

添付資料：

1. 現地入手資料

ALAOA / VAISIGANO WTP

FLOWS AND LOADING

Design Flow ML/day	9.125	Actual Average ML/day	12.096
m ³ /hour	380	m ³ /hour	504
L/s	105.6	L/s	140
		% increase over design	33

TREATMENT SYSTEM

Raw Water Intake Bar screen

No. of units	1
Width	m approx 1.25
Bar Aperture	mm 25

Settling Tank

No. of tanks	2
Diameter	m 17.8
Surface Area	m ² 248.8
Side Water Depth	m 2.5
Tank volume	m ³ 622.1139
Overflow Rate @ Design Flow	m ³ /m ² .hour 0.76
Overflow Rate @ Actual Average Flow	m ³ /m ² .hour 1.01
Detention time @ Design Flow	hours 3.3
Detention time @ Actual Average Flow	hours 2.5
Outlet Weir length (per tank)	m 53.7

ROUGHING FILTERS

(Gravel media)

No. of tanks	4
Diameter	m 11.2
Surface Area	m ² 98.5
Media Depth	m 2
Media volume	m ³ 197.0407
Surface Loading Rate @ Design Flow	m ³ /m ² .hour 0.96
SLR / design flow / 1 filter off-line	m ³ /m ² .hour 1.29
Surface Loading Rate @ Act. Avg Flow	m ³ /m ² .hour 1.28
SLR / actual average flow / 1 filter off-line	m ³ /m ² .hour 1.71
Detention time @ Design Flow	hours 2.1
Detention time @ Actual Average Flow	hours 1.6

Gravel	
size (mm)	depth (mm)
4 - 7	750
7 - 10	500
12 - 18	1000
20 - 25	250

Backwash

Once every 2 weeks

SLOW SAND FILTERS

(Sand mono-media)

No. of tanks	5
Diameter	m 28
Surface Area	m ² 616
Media Depth	m 1
Media volume	m ³ 616
Surface Loading Rate @ Design Flow	m ³ /m ² .hour 0.123
SLR / design flow / 1 filter off-line	m ³ /m ² .hour 0.154
Surface Loading Rate @ Act. Avg Flow	m ³ /m ² .hour 0.164
SLR / actual average flow / 1 filter off-line	m ³ /m ² .hour 0.205
Detention time @ Design Flow	hours 8.1
Detention time @ Actual Average Flow	hours 6.1

	size (mm)	depth (mm)
Sand media	0.15 - 0.60	1000
Supporting	2 - 4	100
Gravel	4 - 10	100
	10 - 25	100

Cleaning

Once every 3 months

BALANCE TANK

No. of tanks	1
Diameter	m 17.8
Side Water Depth	m 1.8
Active volume	m ³ 447.9
Retention time @ Design Flow	hours 1.2
Retention time @ Actual Average Flow	hours 0.9

$$V = \frac{\pi r^2}{4} \times H$$

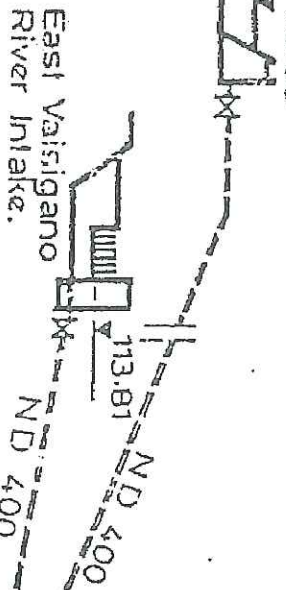
$$= \frac{\pi \times (17.8)^2}{4} \times 1.8 \text{ m}$$

$$= 447.9 \text{ m}^3$$

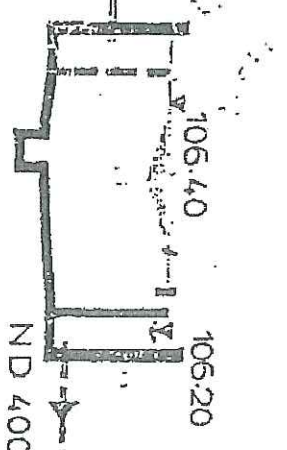
(All Gravity Flow)

Alaca T

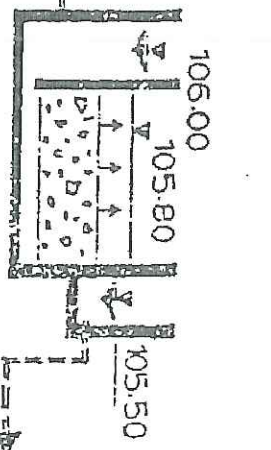
Alaca Power House
Tailrace Intake.
118.86



