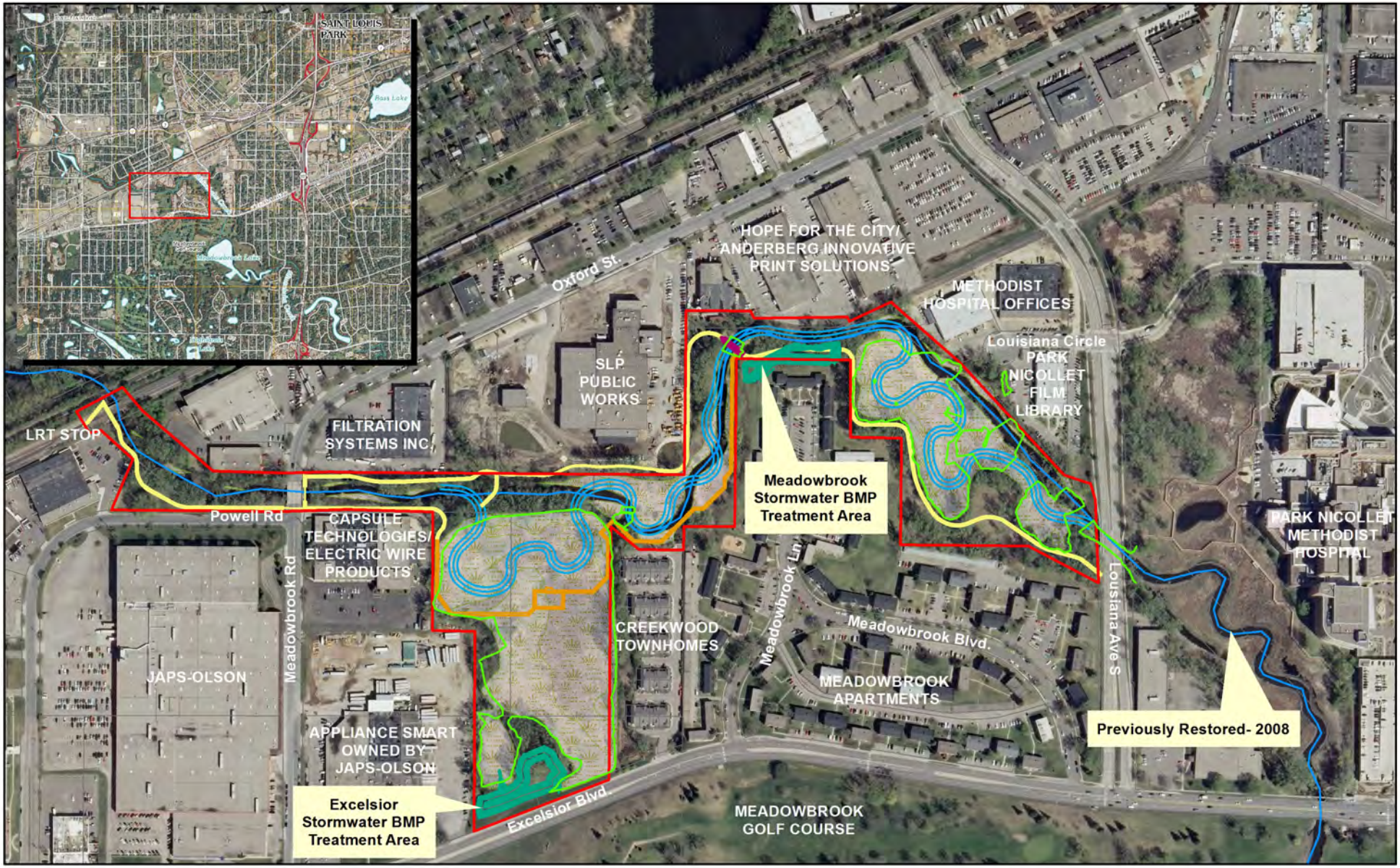


FIGURE 1- PROJECT LOCATION MAP
Minnehaha Creek Reach 20 Restoration
St. Louis Park, Minnesota

0 150 300 600 900 1,200 Feet

N

- Bridge
- Boardwalk
- Bituminous_Trail
- 2011_Minnehaha_Creek
- Prelim_Wetland_Delineation
- DNR_OHW_889.8_Contour
- ProjectBoundary
- Proposed_Channel
- Stormwater_BMPs

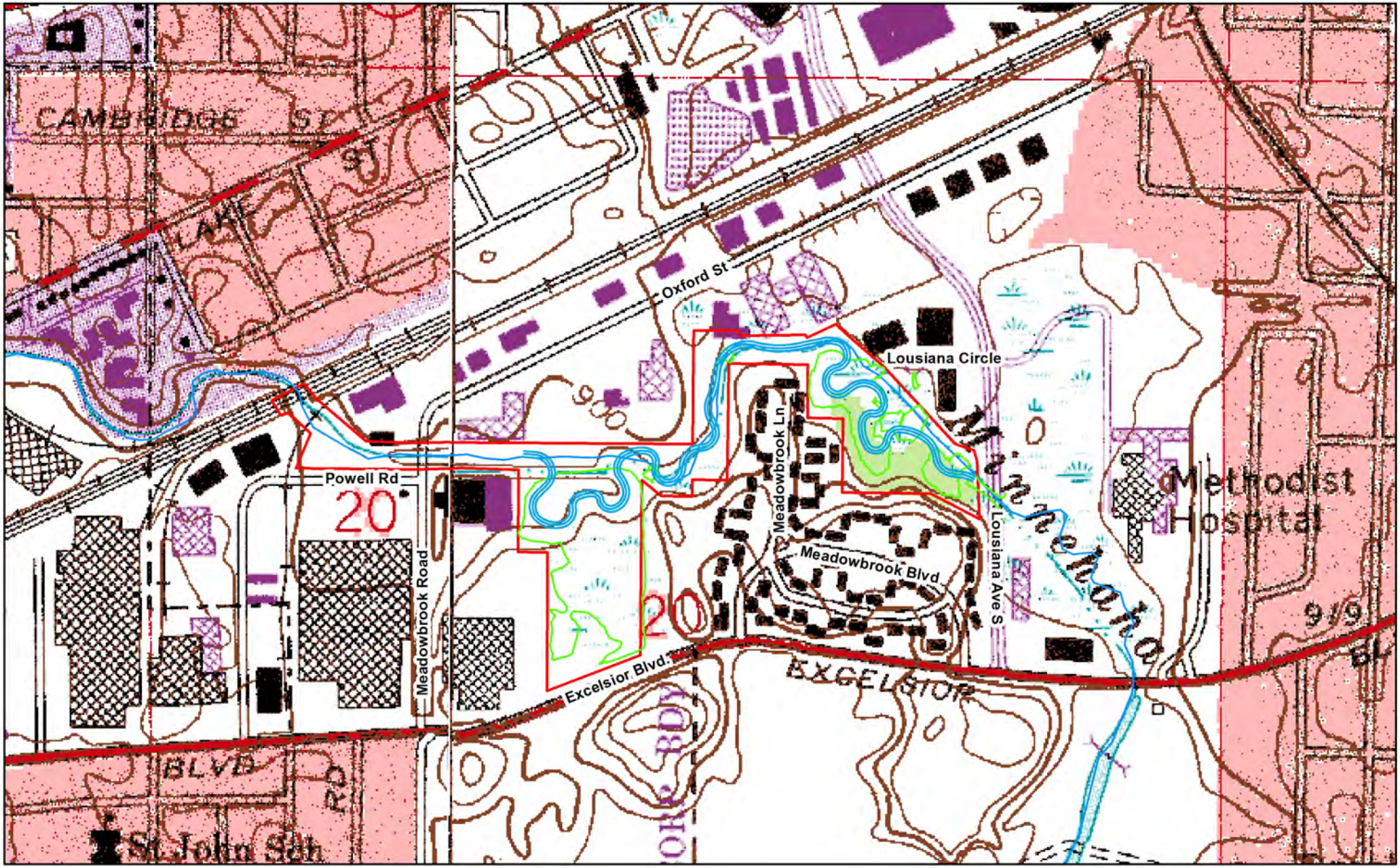


FIGURE 2- USGS 7.5 Minute Topographic Map
Minnehaha Creek Reach 20 Restoration
St. Louis Park, Minnesota

0 200 400 800 1,200 1,600
Feet

N

Proposed_Channel
DNR_OHW_889.8_Contour
2011_Minnehaha_Creek
ProjectBoundary

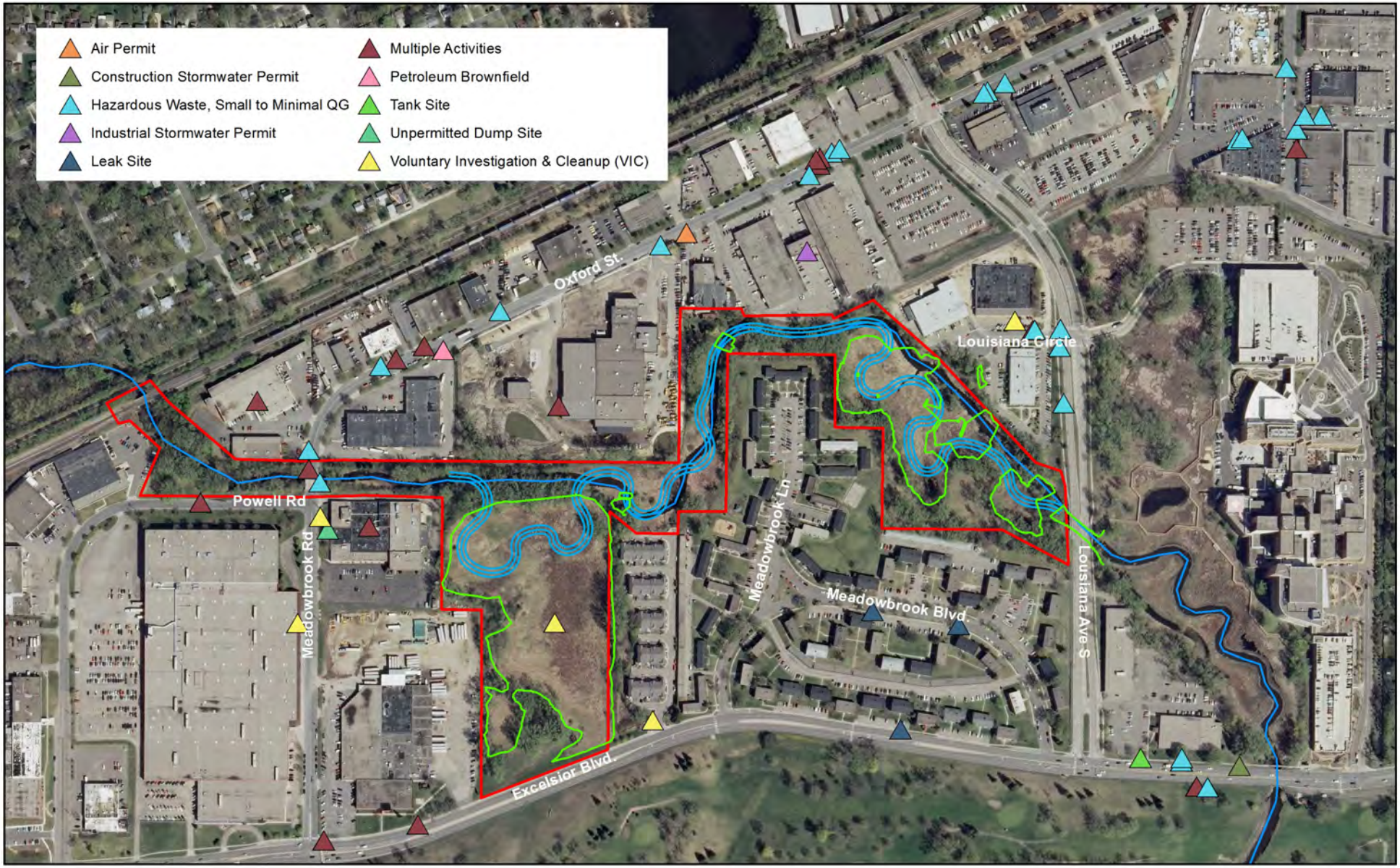
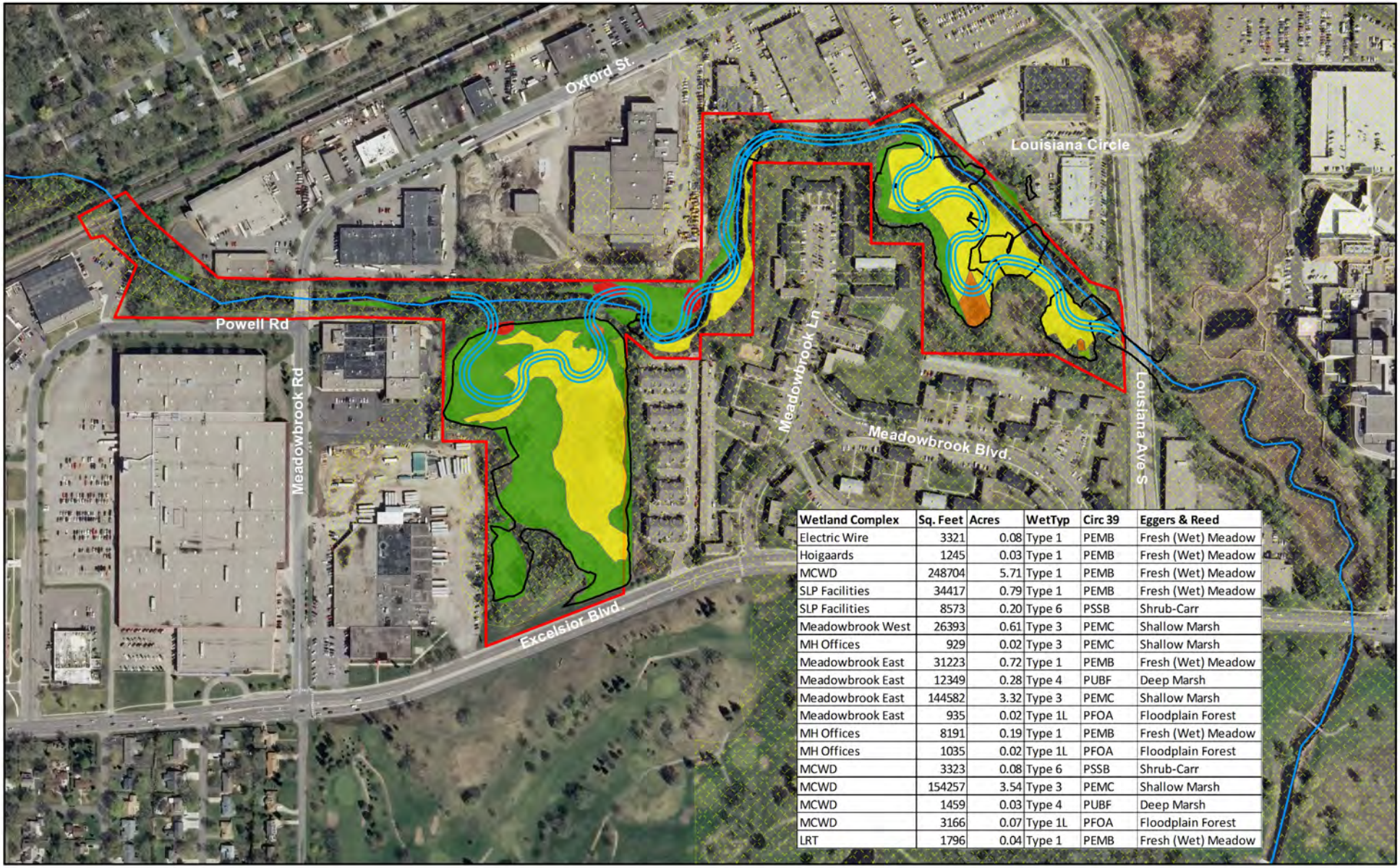


FIGURE 3- Sites of Environmental Concern (MPCA)
Minnehaha Creek Reach 20 Restoration
St. Louis Park, Minnesota

0 150 300 600 900 1,200
Feet

N

DNR_OHW_889.8_Contour
Proposed_Channel
2011_Minnehaha_Creek
ProjectBoundary



Wetland Complex	Sq. Feet	Acres	WetTyp	Circ 39	Eggers & Reed
Electric Wire	3321	0.08	Type 1	PEMB	Fresh (Wet) Meadow
Hoigaards	1245	0.03	Type 1	PEMB	Fresh (Wet) Meadow
MCWD	248704	5.71	Type 1	PEMB	Fresh (Wet) Meadow
SLP Facilities	34417	0.79	Type 1	PEMB	Fresh (Wet) Meadow
SLP Facilities	8573	0.20	Type 6	PSSB	Shrub-Carr
Meadowbrook West	26393	0.61	Type 3	PEMC	Shallow Marsh
MH Offices	929	0.02	Type 3	PEMC	Shallow Marsh
Meadowbrook East	31223	0.72	Type 1	PEMB	Fresh (Wet) Meadow
Meadowbrook East	12349	0.28	Type 4	PUBF	Deep Marsh
Meadowbrook East	144582	3.32	Type 3	PEMC	Shallow Marsh
Meadowbrook East	935	0.02	Type 1L	PFOA	Floodplain Forest
MH Offices	8191	0.19	Type 1	PEMB	Fresh (Wet) Meadow
MH Offices	1035	0.02	Type 1L	PFOA	Floodplain Forest
MCWD	3323	0.08	Type 6	PSSB	Shrub-Carr
MCWD	154257	3.54	Type 3	PEMC	Shallow Marsh
MCWD	1459	0.03	Type 4	PUBF	Deep Marsh
MCWD	3166	0.07	Type 1L	PFOA	Floodplain Forest
LRT	1796	0.04	Type 1	PEMB	Fresh (Wet) Meadow

FIGURE 4- Preliminary Wetland Delineation/FEMA Floodplains
Minnehaha Creek Reach 20 Restoration
St. Louis Park, Minnesota

0 300 600 900 1,200 Feet

N

Proposed_Channel
DNR_OHW_889.8_Contour
FEMA_100_Year_Flooplain
2011_Minnehaha_Creek
ProjectBoundary

