



CHAPTER 11

EXISTING STORM WATER SYSTEM

11.1 GENERAL DESCRIPTION OF SYSTEM

There are three types of existing storm water systems in the Sister Bay planning area. The rural areas have little or no defined conveyance systems. Runoff follows the natural topography. As development increases, a combination of shallow open channel swales paralleling adjacent roadways with connecting culverts at intersections carries runoff. Interspersed within these drainage areas are channels of significantly greater cross-section and occasional manhole and storm sewer pipe. Finally, in some of the areas of concentrated development, there are several underground storm sewer systems. A number of interior depressed or low gradient areas are served by storm sewer inlets.

The general location and layout of the existing storm water system is illustrated in Figure 11-1. This chapter presents a summary of the observed design and operating characteristics of the existing storm water system and components.

Most open channels are grass lined but some show erosion. Culvert pipes are a variety of materials including reinforced concrete, corrugated metal, and HDPE. Storm sewer pipes are primarily reinforced concrete and corrugated metal. Storm sewer outfalls are generally in good condition.

A unique feature of the Sister Bay system is a storm sewer lift station pump. The pump is located directly adjacent to the large wetland area between Bay Shore Drive and North Spring Road, north of Scandia Road. This wetland area has been used to store and detain storm water runoff. Excess water is pumped to an outfall on Green Bay.

The topography of the area also has numerous natural closed depressions that detain runoff. When these areas pond with water it is often viewed as a problem by landowners. Standing water is often viewed as a nuisance and if features have been constructed too low there is the potential for flood damage. If these features are upstream of other similar areas along the same drainage route, increasing the drainage efficiency will increase downstream flooding. Likewise, development of contributing areas will increase flooding problems for those downstream along the system.

A common feature of the Sister Bay region is the presence of shallow, highly fractured bedrock. The geological formation is susceptible to the formation of large voids, also known as sinkholes or karst formations. When coupled together with the closed depressions discussed above, this creates a direct path for the contamination of the drinking water aquifer from contaminated runoff. On-site private septic systems are also a major pollution concern and are discussed later in this report.

Several areas of residential development are occurring on a lot by lot basis. This type of development falls beneath the one acre threshold for state storm water regulation. As development in these areas fills in, the storm water management issues are the same as a larger residential subdivision development. But without effective storm water management planning, these issues can become problems. In some planning area locations, the natural drainage areas have been obstructed by homes, structures or other landscaping. Eventually, flooding of these areas could create significant problems for the Village and surrounding areas.



11.2 OBSERVED AREAS OF CONCERN

As part of developing the inventory of the planning area's storm water infrastructure, a general review of existing problem areas was investigated. The following summarizes a review of the known existing storm water areas of concern within the Village and surrounding planning area. The locations of these problem areas are indicated in Figures 11-2, 11-3 and 11-4.

11.2.1 Location #1: Area Bounded by Country Lane, Fieldcrest Road, and South Bay Shore Drive (STH 42)

The area of the Village of Sister Bay bounded by Country Lane, Fieldcrest Road, and South Bay Shore Drive is area is poised to experience significant land use changes as residential subdivision and other development of the land is currently occurring. Storm water drainage collected from this area currently flows to the north under South Bay Shore Drive through twin 30 inch diameter culverts. The culverts appear to be undersized, which may be the cause for localized flooding upstream of the culverts. A 3 foot deep, low gradient ditch has been constructed upstream of the culverts as a means to improve the flows to culverts. However, visual evidence of road overtopping has been observed.

As the storm water runoff water flows under South Bay Shore Drive, it follows a series of ditches, culverts, and a pond as it passes through the Bay Ridge Golf Course, then along Little Sister Road until the water flow eventually discharges into a depression formed by a beach ridge near the shore of Sister Bay. There are surface erosion and flooding events below the golf course.

The entire catchment discharges to a closed depression on private property that is ready for potential development. Increased runoff from upstream developed areas may cause increased flooding and erosion to this private property. As lots are sold and houses and other structures built upstream, the storm water problems in this area can be expected to worsen. A policy needs to be developed for dealing with this storm water issue.

Other concerns in this area include the presence of sink holes and properties served by private wells and on-site sewage disposal systems.

11.2.2 Location #2: Westwood, Woodland, and Forest Road Area

This Village area drains to closed depressions formed between the beach ridge near the shore of Sister Bay and the bluffs similar to the area described above. There are similar concerns with continued conveyance of upstream runoff to outfalls to private property.

11.2.3 Location #3: Sunnyside, Admiral, and Sunny Road Area

This area is experiencing a rapid increase in single family home construction. Driveways currently exist without culverts, ditches are present without outlets, and homes have been constructed within the natural drainage ways.

11.2.4 Location #4: STH 42 corridor from Fieldcrest to Gateway

The property along STH 42 in this area is a growing commercial corridor, with a limited defined storm water drainage system and controls. Although individual sites will restrict their storm water runoff



discharge rates and volumes, this area as a whole will be impacted by the overall increased volume of storm water as impervious surfaces increase with development.

In addition, contamination of groundwater is a concern due to proximity of the fractured bedrock to the ground surface. Current drainage patterns indicate infiltration maybe prevalent in the area. A regional system with a planed collection and conveyance system may be appropriate for this area to protect groundwater quality and control storm water quantity as development of the corridor increases.

11.2.5 Location #5: Gateway Drive

The drainage upstream of Gateway Drive collects some of the STH 42 commercial corridor storm water flow and all of the flow from the upstream development. The existing conveyance system alternates between pipes and ditches. The pipe sizes under STH 57 have been recently increased during DOT roadway reconstruction and are presumed adequate for the flows to be conveyed.

Development to the west of this area raises concerns over the adequacy of pipe sizes and continued erosion in the ditches along Gateway Drive as well as South Bay Shore Drive. The upper basin has a storm sewer pipe network that is in deteriorating condition that will need replacement.

11.2.6 Location #6: STH 42 North of Harbor Shores

The existing ditch system along STH 42 north of Harbor Shores has been paved in an apparent effort to limit surface erosion. A portion of this paved area was observed to be failing and new areas of erosion are evident. There appears to be available space in this location for structural storm water controls.

11.2.7 Location #7: Storm Sewer Lift Station Pump

As noted above, the wetland area north of Scandia Road and east of Bay Shore Drive is served by a small storm water lift station. The station pump was originally installed to remove excess water from the wetland and pump it west to an outfall structure on the shore of Green Bay. Village Utility staff have reported that there are maintenance and operation cost issues with this pump system. The equipment is old and appears to be near the end of its useful life. In addition, the pump uses an oil drip feed system for lubrication, and frequently traces of the pump oil can be observed being discharged from the storm sewer outfall pipe creating a source of pollution.

11.2.8 Location #8: Ponds and Beach Ridge/Bluff Depressions East of Downtown (between downtown and the bluffs)

These Village areas absorb storm water runoff to a certain extent, but do become full or saturated and then cause localized flooding. The frequency of this localized flooding occurrence has increased with development of the area. The area may also be accumulating depositions of silt.

It appears that this area has been filled in over time to increase developable land in the downtown area. These depressions may have some water quality benefits since they may act like Best Management Practices. The slope to the Sister Bay shoreline is low gradient from these depressions. Few direct connections currently even exist between the bay and the depressions. Improving the direct connections may be able to reduce localized flooding, but the runoff water discharging into the bay may be of poorer quality.