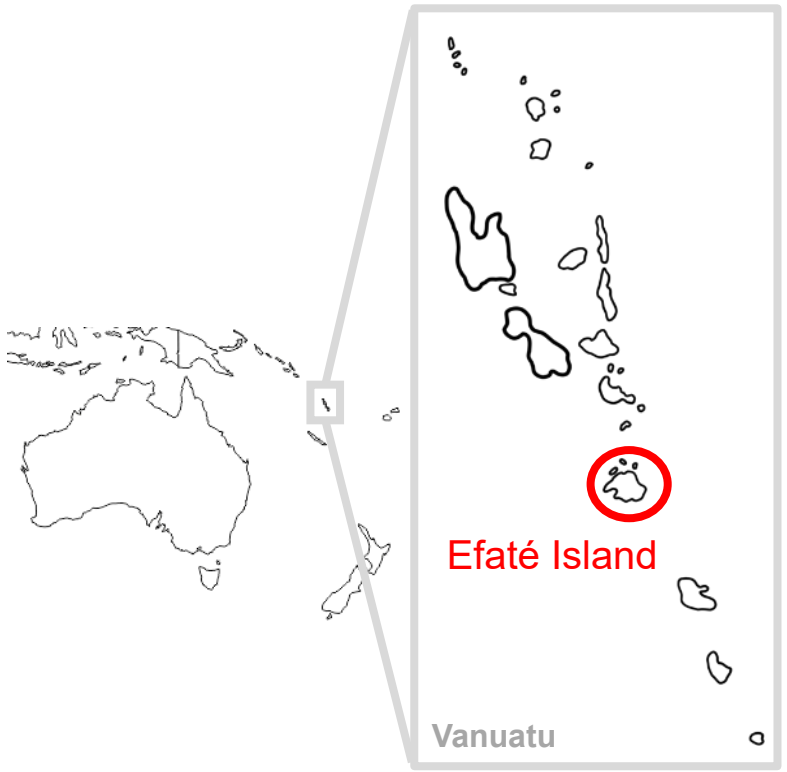
The current situation and Challenges of Water Supply System in Vanuatu (Port-Vila)

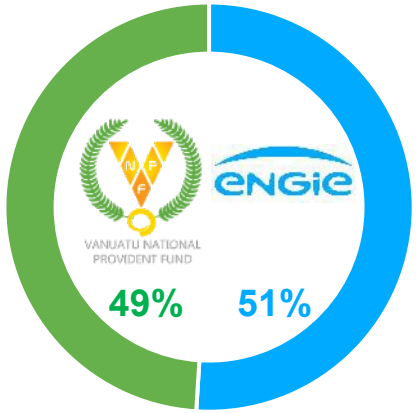
Rodrigue PAKOA, hydraulic engineer in charge of UNELCO's water design office

UNELCO operates 2 concessions contracts on the Island of Efaté in Vanuatu supplying water and electricity…



Corporate

- **155 staffs** (32% female)
- **433** hours of training
- **No accident** resulting in time off work



Electricity

- **12.8 MW** peak demand (avg. 6,6 MW)
- **67 GWh** generation
- **9% RE**
- **626 km** network (HV & LV)
- **301** HV/LV transformers
- **17 600** customers
- **SAIDI: 7 h 36 min** per customer (incl. natural disasters)

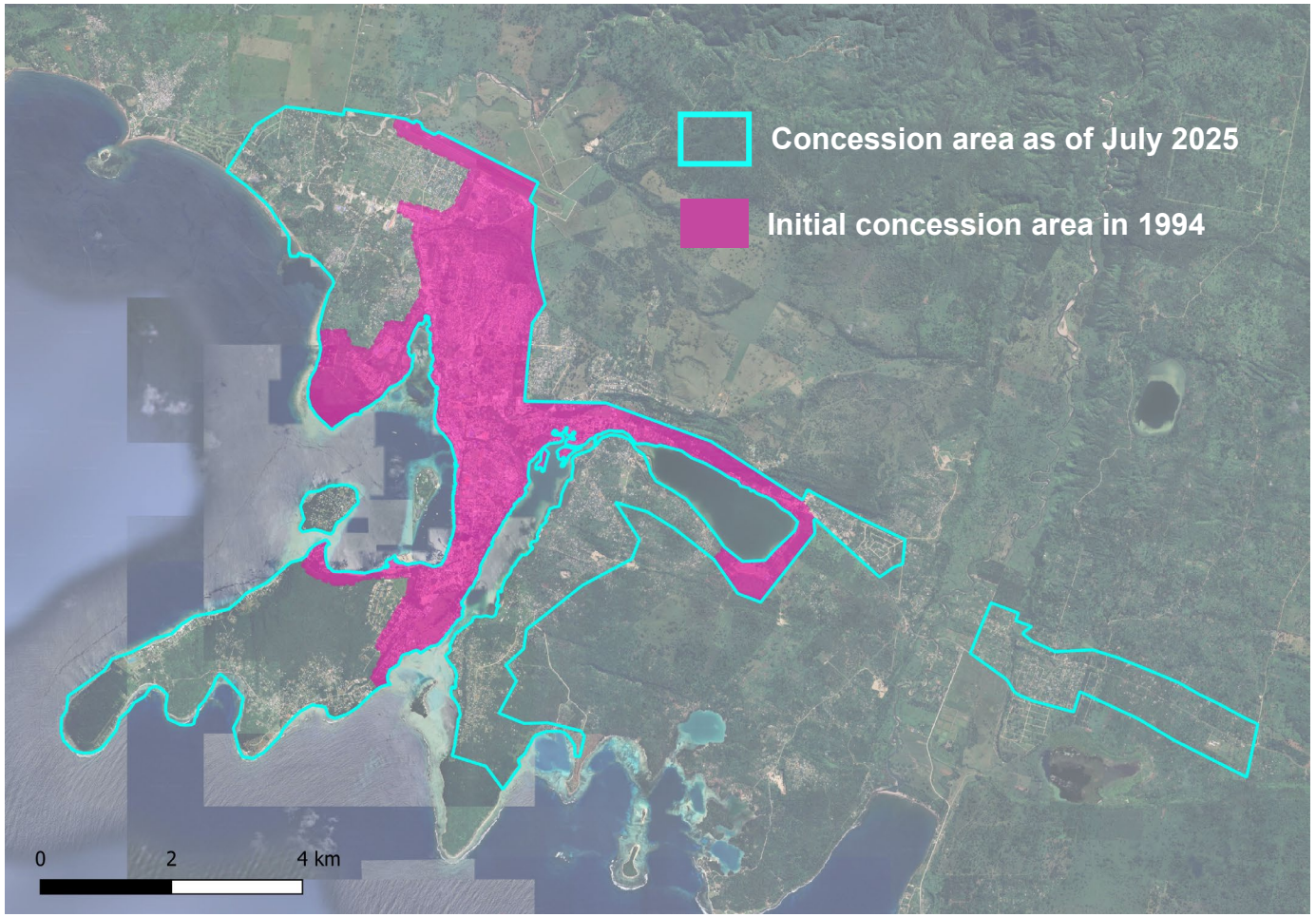
Water

- **6,8 Mm³** production
- **260 km** network
- **12 000 m³** storage capacity
- **11** storage tanks
- **69,8 %** network efficiency
- **10 500** customer
- **Tap water is safe** to drink
- **Best Water Utility in the Pacific** by PWWA in 2024 and 2025

… Vanuatu was the country with the highest disaster risk worldwide in the World Risk Report 2021 and we call it Home.

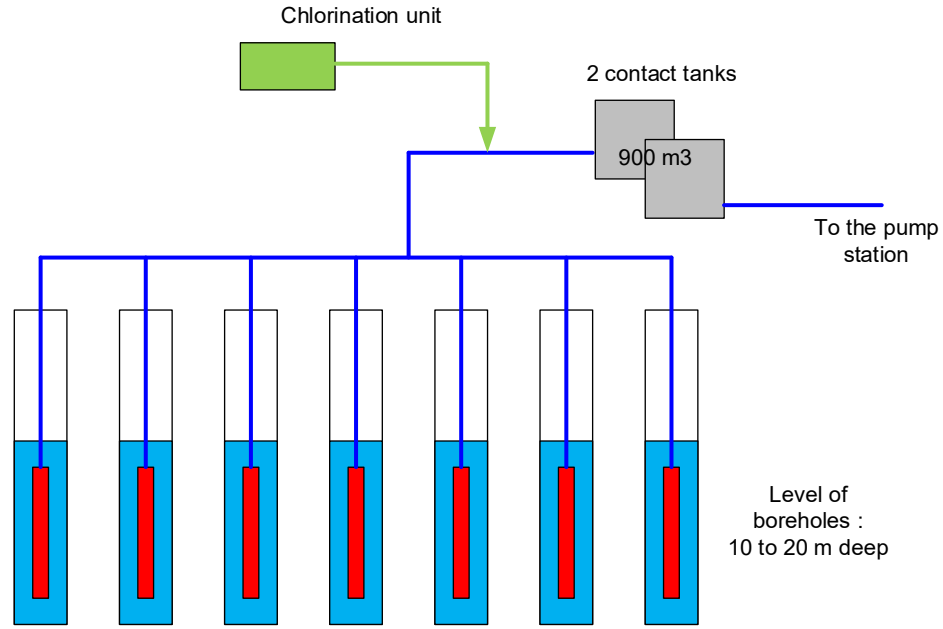
UNELCO ENGIE

Port Vila and neighboring boroughs water supply has been under UNELCO's management since 1994, the concession covers 4,200 hectares, serves 10,774 customers, delivers 4,75 M cubic meters per year and relies on a team of only 17 direct employees …

