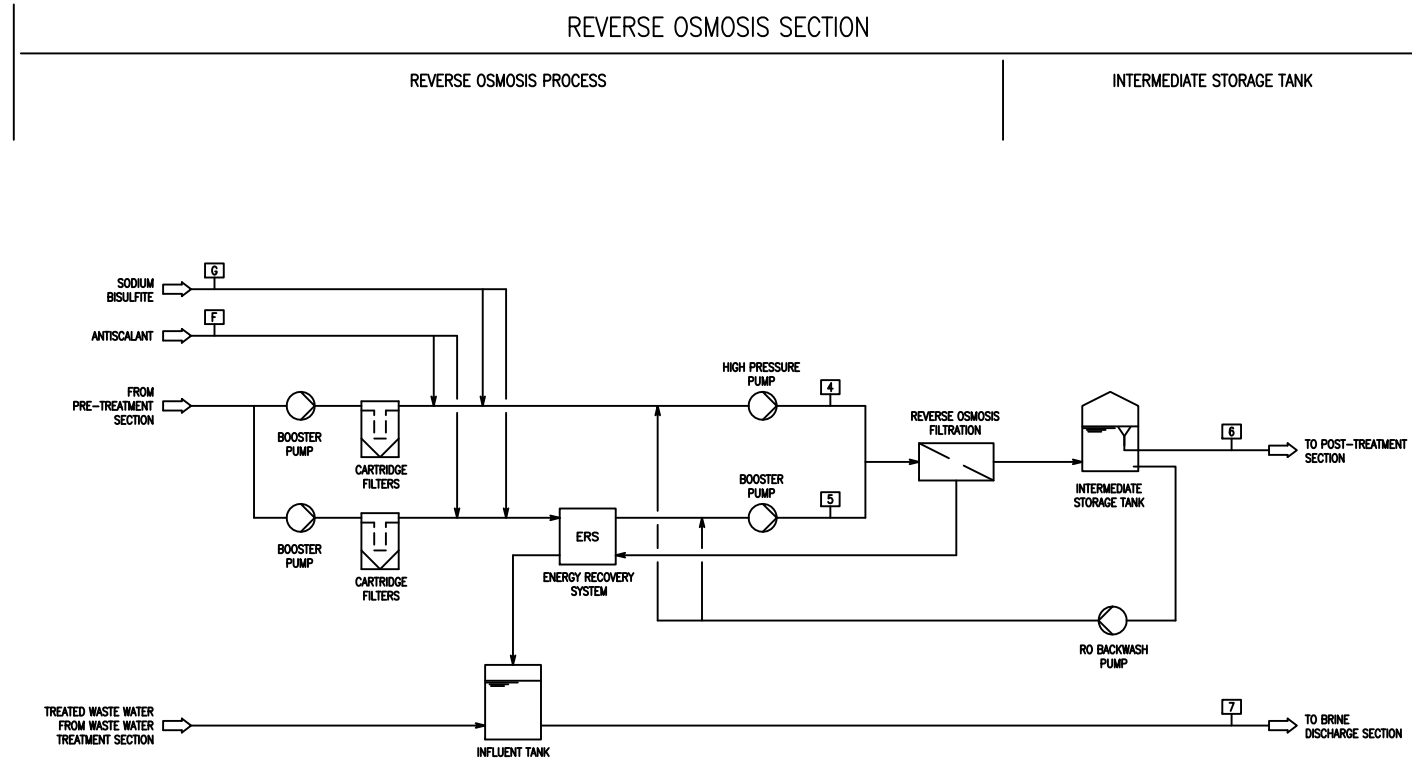


PREPARATORY SURVEY FOR MAMELLES SEA WATER  
DESALINATION PLANT CONSTRUCTION PROJET

TITLE OF DRAWING  
Process Flow Diagram (1/5)  
Pre-treatment section

Drawing No. SWDP-PFD-01

REVERSE OSMOSIS SECTION

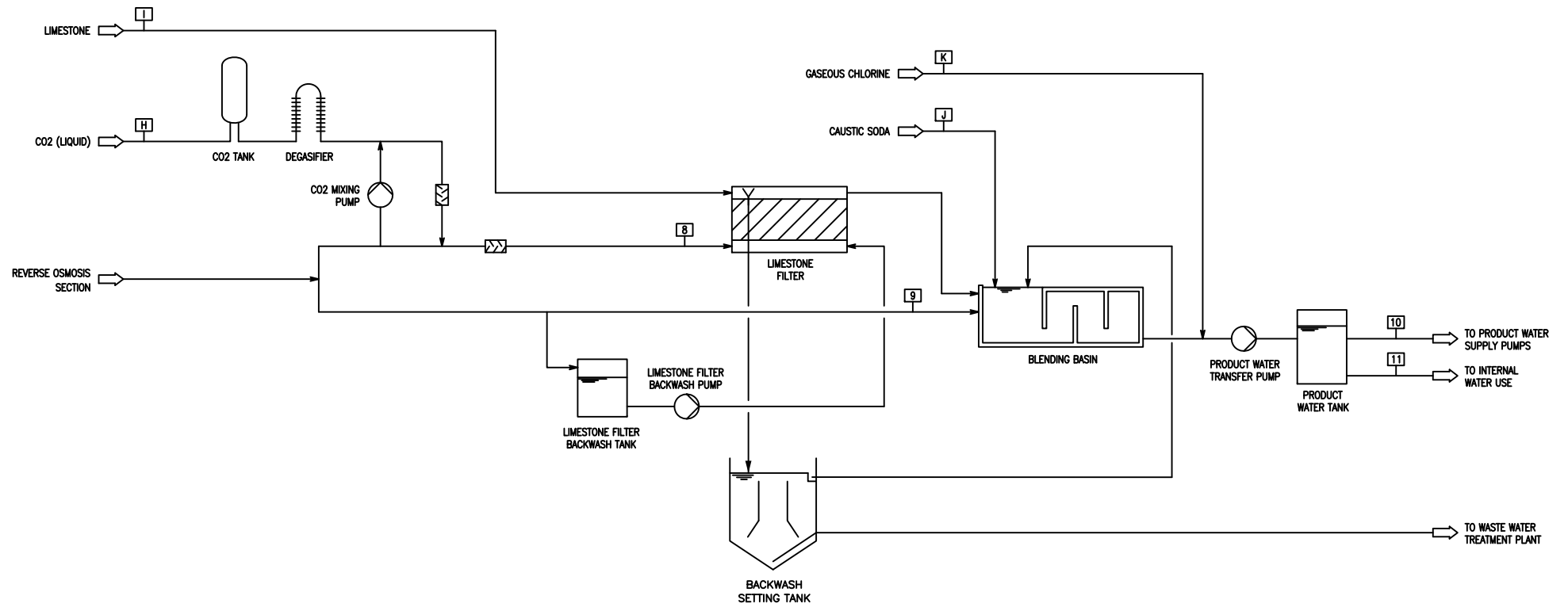


PREPARATORY SURVEY FOR MAMELLES SEA WATER  
DESALINATION PLANT CONSTRUCTION PROJCT

TITLE OF DRAWING  
Process Flow Diagram (2/5)  
Reverse Osmosis Section

Drawing No. SWDP-PFD-02

### POST-TREATMENT SECTION

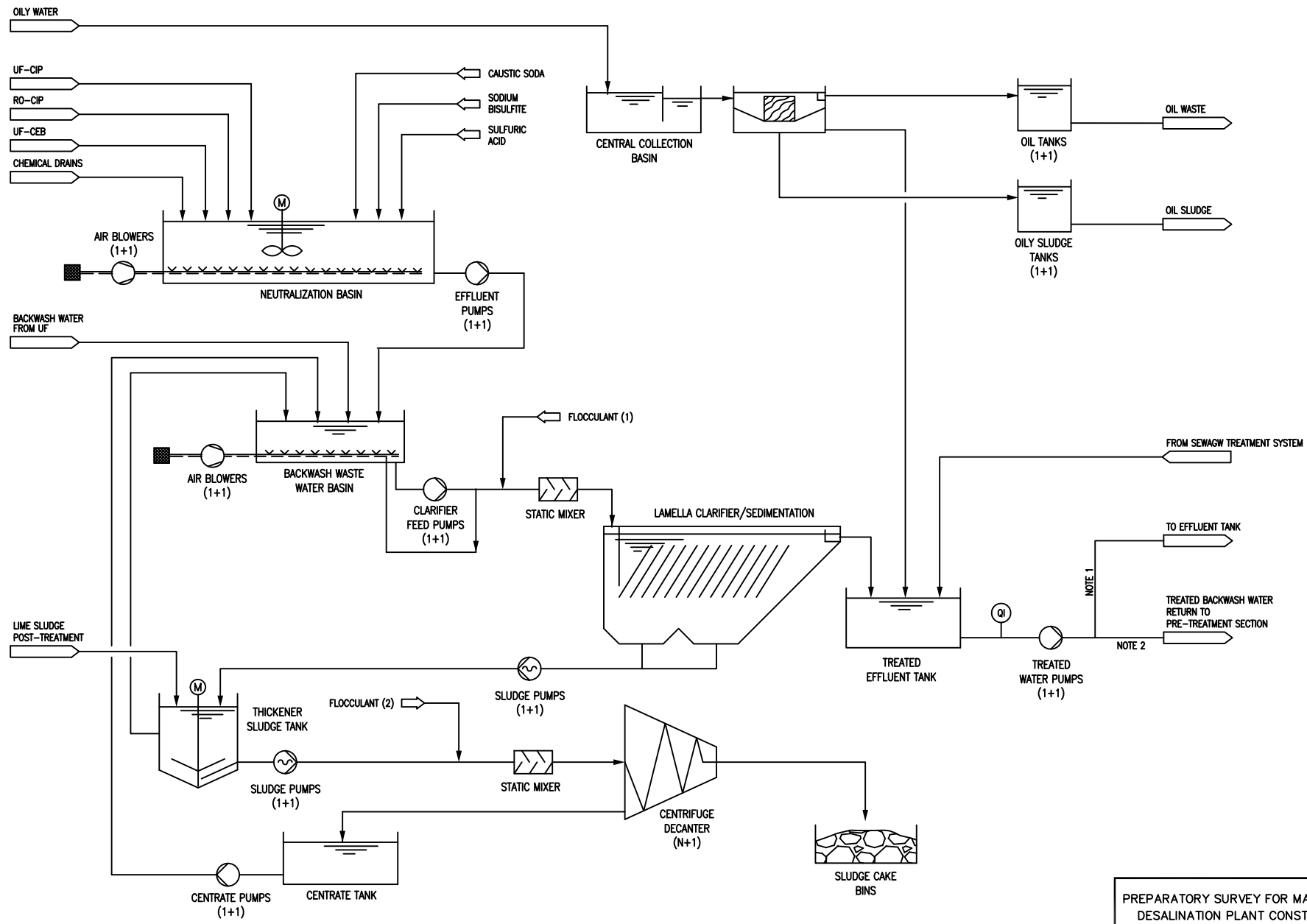


PREPARATORY SURVEY FOR MAMELLES SEA WATER  
DESALINATION PLANT CONSTRUCTION PROJET

