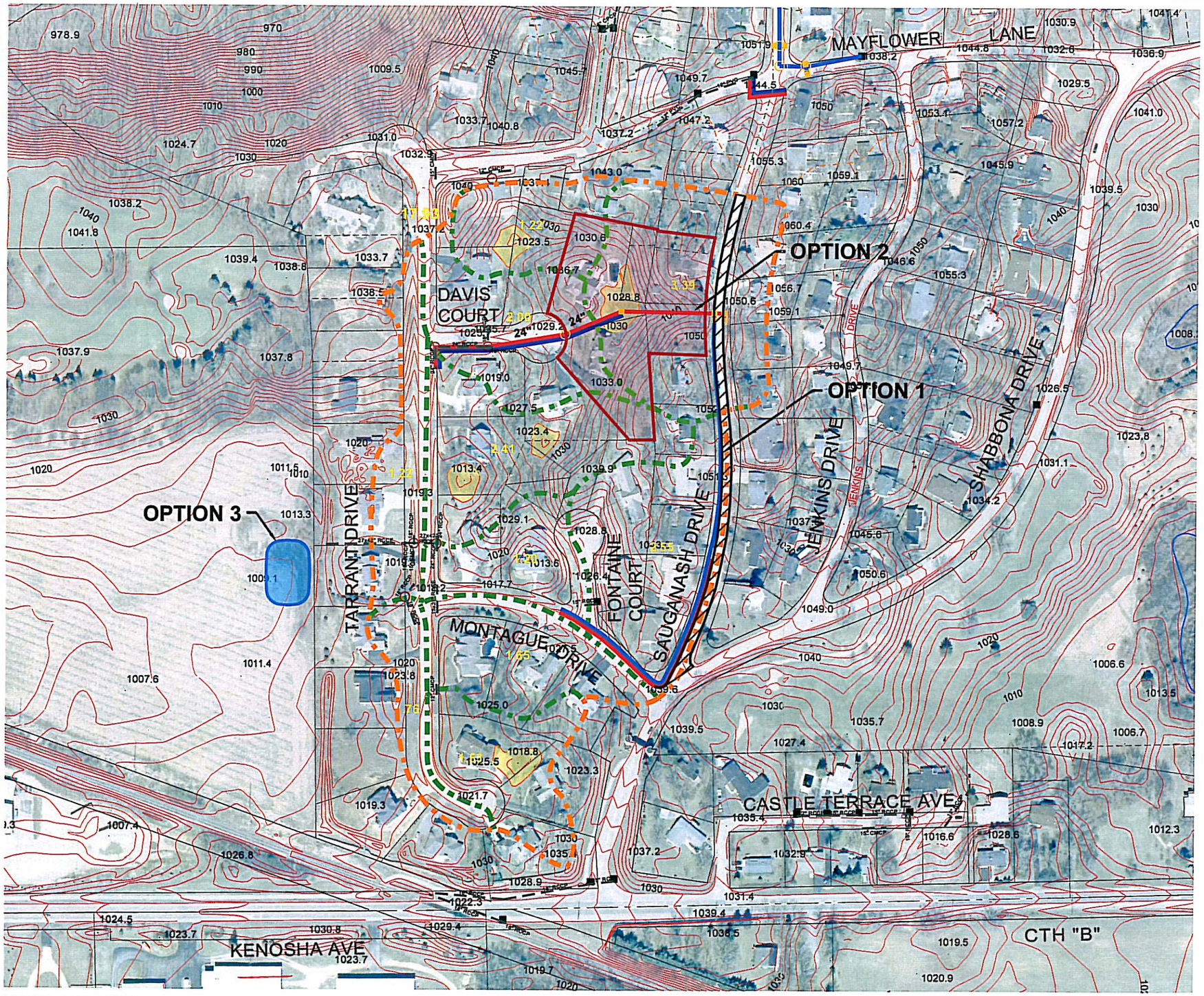

FONTANA on Geneva Lake

EXHIBIT 11

HOTSPOT 1
STORM WATER MANAGEMENT PLAN

VILLAGE OF FONTANA-ON-GENEVIA LAKE
WALWORTH COUNTY, WISCONSIN

LEGEND

- EXISTING STORM SEWER
- STORM SEWER OPTION
- STORM SEWER OPTION
- STORM SEWER OPTION
- BASIN BOUNDARY
- SUBBASIN BOUNDARY
- IDENTIFIED PROBLEM AREA
- EXISTING WATERWAYS
- DEPRESSION AREA
- POND OPTION
- ROAD RESURFACE

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GRAPHIC SCALE

DATE: SEPTEMBER, 2009

SOURCE: VILLAGE OF FONTANA-ON-GENEVA LAKE
BASEMAP SOURCE: WALWORTH COUNTY

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Hot Spot 1, Option 2 – This option also requires reconstruction of 950 feet of Sauganash Drive with a super elevated section with Carlson screed asphalt ditch similar to option 1 above. As part of this option a storm sewer easement through the affected properties on the east side of Davis Court and west side of Sauganash Drive would need to be acquired. Storm sewer installed from the low point in Sauganash Drive to an existing manhole in Davis Court through the acquired easement would relieve the ponding within the area identified on Exhibit 11. A new storm sewer system would also be constructed in the southern 300 feet of

Sauganash Drive. Additional capacity improvements are needed to the culvert and ditch system in Davis Court, Tarrant Drive and Montague Drive.

Hot Spot 1, Option 3 – The incorporation of a storm water detention facility would be constructed in conjunction with either option 1 or 2 or by itself. The benefits of the added storm water detention include peak flow reduction, sediment and pollutant removal to improve storm water runoff quality, and reduced erosion from concentrated storm sewer discharges. In addition to the above listed benefits considerations in the storm water detention facility design, provided the location has suitable soil and depths to groundwater, may provide for infiltration thereby reducing storm water volumes as well. The reduction in storm water volumes may minimize or eliminate any constant wetness, erosion, or other complaints from downstream property owners that may result from directing more storm water runoff to the west. The storm water detention facility location shown on the exhibit is for planning purposes only and the exact location would need to be evaluated in more detail. An easement and/or agreement would also be necessary with the current property owner.

Hot Spot 2 – Indian Hills Road and Brickley Drive

Hot Spot 2 incorporates multiple storm water locations within the watershed. Several storm sewer system and storage options were analyzed for Hot Spot 2 and are shown on Exhibit 12.

Hot Spot 2, Option 1 – This option reconstructs the east ditch-line of Mohr Rd. allowing for additional capacity along with placement of stone ditch checks and matting. This option will channel the contributing flow and control the velocity along with maintaining the integrity of the channel bottom. In addition, an upsized inlet structure and grate would be installed at the downstream end of the ditch to collect the storm water. This option includes upsizing the existing storm pipe crossing Mohr Road from the east ditch-line to the drainage ditch. An 18-inch reinforced concrete pipe (RCP) would be installed replacing the existing 12-inch pipe.

Hot Spot 2, Option 2 – This option up-sizes the existing 15-inch storm pipe under Indian Hills Road at South Lake Shore Drive to a 36-inch storm pipe. This would allow runoff from events up to a 100-year recurrence storm to pass through the pipe without overtopping the road, thereby reducing or eliminating the erosion and undermining of the road edge.