Settling Tank
 $V_s = 0.75 \text{ m}^3/\text{h}$



Up-Flow
Roughing Filter
 $V_F = 1 \text{ m}^3/\text{h}$



To Sl
Sand
Filter

Slow Sand Filter
 $V_F = 0.125 \text{ m}^3/\text{h}$

Chlorination
 $1 \text{ mg}/\text{l}$

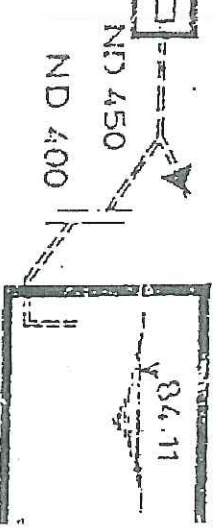
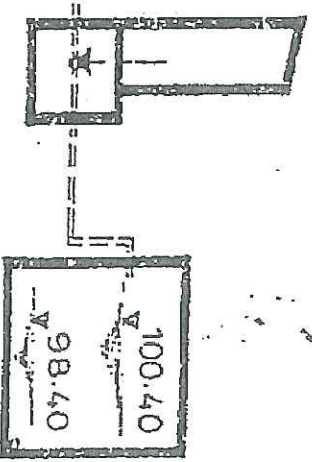
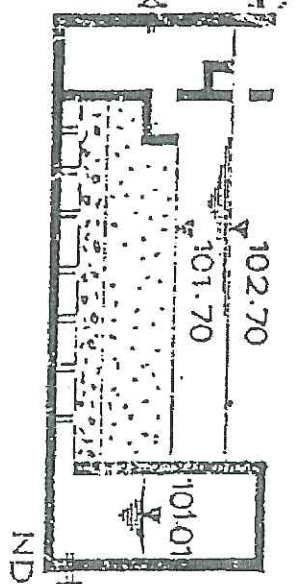
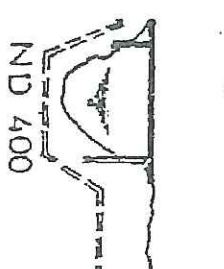
Equalizing
Reservoir
 450 m^3

Meter
Chamber

Mt. Vaca
Reservoir
 4500 m^3
(Existing)

