RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

December 2019 Board Packet

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Agenda

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RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

Regular Board Meeting Agenda

Wednesday, December 11, 2019
6:30 P.M.
District Office Board Room
2665 Noel Drive, Little Canada, MN

1. Call to Order – 6:30 PM
2. **Approval of Agenda**
3. **Consent Agenda**
    A. Approval of Minutes November 6, 2019
4. **Treasurer's Report and Bill List**
5. Visitor Comments (limited to 4 minutes each)
6. Permit Program
    A. Applications
        i. **19-49 RWMWD 2020 CIP**
        ii. **19-50 Window World Expansion, North St. Paul**
        iii. **19-51 Margaret Street Downtown Improvements, North St. Paul**
        iv. **19-52 Bailey Road Reconstruction, Woodbury**
    B. Enforcement Action Report
7. Stewardship Grant Program
    A. Applications
        i. **19-11 CS Reynen – Budget Adjustment Request**
    B. Budget Status Update
    C. **2019 Program Overview and 2020 Program Review and Approval**
8. Action Items
    A. **2020 CIP Maintenance and Repair Project Bid Review and Award**
    B. **Capital Improvement Budget Fund Transfer – Resolution 19-03**
    C. **2020 Budget and Levy Final Approval – Resolution 19-04**
9. Administrator's Report
    A. Meetings Attended
    B. Upcoming Meetings and Dates
    C. MAWD Annual Meeting Discussion

D. Special Meeting for Beltline Resiliency Study

E. January Meeting Change and Annual Meeting Reminder

10. Project and Program Status Reports

A. Twin Lake Flood Risk Mitigation Feasibility Study

B. Ongoing Project and Program Updates

i. Twin Lake Emergency Response Management 2019

ii. Beltline Resiliency Study

iii. Twin Lake Flood Risk Mitigation Feasibility Study

iv. FEMA Flood Mapping

v. West Vadnais Lakes Outlet Permitting

vi. 500-Year Atlas 14 Modeling

vii. Hillcrest Golf Course

viii. Wetland Restoration Site Search

ix. Maplewood Mall Monitoring

x. Wakefield Park/Frost Avenue Project

xi. Targeted Retrofit Projects

xii. Willow Pond CMAC

xiii. Aldrich Arena

xiv. Kohlman Lake Macrophyte Management

xv. CIP Maintenance and Repair 2020 Project

xvi. Natural Resources Program

xvii. Education Program

11. Informational Items

12. Report of Managers

13. Adjourn

Items in **bold signify that an action needs to be taken by the Board.*

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Consent Agenda

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Ramsey-Washington Metro Watershed District
Minutes of Regular Board Meeting
November 6, 2019

The Regular Meeting of November 6, 2019, was held at the District Office Board Room, 2665 Noel Drive, Little Canada, Minnesota, at 6:30 p.m.

PRESENT:
Marj Ebensteiner, President
Cliff Aichinger, Vice President
Dianne Ward, Treasurer
Lawrence Swope, Manager

ABSENT:
Dr. Pam Skinner, Secretary

ALSO PRESENT:
Tina Carstens, District Administrator
Amanda Staple, Recording Secretary
Erin Anderson Wenz, Barr Engineering
Eric Korte, Water Quality Monitoring Coordinator
Dave Vlasin, Water Quality Technician
Reese Sudtelgte, ISG/Elim Care
Sheila Otto, Crestview Addition
Mark McCabe, Ramsey Co. Parks and Recreation
Burt Johnson, 205 Twin Lake Trail
Joe and Chris Kammerer, 466 Suzanne Ave
Terry Telega, 253 Twin Lake Trail
Paige Ahlborg, Project Manager
Tracey Galowitz, Attorney for District
Nicole Soderholm, Permit Inspector
Bill Bartodziej, Natural Resource Specialist
Gus Blumer, Ramsey County Parks
Bruce Copley, Crestview Addition
Ken Otto, Crestview Addition
Steve LaBerge, Crestview Addition
Amit Chandra, 3331 Twin Lake Ct.
Stan Martin, 289 Twin Lake Trail

1. CALL TO ORDER
The meeting was called to order by President Ebensteiner at 6:30 p.m.

2. APPROVAL OF AGENDA
Motion: Cliff Aichinger moved, Lawrence Swope seconded, to approve the agenda as presented. Motion carried unanimously. (Dr. Pam Skinner absent)

3. CONSENT AGENDA
A. Approval of Minutes from October 2, 2019
B. 2020 BMP Program Service Agreement with Washington Conservation District
C. 2020 BMP Program Service Agreement with Ramsey County

Motion: Lawrence Swope moved, Cliff Aichinger seconded, to approve the consent agenda as presented. Motion carried unanimously. (Dr. Pam Skinner absent)

4. TREASURER'S REPORT AND BILL LIST
Motion: Lawrence Swope moved, Dianne Ward seconded, to approve the November 6, 2019, bill list as submitted. Motion carried unanimously. (Dr. Pam Skinner absent)

5. VISITOR PRESENTATIONS

Bruce Copley expressed concern with prioritization of the Beltline Study, noting that it is not clear how the criteria were selected and there has been no citizen input to date. He requested that the prioritization criteria be published and that the public is provided opportunity to comment. He noted that the residents that he represents would be impacted by certain actions within the study. He commented that the uniquely flat characterization of the area means that if flooding occurs it would take longer than normal to drain. He hoped that many of the projects could be completed concurrently. He suggested that the Owasso shunt and pumping of West Vadnais Lake occur to assist the residents in his area. He commented that a minimum pumping of West Vadnais Lake should occur this winter until a more permanent solution could be found. He asked that more water be brought out of his area.

Sheila Otto stated that the situation in her neighborhood is pretty grave, noting that the water is high in both Snail and Grass Lake and their yards are flooded. She stated that there is concern that additional homes will be flooded as well. She noted that winter does not provide any solace as the pumps freeze and water still rises. She commented that their homes are dependent on the Suzanne Pond pump, which was never meant to run continually. She commented that one neighbor was walking in his yard and his foot went into a sinkhole from water. She asked for more coordination with the City of Shoreview. She stated that when the City assumed responsibility for the pond, she would not imagine that the City would have believed the pumps would have to run continually. She stated that the residents in this area do not want this to be their normal as they are unable to use the trails or their backyards. She commented that one neighbor is removing water equal to one sixth of their swimming pool daily with his pumps. She stated that these residents have been waiting patiently for over four years. She noted that there are solutions and they are asking the District to implement them.

Burt Johnson stated that on behalf of the Twin Lake Association they urge the District to implement the West Vadnais bypass, reestablish the Twin Lake outlet on the southeast side, and that the District continue to communicate with the association/residents in the same manner it has. He asked for an update on the negotiations with the property owner to the southeast side of the lake, as that could impact whether an outlet could be reestablished. He echoed the desire for citizen input related to the Beltline Study.

Chris Kammerer stated that the previous week water was raising in her yard quite rapidly. She stated that she alerted public works and they have continued emergency pumping for the past six days. She noted that the water has still not receded to the previous level and she is concerned going into the winter under these conditions.

Amit Chandra stated that he represents the second lowest lot on Twin Lake and is concerned. He stated that there has been a lot of flooding and his home needed sandbagging. He commented that for all the hours spent they would like to see some advancement related to the water level. He understood that the District has responsibility to a greater area but believed that there has to be a solution to the problem.

6. PERMIT PROGRAM

A. Applications

Permit #19-46: Snail Lake Beach Improvements – Shoreview

Motion: Cliff Aichinger moved, Lawrence Swope seconded, to approve Permit #19-46.

Further discussion: Lawrence Swope referenced the 100-year highwater mark that is identified and asked where the previous 100-year highwater mark was. He asked what assurance there would be that the area would not flood again.

Gus Blumer commented that there is no assurance that the area would not flood. He commented that the 100-year highwater mark has not changed, they are simply building the beach up.

Dianne Ward asked what would be done if the water level decreases.

Gus Blumer replied that there would simply be a larger beach if the water levels decrease.

Motion carried unanimously. (Dr. Pam Skinner absent)

Permit #19-47: Valley Creek-Woodlane Redevelopment – Woodbury
Motion: Dianne Ward moved, Lawrence Swope seconded, to approve Permit #19-47. Motion carried unanimously. (Dr. Pam Skinner absent)

Permit #19-48: Elim Care Assisted Living – Maplewood
Motion: Dianne Ward moved, Lawrence Swope seconded, to approve Permit #19-48. Motion carried unanimously. (Dr. Pam Skinner absent)

B. Monthly Enforcement Report
During October, 15 notices were sent to address: install/maintain inlet protection (1), install/maintain perimeter control (3), install/maintain construction entrance (2), sweep streets (3), stabilize exposed soils (1), remove discharged sediment (1), maintain/protect permanent BMPs (1), install/maintain energy dissipation (1), and maintain temporary sediment basin (2).

7. STEWARDSHIP GRANT PROGRAM

A. Applications
None.

B. Budget Status Update
No comments.

8. ACTION ITEMS

A. 2020 CIP Maintenance and Repair Project Approval of Plans and Authorization to Advertise for Bid
Erin Anderson Wenz advised that there are a lot of city paid for pond dredging projects proposed for 2020 and provided a brief summary of the details of each project. She provided additional details on the estimated costs for the pond dredging, explaining that because the sediment test results had not been received as of the Board meeting, a range of total potential dredging costs were presented for the engineer's opinion of cost. Also, some of the projects within the 2020 CIP bid package may be bid as alternates since it's not clear that the cities will choose to pursue some elements of the overall project, depending on cost. She stated that the range for the engineer's opinion of cost is from $650,000 to $1,100,000 but the most likely estimated opinion of project cost of $512,800 (based on the total budget that the member cities had set aside for the work). She confirmed that a portion of that cost would be reimbursed from the member cities.

Motion: Cliff Aichinger moved, Dianne Ward seconded, to approve the preliminary design, estimated costs, and proposed project schedule, and direct staff to finalize the design and bidding documents and advertise the project for bid.

Further discussion: Lawrence Swope asked if this would simply prepare the design documents and advertise for bid but would not be ordering the work.

Erin confirmed that the bids received would be brought back before the Board for final approval and award. She stated that the bid would include the first list of projects and the ponds that would be likely to be completed with alternates for two additional ponds that may or may not be completed. She confirmed that the work for the ponds listed in the bid would be reimbursed by the cities.

Motion carried unanimously. (Dr. Pam Skinner absent)

9. PROJECT AND PROGRAM STATUS REPORTS

A. Presentation: Ongoing Program and Program Updates

i. Grass/Snail Lake Area Flood Risk

ii. Twin Lake Emergency Response Management 2019

Erin Anderson Wenz stated that since the last Board meeting West Vadnais elevation did increase, and the bypass project has been mobilized. She stated that on October 22nd the large structure was delivered to the site but given the wet conditions it was not ideal construction conditions and the decision was made to move the structure further north. She stated that the structure has not been installed as of yet because of the wet conditions. She reported that there is a temporary sump. She noted that although West Vadnais is high, the overflow has slowed and pumping is no longer needed at this time. She reported that staff is ready for the project.

Dave Vlasin reported that the city plans to let the Twin Lake pump run out of gas and then pull them out of the area.

Lawrence Swope asked what the current level of Twin Lake is.

Tina Carstens reported that today's elevation is 871.95.

Erin stated that they are also looking at different options to manage Twin Lake going forward, noting that those study results will be presented at the December Board meeting.

iii. Beltline Resiliency Study

Erin Anderson Wenz noted that a report will be provided to the Board at a workshop in the near future.

iv. FEMA Flood Mapping

Erin Anderson Wenz stated that this project has been ongoing for some time to update the 100-year flood mapping data used by FEMA.

v. West Vadnais Lakes Outlet Permitting

Erin Anderson Wenz stated that upon the completion of the EAW, the decision has been made that an EIS is not necessary and therefore they can move forward to address the necessary steps for permitting. She confirmed that she could provide an updated timeline for the permitting process at the next Board meeting.

Lawrence Swope commented that there are funds in the budget for a drawdown and asked if that has been discussed for this winter.

Erin noted that would not occur this year, advising that a feasibility study would need to be completed to determine if there would be a benefit provided.

Lawrence Swope commented that if the level of West Vadnais is not addressed, the problems with flooding in that area will not be solved.

Erin noted that they are attempting to move through the options systematically. She confirmed that those bigger discussions will occur at the workshop in December in attempt to find a larger scale long-term solution.

Cliff Aichinger noted that this is a problem related to climate change and that cannot necessarily be engineered out of. He explained that the groundwater level is high and there are some problems that the District will not be able to solve. He used the example of pumping Wetland A, which did not provide a solution.

Lawrence Swope disagreed that there was not a benefit in pumping Wetland A.

vi. 500-Year Atlas 14 Modeling

Erin Anderson Wenz stated that flood risk maps were created for the entire watershed to determine where there are structures at risk for the different storm events, ranging from 2-year to 500-year events.

Tina Carstens noted that these maps will be used to meet with the member cities, similar to what was done with the Atlas 14 maps and information. She explained that not all of the at-risk areas are the responsibility of the District. She stated that she will be starting the public works forum meetings that will meet at least monthly going forward.

Cliff Aichinger suggested that a paragraph on the District website related to flooding from last spring be updated.

Erin noted that once the freeze levels are known, they can begin modeling in attempt to determine spring levels and that information would be shared.

President Ebensteiner asked and received confirmation that this information would be shared with the cities and counties.

vii. Hillcrest Golf Course

Erin Anderson Wenz stated that the property was purchased by the St. Paul Port Authority, noting that the entire site would be redeveloped as mixed-use light industrial. She stated that the city is working with Port Authority to determine how that site could be developed in that manner and still meet the goals and desires of the city as well.

President Ebensteiner noted that there has been mention of potential soil contamination.

Tina Carstens confirmed that the work the District is doing on the project helps to provide additional information.

Erin stated that it is a very interesting site and staff has been working to determine existing stormwater flow leaving the site, as well as flow rate capacity of adjacent, downstream storm sewer systems as well as permitting requirements.

viii. Wetland Restoration Site Search

Erin Anderson Wenz identified the sites that were part of the initial scope, noting that was expanded to include other flooded wetland areas. She noted that a technical report will soon be reviewed with District staff and the Board will discuss that information in a future workshop.

ix. Auto Lake Monitoring Systems

Erin Anderson Wenz provided a photograph of an automated lake monitoring system. She noted that the locations of the stations are identified on the map.

Dave Vlasin provided an update on the installation process which will soon be complete.

x. Maplewood Mall Monitoring

Erin Anderson Wenz noted that some areas of the project have gardens that are now 10 years old. She advised that there has been some tree replacement on site and some of the gardens that were not functioning properly are being rebuilt. She commented that work should be completed in the next week or so.

xi. Spent-Lime Pond Research Project

Erin Anderson Wenz stated that this is a research project that received an extension for next year. She stated that a spent lime application in a small pond south of Wakefield Lake ("Wakefield Pond") and subsequent monitoring will be completed next year to determine the impact on internal loads.

xii. Iron Aggregate Pond Application Research

Erin Anderson Wenz advised that this is another research project (in partnership with SAFL) that will help to determine if iron would reduce internal loading in stormwater ponds. This application will be at a pond in Shoreview Commons (City Hall campus).

xiii. Wakefield Park/Frost Avenue Project

Erin Anderson Wenz stated that excavation has begun, noting that this is part of a larger project.

xiv. Targeted Retrofit Projects

Erin Anderson Wenz highlighted some of the retrofit project locations which will be online next year. She noted that District staff has been working with two Target properties and a Motel 6 in hopes to bring those forward.

xv. Willow Pond CMAC

Erin Anderson Wenz provided photographs, noting that a test run was completed.

Dianne Ward asked if part of the results will include the benefit compared to the cost.

Erin confirmed that a cost benefit analysis had been presented to the Board before the project was constructed (based on modeling) and could be calculated again after more monitoring data is collected at the site.

xvi. Cottage Place Wetland Restoration

Erin Anderson Wenz stated that the concept has been completed and this has been tabled until the larger wetland discussion with the Board is completed.

xvii. Aldrich Arena

Erin Anderson Wenz reported that this project is nearing completion.

Mark McCabe commented that the last lift of pavement will occur next spring. He advised that mulch was installed today.

Gus Blumer provided details on an area of contamination that was discovered and therefore a rain garden was not installed on that location.

President Ebensteiner commented that this was an area that was previously not attractive and will now not only function well but will also be aesthetically pleasing.

xviii. Kohlman Lake Macrophyte Management

Bill Bartodziej stated that the model has been completed and will be used to help monitor shallow lakes more effectively. He noted that once the data is completed and finalized it would be available to share with other agencies/organizations.

xix. CIP Maintenance and Repair 2019 Project

Erin Anderson Wenz provided an example of a project that was removed from the contractor's list because of the high-water conditions that prevented the work from being completed. She stated that the remainder of the work has been completed.

Tina Carstens noted that when conditions improve, the District can rebid the project.

xx. CIP Maintenance and Repair 2020 Project
xxi. 2019 Tanners Lake Alum Facility
xxii. New Technology Review: In-Situ Harmful Algal Bloom Monitoring
xxiii. Natural Resources Program
xxiv. Education Program

Lawrence Swope noted that the first page mentioned the higher than normal rainfall. He asked why Grass Lake overflowed in 2014, but not 2015 but then overflowed again in 2016.

Tina stated that it may have been event based.

Cliff Aichinger noted that there were some large rain events that occurred during certain years.

Lawrence Swope commented that he believes the events in 2014 caused the conditions that still exist today. He was curious as to why it happened again in 2016 but did not happen in 2015.

10. ADMINISTRATOR'S REPORT

A. Meetings Attended
No comments.

B. Upcoming Meetings and Dates
No comments.

C. MAWD Annual Meeting Information and Delegate Designation
Tina Carstens noted that President Ebensteiner and Lawrence Swope are planning to attend.

Motion: Dianne Ward moved, Cliff Aichinger seconded, to appoint President Ebensteiner and Lawrence Swope as delegates for the MAWD annual meeting. Motion carried unanimously. (Dr. Pam Skinner absent)

Cliff Aichinger noted that he may drive up for the day Friday.

Tina Carstens noted that this is the last meeting before the MAWD Annual Meeting and therefore this is the last opportunity to discuss any resolutions or Committee recommendations. She stated that the Committee did oppose the resolution submitted by the District because of a mention of a specific Twin Cities area. She suggested that the delegates amend the resolution on the floor to remove the urban language.

Cliff Aichinger noted that the urban information could still be shared and lobbied for at the legislature.

Lawrence Swope stated that he would be open to removing the urban language.

President Ebensteiner stated that it is her opinion that there is no point in attempting to debate on the floor at the conference. She stated that she would prefer the follow Cliff Aichinger's suggestion to bring the data to the legislature rather than bring this forward at MAWD.

Cliff Aichinger stated that he did not have any conflicts with the list of recommended/not recommended resolutions.

11. INFORMATIONAL ITEMS

Dianne Ward mentioned a study at Michigan State related to the benefit of linking natural areas. She commented that could be considered as a benefit of ranking the wetland restoration sites.

Lawrence Swope asked for an update on the Communications Manager.

Tina Carstens noted that she is reviewing resumes and continuing to search for the right candidate.

Lawrence Swope asked if there would be a wetland meeting and Beltline Resiliency Study in December.

Tina Carstens noted that she would take guidance from the Board. She confirmed consensus to hold the Beltline Resiliency Study workshop in December and the wetland workshop in January.

Cliff Aichinger referenced the new technology review related to algal bloom monitoring, noting that he found the item interesting although expensive.

Lawrence Swope asked for an update on the restoration project around Wetland A.

Bill Bartodziej stated that the project is driven by the County and is mainly focusing on buckthorn removal in the upland areas. He noted that is following the project schedule and will continue into 2020.

12. REPORTS OF MANAGERS

No comments.

13. ADJOURN TO A CLOSED EXECUTIVE SESSION RE: NOTICE OF CLAIM

Tracey Galowitz requested that the meeting move be closed to executive session specific to Minnesota Statute 13D.05 Subd.3 for attorney-client privilege discussion regarding a claim served by a homeowner to 10 public entities that threatens sufficient imminent damages and requires consultation with legal counsel.

Motion: Cliff Aichinger moved, Lawrence Swope seconded, to adjourn the meeting to closed executive session regarding notice of claim at 8:23 p.m. Motion carried unanimously. (Dr. Pam Skinner absent)

The meeting returned to open session at 9:05 p.m.

14. ADJOURN

Motion: Cliff Aichinger moved, Lawrence Swope seconded, to adjourn the meeting at 9:05 p.m. Motion carried unanimously. (Dr. Pam Skinner absent)

Respectfully submitted,

Dr. Pam Skinner, Secretary

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Bill List

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RWMWD BUDGET STATUS REPORT
Administrative & Program Budget
Fiscal Year 2019
11/30/2019

Budget Category	Budget Item	Account Number	Original Budget	Budget Transfers	Current Month Expenses	Year-to-Date Expenses	Current Budget Balance	Percent of Budget
Manager	Per diems	4355	$6,500.00	-	842.50	5,422.50	$1,077.50	83.42%
	Manager expenses	4360	3,500.00	-	33.06	904.46	2,595.54	25.84%
Committees	Committee/Bd Mtg. Exp.	4365	3,500.00	-	215.00	3,294.54	205.46	94.13%
Employees	Staff salary/taxes/benefits	4010	1,385,000.00	-	140,806.20	1,226,018.76	158,981.24	88.52%
	Employee expenses	4020	10,000.00	-	438.09	6,964.01	3,035.99	69.64%
	District training & education	4350	25,000.00	-	2,510.56	19,613.36	5,386.64	78.45%
Administration/	GIS system maint. & equip.	4170	15,000.00	-	-	2,028.52	12,971.48	13.52%
Office	Data Base/GIS Maintenance	4171	5,000.00	-	-	2,210.00	2,790.00	44.20%
	Equipment maintenance	4305	3,000.00	-	-	-	3,000.00	0.00%
	Telephone	4310	8,000.00	-	361.48	6,080.54	1,919.46	76.01%
	Office supplies	4320	5,000.00	-	328.30	4,554.25	445.75	91.09%
	IT/Internet/Web Site/Software Lic.	4325	45,000.00	-	4,109.41	38,032.05	6,967.95	84.52%
	Postage	4330	10,000.00	-	142.47	739.86	9,260.14	7.40%
	Printing/copying	4335	8,000.00	-	294.00	5,067.29	2,932.71	63.34%
	Dues & publications	4338	11,000.00	-	-	9,953.00	1,047.00	90.48%
	Janitorial/Trash Service	4341	17,000.00	-	-	5,652.18	11,347.82	33.25%
	Utilities/Bldg.Contracts	4342	20,000.00	-	2,243.10	18,729.57	1,270.43	93.65%
	Bldg/Site Maintenance	4343	300,000.00	-	9,277.72	82,228.55	217,771.45	27.41%
	Miscellaneous	4390	5,000.00	-	-	500.00	4,500.00	10.00%
	Insurance	4480	35,000.00	-	-	36,479.00	(1,479.00)	104.23%
	Office equipment	4703	40,000.00	-	-	29,222.15	10,777.85	73.06%
	Vehicle lease, maintenance	4810-40	43,000.00	-	348.83	7,374.83	35,625.17	17.15%
Consultants/	Auditor/Accounting	4110	55,000.00	-	2,540.12	48,234.35	6,765.65	87.70%
Outside Services	Engineering-administration	4121	93,000.00	-	7,236.00	65,721.80	27,278.20	70.67%
	Engineering-permit I&E	4122	10,000.00	-	-	3,024.44	6,975.56	30.24%
	Engineering-eng. review	4123	55,000.00	-	2,400.00	41,087.66	13,912.34	74.70%
	Engineering-permit review	4124	55,000.00	-	1,812.50	32,620.00	22,380.00	59.31%
	Project Feasibility Studies	4129	790,000.00	-	58,194.27	385,927.52	404,072.48	48.85%
	Attorney-permits	4130	10,000.00	-	-	-	10,000.00	0.00%
	Attorney-general	4131	40,000.00	-	3,022.50	28,025.00	11,975.00	70.06%
	Outside Consulting Services	4160	40,000.00	-	-	-	40,000.00	0.00%
Programs	Educational programming	4370	60,000.00	-	296.55	15,240.04	44,759.96	25.40%
	Communications & Marketing	4371	25,000.00		63.20	6,000.98	18,999.02	24.00%
	Events	4372	50,000.00	-	4,469.03	39,444.98	10,555.02	78.89%
	Water QM-Engineering	4520-30	300,000.00	-	31,422.86	254,790.33	45,209.67	84.93%
	Project operations	4650	160,000.00	-	296.30	26,914.17	133,085.83	16.82%
	SLMP/TMDL Studies	4661	68,000.00	-	93.00	4,115.00	63,885.00	6.05%
	Natural Resources/Keller Creek	4670-72	115,000.00	-	2,232.30	129,816.30	(14,816.30)	112.88%
	Outside Prog.Support/Weed Mgmt.	4683-84	67,000.00	-	994.87	46,729.28	20,270.72	69.75%
	Research Projects	4695	115,000.00	-	3,507.50	53,333.09	61,666.91	46.38%
	Health and Safety Program	4697	3,000.00	-	-	1,043.48	1,956.52	34.78%
	NPDES Phase II	4698	10,000.00	-	-	-	10,000.00	0.00%
GENERAL FUND TOTAL			**$4,124,500.00**	**$0.00**	**$280,531.72**	**$2,693,137.84**	**$1,431,362.16**	65.30%
CIP's	CIP Project Repair & Maintenance	516	1,120,000.00	-	105,104.42	949,835.28	170,164.72	84.81%
	Targeted Retrofit Projects	518	978,760.00	-	55,405.26	292,654.73	686,105.27	29.90%
	District Office Building Solar Energy Retrofit	519	-	-	-	-	-	---
	Flood Damage Reduction Fund	520	2,500,000.00	-	58,145.78	314,266.24	2,185,733.76	12.57%
	Debt Services-96-97 Beltline/MM/Battle Creek	526	399,113.00	-	-	396,907.30	2,205.70	99.45%
	Stewardship Grant Program Fund	528-529	1,250,000.00	-	188,125.87	774,500.04	475,499.96	61.96%
	Impervious Surface Volume Reduction Opportunity	531	1,500,000.00	-	-	-	1,500,000.00	0.00%
	Beltline & Battle Creek Tunnel Repair	549	-	-	-	-	-	---
	Frost/Kennard Enhanced WQ BMP	550	-	-	-	-	-	---
	Markham Pond Dredging & Aeration	551	65,000.00	-	-	5,842.48	59,157.52	8.99%
	Wakefield Park Project	553	1,100,000.00	-	2,688.16	69,883.12	1,030,116.88	6.35%
	Willow Pond CMAC	554	300,000.00		12.95	14,370.74	285,629.26	4.79%
	District Office Bond Payment	585	194,885.00	-	-	193,453.76	1,431.24	99.27%
CIP BUDGET TOTAL			**$9,407,758.00**	**-**	**$409,482.44**	**$3,011,713.69**	**$6,396,044.31**	32.01%
TOTAL BUDGET			**$13,532,258.00**	**$0.00**	**$690,014.16**	**$5,704,851.53**	**$7,827,406.47**	**42.16%**

Current Fund Balances:

Fund:	Beginning Fund Balance @ 12/31/18	Fund Transfers	Year to date Revenue	Current Month Expenses	Year to Date Expense	Fund Balance @ 11/30/19
101 - General Fund	$4,464,553.28	-	1,873,769.13	280,531.72	2,693,137.84	3,645,184.57
516 - CIP Project Repair & Maintenance	951,963.00	-	760,404.96	105,104.42	949,835.28	762,532.68
518 - Targeted Retrofit Projects	994,725.00	-	105,227.91	55,405.26	292,654.73	807,298.18
519 - District Office Building Solar Energy Retrofit	32,805.00	-	-	0.00	0.00	32,805.00
520 - Flood Damage Reduction Fund	1,823,918.00	-	497,317.39	58,145.78	314,266.24	2,006,969.15
526 - Debt Services-96-97 Beltline/MM/Beltline-Battle Creek Tunnel Repair	381,949.00	-	311,016.62	0.00	396,907.30	296,058.32
528/529 - Stewardship Grant Program Fund	389,152.00	-	657,674.45	188,125.87	774,500.04	272,326.41
531 - Impervious Surface Volume Reduction Opportunity	1,484,215.00	-	-	0.00	0.00	1,484,215.00
549 - Beltline & Battle Creek Tunnel Repair	863,674.00	-	-	0.00	0.00	863,674.00
550 - Frost/Kennard Enhanced WQ BMP	70,017.00	-	-	0.00	0.00	70,017.00
551 - Markham Pond Dredging & Aeration	110,379.00	-	-	0.00	5,842.48	104,536.52
553 - Wakefield Park Project	1,049,286.00	-	-	2,688.16	69,883.12	979,402.88
554 - Willow Pond CMAC	(44,588.00)	-	-	12.95	14,370.74	(58,958.74)
580 - Contingency Fund	598,985.00	-	-	0.00	0.00	598,985.00
585 - Certificates of Participation	131,513.00	-	102,536.71	0.00	193,453.76	40,595.95
Total District Fund Balance	**$13,302,546.28**	**-**	**$ 4,307,947.17**	**$ 690,014.16**	**$5,704,851.53**	**$11,905,641.92**

Ramsey Washington Metro Watershed Dist.
Check Register
For the Period From Nov 1, 2019 to Nov 30, 2019