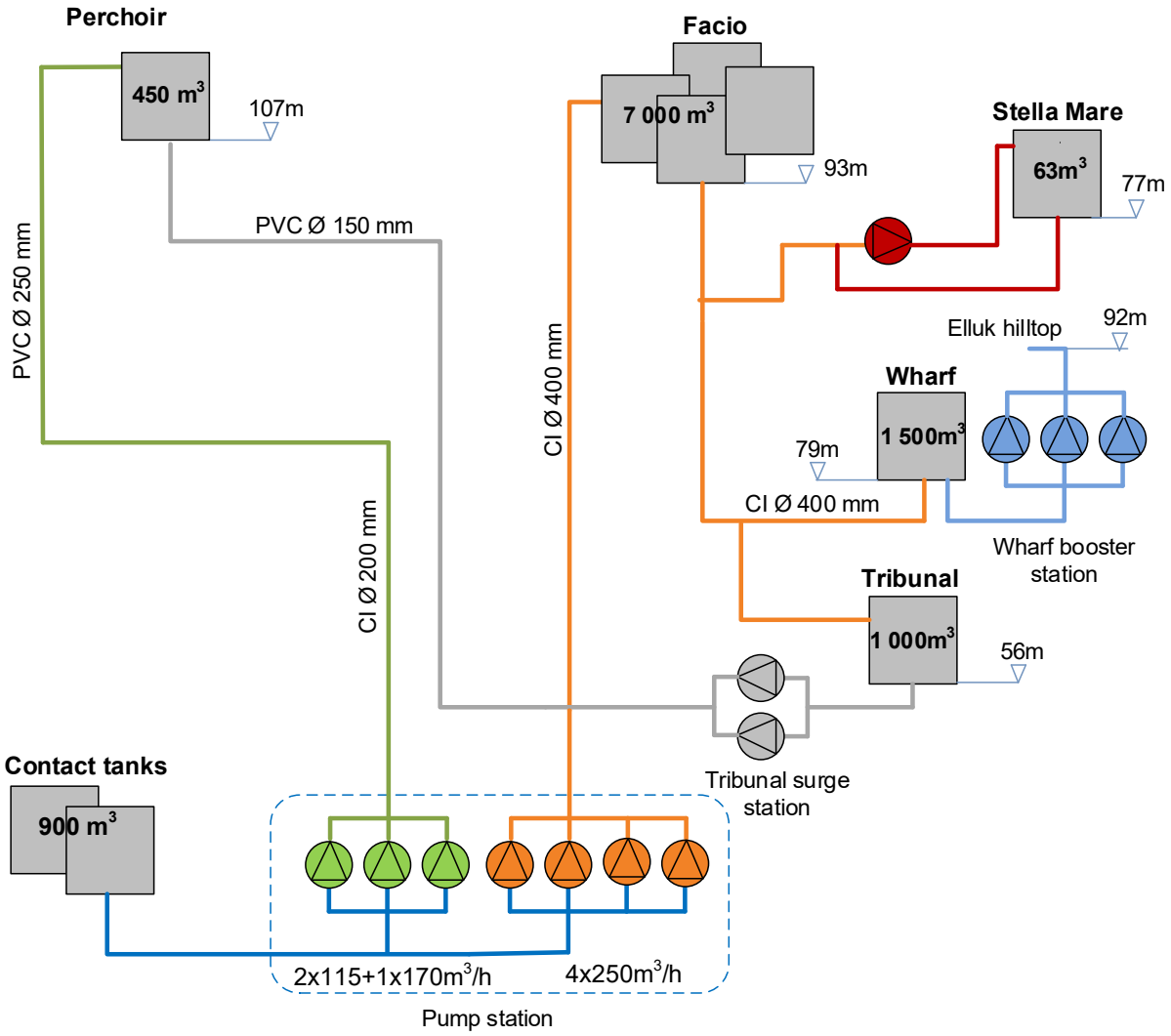


		1994	2025	Evol. per year
	ha	1 500	4 200	3,5%
	m³	8 000	12 000	1,4%
	km	85	285	3,8%
	m³/day	9 550	20 237	2,2%
	U	3 173	10 774	4,1%
	m³	2,2 M	4,75 M	2,6%
	VUV/m³	40	95,85	2,8%
	m³/day/km	41	37	-2,1%

