ECO-HYDROLOGICAL ANALYSIS & RESTORATION PLANNING

SOMERS BRANCH OF THE PIKE RIVER

Report Prepared for:

Fund for Lake Michigan
c/o Greater Milwaukee Foundation
101 W. Pleasant Street, Suite 210
Milwaukee, WI 53212

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Fund for Lake Michigan

Somers Wisconsin — Something for Everyone

Ecological Research Partners LLC — Where Science Meets Society

Thompson & Associates Wetland Services

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Restoration/Research Team:

Thompson and Associates Wetland Services
Alice Thompson
Stefanie Nadeau
Aaron Menke
1514 Menomonee Ave.
South Milwaukee WI 53172
414-571-8383
www.Thompsonwetlands.com

Ecological Research Partners
Dr. Timothy Ehlinger
Dr. Neal O'Reilly
Sarah Ehlinger
4634 N. 105th St.
Wauwatosa, WI 53225
414-243-7672

RA Smith National
Gary Raasch, P.E.
16745 W. Bluemound Road
Brookfield, WI 53005
262-781-1000

Bernklau Surveying
Tom Bernklau, R.L.S.
414-573-2743

Tim Fulton
Town of Somers Park Committee Chair

Lori Artiomow, Naturalist
Hawthorn Hollow Nature Sanctuary and Arboretum

Town of Somers
PO Box 197
Somers, WI 53171

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EXECUTIVE SUMMARY:

In 2012 a Root Pike Watershed Initiative Grant funded a stewardship plan for Neumiller Woods, an 8 acre wetland park owned by Town of Somers. In 2013 the Fund for Lake Michigan funded this project to expand on the initial effort and develop wetland restoration projects at Neumiller Woods and Gitzlaff Park, another Town-owned site east of Neumiller. This eco-hydrologic study was targeted at opportunities for restoration on Town-owned sites, with an emphasis on positively impacting water quality on the Somers Branch of the Pike River that flows through both parks. Somers Branch flows to Lake Michigan and improving water quality through these restoration measures is a key component of the recently competed Pike River Watershed-Based Plan (AES, 2013).

After a year of field research aimed at understanding the ecological status of Neumiller, Gitzlaff and the Somers Branch we have designed wetland restoration projects at Neumiller and Gitzlaff Parks. We have engaged the U.S. Fish and Wildlife Private Lands Office and they anticipate working with the Town of Somers to help implement these projects. Prairie plantings on both parks are proposed to further buffer the stream and provide critical habitat on the Somers Branch of the Pike River. These plans are contained within the report and the Appendix.

The 2.7 mile long stream was inventoried for existing vegetative buffer and 32% of the stream has a buffer of at least 100 feet in width on both sides of the stream. Stream buffers are recommended to be protected where present, and expanded in the future as funding opportunities arise. Groundwater input was evident in multiple locations. Culverts were examined and several (particularly the Union Pacific Railroad culverts) create a barrier to fish movement due to their high placement.

There are a number of other wetland restoration opportunities on the Somers Branch on private lands that are identified in this study. Given that currently less than 1.5% of the subwatershed is wetland, we hope implementation of wetland and prairie restoration projects on Neumiller Woods and Gitzlaff will inspire local landowners to restore wetlands on their lands as well. Federal programs exist to assist private landowners with wetland restoration technical assistance, permitting and implementation and key contacts for this area are listed within the report.

Somers Branch of the Pike River at Neumiller Woods
All photos by Alice Thompson

We gratefully acknowledge the *Fund for Lake Michigan* for granting this work, and Town of Somers for their interest in this project. Tim Fulton, Town of Somers Park Committee Chair provided invaluable volunteer assistance in the field. Dr. Tim Ehlinger, Dr. Neal O'Reilly and UW-Milwaukee Students used the sites as outdoor laboratories and provided scientific expertise to the study.

Charlie Luthin was instrumental in the process of organizing this work.

1) BACKGROUND

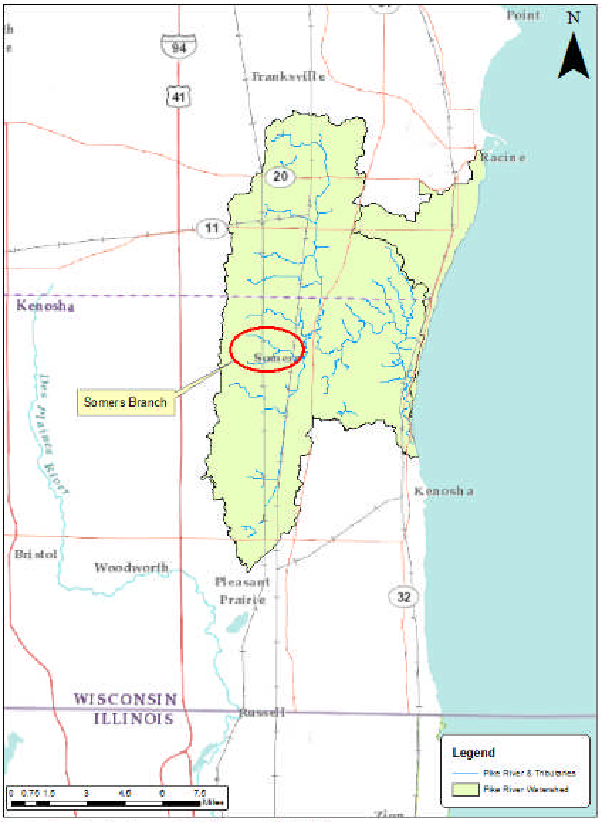
Neumiller Woods in spring, 2013

In February, 2013, Town of Somers received a grant from Fund for Lake Michigan in support of an Eco-hydrological Analysis and Restoration Planning project. The Fund for Lake Michigan mission is “to support efforts, and in particular those in southeastern Wisconsin, that enhance the health of Lake Michigan and its shoreline and tributary river systems for the benefit of the people, plants and animals that depend upon the system for water, recreation and commerce.” The funding for this project is a product of this mission. The focus of this restoration project is a comprehensive study of the south tributary of Somers Branch—a tributary to the Pike River—along with restoration planning and design proposed for two Town of Somers-owned park properties: Neumiller Woods, a 7.9 acres wooded wetland adjacent the South Fork of Somers Branch, and Gitzlaff Property, a 25.8 acres adjoining and immediately downstream from Neumiller Woods. Both parks were generously donated by local citizens to the Town of Somers. Portions of both parks are in active agricultural use currently.

The goal of restoration on the Neumiller and Gitzlaff Park properties is to restore wetlands and native prairie adjacent the Somers Branch, which will result in improved water quality, reduced flooding, improved wildlife habitat and increased opportunities for low-impact recreation on these properties.

This eco-hydrological study builds off the Pike River Watershed-Based Plan (RPWBP) prepared for the Root-Pike Watershed Initiative Network and completed in August, 2013. It was the first watershed plan in Wisconsin approved by the Environmental Protection Agency. The watershed plan documented special natural features in the watershed, challenges and threats to the Pike River and its tributaries, and in addition proposed “green infrastructure” planning in critical areas. Among the plan’s recommendations are stream bank and channel restoration, wetland restoration, detention basin retrofits and maintenance, riparian area restoration and agricultural management.

The Somers Branch is a 2.7 square mile subwatershed within the Pike River Watershed and is listed as SMU 11 in the Pike River Watershed – Based Plan (Applied Ecological Services Inc., 2013, Figure 10, p.24). It has a significant portion of land classified as “open” in the plan (Applied Ecological Services Inc., 2013, Figure 22, p.48) primarily due to actively farmed agricultural land. Due to the presence of agricultural land adjacent the tributary among other characteristics, a significant amount of this open land is classified as a High Priority for “green infrastructure”, with the remaining land adjacent the tributary being Medium Priority (Applied Ecological Services Inc., 2013, Figure 27, p.54). Based on the prediction that as the land around the Somers Branch is converted from agriculture to residential development the impervious cover will dramatically rise, the stream is rated as “High” Vulnerability to land use changes and a priority for ‘green infrastructure” implementation (Applied Ecological Services Inc., 2013, Figure 37, p.83). The riparian areas adjacent the stream are assessed as in “poor” ecological condition (Applied Ecological Services Inc., 2013, Figure 44, p. 107). This report further expands on this ecological assessment and makes specific recommendations in particular the two town owned parks adjacent the stream.



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Sources: Esri, USGS, NOAA

Figure 1- Somers Branch of Pike River in relation to the Pike River Watershed

The first park, Neumiller Woods was donated to Somers by Fred and Lois Neumiller and was dedicated as a Town of Somers Park on October 21, 2010. Thompson wrote a Neumiller Woods Stewardship Plan funded by a 2011 Root-Pike Watershed Initiative Grant obtained by Town of Somers. This restoration project seeks to expand on the stewardship plan and develop “shovel-ready” restoration plans to implement. Neumiller Park is designated as a “High” priority for restoration and protection in the watershed plan(Applied Ecological Services Inc., 2013, GI13 in Table of Priority Green Infrastructure Protection, p.215).

The Gitzlaff site was donated by Larry Gitzlaff in 2007 to the Town of Somers as a future park and a park concept plan was developed by Ruekert- Mielke. This restoration project will outline “shovel-ready” restoration plans in Section 4 to implement some of the ecological features of the original park plan. Gitzlaff Park is also designated as a “High” priority for restoration and protection in the watershed plan (Applied Ecological Services Inc., 2013, GI14 in Table of Priority Green Infrastructure Protection p.215).

2) HISTORIC CONDITIONS

a) WATERSHED AND LAND USE

Prior to European settlement, Kenosha County was home to prairie, oak savanna (or oak openings), maple/oak/basswood forest and wetlands dominated by marsh and sedge meadow habitats. The 1836 land surveyor notes show Sections 9 and 10, which are within the subwatershed as prairie. The 1837 Kenosha County plat shown in Figure 2 illustrates the Somers forked stream, and a large “oak opening” bordering the south branch of Somers Branch, which now contains residential lots. We presume that most of the landscape is prairie, with the exception of several small fields. Extensive wetlands are documented within and adjacent this subwatershed on the 1837 map as well.

Historically prairies were open grasslands because of periodic fires caused by lightning strikes and Native Americans setting intentionally fires to keep these prairies open of tree and shrub seedlings. Based on Native American artifacts we know that these prairies, oak savannas, wetlands and river systems supported Native American communities who actively managed the land.

When settlers arrived, they soon discovered that the deep prairie soils were excellent for farming so almost all suitable land was converted for agricultural purposes, including all wetlands that could feasibly be drained. In the Pike River watershed, 93% of wetlands were filled or drained to accommodate cropland and urban construction.

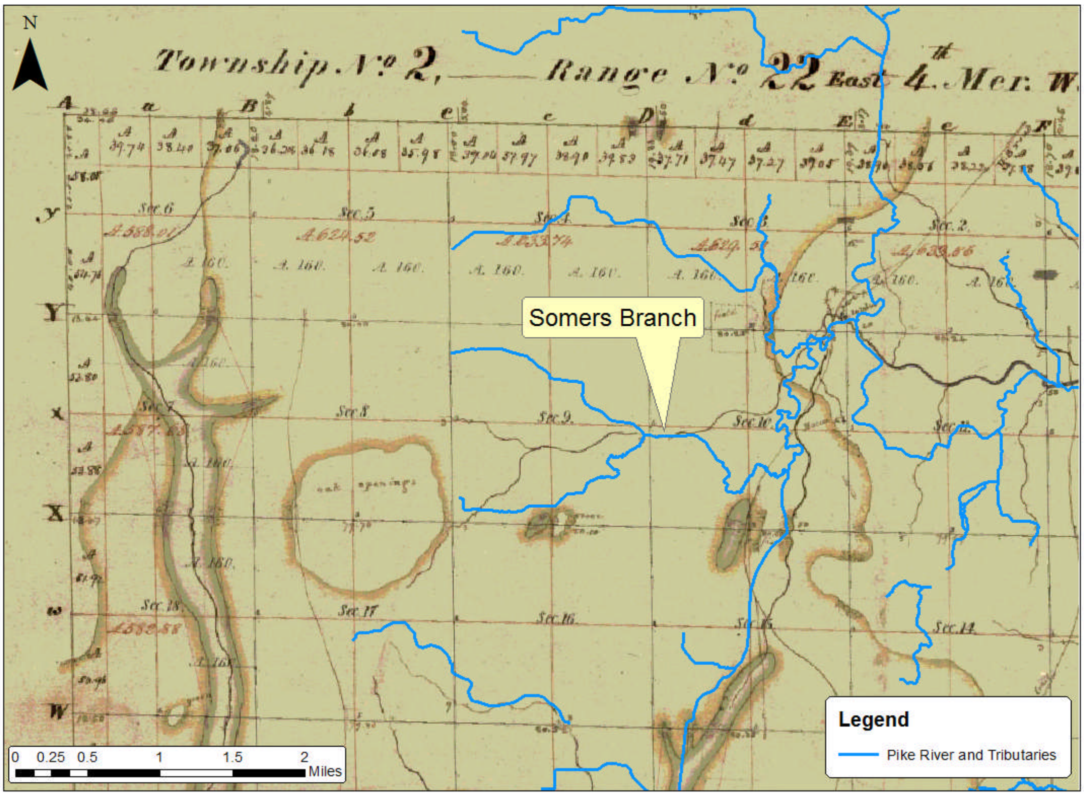


Figure 2—1837 Kenosha County Original Plat Book

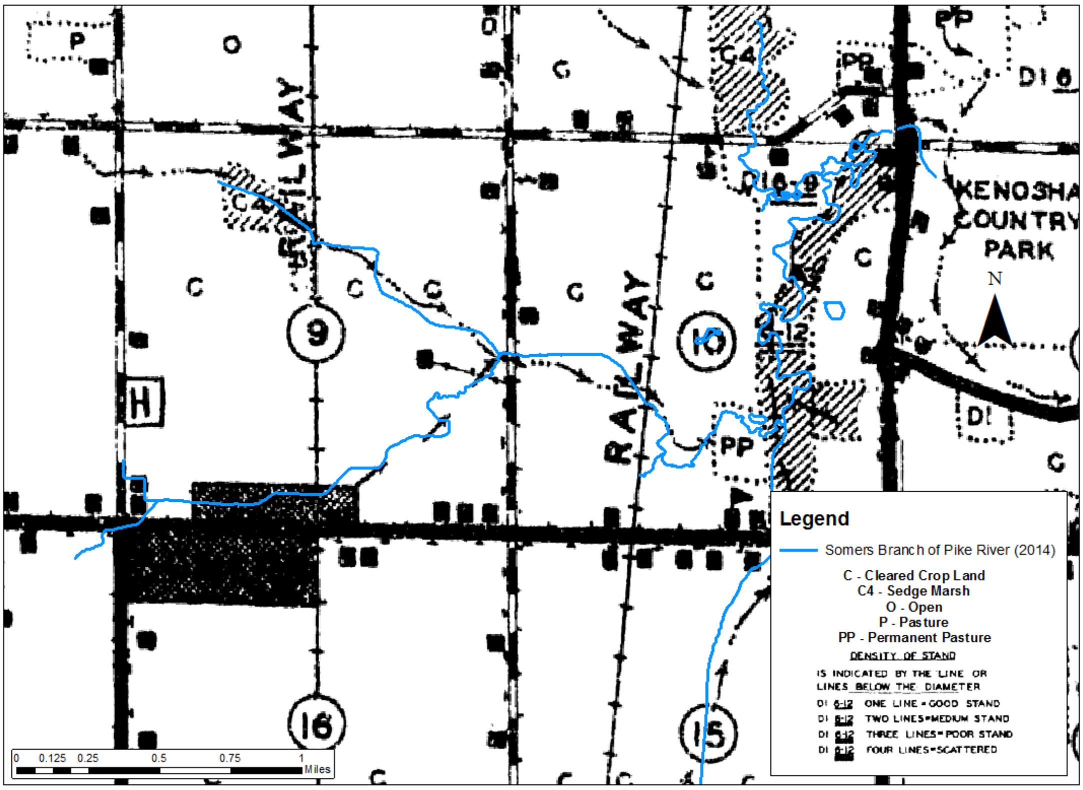


Figure 3—1934 Bordner Survey

The Bordner survey shown in Figure 3 above was a statewide Wisconsin Land Economic Inventory (The University of Wisconsin-Madison, 2011) that mapped land use, land cover, erosion, and stands of timber. Data were collected in the 1930's and 40's and represent a snapshot of land use from that era. Because the field workers were trained foresters, forest stands were identified to dominant tree species. The land surrounding the Somers Branch of the Pike is mapped by the Bordner survey as cropland (c) with a small area of sedge marsh (c4) in the northwest portion of the stream (Figure 3).The confluence to the Pike is mapped as "permanent pasture" and the Pike River is mapped as a medium density stand of forest. The conversion of the prairie, oak woodland, riverine landscape to agriculture was evident by the early 20th century.

b) WETLANDS

In the better portion of the 20th century, wetlands were drained by farmers and federal farm agencies to promote agriculture. The resulting ditches and subsurface drain tiles expanded crop production into former wetlands. Our understanding of the location of historic wetlands is based on the pattern of wetland soils that were adjacent and feeding into the stream as previously described. Wetlands intermingled with prairie varied from marshes (cattails, bulrush) in the wettest soils to sedge meadow (sedges forming tussocks) in areas of constant wet soils to wet prairies which were formed in moist soils. Wet prairie was a grassland dominated by prairie cord grass, Canada bluegrass and Indian grass. Areas protected from frequent fires were lowland forest communities of silver maple, American elm, green ash, black willow, cottonwood, river birch and swamp white oak (Curtis, 1959).

c) SURFACE WATER AND STREAMS

The early maps from 1836 and 1837 illustrate the stream network in the Somers Branch watershed. Prairie stream typically consisted of multiple small meandering channels or "rivulets" that would connect among series of wetlands. Such prairie streams would carry water intermittently depending on seasonal precipitation and temperatures; as water levels in pothole wetlands rose during snowmelt, rivulets would fill with water and carry flow during spring into early summer, and then flow intermittently during summer depending on precipitation patterns.

3) EXISTING CONDITIONS

a) BASIN CHARACTERISTICS

i) Watershed

Somers Branch has been identified in the ongoing watershed study of Pike River as Subwatershed Management Unit (SMU) #11, comprising 1,778 acres or roughly 5% of the entire Pike River watershed (Applied Ecological Services Inc., 2013). The Somers Branch sub-watershed is considered "open" in the Pike River Watershed-Based Plan due to surrounding land use. The combination of agricultural land and residential development surrounding Somers Branch makes it vulnerable to flooding. The Somers Branch has high amounts of water inputs from agricultural and urban runoff (via drain tiles, storm drains, and runoff from impervious surfaces). Additional inputs include on-site snowmelt, rainfall and groundwater discharge.

ii) Land use

2010 land use in the Somers Branch watershed, as delineated by the Southeastern Wisconsin Regional Planning Commission is illustrated in Figure 4. The predominant land use is agriculture (light green) followed by residential (orange) clustered in the south portion of the watershed.

