

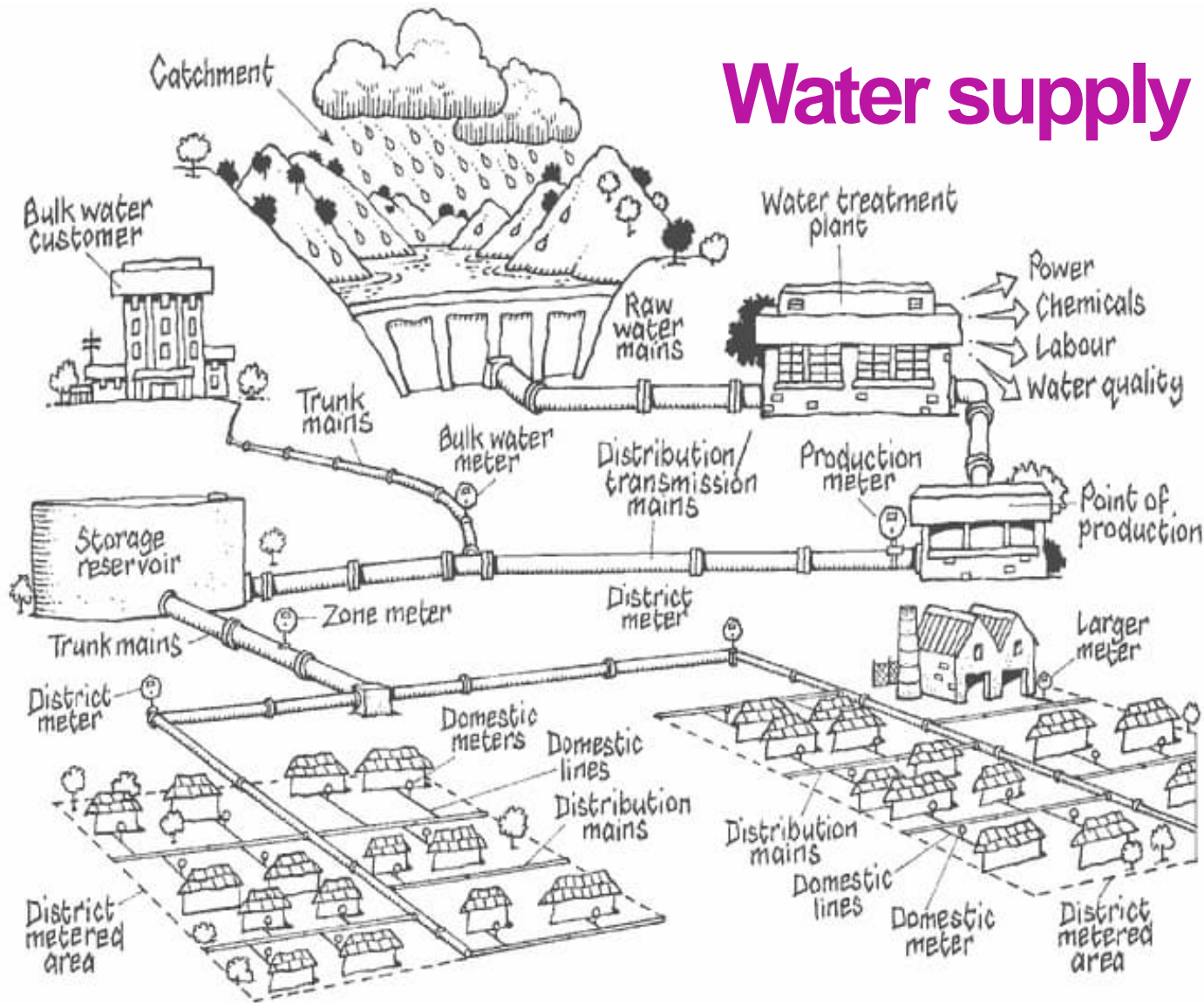


Aalto University  
School of Engineering

# Components of urban water supply and sanitation systems

*Prof. Anna Mikola*

# Water supply system

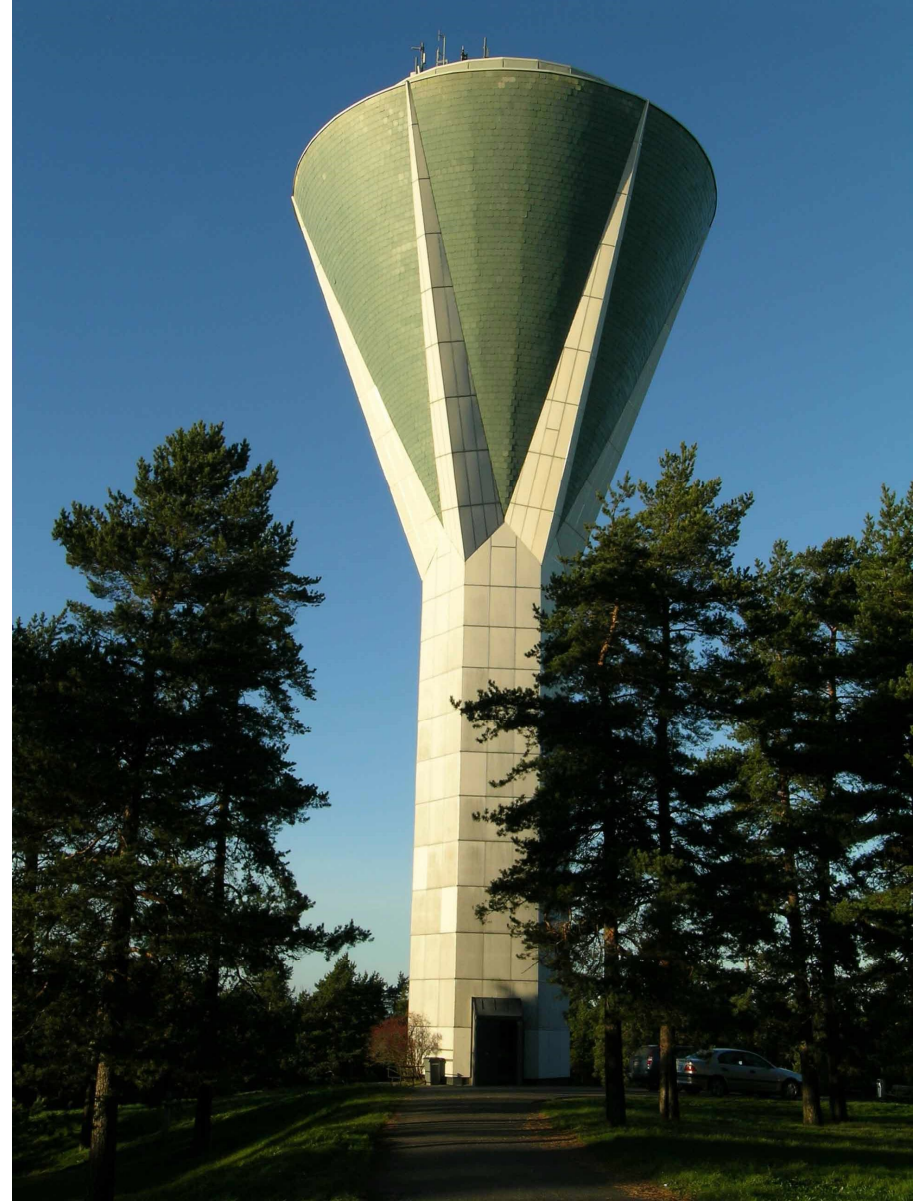


# Water distribution



# Water distribution

