

**Water Edge Symposium 2016**  
**Waterfront Landscape Projects**  
**in Taichung**  
**Luchuan Canal, Liuchuan Canal**

**Hsien-Yi Lee, Deputy Secretary-General**  
**Taichung City Government**



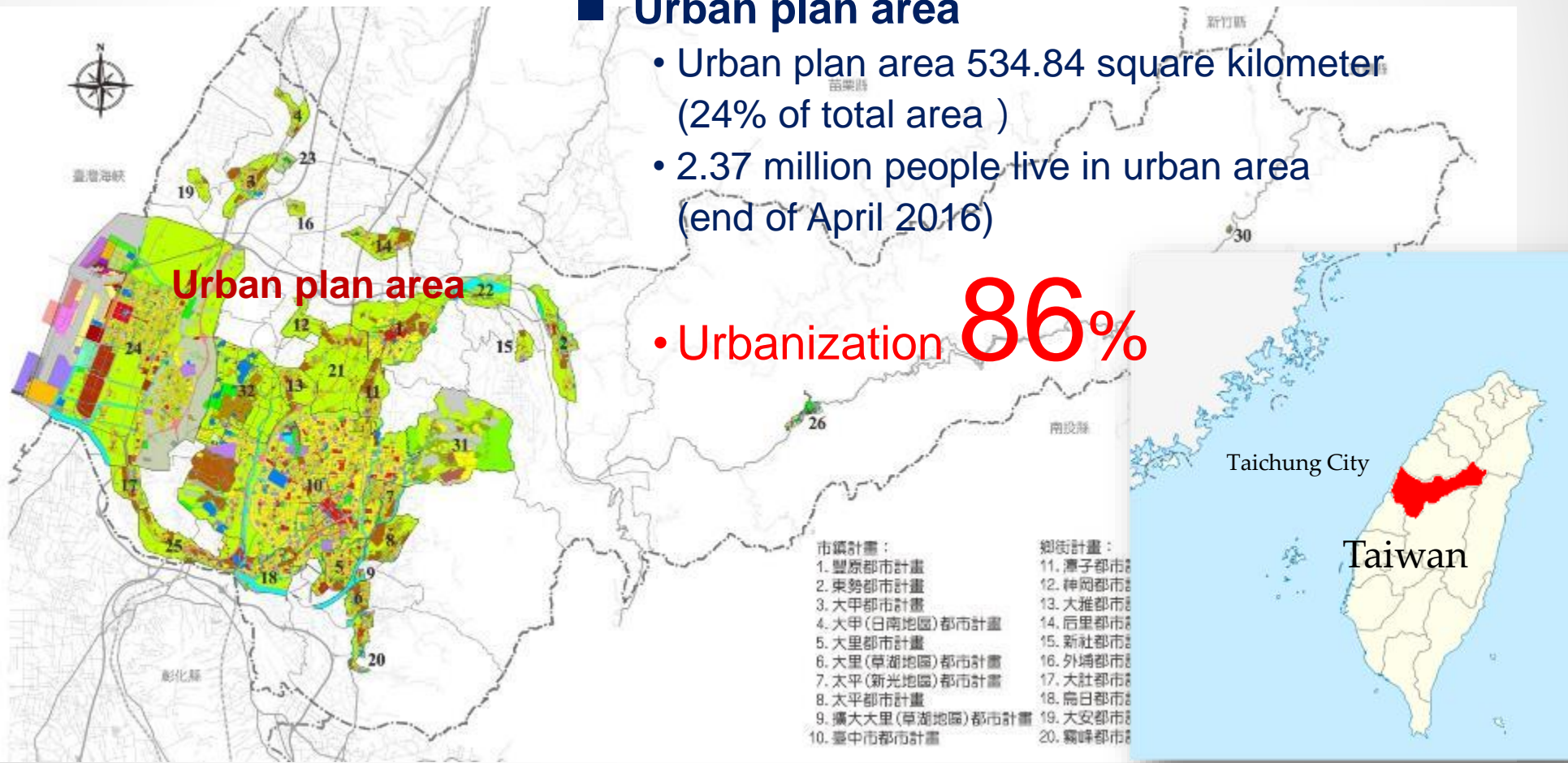
# Our Urban Orientation

## ■ Taichung City

- Taichung City and Taichung County merged in 2011
- Total area 2,215 square kilometer
- Total population 2.75million (end of April 2016)