Cabbage field, Somers, WI

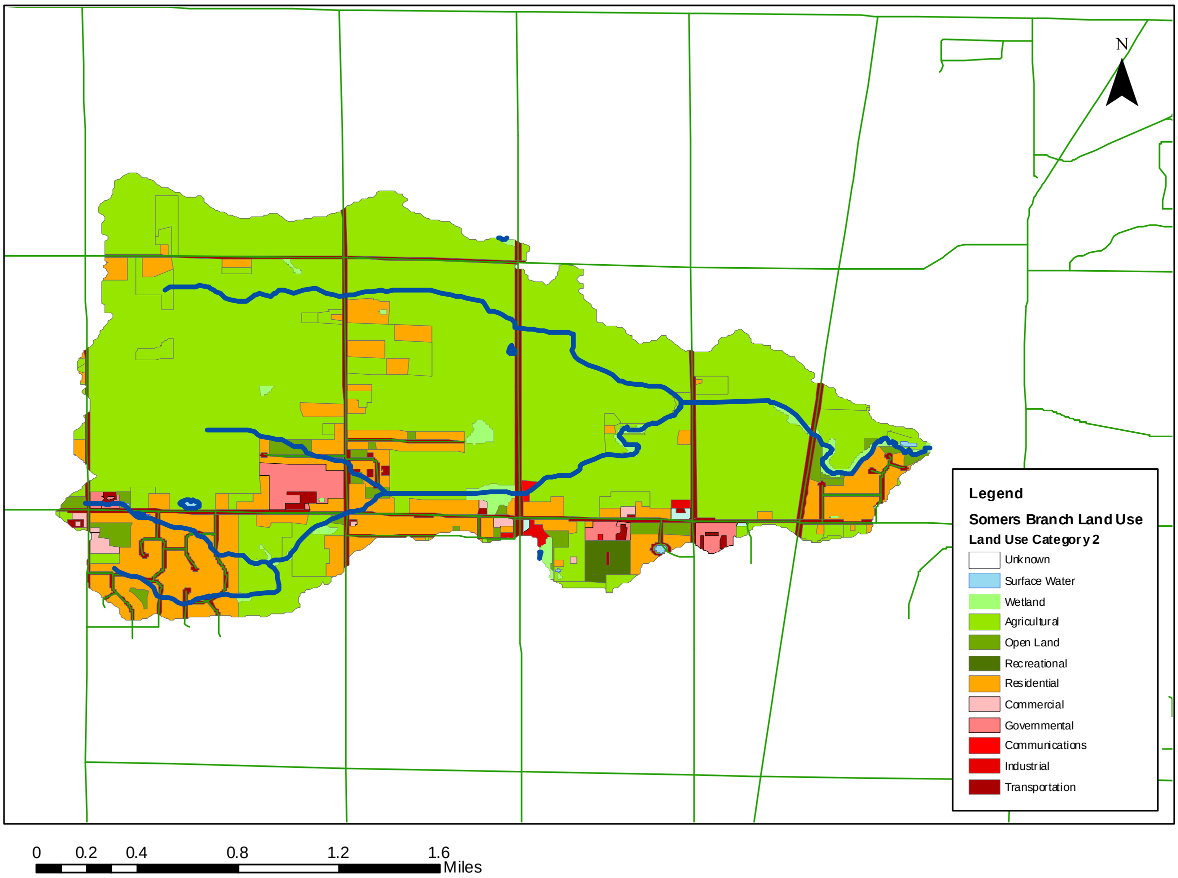


Figure 4 – Land Use Somers Branch Watershed
(Source: SEWRPC and ERP)

iii) <u>Soils</u>

The soils in the subwatershed are classified by Natural Resource Conservation Service (USDA) by their runoff potential into soil classifications with A, B having high infiltration rates (water readily passes through the soil) and C classes being upland soils with clay present that perches water to some extent. Class D soils had a high clay content and are hydric or wetland soils that have the highest runoff potential. Figure 5 illustrates the hydraulic soil groups in the Somers branch of the Pike River subwatershed. Hydric or wetland soils are contained within the mapped orange and dark green units that are adjacent the stream. The majority of mapped soils in this subwatershed have a low ability to allow water to pass through and a high rate of runoff, which contributes to flooding and periodic high stream flows.

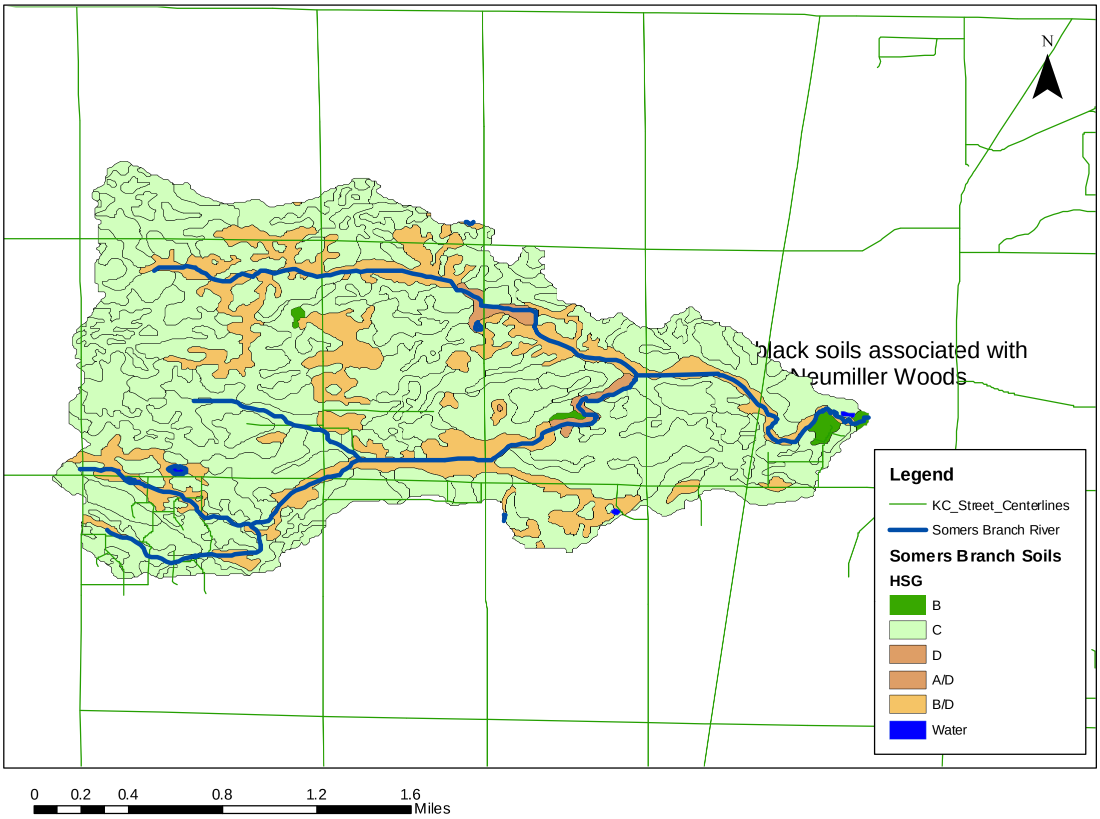
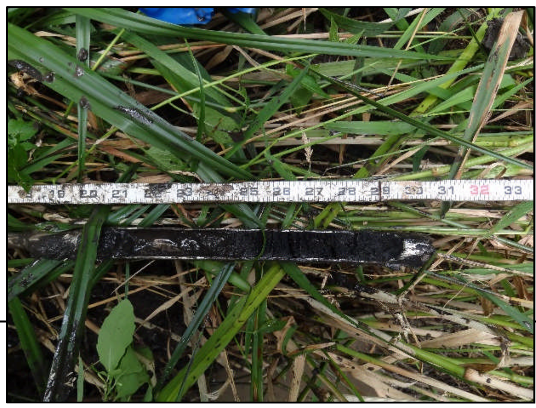


Figure 5 – Hydrologic Soil Groups Somers Branch Watershed
(Data Source: NRCS, ERP)

The NRCS (Natural Resource Conservation Service) mapped Kenosha County soils for agricultural purposes in the 1960's and first published the maps in 1970. These maps were created to better inform agricultural production and erosion practices; however they are very useful tools to understand the historic and current landscape of the region. Soils that were associated with wetlands are mapped, and generally show a pattern of being a wide band adjacent the current stream, with wetter soils (hydrologic inclusions) in long amoeba-like drainageways and swales throughout the sub-watershed. The upland soils appear as islands floating among these wet soils. Most of these wet soils were drained for agriculture, or filled for residences prior to wetland protection under the Clean Water Act (1972).



The majority of mapped soils as shown in Figure 6 in this sub-watershed are classified as "Mollisols", deep black soils that were created by the prairie landscape. Prairie plants rooted deep in the soil and as they decayed left black carbon in the soil. Over thousands of years very black thick soils developed by the action of prairie grasses including big bluestem and

Indian grass. The dominant wetland soils adjacent Somers branch, Ashkum silty clay loam (AtA) and Navin (Na) were created by prairie, and the hydric indicator soils that were created by prairie are also dominant: Aztalan loam(AzA), Elliot (EtA, EtB), Kane (KaA). The upland prairie soils include the dominant soil types Varna silt loam (VaB, VaB2, VaC2) and Morley silt loam (MzdB, MzdC, MzdD).

Neumiller Woods, Spring 2012

These soil types confirm the early survey maps that noted the prairie landscape. These deep rich soils were prime agricultural land and early Somers settlers modified the landscape to take advantage of this resource.

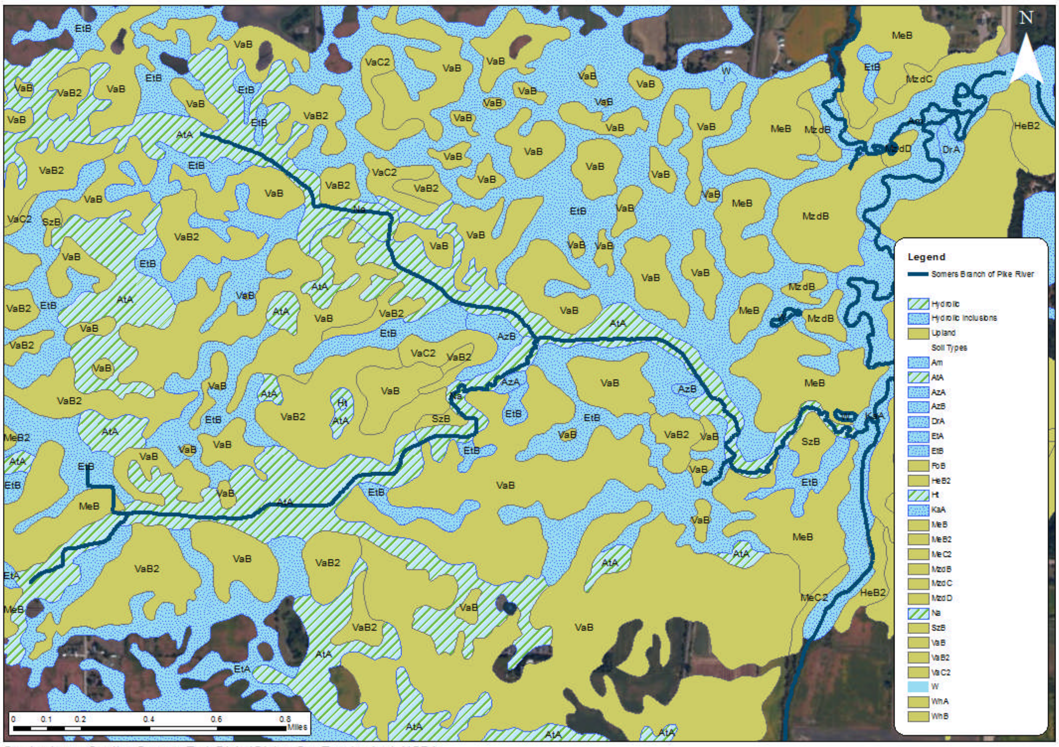


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Figure 6—Somers Branch Mapped Soil Units
(Date Source: NRCS)

iv) Wetlands

Current wetlands within the Somers branch subwatershed are mapped on Figures 7 and 8 and demonstrate the altered condition of the land post agricultural development. The hydric soils as discussed in the previous section were drained for agriculture, and small remnant pockets of wetlands remain. Remnant wetlands on the landscape include areas that were too wet to drain, or areas that have reverted to wetland as farming ceased and drainage features failed. Wetlands are typically smaller and more fragmented than during pre-settlement, and have much less plant and animal diversity.

Despite their current depauperate state, wetland services including water quality, flood abatement, and erosion control are critical to the health of the Pike River and its tributaries.

The loss of wetlands has led to increased storm flows due to decreased storage of stormwater and snow melt, decreased water quality as the wetlands that filter and process nutrients and sediments are lost, and a loss of biodiversity. 75% of Wisconsin's wildlife species rely on wetlands for some portion of their life cycle (Wisconsin Wetlands Association, 2002) either for food, water, shelter, breeding or overwintering. Restoring wetlands restores critical habitat for local wildlife and fisheries.

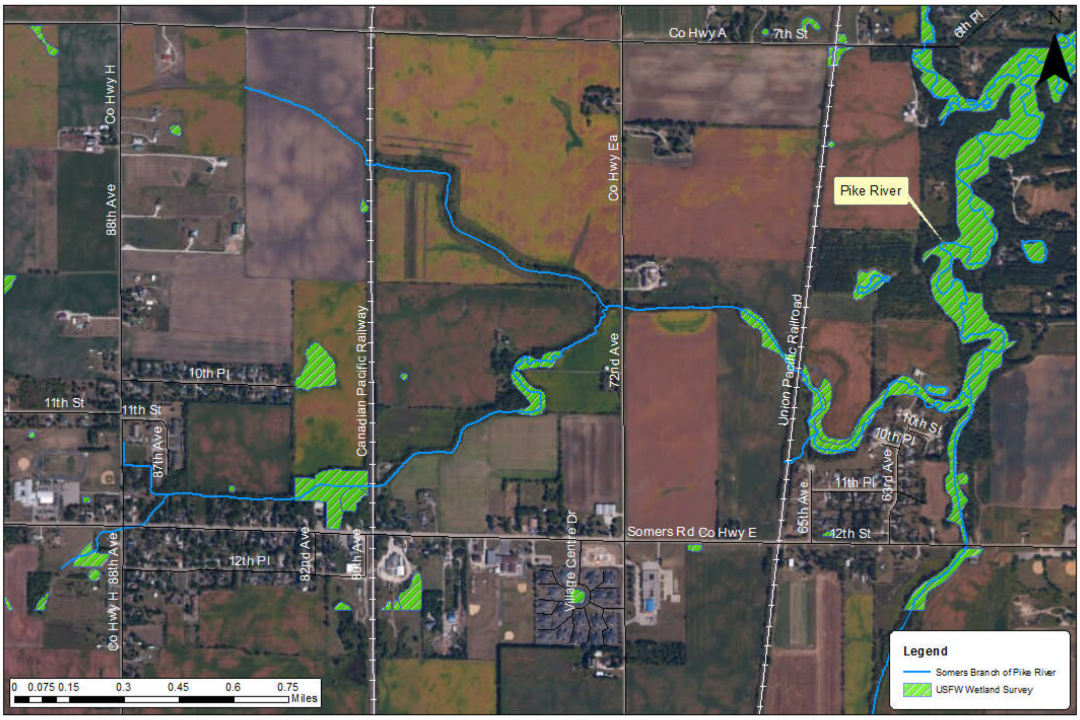

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Figure 7—Somers Branch and Pike River Wetlands
(Data Source: U.S. Fish and Wildlife)

Approximately 24.2 acres of wetlands are currently mapped by the U.S. Fish and Wildlife Survey in this subwatershed, which is less than 1.5% of the total acreage. The largest wetland remaining is Somers owned and protected Neumiller Woods. The next largest wetland is the isolated marsh (3.35 acres) within a farm field north of Neumiller Woods just east of 10th Place. This wetland is in private ownership and there is no vegetation buffer to the wetland. It is a reservoir of biodiversity on this altered landscape, and spring peepers were heard calling in it in 2012, and 2013. Additional wetlands are mapped as narrow areas adjacent the stream.

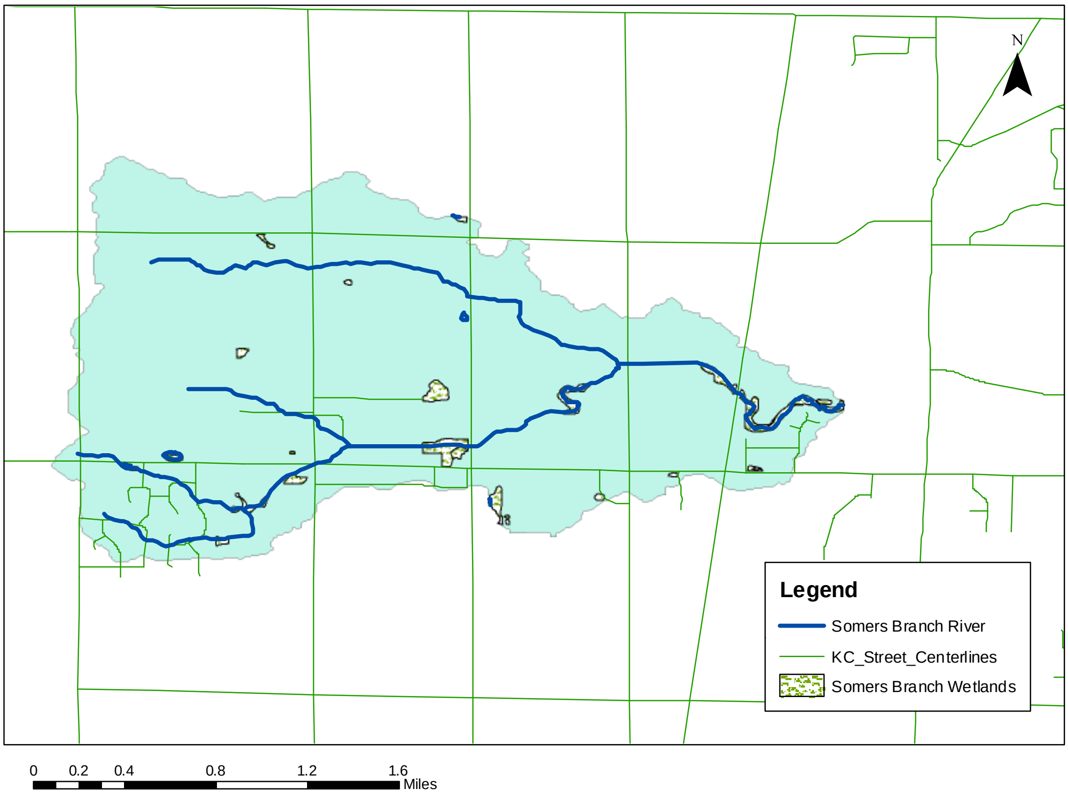
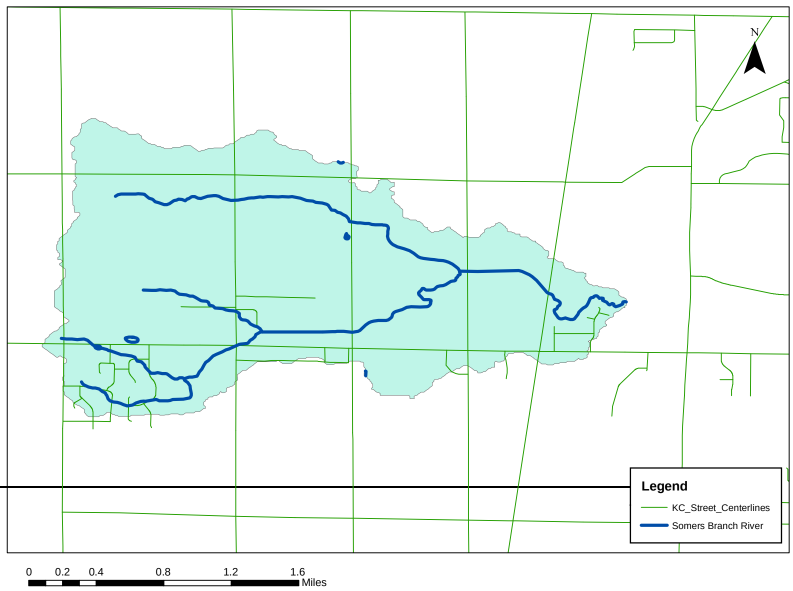


Figure 8— Mapped Wetlands Somers Branch Watershed
(Data Source: WDNR, Kenosha County, ERP)



v) Streams

Figures 9 illustrates the stream network in the Somers Branch watershed.

Figure 10 depicts the actual channel in the 2013 field season is shown in blue and varies from the more extensive mapped historic stream. The Somers Branch has been extensively channelized with more than 70 percent of the channel showing evidence of dredging or straightening. In many cases the stream channel has been lowered to assist farm field drainage.