Prelim_WetlandType
Type 1
Type 1L
Type 3
Type 4
Type 6

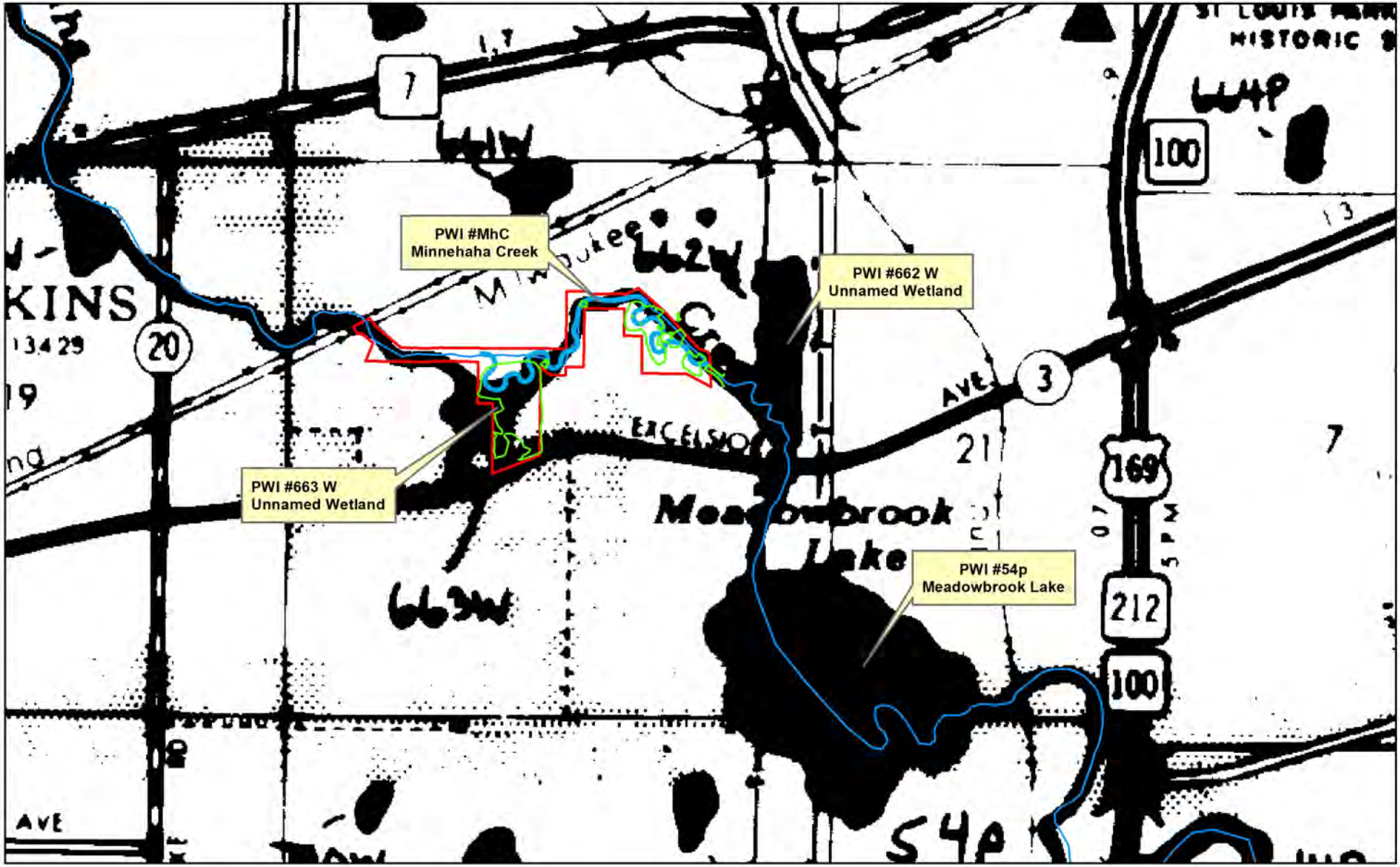
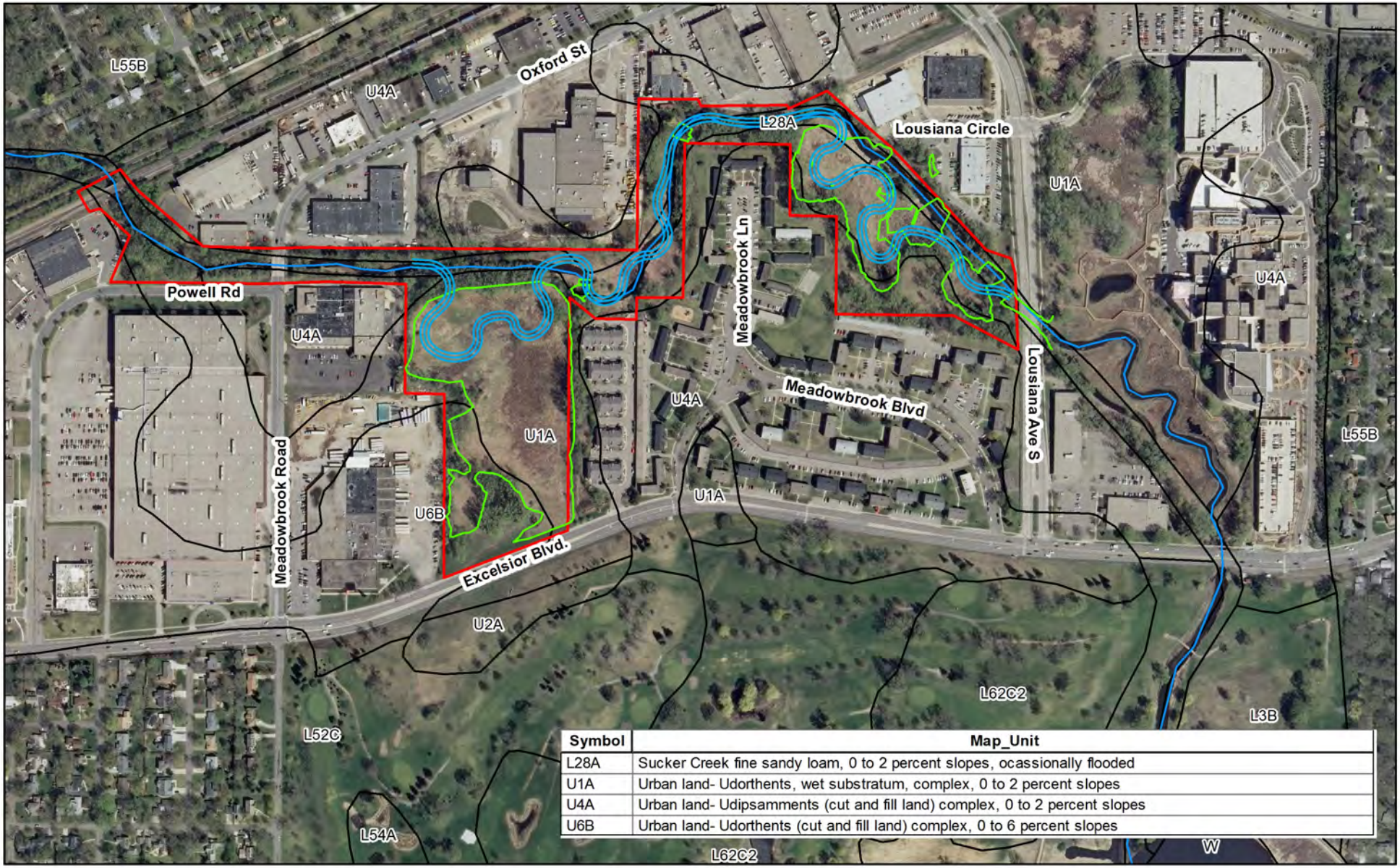


FIGURE 5- Public Waters Inventory
Minnehaha Creek Reach 20 Restoration
St. Louis Park, Minnesota

0 400 800 1,600 2,400 3,200
Feet

N

DNR_OHW_889.8_Contour
Proposed_Channel
ProjectBoundary
2011_Minnehaha_Creek



Symbol	Map_Unit
L28A	Sucker Creek fine sandy loam, 0 to 2 percent slopes, ocassionally flooded
U1A	Urban land- Udorthents, wet substratum, complex, 0 to 2 percent slopes
U4A	Urban land- Udipsamments (cut and fill land) complex, 0 to 2 percent slopes
U6B	Urban land- Udorthents (cut and fill land) complex, 0 to 6 percent slopes

FIGURE 6- PROJECT AREA SOILS
Minnehaha Creek Reach 20 Restoration
St. Louis Park, Minnesota

0 150 300 600 900 1,200
Feet

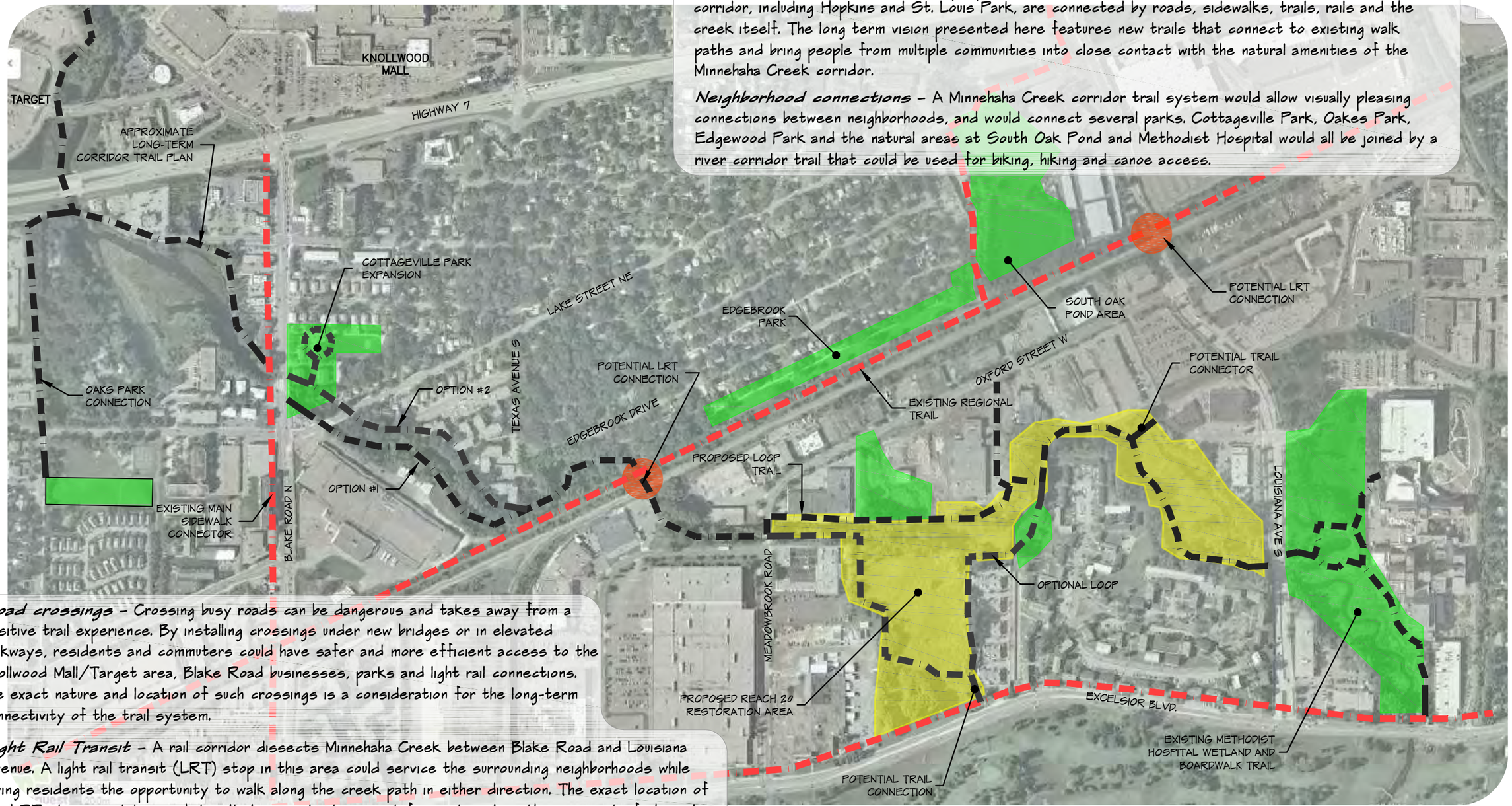
N

Proposed_Channel
DNR_OHW_889.8_Contour
2011_Minnehaha_Creek

ProjectBoundary
Project_Area_Soils

Trail connections:
Healthy and vibrant communities link people with the environment. Communities along the Minnehaha Creek corridor, including Hopkins and St. Louis Park, are connected by roads, sidewalks, trails, rails and the creek itself. The long term vision presented here features new trails that connect to existing walk paths and bring people from multiple communities into close contact with the natural amenities of the Minnehaha Creek corridor.

Neighborhood connections – A Minnehaha Creek corridor trail system would allow visually pleasing connections between neighborhoods, and would connect several parks. Cottageville Park, Oakes Park, Edgewood Park and the natural areas at South Oak Pond and Methodist Hospital would all be joined by a river corridor trail that could be used for biking, hiking and canoe access.



Road crossings – Crossing busy roads can be dangerous and takes away from a positive trail experience. By installing crossings under new bridges or in elevated walkways, residents and commuters could have safer and more efficient access to the Knollwood Mall/Target area, Blake Road businesses, parks and light rail connections. The exact nature and location of such crossings is a consideration for the long-term connectivity of the trail system.

Light Rail Transit – A rail corridor dissects Minnehaha Creek between Blake Road and Louisiana Avenue. A light rail transit (LRT) stop in this area could service the surrounding neighborhoods while giving residents the opportunity to walk along the creek path in either direction. The exact location of the LRT stop is not known, but multiple opportunities exist for a stop along this segment of channel.

PLAN VIEW TRAILS AND LRT CONNECTION

Figure 7

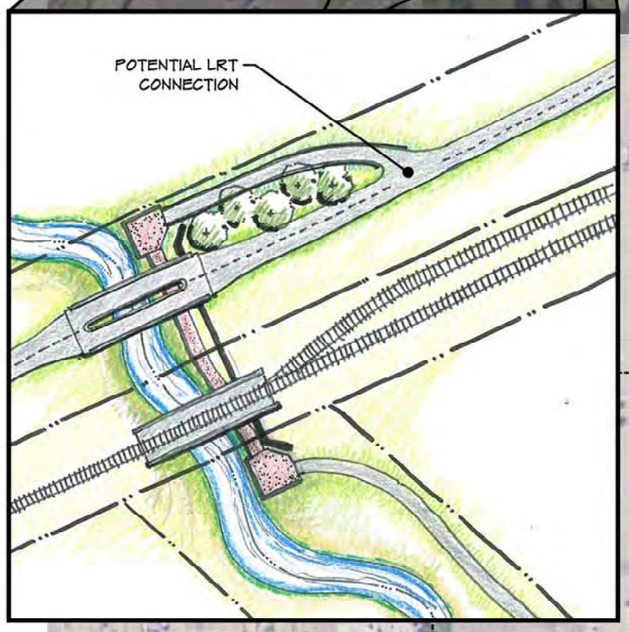
In association with:

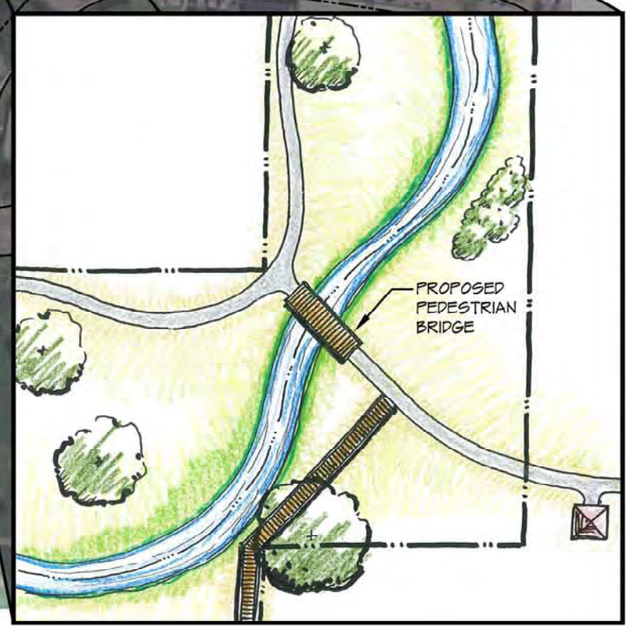
inter·fluve Inc.

HRGreen

PROPOSED CONDITIONS
MINNEHAHA CREEK

POTENTIAL LRT CONNECTION
EXISTING TRAIL & FUTURE LRT
OXFORD STREET W
EXISTING STORMWATER DETENTION AREAS
FLOW
SCHLAFF CHEMICAL
SLP PUBLIC WORKS
PUBLIC PARKING AND ACCESS
FILTRATION SYSTEMS INC.
PROPOSED PEDESTRIAN BRIDGE
EXISTING CHANNEL
EXISTING CANOE LAUNCH
CREEKSIDE PARK
MINNEHAHA CREEK
POWELL ROAD
BRIDGE
CAPSULE TECHNOLOGIES/ELECTRIC WIRE PRODUCTS
MEADOWBROOK APARTMENTS
JAPS-OLSON COMPANY
MEADOWBROOK ROAD
APPLIANCE SMART OWNED BY JAPS-OLSON
EXCELSIOR BLVD.