## ■ Urban plan area

- Urban plan area 534.84 square kilometer (24% of total area )
- 2.37 million people live in urban area (end of April 2016)



# Our Urban Orientation

## Industry Cluster Effect

**Population**  
**2,759,887**

The **3rd** Largest City in Taiwan  
Population Growth Rate is 9.05 ‰ in 2015

**Geography**  
**2,214.9**  
**Km<sup>2</sup>**

60Km 「**Golden Gorge**」  
On the Tableland of the Dadu Plateau is the  
Center of Precision Machinery

High Speed Rail  
Taichung Port  
Taichung Airport  
**The Core of Central  
Taiwan**

Machinery

Machine  
Tools

Hand  
Tools

Six Major  
Industries of  
Taichung

Photoelectricity

Bicycle

Aerospace

## History Cultural Heritage

**Little Kyoto**  
The **1st** Urban Planning City  
in Asia



Our  
Urban Orientation

Return to the  
Basic Value of  
the City



Why Taichung is the most  
livable city in Taiwan ?



Good Location  
Convenient Transportation  
2 Rails,  
4 High-Speed Highways,  
1 Circular Expressway

## Lifestyle Capital of Taiwan

Pleasant Weather  
Average Annual  
Temperature is 23.5 °C  
Plenty of Water Supply

Prosperous Art and  
Literature  
100 Years History

Convenient Life  
Economic, Cultural and  
Consuming Center in  
Central Taiwan

Diverse Agriculture,  
Landscape and Ecology





*Every happy city owns a  
beautiful river.*

*A splendid river contributes to a  
happy city.*



Every happy city owns a beautiful river.  
A splendid river contributes to a happy city

**Luchuan  
Canal  
Liuchuan  
Canal**

**Waterfront  
Landscape  
Project**

1

• **Recover** **Impression**

2

• **Improve** **Stench**

3

• **Create** **Landscape**

4

• **Prevent** **Floods**

5

• **Promote** **Tourism**

6

• **Construct** **Highlight**

- The Old Urban Zone is Planned to be Regenerated with the Flipping of the Blue Water Scenery and Axis in the City to Restore the Natural Ecology and Water Space.
- By improving the Water Quality and Constructing the Landscapes as the Core.

*Xinsheng  
Luchuan  
Canal  
Waterfront  
Corridor*





# Luchuan Canal 's Beauty and Sorrow

1903

## Before Urban Planning



1949

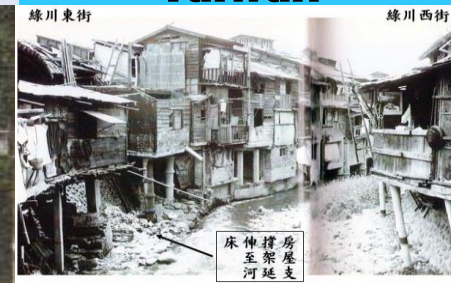
## Little Kyoto Scenery, Green River



In 1911, Xinsheng Creek was renamed as Luchuan Canal, and Taichung City was nicknamed "Little Kyoto" during the Japanese colonial period.

1958

## Restoration of Taiwan



The willow trees were removed to clear up lands for building temporary residences.

1986

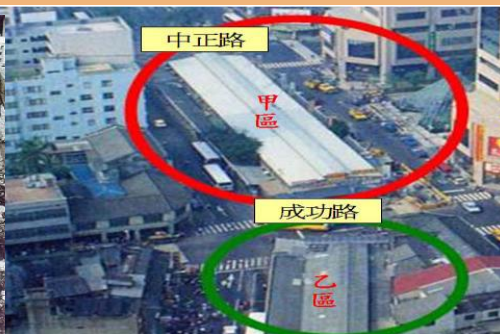
## Construct Waterfront



Promote "Concentric Garden" Activity.

1998

## Urban Development



Land was taken from the river and parts of the watercourse were covered.

2016

## Regenerate Waterfront Landscape



## Improve Water Quality



Large amounts of urban sewage was discharged into the waterway.



