

Stormwater management practice in Lithuanian



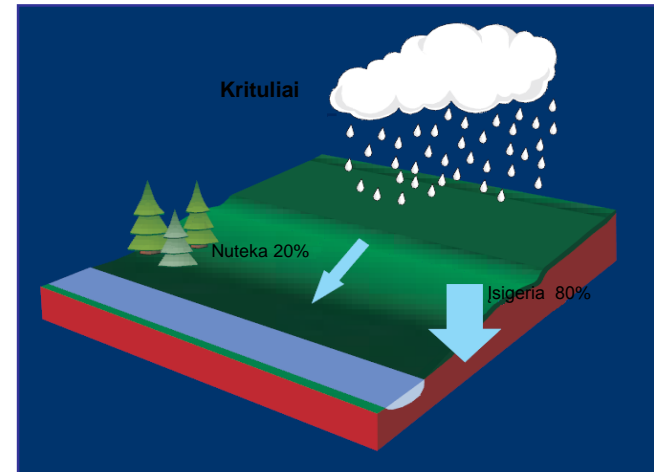
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BALTIC WATER WORKS CONFERENCE
19-05-2016

Human created problem

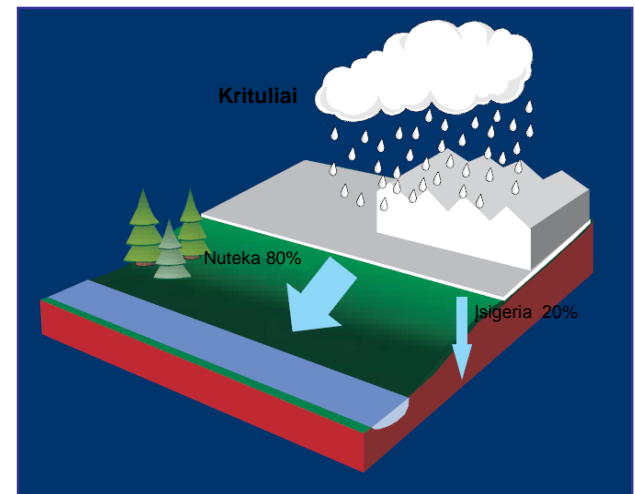
Natural territories:

- ✓ 80% rainfall infiltrate to ground
- ✓ 20% runoff flows to water bodies



Urbanized territories:

- ✓ 80% runoff flows to water bodies
- ✓ 20% rainfall infiltrate to ground



Cities after heavy rains (separate system)

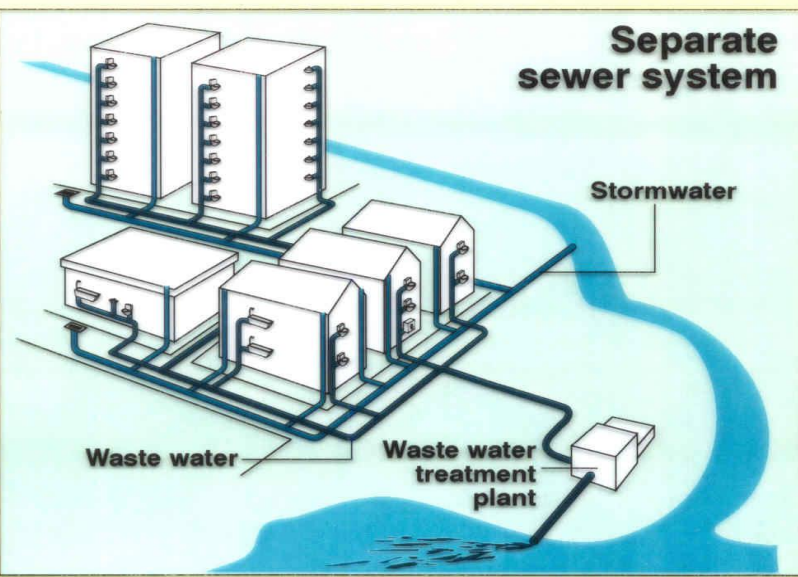
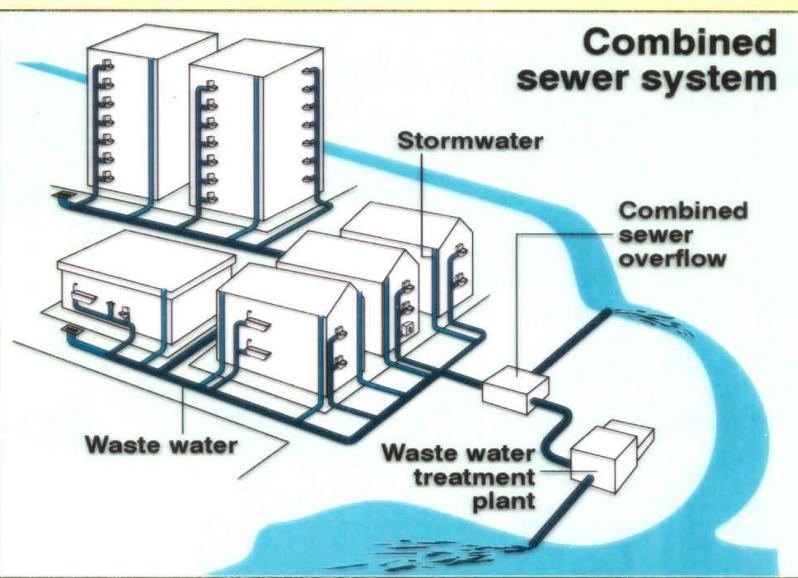


Tasks of stormwater managements

- Collect and discharged runoff as fast as possible, in order to avoid flooding of cities.
- Treat stormwater runoff before discharge to water bodies.



Sewer systems

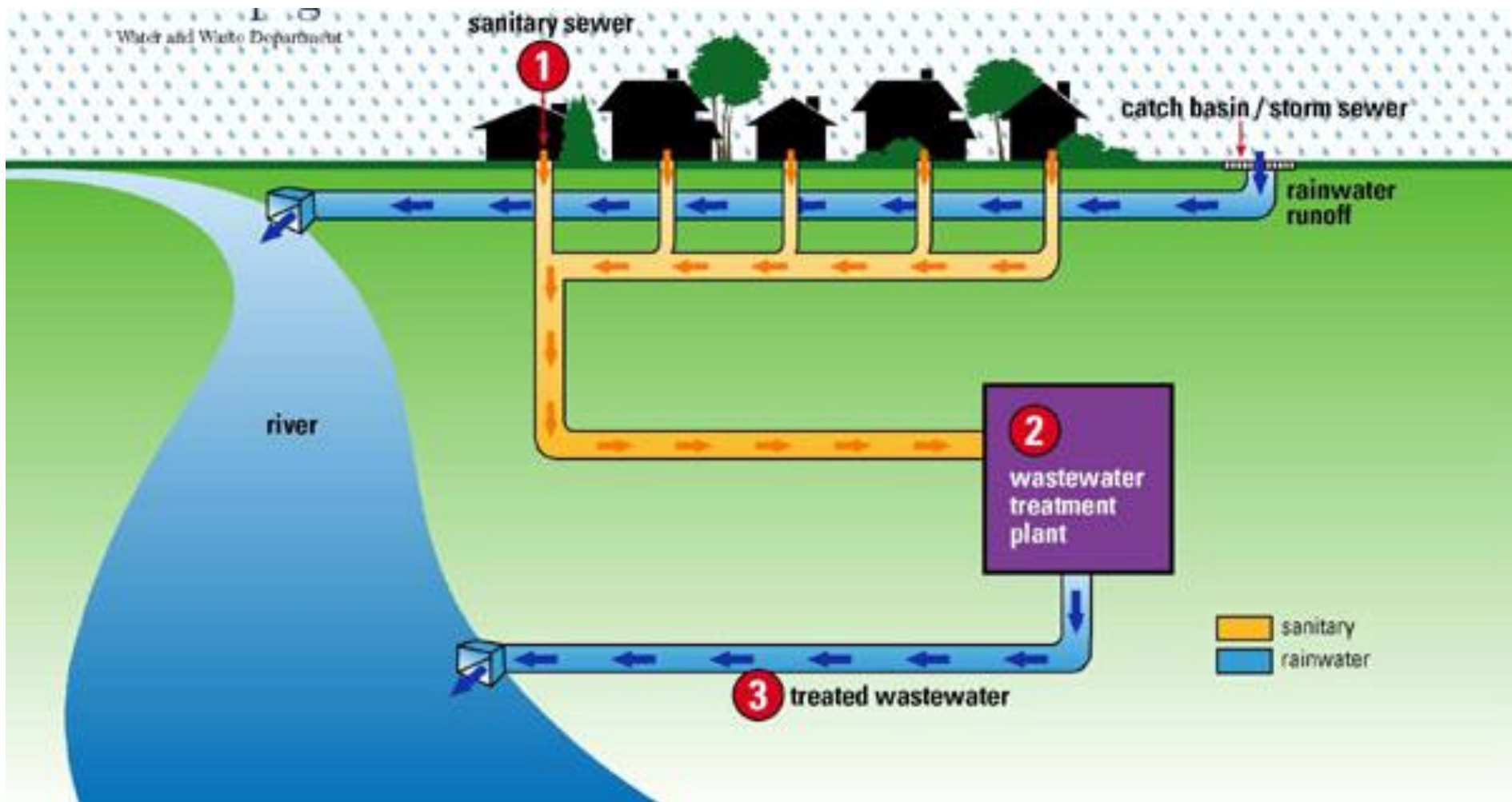


Combined system: mixture of domestic and stormwater discharged to recipients.

