



Mt. Olivet Stream Stabilization & Parkers Lake Drainage Improvement Projects

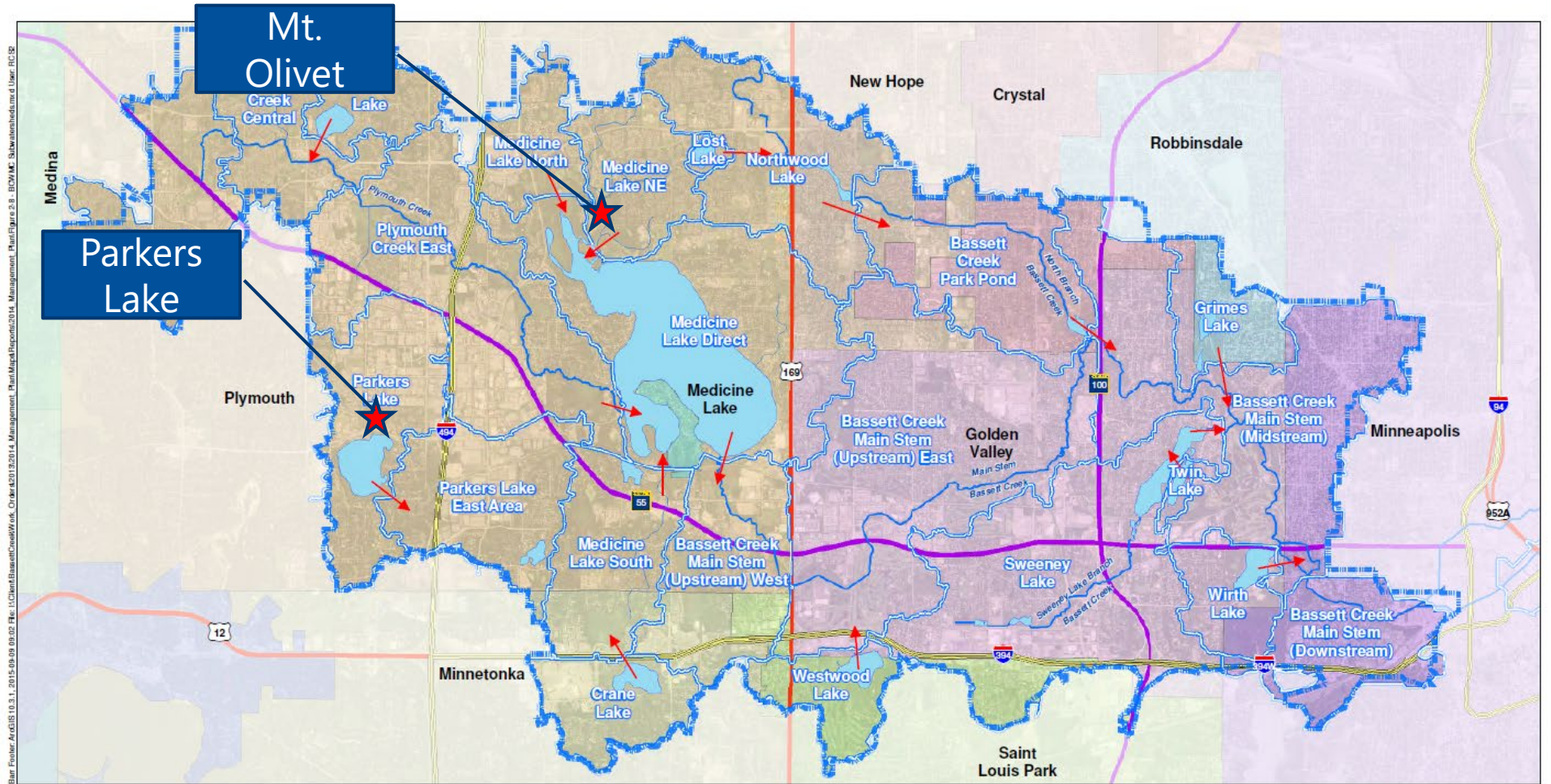
BCWMC Meeting

May 21, 2020

Jen Koehler, PE



Overview – project locations



- BCWMC Jurisdictional Boundary
- Major Subwatersheds
- Lakes and Ponds
- BCWMC Priority Streams
- Other Streams
- Flow Directions

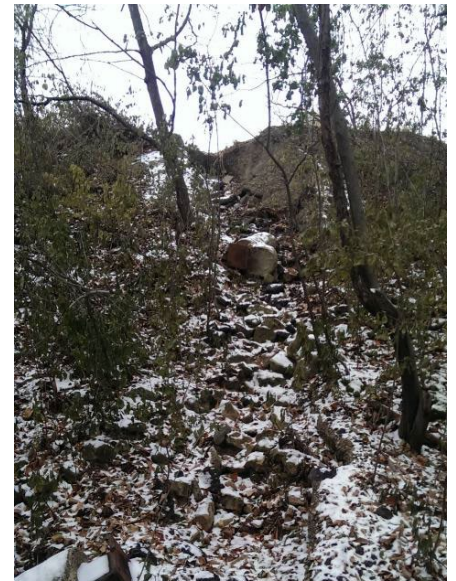


Figure 2-8

BCWMC MAJOR SUBWATERSHEDS
AND DRAINAGE PATTERNS
Bassett Creek Watershed
Management Commission
2015 Management Plan

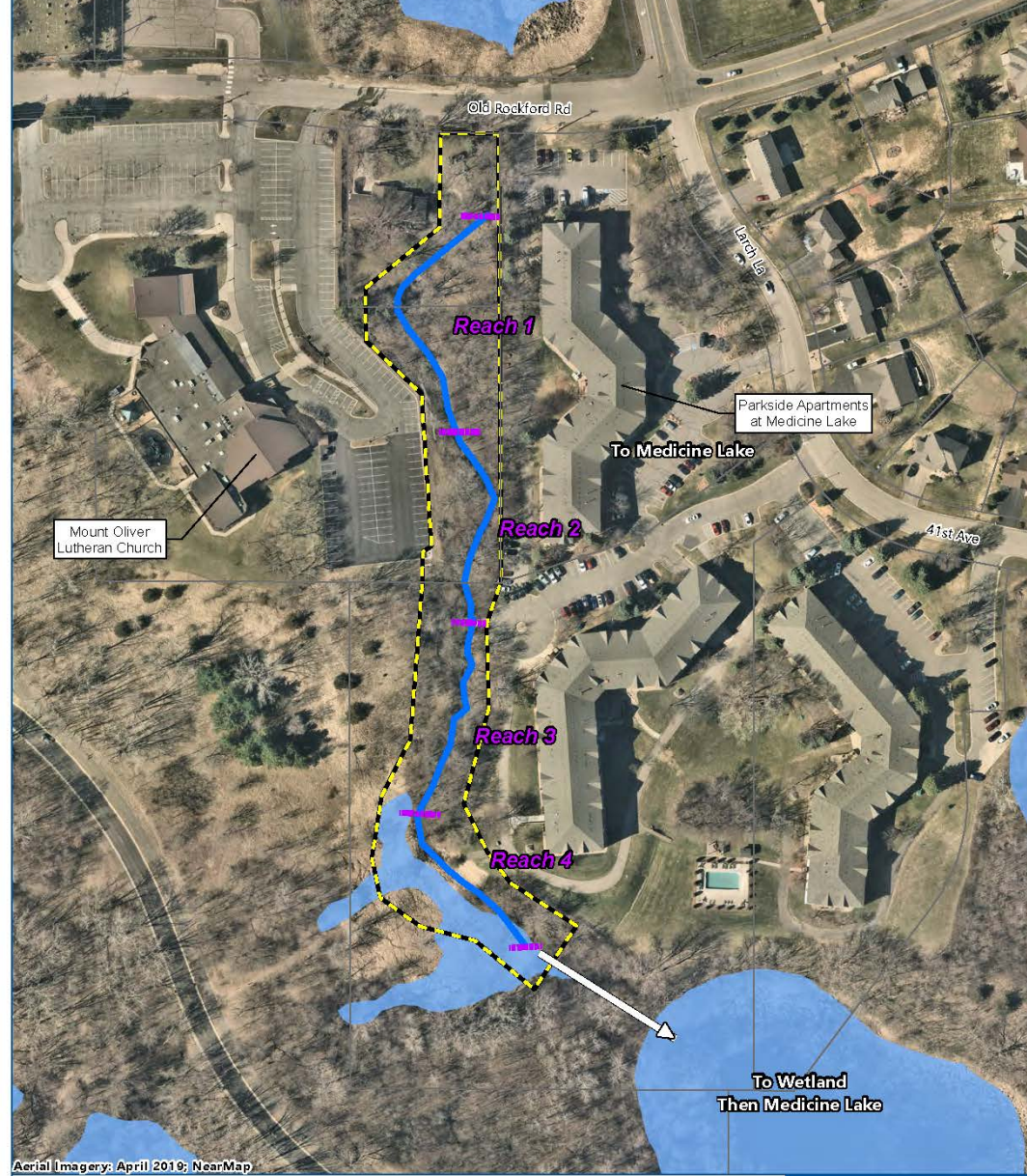
Mt. Olivet-
CIP (ML-20)
Site
Conditions &
Goals