# Water Quality Improvement Plan

## Luchuan Canal Sanitary Sewage Separation Project

- Intercept sewage (Max. 24,000CMD) along the Luchuan Canal to Futian Wastewater Treatment Plant.

## Flow of Fresh Water

## Hansi River Diversion Project

- Introduce fresh water (0.1cms) to purify and recharge the Luchuan Canal.
- Solve the solution of insufficient base stream flow.

## Sewage Interceptor

## Park Square

## On-Site Gravel Contact Oxidation System

## Luchuan Canal On-Site Wastewater Treatment Plan

- Establish an on-site gravel filtration system to reduce pollution and produce cleaner water (Max. 24,000CMD).

## Waterfront Regeneration

## Sewage Interceptor

## Luchuan Canal Environmental Construction Project

- Spans 610m in length.
- Provide multiple usages for the space of water course to regenerate the past glory of the Central District.
- The project will be completed in December 2017.

GREENER

MORE SPACES

MORE HUMANISTIC ZONE

MORE ECOLOGICAL ZONE

*Xinsheng Luchuan Canal  
Waterfront Corridor*



# Creative Waterfront

- Flip the façade to retain the space for pedestrians.
- Increase the green belt along the banks and purify the water source with water plants.

- Provide spaces for riverside activities as the riverside entrance of the rail station zone.





Space

Ahead of


ASEAN Square





# Artistic Waterfront

- Display nature and art, with the introduction of public art.
- Use the elements of water to construct spaces for creative art activities in order to create a multicultural riverside space.

- 
- An architectural rendering of a waterfront park at night. The scene features a winding river or canal with a low, arched bridge crossing it. The riverbank is lined with trees, some with green foliage and others with yellow autumn leaves. A paved path runs along the river, illuminated by small lights. In the background, modern buildings with large windows are visible. A basketball court is situated on the right side of the path. The overall atmosphere is vibrant and modern.
- Use water stage to provide space for performance and festive activities.
  - Provide stratified riverside paths for leisure walking.



# Reappearance of Sakura Bridge



- The ruins of the Sakura Bridge has been covered under the bridge deck on Taiwan Boulevard.
- In order to allow people to witness the charm of the Sakura Bridge during the Japanese colonial period, a facade will be reappeared along the side of Taiwan Boulevard.



## Architectural Conservation of Zhongshang Lu Bridge (Xinsheng Bridge)



- In order to protect the Zhongshan Lu Bridge, a monitoring mechanism will be constructed to prevent it from being damaged by the progress of the construction project.
- Gathering sightseeing crowds, it will also provide historical background for the publics.

- Zhongshan Lu Bridge was built in 1908, originally called Xinsheng Bridge.
- It was built by the Japanese colonial government for holding a ceremony in Taichung Park to celebrate the inauguration of North-South Railway.
- In 1999, it was listed as City Historic Monument of Taichung.
- In 2004, it was announced as a historic architecture.



# Humanistic Waterfront

- Connect the historical architectures of Zhongshan Lu Bridge and Sakura Bridge, we are going to construct a riverside landscape with humanistic touch.

- More deciduous cypress will be grown along the riverside.
- The original public arts along the riverside will be retained.
- A Japanese-style riverbed retaining space will be built to facilitate people watching seasonal flowering plants along the riverbank.



# Historical Waterfront

- The green memories along the banks during the Japanese colonial period will be presented in a Japanese style.
- Taiwan's native trees species and revetment with trailing plants and planters will be grown to demonstrate the unique water space in Taiwan.



# Luchuan Canal Vision Empowerment Program



黃○○/區長(A01)



薛○○/綠川里長(A02)



吳○○/繼光里里長(A03)



林○○/公園里里長(A04)



張○○/光復里里長(A05)



張○○、莊○○ 鄰長(A12、A13)



張○○/大墩里里長(A06)



蔡○○/柳川里里長(A07)



林○○/大誠里里長(A08)



廖○○/中華里里長(A09)



楊○○/前綠川里里長(A10)



耿○○/民族路教會牧師(C02)



胡○○/第一廣場總幹事(B01)



林○○/繼光商店街行人徒步區管理委員會主委(B02)



余○○/電子街行人徒步區管理委員會主委(B03)



陳○○/阿蘭百草茶老闆(B04)



陳○○老師、黃○○先生/綠川工坊(C01)