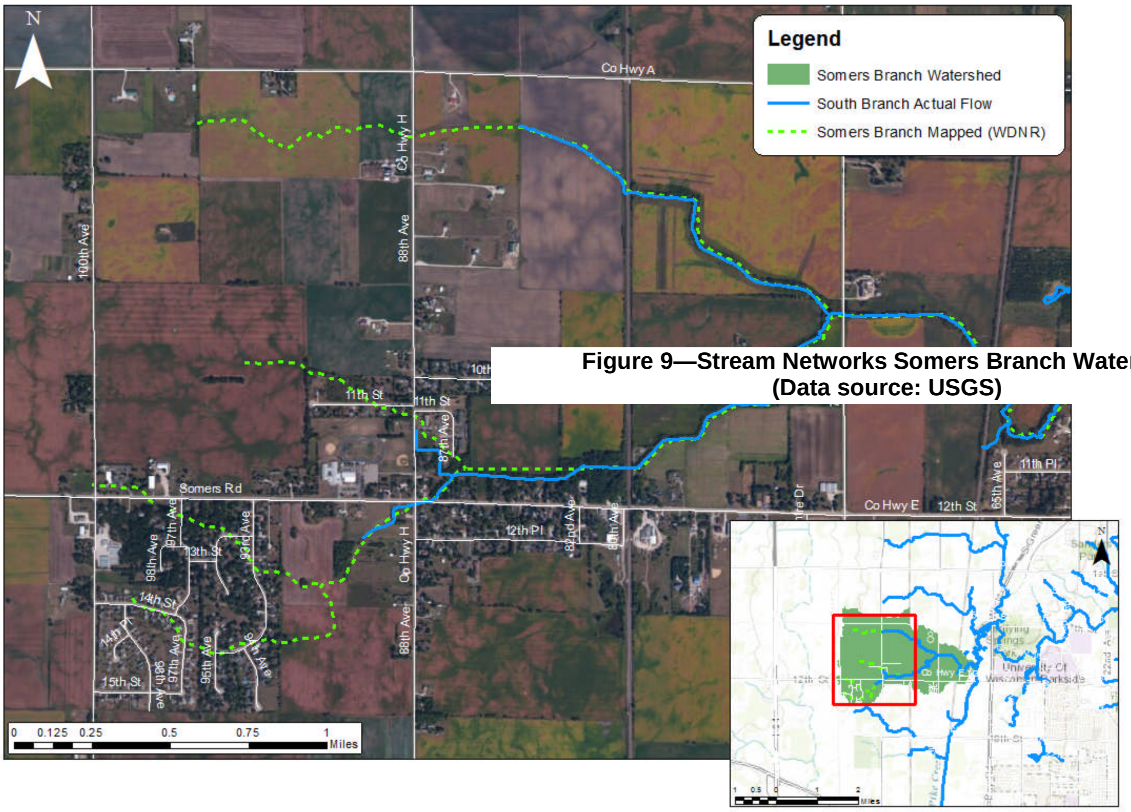


Figure 9—Stream Networks Somers Branch Watershed (Data source: USGS)

Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Figure 10—Current versus Mapped Somers Branch Stream
(Data Source: 2013 field reconnaissance)

For the South Branch of Somers Creek, the stream channel drops from an elevation of 702 feet at Hwy H to approximately 650 feet at the confluence with the South Branch of the Pike River (Figure 11) – orange and green lines), resulting in an average bed slope of 0.35 percent over 15,000 linear feet of stream.

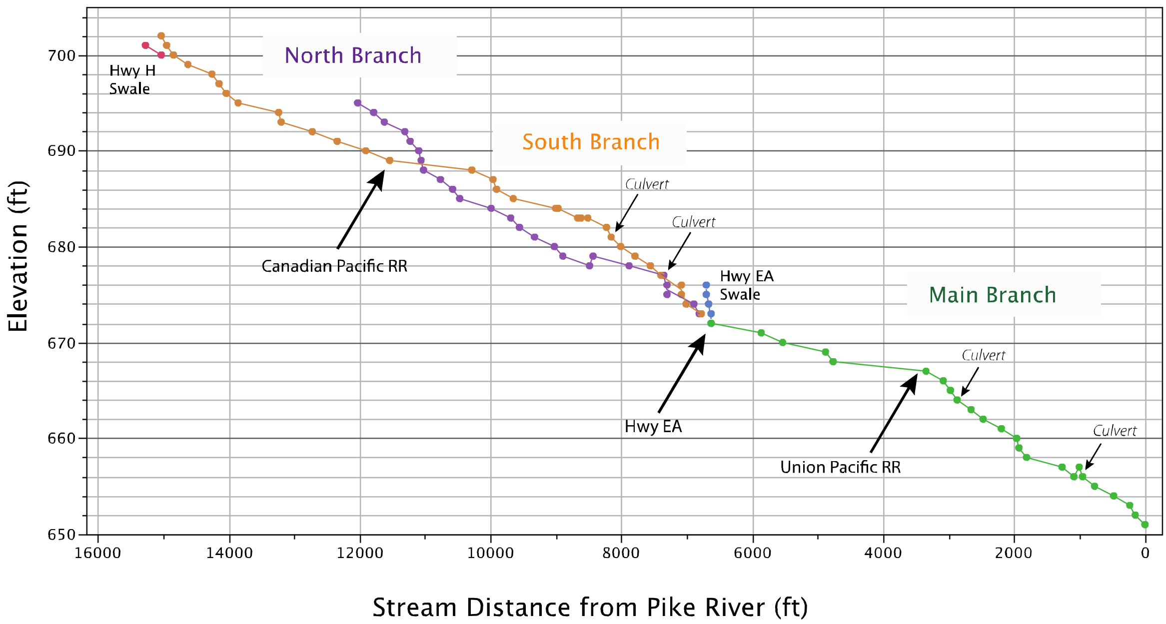


Figure 11 - Stream Bed Elevation Profile for Somers Branch, including North, South and Main Stems
(Data Source: Kenosha Co.)

Impact of culverts on stream

Culvert under Canadian Pacific Railroad bed at Neumiller Woods, spring, 2012

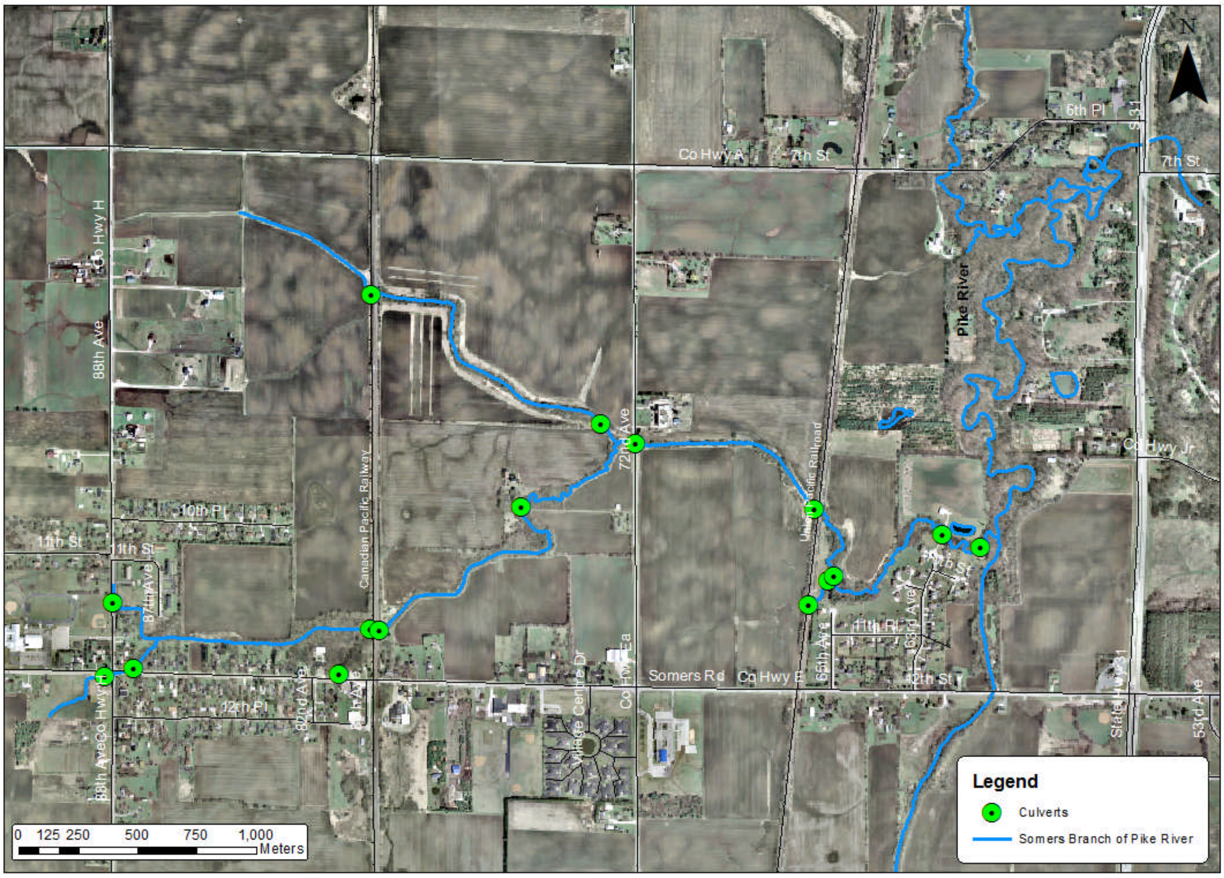
More than a dozen culverts are located along the flow path of the stream (shown below in Figure 12) associated with road crossings, driveways and railroads. In turn, these culverts and the impact they have on flow control associated have a strong effect on the streambed elevation profile (See Figure 11 above). Undersized culverts can constrict stream flow, contributing to increased water elevations upstream during storm events. Over time, this can result in higher sedimentation upstream of the culvert deposition and depending on the amount of sediment moving in the stream, can significantly change the bed profiles. By blocking or slowing the movement of sediment, culverts can contribute to streambed erosion problems downstream. Conversely, if a culvert is undersized to the extent that it does not allow enough water to pass during high flow events (i.e. the channel forming flow), then the stream channel downstream will eventually become uniformly shallow in depth and have poor habitat for fish and invertebrates.

There are several reaches of the Somers Branch that appear to be negatively affected by culverts. These include the reach between the Union Pacific Railroad and Highway EA (stream slow approximately 0.1 percent) in addition to the reaches both upstream and downstream of the Canadian Pacific Railroad on the South Branch (the Neumiller and Gitzlaff sites respectively).

In addition to impacts on water flow and sediment movement, misplaced culverts can contribute to the fragmentation of fish populations by creating barriers to movement to and from spawning habitats. Photographs of the major culverts along the course of the Somers Branch are presented moving from upstream to downstream in Figures 14 through Figure 17. Furthest upstream near Hwy H, the culverts are appear adequate for flow and sediment transport, and do not provide an obstacle to fish movement (Figure 14).

Figure 12 - Stream Channel location for Somers Branch showing location of culverts and road crossings

(Data Source: WDNR, Kenosha Co., 2013 field reconnaissance)



Culverts under Maintenance access drive east of C.-P.RR tracks, spring, 2013

The culverts underneath the Canadian Pacific Railway and the road to the Town of Somers maintenance garage (Figure 15) do not impede fish movement, but are significantly undersized for passing water during storm events. This is discussed in more detail below under hydrology. The large culvert under Hwy EA (Figure 16) appears of sufficient size to pass flood flows, but erosion on the downstream end has created a vertical barrier of nearly 20 inches from the streambed to the culvert bottom. The culverts under the Union Pacific Railroad also appear to be undersized (Figure 17) and collect debris, which can also reduce their capacity. Other small culverts under private driveways also collect debris.

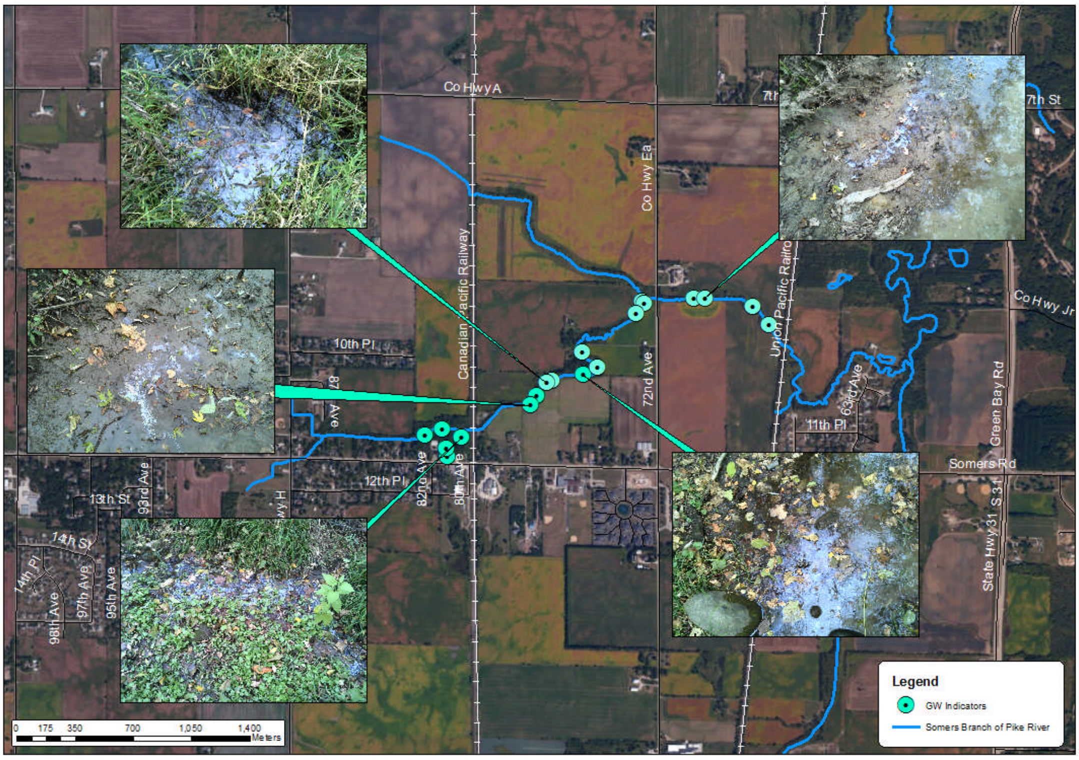


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Figure 13 – Locations of Groundwater Indicators on Somers Branch
(Data Source: 2012, 2013 field reconnaissance)

Groundwater inputs into the Somers branch are visible as a characteristic bright sheen to the water or soil surface. This sheen was documented on numerous locations in the streambed throughout 2012 and 2013 as shown on Figure 13 below. The presence of watercress (*Nasturtium officinale*) in the stream is another indicator of groundwater. The plant, a non-native, is prevalent in springs and seeps in Wisconsin, and was found in multiple locations in the streambed. Locations of the groundwater sheen, and watercress are mapped in Figure 13.

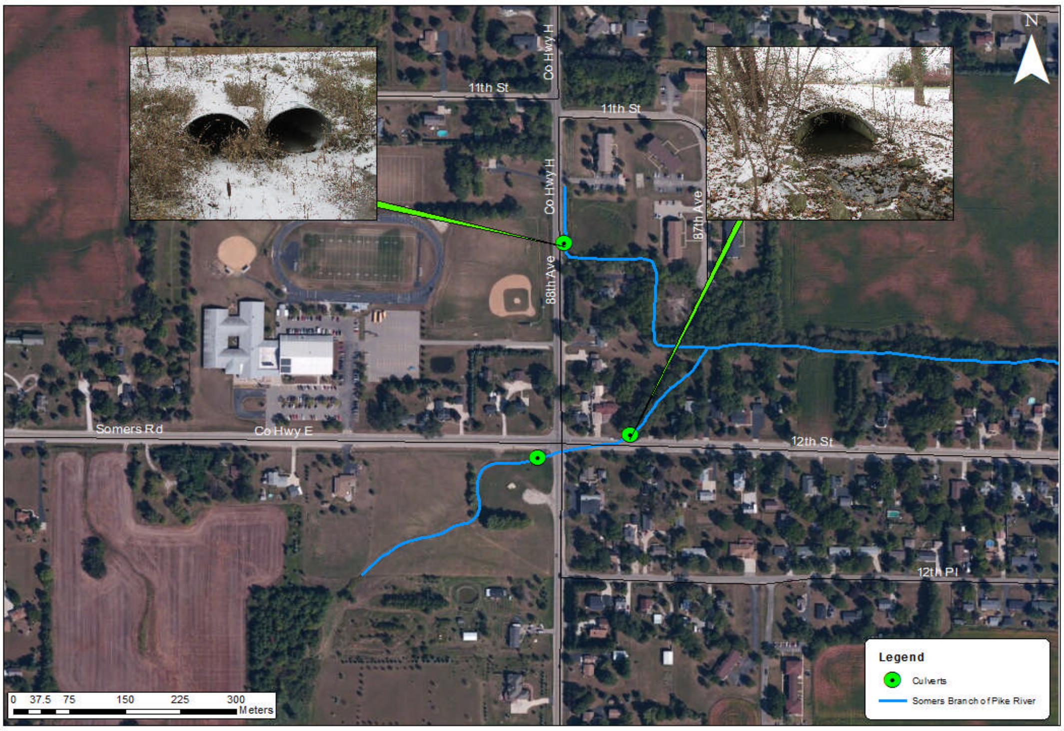

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Figure 14- Stream Crossings and Culverts on Somers Branch near Hwy H

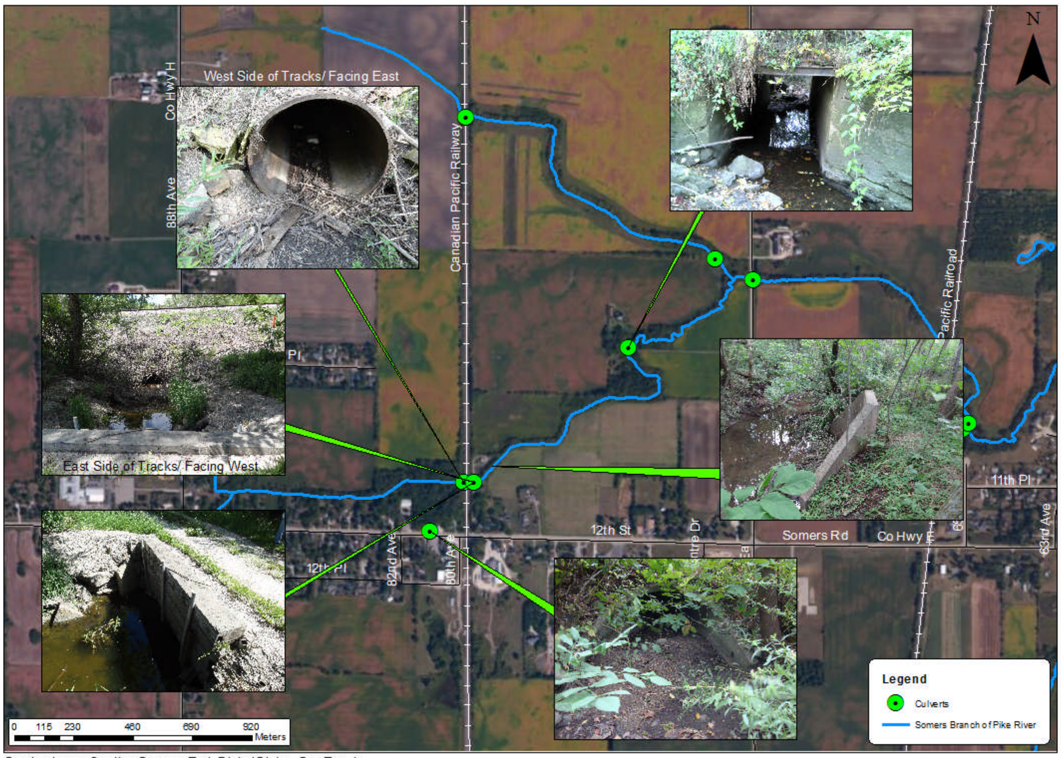

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Figure 15- Stream Crossings and Culverts on Somers Branch near Canadian Pacific RR

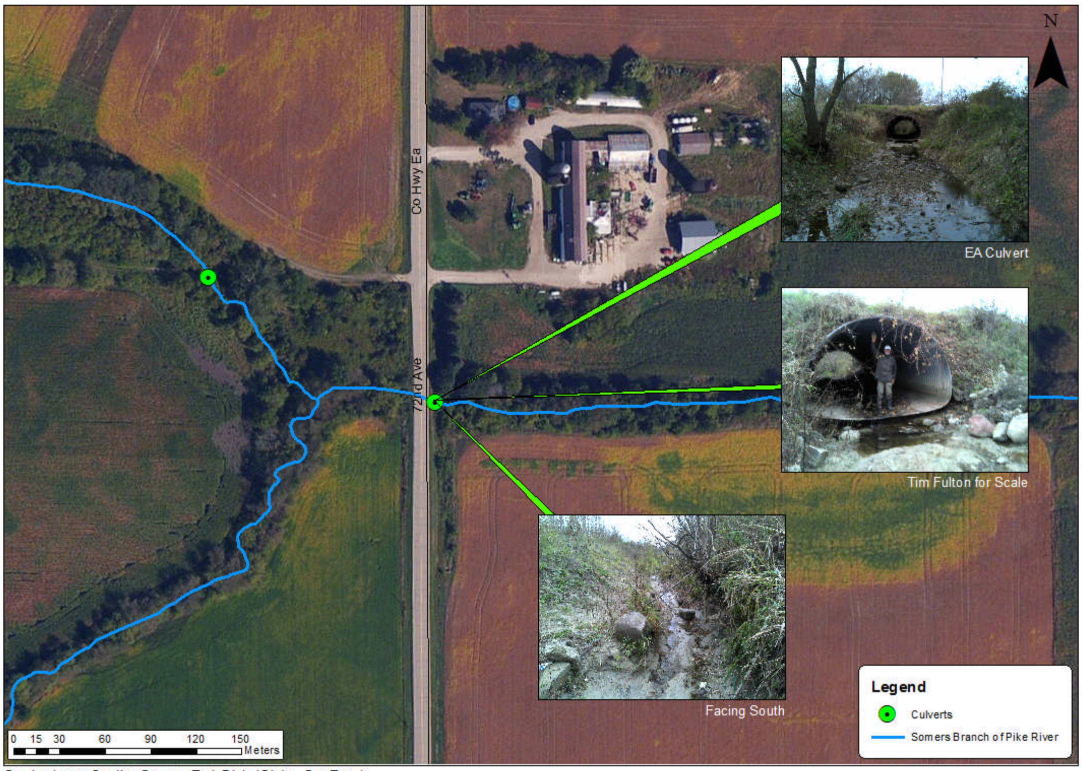

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Figure 16 - Stream Crossings and Culverts on Somers Branch near Hwy EA