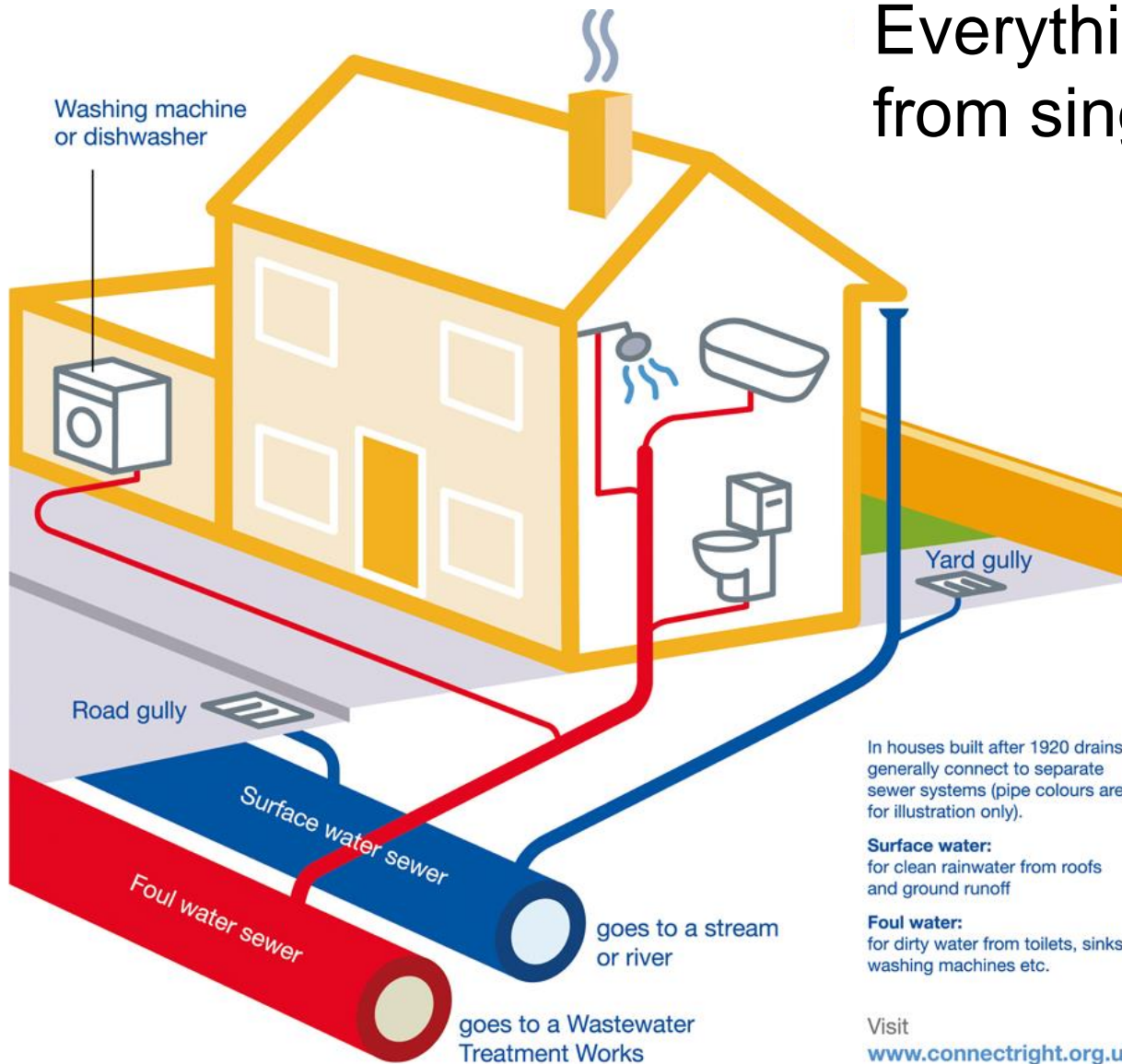
Separate system: stormwater was discharged directly to the receiving waters.

Problems in both cases – pollution of receiving waters.

Separate sewer systems



Everything starting from single house ...



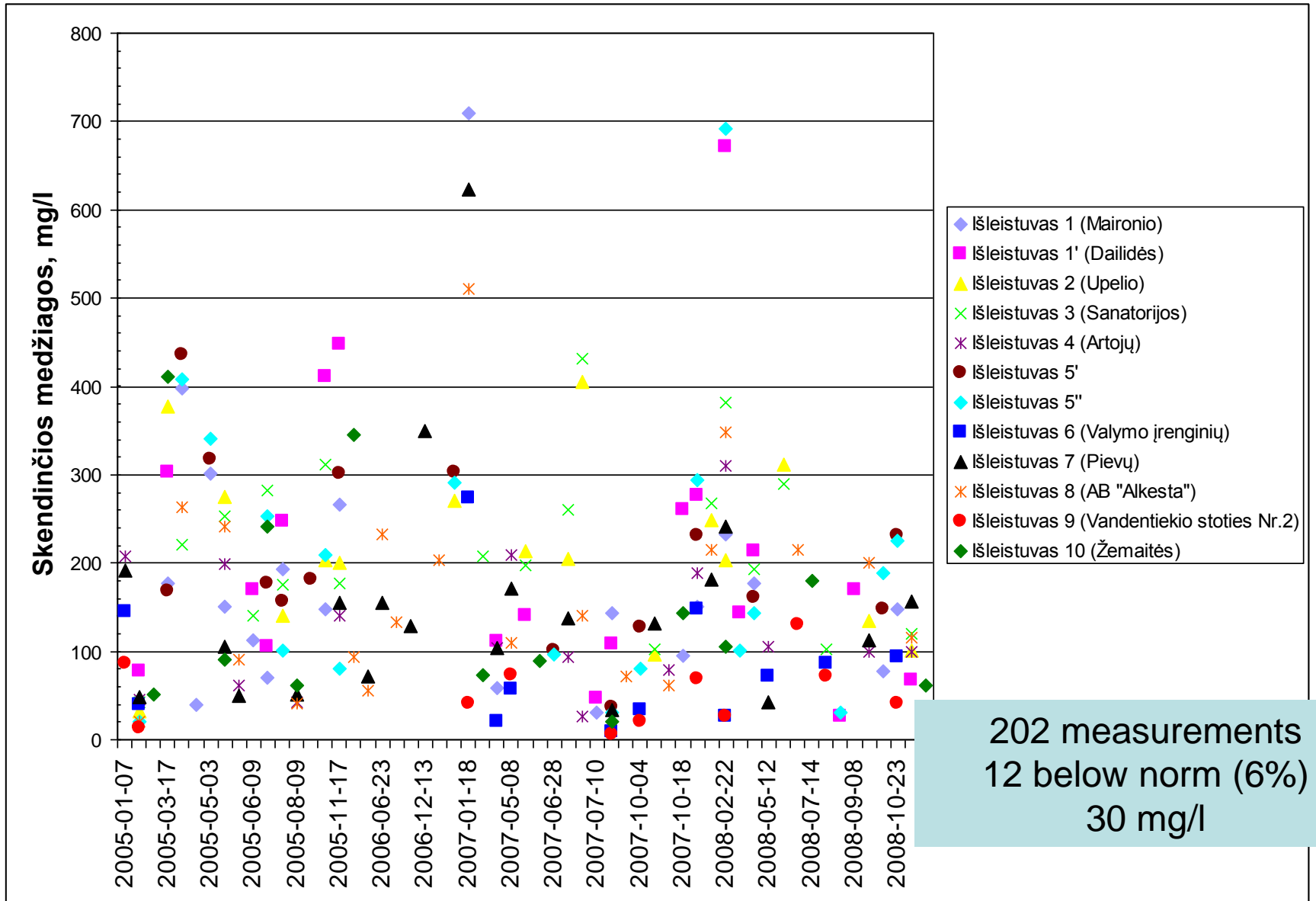
In houses built after 1920 drains generally connect to separate sewer systems (pipe colours are for illustration only).

Surface water:
for clean rainwater from roofs and ground runoff

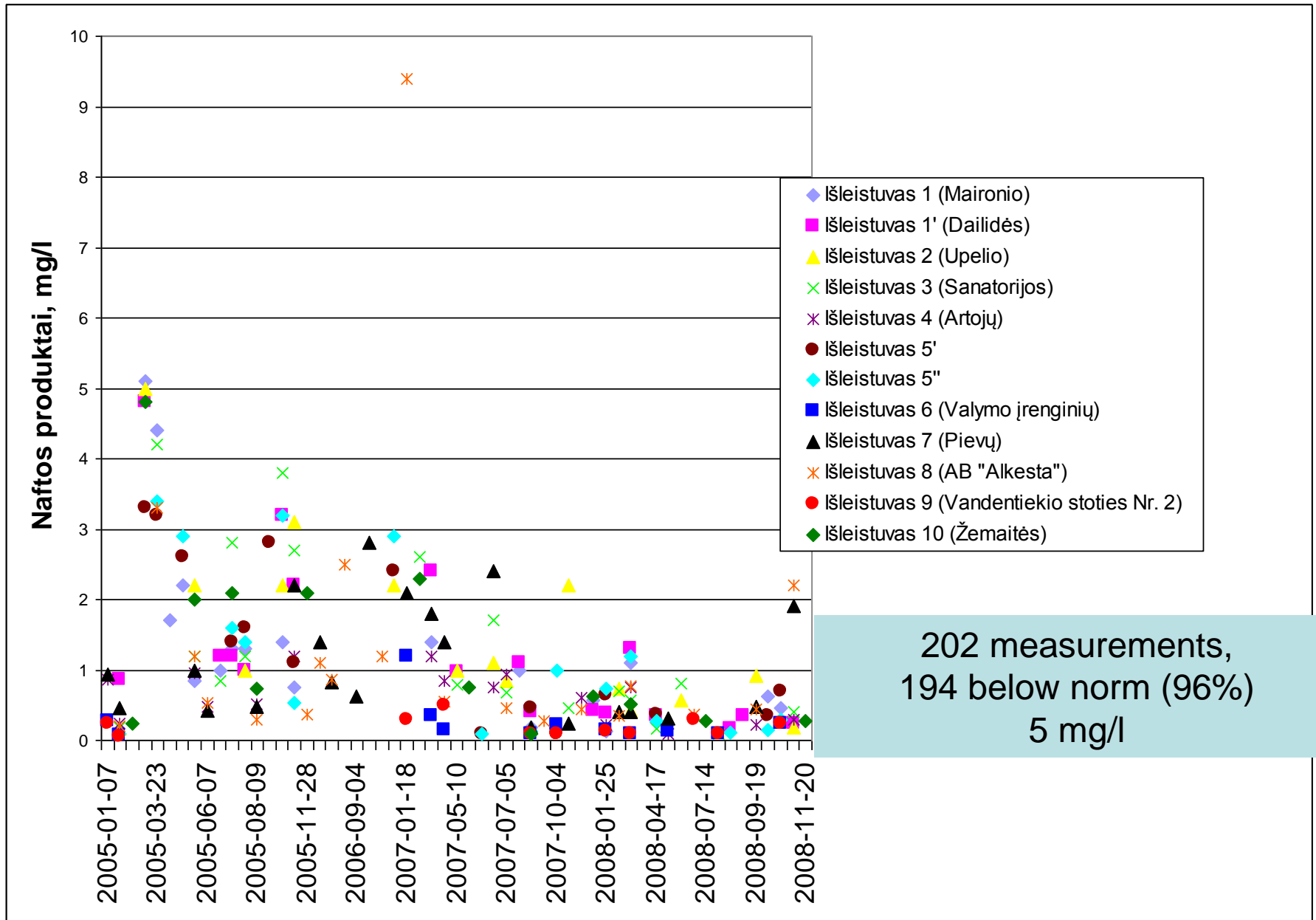
Foul water:
for dirty water from toilets, sinks, washing machines etc.