Check #	Date	Payee ID	Invoice #	Payee	Cash Account	Amount
EFT	11/01/19	met003	Nov 2019	MetLife-Group Benefits	Employee Benefits	$1,615.20
EFT	11/12/19	hea002	Dec 2019	HealthPartners	Employee Benefits	11,178.82
71140	11/04/19	app001	Oct 2019	Applied Ecology Services, Inc.	Stewardship Grant Fund	1,248.39
71141	11/04/19	sod001	Oct 2019	Nicole Soderholm	Employee Reimbursement	79.40
71142	11/04/19	som001	Oct 2019	Eric Sommers	Events	950.00
71143	11/14/19	aws001	S1335957-110119	AWS Service Center	Utilities/Bldg. Contracts	208.90
71144	11/14/19	hom001	10/28/19	Home Depot Credit Services	Water QM Staff	5.95
71145	11/14/19	min008	22123/22124	Minnesota Native Landscapes, Inc.	Const-Maint. & Rep./Stewardship	39,620.00
71146	11/14/19	msp001	16-22	MSP Commercial	Dev.Escrow-General	32,080.00
71147	11/14/19	ncp001	10/13/19	NCPERS Group Life Ins.	Employee Benefits	16.00
71148	11/14/19	pre003	317179185	Premium Waters, Inc.	Utilities/Bldg. Contracts	24.00
71149	11/14/19	sch009	24330	Schlomka Services, LLC	Project Operations	3,780.00
71150	11/14/19	tow001	19-01 CS	Townhomes of Pathways HOA	Stewardship Grant Fund	56,267.50
71151	11/14/19	twi003	0818008 Revised	Twin Cities Metro Painting, Inc.	Bldg./Site Maintenance	8,362.50
71152	11/14/19	usb005	398810663	US Bank Equipment Finance	Printing Expense	294.00
71153	12/02/19	ada002	2849692	Adam's Pest Control, Inc.	Utilities/Bldg. Contracts	79.00
71154	12/02/19	ahl001	Nov 2019	Paige Ahlborg	Employee Reimbursement	177.46
71155	12/02/19	aic001	11/18/19	Clifton Aichinger	Manager Expense	33.06
71156	12/02/19	app003	19-01 MTN	Applewood Pointe of Shoreview Sr.Co-Op	Stewardship Grant Fund	970.00
71157	12/02/19	arl002	19-02 MTN	Janet Arleth	Stewardship Grant Fund	323.64
71158	12/02/19	att002	X11252019	AT & T Mobility - ROC	Water QM Staff	80.45
71159	12/02/19	bar001	10/19-11/15/19	Barr Engineering	10/19-11/15/19 Engineering Expense	212,904.84
71160	12/02/19	can001	18-02 MTN	Canabury Pond Condominium Assoc.	Stewardship Grant Fund	1,000.00
71161	12/02/19	chi002	19-05 MTN	Linda Chimzar	Stewardship Grant Fund	15.22
71162	12/02/19	chi003	19-06 MTN	Christ United Methodist Church	Stewardship Grant Fund	447.50
71163	12/02/19	cit011	227132	City of Roseville	IT/Website/Telephone/Escrow	18,085.12
71164	12/02/19	cit023	18-06 CS	City of St. Paul	Stewardship Grant Fund	17,336.25
71165	12/02/19	com004	Nov 2019	Comcast	Utilities/Bldg. Contracts	61.93
71166	12/02/19	cut001	Payment #1	Cutting Edge Property Maintenance	Project Operations	51,258.10
71167	12/02/19	dev001	19-10 MTN	Mark Devine	Stewardship Grant Fund	100.00
71168	12/02/19	eas001	0505	East Side Area Business Association	Stewardship Grant Fund	200.00
71169	12/02/19	eve001	19-11 MTN	Evergreen Country Homes	Stewardship Grant Fund	350.00
71170	12/02/19	fis002	19-20 MTN	Fish & Waters Conservation Fund	Stewardship Grant Fund	2,271.38
71171	12/02/19	fit002	Nov 2019	Mary Fitzgerald	Employee Reimbursement	69.58
71172	12/02/19	fol003	Nov 2019	Bonnie Foley	Events	100.00
71173	12/02/19	gal001	Nov 2019	Galowitz Olson, PLLC	November Legal Fees	3,997.00
71174	12/02/19	ger003	2/6-10/31/19	Carole Gernes	Employee Reimbursement	108.37
71175	12/02/19	gil001	186604	Gilbert Mechanical Contractors, Inc.	Bldg./Site Maintenance	509.03
71176	12/02/19	gra003	19-03 MTN	Grace Church Roseville	Stewardship Grant Fund	775.00
71177	12/02/19	ham004	19-08 MTN	Hampden Woods HOA	Stewardship Grant Fund	482.07
71178	12/02/19	hof002	19-23 CS	John Hoffman	Stewardship Grant Fund	8,443.88
71179	12/02/19	hom001	Dec 2019	Home Depot Credit Services	Natural Resources/Water QM	137.73
71180	12/02/19	hor001	19-28 CS	Gerald Horgan	Stewardship Grant Fund	3,450.00
71181	12/02/19	inn003	5201	Innovational Water Solutions	Utilities/Bldg. Contracts	206.75
71182	12/02/19	int001	W19100516	Office of MN, IT Services	Telephone Expense	57.48
71183	12/02/19	joh006	18-09 mTN	Skip Johnson	Stewardship Grant Fund	496.61
71184	12/02/19	kor001	4/11/19	Eric Korte	Employee Reimbursement	210.48
71185	12/02/19	kos001	19-09 MTN	Helen & Kent Kosobayashi	Stewardship Grant Fund	332.63
71186	12/02/19	kub001	Nov 2019	Kyle W. Kubitza	Employee Reimbursement	11.60
71187	12/02/19	lan003	KEL01336	Lancer Catering	Events	3,353.09
71188	12/02/19	mcg004	18-21 CS	Kara McGuire	Stewardship Grant Fund	900.00
71189	12/02/19	mcs001	19-04 MTN	Linda McShannock	Stewardship Grant Fund	490.00
71190	12/02/19	mel001	Oct/Nov 2019	Michelle L. Melser	Employee Reimbursement	251.33
71191	12/02/19	min008	22357	Minnesota Native Landscapes, Inc.	Construction-Maint. & Repair	1,029.00
71192	12/02/19	ncp001	Nov 2019	NCPERS Group Life Ins.	Employee Benefits	16.00
71193	12/02/19	nor013	37749	Northern Dewatering, Inc.	Construction-Flood Damage	36,089.00
71194	12/02/19	nor019	19-01 CS	North Park Condominium Assoc., Inc.	Stewardship Grant Fund	10,743.69
71195	12/02/19	nsp001	662457954	Xcel Energy	Proj.Operations/Utilities/Willow Pond	1,354.27
71196	12/02/19	out001	19-140	Outdoor Lab Landscape Design, Inc.	Construction-Maint. & Repair	9,791.72
71197	12/02/19	pac001	1912011401	Pace Analytical Services, Inc.	Water QM Staff	2,361.00

Ramsey Washington Metro Watershed Dist.
Check Register
For the Period From Nov 1, 2019 to Nov 30, 2019

Check #	Date	Payee ID	Invoice #	Payee	Cash Account	Amount
71198	12/02/19	par004	18-08 MTN	Park View Terrace HOA	Stewardship Grant Fund	1,000.00
71199	12/02/19	pas002	Nov 2019	Sage Passi	Employee Reimbursement	199.98
71200	12/02/19	pet001	Payment #6	Peterson Companies, Inc.	Progress Pay #6	15,099.12
71201	12/02/19	pit001	3103562991	Pitney Bowes Global Financial Serv LLC	Postage Expense	142.47
71202	12/02/19	pra001	1932501500	Prairie Moon Nursery, Inc.	Natural Resources Project	2,014.77
71203	12/02/19	qwe001	Nov 2019	CenturyLink	Water QM Staff	230.87
71204	12/02/19	ram002	PRK-001679	Ramsey County	Stewardship Grant Fund	4,000.00
71205	12/02/19	red002	150449707	Redpath & Company, Ltd	October Monthly Accounting	2,540.12
71206	12/02/19	rey001	19-11 CS	Thomas Reynen	Stewardship Grant Fund	9,397.20
71207	12/02/19	sex001	19-27 CS	Heather Sexton	Stewardship Grant Fund	5,000.00
71208	12/02/19	she003	18-03 MTN	Shepherd of the Hills Lutheran Church	Stewardship Grant Fund	262.50
71209	12/02/19	sod001	Nov 2019	Nicole Soderholm	Employee Reimbursement	57.60
71210	12/02/19	tim002	M25235	Timesaver Off-Site Secretarial, Inc.	Committee/Board Meeting Expense	215.00
71211	12/02/19	tow001	19-01 CS	Townhomes of Pathways HOA	Stewardship Grant Fund	10,743.69
71212	12/02/19	tro002	19-08	Cathy Troendle	Educational Program	296.55
71213	12/02/19	usb002	Nov 2019	U.S. Bank	October/November Credit Card	3,741.38
71214	12/02/19	van001	69694	Vanguard Cleaning Systems of Minnesota	Utilities/Bldg. Contracts	550.00
71215	12/02/19	ves001	18-05 MTN	Peter Vesterholt	Stewardship Grant Fund	275.00
71216	12/02/19	voy001	869293423948	US Bank Voyager Fleet Sys.	Vehicle Fuel-General	348.83
71217	12/02/19	wal005	18-04 MTN	Heidi Walz	Stewardship Grant Fund	945.00
71218	12/02/19	was002	19-14 CS	Washington Conservation District	Stewardship Grant Fund	1,451.50
71219	12/02/19	woo001	18-06 MTN	Woodland Hills Church	Stewardship Grant Fund	1,000.00
71220	12/02/19	zib001	15-22	Donald Zibell	Dev.Escrow-General	11,985.00
Total						**$618,688.50**
EFT	10/04/19	myp001	10/04/19	October 4th Payroll Fee	4110-101-000	71.00
EFT	10/18/19	myp001	10/18/19	October 18th Payroll Fee	4110-101-000	72.95
Dir.Dep.	11/01/19	---	Payroll Expense-Net	November 1st Payroll	4010-101-000	23,886.71
EFT	11/01/19	int002	Internal Rev.Serv.	November 1st Federal Withholding	2001-101-000	9,249.95
EFT	11/01/19	mnd001	MN Revenue	November 1st State Withholding	2003-101-000	1,470.97
EFT	11/01/19	per001	PERA	November 1st PERA	2011-101-000	4,979.96
EFT	11/01/19	emp002	Empower Retirement	Employee Def.Comp. Contributions	2016-101-000	2,425.00
EFT	11/01/19	emp002	Empower Retirement	Employee IRA Contributions	2018-101-000	375.00
Dir.Dep.	11/15/19	---	Payroll Expense-Net	November 15th Payroll	4010-101-000	24,055.09
EFT	11/15/19	int002	Internal Rev.Serv.	November 15th Federal Withholding	2001-101-000	8,340.68
EFT	11/15/19	mnd001	MN Revenue	November 15th State Withholding	2003-101-000	1,486.77
EFT	11/15/19	per001	PERA	November 15th PERA	2011-101-000	5,090.51
EFT	11/15/19	emp002	Empower Retirement	Employee Def.Comp. Contributions	2016-101-000	2,425.00
EFT	11/15/19	emp002	Empower Retirement	Employee IRA Contributions	2018-101-000	375.00
Dir.Dep.	11/29/19	---	Payroll Expense-Net	November 29th Payroll	4010-101-000	24,546.08
EFT	11/29/19	int002	Internal Rev.Serv.	November 29th Federal Withholding	2001-101-000	8,416.85
EFT	11/29/19	mnd001	MN Revenue	November 29th State Withholding	2003-101-000	1,492.06
EFT	11/29/19	per001	PERA	November 29th PERA	2011-101-000	5,056.50
EFT	11/29/19	emp002	Empower Retirement	Employee Def.Comp. Contributions	2016-101-000	2,525.00
EFT	11/29/19	emp002	Empower Retirement	Employee IRA Contributions	2018-101-000	375.00
					Payroll/Benefits	**$126,716.08**
Total					**Accounts Payable/Payroll/Benefits:**	**$745,404.58**

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From Nov 1, 2019 - Nov 30, 2019

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
11/01/19	EFT	met003	MetLife-Group Benefits			$1,615.20	
				4040-101-000	Employee Benefits-General		1,398.12
				2015-101-000	Employee Health-General		217.08
11/12/19	EFT	hea002	HealthPartners			11,178.82	
				4040-101-000	Employee Benefits-General		9,539.81
				2015-101-000	Employee Health-General		1,639.01
11/04/19	71140	app001	Applied Ecological Services, Inc	4682-529-000	Stewardship Grant Fund	1,248.39	
11/04/19	71141	sod001	Nicole Soderholm			79.40	
				4040-101-000	Employee Benefits-General		52.90
				4020-101-000	Employee Expenses-General		26.50
11/04/19	71142	som001	Eric Sommers	4372-101-000	Events	950.00	
11/14/19	71143	aws001	AWS Service Center	4342-101-000	Utilities/Bldg. Contracts	208.90	
11/14/19	71144	hom001	Home Depot Credit Services	4530-101-000	Water QM Staff-General	5.95	
11/14/19	71145	min008	Minnesota Native Landscapes, Inc.			39,620.00	
				4630-516-000	Construction Imp.-Maint. & Repair		490.00
				4682-529-000	Stewardship Grant Fund		39,130.00
11/14/19	71146	msp001	MSP Commercial	2024-101-000	Dev. Escrow-General Fund	32,080.00	
11/14/19	71147	ncp001	NCPERS Group Life Ins.	2015-101-000	Employee Health-General	16.00	
11/14/19	71148	pre003	Premium Waters, Inc.	4342-101-000	Utilities/Bldg. Contracts	24.00	
11/14/19	71149	sch009	Schlomka Services, LLC	4650-516-000	Project Operations-Maint. & Repair	3,780.00	
11/14/19	71150	tow001	Townhomes of Pathways HOA	4682-529-000	Stewardship Grant Fund	56,267.50	
11/14/19	71151	twi003	Twin Cities Metro Painting, Inc.	4343-101-000	Bldg./Site Maintenance	8,362.50	
11/14/19	71152	usb005	US Bank Equipment Finance	4335-101-000	Printing-General	294.00	
12/02/19	71153	ada002	Adam's Pest Control, Inc.	4342-101-000	Utilities/Bldg. Contracts	79.00	
12/02/19	71154	ahl001	Paige Ahlborg			177.46	
				4040-101-000	Employee Benefits-General		40.00
				4020-101-000	Employee Expenses-General		137.46
12/02/19	71155	aic001	Clifton Aichinger	4360-101-000	Manager Expenses-General	33.06	
12/02/19	71156	app003	Applewood Pointe of Shoreview Sr. Co-Op	4682-529-000	Stewardship Grant Fund	970.00	
12/02/19	71157	arl002	Janet Arleth	4682-529-000	Stewardship Grant Fund	323.64	
12/02/19	71158	att002	AT & T Mobility -ROC	4530-101-000	Water QM Staff-General	80.45	
12/02/19	71159	bar001	Barr Engineering			212,904.84	
				4121-101-000	Engineering Admin-General Fund		7,236.00
				4129-101-000	Project Feasability-General		459.00
				4123-101-000	Engineering-Review-General		2,400.00
				4129-101-000	Project Feasability-General		24,821.50
				4129-101-000	Project Feasability-General		221.50

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From Nov 1, 2019 - Nov 30, 2019

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
				4129-101-000	Project Feasability-General		4,067.50
				4129-101-000	Project Feasability-General		516.00
				4129-101-000	Project Feasability-General		3,563.50
				4129-101-000	Project Feasability-General		3,643.50
				4129-101-000	Project Feasability-General		517.50
				4129-101-000	Project Feasability-General		19,450.00
				4129-101-000	Project Feasability-General		934.27
				4520-101-000	Water QM-Engineering		10,906.65
				4520-101-000	Water QM-Engineering		1,415.16
				4520-101-000	Water QM-Engineering		1,062.50
				4520-101-000	Water QM-Engineering		11,092.08
				4520-101-000	Water QM-Engineering		1,562.50
				4520-101-000	Water QM-Engineering		2,545.78
				4124-101-000	Engineering-Flood Damage		1,812.50
				4661-101-000	SLMP/TMDL Studies		93.00
				4128-520-000	Engineering-Flood Damage		5,963.16
				4695-101-000	Research Projects-General		690.50
				4695-101-000	Research Projects-General		880.00
				4695-101-000	Research Projects-General		17.00
				4650-101-000	Project Operations-General		67.50
				4128-553-000	Engineering-Wakefield		2,688.16
				4128-518-000	Engineering-School/Commer Retrofit		22,400.56
				4128-518-000	Engineering-School/Commer Retrofit		29,158.70
				4128-518-000	Engineering-School/Commer Retrofit		338.00
				4128-518-000	Engineering-School/Commer Retrofit		1,043.00
				4682-529-000	Stewardship Grant Fund		2,298.00
				4128-518-000	Engineering-School/Commer Retrofit		2,465.00
				4682-529-000	Stewardship Grant Fund		5,979.22
				4695-101-000	Engineering-Research Projects		1,920.00
				4128-516-000	Engineering-Maint. & Repair		32,688.60
				4128-516-000	Engineering-Maint. & Repair		1,461.00
				4128-516-000	Engineering-Maint. & Repair		4,526.00
12/02/19	71160	can001	Canabury Pond Condominium Assoc.	4682-529-000	Stewardship Grant Fund	1,000.00	
12/02/19	71161	chi002	Linda Schimzar	4682-529-000	Stewardship Grant Fund	15.22	
12/02/19	71162	chi003	Christ United Methodist Church	4682-529-000	Stewardship Grant Fund	447.50	
12/02/19	71163	cit011	City of Roseville			18,085.12	
				4310-101-000	Telephone-General		304.00
				4325-101-000	IT/Website/Software		4,016.00
				2024-101-000	Dev. Escrow-General Fund		13,765.12
12/02/19	71164	cit023	City of St. Paul	4682-529-000	Stewardship Grant Fund	17,336.25	
12/02/19	71165	com004	Comcast	4342-101-000	Utilities/Bldg. Contracts	61.93	
12/02/19	71166	cut001	Cutting Edge Property Maintenance	4650-516-000	Project Operations-Maint. & Repair	51,258.10	
12/02/19	71167	dev001	Mark Devine	4682-529-000	Stewardship Grant Fund	100.00	
12/02/19	71168	eas001	East Side Area Business Association	4682-529-000	Stewardship Grant Fund	200.00	
12/02/19	71169	eve001	Evergreen County Homes	4682-529-000	Stewardship Grant Fund	350.00	
12/02/19	71170	fis002	Fish & Waters Conservation Fund	4682-529-000	Stewardship Grant Fund	2,271.38	

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From Nov 1, 2019 - Nov 30, 2019

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
12/02/19	71171	fit002	Mary Fitzgerald			69.58	
				4040-101-000	Employee Benefits-General		40.00
				4020-101-000	Employee Expenses-General		29.58
12/02/19	71172	fol003	Bonnie Foley	4372-101-000	Events	100.00	
12/02/19	71173	gal001	Galowitz Olson, PLLC			3,997.00	
				4131-520-000	Attorney-Flood Damage		894.50
				4131-516-000	Attorney-Maint. & Repair		80.00
				4131-101-000	Attorney General-General		3,022.50
12/02/19	71174	ger003	Carole Gernes	4684-101-000	Weed Management Program	108.37	
12/02/19	71175	gil001	Gilbert Mechanical Contractors, Inc.	4343-101-000	Bldg./Site Maintenance	509.03	
12/02/19	71176	gra003	Grace Church Roseville	4682-529-000	Stewardship Grant Fund	775.00	
12/02/19	71177	ham004	Hampden Woods HOA	4682-529-000	Stewardship Grant Fund	482.07	
12/02/19	71178	hof002	John Hoffman	4682-529-000	Stewardship Grant Fund	8,443.88	
12/02/19	71179	hom001	Home Depot Credit Services			137.73	
				4670-101-000	Natural Resources Project-General		79.45
				4530-101-000	Water QM Staff-General		58.28
12/02/19	71180	hor001	Gerald Horgan	4682-529-000	Stewardship Grant Fund	3,450.00	
12/02/16	71181	inn003	Innovational Water Solutions	4342-101-000	Utilities/Bldg. Contracts	206.75	
12/02/19	71182	int001	Office of MN, IT Services	4310-101-000	Telephone-General	57.48	
12/02/19	71183	joh006	Skip Johnson	4682-529-000	Stewardship Grant Fund	496.61	
12/02/19	71184	kor001	Eric Korte			210.48	
				4040-101-000	Employee Benefits-General		120.00
				4020-101-000	Employee Expenses-General		90.48
12/02/19	71185	kos001	Helen & Kent Kosobayashi	4682-529-000	Stewardship Grant Fund	332.63	
12/02/19	71186	kib001	Kyle W. Kubitza	4020-101-000	Employee Expenses-General	11.60	
12/02/19	71187	lan003	Lancer Catering	4372-101-000	Events	3,353.09	
12/02/19	71188	mcg004	Kara McGuire	4682-529-000	Stewardship Grant Fund	900.00	
12/02/19	71189	mcs001	Linda McShannock	4682-529-000	Stewardship Grant Fund	490.00	
12/02/19	71190	mel001	Michelle L. Melser			251.33	
				4040-101-000	Employee Benefits-General		200.00
				4020-101-000	Employee Expenses-General		51.33
12/02/19	71191	min008	Minnesota Native Landscapes, Inc.	4630-516-000	Construction Imp.-Maint. & Repair	1,029.00	
12/02/19	71192	ncp001	NCPERS Group Life Ins.	2015-101-000	Employee Health-General	16.00	
12/02/19	71193	nor013	Northern Dewatering, Inc.	4630-520-000	Construction-Flood Damage	36,089.00	
12/02/19	71194	nor019	North Park Condominium Assoc. Inc.	4682-529-000	Stewardship Grant Fund	10,743.69	
12/02/19	71195	nsp001	Xcel Energy			1,354.27	
				4650-101-000	Project Operations-General		228.80
				4342-101-000	Utilities/Bldg. Contracts		1,112.52
				4630-554-000	Construction Imp.-Willow Pond		12.95
12/02/19	71196	out001	Outdoor Lab Landscape Design, Inc.	4630-516-000	Construction Imp.-Maint. & Repair	9,791.72	
12/02/19	71197	pac001	Pace Analytical Services, Inc.			2,361.00	
				4530-101-000	Water QM Staff-General		189.00
				4530-101-000	Water QM Staff-General		408.00
				4530-101-000	Water QM Staff-General		345.00
				4530-101-000	Water QM Staff-General		567.00
				4530-101-000	Water QM Staff-General		189.00
				4530-101-000	Water QM Staff-General		138.00
				4530-101-000	Water QM Staff-General		525.00
12/02/19	71198	par004	Park View Terrace HOA	4682-529-000	Stewardship Grant Fund	1,000.00	

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From Nov 1, 2019 - Nov 30, 2019

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
12/02/19	71199	pas002	Sage Passi			199.98	
				4040-101-000	Employee Benefits-General		60.50
				4020-101-000	Employee Expenses-General		73.54
				4372-101-000	Events		65.94
12/02/19	71200	pet001	Peterson Companies, Inc.	4630-520-000	Construction-Flood Damage	15,099.12	
12/02/19	71201	pit001	Pitney Bowes Global Financial Services, LLC	4330-101-000	Postage-General	142.47	
12/02/19	71202	pra001	Prairie Moon Nursery, Inc.	4670-101-000	Natural Resources Project-General	2,014.77	
12/02/19	71203	qwe001	CenturyLink	4530-101-000	Water QM Staff-General	230.87	
12/02/19	71204	ram002	Ramsey County	4682-529-000	Stewardship Grant Fund	4,000.00	
12/02/19	71205	red002	Redpath & Company, Ltd.	4110-101-000	Auditor/Accounting	2,540.12	
12/02/19	71206	rey001	Thomas Reynen	4682-529-000	Stewardship Grant Fund	9,397.20	
12/02/19	71207	sex001	Heather Sexton	4682-529-000	Stewardship Grant Fund	5,000.00	
12/02/19	71208	she003	Shepherd of the Hills Lutheran Church	4682-529-000	Stewardship Grant Fund	262.50	
12/02/19	71209	sod001	Nicole Soderholm			57.60	
				4040-101-000	Employee Benefits-General		40.00
				4020-101-000	Employee Expenses-General		17.60
12/02/19	71210	tim002	Timesaver Off-Site Secretarial, Inc.	4365-101-000	Committee/Board Meeting Expense	215.00	
12/02/19	71211	tow001	Townhomes of Pathways HOA	4682-529-000	Stewardship Grant Fund	10,743.69	
12/02/19	71212	tro002	Cathy Troendle	4370-101-000	Educational Program-General	296.55	
12/02/19	71213	usb002	U.S. Bancorp			3,741.38	
				4630-520-000	Construction-Flood Damage		100.00
				4343-101-000	Bldg./Site Maintenance		48.81
				4350-101-000	Training & Education-General		250.00
				4343-101-000	Bldg./Site Maintenance		47.06
				4670-101-000	Natural Resources Project-General		40.00
				4530-101-000	Water QM Staff-General		43.17
				4670-101-000	Natural Resources Project-General		98.08
				4343-101-000	Bldg./Site Maintenance		40.77
				4343-101-000	Bldg./Site Maintenance		62.33
				4343-101-000	Bldg./Site Maintenance		207.22
				4320-101-000	Office Supplies-General		51.78
				4530-101-000	Water QM Staff-General		25.76
				4320-101-000	Office Supplies-General		58.86
				4320-101-000	Office Supplies-General		21.28
				4325-101-000	IT/Website/Software		93.41
				4320-101-000	Office Supplies-General		76.89
				4320-101-000	Office Supplies-General		26.95
				4350-101-000	Training & Education-General		128.10
				4350-101-000	Training & Education-General		7.46
				4530-101-000	Water QM Staff-General		32.71
				4350-101-000	Training & Education-General		925.00
				4350-101-000	Training & Education-General		400.00
				4350-101-000	Training & Education-General		400.00
				4350-101-000	Training & Education-General		200.00
				4320-101-000	Office Supplies-General		92.54
				4371-101-000	Communications & Marketing		63.20
				4350-101-000	Training & Education-General		200.00

Ramsey Washington Metro Watershed Dist.
Cash Disbursements Journal
For the Period From Nov 1, 2019 - Nov 30, 2019

Date	Check #	Vendor ID	Name	Account ID	Account Description	Amount	Check Detail
12/02/19	71214	van001	Vanguard Cleaning Systems of Minnesota	4342-101-000	Utilities/Bldg. Contracts	550.00	
12/02/19	71215	ves001	Peter Vesterholt	4682-529-000	Stewardship Grant Fund	275.00	
12/02/19	71216	voy001	US Bank Voyager Fleet Sys.	4830-101-000	Vehicle Fuel-General	348.83	
12/02/19	71217	wal005	Heidi Walz	4682-529-000	Stewardship Grant Fund	945.00	
12/02/19	71218	was002	Washington Conservation District			1,451.50	
				4682-529-000	Stewardship Grant Fund		879.50
				4682-529-000	Stewardship Grant Fund		572.00
12/02/19	71219	woo001	Woodland Hills Church	4682-529-000	Stewardship Grant Fund	1,000.00	
12/02/19	71220	zib001	Donald Zibell	2024-101-000	Dev. Escrow-General Fund	11,985.00	
			Accounts Payable Total:			**$618,688.50**	
EFT	10/04/19	myp001	Payroll Fees	4110-101-000	October 4th Payroll Fee	71.00	
EFT	10/18/19	myp001	Payroll Fees	4110-101-000	October 18th Payroll Fee	72.95	
Dir.Dep.	11/01/19	---	Payroll Expense-Net	4010-101-000	November 1st Payroll	23,886.71	
EFT	11/01/19	int002	Internal Revenue Service	2001-101-000	November 1st Federal Withholding	9,249.95	
EFT	11/01/19	mnd001	MN Revenue	2003-101-000	November 1st State Withholding	1,470.97	
EFT	11/01/19	per001	PERA	2011-101-000	November 1st PERA	4,979.96	
EFT	11/01/19	emp002	Empower Retirement	2016-101-000	Employee Def.Comp. Contributions	2,425.00	
EFT	11/01/19	emp002	Empower Retirement	2018-101-000	Employee IRA Contributions	375.00	
Dir.Dep.	11/15/19	---	Payroll Expense-Net	4010-101-000	November 15th Payroll	24,055.09	
EFT	11/15/19	int002	Internal Revenue Service	2001-101-000	November 15th Federal Withholding	8,340.68	
EFT	11/15/19	mnd001	MN Revenue	2003-101-000	November 15th State Withholding	1,486.77	
EFT	11/15/19	per001	PERA	2011-101-000	November 15th PERA	5,090.51	
EFT	11/15/19	emp002	Empower Retirement	2016-101-000	Employee Def.Comp. Contributions	2,425.00	
EFT	11/15/19	emp002	Empower Retirement	2018-101-000	Employee IRA Contributions	375.00	
Dir.Dep.	11/29/19	---	Payroll Expense-Net	4010-101-000	November 29th Payroll	24,546.08	
EFT	11/29/19	int002	Internal Revenue Service	2001-101-000	November 29th Federal Withholding	8,416.85	
EFT	11/29/19	mnd001	MN Revenue	2003-101-000	November 29th State Withholding	1,492.06	
EFT	11/29/19	per001	PERA	2011-101-000	November 29th PERA	5,056.50	
EFT	11/29/19	emp002	Empower Retirement	2016-101-000	Employee Def.Comp. Contributions	2,525.00	
EFT	11/29/19	emp002	Empower Retirement	2018-101-000	Employee IRA Contributions	375.00	
			Payroll/Benefits			**$126,716.08**	
			TOTAL:			**$745,404.58**	

BARR

Summary of Professional Engineering Services During the Period
October 19, 2019 through November 15, 2019