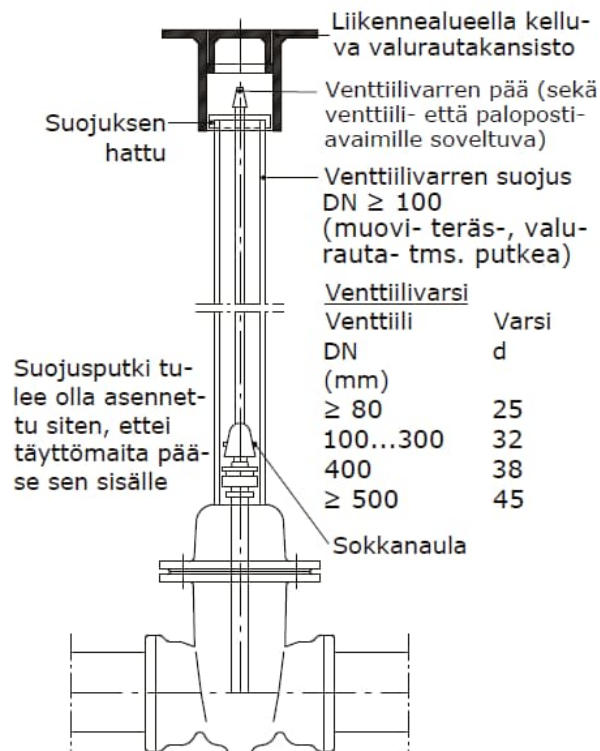
- **Pressurised underground system consisting of:**
  - **Pipes (mains and domestic lines)**
  - **Valves**
  - **Fire hydrants**
  - **Storage reservoir (tanks and water towers)**
  - **Pumping stations**
  - **Water meters**



