

# **2nd IWA Leading-Edge Conference & Exhibition on Strategic Asset Management**

## **Application of Monitoring and Information Technologies to Optimise Asset Management**

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LESAM 2007 – Lisbon 17-19 October 2007

# Contents of the presentation

- TILDE Project :Tool for Integrated **Leakage Detection** (EC)
- ADRICOSM Project : **Integrated Wastewater Management** (Italian Ministry of Environment)
- Conclusions

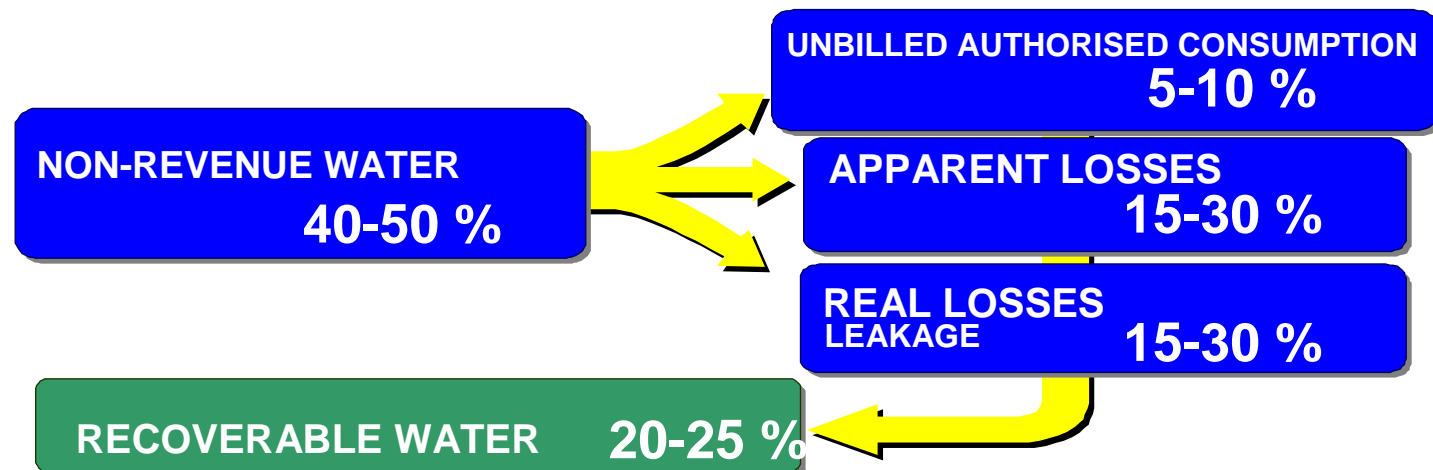




# TILDE Project



- **Goal:** Support the water practitioner in managing water losses in distribution networks
- The **Problem of Water Losses**



## Project approach

- Proactive leakage management
  - Increase knowledge: data collection & performance benchmarking;
  - Active Leakage Control (ALC)

STEPS	TILDE products
1. Quick diagnosis of the system	Leakage Check-Up
2. Leakage Reduction Strategy	DST
3. Leakage Management	DMS

# Leakage Check Up

## **Leakage Check-Up answers the questions:**

- What are the components of Non Revenue Water in my system? i.e. how much of my losses are physical and administrative ?
- How can I measure my leakage performance?
- Is my leakage level critical with respect to the availability of supply source?
- What to do next?

# Leakage Check Up - free at [www.waterportal.com](http://www.waterportal.com)



## WATERPORTAL

[www.WATERPORTAL.COM](http://www.WATERPORTAL.COM)

ACCESS THE STATE OF THE ART RESOURCES IN THE WORLD OF LEAK DETECTION AND WATER DISTRIBUTION !

English Version Versione Italiana

**MANUFACTURERS DATA BASE**  
ALLOWS YOU TO:  
Find/offer water systems related services and products.

**TECHNOLOGY DATA BASE**  
ALLOWS YOU TO:  
Find out about innovative methods and technologies in the water sector

**WATERPORTAL ENABLES YOU TO:**  
Access relevant web sites and documents on leak detection and water distribution

Information Society Technologies

Innovation

**«TILDE (Tool for Integrated Leakage Detection)»**  
Project is supported by the Innovation and SME Programme of the European Commission (EC Contract No. IPS-2001-42077-TILDE)

## TILDE PROJECT

TILDE - TOOL FOR INTEGRATED LEAKAGE DETECTION

TEST YOUR LEAKAGE MANAGEMENT PERFORMANCE !

**Diagnosis**  
LEAKAGE CHECKUP SIMPLIFIED IWA WATER BALANCE & PI

**LEAKAGE CHECK-UP ANSWERS THE QUESTIONS:**

- How can leakage be managed ?
- What are the components of Non Revenue Water ?
- How much leakage is occurring in my system ?
- How can I compare my performance?
- What should I do next?

Current Situation Target Situation

View a Demo presentation of Leakage CheckUp

**NEW - TRY OUT LEAKAGE CHECK-UP FOR FREE**

**Tilde DST**  
DECISION SUPPORT TOOL

**TILDE DST GUIDES THE USER THROUGH THE VARIOUS PROCESSES OF MANAGING AND CONTROLLING LEAKAGE MANAGEMENT:**

- Pressure Management
- Quality and Speed of Repairs
- Active Leakage Control
- Rehabilitation and more...

Pressure Management  
Quality and Speed of Repairs  
Active Leakage Control  
Rehabilitation  
Real Losses  
IWA 4 figure diagram