TITLE OF DRAWING  
Process Flow Diagram (3/5)  
Post-treatment Section

Drawing No.	SWDP-PFD-03
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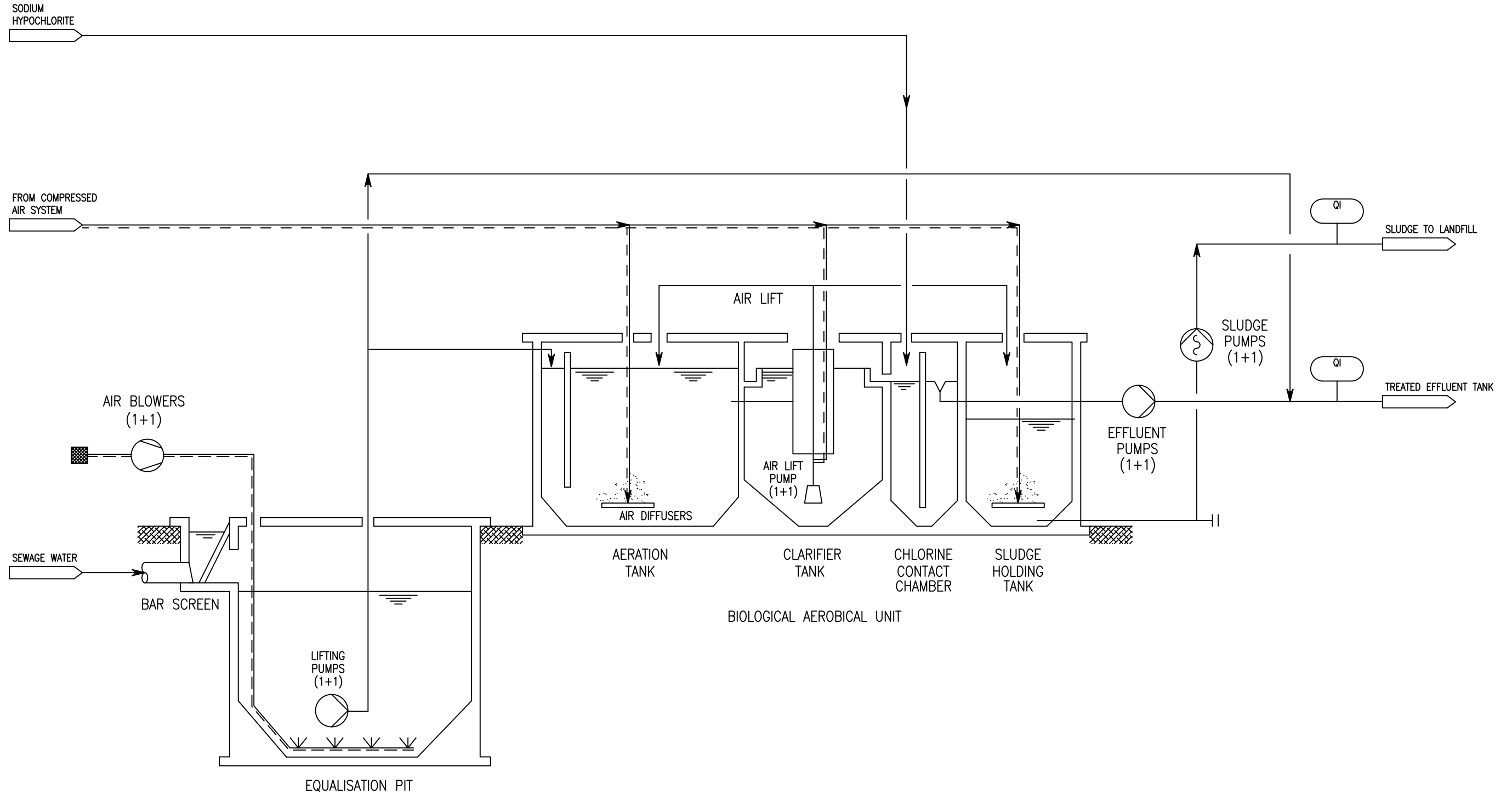




PREPARATORY SURVEY FOR MAMELLES SEA WATER  
DESALINATION PLANT CONSTRUCTION PROJCT

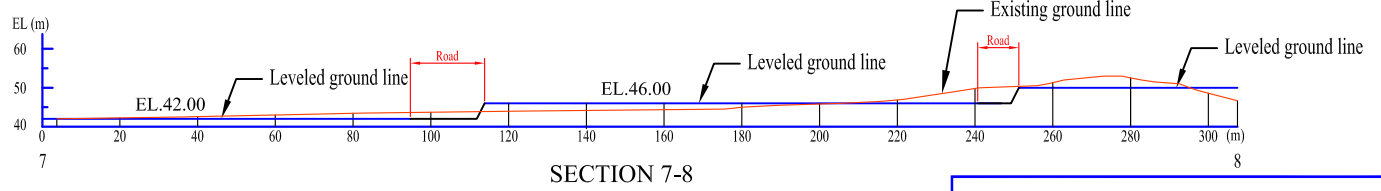
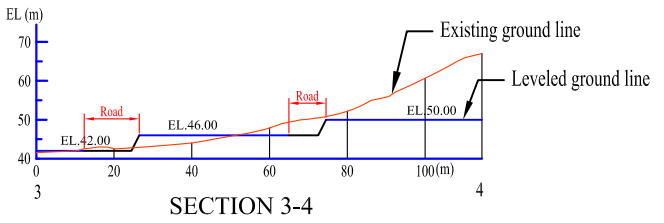
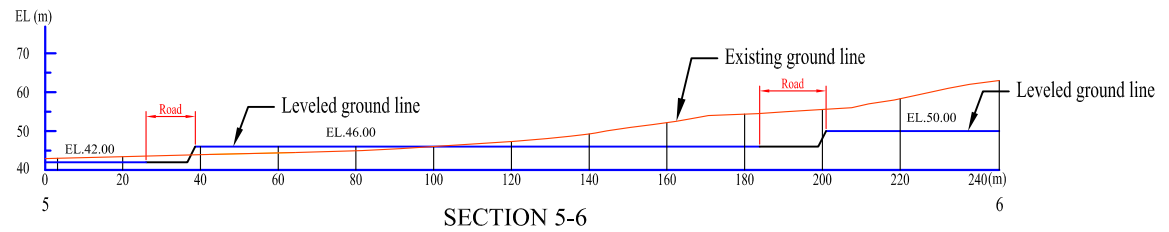
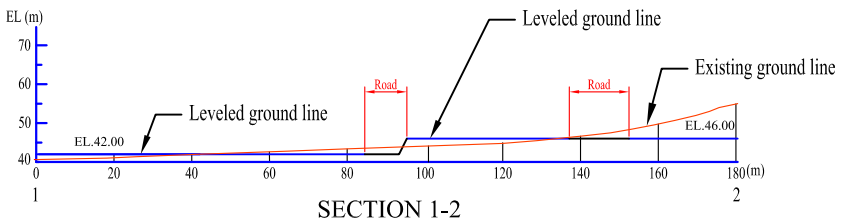
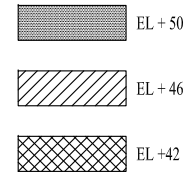
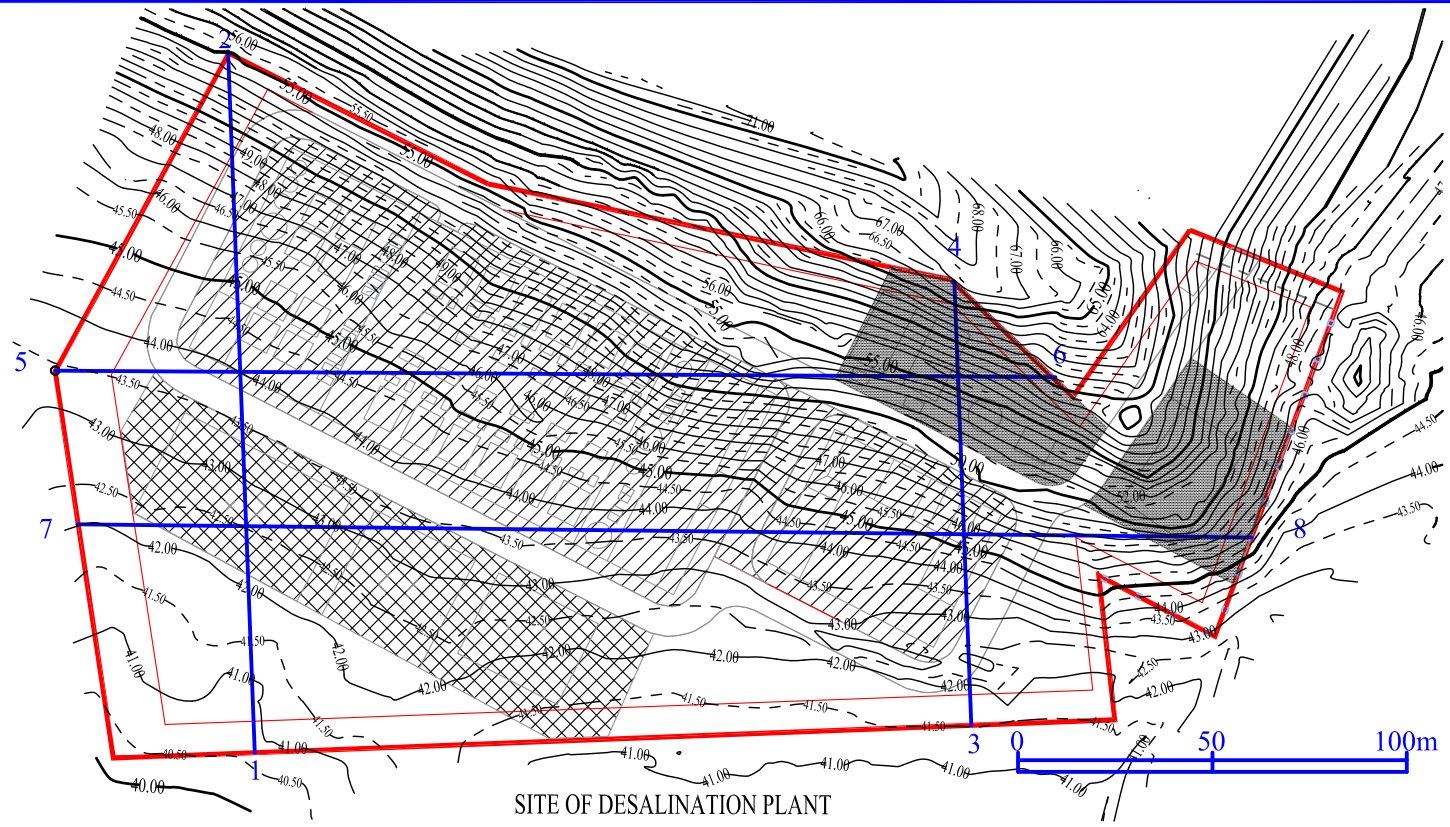
TITLE OF DRAWING  
Process Flow Diagram(4/5)  
Waste Water Treatment Plant