# Pipes



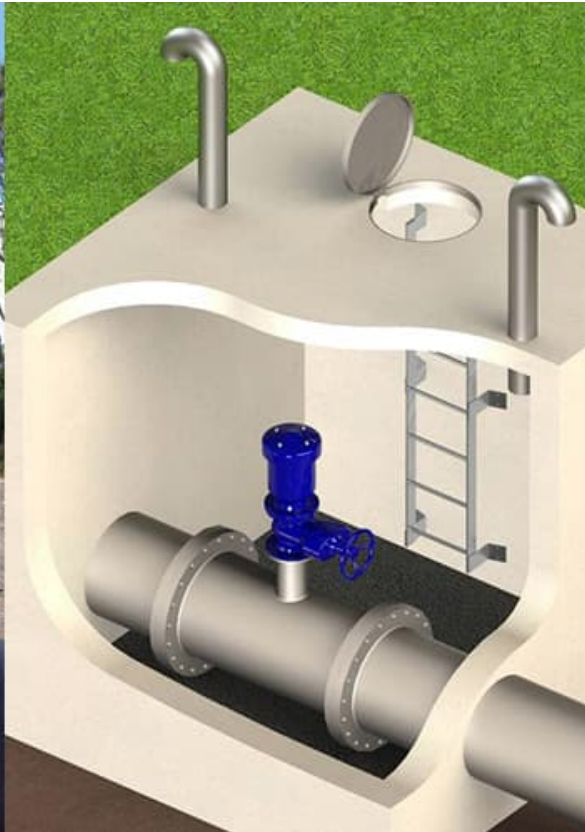
# Gate valves



Venttiilin asennusalueesta kuten johtolinjassa. Joustavat liitokset mahdollisimman lähelle maahan asennettavaa venttiiliä. Tuenta varmistettava.