**VIEW A DEMO**

**Tilde DMS**  
TILDE DMS ENABLES USERS TO:

Losses TILDE



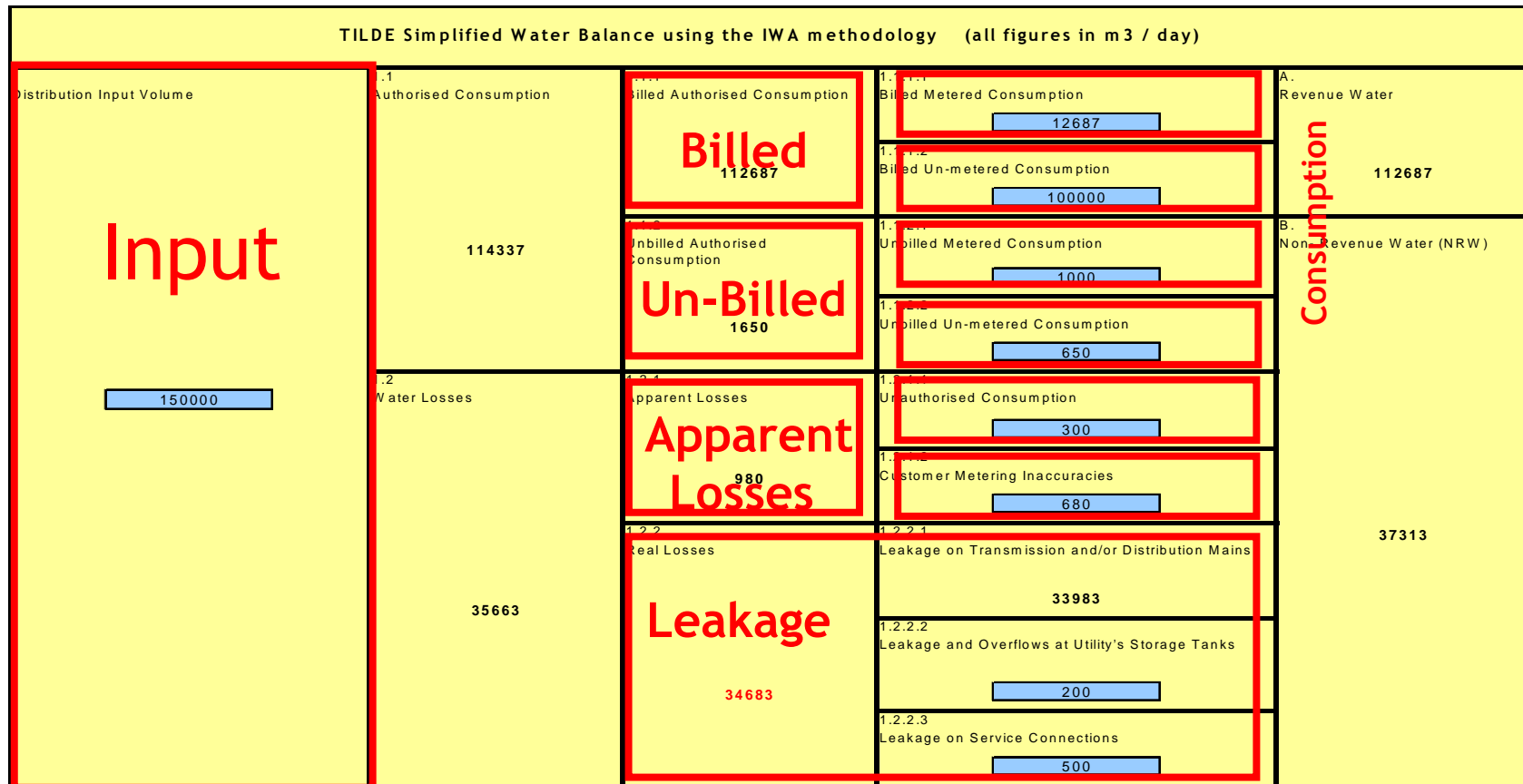
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# Leakage Check Up

## IWA's water balance to calculate components of NRW (Top down approach)



## Leakage Check-Up calculates leakage performance indicators

- Leakage, expressed as: m<sup>3</sup>/day, litres/connection/day & m<sup>3</sup>/km/day
- Infrastructure Leakage Index (ILI)
  - $ILI = CARL / UARL$
- Leakage against the availability of supply (Supply Demand Balance Indicator)



### TILDE - IWA ILI analysis calculator - simplified for continuous water supply

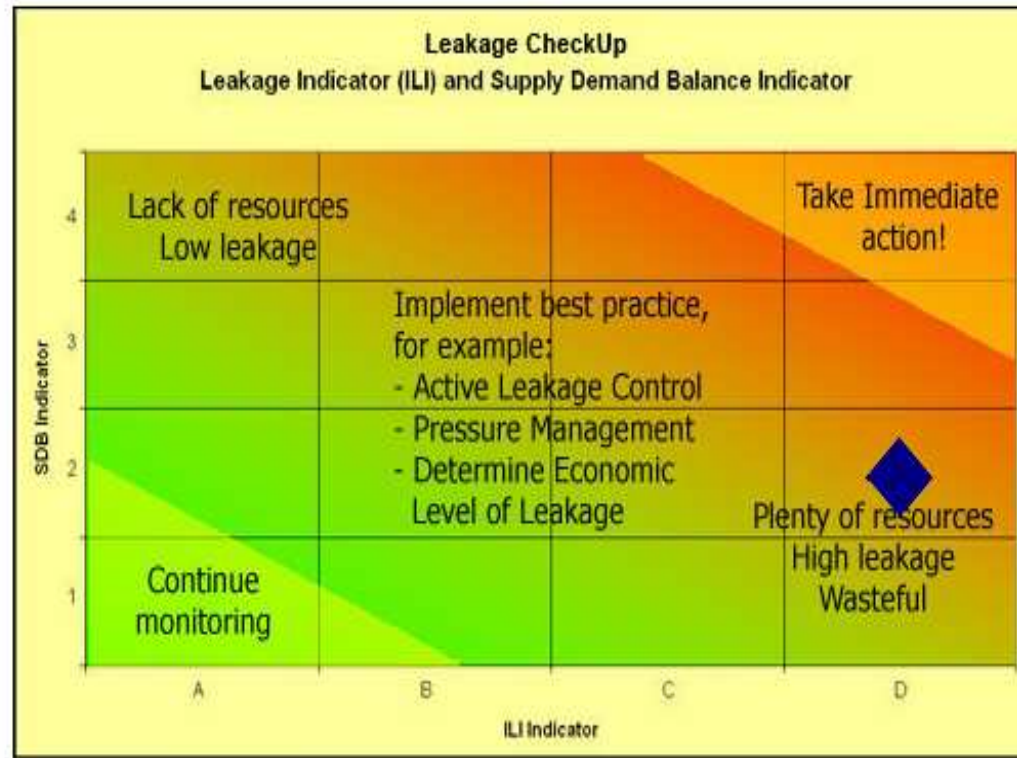
Number of connections	1636	
Length of mains	20	km
Average water supply pressure	55	meters
Density of connections	82	connections per km of mains
Average length of underground supply pipes (from property line to meter)	8	metres
Length of supply pipes	13	
Mains factor	18	
Connections factor	0,8	
Supply pipe factor	25	
UARL	109725	l/day
UARL	67	litres/connection/day
Real losses	532	litres/connection/day
<b>ILI (Infrastructure Leakage Index)</b>	<b>7,94</b>	
<b>ILI Indicator</b>	<b>C</b>	

### TILDE - Supply Demand Balance Indicator

Distribution Input Volume	2460	m3/day
Peak to Average Factor	1,0	
Maximum Demand Scenario	2706	m3/day
Supply Demand Factor	90,91	
<b>Supply Demand Balance Indicator</b>	<b>2</b>	

[Go to Opportunities](#)

