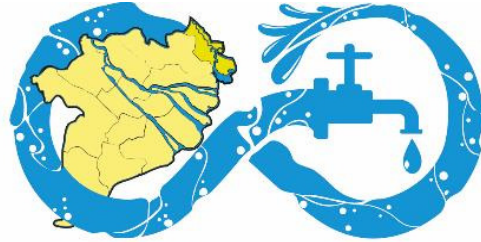


SECURING RAW WATER SOURCES FOR HO CHI MINH CITY



CLIMATE CHANGE AND WATER SUPPLY
IN THE MEKONG DELTA

4th International Climate Change
Adaptation Futures 2016

Fresh water availability and access
Green Drinking Water Utilities
Rotterdam, 11 May 2016



Mekong sees worst drought in 90 years

HCM CITY — Deputy Prime Minister Nguyễn Xuân Phúc has ordered relevant ministries and Cửu Long (Mekong) Delta provinces to prioritise the fight against drought and saltwater intrusion which have severely affected agriculture and fisheries and caused a crippling water shortage.

Speaking at a seminar in Cần Thơ City on Wednesday, he said each province should have a comprehensive and appropriate plan for this and mobilise all resources required to implement it.

"They should ensure that people's livelihoods are not affected, everyone has enough water and food, and diseases do not break out due to the prolonged drought," he said.

The delta, the country's largest rice, fruit and fisheries producer, is facing the worst drought and saltwater intrusion in 90 years though it is not yet the peak of the dry season, according to the Ministry of Agriculture and Rural Development (MARD).

The ongoing El Nino phenomenon caused the rainy...

CONTINUED PAGE 4



A farmer stands in his rice field in Mekong Delta Kiên Giang Province's Nam Yên Commune. The field has been hit by the rice blast disease due to saltwater intrusion. Fighting against saltwater intrusion is one of tasks that Deputy Prime Minister Nguyễn Xuân Phúc orders ministries to prioritise now. — VNA/VNS Photo Huy Hải

River salinity threatens water supply

High salt levels have affected stations that pump water to HCM City residents



The La Ngà River, part of the Đồng Nai River, has been narrowed due to salinity and water shortages. Climate change could also shorten water supplies for HCM City residents this year. — VNA/VNS Photo Ngọc Hà

Văn Đạt

HCM CITY — HCM City residents could face a water shortage this year as El Nino and climate change caused an unexpected increase in the salinity of the Sài Gòn and Đồng Nai rivers,

which provide most of the city's water.

The salinity rate in the rivers is the highest in the last five years, which has affected the operations of some of the pumping stations that supply water to the city's nearly 10 million population.

The Sài Gòn Water Corporation (Sawaco) has reported that in January and this month, Bình An, a Malaysian joint-venture water treatment plant with a capacity of 100,000cu.m a day, had to cease operations for several hours a day on several days due

to excessive salinity in the Đồng Nai.

The maximum permitted salinity rate is 250mg per litre.

The Hòa Phú pumping station in Củ Chi District has also had to shut down,...

CONTINUED PAGE 2

DROUGHT and SALINITY | March 2, 2016

PM calls for action on drought, salinity



A field has been dried up due to the impacts of El Nino in Ninh Thuận Province. Prime Minister Nguyễn Tấn Dũng recently urged agencies to take measures to tackle the ongoing drought and saline intrusion in the central region. — VNA/VNS Photo Trọng Đạt

SALINITY | Flushing of Saigon River – March 11, 2016

Reservoir releases water for HCM City

HCM CITY — Dầu Tiếng reservoir has begun to release water at 30 cubic metres per second on the Sài Gòn River, providing water for HCM City's residents.

Water from the Đồng Nai and Sài Gòn rivers, which provides most of the city's water, has not met the standard, especially the salinity rate, for several periods this year, according to data from the Southern Hydro-Meteorological Station.

The maximum permitted salinity rate is 250mg per litre. The excessive salinity rate has affected the operations of water treatment plants.

The Sài Gòn Water Corporation (Sawaco) has reported that some big water treatment plants including Tân Hiệp, Bình An and Thủ Đức had to cease operations several times or face difficulties in treating water due to excessive salinity.

Sawaco forecasts that saltwater intrusion will continue to affect the city's water supply system at least until April.

According to the Dầu Tiếng-Phước Hoà Irrigation Exploitation Company, this is the fifth time the company has released water from the Sài Gòn River since the beginning of this year.

The release is to help downstream water treatment plants cope



A photo shows the Dầu Tiếng Reservoir releasing water in order to provide it for residents in HCM City. — VNA/VNS Photo Thanh Tân

with the high salinity rate, which has been increasing rapidly.

Salinity in Nhà Bè District in February was 30-40 per cent higher year-on-year, and around 80 per cent higher than the average a few years ago, according to data of the city's Department of Agriculture and Rural Development's Bureau of Irrigation and Flood and Storm Prevention.

Sawaco is building a plan to build a raw water reservoir in Củ Chi District.

In case the salinity rate in Đồng Nai and Sài Gòn rivers is too high, the plants can draw water from the reservoir instead of from the rivers.

Phạm Thế Vinh, officer of

the Southern Institute of Water Resource Research, blamed the drought and salinity intrusion on the ongoing El Nino phenomenon, which has reduced rainfall in the southern region.

It has also been caused by the flood tides in March. This has pushed saltwater further into the estuaries.

According to the Ministry of Agriculture and Rural Development, the water level in the upper Mekong River continues to fall rapidly, reaching the lowest level in the past 90 years.