# Air valves



# Fire fighting







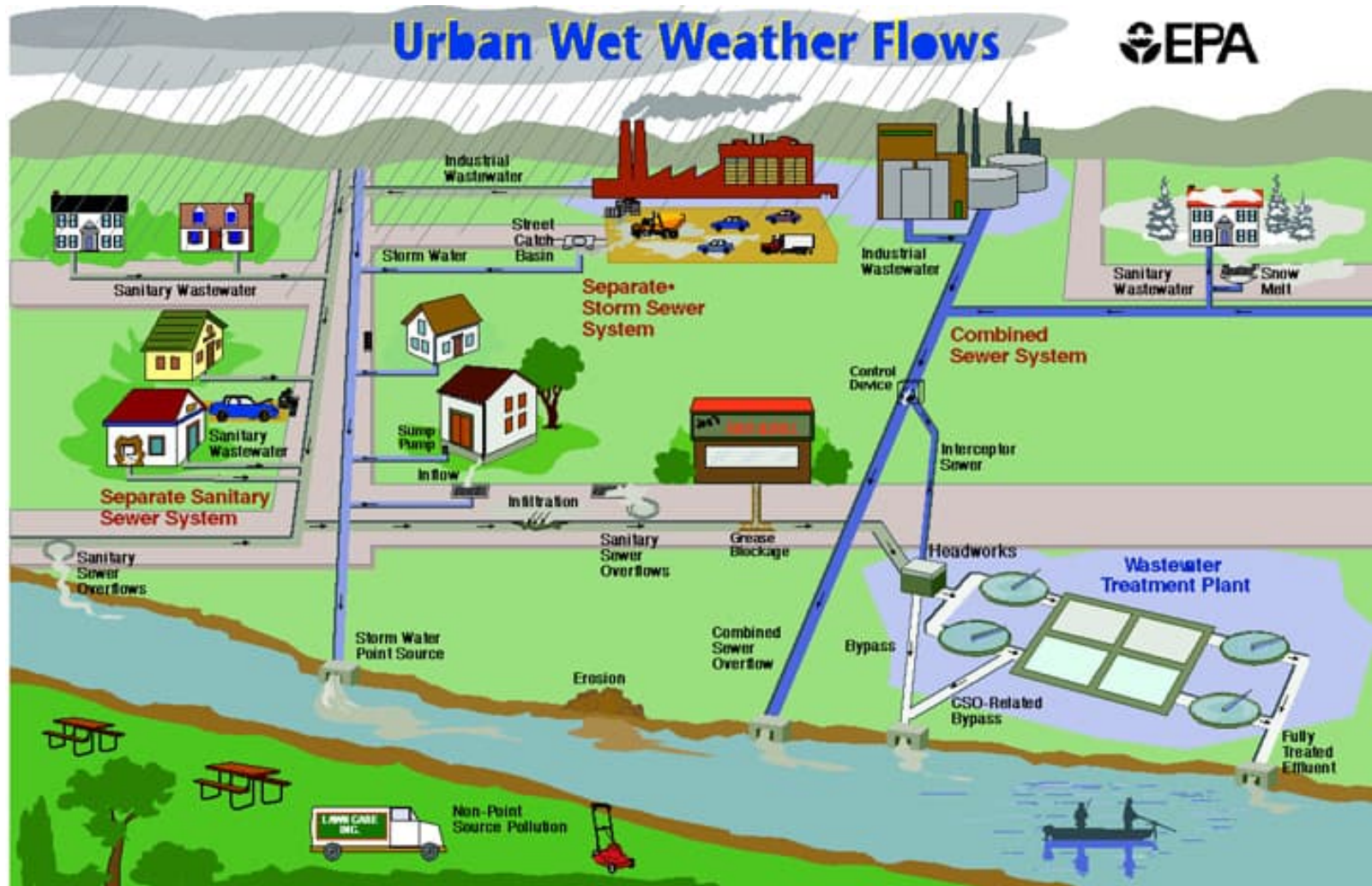
# Storage reservoir



# Water meters



# Centralised sewer system



# Sewer system

- Infrastructure that conveys sewage mainly by gravity
- Consists of pipes, pumping stations, manholes, storm overflows etc.
- Ends at the entry to a sewage treatment plant or at the point of discharge into the environment.
- Combined sewer systems are designed to transport both stormwater runoff and sewage in the same pipe
- Separate sanitary sewer systems are designed to transport sewage alone



# Components of the sewer system

- Sewer pipes
- Manholes
- Lift stations
- Street inlets (in CS)
- Retarding basins (in CS)
- Combined sewer overflows (CSOs)

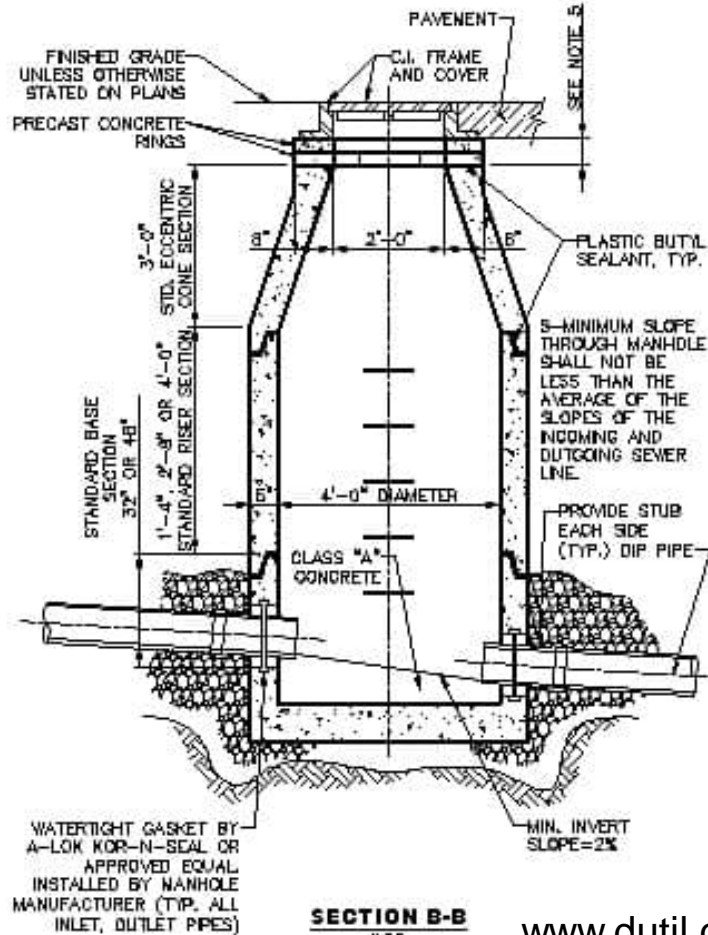


# Sewer pipes

- **Service connection (house sewer) normally 110-315 mm in diameter**
- **Common (public) sewers up to 1000 mm in diameter**
- **Plastic pipes are easy to install, but need carefully constructed**
- **Concrete pipes are more tolerant against dynamic forces but are vulnerable to corrosion**
- **Laid deep to protect against traffic loads, freezing and to serve premises without need to pump**