Visit
www.connectright.org.uk

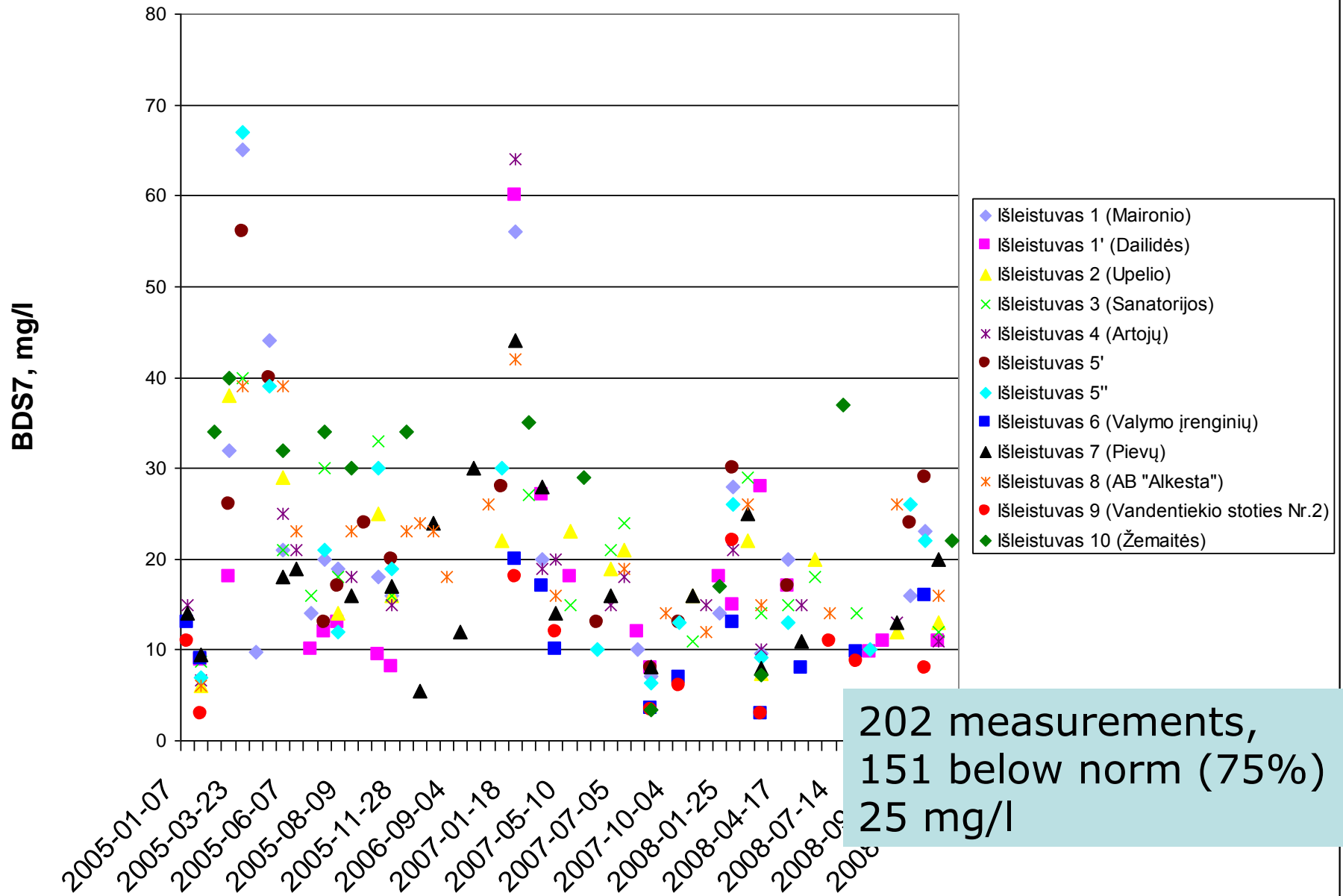
Suspended solids in urban storm water runoff (one city)