Connection
To Magiagi
Reservoir

Crossing west
Vaisigano River

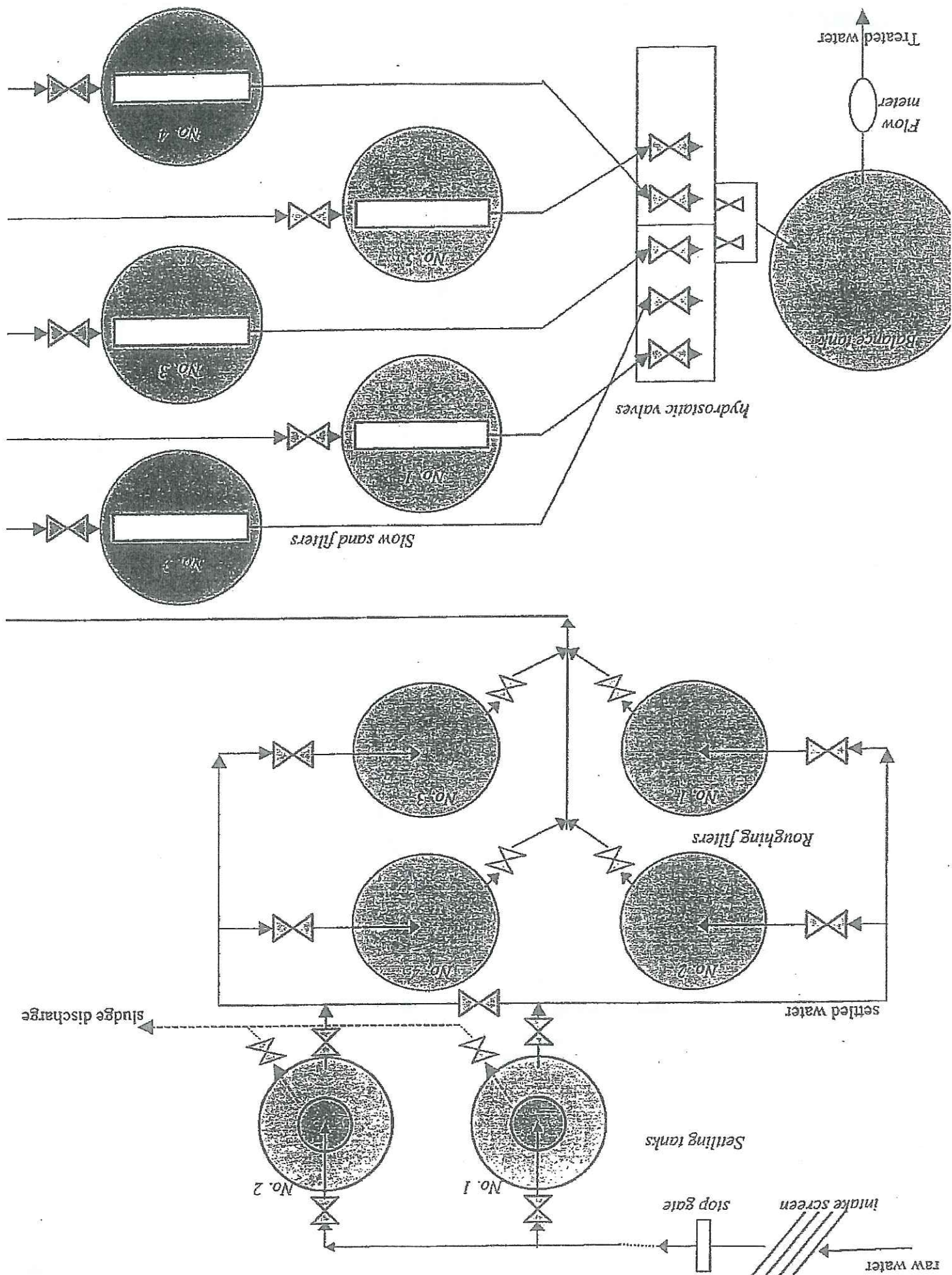


To Distri
Network

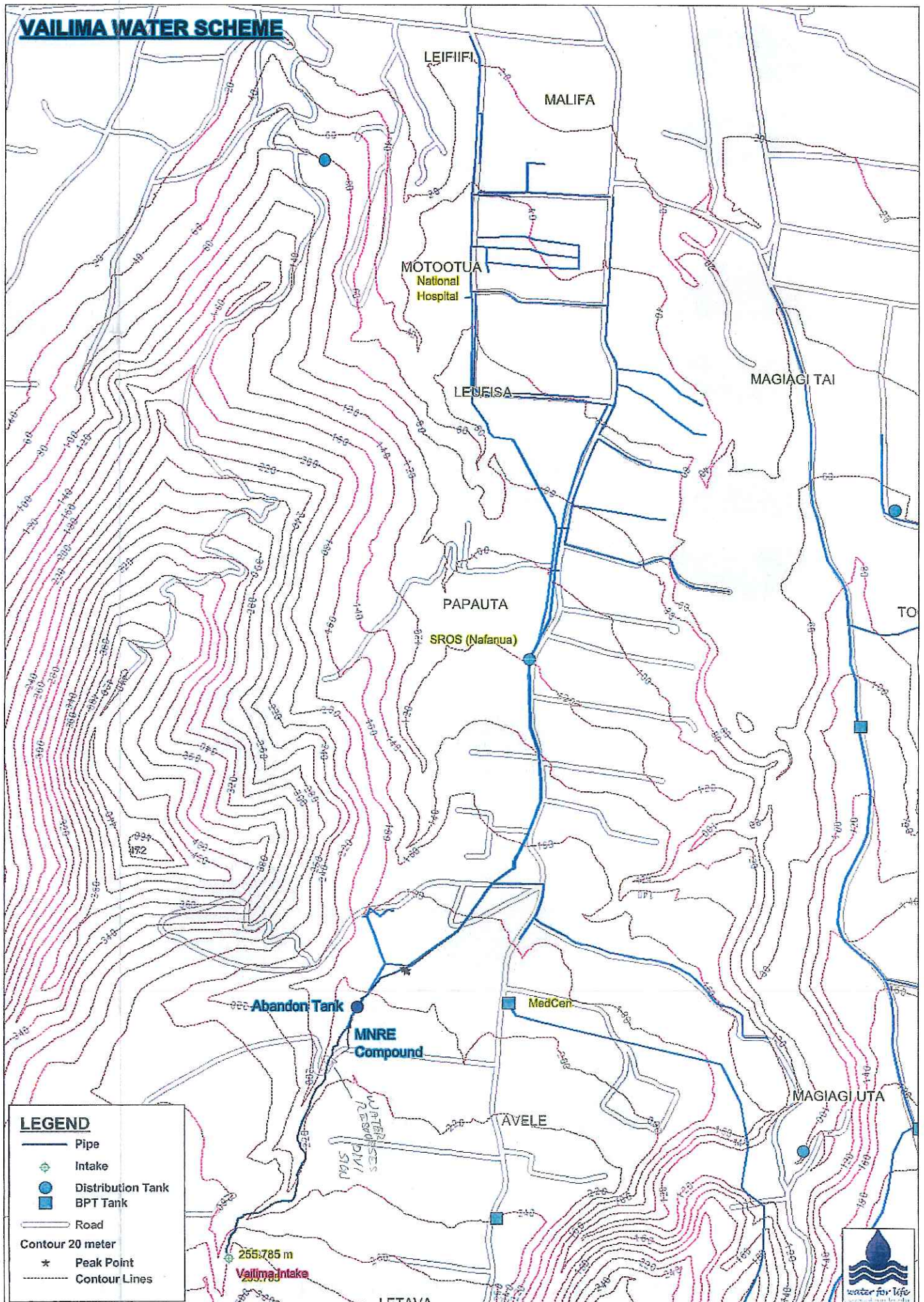
Flow: (m^3/day) Alaca

average : 9125 $\equiv 380 \text{ m}^3/\text{h}$
peak : 11860 $\equiv 494 \text{ m}^3/\text{h}$ (using Flow rate 2 to calc peak flow)

ALAOA WATER TREATMENT PLANT - Figure 1a - processing



VAILIMA WATER SCHEME



VAIVASE UTA WATER SCHEME

MONO

VAIVASE TAI

Toomatagi Tank

Propose Pump Station
build inside Tank Boundary

TOOMATAGI

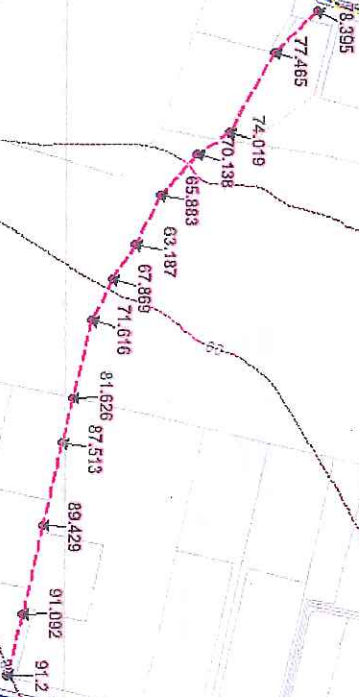
MAGIAGI TAI

VAIVASE UTA

FAGALII



Elevation Profile (Trimble GNSS Height)