# TILDE Check Up : Leakage (ILI) vs. Supply Balance Indicator



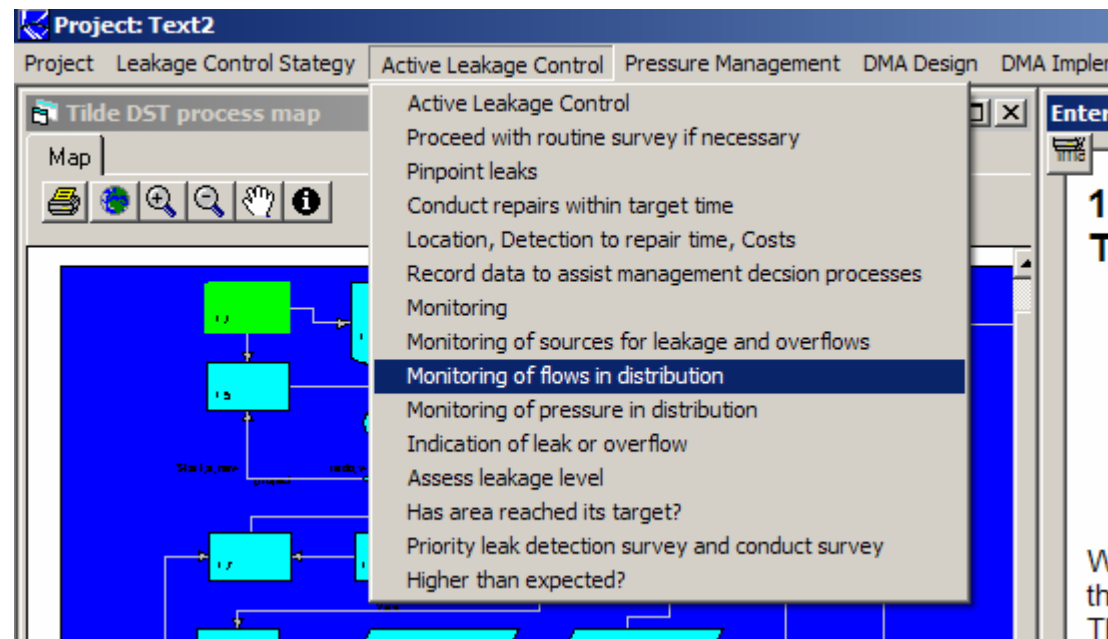
## TILDE DST (Decision Support Tool)

- **What to do next ?**
- TILDE DST provides guidance on international best practice
  - **Active Leakage Control (ALC):**
    - **Network Analysis & Target definition**
    - **Zonal Disaggregation**
    - **District Metering Area (DMA) implementation**
    - **Leaks location and repairs**

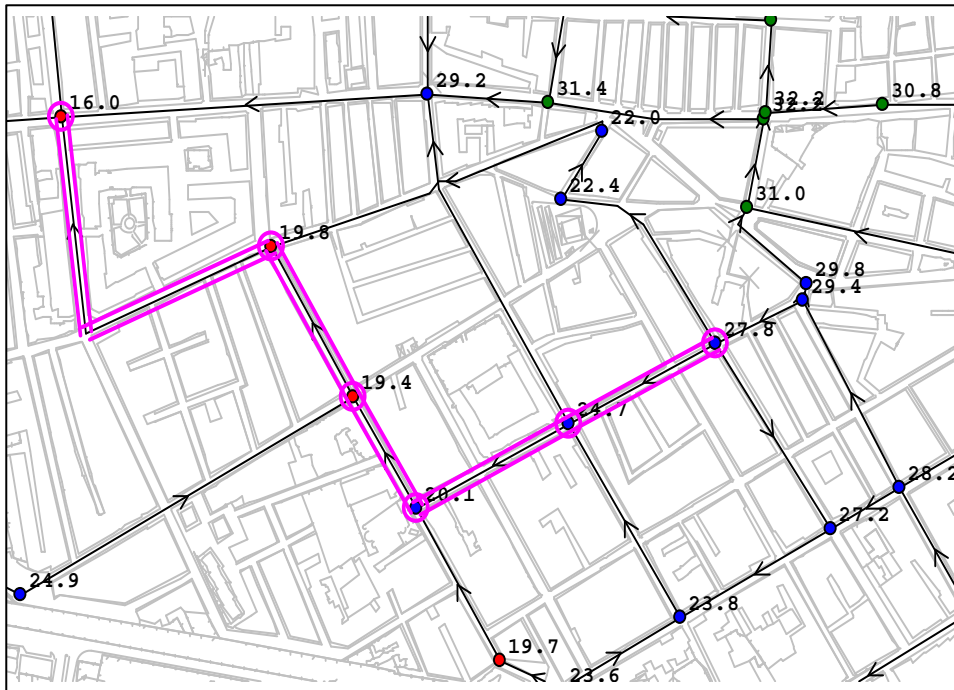


# The TILDE DST

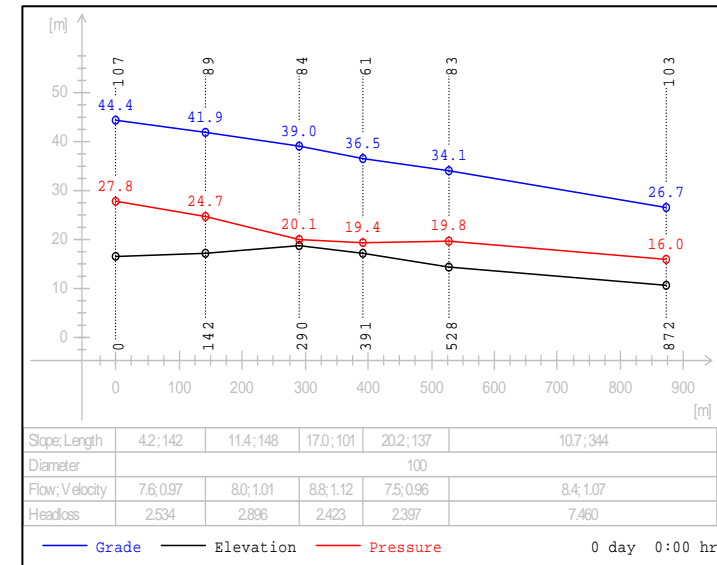
- Leakage Control best practice and available technologies