蔡○○、格○○/臺中文史復興組合(C04)



張○○/臺中市青年創業協會理事/綠柳町文旅 Reloading Hotel/紅磚餐廳負責人(B05)



江○○/繼光商店街行人徒步區管理委員會副主委/漢強百草店老闆(B06)



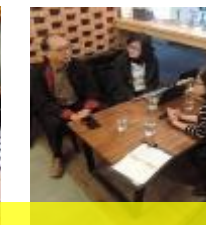
陳○○/越南文化講堂(C03)



陳○○/印尼文化講堂(C05)



余○○/前台視記者、推動綠川同心花園運動(C06)



黃○○/臺中市文山社大講師(E02)



蘇○○/中區再生基地專案經理(C03)

## Listen to Public Opinion

Understand the opinion of leaders, representatives of the commercial zones and NGOs, and pay more concern to the thinking and suggestions of the local people and inhabitants near the Luchuan Canal



# EMPOWERMENT PROGRAM

綠川培力學堂

## 綠川增源

105.2.3 13:30~16:30

台中農田水利會(南區)管理處  
(臺中市豐原區111號)

活動時間: 水質改善工程進度及水質改善成效說明  
活動地點: 豐原區水利會第四管理處  
活動時間: 臺中市農田水利會  
活動時間: 可行性探討

綠川培力學堂

## 後巷接管知多少

附近居民已準備好接管後巷污水管線  
為何後巷污水管線不接管後巷管線?

時間: 105年1月28日(三) 14:00-16:00  
地點: 綠川培力學堂(臺中市南區中山路68號5樓)

時間	講題/內容
20:00	後巷接管工程進度說明
20:10	後巷接管工程進度說明
20:20	後巷接管工程進度說明
20:30	後巷接管工程進度說明
20:40	後巷接管工程進度說明
20:50	後巷接管工程進度說明
21:00	後巷接管工程進度說明

綠川培力學堂

## 國內外水岸空間營造案例分享

綠川兩岸空間營造與過去有連結, 如何透過山水之石之景觀, 讓民意對綠川水岸環境營造有更豐富的想像, 共同期待綠川的改變。

時間: 105年2月17日(三) 19:00至21:00  
地點: 中區綠川南岸聯合辦公處  
(地址: 臺中市西區成功路27號)  
講師: 許少華老師/臺中大學土木工程與環境學系  
蕭立群/都市計畫師

綠川——培力——學堂

## 話圖話圖

通川水質改善計畫進度說明

綠川水質改善計畫進度說明

時間: 105年2月17日(三) 19:00至21:00  
地點: 臺中市西區成功路27號

綠川培力學堂

## 越南文化/歷史與印度文化/歷史

2020 3 20:00 14:00 16:00

越南文化/歷史與印度文化/歷史

時間: 105年3月20日(六) 14:00-16:00  
地點: 1095基地(臺中市南區光復路49號2F)

綠川培力學堂

## 綠川開基對街友之衝擊探討

臺中市南區對街友之衝擊探討

時間: 105年3月29日(二) 14:00-16:00  
地點: 臺中市南區對街友之衝擊探討

綠川培力學堂

## 綠川水質改善構想探討

105/4/16 18:30-20:30

臺中市農田水利會(南區)管理處  
(臺中市豐原區111號)

綠川培力學堂

## 綠川水質改善構想探討

105/4/16 14:00-16:00

臺中市農田水利會(南區)管理處  
(臺中市豐原區111號)

綠川培力學堂

## 綠川的時間軌跡

水文學者的共同生活圖

時間: 105年3月27日(六) 14:00-16:00  
地點: 臺中市南區對街友之衝擊探討

綠川培力學堂

## 非常用

105/5/4(三) 14:00-16:00

臺中市農田水利會(南區)管理處  
(臺中市豐原區111號)

- Sponsor empowerment lectures, vision workshops and documentary activities related to the water quality, history, ecology, multicuture, ethnic minorities and more.
- In order to allow the Luchuan Canal to transform into a model case for public participation and regeneration of water environment, we are going to make the Luchuan Canal the people's river.