Total petroleum hydrocarbons in urban storm water runoff



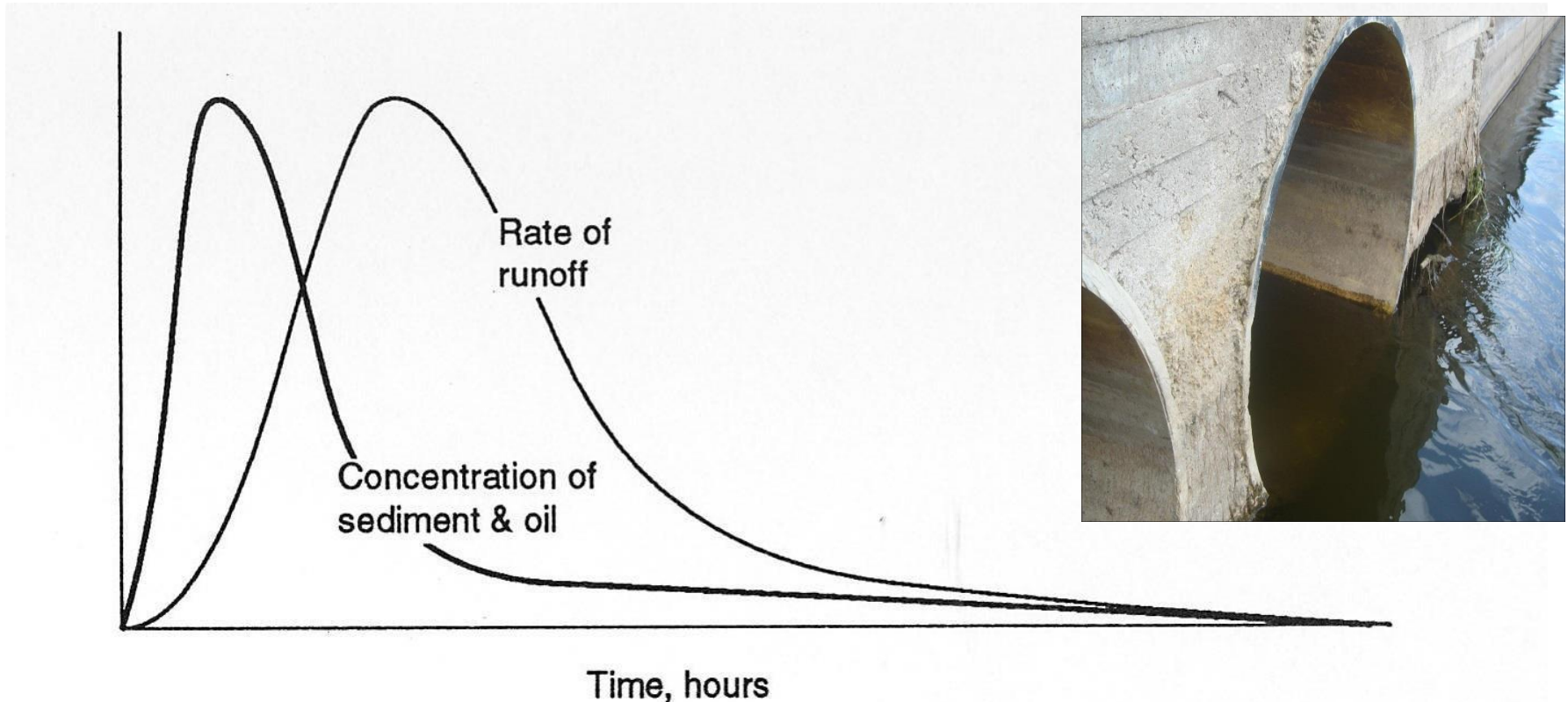
BOD₇ in urban storm water runoff



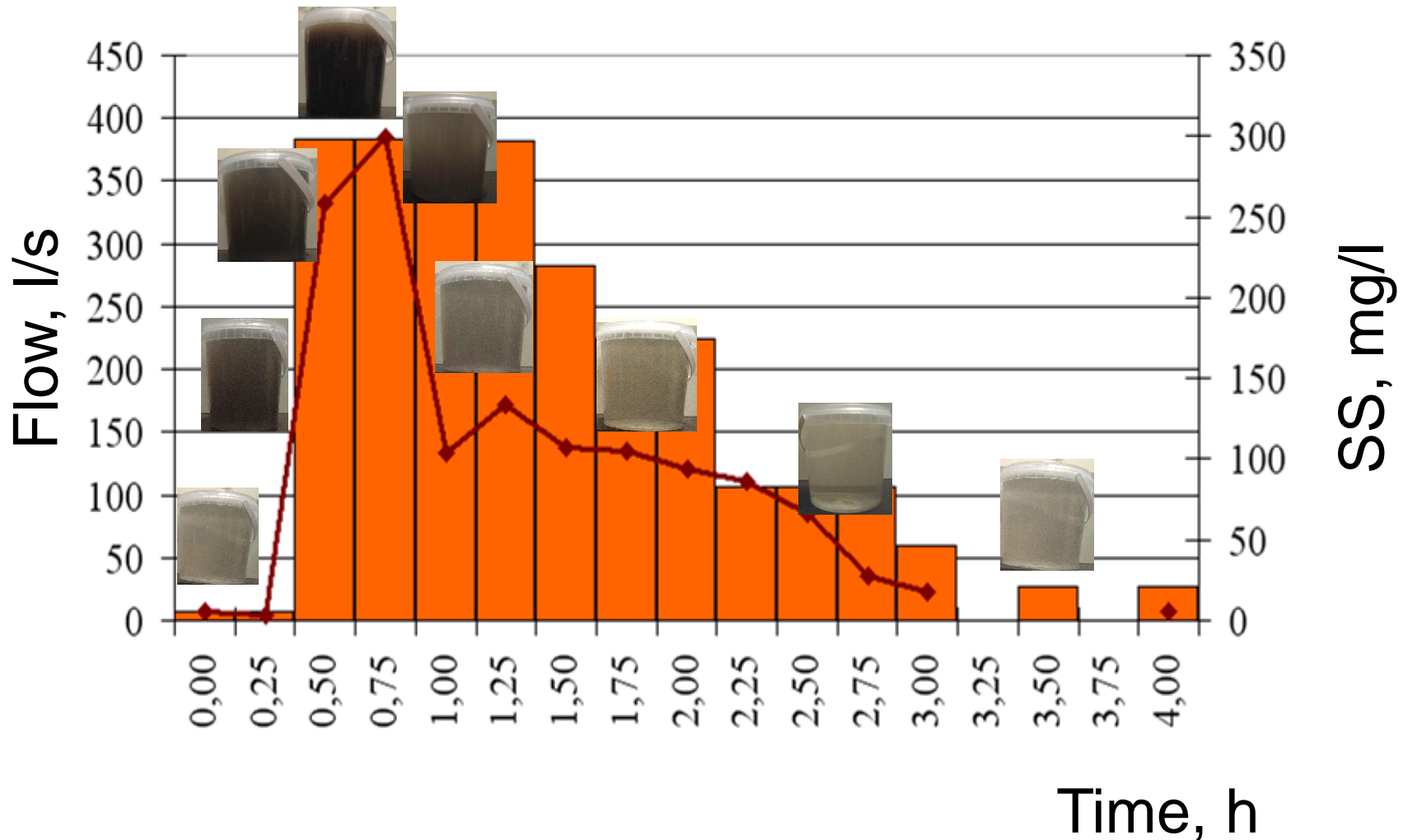
First flush

First flush phenomena - about 30% of runoff volume consist about 80% of pollutants.

However first flush could be observed on relatively small catchment.



Flow – pollution relation



Typical Lithuanian values

Parameters	pH	SS	COD	BOD ₇	Oil
		mg/l	mg/l	mg O ₂ /l	mg/l
Average value	7,8	238	56	25	2,1

Snow melt runoff has 1,5 higher SS concentration and high chloride level (1000-2000 mg/l).



Lithuanian requirements for stormwater runoff effluents (2007)

- SS – 30 mg/l average annual and 50 mg/l maximum;
- Oil - 5 mg/l average annual and 7 mg/l maximum;
- BDS₅ - 25 mg/l average annual and 50 mg/l maximum;
- Chloride – 1000 mg/l maximum;
- Sulfate – 300 mg/l maximum;



Lithuanian requirements

- All effluents bigger than 100 mm diameter shall be registered and monitored;
- From each effluent shall be taken samples 4 time per year;
- All catchments bigger than 10 ha shall have flow measuring units;
- Industrial and specific pollution sites shall have flow measuring units (independent to size);

Requirement's of treatment facilities

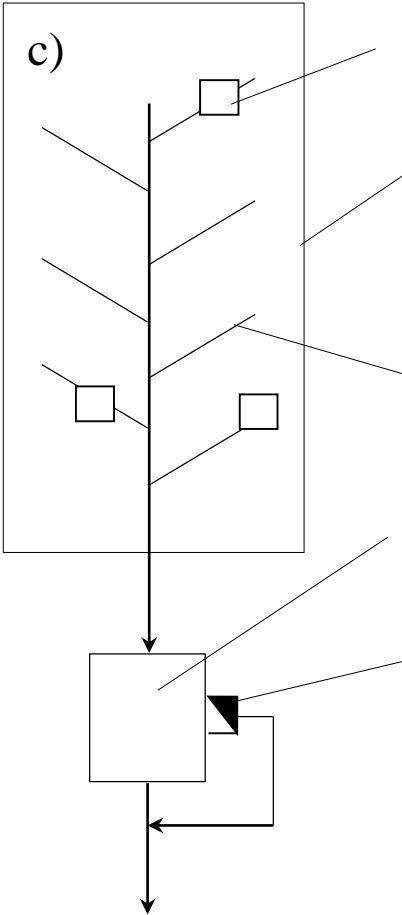
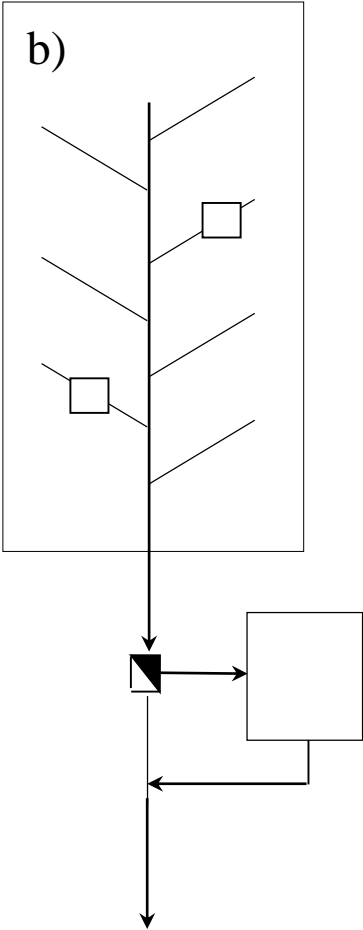
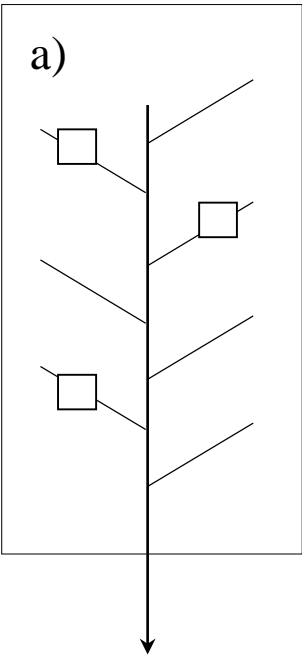
- Obligatory to all catchments more than 10 ha.
- Any kind of industrial territory;
- Parking lot bigger than 0,5 ha (cars);
- Parking lot for more than 20 trucks;
- Treated shall be more than 15% of maximum calculated runoff (l/s).

LT situation

- *Allowed* separate sewer system only.
- Only three cities downtowns has combine systems.
- Small problems with combine sewer overflows.
- Wastewater treatment plant 1 unit per city.
- Money for stormwater management for 2014-2020.
- Stormwater effluents (treatment plants):
 - Vilnius – 110 (4);
 - Kaunas – 105 (0);
 - Klaipėda – 60 (1).



