

Stormwater quality requirements that are to be discharged into drains

Stefanescu Camelia¹

Șumălan Ioan¹

Abstract: A major problem in urban areas is the rainwater. Sometimes collected by separate sewer systems and discharged directly into the environment—usually river passing through/in addition to locations. But they are more than mere water runoff loaded with suspension. The streets they are loaded with oil and oil residues, lead from fuels, tires and abrades particles of automotive brake discs etc. and so are sufficiently polluted that it actually requires municipal sewage treatment plant as well as other wastewater. In other cases they are collected together with household sewage or face also heavily polluted waters, and reach common treatment plants. To heavy rains but flow is generated which no treatment plant could not cope and get that large volumes of wastewater to be discharged directly into rivers close, shorting the treatment plant, thus obtaining an effect and serious than if only rainwater was discharged untreated into the environment.

Keywords: rainwater, runoff, drainage, water quality

1. STORMWATER POLLUTION

Stormwater runoff is precipitation that washes over the land and discharges to nearby streams, lakes, wetlands, estuaries and other waters. Stormwater runoff is a part of the hydrologic cycle, which is the distribution and movement of water between the earth's atmosphere, land, and waterbodies (Figure 1). Water that does not runoff includes the following: atmospheric evaporation; transpiration or uptake by plants, which in combination with evaporation, is referred to as evapotranspiration; and infiltration into underlying soils, which is responsible for groundwater recharge. Thus, stormwater runoff is essentially the remaining water after evapotranspiration and infiltration.(swmanual.pdf)

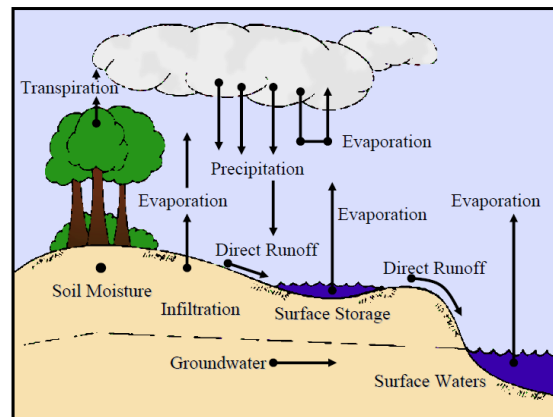


Fig. 1 Hydrologic cycle[1].

Additional impacts occur after construction. Rooftops, roads, parking lots, driveways and other impervious surfaces interrupt infiltration mechanisms by not allowing rainfall to soak into the ground. Consequently, most rainfall is directly converted into stormwater runoff.

Development not only increases runoff quantity, but can also introduce new sources of pollutants from everyday activities associated with residential, commercial, and industrial land uses. When it rains, stormwater flowing over pavement and disturbed areas carries these pollutants directly into nearby wetlands and surface waters, either by direct runoff or via storm drains, bypassing any treatment that would naturally occur when rainwater infiltrates into the ground [1].

Because impervious surface (parking lots, roads, buildings, compacted soil do not allow rain to will be infiltrated into the ground, more runoff is generated than in the undeveloped condition. This additional runoff can erode watercourses as well as cause flooding after the stormwater collection system is overwhelmed by the additional flow.

Pollutants entering surface waters during precipitation events are termed polluted runoff. Daily human activities result in deposition of pollutants on

¹ "Politehnica" University of Timișoara, Department of Hydrotechnical Engineering, George Enescu Street, no.1A, Zip code 300022, Timisoara, Romania, e-mail: achim_camelia@yahoo.co.uk

roads, lawns, farm, roofs, fields, etc. When it rains, water runs off and ultimately makes its way to a lake or river. While there is some attenuation of these pollutants before entering the receiving waters, the quantity of human activity results in large enough quantities of pollutants to impair these receiving waters.

2. STORMWATER DRAINAGE PROBLEM

They tried several solutions abundant rainwater release. Some cities have spent huge build huge reservoirs to collect rainwater where during heavy rains flows that cannot be taken for wastewater treatment and then be gradually abated during periods without precipitation.

More logical and cheaper is to seek solutions closer to the causes, not effects, namely reducing wastewater flow reaching storm drains or on the whole or at least delay them to avoid peak flow

Permanent reduction is achieved by reducing the surface sealed (waterproof) in urban areas and increase those on which water can seep into the ground instead of flowing into drains. So instead of asphalt or other impervious materials can be placed on sidewalks, plazas, parking lots and even streets of porous pavement, permeable to water, which allow for infiltration. This solution already is spreading more and more, while her motivation is often easy dissolution in case of occurrence of the need for excavation (access to ducts, cables and so on) and not for reasons of water [2].