Abandon PBT Tank
Propose New Treatment Plant

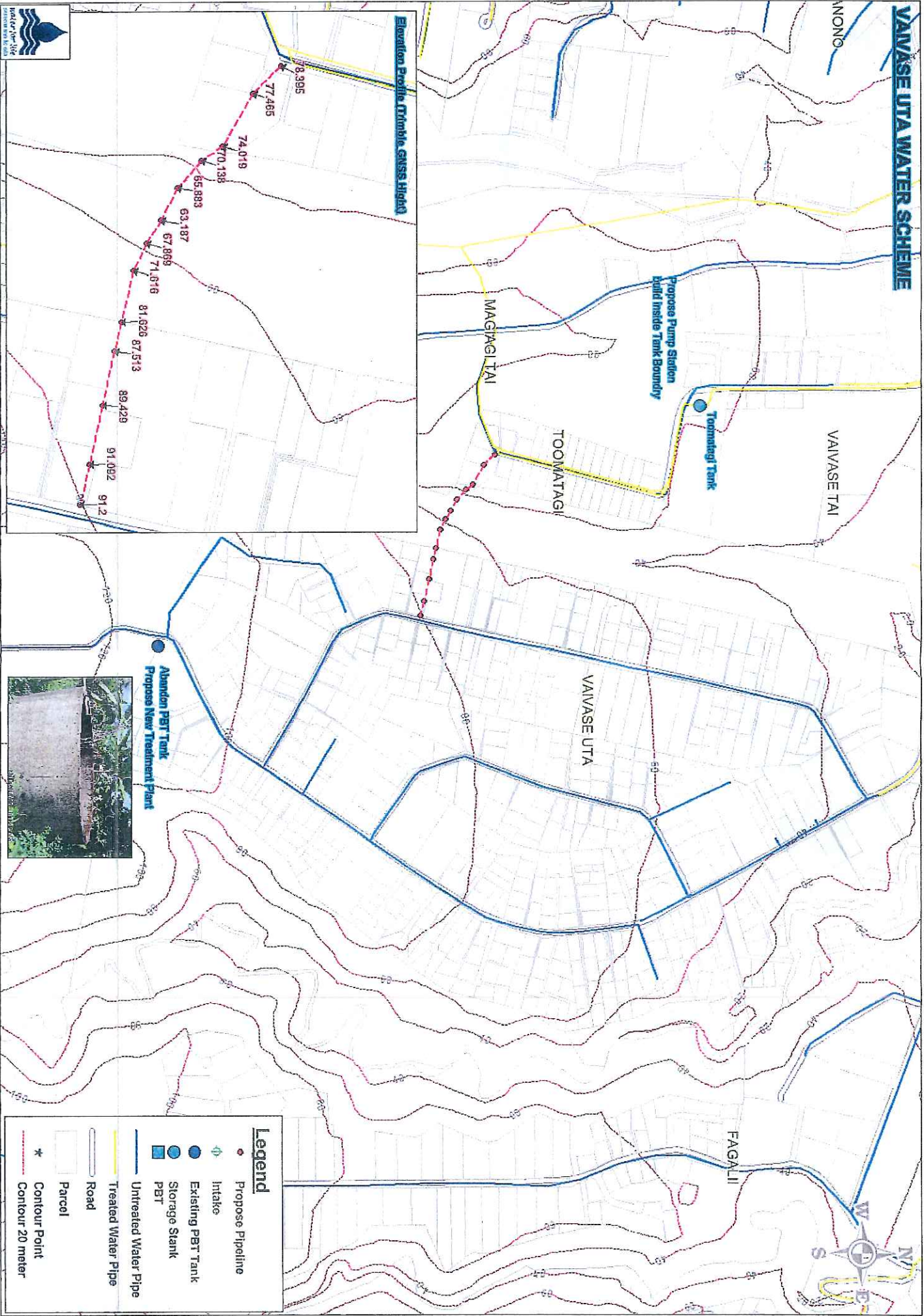


Legend

- Propose Pipeline
- ⊕ Intake
- Existing PBT Tank
- Storage Stank
- PBT
- Untreated Water Pipe
- Treated Water Pipe
- Road
- Parcel
- * Contour Point
- Contour 20 meter



VAIVASE UTA WATER SCHEME



Legend

- Propose Pipeline
- Intake
- Existing PBT Tank
- Storage Stank
- PBT
- Untreated Water Pipe
- Treated Water Pipe
- Road
- Parcel
- Contour Point
- Contour 20 meter



添付資料：

2. 議事録

(12月10日SWA協議概況)

2-1. 調査内容説明資料

2-2. 調査スケジュール説明資料

Survey for JICA's Ex-ante Planning

Applying the Miyako-jima Water Supply Model

Fukuyama Syoji Co., Ltd.

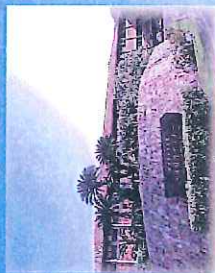
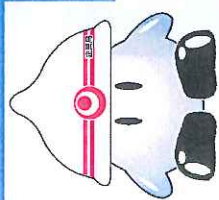
Okidensystem Co., Ltd.

Nansei Shoto Industrial Advancement Center

Objective

Survey the current states of Samoan water supply for seeking applicability of Miyako-jima Water Supply Model which has been acquired through its characteristics of islands and subtropical zones leading to the future application of the model to other Oceania islands. Also marshal the applicability of the model, conditions of application of the model, and selling points of the model