Drawing No.	SWDP-PFD-04
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PREPARATORY SURVEY FOR MAMELLES SEA WATER  
DESALINATION PLANT CONSTRUCTION PROJCT

TITLE OF DRAWING  
Process Flow Diagram (5/5)  
Sewage Treatment System



PREPARATORY SURVEY FOR MAMELLES SEA WATER  
DESALINATION PLANT CONSTRUCTION PROJCT

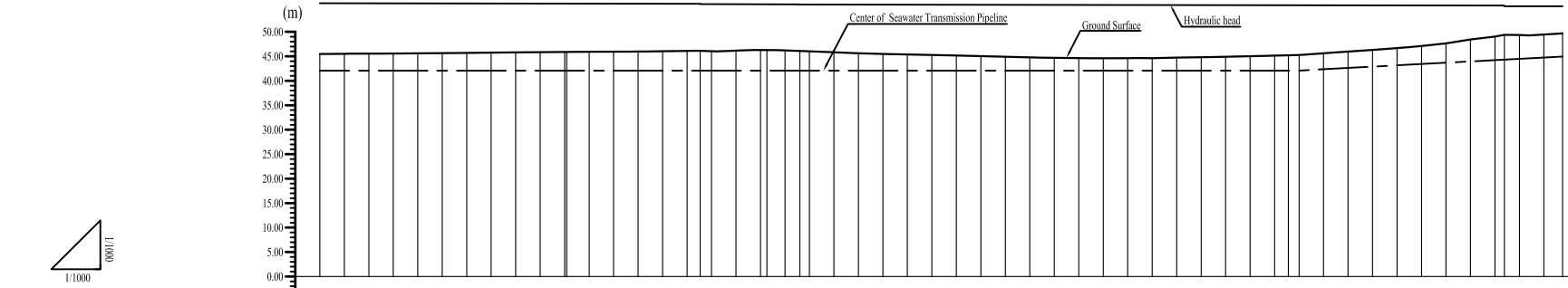
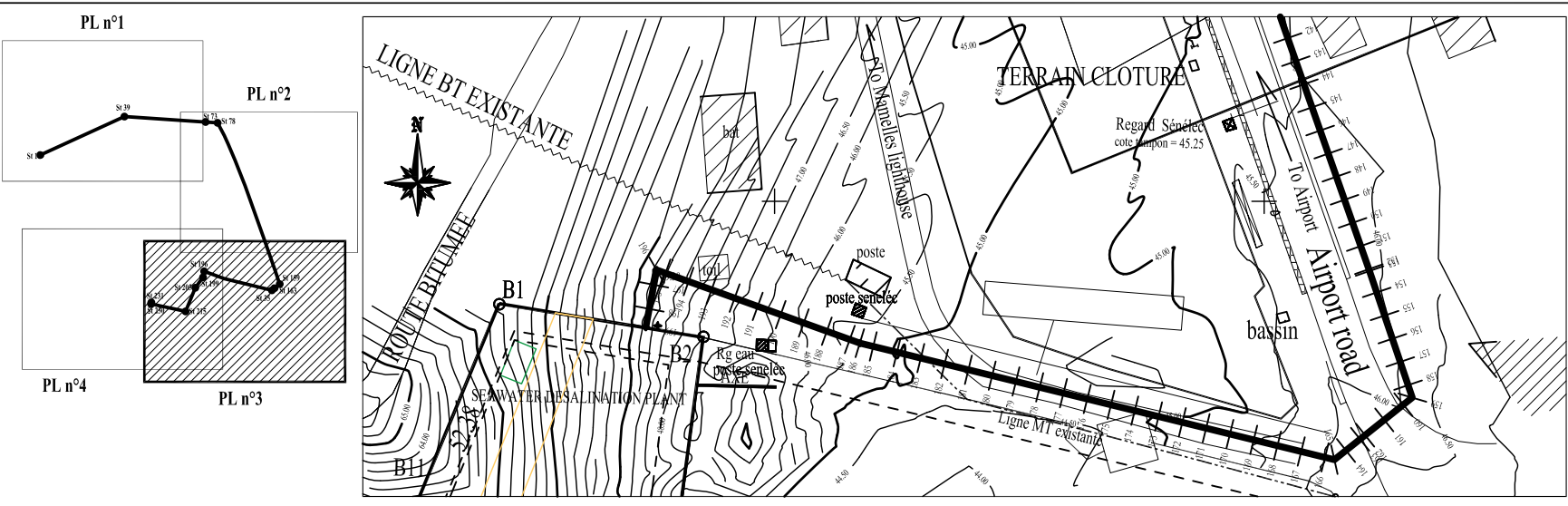
TITLE OF DRAWING  
Land Leveling