In the main rivers in the western region, saltwater has intruded 40 to 93km deep into estuaries, an increase of 10-

15km compared to previous years.

Around 340,000ha of total 1.55 million hectares of winter-spring rice produced in the western region face danger of saltwater intrusion.

Of that number, around 104,000ha were seriously damaged and thousands of hectares were destroyed.

In the face of an urgent situation, Prime Minister Nguyễn Tấn Dũng has required the entire political system to take part in helping people combat the effects of saltwater intrusion.

The Prime Minister has also asked China to discharge water from their dams on the Mekong River. — VNS

Party chief wants response to saltwater intrusion and drought

BẾN TRE — Party General Secretary Nguyễn Phú Trọng asked the southern province of Bến Tre to adopt short and long term plans to tackle saltwater intrusion while inspecting local measures to tackle the ongoing disaster yesterday.

Bến Tre has lost 19,000ha of winter-spring rice crop, over 500ha of vegetables, nearly 5,800ha of fruits, and 475ha of aquaculture to salinity, becoming one of the Vietnamese localities hardest hit by saltwater intrusion.

Over 88,200 households with 353,000 people lack fresh water. Those living in three coastal districts are most afflicted. As many as 162 out of 164 communes and precincts are affected by the lack of fresh water.

To minimise losses, the Party leader called for switching to drought-resistant plants and animals. He hailed the provincial Party Committee for improving local well-being within the region, partly by developing a set of specific remedial actions. The upgraded socio-economic and technical infrastructure has re-



Party General Secretary Nguyễn Phú Trọng (left) talks to farmers in Tân Thành Commune, Giồng Trôm District during his visit to southern Bến Tre Province yesterday. — VNA/VNS Photo Trí Dũng

sulted in a 7.3 per cent economic growth increase per year, with the rate of poor households falling to 5.5 per cent.

Bến Tre should remove any business obstacles which may

arise, improve the business climate, develop tourism, and tap marine-based economic potential, the Party leader suggested. Lauding the province for its...

CONTINUED PAGE 4

Long-term solutions sought for VN drought

HÀ NỘI — China has decided to double the release of water from its Jinghong reservoir on the Mekong River to help Việt Nam mitigate the impact of a severe drought in the Mekong Delta provinces.

Việt Nam welcomes the planned release, but it is believed to be only a short-term solution for the current situation, and the country has to seek longer-term solutions.

News of the extra water was released at a press conference held by the Ministry of Natural Resources and Environment last week.

A document sent by China's Ministry of Water Resources to the Mekong River Commission Secretariat and the Việt Nam National Mekong Committee on March 15, says that the drought has worsened recently in the Mekong Basin.

China has decided to implement an emergency water supplement to the Mekong River by increasing the discharge from the Jinghong reservoir to 2,000 cubic metres per second between March 15 and April 10, 2016. This is about twice the volume of the same period last year.

Speaking at the conference, Trần Đức Cường, deputy chief of the Việt Nam National Mekong

Committee's Office, said that hopefully 27-54 per cent of the total water released would reach Việt Nam.

The water would first have to run through Laos and Thailand, two nations that were also currently coping with severe drought, he said. It added that it would take at least two weeks from discharge until the water reached Việt Nam.

According to Đào Trọng Tứ from the Việt Nam River Network, the water had to travel a distance of over 4,000km from the Jinghong reservoir to reach Việt Nam.

To ensure the maximum amount of water reaches the country, the Việt Nam National Mekong Committee submitted a request to the Mekong River Commission to require upstream countries to create the most favorable water flow conditions possible.

Cường said analyses from the committee found the water flow from upstream of the Mekong River during the dry season of 2015-16 decreased up to 30 per cent compared to the same period last year.

The two main reasons behind the lack of water flow was that rainfall was half as much as is usual this season, and that there was little water flowing from



Farmers in southern Bình Phước Province's Hưng Phước Commune attempt to drill a freshwater well to save their pepper trees. To aid Việt Nam in battling with historic drought conditions, China will double the amount of water released from Jinghong reservoir. — VNA/VNS Photo

Cambodia's Tonlé Sap River to the Mekong River during the dry season of 2015-16.

Usually, water from the Tonlé Sap River would flow into the Mekong River during the dry season. However, there was no flood season in Cambodia in 2015, so the Tonlé Sap River did not store

water to release back into the Mekong River as usual.

Following orders from Prime Minister Nguyễn Tấn Dũng, Vietnamese ministries, sectors and relevant agencies have joined hands to battle the most severe drought and saltwater intrusion within a century.

Lê Thanh Hải, director of the National Centre for Hydro-Meteorological Forecasting said the drought would last until June due to strong El Niño effects that started in 2014. The drought was forecast to become more severe in the Mekong Delta provinces in the coming months. — VNS

Experts make proposals to preserve City water

HCM CITY — Local and international experts have proposed solutions to help HCM City secure its short- and long-term water supply.

The solutions were discussed on Friday after a four-day brainstorming workshop organised by the Sài Gòn Water Corporation and the Dutch-funded project "Climate Change and Water Supply in the Mekong Delta and HCM City".

Experts proposed building multiple day reservoirs that hold river water to supply water to the city when the salinity rate is high, and a long pipeline from the Dầu Tiếng Reservoir carrying water to water treatment plants, among other solutions.

They also suggested using the 19-km existing river bed of Láng Thê in HCM City's Củ Chi District while moving the intake station upstream, and building a salinity weir.