About the Team



県企業局

Dept. of Water-Sewage of Miyako-jima City

Sustainable Water Business

Cooperation

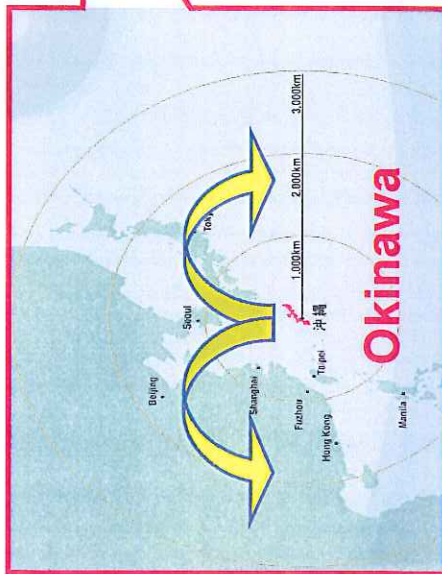
JICA Okinawa

JICA, Samoa

Independent State of Samoa
Mālō Sa'oloto Tuto'atasi o Samoa

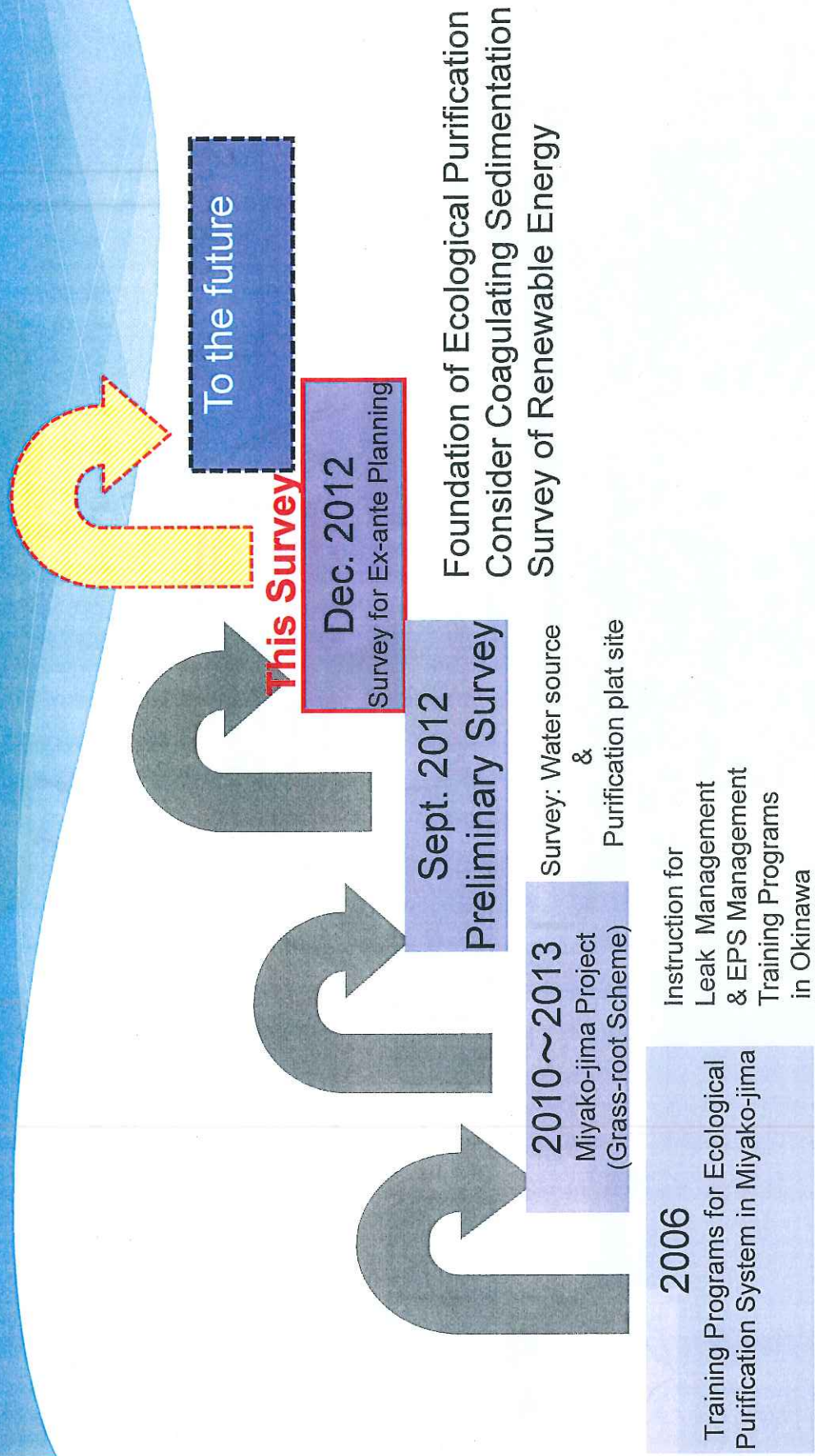


Survey for Ex-ante Planning



Disseminating knowledges and findings of Okinawa obtained through its nature of islands and subtropical to other islands

Positioning of the Survey



Point of Issues

Current States

- Management problem of water plants
- Unprocessed and unsterilized raw water
- Water Leakage on pipelines

Issues

- Method of water purification
- Access to safe drinking water
- Sustainability of water management
- Effective use of water resources

Ideal States

- Supply of secure and safe water
- Strong Water Management
- Economical ease of water purveyors and users(citizens)

Solution

Miyako-jima Water Supply Model

Contents of Survey (1)

Biological Purification

Facility utilizing the biological purification method and using less chemical agents
Establishing the biological purification in tropical zones

Introduction of Pretreatment

Measures for turbidity water in rainy season
Verifying introduction of natural coagulant

Study of the Reservoir

Selecting the reservoir for Miyako-jima Water Supply Model

Selection of the site for the Water Plant

Selecting the location for the water plant
Study for introduction of micro generation
Study for water pressure of aqueduct and distribution pipe line

Contents of Survey (2)

Introduction of renewable energy

Reconstruction of aqueduct and
distribution pipe line

Assessment of Miyako-jima Water
Supply Model

Survey for installations
of water meters

Miscellaneous

Meteorological Research (Sunlight, etc.), Site
Search for solar panels, and consideration of
setting micro generations