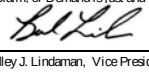
Engineering Administration	Total Engineering Budget (2019)	Total Fees to Date (2019)	Budget Balance (2019)	Fees During Period	District Accounting Code	Plan Implementation Task Number
General Engineering Administration	$76,000.00	$65,721.80	$10,278.20	$7,236.00	**4121-101**	DW-13
RWMWD Health and Safety/ERTK Program	$2,000.00	$759.00	$1,241.00		**4697-101**	DW-13
Educational Program/Educational Forum Assistance	$20,000.00	$14,643.60	$5,356.40	$459.00	**4129-101**	DW-11
Engineering Review						
Engineering Review	$55,000.00	$41,087.66	$13,912.34	$2,400.00	**4123-101**	DW-13
Project Feasibility Studies						
Owasso County Park Stormwater Master Plan and Detailed Design: Phase 1 and Phase 2	$50,000.00	$6,098.70	$43,901.30		**4129-101**	DW-6
Beltline Resiliency and Phalen Chain Water Level Management Study	$217,000.00	$151,875.62	$65,124.38	$24,821.50	**4129-101**	BELT-3
Interim emergency response plan funds for top priority District flooding areas (such as Owasso Basin, Willow Creek, PCU Pond, etc)	$50,000.00	$324.00	$49,676.00		**4129-101**	DW-19
FEMA Flood Mapping Update	$90,000.00	$47,352.50	$42,647.50	$221.50	**4129-101**	DW-9
Snail, Grass, and West Vadnais outlet permitting with the MnDNR	$100,000.00	$45,850.26	$54,149.74	$4,067.50	**4129-101**	DW-9
Modeling of 500-year event Atlas 14 District-wide (Climate Change Scenario) and Generation of Flood Maps for Future Outreach Efforts	$70,000.00	$37,696.00	$32,304.00	$516.00	**4129-101**	DW-9
Climate Adaption Workshops with Member Cities	$100,000.00	$255.00	$99,745.00		**4129-101**	DW-9
Hillcrest Golf Course (multi-use)	$25,000.00	$12,138.85	$12,861.15	$3,563.50	**4129-101**	DW-6
Wetland Restoration site search. BWSR criteria needed to help guide this idea.	$25,000.00	$27,489.60	-$2,489.60	$3,643.50	**4129-101**	DW-1, DW-8
Gold BRT planning	$20,000.00	$0.00	$20,000.00		**4129-101**	DW-6
Priority Pond Assessment (WQ Monitor/Dredge/Treat/Leave As-Is)	$20,000.00	$793.00	$19,207.00	$517.50	**4129-101**	DW-5
Twin Lake Outlet	$50,000.00	$23,269.50	$26,730.50	$19,450.00	**4129-101**	DW-9
Point DouglasDrive Study	$10,000.00	$934.27	$9,065.73	$934.27	**4129-101**	DW-9
Contingency*	$20,000.00	$3,233.00	$16,767.00		**4129-101**	
GIS Maintenance						
GIS Maintenance	$5,000.00	$341.50	$4,658.50		**4170-101**	DW-13
Monitoring Water Quality/Project Monitoring						
Lake Water Quality Monitoring (Misc QA/QC)	$10,000.00	$2,753.68	$7,246.32		**4520-101**	DW-2
Auto lake monitoring system for Grass Lake	$20,000.00	$17,285.07	$2,714.93	$10,906.65	**4520-101**	DW-18
Auto lake monitoring system for Owasso Lake	$20,000.00	$7,588.70	$12,411.30	$1,415.16	**4520-101**	DW-18
Auto lake monitoring system for Phalen Lake	$20,000.00	$5,862.00	$14,138.00	$1,062.50	**4520-101**	DW-18
Auto lake monitoring system for Snail Lake	$20,000.00	$15,655.09	$4,344.91	$11,092.08	**4520-101**	DW-18
Auto lake monitoring system for Wabasso Lake	$20,000.00	$7,981.52	$12,018.48	$1,562.50	**4520-101**	DW-18
Special Project BMP Monitoring (Maplewood Mall, Frost Kennard Spent Lime Filter, Willow Pond CMAC)	$25,000.00	$27,661.85	-$2,661.85	$2,545.78	**4520-101**	DW-12
Permit Processing, Inspection and Enforcement						
Permit Application Inspection and Enforcement	$10,000.00	$3,055.94	$6,944.06		**4122-101**	DW-7
Permit Application Review	$55,000.00	$32,620.00	$22,380.00	$1,812.50	**4124-101**	DW-7
Lake Studies/WRPPs/TMDL Reports						
2019 Grant Applications	$30,000.00	$144.00	$29,856.00		**4661-101**	--
Tanners Flood Response Tool Model Update	$3,000.00	$1,264.00	$1,736.00		**4661-101**	TaL-1
Internal Load Management Discussions	$10,000.00	$2,707.00	$7,293.00	$93.00	**4661-101**	KL-2, GC-2, WL-3, BL-3, BCL-2, LE-4, BeL-3, LO-5
Twin Lake Public Meeting	$20,000.00	$13,942.12	$6,057.88		**4129-101**	DW-19
Twin Lake Emergency Response Management 2019		$80,495.93	-$80,495.93	$5,963.16	**4128-520**	
Contingency for Lake Studies	$5,000.00	$0.00	$5,000.00		**4661-101**	
Research Projects						
New Technology Mini Case Studies (average 6 per year)	$12,000.00	$12,359.00	-$359.00	$690.50	**4695-101**	DW-12
Kohlman Permeable Weir Test System - Implement Monitoring Plan	$15,000.00	$11,616.52	$3,383.48	$880.00	**4695-101**	DW-12
Iron aggregate pond application research project	$20,000.00	$495.57	$19,504.43	$17.00	**4695-101**	DW-12
Project Operations						
2018 Tanners Alum Facility Monitoring	$15,000.00	$13,986.25	$1,013.75	$67.50	**4650-101**	TaL-3
Capital Improvements						
Wakefield Park/Frost Avenue Stormwater Project	$175,000.00	$69,883.12	$105,116.88	$2,688.16	**4128-553**	WL-1
Commercial Sites Retrofit Projects 2018 (Targeted Retrofits)	$55,000.00	$49,748.60	$5,251.40	$22,400.56	**4128-518**	DW-6
Survey - Stonebrooke Engineering (Target and Motel 6 Retrofits)	$230,000.00	$29,158.70	$200,841.30	$29,158.70	**4128-518**	DW-6
School Sites Retrofit Projects 2018 (Targeted Retrofits)	$55,000.00	$15,153.00	$39,847.00	$338.00	**4128-518**	DW-6
Church Sites Retrofit Projects 2018 (Targeted Retrofit)	$55,000.00	$12,599.50	$42,400.50	$1,043.00	**4128-518**	DW-6
Roseville High School Campus Stormwater Retrofit (Bennett Lake Subwatershed)	$125,000.00	$19,860.26	$105,139.74		**4128-518**	BeL-4
BMP Incentive Fund: Gen'l BMP Design Assistance and Review (cases where Dist is approached by landowner, or landowner is not commercial, school, church).	$50,000.00	$44,396.60	$5,603.40	$2,298.00	**4682-529**	DW-6
Lowering West Vadnais Lake Outlet	$50,000.00	$0.00	$50,000.00		**4128-520**	DW-9
Cottage Place Wetland Restoration	$100,000.00	$65,278.78	$34,721.22	$2,465.00	**4128-518**	DW-1, DW-8
Markham Pond Aeration Project and Grant Reporting	$1,000.00	$5,842.48	-$4,842.48		**4128-551**	KC-1
Aldrich Arena Plans and Specifications	$125,000.00	$168,046.98	-$43,046.98	$5,979.22	**4682-529**	DW-6
Willow Pond CMAC Implementation	$100,000.00	$131,251.61	-$31,251.61		**4128-554**	BeL-4
CIP Project Repair & Maintenance						
Kohlman Lake Macrophyte Mgmt	$5,000.00	$9,152.00	-$4,152.00	$1,920.00	**4695-101**	KL-3
Routine CIP Inspection and Unplanned Maintenance Identification	$75,000.00	$157,077.46	-$82,077.46	$32,688.60	**4128-516**	DW-5
2019 CIP Maintenance and Repairs	$150,000.00	$95,459.35	$54,540.65	$1,461.00	**4128-516**	DW-5
2020 CIP Maintenance and Repairs	$150,000.00	$4,526.00	$145,474.00	$4,526.00	**4128-516**	DW-5

*Final edits to Beaver, Owasso and Battle Creek Lakes Subwatershed Feasibility Studies per Board comments at the 1/2/19 meeting.

Subtotal

TOTAL PAYABLE FOR PERIOD 10/19/2019 - 11/15/2019 **$212,904.84**

Barr declares under the penalties of Law that this Account, Claim, or Demand is just and that no part has been paid.



Bradley J. Lindaman, Vice President

CMAC FILTRATION BMP AT WILLOW POND
Progress Payment Number 6

1.0	Total Completed Through This Period:	$301,982.32		
2.0	Total Completed Previously Completed:		$301,982.32	
3.0	Total Completed This Period:			$0.00
4.0	Amount Previously Retained:		$15,099.12	
5.0	Amount Retained This Period (See Note 1):			$0.00
6.0	Total Amount Retained (See Note 2):		$15,099.12	
7.0	Retainage Released Through This Period:			$15,099.12
8.0	Total Retainage Remaining:		$0.00	
9.0	Amounts Previously Paid:	$286,883.20		
10.0	Amount Due This Estimate:			$15,099.12

Note 1: At rate of 5%.

Note 2: Maximum amount is 5% of current Contract Price ($279,049.00)

SUBMITTED BY:

Name: Jake Sikora Date: 11/25/19

Title: Project Manager

Contractor: Peterson Companies, Inc.

Signature: 

RECOMMENDED BY:

Name: Brad Lindaman Date: 11/22/2019

Title: District Engineer

Engineer: Barr Engineering Company

Signature: 

APPROVED BY:

Name: Marj Ebensteiner Date:

Title: President

Owner: Ramsey-Washington Metro Watershed District

Signature:

CMAC FILTRATION BMP AT WILLOW POND
RAMSEY-WASHINGTON METRO WATERSHED DISTRICT
Summary of Work Completed Through November 22, 2019 for Progress Payment Number 6

						(1) Total Completed Through This Period		(2) Total Completed Previous Period		(3) Total Completed This Period	
Item	Description	Unit	Estimated Quantity	Unit Price	Extension	Quantity	Amount	Quantity	Amount	Quantity	Amount
A	Mobilization/Demobilization	L.S.	1	37,080.09	37,080.09	1	$37,080.09	1	$37,080.09	0	$0.00
B	Erosion Control Construction Entrance	Each	1	2,500.00	2,500.00	1	$2,500.00	1	$2,500.00	0	$0.00
C	Erosion Control Silt Fence	L.F.	884	4.00	3,536.00	640	$2,560.00	640	$2,560.00	0	$0.00
D	Double Row Floatation Silt Curtain	L.F.	164	11.74	1,925.36	164	$1,925.36	164	$1,925.36	0	$0.00
E	Inlet Protection	Each	1	125.00	125.00	1	$125.00	1	$125.00	0	$0.00
F	Erosion Control Blanket	S.Y.	90	3.50	315.00	2048	$7,168.00	2048	$7,168.00	0	$0.00
G	Traffic Control	L.S.	1	2,000.00	2,000.00	1	$2,000.00	1	$2,000.00	0	$0.00
H	Control of Water	L.S.	1	23,666.12	23,666.12	1	$23,666.12	1	$23,666.12	0	$0.00
I	Tree Removal (8" diameter or greater)	Each	6	375.81	2,254.86	21	$7,892.01	21	$7,892.01	0	$0.00
J	Clear and Grub	S.Y.	1,003	6.17	6,188.51	1,003	$6,188.51	1,003	$6,188.51	0	$0.00
K	Remove & Salvage Topsoil (P)	S.Y.	673	4.14	2,786.22	673	$2,786.22	673	$2,786.22	0	$0.00
L	Remove and Dispose of 12" RCP	L.F.	9	48.67	438.03	9	$438.03	9	$438.03	0	$0.00
M	Sawcut, Remove and Dispose of Asphalt Trail	S.Y.	40	8.65	346.00	40	$346.00	40	$346.00	0	$0.00
N	60 inch Precast Manhole with Access Door	Each	1	10,041.00	10,041.00	1	$10,041.00	1	$10,041.00	0	$0.00
O	Precast Concrete Weir and FRP Stop Log	L.S.	1	8,291.00	8,291.00	1	$8,291.00	1	$8,291.00	0	$0.00
P	48 inch Precast Manholes with Casting and Frame (Neenah R-1537)	Each	2	4,570.50	9,141.00	2	$9,141.00	2	$9,141.00	0	$0.00
Q	48-inch Precast Manhole with Access Door	Each	1	6,386.00	6,386.00	1	$6,386.00	1	$6,386.00	0	$0.00
R	12 inch Corrugated Polyethylene Pipe (CPEP) Dual-Wall (Smooth Interior)	L.F.	176	32.74	5,762.24	179	$5,860.46	179	$5,860.46	0	$0.00
S	12" CMP FES	Each	1	760.00	760.00	2	$1,520.00	2	$1,520.00	0	$0.00
T	Trash Guard for 12" CMP FES	Each	1	66.00	66.00	1	$66.00	1	$66.00	0	$0.00
U	12 inch Ductile Iron Pipe (DIP)	L.F.	71	73.03	5,185.13	75	$5,477.25	75	$5,477.25	0	$0.00
V	12 inch Cast Iron Plug Valve with Epoxy Lining & Coating w/Box ASM	Each	1	4,896.00	4,896.00	1	$4,896.00	1	$4,896.00	0	$0.00
W	Install 12 inch Butterfly Valve and Electrical Actuator (provided by others)	L.S.	1	1,576.00	1,576.00	1	$1,576.00	1	$1,576.00	0	$0.00
X	Existing Pipe Connection	Each	1	1,314.00	1,314.00	1	$1,314.00	1	$1,314.00	0	$0.00
Y	Stormwater Filter Piping and Fittings, All Complete	L.S.	1	11,011.00	11,011.00	1	$11,011.00	1	$11,011.00	0	$0.00
Z	Insulate Existing Sanitary Sewer	Each	1	599.00	599.00	1	$599.00	1	$599.00	0	$0.00
AA	Common Excavation for Filter (P)	C.Y.	376	64.72	24,334.72	376	$24,334.72	376	$24,334.72	0	$0.00
AB	Off-site Disposal of Excavated Material (P)	C.Y.	284	16.27	4,620.68	284	$4,620.68	284	$4,620.68	0	$0.00
AC	Geosynthetic Clay Liner (P)	S.Y.	662	43.12	28,545.44	662	$28,545.44	662	$28,545.44	0	$0.00
AD	Drain Filter	Ton	93	60.18	5,596.74	95	$5,717.10	95	$5,717.10	0	$0.00
AE	Plastic Netting	S.Y.	275	3.11	855.25	275	$855.25	275	$855.25	0	$0.00
AF	Spent Lime	L.S.	1	7,206.00	7,206.00	1	$7,206.00	1	$7,206.00	0	$0.00
AG	Class III Riprap	Ton	5	302.99	1,514.95	18.5	$5,605.32	18.5	$5,605.32	0	$0.00
AH	Asphalt Trail Paving	S.Y.	40	78.00	3,120.00	40	$3,120.00	40	$3,120.00	0	$0.00
AI	Electrical installation	L.S.	1	12,500.00	12,500.00	1	$12,500.00	1	$12,500.00	0	$0.00
AJ	Instrumentation Installation and Controls	L.S.	1	5,144.00	5,144.00	1	$5,144.00	1	$5,144.00	0	$0.00
AK	Helical Piles with Void Filling Material	L.S.	1	8,127.00	8,127.00	1	$8,127.00	1	$8,127.00	0	$0.00
AL	Import Common Topsoil Borrow	C.Y.	45	23.94	1,077.30	0	$0.00	0	$0.00	0	$0.00

CMAC FILTRATION BMP AT WILLOW POND
RAMSEY-WASHINGTON METRO WATERSHED DISTRICT
Summary of Work Completed Through November 22, 2019 for Progress Payment Number 6

						(1) Total Completed Through This Period		(2) Total Completed Previous Period		(3) Total Completed This Period	
Item	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extension**	**Quantity**	**Amount**	**Quantity**	**Amount**	**Quantity**	**Amount**
AM	Shoreline Seed Mix (Furnish & Install)	S.Y.	41	19.00	779.00	41	$779.00	41	$779.00	0	$0.00
AN	Woodland Seed Mix (Furnish & Install)	S.Y.	1,355	3.00	4,065.00	2007	$6,021.00	2007	$6,021.00	0	$0.00
AO	Tree with Trunk Protection, #20 Container	Each	4	585.00	2,340.00	7	$4,095.00	7	$4,095.00	0	$0.00
AP	#2 Container Shrub	Each	30	65.00	1,950.00	60	$3,900.00	60	$3,900.00	0	$0.00
AQ	Shrub Protection Fencing	LF	320	5.40	1,728.00	506	$2,732.40	506	$2,732.40	0	$0.00
AR	12 inch Backflow Preventer	Each	1	2,138.00	2,138.00	1	$2,138.00	1	$2,138.00	0	$0.00
AS	Sedimentation Log	LF	60	5.00	300.00	154	$770.00	154	$770.00	0	$0.00
AT	Trail Protection	L.S.	1	13,830.36	13,830.36	1	$13,830.36	1	$13,830.36	0	$0.00
AU	15” CMP FES	Each	1	1,087.00	1,087.00	1	$1,087.00	1	$1,087.00	0	$0.00
			TOTAL BASE BID		**279,049.00**	**TOTAL EXT. =**	**$301,982.32**		**$301,982.32**		**$0.00**

Maplewood Mall Raingarden Improvements
Progress Payment Number 1

1.0	Total Completed Through This Period:	$51,258.10		
2.0	Total Completed Previously Completed:		$0.00	
3.0	Total Completed This Period:			$51,258.10
4.0	Amount Previously Retained:		$0.00	
5.0	Amount Retained This Period (See Note 1):			$0.00
6.0	Total Amount Retained		$0.00	
7.0	Retainage Released Through This Period:			$0.00
8.0	Total Retainage Remaining:		$0.00	
9.0	Amounts Previously Paid:	$0.00		
10.0	Amount Due This Estimate:			$51,258.10

SUBMITTED BY:

Name: Mike Collins Date: 11-21-19

Title: Sr. Sales Executive

Contractor: Cutting Edge Property Maintenance

Signature: _____

RECOMMENDED BY:

Name: Brad Lindaman Date: _____

Title: District Engineer

Engineer: Barr Engineering Company

Signature: _____

APPROVED BY:

Name: Marj Ebensteiner Date: _____

Title: President

Owner: Ramsey-Washington Metro Watershed District

Signature: _____

Maplewood Mall Raingarden Improvements
Ramsey-Washington Metro Watershed District
Summary of Work Completed Through November 26, 2019 for Progress Payment Number 1

						(1) Total Completed Through This Period		(2) Total Completed Previous Period		(3) Total Completed This Period	
Item	Description	Unit	Estimated Quantity	Unit Price	Extension	Quantity	Amount	Quantity	Amount	Quantity	Amount
1.04.A	Site Clearing, Preparation and Demolition	LS	1	12,750.00	12,750.00	1	$12,750.00	0	$0.00	1	$12,750.00
1.04.B	Filtration Soil, 12" Depth (P)	CY	220	61.90	13,618.00	220	$13,618.00	0	$0.00	220	$13,618.00
1.04.C	Mechanically Loosen Subgrade Soil	LS	1	5,150.00	5,150.00	1	$5,150.00	0	$0.00	1	$5,150.00
1.04.D	Sand Trench Material (P)	CY	73	37.00	2,701.00	73	$2,701.00	0	$0.00	73	$2,701.00
1.04.E	Topsoil, 12" Depth (P)	CY	51	58.00	2,958.00	51	$2,958.00	0	$0.00	51	$2,958.00
1.04.F	Erosion and Sedimentation Control	LS	1	5,150.00	5,150.00	1	$5,150.00	0	$0.00	1	$5,150.00
1.04.G	Herbaceous Plants	LS	1	23,806.00	23,806.00	0	$0.00	0	$0.00	0	$0.00
1.04.H	Shredded Hardwood Mulch, 3" Depth (P)	CY	57	75.10	4,280.70	25	$1,877.50	0	$0.00	25	$1,877.50
1.04.I	4" CPEP Slotted Drain Tile	LF	181	3.87	700.47	180	$696.60	0	$0.00	180	$696.60
				Total of Extensions =	**$ 71,114.17**		**$44,901.10**		**$0.00**		**$44,901.10**
Change Orders											
C.O.1A	Extra Work: Repl. PVC pipe and fittings, Jet clean underdrain systems	LS	1	6,357.00	6,357.00	1	$6,357.00	0	$0.00	1	$6,357.00
					GRAND TOTALS		**$51,258.10**		**$0.00**		**$51,258.10**

Galowitz Olson, PLLC
10390 39th Street North
Lake Elmo, Minnesota 55042
Office: (651) 777-6960
Fax: (651) 777-8937

Ramsey-Washington Metro Watershed District
C/O Tina Carstens
2665 Noel Drive
Little Canada MN 55117

November 26, 2019
File No: 9M

	Balance
General Account	$3,022.50
Twin Lakes Litigation	$894.50
2020 CIP	$80.00
	$3,997.00

****

Permit Program

****

Permit Application Coversheet

Date December 11, 2019

Project Name RWMWD 2020 CIP Project Number 19-49

Applicant Name Tina Carstens, Ramsey-Washington Metro Watershed District

Type of Development Maintenance

Property Description

This project is led by Ramsey-Washington Metro Watershed District (RWMWD) and is located at various locations throughout the District. See map included for site locations and descriptions. The project includes maintenance activities relating to: sediment removal, paver cleaning, weir maintenance, filter maintenance, and erosion repair. Wetland Conservation Act (WCA) approval is needed for Sites #8, 9, and 10 where proposed activities will temporarily disturb wetland areas. Site #7 involves a DNR-regulated Public Water and may require a separate DNR permit. All other required permits and access agreements must be obtained prior to start of construction. Disturbed areas will be restored with native vegetation.

Watershed District Policies or Standards Involved:

- [x] *Wetlands*
- [x] *Erosion and Sediment Control*
- [ ] *Stormwater Management*
- [x] *Floodplain*

Water Quantity Considerations

The proposed net cut/fill is sufficient to prevent adverse impacts to the floodplain.

Water Quality Considerations

Short Term

The proposed erosion and sediment control plan is sufficient to protect downstream water resources during construction.

Long Term

There are no long term water quality considerations.

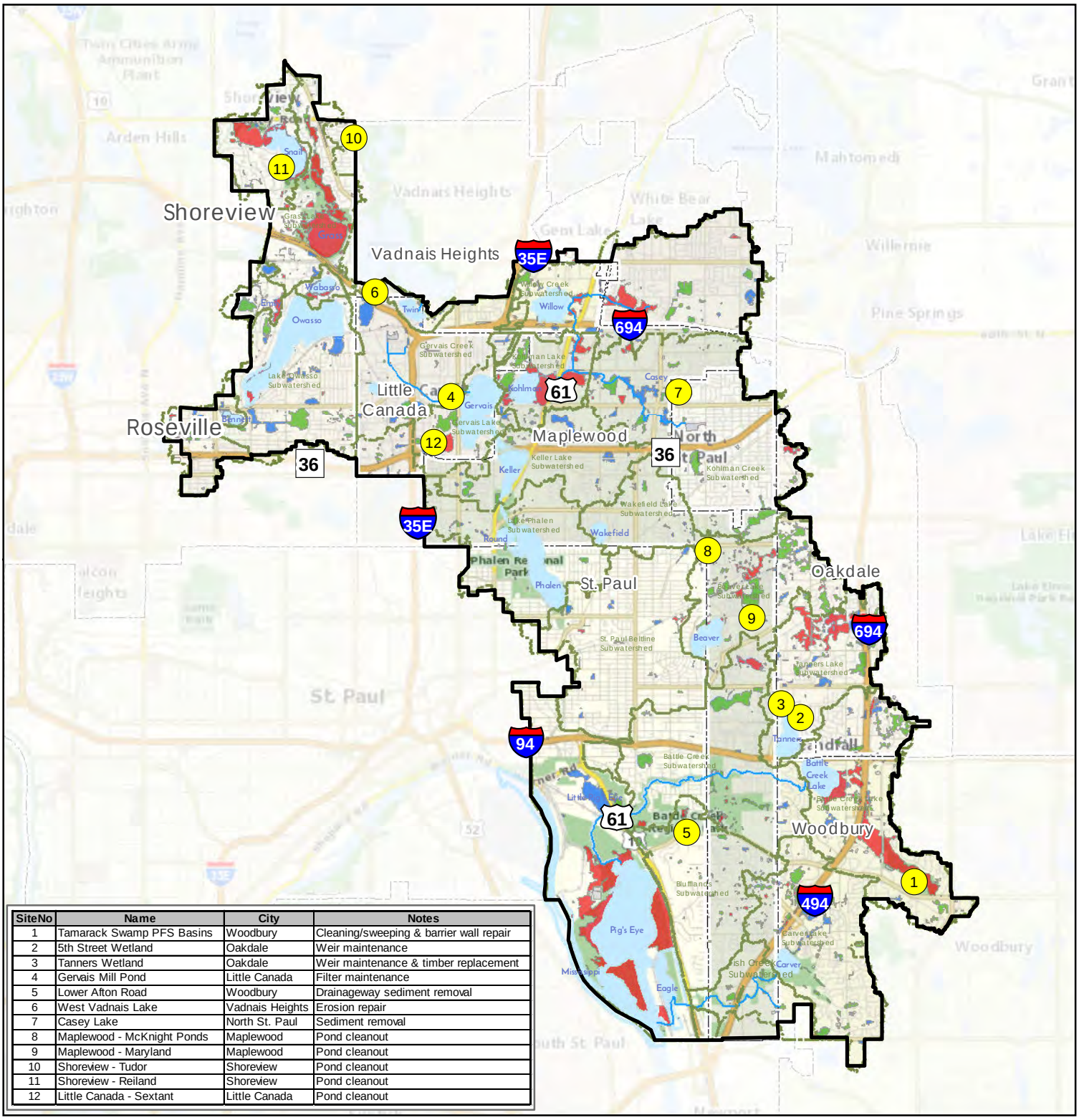
Staff Recommendation

Staff recommends approval of this permit with the special provisions.

Attachments:

- [x] Project Location Map
- [ ] Project Grading Plan

#19-49 RWMWD 2020 CIP Maintenance/Repairs



SiteNo	Name	City	Notes
1	Tamarack Swamp PFS Basins	Woodbury	Cleaning/sweeping & barrier wall repair
2	5th Street Wetland	Oakdale	Weir maintenance
3	Tanners Wetland	Oakdale	Weir maintenance & timber replacement
4	Gervais Mill Pond	Little Canada	Filter maintenance
5	Lower Afton Road	Woodbury	Drainageway sediment removal
6	West Vadnais Lake	Vadnais Heights	Erosion repair
7	Casey Lake	North St. Paul	Sediment removal
8	Maplewood - McKnight Ponds	Maplewood	Pond cleanout
9	Maplewood - Maryland	Maplewood	Pond cleanout
10	Shoreview - Tudor	Shoreview	Pond cleanout
11	Shoreview - Reiland	Shoreview	Pond cleanout
12	Little Canada - Sextant	Little Canada	Pond cleanout

Note: Shaded area is outside RWMWD

Wetlands
- Manage A
- Manage B
- Manage C
- Lake
- Sediment Pond
- Not Assessed

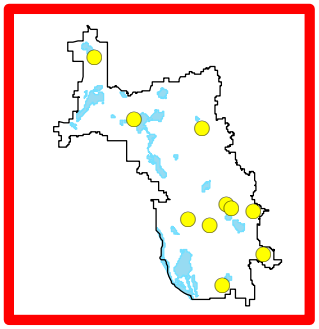
- Maintenance Sites
- Creeks
- Subwatersheds
- City Boundaries
- RWMWD Boundary

Highlighted Areas Represent Active Permit

0 7,000 14,000
Feet

0 1.5 3
Miles

N



19-49

Special Provisions

1. The applicant shall revise the plans:
   A. Verify note referencing elevation 844.0' on Sheet C-06.
   B. Add a note to Sheet C-06 that placement of fill must be on or east of the berm in upland areas only.
   C. Add a note to Sheet C-07 that no net fill shall be placed below the Casey Lake 100-year floodplain elevation of 929.4'.
   D. Continue the standard watershed notes on Sheets C-06 to C-14.
   E. Include locations and labels for stabilized construction exits to limit sediment tracking.

2. The applicant shall obtain final wetland permits and access agreements prior to commencement of construction.

3. The applicant shall provide contact information for the trained erosion control coordinator responsible for implementing the Stormwater Pollution Prevention Plan (SWPPP).

4. The applicant shall submit a copy of the approved Minnesota Pollution Control Agency's NPDES Construction Permit for the project.

Permit Application Coversheet

Date December 11, 2019

Project Name Window World Expansion Project Number 19-50

Applicant Name Terry Derosier, Window World

Type of Development Commercial/Retail

Property Description

This project is located at 2220 Castle Ave East, southwest of Highway 36 and McKnight Road in the City of North St. Paul. The applicant is proposing to construct an addition on the south side of the existing building. The existing building's finished floor elevation is below the 100-year floodplain elevation of 940.4.' An addition that ties in to existing elevations will require a variance request from the District's freeboard requirement. This signed request has been included with the permit submittal and includes acknowledgement from the landowner of the risk for flooding on the property. Compensatory storage is proposed to offset placement of fill to accommodate this addition, resulting in no net loss of floodplain storage. A wetland delineation was approved on 10/11/19 (#19-15 WCA). There are no anticipated wetland impacts. The total site area is 0.52 acre.

Watershed District Policies or Standards Involved:

- ☐ *Wetlands*
- ☑ *Erosion and Sediment Control*
- ☐ *Stormwater Management*
- ☑ *Floodplain*

Water Quantity Considerations

The proposed grading plan is sufficient to prevent adverse impacts to the floodplain.

Water Quality Considerations

Short Term

The proposed erosion and sediment control plan is sufficient to protect downstream water resources during construction.

Long Term

There are no long term water quality considerations.

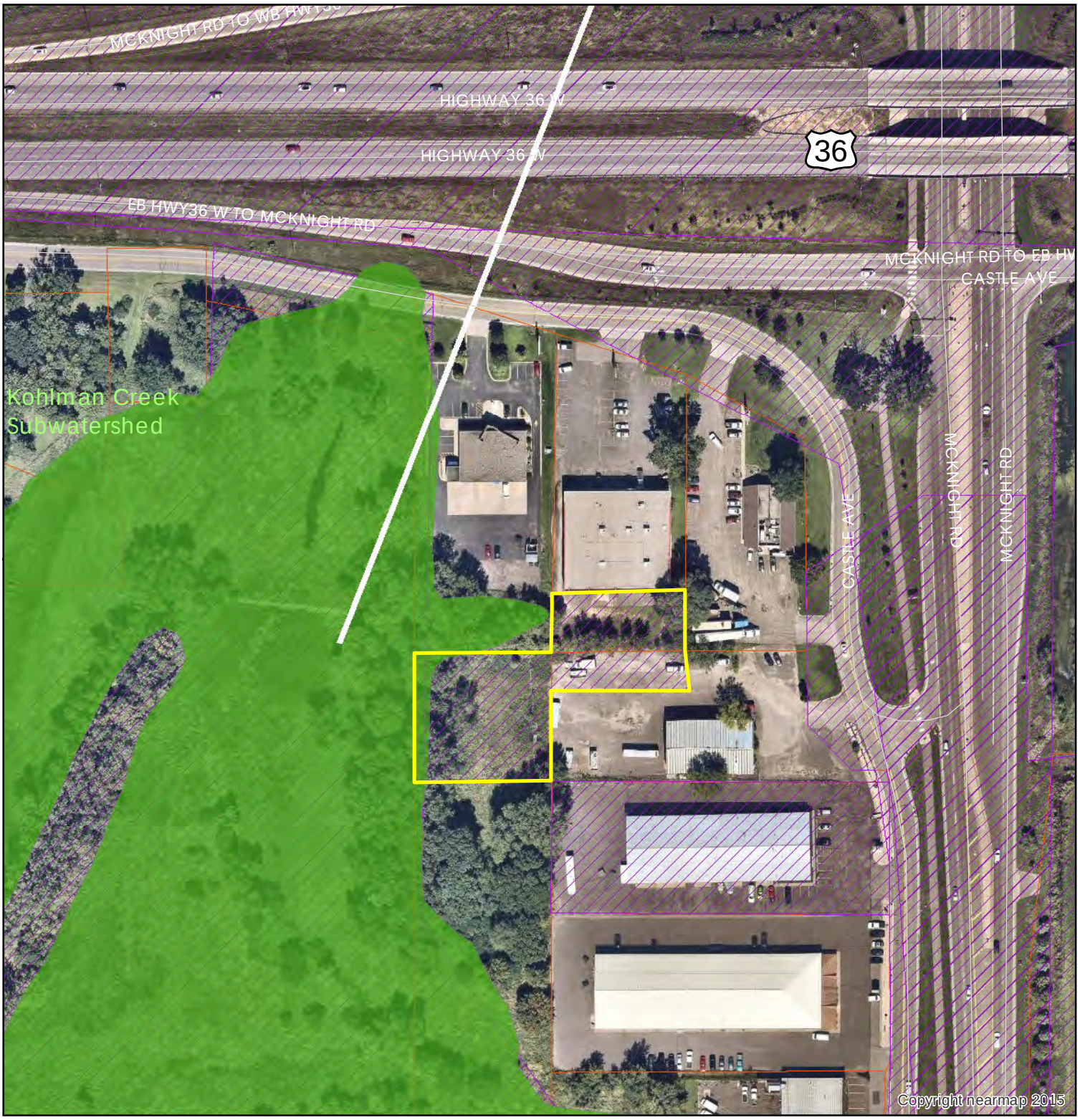
Staff Recommendation

Staff recommends approval of this permit with the special provisions and variance request (District Rule D).