They said the city should take immediate action at Hòa Phú intake station, including adjusting the raw water intake criteria for chloride and mixture with water at the Kênh Dông Water Treatment Plant.

Forecasting salinity levels on the two rivers, combined with an improved flushing policy for the Dầu Tiếng Reservoir, were two other solutions suggested.

In 2012, Sawaco outlined a plan for securing water supply in the city through several measures, including reforestation, construction of sea barrier in estuary of Nhà Bè

River, and control of industrial zone development upstream and downstream of intakes.

The company also had plans to ask Tri An and Dầu Tiếng authorities to flush Đồng Nai and Sài Gòn Rivers. The plan to relocate water intakes to the two reservoirs was also mentioned.

Beside the plan to apply new treatment technologies, building raw water storage reservoirs was also considered.

Rik Diers, resident project manager of the Dutch-funded project "Climate Change and Water Supply in the Mekong Delta and HCM City", said that experts were not privileged to spend the money, but they could give suggestions for short- and long-term solutions that could help solve the problem.

The Dutch expert said that, based on a recent survey of the salinity rate on the Sài Gòn River, this level of high salinity had never previously occurred. This has put Sawaco in a difficult situation in finding solutions.

It is possible that Sawaco would have to stop supplying water for a half day or a full day in the future when there is high saline intrusion, if the company does not adapt to the situation.

In the worst case scenario, Rik suggested the company continue supplying water with a saline rate higher than the permitted level, because when the supply stops, dirty water will get into the pipe



Workers maintain facilities in the Thủ Đức Water Plant in HCM City. Experts suggested building multiple reservoirs that hold river water to supply water to the city when salinity is high. Building a long pipeline to carry water from Dầu Tiếng Reservoir to water treatment plants is yet another proposal being considered. — VNA/VNS Photo Ngọc Hà

system, affecting the equipment.

"So far, there is no problem, but we have to be prepared," he said, adding that he cannot predict how many years from now Sawaco will periodically pause supplying water, especially with the increasing salinity-rate situation.

He said there was a threat that some day the Dầu Tiếng Reservoir, which is used to release water to desalinate the Sài Gòn River, would not have enough water for this function.

With the proposed solutions

made at the workshop, Sawaco will evaluate and make suggestions to the city government for investment.

The current severe drought and rise in sea levels has caused saline intrusion in the Sài Gòn and Đồng Nai Rivers.