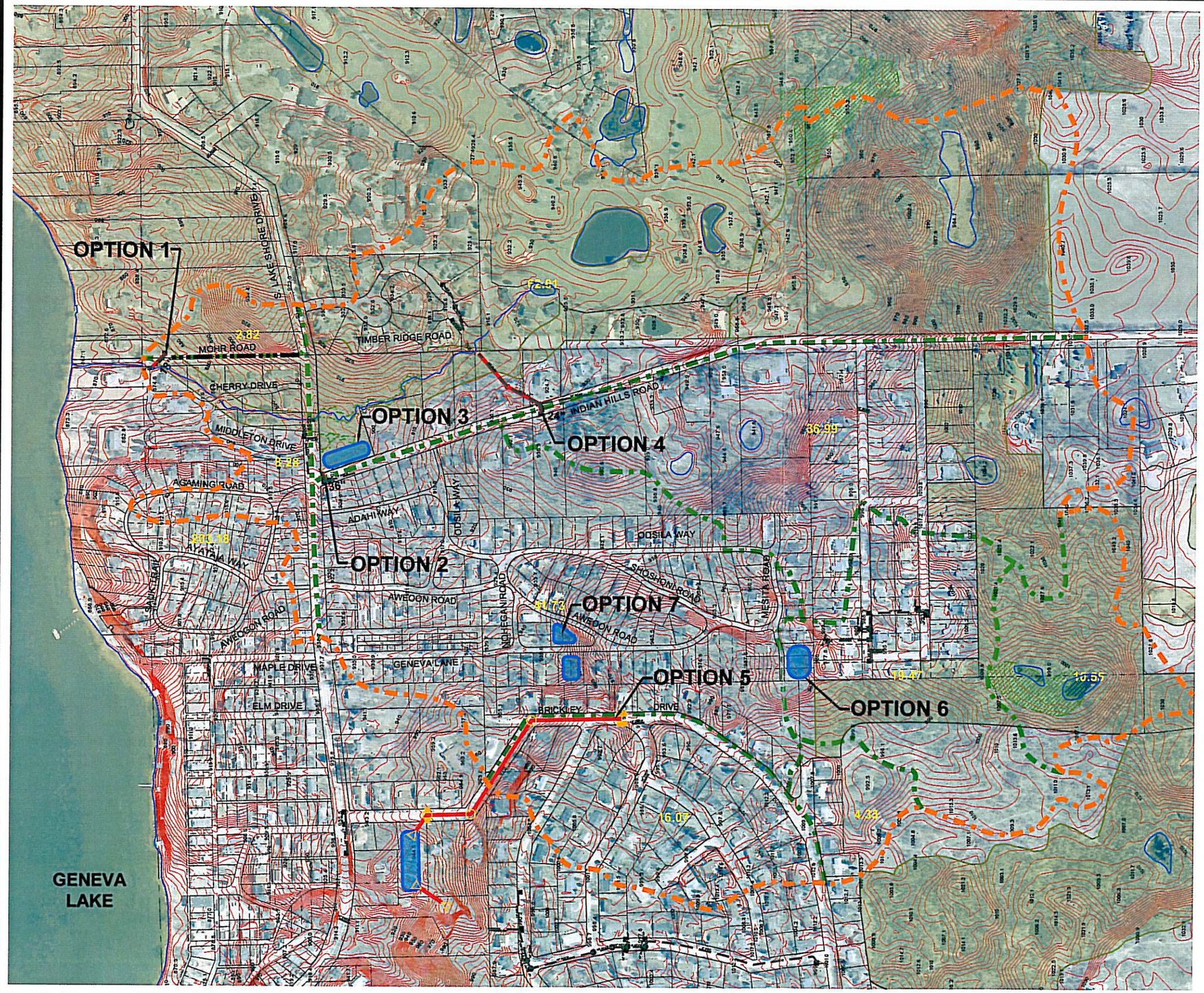

EXHIBIT 12

HOTSPOT 2
STORM WATER MANAGEMENT PLAN

VILLAGE OF FONTANA-ON-GENEVIA LAKE
WALWORTH COUNTY, WISCONSIN

LEGEND

- EXISTING STORM SEWER
- STORM SEWER OPTION
- STORM SEWER OPTION
- STORM SEWER OPTION
- DITCH
- BASIN BOUNDARY
- SUBBASIN BOUNDARY
- IDENTIFIED PROBLEM AREA
- EXISTING WATERWAYS
- DEPRESSION AREA
- POND OPTION
- WETLANDS
- ENVIRONMENTAL CORRIDORS

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DATE: SEPTEMBER, 2009

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engineering solutions for a working world

SOURCE: VILLAGE OF FONTANA-ON-GENEVA LAKE
BASEMAP SOURCE: WALWORTH COUNTY

Hot Spot 2, Option 3 – A storm water detention or bioretention facility was evaluated at the southeast corner of the intersection of South Lake Shore Drive and Indian Hills Road. This storm water facility would decrease the peak rate of storm water runoff to the downstream area and provide a reduction in total suspended solids and other pollutants. This option was also one of the recommended measures of the 2008 study conducted by Liesch Environmental. The site could be designed to incorporate a park or walking trails. The existing wetlands in the area indicate shallow groundwater levels in the area and could limit the type and size of proposed storm water facilities on the site. The storm water detention facility location shown on the exhibit is for planning purposes only and the exact location would need to be evaluated in more detail. An easement and/or agreement would also be necessary with the current property owner or the property would need to be acquired to install a storm water facility.

Hot Spot 2, Option 4 - This option, increases the size of the existing 15-inch storm pipe under Indian Hills Road to a 24-inch storm pipe. This would allow runoff from events up to a 100-year recurrence storm to pass through the pipe without overtopping the road and causing erosion and undermining of the edge of pavement.

Hot Spot 2, Option 5 – Installation of storm sewer in Brickley Drive was evaluated in conjunction with the construction of a storm water detention facility to reduce storm water volume, peak flow and improve storm water quality. The storm sewer would intercept flow normally contributing to the Indian Hills Subdivision and route it along Brickley Drive to the storm water detention facility. As part of this option the Village would have to acquire a parcel of land to accommodate the construction of the storm water detention facility. The parcel needed for the storm water detention facility construction is located immediately north of 744 Brickley Drive. This option would potentially reduce the size of pipe required at the downstream crossing of Indian Hills Road and North Lake Shore Drive as described in option 2 above, in addition to redirecting flows that currently flow through the subdivision.

Hot Spot 2, Option 6 – This option includes the construction of a storm water detention facility to help reduce storm water peak flows to the Indian Hills Subdivision in addition to obtaining a reduction in total suspended solids. The property in which the storm water detention facility would be constructed is already owned by the Village and therefore, no land would need to be acquired. This option would potentially reduce the size of pipe required at the downstream crossing of Indian Hills Road and North Lake Shore Drive as described in option 2 above.

Hot Spot 2, Option 7 – The installation of a storm water facility within Indian Hills Subdivision to reduce peak flows and possibly volumes was one of the recommended measures of the 2008 study conducted by Liesch Environmental. The plan referred to the site as the Aweogon Road site. However the parcel has steep slopes that are not conducive for storm water management activities (i.e. detention/retention ponds). The parcels are surrounded by private roads with a minimal storm water conveyance system. With this option, it is likely that additional conveyance improvements will be required in the private roads in the future. The plan also called for a network of roadside and private property swales.

Hot Spot 3 – Sauganash Drive & Tarrant Drive at Waubun Drive

Several storm sewer system and storage options were analyzed for Hot Spot 3 and are shown on Exhibit 13.