PLAN VIEW TRAILS AND LRT CONNECTION

Figure 7

0 250 500
SCALE IN FEET

In association with:

inter·fluve

HRGreen

TRAILS AND LRT CONNECTION
MINNEHAHA CREEK

PLAN VIEW EXISTING CONDITIONS AND STAGING

Figure 7

0 250 500

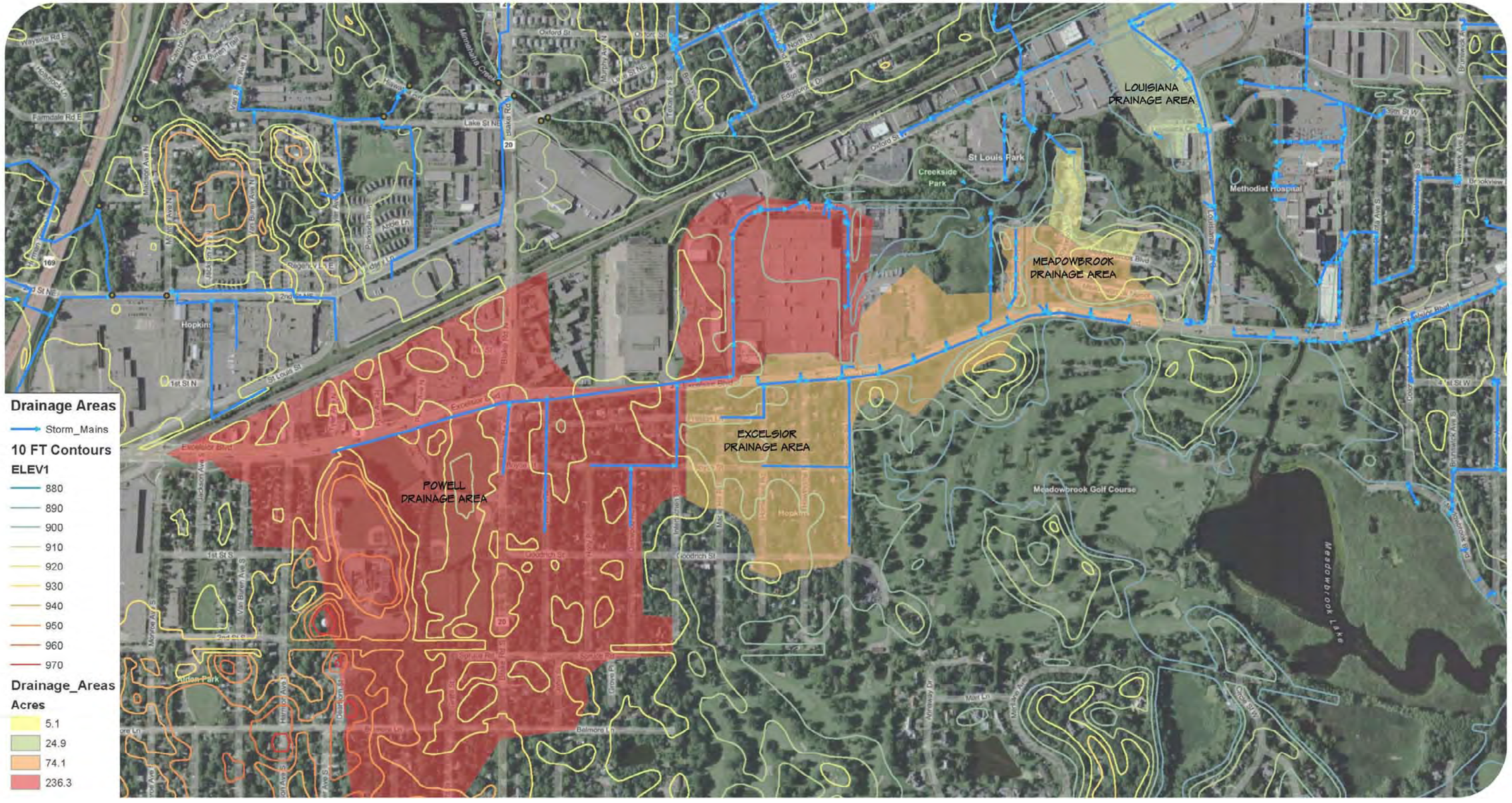
SCALE IN FEET

In association with:

inter·fluve

HRGreen

EXISTING CONDITIONS
MINNEHAHA CREEK



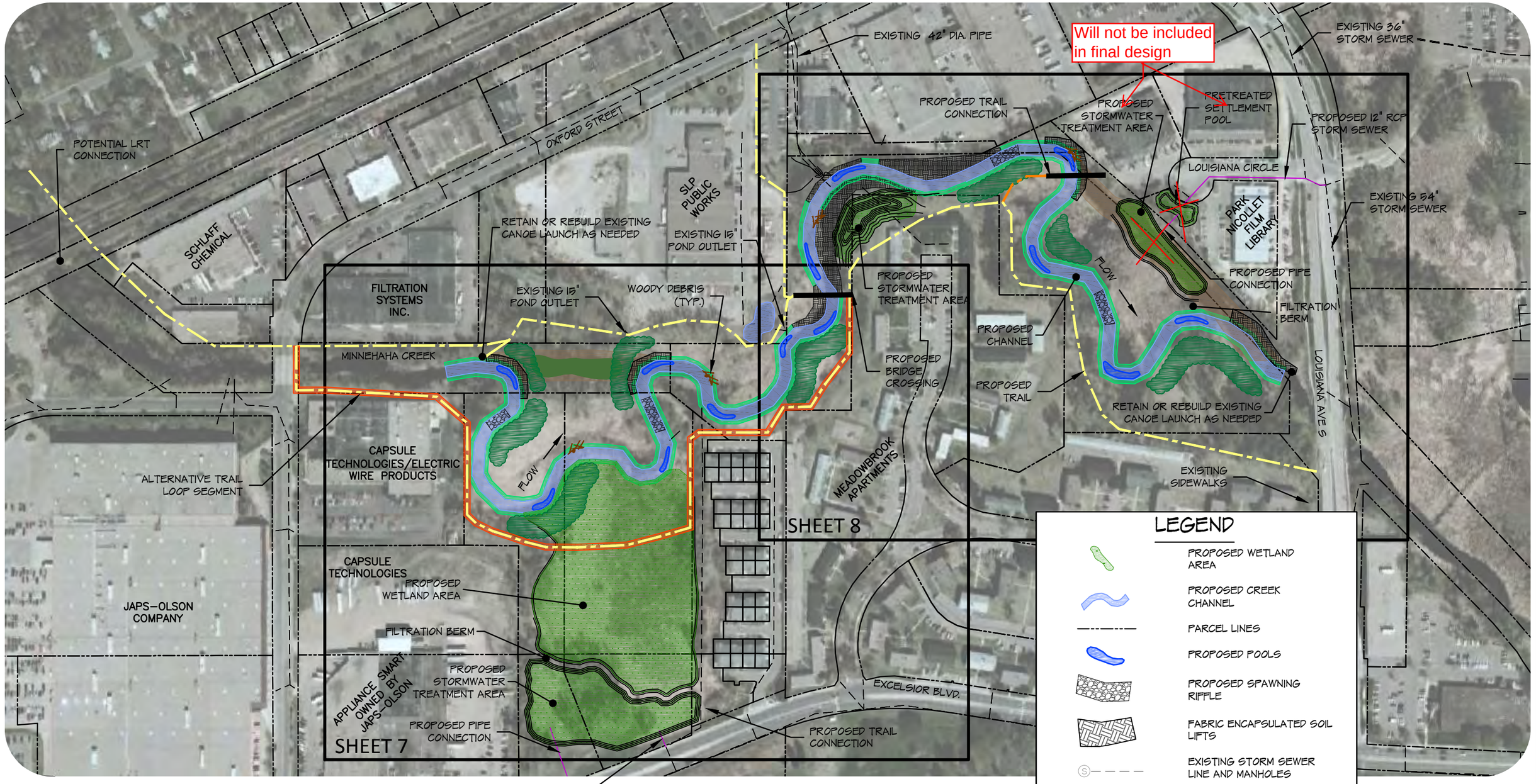
PLAN VIEW DRAINAGE AREAS

Figure 7

In association with:

HRGreen

DRAINAGE AREAS
MINNEHAHA CREEK



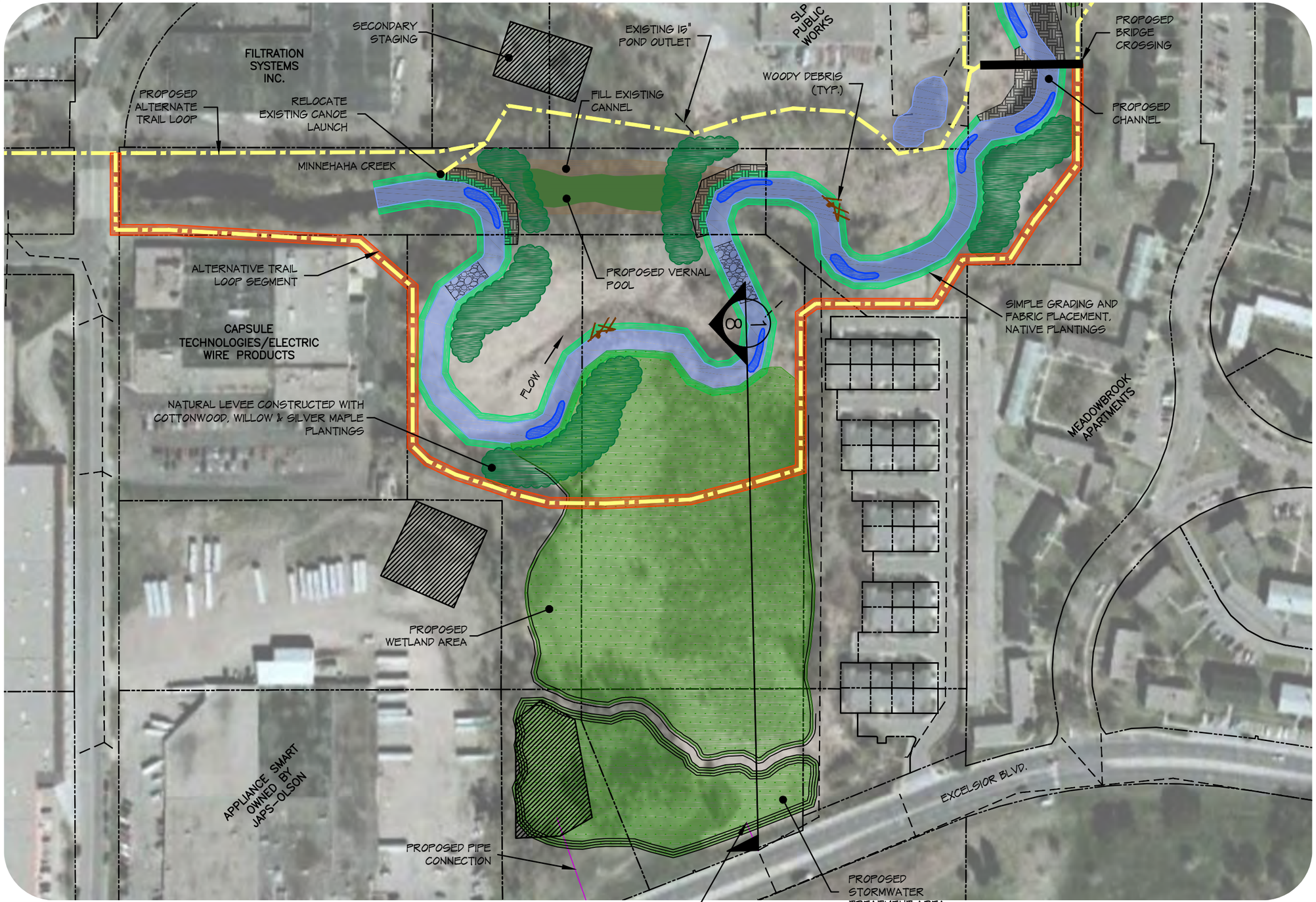
PLAN VIEW PROPOSED CONDITIONS

0 250 500
SCALE IN FEET

Figure 7

In association with:
inter·fluve
HRGreen

PROPOSED CONDITIONS
MINNEHAHA CREEK



LEGEND

- PROPOSED WETLAND AREA
- PROPOSED CREEK CHANNEL
- PARCEL LINES
- PROPOSED POOLS
- PROPOSED SPAWNING RIFFLE
- EXISTING PIPES
- PROPOSED PIPES
- FABRIC ENCAPSULATED SOIL LIFTS
- NATURAL LEVEE
- PROPOSED RIPARIAN VEGETATION
- PROPOSED STAGING AREA
- PROPOSED OPTIONAL TRAIL SEGMENT
- PROPOSED TRAIL

0 150 300

SCALE IN FEET

Figure 7

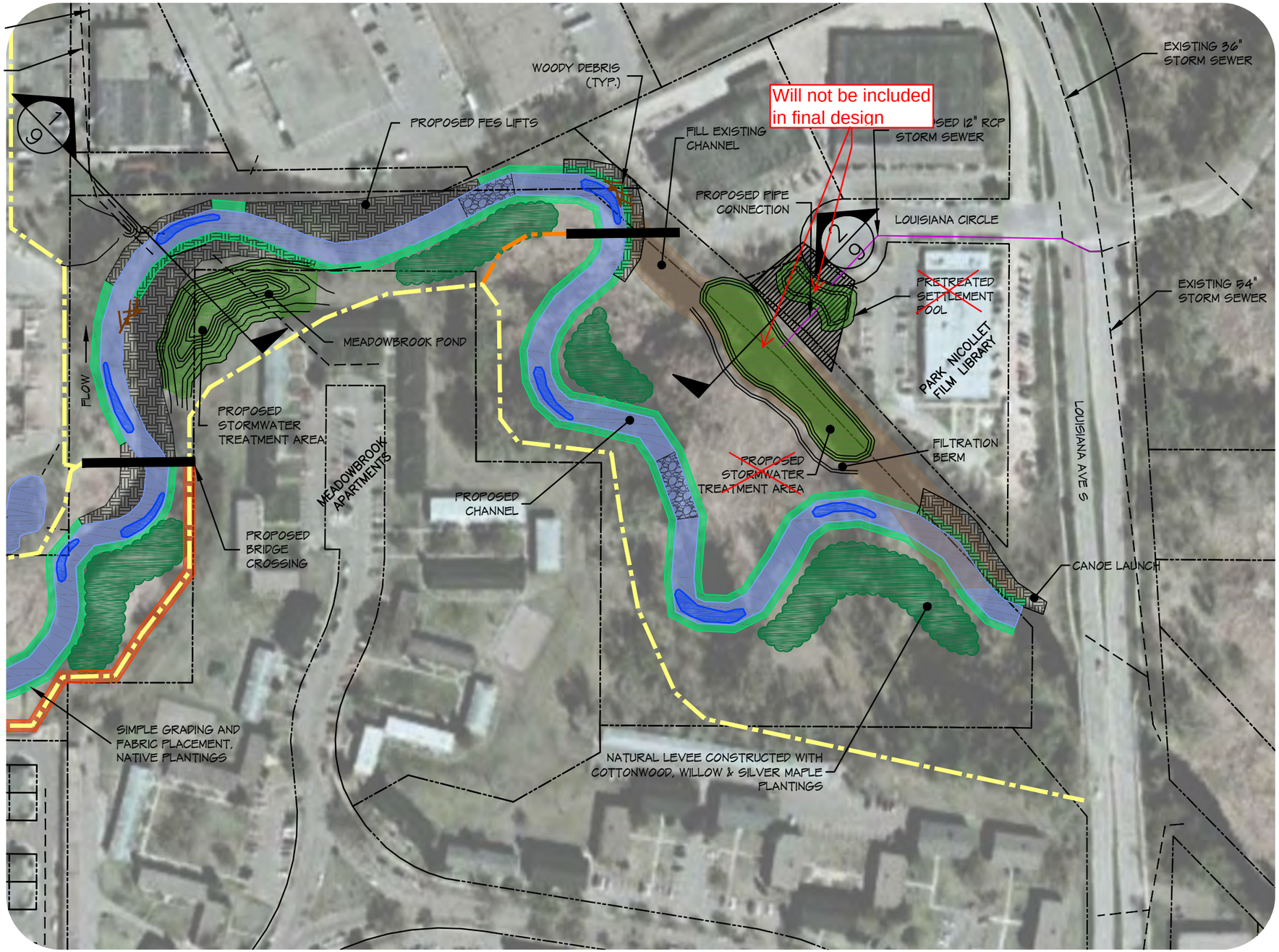
PLAN VIEW PROPOSED CONDITIONS

In association with:

inter·fluve

HRGreen

PROPOSED CONDITIONS
MINNEHAHA CREEK
SUBREACH 1



LEGEND

- PROPOSED WETLAND AREA
- PROPOSED CREEK CHANNEL
- PARCEL LINES
- PROPOSED POOLS
- PROPOSED SPAWNING RIFFLE
- EXISTING PIPES
- PROPOSED PIPES
- FABRIC ENCAPSULATED SOIL LIFTS
- NATURAL LEVEE
- PROPOSED RIPARIAN VEGETATION
- PROPOSED STAGING AREA
- PROPOSED OPTIONAL TRAIL SEGMENT
- PROPOSED TRAIL

0 150 300

SCALE IN FEET

PLAN VIEW PROPOSED CONDITIONS

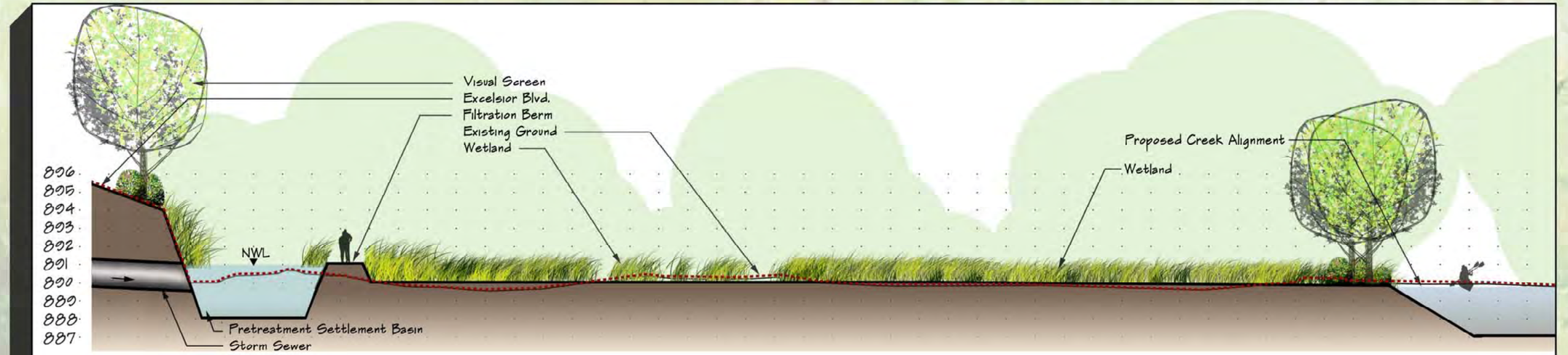
Figure 7

In association with:

inter·fluve

HRGreen

PROPOSED CONDITIONS
MINNEHAHA CREEK
SUBREACH 2



1/8 CROSS-SECTION

Excelsior Filtration Wetland Design

General design: Construct a wetland that allows for drawdown via filtration of captured flows to the adjacent wetland through an enhanced sand filter berm. Note that the following removal rates do not account for removal of soluble phosphorus utilizing the iron-enhanced sand filter technology.