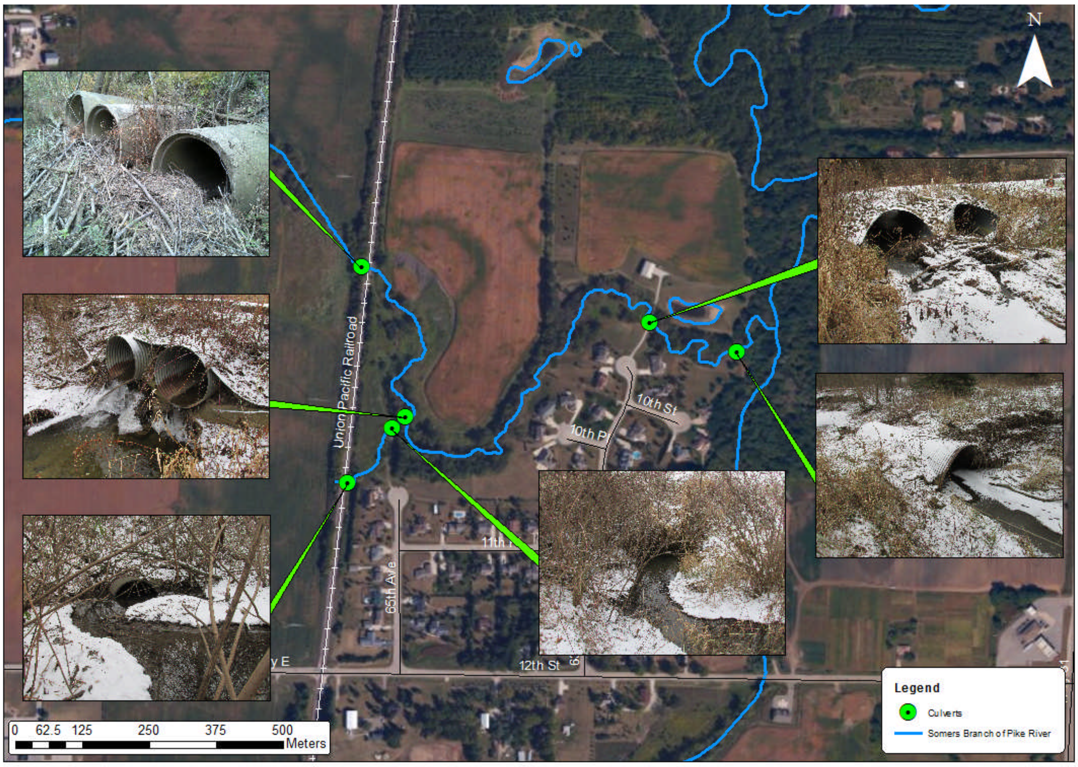

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Figure 17- Stream Crossings and Culverts on Somers Branch near Union Pacific RR to Confluence with Pike River

vi) Storm Flows

Stream flows along the Somers Branch have been estimated by Federal Emergency Management Agency (FEMA) in the Flood Insurance Study for Kenosha County (FEMA, 2012). Flows for a range of storm events at locations along the stream are summarized in Table 1.

Table 1 – Flow Conditions along Somers Branch

Location	**Peak Stream Flow** (cubic feet per second)		
	10-year Recurrence Interval	50-year Recurrence Interval	100-year Recurrence Interval
	(10% Chance of Occurrence)	(2% Chance of Occurrence)	(1% Chance of Occurrence)
Confluence with Pike Creek	110	255	320
CTH EA	115	270	320
Upstream of confluence with Tributary	70	110	120
Gitzlaff Park	60	95	110
Town Public Works Drive (Downstream of CP Railroad)	55	80	90
Upstream of CP Railroad	300	500	560

As mentioned above, the consequences of restricted flows resulting from undersized culverts can be observed both in flood elevation levels and in stream sedimentation and erosion patterns. The decrease in peak flows at the Canadian Pacific (CP) Railroad, as shown in Table 1, are due to the limited capacity of the 48-inch diameter culvert crossing beneath the railroad and the resulting floodwater detention storage that occurs upstream.

Based on review of Flood Insurance Study data (FEMA, 2012) and historic aerial photography (Kenosha County), the 48-inch railroad culvert was installed in the 1990's. The previous culvert was a 42-inch diameter metal pipe at an elevation several feet higher than the 48-inch culvert. The 42-inch pipe that was likely in place for decades and restricted flood flows, causing upstream detention and associated sediment deposition, at a greater level than does the current culvert. This would substantiate our findings of significant sediment load at Neumiller Woods.

48 inch culvert under of C.-P.RR tracks, from Gitzlaff side facing west, spring, 2013

vii) Water Quality

Preliminary data have been collected and analyzed by Dr. Julie Kinzelman at the City of Racine Health Department Laboratory at a location on the Somers Branch of the Pike River at the stream crossing on Co Hwy EA. Samples were taken from 5/17/12 to 3/19/13. The turbidity varied from a minimum of 2.4 NTU to a maximum of 638.0 NTU (recommended Standard 10-25 NTU) (Havron & Kinzelman, 2013). In 56 samples, the turbidity was below standard 12 times and above standard 38 times.

E. coli varied from a minimum of 5 MPN/100 mL to 61,310.0 MPN/100 mL. The *E. coli* count recommended standard is below 235 MPN/100 mL and was below standard for 19 samples and above standard to 37 samples.

Havron states, "high *E. coli* concentrations are likely due to ag run-off in the surrounding and upstream areas of this site. *E. coli* is significantly positively correlated with 24-hr rainfall, and concentrations are seasonally highest in spring, when snowmelt and frequent rainfall occurs" (email communication 1/15/14).

viii) Stream Vegetation and Buffer

We field reviewed the Somers branch stream on multiple dates in 2013. The dominant plant species on and adjacent the bank, the locations of culverts, groundwater seeps, drain tiles and other features were noted.

A 100 foot buffer area was drawn on the 3.71-mile long stream corridor (light blue) as a reference to understand where the stream is currently buffered and where it could be expanded as shown on Figures 18-21. Table 2 lists dominant vegetation found within the corridor.

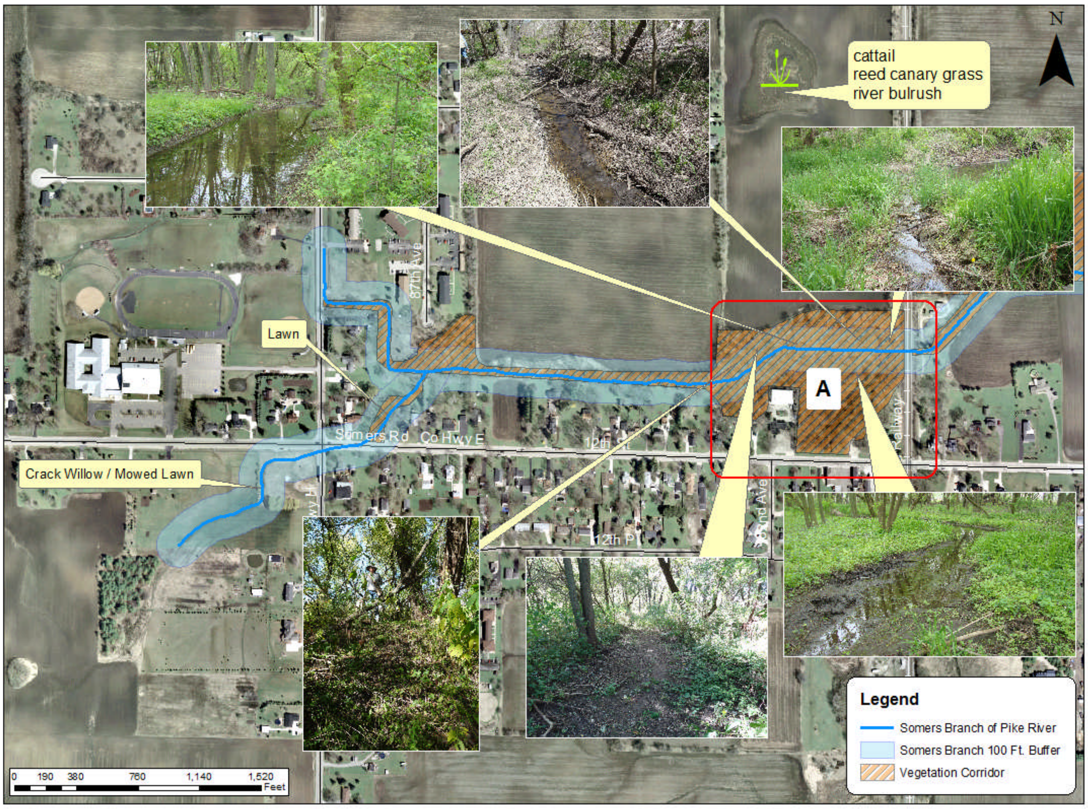


Figure 18—Somers Stream South Branch Vegetation Buffer: County Highway H to Canadian Pacific Railroad (Data Source: USGS, 2013 field reconnaissance)

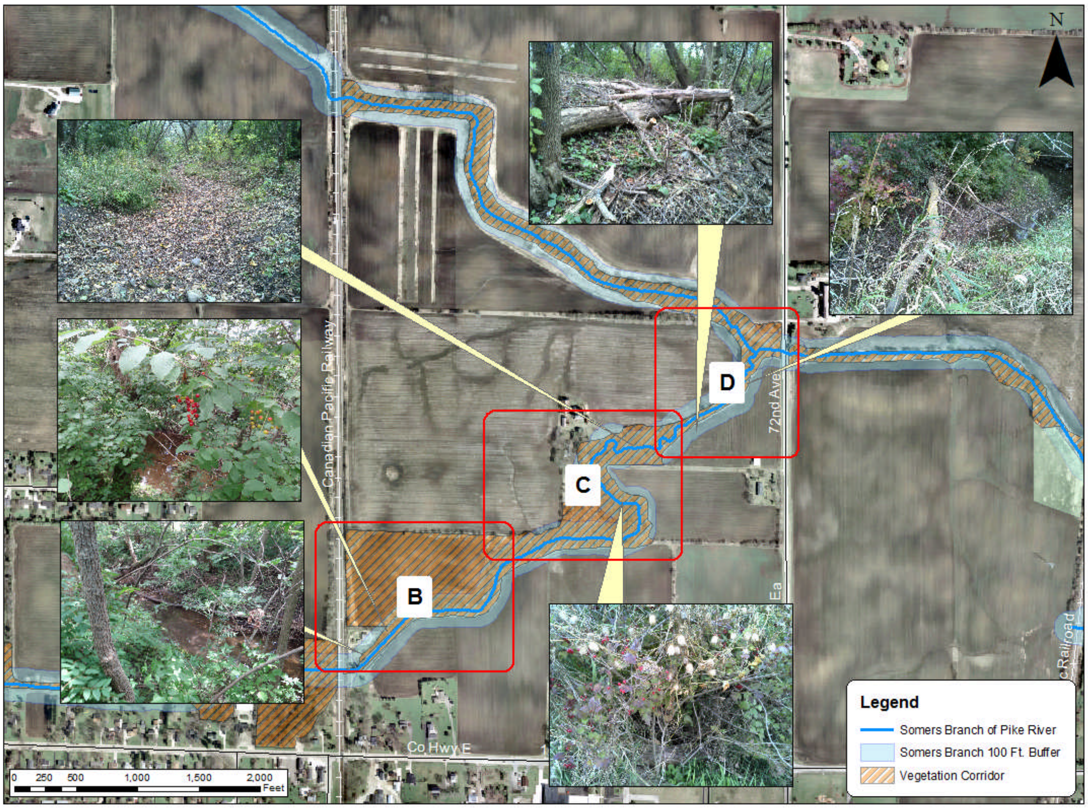


Figure 19—Somers Stream South Branch Vegetation Buffer: Canadian Pacific Railway to County Highway EA (Data Source: USGS, 2013 field reconnaissance)

The stream on the far west side has a narrower wooded buffer with areas of mowed lawn due to multiple residences. East of this the stream has significant areas of wooded buffer, with the greatest extent at Neumiller Woods – Figure 18, Area A- of over 800 feet in width. The wooded stream buffer capacity is significant in many reaches as it varies in width from 60, 100, 250 and 400 feet from west of Neumiller Woods to the junction of the Pike River. There is 100 foot or greater buffers on both sides of the stream for 32% of its length, generally in Areas A, B, C, and I. The remaining 68% of the stream length has minimal buffers or is buffered on one side only.

The wooded buffer community type is lowland hardwood forest dominated by crack willow, box elder, black cherry, black walnut, green ash and silver maple. The dominant native shrub species include highbush cranberry, nannyberry, elderberry, black raspberry, and choke cherry. Sub-dominants included hawthorn, gray dogwood and staghorn sumac. Non-native shrubs include honeysuckle and common buckthorn. Wild cucumber was a common vine which was prevalent in many areas of the steam in 2013.

The understory was dominated by reed canary grass, fowl manna grass (*Glyceria striata*), watercress, and duckweed. Small isolated areas had soft stemmed bulrush and cattail where water pooled.

Stream banks were generally well vegetated, the exception being the stream banks immediately east of EA which had less vegetation (See Figure 20, Areas E-H).

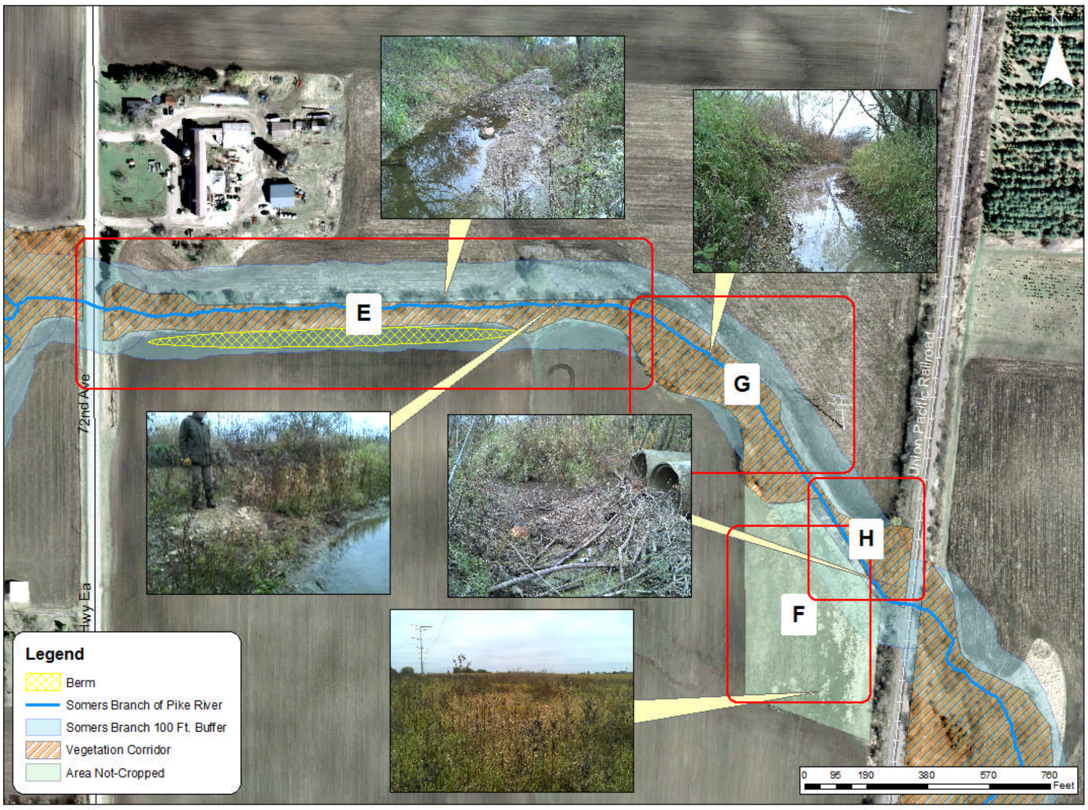


Figure 20—Somers Stream South Branch Vegetation Buffer: County Highway EA to Union Pacific Railroad (Data Source: USGS, 2013 field reconnaissance)

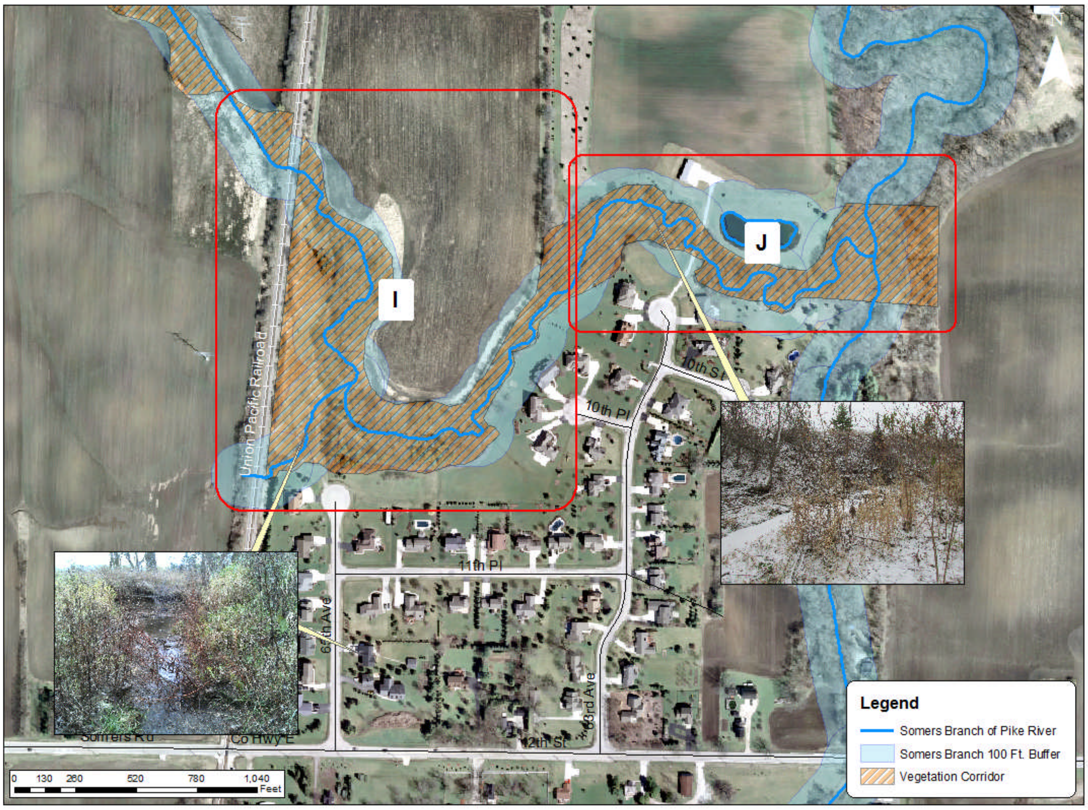


Figure 21—Somers Stream South Branch Vegetation Buffer: Union Pacific Railroad to Junction with Pike River (Data Source: USGS, 2013 field reconnaissance)

Table 2 – Somers Branch Vegetation Buffer

Stream Vegetation on the Somers Branch- Inventoried 2013											
		Reference Sites (See Figures 18-21)									
Common Name	**Scientific Name**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Trees											
black cherry	*Prunus serotina*		x	x	x						
black walnut	*Juglans nigra*		x	x							
box elder	*Acer negundo*	x	x	x	x			x		x	x
crack willow	*Salix fragilis*	x	x	x	x			x		x	x
green ash	*Fraxinus pennsylvanica*	x	x							x	
hawthorn	*Crataegus spp.*										x
silver maple	*Acer saccharinum*	x			x					x	
Shrubs											
allegheny blackberry	*Rubus allegheniesis*		x								
chokecherry	*Prunus virginiana*		x		x						
common buckthorn	*Rhamnus cathartica*										x
elderberry	*Sambucus canadensis*		x		x					x	
gray dogwood	*Cornus racemosa*		x	x						x	
high bush cranberry	*Viburnum opulus*			x	x					x	x
honeysuckle	*Lonicera spp.*				x						
nannyberry	*Viburnum lentago*		x	x	x						
Understory											
beggar-ticks	*Bidens spp.*			x							
cattail	*Typha spp.*							x	x	x	
common brome grass	*Bromus inermis*						x				
Canada goldenrod	*Solidago canadensis*			x							
duckweed	*Lemna minor*				x				x		
fowl manna grass	*Glyceria striata*	x	x	x							
garlic mustard	*Alliaria petiolata*	x									
giant ragweed	*Ambrosia trifidia*					x	x	x	x	x	
lesser burdock	*Arctium minus*			x							
reed canary grass	*Phalaris arundinacea*	x	x	x	x		x	x	x	x	
soft-stem bulrush	*Scripus validus*							x	x	x	
staghorn sumac	*Rhus typhina*									x	
watercress	*Nasturtium officinale*	x	x	x							
wild-cucumber	*Echinocystis lobata*	x	x	x	x			x	x		

Hawthorn Hollow, a local non-profit nature center, located on the Pike River north and downstream of the junction of Somers Branch serves as a wooded reference site. Hawthorn Hollow in addition to the trees in common with the Somers branch, has black ash and hawthorn, as well as some American bittersweet (*Celastrus scandens*), hazelnut (*Corylus Americana*), sugar maple, basswood, one large hackberry, Eastern wahoo (*Euonymus atropurpureus*), and two very old, large black willows (no new reproduction of black willow noted). Although reed canary grass is found on the banks at Hawthorn Hollow there is no fowl manna grass (*Glyceria striata*) or watercress, which are found throughout the Somers branch. Another plant dominant at Hawthorn Hollow but not found on the Somers branch is scouring rush (*Equisetum hyemale*).