## STANDARD PRECAST MANHOLE SECTION B-B

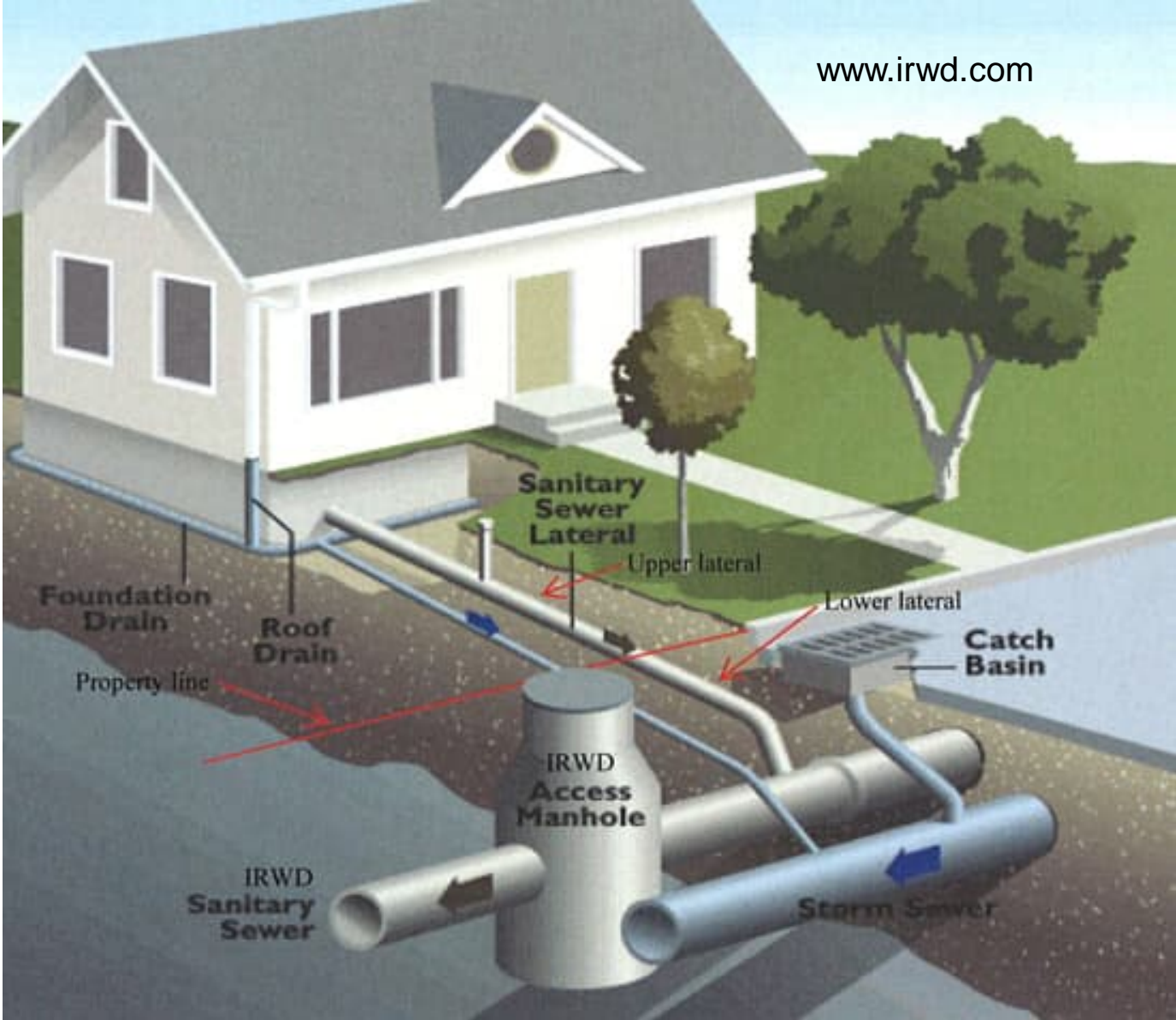


# Manholes

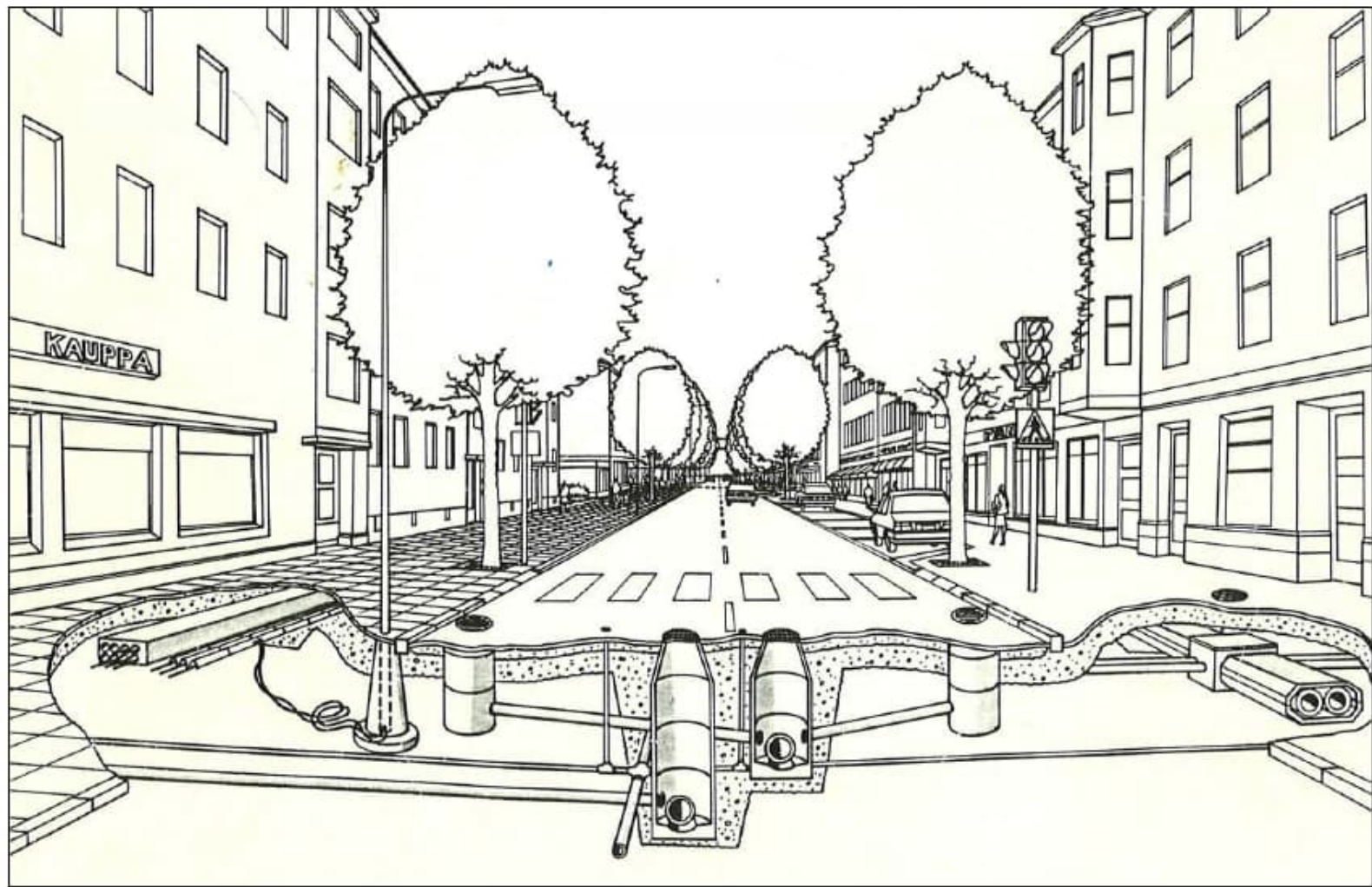


- Provide access point for connections and maintenance