Management schemes



Point treatment
plant

Drainage
basin

Sewer

Drainage basin
treatment plant

Overflow

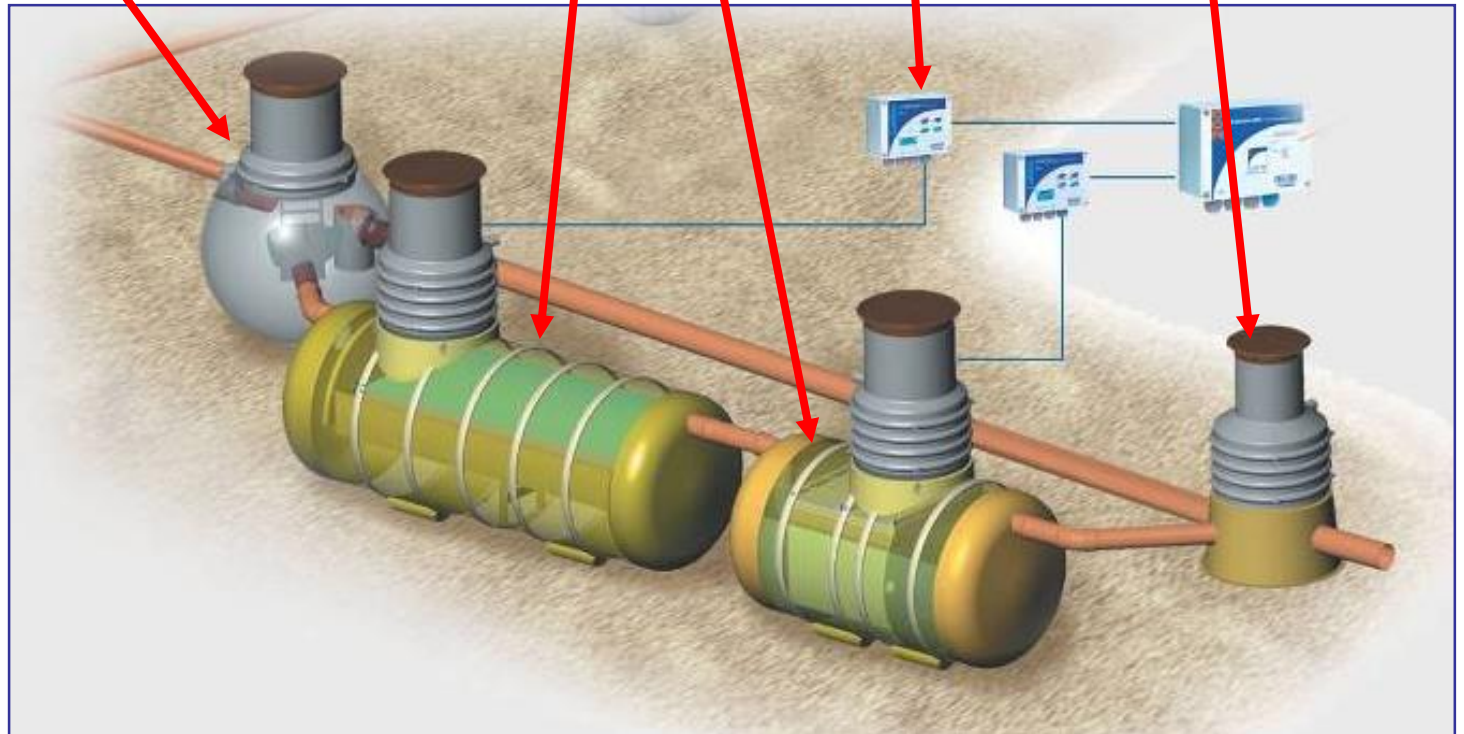
Obligatory devices

Flow separation

Oil sensors

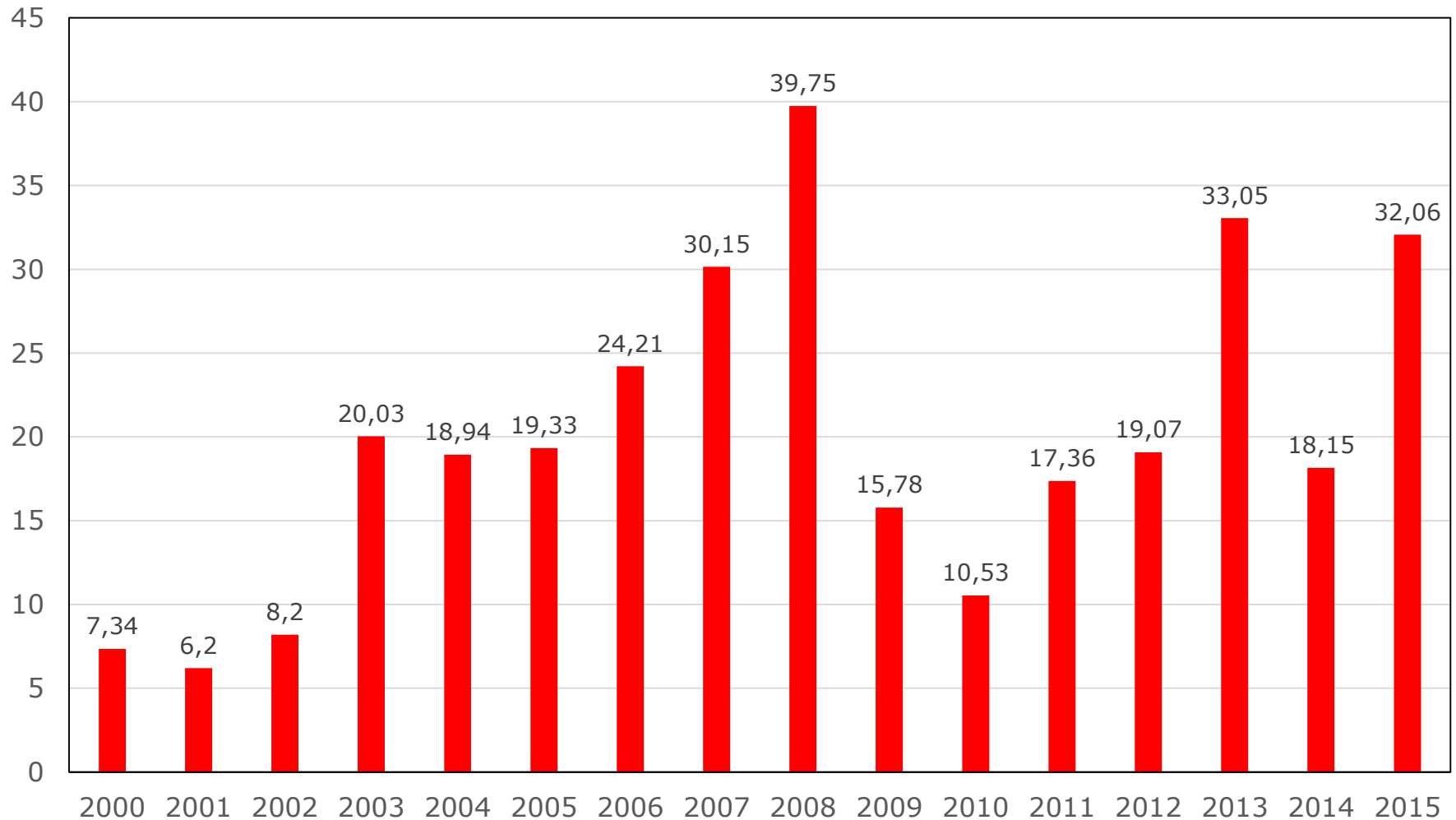
Treatment

Sampling point

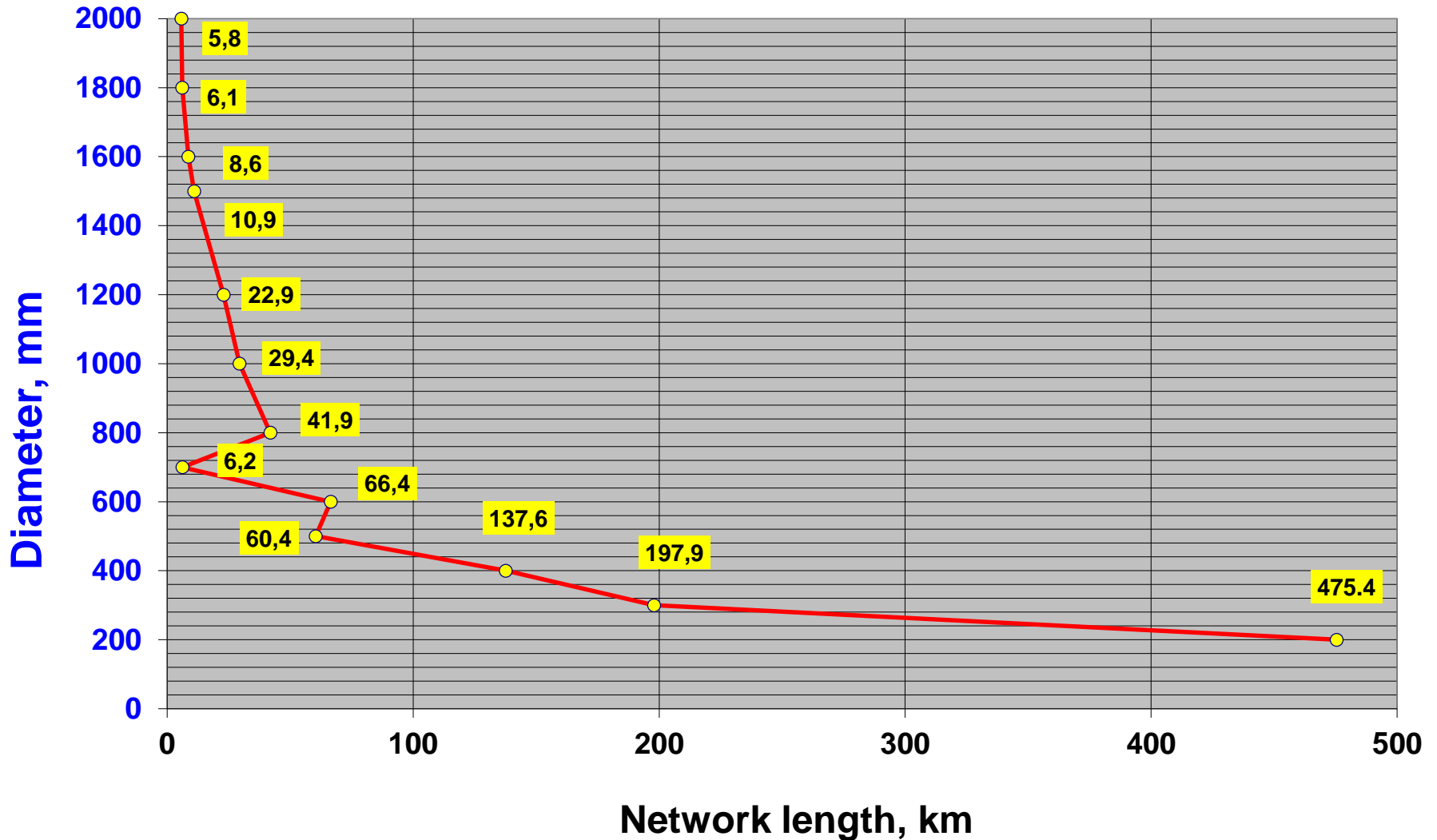


Vilnius Stormwater Network (km)