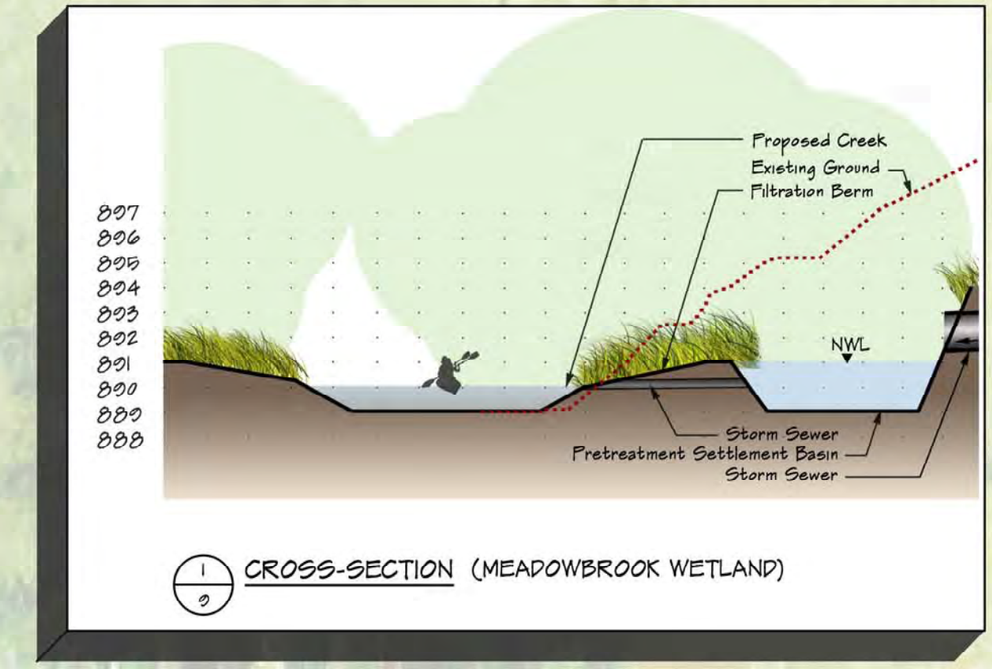
Model inputs:

Average residential lot size = ½ acre.
Drainage Area = 74.1 acres
Average Watershed Slope = 0.6%
Drainage area Curve Number utilized reflects typical residential development = 81

Results:

Total Phosphorus (TP) Inflow = 69 lb/yr average
TP reduction = 61%
Trapped = 41 lbs/yr average

Figure 7



1/9 CROSS-SECTION (MEADOWBROOK WETLAND)

Meadowbrook Wetland Design

General design: Construct a wetland that allows for drawdown filtration of captured flows to the adjacent stream over a berm. Note that the following removal rates do not account for removal of soluble phosphorus utilizing the iron-enhanced sand filter technology.

Model inputs:

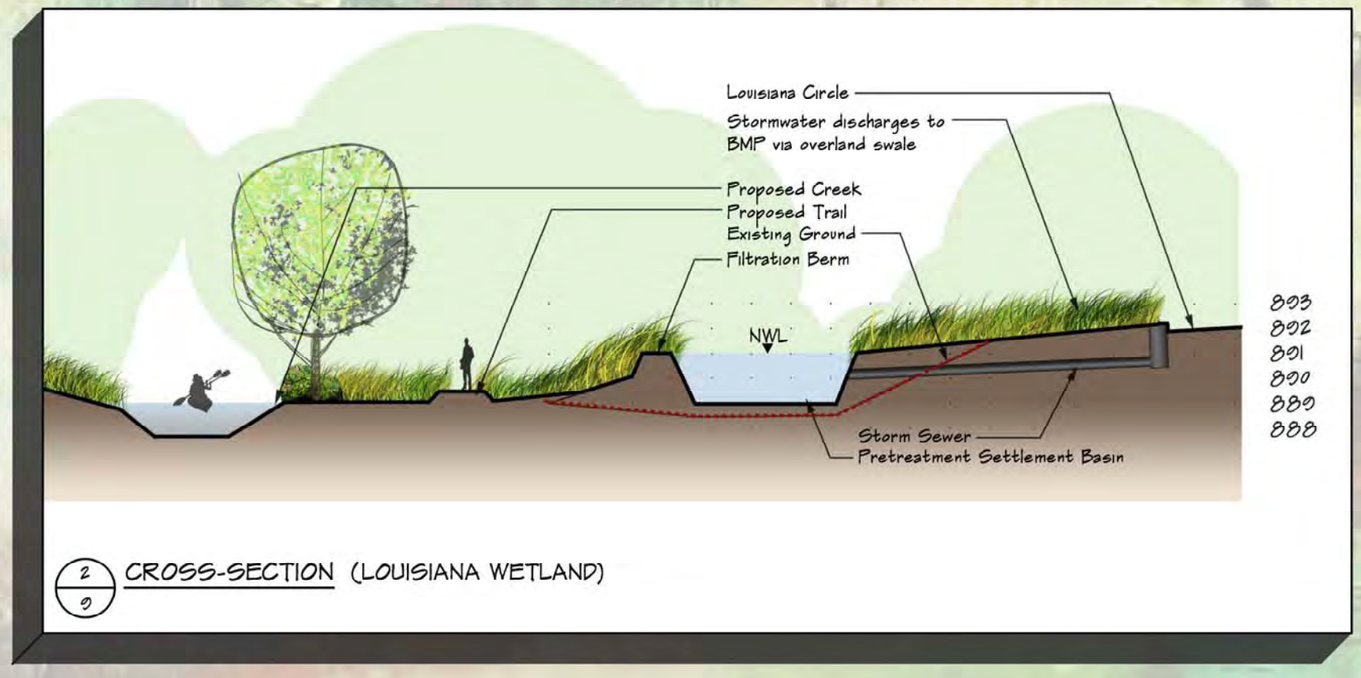
Land use is high density residential.
Drainage Area = 5.1 acres
Average Watershed Slope = 1.1%
Drainage area Curve Number utilized reflects high density residential development = 92

Results:

Total Phosphorus (TP) Inflow = 8 lb/yr
TP reduction = 48%TP
Trapped = 4 lbs/yr

Louisiana Circle Wetland Design

Will not be included in final design



2/9 CROSS-SECTION (LOUISIANA WETLAND)

General design: Construct a wetland that allows for drawdown filtration of captured flows to the adjacent constructed wetland through an enhanced sand filter berm. Note that the following removal rates do not account for removal of soluble phosphorus utilizing the iron-enhanced sand filter technology.

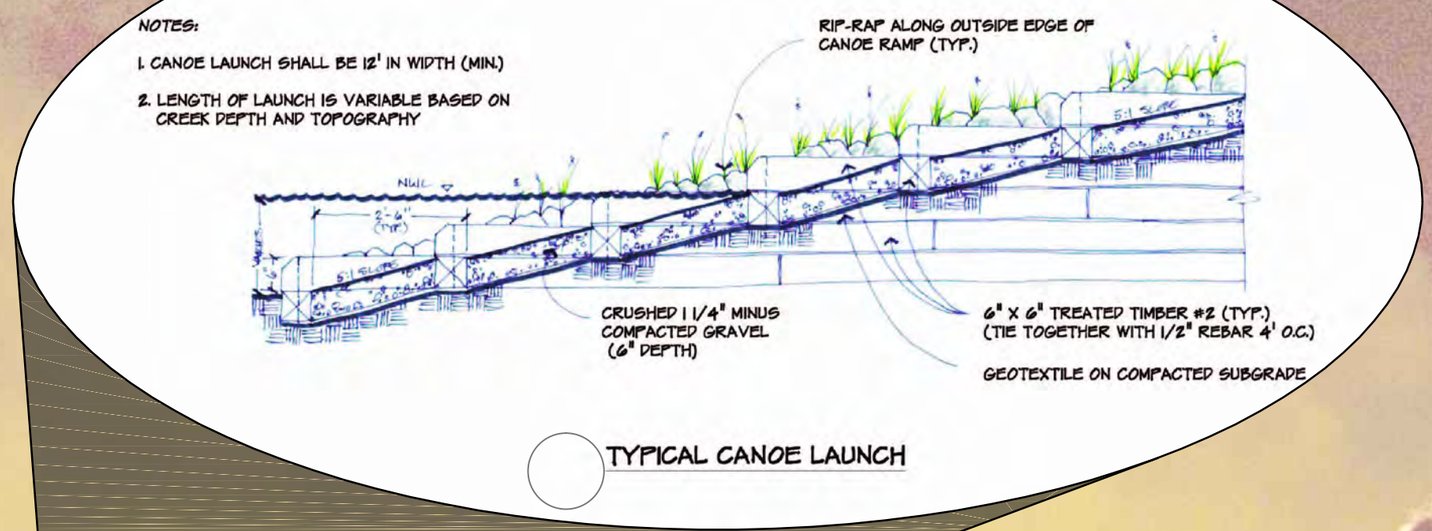
Model inputs:

Land use is industrial/medical.
Drainage Area includes 3.0 acres direct commercial and 21.9 from medical/industrial via the Louisiana Avenue storm sewer connection.
Average Watershed Slope = 0.25%
Drainage area Curve Number utilized reflects average land use = 88

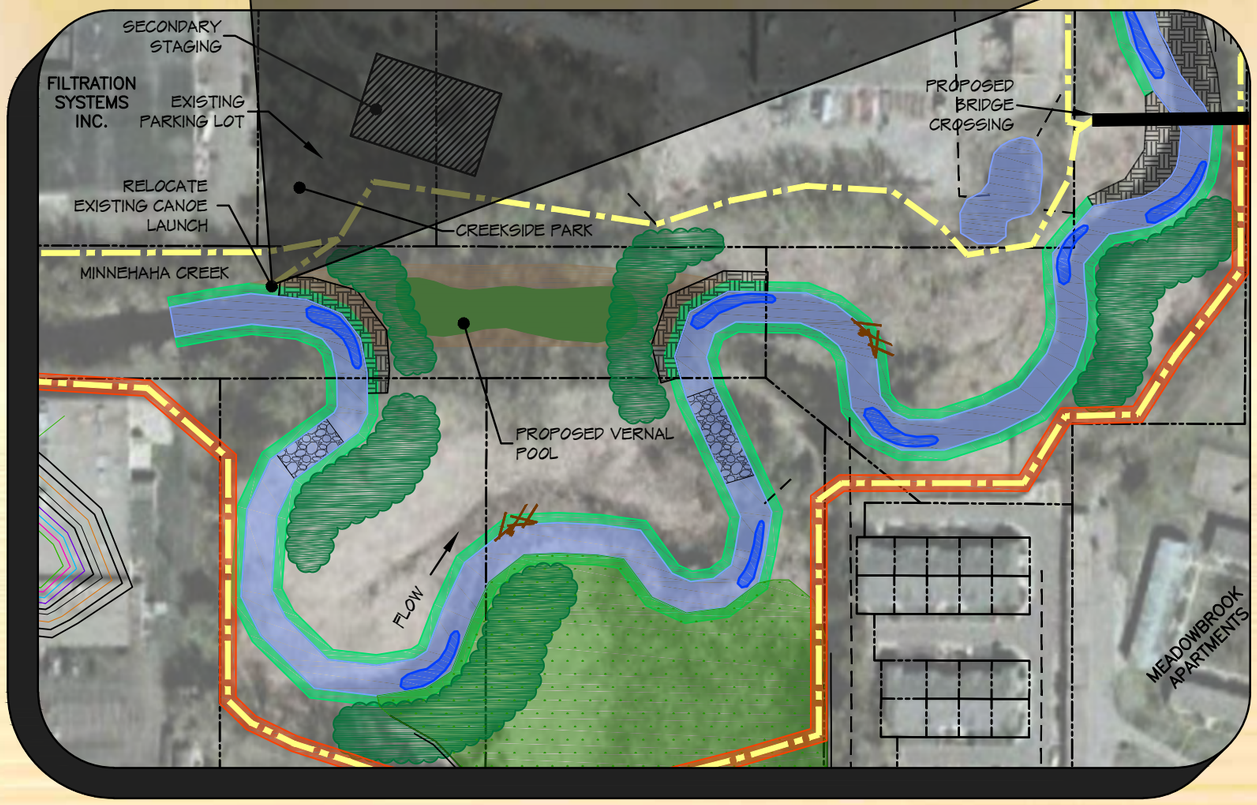
Results:

Total Phosphorus (TP) Inflow = 28 lb/yr average
TP reduction = 53 %
Trapped = 15 lbs/yr average

Figure 7



TYPICAL CANOE LAUNCH



PLAN VIEW PROPOSED CONDITIONS

Recreational Boating Opportunities

Threading through the heart of the west metro area, Minnehaha Creek offers a unique experience for recreational boaters. Making the creek more accessible to canoeing and kayaking is a long-term maintenance goal of the Minnehaha Creek Watershed District and surrounding communities.

The plan for Reach 20 includes replacement of an existing canoe launch with one specifically designed for easy access. The stepped design shown here allows for low water boat entry over a range of water levels, and will be more convenient for people with limited mobility or small children. A trail will extend from the existing canoe launch parking lot, through the floodplain wetland and down to the streambank launch.

This plan preserves the existing canoe launch locations in Reach 20, with some slight modifications. The Creekside Park trail connection will connect the parking lot with the stream, and may run along the main trail for a short distance. We anticipate a portage of no more than 150 feet.

Figure 7

In association with:

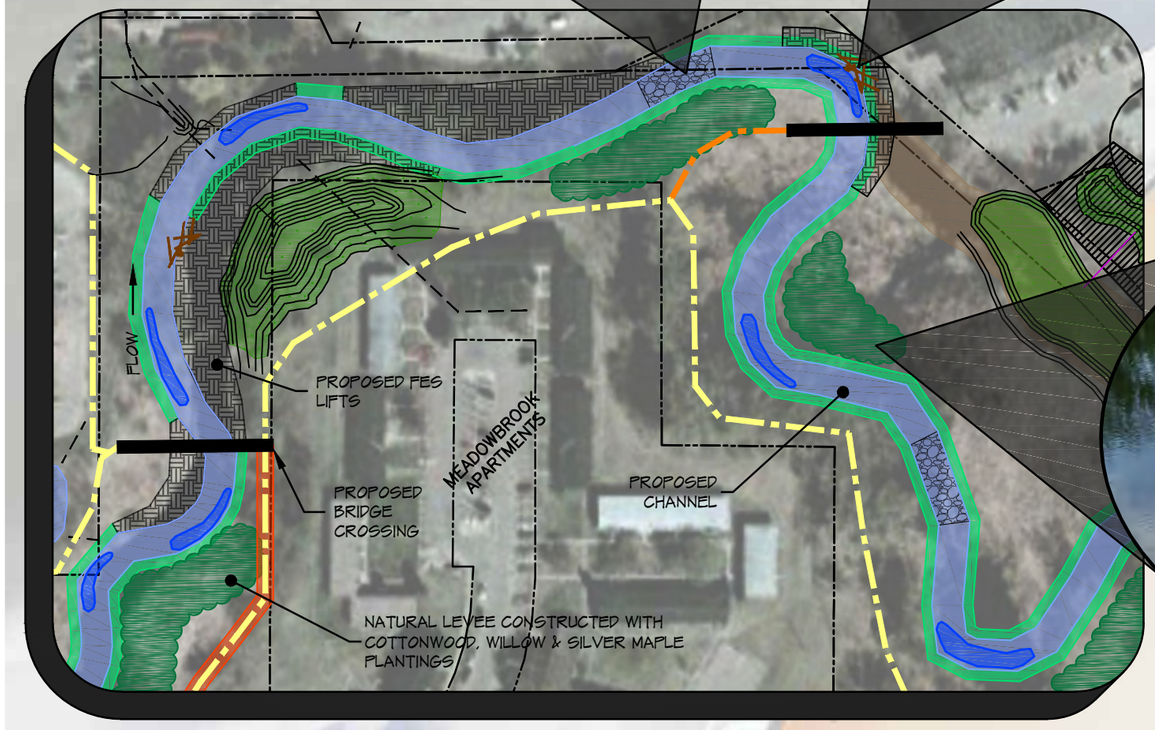
inter·fluve

HRGreen

PROPOSED CONDITIONS
MINNEHAHA CREEK

Typical Riffle during installation at Methodist Hospital

Typical LWD during installation at Methodist Hospital



PLAN VIEW PROPOSED CONDITIONS

Typical Natural Levee

In-stream Habitat Features

Large woody habitat - Logs and fallen wood make up an important part of the woodland stream ecosystem. Wood offers hiding cover for fish, nesting opportunities for waterfowl, perches for wading birds, and resting or hiding places for amphibians and reptiles. The Reach 20 design features low profile wood installation underneath banks on the outside of meander bends. In addition to providing valuable habitat, wood provides long term (10-20 years) stability of the bank, protecting the stream from immediate erosion. The wood will be placed low to the streambed, so that during boatable flows, canoes and kayaks will float over the top of the installed wood. Similar installations can be found just downstream of Louisiana Avenue in the restored section of the Methodist Hospital wetland.

Riffles - Reach 20 is currently an important spawning reach for fish using Lake Minnetonka and Minnehaha Creek. These fish include sunfish, bass, suckers and various minnow species. Included in the design are riffles that provide spawning gravel of the size used regularly by these fish.

