Enhancing the Residential Inflow and Infiltration Subsidy Program

Purpose

The solutions presented in this report are intended to assist residential owners who do not have property that is reasonably capable of handling the discharge from their sump pump or weeping tiles and roof leaders in the confines of their property lines. These additional tools are being requested to expand the list of options that are available to help eliminate unnecessary sump pump and weeping tile connections to the wastewater collection system. These changes will help the municipality be more responsive to reduce and mitigate the anticipated risks from Climate Change and contribute to lowering the City's carbon footprint along with deferring or reducing the requirement of some capital expenditures outlined in the Water and Wastewater Master Plan.

Background

As society becomes increasingly aware of actions that must be taken to reduce and mitigate the impacts of Climate Change and minimize large amounts of capital budget expenditures building increasingly larger treatment facilities, processes are put in place to facilitate better decisions.

One such situation that requires attention in the City of Greater Sudbury is to work towards reducing the considerable number of private residences that have connected sump pumps, weeping tiles, and roof leaders to the sanitary sewer collection system. Engineering studies have shown that at least 50% of storm water, or inflow, entering the sanitary collection system during storm and snow melt events originates from private property, resulting in an overwhelming amount of water that quite often is directed untreated to our local water ways and an increase in risk for sewer back-ups into private residences. The Water and Wastewater Master Plan has identified removing Inflow and Infiltration from City systems as a high priority for managing infrastructure risks and offsetting large capital expenditure.

Wet weather flow deficiencies were identified in the Chelmsford, Azilda, Coniston, Sudbury, Valley, and Lively-Walden wastewater systems[1]. Wet weather flow means that after it rains, there is an observed increase in the wastewater collection and treatment facilities from the inflow and infiltration.

The Water and Wastewater Master Plan has identified the following projects (Table 1) to manage the wet weather flow.

Table 1 - Projects Recommended for Wet Weather Flow

Chelmsford - Wet Weather Infrastructure	$24,973,000
Walden WWTP Plant Expansion	$66,105,000
Azilda - Wet Weather Infrastructure	$16,893,500
Valley East - Wet Weather Infrastructure	$22,035,000
Sudbury - Wet Weather Infrastructure	$44,070,000
Coniston - Wet Weather Infrastructure	$13,955,500

The estimated costs could be deferred or eliminated by reducing the volume of inflow and infiltration reaching the plants.

To understand the magnitude of the inflow occurring take the example of a garden hose, which has a volumetric flow rate of about 0.5L/s when fully open. This volume of water would fill 6.4 Olympic sized swimming pools after one year.

Depending on the soil conditions around the premises and the depth of the foundation, some sump pumps run for a few hours a year and others run non-stop. There is a considerable variation in conditions across the City.

Additionally, some homes in the City were not constructed with sump pumps and many have gravity weeping tiles which means many residents are unaware that water from their residence is actually being drained into the sanitary collection system.

If a sump pump or gravity connected weeping tiles were to run for 4 hours a day for 8 weeks of the year at the flow rate mentioned above, that would be contributing an approximate volume of 403,200L at a treatment cost of $316 per year when using the City's MBNCan reported cost of $784.20/ML[2].

At the other end of the spectrum, if there were a sump pump running 24 hours a day for 6 months of the year this will contribute an approximate volume of 7,862,400L at a treatment cost of $6165 per residence. This sensitivity analysis, when multiplied against the number of premises that have gravity weeping tiles and sump pumps shows that the inflow that is contributing to the wet weather flow from private drainage is substantial.

There are many homes built prior to 1973 that connected weeping tile drainage to the sanitary collection systems at the time of construction. Many of these homes are now being renovated and weeping tiles updated. Many responsible owners make progressive decisions, by disconnecting their sump pumps, and weeping tiles from the sanitary collection systems. Most of the time this is done without issue and the water can be contained and absorbed on the premises. Due to the varied ground conditions across the municipality, there are some areas where finding a location for the sump

pump to discharge on the premises is more challenging, and in some cases results in creating public safety hazards such as slippery roads and sidewalks.

Solutions must be designed to remove the rainwater from the sanitary systems guided by the principle of leaving the rain closest to where it falls. This means that where possible, sump pump and weeping tile water should be discharged on the premises, but where this is not possible more resource intensive solutions will be investigated such as connecting to the storm system and as a last resort the sanitary sewer system when there is no other reasonable alternative. This will ultimately reduce the energy for pumping, treatment, and discharge and bring the City closer to meeting Climate Change goals by reducing the municipal carbon footprint, and ultimately reduce or offset future capital expenditures related to wet weather flow.

Staff recommends the creation of a residential sanitary sewer discharge agreement so that where the water is causing a public safety hazard, the sump pump or weeping tiles can be temporarily reconnected to the sanitary sewer system to eliminate the hazard while the permanent solution is being designed and built. The agreement is only intended to be used where there are no other reasonable alternatives available. This will provide for an immediate public safety remedy until such time that construction can take place to connect the sump pump or weeping tile discharge to the storm sewer system. Staff is also recommending that the existing RIISP subsidy is enhanced to include a new category to assist with the construction costs for connecting weeping tile, roof leader, or sump pump discharges to the storm sewer system as a last resort for cases where this is the only appropriate solution. Staff recommends that this type of agreement be used on existing residences and that this agreement is not intended to be used for new development or new construction. The residential compliance agreement and connection to the sanitary sewer system is not an option available for roof leaders.

Analysis

The established subsidy that has been assisting owners protect themselves from sewer backups, the Residential Inflow and Infiltration Subsidy Program (RIISP) has funding in several categories to provide owners the assistance in keeping rainwater where it falls. This report is proposing expanding the offerings of this subsidy program to include a subsidy for allowing residential owners to connect to the storm sewer.

The purpose of the subsidy is to allow owners who have exhausted all reasonable alternatives to help offset the cost of connecting to the storm sewer, where the General Manager or designate has made the assessment that the nature of said connection to the storm sewer in that location would not be problematic or cause unacceptable risks for the maintenance and operation of the storm sewer system.

Connections to the storm sewer cannot be made directly from the premises to the storm sewer system, as one might see in a connection to the sanitary sewer collection system or the water distribution system. Storm sewers are designed to overflow, so if the premises were directly connected the premises would experience flooding when the storm sewer surcharges. The connections to the storm sewer must be designed with protection in place such as an air gap to allow the storm sewer to overflow, as designed, without filling basements. One example of a solution could be: the owner discharges their sump pump at ground level, the water then runs across the ground to their private catch basin on private property and their private pipe would convey the water from the private catch basin to the City's storm sewer system.

Due to the design requirements to keep the premises safe from flooding, these types of installations can be costly and the proposed RIISP subsidy is significantly larger than other existing subsidies to reflect that challenge.

Establishing a residential sanitary sewer agreement at an annual fee of $100 per agreement better reflects the volume of work associated with the preparation of a residential agreement. The other comparable existing compliance agreement was put in place for commercial properties and the fee is not reasonable for residential applications.

Next Steps

Staff will keep council updated on the uptake of the new subsidy in the annual RIISP report.

Resources Cited

1 - Water and Wastewater Master Plan, WSP, 2018.

2 – MBNCan : Total operating cost of Wastewater Collection & Wastewater Treatment per megaliter treated $ 784.20 (median of participating municipalities is $683.16) based on costs of $24.05M and 30,667 megaliters treated. Includes all direct and indirect costs (engineering, GM's office, program support, etc.)