Drawing No. SWDP-LL

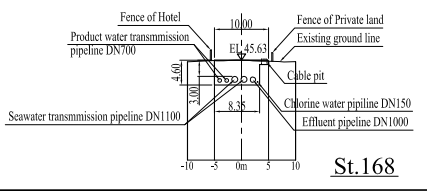






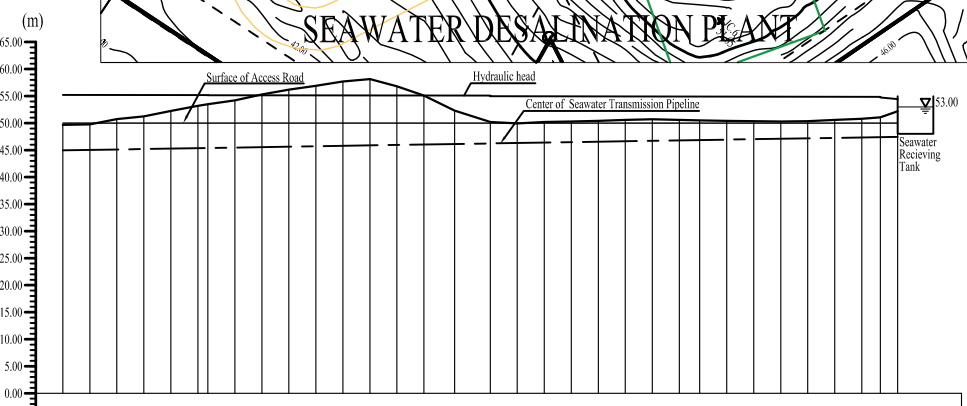
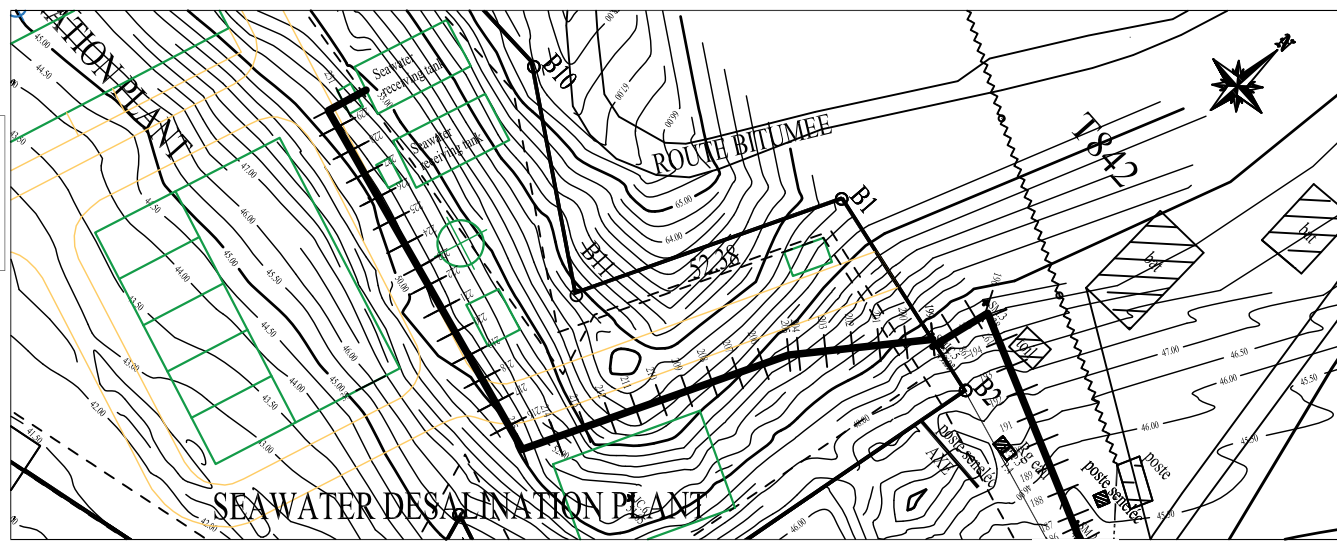
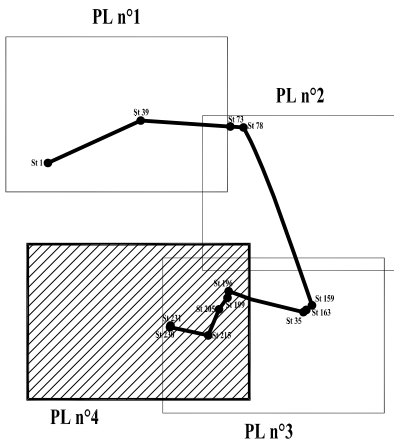


Station N°																																																											
Numéros de profils	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	
Ground surface elevation (m) Altitude du Terrain Naturel (m)	45.48	45.52	45.55	45.58	45.60	45.63	45.69	45.76	45.80	45.86	45.88	45.89	45.93	45.95	45.97	46.03	46.10	46.14	46.05	46.16	46.29	46.28	46.26	46.01	46.11	45.83	45.63	45.48	45.38	45.27	45.16	45.02	44.89	44.78	44.71	44.65	44.59	44.63	44.63	44.72	44.78	44.91	44.98	45.14	45.20	45.28	45.61	45.95	46.30	46.68	47.11	47.65	48.43	49.03	49.38	49.34	49.44	49.68	
Elevation of road surface (m) Altitude de la route d'accès (m)																																																											
Elevation of center of pépeline (m) Altitude axe de la conduite (m)	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08	42.08
Hydraulic head ( m ) Hauteur hydraulique (m)																																																											
Distances (m)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.59	5.00	5.00	5.00	5.00	5.00	2.68	5.74	5.00	5.00	5.00	3.69	3.03	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.81			
Accumulated distances (m) Distances cumulées (m)	655.00	660.00	665.00	670.00	675.00	680.00	685.00	690.00	695.00	700.00	705.00	710.00	715.00	720.00	725.00	730.00	735.00	740.00	745.00	750.00	755.00	760.00	765.00	770.00	775.00	780.00	785.00	790.00	795.00	800.00	805.00	810.00	815.00	820.00	825.00	830.00	835.00	840.00	845.00	850.00	853.83	855.00	860.00	865.00	870.00	875.00	880.00	885.00	890.00	895.00	900.00	905.00	908.81						
Pipe diamètre (mm) and material Diamètre conduite (mm) et matériaux	Coated steel pipe $\Phi$ 1100x2 1 line for Phase 1 and 1 line for Phase 2																																																										

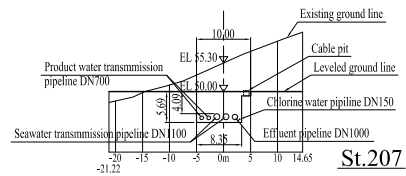


**PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJET**

**TITLE OF DRAWING**  
**Seawater Transmission Pipeline (3/4)**



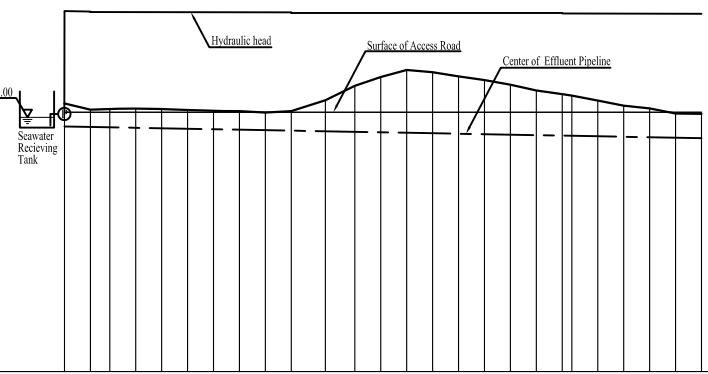
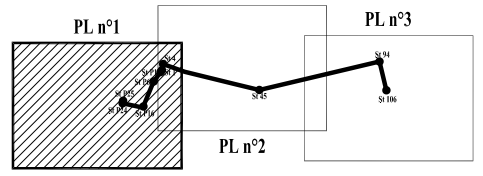
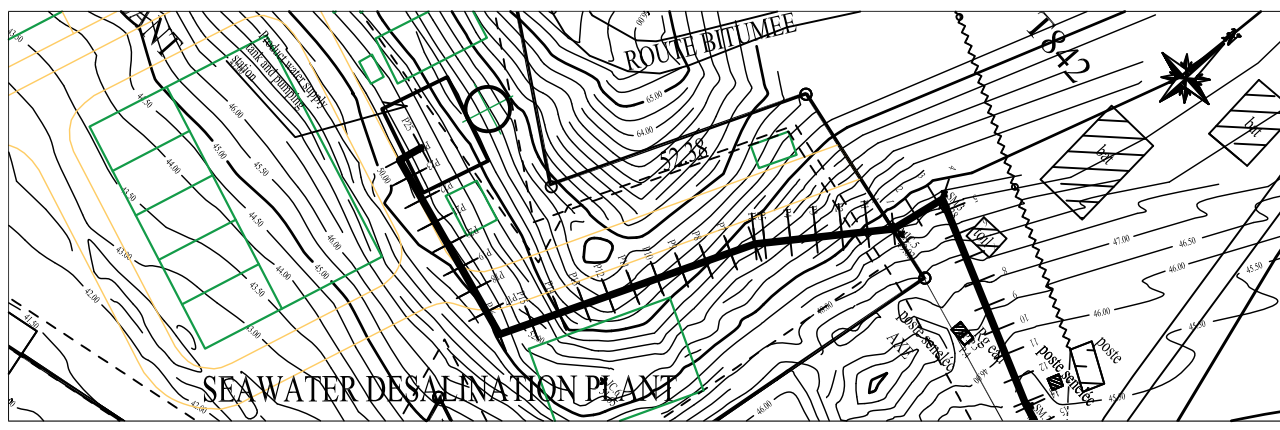
Station N°	199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231																																
Numéros de profils																																	
Ground surface elevation (m)																																	
Altitude du Terrain Naturel (m)	49.68	49.75	50.75	51.25	52.25	53.20	53.20	54.20	55.30	56.20	56.90	57.70	58.15	56.80	55.10	52.30	50.20	49.95	50.20	50.30	50.40	50.60	50.70	50.60	50.50	50.40	50.35	50.30	50.35	50.60	51.05	52.20	
Elevation of road surface (m)	50.00																																
Altitude de la route d'accès (m)	50.00																																
Elevation of center of pèpeline (m)																																	
Altitude axe de la conduite (m)	44.95	45.03	44.89	45.19	45.27	45.38	45.38	45.47	45.55	45.63	45.71	45.79	45.87	45.95	46.03	46.12	46.23	46.31	46.39	46.47	46.55	46.63	46.72	46.80	46.86	46.94	47.02	47.10	47.18	47.26	47.34	47.40	47.45
Hydraulic head ( m )																																	
Hauteur hydraulique (m)																																	
Distances (m)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Accumulated distances (m)																																	
Distances cumulées (m)	908.81	913.81	918.81	923.81	928.81	933.81	938.81	940.66	945.66	950.66	955.66	960.66	965.66	970.66	975.66	981.35	987.94	992.94	997.94	1002.94	1007.94	1012.94	1017.94	1022.94	1026.69	1031.71	1036.71	1041.71	1046.71	1051.71	1056.71	1060.16	1063.35
Pipe diamèter (mm) and material	Coated steel pipe $\Phi 1100 \times 2$																																
Diamètre conduite (mm) et matériaux	1 line for Phase 1 and 1 line for Phase 2																																



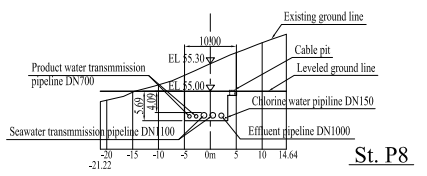
PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJCT

TITLE OF DRAWING  
Seawater Transmission Pipeline (4/4)