# TILDE DST - Network Analysis

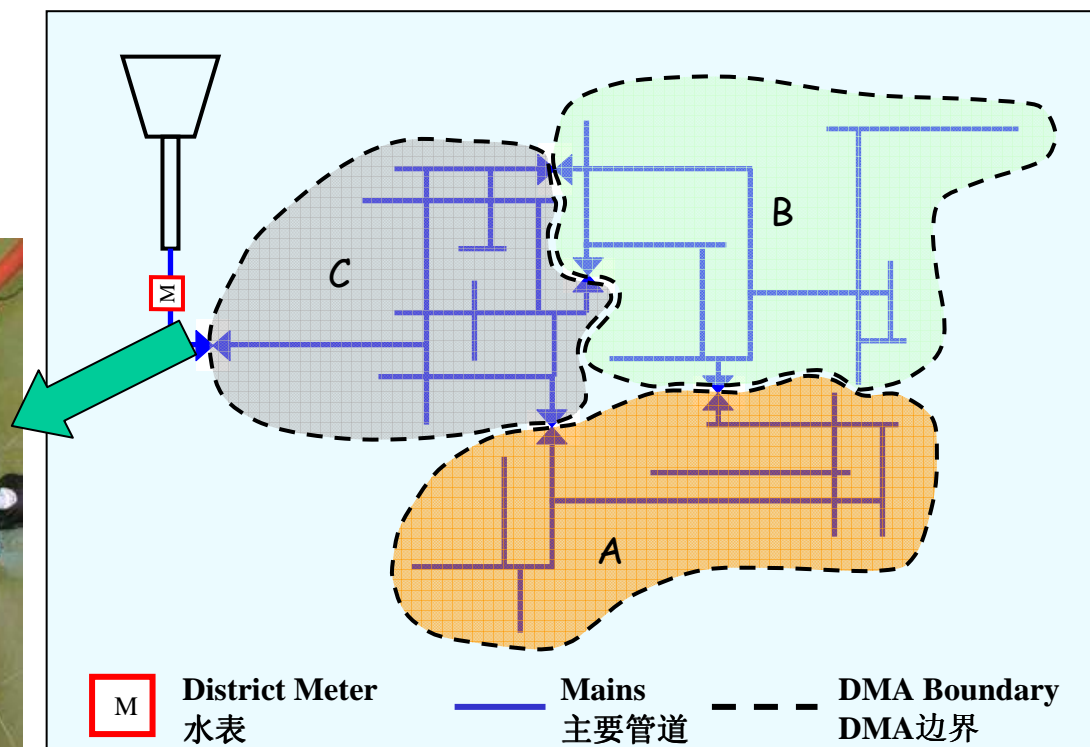


GIS based database



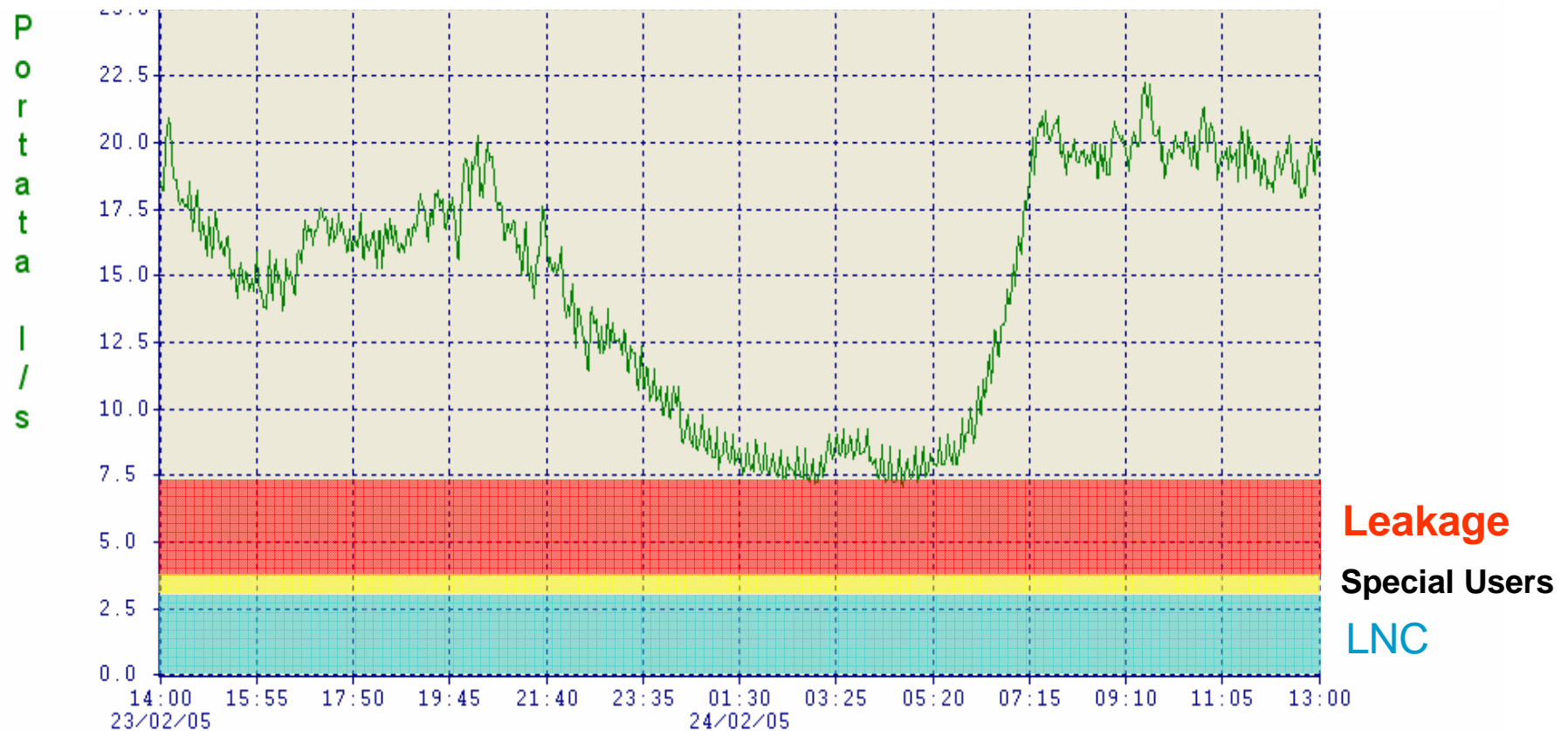
Mathematical model of the network

# TILDE DST - Active Leakage Control: Zone disaggregation and creation of DMAs. Flow into the district is metered



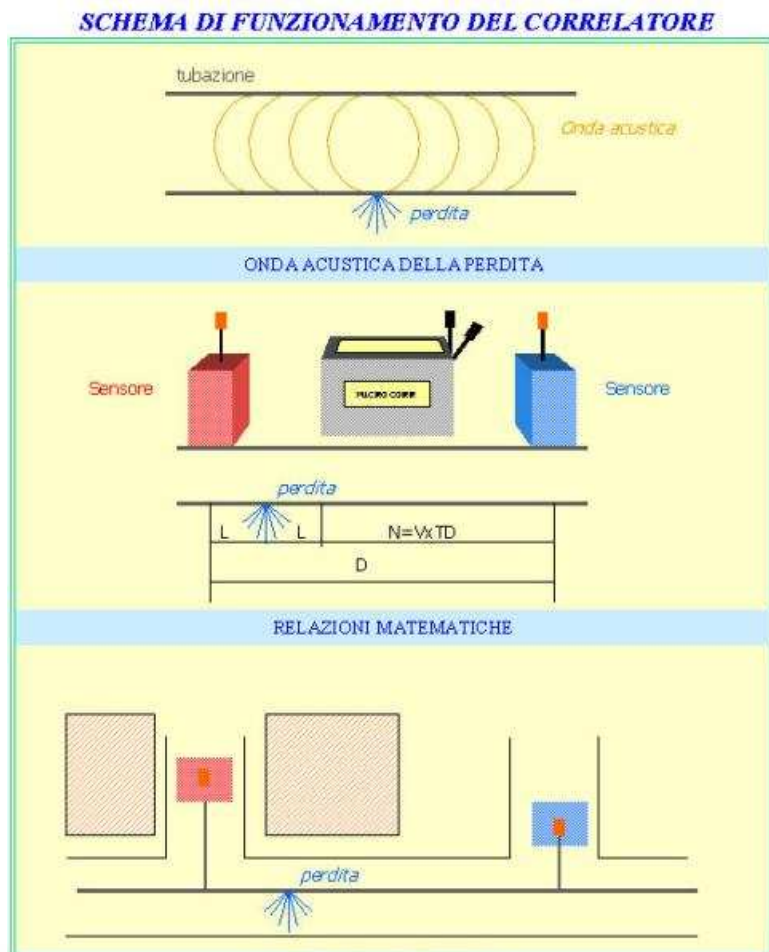


**Leakage** = Minimum Night Flow MNF (measured) – Legitimate