Survey for water pipeline network and
investigation of causes of water leakage

Assessment of the model by questionnaire to
SWA staff

Search of the locations of installed water
meters and no meters

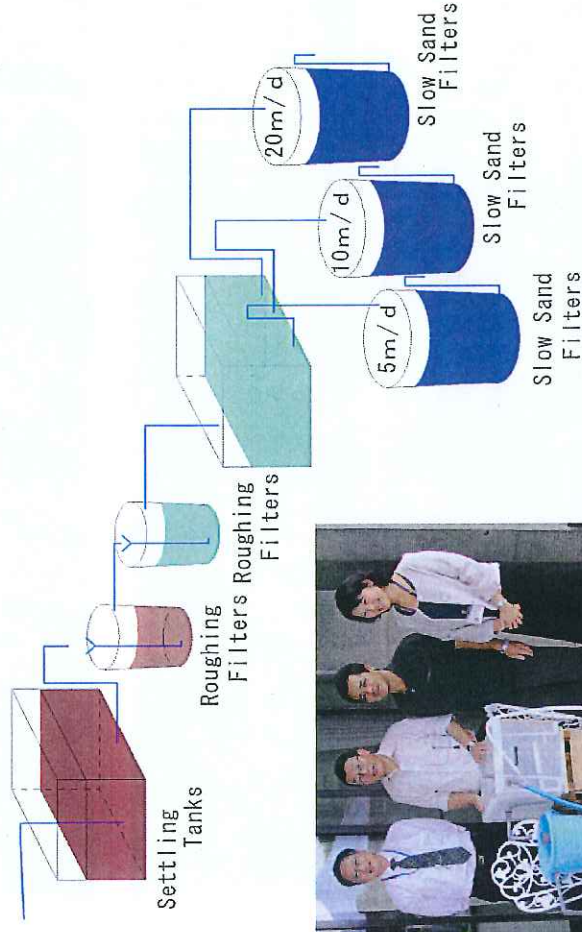
Exploration of issues on development for the
subject area proposing its solutions

Establishing Biological Purification in the Tropical Zone

Unknown Condition of
Filtration Rate



Conducting the “Model of
Buckets” changing the
filtration rates
(5m/d, 10m/d, 20m/d)



Instruction by Dr. Nakamoto,
professor emeritus

Introduction of Pretreatment

- * Consideration of the measures for turbidity water



- * Confirmation of effectiveness of several natural coagulant



- * Water treatment without wastes
- * Use of sludge being generated



Study of the Reservoir

- * Study of the Reservoir of Vailima water system



- * Research of flow rate of the source



- * Judging the possible volume of intake



Selection of the Site for the Water Plant

- * Selection of the planned site for the water plant



- * Drawing up the aqueducts area map



- * Considering the locations for air release valves and discharge valves



Introduction of Renewable Energy

Solar Power Systems

- * Renewable Energy
 - Solar Power Systems
 - Micro Hydro Generations
- * Operation of the systems by supplying the electricity
- * Consideration of Supplying the electricity to the water pumps of Vaivase-Uta water systems



Adjacent area of the source reservoir at Shirakawata Reservoir of Dept. of Water-Sewage of Miyako-jima City

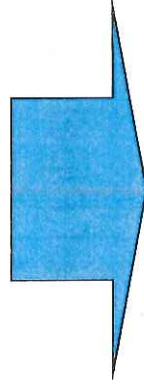
Reconstruction of Aqueduct and Distribution Pipe Line

- * Research of Pipeline network (Calc. of network)
- * Reconsideration of the type, material and size of the pipes used
- * Investigation of causes of water leakage
- * Considering the installation of pressure reducing Valves and tanks for high pressure area
- * Considering the installation of air release valves and discharge valves



Assessment of Miyako-jima Water Supply Model

- * Questionnaires for the technical transfer of the Miyako-jima Water Supply Model



- * Recent Changes
(Being succeeded and to be improved)
- * Prioritize the items



Considering the Protection of the Sources

Inflow of the high
turbidity water in rainy
season



Examine the cause of
turbidity at the water
intake point and consider
the measures



From Now On

- * Establishing the Miyako-jima Water Supply Model and Applying the model to other island nations in Oceania



- * Proposing the Facilities and the Equipments to Samoa
- * Stable Supply of the Water