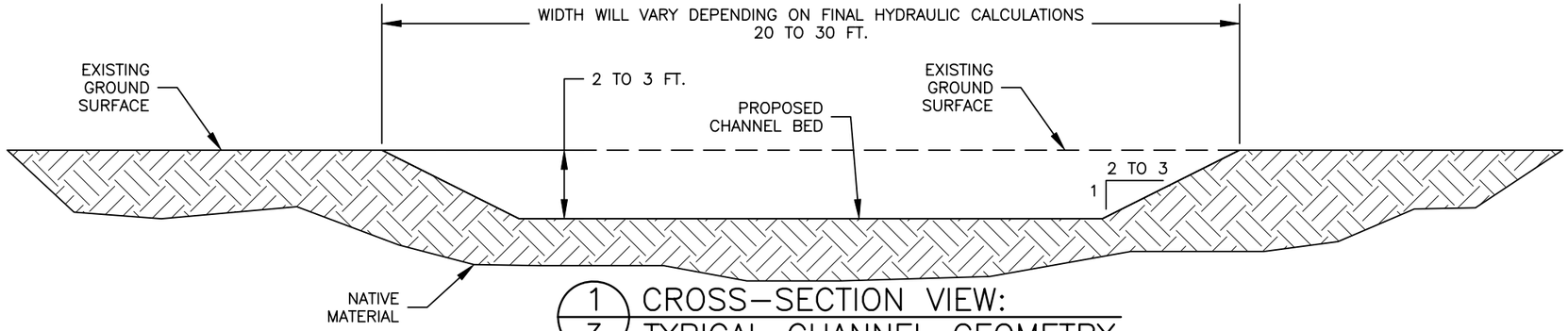
Natural Levees - Streams that transport fine sediment and sand downstream often deposit this material on banks during floods. These deposits take the form of natural levees that might be a foot or two higher than the adjacent floodplain surface. Our design for Reach 20 repeats the work done in Reach 19 of the Methodist Hospital area project, where we included levee features to provide topographic variability. Levees offer slightly dryer wetland surfaces that promote the establishment of planted cottonwood, silver maple and black willow trees common to the riparian corridor.

Figure 7

In association with:

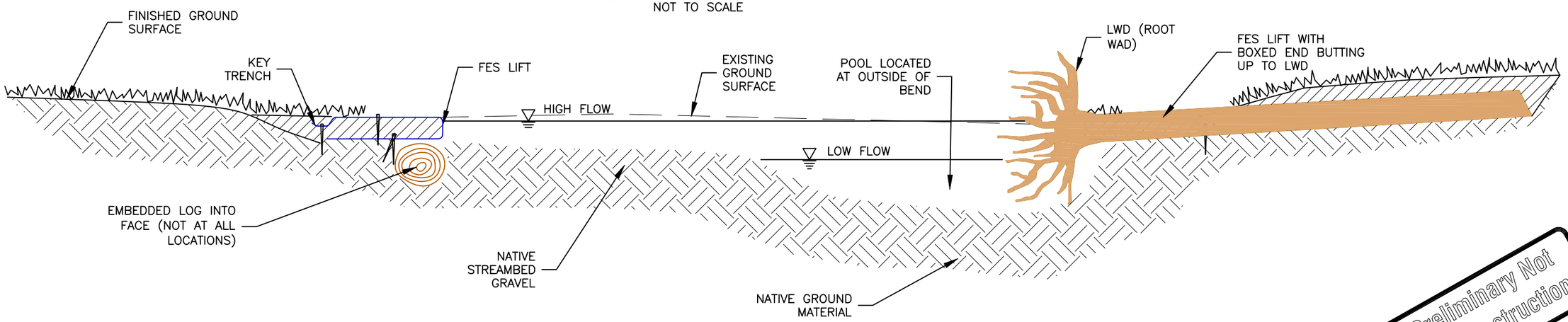
inter·fluve

HRGreen



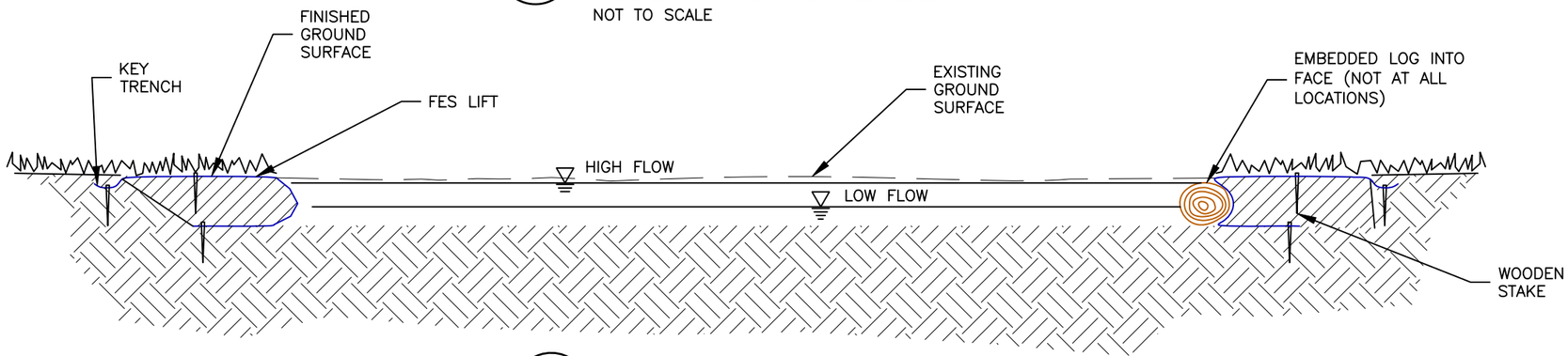
1/3 CROSS–SECTION VIEW: TYPICAL CHANNEL GEOMETRY

NOT TO SCALE



2/3 CROSS–SECTION VIEW: POOL AT OUTSIDE BEND

NOT TO SCALE



3/3 CROSS–SECTION VIEW: RIFFLE

NOT TO SCALE

Preliminary Not For Construction

Figure 7

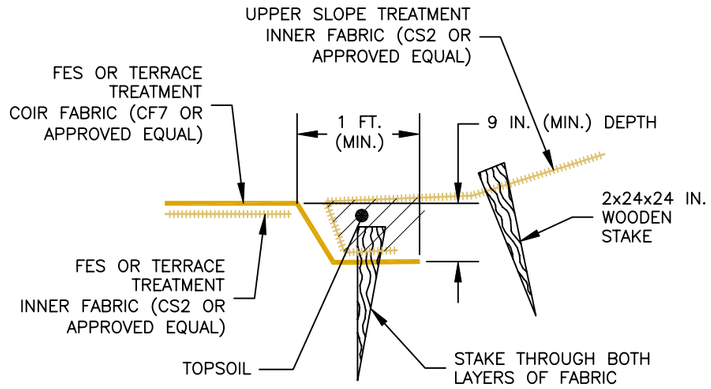
NO.	BY	DATE	REVISION DESCRIPTION

REP	MM,AS,MB	MM,AS,MB
DRAWN	DESIGNED	CHECKED
MM,MB	11/03/06	
APPROVED	DATE	PROJECT

Channel Construction Concept Design

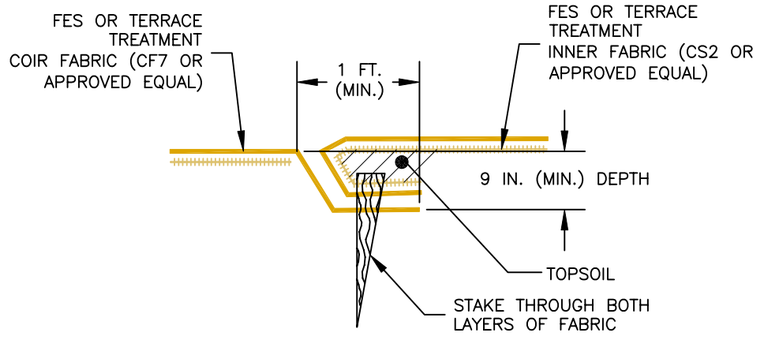
inter·fluve, inc.
3602 Atwood Ave, Suite 3,
Madison, WI
608–441–0342
www.interfluve.com

Typical Details:
Proposed Channel



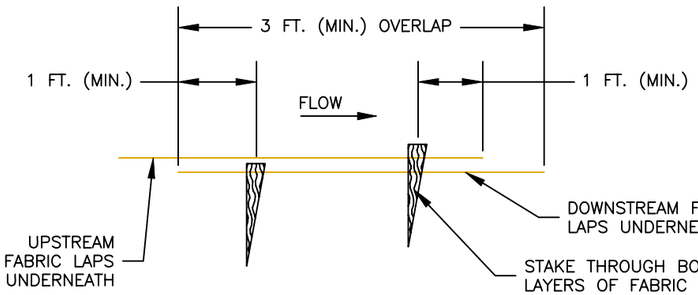
DETAIL A: FABRIC OVERLAP

NOT TO SCALE



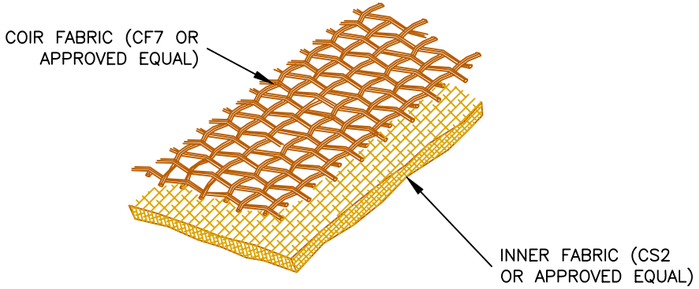
DETAIL B: FABRIC OVERLAP

NOT TO SCALE



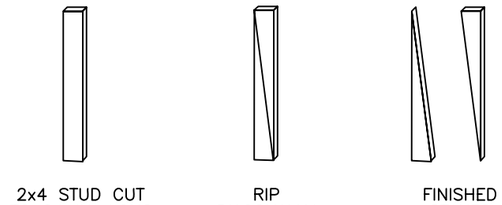
DETAIL C: FABRIC OVERLAP

NOT TO SCALE



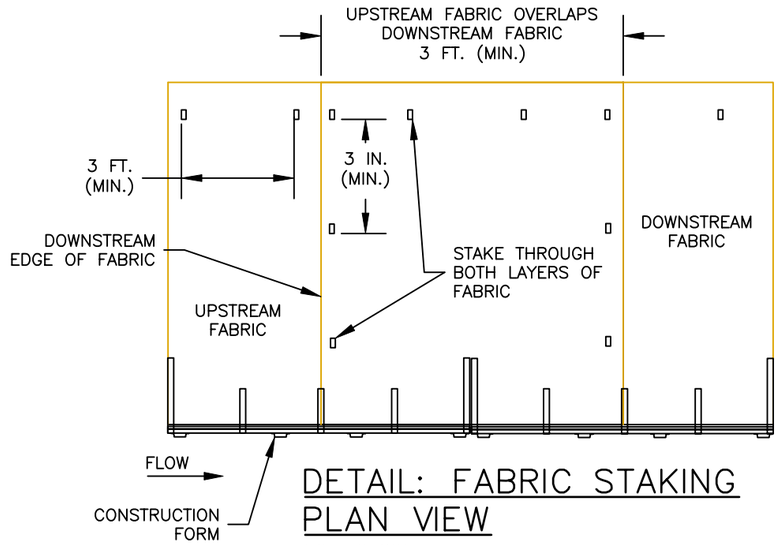
TYPICAL DETAIL: FABRIC LAYERING

NOT TO SCALE



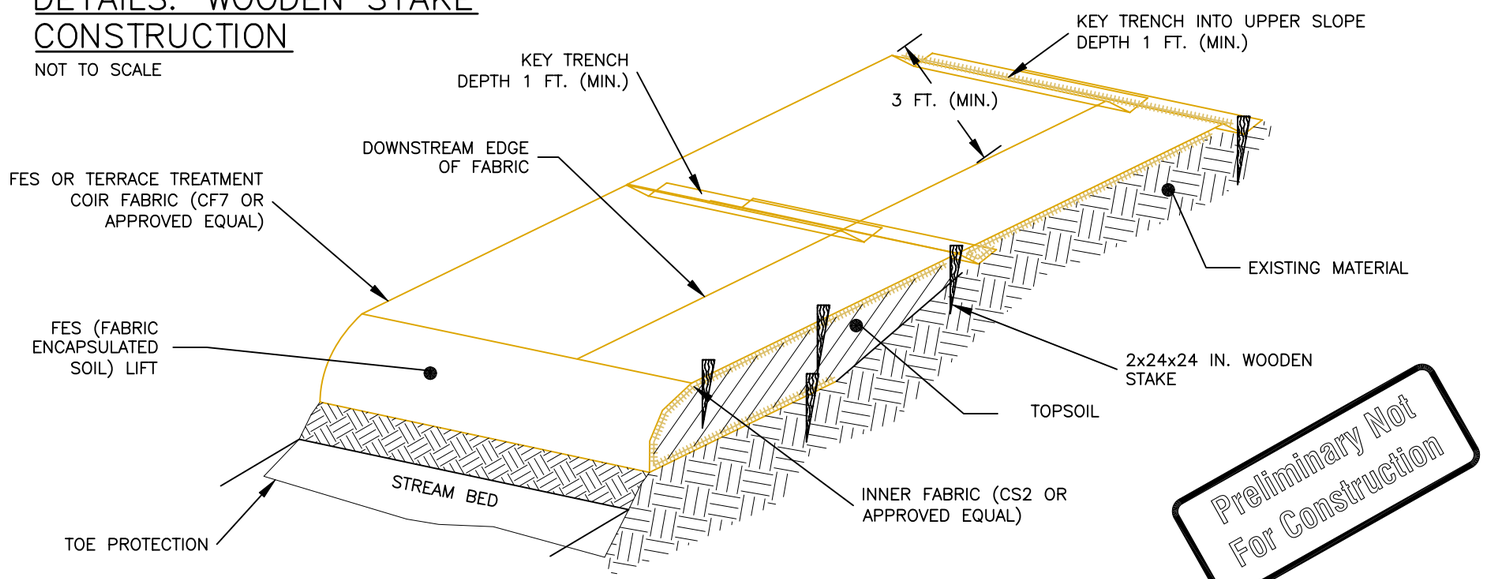
DETAILS: WOODEN STAKE CONSTRUCTION

NOT TO SCALE



DETAIL: FABRIC STAKING PLAN VIEW

NOT TO SCALE



ISOMETRIC: FES CONSTRUCTED LIFT

NOT TO SCALE

Preliminary Not For Construction

Figure 7

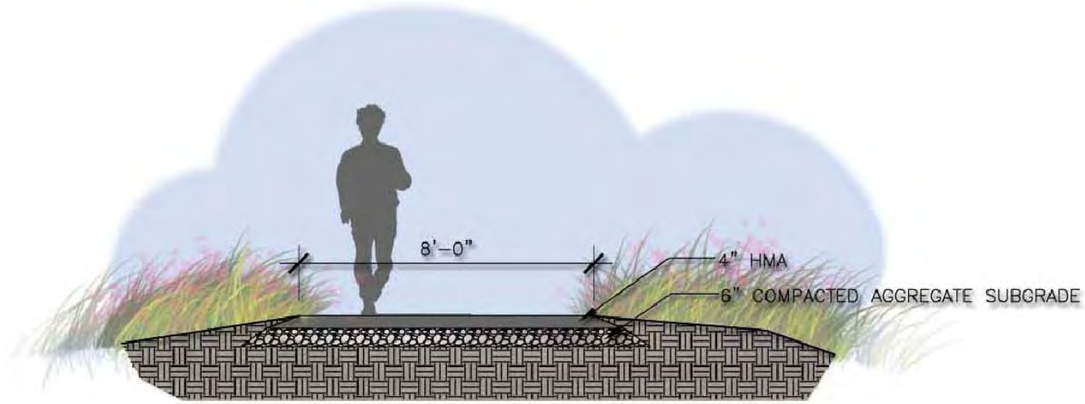
NO.	BY	DATE	REVISION DESCRIPTION

DRAWN	DESIGNED	CHECKED
REP	MM,AS,MB	MM,AS,MB
APPROVED	DATE	PROJECT
MM,MB	11/03/06	

Stream Bank Construction Concept Design

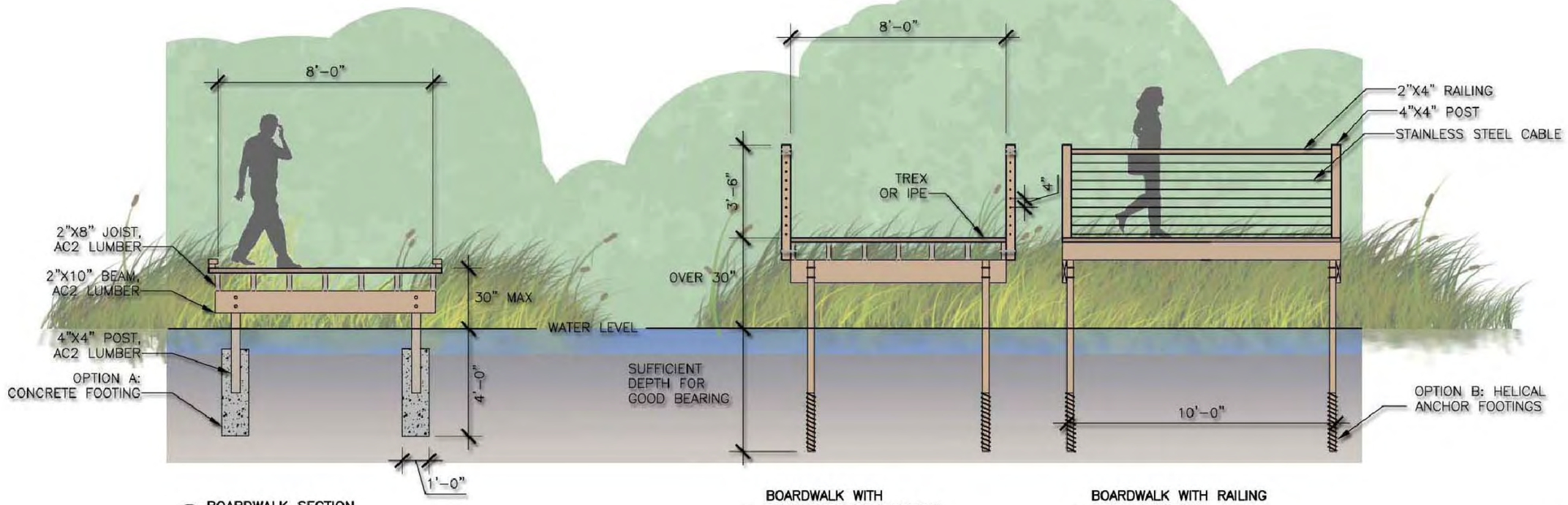
inter·fluve, inc.
3602 Atwood Ave, Suite 3,
Madison, WI
608-441-0342
www.interfluve.com