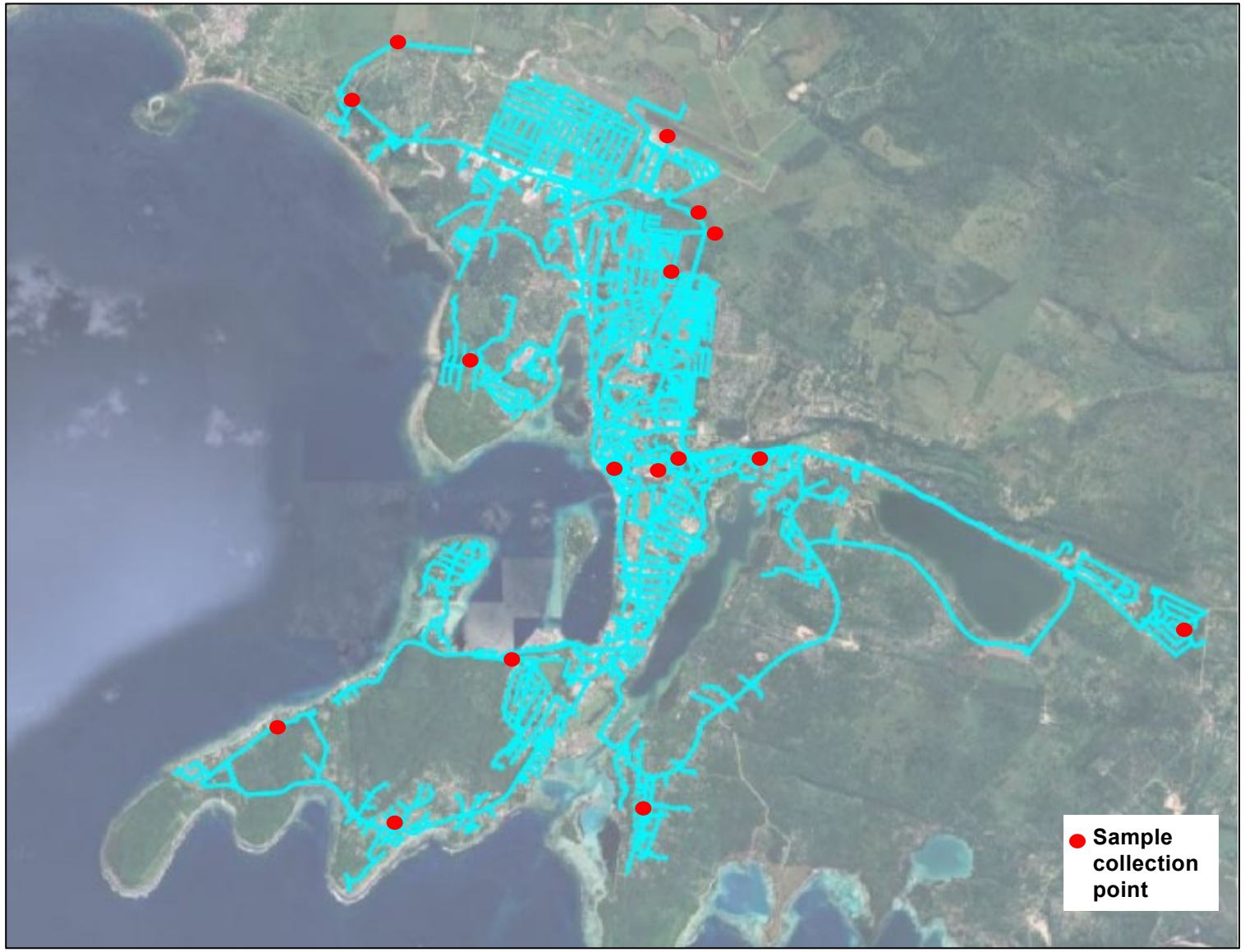
Water production



Water distribution



Water analysis



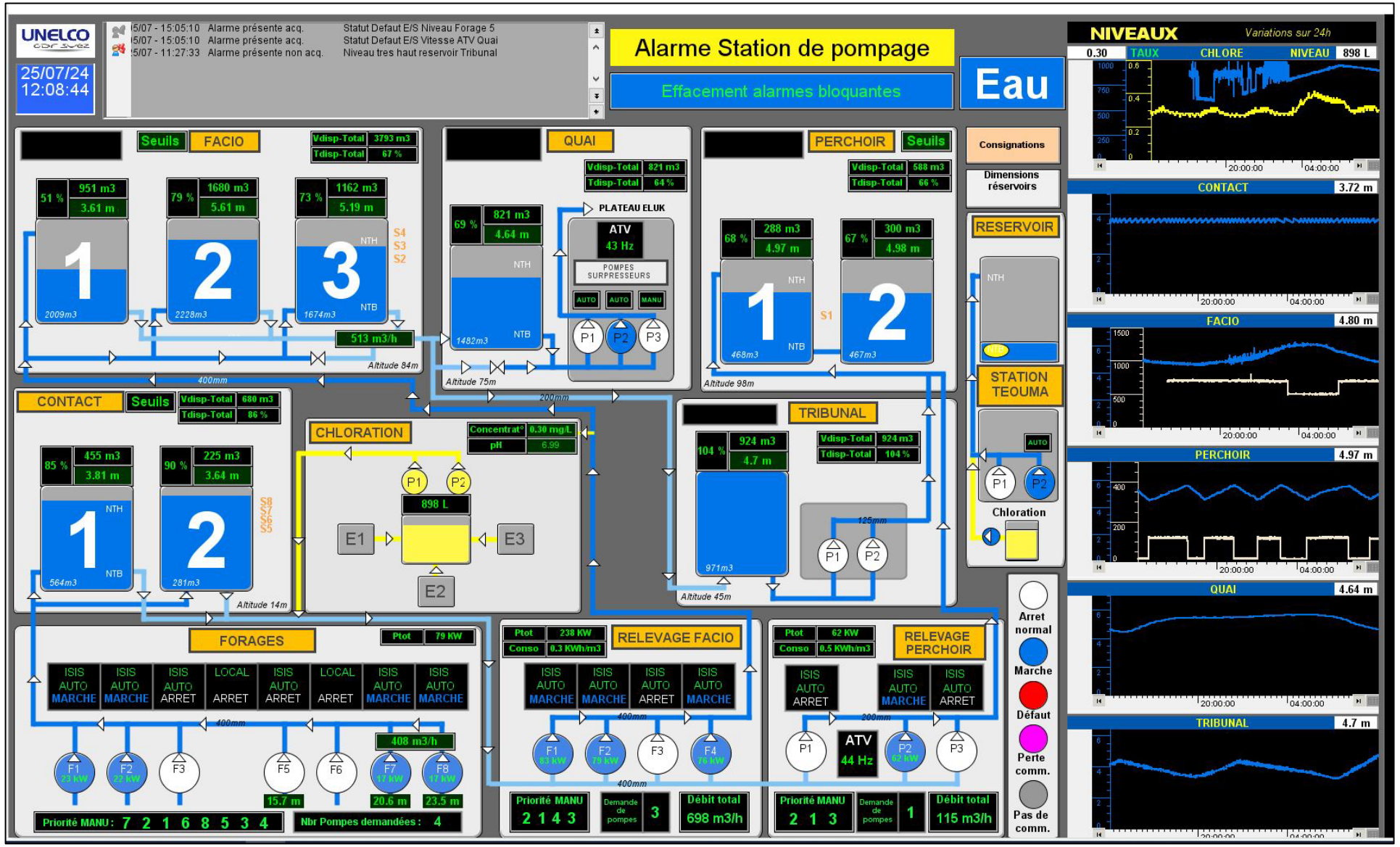
Weekly analysis in our lab, samples taken trought Port-vila town : 16 different locations.

Parameters tested on analysis based on European, WHO and Vanuatu standards:

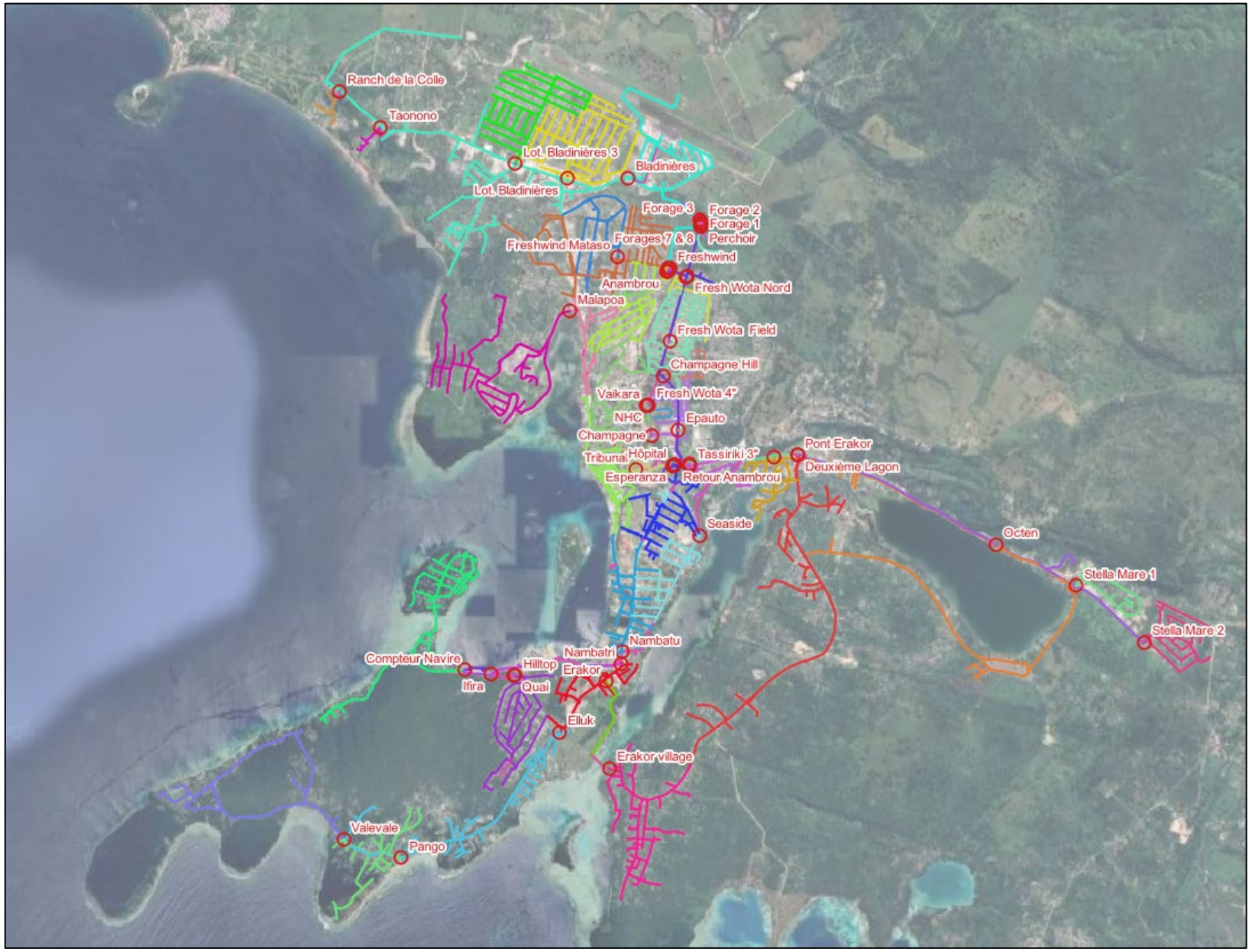
- Chlorine (between 0,1-5 mg/l)
- pH (between 6,5-8,5)
- Conductivity (between 300-8000 µS/cm)
- Turbidity (<1 NTU)
- HPC 37°C/ 24Hrs <10
- HPC 22°C/72Hrs <100
- Total Coliform (U/100ml) = 0
- Faecal Coliform (U/100ml) = 0
- Faecal Streptococcus (U/100ml) = 0

UNELCO ENGIE

Supervisory Control and Data Acquisition (SCADA)