Woody debris under of Union-Pacific RR tracks, on west side of tracks fall, 2013

Areas of tree falls and woody debris were noted on our October 2013 field review and on Figure 22. The most conspicuous area of debris is trapped west of the Union Pacific Railroad (see photos on to left). The culverts are set high and debris accumulates at this point. *Salix fragilis,* or crack willow, is an introduced species that has become naturalized and is the most common willow in southern Wisconsin (The University of Wisconsin-Green Bay, 2004). This dominant tree on the stream is very hardy in wet areas and holds soil on the banks. However once it matures into a multiple branched tree, the soft wood cracks under its weight and falls to the streambed creating debris.

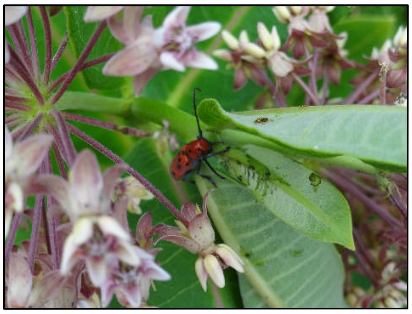
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 22—Somers Stream South Branch Tree Debris Locations (Data Source: USGS, 2013 field reconnaissance)

b) NEUMILLER AND GITZLAFF PARK SITE CHARACTERISTICS

i) Wildlife

Seasonally flooded basins provide a unique and important habitat for many species. Many of the native species identified in Neumiller Woods and Gitzlaff Park provide habitat for birds and mammals as described in the Vegetation List species notes (Appendix A and B, Tables 2). Plant nectar and pollen provide food sources for insects including native bees and flies, and fruits and berries are food sources for songbirds, waterfowl, and mammals. Both arthropods and songbirds feed on trees, and even the lowly box elder has a high arthropod count, providing ecosystem services to the local food web.



Common milkweed attracts red milkweed beetle at Gitzlaff Park, north of the stream

ii) Invertebrates

Stream macroinvertebrates provide an indicator for water quality and stream habitat, and in addition to providing a food source for other animals (fish, birds, amphibians) they are an essential ecological connection for recycling nutrients and energy from plant material that falls into in the stream back into the ecosystem. Kick samples taken along the Somers branch indicate that the stream invertebrate community is typical for an intermittently flowing stream, dominated by taxa with high tolerance for low oxygen levels such as blood worm midgets (family Chironomidae) and sow bug isopods (family Asellidae). In areas of flowing water over rocks and gravels, taxa of higher sensitivity were found such as common net spinner caddisflies (family Hydropsychidae) and small minnow mayflies (family Baetidae).

Rock from Somers branch stream adjacent Gitzlaff with invertebrates including sow bugs.

iii) Herptiles

Seasonally flooded wooded wetlands lack predatory fish and are rich in nutrients because of decaying leaves. This combination is ideal for woodland amphibians such as mole salamanders, wood frogs, and toads, which lay their eggs in these sheltered pools. Although we did not confirm any amphibians in our field visits over two years, we know that amphibians are present in the wetland basin north of this site, and could serve as a source population if more favorable conditions and longer periods of pooled water were created at Neumiller Woods.

iv) Fish

Degraded habitat due to extensive fine sediment and uniform habitat, combined with intermittent flows creates poor conditions for fish in the stream traveling through Gitzlaff and Neumiller Woods. Furthermore, fish fragmentation problems due to passage through downstream culverts, especially at Hwy EA makes the establishment of a balanced, indigenous fish community difficult. Due to the constraints of fish passage downstream and the intermittent flow in the stream there are few fish in Somers branch. Those that exist are small minnows that can survive trapped in small pools with low oxygen levels during low water periods. Because there are few fish, any restored wetlands have the potential to be significant for amphibians, since the absence of fish predators during the early amphibian reproductive phases is a critical part of their life.

v) Birds

Seasonal wetlands are also important for birds. Wading birds, waterfowl, and song birds feed and water at seasonally flooded basins. Floodplain forests provide migration corridors for migrating birds and nesting/resting habitat. Cavities in dead wood are used as shelter and nesting. A variety of birds were observed at Neumiller Woods in 2012, including crows, goldfinches, mourning doves, chickadees, song sparrows, and red-headed woodpeckers. Gitzlaff Park songbird observations in 2013 included song sparrow, chickadee, gold finch and red winged blackbird. Sandhill crane calls were heard in the vicinity of Gitzlaff in the spring, they might utilize restored areas in the future.

c) Gitzlaff Prairie Park

Gitzlaff Park -north of stream-has open “old field” vegetation

The Gitzlaff Park property consists of 24.28 acres of land located north of CTH E and east of the Canadian Pacific railroad in the SW ¼ of the SE ¼ of Section 9 in Township 2 North, Range 22 East in the Town of Somers, Kenosha County, WI. The study area is bordered by the Canadian Pacific Railroad to the west, agricultural land to the north, agricultural land and residential lots to the east, and CTH E and agricultural land to the south. The site contains active and fallow agricultural land, upland old field vegetation and the Somers branch of the Pike River which is primarily wooded. The wooded stream feature is mapped as Secondary Environmental Corridor by the Southeastern Regional Planning Commission.

Somers branch flows east and divides the site into two sections, the northern field totals 11.31 acres and plowing ceased sometime between 1985 and 1990. The southern field is 12.6 acres in size and is actively farmed. The 2012 and 2013 crop was winter wheat. The only access to the north site for vehicles is now blocked by the Maintenance shed and fencing. Currently there is no equipment access to the north side, although the stream is low enough to be crossed by foot in most seasons, or there is a narrow edge to the stream north of the culvert and south of the maintenance fence that can be walked as well.

Somers branch flows through Gitzlaff Park

i) Topography

The Gitzlaff site was surveyed by Tom Bernklau, Bernklau Surveying in a leaf – off condition in the winter and early spring of 2014 (Figure 23). A copy of the survey and CADD file is provided in Appendix E in the electronic version of this report. The purpose of the survey was to understand topography as it relates to water flow and restoration potential. The survey included cross sections of the stream and also all boundary corners were staked. This was not a boundary survey, so boundaries staked were for the general purpose of locating the property line. There is some overlap of property boundaries in the portion of the site south of the stream on the eastern edge, which needs to be further delineated; this was outside the scope of this survey.

The south field has low-lying areas adjacent the stream, which correspond with mapped hydric soils and active drain tile (7 were field located). Elevations in the low-lying areas vary from 690 to 692 feet above sea level. The field rises to the south to a high of 700 feet above sea level adjacent C.T.H "E".

The north field has a narrow shelf adjacent the stream that is 691 to 692.5 feet above sea level. This low-lying portion of the site corresponds with hydric soils and one drain tile located. The terrain rises to the north and northwest corner of the site with a high knob at 711.5 feet above sea level at the northwest property line. This rise in elevation creates a very aesthetically appealing sense of isolation in the north field. The vista of open field and sky is only interrupted by the Canadian Pacific Railroad tracks on the east property boundary.

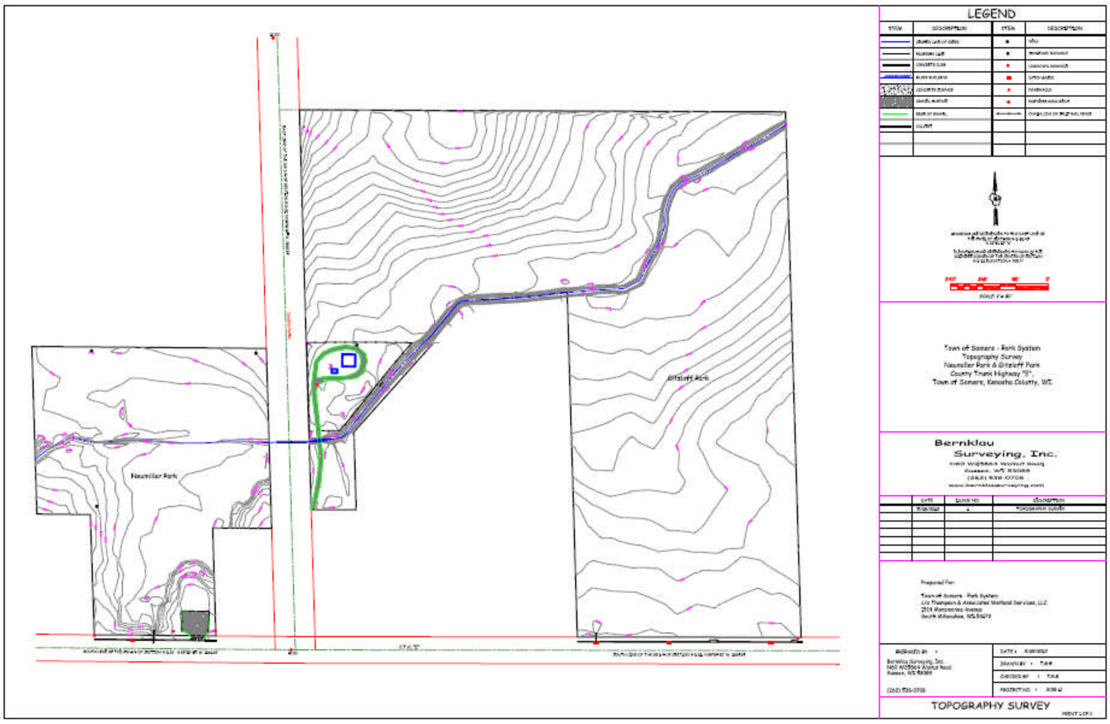
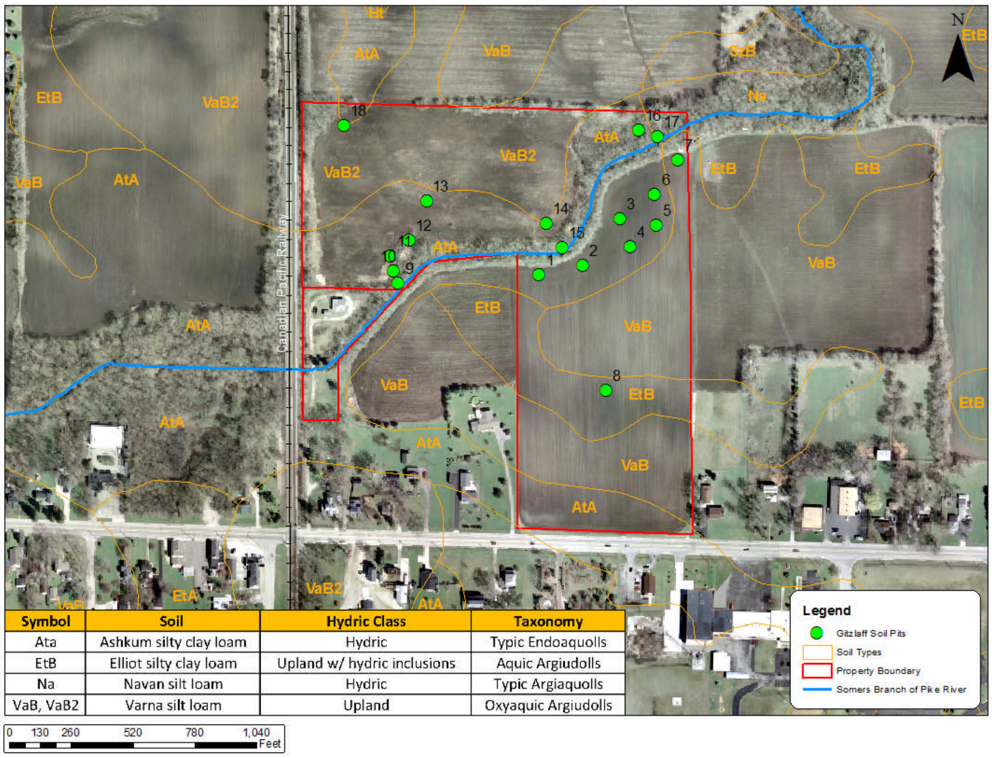


Figure 23—Topographic Survey of Neumiller and Gitzlaff
(Data Source: Bernklau Surveying, Inc.)



Symbol	Soil	Hydric Class	Taxonomy
Ata	Ashkum silty clay loam	Hydric	Typic Endoaquolls
EtB	Elliot silty clay loam	Upland w/ hydric inclusions	Aquic Argiudolls
Na	Navan silt loam	Hydric	Typic Argiaquolls
VaB, VaB2	Varna silt loam	Upland	Oxyaquic Argiudolls

Figure 24—Gitzlaff Mapped Soils and Soil Data Pit Locations
(Data Source: NRCS, 2013 field reconnaissance)

ii) <u>Soils</u>

Natural Resource Conservation Service also classifies soils into soil series, which are more detailed categories of soil types as shown on Figure 24. The Gitzlaff stream corridor is bordered by Ashkum silty clay loam (AtA), and Navin silt loam (Na), both hydric soils that were formed in a prairie landscape. At higher elevations away from the stream the predominant soil is Varna silt loam (VaB, VaB2), a well-drained upland soil also formed in a prairie landscape. There is a band of Elliot silty clay loam (EtB), a somewhat poorly drained soil, located south of the stream.

Black clayey topsoil typical of wetlands formed in prairie in Gitzlaff Park

A series of soil pits were dug in 2013 in the north and south field and the locations of the pits are shown on Figure 24. The soil data is found in Appendix A. On the south side of the stream (data points 1-8) the soils varied from 12 to 15 inches of black silty clay loam or black silty clay overlying at least one foot of clay (silty clay or sandy clay), with those layers depleted of oxygen in the areas closest to the stream. These depleted areas indicate that water perches long enough to drive out oxygen and create wetland soil conditions. These features remain in the soil despite the presence of subsurface drain tiles.

The soils on the north side of the stream varied from 9-15 inches of black silty clay loam on the stream edge with clay located below. Many of the soil samples had redoximorphic features in the upper 12 inches, which indicates water perching seasonally in the root zone, again indicating the presence of historic hydric (wetland) soils in the lowland areas adjacent the stream.

The black soils indicate that prairie plants once dominated the landscape and are conducive to re -introducing prairie species.

iii) Sedimentation and site hydraulics

As depicted above in Figures 14-17 (Stream Crossings and Culverts on Somers Branch), the placement of undersized culverts has had a negative impact both stream water and sediment flows, affecting flood elevations and streambed sedimentation and erosion patterns. Figure 25 shows the impacts on stream gradient for the Neumiller and Gitzlaff sites. Channel gradient for the Neumiller site (approximately 0.23 %) and Gitzlaff (0.09 %) are significantly lower than for the Somers Branch as a whole (0.35 %). The lower gradient of the channel results in slow water velocities, less bedload sediment movement and higher sedimentation accumulation rates. Although some of these issues may be addressed with the replacement of the maintenance road culvert (see below) the undersized culvert at the Canadian Pacific Rail Road crossing will continue to constrain water flow and sediment patterns.

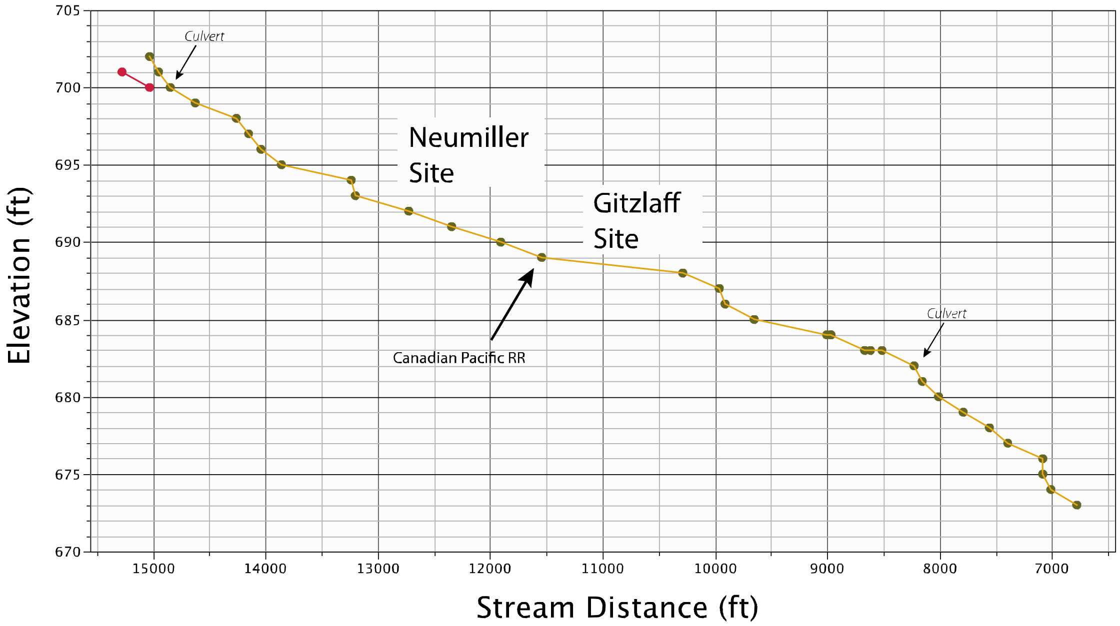


Figure 25—Stream Bed Elevation Profile for Neumiller and Gitzlaff Sites
(Data Source: Kenosha Co.)

iv) Drain tiles

Drain tile outlets into Somers Branch from the south field at Gitzlaff, above and right

Sub surface drain tiles are visible in the south field of Gitzlaff on the Kenosha County 2005 aerial (Figure 26). Drain tiles are characteristic on aerial photos as regularly spaced white lines running perpendicular to the stream as an artifact of winter frost heave in a plowed field. They are not noticeable on the north field as there is permanent plant cover by 1990. Rachel Samerdyke of the U.S. Fish and Wildlife Service assisted us in locating tile outlets entering into the stream on November 13, 2013. Seven tile locations were found on the south side of the stream, and one tile on the north side of the stream. Some are newer plastic pipe as shown on the photo to the left, others were clay tile that would be an older installation. There were multiple other suspicious areas that appeared as washout areas or eroded channels on the north but we could not confirm tile in them. Tile lines can become buried over time. As shown on Figure 26 drain tile lines are also present adjacent the Gitzlaff property on both the east and west fields south of the stream. These tiles drain the former wetland areas and facilitate agriculture.