- **Description:** Restoration of eroding stream channel
- **Goals (per BCWMC Gatekeeper Criteria):**
 - Protects/Improves water quality in a priority water body (Medicine Lake)
 - Addresses approved TMDL (Medicine Lake, Excess Nutrients)
 - Addresses erosion/sedimentation issues
 - Addresses multiple Commission goals, including riparian habitat restoration



Mt. Olivet- Project Area

Barr Footer: ArcGIS 10.7.1, 2020-03-24 10:33 File: I:\Client\BassettCreek\Work Orders\2019\Mt. Olivet Restoration Parkers Lake Drainage\Map\Report\Restoration Alternatives Feb 2020\Figure 2-2 - Mt. Olivet Project Area.mxd



- Stream Path
- Reach Boundary
- Project Area
- Ponds and Wetlands
- Parcels

0 150 300 Feet

MT. OLIVET
PROJECT AREA
Mt. Olivet/Parkers Lake
Feasibility Study

FIGURE 2-2



Parkers Lake

- CIP (PL-7)

Site

Conditions &

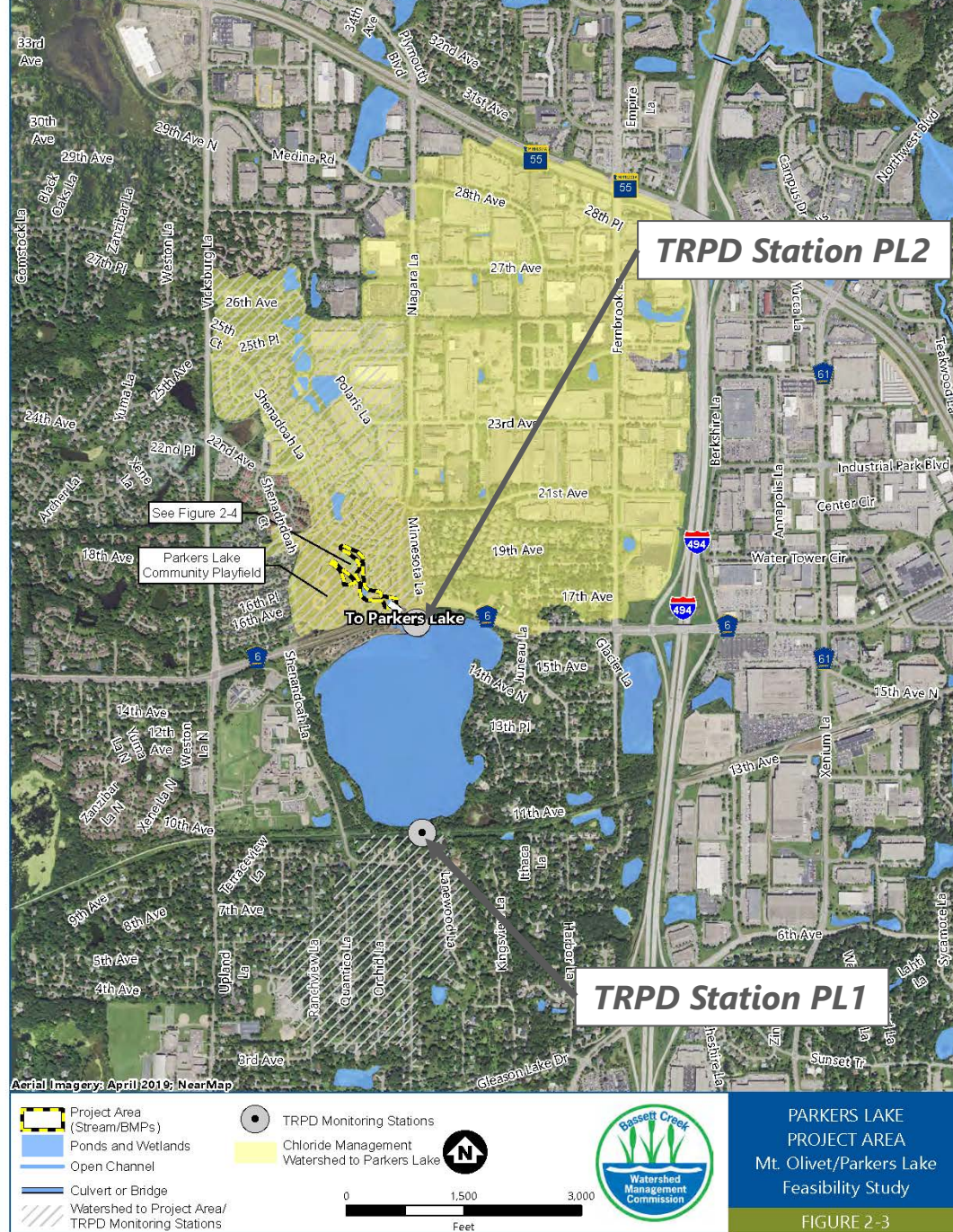
Goals

- **Description:**
 - Restoration of eroding drainage channel
 - Improvements to stormwater quality (BMPs, Chloride Reduction Strategies)
- **Goals (per BCWMC Gatekeeper Criteria):**
 - Protects/Improves water quality in a priority water body (Parkers Lake)
 - Addresses approved TMDL (Parkers Lake, Chlorides)
 - Meets deep lake standard for phosphorus
 - Addresses erosion/sedimentation issues
 - Addresses multiple commission goals, including riparian habitat restoration

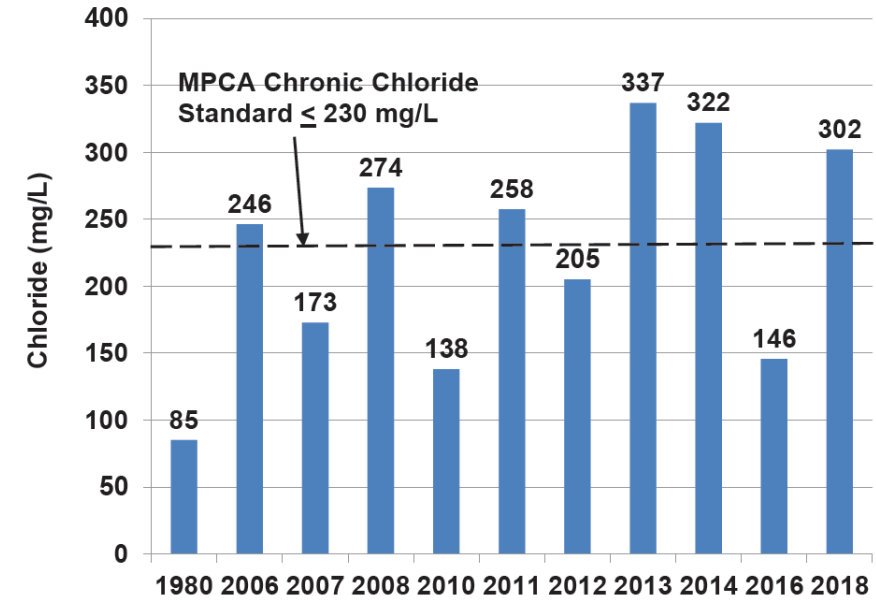


Parkers Lake – Project Area Watershed & Chloride Data

Bar Footer: ArcGIS 10.7.1, 2020-03-24 10:39 File: I:\Client\BassettCreek\Work_Order\2019\Mt_Olivet_Restoration_Parkers_Lake_Drainage_Map\Report\Restoration_Alternatives_Feb2020\Figure 2-3 - Parkers Lake Project Area