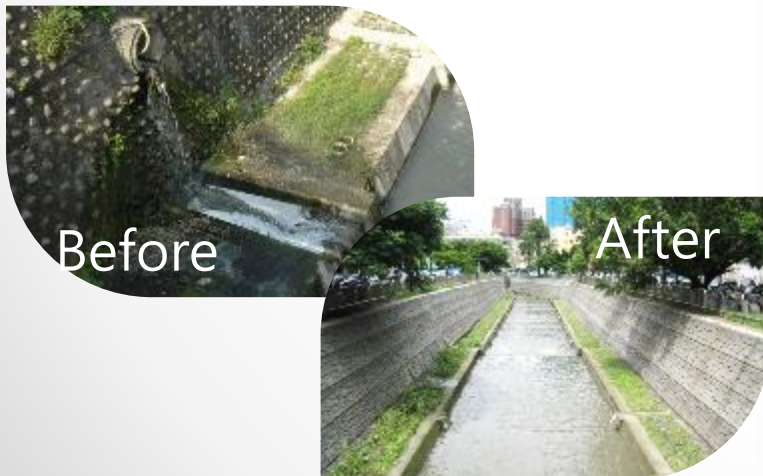
*Liuchuan  
Canal*

**LIUCHUAN CANAL** WATERFRONT LANDSCAPE  
WILL BE COMPLETED IN **DECEMBER 2016**



# Reduce & Intercept Sewage!

- **The first phase (Chongde Liu Bridge ~ Zhongzheng Liu Bridge) :**
  - (1) Comprise of **30** sewage interceptors .
  - (2) Lead **10,000CMD** sewage to **Zhonghua Water Purification Station**.
  - (3) Send **20,000CMD** sewage to **Futian Wastewater Treatment Plant**.
- **The second phase (Zhongzheng Liu Bridge ~ Nantun Bridge):**
  - (1) Comprise of **42** sewage interceptors.
  - (2) Send **27,000CMD** sewage to **Futian Wastewater Treatment Plant**.



# Water Quality

## Zhonghua Water Purification Station

**TAICHUNG FIRST ONE**

- Install an observation corridor as ecological classroom !



Item	Pollution Decline Effect (kg/day)	Removal Rate(%)
Biochemical Oxygen Demand (BOD)	440	80%
Suspended Solids (SS)	230	66%
NH <sub>3</sub> -N	230	75%