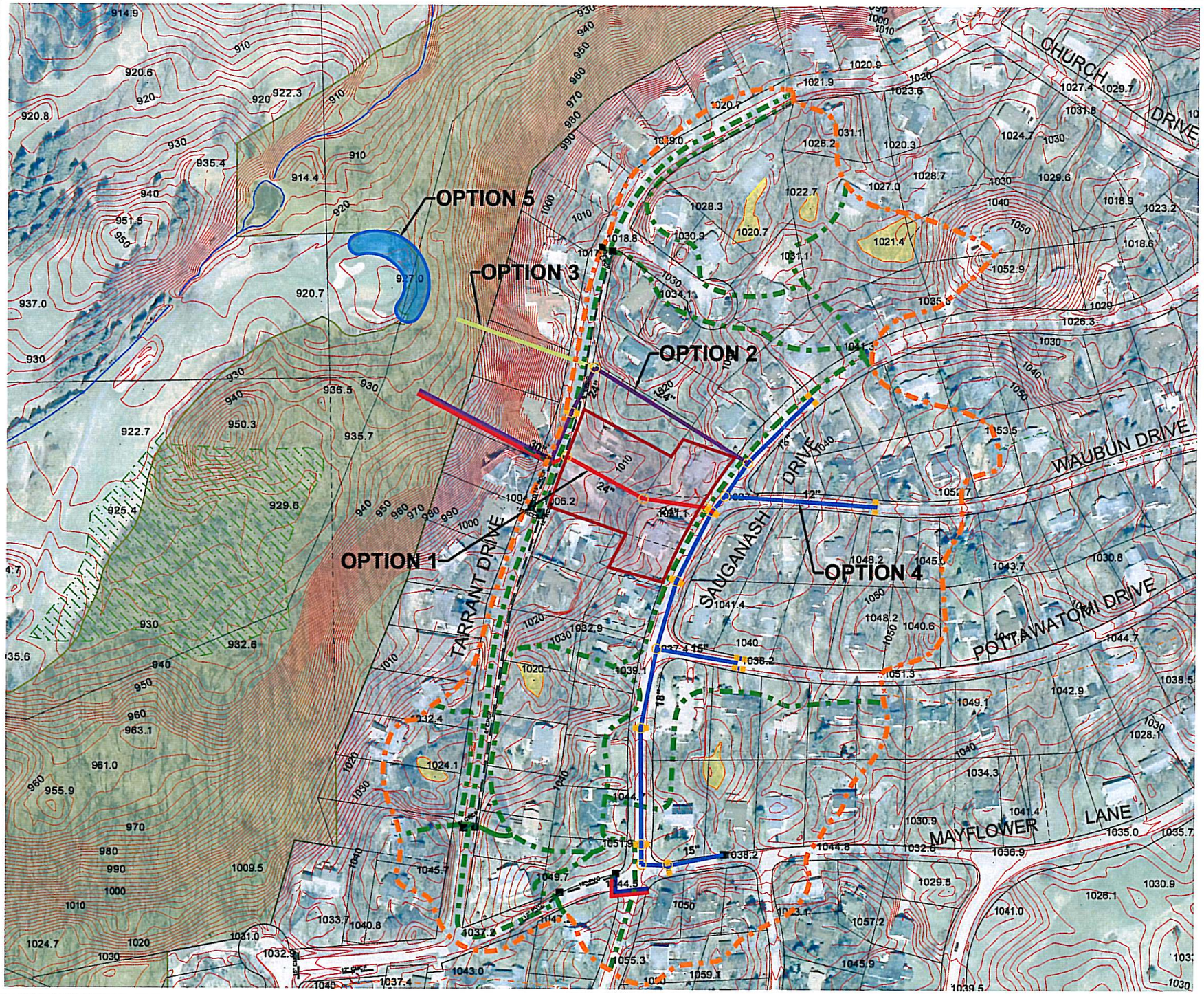
Hot Spot 3, Option 1 – This option includes the conveyance of storm water from the low point in Sauganash Drive via storm sewer through the side yards 908 and 916 Sauganash Drive and 897 and 905 Tarrant Drive. The storm sewer then crosses Tarrant Drive where it will then be either open cut or directionally drilled down the steep grade until discharging in the woods east of Big Foot Country Club golf course.

Hot Spot 3, Option 2 – This option is the same as option 1 with the exception that the storm sewer is shifted further north along the south sides of the residences at 900 Sauganash Drive and 885 Tarrant Drive. This routing maybe less disruptive to affected properties and may be easier to construct.

Hot Spot 3, Option 3 – Option 3 includes the relay or relocation of the storm sewer system outlet pipe from the easement on the south side of lot 896 Tarrant Drive to the empty lot south of 886 Tarrant Drive. The existing storm sewer outlet pipe is located adjacent to an existing sanitary sewer lift station and access is extremely limited. Either of options 1 or 2 could be constructed with or without option 3. Option 3 in conjunction with option 2, referred to as option 3A, would reduce the length of storm water pipe necessary in Tarrant Drive. Option 3 in conjunction with option 1, referred to as option 3B, would increase the length of storm water pipe necessary in Tarrant Drive. A new storm water easement would be required however if option 3A is selected.

Hot Spot 3, Option 4 – This option simply expands the storm sewer system along Sauganash Drive and the adjoining roads, and would be utilized in conjunction with options 1 through 3. Storm water runoff is captured throughout the subdivision thereby minimizing or eliminating ponding water and drainage issues in other areas in addition to the low point at Sauganash Drive. This option would require installing curb and gutter and street reconstruction but could be constructed after the previous options are installed.

Hot Spot 3, Option 5 – This option can be used in addition to options 1 through 4 and includes construction of a storm water detention facility to capture storm water runoff prior to reaching Potawatomi Creek. The benefits of the added storm water detention include peak flow reduction, sediment and pollutant removal to improve storm water runoff quality, and reduced erosion from concentrated storm sewer discharges. In addition to the above listed benefits considerations in the storm water detention facility design, may allow for infiltration, provided the location has suitable soil and depths to groundwater thereby reducing storm water runoff volumes as well. The storm water detention facility location shown on the exhibit is for planning purposes only and the exact location would need to be evaluated in more detail. An easement and/or agreement would also be necessary with Big Foot Country Club, as they currently own the land where the storm water detention facility would be located.



FONTANA on Geneva Lake

EXHIBIT 13

HOTSPOT 3
STORM WATER MANAGEMENT PLAN

VILLAGE OF FONTANA-ON-GENEVIA LAKE
WALWORTH COUNTY, WISCONSIN

LEGEND

- EXISTING STORM SEWER
- STORM SEWER OPTION
- STORM SEWER OPTION
- STORM SEWER OPTION
- STORM SEWER OPTION
- BASIN BOUNDARY
- SUBBASIN BOUNDARY
- IDENTIFIED PROBLEM AREA
- EXISTING WATERWAYS
- DEPRESSION AREA
- POND OPTION
- WETLANDS
- ENVIRONMENTAL CORRIDORS

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GRAPHIC SCALE

DATE: SEPTEMBER, 2009

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SOURCE: VILLAGE OF FONTANA-ON-GENEVA LAKE
BASEMAP SOURCE: WALWORTH COUNTY

Hot Spot 4 – Abbey Hill Condominiums at STH 67

The main problem from this area is the runoff from the Town of Walworth and STH 67 right-of-way that flows towards the Abbey Hill Condominium buildings. Most of this work would take place in the Wisconsin Dept of Transportation (DOT) STH 67 right-of-way so additional state approvals would be necessary. Several storm water conveyance options were analyzed for Hot Spot 4 and are shown on Exhibit 14.