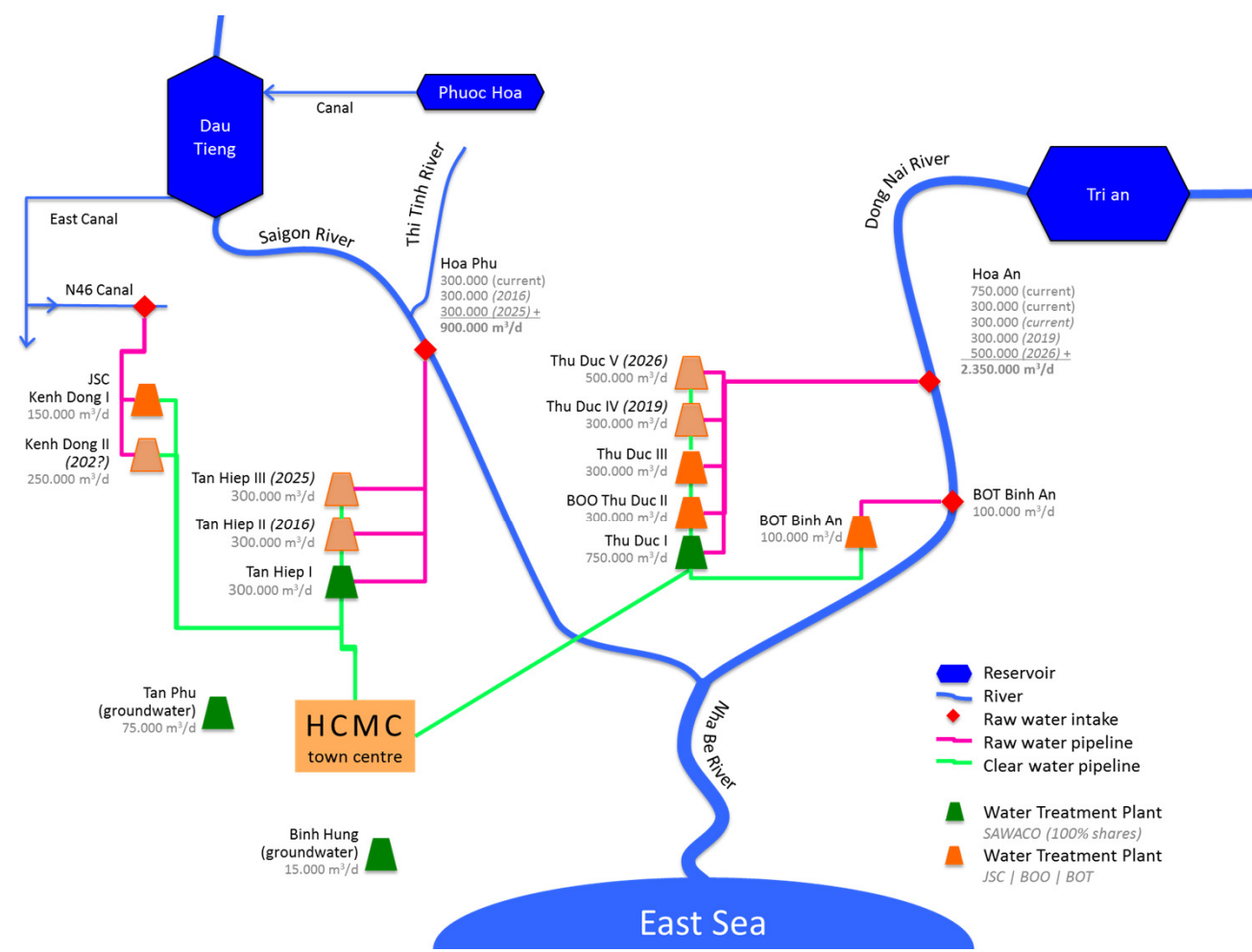
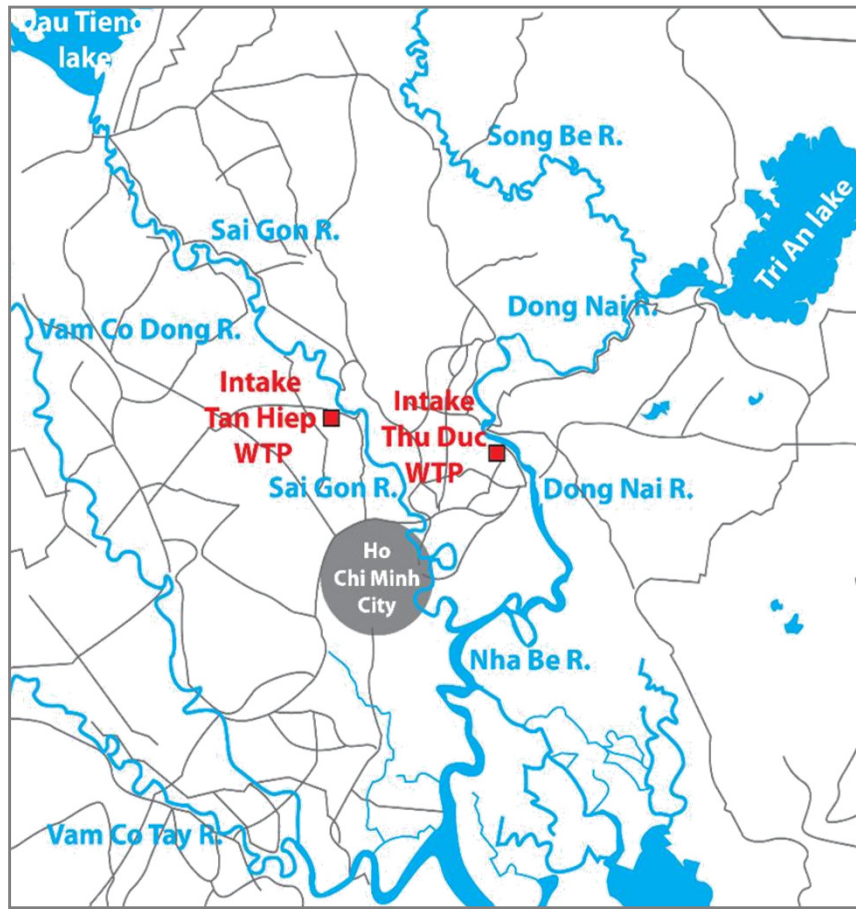
The two rivers supply raw water to businesses and more than 10 million residents.

Since early this year, there has been a shortage of raw water due to the high salinity level, which has been over 250mg per litre, said Trần Cường of the Sài Gòn Water Cor-

poration.

The company's water treatment plants had to shut down between four and five hours during the period of high saline rate, Cường said, adding that the saline rate in the water of the Sài Gòn River was recorded at nearly 600mg per litre at the Hòa Phú Intake on March 31.

A few weeks before that, the saline rate in the Sài Gòn River was 400mg per litre, but the maximum-permitted salinity rate is 250mg per litre, according to Sawaco's report. — VNS