Parking Lot

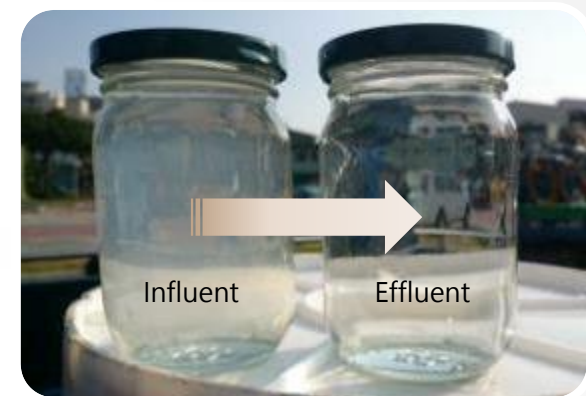
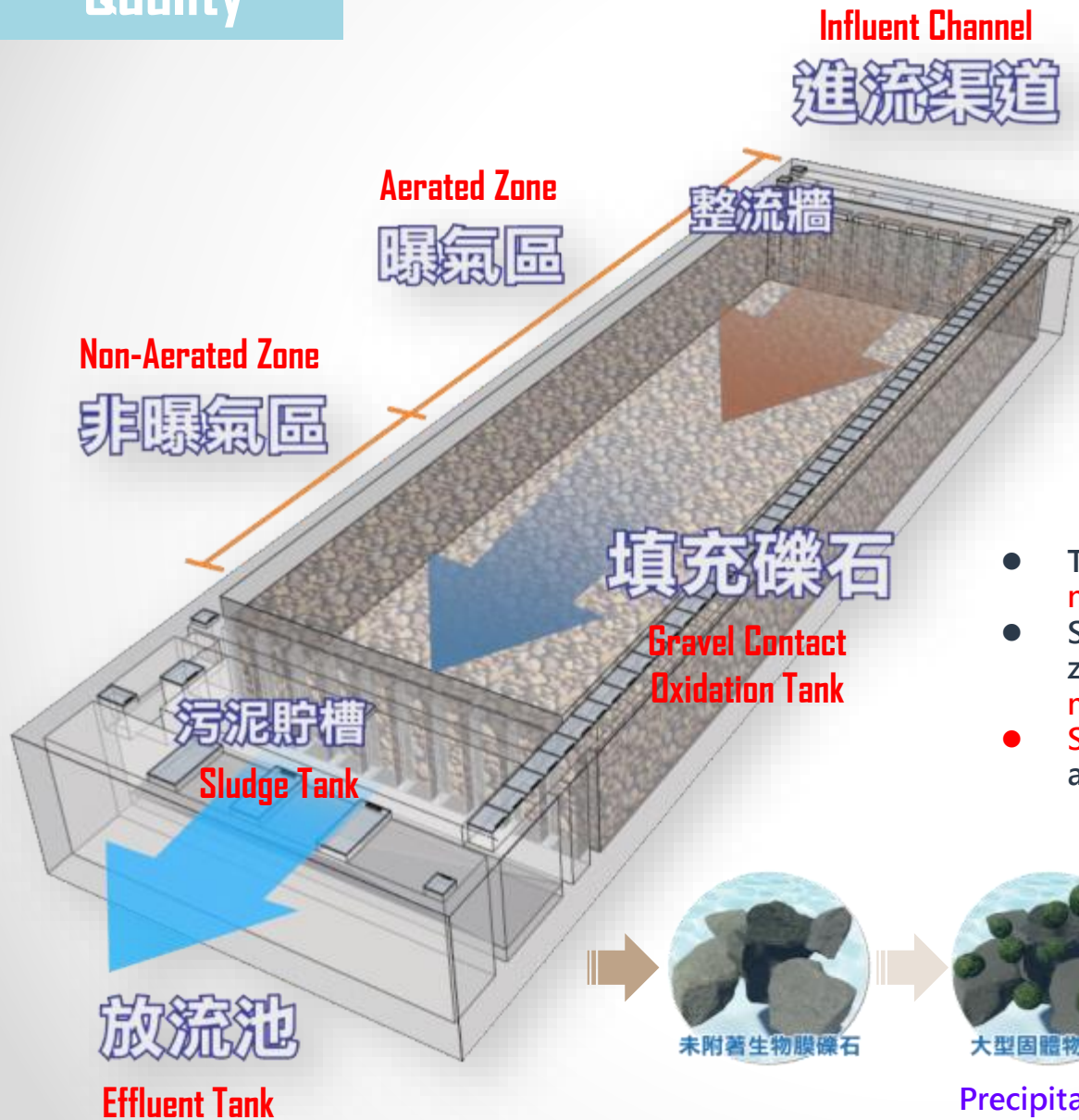


Observation Corridor

- The effluent is released downstream, beneath the Zhongzheng Liu Bridge, as a clean water source of the LID waterfront landscape.



# Gravel Contact Oxidation Process



**Removal Rate**  
BOD 80% 、 SS 66 % 、 NH3-N 75 %

- The gravel tank is divided into an **aerated zone** and a **non-aerated zone**.
- Sufficient **oxygen** is constantly supplied in the aerated zone for **micro-organisms** to decompose the **organic matters**.
- **Sludge removal** for non-aerated zone is carried out by air blowing through diffuser pipes every 3-6 months.