Hot Spot 4, Option 1 – Option 1 consists of the creation of a berm along the south side of the ditch on the south side of STH 67 just north of the north culvert crossing. The berm would be located across the swale where runoff from STH 67 currently leaves the right-of-way and heads southeast towards the condominiums. This proposed earthen berm would need to be installed in combination with other options to provide a comprehensive storm water solution.

Hot Spot 4, Option 2 & 2A – Option 2, in conjunction with Option 1, would redirect the runoff from the location where it currently flows towards the condominiums to the north along the east side of the STH 67 right-of-way. The runoff would be collected by a new 18-inch storm sewer and piped 750 feet to the north and outfall on the east side of South Main Street. Option 2A follows the same route as option 2 but replaces 650 feet of new storm sewer pipe with ditch work. Although option 2A has a smaller construction cost than option 2, the grading required for the ditch work may not be allowable in the DOT right-of-way.

Hot Spot 4, Option 3 - This storm water detention facility option can be used in conjunction with options 1, 2 or 2A. The benefits of the added storm water detention include peak flow reduction, sediment and pollutant removal to improve storm water runoff quality, and reduced erosion from concentrated storm sewer discharges. In addition to the above listed benefits, this storm water detention facility design may allow for infiltration, provided the location has suitable soil and depths to groundwater thereby reducing storm water volumes as well. The Village already owns the parcel of land on which the proposed storm water detention facility is located and thus property acquisition would not be necessary.

Hot Spot 4, Option 4 - This option would intercept storm water runoff on the south side of STH 67 and direct it north across STH 67 in the location of the existing 30-inch pipe and then northeast in the ditch line along the north side of STH 67. The berm work described in option 1 would also be required. Approximately 260 feet of 18-inch storm sewer would need to be installed. A temporary variation of this option could also be implemented relatively quickly by berming around the south side of the existing 30-inch pipe and forcing the water to pond until it flows north, against the normal flow direction of the pipe. The water would pond several feet on the south side before it could reach a level where it would flow northeast in the existing ditch line. This option would also increase the amount of water directed to the Fontana Fen, which Village Staff has indicated is experienced lower water levels in the past several years.

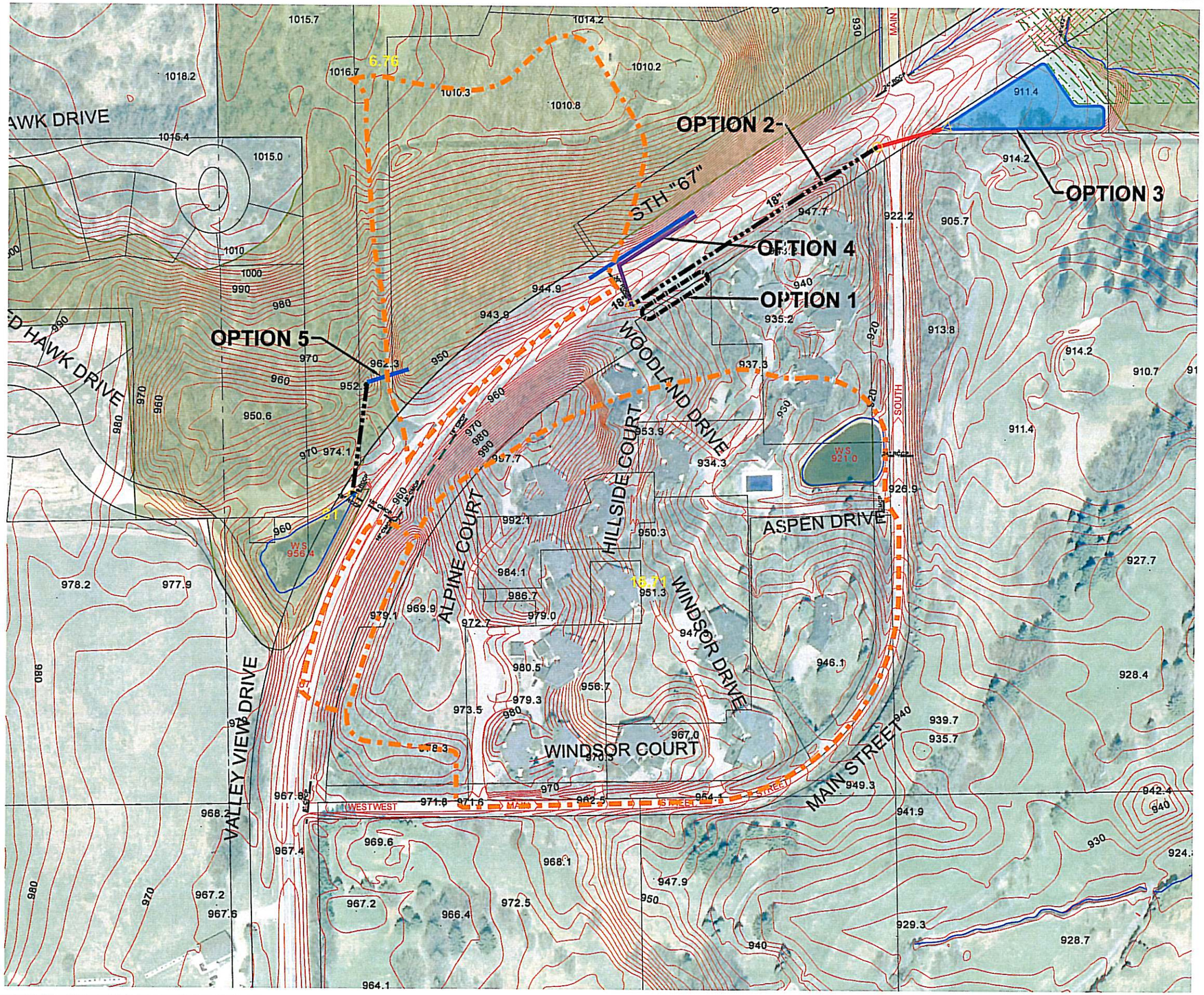

EXHIBIT 14

HOTSPOT 4
STORM WATER MANAGEMENT PLAN

VILLAGE OF FONTANA-ON-GENEVIA LAKE
WALWORTH COUNTY, WISCONSIN

LEGEND

- EXISTING STORM SEWER
- STORM SEWER OPTION
- STORM SEWER OPTION
- STORM SEWER OPTION
- DITCH
- BERM
- BASIN BOUNDARY
- SUBBASIN BOUNDARY
- IDENTIFIED PROBLEM AREA
- EXISTING WATERWAYS
- DEPRESSION AREA
- POND OPTION
- WETLANDS
- ENVIRONMENTAL CORRIDORS

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GRAPHIC SCALE

DATE: SEPTEMBER, 2009

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SOURCE: VILLAGE OF FONTANA-ON-GENEVA LAKE
BASEMAP SOURCE: WALWORTH COUNTY