Drawing No. SWTP-P-04



Station N°	P25	P24	P23	P22	P21	P20	P19	P18	P17	P16	P15	P14	P13	P12	P11	P10	P9	P8	P7	P6	P5	P4	P3	P2	P1	I
Numéros de profils																										
Ground surface elevation (m)																										
Altitude du Terrain Naturel (m)		51.70	50.50	50.60	50.70	50.40	50.30	50.20	49.95	50.20	52.30	55.10	56.80	58.15	57.70	56.90	56.20	55.30	54.20	53.50	53.20	52.25	51.25	50.75	49.75	49.68
Elevation of road surface (m)		50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Elevation of center of pepeline (m)		47.25	47.16	47.09	47.00	46.91	46.81	46.72	46.63	46.54	46.45	46.32	46.22	46.13	46.04	45.94	45.85	45.76	45.67	45.58	45.48	45.38	45.28	45.17	45.08	44.99
Hydraulic head ( m )		69.50	69.41	69.32						69.25	69.13										69.13	69.05				
Distances (m)		4.74	3.75	5.00	5.00	5.00	5.00	5.00	5.00	6.59	5.69	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Accumulated distances (m)		0.00	4.74	8.49	13.49	18.49	23.49	28.49	33.49	38.49	43.49	50.08	55.77	60.77	65.77	70.77	75.77	80.77	85.77	90.77	95.77	100.77	105.77	110.77	115.77	120.77
Pipe diamètre (mm) and material		DCIP Ø800x1																								
Diamètre conduite (mm) et matériaux		DCIP Ø800x1																								

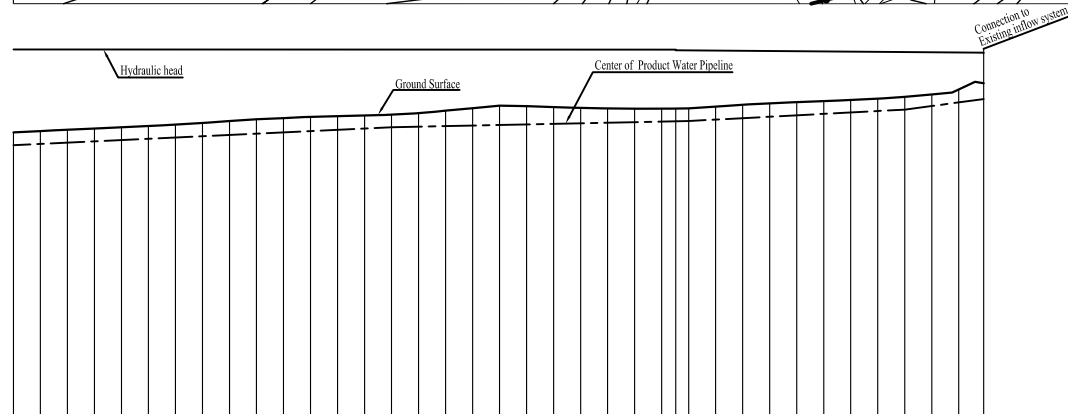
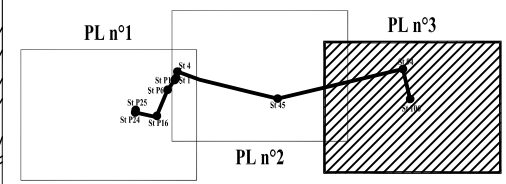
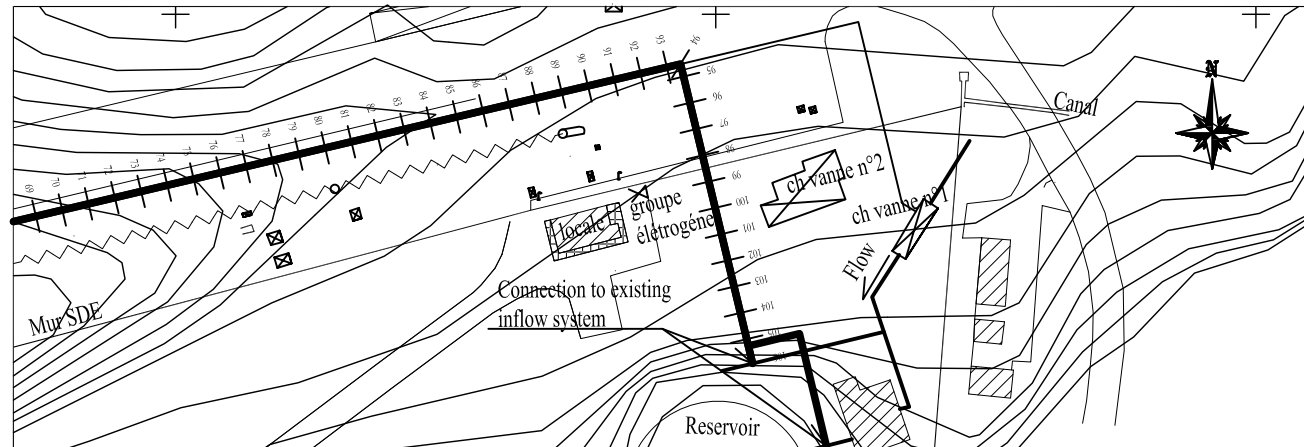


PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJET

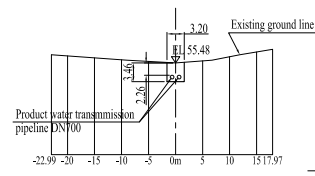
TITLE OF DRAWING  
Product water Transmission Pipeline (1/3)

Drawing No. FWTP-P-01





Station N°																																									
Numéros de profils	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106			
Ground surface elevation (m) Altitude du Terrain Naturel (m)	52.62	52.87	53.11	53.34	53.57	53.80	54.04	54.38	54.72	55.04	55.26	55.48	55.64	55.78	55.92	56.20	56.65	57.11	57.56	57.49	57.30	57.14	57.10	57.05	57.01	54.68	57.00	57.08	57.40	57.77	58.00	58.21	58.42	58.64	58.87	59.19	59.65	60.57	61.72		
Elevation of road surface (m) Altitude de la route d'accès (m)																																									
Elevation of center of pèpeline (m) Altitude axe de la conduite (m)	50.27	50.50	50.74	50.98	51.22	51.45	51.69	51.93	52.16	52.40	52.63	52.87	53.10	53.34	53.57	53.68	53.78	53.89	53.99	54.10	54.20	54.31	54.41	54.52	54.62	54.68	54.73	54.99	55.26	55.52	55.79	56.05	56.32	56.58	56.84	57.51	58.18	58.79			
Hydraulic head ( m ) Hauteur hydraulique (m)																																									
Distances (m)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.62
Accumulated distances (m) Distances cumulées (m)	442.62	447.62	452.62	457.62	462.62	467.62	472.62	477.62	482.62	487.62	492.62	497.62	502.62	507.62	512.62	517.62	522.62	527.62	532.62	537.62	542.62	547.62	552.62	557.62	562.62	565.23	567.62	572.62	577.62	582.62	587.62	592.62	597.62	602.62	607.62	612.62	617.62	622.24			
Pipe diamètre (mm) and material Diamètre conduite (mm) et matériaux	DCIP Ø800x1																																								



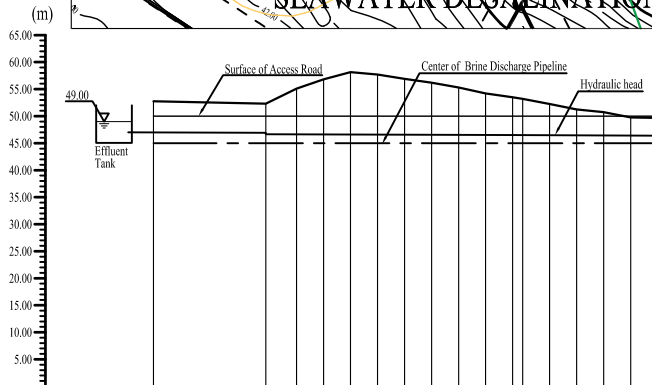
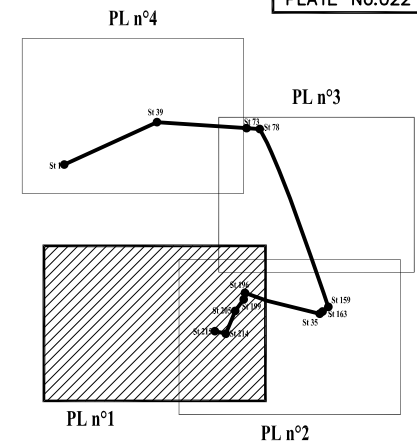
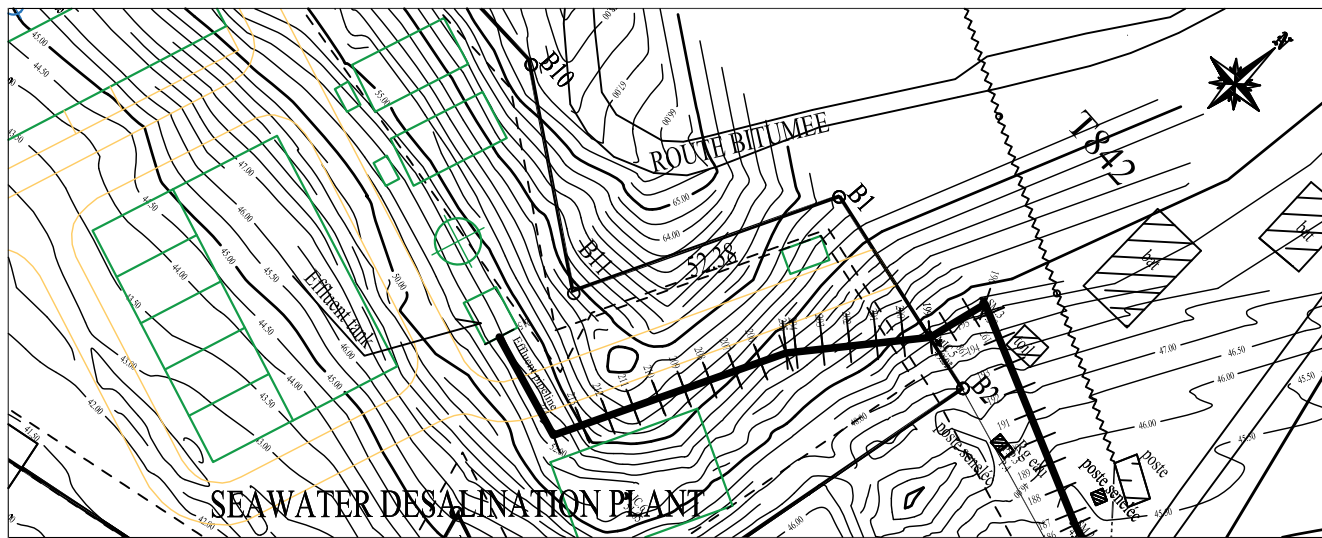
St.80

PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJCT

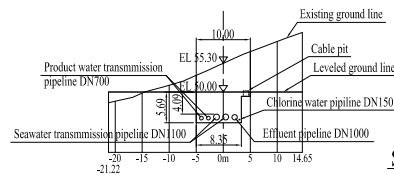
TITLE OF DRAWING  
Product water Transmission Pipeline (3/3)

Drawing No. PWTP-P-03





Station N°	215	214	213	212	211	210	209	208	207	206	205	204	203	202	201	200	199
Numéros de profils																	
Ground surface elevation (m) Altitude du Terrain Naturel (m)	52.75	52.30	55.10	56.80	58.15	57.70	56.90	56.20	55.30	54.20	53.80	53.20	52.25	51.25	50.75	49.75	49.68
Elevation of road surface (m) Altitude de la route d'accès (m)	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Elevation of center of pépeline (m) Altitude axe de la conduite (m)	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
Hydraulic head ( m ) Hauteur hydraulique (m)	47.00	46.93	46.85								46.30	46.34					
Distances (m)		20.78	5.69	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Accumulated distances (m) Distances cumulées (m)	0.00	20.78	26.47	31.47	36.47	41.47	46.47	51.47	56.47	61.47	66.47	71.47	76.47	81.47	86.47	91.47	96.47
Pipe diamètre (mm) and material Diamètre conduite (mm) et matériaux	Coated steel pipe Ø1000x1																



St.207

PREPARATORY SURVEY FOR MAMELLES SEA WATER DESALINATION PLANT CONSTRUCTION PROJCT

TITLE OF DRAWING  
Brine Discharge Pipeline (1/4)