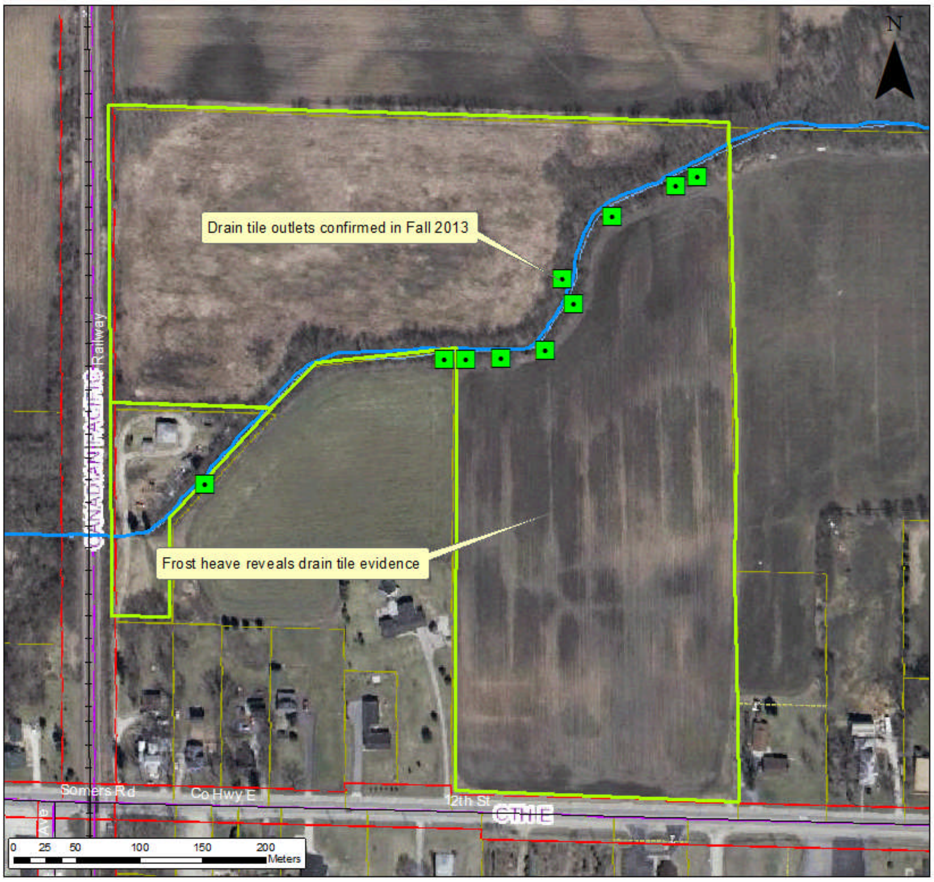


Figure 26—Gitzlaff Drain Tile Locations
(Data Source: 2005 aerial, Kenosha Co., 2013 field reconnaissance)

v) Biological resources

Vegetation

Plants were inventoried in the 2013 field season on multiple field dates from spring to fall. There are three major vegetation communities on the Gitzlaff property: old field vegetation, lowland hardwood forest and agricultural field. A complete list of vegetation including species names as well common name is found in Table 2 in Appendix A, a general discussion of the findings follows.

Relic prairie plants include native yellow coneflowers mixed within the old field vegetation north of the stream

Old field Vegetation: The *north field* was in agricultural production for most of the 20th century, the 1937 historic aerial photo shows the field is plowed, with a single tree in the center of the site, and several trees on the north property line. It was taken out of agriculture in the late 1980's and is succeeding to old field vegetation. Old field vegetation is described as the annual and perennial plants that colonize former agricultural fields in the decades following release from agriculture, often a mixture of non-native grasses and native early successional forbs in Southeastern Wisconsin. The vegetation in the north field is dominated by non-native grasses including common brome grass, Kentucky blue grass, Canada blue grass and reed canary grass (small stands). Forbs include common milkweed, Canada goldenrod, saw-toothed sunflower, wild strawberry, and annual fleabane. Non-native invasive forbs include sweet clover. There are box elder saplings colonizing the open field. Native prairie forbs area colonizing the site including yellow coneflower (large stands), evening primrose, Indian-hemp, and ironweed. The adjacent railroad tracks may have provided a refuge for native plants during the years of agriculture.

Ironweed in bloom adjacent the railroad tracks on the north side of the stream at Gitzlaff

There a small pockets of wetland vegetation adjacent the wooded stream corridor that include sedges, stalk-grain sedge, common fox sedge, saw-toothed sunflower, curly dock, yellow avens, late goldenrod, early goldenrod and reed canary grass.

There is a *hedgerow* on the north property boundary that includes black locust, a tree considered to be non-native to Kenosha County, and a tree that responds positively to fire disturbance. Box elder, honeysuckle and black locust seedlings are present as well.

Lowland Hardwood Forest: The *stream corridor* is a narrow corridor of lowland forest dominated by trees and overhanging shrubs and is an effective buffer to the stream, shading and cooling the stream and providing cover to wildlife. The *lowland hardwood forest* is dominated by box elder, crack willow, black cherry, black walnut, green ash, slippery elm, silver maple and Russian mulberry.


Native choke cherry shades the stream at Gitzlaff

The *shrub layer* is dominated by native shrubs including choke cherry, highbush cranberry, gray dogwood, wahoo, black raspberry, hawthorn and elderberry. These shrubs provide shelter, shade, and wildlife food. Non-native shrubs include honeysuckle and common buckthorn, which are present but not dominant at this time.

Herbaceous plants on the stream bank include Solomon's seal, fowl manna grass, Canadian honewort, jewelweed, common three-seed mercury, yellow and white avens, cleavers, beggar's ticks, bristly buttercup, early goldenrod, Canada goldenrod. Weedier species include reed canary grass, dandelion, catnip, dame's rocket, burdock, garlic mustard, and oxeye daisy.

Vines overhanging the stream and adjacent vegetation include wild cucumber, climbing nightshade and riverbank grape.

The *intermittent stream* has pockets of vegetation low on the bank including native fowl manna grass, northern water plantain, and water smartweed as well as non-native reed canary grass and watercress. Because the stream is wooded the low light levels inhibit reed canary grass from dominating the channel. The presence of watercress is an indicator of groundwater discharge into the stream.


Winter wheat planted in agricultural field south of the stream at Gitzlaff


Pearly Crescentspot butterfly at Gitzlaff

Agricultural Field: The *south field* is currently plowed and planted; winter wheat was the crop planted and harvested in 2012 and 2013.

There were a total of 113 plants identified in 2013 on the Gitzlaff park property, 75 were native Wisconsin species, 38 were non-native species. There were no listed species (threatened, endangered or special concern). The Chicago Region Coefficients of Conservation were used to evaluate the quality of the vegetation. The mean Chicago Region coefficient of conservation value for Gitzlaff was 2.83, and the


Deer bed north of stream at Gitzlaff

Chicago Region Floristic Quality Index was 24.48. In comparison the Neumiller Woods mean C-value is 2.84 and the FQI for Neumiller Woods is currently 25.56.

The reason we applied Chicago Region Coefficients of Conservatism values for Florist Quality Index instead of the Wisconsin values is because the Chicago Region is an area that includes land surrounding the southern tip of Lake Michigan, including Kenosha County. It is a specific eco-region where the plant communities developed in similar geology and climate over 10,000 years, following the last ice age. Coefficient of Conservatism values were first developed for the flora of the Chicago Region, in the late 1970s to evaluate the likelihood of a plant to be found in a natural plant community. Since then, these values have increasingly been used to evaluate and monitor the quality and potential of remnant and restored lands. The Floristic Quality Index, which uses the Coefficient of Conservatism values, was developed to discriminate between tracts of land with differing levels of floristic integrity. Recently other regions and states have developed their own Coefficient of Conservation values to assess their plant communities. Wisconsin's Coefficient of Conservation values became available for use in the early 2000's. Wisconsin is a large state and has many eco-regions, but assigns only one value to a species. It is our judgment that the Chicago Region values are more specific to Kenosha County than the Wisconsin values.

Invasive Species

Invasive species are of concern to on-going restoration as they outcompete native plants for space and resources often forming monocultures. In addition they generally provide low habitat value for native species. The non-native species that should be controlled during and after restoration of Gitzlaff include black locust, common buckthorn, honeysuckle, sweet clover, reed canary grass and garlic mustard. These are currently in pockets throughout the site and possible to control. See the Neumiller or Gitzlaff Stewardship Plan for direction on invasive plant identification and control.

Wildlife

Mammals and birds
Wildlife currently inhabiting the Gitzlaff Park site includes white tailed deer (deer beds and tracks seen), cottontail rabbit, raccoon and coyote. Songbirds including song sparrow, chickadee, gold finch and red winged blackbird were observed in 2013; however no formal bird survey was undertaken so we expect many more birds to be utilizing these habitats. Sandhill crane calls were heard in the vicinity of Gitzlaff in the spring, and they might utilize restored areas in the future.

Invertebrates
The wildflowers in the north field attracted at least three species of butterflies in 2013; Monarch (*Danaus plexippus*), Pearly Crescentspot (*Phyciodes tharos*), and Question Mark (*Polygonia interrogationis*) were seen on multiple occasions. Red milkweed beetles (*Tetraopes tetrophthalmus*) were found on flowering milkweed plants.

Chimney crayfish burrows were found on the north side of the stream. Chimney crayfish burrow to the groundwater table, often many feet below the soil surface, and these burrows are important to other wildlife including resident snakes that overwinter in the burrows.
As mentioned above, stream invertebrates were noted under rocks and include isopod sow bugs and midge larvae.

Question M
India

Chimney crayfish burrow at Gitzlaff Park

Fish
As noted previously, due to general constraints of fish passage downstream and the intermittent flow in the stream there are few fish in Somers branch. The low gradient and lack of water depth in pools is also a primary factor inhibiting fish abundance and diversity. Fish that persist are small minnows that can survive in small pools during low water periods. Because there are few fish, any restored wetlands could be significant for amphibians, as fish would not prey upon their early life history stages.

Reptiles and Amphibians
No resident snakes, turtles or amphibians were noted. There were spring peeper calls heard from the wetland located in a kettle within a neighboring farm field to the north, west of the Canadian Pacific Rail Road. If wetlands were restored, amphibians could potentially utilize these new breeding areas.

Shelf fungi on box elder trees overhanging the stream

vi) <u>Other Constraints</u>

The property neighboring Gitzlaff Park on the southeast side of the stream is farmed as well. A small shooting range/target practice area with a wooden barrier is located on the stream edge very close to the property boundary. This is also the portion of the site where the exact property boundary needs to be researched. Park design and usage will need to be made in consideration of this neighboring use.

There is a former sewer treatment building on the west side of Gitzlaff that is now a Town of Somers Maintenance Building/yard. Storage of Town materials is behind a locked gated yard and accessed by a culvert over the stream. This culvert and access road is the only way to access the north portion of the site. Creating a gate on the north side of the yard would allow for restoration and maintenance vehicles to access the north side.

Maintenance yard fence blocks equipment access to north side of stream

An agricultural lease granting access for a tenant farmer on the south side of the Gitzlaff property is active until December, 2014 unless re-negotiated by the Town of Somers.

d) Neumiller Woods

The site consists of approximately 8 acres of Town of Somers parkland located north of CTH E and west of the Canadian Pacific Railroad. More specifically, the study area is located in the SE ¼ of the SW ¼ of Section 9 in Township 2 North, Range 22 East in the Town of Somers, Kenosha County, WI. While the majority of the park is wooded, a narrow strip of agricultural land is on the north side of the stream and is actively farmed. The wooded wetland and stream is mapped as Secondary Environmental Corridor by the Southeastern Regional Planning Commission. A formal wetland delineation was done by Thompson and Associates in 2012 in conjunction with the preparation of the Neumiller Woods Stewardship Plan and the wetland line is mapped on Figure 28. This was funded by a 2012 grant to Town of Somers from the Root Pike Watershed Initiative Network. At that time restoration opportunities were identified and this work expands on that plan.

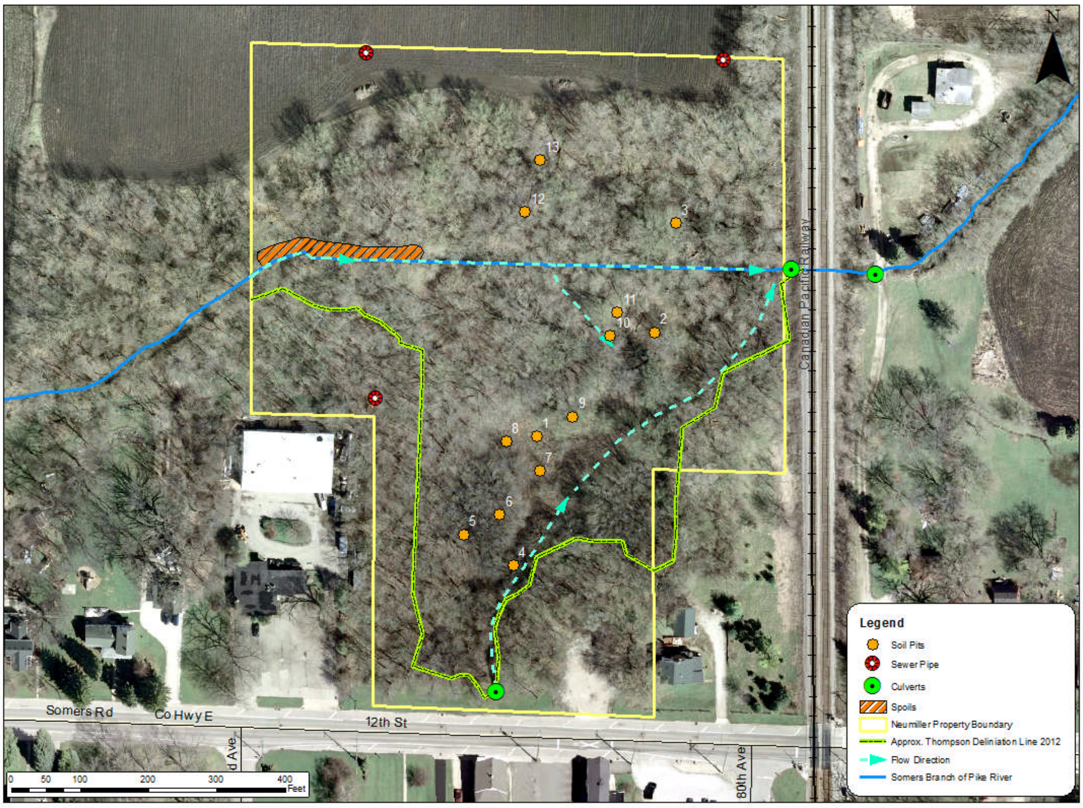


Figure 27—Neumiller Woods 2010 Aerial with Features
(Data Source: USGS, Kenosha Co., 2013 field reconnaissance)

i) Topography

The Neumiller Woods site was surveyed by Tom Bernklau, Bernklau Surveying in a leaf – off condition in the winter and early spring of 2014 (Figure 23- Topographic Survey). The purpose of the survey was to understand topography as it relates to water flow and restoration potential. The survey included many sub-foot elevations and also all boundary corners were staked. This was not a boundary survey, so boundaries staked were for the general purpose of locating the property line. The boundary on the north side of the site is obscured by plowing and planting yearly.


Wooded wetland in flat shallow basin at Neumiller Woods

The wooded wetland in Neumiller Woods is a very flat basin, with subtle changes in elevation varying from 689.5 feet above sea level to 690 and 691 feet above sea level.

There is an area of high ground in the south end of the site, which was likely an area filled historically. Rough concrete block and rebar are apparent on the side slopes. The parking lot and a picnic area with tables and benches are located in a mowed grass area. The ground also slopes up on the southwest portion of the site and is lowland forest, delineated in 2012 as uplands. The wetland north of the stream crossing has elevations varying from 690.5 feet to 692 feet above sea level, tilting towards the railroad culvert.

The farmed field on the north portion of the site slopes to a high of 694.5 feet above sea level adjacent the railroad tracks.

ii) Soils

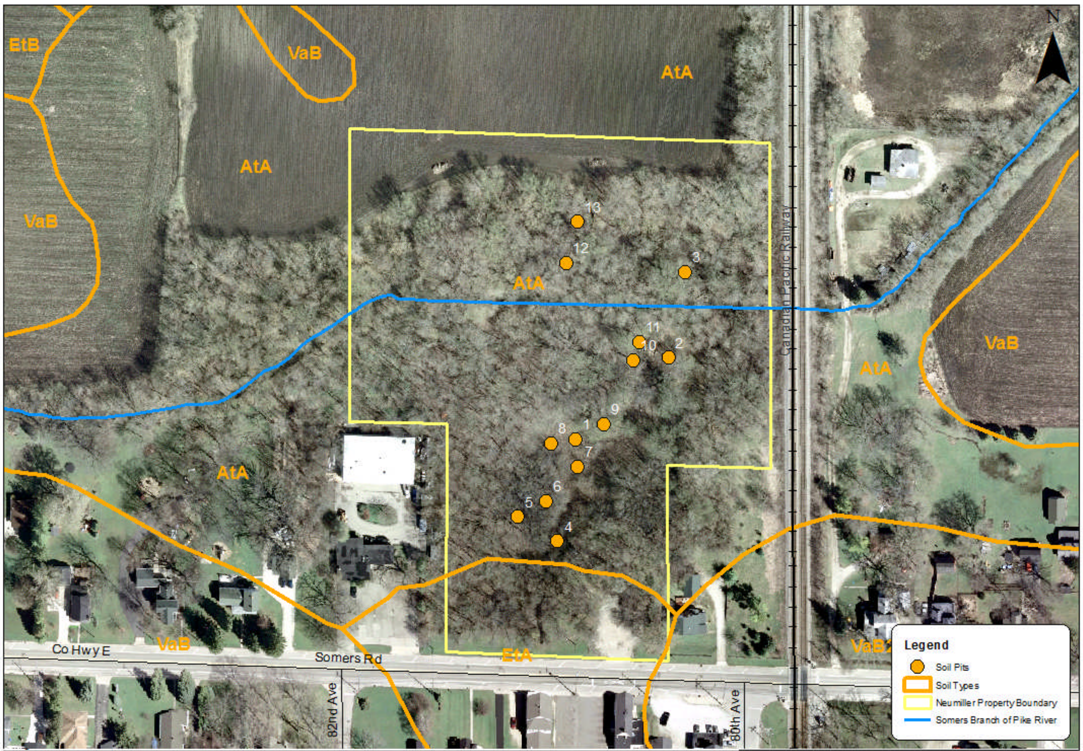
According to the NRCS Soil Survey Neumiller Woods is comprised of Ashkum silty clay loam (AtA) and Elliott silty clay loam (EtA). The NRCS classifies Ashkum silty clay loam as a hydric soil. A series of soil pits were dug and described in 2013 at locations shown on Figures 27 and 28. More detailed soil profiles are described in Appendix B, Table 1. There was extensive sedimentation overlaying the original black soils throughout the wetland basin and varied from 19 to 32 inches of sediment.


Very black soils approach a muck in the wooded wetland at Neumiller Woods

Buried soils were significantly blacker and higher in organic matter, approaching a muck soil (mucks are composed primarily of decayed plant matter and formed in very wet conditions). The basin's low position on the landscape and the railroad blocking flow to the east has caused significant deposition of sediments from upstream, from adjacent farmland to the north and from the culvert on the south end of the site.

The areas dominated by reed canary grass, an invasive plant, had 13-31 inches of sediment and were in light gaps in the woods.

The soils in the north field were noted to be very deep black soils that are so wet in the spring that algae formed on the soil surface. The low points, particularly in the northwest corner of the site were un-walkable in the spring due to the heavy waterlogged soils.



Soil	Symbol	Hydric Class
Ashkum silty clay loam, 0 to 3 percent slopes	AtA	Hydric
Elliott silty clay loam, 0 to 2 percent slopes	EtA	Upland with hydric inclusions

Figure 28—Neumiller Mapped Soils and Soil Data Pit Locations
(Data Source: NRCS, 2013 field reconnaissance)

iii) Bank Stability and Stream Channel

The Somers Branch flows through the northern half of the Neumiller Woods property. The channel is straight with minimal meandering, leading to some spots with severe bank erosion. During channelization of the stream in this reach some of the dredging spoils have been piled up along the side of the stream. This has occurred mostly along the northwest portion of the property.

Dr. Tim Ehlinger, and Dr. Neal O'Reilly with UW Milwaukee students observe stream channel in early spring, 2013

iv) Sedimentation

Neumiller Woods is a local low point and has been the recipient of sedimentation historically and currently. Erosion off of the active agricultural land to the north is an ongoing process that leads to thickened soils at local low points within the woods. The Somers branch stream carrying sediment off the residences from the west is slowed at the railroad grade that essentially acts as a berm and additional sediment is dropped in the wooded basin. A third source of sediment is from the culvert on the south side of the woods under CTH “E” which deposits gritty soil particles from south of the site into the wooded wetland. This historic and current sediment deposition into the woods has led to the accumulation of from 19-32 inches of sediment that was documented by soil pits as described above in the soils section.