Total 1700 km



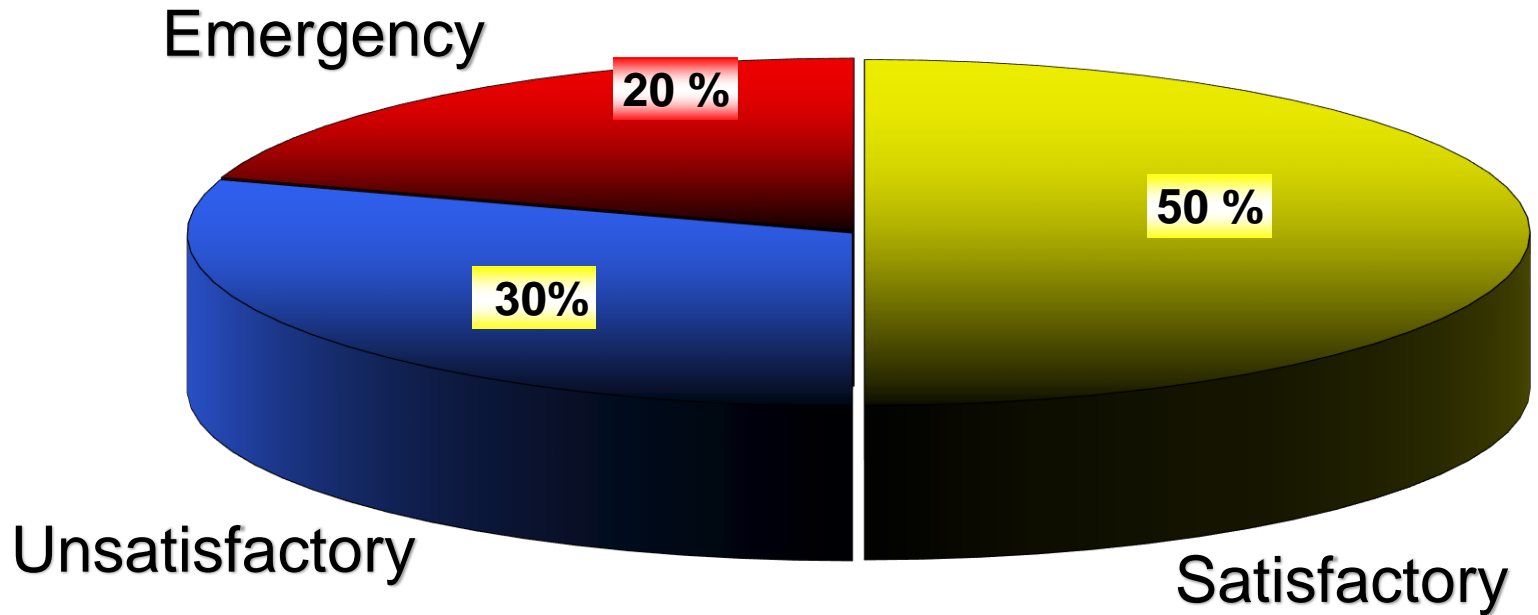
Vilnius stormwater network pipelines





Stormwater pipes

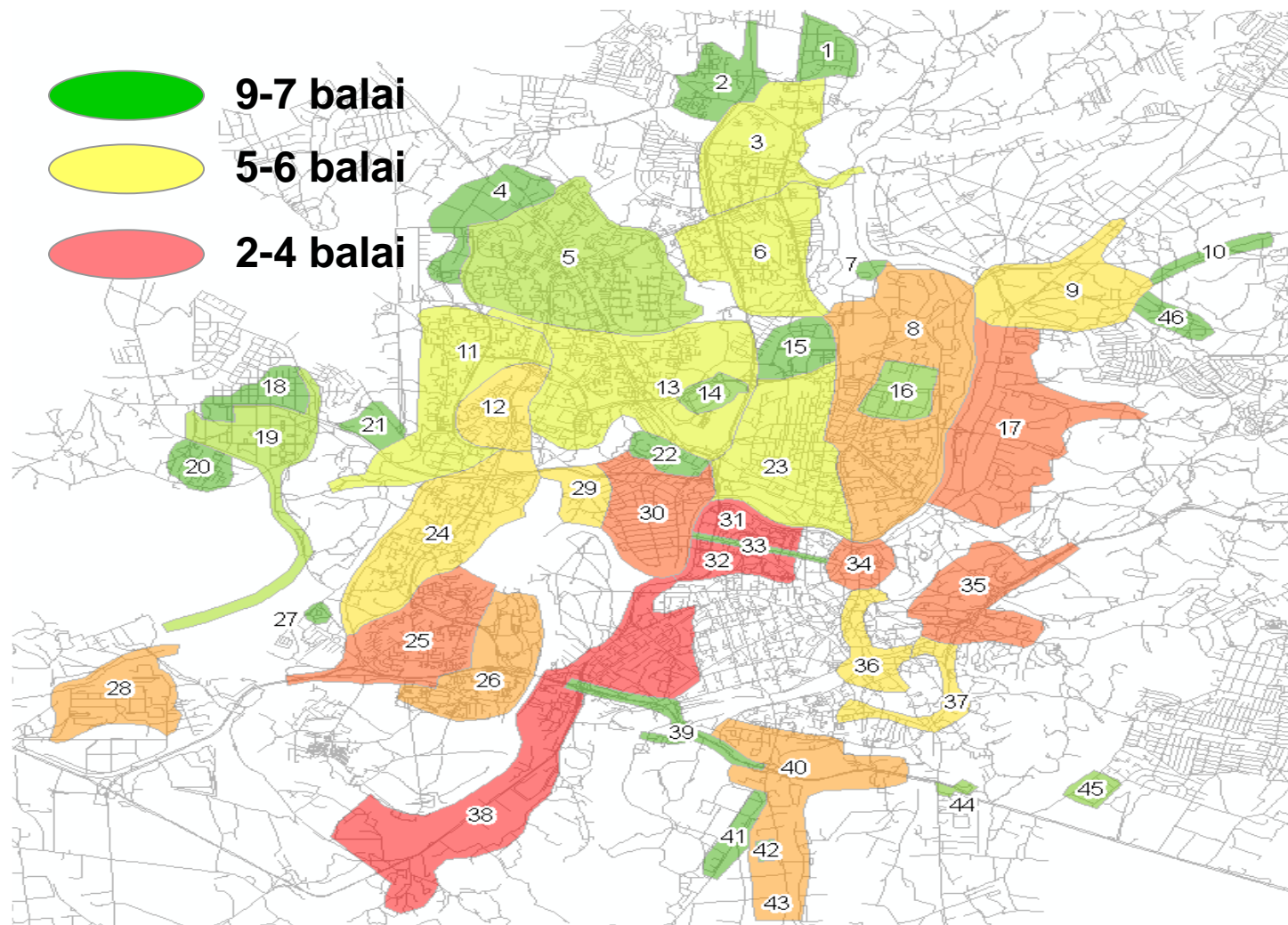
Present situation with stormwater networks



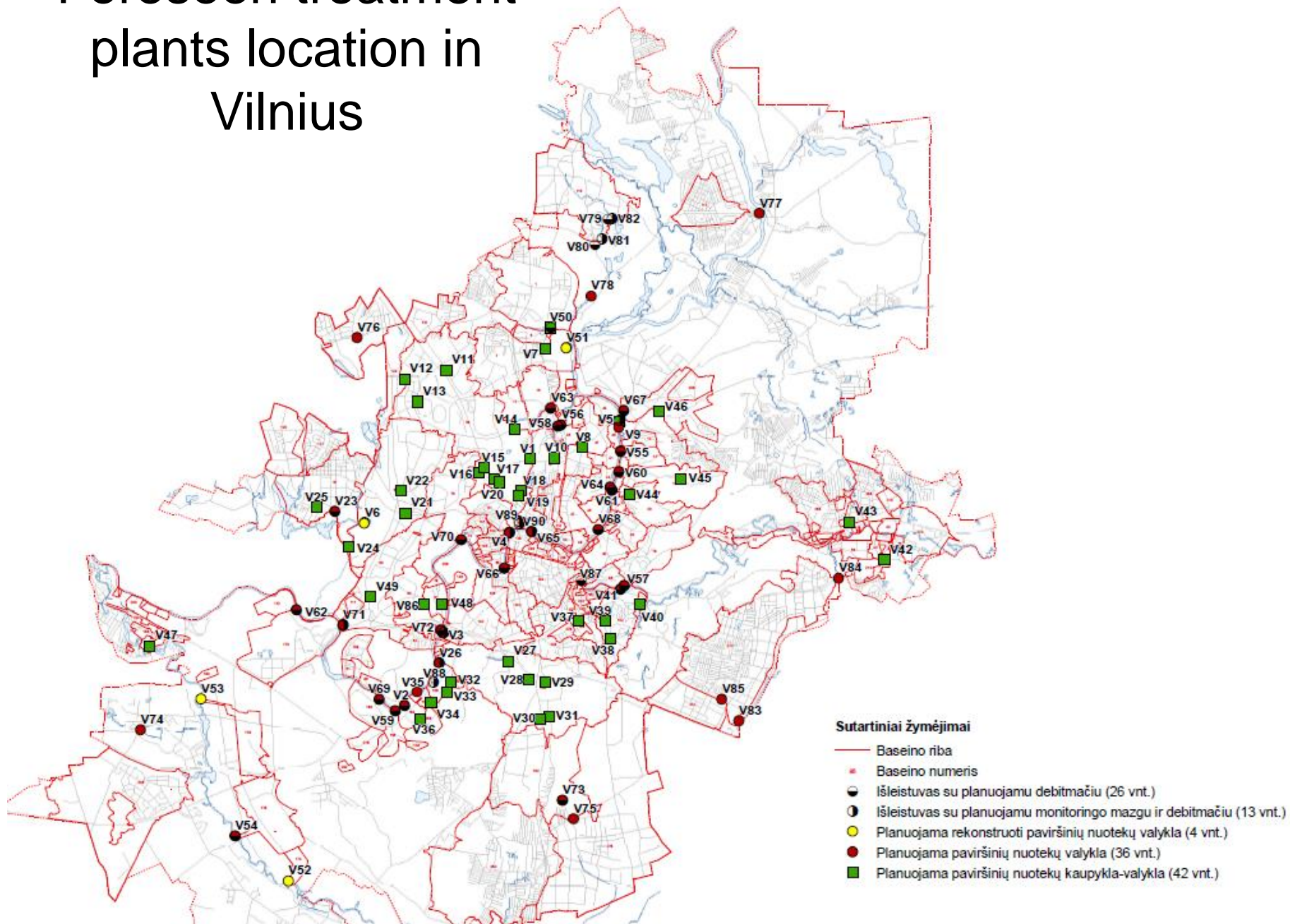
Emergency situation with 200 km of stormwater pipelines