1980-2018 Average Overall Chloride Concentrations in Parkers Lake



Watershed Chloride Contributions

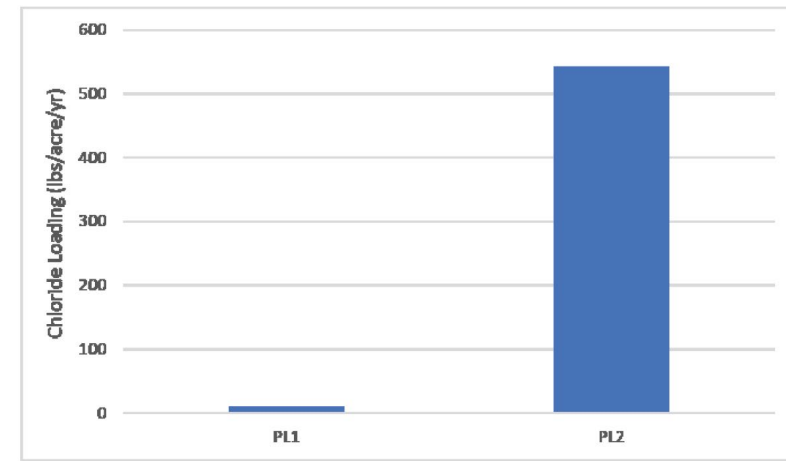
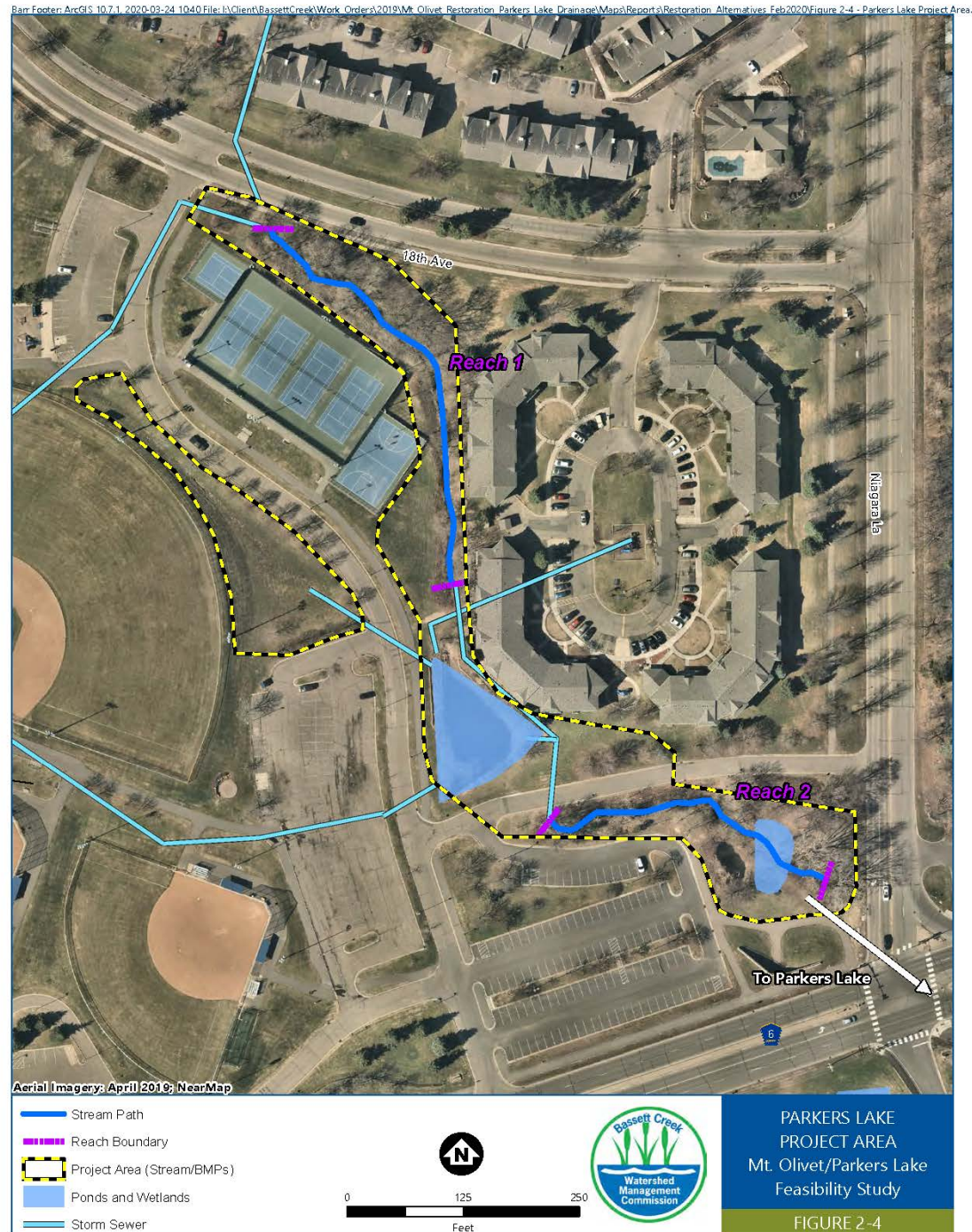


FIGURE 2-3

Parkers Lake – Project Area



Stakeholder Input

- Kickoff Meeting
 - September 2019 – BCWMC Engineers/Administrator, City of Plymouth, Three Rivers Park District, Commissioner/Alternate Commissioner
- Agency Meeting
 - December 2019 – BCWMC Engineers/Administrator, City of Plymouth, Three Rivers Park District, USACE
- Public Open House
 - February 2020 – BCWMC Engineers/Administrator, City of Plymouth, Three Rivers Park District, Alternate Commissioner, 10 residents
- Technical Team Meeting
 - March 2020 - BCWMC Engineers/Administrator, City of Plymouth
- Draft Report –
 - May 2020 - Reviewed by the BCWMC Administrator and City of Plymouth staff

Data Collection

- MnDNR Public Waters Inventory Review
 - No PWI waters within project area
- FEMA Floodplain Review
 - Not in mapped floodplains
- Wetland Delineations
- Cultural Resource Desktop Review
 - Indirect, visual impacts not likely, no archeological resources
- Threatened and Endangered Species Review
 - Likely no impacts to Blanding's turtle, Bald Eagles, Northern long-eared bat (threatened), Southern mesic maple-basswood forest class
- MPCA What's in my Neighborhood
 - No anticipated environmental/contamination concerns