Night Consumption LNC (estimated) - Special Users Consumption (measured)



Site	Channel	Units	Min	Max	Vol
SER02 pennile	2.0 Minutes Flow	Litres per Sec.	7.03	22.27	1213

# Equipment used for leakage detection



Noise Loggers,  
Correlator

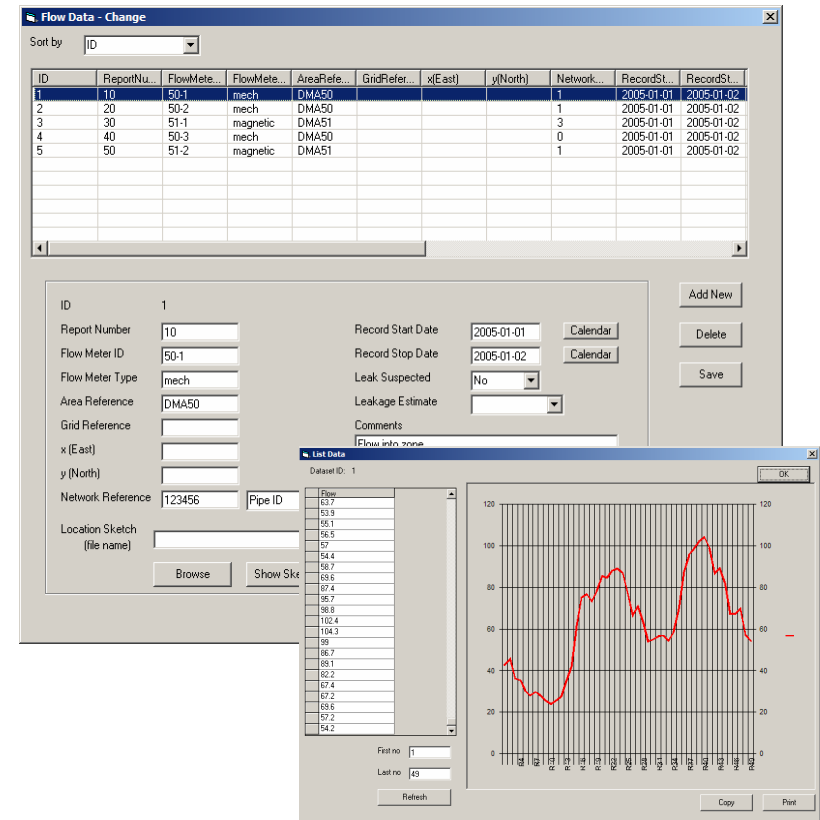


Listening sticks,  
geophone

# The TILDE DMS

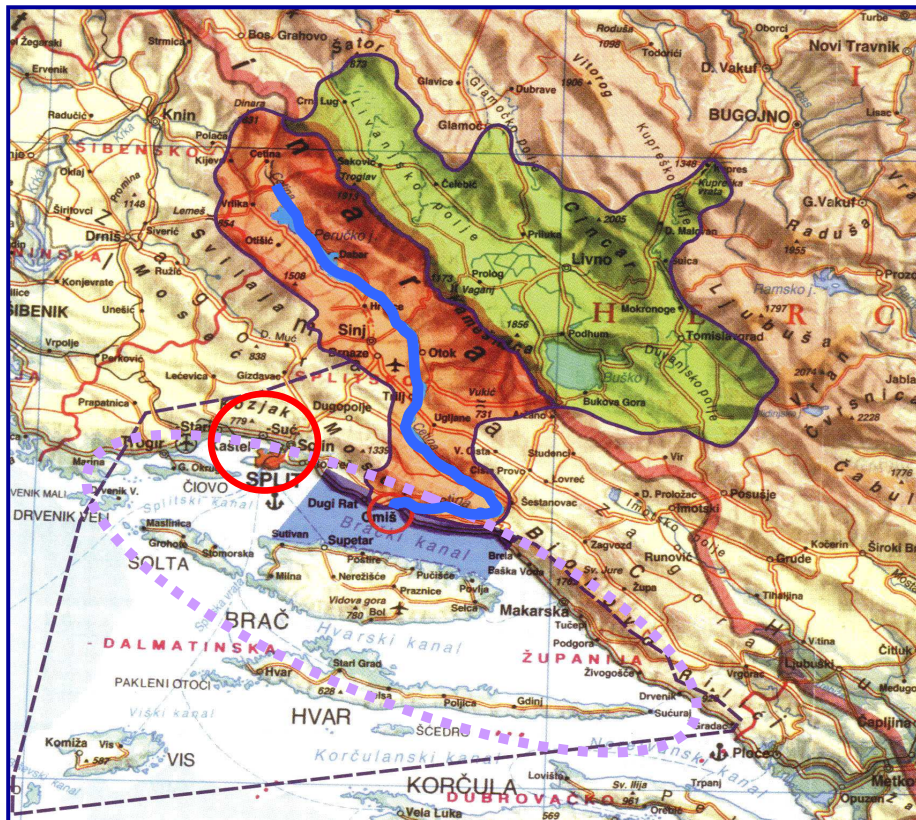
## Leakage Database that:

- **Manages water network data from:**
  - flow meters
  - pressure meters
  - acoustic devices
- **Records and reports information on:**
  - leaks
  - leakage detection activities
  - repairs
- **Analyses:**
  - flow data for prioritizing zones





# ADRICOSM: Integrated Wastewater Management



City of Split : 220,000  
population

River Cetina

Coastal area between the  
mainland and the Island of  
Brač



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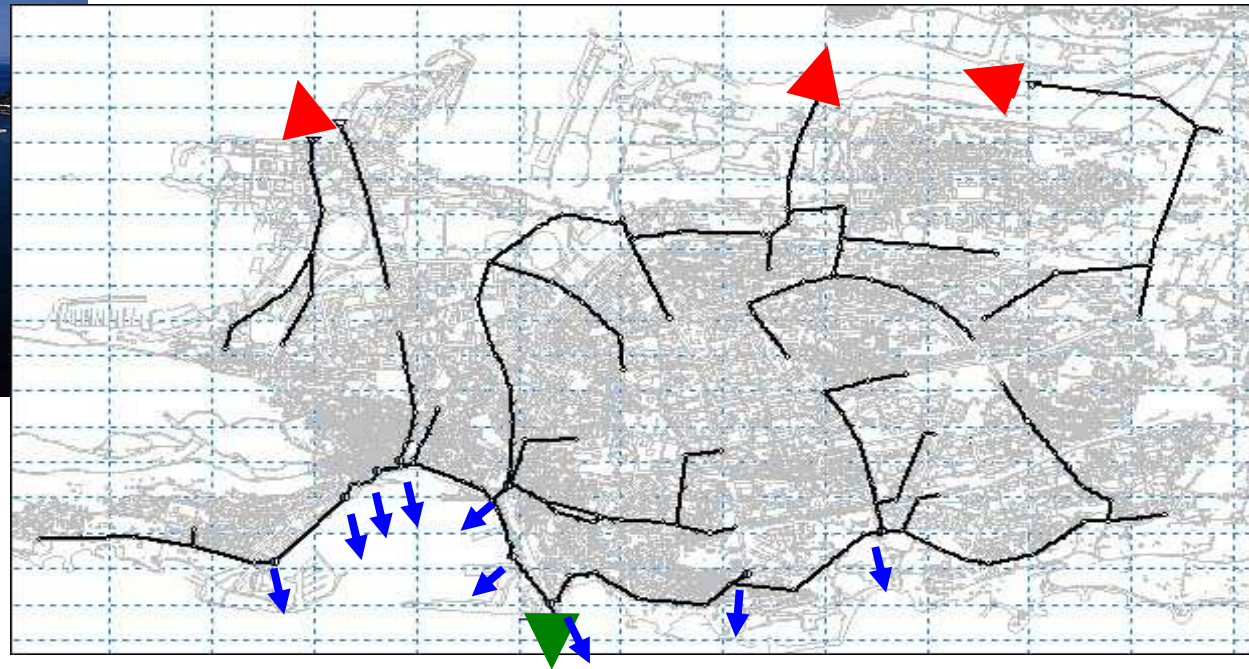
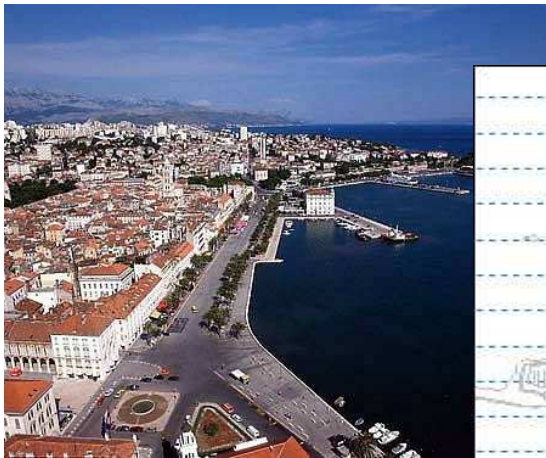
# Network Modelling - CSOs and Outlets

- 9 Overflow chambers discharging into the sea
- 4 Outfalls in the Kastela bay
- 1 Submarine outfall in the Brac Channel

154 Nodes

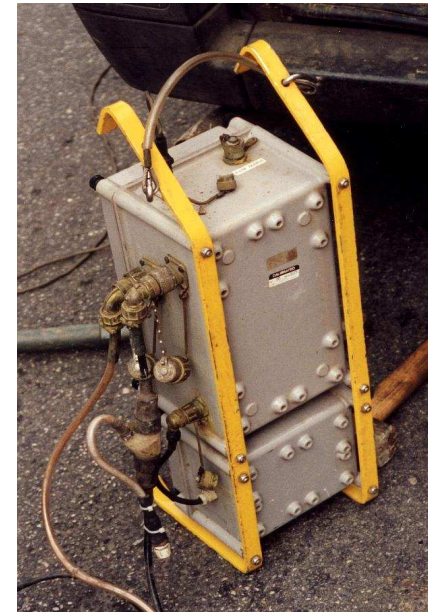
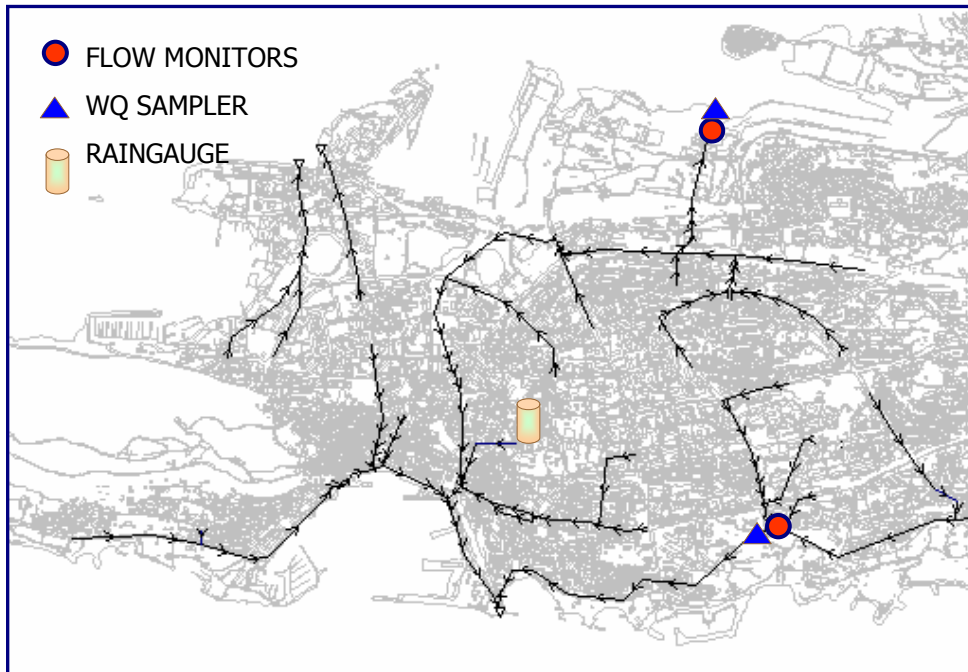
148 Links