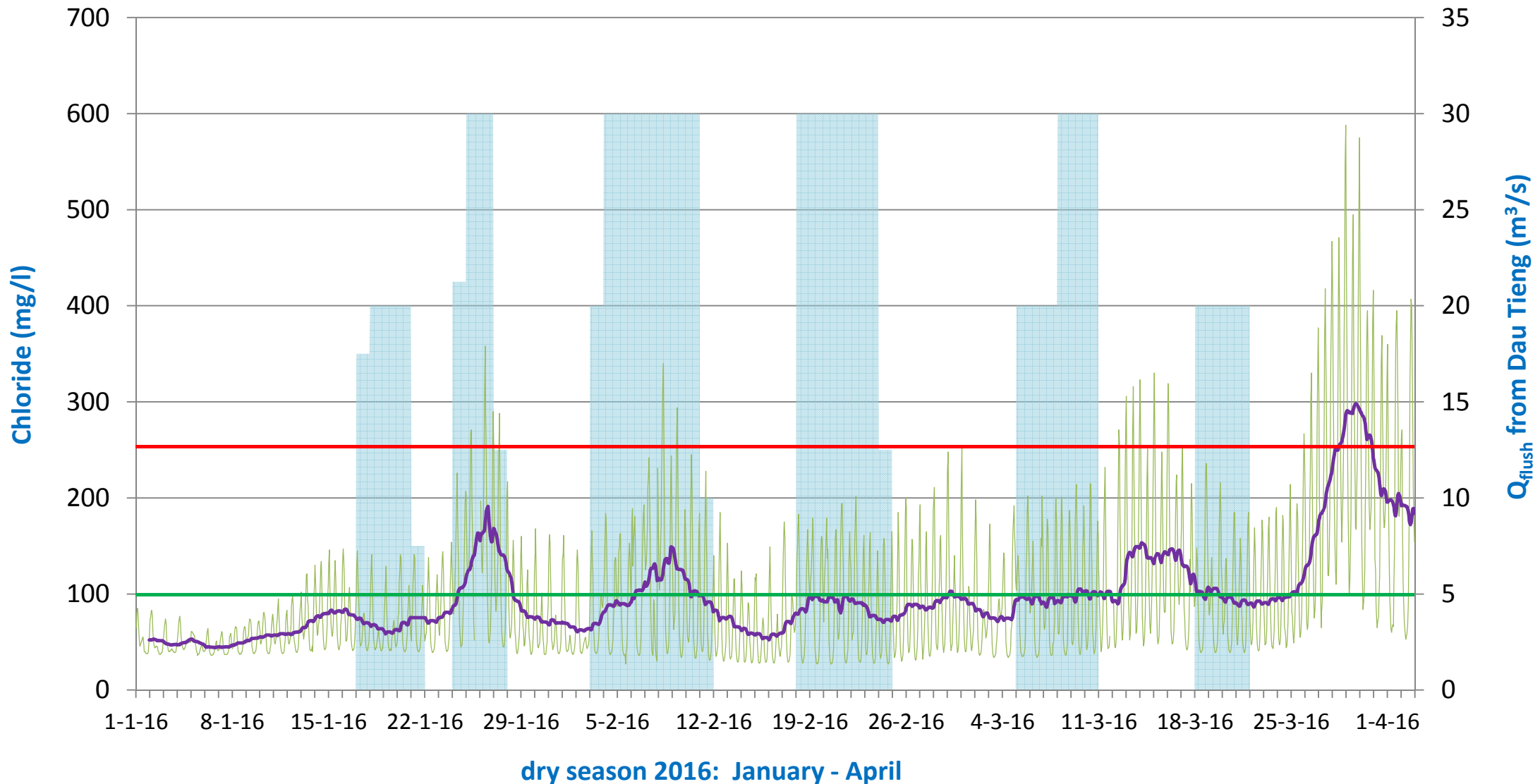


SAWACO'S RAW WATER INTAKES AND PLANNED WATER SUPPLY SYSTEM

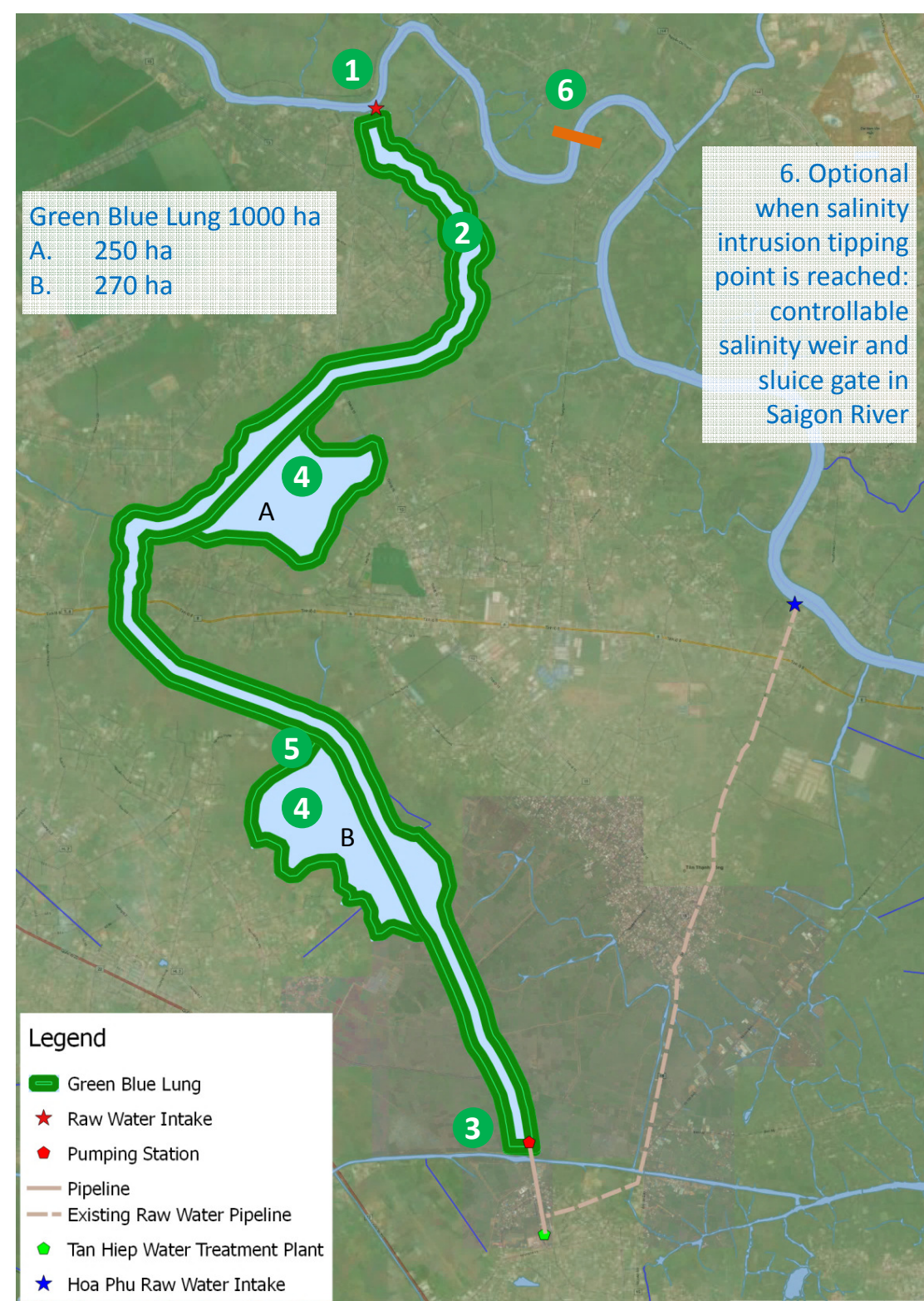
WATER QUALITY | Saigon River – Hoa Phu Intake