Data Collection

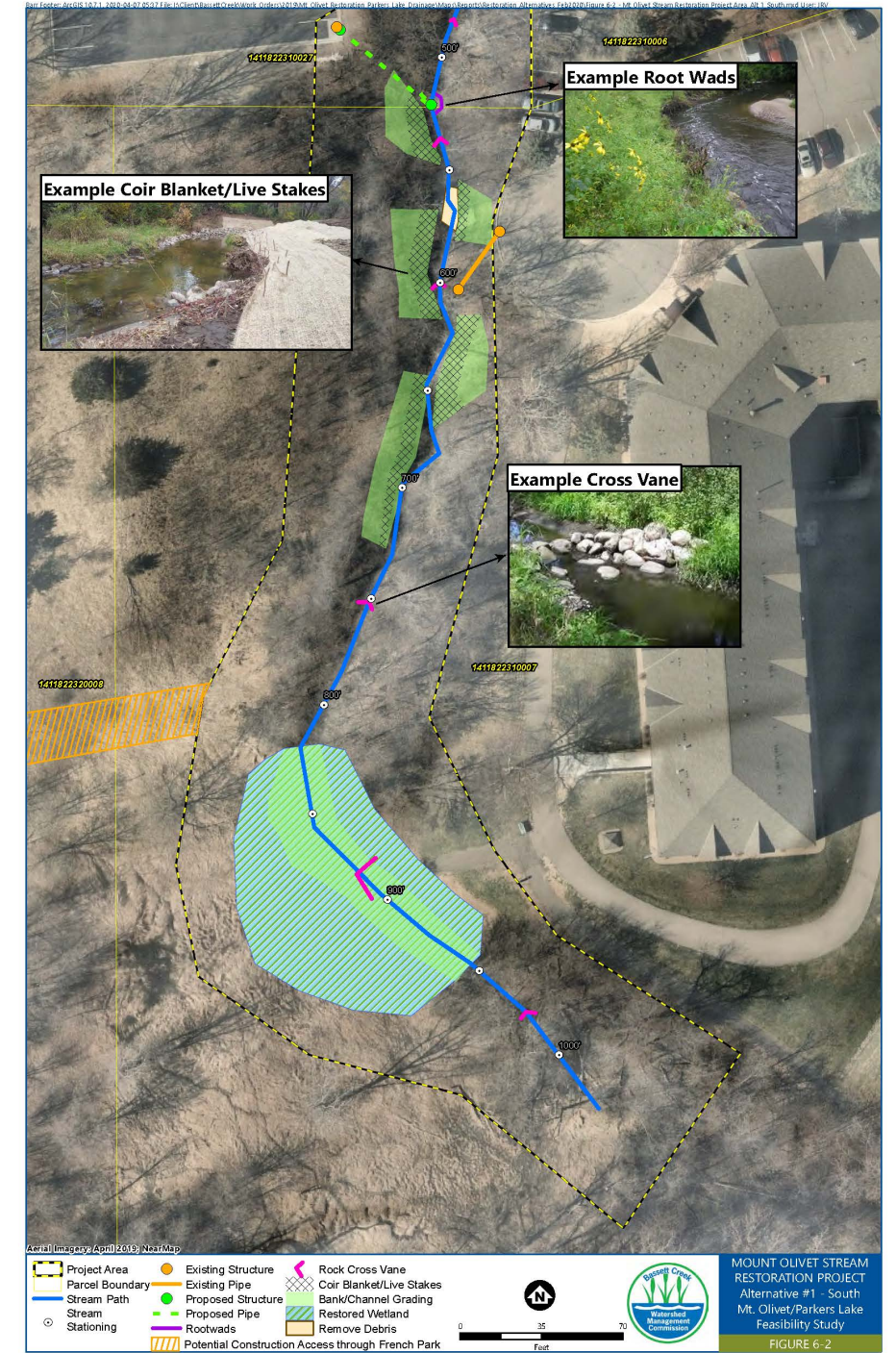
- Topographic survey
- Utility locates
- Tree survey
- Stream hydraulics review (BCWMC XP-SWMM model)
- Existing drawing review
- Water quality data (Parkers Lake)

Mt. Olivet Stream Restoration Alternatives

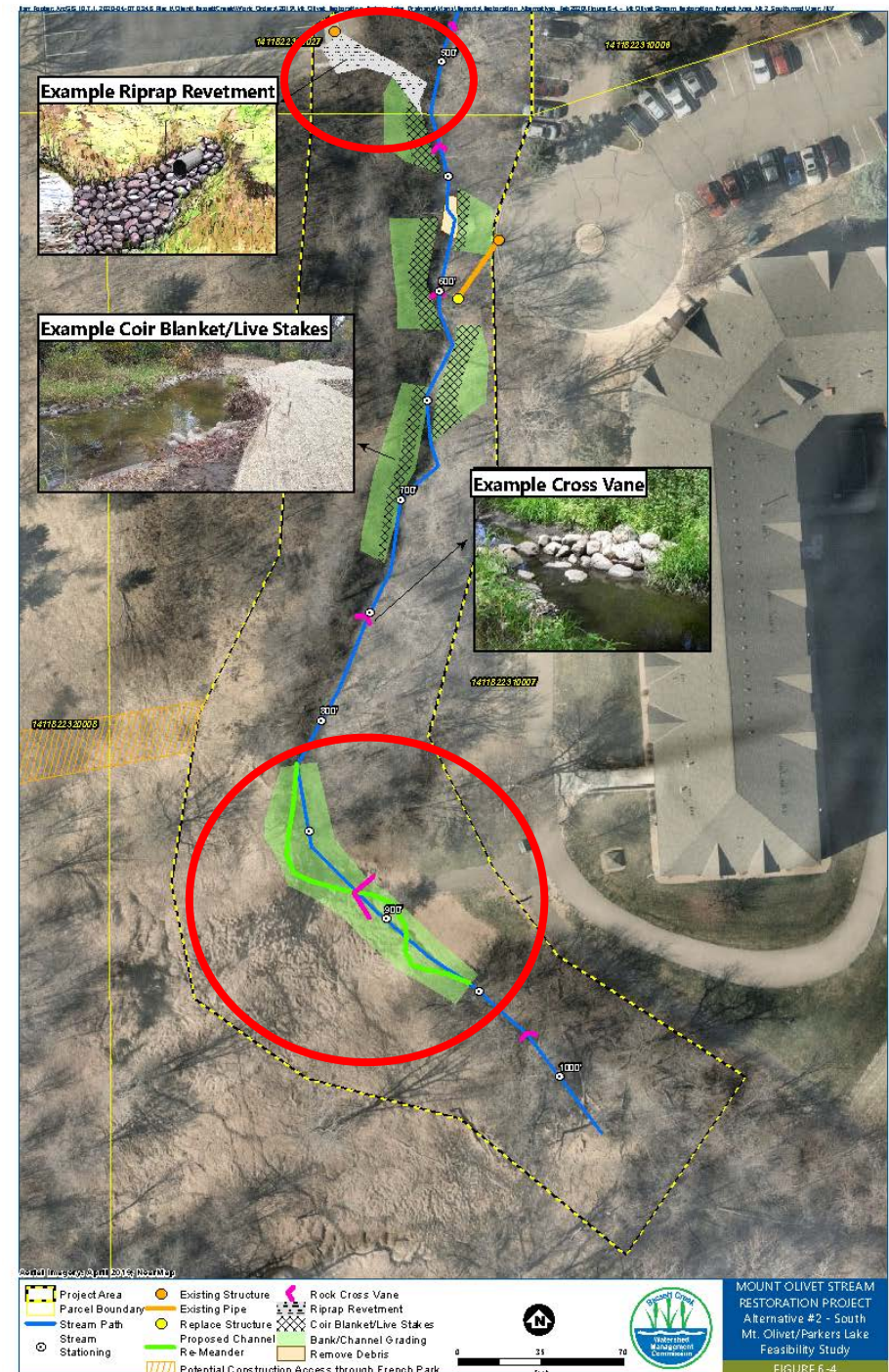
Alternative	Description
Alternative 1	Stream stabilization utilizing bio-engineering techniques, wetland restoration , and installation of a manhole drop structure at the Mount Olivet Church parking lot
Alternative 2	Stream stabilization utilizing bio-engineering techniques, stream re-meandering , and installation of hard armoring at the Mount Olivet Church parking lot



Mt. Olivet Stream Restoration Alternative 1 (North/South)



Mt. Olivet Stream Restoration Alternative 2 (North/South)



Agencies and Permitting

- DNR – work in public waters permit NOT required (no DNR public waters)
- USACE – Section 404
- MPCA
 - Section 401 certification
 - Construction stormwater
- City
 - WCA
 - Local permits
- BCWMC – CIP project review process
- Agreements with TRPD for access
- Coordination with Mount Olivet Lutheran Church

Project
Impacts &
Costs

	Alternative 1	Alternative 2
Flood Impacts	No Change	No Change
Tree Removal (#)	~39 trees	~39 trees
Other	<ul style="list-style-type: none"> • ~720 ft of restored stream • Drop Structure at parking lot • Wetland Restoration (0.15 ac) • Allows for Pedestrian Crossing 	<ul style="list-style-type: none"> • ~720 ft of restored stream • Rip rap at parking lot • Stream Re-meander • Allows for Pedestrian Crossing
Pollutant Removal (TP) (lbs/year)	5.3	5.3
Total Project Cost ¹	\$134,000	\$111,000
Annualized Project Cost ²	\$10,000	\$8,000
Cost Benefit (\$/lb TP/yr)	\$1,892	\$1,509

1 – Includes Engineering, Design, and Construction Oversight; Based on conceptual level of design, project cost uncertainty expected to range from -20% to +30%

2 – Over 30-year project lifespan, including annual maintenance and estimated major repair costs