The sediment alters the soils profile, topography, and hydrology, while vegetation responds to these changes. As the wetland filled with sediment over the last 100 years, and the elevation rose, trees became successful colonizers of much of the basin. However the lack of depth creates very shallow pools within the woods that draw down rapidly and thus are not conductive to amphibian breeding or other ephemeral pond habitat uses that require a longer residence of water.

v) <u>Stream hydrology and hydraulics</u>

Neumiller Woods receives drainage from a 539 acre watershed. Land use in the watershed is illustrated in Figure 29 and is dominated by 60% agricultural use (green) with the remaining land use predominantly residential (orange). The peak flow data from the Flood Insurance Study for Kenosha County (FEMA, 2012), as presented in Table 3, shows the significant reduction in peak flows due to the limited capacity of the 48-inch diameter culvert beneath the CP Railroad and the available floodplain storage upstream in Neumiller Woods.

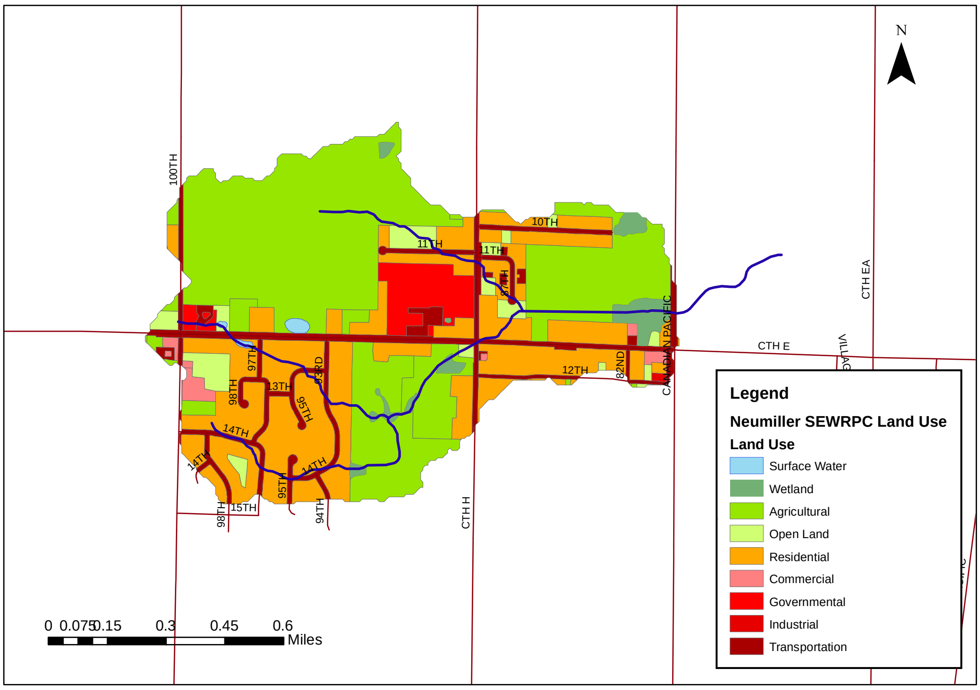


Figure 29—Neumiller Watershed Land Use Map
(Data Source: SEWRPC and ERP)

Table 3 – Estimated Storm Flow through Neumiller Woods

Storm Event		**Peak Flow** (cubic feet per second)	
Recurrence Interval	Annual Chance of Occurrence	Upstream of CP Railroad	Downstream of CP Railroad
10-year	10%	300	55
50-year	2%	500	80
100-year	1%	560	90

In the mid 1960's, the Town of Somers constructed an access road just downstream of the CP Railroad to a public works yard on the north side of the Somers Branch Creek. The stream crossing consists of two 30-inch diameter culverts. The culverts are at the same invert elevation as the 48-inch culvert beneath the adjacent railroad. The railroad culvert was replaced in the 90's from a 42-inch pipe and lowered to match the town driveway culverts.

The Town road crossing was not included in the 2012 FEMA flood elevation study. The effect of the crossing was evaluated using the FEMA data and the U.S. Army Corps of Engineers HEC-RAS software. This analysis determined that replacing crossing with larger culverts would reduce the upstream flood stages by 0.2 to 1.0 feet. Table 4 shows the effects of alternative size replacement culverts on the flood stages in the vicinity.

Table 4 – Effects of replacement culverts on flood stages
Upstream of the Town driveway

	Stage Change Upstream of Town Driveway (feet)		**Stage Change Upstream of CP Railroad (feet)**	
Culvert Alternative	**10-year**	**100-year**	**10-year**	**100-year**
Existing (twin 30" CMP)	0.0	0.0	0.0	0.0
Proposed 48" CMP	-0.6	-0.2	-0.6	-0.2
Proposed 47"x71" CMPA	-1.0	-0.5	-1.0	-0.5

vi) <u>Drain tiles</u>

There are several holes in the wetland basin suggestive of drain tile "blow outs" that are created when a drain tile line is under pressure and blows out a hole to the surface. Numerous probes to these areas failed to locate drain tile below. We also suspect drain tile in the north portion of the site in the area currently farmed. However soil pits and soil probes in likely areas failed to reveal drain tiles. Furthermore we were unable to locate outlets to the suspected

Neumiller Woods wetland in spring, 2013

drain tile in the stream area. Even if tile once existed, they do not appear to be currently functional. Without any positive evidence of drain tiles the restoration plan presented below does not involve dislocation of tiles to alter hydrology.

Neumiller Woods wetland ponds in spring, 2013

vii) Biological resources

Vegetation

The site largely consists of forested land, the majority of which is wetland. The community type is a lowland hardwood swamp. The wetland is seasonal, with standing water in the spring and dry ground in summer. The lowland hardwood forest habitat is regionally important because of its rarity. This habitat type represented 1.2% of the total area of the state prior to European settlement, and by the 1950s this acreage had dropped by one-third (Curtis, 1959). While lowland hardwood forests lost a small percentage of their overall coverage compared to other habitats, they comprise a small portion of land in the state and the Pike River watershed. The value of lowland forests is furthered because of the dramatic loss of all wetland types in southeast Wisconsin.

There are 84 native species of a total of 117 plants identified on the site and major dominants in Neumiller are listed in Table 2 in Appendix B, along with species names, native status and C-values. The C-value, or the coefficient of conservation, was developed by Swink and Wilhelm (1994) and describes a plant's tolerance to disturbance (Swink & Wilhelm, 1994). Native plants that are more tolerant to disturbance and likely to be found in a variety of ecological conditions have low numbers (for example box elder, a ubiquitous tree found in disturbed sites has a C-value of 0, and Canada goldenrod has a C-value of 1).

Ohio Buckeye

Solomon's Seal

The Mean Chicago Region Coefficient of Conservatism Value for Neumiller Woods is 2.84 with a Floristic Quality Index of 25.56. The C-value and Floristic Quality Index are useful indicators that can be used to monitor a site over time to assess vegetation management, disturbance, and the success of plantings and restoration. The current condition of the site as quantified by these indexes is that despite human disturbance, a significant number of native species are present. Neumiller Woods also has good structural diversity. Its tree canopy, shrubs, and herbs each provide significant wildlife habitat as is, yet the site also presents restoration opportunities.

Lowland Hardwood Swamp

Somers Branch flows through Neumiller Woods

Dominant trees in this wooded wetland include silver maple, green ash, box elder and crack willow with subdominants including American elm and slippery elm. The areas that seasonally pond had sparse shrubs but the areas upslope with less frequency of ponding have native wetlands shrubs including gray dogwood, wahoo, choke-cherry, American black currant, elderberry, and high-bush cranberry.

The frequent ponding of the wetland basin and low light level due to shading from the trees limits herbaceous vegetation in the understory. There are many bare areas with leaf litter. Species in light gaps include native fowl manna grass, Virginia blue flag (Iris), river bulrush, common water hemlock, jewelweed, pinkweed, and cattail.

Crack Willow provides habitat as it decays

Non-native invasive reed canary grass is present in a large light gap on the eastern portion of the site intermixed with river bull rush and cattail. It is in an area of the site with accumulated sediment over the original soils varying from 13-31 inches.

Vines

There were six vines identified, the more common being bittersweet nightshade (non-native; poisonous), poison ivy, Virginia creeper, and riverbank grape. Less common vines included wild cucumber and upright carrion.

Upland Forest Community

Major upland forest species on higher ground include black walnut, black cherry and box elder, with subdominants including sugar maple, honey locust, black locust, Russian mulberry and Ohio buckeye.

Upland shrubs on higher ground included the invasive species: common buckthorn and honeysuckle. Native shrubs included prickly ash, common blackberry, and black raspberry.

Agricultural Land

A narrow strip approximately 1 acre in size borders the wooded wetland and stream corridor on the north side of the site. This area was planted to corn last year.

Agricultural land north of stream at Neumiller

Invasive species

Invasive species in Neumiller Woods include the shrubs common buckthorn and honeysuckle. Herbaceous invasive species include reed

Reed canary grass in light gaps at Neumiller Woods

canary grass in the wetland and garlic mustard on the margins. Upland invasive plants include common burdock and dame's rocket. Non-native plants include gill-on-the ground, (*Glechoma hederacea*), orange daylily, and motherwort. Many of the upland invasive plants are located on the rough fill that borders the parking lot/picnic area, or borders the farm field. More extensive details on identification and management are contained in the Neumiller Stewardship Plan.

viii) Other constraints

A sanitary sewer line and three manholes are present on Neumiller (see Figure 27). The sewer line has a 10-foot easement centered on the line that cannot be disturbed. The sewer crosses the site close to the north property line and under the railroad tracks.

There are neighbors on the east and west side of Neumiller, the west side is a business and at least one shed appears to be on Somers land. The neighbor to the southeast is a single-family residence.

An active railroad line including freight trains and Amtrak service uses the Canadian Pacific Railroad that borders the east property boundary. This railroad and the culvert under the tracks present a constraint to water flow from Neumiller to Gitzlaff and a constraint to park planning in terms of connected trails.

4) ECO-HYDROLOGICAL RESTORATION RECOMMENDATIONS

a) GOALS AND OBJECTIVES

Bee gathers pollen on Canada goldenrod at Neumiller Woods

From the "big picture" scale, the key elements of restoration work should be multifold: (1) to restore a more natural flow regime for the stream channel, (2) to restore wetlands on the banks of Somers branch (3) to provide prairie or wooded buffer to wetlands and the stream and: (4) to provide public access to the ecosystem amenities of the park sites.

i) Water quality (reduced pollution)

Reconnecting the stream channel with the floodplain wetlands can enhance water quality. This will allow nutrients carried in the stream flow to be removed more effectively and reduce the amount of phosphorus and nitrogen moving downstream toward the Pike River and Lake Michigan. The restoration of an ephemeral pond and native prairie buffer on the Neumiller site and riparian wetlands and prairie buffer on the Gitzlaff site will provide significant improvement in this regard.

ii) Green space

Habitat preservation/restoration

As the Town of Somers develops from agricultural land to residential or commercial land use, it will be increasingly important to provide and protect natural features including existing wetlands, restore additional wetlands, protect riparian habitat with significant vegetated buffers to the stream. The enhancement of ecological function and public access are key elements in the restoration of both Neumiller and Gitzlaff Parks. The re-creation of an ephemeral pond within the existing floodplain forest wetland and prairie buffer on the Neumiller site and restoration of prairie and riparian wetland scrapes on the Gitzlaff site will generate significant higher quality habitats for amphibians, birds, small mammals and insects such as butterflies.

Recreation

The ecosystem services provided by the restoration and protection work on Gitzlaff and Neumiller Parks could be significantly enhanced by providing public access with a walking trail system, with bridges over the stream channel. These could be completed in phases depending upon available resources for implementation.

Picnic area at Neumiller Woods

Education

The proximity of Neumiller and Gitzlaff sites to the Town center and to elementary and secondary schools is an asset that can be enhanced by developing educational programs, including signage along the trails that explain the components of wetland, stream and prairie ecosystems. The important roles of agriculture and environmental stewardship should be included to provide a complete history for how the landscape has evolved over the past 150 years. These sites also serve as models of restoration that could be duplicated by private landowners in the sub watershed.

UW Milwaukee students investigate the Somers Branch

b) Restoration Opportunities

This plan highlights wetland restoration on two town-owned properties: Gitzlaff Prairie Park and Neumiller Woods. Both sites contain mapped wetland – hydric soil and human impacts to original hydrology including drain tile, and sedimentation. These projects will positively impact the stream in terms of water quality, flood storage and wildlife habitat. They will also provide more diversity of habitats on the parks that are visually and aesthetically appealing to residents as well. When combined with trails and educational features, they can help create green spaces that function in water purification and management while enhancing recreation. These sites can also serve as models on the local level to motivate private landowners to also restore wetlands.

The U.S. Fish and Wildlife Private Lands Office is interested in partnering with Town of Somers on the proposed wetland restorations on parkland. Rachel Samerdyke, from the USF&W Horicon office is interested in providing implementation funding, technical expertise and permitting expertise in order to restore these wetlands and prairies. The Fish and Wildlife projects have a modified wetland permit with the state and federal agencies. These wetland plans were designed with Fish and Wildlife specifications in order to be covered by their permitting process.

c) GITZLAFF PRAIRIE PARK

i) Drainage improvements (culverts)

As discussed above the Town of Somers has installed an access road to a public works yard on the north side of Somers Branch Creek, which includes a small bridge made up of two 30-inch culverts. The Town road crossing was not included in the 2012 FEMA flood elevation study. The effect of the crossing was evaluated using the FEMA data and the U.S. Army Corps of Engineers HEC-RAS software. This analysis determined that replacing crossing with larger culverts would reduce the upstream flood stages by 0.2 to 1.0 feet. Table 4 on page 43 shows the effects of alternative size replacement culverts on the flood stages in the vicinity.

This culvert replacement would require permits from the WDNR (Contact Elaine Johnson, WDNR) and Kenosha County.

ii) Wetland restoration

In our investigation of the existing conditions at Gitzlaff Park we found wetland soils adjacent the stream in a broad band on the south side of the stream and a narrower band on the north side of the stream. In the farm field adjacent the south side of the stream the soils varied from 12 to 15 inches of black silty clay loam or black silty clay overlying at least one foot of clay (silty clay or sandy clay), with those layers depleted of oxygen in the areas closest to the stream. These depleted areas indicate that water perches long enough to drive out oxygen and create wetland soil conditions. These features remain in the soil despite the presence of subsurface drain tiles.

The soils on the north side of the stream varied from 9-15 inches of black silty clay loam on the stream edge with clay located below. Many of the soil samples had redoximorphic features in the upper 12 inches, which indicates water perching seasonally in the root zone, again indicating the presence of historic hydric (wetland) soils in the lowland areas adjacent the stream.

We found multiple drain tiles entering into the stream on the south bank, indicating that the south field has sub surface drainage. These tiles matched the drain tile shadow on the 2005 aerial photo (Figure 26). We only found one active drain tile on the north bank of the stream, however there were multiple seeps that may indicate buried tile, or may be groundwater seeps.

These areas of wetland soils, and wetland drainage (tiles) were found in areas of low topography, which will also capture periodic floodwaters.

iii) Scrapes

A series of four wetland scrapes varying from 1-2 feet in depth are shown on the accompanying wetland restoration plans located in Appendix D in the electronic version of this report. They are located adjacent the stream in clay-rich hydric soils which will pond water. Scrapes on the south side of the stream are 0.82 and 0.16 acres in size, and 0.27 and 0.15 acres on the north side of the stream, for a total of 1.4 acres of wetland restoration.

Since the black soils are less than 1-2 feet in depth, topsoil shall be stockpiled and then re-spread over the excavated basin. The spoils from the excavation on the south side of the stream shall be used to create a berm on the eastern property boundary. This berm is planned to be planted to native prairie species.

The areas of the two wetland scrapes on the north side may contain sub surface drain tile, the area should be examined for tile that could be an additional source of hydrology as the scrapes are constructed.

Maintenace yard fence blocks access to north side of Gitzlaff

Drain tile breakage

The wetland scrapes shall be located in areas of active drain tile, and prior to them being dug, the excavator shall locate the tiles and then break them in the vicinity of the wetland scrape to provide additional hydrology. Care will be taken to avoid impacting drain tiles on the property boundary.

Other features

The restoration includes a gate to be added to the maintenance yard fencing on the north side to allow for equipment access to the north side of Gitzlaff for the restoration and any maintenance.

iv) Prairie enhancement/restoration

Restored native prairie on the Pike River corridor in Mount Pleasant

Native prairie is proposed to be planted as a buffer to the wetland restoration areas on both sides of the stream. Prairie buffers increase the habitat value of the wetlands and create areas to further treat overland flow. The dense vegetation slows water as it travels on the soil surface while the deep prairie roots create pore spaces in the soil to infiltrate water.

The south side is proposed to have an approximate 100-foot buffer to the wetlands and stream seeded to native prairie. This complements the Ruekert-Mielke designed park plan (Figure 30) that showed prairie restoration as a component of the park plan. This prairie would be approximately 3 acres in size.

North of the stream the uplands are presently old field vegetation as described in the section on existing Gitzlaff vegetation above. Some prairie species are already colonizing the site including evening primrose, yellow coneflower, ironweed and Indian hemp. Instead of destroying the current vegetation to plant prairie species we recommend the site be burned and then overseeded with native species. Alternately the site could be mowed closely followed by native seed however this may not be as effective as a burn. Seeding in late fall would allow the frost action to work the seeds into the soil. The prairie area that potentially could be restored is 10 acres. These planting plans are included in Appendix D.

v) Recreation/public access

Trails and bridge

The Gitzlaff Park Plan designed by Ruekert-Mielke proposes several trails to access natural features on the north and south side of the stream (Ruekert-Mielke, 2009). UWM students also studied public access on the Gitzlaff property, and propose a trail system to facilitate public access. The trail material would need to be engineered if there needed to be access for support vehicles used for maintenance or police patrols.

A footbridge was also proposed in the Ruekert-Mielke plan to connect the two sides of the park. Since the stream is intermittent and shallow, there are many times of the year currently when the stream can be crossed by foot.

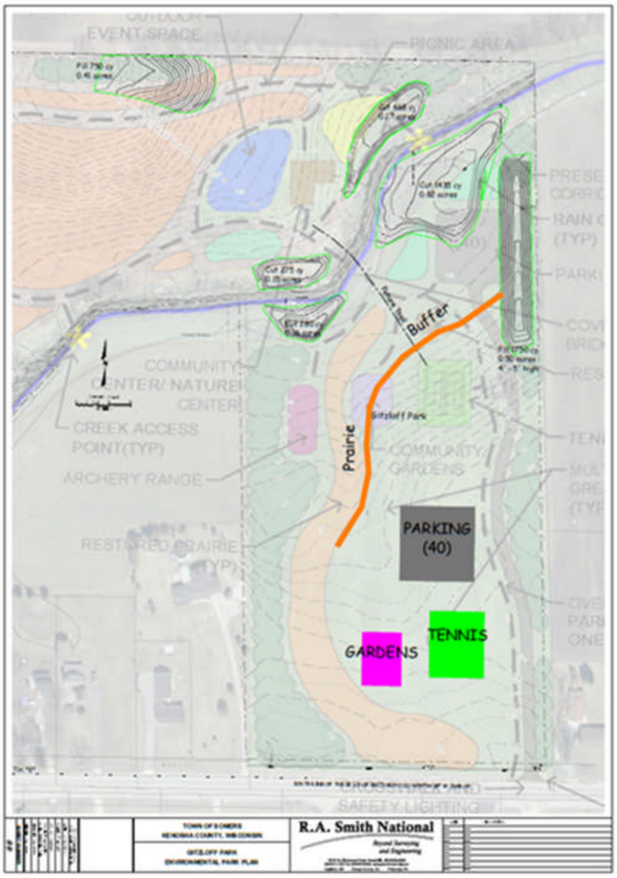


Figure 30-Modified Gitzlaff Park Plan
(Source: Ruekert-Mielke and R.A. Smith National)

Maintenance Road

A gravel maintenance road currently exists that runs between Highway E and the maintenance shed and fenced yard. This road could be extended north in order to provide access to the northern site. The road could be utilized for general maintenance of the property including prescribed burns and regular police patrol as the park use is developed. A preliminary proposal on the Gitzlaff restoration plan is to insert a locked gate into the chain link fence on the north side of the yard to provide limited access for wetland restoration construction and maintenance.

d) NEUMILLER WOODS

The restoration proposed for Neumiller Woods includes two phases: the first for Eco-hydrology (Figure 31) and the second for public access (Figure 32). The 2012 Neumiller Woods Stewardship Plan which was funded by a Root Pike WIN grant recommended further field work and the development of a restoration plan (Thompson and Associates Wetland Services, 2012), which this project accomplishes. The plan recommended that the restoration plan with design components including grading, hydrology, and wildlife habitat to integrate the site with Gitzlaff and the entire Somers branch; and a native vegetation planting plan to increase diversity and ecosystem services for any disturbed areas and the agricultural field on north end. This plan includes those elements as described below and in the accompanying restoration plan.

