

- Soil Erosion and Sediment Control Plan review and approval, Lake County SMC
- IDNR-OWR Part 3708 permit for construction in the floodway or documentation that the project can meet the requirements of IDNR-OWR Regional Permit 3
- Village of Mettawa Building Permit

Concept-level estimate of probable cost (to include final design, permitting, and construction): \$95,000

2. 27115 Meadowoods Drive (Reported Concern 18)

Open ditch flow from along N Meadowoods Drive is conveyed under Southwoods Lane in a 15-inch reinforced concrete pipe. The flared end section on the upstream pipe terminus has pulled away from the pipe connection and is limiting capacity and rendering the pipe prone to clogging and creating a situation where water can drain around the outside of the pipe, causing potential settlement issues. Rational method and culvert capacity calculations included in Appendix D were performed to determine if the existing pipe has capacity to convey peak discharge from the approximately 4.4-acre contributing area, which was confirmed for the 7.5-year recurrence interval event. Replacement of this upstream flared end section is recommended to ensure the design conveyance is achieved, as depicted in schematic design plan C2.0.

Anticipated Regulatory Needs: None, likely considered maintenance

Concept-level estimate of probable cost (construction): \$3,000

3. Bradley Oasis Park Area (Reported Concerns 7 and 15 and 5. Mettawa Lane (Reported Concern 5)

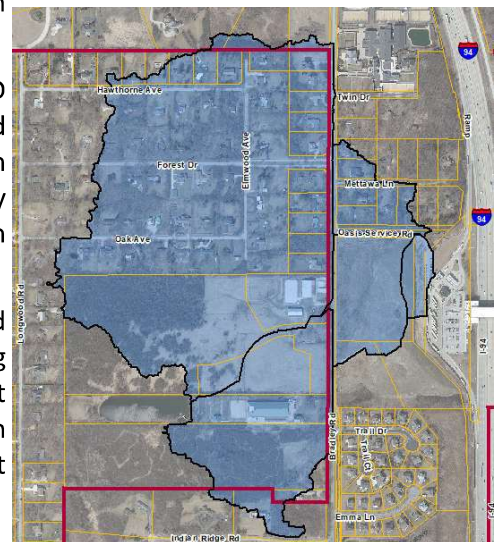
More than 250-acres drains to the conveyance route under Mettawa Lane. Drainage concerns along this flow path include the overtopping of Oasis Service Road, structure flooding at 707 W Bradley Road (Reported Concern 15), and Mettawa Lane roadway flooding (Reported Concern 5). The Village-owned Oasis Park has been identified as an opportunity to provide some level of stormwater storage in the upper watershed.

Drainage from west of Bradley Road and north of the Lake Forest Equestrian Center is collected in a north-south ditch system and is conveyed through a 30-inch roadway culvert to the northwest corner of Oasis Park, and through a 12-inch pipe system to the road ditch along the southern expanse of Mettawa Lane. Drainage from west of Bradley Road and south of the Lake Forest Equestrian Center is conveyed through a 36-inch roadway culvert to the southwest corner of Oasis Park.

Existing conditions modeling, described in detail and included in Appendices D and E, and summarized in Table 1, shows Oasis Service Road and Bradley Road overtop in the 25-year event from west to east, both at the northwestern corner of Oasis Park and at Mettawa Lane. Model results show that roadway overtopping does not occur at either location in the 10-year critical duration event.

Options were explored to increase storage in Oasis Park to alleviate flood concerns to the extent practicable, primarily focused on roadway overtopping at the three locations identified. A land use plan consistent with the concept shown on Exhibits 5 and 6, comprised of a restored channel and floodplain while maintaining the recently constructed pathway could provide sufficient storage to alleviate the Oasis Service Road flooding in the 25-year event.

Additional modeling was performed to explore the feasibility of limiting the overtopping of Bradley Road in this location. Preliminary results show that



Approximately 250-acres Drain to Mettawa Lane

upsizing the 30-inch culvert to re-direct greater flows to Oasis Park would require creating an additional 165-acre-feet of flood storage at Oasis Park. Given the total site is 19.2-acres, this strategy is impractical.