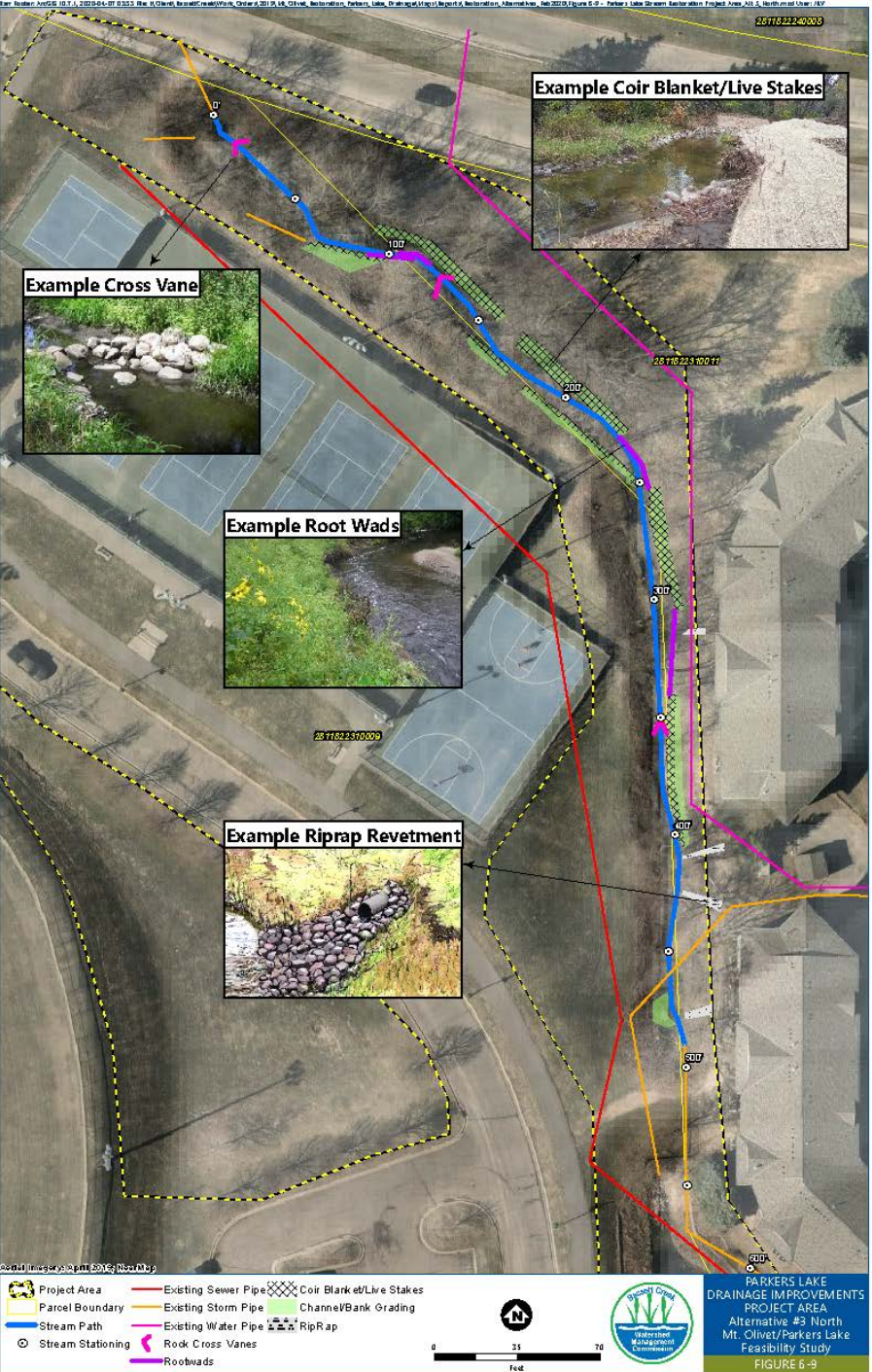
Discussion



Parkers Lake Alternatives

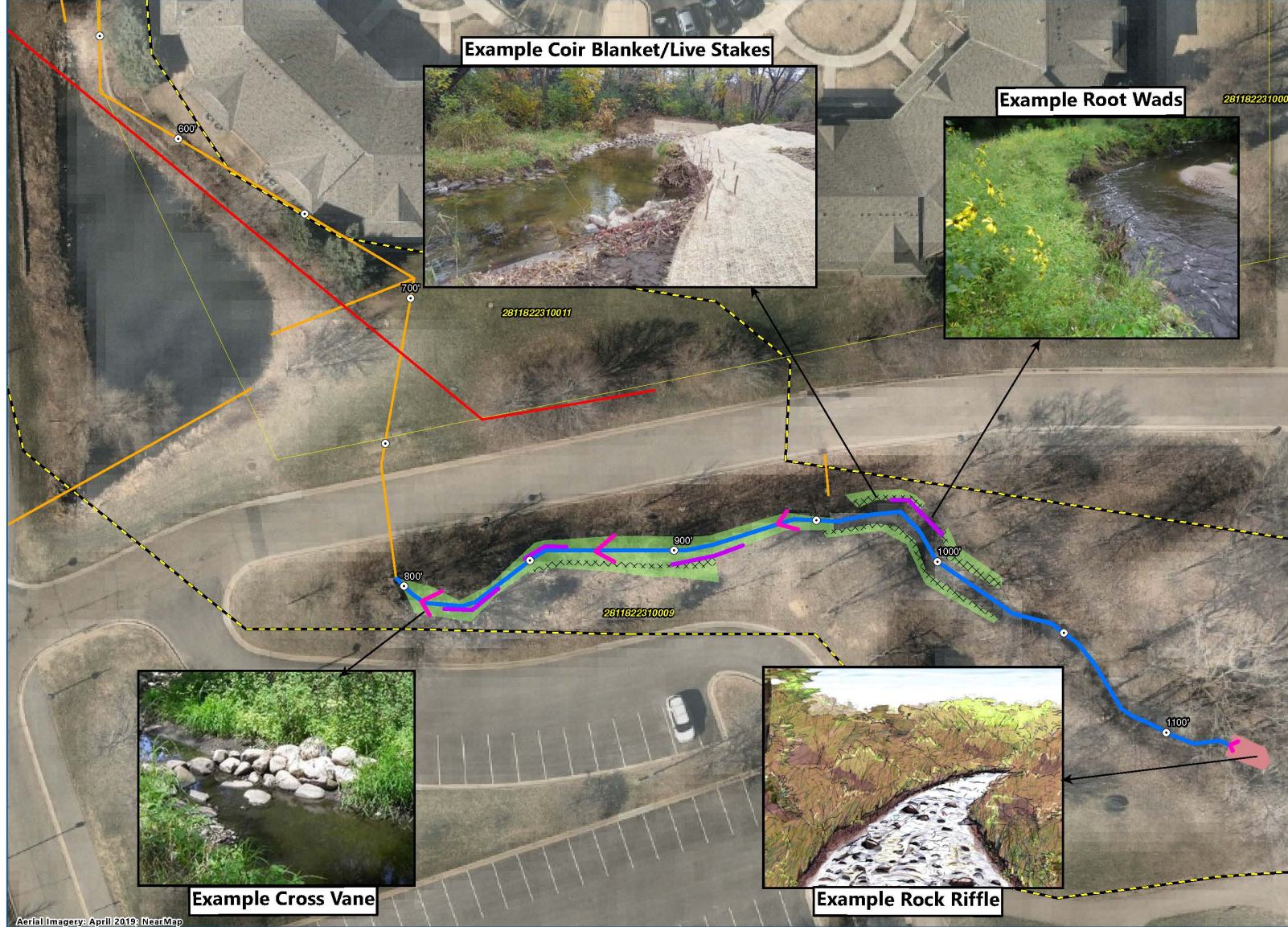
Alternative	Description
Alternative 1	Stream stabilization by conveying flow through a pipe
Alternative 2	Stream stabilization using a standard hard-armoring approach
Alternative 3	Stream stabilization using bio-engineering techniques
Alternative 4	Diversion of low flows from the existing storm sewer in park to an iron-enhanced bioretention filtration system
Alternative 5a/5b	Opportunities for a wet retention pond in open space along the existing stream alignment through park (2 options)
Alternative 6	Chloride demonstration projects in the northern watershed tributary to Parkers Lake to reduce salt usage and chloride loads

Parkers Lake Alternative 3 (North)

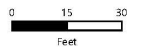


Parkers Lake Alternative 3 (South)

Barr Footer: ArcGIS 10.7.1, 2020.04.07 09:01 File: H:\Client\BassettCreek\Work_Orders\2019\Mt. Olivet_Restoration_Parkers_Lake_Drainage\Map\Reports\Restoration_Alternatives_Feb2020\Figure 6-10 - Parkers Lake Stream Restoration Project Area_Alt 3_South.mxd User: JRV