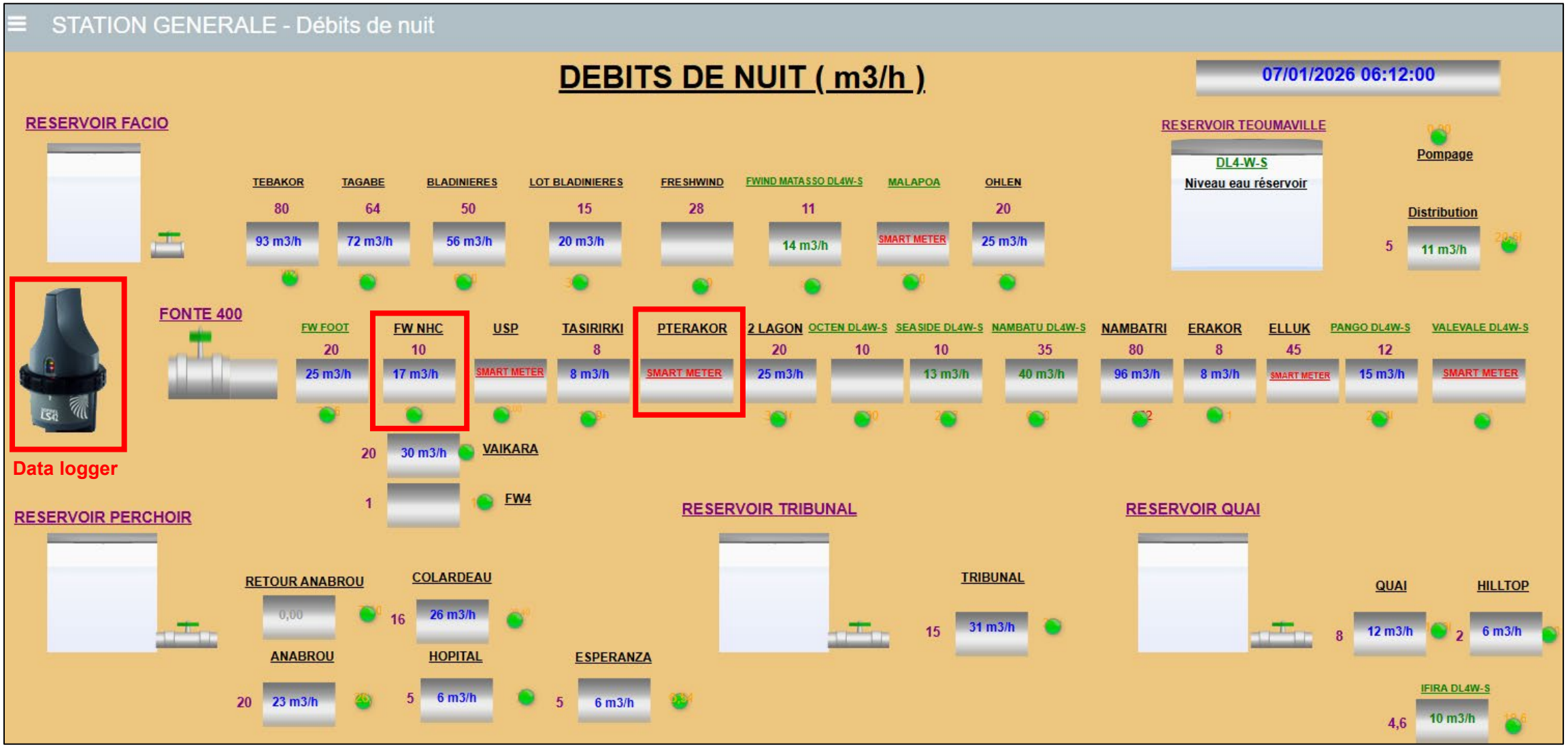


Leaks management

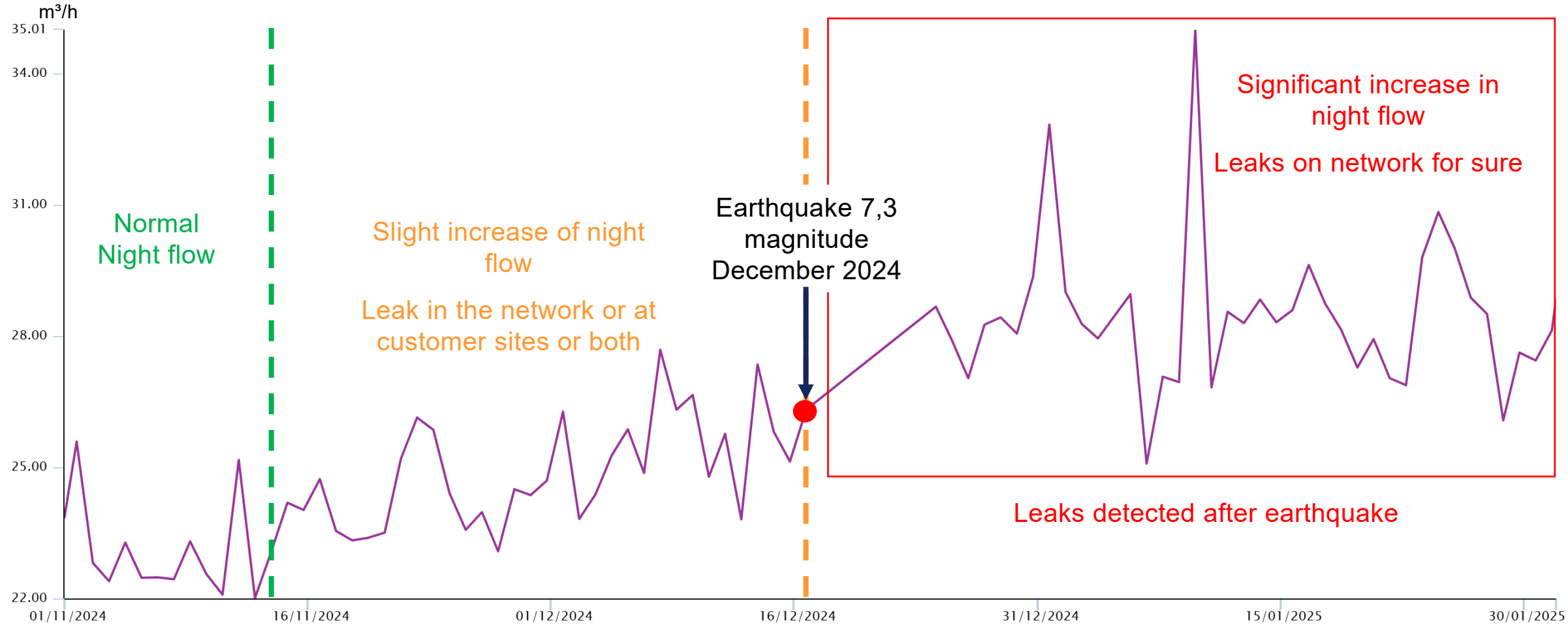


- **Network divided in 45 districts metered areas (DMA)**
- **Production of water (m^3) measured (pump station to tanks)**
- **Distribution of water (m^3) measured (Tanks to DMA)**

SOFREL : remote management of water network flow



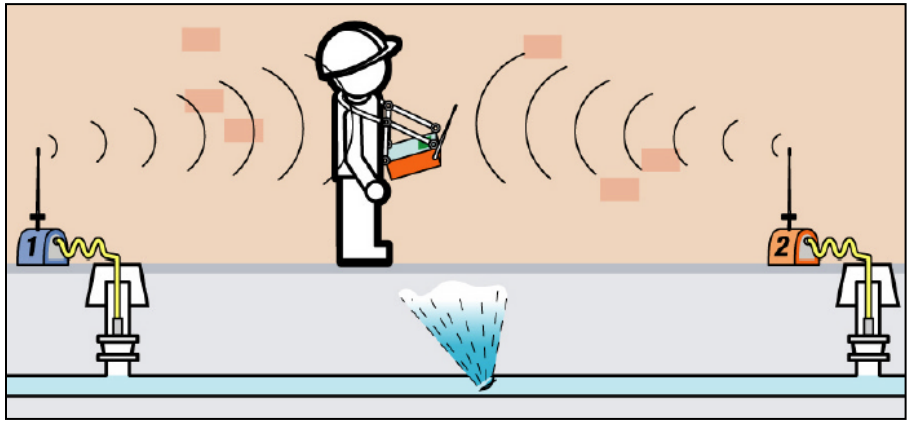
District meter for the area « FW NHC »



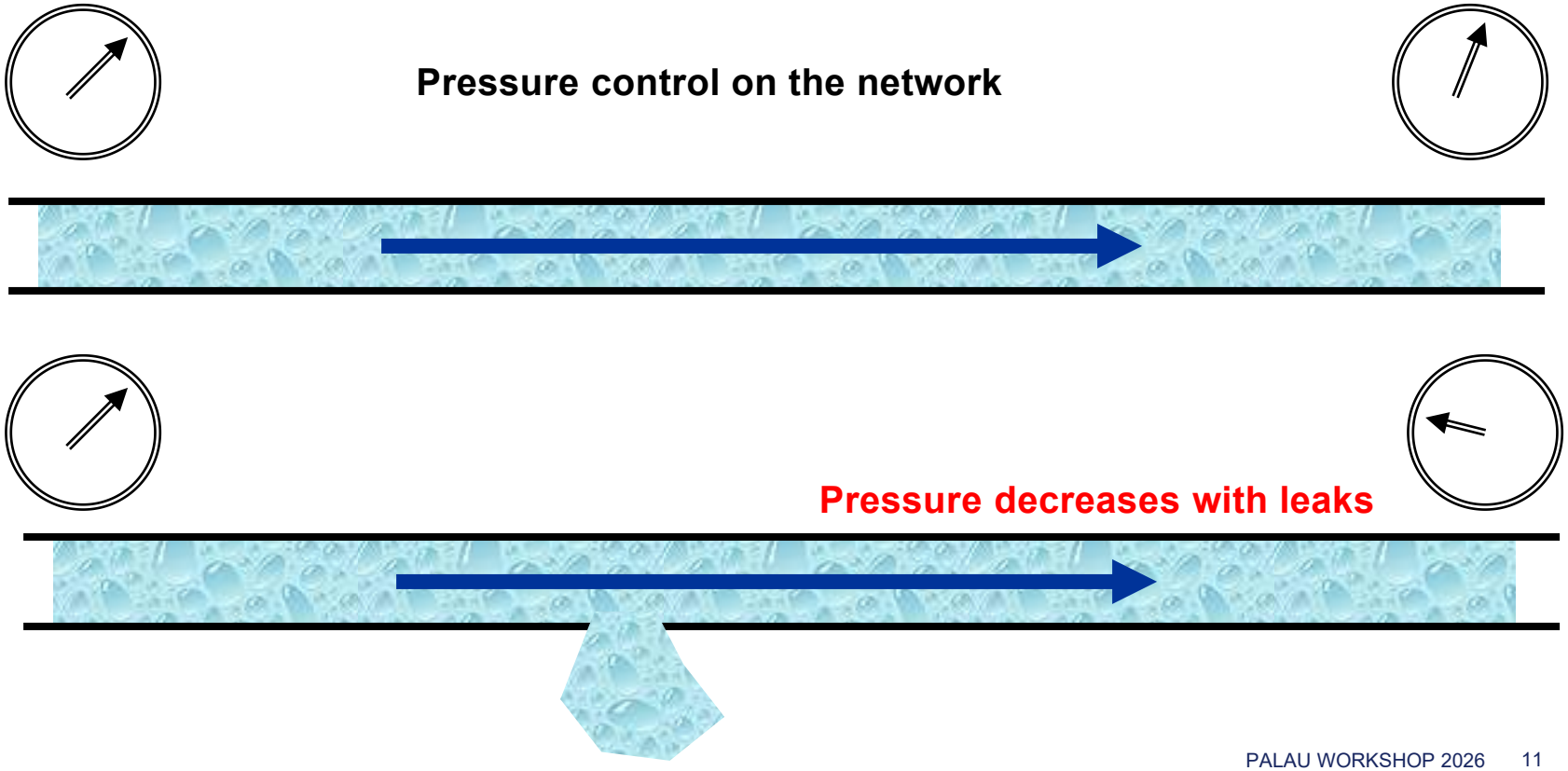
Leaks detection: pressure analyses, acoustic loggers and correlator

Loggers are designed to be mounted on metal fittings within the water distribution network. A powerful magnet retains the logger on steel and iron fittings.