However, two additional preliminary scenarios were prepared for the Oasis Park and Mettawa Lane. Results summarizing roadway overtop frequency and magnitude in the modeled design storms are shown in Table 1 and include the following scenarios:

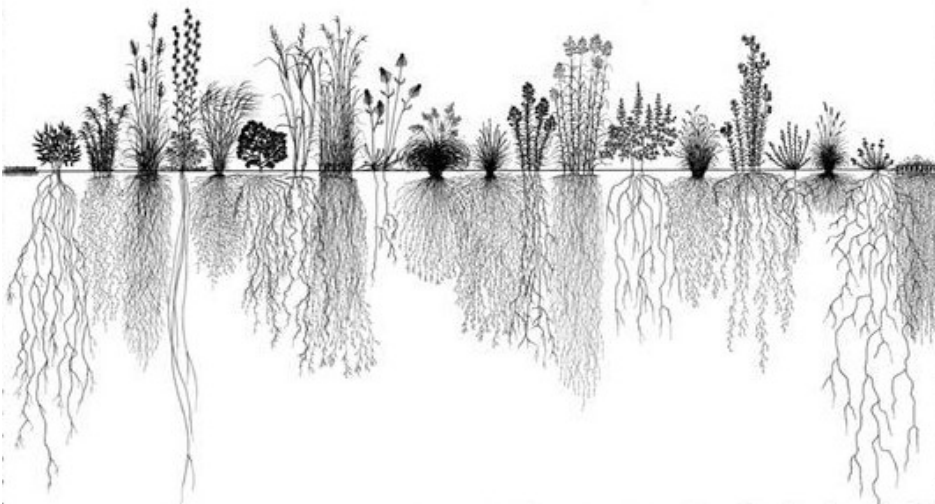
1. Base Scenario, representing the existing conditions
2. Pr1: adding 10-acre-feet of stormwater storage below an elevation of 685.0
3. Pr2: adding of 10-acre-feet of stormwater storage below an elevation of 685.0 and upsizing the 30-inch pipe from Bradley Road to Oasis Park to a 36-inch pipe
4. Pr3: adding of 10-acre-feet of stormwater storage below an elevation of 685.0, upsizing the 30-inch pipe from Bradley Road to Oasis Park to a 36-inch pipe, and upsizing the Bradley Road to Mettawa Lane culvert system to a 24-inch system

Location	10-year				25-year				50-year				100-year			
	Ex	Pr1	Pr2	Pr3	Ex	Pr1	Pr2	Pr3	Ex	Pr1	Pr2	Pr3	Ex	Pr1	Pr2	Pr3
Bradley Road at Oasis Park	0.0	0.0	0.0	0.0	2.6	2.6	1.2	1.0	4.9	4.8	3.1	2.9	7.8	7.6	5.6	5.2
Bradley Road at Mettawa Lane	0.0	0.0	0.0	0.0	148.3	148.3	92.9	81.4	232.6	228.6	172.0	160.9	318.2	311.8	254.2	243.1
Oasis Service Road	0.0	0.0	0.0	0.0	45.6	0.0	50.0	44.2	97.5	3.0	91.1	73.7	145.6	48.1	141.2	103.3

In the concept for Oasis Park, creation of approximately 10-acre-feet of storage could be provided at an elevation below 685 (the approximate lowest elevation of the Oasis Service Road) in a functional manner to preserve the integrity of the park site and this reach of the Mettawa Trail. A low flow channel is proposed to convey the drainage through this site in most conditions and low flow storm events, likely represented by the 2-year event. Natural riffle structures would function to restore and protect grade, while the alignment would restore the natural meanders of a small stream. A terrace would be constructed to convey events in the 5-year to 10-year recurrence interval range. Capacity would be designed for flows to access this terrace, supporting a unique native plant community and restoring

a facet of ecosystem function. The third terrace, identified as the high water level area, would provide stormwater storage in the 10-year to 25-year event range, increasing infiltration and providing for another diverse habitat.