- Project Area
- Parcel Boundary
- Stream Path
- Stream Stationing
- Existing Sewer Pipe
- Existing Storm Pipe
- Rock Cross Vanes
- Coir Blanket/Live Stakes
- Channel/Bank Grading
- Rock Riffle



PARKERS LAKE
DRAINAGE IMPROVEMENTS
PROJECT AREA
Alternative #3 South
Mt. Olivet/Parkers Lake
Feasibility Study
FIGURE 6-10



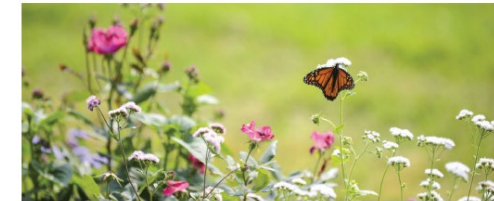
Parkers Lake Alternative 4



Existing Low Area



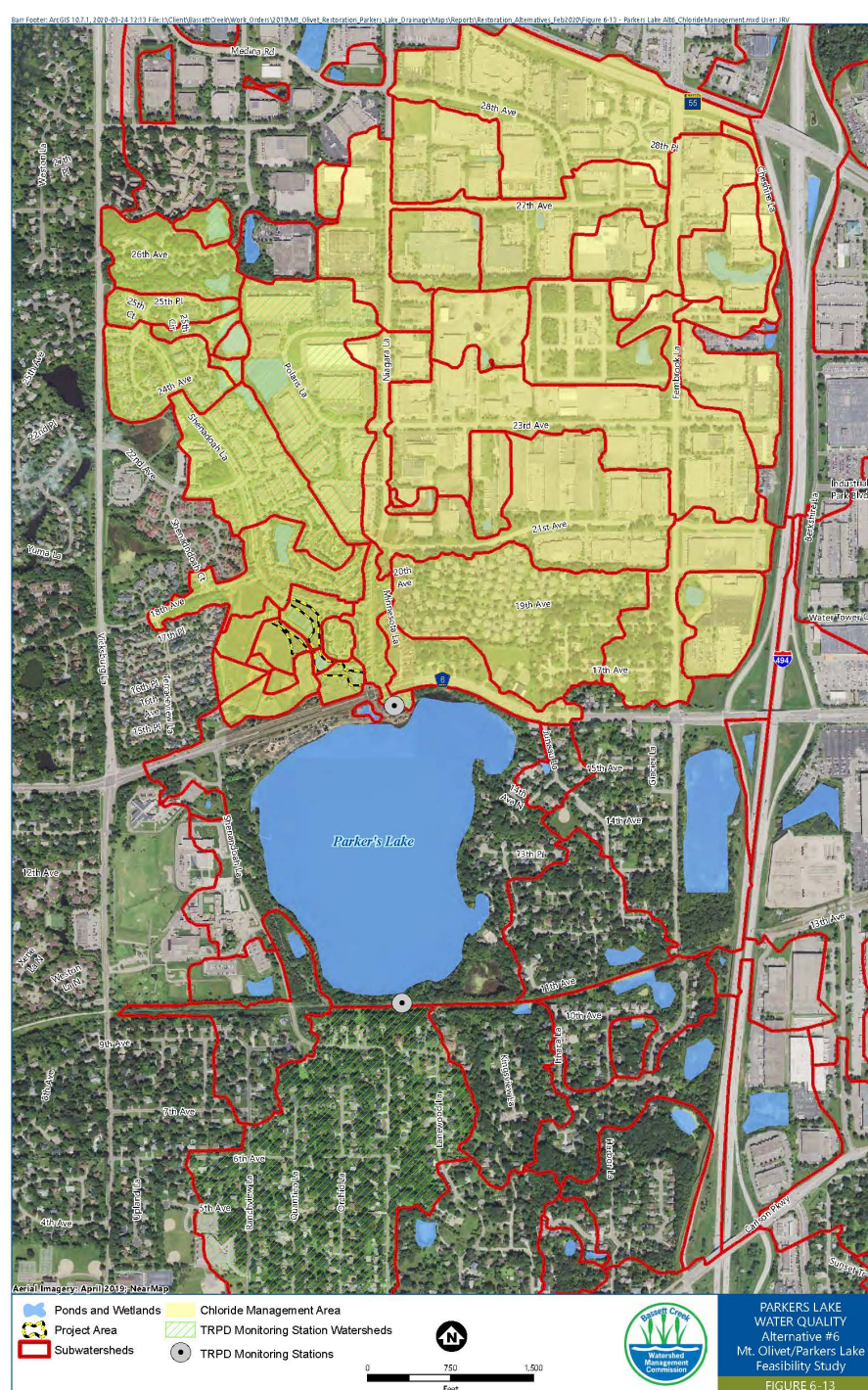
Example Images



Parkers Lake Alternative 5a/5b



Parkers Lake Alternative 6



Chloride Reduction Demonstration Project:

- Work with willing private landowners & property managers
- Could include site pre and post implementation monitoring
- City will take lead on initial communications to property owners in the northern watershed to identify interested parties
- Implementation of projects beyond smart salt trainings & ongoing support for limited liability legislation

Example Projects:

- Upgrading plowing (e.g. segmented blades) and deicing equipment (e.g. brining)
- Automated pavement anti-icing system
- Snowmelt systems below high use walks/drives
- Conversion of impervious surfaces to permeable surfaces
- Education of multi-family occupants

Parkers Lake Alternative 6

Chloride Reduction Practice	Example Project Costs¹	Planning Level Unit Costs²
Upgrades to Segmented Plow Blades	\$50,000	\$10,000 / blade (+ replacement blade)
Upgrade Trucks with Brining Equipment	\$10,000-\$90,000	N/A
Upgrades to Brine Making Equipment	\$60,000-\$90,000	N/A
Automated pavement anti-icing systems	\$90,000	\$7-20/SF
Pavement snowmelt systems	N/A	\$10-25/SF
Permeable Pavements	N/A	\$16-40/SF

1 – Chloride reduction example project costs based on information related to chloride reduction projects from the City of Plymouth or as submitted to the Nine Mile Creek Watershed District (NMCWD) cost-share program from 2010-2018. All costs were adjusted to 2020 dollars.

2 – Planning level unit costs (if applicable) based on information from the NMCWD, recent bid tabs, information from the United States Department of Transportation Intelligent Transportation Systems Joint Program Office. All costs were adjusted to 2020 dollars.

Project Impacts & Costs

Recommended Alternatives based on feedback from Public, City of Plymouth Staff, & BCWMC Administrator

	Alternative 1: Piped	Alternative 2: Hard Armor	Alternative 3: Bio-engineering	Alternative 4: Filtration	Alternative 5a/5b: Retention	Alternative 6: Chloride Reduction
Flood Impacts	No Change	No Change	No Change	No Change	No Change	No Change
Tree Removal (#)	20 trees	20 trees	20 trees	0 trees	6 trees / 35 trees	N/A
Other	<ul style="list-style-type: none"> No restored stream 	<ul style="list-style-type: none"> ~830 ft of restored stream 	<ul style="list-style-type: none"> ~830 ft of restored stream 	<ul style="list-style-type: none"> Pollinator habitat Education 	<ul style="list-style-type: none"> 0.14 ac/0.28 ac open water Education 	<ul style="list-style-type: none"> Agreements with private property owners
Pollutant Removal (TP) (lbs/year)	20.1	20.1	20.1	1.2	2.6 / 3.4	30-70% reduction in chloride use
Total Project Cost ¹	\$208,000	\$204,000	\$113,000	\$214,000	\$145,000 / \$192,000	\$300,000
Annualized Project Cost ²	\$15,000	\$14,000	\$8,000	\$14,214	\$9,625 / \$12,725	N/A
Cost Benefit (\$/lb TP/yr)	\$748	\$698	\$399	\$11,835	\$3,702 / \$3,751	N/A

¹ – Includes Engineering, Design, and Construction Oversight; Based on conceptual level of design, project cost uncertainty expected to range from -20% to +30%

² – Over 30-year project lifespan, including annual maintenance and estimated major repair costs