- Required at junctions and at each change in pipe direction, size or slope
- Precast concrete or plastic
- Protected by cast-iron manhole cover









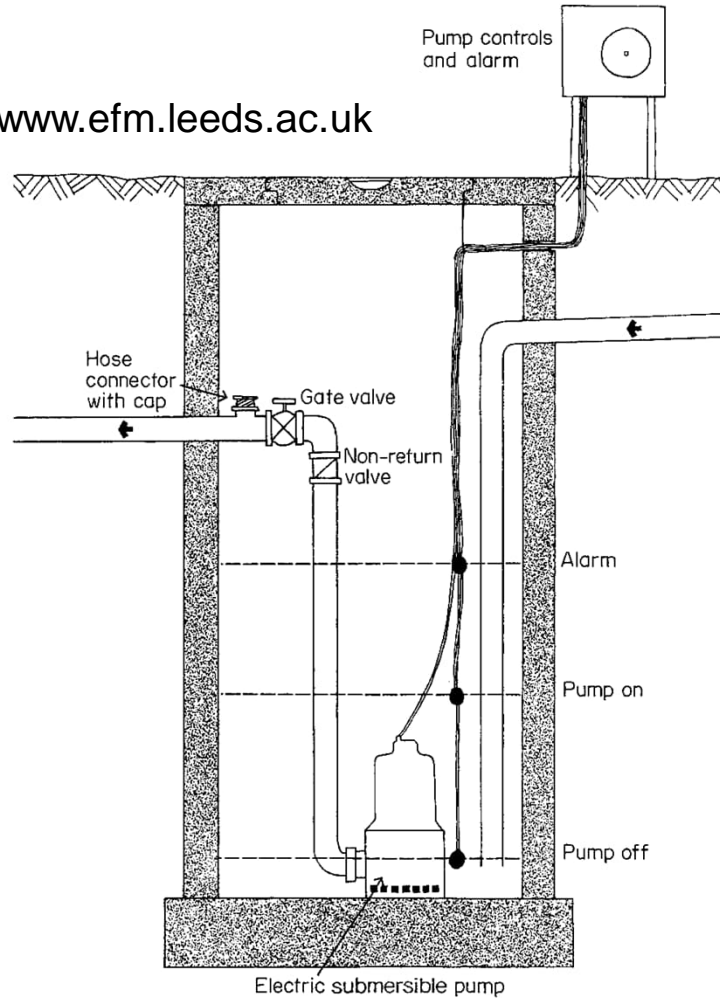
# Lift stations (pumping stations)

