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Urban Water and Drainage Management

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ABSTRACT

Urban Water Drainage Management involves the fields of water supply drainage, wastewater treatment and sludge handling. An efficient use of all the resources is important we have to use technology in such a way so that we can solve more problems faced by people living in urban areas. urban drainage planning and operation is aimed to ensure the public health and flood protection by completely collecting and quickly removing wastewater from the collected area, during both dry and monsoon season. As an "end of pipe strategy", the wastewater treatment plant (WWTP) was dedicated to improving the receiving water quality, mainly during dry weather periods, by treating wastewater prior to its discharge, the sewer system was improved by increasing its collection efficiency and minimize the volume of combined sewer overflows (CSO). In many cases, this strategy provides insufficient and cost-ineffective protection of water, particularly in receiving waters.

In many cases, this strategy provides insufficient and cost-ineffective protection of water resources. particularly of receiving waters. Reducing the CSO volume by storage causes an extended wet weather load on the WWTP, and may subsequently reduce its quality. Therefore. for optimum protection of the receiving waters. it is essential to take into consideration the loads from CSOs as well as from the WWTP effluent and relate them to the conditions inthe receiving water. Depending on the site specific conditions, different pollutants or different dynamic characteristics may be controlling the receiving water quality. In the future urban drainage planning and operation should thus be guided by a site specific and problem-oriented approach. which requires extension of the system boundaries. The development of an appropriate strategy should be based on comprehensive analysis of the entire urban drainage system of areas lies in urban.

CAUSES OF OVERFLOW OR DRAINAGE SYSTEM IN CITIES

Intense rainfall increases flow in the sewer system that had increased portion of flow that occurs during and after a rainfall for a period of time leads to infiltration and runoff that's why there are sanitary sewers are designed to accommodate a certain amount of inflow and infiltration. During the heavy rainfall this may leads to the Sanitary Sewer Overflows (SSO). The SSOs occur when sewage overflows from the manholes surcharge is a situation when sewage rises in the manhole shaft but does not overflow it as in case of SSOs. These SSOs carry inherent risks to human health as well as to the environment [1]. It is necessary to have a better understanding about the sources of RDII in planning a sewer system and propose mitigation strategies to reduce SSOs. RDDI is called as the Rainfall Derived

Infiltration and inflow for groundwater and stormwater to sanitary sewage. IN many cases the RDII can be a significant cause of sanitary sewer overflows. IRDII models require appropriate inputs and intricate computational algorithms to achieve intended analysis objectives. The typical RDII sources within a sanitary sewer system (as illustrated in Figure 1) contribute extraneous flow in multiple and complicated pathways. This makes RDII quantification challenging and adds a high degree of uncertainty. This uncertainty comes from spatial and temporal factors as outlined later. Inflow is stormwater which enters the sewer pipes through direct connections: roof downpipes which are illegally connected to the sanitary sewers, broken manhole covers and cross-connections between stormwater and sewer pipes. On the other hand, infiltration is the runoff that filters through the soil and then enters the sewer network through cracked pipe sections, defective joints and damaged manhole walls. It can also occur due to rise in the water table. Urban floods are entirely manmade with poorly maintained [2].

drains, plastic bags, shrinking open spaces and climate change contributing to accumulation of water on roads after a

heavy downpour, experts say. They said that steps such as rainwater harvesting, ban on use of plastic bags and betteruse of weather forecasts will go a long way in helping tackle flooding in cities after rains. Heavy downpours have been disrupting normal life in almost all metro cities in India, with Mumbai bearing the brunt last month which led to death of at least six persons.

Experts said a range of factors including rapid migration to urban areas and "lackadaisical attitude" of civicauthorities were among the factors that contribute to cities coming to a standstill after heavy rains.

They said citizens also have to behave responsibly and ensure that plastic bags or used food plates are not thrown inthe open or in the neighborhood drains.

V.K. Sharma, Senior Professor of Disaster Management at the Indian Institute of Public Administration (IIPA) saidthe cities need a proper system of garbage collection and sewage disposal and regular cleaning of drains.