Other solutions are still not widely spread, although feasible: grill metal, concrete or plastic, instead of asphalt, the parking areas and other areas, even gravel instead of asphalt paths and different roads, ditches and gullies intercalation grassed areas or pits and other favors infiltration, porous or perforated pipes for rain water tanks and reservoirs intercalation of water from parking lots and rooftops and management of these waters, with the street level where differences allow for infiltration beds, pools of water or pools in parks and urban green areas, collection tanks and waste recycling purposes, by spraying green or other uses rainwater etc.

Late surge to storm water drains are receiving increasing surface roughness and decreased use of materials collection and favors a rapid flow: grassing drains and ditches collecting or disposing of gravel in them, intercalation of strips of grass, small pits and other dents, possibly making flat roofs with grass or gravel, or even temporary flooding by limiting debit flat roof drainage system, the use of materials with small increases and small ditches roof and water tanks to retard flow etc. You can also insert the runoff from roofs and parking lots and temporary storage tanks for collecting rainwater and extensions can be made leak paths for some of the water, as they successively discharging sewage flow and thus avoid peak.

3. QUALITY REQUIREMENTS OF WASTE WATER DISCHARGE INTO RIVER

Wastewater that is discharged into the local sewerage networks and treatment plants directly should not contain:

a) suspended solids in quantities and sizes that can be an active factor in the erosion of the channel, which can cause deposition or can hinder normal flow, such as:

- Material at speeds achieved in proper sewage collectors computing their minimum flow can generate deposits;

- Various substances that can solidify and clog Thus channel section;

- Solids, floating or driven, which do not pass through the grill with 20mm space between bars, and if and textile fibers or of similar materials - feathers, animal hairs, which do not pass through a sieve with side slit 2 mm;

- Suspension as harsh and abrasive rock metal powders and granules, and the like that the drive can cause channel erosion;

- Oil, oil, grease or other material in form, quantity or adherence can lead to the accumulation of deposits on area

- collector channel walls;

- Substances which, alone or in mixture with other substances in water sewerage networks, coagulates, with the risk of their submission on the walls of the channels, or aggressive substances lead to us;

b) chemically aggressive substances on the materials they are made of sewerage networks and equipment and piping wastewater treatment plants;

c) substances of any kind, which, floating or dissolved or colloidal suspension can disturb normal operation of canals and wastewater treatment plants or with air can form explosive mixtures, such as gasoline, benzene, ethers, chloroform, acetylene, carbon disulfide, solvents, ethylene dichloride and other chlorinated hydrocarbons, water or sludge from acetylene generators;

d) toxic or harmful substances, alone or mixed with water from sewage, could endanger the operating personnel of the sewerage network and treatment plant [5];

e) highly dangerous substances, such as [5]:

- heavy metals and their compounds;

- halogenated organic compounds;

- organic compounds with phosphorus or tin;

- plant protection agents, pesticides, fungicides, herbicides, insecticides, algacides, and chemicals used to preserve lemons material, leather or textile materials;

- radioactive substances, including wastes;

f) substances, alone or mixed with sewage water can develop odors that contribute to environmental pollution;

- g) colored substance whose amount and nature, even with dilution made in sewers or treatment plant, determined by downloading them once the sewage water discoloration natural receptor [5];
- h) substances that inhibit the biological process of wastewater treatment and sludge treatment;
- i) readily biodegradable organic substances

4. IMPACTS TO WATER QUALITY

Development concentrates and increases the amount of nonpoint source pollutants. As stormwater runoff moves across the land surface, it picks up and carries away both natural and anthropogenic pollutants, depositing them into town of Romania streams, rivers, lakes, wetlands, coastal waters and marshes, and groundwater. Stormwater pollution is one of the leading sources of water quality degradation in Romania. Water quality impacts are numerous, and common pollutants found in stormwater runoff are listed and described below [2].

Further defined specific criteria essential requirements listed above for rainwater drainage facilities. Choosing solutions is technical and economic criteria, taking into account the needs specific and feasibility. In the analysis of the economy of a solution, including the opportunity for modernization or transformation, taking into account all aspects of investment and operation cost.