Attachments:

- ☑ Project Location Map
- ☑ Project Grading Plan

#19-50 Window World Expansion



Wetlands
- Manage A
- Manage B
- Manage C
- Lake
- Sediment Pond
- Not Assessed

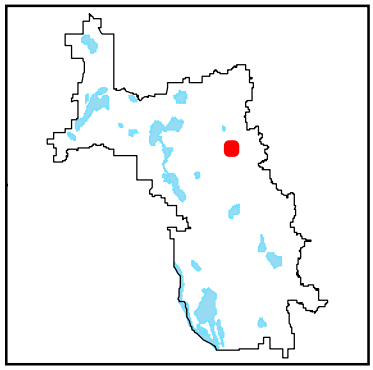
- RWMWD Boundary
- Flow Arrows
- Major Flow Arrows
- Subwatersheds
- Creeks
- Permits
- Ramsey Co Parcels
- Washington Co Parcels

Highlighted Areas Represent Active Permit

0 125 250
Feet

0 0.02 0.04
Miles

N



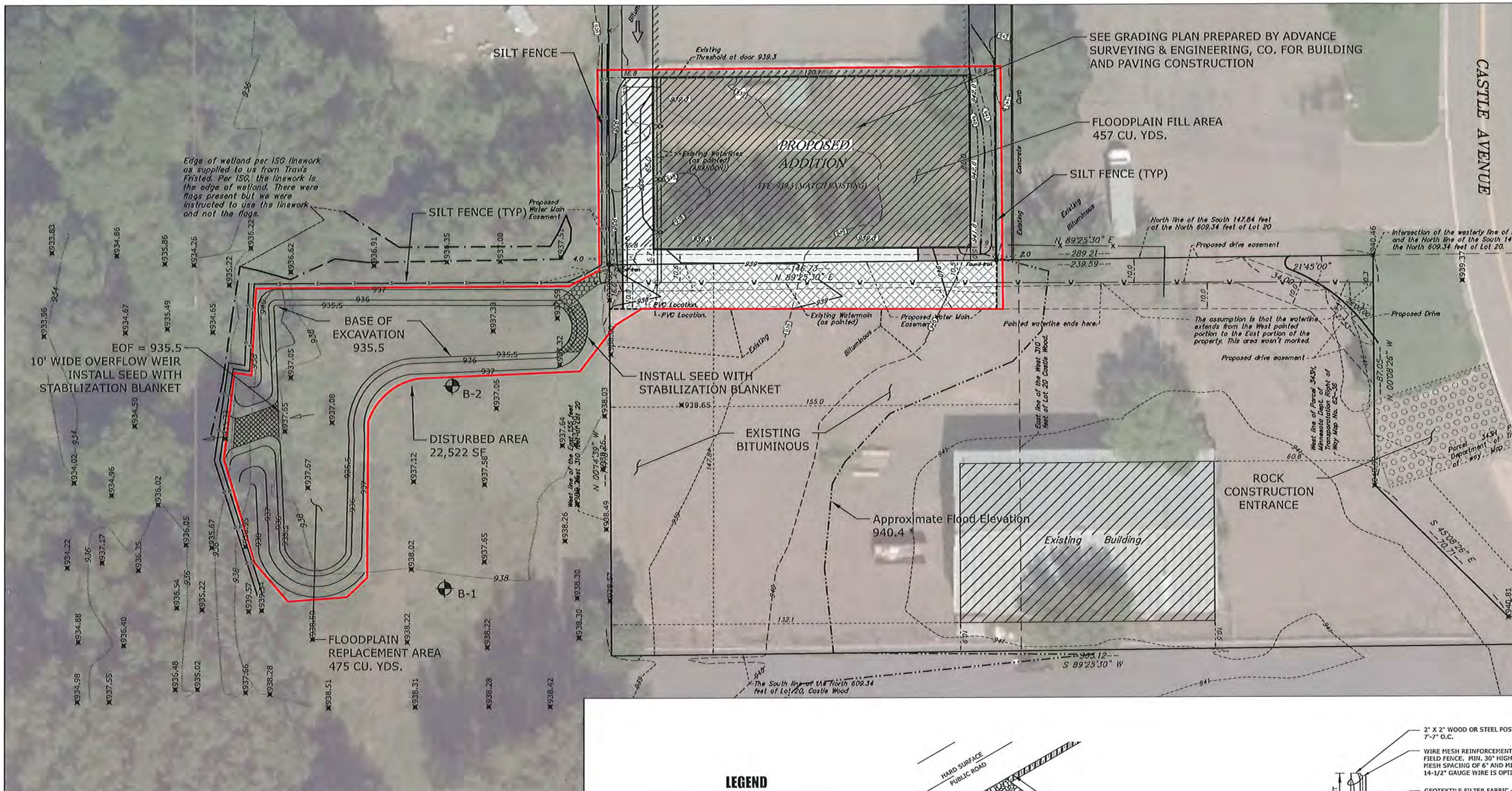
19-50

Special Provisions

1. The applicant shall submit the final, signed Floodplain Fill & Replacement Exhibit.

2. The Owner shall enter into an Agreement with Ramsey-Washington Metro Watershed District (RWMWD), waiving the Owner's right to any claims, seen or unseen, against RWMWD for exercising its discretion and granting a permit for an improvement to property located in the 100-year floodplain. The Owner shall agree to bind its heirs and assigns to said property, to the terms of said Agreement, which shall be recorded and made of record with the county recorder's office.

FLOODPLAIN FILL & REPLACEMENT EXHIBIT
WINDOW WORLD



GENERAL NOTES

THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING TYPE AND LOCATION OF EXISTING UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO TYPE AND LOCATION OF UTILITIES AS NECESSARY TO AVOID DAMAGE TO THESE UTILITIES.

CALL "811" FOR EXISTING UTILITIES LOCATIONS PRIOR TO ANY EXCAVATIONS.

INSTALLATIONS SHALL CONFORM TO THE CITY STANDARD SPECIFICATIONS AND DETAIL PLATES.

EXISTING SURVEY ELEVATIONS WERE ACQUIRED BY E.G. RUD & SONS ON 10/29/19.

THE CONTRACTOR SHALL MAINTAIN SILT FENCE, INCLUDING THE REMOVAL OF ACCUMULATED SEDIMENT, THROUGH COMPLETION OF BUILDING CONSTRUCTION. SILT FENCE TO BE REMOVED ONLY AFTER COMPLETION OF BUILDING CONSTRUCTION AND UPON ESTABLISHMENT OF VEGETATION.

UPON GRADING COMPLETION, THE CONTRACTOR SHALL INSTALL NATIVE 4" TOPSOIL WITH APPROVED SEED & MULCH IN DISTURBED EXCAVATED AREA.

THE SPECIFIED EROSION AND SEDIMENT CONTROL PRACTICES ARE THE MINIMUM. ADDITIONAL PRACTICES MAY BE REQUIRED DURING THE COURSE OF CONSTRUCTION.

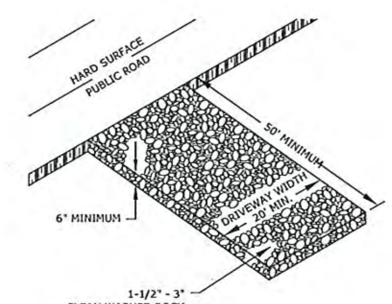
NOTIFY NICOLE SODERHOLM, RAMSEY-WASHINGTON METRO WATERSHED DISTRICT, AT 651-792-7976 PRIOR TO BEGINNING ANY AND ALL CONSTRUCTION FOR AN INITIAL SWPPP INSPECTION.

* PER CITY OF N. ST. PAUL: FLOOD ELEVATION OF 940.40 PROVIDED
PER RMWMD MODEL: NWL OF 932.10± (BASED ON EXISTING CULVERT INVERT AT CASTLE AVE)

Know what's **below.**
Call before you dig.

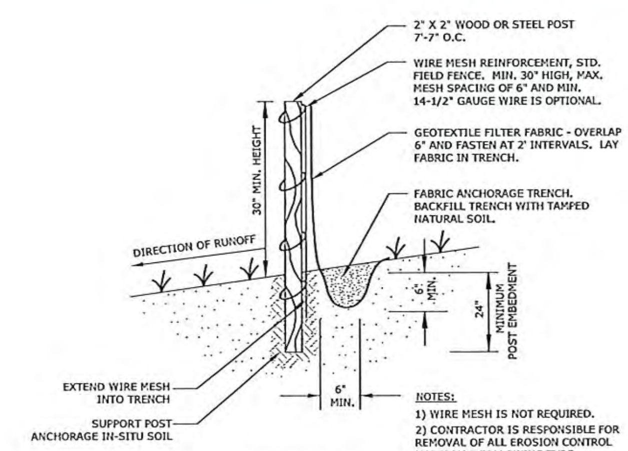
LEGEND

930	EXISTING CONTOUR
⌘938.28	EXISTING SURVEY ELEVATION
	FLOODPLAIN LINE (940.4)
	WETLAND EDGE
928 / 930	PROPOSED CONTOUR
S	PROPOSED SILT FENCE
	PROPOSED DIRECTION OF DRAINAGE
	PROPOSED RIPRAP
	SOIL BORING LOCATION



ROCK CONSTRUCTION ENTRANCE

NOT TO SCALE



NOTES:
1) WIRE MESH IS NOT REQUIRED.
2) CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL EROSION CONTROL MATERIALS FOLLOWING TURF ESTABLISHMENT.

SILT FENCE

NOT TO SCALE

DRAWN BY: M.Q.A.	DESIGN BY: C.W.P.
CHCKD BY: C.W.P.	PROJ. NO. 19-1868

ORIGINAL DATE: OCTOBER 18, 2019

DATE	REVISION DESCRIPTION
11/18/19	RWMWD COMMENTS

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
PRELIMINARY
CHARLES W. PLOWE
DATE: 11.18.2019 LIC. NO. 18227

WINDOW WORLD
NORTH ST. PAUL, MINNESOTA
FLOODPLAIN FILL & REPLACEMENT EXHIBIT

PREPARED FOR:
WINDOW WORLD

SITE PLANNING & ENGINEERING
PLOWE ENGINEERING, INC.
6776 LAKE DRIVE
SUITE 110
LINO LAKES, MN 55014
PHONE: (651) 361-8210
FAX: (651) 361-8701

NORTH
0 10 20
1 INCH = 20 FEET

C1

S:\plowe\cad\19proj\19-1868 WINDOW WORLD\19-1868 CAD\19-1868 BASE 13.dwg 11/18/2019

PLOWE
ENGINEERING, INC.

November 26, 2019

Board of Managers
Ramsey-Washington Metro Watershed District
2665 Noel Drive
Little Canada, MN 55117

Re: **Window World Addition – Freeboard Requirement Variance Request**

Dear Members of the Board:

I am writing on behalf of Terry Derosier (Window World), Applicant, to request a variance to the District's freeboard requirement for the proposed building addition to the existing building at 2220 Castle Avenue E in North St. Paul.

Physical limitations of the site, namely the floor elevation of the existing building, prevent the building addition to meet the District's 2-foot freeboard requirement. The existing building's finished floor elevation (FFE) is 939.3 which is below the RWMWD's modeled High Water Line of 940.2. The building addition FFE will match the 939.3 elevation of the existing building.

The flood plain volume that is lost due to the building addition is proposed to be replaced with an excavated basin area to the southwest of the proposed addition. There will be no net fill within the 100-yr floodplain. The floodplain compensatory storage area will be constructed concurrently with or prior to the placement of the fill for the building addition to maintain no net fill to the floodplain during and after the duration of the construction activities. There are also no anticipated adverse wetland impacts (no work to be performed within the delineated wetland boundaries) or impacts to downstream structures.

The Applicant is aware of the risk of flooding and intends to proceed with the application process pending approval of this variance request. The Applicant assumes full responsibility, holding RWMWD harmless, in the event the building floods in the future.

Charles W. Plowe, PE
PLOWE ENGINEERING, INC.
(651) 361-8210

Terry Derosier
WINDOW WORLD
(651) 226-5316

Permit Application Coversheet

Date December 11, 2019

Project Name Margaret Street Downtown Improvements Project Number 19-51

Applicant Name Scott Duddeck, City of North St. Paul

Type of Development Linear

Property Description

This project is located in downtown North St. Paul at Margaret Street and 7th Avenue. The applicant is proposing to reconstruct the roadway, sidewalks, and landscape features. The total site area is 2.42 acres. Due to soil contamination and spatial constraints in a fully developed downtown area, the applicant is proposing to pay into the Stormwater Impact Fund in the amount of $65,100 in lieu of onsite treatment. Parcels near the project site were reviewed for purchase to accommodate stormwater features, but there are none available at this time. The project will result in a slight decrease in impervious area.

Watershed District Policies or Standards Involved:

- ☐ *Wetlands*
- ☑ *Erosion and Sediment Control*
- ☑ *Stormwater Management*
- ☐ *Floodplain*

Water Quantity Considerations

The proposed stormwater management plan is sufficient to handle runoff from the site.

Water Quality Considerations

Short Term

The proposed erosion and sediment control plan is sufficient to protect downstream water resources during construction.

Long Term

The applicant will pay into the Stormwater Impact Fund to mitigate long term water quality considerations.

Staff Recommendation

Staff recommends approval of this permit with the special provisions.

Attachments:

- ☑ Project Location Map
- ☐ Project Grading Plan

#19-51 Margaret Street Downtown Improvements

Wetlands
- Manage A
- Manage B
- Manage C
- Lake
- Sediment Pond
- Not Assessed

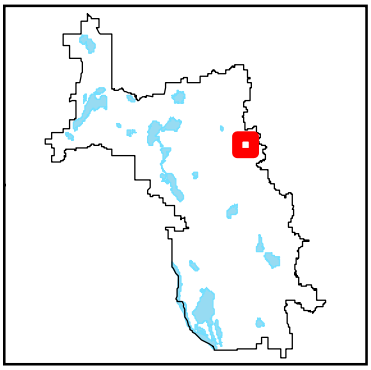
- RWMWD Boundary
- WMU
- Creeks
- Permits
- City Boundaries

Highlighted Areas Represent Active Permit

0 350 700
Feet

0 0.05 0.1
Miles

N



19-51

Special Provisions

1. The applicant shall submit a Stormwater Pollution Prevention Plan (SWPPP).

2. The applicant shall provide contact information for the trained erosion control coordinator responsible for implementing the SWPPP.

3. The applicant shall add notes to the plans:
A. Notify Nicole Soderholm, Ramsey-Washington Metro Watershed District, at 651-792-7976 prior to beginning any and all construction to schedule an initial SWPPP inspection.
B. The specified erosion and sediment control practices are the minimum. Additional practices may be required during the course of construction.

4. The applicant shall provide construction details for the proposed erosion and sediment control practices.

5. The applicant shall provide the final, signed plans set.

6. The applicant shall provide a copy of the approved Minnesota Pollution Control Agency's NPDES Construction Permit for the project.

7. The applicant shall submit a payment into the District's Stormwater Impact Fund in the amount of $65,100.

Permit Application Coversheet

Date December 11, 2019

Project Name Bailey Road Reconstruction Project Number 19-52

Applicant Name Nathan Arnold, Washington County

Type of Development Linear

Property Description

This project is located along Bailey Road between Lydia Lane and Radio Drive in the City of Woodbury. A majority of the project is located within South Washington Watershed District (SWWD). The applicant is proposing to reconstruct and expand Bailey Road in order to implement safety improvements including a pedestrian/bicycle trail, pedestrian ramps, signals, lighting, landscaping, and conversion from a rural ditch system to storm sewer with curb and gutter. The total site area is 30.6 acres. Water quality treatment has been provided in SWWD to partially meet the overall volume reduction requirement because a majority of the site drains there. Best Management Practices (BMPs) include stormwater reuse, filtration, and retention. While no volume reduction is proposed in Ramsey-Washington (RWMWD), the proposed project would reduce the overall drainage area and runoff rates to Carver Lake. Due to spatial constraints, the applicant is proposing to submit a payment into the District's Stormwater Impact Fund in the amount of $65,400 for the remaining impervious area left untreated. Drainage and vegetation improvements are proposed to a historical wetland at Gordon Bailey Elementary School, located in the RWMWD portion of the project (#19-04 WCA). The applicant has submitted a variance request for temporary disturbance to the wetland buffer in order to complete this work.

Watershed District Policies or Standards Involved:

- [x] *Wetlands*
- [x] *Erosion and Sediment Control*
- [x] *Stormwater Management*
- [ ] *Floodplain*

Water Quantity Considerations

The proposed stormwater management plan is sufficient to handle the runoff from the site.

Water Quality Considerations

Short Term

The proposed erosion and sediment control plan is sufficient to protect downstream water resources during construction.

Long Term

The proposed stormwater management plan is sufficient to protect the long term quality of downstream water resources.

Staff Recommendation

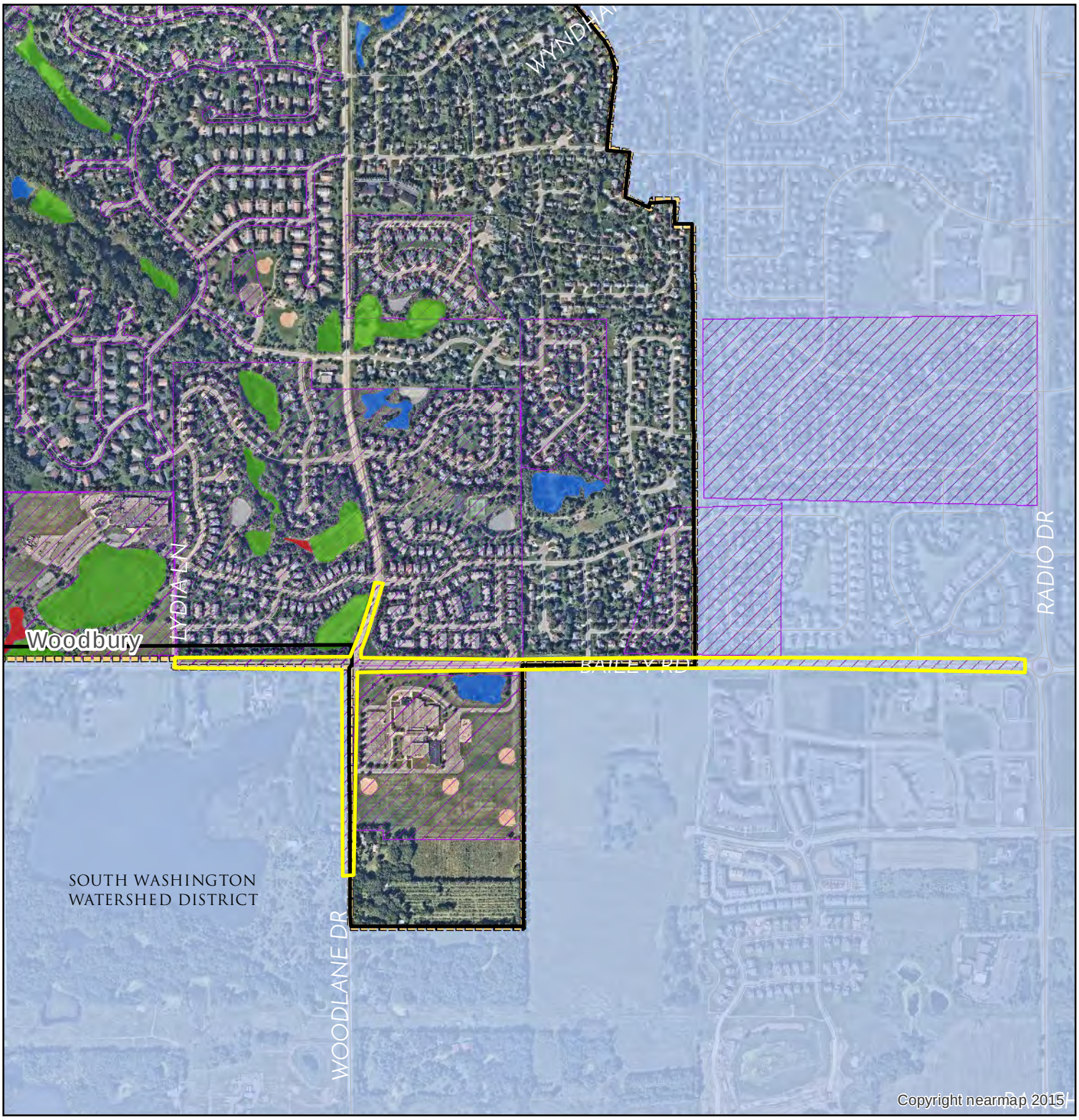
Staff recommends approval of this permit with the special provisions and variance request.

Attachments:

- [x] Project Location Map

- [ ] Project Grading Plan

#19-52 Bailey Road Reconstruction



Note: Shaded area is outside RWMWD

Wetlands
- Manage A
- Manage B
- Manage C
- Lake
- Sediment Pond
- Not Assessed

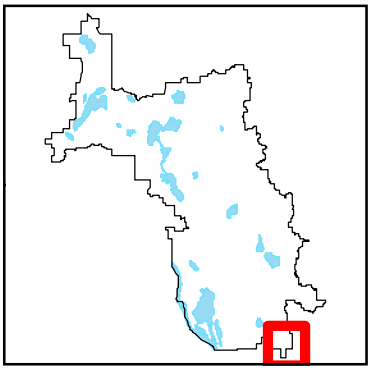
- RWMWD Boundary
- WMU
- Creeks
- Permits
- City Boundaries

Highlighted Areas Represent Active Permit

0 750 1,500
Feet

0 0.125 0.25
Miles

N



19-52

Special Provisions

1. The applicant shall submit the final, signed construction plans.

2. The applicant shall provide contact information for the trained erosion control coordinator responsible for implementing the Stormwater Pollution Prevention Plan (SWPPP).

3. The applicant shall add a note to the plans to notify Nicole Soderholm, Ramsey-Washington Metro Watershed District, at 651-792-7976 prior to beginning any and all construction activity to schedule an initial SWPPP inspection.

4. The applicant shall submit a copy of the approved Minnesota Pollution Control Agency's NPDES Construction Permit for the project.

5. The applicant shall submit a payment into the District's Stormwater Impact Fund of $65,400.

Memorandum

SRF No. 10206

To: Ramsey-Washington Metro Watershed District Board of Managers
Marj Ebensteiner, Cliff Aichinger, Pamela Skinner, Dianne Ward, and Larry Swope

From: Emily Deering, MN WDC #1339

Date: November 11, 2019

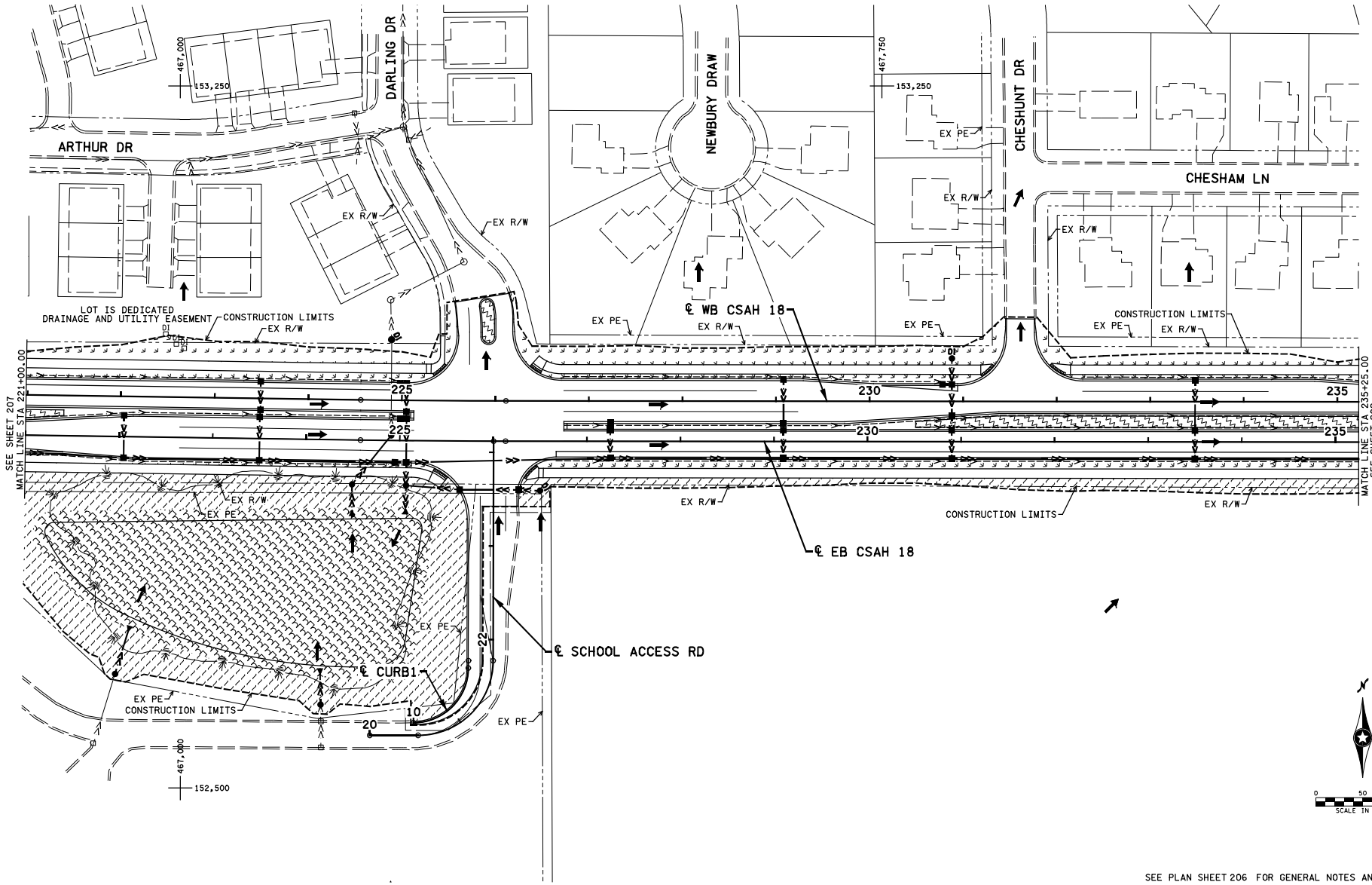
Subject: Variance Request
CSAH 18 – Management and Safety Project
Woodbury, MN

On behalf of Washington County, SRF Consulting Group, Inc. is submitting a variance request from Rule E Wetland Management. This variance request is part of the permit application for the CSAH 18 – Management and Safety Project.

Wetland W-4 is a shallow marsh and shrub-carr wetland. The wetland is located north of Gordon Bailey Elementary School, approximately 715 feet west of the Bailey Road / Woodlane Drive intersection. The aquatic resource has been significantly altered, with an expansion of the pond in the 1990s into an area that was previously upland. Wetland W-4 is a Manage C wetland, based on MnRAM analysis. Rule E requires an average buffer width of 25 feet with a minimum 12.5-foot buffer. The current wetland buffer is mowed turf grass.

During construction, the existing wetland buffer will be temporarily removed to allow improvements to the pond. Wetland vegetation will be removed and the pond will be lowered by approximately 3 feet. The outlet will be modified to improve bounce. The project will maintain the basin's existing wetland characteristics and expand its current area. Any adjacent fill will not increase discharge rates to the north and there will be no increase in flood level to the pond. The Project will maintain the basin's existing wetland characteristics. See attached Construction Plans.

Construction is scheduled to begin April 2020 and expected to be completed by November 2020. The wetland buffer will be reseeded with Seed Mixture 25-141 and stabilized with an erosion control blanket category 3N. See attached Turf Establishment Plans. Seed Mixture 25-141 is a mesic general roadside suitable for the current site land use (elementary school).



SEE PLAN SHEET 206 FOR GENERAL NOTES AND LEGEND

NO	DATE	BY	CKD	APPR	REVISION
					...\Plan\Final Plan\10206 .Bec03.dgn

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Print Name: AMBER E ORTLEPP

Date 9-27-19 License 50890

STATE AID PROJECT NO.
082-618-025
192-109-019

COUNTY PROJECT NO.
11806

CITY PROJECT NO.
19-2017-01

DRAWN BY
S MARTINS

DESIGNED BY
A JOHNSON

CHECKED BY
A ORTLEPP

COMM. NO. 170206

SRF

WASHINGTON COUNTY

EROSION CONTROL AND TURF ESTABLISHMENT PLANS

CSAH 18 MANAGEMENT AND SAFETY PROJECT

SHEET 208 OF 338

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9/30/2019
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RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

MEMORANDUM

Date: December 11, 2019

To: Board of Managers and Staff

From: Nicole Soderholm, Permit Coordinator

Subject: November Enforcement Action Report

During November 2019:

Number of Violations:	**6**
Install/Maintain Inlet Protection	2
Install/Maintain Perimeter Control	1
Stabilize Exposed Soils	2
Contain/Dispose of Liquid or Solid Waste	1

Activities:

Permitting assistance to private developers and public entities, permit review with Barr Engineering, miscellaneous inquiries, ongoing ESC site inspections and reporting, WCA administration/procedures, pre-application planning meetings, permit close-out inspections, U of M Certification Advisory Board meeting, Metro Watershed Regulators meeting

Project Updates:

Permit #19-38 Anchor Block Commons, North St. Paul

Staff completed a routine inspection on Nov 22nd and notified onsite personnel that all inactive soil must be stabilized within 7 days. Staff also noted that the rock entrance needed repair. Staff drove by the site several days later and found the rock entrance to be failing, and noted excessive tracking along the roadway. The contractor was notified and warned of enforcement escalation if necessary repairs were not made within permit timeframes. Temporary stabilization plans are currently being reevaluated due to snow accumulation and freezing temperatures.

Permit #17-22 Willow Ridge Apartments, Vadnais Heights

Permit staff received a complaint early in the month of excessive tracking from the site. An inspection was completed on Nov 5th and staff emphasized the importance of maintaining a proper anti-tracking entrance to the contractor. On Nov 20th another inspection was completed and found that tracking was an ongoing issue, which resulted in a non-compliant report. The contractor ordered additional rock for the entrance and agreed to increase the frequency of their street sweeper.

Permit #17-32 Villas of Gem Lake, Gem Lake

Development continues with homes in different phases of completion. Contractors have made improvements to perimeter control and street sweeping, however stabilization continues to be a reoccurring non-compliance issue. Email correspondence with the applicant and permit staff took place the week of Nov 18th; staff were notified that the site has been stabilized with hydromulch on Nov 26th. Staff will continue to inspect the site on a regular basis to ensure permit requirements are being met.

Permit #18-11 Whistler Pines, Shoreview

Significant progress has been made to this site including curb and gutter, asphalt driveway and a final graded basin. Staff noted on inspections that inlet bags need to be cleaned out, street sweeping is needed and entrances from exposed soil to paved surface must be installed. A phone call took place on Nov 19th with the contractor to discuss necessary site improvements. The contractor ensured all repairs would be made, and that the site was nearly ready to be stabilized for the winter. Staff will continue to inspect the site to ensure all necessary BMPs are in place and functioning.

Permit #18-24 Roseville Luxury Apartments, Roseville

Site work continues, mostly focused on finishing the interior and exterior of the apartment building. Large portions of the site were stabilized early on in the season, and smaller sections that have recently become inactive have been stabilized. The onsite senior superintendent, Ben Lato, was recognized with a Watershed Excellence award at the RWMWD Recognition Dinner on Nov 14th. Ben received this award because of his thoroughness in sediment and erosion control, and consistent communication with permit staff.