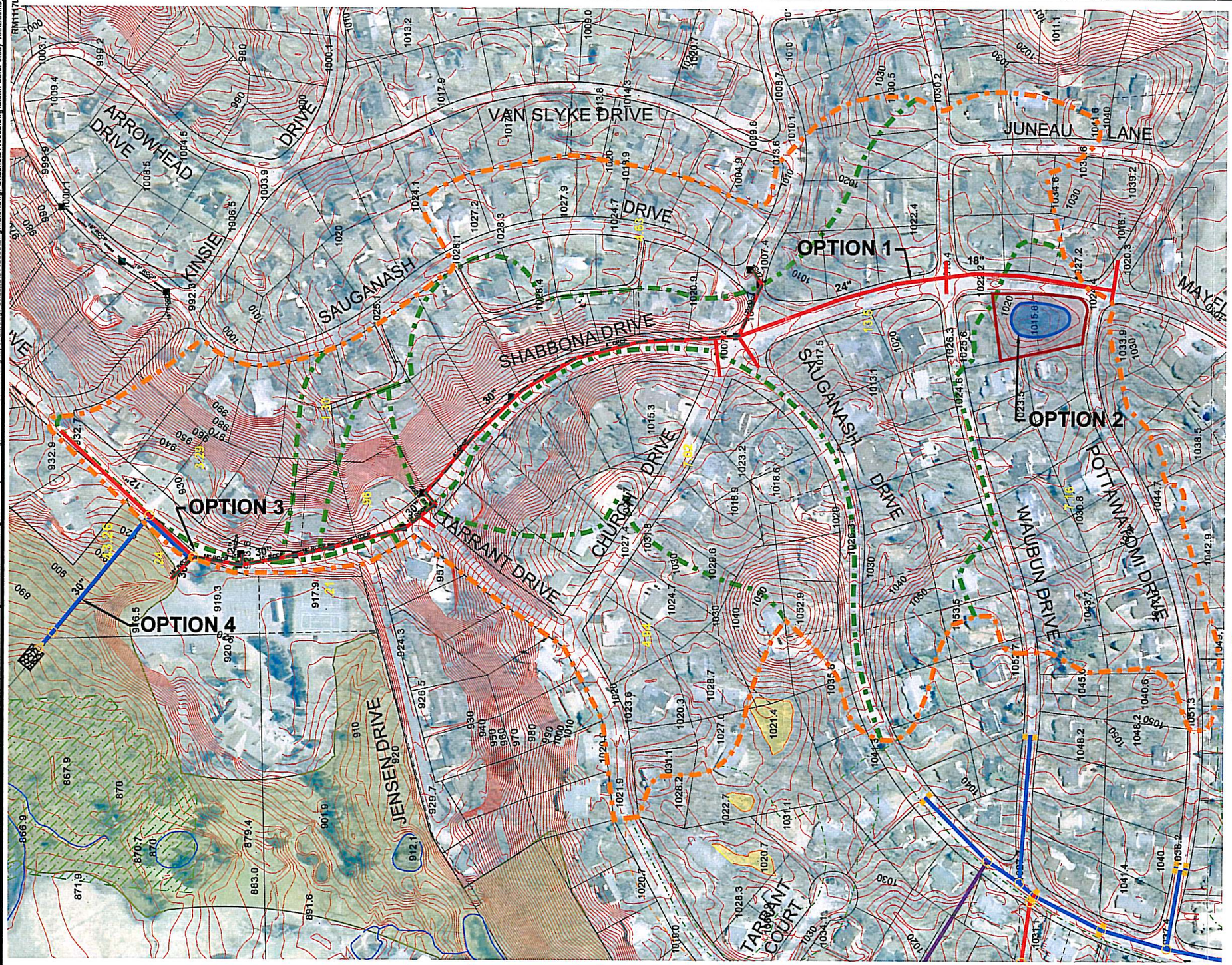
Hot Spot 4, Option 5 – Under this option the outfall structure of the storm water detention facility on the northwest side of STH 67 as well as the existing 18-inch storm pipe crossing STH 67 was evaluated. The storm water detention facility outfall can be reconfigured so that it discharges to the northeast rather than the southeast under the highway. The current outfall structure and 18-inch storm pipe under STH 67 would be abandoned. In addition, a culvert pipe would need to be installed across the driveway located 150 feet northeast of the storm water detention facility on the north side of the STH 67. Approximately 230 feet of ditch-line would need to be excavated as well as the installation of 330 feet of 18-inch storm sewer pipe. The existing 30-inch storm crossing would also be abandoned and the berm work described in option 1 would also be included. This option would also increase the amount of water directed to the Fontana Fen, which Village Staff has indicated is experienced lower water levels in the past several years.

Hot Spot 5 – Shabbona Drive Between Big Foot Country Club and Pottawatomi Drive

Several storm sewer system and storage options were analyzed for Hot Spot 3 and are shown on Exhibit 15.

Hot Spot 5, Option 1 – Option 1 of Hot Spot 5 involves the relay and extension of the storm sewer in Shabbona Drive that extends from the north side of the Big Foot Country Club clubhouse to Sauganash Drive. In addition to upsizing of the system and creating maintenance access points, it includes an extension to the south in order to pick up two noted areas of concern. The first area includes the two vacant parcels located on the northwest corner of Shabbona Drive and Pottawatomi Drive where water ponds in the depressed area after storm events. The second area is the depressed area on the parcel located on the northeast corner of Shabbona Drive and Pottawatomi Drive. Stubs would be provided along the route at those locations allowing for future connections. The discharge point in this option was left in the original position, which would require some hillside stabilization to repair an existing eroded area and armoring to prevent future erosion. Trench patching would be required as a minimum road restoration measure, although pulverize, shape and overlay may be recommended during the design phase.

Hot Spot 5, Option 1A is a limited variation of option 1 where only the storm sewer south of Tarrant Drive would be installed/relayed. The existing 15 and 18-inch storm sewer north of Tarrant Drive would remain. The __ feet of storm sewer installed south of Tarrant Drive would be installed as 15-inch storm sewer. This option would not meet the standard Village design guidelines for a conveyance system designed to handle a 10-year recurrence storm event and an overland flow route to handle a 100-year recurrence storm event, however it would not require the reconstruction of the entire existing storm sewer system.



FONTANA on Geneva Lake

EXHIBIT 15

HOTSPOT 5
STORM WATER MANAGEMENT PLAN

VILLAGE OF FONTANA-ON-GENEVIA LAKE
WALWORTH COUNTY, WISCONSIN

LEGEND

- EXISTING STORM SEWER
- STORM SEWER OPTION
- STORM SEWER OPTION
- STORM SEWER OPTION
- BASIN BOUNDARY
- SUBBASIN BOUNDARY
- IDENTIFIED PROBLEM AREA
- EXISTING WATERWAYS
- DEPRESSION AREA
- POND OPTION
- WETLANDS
- ENVIRONMENTAL CORRIDORS

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GRAPHIC SCALE

DATE: SEPTEMBER, 2009

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SOURCE: VILLAGE OF FONTANA-ON-GENEVA LAKE
BASEMAP SOURCE: WALWORTH COUNTY

Hot Spot 5, Option 2 – This storm water detention facility option can be constructed on its own or in conjunction with the other storm water options for Hot Spot 5. The benefits of the added storm water detention include peak flow reduction, sediment and pollutant removal to improve storm water runoff quality, and reduced erosion from concentrated storm sewer discharges. Water quality benefits measured at the downstream end of the storm sewer near the Big Foot Country Club clubhouse prior to discharge into Potawatomi Creek will be minimal however, as this storm water detention facility would only treat runoff from a small portion of the watershed. An easement, land purchase or agreement would also be necessary with the property owners. The storm water detention facility could also potentially reduce the sizing of the downstream storm sewer system described in option 1.

Hot Spot 5, Option 3 – A mechanical water quality separator unit would be installed prior to the outfall location to collect debris and pollutants in the storm water runoff prior to discharging to the wetland and Potawatomi Creek. The unit could be installed in the road right-of-way or adjacent private parking lot for easy maintenance access, and can be installed in locations where storm water detention facilities cannot.