Prescribed values of performance indicators, means of verification and the necessary measures are provided to ensure that their design will be made in accordance with specific regulations in force. Performance criteria of quality requirements in accordance with Law 10/1995 are presented below:

a) Mechanical resistance and stability

- Resistance to fluid pressure - mechanical strength of components at pressures may occur inside the plant during operation;
- Temperature resistance - Mechanical resistance to variations components temperature that may occur in service; travel insurance to protect piping from expansion and transition them through walls and ceilings;
- Resistance to mining efforts - mechanical strength of plant available elements to mechanical stress that may occur in service or accidental;
- Seismic protection - seismic protection of components by location and appropriate measures of stability

b) Fire safety

- Reaction to fire - flammability and fire resistance of constituents to be commensurate with the construction elements pierced or that installation
- Preventing the spread of fire - providing appropriate containment measures prevent the spread of fire between levels. For tall buildings and high, seals pass through walls and ceilings antiphon will be made in compliance with the specific requirements set by normative.

c) Hygiene, health and environment

- Environment; nonpolluting water and soil - avoid environmental pollution, or pollution emissaries (water surface or underground) and soil contamination with water from buildings and areas adjacent channel (platforms, parking lots) by providing load limits pollutants required by specific regulations.

d) Safety operating

- Integrating plant under construction by integrating the facilities in the building served by These distances assembly to the elements of construction and, where appropriate, masking their;
- Aesthetic appearance of the plant through the installation and assembly of components and surfaces visible by installing hidden or apparent elements of plants according to the destination room;
- The insurance consumer by providing the user against inadvertent operation of the plant by providing necessary supplies;
- Normal operation of the collection and disposal networks by ensuring the proper functioning of enabling connections and sewerage networks;
- Sealing system with sealing water of the water of the components of the operating system;
- Security by limiting the contact surface roughness, the roughness, edges and discontinuities unpleasant or dangerous to touch the protection of users;
- Security intrusion by security installations and related spaces (pumping stations, reservoirs) intrusion attempts of humans and animals;
- Follow the operation of facilities by ensuring the tracking of plant operation by knowing its parameters;
- Facilities maintenance and repair of plant elements by applying solutions to allow the proper conditions for maintenance and repair facilities and by ensuring minimum space required for mining interventions;

e) Protection against noise

- Noise protection by ensuring conditions for conduct of business premises by external noise protection;
- Limiting the generation and transmission of

vibrations through the vibration transmission system elements (pipes, pumps) to the structural frame parts liable to come into resonance (floors, roofs, platforms, etc).

f) Sustainability

- Stable and continuous operation by providing an appropriate embodiments for maintaining continuity of the facility operation
- Corrosion resistance of plant resistance to corrosion surface elements due to chemical and atmospheric agents
- resistance to biological agents by providing components of plant resistance to biological agents (microorganisms, rodents).

g) Economy of energy and thermal isolation

- Energy consumption in embedded system components by providing minimum energy consumption in embedded system elements;
- Energy consumption in the operation of the plant through energy efficient equipment to ensure minimum consumption of energy.

h) Economics

- Economics economy, expressed facility costs considered whole other category of requirements that determine quality system

5. THE EFFECTS OF POLLUTION

Polluted stormwater runoff can have many adverse effects on plants, fish, animals and people.

Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.

Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels [2].

Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.

Debris - plastic bags, six-pack rings, bottles, and cigarette butts - washed into water bodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.

Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick from eating diseased fish and shellfish or ingesting polluted water.

Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs [3].

6. CONCLUSIONS

There are many simple, basic steps people can do each day to prevent storm water pollution:

- Don't dump waste into storm drains
- Keep yard clippings out of the street
- Dispose of household chemicals properly by following the directions on the package or by calling the local public works department for proper disposal guidelines
- Clean up oil spills and fix leaking automobiles
- Use drip pans to catch engine oil and other pollutants while repairing cars
- Recycle used motor oil
- Sweep driveways clean instead of hosing them down
- Water your lawn by hand, or adjusted sprinklers to avoid over-watering. If any water flows off your lawn, you're using too much water.
- Wash your car at a commercial car wash, or at least wash your car on an unpaved surface so the excess water can be absorbed by the ground.
- Drain swimming pools and spas into a sanitary sewer outlet, never into a street. Check first with your local wastewater treatment plant before disposing of anything in the sewer.

REFERENCES

[1] Stormwater Discharges From Municipal Separate Storm Sewer Systems

[2] www.dnr.mo.gov/pubs/pub2209

[3] www.who.int/entity/water_sanitation_health/hygiene/plumbing16.pdf

[4] http://www.mdr.ro/userfiles/constructii_ancheta_public_a_ghid_proiectare_executare_instalatii_ape_meteorice.pdf

[5] Regulation on requirements for wastewater treatment in urban and rural, calm.md/public/files/Regulament_epurare.doc