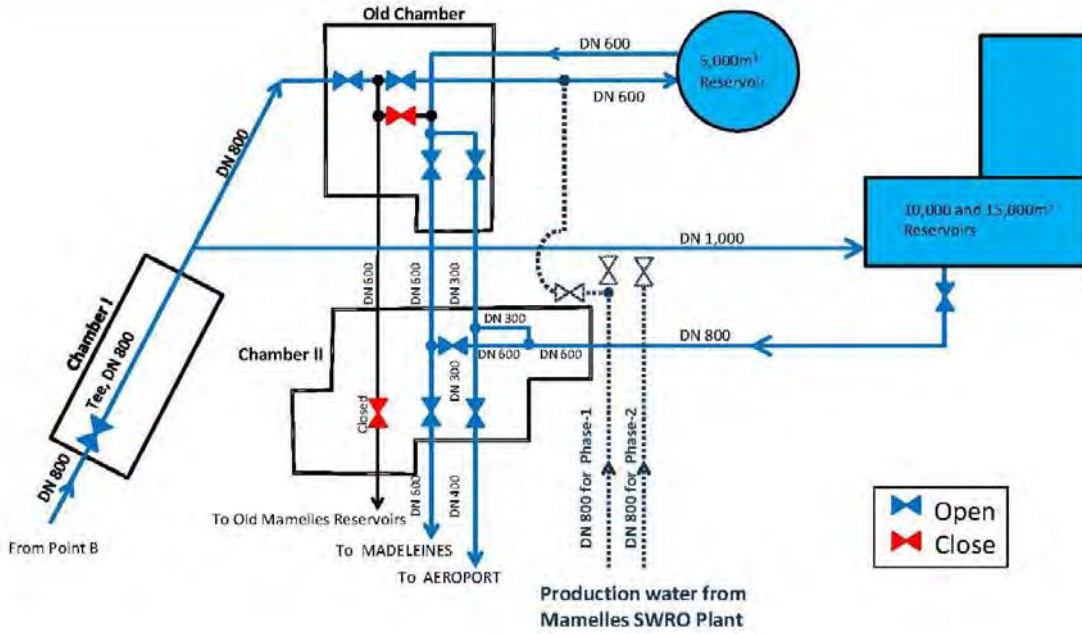




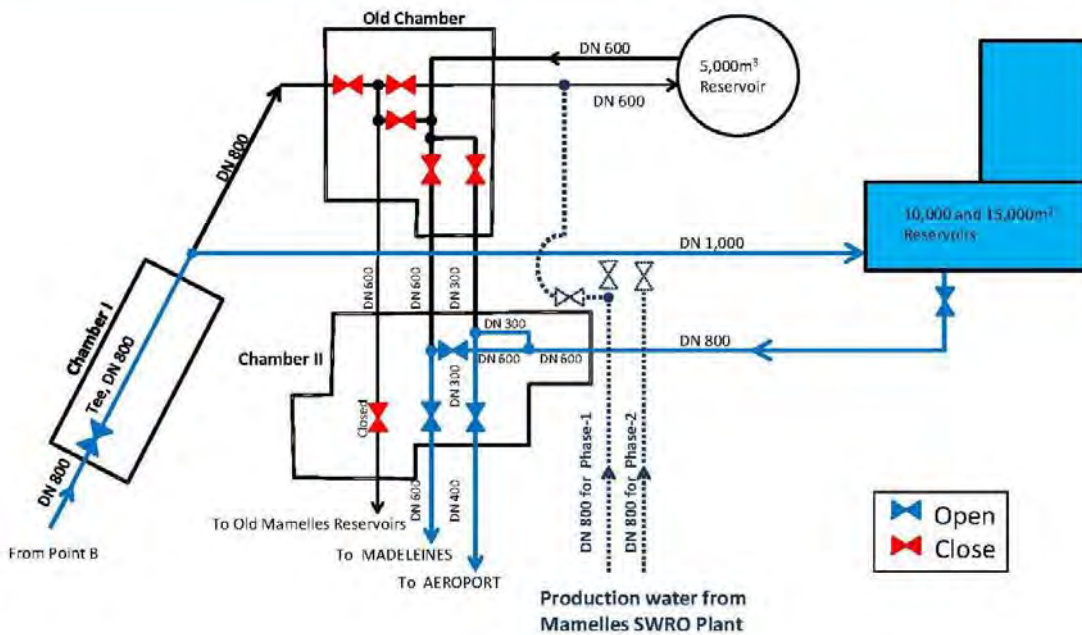


Appendix 5-2 Connection to existing inflow system

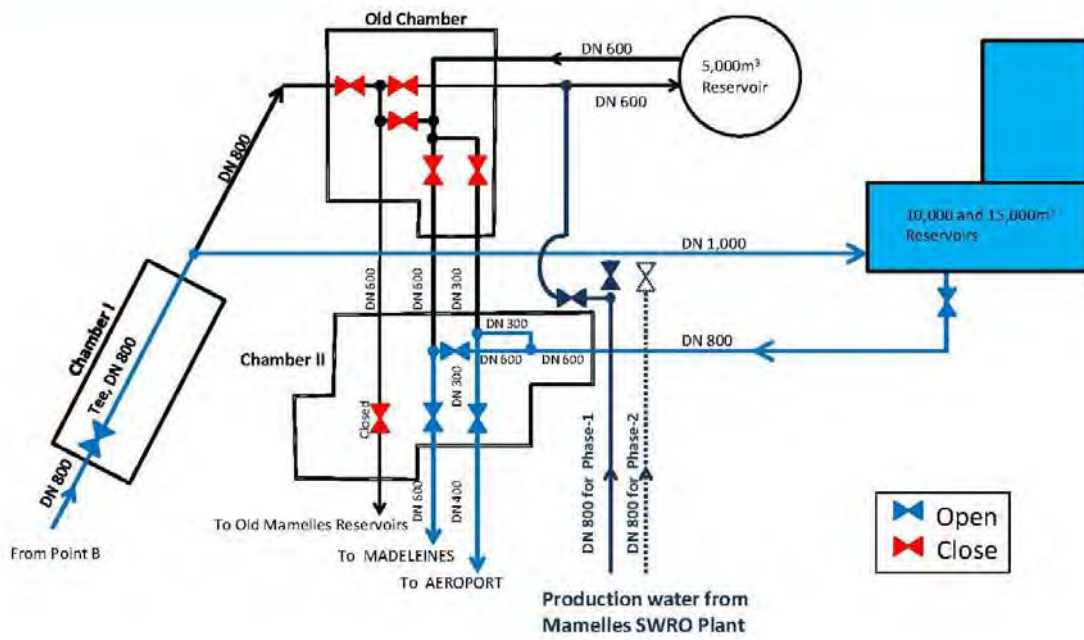
**Current Situation**



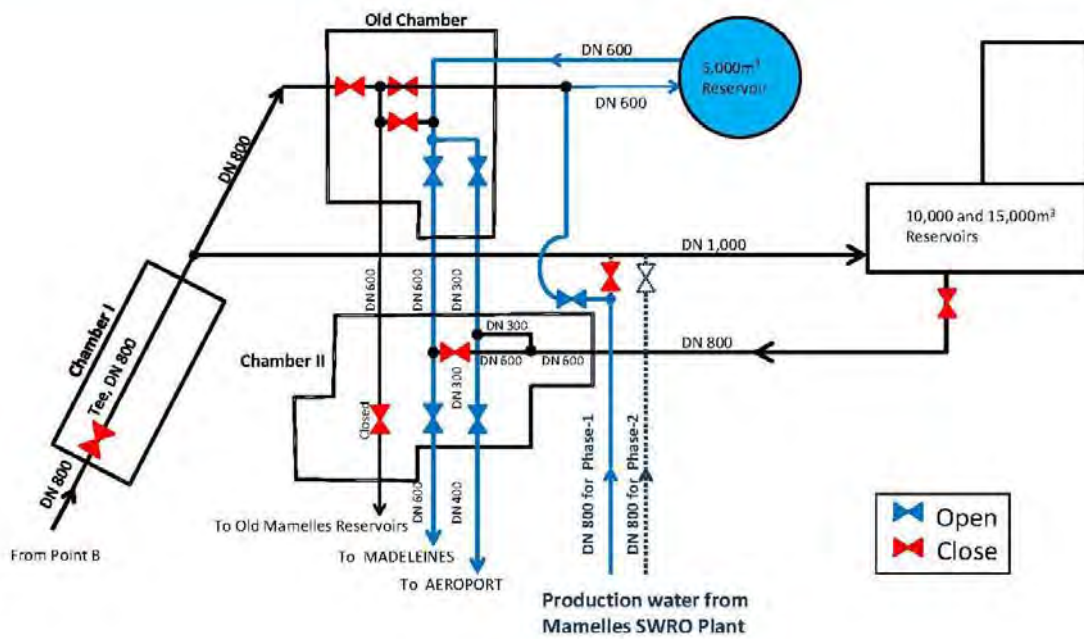
**Temporary work step-1**



## Temporary work step-2

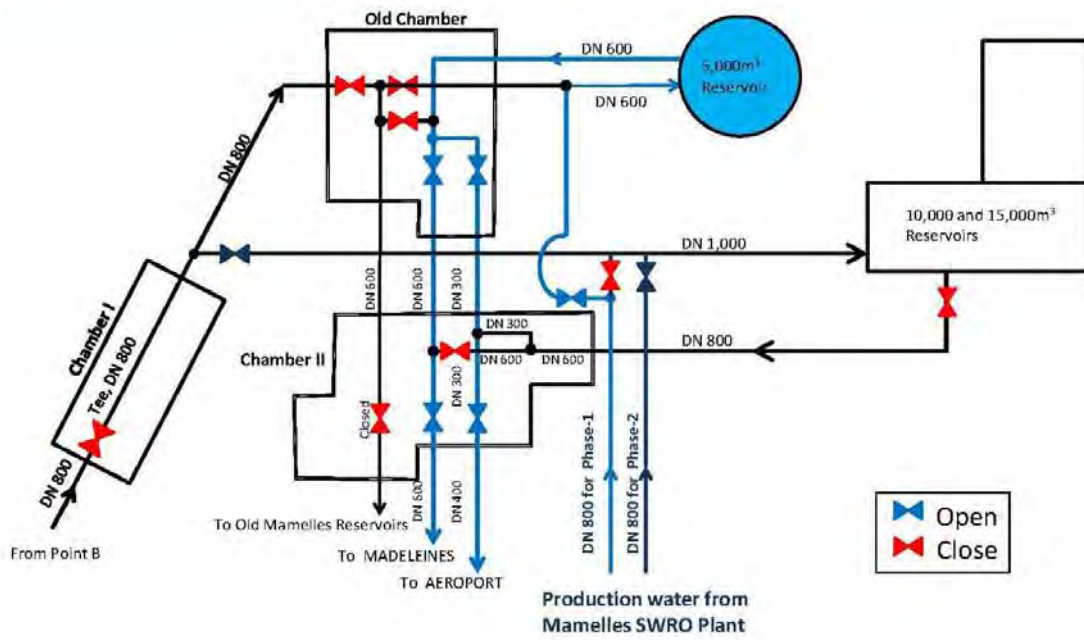


## Temporary work step-3

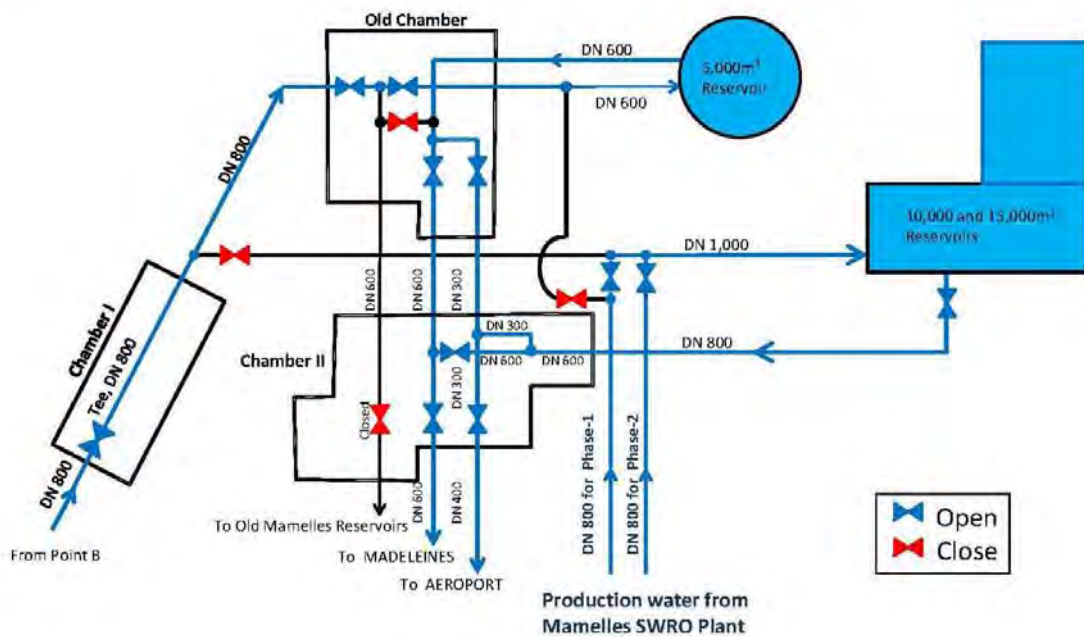




## Temporary work step-4



## Completion of connection



Source: JICA Study Team

### Appendix 6-1 Environmental check list

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) - (d) -	(a) EIA Report is not prepared. But, TOR of the EIA Report was approved by the authorities of Senegal. (b) EIA Report will be prepared by December 2015 and will be approved by the authorities on March, 2016.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) N (b) N	(a) Stakeholder meetings with relevant agencies will be held after July 2015 within the EIA study period. (b) Comments from the stakeholders are not reflected to the project design because the stakeholder meeting are not held so far.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Alternative analysis was examined by environmental aspects such as environmentally-friendly discharging pipe design, which will be minimized possible adverse impacts on the ecosystem, and social aspects such as stable water supply for the local peoples.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that desalination plant and other facilities such as electric generation facilities will cause air pollution?	(a) N (b) Y	(a) There is no possibility that the proposed desalination plant and other facilities will cause air pollution, except the construction period.
	(2) Water Quality	(a) Do pollutants, such as TSM, BOD, COD, pH contained in treated effluent from the desalination plant comply with the country's effluent standards? (b) Does untreated water contain heavy metals?	(a) Y (b) N	(a) Effluent standards of pH, TSM, BOD, and COD complied in treated effluent from the proposed desalination plant. (b) Untreated water from the proposed plant is not included in heavy metals.
	(3) Wastes	(a) Are wastes, generated by the plant and facility operations properly treated and disposed of in accordance with the country's standards?	(a) Y	(a) Wastes such as exchanged old RO and UF membrane will properly managed in accordance with Environmental Code in Senegal.
	(4) Noise and Vibration	(a) Do noise and vibrations generated from the facilities, such as pumping stations and construction activities of renewal of pipe line comply with the country's standards?	(a) Y	(a) The proposed facilities, which may generate heavy noise, such as pumping station is layout within the indoor, noise and vibrations generated from construction activities including renewal of pipe line keep in the operation time and so on, and will be operated in order to comply with Environmental Code in Senegal.
	(5) Odor	(a) Are adequate control measures taken for odor sources, such as proposed pump station?	(a) Y	(a) Mitigation measures for odor such as regular cleaning of the detached fishes with putrefactive smell of the pumping station is taken as the countermeasure.
3 Natural Environment	(1) Protected Areas	(a) Is the project site or discharge area located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project including renewal of pipe line will affect the protected areas?	(a) N	(a) The Project sites are not located within the designated protected by Senegalese laws and international treaties/conventions sites. However, designated historical site is located near the desalination plant.
3 Natural Environment	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site or discharge area encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the discharging of wastewater from the plant by project will adversely impacts on the marine ecosystem?	(a) N (b) N (c) - (d) N	(a) No primeval forests, tropical rain forests, ecologically valuable habitats are found in and around the project sites. (b) No protected habitats of endangered species are found in and around the project sites. (c) (d) The project will not cause significant impacts on the marine ecosystem. Because, environmentally-friendly discharging pipe design, which will be minimized the possible adverse impacts on the marine ecosystem, are applied.
		(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) N (b) - (c) - (d) - (e) - (f) - (g) - (h) - (i) - (j) -
4 Social Environment	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? (b) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect the existing water uses and water area uses?	(a) N/Y (b) N	(a) There is few possibilities that stakeholders such as fishermen will affect the significant livelihood. But, if significant decrease of the income of the fisheries by the project, appropriate assistances for the livelihood of the affected fishermen are considering. (b) There is few possibilities.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) Although there is a designated historical site is located close to the proposed site, appropriate countermeasures such preventing possible noises and the other nuisances are taken.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape?	(a) N	(a) There is no possibility that the proposed facilities will not adversely affect the present local landscape in the sites, although the sites includes a beach, and is closed to archeological site.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) - (b) -	(a) No ethnic minorities or indigenous peoples live in the project site. (b) Not applicable due to the above reason
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?	(a) Y (b) Y (c) Y (d) Y	(a) The project will be implemented in compliance with relevant laws/ordinances, which associated with labor, safety (b) Safety countermeasures such as installation of safety equipment to prevent labor accidents and chemical subsistence are planned in the project. And also safety equipment such as masks, goggles, and boots are provided for workers. (c) Continuous safety awareness trainings for worker will be conducted. (d) The project will provide appropriate education to security guards not to violate safety of other individuals and/or local residents.
	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts? (d) If the construction activities might cause traffic congestion, are adequate measures considered to reduce such impacts?	(a) Y (b) Y (c) Y (d) Y	(a) Construction equipment of low-noise and/or low-vibration type will be selected as far as practicable. And water sprinkling is conducted in dry season not to scatter dust during construction works. (b) Coastal ecosystem may not deteriorate due to the environmentally friendly construction methods. (c) No significant impact to social environment is predicted during construction including renewal of pipe line. (d) Sign board are set up to prevent traffic congestion in and around project sites during construction including renewal of pipe line.
6 Note	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) Y (c) Y (d) Y	(a) JICA Final Report proposed the monitoring plan. (b) Monitoring items, and frequencies, and responsible organization are described in the monitoring plan of JICA Final Report. (c) Monitoring Organizations are proposed on JICA Final Report. (d) JICA Final Report proposed basic monitoring report system. But, the format and frequency are not identified.
	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Dam and River Projects checklist should also be checked.	(a) N	(a) It was not refer to check items described in the Dam and River Projects checklist. But, the check items were considered based on the characteristics of the desalination plant and the other proposed facilities.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N	(a) There is no transboundary issues due to scale of the construction works and operation. The operation of the plant will be contributed to mitigation as one of the climate change adaptation measures