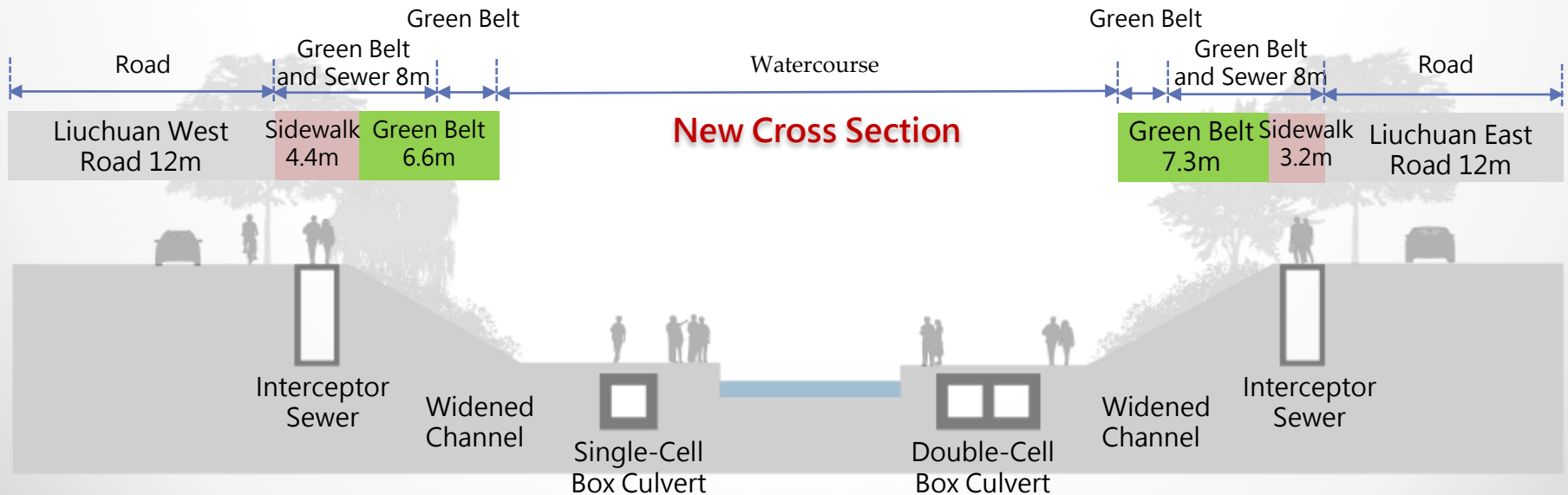
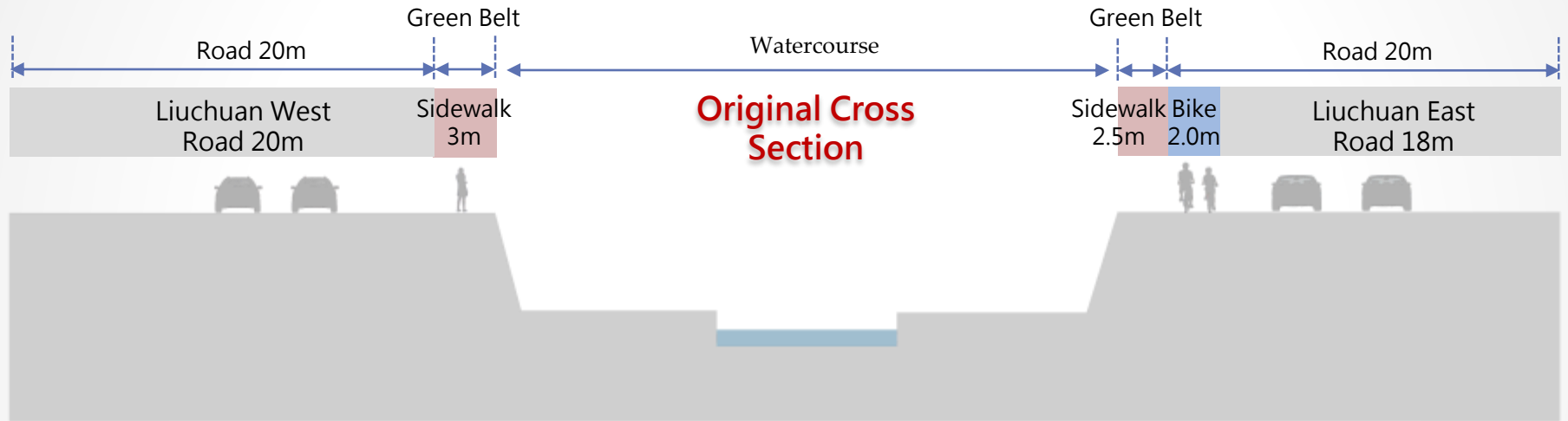




# Flood Control

## Widened Channel

The original three glass concrete revetments will be changed into gentle slope with green belts for the length of about 300 meters.