Hot Spot 5, Option 4 – Option 4 involves relaying the outfall pipe approximately 120 feet further north. This new location is in line with a portion of the hill that has a more gradual and consistent downhill slope. At this point a new section of 30-inch storm sewer pipe will be extended west down the slope of the hill for 340 feet. The discharge location is located in a flatter section than the existing discharge area, which will result in less erosion and sediment loss into the existing wetland and Potawatomi Creek. The new discharge point will still require armoring to minimize erosion and protect the area.

Hot Spot 5, Option 5 – This option involves constructing a storm water detention facility within the Big Foot Country Club property near the existing storm water outfall location. Several locations were analyzed during the study including underground storage in the parking lot and areas to the north and west of the existing clubhouse. The high cost of construction and maintenance, as well as nominal water quality improvements eliminated the underground storage option from further consideration. The presence of wetlands as well as steep terrain and existing ponds removed the storm water detention facility option at the Big Foot Country Club clubhouse from consideration.

Recurring Problem Areas 1 – 4

For the four recurring Problem Areas, no site-specific exhibits were created and only one alternative was analyzed for each area. The general locations of the Problem Areas are shown on Exhibit 9.

The alternative for Problem Area 1 includes installation of approximately 3,400 feet of curb and gutter and 1,100 feet of 12 through 18-inch storm sewer to collect and convey runoff in the North Lake Shore Drive right-of-way to a ditch draining into Geneva Lake. An overlay of the street in order to provide a crown and direct storm water toward the curb line would also be necessary.

The Problem Area 2 alternative includes installation of approximately 1,500 feet of curb and gutter and 300 feet of 12 through 18-inch storm sewer to collect and convey runoff in the North Lake Shore Drive right-of-way to a ditch draining into Geneva Lake. An overlay of the street in order to provide a crown and direct storm water toward the curb line would also be necessary.

Problem Area 3 results from storm water runoff from Dade Avenue and farm fields located in the Town of Walworth. In order to minimize the erosion along the road as well as in the recently restored native prairie north of the pedestrian/bike path a rain garden is proposed. Some minor asphalt curbing work would also be necessary to direct runoff from the road into the rain garden.

Problem Area 4 is the deposition of sediment and pollutants into Potawatomi Creek. Within the Big Foot Country Club the proper design and installation of riprap, biologs, erosion mat and other soft armoring or stabilization methods can address bank erosion and resulting sedimentation. A minimum 30 foot native plant buffer of waterways within the golf course that are currently mowed right up to the top of bank can reduce further erosion and filter particles prior to them reaching the waterways. Sedimentation within storm water management facilities installed in the upper reaches of the watershed will reduce pollution and sediment loads to the creek. Once bank erosion and sediment removal can be achieved upstream of the navigable waterways, existing ponds or pools can be dredged with proper permitting.

CHAPTER SEVEN
RECOMMENDED PLAN

Introduction

The preparation of the recommended storm water management system plan for the Village of Fontana-on-Geneva Lake involved a synthesis of corrective measures selected from among the alternatives considered and described in Chapter Seven. The selection of the corrective measures to be included in the recommended plan was based upon a comparative economic analysis, consideration to the level of protection provided, ease of construction and potential environmental impacts. The recommended plan is presented in summary form in Table 2. Detailed cost estimates for each recommended plan can be found in Appendix A.

Undeveloped or available parcels should be reviewed for possible Village storm water management activities when storm water projects occur. The availability of land in one of the Hot Spot or Problem Areas could affect the location of facilities or the alternative selected for construction, which may differ from the recommended plan.

It should be reinforced, however, that even after implementing all of the following recommendations, complete prevention of future flooding is not possible. Therefore these recommendations are intended to minimize the effects of future flooding by containing the flooding to areas designated to convey or store the runoff (floodplains and ponds). In addition, all structures and critical infrastructure shall be removed from the flood storage and conveyance areas. The recommendations are also intended to ensure that future development does not increase flooding in other areas of the Village.

Hot Spot 1 – Sauganash Drive Near Davis Court

The recommended plan for the Hot Spot 1 is a combination of capacity and conveyance improvements as well as a storm water detention facility. Option 2 is the recommended conveyance improvement alternative. Both Options 1 and 2 address ponding on private properties at the end of Davis Court by upsizing the storm sewer in Tarrant Drive and Davis Court and extending the storm sewer to the depression area east of Davis Court. Both options also add storm sewer in Sauganash Drive between Montague Drive and Mayflower Lane and upsize the existing conveyance system in Montague Drive. However, Option 2 requires less tree clearing to install the storm sewer system, does not require easements from property owners along the west side of Sauganash Drive and will require less maintenance outside of the Village right-of-way than Option 1.

In addition to the conveyance options the storm water detention facility, described in Option 3, is recommended at the downstream end of the existing Tarrant Drive storm sewer outfall. While the total volume of water being directed to the existing storm sewer outfall will remain similar to existing conditions, the new storm sewer will allow the runoff to reach the outfall area sooner with higher peak flows, and some of the runoff that used to be detained in depression areas on private properties will now flow to this outfall. The runoff from Hot Spot area 1 is also tributary to Potawatomi Creek. By reducing sediment loads from this basin sediment loads reaching Potawatomi Creek will also be less.

Table 2
Summary of Recommended Corrective Measures
Village of Fontana-on-Geneva Lake, Walworth County, Wisconsin: 2009

Areas of Concern	Project and Component Description	Village Capital Cost	Area Subtotal	Exh #
Hot Spot #1 (Davis Ct, Sauganash Dr)	Opt 2 - 1700' of 8"-30" storm sewer in Sauganash Dr to Montague Opt 3 - 2.9 acre-ft storm water facility (2)	$325,000 $215,000	$540,000	11
Hot Spot #2 (Indian Hills Subdivision, Mohr Rd & Brickley Dr)	Opt 1 - Mohr Rd ditching & relay 50' of 18" storm sewer Opt 2 - Relay 350' of 24"-36" storm sewer Opt 4 - Relay 350' of 24" storm sewer Opt 5 - 1350' of 12"-24" storm sewer & 2.7 acre-ft storm water facility (2) Opt 6 - 1.0 acre-ft storm water facility	$39,000 $78,000 $67,000 $512,000 $129,000	$825,000	12
Hot Spot #3 (Tarrant Dr, Sauganash Dr)	Opt 2 - 790' of 12"-30" storm sewer Opt 3B - Relocate storm outfall with option 2 (2) Opt 4 - 1730' of 12"-18" storm sewer extension Opt 5 - 1.5 acre-ft storm water facility (2)	$267,000 ($27,000) $414,000 $143,000	$797,000	13
Hot Spot #4 (STH 67 & S. Main St)	Opt 1 - Install berm along south side of STH 67 R.O.W. Opt 2A - 100' of 18" storm sewer & ditching Opt 3 - 3.1 acre-ft storm water or bioretention facility	$34,000 $46,000 $229,000	$309,000	14
Hot Spot #5 (Shabbona Dr)	Opt 1 - Shabbona Dr storm sewer relay/extension Opt 3 - Mechanical storm water quality separator Opt 4 - Relay 490' of 30" storm sewer outlet (2)	$682,000 $102,000 $110,000	$894,000	15
Problem Area #1 (Lakeshore Dr @ N Lower Gardens Rd)	Curb & gutter, storm sewer	$300,000	$300,000	9
Problem Area #2 (Lakeshore Dr @ Belvidere Pl)	Curb & gutter, storm sewer	$136,000	$136,000	9
Problem Area #3 (Duck Pond Recreation Area)	Raingarden to intercept runoff from Dade Ave north of trail underpass	$100,000	$100,000	9
Problem Area #4 (Potawatomi Cr)	Streambank stabilization, native plant waterway buffers, pond dredging (3) Potawatomi Creek Phase 1 Initial Assessment	$0 $25,000	$25,000	9
Village Wide	Land acquistion and easements	$500,000	$500,000	

Total Village Capital Costs =	$4,400,000

1) Costs reflect January 2009 dollars and include 30% for contingency, legal, engineering and administration.
2) Cost for land acquisition/easements for storm water facilities not included
3) Potential Private Landowner Cost
4) Storm sewer alternatives include pipe, structures, erosion control, trench patching or asphalt overlay

The total estimated cost for Hot Spot area 1 is $540,000, not including any potential land acquisition or easement costs.