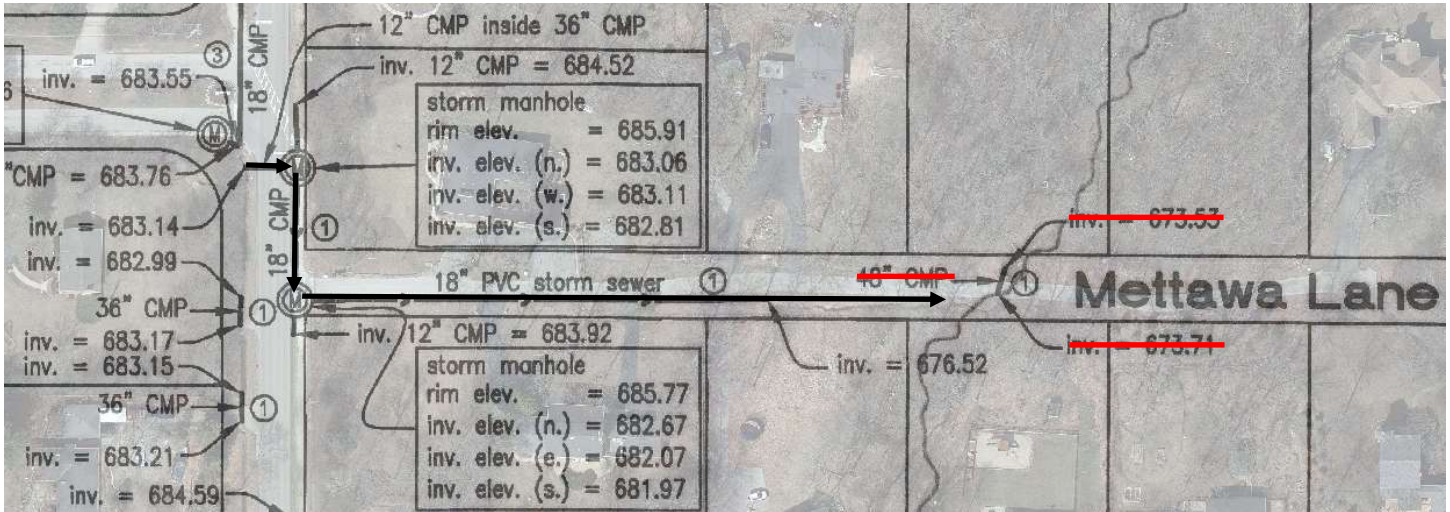
As shown on Exhibits 5 and 7, stabilization of the reach from the Oasis Service Road crossing to Mettawa Lane and from Mettawa Lane to Interstate 94 is also recommended. Construction of engineered scour pools, riffles, additional bank protection measures, and removal of woody underbrush could be implemented to protect



Deep Root Systems to Stabilize Banks
 Lake County SMC's Riparian Area Management: A Citizen's Guide

against erosion and restore bank areas. Large trees in this area would remain, but dense underbrush would be cleared to encourage the establishment of a herbaceous native vegetative understory to utilize the complex root systems to stabilize soils and overbank areas further. A conceptual rendering of this restoration is shown as Exhibit 8.

To address the remaining overflow of Bradley Road at Oasis Park and at Mettawa Lane (depicted in Reported Concern 5), it is recommended that the 12-inch to 18-inch pipe system conveying flows from the ditch system along the western side of Bradley Road to the ditch system along Mettawa Lane be upsized. To accommodate this flow, and considering the limitations in increasing ditch capacity, it is recommended that new storm sewer be installed to convey flows.



Ditch west of Bradley Drainage System to Mettawa Lane

The Village has been involved in ongoing discussions about the reconstruction of Mettawa Lane to comprehensively address stormwater and improve the roadway. It is recommended that any stormwater improvements, including upsizing the identified 12-inch to 18-inch piped system along Mettawa Lane be implemented in conjunction with roadway improvements for infrastructure maintenance access. Additionally, increasing capacity through this system would require the stabilization of the drainageway from Mettawa Lane downstream to the Interstate 94 culvert.

The two corrugated plastic pipes along the drainageway under Mettawa Lane, may be prone to clogging and thus impacting the conveyance system from both Oasis Park and down Mettawa Lane. It is feasible that these be replaced by a box culvert or bridge structure, though this would have substantial cost implications for construction. As described above, it is recommended that this replacement to increase capacity and limit clogging potential and scour be implemented in conjunction with roadway improvements for infrastructure maintenance access and the stabilization of the drainageway from Mettawa Lane downstream to the Interstate 94 culvert.

To protect against erosion and stabilize the existing scour pool forming on the downstream end of the two existing corrugated plastic pipes, and to accommodate the recommended storm sewer system's more consolidated flows, it is recommended that both the upstream and downstream extents of the Mettawa Lane crossing be treated with rock riprap scour protection. In addition, further downstream clearing and stabilization treatments to protect grade and prevent against erosion similar to those recommended for the reach extending from Oasis Service Road to Mettawa Lane are recommended to protect against additional flow.

Access and maintenance easements along drainageway on private property, for both the Oasis Service Road to Mettawa Lane reach and the Mettawa Lane to Interstate 94 reach would be required to accomplish these improvements and facilitate construction of the potential Mettawa Lane stormwater improvements.

Ditches west along Bradley Road in the Village right-of-way are primarily turf grass. Exploration of providing additional capacity could be pursued by the Village as part of ongoing ditch maintenance, although adjacent grades and widths of right-of-way will be limiting and prove additional storage creation in this area infeasible. The drainageway on the 690 N Bradley Road parcel, directly adjacent to the 30-inch culvert leading to Oasis Park has already been cleared of woody understory vegetation, minimizing the potential clogging of the culvert. Additional understory clearing on the 696 N Bradley Road parcel or the feasibility of utilizing this parcel for added stormwater storage could be explored in cooperation with the property owner. Similar to Oasis Park, creating sufficient storage volume to have a measurable impact on flooding relief is impractical on this parcel.

