

Research on measures to issues associated with sewer (pipe) in wet weather

Year of Research

2013 • 2014

Implementation of anti-inundation measures

(Objectives)

Sewer pipes conditions are substantially different in wet weather than those in normal (dry) weather. Various troubles occur because methods used to reflect these changes in these conditions in the sewerage plan have not been established. Stormwater inflow and manhole cover fly-loss are issues requiring particular attention. Stormwater inflow generally causes high water, which hampers pumping station and the treatment plant operations, resulting in increased maintenance costs. Local measures have proven effective only in limited cases, and, even in such cases, costs tend to be enormous. As for fly-loss of manhole covers, a guide for manhole safety measures was published in 1999, but it does not cover planning methods such as how to prioritize measures or select specific locations. This presents difficulties to municipalities when they attempt to develop plans for the measures.

This study covers the problems described above, and analyzes the current state of stormwater inflow and cover fly-loss. On the basis of the findings obtained and using a runoff analysis model as a tool, this study attempts to clarify the causes of stormwater inflow and cover fly-loss. We then review efficient and feasible approaches for sewage works to deal with these problems and identify the institutional and systemic issues municipalities face in the course of operating the sewerage works. We then summarize proposals to be reflected in guidelines and policies. The flow of the research on stormwater inflow countermeasures and fly-loss prevention measures are shown in **Figure 1** and **Figure 2** respectively.

(Results)

(1) Present state, issues, and final goals for stormwater inflow countermeasures

Results of questionnaire surveys indicate that most municipalities are making efforts to develop stormwater inflow countermeasures. However, most are not yet at the stage of selecting detailed areas and identifying causes and locations of stormwater inflow because of the substantial time and cost incurred for flow surveys. One of the causes for limited effectiveness of surface measures is cross connections in private land. Implementing countermeasure becomes difficult on private land. Final proposals will be made on the five methods listed below on the basis of a study of these issues and by referring to field verifications being conducted in 2014.

- ① Focus on priority areas while making full use of a runoff analysis model
- ② Use alternative indices (EC, temperature) to focus on areas where stormwater inflow preventive measures will be taken
- ③ Use basin characteristics to focus on areas where stormwater inflow countermeasures will be taken
- ④ Evaluate inflow based on measurement of groundwater levels
- ⑤ Set targets for each step when conducting evaluations

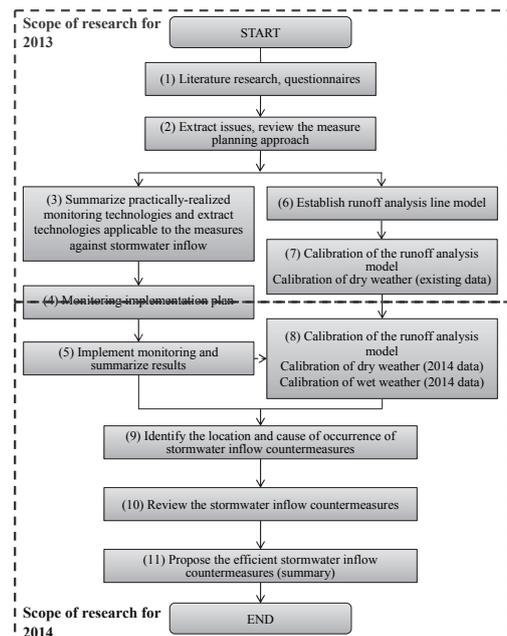


Figure 1 Research flow (stormwater inflow countermeasures)

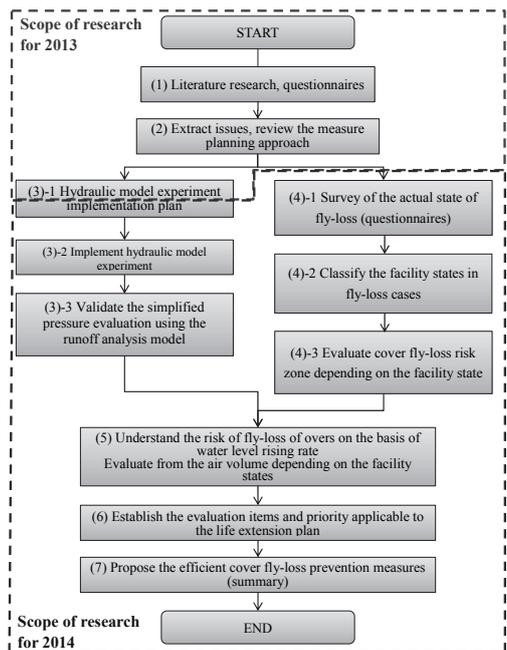


Figure 2 Research flow (measures against fly-loss of covers)

(2) Present situation, issues, and final goals of cover fly-loss prevention measures

The results of the questionnaires confirmed that more than 600 cases of cover fly-loss were reported in the past ten years in participating municipalities. However, only a few municipalities have established design and countermeasure standards for prevention of fly-loss. Actually, many municipalities utilize floating and fly-loss prevention covers to all manholes in design and installation, regardless of the risk of fly-loss. What needs to be done regarding fly-loss risk is to establish a uniform approach for non-point evaluation of sewerage pipe networks. In 2014, final proposals will be made on the three approaches indicated below on the basis of above description while utilizing hydraulic model experiment facilities capable of flexible changes in conditions.

- ① Non-point risk evaluations on cover fly-loss by using run-off analysis
- ② Risk evaluation of fly-off factors by referring to fly-off cases
- ③ Establishing priorities in renovation work to prevent fly-loss of covers (ranking by priority)

※ Liaison Conference for Sewerage Technology Development (Sendai, Saitama, Chiba, Tokyo, Yokohama, Sagami-hara, Niigata, Shizuoka, Hamamatsu, Nagoya, Kyoto, Osaka, Sakai, Kobe, Okayama, Hiroshima, Kita Kyushu, Kumamoto, Japan Institute of Wastewater Engineering and Technology
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Key words

Stormwater inflow countermeasures, water quality measurement, runoff analysis model, measures against fly-loss of covers, hydraulic model experiment