4 Outlets





# Flow Rainfall and WQ Survey



**Sewer Flow Monitors**



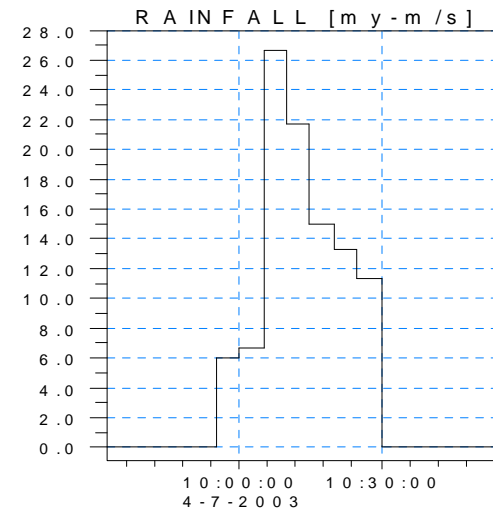
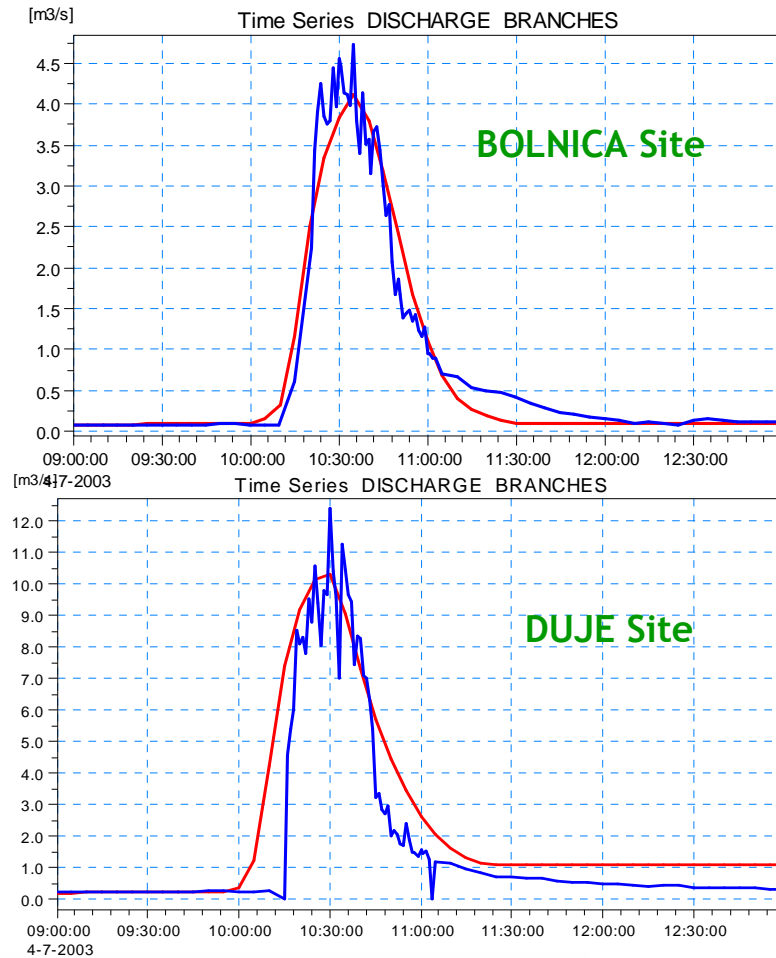
**Automatic Samplers**

**Rain Gauges**





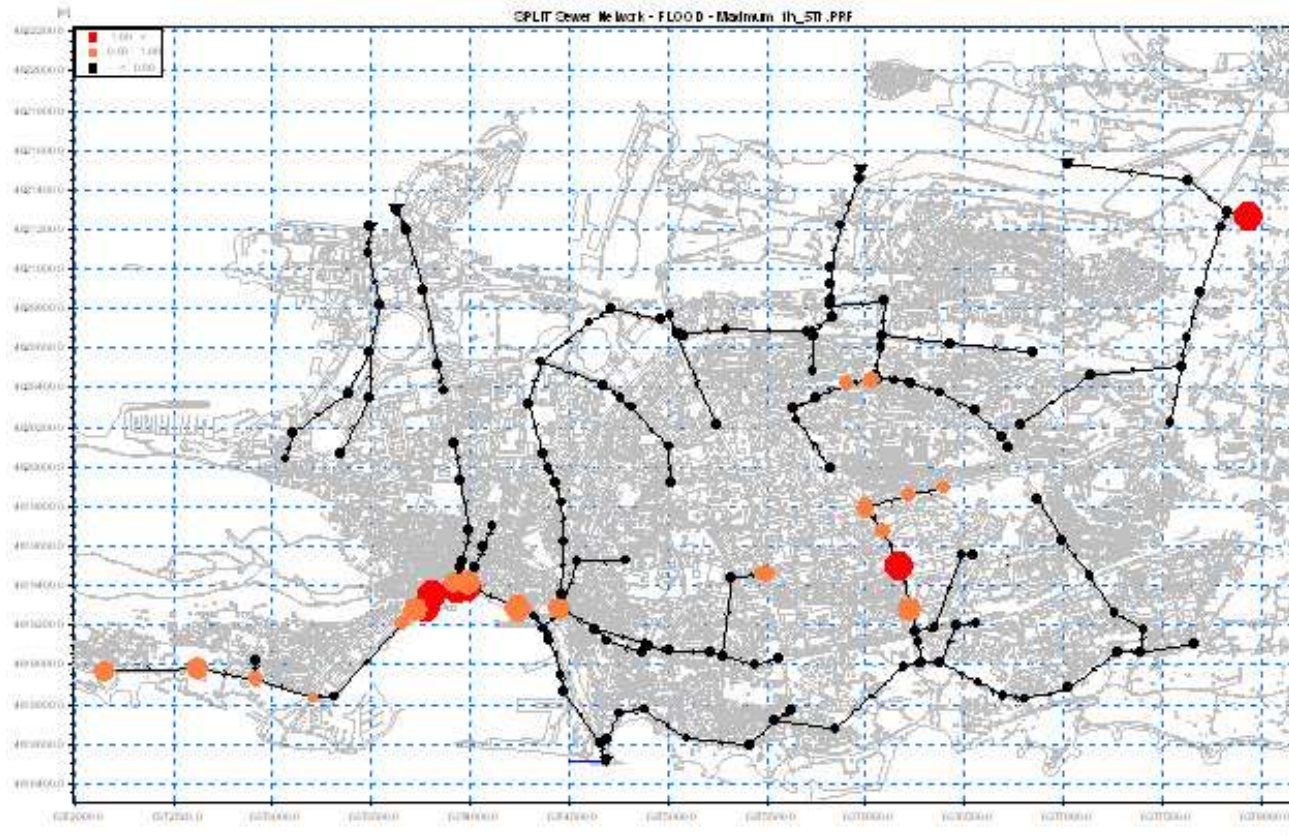
# MOUSE Model Calibration



- Duration = 30 Minutes
- Total Rainfall = 29.2 mm
- Max Rain Intensity = 93 mm/h