Stormwater network evaluation, Vilnius

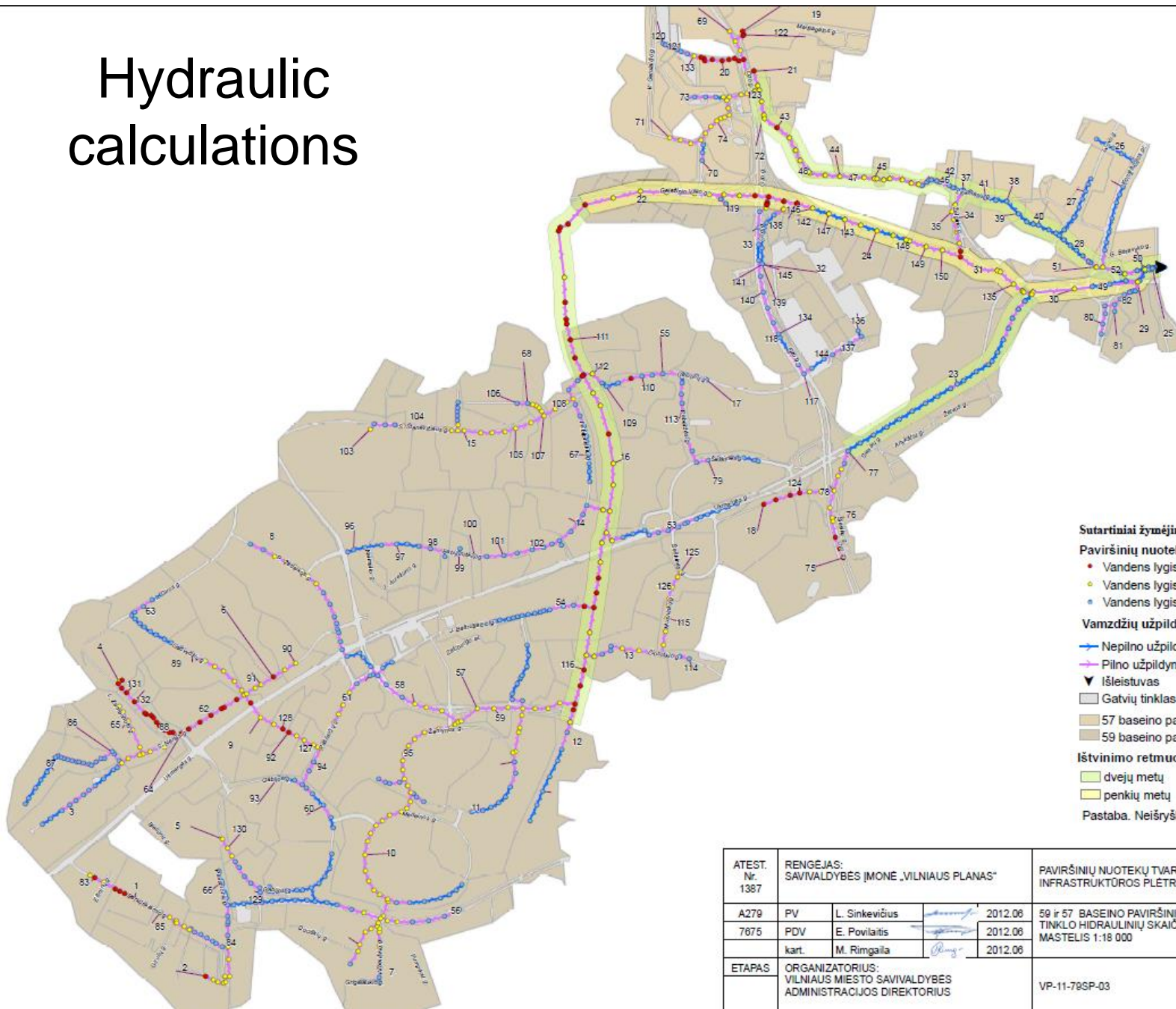
Nr.	Stat. metai	Ekspl. trukmė, m	Kokybė	Ilgis, km
1	2006	3	9	
2	2005	4	9	14.8
3	1978	31	6	45.1
4	2004	5	9	20.8
5	1985	24	7	118.3
6	1985	24	6	43.1
7	2007	2	9	1.4
8	1967	42	4	106.8
9	1965	44	5	27
10	2007	2	9	
11	1982	27	6	61.8
12	1975	34	5	25.9
13	1980	29	6	75.3
14	2000	9	8	8.2
15	2007	2	9	10.7
16	2007	2	8	20.9
17	1960	49	3	50
18	2007	2	9	9.2
19	1989	20	7	31
20	2004	5	9	7.1
21	2008	1	9	3.4
22	2008	1	9	6.4
23	1975	34	6	51.1
24	1975	34	5	60.3
25	1967	42	3	47
26	1980	29	4	26.5
27	2005	4	9	1.5
28	1970	39	4	13
29	1974	35	5	7.6
30	1970	39	3	23.3
31	1958	51	2	12
32	1958	51	2	11.3
33	2007	2	9	5.1
34	1938	71	3	7.7
35	1930	79	3	32.6
36	1982	27	5	12.5
37	1980	29	5	8.5
38	1960	49	2	83.8
39	2008	1	9	14
40	1969	40	4	
41	2007	2	9	
42	2008	1	9	
43	2008	1	9	
44	2007	2	8	
45	2005	4	8	
46	2004	5	9	5.1



Foreseen treatment plants location in Vilnius



Hydraulic calculations



- Sutartiniai žymėjimai**
- Paviršinių nuotekų šuliniai**
 - Vandens lygis virš šulinio dangčio
 - Vandens lygis virš 2 m nuo šulinio dugno
 - Vandens lygis iki 2 m nuo šulinio dugno
 - Vamzdžių užpildymas**
 - Nepilno užpildymo paviršinių nuotekų tinklas
 - Pilno užpildymo paviršinių nuotekų tinklas
 - Išleistuvai**
 - ▼ Gatvių tinklas
 - 57 baseino pabaseiniai
 - 59 baseino pabaseiniai
 - Ištvinimo retmuo (p)**
 - dvejų metų
 - penkių metų
- Pastaba. Neišryškinti - vienų metų

ATEST. Nr. 1387	RENGEJAS: SAVIVALDYBĖS ĮMONE „VILNIAUS PLANAS“				PAVIRŠINIŲ NUOTEKŲ TVARKYMO INFRASTRUKTŪROS PLETROS SPECIALUSIS PLANAS	
	A279	PV	L. Sinkevičius	2012.06	59 ir 57 BASEINO PAVIRŠINIŲ NUOTEKŲ TINKLO HIDRAULINIŲ SKAIČIAVIMŲ SCHEMA MASTELIS 1:18 000	LAIDA
	7875	PDV	E. Povilaitis	2012.06		0
		kart.	M. Rimgaila	2012.06		
ETAPAS	ORGANIZATORIUS: VILNIAUS MIESTO SAVIVALDYBĖS ADMINISTRACIJOS DIREKTORIUS				VP-11-78SP-03	LAPAS LAPŲ
						9 28

General outcomes

- About 20 % of network has emergency status (hydraulic or structural).
- Some basins has 3 time increased paved area.
- Stormwater has treatment up to 10%, only.
- Almost all network has no legal status or registration.
- Only industrial territories paid taxes for stormwater.
- No money for extension and proper maintenance.
- Municipalities directly supporting stormwater.
- Water Utilities temporally operate storm water networks for 75% of cases.
- Long procedure with land transfer for treatment plants.