Chloride (mg/l) and Q_{flush} from Dau Tieng Reservoir

Qflush from Dau Tieng Chloride at Hoa Phu Chloride 24 hour average Chloride Standard



#1



LONG TERM SOLUTION

Multiple day reservoir

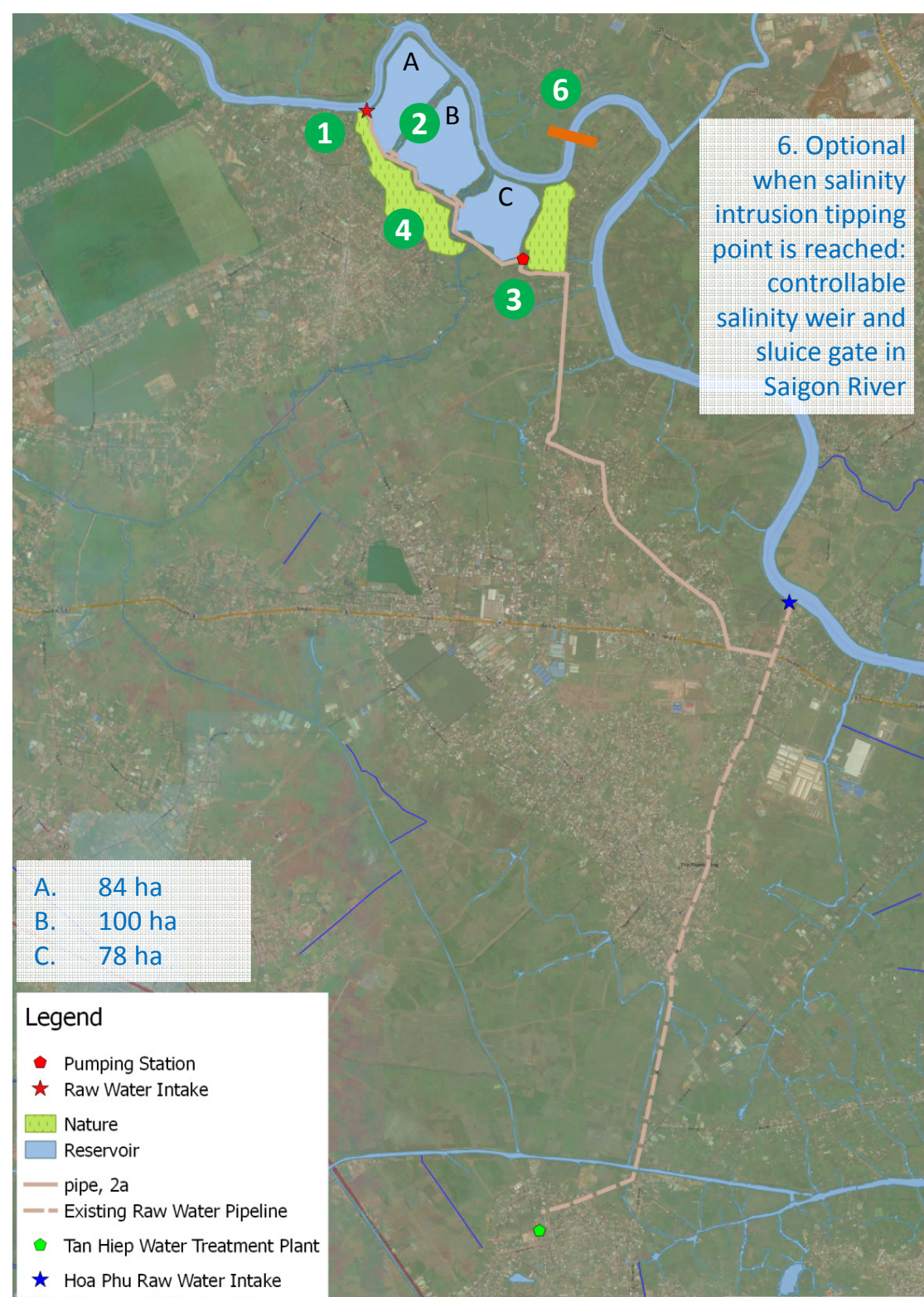
#2

1. Move **intake point upstream** to Nang Am, build intake works & pump to fill reservoir A (capacity of 1.200.000 m³/d)
2. Build **three retention & pre-treatment reservoirs** with total area of 262 ha, *connect reservoir with pipes, water transport between reservoirs A → B → C based on gravity flow. Pipelines to bypass each reservoir are also included*

Retention time at max water level	90 days*
Retention time at min water level	70 days
Storage capacity	20 days

3. Build intake works, pump and pipeline to Hoa Phu with a capacity of 600.000 m³/d
4. Develop **wetland nature, flood retention and eco tourism** in the surrounding area of ±238 ha (total area ± 500 ha)

* with a production of 600.000 m³/d, reservoir depth from surface level 20m, height of dike 5m, max water level 20+3,5m, min water level 18 (2m below surface level).