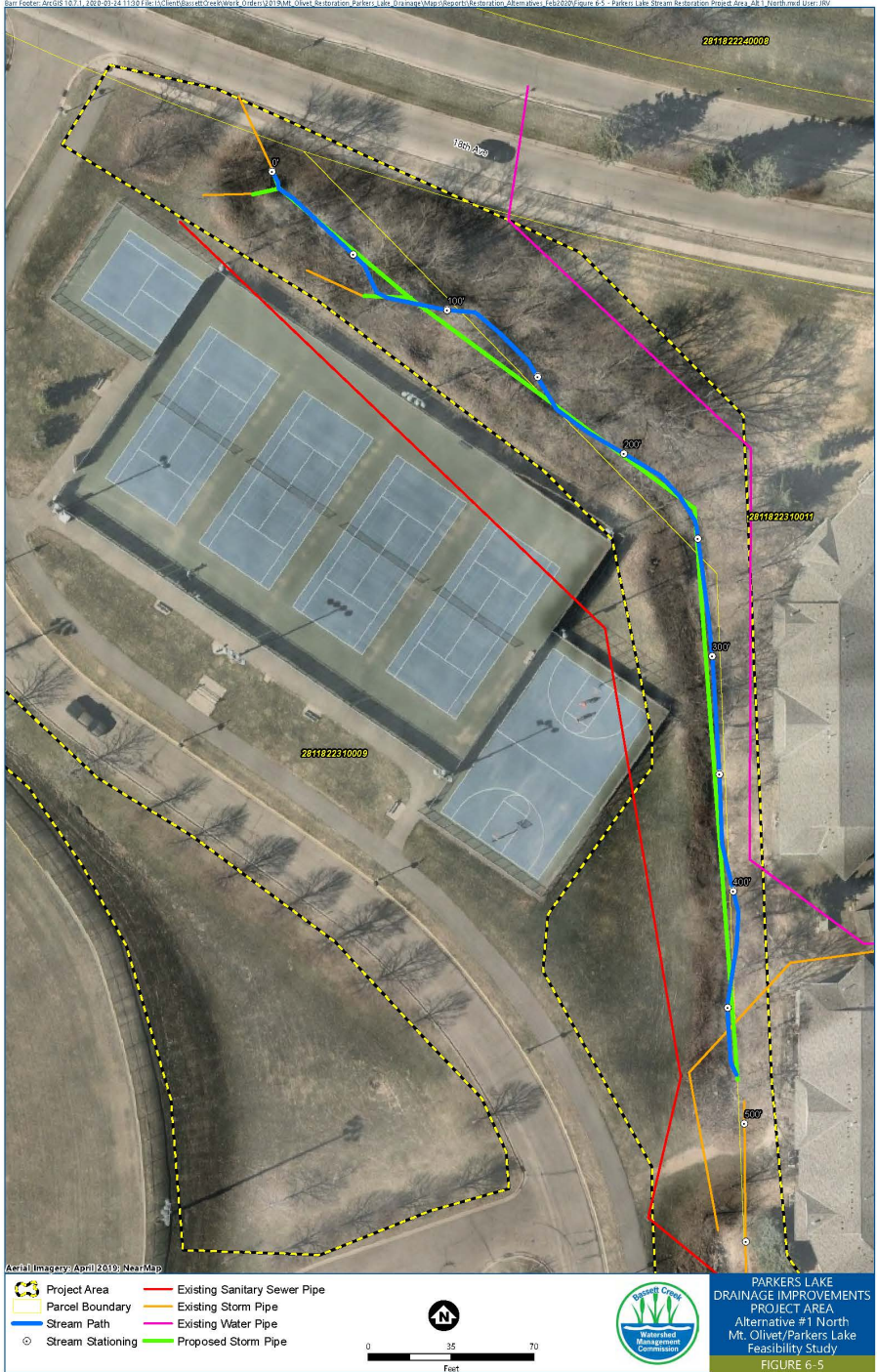
Agencies and Permitting

- DNR – work in public waters permit NOT required (no DNR public waters)
- USACE – Section 404
- MPCA
 - Section 401 certification
 - Construction stormwater
- City
 - WCA
 - Local permits
- BCWMC – CIP project review process
- Agreements with Private Property Owners for Chloride Reduction Project

Discussion

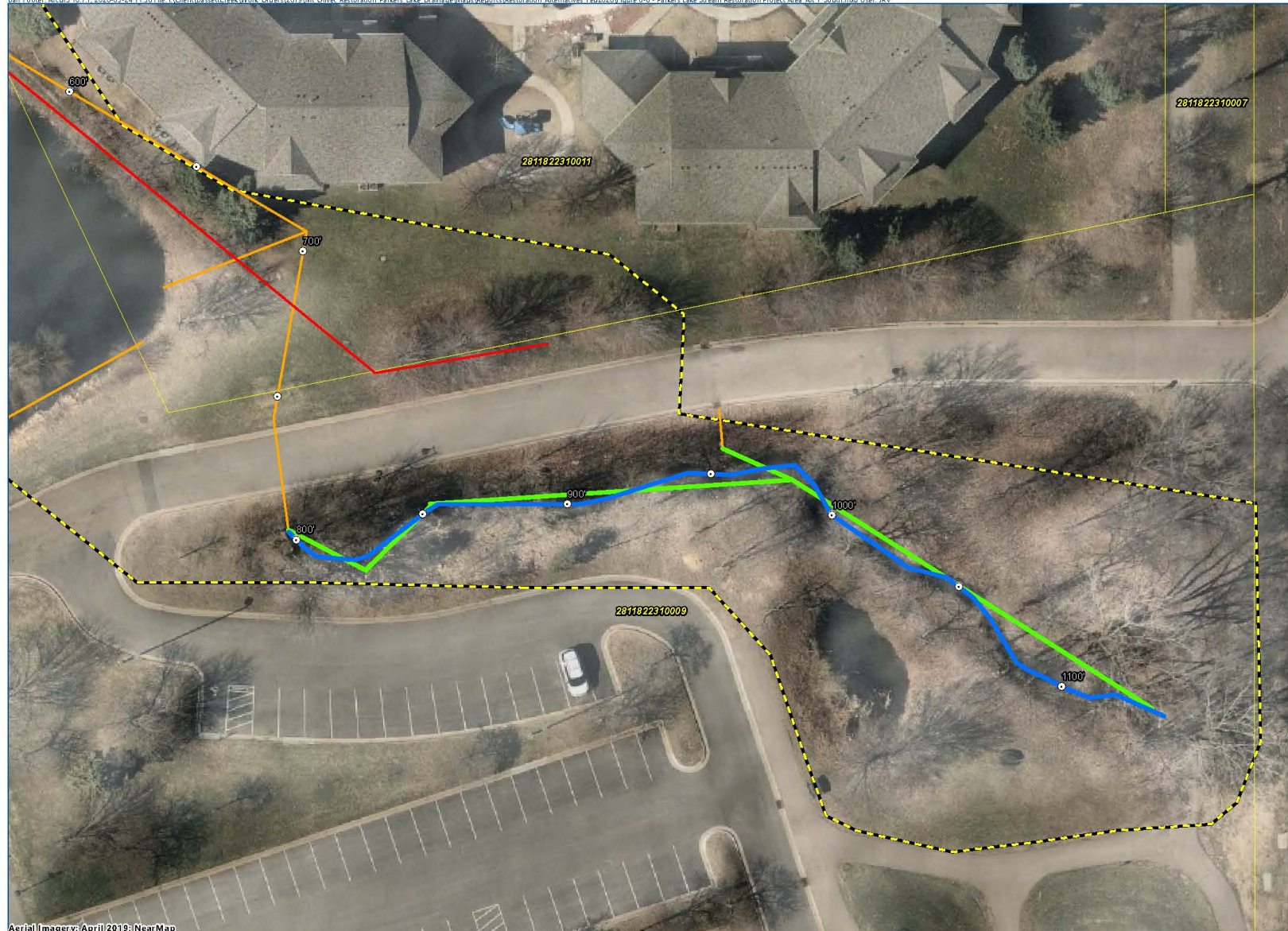


Parkers Lake Alternative 1 (North)



Parkers Lake Alternative 1 (South)

Barr Footer: ArcGIS 10.7.1, 2020-03-24 11:36 File: I:\Client\BassettCreek\Work Orders\2019\MT Olivet Restoration Parkers Lake Drainage\Map\Reports\Restoration Alternatives Feb2020\Figure 6-6 - Parkers Lake Stream Restoration Project Area Alt 1 South.mxd User: JRV