Permit #19-30 White Bear Lake Apartments, White Bear Lake

During an inspection on Nov 4th, staff observed and documented the underground infiltration system being installed. Perimeter control was in good shape and a vegetative buffer remained in place to act as additional perimeter control. Street tracking was noted on multiple inspections; the importance on maintaining entrances/sweeping was communicated to the contractor. The contractor informed staff that they have a daily sweeper scheduled and will continue to rough up rock entrances on a regular basis.

Permits Closed in November 2019:

15-22 Zibell Homes, Shoreview
16-22 Woodbury Medical Office Building
19-15 Spooner Park Improvements, Little Canada

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Stewardship Grant Program

****

RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

(651) 792-7950
rwmwd.org

2665 Noel Drive
Little Canada, MN 55117

December 11, 2019

To: Board of Managers
From: Paige Ahlborg

Re: Budget Adjustment - Reynen 19-11 CS

Thomas Reynen applied for the Best Management Practices Cost Share Program and was approved on 6/5/2019. The application funded the installation of 2 rain gardens to capture and treat stormwater runoff before it reaches Lake Emily in Shoreview. Project costs came in higher for due to additional work requested by staff to complete the project. Thomas Reynen is requesting a budget increase of $1,897.20 to the cost share application. This brings his total to $9,397.20. His project is eligible to receive $15,000.

Stewardship Grant Program Budget Status Update

December 11, 2019

Homeowner	Coverage	Number of Projects	Funds Allocated
Habitat Restoration and rain garden w/o hard surface drainage	50% Cost Share $15,000 Max	9	$24,564.65
Rain garden w/hard surface drainage, pervious pavement, green roof	75% Cost Share $15,000 Max	8	$64,926.25
Master Water Steward Project	100% Cost Share $15,000 Max	1	$7,500
Shoreland Restoration	100% Cost Share $15,000 Max	1	$12,000

Commercial, School, Government, Church, Associations, etc.	Coverage	Number of Projects	Funds Allocated
Habitat Restoration	50% Cost Share $15,000 Max	5	$25,900
Shoreland Restoration (below 100-year flood elevation w/actively eroding banks)	100% Cost Share $100,000 Max	2	$240,000
Priority Area Projects	100% Cost Share $100,000 Max	3	$341,000
Non-Priority Area Projects	75% Cost Share $50,000 Max	0	$0
Public Art	50% Cost Share	1	$6,000
Aquatic Veg Harvest/LVMP Development	50% Cost Share $15,000 Max	2	$15,000
Maintenance	50% Cost Share $5,000 Max for 5 Years	23	$19,200
Consultant Fees			$237,400
Total Allocated			**$989,090.90**

2019 Stewardship Grant Program Budget	
Budget	$1,250,000
Total Funds Allocated	$989,090.90
Total Available Funds	**$260,909.10**

RAMSEY-WASHINGTON
METRO WATERSHED DISTRICT

MEMORANDUM

DATE: December 11, 2019

TO: Board of Managers and Staff

FROM: Paige Ahlborg, Watershed Project Manager

SUBJECT: 2020 Stewardship Grant Program

At this meeting, staff will review the 2019 Stewardship Grant Program and discuss upcoming projects in 2020. Staff are not proposing any changes to the 2019 program.

Discussion Items

- Priority Areas: Staff recommend maintaining the 2019 water quality priority areas for 2020. Large-scale projects in these areas are eligible for 100% funding. Projects located within flood reduction, groundwater recharge, and certain demographic areas may be eligible for additional funding. See Table 1 for coverage amounts.

- Residential Project Coverage: Staff recommend continuing the maximum coverage amounts for residential and large-scale projects. See Table 1 for coverage amounts.

- Watershed Maintenance Grants: Staff recommend continuing the maintenance cost share grant which can be used by cost share recipients to assist with routine BMP maintenance. Applicants can receive up to 50% of the annual maintenance costs for a maximum of 5 years after project completion up to $5,000.

- Equity Initiative: Staff will continue to identify projects in areas of concentrated poverty and people of color. These projects are eligible for 100% funding and will be constructed and maintained for two years by a District hired contractor.

- Aquatic Plant Harvesting: 2018 was used as a pilot program year to develop criteria for an aquatic plant harvesting program. Staff recommend continuing this program for 2020.

- In the past, the Board of Managers has approved 100% funding for Master Water Steward projects. Staff recommend continuing this funding eligibility for 2020.

(651) 792-7950
fax (651) 792-7951
office@rwmwd.org
rwmwd.org
2665 Noel Drive
Little Canada, MN 55117

Action Items

Staff is requesting action from the Board on the following items:

- Approve the 2020 priority areas as the following subwatersheds: Battle Creek Lake, Battle Creek, Beaver Lake, Bennett Lake, Carver Lake, Fish Creek, Gervais Creek, Kohlman Creek, Kohlman Lake, Lake Emily, Lake Owasso, Shoreview Pond, Wakefield Lake, and Willow Creek.
- Approve 2020 coverage amounts as shown in Table 1.
- Approve staff to continue watershed maintenance, equity initiative, master water steward and aquatic plant harvesting grants.

Table 1. Proposed 2020 Cost Share Coverage

	Type of Projects	Cost Share %	Maximum $*
Homeowner Projects	Habitat Restoration & raingarden w/o hard surface drainage	50%	$15,000
	Raingarden w/ hard surface drainage, pervious pavement	75%	$15,000
	Shoreland Restoration (below 100 yr flood elevation w/ actively eroding banks)	100%	$15,000
Large Scale Projects: Commercial, Church, School, Government, Associations, etc.	Habitat Restoration	50%	$15,000
	Shoreland Restoration	100% below 100 yr flood elev. with actively eroding banks	$100,000
	Water Quality BMPs	75% in non-priority drainage areas	$50,000
		100% in priority drainage areas*	$100,000

*Projects located within RWMWD priority subwatersheds, flood reduction, groundwater recharge, and certain demographic areas may be eligible for additional funding. Contact us with your project location to determine maximum coverage amount.

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Action Items

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Request for Board Action

Board Meeting Date: December 11, 2019 **Agenda Item No.:** 8A

Preparer: Tina Carstens, Administrator

Item Description: 2020 CIP Maintenance and Repair Project Bid Award

Background:
Annually, the District completes a project to maintain the existing infrastructure owned and operated by the District, and to assist and facilitate stormwater pond cleanouts to allow other public entities to meet their municipal separate storm sewer system (MS4) requirements.

At the November meeting, staff presented the plans and cost estimate. The board directed Barr to finalize design, prepare the bidding package, and advertise the project for bid. The project was advertised, and the bids are scheduled to be received on December 5th. We will review the bids shortly thereafter and present them to the board for consideration at the December 11th meeting. If awarded, the contracting process will occur during December and construction will begin soon thereafter.

Applicable District Goal and Action Item:

Goal: Achieve quality surface water – The District will maintain or improve surface water quality to support healthy ecosystems and provide the public with a wide range of water-based benefits.

> **Action Item:** Maintain District projects and consider opportunities to support the maintenance activities of others.

Goal: Manage Risk of Flooding – The District will reduce the public's risk to life and property from flooding through programs and projects that protect public safety and economic well-being.

> **Action Item:** Maintain District flood storage facilities and storm sewer systems.

Staff Recommendation:
Staff recommends that the Board award the project to the responsive bidder whose bid was the lowest and whose involvement would be in the best interest of the District. Staff also recommends the Board direct staff to prepare and mail the Notice of Award, prepare the draft agreement and request and review the required submittals.

Financial Implications:
The CIP Maintenance and Repair project is included in the 2020 budget.

Board Action Requested:
Accept the bids and award the 2020 CIP Maintenance and Repair Project to _____. Direct staff to prepare and mail the notice of award, prepare the draft agreements and review the required submittals.

Request for Board Action

Board Meeting Date: December 11, 2019 **Agenda Item No:** 8B

Preparer: Tina Carstens, Administrator

Item Description: Capital Improvement Budget Fund Transfers

Background:
In an effort to clean up the budget status report and the open funds we have for project implementation, I am recommending that we close out a number of projects that have been completed.

- Fund 519: District Office Building Solar Energy Retrofit
- Fund 549: Beltline/Battle Creek Tunnel Repair
- Fund 550: Frost/Kennard Enhanced Water Quality BMP
- Fund 551: Markham Pond Dredging and Aeration
- Fund 554: Willow Pond CMAC

It is customary for the closed fund balances to be transferred to the capital improvement contingency fund. In this case though, we have funds left in our Beltline and Battle Creek Tunnel Repair construction fund that was levied for that purpose before the board decided to bond for the whole project. I am proposing that we transfer that $863,674 from fund 549 to the debt service fund that was established to pay down the debt on this project – fund 526. This money will sit in this fund as we pay our debt payments each year. We can then use these carry over funds instead of levying more funds for the payments. The rest of the projects balances can then be transferred to the contingency fund, 580. The approximate balance to be transferred to contingency with approval of resolution 19-03 is $148,400.

Applicable District Goal and Action Item:

Goal: Manage effectively – The District will operate in a manner that achieves its mission while adhering to its core principles.

Action Item: Maintain financial solvency and accountability.

Staff Recommendation:
Staff recommends approval of Resolution 19-03.

Financial Implications:
Resolution 19-03 will increase the CIP funds that it transfers money to.

Board Action Requested:
Approval of Resolution 19-03.

RESOLUTION 19-03

RESOLUTION RELATING TO THE ADJUSTMENT
OF THE CAPITAL IMPROVEMENTS BUDGET

WHEREAS, the Ramsey-Washington Metro Watershed District (District) budgeted for items related to the District Office Building Solar Retrofit (Fund 519), Beltline and Battle Creek Tunnel Repair (Fund 549), Frost/Kennard Enhanced Water Quality BMP (Fund 550), Markham Pond Dredging and Aeration (Fund 551), and Willow Pond CMAC (Fund 554); and

WHEREAS, the total revenue in the funds are greater than the total expenditures; and

WHEREAS, the projects are now complete;

NOW, THEREFORE, BE IT RESOLVED by the Board of Managers of the Ramsey-Washington Metro Watershed District that the District authorize closing the fund 549 and transferring the balance to fund 526 (Debt Service for Beltline and Battle Creek Tunnel Repair);

NOW, THEREFORE, BE IT FURTHER RESOLVED by the Board of Managers of the Ramsey-Washington Metro Watershed District that the District authorize the closing of funds 519, 550, 551, and 554 and transferring the total fund balance to fund 580 (Capital Improvement Contingency Fund).

Adopted by the Board of Managers of the Ramsey-Washington Metro Watershed District this 11th day of December, 2019.

_____
Marj Ebensteiner, President

Attest:

_____
Cliff Aichinger, Vice President

Request for Board Action

Board Meeting Date: December 11, 2019 **Agenda Item No.:** 8C

Preparer: Tina Carstens, Administrator

Item Description: Adopt Final FY 2020 Budget and Certify Final Levy.

Background:
The District Board of Managers adopted the draft budget at the September Board meeting for review and comment by the cities and counties. No written or verbal comment have been received.

The Board held its required public hearing on September 12, 2019. No comments were received at the public hearing or after the hearing. The preliminary budget was placed on the website and the final will also be placed there for public information.

Since the approval of the preliminary budget in September, I have made just one change to the budget based on the anticipated action of the board in action item 8B. I moved the Beltline and Battle Creek Tunnel Repair Debt Service item from a levy item to a carryover item because of the transfer of funds from the construction fund 549.

With that change, I am proposing a levy increase of 0.60%. See the attached table for more information.

Applicable District Goal and Action Item:
The District budget relates to all facets of the District operations, since it provides the funds for staff and project activities.

Staff Recommendation:
Approve the Final General Fund and CIP budgets and approve certification of the final levy as indicated in the budget table and on the attached Resolution 19-04.

Financial Implications:
This year's levy reflects an increase from the 2019 levy of 0.60%.

Board Action Requested:
Approve the proposed FY 2020 General Fund and CIP budgets and adopt resolution 19-04.

Fiscal Year 2020 Budget V5
December 11, 2019 Board Meeting Final Budget and Levy Approval

Budget ID Number	Budget Item		FY 2019 Budget	FY 2020 Budget Fund Source				Total Proposed 2020 Budget	Increase (decrease) from 2019 Budget
				General Fund	Capital Improvements	Carry-over Funds	Grant Funds		
1	**Engineering**	Administration	**93,000**	**93,000**				**93,000**	0
2		Engineering Review	**55,000**	**55,000**				**55,000**	0
3		Permit Application Review	**55,000**	**55,000**				**55,000**	0
4		Permit Inspection and Enforcement	**10,000**	**10,000**				**10,000**	0
5		Project Feasibility Studies	**790,000**	**515,000**			**55,000**	**570,000**	(220,000)
6		GIS Maintenance	**5,000**	**5,000**				**5,000**	0
7									
8	**Attorney**	General	**40,000**	**40,000**				**40,000**	0
9		Permit Enforcement	**10,000**	**10,000**				**10,000**	0
10									
11	**Managers**	Meeting Per diems	**6,500**	**8,500**				**8,500**	2,000
12		Managers Expenses	**3,500**	**3,500**				**3,500**	0
13									
14	**Auditor/Accounting**	Auditor/Accounting	**55,000**	**60,000**				**60,000**	5,000
15									
16	**Miscellaneous**	Dues & Publications	**11,000**	**11,000**				**11,000**	0
17		Insurance	**35,000**	**40,000**				**40,000**	5,000
18		Committee & Board Meeting Expenses	**3,500**	**3,500**				**3,500**	0
19		Miscellaneous	**5,000**	**5,000**				**5,000**	0
20									
21	**Administrative**	Salary & Benefits	**1,385,000**	**1,450,000**				**1,450,000**	65,000
22		Employee Expenses	**10,000**	**10,000**				**10,000**	0
23		Janitorial/Trash Services/Snow Plowing	**17,000**	**15,000**				**15,000**	(2,000)
24		Building Maintenance	**300,000**	**200,000**				**200,000**	(100,000)
25		Utilities (gas,electric, water, sewer, maintenance)	**20,000**	**20,000**				**20,000**	0
26		Office Supplies	**5,000**	**5,000**				**5,000**	0
27		Copying/Printing	**8,000**	**8,000**				**8,000**	0
28		Postage/Delivery	**10,000**	**5,000**				**5,000**	(5,000)
29		Office Furniture & Computer Equipment	**40,000**	**150,000**				**150,000**	110,000
30		Office Equipment Maintenance	**3,000**	**3,000**				**3,000**	0
31		Training/Education	**25,000**	**25,000**				**25,000**	0
32		Telephone	**8,000**	**8,000**				**8,000**	0
33		District Vehicles/Maintenance	**43,000**	**43,000**				**43,000**	0
34		GIS System Maintenance & Equip.	**10,000**	**10,000**				**10,000**	0
35		Data Base Improvements	**5,000**	**5,000**				**5,000**	0
36		IT Services/Internet/Website/Software Licenses	**45,000**	**55,000**				**55,000**	10,000
37		Outside Program Support	**57,000**	**57,000**				**57,000**	0
38		Outside Consulting Services	**40,000**	**40,000**				**40,000**	0
39									
40	**Program**	Lake Studies/WRPPs/TMDL Reports	**68,000**	**173,000**				**173,000**	105,000
41	**Activities**	Natural Resources Program	**115,000**	**140,000**				**140,000**	25,000
42		Water Monitoring-Lab Costs & Equip.	**300,000**	**185,000**				**185,000**	(115,000)
43		Lake Macrophyte Monitoring	**10,000**	**10,000**				**10,000**	0
44		Research Projects	**115,000**	**95,000**				**95,000**	(20,000)
45		Project Operations	**160,000**	**160,000**				**160,000**	0
46		Education Program	**60,000**	**60,000**				**60,000**	0
47		Communications and Marketing	**25,000**	**25,000**				**25,000**	0
48		Events	**50,000**	**50,000**				**50,000**	0
49		NPDES Phase II	**10,000**	**10,000**				**10,000**	0
50		Health & Safety Program/Staff In-House Training	**3,000**	**3,000**				**3,000**	0
51									
52	**Capital Improvements**	Maplewood Mall SRF Loan Debt Service	**91,950**		**92,611**			**92,611**	661
53	**Summary**	Beltline and Battle Creek Tunnel Repair Debt Service	**307,163**			**307,463**		**307,463**	300
54		District Office Building Bond Payment	**194,885**		**194,885**			**194,885**	0
55		Targeted Retrofit Projects	**978,760**		**1,012,000**			**1,012,000**	33,240
56		BMP Stewardship Grant Fund	**1,250,000**		**800,000**	**200,000**		**1,000,000**	(250,000)
57		Project Repair & Maintenance	**1,120,000**		**615,000**	**500,000**		**1,115,000**	(5,000)
58		Wakefield Park Project	**1,100,000**		**0**	**0**		**0**	(1,100,000)
59		Markham Pond Dredging and Aeration	**65,000**		**0**	**0**		**0**	(65,000)
60		Willow Pond CMAC	**300,000**		**0**	**0**		**0**	(300,000)
61		Volume Reduction Opportunity Fund	**1,500,000**		**100,000**	**1,500,000**		**1,600,000**	100,000
62		Flood Risk Reduction Fund	**2,500,000**		**1,500,000**	**2,500,000**		**4,000,000**	1,500,000
		Totals	13,532,258	3,934,500	4,314,496	5,007,463	55,000	13,311,459	(220,799)

	Budget Total	Budget Total By Fund		Proposed Final Levy
		General Fund	CIB	
2020 Budget Total and totals by fund	13,311,459	3,989,500	9,321,959	6,803,996
2019 Budget Total and totals by fund	13,532,258	4,124,500	9,407,758	6,763,498
2020 Budget Increase or (Decrease) from 2019 Budget	(220,799)	(135,000)	(85,799)	40,498
2020 Budget % change from 2019 Budget	-1.63%	-3.27%	-0.91%	0.60%

RESOLUTION 19-04

RESOLUTION APPROVING THE 2020 BUDGET AND FINAL PAYABLE 2020 TAX LEVY

WHEREAS, the Ramsey-Washington Metro Watershed District Board of Managers adopted a proposed budget and payable 2020 levy on September 12, 2019; and

WHEREAS, the Ramsey-Washington Metro Watershed District distributed the proposed budget and levy for review and comment to all Cities and Counties; and

WHEREAS, The District held a public hearing on the budget, Capital Improvements Program and proposed levy on September 12, 2019;

NOW, THEREFORE, BE IT RESOLVED by the Board of Managers of the Ramsey-Washington Metro Watershed District that the General Fund and Capital Improvements Budget be approved and the following final levy be certified to Ramsey and Washington Counties.

General Revenue Levy	$6,711,385
Debt Service Levy	$92,611
Total Levy	$6,803,996

Adopted by the Board of Managers of the Ramsey-Washington Metro Watershed District this 11th day of December, 2019.

_____

Marj Ebensteiner, President

Attest:

_____

Cliff Aichinger, Vice President

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Administrator's Report

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MEMO

TO: Board of Managers and Staff

FROM: Tina Carstens, Administrator

SUBJECT: December Administrator's Report

DATE: December 11, 2019

A. **Meetings Attended**

Wednesday, November 6	6:30 PM	Board Meeting
Thursday, November 7	11:00 AM	Check with Met Council
Tuesday, November 12	9:00 AM	Health Insurance Staff Meeting
Thursday, November 14	5:00 PM	Watershed Excellence Awards
Tuesday, November 19	10:00 AM	Audit Planning Meeting
	2:00 PM	Sea Grant Partner Interview
Friday, November 22	10:30 AM	Budget and Project Meeting with Barr
Wednesday, December 4	9:00 AM	Administrator's Meeting at MAWD
Thursday, December 5	ALL DAY	MAWD Annual Meeting
Friday, December 6	ALL DAY	MAWD Annual Meeting

B. **Upcoming Meetings and Dates**

Board Workshop Meeting re: Beltline Resiliency	Tuesday, December 17 – 6:00 pm
Staff and Board Holiday Luncheon	Thursday, December 19 – 1:00 pm
January Board Meeting	Wednesday, January 8, 2020

C. **MAWD Annual Meeting Discussion**

Since the board meeting is right after the MAWD Annual Meeting, I just wanted to reserve this time for those that attended to discuss anything they'd like to share with the rest of the board.

D. **Special Meeting for Beltline Resiliency Study**

As requested, I have scheduled a special board meeting for Tuesday, December 17, 2019 at 6:00 – 8:00 PM. The subject of this special meeting is for the board to have a staff presentation on the Beltline Resiliency Study and have a dedicated time for the board to ask staff questions about the study and discuss the potential next steps. No actions will be asked of the board at this meeting.

This special board meeting is an open meeting which means that the public is welcome to attend and listen to the discussion the board is having. To address the desire for the public to be able to comment on the study, I am proposing that the board set a written public comment period. I would suggest that those comments be received in writing, then staff would respond to them also in writing and provide the comments and responses to the board at a following meeting.

E. **January Meeting Change and Annual Meeting Reminder**

Just a reminder that the January board meeting had previously been rescheduled for Wednesday, January 8th, 2020. This meeting will also be the District's annual meeting. The annual meeting requires the election of officers and designation of official newspapers and banks.

Every two years the District is required to solicit interest proposals for our engineering, accounting, and attorney services. The deadline to receive letters of interest is January 2, 2020. All that are received will be included in the January board packet for your information as you make the annual selection.

I would like to be sure that we will have a full board at the January meeting if possible. If you have any known conflicts, let me know. Thank you!

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Project and Program Status Reports

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Twin Lake Flood-Risk Mitigation Feasibility Study

Prepared for
Ramsey-Washington Metro Watershed District

December 2019

4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435
952.832.2600
www.barr.com

Twin Lake Flood-Risk Mitigation Feasibility Study

December 2019

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Certifications

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Brandon Barnes
PE #: 49540

December 3, 2019
Date

Abbreviations

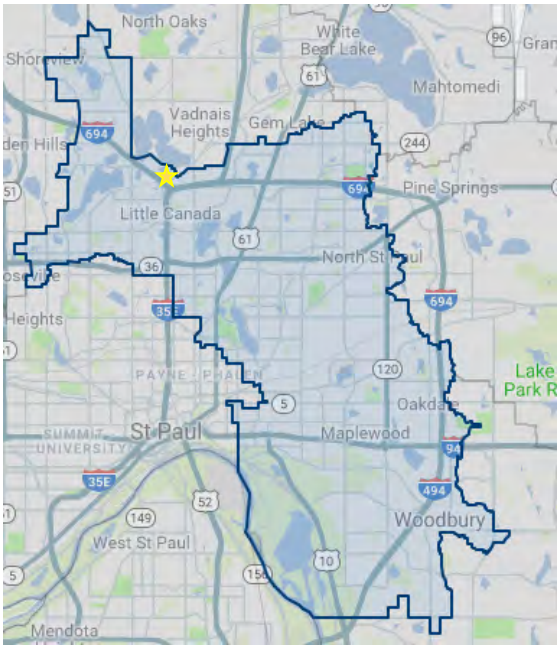
BP	British Petroleum
BWSR	Board of Soil and Water Resources
cfs	Cubic feet per second
ERP	Emergency Response Plan
FEMA	Federal Emergency Management Agency
HEC-SSP	Hydrologic Engineering Center Statistical Software Package
ID	Identification
MDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MnRAM	Minnesota Rapid Assessment Method for Evaluating Wetland Functions
MPCA	Minnesota Pollution Control Agency
MS4	Municipal Separate Storm Sewer System
MSP	Minneapolis-Saint Paul International Airport
NAVD88	North America Vertical Datum of 1988
NGVD29	National Geodetic Vertical Datum of 1929
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWL	Normal Water Level
OHW	Ordinary High Water
RWMWD	Ramsey-Washington Metro Watershed District
SP	State Project
SPRWS	Saint Paul Regional Water Services
SWMM	Stormwater Management Model
SWPPP	Stormwater Pollution Prevention Plan
TP40	Technical Paper 40
USACE	United States Army Corps of Engineers

Executive Summary

During the spring and summer of 2019, record high water levels were measured in Twin Lake. Lake levels exceeded the 100-year water level and the low floor elevation of the lowest habitable structure on Twin Lake (154 Twin Lake Boulevard). In response to recent high water levels, the RWMWD Board of Managers authorized the evaluation of alternatives to reduce flood risk to habitable structures.

An evaluation for flood-risk reduction alternatives was completed relative to applicable design criteria and flood-risk mitigation goals. For the context of this feasibility study, design criteria are the minimum requirements each flood-risk alternative must achieve based on the rules and requirements of entities with permitting authority. Flood-risk mitigation goals are objectives that go above and beyond minimum design criteria. The evaluation for each alternative considered floodplain impacts, regulatory approvals, affected property owners, wetland/upland impacts, and cost to construct and maintain. A feasibility evaluation was completed for the following alternatives:

- Alternative 1: Remove flood-prone structure
- Alternative 2: Emergency response plan
- Alternative 3: Gravity outlet at elevation 874.0
- Alternative 4: Gravity outlet at elevation 872.2



Twin Lake location within RWMWD.

In addition, other alternatives were considered and ultimately discarded because they did not meet the minimum design criteria. These included a permanent stormwater lift station and lowering the embankment north of Waldo Pond.

Based on the evaluation, Alternative 4, gravity outlet at elevation 872.2, is recommended as the most feasible flood-risk mitigation alternative. This alternative would include a gravity outlet at elevation 872.2 consisting of a ditch and gravity pipe with a valve through the existing embankment. This alternative would include a detailed operating plan that describes when the valve could be opened and when it should be closed. This recommendation is based on Twin Lake flood-risk mitigation objectives, as well as the assessment of downstream impacts, site and wetland impacts, and flexibility for long-term management. Alternative 4 does discharge additional water downstream and therefore increases the flood risk to properties along Gervais Creek and in the Phalen Chain. However, adherence to an operating plan developed consistent with permitting requirements and hydrologic modeling will reduce the risk for Alternative 4.

Alternative 4 is a feasible project, consistent with the 2019 District Management Plan and based on available information and requirements of permitting entities. This alternative mitigates flood risk while protecting the water quality of Twin Lake.

The engineer's opinion of probable cost for the design, permitting, and construction of Alternative 4 is $226,000, with a potential range of $181,000 to $339,000, based on the current level of design. As plans and specifications for the recommended alternative are prepared, the District should continue to collaborate with City of Little Canada staff about design details and long-term maintenance. If the Board elects to pursue the project, it is recommended that coordination with the City of Little Canada start in the near-term to develop a cooperative agreement in advance of the project implementation, and coordination with the property owners regarding easement acquisition begin prior to final design.

1 Introduction

This report summarizes the feasibility evaluation of proposed modifications that would reduce flood risk to habitable structures in the Twin Lake watershed in Little Canada and Vadnais Heights, Minnesota. Figure 1-1 illustrates the Twin Lake watershed, drainage patterns, and contributing subwatersheds under historically typical conditions. This report is prepared under the direction of the Board of Managers of the Ramsey-Washington Metro Watershed District (RWMWD or District).

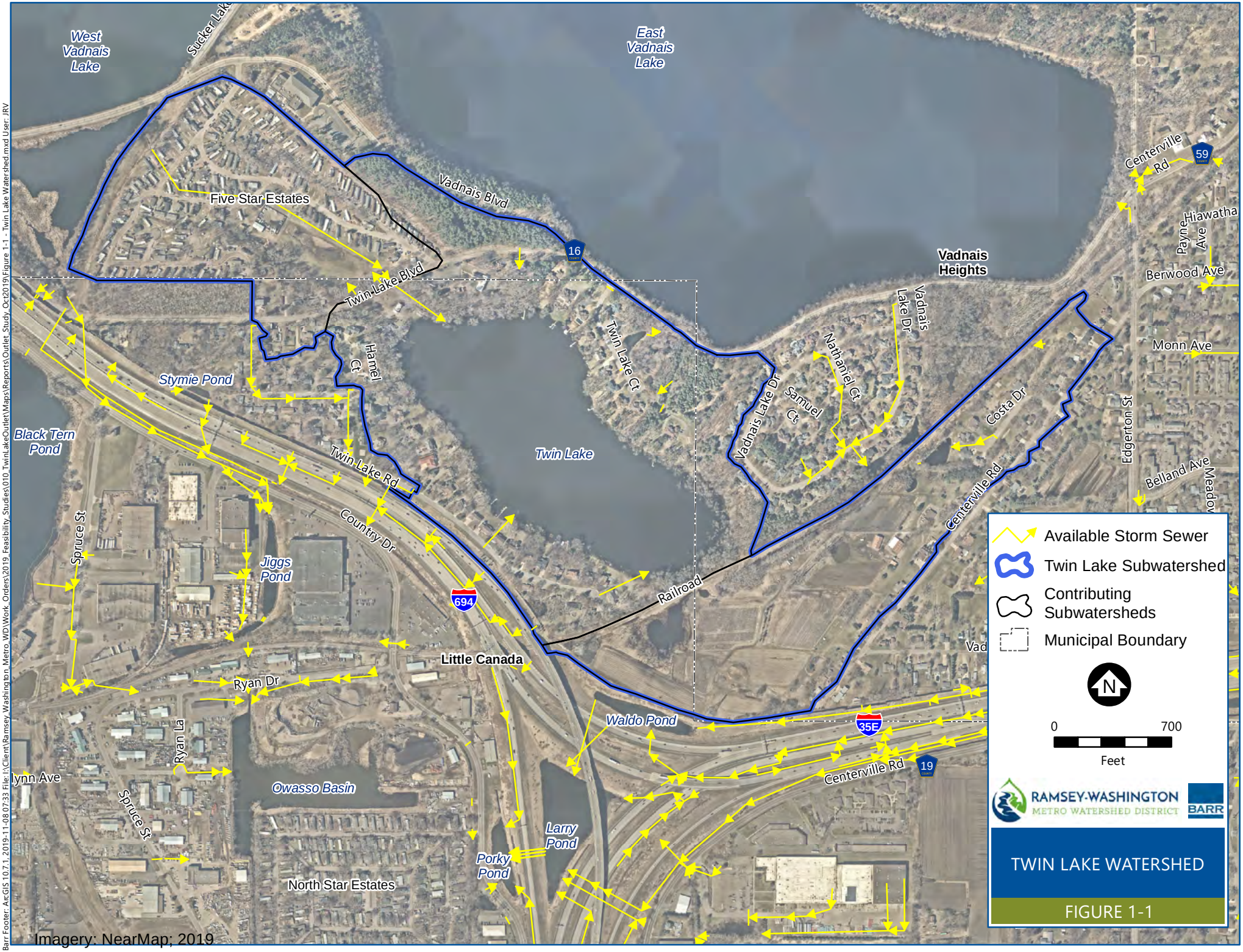
The District was established on February 24, 1975, by the Minnesota Water Resources Board (now the Minnesota Board of Water and Soil Resources, or BWSR), pursuant to the Minnesota Watershed Act, to affect the protection and provident use of water resources. The District is located in eastern Ramsey County and western Washington County, encompassing an area of nearly 65 square miles.

Stormwater management and development were guided by the District's 1977 Overall Plan, which was revised in December 1986, May 1997, June 2007, and April 2017 in accordance with the Metropolitan Surface Water Management Act and Watershed Law (Minnesota Statutes Chapters 103B and 103D). The April 2017 plan is the current guiding document of the District (the Plan) and prioritizes, "flood-mitigation projects to protect habitable structures or major arterial roadways" (reference [1]).