Typical Details:
FES Lifts



1 ASPHALT PATH SECTION, TYP. – NON-WETLAND AREAS
SCALE: 1/2"=1'-0"

Preliminary Not For Construction



2 BOARDWALK SECTION
SCALE: 1/2"=1'-0"

3 BOARDWALK WITH RAILING CROSS SECTION
SCALE: 1/2"=1'-0"

4 BOARDWALK WITH RAILING SIDE ELEVATION
SCALE: 1/2"=1'-0"

1/2" = 1'- 0"

NOTE: BOARDWALK DESIGN BY HRGREEN

Figure 7

NO.	BY	DATE	REVISION DESCRIPTION

DRAWN | DESIGNED | CHECKED
APPROVED | 11/03/06 DATE | PROJECT

Bituminous Trail and Boardwalk Construction Concept Design

Howard R. Green Company

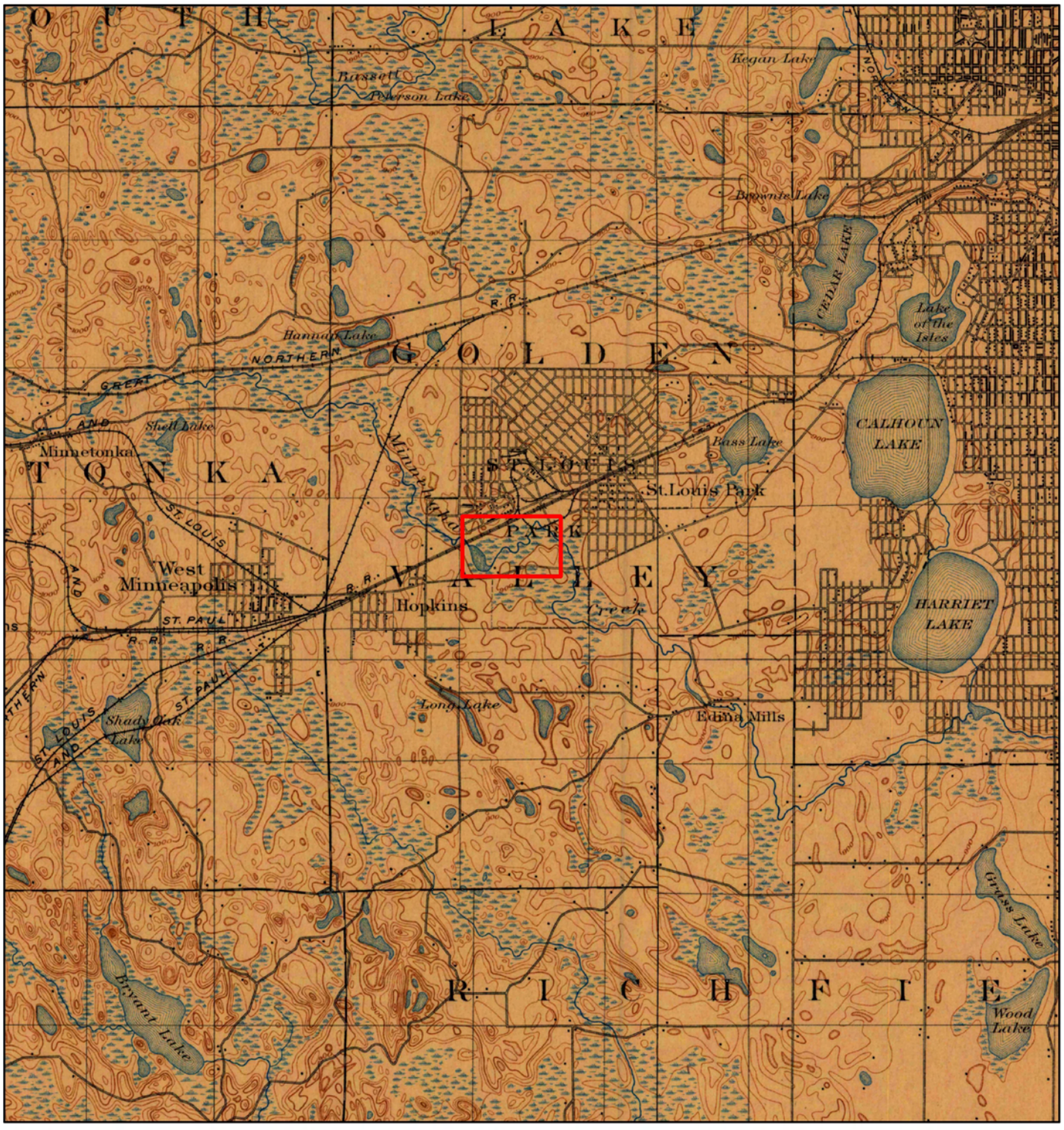
Typical Sections and Details

Appendix A

Historical Topographic Maps

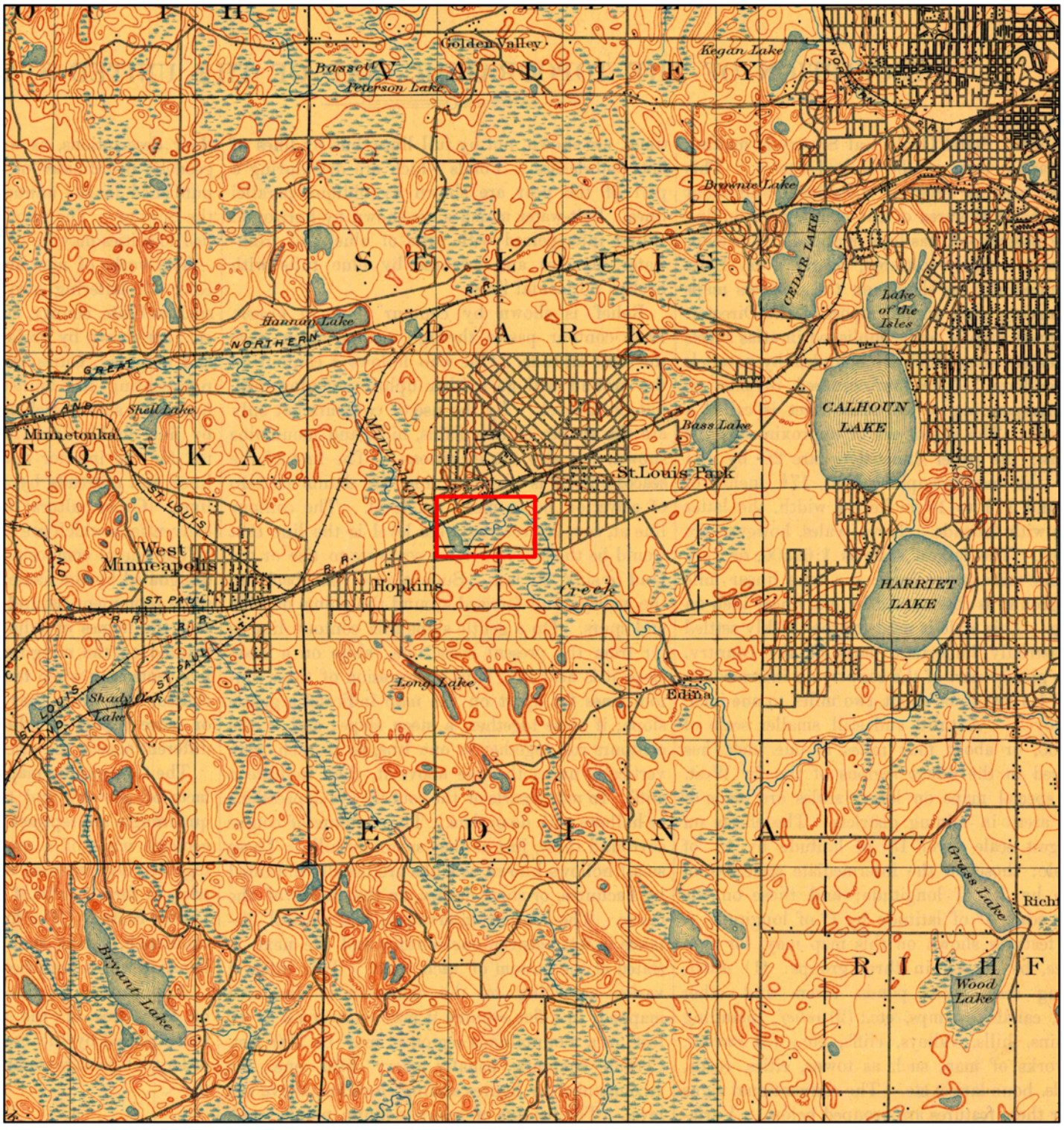
(Courtesy of USGS & http://www.nationalatlas.gov/)

Historical Topographic Map



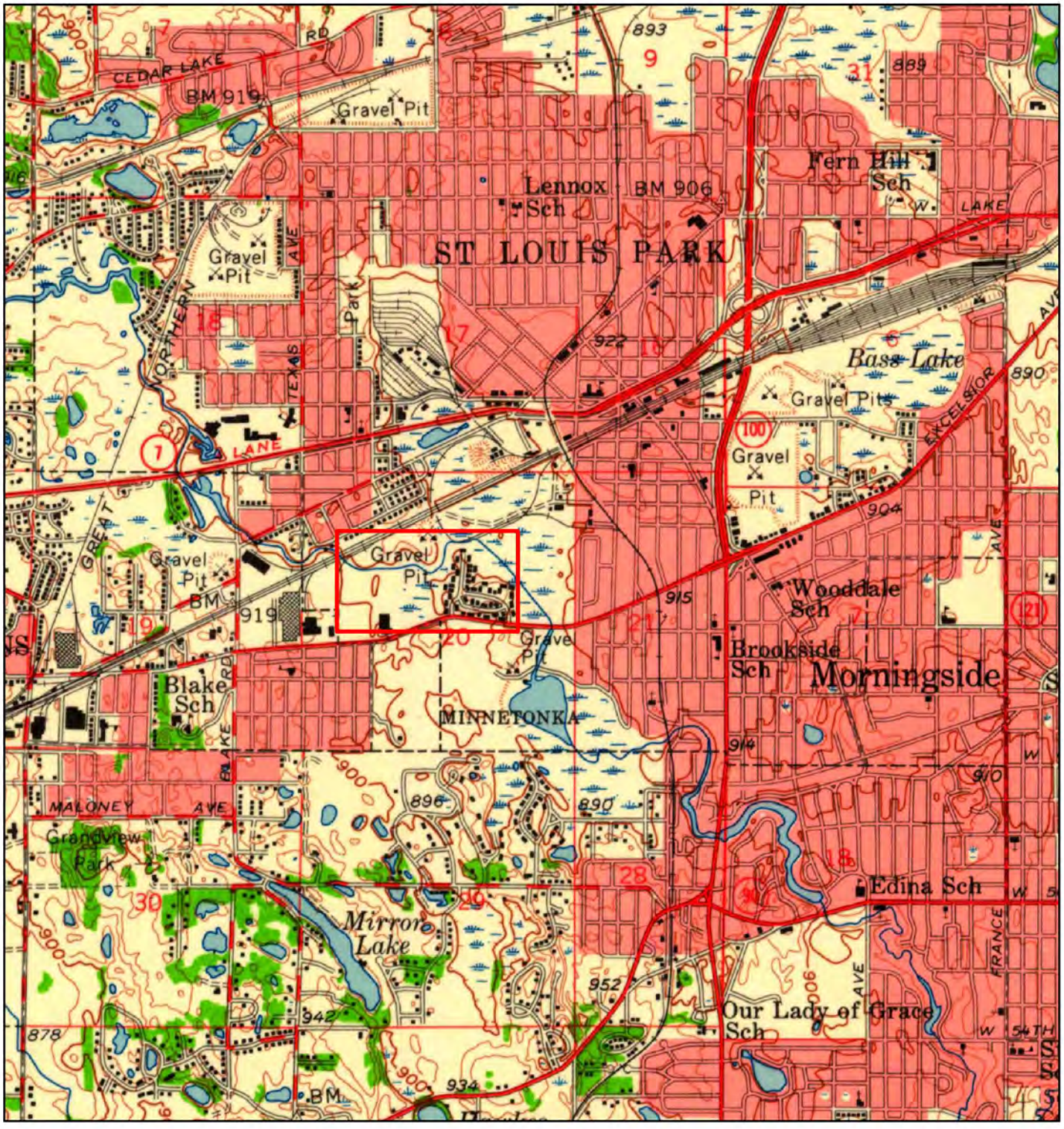
N	TARGET QUAD NAME: MINNEAPOLIS-SOUTH MAP YEAR: 1896 SERIES: 15 SCALE: 1:62500	SITE NAME: Minnehaha Creek Reach 20 Restoration LAT/LONG: 44.9300/93.3706 Project Area

Historical Topographic Map



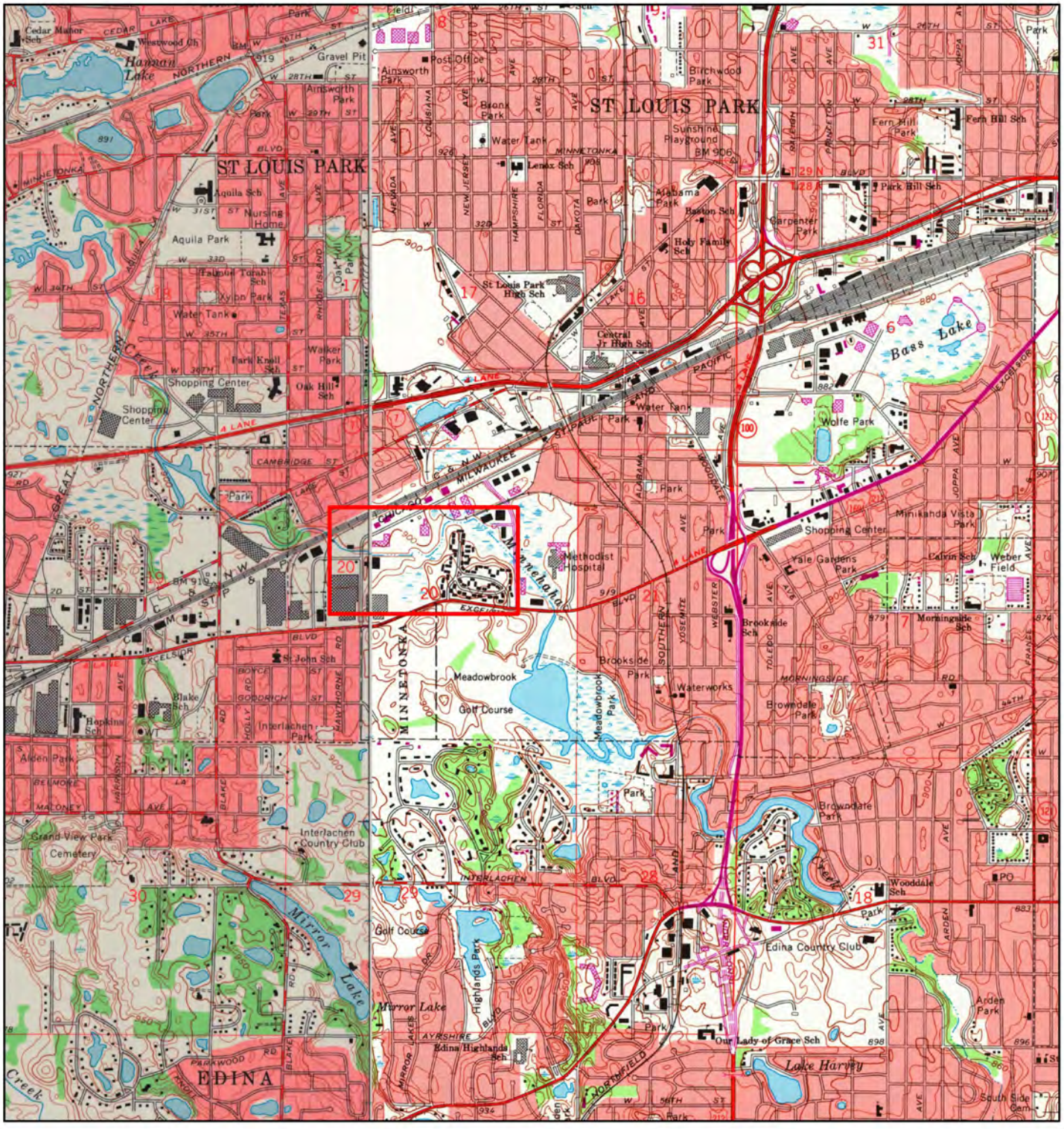
N	TARGET QUAD NAME: MINNEAPOLIS-SOUTH MAP YEAR: 1901 SERIES: 15 SCALE: 1:62500	SITE NAME: Minnehaha Creek Reach 20 Restoration LAT/LONG: 44.9300/93.3706 Project Area