METHODS TO MANAGE DRAINAGE IN URBAN AREAS

1. Drainage monitoring system using LOT: Drainage system in cities or in urban areas are one of the major infrastructure. Most management on underground drainage is manual therefore it is not efficient to have clean and working underground system also in such big cities, that's why we have to use some new technique to growthrough this major problem Underground Drainage involves sewerage system, gas pipeline network, water pipeline, and manholes. It provides a system which is able to monitor the water level, atmospheric temperature, water flow and toxic gasses. If drainage system gets blocked and water overflows it can be identified by the sensorsystem. And that sensor sends information via the transmitter which is located in that area to the corresponding managing station. The Internet of Things (IoT) consists of real life objects, communication devices attached to sensor networks in order to provide communication and automated actions between real world and information world. Sensor Network is a key enabler for IoT paradigm. The vital considerations of this design are low cost, low maintenance, fast deployment, and a high number of sensors, long life-time and high quality of service. The proposed model provides a system for monitoring the water level and atmospheric temperature and pressure insidea manhole and to check whether a manhole lid is open. It also monitors underground installed electric power lines,inside it [3].

2. DWMP management structure A key element of the framework is to ensure that there is early, continued and effective engagement between companies and regulators/stakeholders at both a company-wide level and more locally. Partnership working and collaborative planning will be essential to delivering resilient wastewater and drainage systems. To achieve this a DWMP management structure has been developed that takes consideration of The need for a company level output; > The need for greater transparency and rigour in planning to maintain and increase levels of service in respect of drainage and wastewater (infrastructure and non-infrastructure) systems; > The increased granularity required to define the risks and reflect investments at a sub-company scale; > The need to include at the heart of the planning process impacts on customers and the environment; > Aplanning structure that is proportionate in respect of risk as well as the effort required. To address the above the structure underpinning DWMPs has three levels Level 3 – the basic tactical planning unit will be the wastewater treatment works and its catchment (or aggregations thereof for small catchments, or discrete subcatchments for larger wastewater treatment works catchments). Companies can disaggregate level 3 tactical planning units further where appropriate (designating as level 4). > Level 2 – an aggregation of level 3 units into larger level 2 strategic planning areas. The level 2 strategic planning areas are to describe strategic drivers for change (relevant at the level 2 strategic planning area scale) as well as facilitating a more strategic level of planning above the detailed catchment assessments. > Level 1 water company DWMP – planning at level 2 and level 3 to be brought together within an overarching company level DWMP to provide a strategic, long-term plan for drainage and wastewater resilience and associated investment over the plan period. The DWMP framework provides a management structure that operates at level 1 and level 2, drawing upon (and influencing) activities undertaken at level 3. The management structure will enable effective engagement across the defined levels: > Level 1

DWMP – engagement and challenge provided through the existing customer challenge group process and to support strategic discussions with regulators and other key stakeholders. > Level 2 strategic planning area – stakeholder and customer engagement processes will be more formalised at this level. For each level 2 strategic planning area, a stakeholder engagement strategic planning group led by the water company should be established [4]. The level 2 strategic planning groups should include all key stakeholders relevant to the level 2 area. The establishment of level 2 strategic planning groups should not be seen as the introduction of another level of bureaucracy into the planning process but should, where possible, build on and where necessary enhance existing partnership arrangements (e.g. catchment partnerships, regional flood and coastal committees and others). > Level 3 tactical planning unit – engagement with local interested parties to understand risk and inform the development of options to mitigate identified risk. The level 2 strategic planning groups are a response to the need to ensure transparency on issues affecting (and the assessment of) vulnerability, engage in the identification and assessment of potential options, facilitate plan/data sharing, provide a mechanism for defining ownership of interventions and, potentially, the means of resourcing them. The level 2 engagement will also facilitate coordination of strategic planning activities undertaken by all parties.

3. There is a new modern decision has been taken that supports the idea of sustainable management of running water just like the the U.S Environment agency has come to a decision that is SUSTAIN Analysis Integration to evaluate alternative plans for running or stormwater and flow abatement techniques in urban and developing areas. Sustain provides a public domain tool capable of evaluating the optimal location, type, and cost of stormwater best management practices (BMPs) needed to meet water quality and quantity goals. It is atool designed to provide critically needed support to watershed practitioners in evaluating stormwater management options based on effectiveness and cost to meet their existing program needs. The

developed *SUSTAIN* model was calibrated by observed rainfall and flow data, representing the existing conditions. The *SUSTAIN* model developed two BMP cost-effectiveness curves for flow volume and pollutant load reductions. A sensitivity analysis was also conducted by varying important BMP implementation specifications.

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