- To move wastewater from lower to higher elevation
- Prefabricated or constructed on-site
- Centrifugal pumps where the flow can be adjusted by variable speed drives
- Two common types: Dry well and submersible lift stations

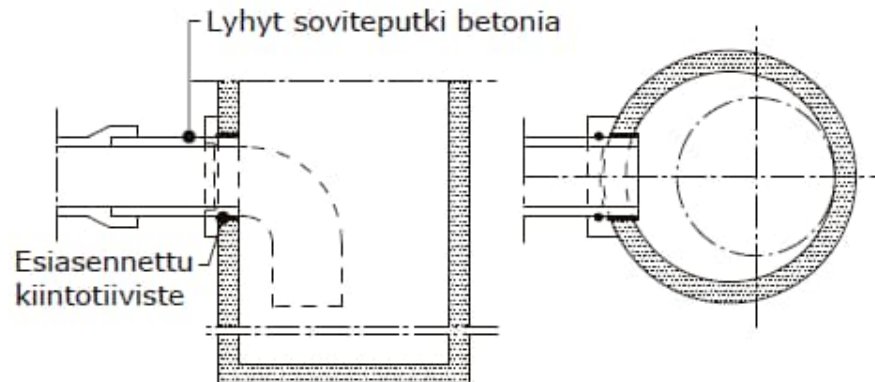
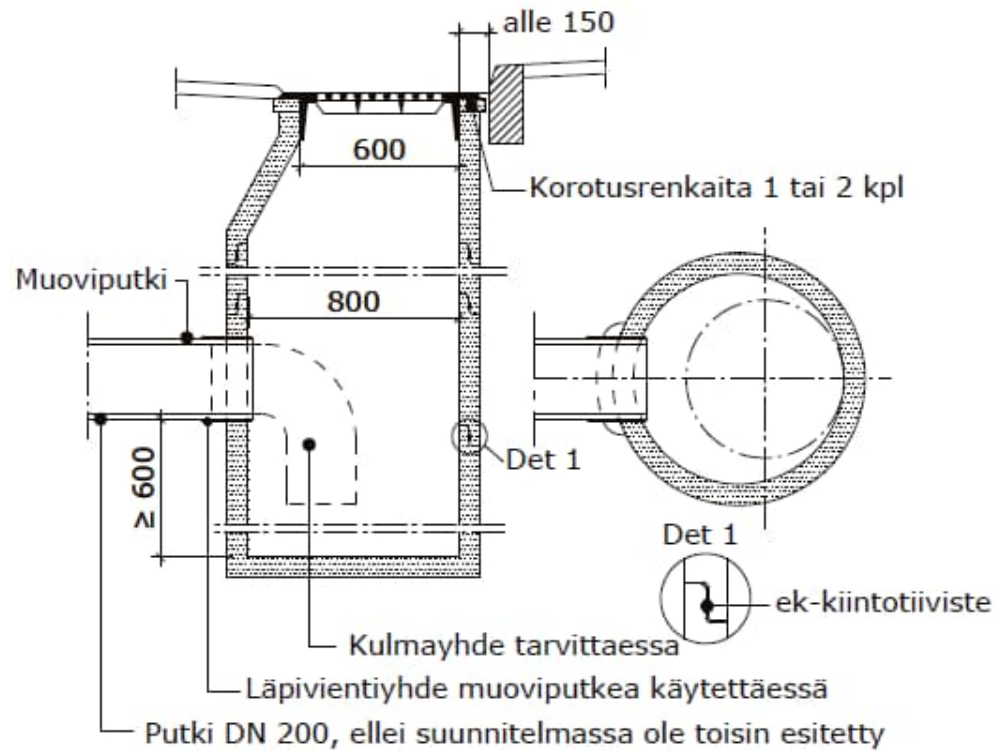


# Prefabricated submersible lift station

[www.efm.leeds.ac.uk](http://www.efm.leeds.ac.uk)