Hot Spot 2 – Indian Hills Road and Brickley Drive

Hot Spot Area 2 recommendations include both capacity and conveyance improvements as well as storm water detention. Option 1 that incorporates improvements to the Mohr Road drainage system is recommended. The improvements include reconstruction of the road ditch line on the east side of Mohr Road and replacement of the storm sewer and inlet structure at the north end of Mohr Road.

Option 2 and Option 4 are recommended to increase capacity of the storm water pipes crossing Indian Hills Road. Both are undersized and result in overtopping of the Indian Hills during large storm events that cause rutting and undermining of the asphalt as well as dangerous conditions for vehicles or pedestrians.

To reduce peak flow rates to the Indian Hills Subdivision, Options 5 and 6 are recommended. Option 5 is a combination of storm sewer and detention that would intercept approximately 16 acres of primarily residential runoff at Brickley Drive that is currently flowing into the Indian Hills Subdivision. The parcel where the storm water pond for Option 5 is shown is currently not owned by the Village and would need to be acquired. Approximately 19 acres of residential and undeveloped lands are tributary to the storm water detention facility described in Option 6. Because the Village already owns the land no acquisition costs would be required for Option 6. Option 3, while near the downstream end of the basin is not recommended because of size limitations due to adjacent wetlands. A high water table in the vicinity of the Option 3 could also place additional design constraints on a storm water detention facility, limiting its effectiveness.

The total estimated cost for Hot Spot Area 2 is $825,000, not including any potential land acquisition or easement costs.

Hot Spot 3 – Sauganash Drive & Tarrant Drive at Waubun Drive

Storm water collection, conveyance, storage and treatment are recommended for Hot Spot Area 3. Options 1 through 3 are all improvements to the existing storm water system to reduce flooding of private properties and road drainage. The combination of Option 2 and 3B are recommended as they provide the most cost effective method to address the drainage current drainage problem, and can be constructed with the least amount of disturbance to existing residences. Drainage easements will be required in order to construct the new outfall pipes in either outfall location option. We are recommending that Option 3B be installed through directional drilling methods if possible to minimize the amount of tree clearing necessary, to reduce the potential for erosion and to reduce construction costs.

Option 4 is the extension of the storm sewer system along Sauganash Drive and the connecting roads within the drainage basin. This option is recommended but could potentially be installed at a later date in conjunction with a possible water main relay or road reconstruction project to reduce costs.

The storm water detention facility shown as Option 5 on Exhibit 13 is also recommended to reduce the amount of suspended solids and pollution load to the waterway that leads to Potawatomi Creek and eventually into Geneva Lake. The storm water detention facility will also serve to reduce peak runoff rates in the waterway that is currently experiencing bank erosion. The design and location of the storm water detention facility will need to be analyzed further in the preliminary design phase and agreements made with the property owners, Big Foot Country Club.

The total estimated cost for Hot Spot Area 3 is $797,000, not including any potential land acquisition or easement costs.

Hot Spot 4 – Abbey Hill Condominiums At STH 67

The recommended plan for Hot Spot 4 is a combination of capacity and conveyance improvements as well as a storm water detention facility. Option 1 is recommended for all alternatives as the berm removes the main drainage swale directing water from the STH 67 right-of-way towards the Abbey Hills Condominiums. The other options are largely dependent on obtaining DOT approvals to construct the work in the State right-of-way.

Option 2A that provides a reconstructed ditch line along with the storm water detention facility described in Option 3 are recommended as they would convey the water away from the Abbey Hills area as well as provide additional storm water quality treatment prior in the detention pond prior to reaching the tributary to Potawatomi Creek. There are existing underground private utilities located in the area of Option 2 and 2A that may need to be relocated or could affect the design of ditches or storm sewer placement. The design of roadside ditches within the DOT right-of-way must also meet DOT standards.

Options 4 or 5 would be viable options, especially if the storm water detention facility described in Option 3 were not built. The other potential benefit to Options 4 and 5 are that they would increase the amount of water directed towards the Fontana Fen, which Village Staff has indicated is experienced lower water levels in the past several years. A proposed bike trail along the north side of STH 67 as well as potential concerns with additional water in the shallow roadside ditches on the north side of the highway were also of concern and removed Options 4 and 5 from consideration at this time.

In addition to the above-referenced options for Hot Spot 1, another potential temporary remedy to help prevent runoff from flooding the Abbey Hills Condominiums was discussed with the advisory group. This would be to install the berm in Option 1 and another smaller 3-foot high berm on the south side of the existing 30-inch culvert under STH 67 to reverse the flow in the pipe. The runoff would pond several feet on the south side of 67 before flowing north through the pipe and eventually northeast along the north side of STH 67. DOT approvals would be required for any work within the STH 67 right-of-way.

The total estimated cost for Hot Spot Area 4 is $309,000, not including any potential land acquisition or easement costs.

Hot Spot 5 – Shabbona Drive Between Big Foot Country Club and Pottawatomi Drive

The recommended plan for Hot Spot Area 5 includes capacity, conveyance and water quality improvements. The Option 1 storm sewer relay and extension is recommended to extend storm sewer to the upstream sections of Shabbona Drive currently unserved by a public drainage system, and to increase the capacity of the existing storm sewer to meet the Village design guidelines. The new storm sewer will also allow maintenance access to portions of the existing storm sewer that are currently not accessible without excavating the pipe. The Option 4 storm sewer outfall relay is also recommended to reduce the severe erosion problems occurring at the existing storm sewer outfall pipe just north of the Big Foot Country Club clubhouse.

To provide additional water quality improvements prior to the runoff discharge reaching the wetlands and Potawatomi Creek a mechanical storm water quality separator unit is recommended as described in Option 3.

The total estimated cost for Hot Spot Area 5 is $894,000, not including any potential land acquisition or easement costs.

Recurring Problem Areas 1 – 4

The recommendations for recurring problems areas 1 through 4 is the same as described in the alternatives section as only one alternative was selected for each Problem Area. These include capacity and road improvements for Problem Areas 1 and 2, and a rain garden or bioretention area in Duck Pond Recreation Area for Problem Area 3. The recommendations for Problem Area 4, the Potawatomi Creek watershed, will be addressed by water quality recommendations in Problem Areas 3, 4 & 5 as well as recommendations for bank stabilization and native plant buffers for the waterways flowing through the Big Foot Country Club golf course. In addition, we recommend the Village consider proceeding with a phase one initial assessment of Potawatomi Creek for the purposes of restoring the Potawatomi and Van Slyke Creek. Potential costs for stream restoration recommendations resulting from the Potawatomi Creek assessment are not included in this study.

The total estimated cost for recurring Problem Areas 1 through 4 is $561,000.

An additional $500,000 is budgeted for potential land acquisition or easement costs for all of the Hot Spot and recurring Problem Areas.