# Performance Analysis - Flooding

## Design rainfall 5yrs, 60 mins



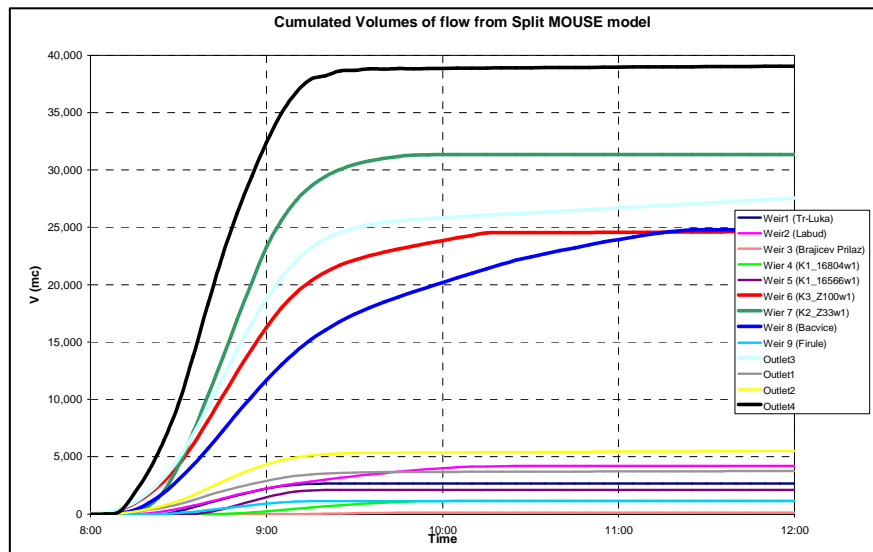
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# Performance Analysis

## CSOs with the design rainfall 5yrs, 60 mins.

Cumulated discharged volume from CSOs



CSO	Volume (m <sup>3</sup> )	COD (kg)	SS (kg)	TKN (kg)
Weir 1	2,678	186	138	4
Weir 2	4,192	124	89	4
Weir 3	116	4	3	0
Weir 4	1,165	39	29	1
Weir 5	2,108	8	4	1
Weir 6	24,637	1,677	1,213	48
Weir 7	31,340	1,219	885	33
Weir 8	24,799	2,262	1,589	89
Weir 9	1,124	4	3	0
Outlet 1	3,747	214	157	5
Outlet 2	5,516	340	245	10
Outlet 3	27,545	1,887	1,330	72
Outlet 4	39,056	3,374	2,409	92
<b>Total</b>	<b>168,023</b>	<b>11,339</b>	<b>8,094</b>	<b>359</b>

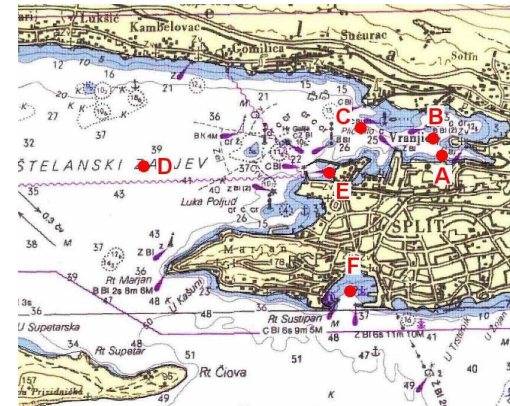
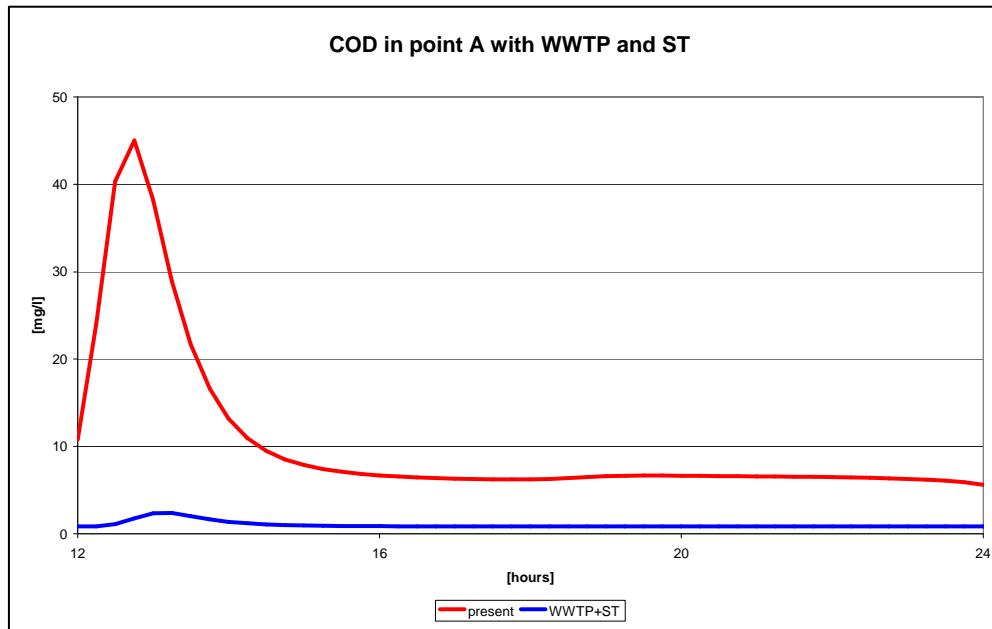
5 Major outlets contribute 80% of the total discharged volume (168.000 m<sup>3</sup>) and nearly 90% of pollutant loads



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# Simulation of Storage Tanks at main CSOs in Split



Implementation of Storage Tanks + WWTP would improve significantly the quality of the receiving waters. (**95 % reduction of COD concentration**)

# Conclusions

- Monitoring and information tools are powerful systems to enhance asset management, however they are not yet fully accepted or used by operators
- Data collection and analysis using methodological and proactive approaches will require changes in operators culture but experience shows it is worthwhile in terms of cost effectiveness and staff motivation.

# THANKS for your attention

[www.sgi-spa.it](http://www.sgi-spa.it)



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