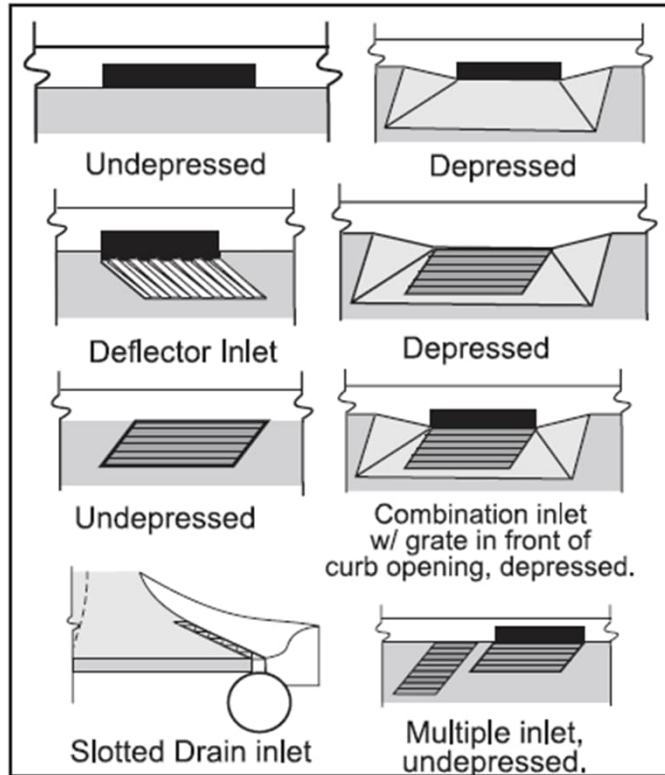
# Gutter inlet



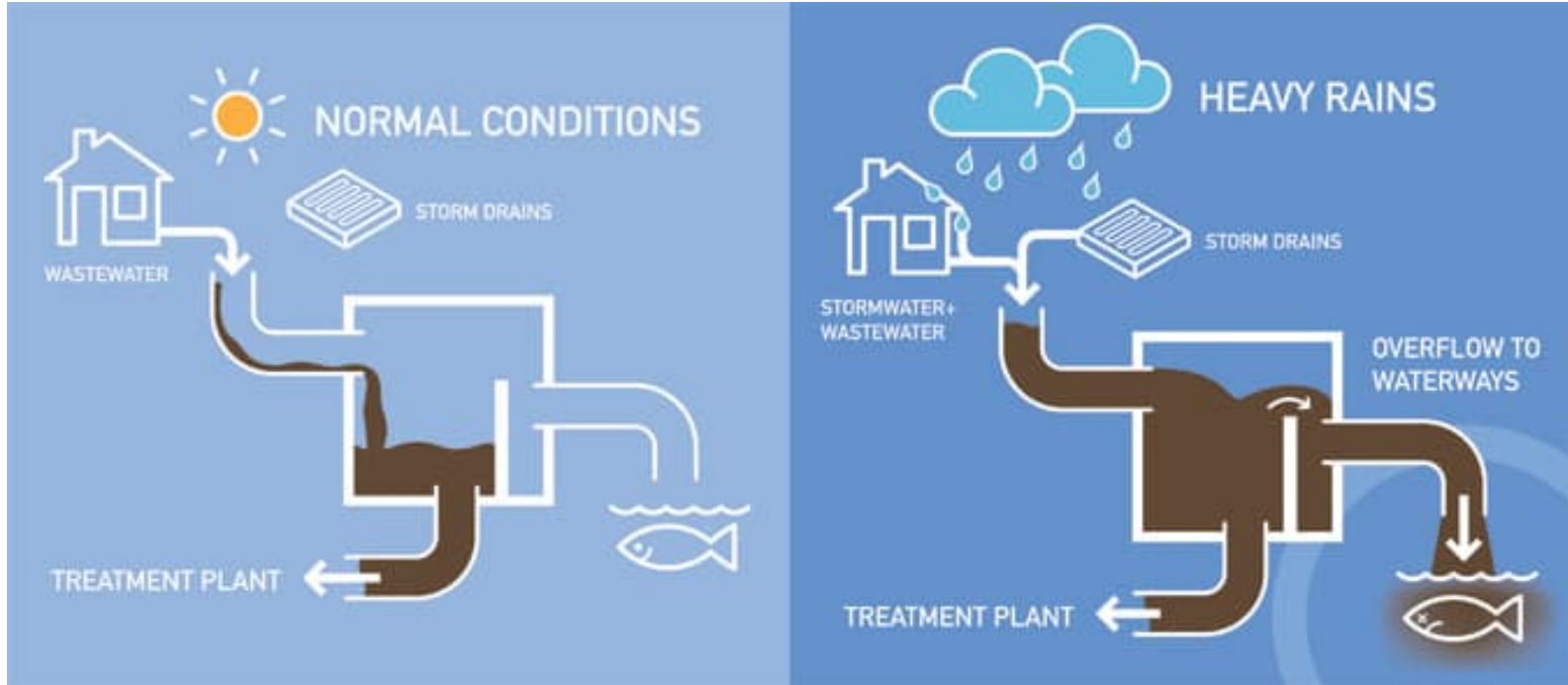
# Curb inlet

Figure 1: Typical stormwater curb/gutter inlets

[www.conteches.com](http://www.conteches.com)



# Combined sewer overflow



[http://wayworks.net/illustration/tech\\_illus\\_06b.jpg](http://wayworks.net/illustration/tech_illus_06b.jpg)

**What are the advantages and disadvantages of separate and combined sewers?**

**Discussion in groups 15 min.**

**Wrap-up 5 min.**



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**BREAK 5 min**