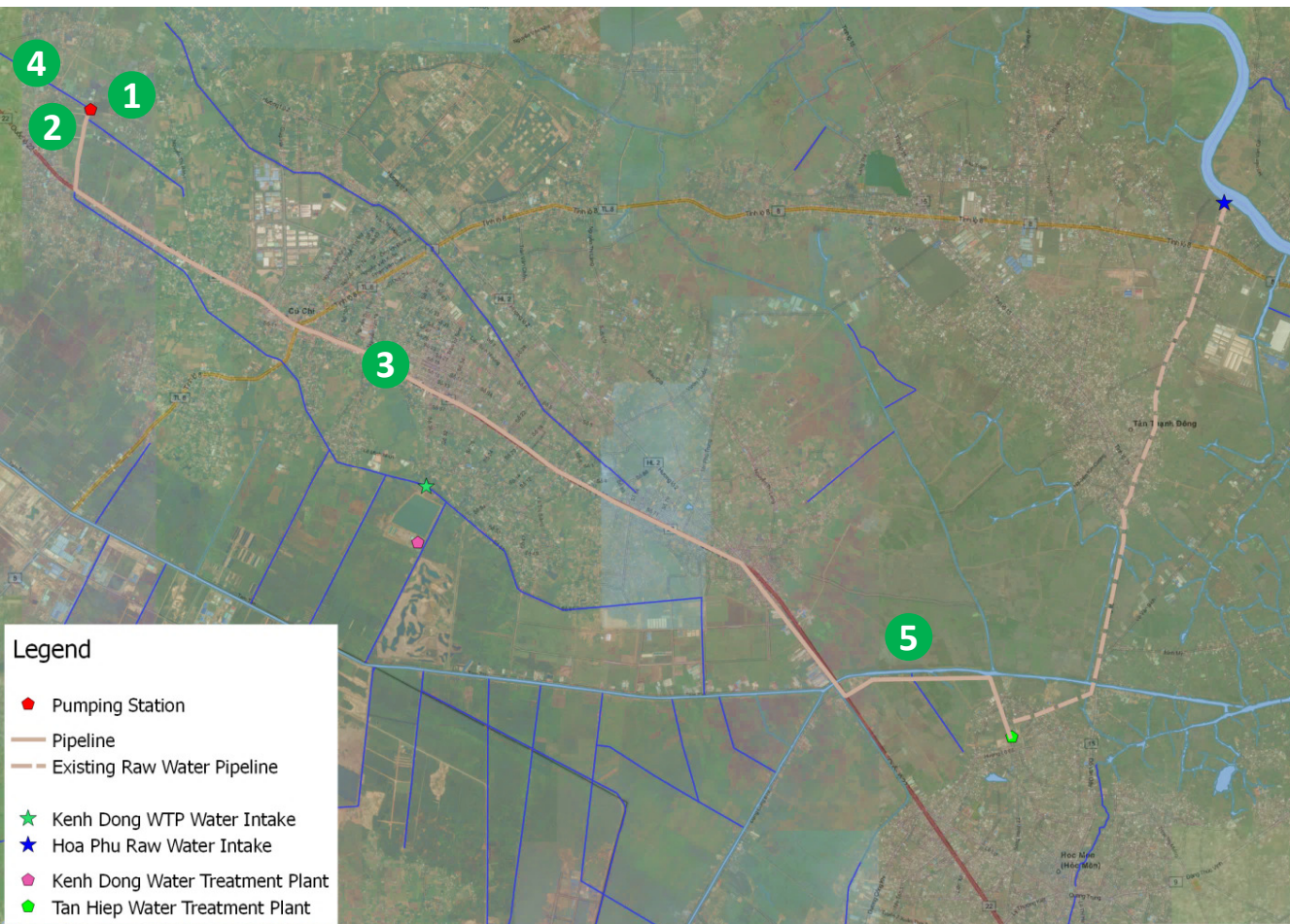
LONG TERM SOLUTION

#3



Take water from irrigation canal K45

1. Create a **new intake point** at the end of irrigation canal K45, the design capacity at this point is 1.000.000 m³/d, available capacity depends on the development of irrigation requirements which is projected to decrease further in the near future
2. Build **intake works & pump** with a capacity of 600.000 m³/d
3. Build **20 km pipeline** to Hoa Phu (2x 1500mm).
4. NB 1: rehabilitation work on the existing K45 canal might be required
5. NB 2: A retention & pre-treatment reservoir with ± 8 day of storage might be necessary to cover the annual maintenance periods. An area of ± 85 ha is required for this and an additional pumping station.