In summary, the stormwater concerns related to overtopping of Oasis Service Road, structure flooding, and Mettawa Lane roadway flooding are all part of a comprehensive drainage system and could realize substantial benefit, both in functionality and in cost, if addressed in both design and construction as an integrated solution. The Village-owned Oasis Park has been identified as an opportunity to provide some level of stormwater storage in the upper watershed, but construction of improvements in this location will only mitigate a portion of the overall flooding issue. Flood elevations can be reduced by providing additional capacity in the Mettawa Lane system, but are not recommended without addressing the reach from Mettawa Lane to Interstate 94.

Anticipated Regulatory Needs:

- Wetland Delineation and a JD
- USACE permit for wetland impacts
- Lake County WDO permit, as administered by the Village of Mettawa as a Certified Community
- WDO Floodplain and Floodway review and approval, as administered by Lake County SMC
- Soil Erosion and Sediment Control Plan review and approval, Lake County SMC
- IDNR OWR Part 3700 permit for construction in the floodway/floodplain
- National Pollutant Discharge Elimination System (NPDES) permit through the Illinois Environmental Protection Agency (IEPA)
- Village of Mettawa Building Permit

Concept-level estimate of probable cost for Oasis Park Improvements (to include model refinement, final design, permitting, and construction): \$450,000

Concept-level estimate of probable cost for Mettawa Lane and Oasis Park Drainage Improvements (to include model refinement, final design, permitting, and construction): \$220,000



Oasis Park, August 2018

Lake County SMC has received funding through the Department of Commerce and Economic Opportunity (DCEO) for regional stormwater capital improvements, intended to fund “in-the-ground improvements (“bondable” projects) and will support the countywide implementation of regional stormwater infrastructure that is identified as having significant flood damage reduction value.” The last grant cycle (applications due January, 2021) considered funding for projects in the \$250,000 to \$2,500,000 range. This program may be a funding mechanism to pursue as part of the improvements at Oasis Park.

4. 15141 W Little Saint Marys Road (Reported Concern 17)

Across from Sapphire Riding Academy, a 12-inch corrugated metal pipe under W Little Saint Marys Road has collapsed. In the interim, a 4-inch PVC pipe was inserted into the upstream side of the culvert in an effort to maintain some level of drainage. The existing PVC pipe limits capacity, causing water to overtop W Little Saint Marys Road, impacting the road surface condition and leading to seasonal ice sheet formation. In an effort to protect public safety and Village infrastructure, it is recommended that this culvert be replaced.

Rational method and culvert capacity calculations were performed to determine if the pipe should be replaced in-kind or upsized to convey peak discharge from the approximately 1.4-acre contributing area. Results show the pipe size is limited, prompting recommendation to upsize the pipe to a 15-inch pipe. Replacement would include the installation of two new flared end sections, minor grading to improve upstream drainage, and the installation of stone outlet scour protection at the downstream flared end section and is shown in schematic design plan C3.0. A design-stage planning information request is recommended to confirm feasibility of upsizing the culvert, as field reconnaissance recovered gas pipeline utility flags in the area.



15141 W Little Saint Marys
Field Utility Flag

Anticipated Regulatory Needs: None, likely considered maintenance

Concept-level estimate of probable cost (construction): \$11,000

6. Mettawa Woods Drive cul-de-sac (Reported Concerns 1, 11, 12, and 14)

The depression area located northwest of the Mettawa Woods Drive cul-de-sac utilizes an overland conveyance route to outlet to the Mettawa Woods Pond, located south of the cul-de-sac. As-built plans provided as part of the document review effort and historical aerial imagery reviewed indicate that the natural drainage was somewhat impeded by the development. In the current conditions, there is also a 24-inch reinforced concrete pipe in this area, installed to drain ditch flow from the cul-de-sac to the detention pond.

The review of this site and associated documents yielded a solution that generally concurs with the James Anderson Company's assessment. To restore some level of a stabilized overland drainage route to the wetland, it is recommended that a swale be graded from the southern extent of the wetlands into the Mettawa Woods Pond. Further exploration of the location of the sanitary system and other utilities in the area should be confirmed prior to finalizing this approach.

The design high water level of this pond is 671.8, and the designed overflow is at an elevation of 672.0. Existing survey provided indicates the current overflow of the wetland area into the pond is approximately 672.7. Topographic review in conjunction with aerial imagery suggest that the nominal normal water level is approximately 672.0. Upon providing a swale connection between these two areas, the elevation of 671.8 may project back into the wetland area in high flow events, as shown in schematic design plan C4.0.