Each logger should be mounted (preferably) vertically on a clean surface. The position should be adjusted for best acoustic coupling to the fitting. For most situations, it is recommended that the spacing between loggers is less than 200 metres for iron or steel pipes; on plastic pipes this recommended maximum distance should be reduced considerably (typically less than 50 metres).

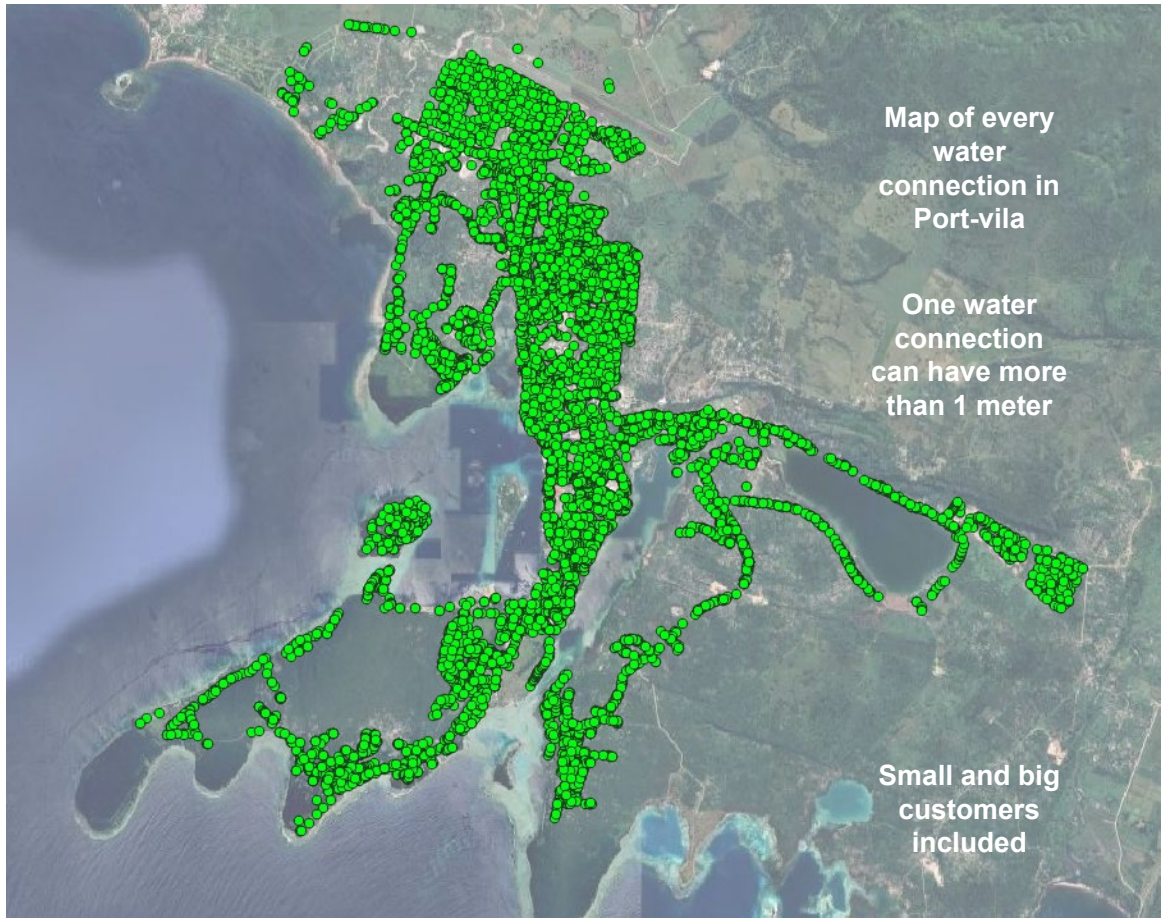


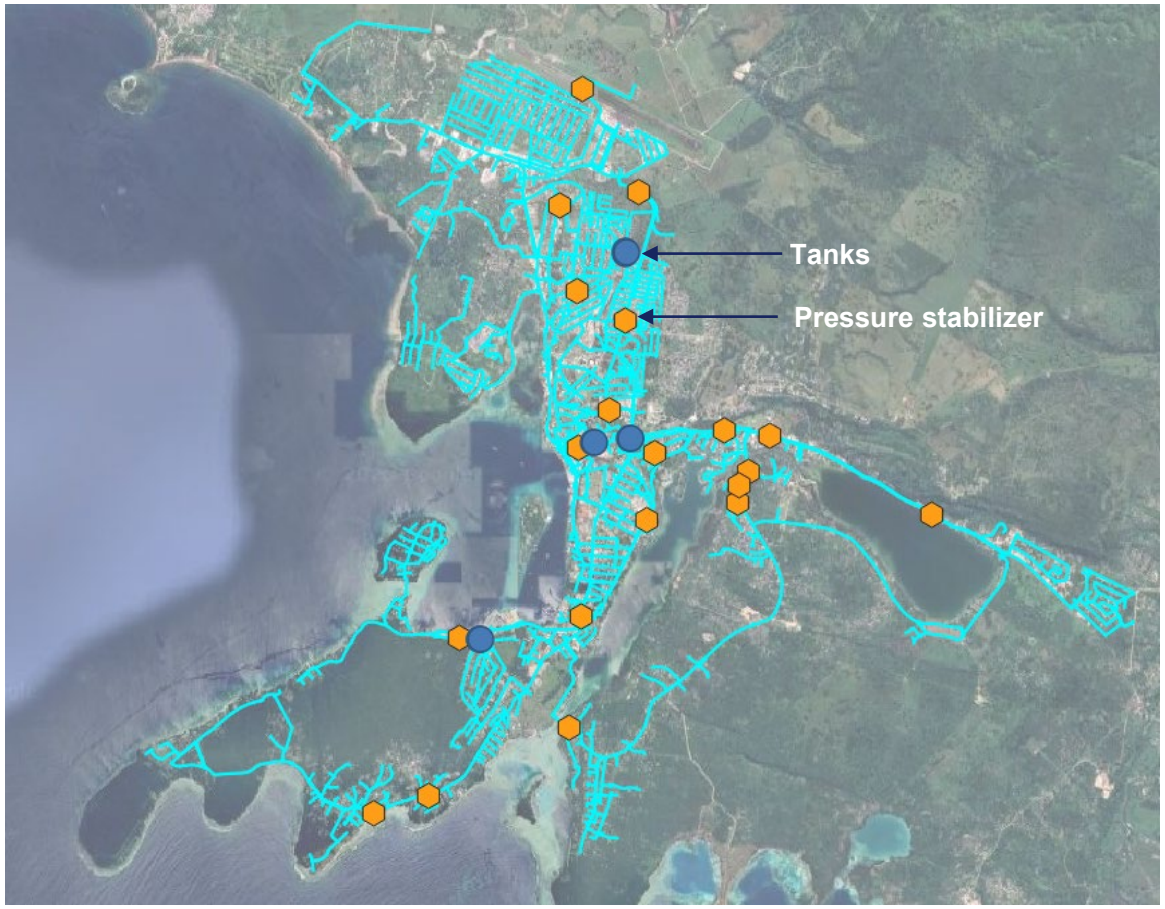
Phocus3 Typical Installation



UNELCO ENGIE

GIS and water network simulator

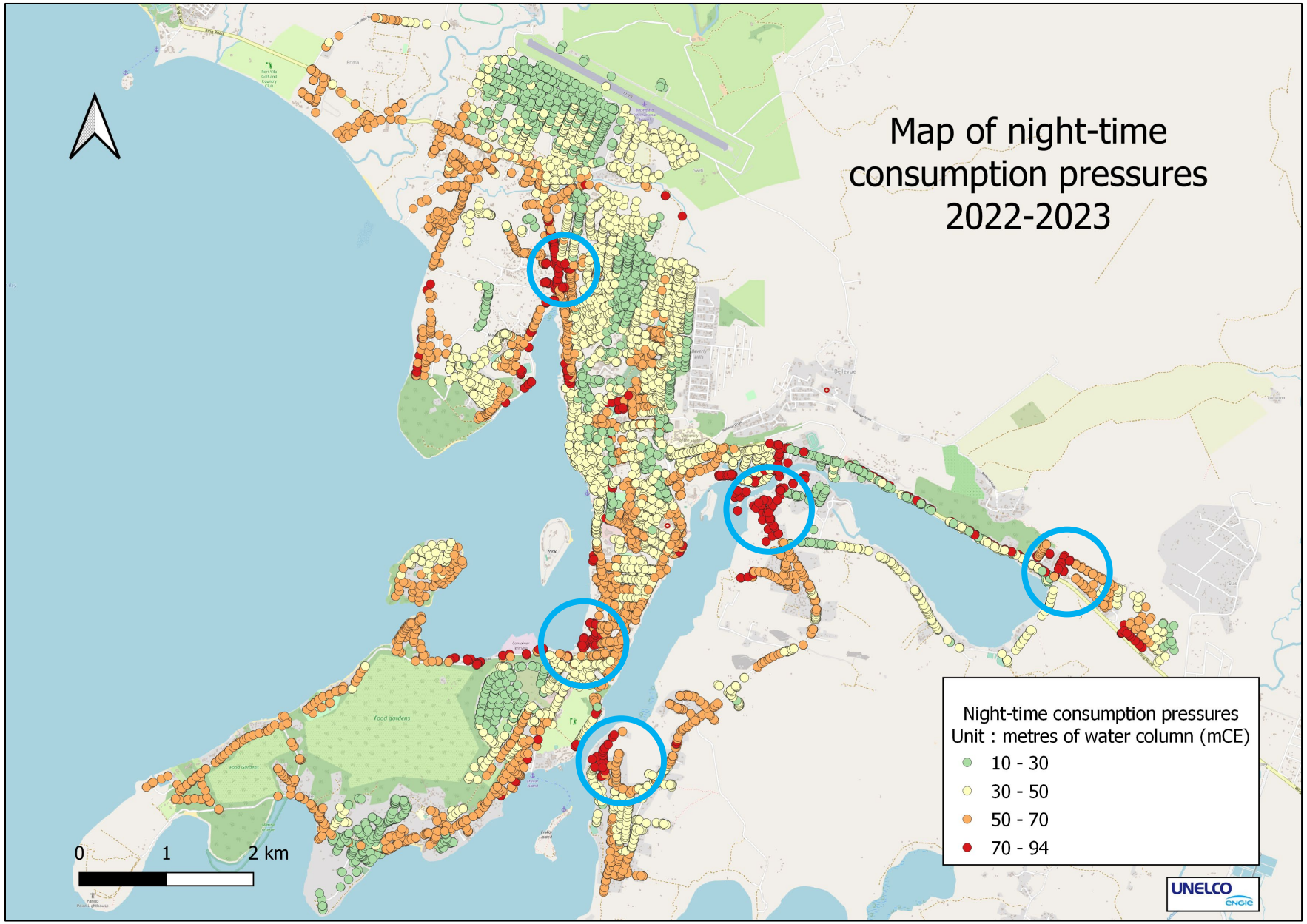