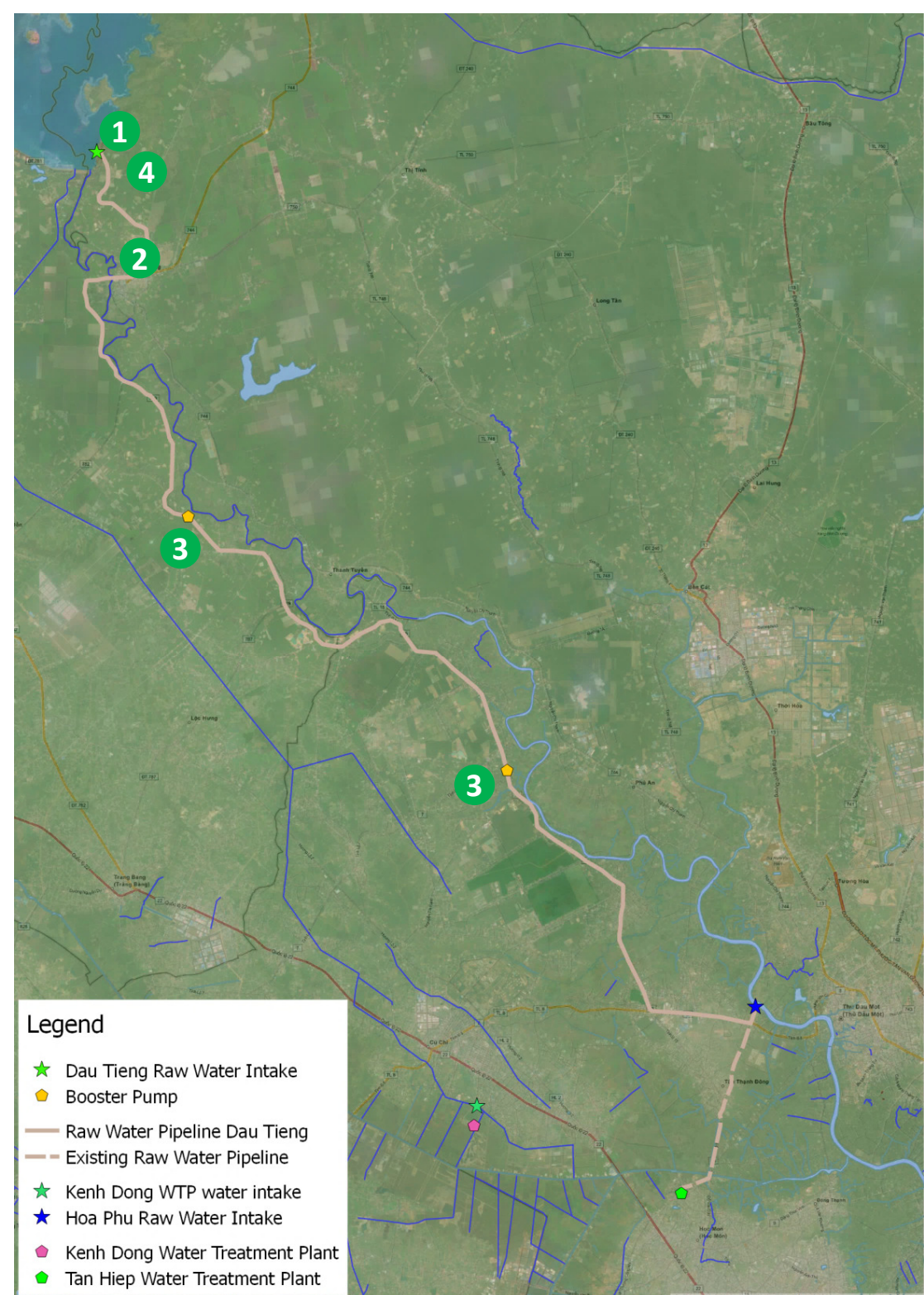


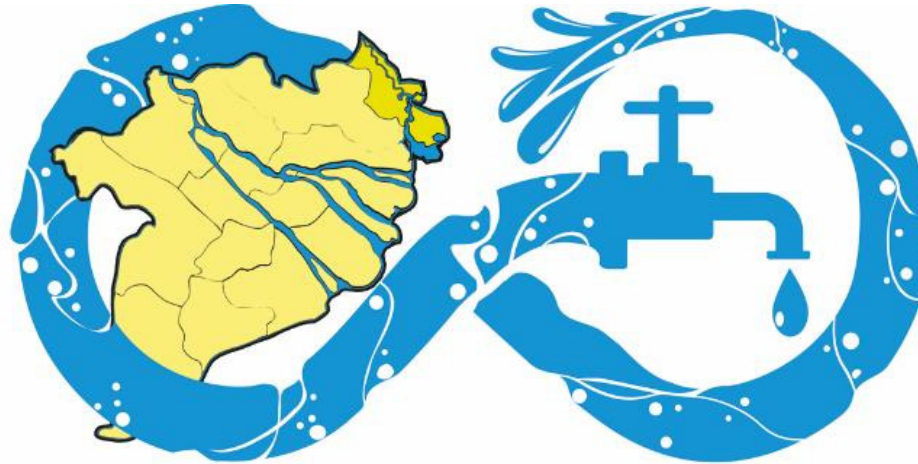
LONG TERM SOLUTION

Pipeline to Dau Tieng

#4

1. Move **intake point** to Dau Tieng Reservoir, build raw water intake and pumping station with a capacity of 900.000 m³/d
2. Build **pipeline to Hoa Phu 62 km** (2x 1800 mm)
3. Build **2 booster pump stations** along the pipeline track
4. A **pretreatment facility** at the intake at Dau Tieng reservoir might be necessary in order to prevent sedimentation and biofouling in the pipeline





CLIMATE CHANGE AND WATER SUPPLY
IN THE MEKONG DELTA

thank you – cảm ơn