Dec. 10, 2012		Dec. 11, 2012		Dec. 12, 2012		Dec. 13, 2012		Dec. 14, 2012		Dec. 15, 2012		Dec. 16, 2012	
Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday	
9:00	Visiting at JICA, Samoa Accompanying a local consultant	G1: Bucket model at Alaoa Station G2: Survey for renewable energy	G1: Bucket model at Alaoa Station G2: Survey for renewable energy	G1: Bucket model at Alaoa Station G2: Survey for renewable energy	G1: Bucket model at Alaoa Station (Joint effort) G2: Exploration of Water Source & Aqueduct	G1: Bucket model at Alaoa Station (Joint effort) G2: Exploration of Water Source & Aqueduct	G1: Bucket model at Alaoa Station (Joint effort) G2: Exploration of Water Source & Aqueduct	G1: Bucket model at Alaoa Station (Joint effort) G2: Exploration of Water Source & Aqueduct	G1: Bucket model at Alaoa Station (Joint effort) G2: Exploration of Water Source & Aqueduct	G1: Bucket model at Alaoa Station (Joint effort) G2: Exploration of Water Source & Aqueduct	G1: Bucket model at Alaoa Station (Joint effort) G2: Exploration of Water Source & Aqueduct	G1: Bucket model at Alaoa Station (Joint effort) G2: Exploration of Water Source & Aqueduct	G1: Bucket model at Alaoa Station (Joint effort) G2: Exploration of Water Source & Aqueduct
10:00	For Scheduling	Exploration: From Alaoa Station to Toomatagi Reservoir	Exploration: From Alaoa Station to Toomatagi Reservoir	Exploration: From Alaoa Station to Toomatagi Reservoir	From Vailima Water Source to Planned site for a purification plant	From Vailima Water Source to Planned site for a purification plant	From Vailima Water Source to Planned site for a purification plant	From Vailima Water Source to Planned site for a purification plant	From Vailima Water Source to Planned site for a purification plant	From Vailima Water Source to Planned site for a purification plant	From Vailima Water Source to Planned site for a purification plant	From Vailima Water Source to Planned site for a purification plant	From Vailima Water Source to Planned site for a purification plant
11:00													
12:00	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch
13:00	Curtsey visit to SWA explaining the mission of the survey Obtaining an approval of: Installing the bucket model Using the managers room (For the purpose of water quality test)												
14:00	Using the electricity Accessing the government	G1: Bucket model at Alaoa Station G2: Survey for renewable energy	G1: Bucket model at Alaoa Station G2: Survey for renewable energy	G1: Bucket model at Alaoa Station G2: Survey for renewable energy	Exploration of Water Source & Aqueduct From Vailima area water source to the site of purification plant	Exploration of Water Source & Aqueduct From Vailima area water source to the site of purification plant	Exploration of Water Source & Aqueduct From Vailima area water source to the site of purification plant	Exploration of Water Source & Aqueduct From Vailima area water source to the site of purification plant	Exploration of Water Source & Aqueduct From Vailima area water source to the site of purification plant	Exploration of Water Source & Aqueduct From Vailima area water source to the site of purification plant	Exploration of Water Source & Aqueduct From Vailima area water source to the site of purification plant	Exploration of Water Source & Aqueduct From Vailima area water source to the site of purification plant	Exploration of Water Source & Aqueduct From Vailima area water source to the site of purification plant
15:00	Alaoa Purification Station Installing the bucket model	Exploration: From Toomatagi Reservoir to Planned site of Vivase/Uta Reservoir	Exploration: From Toomatagi Reservoir to Planned site of Vivase/Uta Reservoir	Exploration: From Toomatagi Reservoir to Planned site of Vivase/Uta Reservoir	Search of causes for sediment runoff at water source area	Search of causes for sediment runoff at water source area	Search of causes for sediment runoff at water source area	Search of causes for sediment runoff at water source area	Search of causes for sediment runoff at water source area	Search of causes for sediment runoff at water source area	Search of causes for sediment runoff at water source area	Search of causes for sediment runoff at water source area	Search of causes for sediment runoff at water source area
16:00	Sedimentation Test												
17:00													
18:00	Testing the operation												

	Dec. 17, 2012	Dec. 18, 2012	Dec. 19, 2012	Dec. 20, 2012	Dec. 21, 2012	Dec. 22, 2012
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9:00	G1: Bucket model at Alaoa Station G2: Exploration in Vailima area	G1: Bucket model at Alaoa Station G2: Exploration in Vailima area	Report Wrap-up			
10:00						
11:00						
12:00	Lunch	Lunch	Lunch	Lunch	Lunch	
13:00	Exploration in Vailima area	Exploration in Vailima area	Report Wrap-up	13:30 Leaving Samoa		
14:00						
15:00	Exploration in Vailima area	Exploration in Vailima area	Report to SWA and Exchanging opinions			
16:00						
17:00						
18:00						

添付資料：

3. 議事録

(1 月 28 日 SWA 協議概況)

4. 議事録

(2 月 1 日在サモア日本大使館協議概要)

5. 議事録

(2 月 6 日 EPC 協議概要)