RWMWD defines the term "habitable" as:

> *Any enclosed space usable for living or business purposes, which includes but is not limited to: working, sleeping, eating, cooking, recreation, office, office storage, or any combination thereof. An area used only for storage incidental to a residential use is not included in the definition of Habitable* (reference [2]).

During the spring and summer of 2019, record high water levels were measured in Twin Lake. Lake levels exceeded the 100-year water level and the low floor elevation of the lowest habitable structure on Twin Lake (154 Twin Lake Boulevard). In response to recent high water levels, the RWMWD Board of Managers authorized the evaluation of alternatives to reduce flood risk to habitable structures.



2 Lake and Watershed Description

Twin Lake is located in the northwest portion of the RWMWD. The drainage area to Twin Lake is approximately 192 acres; historically, the lake has functioned as a landlocked water body. "Landlocked" water bodies or lakes refer to basins where historic water levels have remained below the overflow elevation. Typically, the water balance for Twin Lake has been in a relative state of equilibrium—where the runoff from the subwatershed is generally equal to groundwater seepage and evaporation to the atmosphere.

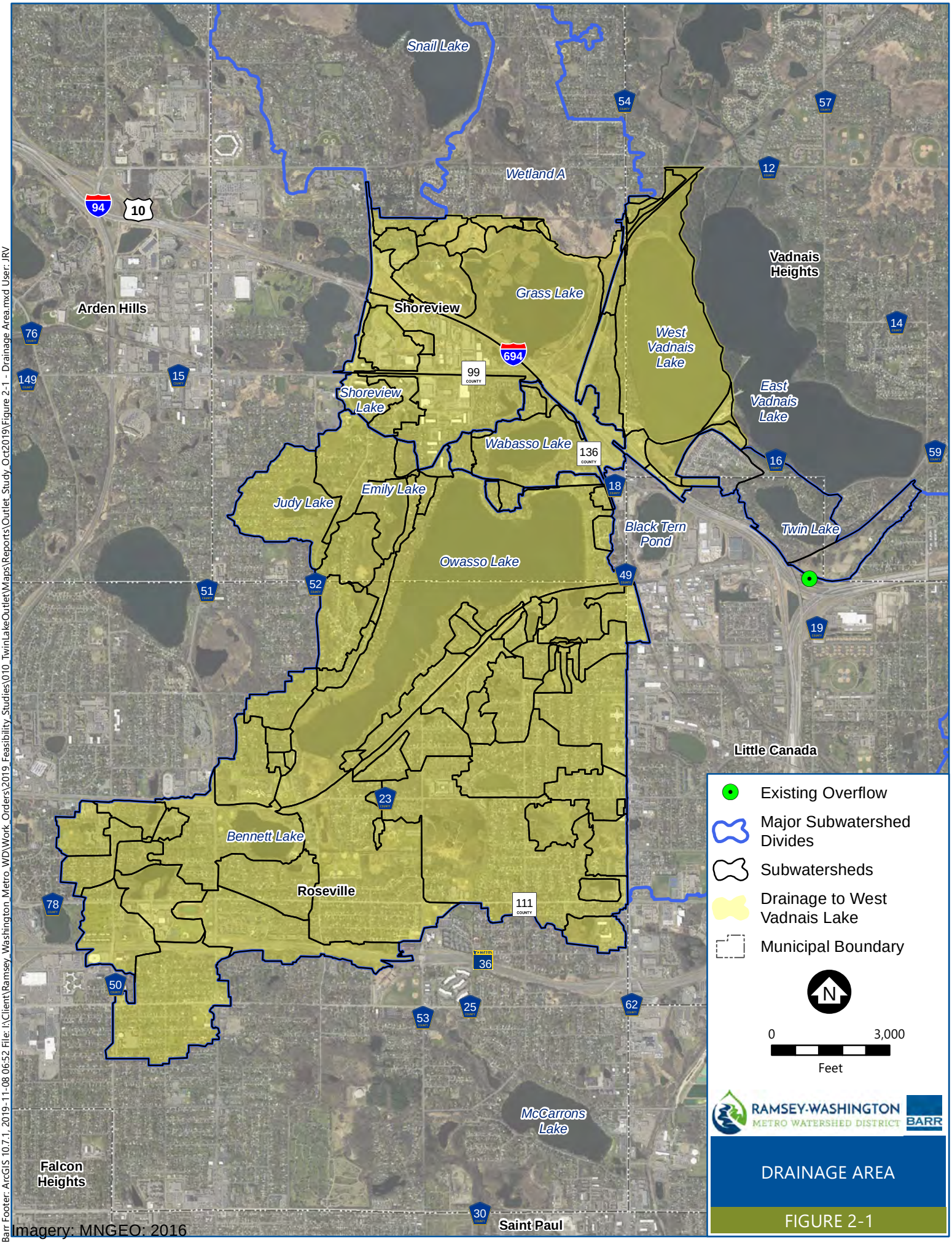
Table 2-1 provides a summary of the physical characteristics for Twin Lake. Twin Lake has an open-water surface area of approximately 33.5 acres and a maximum depth of approximately 33 feet. The lake area, depth, and volume depend on the water level of the lake, which typically varies between an elevation of 869 and 870 feet (reference [3]).

Table 2-1 Twin Lake Physical Parameters

Lake Characteristic	Twin Lake
Minnesota Department of Natural Resources (MDNR) identification (ID)	62-0039-00
MPCA Lake Classification	Deep
MDNR ordinary high water (OHW) elevation	869.9
Water-level-control elevation (feet)	877.0
Surface area (acres)	Approximately 33.5
Maximum depth (feet)	Approximately 33
Littoral area	44%
Volume (at OHW elevation) (acre-feet)	Approximately 565
Total watershed area (acres)	192 (1)
Trophic status based on 2015 growing season average water quality data	Mesotrophic

Note(s):
(1) Watershed area includes surface area of lake and does not consider overflows from West Vadnais Lake.

During the summer of 2019, West Vadnais Lake levels reached record highs causing water to overflow into Twin Lake, increasing the drainage area to Twin Lake to over 5,000 acres. The watershed historically tributary to Twin Lake and the larger watershed tributary to West Vadnais Lake which overflowed to Twin Lake during 2019 are shown in Figure 2-1.



Barr Footer: ArcGIS 10.7.1, 2019-11-08 06:52 File: I:\Client\Ramsey_Washington_Metro_WD\Work_Orders\2019_Feasibility_Studies\010_TwinLakeOutlet\Maps\Reports\Outlet_Study_Oct2019\Figure 2-1 - Drainage Area.mxd User: JRV

2.1 Twin Lake and Downstream Drainage System

Historically, Twin Lake has functioned as a landlocked water body. Typically, inflows to the lake have been relatively equal to infiltration and evaporation. However, if the water levels rise, the lake can overflow to the Gervais Creek subwatershed. The following sections describe the current drainage patterns within the Twin Lake subwatershed, and existing flood-prone areas in the Twin Lake and downstream subwatersheds.

2.1.1 Current Drainage Patterns

Historically, the drainage area to Twin Lake has been approximately 192 acres. The drainage area includes approximately 38 acres north of Twin Lake Boulevard and approximately 53 acres south of the railroad tracks.

The area northwest of Twin Lake Boulevard includes the Five Star Estates development. In this area, stormwater is collected in the storm sewer system, which discharges to a culvert below Twin Lake Boulevard and outlets to Twin Lake, as shown on Figure 2-2.

Figure 2-2 Culvert below Twin Lake Boulevard

The culvert below Twin Lake Boulevard conveys stormwater from the Five Star Estates development into Twin lake. Survey completed by Barr Engineering Co., August 2018. The green icon indicates the location of the inset photograph.

On the south side of Twin Lake there is a culvert below the railroad tracks. There are approximately 53 acres south of the railroad tracks that drain to the culvert. During dry periods, some stormwater is stored in the pond and wetland south of the railroad tracks. During wet periods, stormwater from this area flows

north into Twin Lake. Figure 2-3 and Figure 2-4 show the area are upstream (south) and downstream (north) of the culvert below the railroad tracks.

Figure 2-3 Upstream of Culvert below Railroad Tracks

The culvert below the railroad tracks conveys stormwater north into Twin Lake. The green icon indicates the location of the inset photograph. The inset photograph shows the area facing north, towards the inlet of the culvert below the railroad tracks. The PVC pipe in the inset photograph is a field crossing installed by the property owner. Survey completed by Barr Engineering Co., August 2018.

Figure 2-4 Downstream of Culvert below Railroad Tracks

The culvert below the railroad tracks conveys stormwater north into Twin Lake. The green icon indicates the location of the inset photograph. The inset photograph shows the area facing southwest; the railroad tracks are on the left and Twin Lake is to the right. Survey completed by Barr Engineering Co., August 2018.

The overflow outlet from the watershed is to the Minnesota Department of Transportation (MnDOT) stormwater pond in the I-694 right-of-way (named "Waldo Pond"). As shown in Figure 2-5, the low point in the embankment is 877.0. If water were to overtop the embankment, it would flow downstream through the I-694 storm sewer system into Gervais Creek, the Phalen Chain of Lakes, and ultimately the Mississippi River.

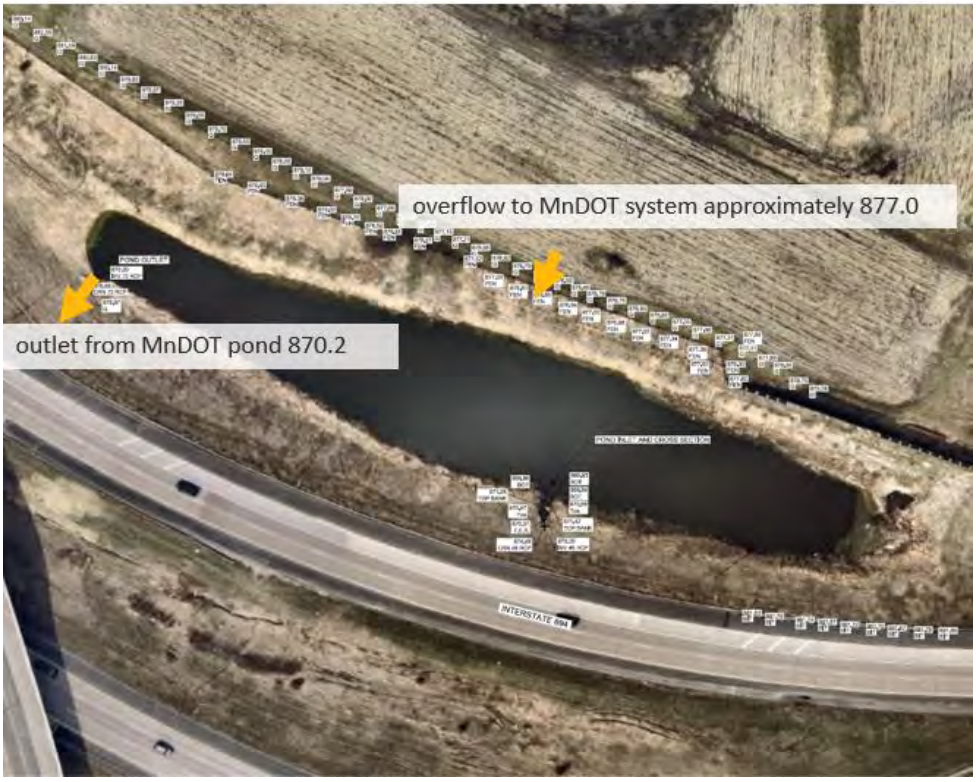


Figure 2-5 Watershed Overflow Location

The overflow from the Twin lake watershed is south into Waldo Pond. Survey completed by Barr Engineering Co., August 2018.

2.1.2 Existing Flood-Prone Areas

Drainage near the Twin Lake watershed was evaluated to define the 100-year floodplain downstream of Twin Lake, the 100-year floodplain on Twin Lake, and the Twin Lake stage-duration curve. A 100-year flood level is the flood level of a waterbody or low-lying area that has a 1-percent chance of occurring or being exceeded in any given year. It is determined by either storm event modeling or a statistical frequency analysis. A 100-year floodplain is the area inundated at the 100-year level elevation.

2.1.2.1 Existing Floodplain Downstream of Twin Lake

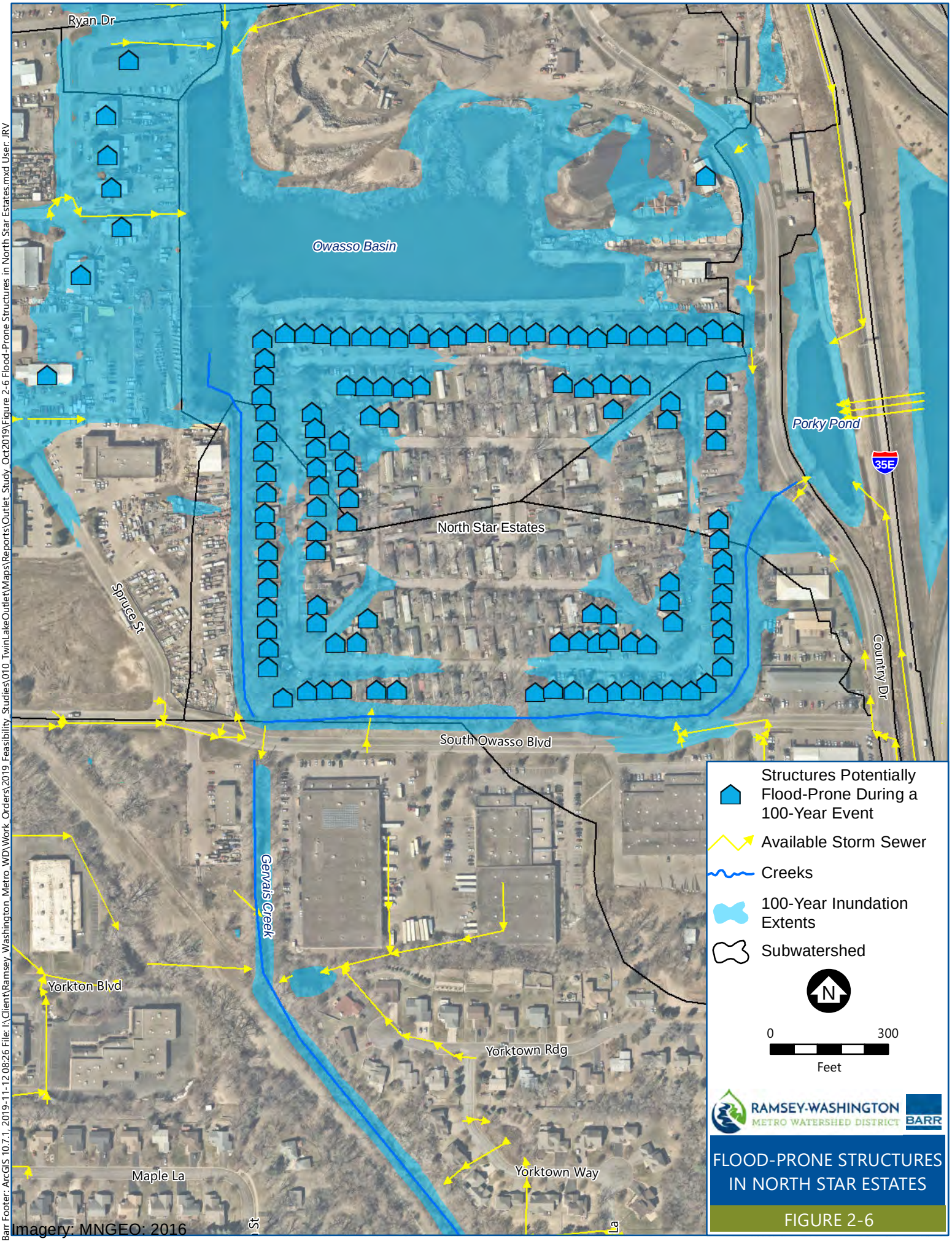
Through the adoption of the District Plan, the District establishes 100-year flood levels for District-managed waterbodies based on hydrologic and hydraulic modeling using Atlas 14 precipitation data (reference [1]). One-hundred-year water surface elevations published in the District Plan or subsequent

studies may differ from Federal Emergency Management Agency (FEMA) base flood elevations published prior to the adoption of Atlas 14.

For the subwatersheds downstream of a potential outlet from Twin Lake, including Gervais Creek, the Phalen Chain of Lakes, and the Saint Paul Beltline, the District stormwater model was used to calculate the 100-year water levels. The District stormwater model was developed using U.S. Environmental Protection Agency's Storm Water Management Model (SWMM) with a computerized graphical interface developed by XP Solutions, now Innovyze (XP-SWMM, version 2014). XP-SWMM simulates both the hydrologic and hydraulic components of watershed modeling. The model uses rainfall and watershed characteristics to generate watershed runoff (hydrology), which is routed simultaneously through pipes and overland flow paths (hydraulics). The model also accounts for detention in ponding areas, backflow in pipes, and tailwater conditions that may exist and affect upstream storage or pipe flows.

Model parameters have been calibrated to measured lake levels throughout the District (reference [4]). The 100-year water levels were simulated using the 100-year, 4-day duration Atlas 14 rainfall depths. Floodplain extents were used to define potentially flood-prone structures in the downstream subwatersheds. The District model assumes that stormwater culverts, sewers, and lake outlets are all free of debris and functioning as designed for calculating floodplain elevations.

North Star Estates, a development located west of the I-35E and I-694 interchange (shown in Figure 2-6), has 114 structures below the 100-year floodplain. Further downstream there are two structures on Gervais Lake, shown in Figure 2-7, whose low entry elevations are below the 100-year floodplain.



2.1.2.2 Existing Twin Lake Floodplain

Twin Lake is a landlocked lake. Water levels in landlocked lakes fluctuate depending on climatic and groundwater conditions. The two primary outflows from landlocked lakes are evaporation and net groundwater outflow, or seepage. Due to the variability in the water surface elevations, the water level prior to running a design rainfall event can vary. Also, prior to 2018, lake levels were not officially taken or recorded in Twin Lake, leaving no historical record of measured lake levels to evaluate. Therefore, Twin Lake was evaluated using 70 years of historical, continuous rainfall data to generate a time series of historical water levels. Then the water levels were statistically evaluated to calculate the elevation corresponding to a 1-percent-annual-probability of occurrence, which is also referred to as the 100-year water level.

Barr used the District's stormwater model to simulate existing conditions in the Twin Lake watershed. The XP-SWMM model's hydrologic inputs were previously calibrated (reference [4]). The evaluation assumes that future hydrologic conditions will match existing hydrology and that the net seepage rate to groundwater and groundwater elevations remain constant during the 70-year simulation.

Historic, hourly precipitation and temperature data from the Minneapolis-Saint Paul International Airport (MSP) weather station were used to model 70-continuous years from January 1949 through December 2018. Years prior to 1949 were not modeled due to the lack of precipitation data. The Twin Lake continuous modeling results are shown in Figure 2-8.

Twin Lake Ordinary High Water (OHW) elevation is determined by the MDNR in the field. The OHW is defined as the elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence on the landscape, typically at the point were natural vegetation changes from aquatic to terrestrial (reference [5]). The OHW for Twin Lake is 869.9 (reference [3]).

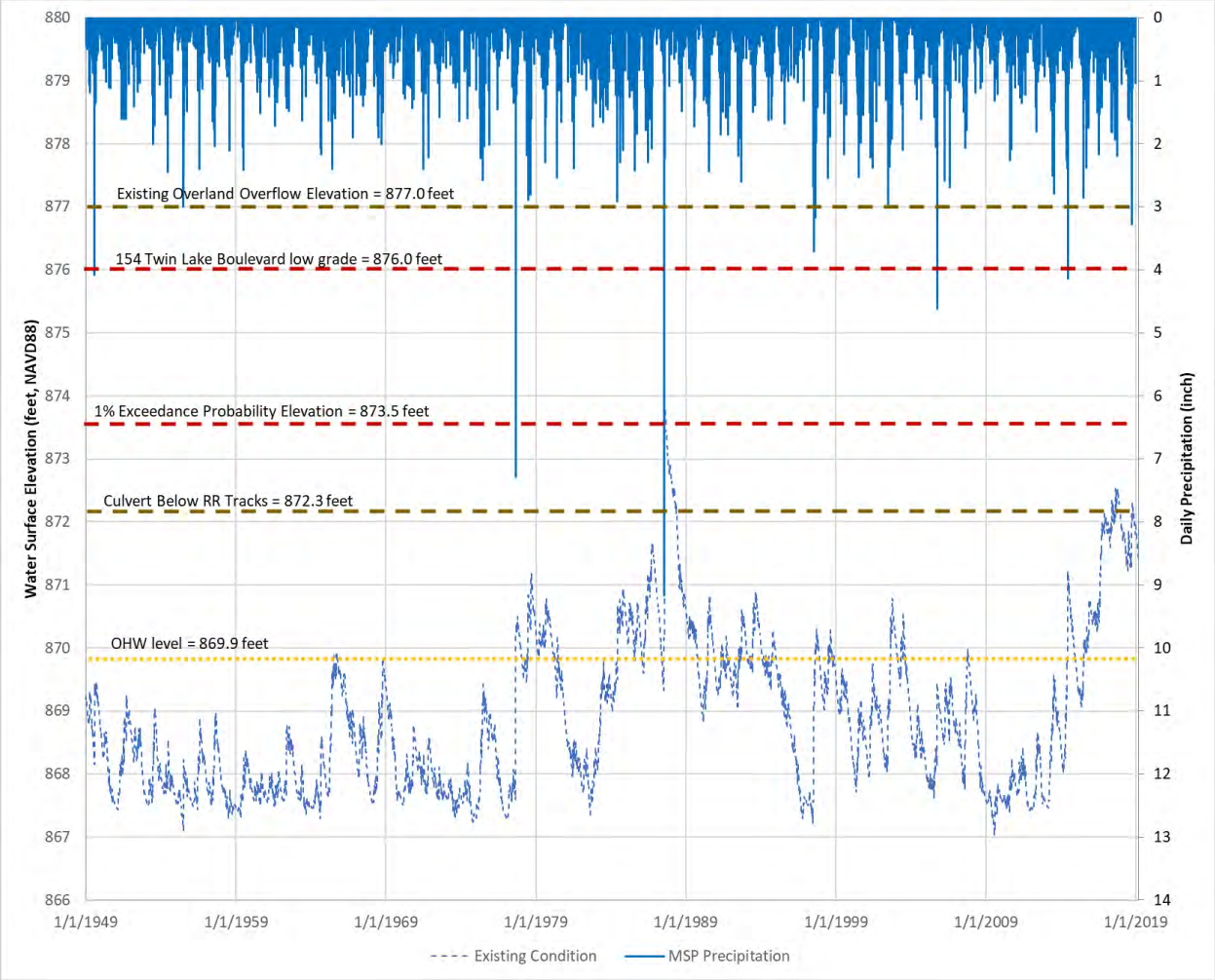


Figure 2-8 **Twin Lake's Simulated Historical Water Levels** under Existing Conditions

The United States Army Corp of Engineers (USACE) Hydrologic Engineering Center's Statistical Software Package (HEC-SSP) was used to estimate the 1-percent-annual-probability lake level (or the elevation defined as the 100-year flood level). The Twin Lake probability curve is shown in Figure 2-9. Using this method, the 100-year flood level for Twin Lake is calculated as 873.5. Figure 2-10 shows the 100-year floodplain on Twin Lake. The floodplain in Waldo Pond would overtop the embankment during a 100-year event, and overflow from Waldo Pond would be conveyed north into Twin Lake. Overflow from Waldo Pond north towards Twin Lake has not occurred in the past but is considered when determining the 100-year floodplain.

The lowest habitable structure on Twin Lake (154 Twin Lake Boulevard) has a low entry elevation of 876.0. The annual water surface "exceedance probability" shown in the figure below shows a range of historical elevations for Twin Lake and the statistical probability that each is exceeded in a given year. For example, there is a 1-percent chance that the lake level will exceed elevation 873.5 in any given year.

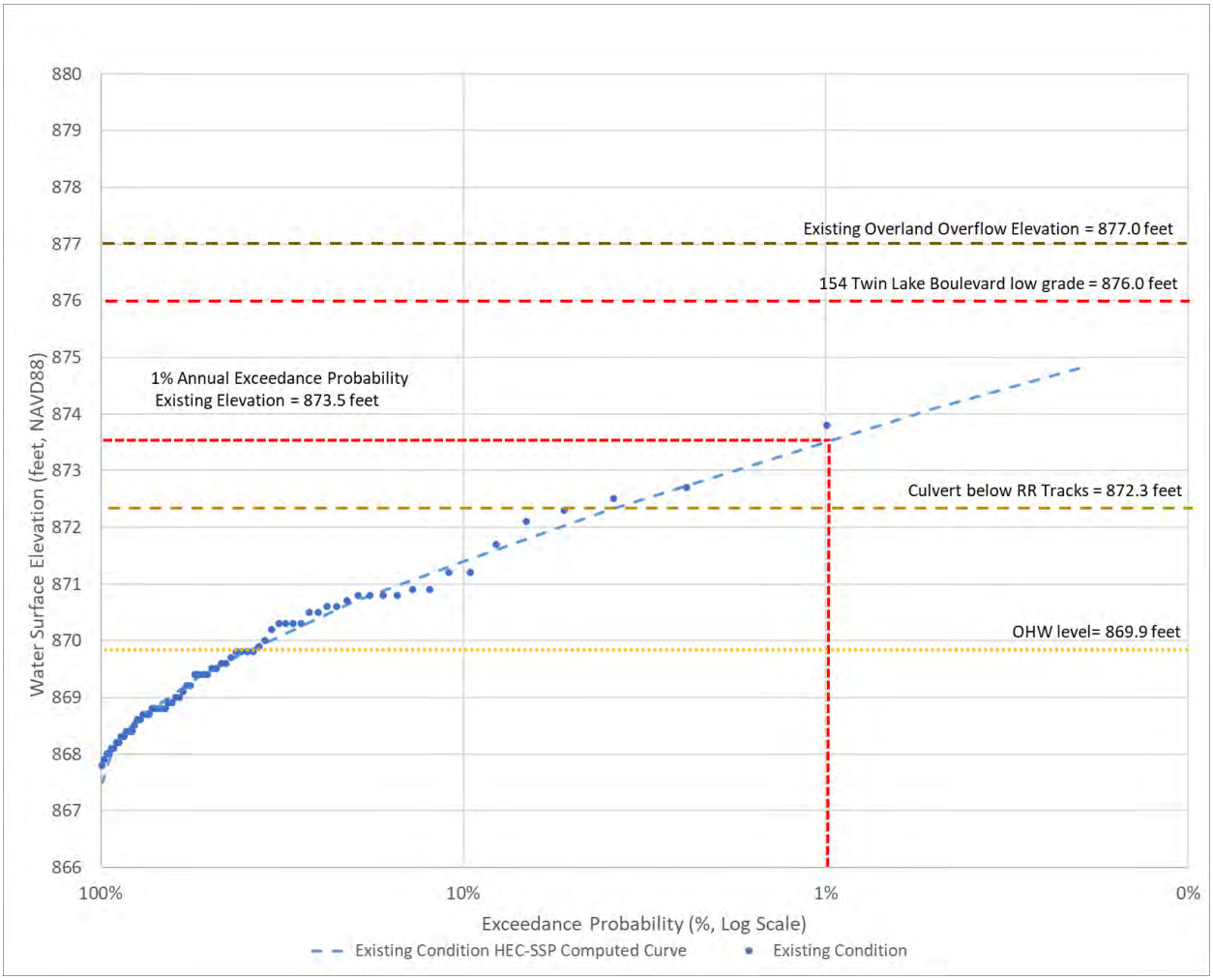
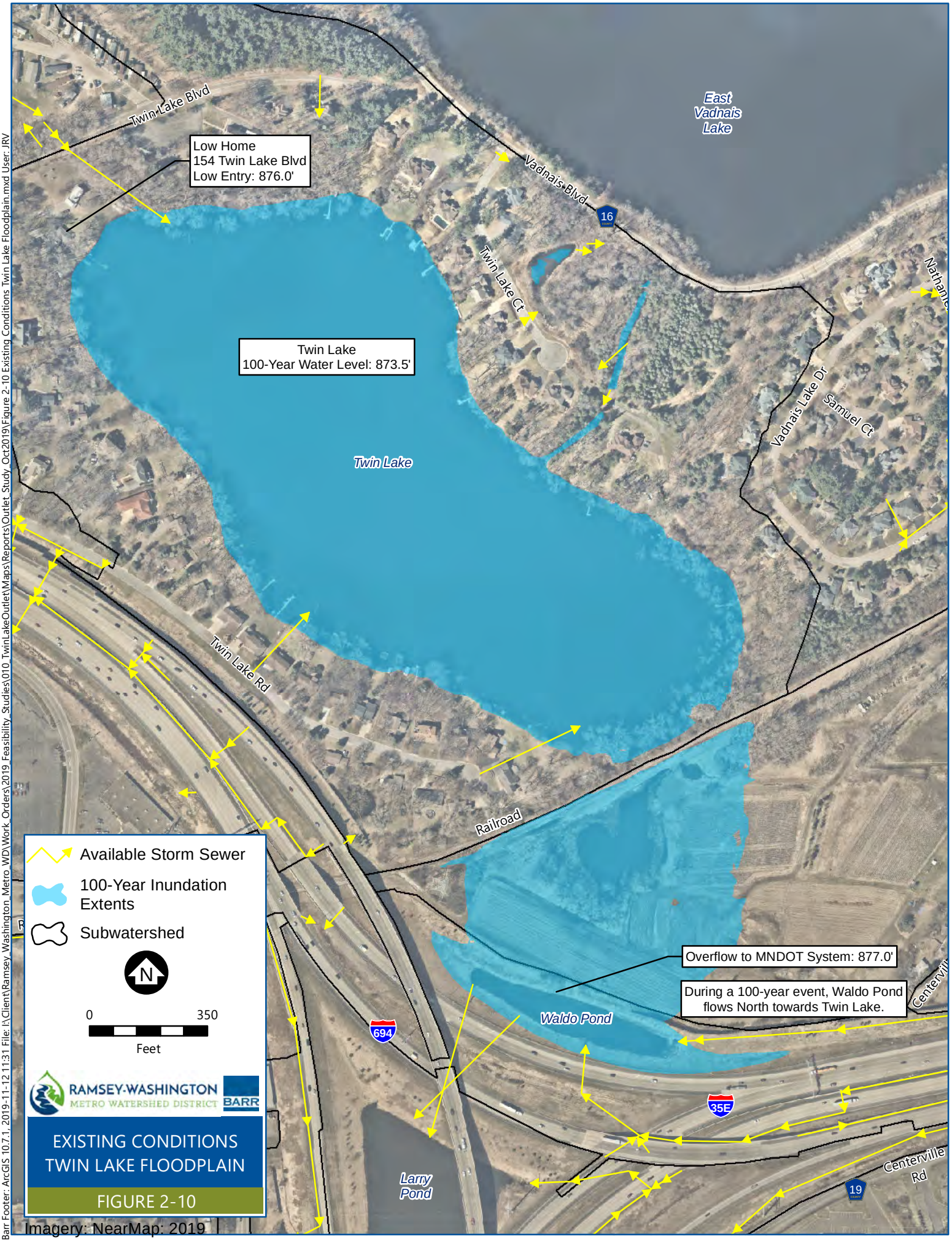


Figure 2-9 Existing Conditions Twin Lake Annual-Exceedance Probability

Existing conditions elevation-frequency curve is based on simulation of 1949 – 2018 rainfall.