And we have also **many valuable data:** Valves (open/closed), leaks history and their location, fire hydrants…

Network simulator provides the **general behaviour of the network** (flow and pressure under various demand condition), identifies areas with **undersized pipes and/or low-pressure areas**, spots **leaky areas** (pipe to renew), computes the **autonomy of storage**, confronts **simulated pressure versus onsite recordings**, provides grounds and material for the **investment plan**,...

Pressure simulation

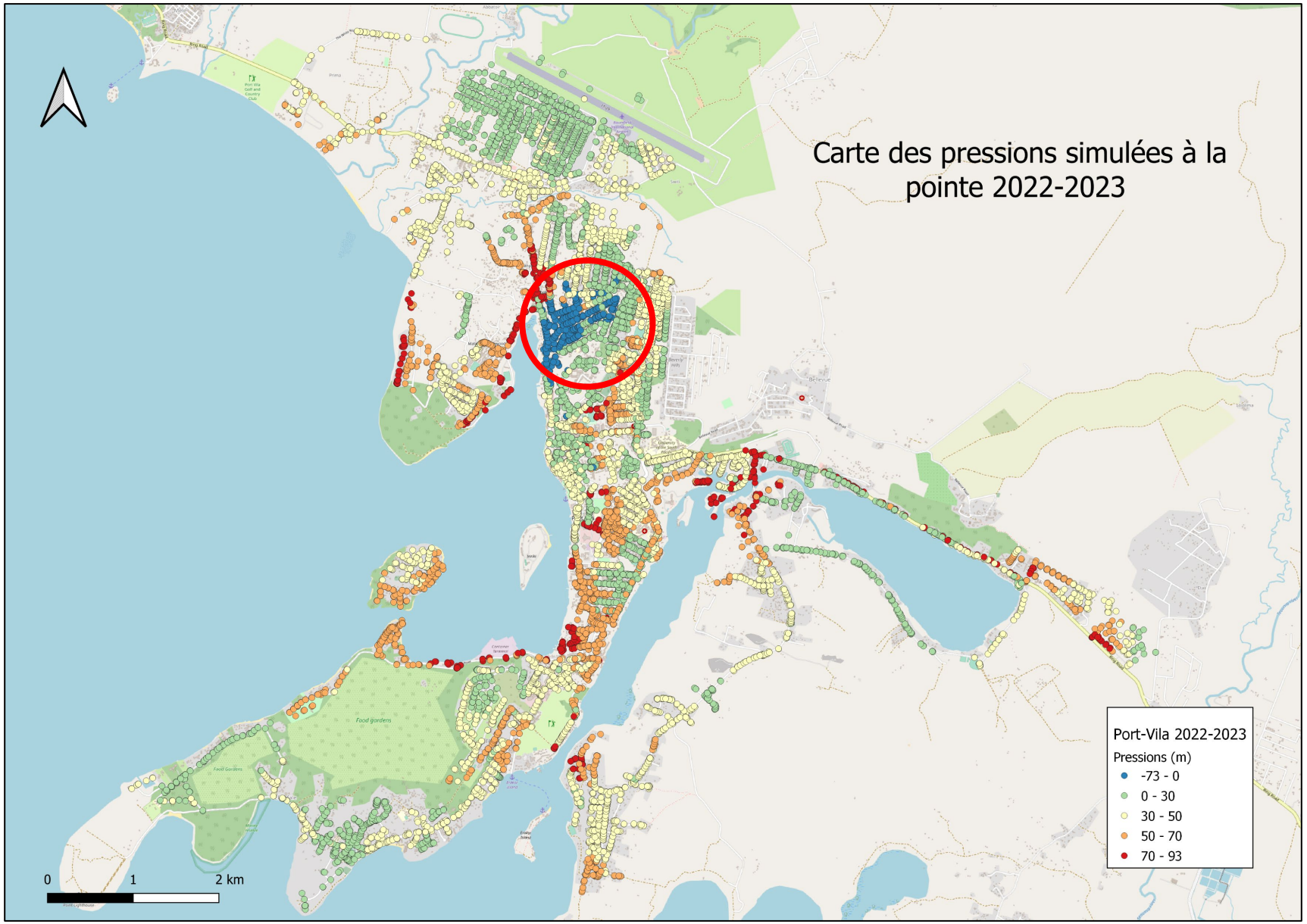


Identification of three types of areas:

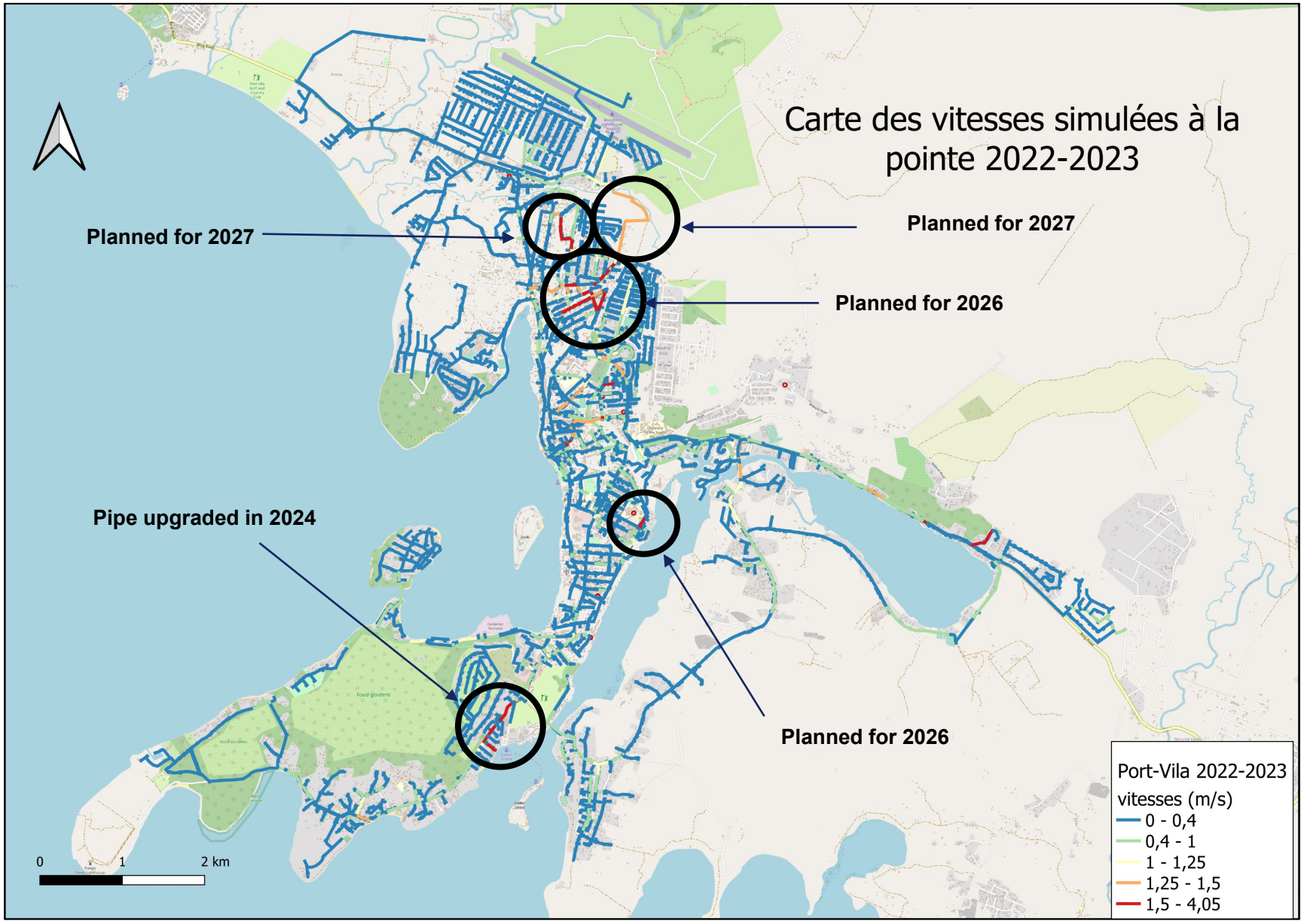
- Standard pressure areas : **1-3 bars**
- Medium pressure areas : **3-5 bars**
- High pressure areas : **above 5 bars**

- Areas with high pressure to stabilize by **installing pressure stabilizer** or by **reorganize the network**.

Low pressure areas



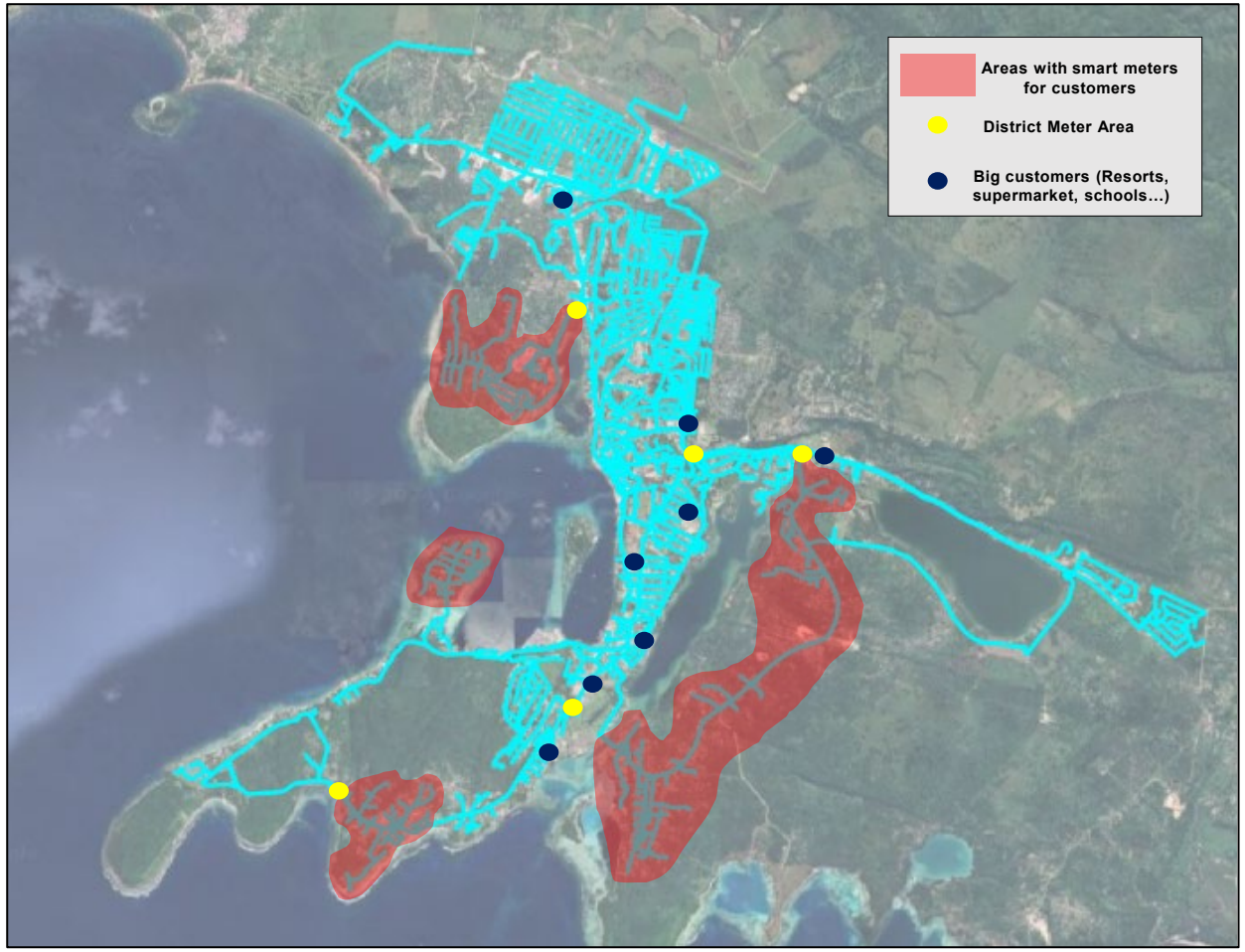
Water velocity simulation



Identification of the velocity (m/s) in the pipes:

- Standard speed : **0-1 m/s**
- Medium speed: **1-1.5 m/s**
- **Over 1.5 m/s**: undersized pipe (need to **upgrade**)

Smart meters



Uses of smart meters:

- **Leaks** known if it's **in the network or on customer side**
- The utility can send **messages to the customer** through the meter
- **Battery status, potential backflow, meter without water**

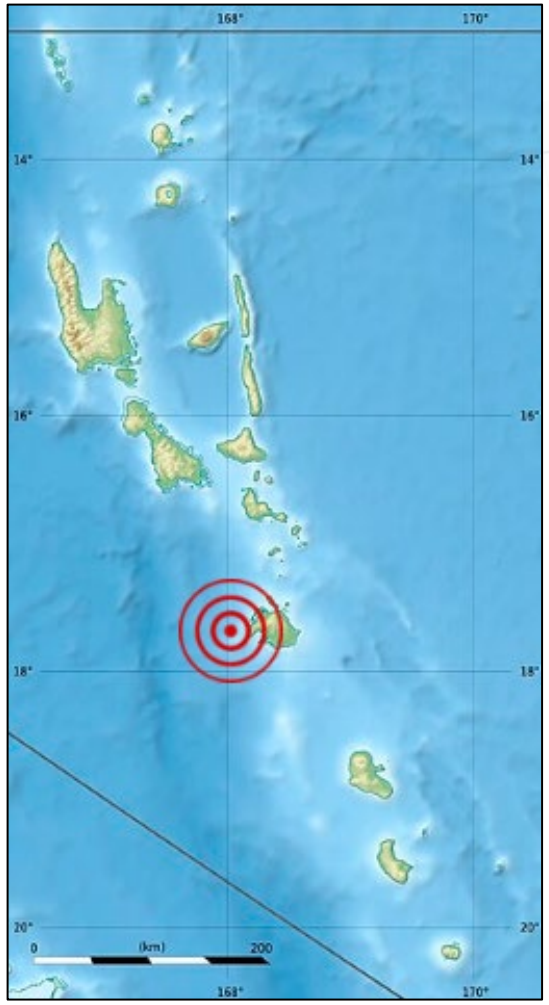
Customer's meter

Size 15 and 20 mm

DMA meter or big customer meter (example : resorts)

Size 40 to 150 mm

Challenges : natural disasters (earthquakes and cyclones)



BBC

Buildings flattened as 7.3 magnitude earthquake hits Vanuatu

Kelly Ng

A 7.3 magnitude earthquake has struck r
landslides, crushing cars and flattening
home to a number of Western embass
There are unconfirmed reports of d
unclear, as power and mobile netv

ALJAZEERA

News Middle East Explained Opinion

Trending

Vanuatu capital

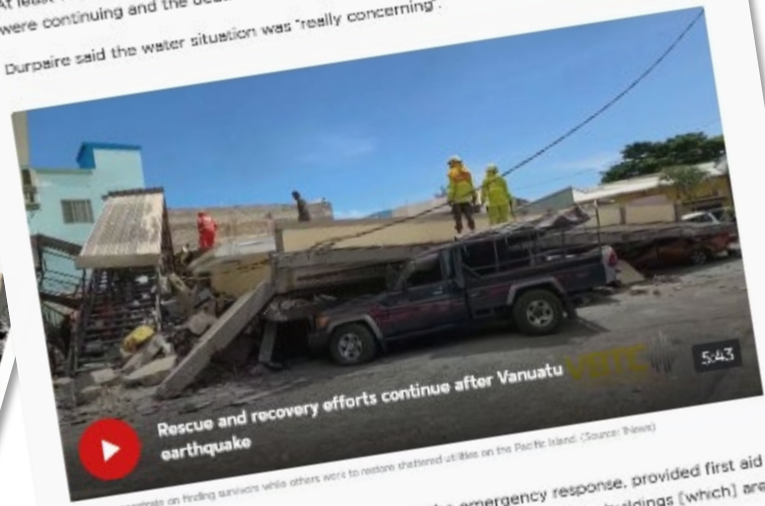
*Tsunami threat has passed for nearby islands after earthquake st
near Vanuatu's capital Porta Vila.*

A magnitude 7.4 earthquake hit near Port Vila, Vanuatu, causing widespread damage and multiple casualties.