Aerial Imagery: April 2019; NearMap

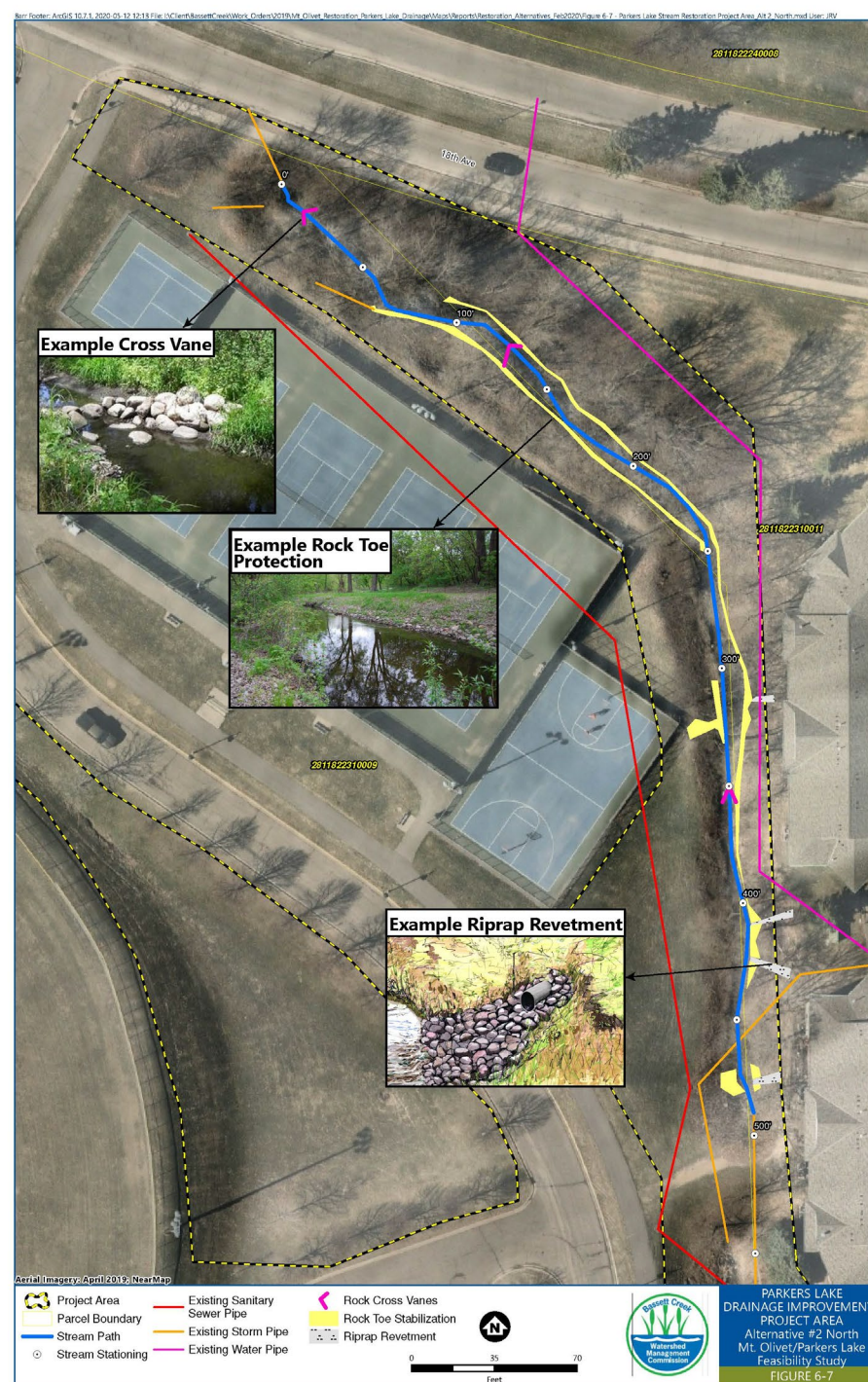
- Project Area
- Parcel Boundary
- Stream Path
- Stream Stationing
- Existing Sanitary Sewer Pipe
- Existing Storm Pipe
- Proposed Storm Pipe



PARKERS LAKE
DRAINAGE IMPROVEMENTS
PROJECT AREA
Alternative #1 South
Mt. Olivet/Parkers Lake
Feasibility Study

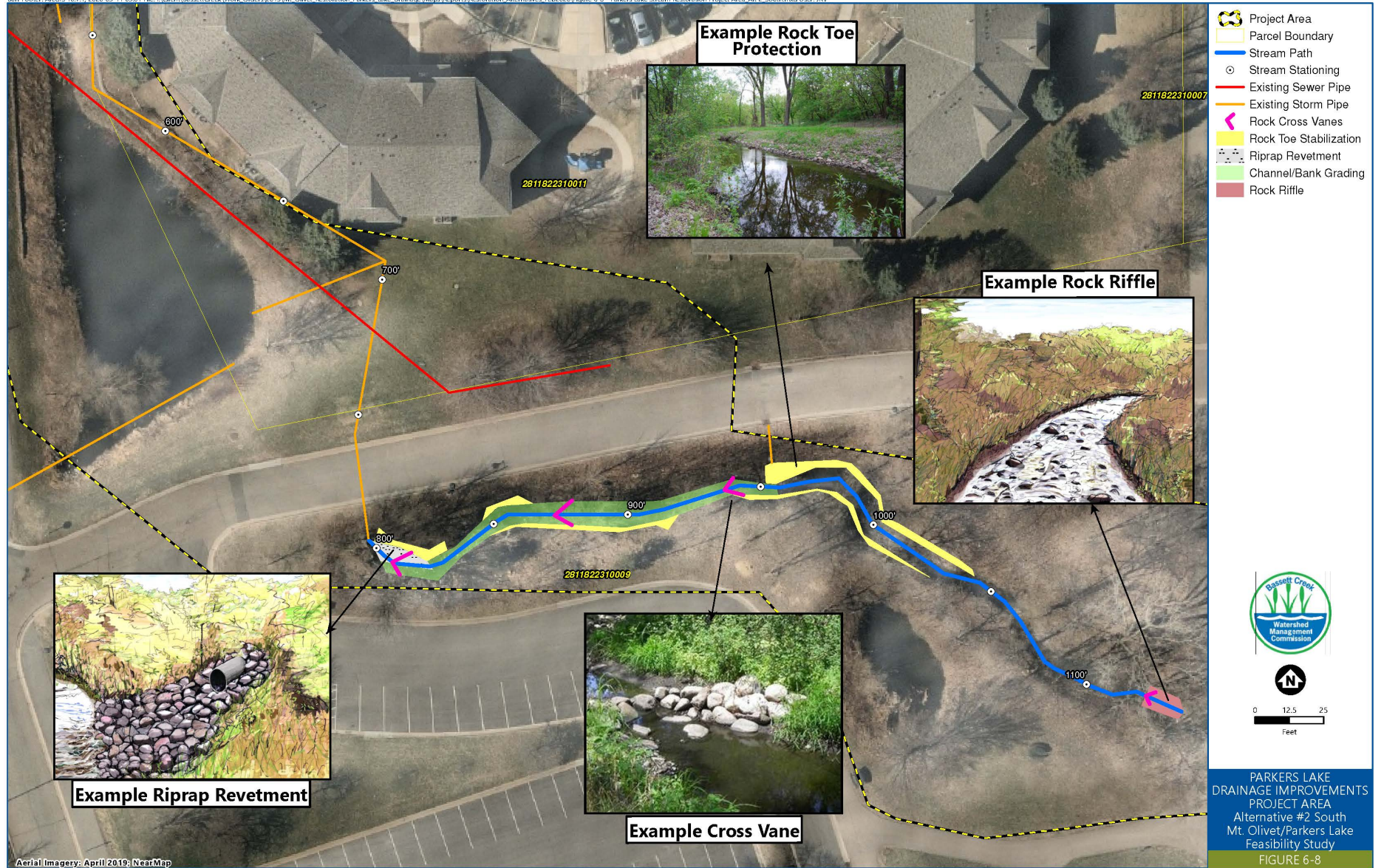
FIGURE 6-6

Parkers Lake Alternative 2 (North)



Parkers Lake Alternative 2 (South)

Barr Footer: ArcGIS 10.7.1, 2020-05-11 05:01 File: I:\Client\BassetCreek\Work_Orders\2019\Mt. Olivet_Restoration_Parkers_Lake_Drainage\Maps\Reports\Restoration_Alternatives_Feb2020\Figure 6-8 - Parkers Lake Stream Restoration Project Area_Alt 2_South.mxd User: JRV



Aerial Imagery: April 2019; NearMap