General Recommendations

We recommend that the Village consider a change to the storm water ordinance to further restrict and regulate the location of buildings within natural depression areas where storm water runoff ponds and there is no outlet for the runoff, and areas that have high water tables. Waukesha County has drafted such an ordinance and rules regarding development in natural depression areas that we have modified for use in other communities. A copy of the Waukesha County rule is included in Appendix B. We also recommend the storm water ordinance also be updated to

comply with the construction site and post-construction storm water management regulations within Chapters NR 151 and NR 216 of the Wisconsin Administrative Code

The Village should work with private property owners in maintaining Village-owned or private drainage easements free of floatable materials that may impair the storm water facilities. This would also include any areas that are within the designated FEMA floodplain. Easements shall be executed over public storm water infrastructure on private properties to the best extent possible so that the Village can maintain the storm water system.

The Village should continue their ongoing storm water maintenance program including as needed: tree and brush removal, structural repair and rehabilitation, routine inspection of major facilities, cleaning and dredging of detention and retention ponds and waterway bank stabilization. We recommend that the Village set up a GIS system to track Village and privately owned and maintained storm water facilities as well as maintenance inspections and practices.

We recommend the Village work with neighboring communities to enforce their storm water ordinances.

We recommend the Village explore the formation of a Storm Water Utility to provide a source of operating funds for ongoing maintenance of storm water facilities and a source of capital funding for expansion of the existing storm water system.

Public Education and Outreach

To increase public awareness of storm sewer impacts on surface and ground water quality, the Village should develop a public education and outreach program. Since it is generally more cost effective to modify an existing program than to develop a new program, it is recommended that the Village partner with the existing public education materials published by the Wisconsin Department of Natural Resources or the University of Wisconsin Extension. The educational materials may be distributed at the Village Hall, the public library, citizen centers or through mailings with utility bills.

In addition to printed materials, the recommended plan includes the following options which may also be employed: creation of a storm water telephone hotline and/or web site to procure information and allow citizens to provide comments back to the Village; development of an educational program for grade school children; recreational guides; posters; bumper stickers; radio or television commercials; restaurant placemats; participation at community festivals; or tributary signage along water resources throughout the Village. To be effective, the selected options must use a mix of appropriate strategies to address viewpoints and concerns from a variety of audiences.

CHAPTER EIGHT
IMPLEMENTATION

Introduction

The final step in the storm water management system planning process will be development of a program for the implementation of the recommended plan. In this step, the recommended corrective measures within the Village will need to be prioritized, and a capital improvement program developed on the basis of this prioritization and estimates of potentially available funding. Following formal adoption of the recommended plan by the Village of Fontana-on-Geneva Lake, realization of the plan will require a long-term commitment to the objectives of the plan, and a high degree of coordination and cooperation among Village officials and Staff, Wisconsin Department of Natural Resources Staff, developers and citizens.

The systems-level storm water management plan presented in this report is intended to serve as a guide to the future design and construction of storm water management facilities. Detailed engineering design should examine in greater depth and detail potential variations in the technical, economic and environmental features of the recommended solutions identified in the system plan in order to determine the best means of carrying out the plan. The resulting facility development plans, however, should be fully consistent with the system plan recommendations presented in this report.

Capital Improvement Program

The estimated cost of the recommended corrective measures for the Village of Fontana-on-Geneva Lake totals $4.4 million expressed in 2009 actual dollars. In order to provide a conservative estimate of the financial impact of the recommended plan, it was assumed that this entire cost would be locally borne through the levy of property taxes. In fact, however, some of these costs may be borne by, or shared with, State and County highway agencies, other local units of government, private property owners; or if a storm water management utility is created by user fees.

Three alternative approaches to funding and implementing the recommended improvement plan exist; one based upon cash financing--that is, upon a "pay as you go" approach utilizing local funding; one based upon debt financing utilizing low interest loans; and one based upon the creation of a storm water utility and the use of user charges.

Funding for capital improvements and operation and maintenance costs may be obtained through local property taxes, special assessments, issuance of general obligation bonds, reserve funds, private developer contributions and grants from the State of Wisconsin. The Village may be able to obtain financial assistance from the Wisconsin Department of Natural Resources Wisconsin Nonpoint Source Pollution Abatement Program for the construction of certain components of the water quality management element.

It is recommended that the low priority improvement projects be completed as an integral part of and at the time of future roadway construction or reconstruction projects. This would permit funding of these improvements to be included in the roadway improvement projects.

At the time of this study, the Village was concurrently on a Village-wide Storm Water Utility study that could be used to help finance a portion of the storm water recommendations addressed in this study.

Environmental Impacts

The long term environmental impacts of full implementation of the recommended storm water management plan should be positive. Implementation of the water quality control element of the plan may be expected to achieve significant the non-point source water pollution reduction levels.

Importantly, full implementation of the recommended plan will also significantly reduce clear water infiltration and inflow into the sanitary sewerage system. This will abate the surcharging of sanitary sewers and the backflow of sewage into the basements of buildings with the attendant hazards to public health; and reduce the frequency and amount of bypassing of raw sewage to the environment.

Full implementation of the plan will also reduce street and yard flooding and the attendant costly and dangerous disruption to traffic and to emergency vehicle access.

The short term environmental impacts of plan implementation would all be related to construction activity. During construction of recommended facilities there would be some disruption of the daily routine of residents and of commercial and industrial establishments, and some temporary disruption of the daily routine of residents and of commercial and industrial establishments, and some temporary disruption of Village services. Most of the required construction activity would, however, take place within existing public street rights-of-way and would therefore tend to minimize construction related erosion and sedimentation. Measures are available to minimize the adverse environmental impacts of construction activities including erosion control, noise and dust emission control, and proper and timely site restoration.

Conclusion

This report presents a recommended storm water management system plan for the Village of Fontana-on-Geneva Lake.

The comprehensive approach used in the preparation of the recommended plan permitted definitive identification and description of the existing storm water management system, existing storm water management problems and the affect of planned and probable future land use conditions on storm water management requirements. The report provides a set of objectives and supporting criteria to guide the development of an effective storm water management system within the Village, presents alternative storm water management plans for the Village, provides a comparative evaluation of the technical, economic, and environmental features of these plans; recommends a cost effective storm water management plan and sets forth a plan implementation program.

The plan recognizes that storm water management is essential to attaining an attractive, efficient, safe, and healthy urban environment. The plan recognizes that the development of an effective storm water management system requires an understanding of urban planning and engineering, the application of principals of hydrology and hydraulics, and an understanding of social, economic, and environmental impacts and public attitudes toward storm water management.

The plan presented herein regards the storm water runoff system of the area as consisting of a major element operating infrequently and a minor element operating frequently, with both of these elements incorporating, to the extent practicable, the storage and conveyance of excess runoff. The recommended storm water management plan set forth herein thus incorporates compatible multi-use planning concepts and recognizes the opportunities provided as well as the constraints imposed by other community needs, such as park and open space, transportation, and water supply.

Implementation of the recommended plan would provide the Village with a storm water management system able to accommodate the peak rates of runoff from a 10-year interval rainfall event under existing and full build out land use conditions without costly and disruptive street flooding; and from a 100-year recurrence interval rainfall event under existing and full build out land use conditions without costly property flooding. Implementation of the recommended plan will contribute significantly to the reduction of clear water infiltration and inflow into the sanitary sewer system and attendant surcharging of sanitary sewers and backflow of sewage into the basement of buildings. Implementation of the recommended plan will also contribute significantly to a reduction of non-point source storm water pollution throughout the Village.