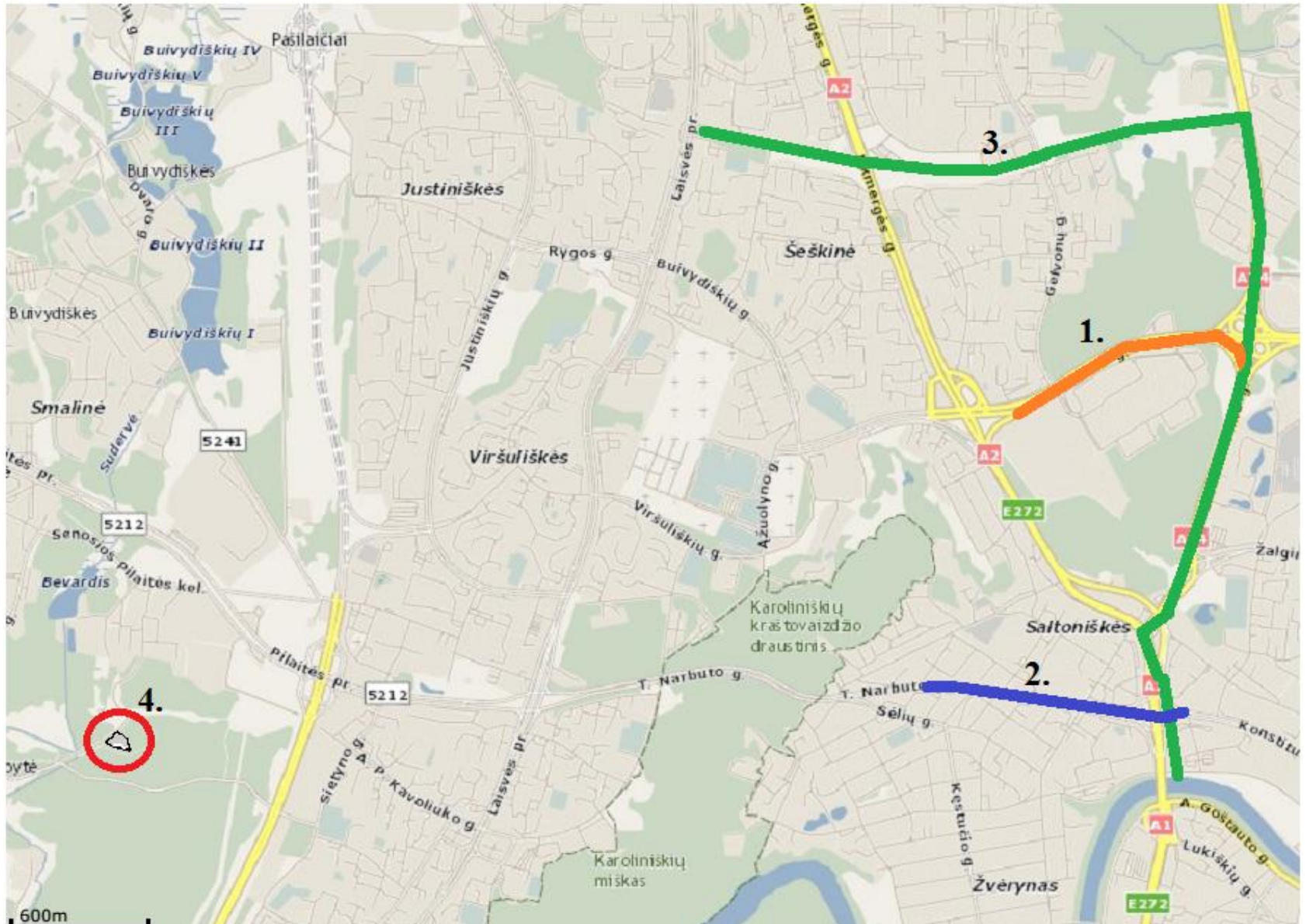
Implemented steps

- Stormwater included into water and wastewater price calculation law (12-06-2014).
- Special plan for Stormwater development approved for Vilnius city on 03-12-2014.
- Hydraulic calculation of network.
- Vilnius municipality approved investments for stormwater for 23 (EU) mln. Eur + 4 (Vilnius) mln. Eur.
- 4 networks renovations and 1 treatment plant construction (470 ha).
- Grinda Ltd is appointed as manager of stormwater system in Vilnius by municipality.
- Financing 85% money from EU and 15% municipality.
- For stormwater allocated 61 mln. Eur for LT from EU.

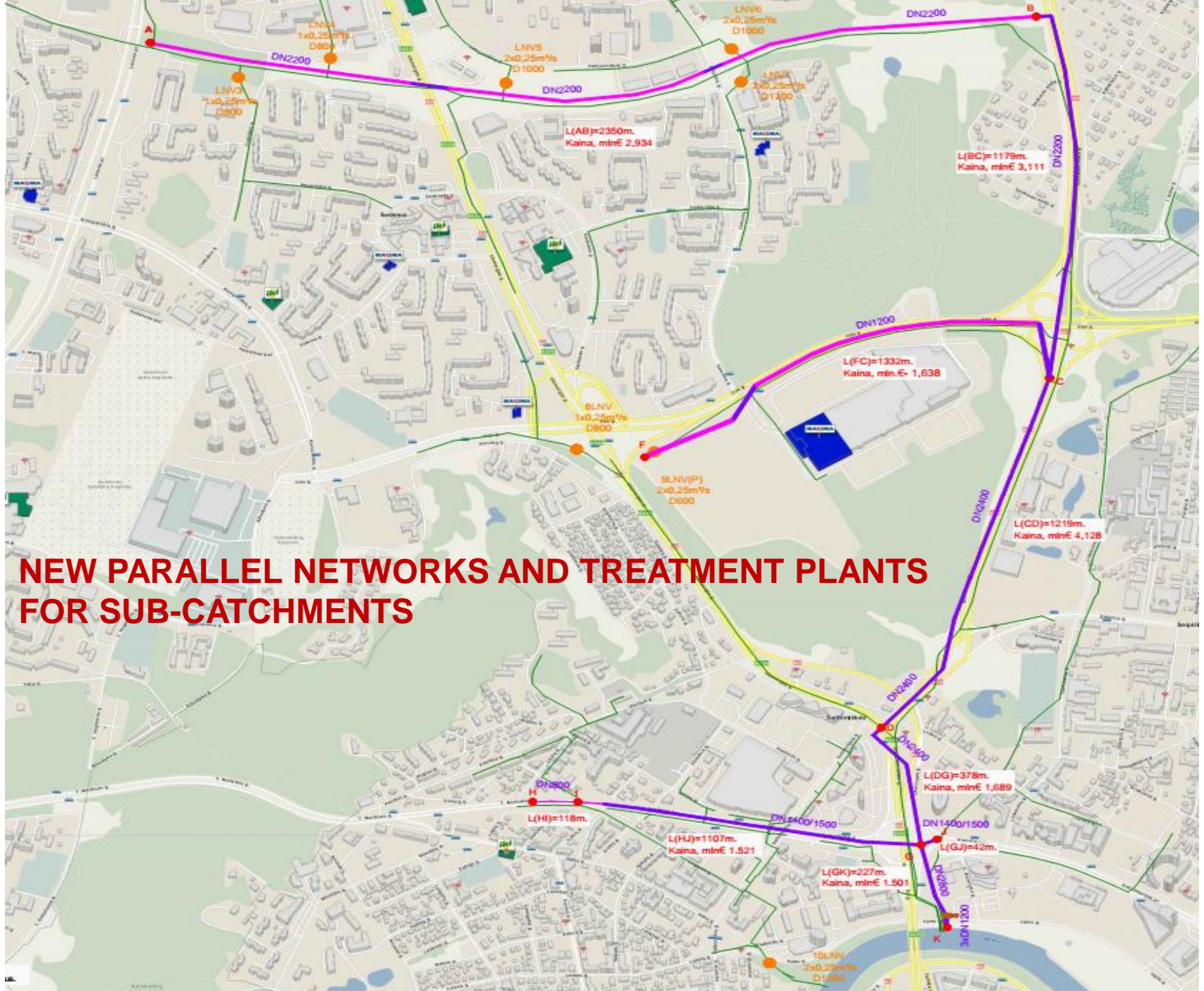
GENERAL LAYOUT – INVESTMENT IN VILNIUS

STORMWATER TREATMENT PLANTS - 5 MIL. EUR

NEW NETWORKS CONSTRUCTION AND TREATMENT – 25 MIL. EUR



NEW PARALLEL NETWORKS AND TREATMENT PLANTS FOR SUB-CATCHMENTS



Existing stormwater treatment plants



New wet pond in the city



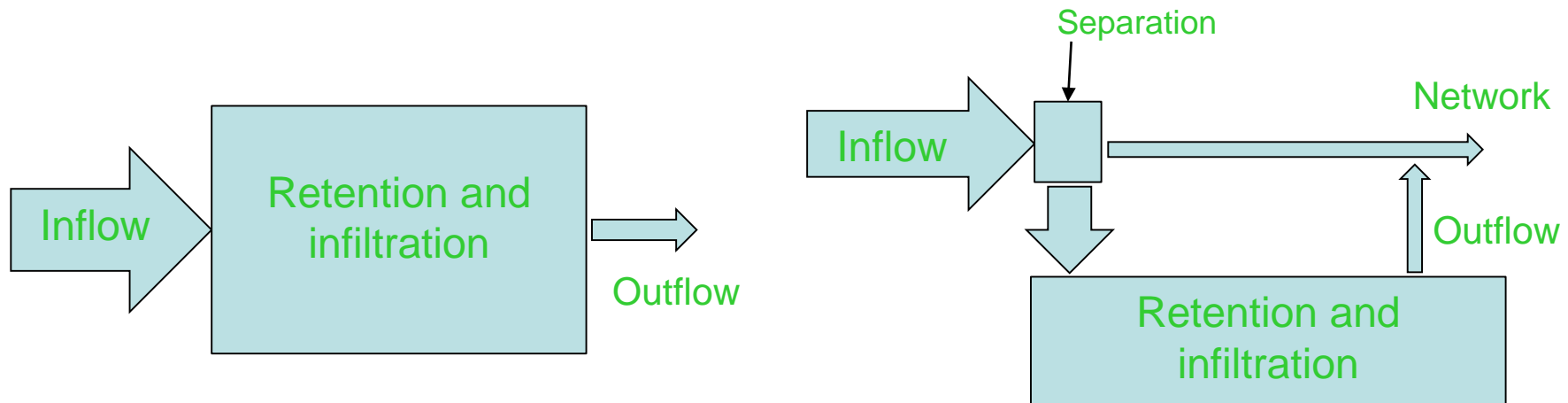


New wet pond in the city



Stormwater Retention

- New developing area connecting to existing network;
- General role – no flows from area during the peak flow;
- Solution is retention (infiltration) only;
- Often underground retention basin are used;
- Hypermarkets and others shall construct water retention under parking lots;
- Hydraulic calculation of network needed.





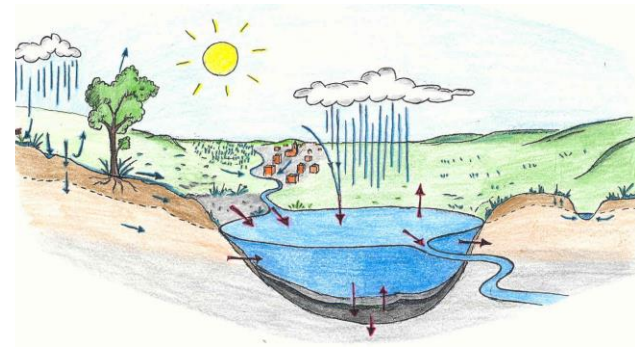
Retention and infiltration (1)



Retention and infiltration (2)



Status Quo



- Discussion who shall be responsible: water supply or road repair companies ???
- Stormwater is not included into water tariff, still.
- No payment for citizens. “Free dry shoes politics” are continuing.
- About 25% of networks has not enough hydraulic capacity.
- Preliminary tax for industry 0,4 Eur/m³, if no municipality fees for roads and pavement.
- If included about 0,15 Eur/m³.

Thank you for attention ...