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made.  
 In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).  
 2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which the project is located.

## Appendix 6-2 Monitoring Form

### 1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Monitoring Results during Report Period
Implementation of the following monitoring item 2 to 4	

### 2. Pollution

#### < Construction Period >

#### - Air Quality (Emission Gas / Ambient Air Quality)

Item, Unit (µg/m <sup>3</sup> )	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards (WHO)	Remarks (Measurement Point, Frequency, Method, etc.)
PM10			24 hour value: 260	24 hour value: 50	4 points in the desalination plant and the surrounding area * 3 times
NO <sub>x</sub>			1 hour value: 200	1 hour value: 200	4 points in the desalination plant and the surrounding area * 3 times
SO <sub>2</sub>			24 hour value: 125	24 hour value: 125	4 points in the desalination plant and the surrounding area * 3 times

#### - Water Quality (Effluent/Wastewater/Ambient Water Quality)

Item, Unit (mg/l)	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
BOD <sub>5</sub>			80		4 points in the desalination plant and the surrounding area * 3 times
TSS			50		4 points in the desalination plant and the surrounding area * 3 times
T-N			30		4 points in the desalination plant and the surrounding area * 3 times

#### - Noise

Item, Unit (mg/l)	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
Noise level dB(A)			55 – 60 (daytime) 40 (night time)		2 points in the desalination plant, and 2 points at pumping station * 1 time per month

< Operation Period >

- Noise

Item, Unit (mg/l)	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method, etc.)
Noise level dB(A)			55 – 60 (daytime) 40 (night time)		2 points in the desalination plant, and 2 points at pumping station * 1 time per month

- Odor

Monitoring Item	Measurement Points, Frequency
Complaints for bad odor	2 points at pumping station and the surroundings * 1 time per month

3. Natural Environment

< Operation Period >

- Ecosystem

Monitoring Item	Measurement Points, Frequency
Salinity level at the discharging point and the surroundings of desalination plant	Total 10 points (every 5 m from the discharging point to perpendicular direction) * 1 time per 6 months

4. Social Environment

< Construction Period >

- Living / Livelihood

Monitoring Item	Measurement Points, Frequency
Fish catch volume at Fisheries Cooperative at Ouakam municipality	Fishing ground at Ouakam area, 1 time per month

< Operation Period >

- Living / Livelihood

Monitoring Item	Measurement Points, Frequency
Fish catch volume at Fisheries Cooperative at Ouakam municipality	Fishing ground at Ouakam area, 1 time per month



### Appendix 6-3 Letter from DEEC regarding Survey on Environmental and Social Consideration necessary for CP-2, CP-3 and CP-4

République du Sénégal  
Un Peuple – Un But – Une Foi

N° 022 MEDD/DEEC/DEIE.as

MINISTÈRE DE L'ENVIRONNEMENT  
ET DU DÉVELOPPEMENT DURABLE

Dakar, le 23 OCT. 2015

Direction de l'Environnement  
et des Établissements Classés

**LA DIRECTRICE**

A  
Monsieur Charles FALL  
Directeur Général Société Nationale  
des Eaux du Sénégal (SONES)

**DAKAR**

**Réf :** BN/FMB/n° 002107 en date du 17 septembre 2015

**Objet :** Demande d'avis d'évaluation environnementale relatif au renouvellement du réseau de distribution d'eau Dakar ville, composante du projet de construction d'une usine de dessalement d'eau de mer aux Mamelles.

**Monsieur le Directeur Général,**

J'accuse bonne réception de la correspondance citée en référence et relative à l'objet susmentionné.

Après examen du document et la visite du tracé du lundi 19 octobre 2015, la Direction de l'Environnement et des Établissements Classés (DEEC) a pris bonne note que le projet consiste : à l'amélioration du réseau existant de distribution d'eau potable dans la zone de Dakar par l'installation d'une conduite principale de distribution de 13,5 km de longueur et le renouvellement des conduites de distribution existantes sur 442 km de longueur.

Pris globalement, ce projet est visé par l'**annexe 2** du décret n°2001-282 portant application du Code de l'environnement, en son **point 10 : Adduction d'eau rurale et urbaine et assainissement**. Ainsi, il est soumis à un régime d'autorisation avec la réalisation d'une analyse environnementale initiale (AEI) préalable.

Cette AEI pourra prendre en charge toutes les problématiques environnementales et sociales associées à ce projet.

A cet effet, veuillez vous rapprocher de la Division Régionale de l'Environnement et des Établissements Classés de Dakar (Boulevard Djily MBAYE, Immeuble FAHD 13<sup>ème</sup> étage ; Tel : (221) 33 823 15 30 ; Email : [dreecdakar@yahoo.fr](mailto:dreecdakar@yahoo.fr) ) pour la poursuite d'instruction de ce dossier.

Je vous prie d'agréer, Monsieur le Directeur Général, l'assurance de ma considération distinguée.

**Ampliation :**

- DCPN (pour information) ;
- DREEC DK (pour information et suivi).

**P/ La Directrice de l'Environnement et des Établissements Classés, pi**

**Cheikh FOFANA**

Parc Forestier et Zoologique de Hann - Route des pères maristes- Tél +221 33 859 13 43  
Site web: <http://www.denv.gouv.sn>

Translated in English

**Republic of Senegal**  
**One People one Aim One Faith**  
**Ministry of Environment and Sustainable Development**  
**Directorate of Environment and Classified Establishments**

N° 3 22 .....MEDD/DEEC/DEIE.as  
Dakar, October 23<sup>rd</sup> 2015

**THE DIRECTOR**  
**Attention to**  
**Mr Charles FALL**  
**General Director the Senegal National**  
**Water Company (SONES)**  
**DAKAR**

**Reference:** BN/FMB/n° 002107 as of September 17, 2015

**Object:** Advisory request on environmental assessment relating to the water distribution network replacement in Dakar City, component of the Mamelles Sea Water Desalination Plant Construction Project

**Dear Director General,**

I acknowledge receipt of the letter issued in the above reference and relating to the Project aforementioned.

After reviewing the document and the visit of the pipe route on October 19<sup>th</sup> 2015, the Directorate of Environment and Classified Establishments took note that the Project consists of: *the improvement of the existing potable water distribution network in the Dakar area through the installation of one main distribution pipe of 13.5 km of length and the replacement of the existing distribution pipes with a length of 442 km.*

Globally taken, this Project is concerned by the **Annex 2** of the Decree N° 2001-282 implementing the Code of Environment in its **point N° 10 Rural and Urban Water Supply and Sanitation**. Therefore, it is subjected to an authorization regime with the implementation a prior initial environmental analysis (IEA).

This IEA will be able to cover all the environmental and social issues relating to the implementation of the Project.

With regard to this, please contact the Regional Division of Environment and Classified Establishments of Dakar (Address: Boulevard Djily MBAYE, Immeuble FAHD 13<sup>ème</sup> Etage, Telephone: 33 823 15 30, Email: [dreecdakar@yahoo.fr](mailto:dreecdakar@yahoo.fr) for the next instructions relating to this Project.

Best regards,

**The Director of Directorate of**  
**Environment and Classified Establishments**  
**Cheikh FOFANA**

**Cc**

- DCPN (for informing)
- DREEC DK (for informing and monitoring)

## **Appendix 8**

This part was omitted due to confidentiality.

## **Appendix 9 Terms of the Reference of the Consulting Services**

This part was omitted due to confidentiality.

## Appendix 10

This part was omitted due to confidentiality.