Historical Topographic Map



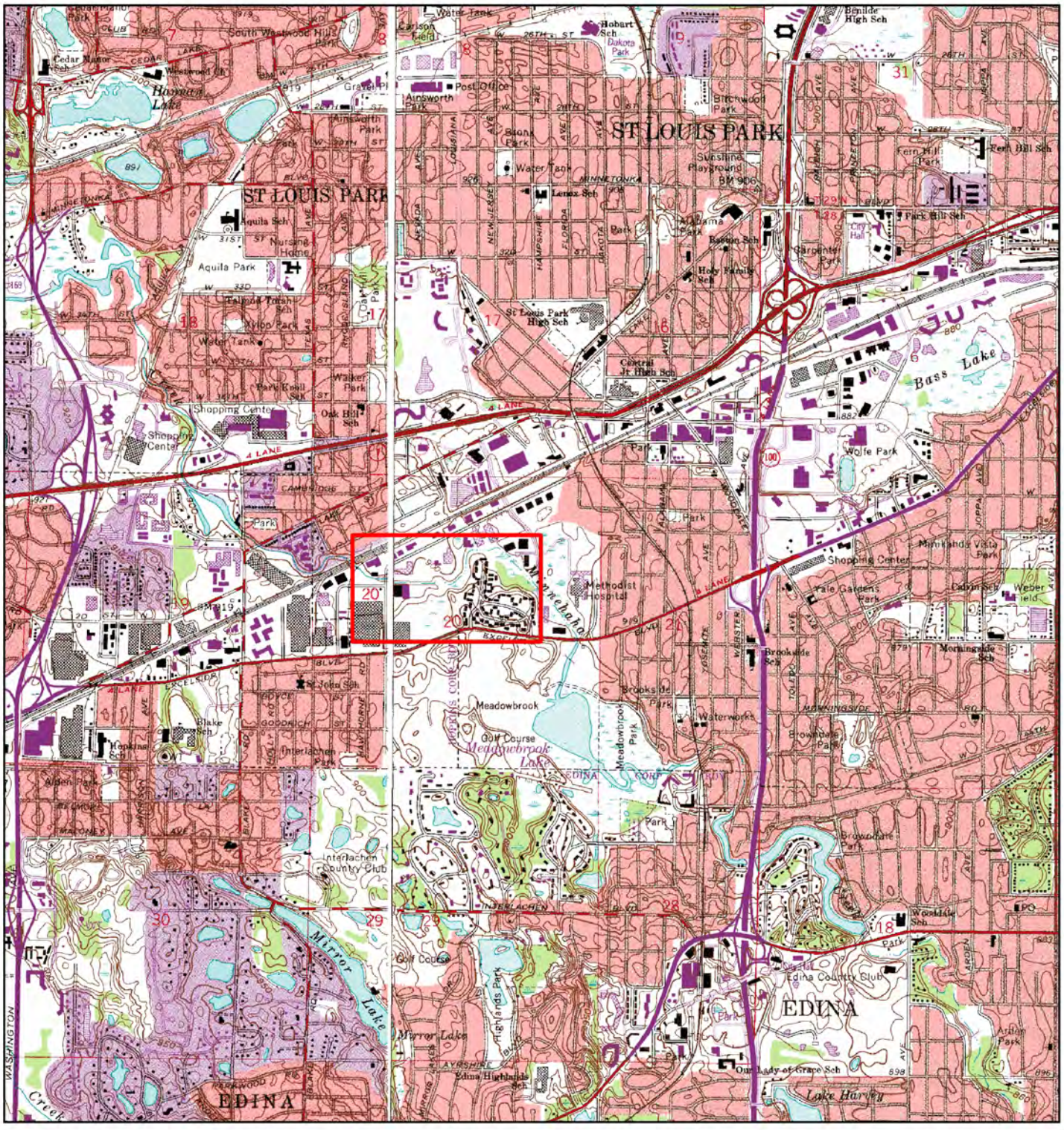
N	TARGET QUAD NAME: MINNEAPOLIS MAP YEAR: 1954 SERIES: 15 SCALE: 1:62500	SITE NAME: Minnehaha Creek Reach 20 Restoration LAT/LONG: 44.9300/93.3706 Project Area

Historical Topographic Map



N	TARGET QUAD NAME: MINNEAPOLIS SOUTH & HOPKINS MAP YEAR: 1967 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Minnehaha Creek Reach 20 Restoration LAT/LONG: 44.9300/93.3706 Project Area

Historical Topographic Map



N	TARGET QUAD NAME: MINNEAPOLIS SOUTH & HOPKINS MAP YEAR: 1993 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Minnehaha Creek Reach 20 Restoration LAT/LONG: 44.9300/93.3706 Project Area

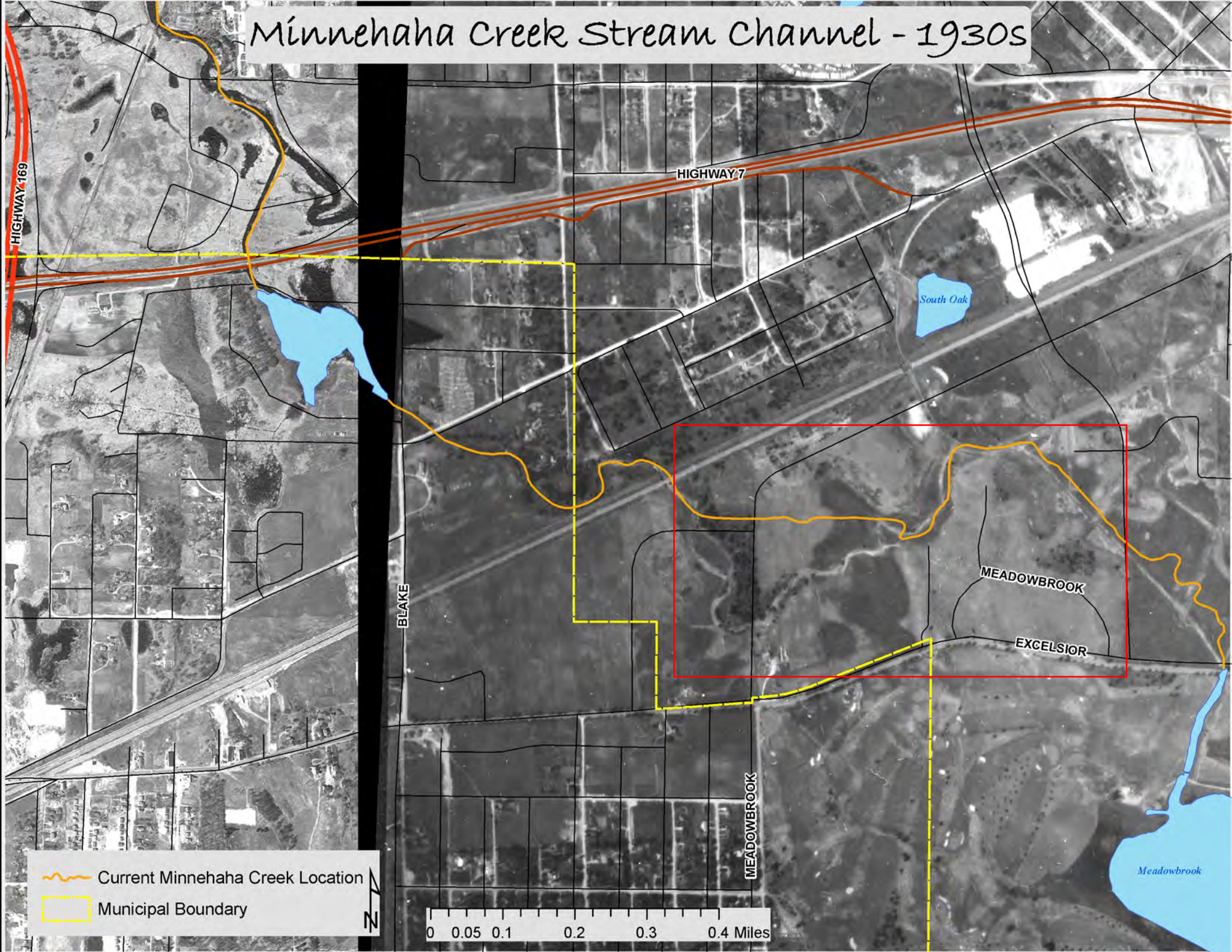
Historical Topographic Map

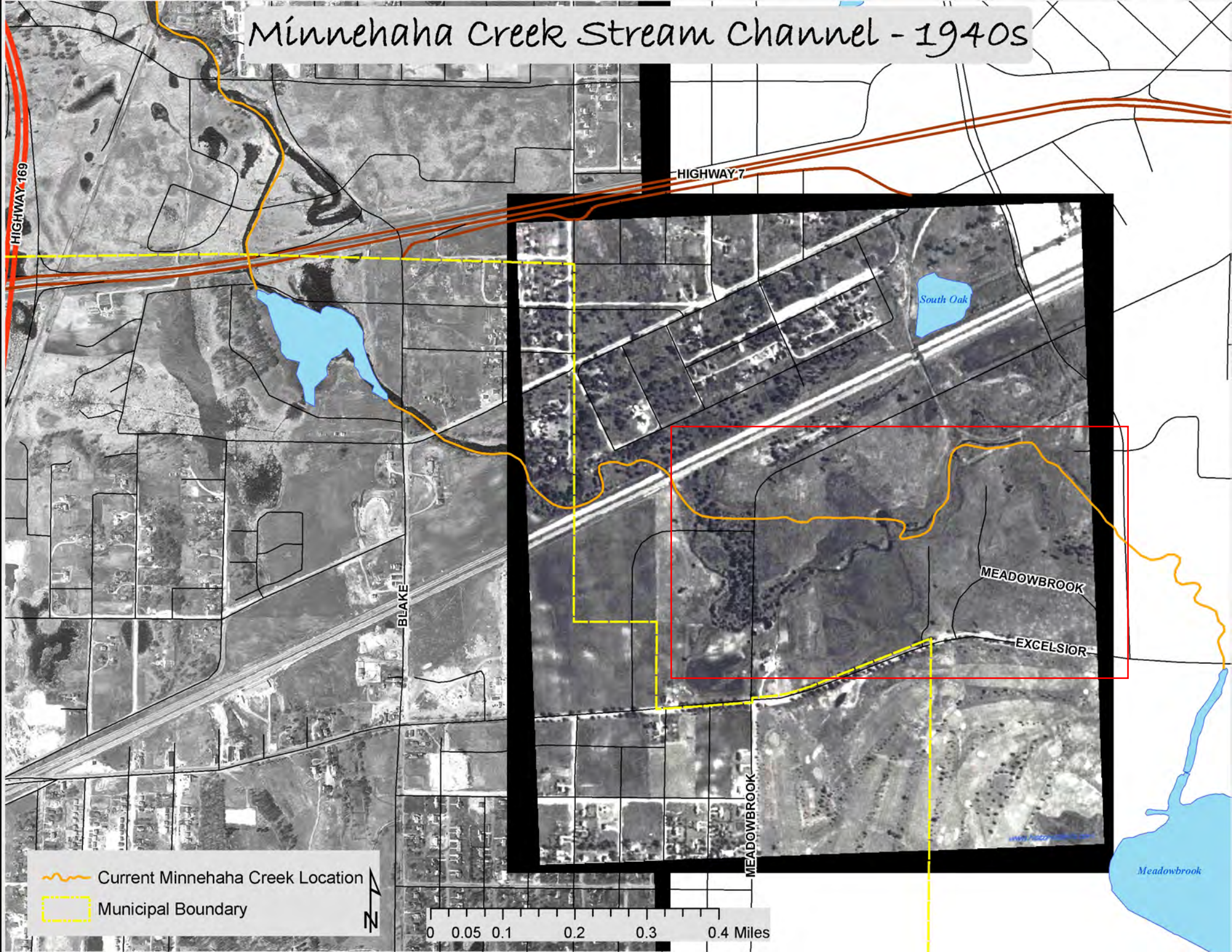
N	TARGET QUAD NAME: MINNEAPOLIS SOUTH & HOPKINS MAP YEAR: 2010 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Minnehaha Creek Reach 20 Restoration LAT/LONG: 44.9300/93.3706 Project Area