2.1.2.3 Existing Twin Lake Stage-Duration Curve

Outflow from landlocked waterbodies is typically limited to evaporation and seepage. As a result, it can take a long time, in some cases several years, for water levels to return to a perceived "normal" following periods of high rainfall. In landlocked basins, shoreline impacts can result from prolonged periods of inundation. As a result flood-risk reduction projects for landlocked basins, such as Twin Lake, may also consider changes to the stage-duration curve.

A stage-duration curve is a plot of the percentage of time the lake level exceeds a given elevation. Whereas the elevation-frequency curve is the probability that a given elevation will be exceeded. In other words, a frequency curve indicates the likelihood that the lake level will exceed a given elevation, and a duration curve indicates how long the water level has stayed above a given elevation. Water bodies with highly variable elevations often have a steep curve, which indicates a quick return to the outlet elevation. Landlocked water bodies often have a flatter curve, which indicates a slower return to normal elevations.

Because historic continuous water level measurements are not available for Twin Lake, the District's stormwater model was used to generate a continuous time series of historical lake levels, which are shown in Figure 2-8. The continuous simulation results were used to develop the stage-duration curve for Twin Lake, which is shown in Figure 2-11.

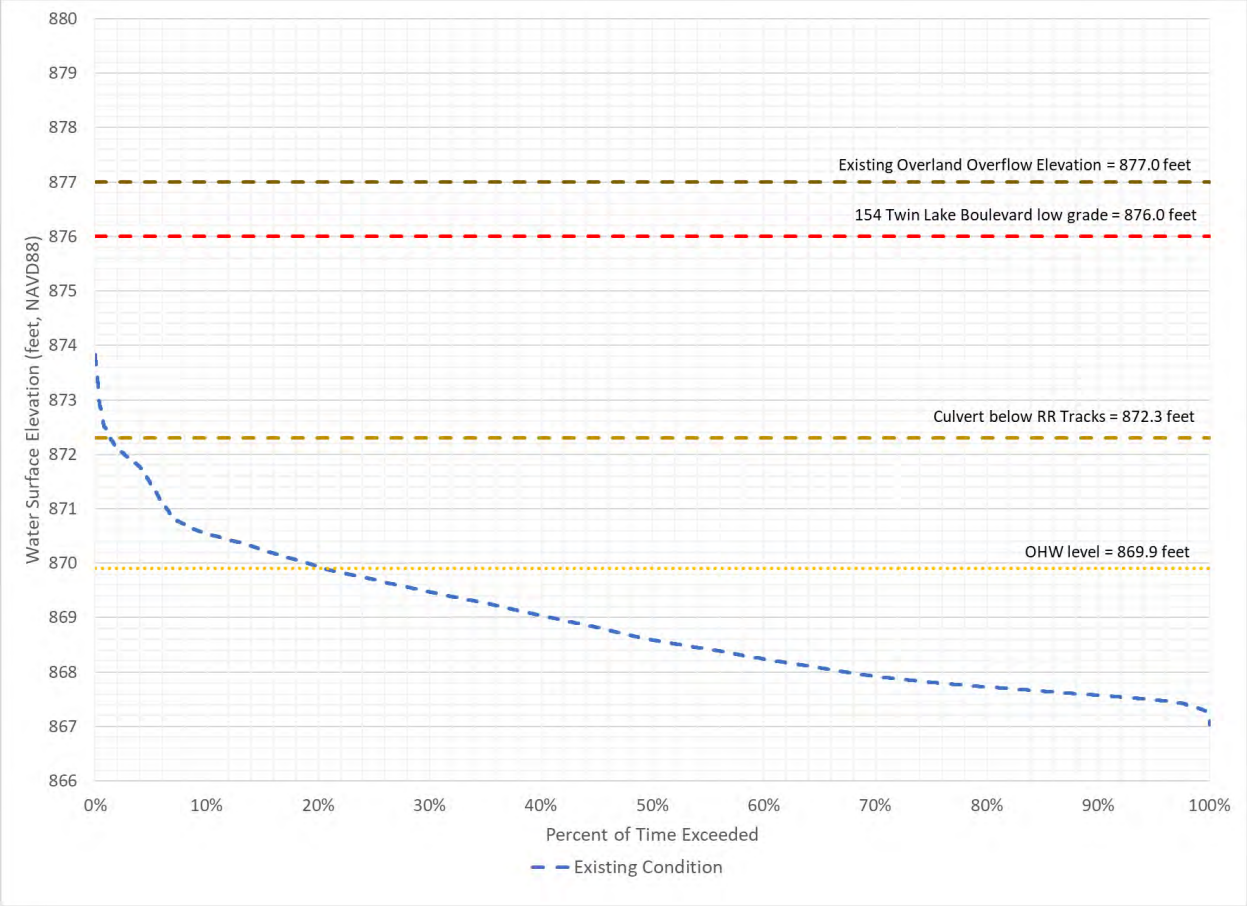


Figure 2-11 Existing Conditions: Twin Lake Elevation-Duration curve

Existing conditions elevation-duration curve is based on simulation of 1949 – 2018 rainfall.

2.2 Historic Drainage Patterns

Twin Lake is located upstream of Gervais Creek (County Ditch 16). The complete history of the Ramsey County ditch system is not clear. Many of the original construction drawings, surveys, descriptions, and many legal documents supporting the construction of the county ditches were destroyed in earlier fires or records lost in moves of the County administration (reference [6]). In 1982, legislation restricted Ramsey County ditch maintenance within watershed districts (reference [7]), and authority for maintenance of county ditches was transferred to RWMWD in 1983 (reference [8]). At that time the District gathered available documents related to County Ditch 16. As requested by the RWMWD Managers, the following is a brief history of County Ditch 16 to provide background on past decisions and guidance on actions going forward.

County Ditch 16 Established

County Ditch 16 was established by the Ramsey County Board on January 3, 1918 (reference [9]). The upstream extent of County Ditch 16 was a point where drainage crosses the Northern Pacific Railroad, continuing southeasterly to the confluence with Gervais Creek at old Centerville Road (reference [9]).

Figure 2-12 shows the December 1917 Ramsey County survey of the County Ditch 16 alignment. County Ditch 16 served as the outlet from Twin Lake if water levels in the lake reached the outlet elevation. The original intent for County Ditch 16 was to improve drainage for agricultural purposes (reference [6]). District does not have original construction drawings that provide information on the profile or ditch geometry.

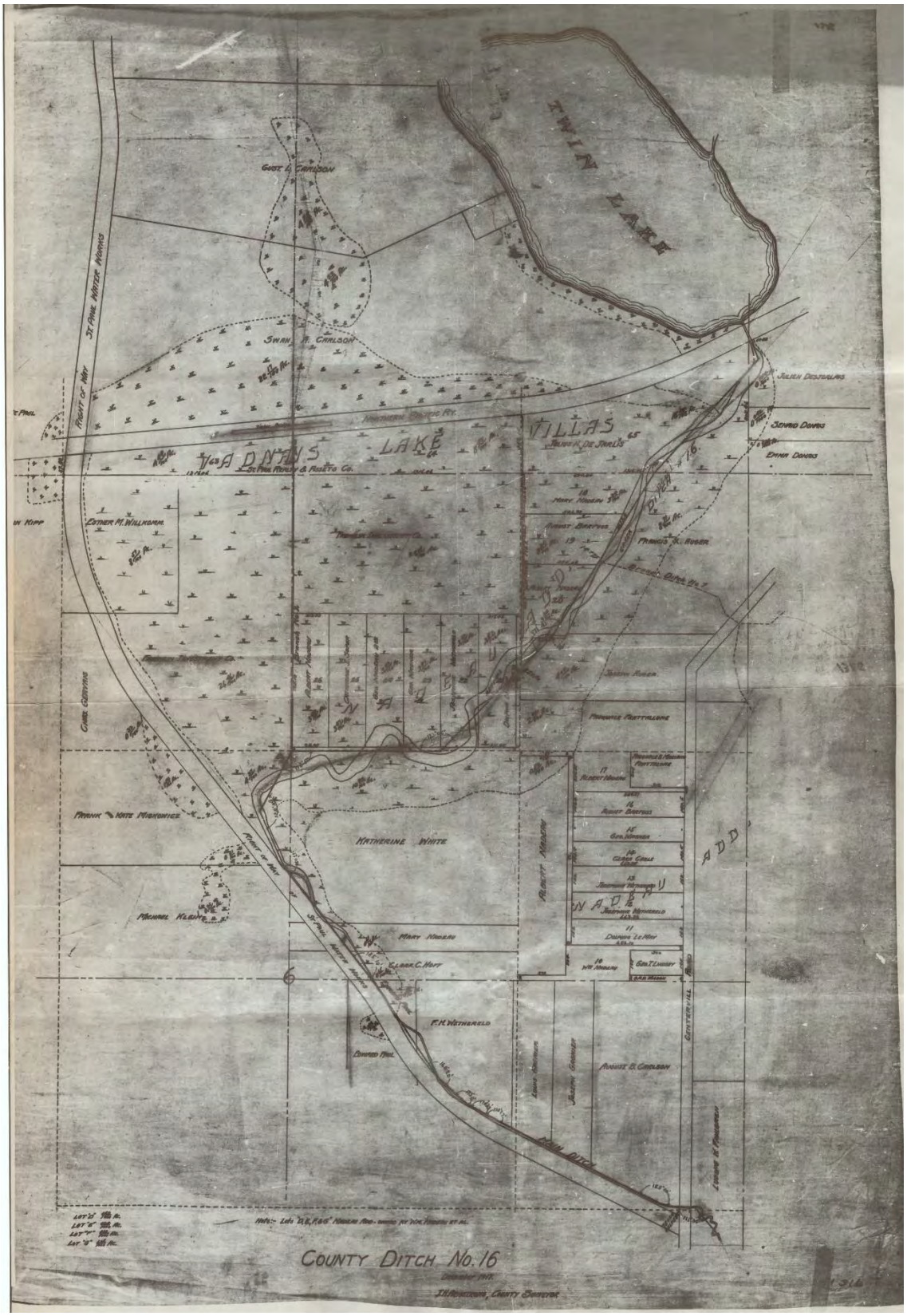


Figure 2-12 Survey of County Ditch 16 Alignment (1917)

CONSTRUCTION OF BP PIPELINE

Standard Oil Company obtained an easement in 1946 for the Dubuque-Twin Cities pipeline (reference [10]), and the pipeline was constructed in 1947 (reference [11]). The pipeline is a 10-inch-steel petroleum pipeline. The approximate alignment is shown on Figure 2-13. In this area, the pipeline is approximately 4 feet deep (reference [11], [12]), which corresponds to an invert elevation of approximately 871.0. Original construction drawings for the pipeline were not available for this study, but current standards require a minimum 2 foot vertical separation for utility crossings, and a minimum 4 foot vertical separation for drainage ditch crossings.

The pipeline is shown on the as-built drawings for I-694 and the recent MnDOT State Project (SP) 6280-304, which improved the I-694 and I-35E interchange, drawings (reference [12], [13]). MnDOT SP 6280-304 is also referred to as "Unweave-the-Weave"

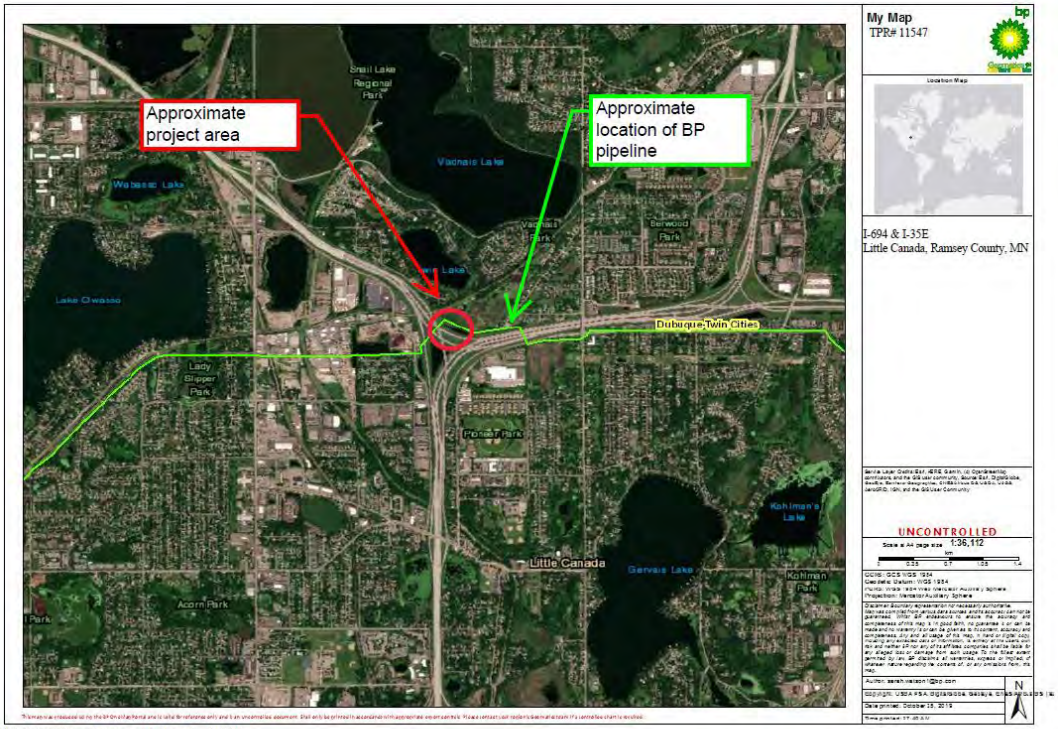


Figure 2-13 Approximate Location of Petroleum Pipeline

The approximate location of the BP pipeline is shown in green. In general, the pipeline is located north of Waldo Pond near the fence along the MnDOT right-of-way. The approximate project area in red shows the general location of the MnDOT berm and Waldo Pond.

CONSTRUCTION OF INTERSTATE SYSTEM

In the late 1960s MnDOT constructed I-694. As a result of the interstate construction, and specifically the interchange between I-694 and I-35E, the portion of County Ditch 16 was modified and realigned, as shown in Figure 2-14. County Ditch 16 was routed through a culvert near the MnDOT right-of-way and directed into the MnDOT drainage system. Within the MnDOT drainage system, County Ditch 16 was

piped through the I-694/I-35E interchange and discharged back into an open ditch west of I-35E (reference [12]). The inlet to the culvert below I-694 was listed as 872.02 (National Geodetic Vertical Datum of 1929 [NGVD29]) on the as-built drawings. The profile for the realigned portion of County Ditch 16 does not show the 10-inch petroleum pipeline, so it is unclear whether the realignment of County Ditch 16 meets current criteria for minimum offset from a petroleum pipeline. The as-built drawings do not include information regarding the profile of County Ditch 16 north of the MnDOT right-of-way.

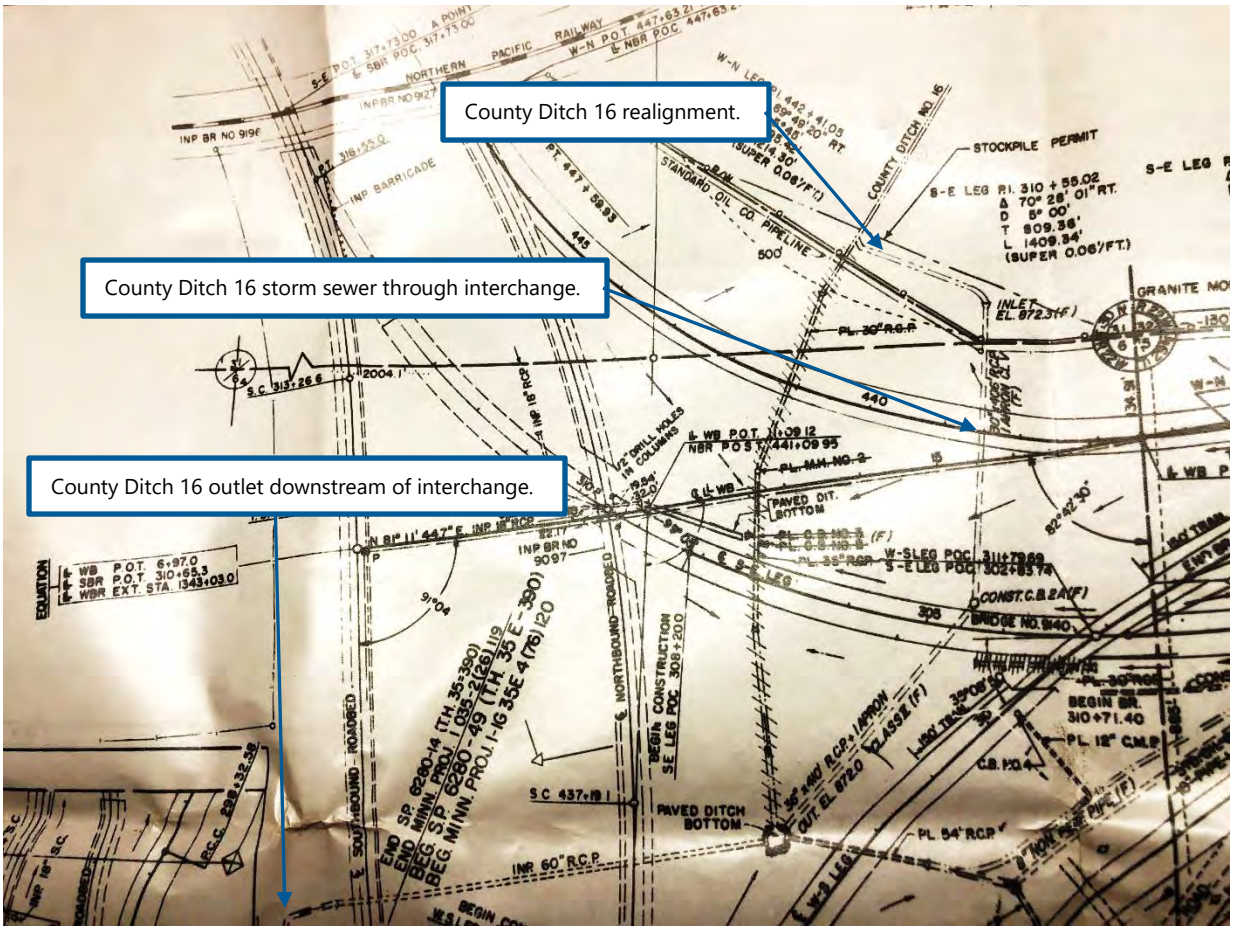


Figure 2-14 I-694 As-Built Drawing (1970)

The 1970 as-built drawing for the I-694/I-35E interchange shows the realignment of County Ditch 16 north of the interchange. Within the interchange the open ditch was replaced with a storm sewer that outlets to the west side of the interchange.

Milner W. Carley & Associates Report on County Ditches 16 and 7

In 1968, Milner W. Carley & Associates completed a report documenting the history of the two county ditches, drainage concerns, and recommendations for modifications to the county ditch system (reference [14]). The study was supporting documentation for proposed modifications to the ditch system to improve drainage. The report noted that the county ditches were constructed in the early 1900's to benefit agricultural lands, but the watershed had been increased due to extension of private ditches and development of property.

The report included figures of profiles for the county ditch system. Figure 2-15 shows the portion of County Ditch 16 from the railroad tracks to I-694. The 1968 profile indicated that there were high points near 874, between the railroad and I-694 that would control when water from Twin Lake would be conveyed downstream. However, the report noted that no maintenance had been performed on County Ditch 16 or 7 since they were constructed, and it is unclear whether the high points in the profile were intended or developed over time following the original ditch construction. The report did not include recommendations for improvements to the section of ditch upstream of I-694.

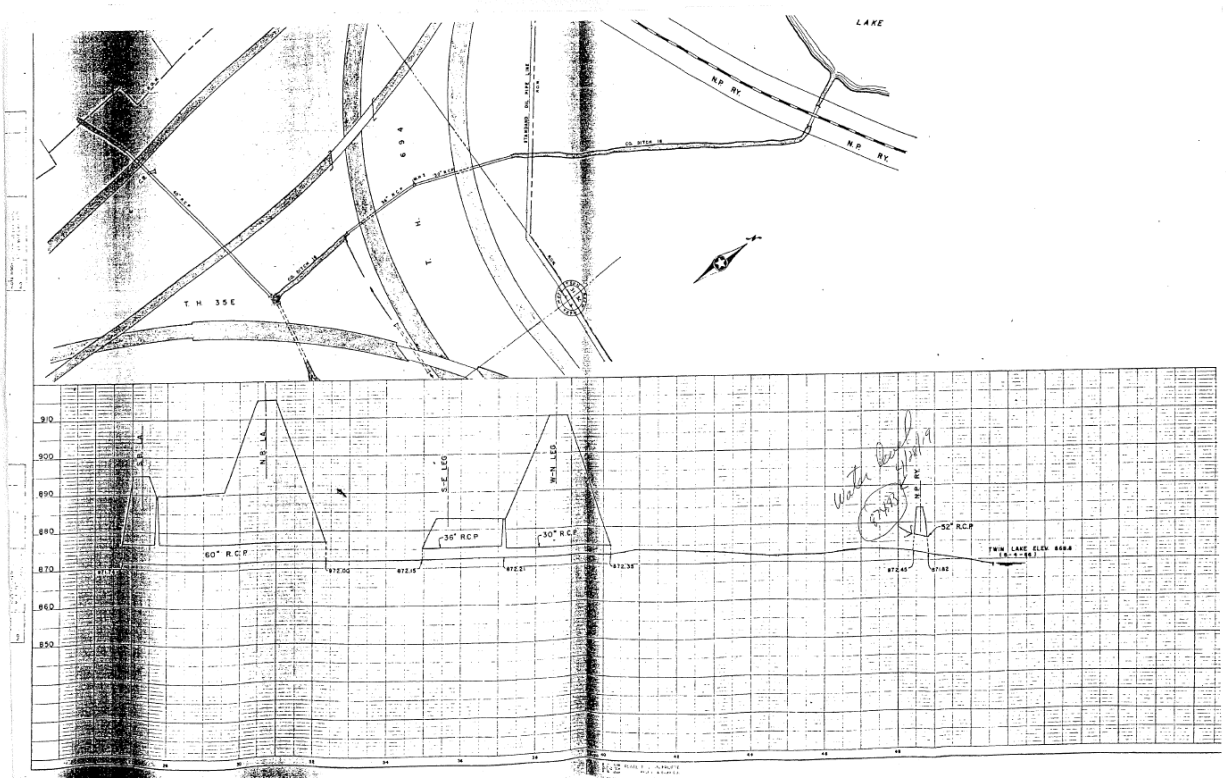


Figure 2-15 Drainage Profile between Twin Lake and I-694 (1968)

Drainage profile between Twin Lake and I-694, from the Milner W. Carley & Associates 1968 Report for County Ditches 16 and 7. The Twin Lake water level in the profile is labeled 1966. The profile indicates there are high points in the County Ditch near approximately 874.0 between the railroad tracks and I-694.

Ramsey County Hydrologic Study

In the early 1970s, open space in Ramsey County was rapidly beginning to be developed. At that time the Ramsey County Commissioners determined that water resource management should be developed around the principle that water is an asset to be enjoyed, utilized, and conserved, and not passed downstream quickly to the nearest river (reference [15]). In support of that principal the Ramsey County Commissioners passed a resolution that:

> *"Now, therefore, be it resolved, that all land development that increases the runoff from any area shall provide for the removal of pollutants and further shall provide ponding so that the rate of flow into lakes, streams or ditches shall not be greater that it was originally."*

In response to the resolution, the Commissioners completed a hydrologic study to develop information needed to enforce the resolution. The study was completed in 1975 and noted that "*the existing control level of Twin lake is at an elevation 874, which is caused by a high point in County Ditch 16 between Twin Lake and Interstate highway 694*" (reference [15]). The study recommended that improvements to the County Ditch 16 system should include lowering the outlet to reduce flood risk to the low home on Twin Lake (reference [15]). However, it is worth noting that this was a planning-level study which did not consider the elevations of downstream culverts through I-694 that would have limited how low the outlet could be and did not consider potential downstream impacts.

Jurisdiction Transferred to RWMWD

In 1983, RWMWD took over jurisdiction of County ditches within the watershed. District staff completed assessments of the ditch system in the fall of 1983 and spring of 1984 (reference [6]). Documentation included a photographic log, depth and width, bank slope, vegetative cover on the bank slope, bottom width, water depth, adjacent land use, identification of ditch bank erosion, and the inventory of outfall structures. The inspection noted that County Ditch 16 was stable and well-vegetated with the exception of the portion north of Owasso Boulevard where some erosion was occurring.

RWMWD Hydrologic Study

In 1993, RWMWD completed a hydrologic study of the Twin Lake subwatershed to evaluate flood risk and identify strategies that would reduce the potential for flooding and degradation of water quality in Twin Lake. As part of the study, drainage profiles were developed between East Vadnais Lake (referred to as Vadnais Lake in the study) and Twin Lake and from Twin Lake to I-694.

The drainage profile between Twin Lake and I-694, shown in Figure 2-16, indicated that the area between the railroad tracks and I-694 drained towards Twin Lake.

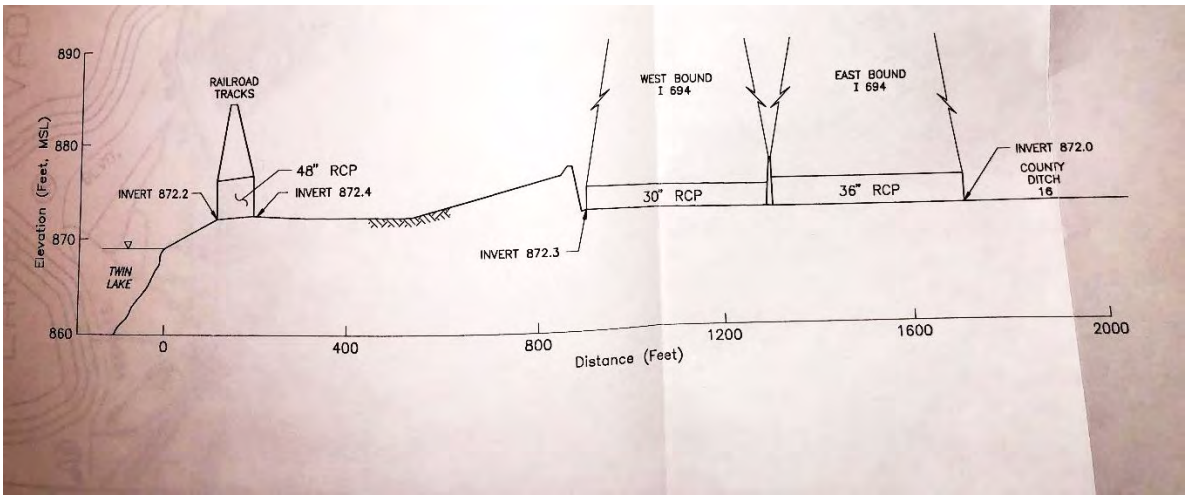


Figure 2-16 Drainage Profile between Twin Lake and I-694 (1993)

Drainage profile between Twin Lake and I-694. In general, the area between the railroad tracks and I-694 is sloped towards Twin Lake. Water levels in Twin Lake would need to exceed the crest of the berm north of westbound I-694 before discharging to the MnDOT drainage system.

The 1993 study also noted that there was potential for Vadnais Lake (East Vadnais Lake) to overflow into Twin Lake. However, Saint Paul Regional Water Services (SPRWS) historically maintained (and still maintains) the East Vadnais Lake level below the overflow to prevent discharge to Twin Lake and avoid adverse water quality impacts to Twin Lake. Because the East Vadnais Lake level was actively managed, the 1993 study assumed there would not be an overflow into Twin Lake (reference [16]). It is important to note that the 1993 study, and previous studies, include general references to Vadnais Lake. The figures in the reports indicate that the discussion is in reference to East Vadnais Lake.

Stormwater modeling developed for the 1993 study estimated a 100-year water level in Twin Lake of 875.1, which was lower than the low home on Twin Lake (low entry of 876.0). Due to the proximity of the 100-year water level to the low home, the 1993 study included a recommendation to construct a pipe to the I-694 drainage system. However, since the calculated flood level was dependent on the starting water level in Twin Lake and the duration of the rainfall event, the recommendation was to defer modifications to the system until water levels in Twin Lake rose above 870.5. If water levels exceeded 870.5, pumping or culvert construction could be selected as a management approach.

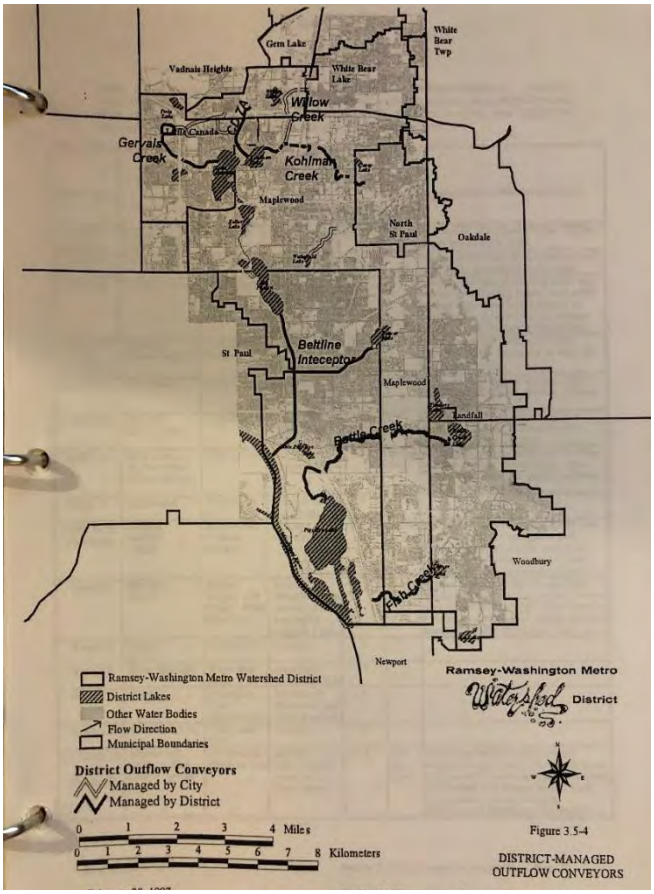
It is important to note that the 1993 study did not recommend removing the embankment near I-694 because doing so could threaten the water quality of Twin Lake. The study noted that because Twin Lake is landlocked it has remained relatively free of pollutants and algal overabundance. Twin Lake is separated from interstate runoff, and this separation is beneficial since it prevents pollutants in highway stormwater runoff from reaching the lake. The study recommended, if possible, to maintain this hydraulic separation.