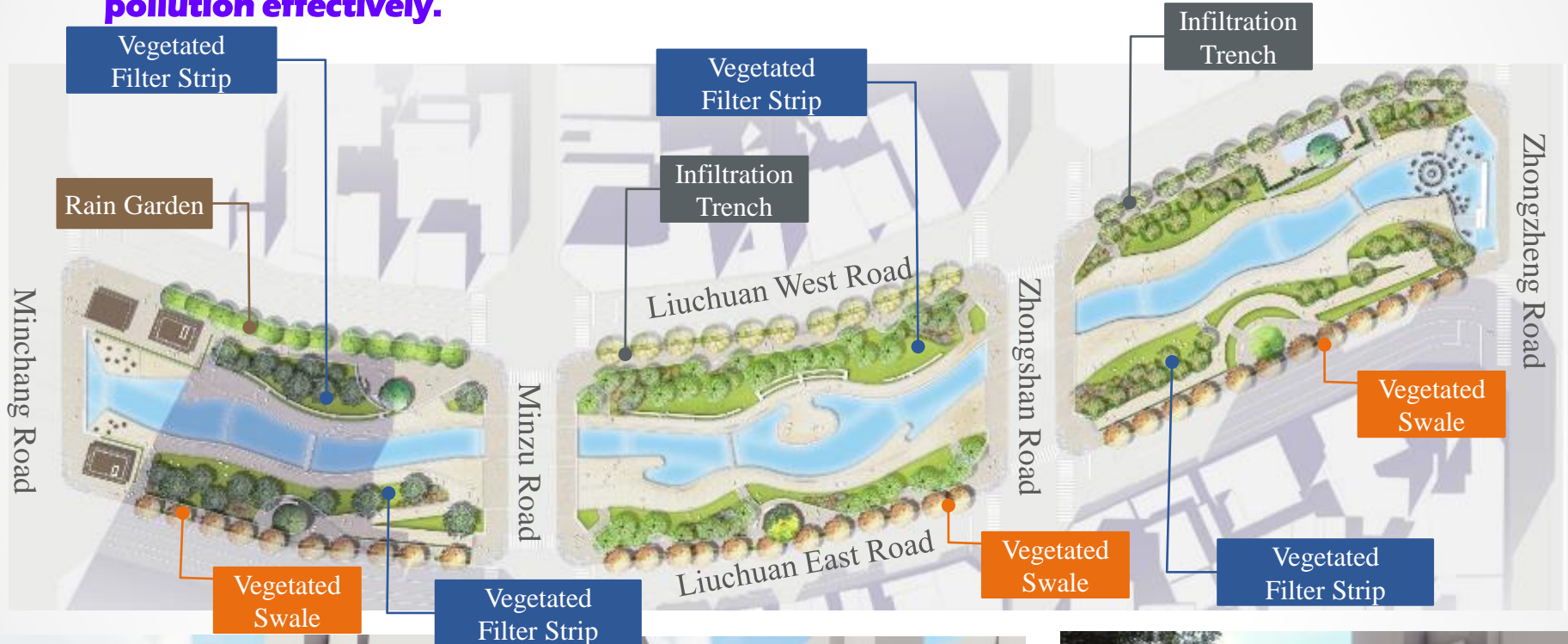
# Space Creation

## TAIWAN FIRST ONE

- Introduce LID (Low Impact Development)

LID

**By increasing infiltration, filtering, and rainwater storage, it will have enough capacity to conserve and protect water quality to alleviate storm flow and minimize nonpoint source pollution effectively.**





# Waterfront Landscape Design



1. Effluent Discharge Outlet
2. Shuixian Temple
3. Barrier-Free Ramp

4. Recreation Deck
5. Waterfront Sidewalk
6. Grass Ladder

7. Water Stage
8. Audience Seating Area
9. Corner Square

10. Ladder Platform





*Liuchuan Canal*



# Conclusions



- By promoting the Luchuan Canal and Liuchuan Canal waterfront landscape projects, Taichung City Government is enthusiastic in restoring the past charm of the old city district and evolving a new Cultural City Center.
- In the future, it is hoped that by regenerating the river in the old city district, we can reconnect the humanistic environment with the surrounding history and memories with railways, paths, and bikeways with people-oriented development.
- Integrating the blue-green belt system and natural environment, we are eager to create a new urban space for city life in order to accomplish economic and industrial transformation and achieve the goal of sustaining use of the environment.



Thank You