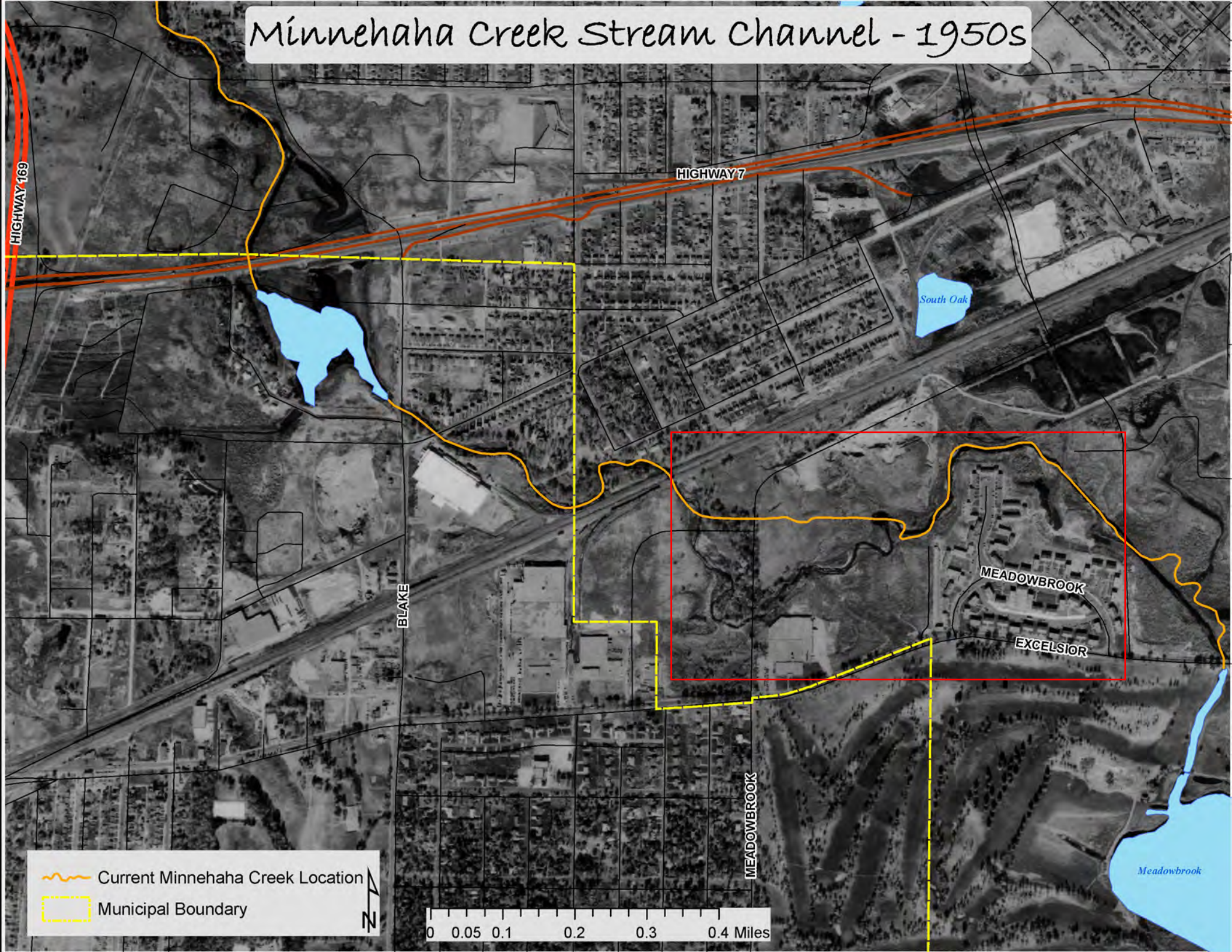
Appendix B

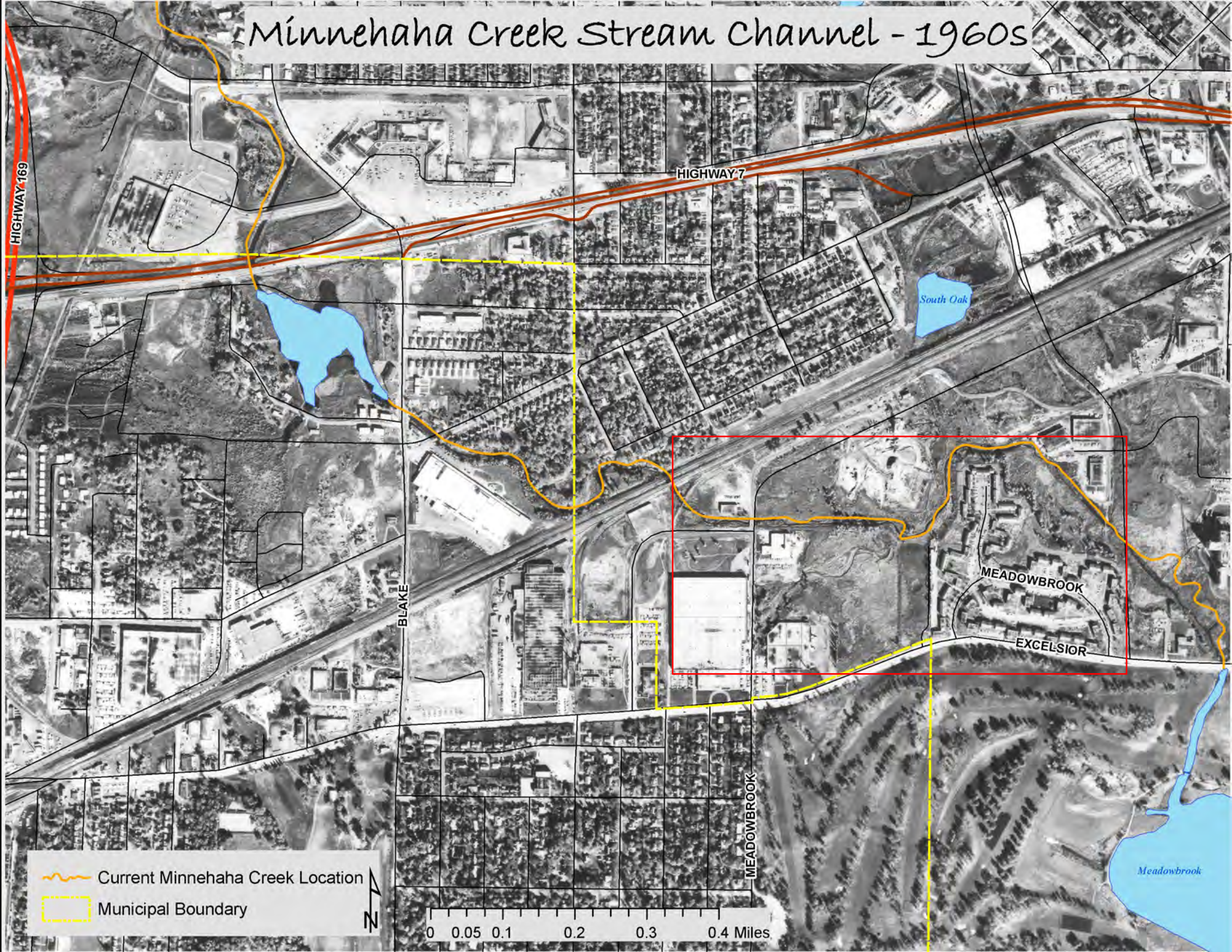
Historical Aerial Photographs

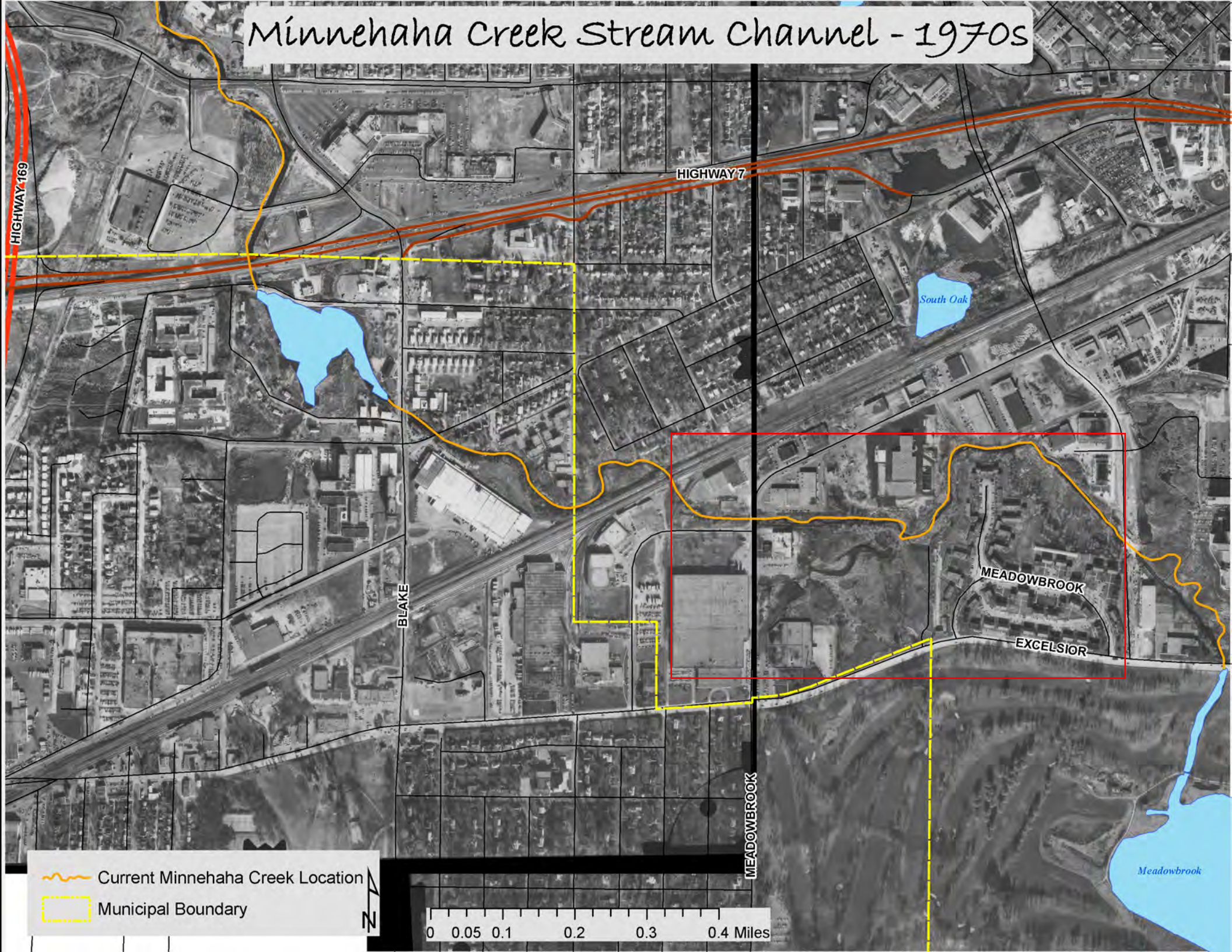
(Compiled by MCWD; Project area delineated by red rectangle)

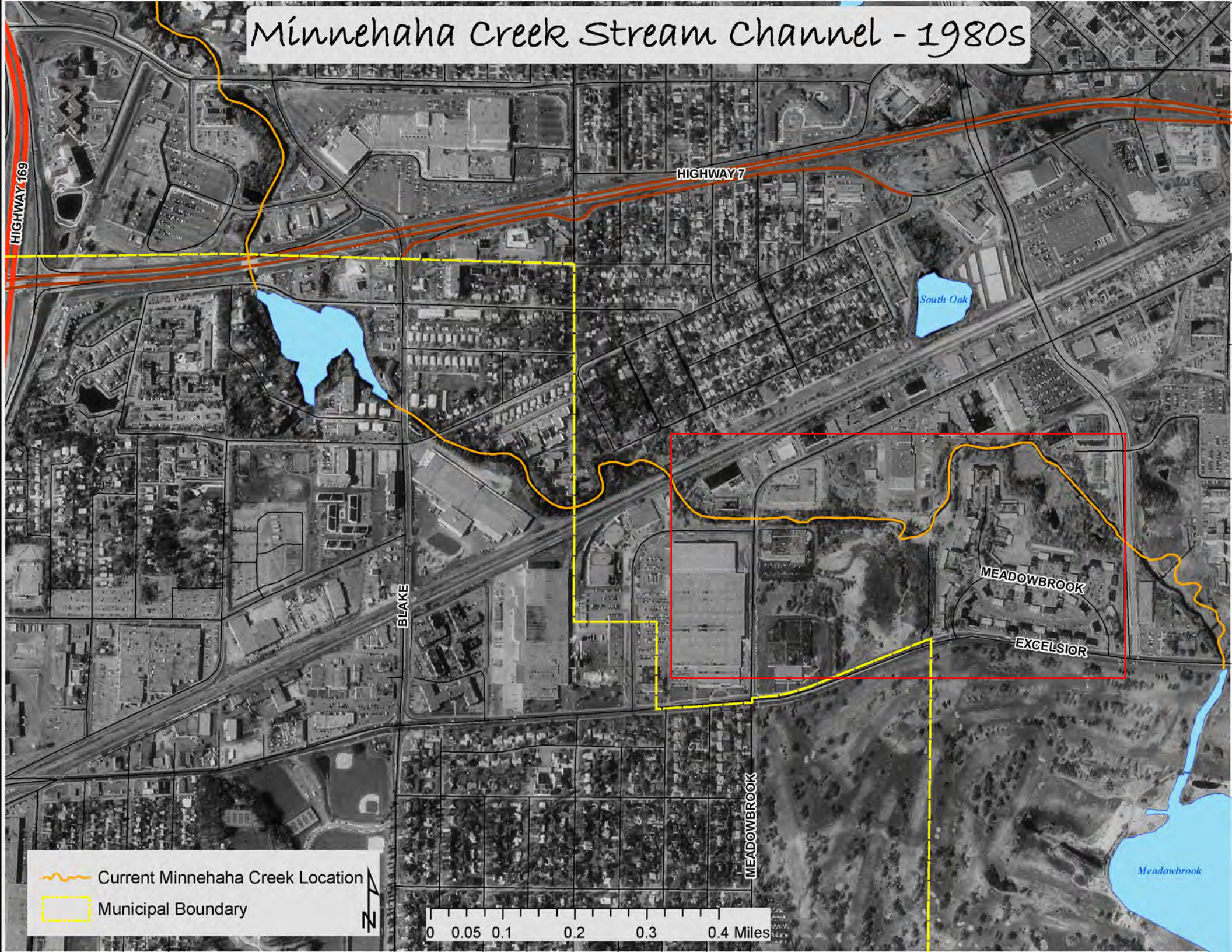

Minnehaha Creek Stream Channel - 1930s
HIGHWAY 169
HIGHWAY 7
South Oak
BLAKE
MEADOWBROOK
EXCELSIOR
MEADOWBROOK
Meadowbrook
Current Minnehaha Creek Location
Municipal Boundary
N
0 0.05 0.1 0.2 0.3 0.4 Miles

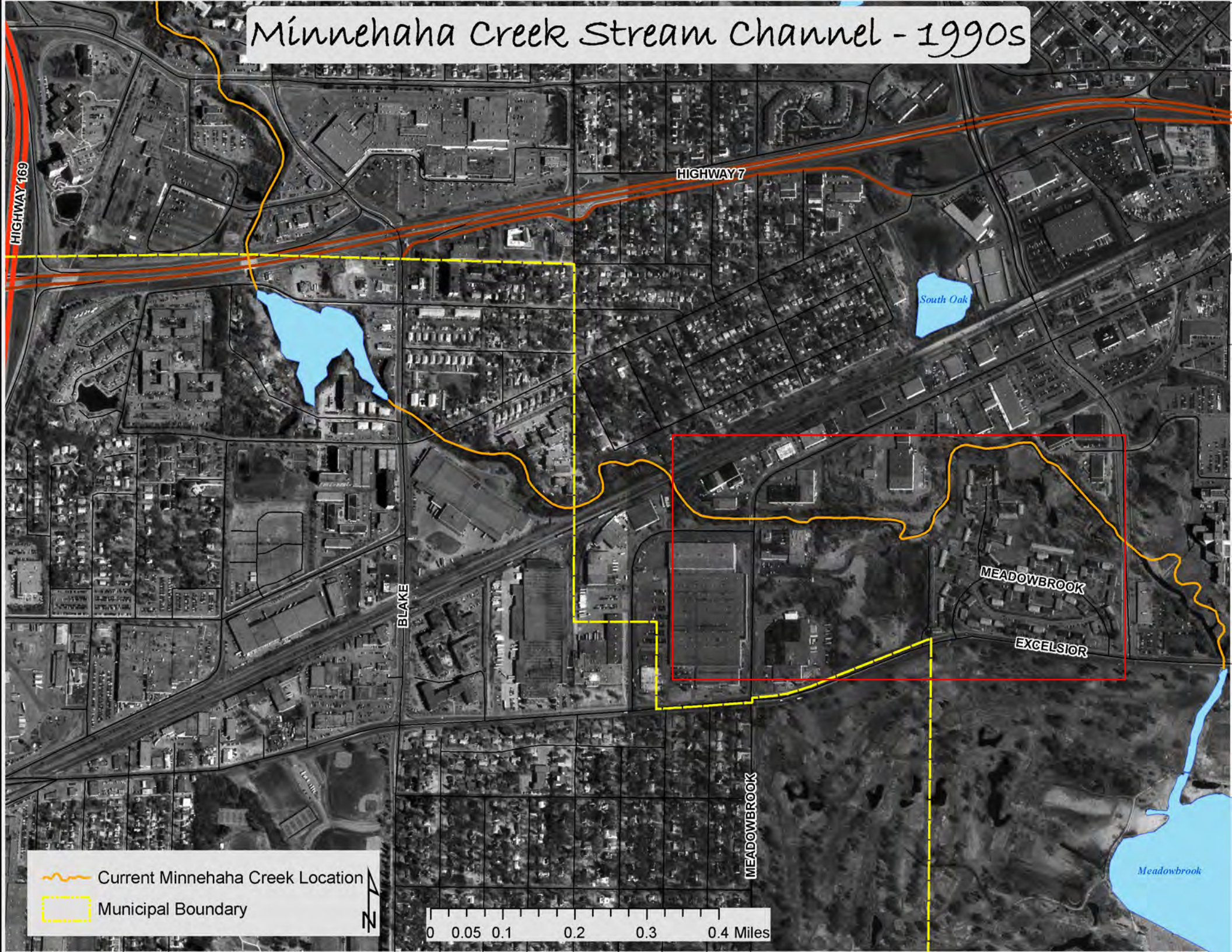

Minnehaha Creek Stream Channel - 1940s
HIGHWAY 169
HIGHWAY 7
BLAKE
South Oak
MEADOWBROOK
EXCELSIOR
MEADOWBROOK
Meadowbrook
Current Minnehaha Creek Location
Municipal Boundary
N
0 0.05 0.1 0.2 0.3 0.4 Miles

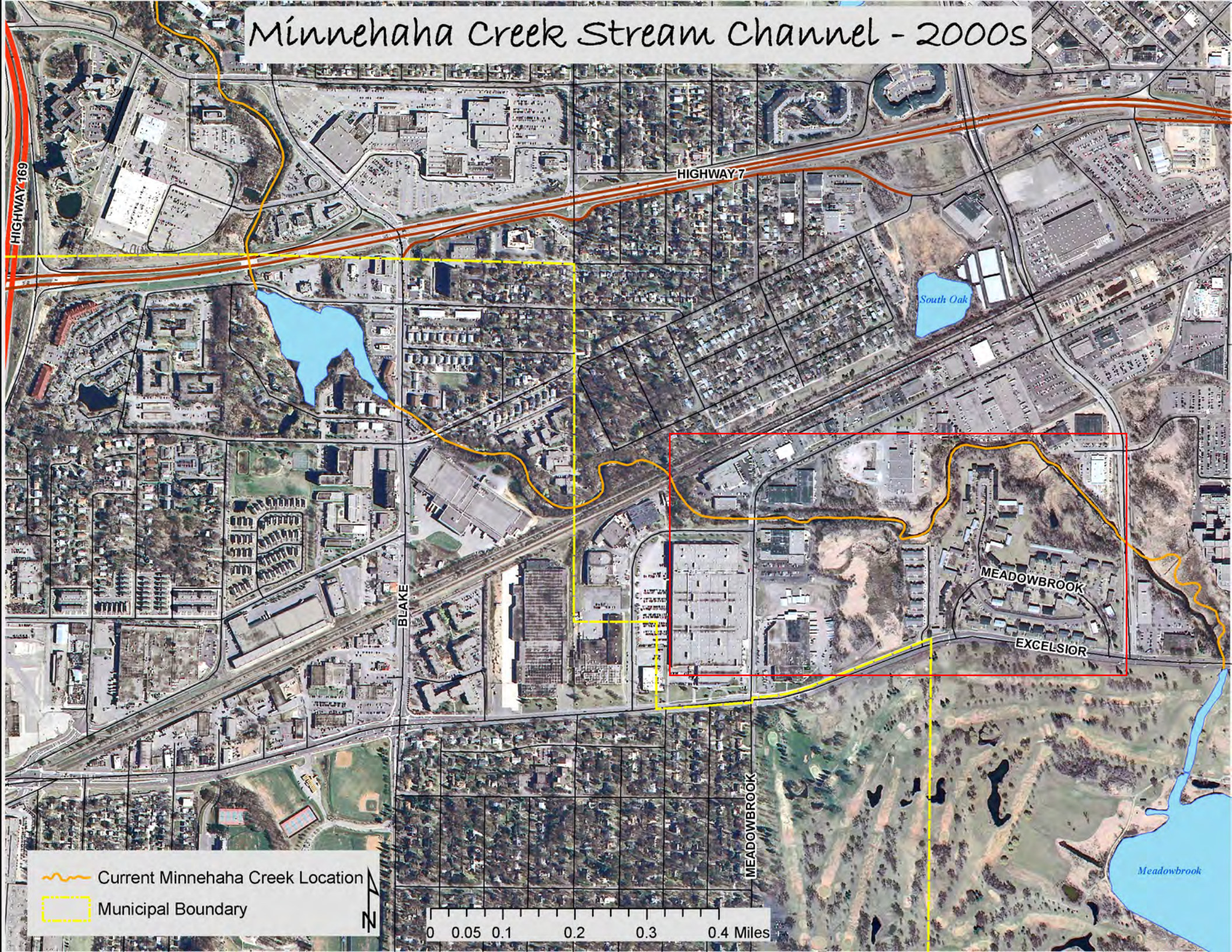

Minnehaha Creek Stream Channel - 1950s
HIGHWAY 169
HIGHWAY 7
South Oak
BLAKE
MEADOWBROOK
EXCELSIOR
MEADOWBROOK
Meadowbrook
Current Minnehaha Creek Location
Municipal Boundary
N
0 0.05 0.1 0.2 0.3 0.4 Miles


Minnehaha Creek Stream Channel - 1960s
HIGHWAY 169
HIGHWAY 7
South Oak
BLAKE
MEADOWBROOK
EXCELSIOR
MEADOWBROOK
Meadowbrook
Current Minnehaha Creek Location
Municipal Boundary
N
0 0.05 0.1 0.2 0.3 0.4 Miles


Minnehaha Creek Stream Channel - 1970s
HIGHWAY 169
HIGHWAY 7
South Oak
BLAKE
MEADOWBROOK
MEADOWBROOK
EXCELSIOR
Meadowbrook
Current Minnehaha Creek Location
Municipal Boundary
N
0 0.05 0.1 0.2 0.3 0.4 Miles


Minnehaha Creek Stream Channel - 1980s
HIGHWAY 169
HIGHWAY 7
South Oak
BLAKE
MEADOWBROOK
EXCELSIOR
MEADOWBROOK
Meadowbrook
Current Minnehaha Creek Location
Municipal Boundary
N
0 0.05 0.1 0.2 0.3 0.4 Miles


Minnehaha Creek Stream Channel - 1990s
HIGHWAY 169
HIGHWAY 7
South Oak
BLAKE
MEADOWBROOK
MEADOWBROOK
EXCELSIOR
Meadowbrook
Current Minnehaha Creek Location
Municipal Boundary
N
0 0.05 0.1 0.2 0.3 0.4 Miles


Minnehaha Creek Stream Channel - 2000s
HIGHWAY 169
HIGHWAY 7
South Oak
BLAKE
MEADOWBROOK
EXCELSIOR
MEADOWBROOK
Meadowbrook
Current Minnehaha Creek Location
Municipal Boundary
N
0 0.05 0.1 0.2 0.3 0.4 Miles


Minnehaha Creek Stream Channel - 2010
HIGHWAY 169
HIGHWAY 7
South Oak
BLAKE
MEADOWBROOK
EXCELSIOR
MEADOWBROOK
Meadowbrook
Current Minnehaha Creek Location
Municipal Boundary
N
0 0.05 0.1 0.2 0.3 0.4 Miles