As search efforts continue for those missing in Vanuatu, UNICEF Pacific chief of Vanuatu field office Eric Durpaire has raised concern over the lack of clean drinking water for some in the wake of yesterday's magnitude 7.3 earthquake.

At least 14 people died in the earthquake and hundreds have been injured. Search efforts were continuing and the death toll was expected to rise.

Durpaire said the water situation was "really concerning".



"Yesterday UNICEF assisted the hospital with the emergency response, provided first aid kits, provided tents, also because patients cannot go back into the buildings (which) are damaged or dangerous.

"What we noticed, and particularly this morning, [was] an increase of diarrhoea cases."

Durpaire put the sickness down people, including children, drinking contaminated water

"It's not quantified yet — it's just what we can observe."

Damage to storage tanks…

… all the tanks were full at that time…

Timber Tank

Bolted steel

Steel structure with liner

UNELCO ENGIE

UNELCO's Water supply after earthquake

Damaged beyond repairs

Affected, non operational but repairable

Fully operational

Pump station

Storage tank (xx m³)

Perchoir

450

450

Facio

2000

1500

2000

1500

Tribunal

1000

Wharf

1500

Port-Vila

Téoumaville

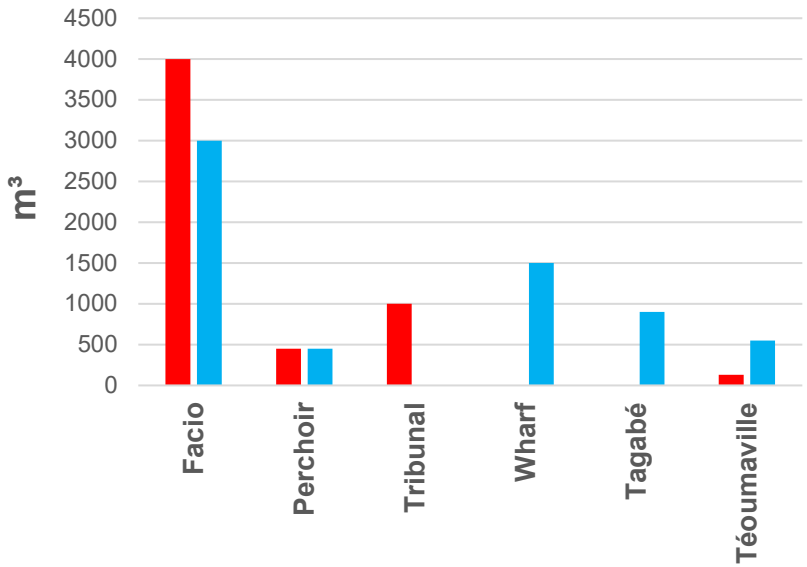
130

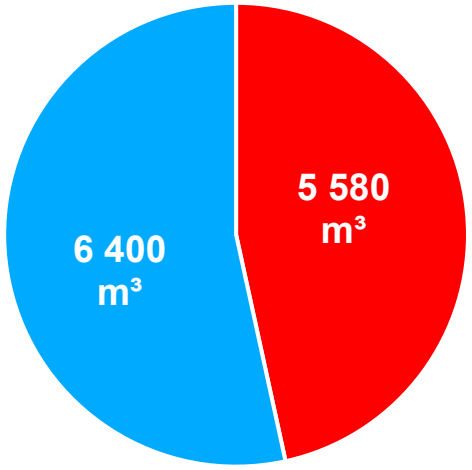
550

600

300

Tagabé pump station





UNELCO's Water supply as of today

Pump station
Storage tank (xx m³)
New tank built in 2025
Construction planned for 2026
Existing tank

Perchoir
450
450
Facio
2000
1500
2000
1500
Tribunal
1000
Wharf
1500
Port-Vila
Téoumaville
130
550
600
300
Tagabé pump station

Cyclones

Cyclones JUDY & KEVIN 2023

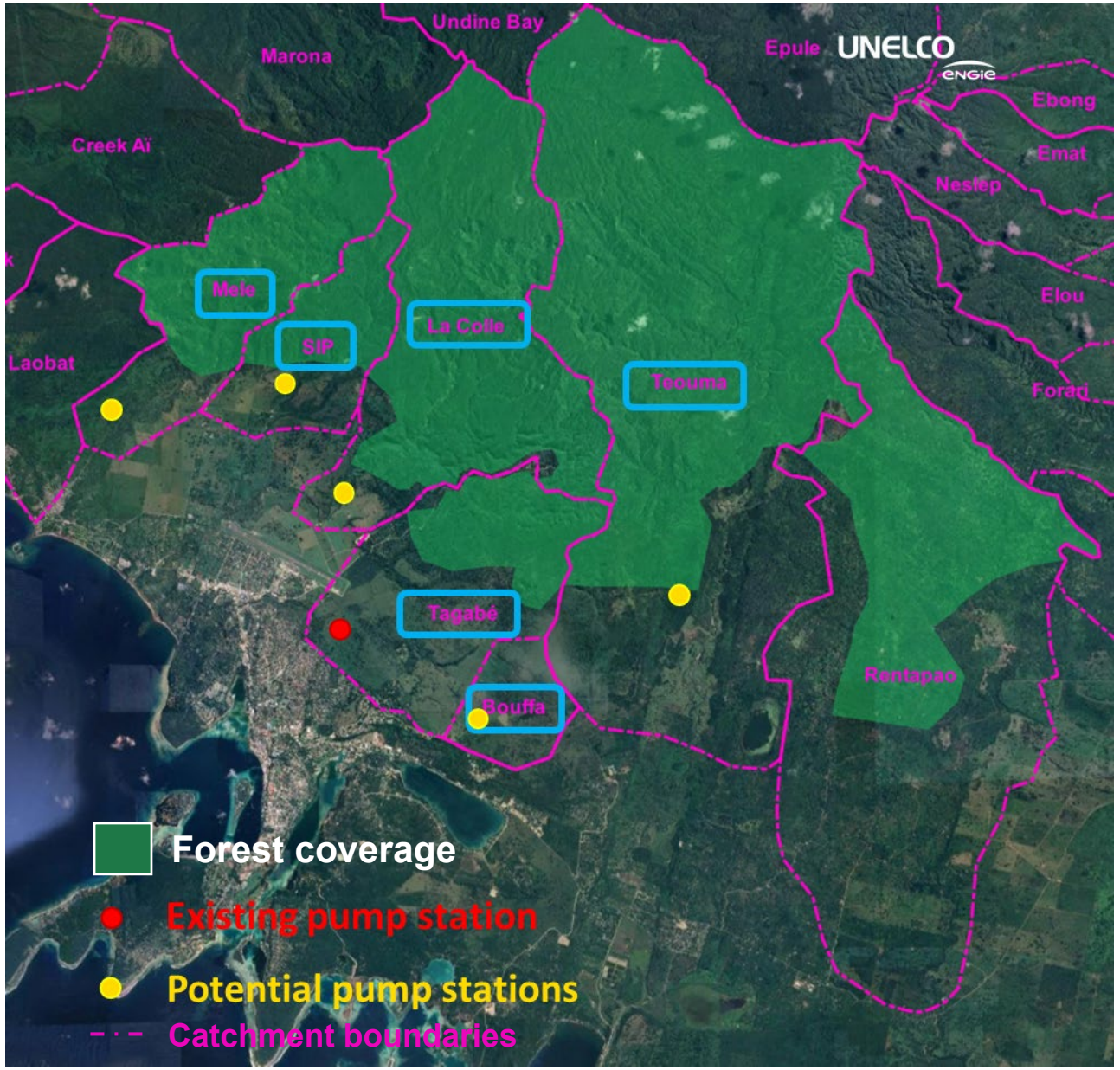
Other challenges

Land issues:

- People can **not have access to water** because the customary owner does not want
- People not living on the side of the road **need permission of their neighbour** (living on the side on the road) to allow them to run their pipe through the property to get to their house.

Current water resource capacity:

- Current estimations show that we may face **water shortage between 5-10 years** (**in 2019 : about 60% of the groundwater capacity used**).
- We urgently need to identify potential alternatives: **localisation, qualification, development, detailed study (bore field, pump station, storage and treatment, power supply, access road and connection to the existing system**…).
- **FUNDINGS**



THANK YOU

UNELCO
ENGIE