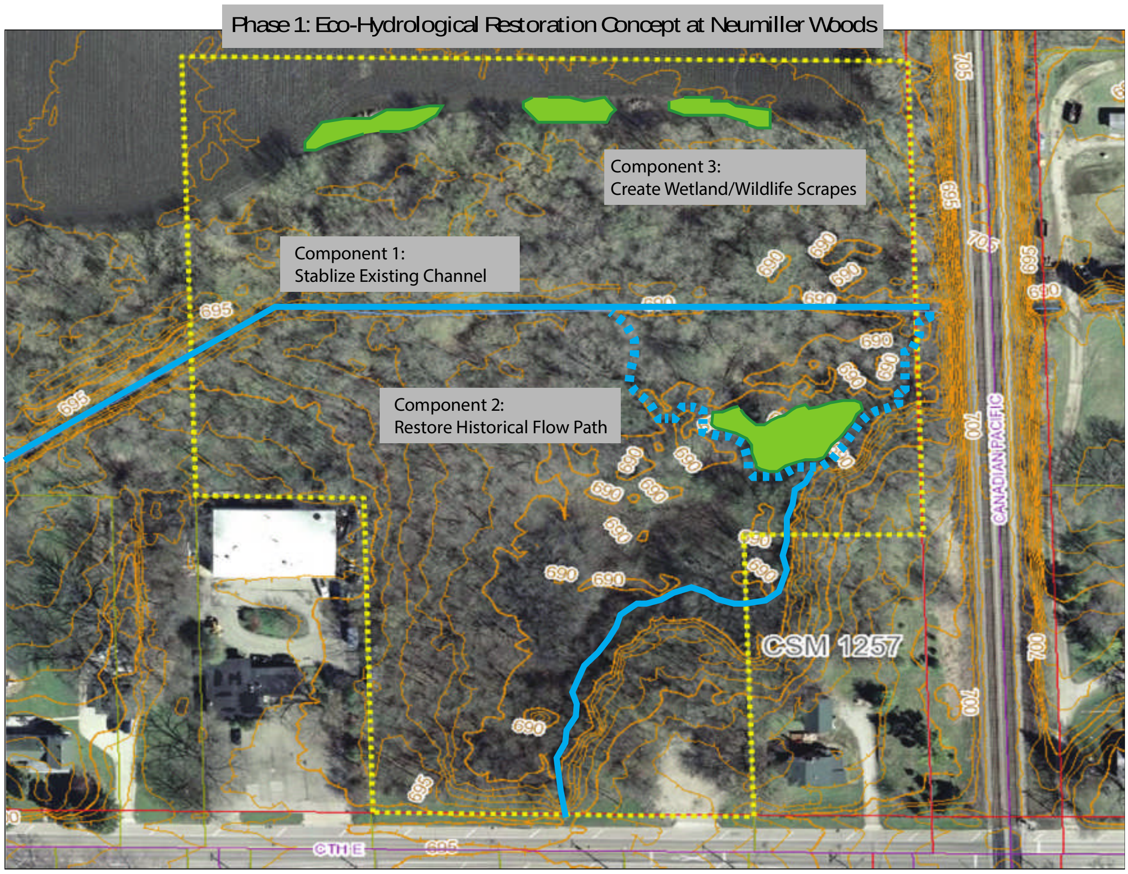


Figure 31 - Concept Design for Neumiller Woods (Phase 1 - Hydrology)
(Source: ERP)

i) <u>Restoration of hydrology</u>

Although we have evidence of the presence of sub-surface drain tiles, principally from the observation of multiple holes or “blow-outs” created by pressurized water within a tile line escaping to the surface, there is no apparent drain tile outflow points in the stream which would indicate that tiles are currently draining the wetland. We speculate that historic drain tiles were buried under the sediment deposits creating the situation that caused the “blow-out” holes. Drain tiles do not appear to be currently draining the wetland within the wooded portion of the site and thus to not create an opportunity for restoration.

There may be drain tile in the 0.9-acre agricultural field to the north, but even if it is active, because the property boundary is in a low point, it would be impossible to disable drain tile on the Neumiller property without impacting the northern neighbor as well.

The restoration of hydrology shall be accomplished by creating a wetland scrape within an area of dense reed canary grass and removing sediment deposits as discussed in the next section.

The treatment of stormwater upstream of Neumiller woods is critical to the long-term maintenance of the wetland. Untreated stormwater released rapidly after rain events will have a negative impact on Neumiller by flooding out trees and delivering sediment and pollution into the wetland and stream. New development within the local watershed should be evaluated to avoid future uncontrolled inputs into the wetland.

ii) Wildlife scrape

A wildlife scrape of 0.19 acres is proposed in an area with deep deposition of sediment, a gap in tree cover and the invasive reed canary grass. The scrape is designed as a 1-2 foot deep basin to increase the amount of time water ponds and provide amphibian habitat.

The spoils removed to create the basin will be used to dress up the slopes of the parking / park area on the south end which currently are very rough, have pieces of concrete block and rebar protruding and are covered with weedy plants.

Wetland permits are required from the U.S. Army Corps of Engineers (Marie Kopka) and the WDNR (Elaine Johnson). These plans are detailed in Appendix D and have the support and interest of Rachel Samerdyke, U.S. Fish and Wildlife Private Lands Office. She could assist the Town in permitting these plans in a more expedited fashion and implementing them.

iii) Tree enhancement

Green ash trees are the second most important tree after silver maple in Neumiller woods according to a 7 Point-Quarter Analysis completed by UW Milwaukee students in 2013. Currently in southeast Wisconsin green ash trees are dying back due to the emerald ash borer; if not replaced, the resulting opened canopy will allow more reed canary grass (an invasive species) to grow (Tu, 2004).

Silver maple saplings at Neumiller Woods

The green ash trees may be replaced by under plantings to allow succession without loss of canopy when the emerald ash borer infestation impacts the site. Green ash trees in neighboring Hawthorne Hollow are already experiencing dieback. Wetland tree species appropriate to flood conditions include silver maple, eastern cottonwood, black willow, American elm, red maple (Barnes & Wagner, 2004, p.304). Other wetland floodplain species appropriate to the condition of the site include hackberry, swamp white oak, black walnut, American beech, and basswood.

iv) Native understory enhancement

The native species in the understory exist in light gaps and areas that pond less frequently. River bulrush, blue flag (iris) and fowl manna grass as examples of native species that are currently present under the tree canopy in the wetter soils. The advantage to the shade provided by the tree canopy is that low light levels inhibit reed canary grass dominance. The native seed mix in the restoration plan in Appendix D is intended to supplement the current understory and could be used in conjunction with the Neumiller wetland scrape, or planted at a later date, as funds were available.

v) Channel restoration

Bank stability can be achieved in part by standardizing the erosion and sedimentation on the streambed (Downs & Gregory, 2004). It is most efficient for a stream to meander back and forth, dissipating or lowering its energy and flow velocity over a distance. This slows the erosion of the system as a whole. Several meanders may be introduced in the northwest portion of the stream (Figure 30). This would also move the stream from a plane-bed reach to a more stable pool-riffle reach (Hauer & Lamberti, 1996). Not only will this type of reach create a more stable channel, the pools and riffles created between meanders will provide prime habitat for native amphibians.

vi) Woody debris

Woody debris in Neumiller Woods

The downed trees and woody debris offer important habitat within the wooded wetland but also create complications when the debris clogs the culvert under the railroad track. The removal of dead trees should be done only if they represent either a hazard to a structure (house, boardwalk etc.) or if they are so close to the culvert that they could obstruct stream flow. As much as possible, trees that die should be left to decompose on the soil, since wood removal may result in a significant loss of nutrients to the system. If the tree is a hazard it should be cut down and allowed to remain on the soil unless it could block the culvert. Downed trees provide important microhabitats within wetlands and woods.

vii) Prairie restoration

Agricultural field north of Neumiller Woods to restore to prairie

There are about 0.9-1 acre of agricultural land on the north side of the wooded wetland that is prior converted cropland, currently planted with corn. The soils are a heavy clay loam and likely have drain tile present. However, as discussed previously the drain tile cannot be disabled without impacting other landowners. This area represents an opportunity to expand the wetland and create a buffer to the stream and lowland forest wetland from the active farmland to the north. The cropland is a narrow strip with low light levels and the species chosen for the native prairie seed mix in the restoration plan are more tolerant of low light. Plans in Appendix D include prairie seeding, and placement of fence posts to distinguish the property boundary.

viii) Enhancement of public access

Neumiller Woods has 5.1 acres of wetland within the 8-acre park, so the public spaces available for picnic, parking and passive use are located in the uplands adjacent the wetland. The small upland knob on the south end of the site has a parking area and mowed picnic area.

Access to the woods for the public may be gained initially by means of a meandering firm and stable trail with an ADA compliant slope and width considerations. Figure 32 depicts a proposed loop design that would follow the topographic counter lines as well as the woods natural corridor and will avoid the wetlands delineated by Thompson and Associates in 2012. The west side of the loop and the area that connects to the east side are at higher elevations so at least this part of the trail can be easily accessible for longer periods during the year. As shown in Figure 32, the trail follows the stream, which is a major point of interest, a good place for informational signage and a potentially wider observational area with benches (Phase III). It curves to the northwest area of the property, which is less susceptible to human noise pollution and would allow for observation of wildlife.

In Wisconsin, trails within delineated wetland areas must be a boardwalk, which may be installed with a permit. A wooden boardwalk through the southern wetland portion of Neumiller could allow public access for better vision of native flora, fauna, and landscape features. Use of Scout projects or other community volunteer opportunities could provide a low cost boardwalk option.

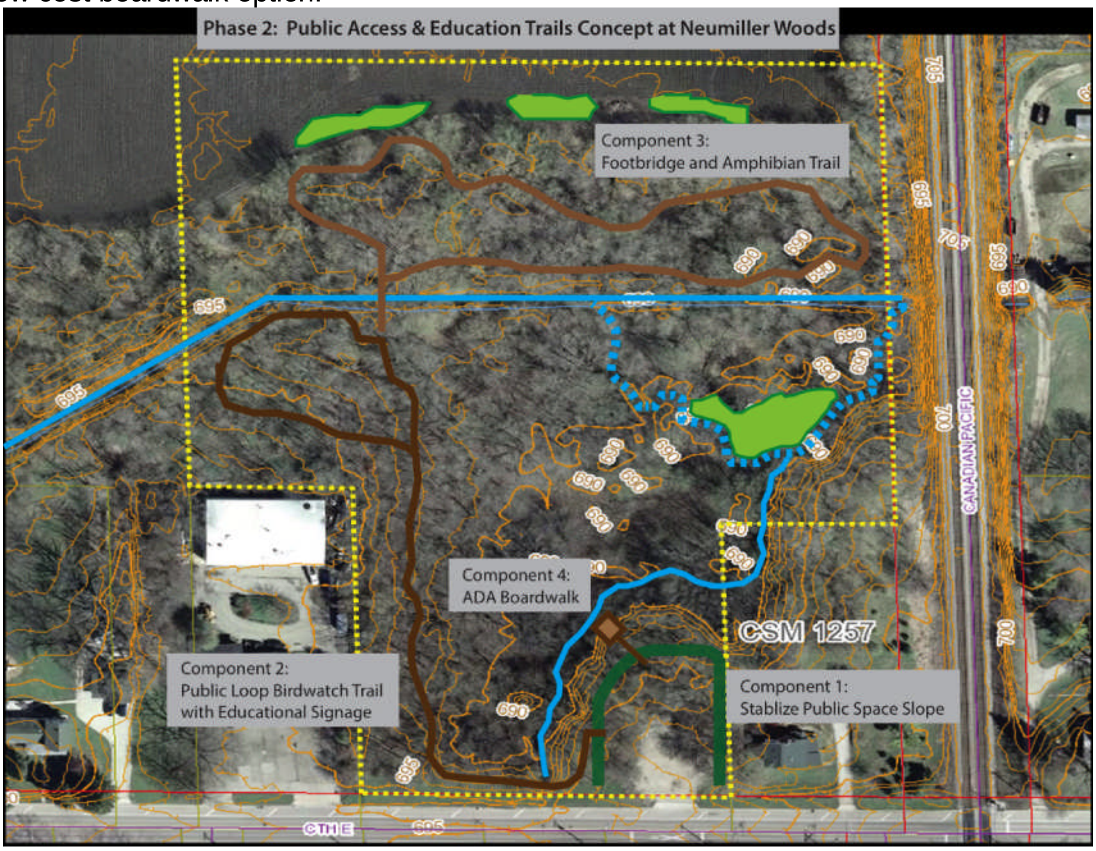


Figure 32—Concept Plan for Restoration of Neumiller Woods
Phase 2 - Public Access (Source: ERP)

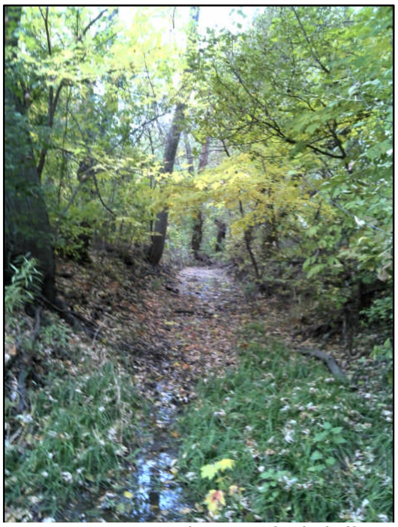
e) RECOMMENDATIONS FOR STREAM-WIDE PRACTICES

Based on the eco-hydrological state of the Somers Branch as detailed in this report, several actions may be taken in the future to address the problems identified while contributing the restoration and health of the stream.

Woody Debris:

Automatically clearing blockages at culverts and bridges is good management. However, the key for stream maintenance is to "manage" woody debris in the stream, not to just automatically "remove" it. Some debris creates problems such as debris that is collecting additional debris and creating backups that contribute to flooding and bank erosion when the water flows around the blockage. Other debris creates habitat, such as logs in the streambed that create scour pools and promote the meandering of the low-flow channel. So, having a "one size fits all" management strategy that removes all woody debris is not good eco-hydrology.

Recognizing the differences is not difficult, but easier to do in the field. A training session with the people who will do the management in the field would be useful to show and explain the differences. In many cases, a chain saw to cut a flow-path through the debris is a good solution, instead of removing all woody debris from the channel. Logs may be laid parallel to the stream to facilitate stream flow.



Somers Branch east of Gitzlaff

Meandering:

The meandering of the stream channel can be facilitated by using boulders and anchored logs to promote the meandering of the low-flow channel to produce a more stable riffle-run structure. Integrating the maintenance of woody debris with allowing the channel to meander over time will allow a more stable stream to evolve.

Culverts:

The ideal solution is to replace and resize culverts that are in poor condition or too small for natural stream flow, especially those which are under the Canadian Pacific and Union Railways. However, with limited resources, replacing culverts is not always a viable option. When residents reconstruct their driveways or the town repaves a road, resizing and replacing existing culverts that are backing up water, or blocking fish passage should be considered. Culverts should be positioned low enough to avoid “waterfalls” and allow for the free movement of fish and other wildlife in the stream corridor. The WDNR should be consulted regarding permits for culvert replacements on navigable streams.

Buffers:

As shown on Figures 18-21 approximately 32% of the stream reach has areas of significant woody buffer that are really commendable and should be protected. Other areas with less buffer could be expanded in depth and federal programs exist to assist landowners in this practice (see contacts below under wetland restoration). As agricultural land is converted to residential or commercial development there will be increased runoff into the stream. With an increase in flow, it will be important to ensure that bank erosion does not increase. Creating deeper vegetation buffers along the stream can counteract bank erosion. Native prairie can provide ecosystem benefits as well as good bank control, however the current wooded buffer provides shade to the stream and is holding the bank in many areas.

<u>Wetland Restoration:</u>

Wetland restoration projects are an important conservation practice to improve the ecological health of the Pike River. A number of wetland restoration opportunities were identified in the Pike River Watershed-Based Plan and further identified on Somers Branch in Figure 33. Table 1 in Appendix C further identifies landowners, acres and zoning details. Agricultural land with remnant wetland soils represent the most successful wetland restorations if wetland hydrology can be restored. Areas with hydric soils and active agricultural drainage including ditches and sub-surface drain tiles are ideal for wetland restoration if the hydrology can be reversed to wet the land without impacting neighboring properties.

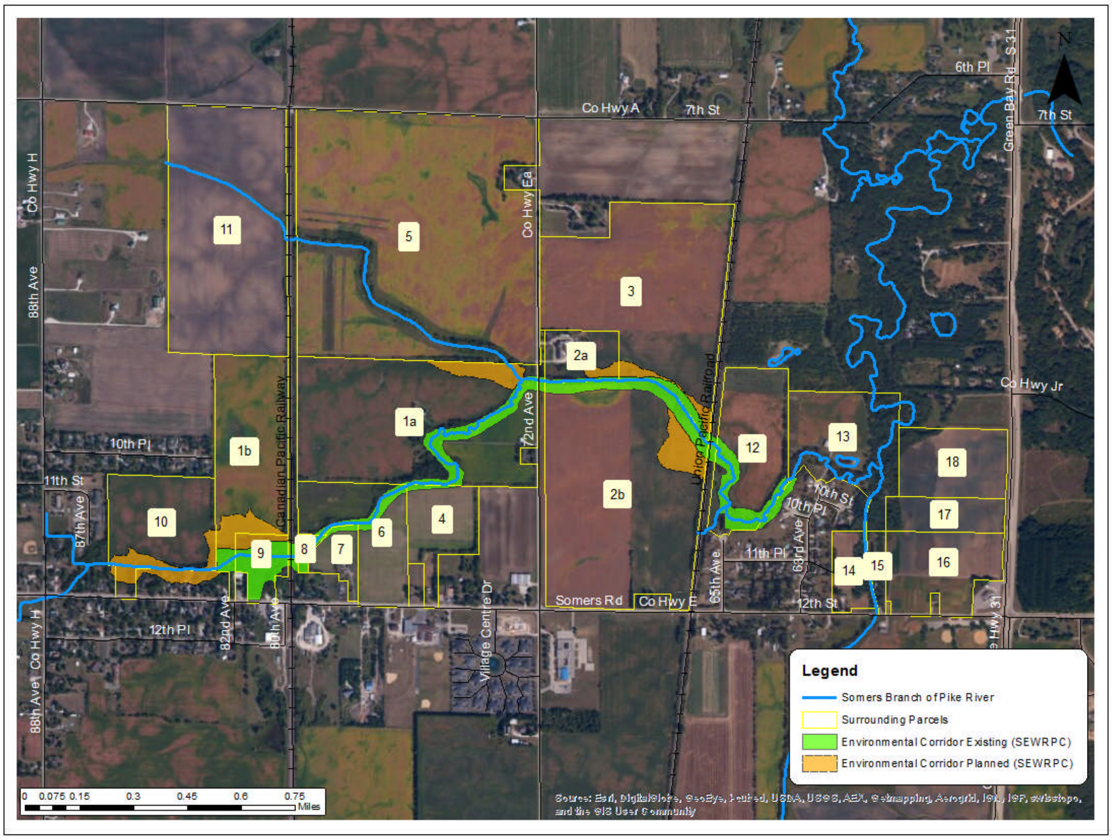


Figure 33—Parcels with potentially restorable wetlands adjacent Somers Branch (Source: Kenosha County)

Private landowners interested in restoring even a portion of their lands into wetlands, or stream buffer may be eligible for financial and technical assistance from several federal agencies:

Rachel Samerdyke
U.S. Fish and Wildlife Private Lands Office
Leopold Wetland Management District
W 4279 Headquarters Road
Mayville, WI 53050
920-387-2658 (X 113)

Ronald Howard
Assistant State Conservationist for Easement Programs
Natural Resource Conservation Service
8030 Excelsior Dr.
Madison, WI 53717
608-662-4422 (X 252)

We recommend that Town of Somers approach these landowners to see if they are interested in restoring land adjacent Somers Branch.

APPENDICIES

APPENDIX A	Gitzlaff Soils Data and Vegetation
APPENDIX B	Neumiller Woods Soils Data and Vegetation
APPENDIX C	Potentially Restorable Wetland Parcels adjacent Somers Branch
APPENDIX D	Restoration Plans for Neumiller Woods and Gitzlaff Park
APPENDIX E	Topographic Survey drawing and CADDS file

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