1997 Watershed Management Plan

The RWMWD 1997 Plan included a County Ditch inventory. The 1997 Plan noted:

> *"County Ditch 16 drains 1,900 acres from portions of Vadnais Heights and Little Canada (including Round and Savage Lakes). The original ditch extended to Twin Lakes. The ditch is now cut off by I-694 and no longer exists north of the freeway. For all practical purposes County Ditch 16 now ends at I-35E, although some improvements were made by the District west of I-35. This plan identifies District responsibility for the flows between I-35E and Gervais Lake; the cities are responsible for the lateral (primary) drainage systems above I-35E."*

The 1997 Plan included the extent County Ditches and streams managed by the District shown on Figure 2-17.



The 1997 Plan indicated that County Ditch 16 ended at I-35E.

Figure 2-17 District Managed County Ditches from 1997 Watershed Management Plan

Unweave the Weave

Figure 2-18 Unweave-the-Weave Stormwater Ponds

In 2005, MnDOT fully reconstructed and improved the I-694 and I-35E interchange. The MnDOT project SP 6280-304, has often been referred to as "Unweave the Weave". As part of the project, MnDOT constructed several stormwater ponds for stormwater detention and treat runoff prior to discharging downstream. Three stormwater ponds, shown in Figure 2-18 as "Waldo," "Larry," and "Porky" were constructed near the interchange. Waldo Pond, constructed on the north side of I-694, was excavated and tied into existing ground north of the MnDOT right-of-way. The improvements to the interchange did not impact the crest elevation of the embankment that separated the MnDOT right-of-way and the agricultural field north of the highway. Downstream of Waldo Pond, MnDOT

drainage is conveyed through Larry and Porky Ponds before discharging to Gervais Creek west of I-694.

2007 RWMWD Watershed Management Plan

The 2007 RWMWD Plan included discussion of the 1993 Hydrologic Study (reference [16]). Future management recommendations for Twin Lake focused on preventing further degradation by keeping Twin Lake segregated from nearby drainage systems including I-694 and East Vadnais Lake. The 1997 Plan, noted that if overflow from East Vadnais Lake was expected, flow should be diverted around Twin Lake to avoid degrading the Twin Lake water quality. The plan also noted that,

> *"Assuming it is not necessary to accommodate periodic flows from Vadnais Lake, it was recommended that alterations to the Twin Lake outlet be considered, and lake levels continue to be monitored. The predicted 100-year flood level for Twin Lake is 875.1 feet, based on hydrologic modeling of the drainage area for the 100-year frequency, 30-day snowmelt event. This flood level is based on a maximum allowable normal water level of 870.7 feet, which is rarely, if ever, reached. When the water level of Twin Lake becomes extremely high, water would flow from the lake to the wetland north of I-694, through the culvert under I-694 and into the Gervais Creek system. If water levels reach 870.5 feet, an additional culvert should be installed through an existing dike that guards the entrance to the I-694 culvert to allow increased capacity from Twin Lake at a lower elevation, or the lake should be pumped to lower the risk of potential flooding. A permit from MNDOT would be required before an additional culvert could be placed. If RWMWD should decide to proceed with installing an additional culvert, the District will discuss the work with MNDOT before applying for a permit."*

At the time of the 2007 plan Twin Lake levels were low and overflows from East Vadnais Lake had not occurred. Following recommendations from previous studies consideration of system modifications was delayed until there was a need (reference [16]).

Atlas 14

In 2013, the National Oceanic and Atmospheric Administration (NOAA) released updated precipitation frequency estimates for the Midwestern states (NOAA Atlas 14, Volume 8). These estimates, which serve as an update to the U.S. Weather Bureau's Technical Paper 40 (TP 40), published in 1961, reflect the results of statistical analyses performed for a much longer period of recorded precipitation data. The results show significant increases in rainfall amounts in the Twin Cities area where the 100-year, 24-hour rainfall depth increased by approximately 25% when compared to TP 40. Following the release of Atlas 14, the District updated the hydrologic and hydraulic model of the stormwater system to incorporate the updated precipitation estimates to calculate the 100-year floodplain. The updated models resulted in identification of several structures downstream of Twin Lake within the 100-year floodplain.

2017 RWMWD Watershed Management Plan

In April 2017, the District revised its Plan in accordance with the Metropolitan Surface Water Management Act and Watershed Law (Minnesota Statutes Chapters 103B and 103D). The 2017 Plan is the current guiding document of the District. Section 2.0 of the Plan includes information regarding the Twin Lake subwatershed, including a general description, past studies, land use, drainage patterns, and District-managed waterbodies.

The Plan includes a discussion regarding managing Twin Lake flood risk if East Vadnais Lake overflows into Twin Lake. If outflow from East Vadnais is necessary, the Plan includes a recommendation that the flow be diverted around Twin Lake to reduce the potential for flooding and protect the water quality of Twin Lake. The Plan also notes that if regular discharge from East Vadnais Lake is anticipated, construction of a culvert through the embankment upstream of I-694 should be evaluated; however, additional coordination with MnDOT would be required prior to construction. In addition, the Plan states,

> *"If an outflow of 63 cfs from Vadnais Lake is necessary, it is recommended that the flow be diverted around Twin Lake to reduce the potential for flooding and protect the water quality of Twin Lake. It was suggested that the potential flow be diverted through wetlands west of Twin Lake, under I-694, and into the Gervais Creek system. Further study of this route would be necessary to assess the impacts on the Gervais Creek system."*

At the time the Plan was published, the District had completed a Districtwide update of the stormwater model to incorporate precipitation depths published in NOAA's Atlas 14, as well as best available topographic information. Since then, site-specific survey information has been collected in the Twin Lake watershed (2019); as such, more accurate outlet and overflow elevations are currently available. The District has continued to update the stormwater model as information has been collected.

City of Little Canada Requests Input from RWMWD

During the summer of 2018, the City of Little Canada requested assistance from the District to respond to residents' concerns related to high water levels. These concerns included discharge into Twin Lake through the culvert below the railroad tracks, dying trees around the perimeter of the lake, and damage to docks, beaches, and landscaping.

In August 2018, District staff met with Little Canada staff to discuss recent survey results for drainage structures within the watershed and review recent precipitation values, stormwater model simulation results, and available groundwater elevation information. Following the meeting, City of Little Canada staff asked District staff to attend a meeting with residents to support City staff and respond to questions.

Barr and the RWMWD attended a public open house facilitated by the City of Little Canada on October 8, 2018. During the meeting, Barr and RWMWD staff explained drainage patterns in the Twin Lake watershed and presented information on the recent survey of critical outlet structures within the subwatershed, recent lake-level information, past water quality data, historic precipitation data, and general groundwater patterns within the region (reference [17]). Residents asked questions related to how the MnDOT Unweave-the-Weave project and East Vadnais Lake affect Twin Lake water surface elevations. Residents also volunteered to provide anecdotal information on lake levels for further validation of the District stormwater model. The City of Little Canada offered to host another public meeting in the spring of 2019 and requested that the RWMWD attend to present responses to additional information provided by residents.

Record Precipitation

Historic water level measurements have not been routinely collected on Twin Lake. The District and County began recording water levels in 2018. Residents indicated that prior to approximately 2014 lake levels remained relatively stable. Following the October 8, 2018, public meeting, residents provided photographs that could be used to estimate historic lake levels. Photographs were compared to aerial images, available topographic information, and landmarks to estimate the lake level at the time the photograph was taken. The photographs provided by residents are consistent with general observations from past studies that lake levels have been relatively consistent (reference [16]). Since approximately 2014, residents have observed a gradual increase in lake levels. Estimated water levels, based on photographs provided by residents and recent measured water levels, are shown on Figure 2-19.

The increase in lake levels corresponds to the wettest period in the historic record. The rainfall record from the Minnesota State Climatology Office extends through 1891—128 complete years of data (Figure 2-20, reference [18]). The rainfall record indicates that:

- 2016 was the wettest year in the historic record (1891 to 2018)
- Three of the 10 wettest years were 2014–2016.
- Seven of the 9 previous years were in the top 30th percentile.
- The past 6 years have been the wettest consecutive 6-year period in the historic records.
- 2019 has the potential to end up as the wettest year on record.

As evident in the photographs provided by residents and water levels simulated using the District's stormwater model, shown in Figure 2-19, the increase in rainfall resulted in higher lake levels.

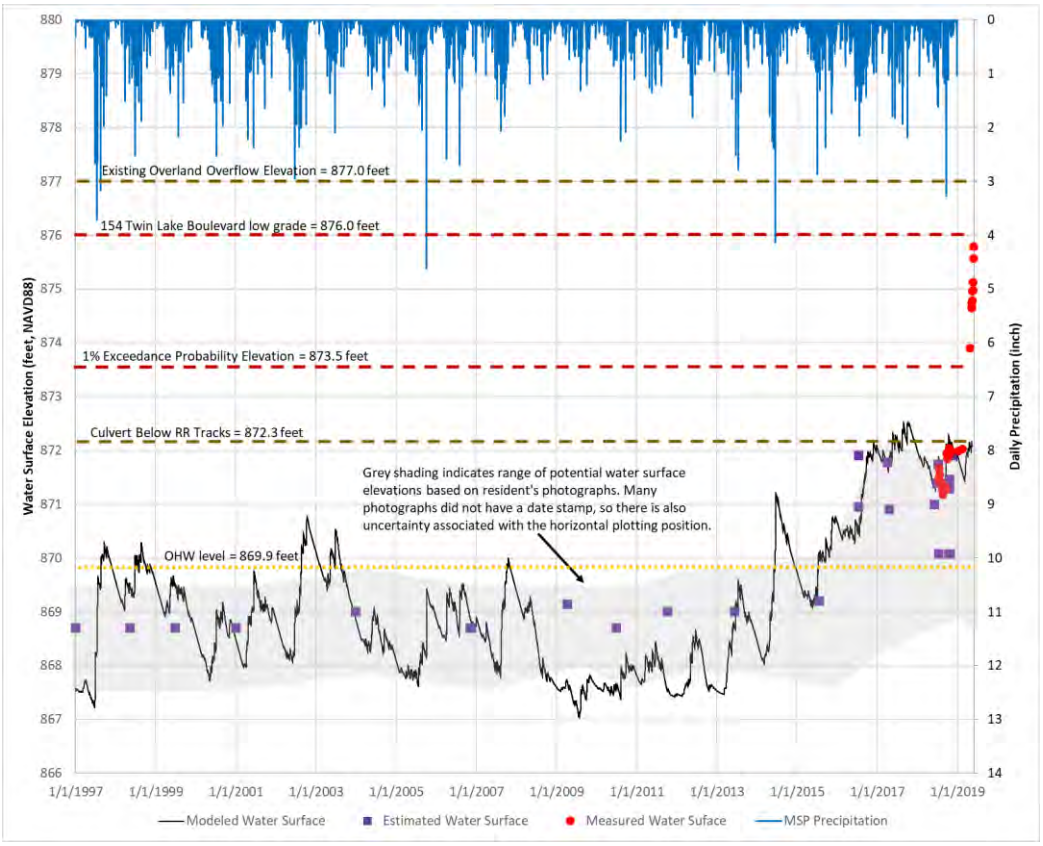
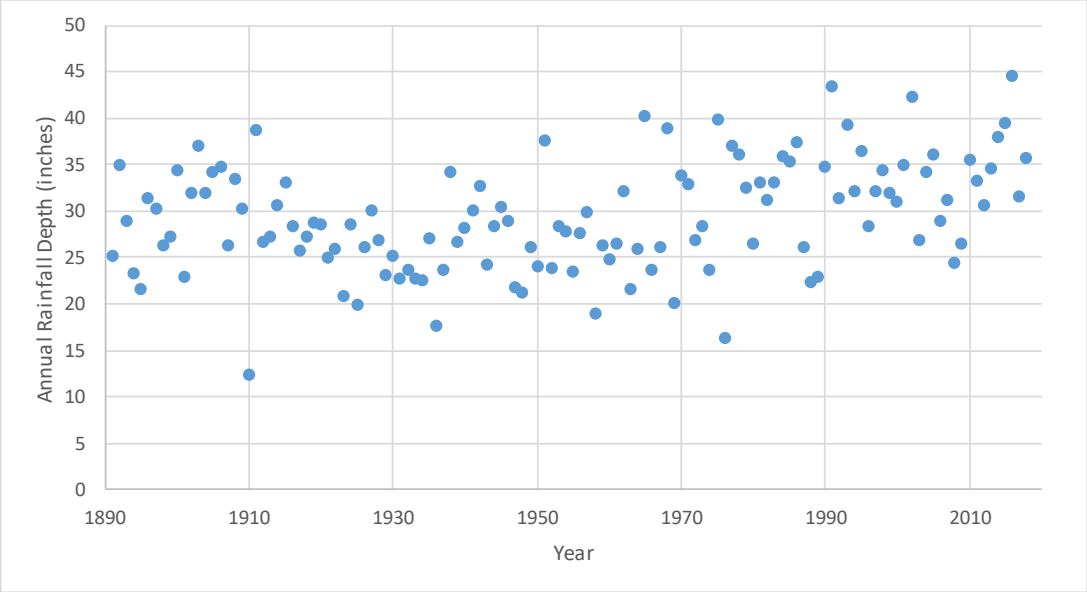


Figure 2-19 Historic Twin Lake Water Levels

This figure shows how the past levels of Twin Lake correspond to the modeled water surface that we estimate for the lake that does not include inflows from West Vadnais Lake. The red dots show measured Twin Lake water surfaces in 2019 that began to sharply increase in April and May 2019 as a result of the inflow from West Vadnais Lake.



Reference [18]

Figure 2-20 Annual Precipitation Record

Public Meetings, Spring of 2019

On March 12, 2019, Barr and the RWMWD attended a follow-up meeting, also facilitated by the City of Little Canada. Barr presented information to address residents' questions from the first public meeting, including how or if the Unweave-the-Weave project affected drainage patterns and historic water levels for East Vadnais Lake and Twin Lake. Following the October meeting, residents provided photographs of lake levels dating back to the mid-1990s, which were used to estimate historic lake levels. Barr used the RWMWD stormwater model to simulate the rise in lake levels prior to March 2019. Simulation results approximated available lake level measurements and estimated water levels, indicating that prior to 2019 the rise in lake levels was due to wetter-than-normal years. During the meeting, several questions were raised about water quality and future lake levels; the RWMWD informed residents that it would continue to monitor both water quality and lake levels (reference [19]).

Following the spring 2019 meeting, Twin Lake water levels were increasing faster than anticipated based on the District's stormwater model. Barr completed a survey of the area north of Five Star Estates on May 17, 2019. During the survey, a 24-inch stormwater inlet was identified west of Star Circle in Vadnais Heights. Barr requested information on the culvert from the City of Vadnais Heights and the City of Little Canada. Neither city had information on the storm sewer inlet or private storm sewer system in the Five Star Estates development. The City of Little Canada requested information from the engineer for the Five Star Estates development and received preliminary utility plans on May 20, 2019. These were dated June 10, 2013 but did not include the storm sewer inlet located in the field (reference [20]). On May 21, 2019, the City of Little Canada received utility information from the Five Star Estates' engineer that was revised on August 20, 2018, and did include the storm sewer inlet identified during the field survey (reference [21]). The revised survey showed that overflow from West Vadnais Lake was being conveyed through the Five Star Estates' private storm sewer into Twin Lake. Information included in the revised survey was communicated to the City of Little Canada City Council and Twin Lake residents during the May 22, 2019, City Council meeting. During this meeting, at the request of City of Little Canada staff, RWMWD also provided the City Council with a summary of information previously presented to residents during public meetings on October 8, 2018, and March 12, 2019 (reference [22]).

Overflow from West Vadnais Lake

As a result of the record precipitation, water levels in many waterbodies within the District were higher than normal during the spring and summer of 2019, including West Vadnais Lake. During the summer of 2019, West Vadnais Lake levels reached record highs and water overtopped along the southeast side of the lake. Overflow followed existing topography and drained to the 24-inch inlet west of Five Star Estates, which ultimately discharged to Twin Lake. This increased the drainage area to Twin Lake to over 5,000 acres. The additional inflow volume resulted in a continued rise in Twin Lake levels. Barr has not found documentation of an overflow from West Vadnais to Twin Lake prior to 2019.

In response to rising water levels, residents placed sandbags around the entry to the low home at 154 Twin Lake Boulevard (Figure 2-21). Other lake residents (with homes whose low entries are above the overflow elevation of 877.0) were concerned about the prolonged high water levels and water entering basements from waves, and some placed sandbags around low entries and sheds.

Figure 2-21 Sandbags at 154 Twin Lake Boulevard

Photo showing where residents and City staff placed approximately 1,900 sandbags at 154 Twin Lake Boulevard and 253 Twin Lake Trail on Saturday, May 25, 2019, and Tuesday, May 28, 2019. On Friday, May 24, 2019, 154 Twin Lake Boulevard was surveyed by RWMWD staff as the home on Twin Lake with the lowest entry elevation (876.0, 1 foot below the overflow in the MnDOT berm at 877.0). The City of Little Canada provided the sandbag materials and placement guidance to the residents.

The District estimated that Twin Lake would overtop the MnDOT embankment due to the continued inflows and rising water levels in Twin Lake. During the June 5, 2019, RWMWD meeting, Managers decided to support pumping from Twin Lake to the MnDOT storm sewer system. The decision was made acknowledging that pumping would mitigate flood risk on Twin Lake, while increasing flood risk to habitable structures downstream. During the meeting, District Managers also directed Barr and District staff to aid City of Little Canada staff in obtaining permits from MnDOT and the Minnesota Department of Natural Resources (MDNR) for temporary pumping.

Following the RWMWD Managers' decision to support temporary pumping from Twin Lake, the City of Little Canada City Council called an emergency meeting on June 6, 2019, to discuss emergency pumping (reference [23]). The City Council decided to authorize temporary pumping. Barr, RWMWD, and City of Little Canada staff obtained permits from MnDOT and the MDNR to lower Twin Lake water levels to 873.5, following an operational plan that was approved by MnDOT (reference [24]). Temporary pumping was started on June 11, 2019, and water levels were lowered to 873.5 by June 28, 2019. After June 28, 2019, water levels in Twin Lake continued to gradually decline through mid-July.

On July 1, 2019, conditions were conducive for placement of temporary sandbags where overflows had eroded areas along the southeast side of West Vadnais Lake. To a great degree, this contained the water

to its intended elevation based on the top of the eroded sections in the overflow areas. This resulted in a reduction of overflow from West Vadnais Lake to Twin Lake.

On July 10, 2019, the City of Little Canada City Council passed a motion to amend the permits the City had with MnDOT and the MDNR to lower Twin Lake to elevation 871.0. City of Little Canada staff requested assistance from Barr and RWMWD staff in revising the permits. To further lower the water level in Twin Lake, the pump intake was moved north of the railroad tracks. Pumping resumed on July 31, 2019. Twin Lake water levels were lowered, and City staff modified the sanitary sewer manhole to reduce the potential for inflow from the lake to the sanitary system. On September 11, 2019, the City council decided to leave the pump in Twin Lake because West Vadnais Lake levels were close to overtopping the temporary berm. All pumping operations were closely monitored and operated consistent with permitting requirements and monitoring of Owasso Basin and Phalen Chain water levels.

Rainfall in September and October resulted in West Vadnais overtopping once again. The City resumed pumping from Twin Lake on October 7, 2019, to prevent a rapid rise in lake levels. At the same time, RWMWD staff members were implementing a temporary bypass to route West Vadnais Lake overflow around Twin Lake. Water levels in the lake were managed effectively by the pumping.

Following the high water levels in 2019, the RWMWD Board of Managers authorized this feasibility study to evaluate alternatives to mitigate flood risk to habitable structures on Twin Lake.

3 Design Criteria

Modifying the outlet from Twin Lake will require approval from multiple entities with permitting authority. The following is a list of entities with permitting authority and minimum design criteria for an outlet modification.

3.1 Ramsey-Washington Metro Watershed District

RWMWD seeks to protect the public health and welfare and the natural resources of the District by providing reasonable regulation of the District's lands and waters to reduce the severity and frequency of flooding and high water; preserve floodplain and wetland storage capacity; improve chemical, physical, and biological quality of surface water; reduce sedimentation; preserve waterbodies' hydraulic and navigational capacity; preserve natural wetland and shore land features; and minimize future public expenditures to avoid or correct these problems.

An outlet from Twin Lake must meet the requirements of Rule C, Stormwater Management, which supports several Board policies including, "…to protect and maintain downstream drainage systems to provide permanent and safe conveyance of stormwater. Reduce the frequency and/or duration of potential downstream flooding." To comply with Rule C a proposed modification must demonstrate that runoff rates for the proposed activity shall not exceed existing runoff rates for the 2-year, 10-year, and 100-year critical storm events using Atlas 14 precipitation depths and MSE3 storm distributions, or as provided by the District. Runoff rates may be restricted to less than the existing rates when the capacity of downstream conveyance systems is limited.

We do not anticipate that proposed modifications will increase or disturb impervious surface; therefore, the runoff volume, or onsite retention, requirement in rule C may not apply.

An outlet from Twin Lake must also meet requirements in Rule D, Flood Control, which supports several Board policies including to "Encourage water quantity controls to ensure no net increase in the impacts or potential for flood on or off the site and encourage, where practical, controls to address existing flooding problems." To comply with Rule D a proposed modification must demonstrate that there would be no increase in the potential for flooding downstream of the modification.

An outlet from Twin Lake may also trigger requirements of Rule E, Wetland Management, which governs impacts to wetlands and wetland buffers. This rule applies whether or not the District is the Wetland Conservation Act local government unit in the municipality where the wetland is located.

An outlet from Twin Lake must meet the requirements in Rule F Erosion and Sediment Control. The project must implement erosion and sediment controls to limit the export of sediment off site, which impacts surface water quality.

3.2 Minnesota Department of Transportation

MnDOT regulates activities that impact the state drainage systems and activities within the MnDOT MS4-regulated area. A MnDOT Drainage Permit must be obtained when systems modify or connect to the state drainage system. The purpose of the Drainage Permit is to protect Minnesota's investment in infrastructure, including stormwater treatment basins, ditches, and storm sewer systems. As part of the Drainage Permit application the applicant must demonstrate that the peak discharge rate conveyed to the MnDOT drainage system does not increase for the 100-year event.

For permanent connections to the state drainage system, MnDOT requires permanent easement for proposed infrastructure and an operations and maintenance plan. Where modifications would reestablish a historic drainage connection, MnDOT would require the outlet type and configuration to be consistent with what was previously approved.

3.3 City of Little Canada

The City of Little Canada regulates grading within the city. Modifications may require a Fill Permit, which is required for all filling/grading work when over 100 cubic yards of material is placed.

3.4 Minnesota Department of Natural Resources

The MDNR regulates work below the ordinary high water (OHW) level of public waters. The OHW level for Twin Lake is 869.9 feet (North American Vertical Datum of 1988, NAVD88). If the outlet modification includes work below the OHW level a Public Water Work Permit must be obtained from the MDNR.

The MNDR requires an Appropriation Permit for actively managing the conveyance of stormwater. An Appropriation Permit would be required for outlet modifications that include pumping or a gate.

3.5 Minnesota Pollution Control Agency

The MPCA regulates the National Pollutant Discharge Elimination System (NPDES) stormwater permitting program. An NPDES permit is required for construction projects that disturb more than 1 acre of soil. An NPDES permit may be required depending on the area of disturbance. The MPCA will also require a stormwater pollution prevention plan (SWPPP).

3.6 BP Pipelines (North America)

Construction or excavation work performed near pipelines, or within a pipeline right-of-way is regulated by the United States Department of Transportation and the Office of Pipeline Safety. A proposed project that is located near a BP pipeline must be reviewed to ensure there are no adverse impacts to the operation and integrity of the pipeline. Work within the BP right-of-way must be reviewed by BP for conformance with applicable requirements. Typically, proposed modifications must comply with BP's General Design and Construction standards. Below is a summary of applicable standards and design criteria that applies to a utility crossing:

- No utility structures (manholes or catch basins) shall be located over the pipeline.

- Minimum vertical separation of 2 feet between the pipeline and underground utilities.
- Grading should not remove cover or add fill over the pipeline.
- A minimum of 4 feet of cover is required for all drainage ditches.
- Design plans must show the location and depth of the pipeline.

3.7 Summary of Design Criteria

Mitigating flood risk will require approval from multiple entities with permitting authority. Table 3-1 summarizes minimum design criteria. Additional requirements may be identified during final design of the selected alternative if the configuration, operation, or function changes when additional information is available.

Table 3-1 Design Criteria Summary

Design Criteria	Permitting Authority
No increase in peak runoff rate during 2-year, 10-year, or 100-year event	RWMWD – Rule C MnDOT
No increase in downstream flood elevations	RWMWD – Rule D
Implement erosion and sediment controls	RWMWD – Rule E City of Little Canada – Fill Permit MPCA – NPDES Permit
Avoid, minimize, and mitigate wetland impacts	RWMWD – Rule F
Minimum 2-foot vertical offset from pipeline for pipes	BP
Minimum 4-foot vertical offset from pipeline for drainage ditches	BP
Pump or actively manage discharge	MDNR

4 Flood-Risk Mitigation Goals

In the context of this feasibility study, flood-risk mitigation goals are considered objectives that go above and beyond the minimum criteria discussed in Section 3. For example, a goal for a system modification may be to provide additional freeboard for the low home or reduce the frequency with which lake levels extend onto residential property. These are potential benefits that system modifications could provide but are not necessarily a requirement. For the context of this evaluation, flood-risk mitigation goals that will be considered are the following:

- Provides additional freeboard between the 100-year water level and the entry of the low home
- Minimizes the frequency and duration that lake levels extend onto residential property or encroach upon auxiliary structures that were built below the floodplain (e.g., sheds or docks)
- Minimizes impacts to upland area including trees
- Provides flexibility for future operation and management of lake levels

Table 4-1 summarizes design goals for modifications to mitigate flood risk to habitable structures. Additional goals maybe identified following stakeholder input during the next phase of design.

Table 4-1 Summary of Design Goals

Design Goal	Notes
Maximize freeboard board between low home and 100-year water level.	Design goals are secondary objectives that a system modification should achieve after meeting the minimum design criteria summarized in Section 3.
Minimize the frequency and duration of inundation on residential property	
Minimize impacts to upland area	
Provide flexibility for future optimization	

5 Flood-Risk Mitigation Alternatives

Several flood-risk mitigation alternatives were considered for Twin Lake. Alternatives that did not meet the minimum design criteria were not evaluated in detail. Section 5.1 includes a brief summary of alternatives that were considered but were not evaluated in detail. Section 5.2 includes a discussion of the five alternatives that were evaluated in detail.

5.1 High-Level Screening of Alternatives

Selection of feasible flood-risk mitigation alternatives occurs by considering a holistic approach that accounts for unique site constraints, operation and maintenance, environmental concerns, effectiveness, downstream impacts, and overall cost. System modifications, at a minimum, should meet the design criteria summarized in Section 3 and preferably achieve the goals summarized in Section 4. As part of this feasibility study several types of system modifications were considered and ultimately discarded because they did not meet the minimum design criteria. A few of these alternatives are briefly described in the following sections.

5.1.1 Lowering Overflow Elevation to MnDOT Pond

Twin Lake is landlocked and the watershed has historically been separated from the I-694 drainage area. In general, this separation has prevented highway runoff, and the pollutants it carries, from discharging to Twin Lake, helping to preserve the historically good water quality in the lake. Lowering the overflow elevation from Twin Lake will allow water to discharge from the lake. However, that also would increase the potential for highway runoff to flow into Twin Lake during large or intense storm events. Maintaining the hydraulic separation between the interstate runoff and Twin Lake has been studied by the District in the past, and findings have led to the recommendation that the embankment should not be lowered (reference [16]). If any hydraulic connection was provided, it should include a backflow preventer to minimize the risk of the highway runoff draining toward the lake.

In addition, the 100-year water surface elevation in Waldo Pond calculated for Unweave the Weave project was originally calculated to be Elevation 876.7, which was based on rainfall depths published in TP40, the industry standard at the time of the design in 2005. Since then, the design rainfall depths for a given return period were revised (per Atlas 14) and, based on the District stormwater model, using the revised data the 100-year water surface elevation in Waldo Pond was updated to be Elevation 881.1. Lowering the overflow elevation would provide a hydraulic connection for more stormwater from Waldo Pond to discharge to Twin Lake and increase the flood elevation. Because lowering the overflow elevation would have adverse impacts on the water quality and increase the risk of flooding of Twin Lake, this alternative was not evaluated in detail.

5.1.2 Permanent Lift Station

MnDOT guidance for reestablishing a permanent connection to the state drainage system is to match the previously approved outlet type and outlet elevation. In the case of Twin Lake, this elevation would be considered as elevation 872.2 through the embankment north of Waldo Pond. The 1970 as-constructed

drawing shows an invert of 872.02 (reference [25]), which was converted to NAVD88 by adding 0.14 feet. Typically, permanent lift stations cost significantly more to construct and maintain than gravity drainage systems. Therefore, a permanent lift station was not evaluated in detail, since gravity flow options are under consideration.

5.2 Flood-Risk Mitigation Alternatives

Four alternatives to reduce flood risk were considered:

- Alternative 1 – Remove Flood-Prone Structure
- Alternative 2 – Emergency Response Plan
- Alternative 3 – Gravity Outlet at Elevation 874.0 through the embankment north of Waldo Pond
- Alternative 4 – Gravity Outlet at Elevation 872.2 through the embankment north of Waldo Pond

Each alternative is discussed in more detail below. The intent of each alternative is to reduce flood risk for habitable structures, meet the design criteria summarized in Section 3, and flood-risk mitigation goals summarized in Section 4.

5.2.1 Alternative 1: Remove Flood-Prone Structure

Alternative 1 includes the evaluation of the purchase of one home in the flood zone (154 Twin Lake Boulevard) and removal of it and all auxiliary structures, driveway, utilities, and abatement of hazardous materials such as asbestos, lead, or mercury, should they exist. When a property is within the floodplain or experiences flooding, costs for the property owner and community to respond can be high. When flood waters eventually recede repairs and cleanup may continue long after the flood risk as passed. Removal of flood-prone structures is the most permanent form of flood-hazard mitigation.

Typically, removal of flood-prone structures is most common when structures are located in the floodplain. Often voluntary buyouts to homeowners are offered to those who are subject to a continued risk of flooding. In the case of Twin Lake, the low home is located above the 100-year floodplain elevation of 873.5. However, because the home is located below the overflow from Twin Lake (elevation 877.0), this home has a higher risk of flooding and potential for prolonged periods of high water levels.

Alternative 1 is shown on Figure 5-1. This alternative does not include modifications to the drainage system or removal of other auxiliary structures that have been constructed below the overflow elevation of 877.0.

5.2.1.1 Floodplain Impacts

This alternative includes removal of the low home and designating the property as open space. This alternative does not change the storage volume within the floodplain or significantly change the volume of runoff that reaches Twin Lake. Therefore, this alternative does not result in changes to the 100-year water level in Twin Lake, discussed in Section 2.1.2.2; the Twin Lake elevation-duration curve, discussed in Section 2.1.2.3; or 100-year water levels downstream of Twin Lake, discussed in Section 2.1.2.1.

5.2.1.2 Regulatory Approvals

A fill permit will be required by the City of Little Canada. If the structure will not be relocated, a demolition permit will also be required by the city. The City of Little Canada provides guidance on pre-demolition procedures including inspection, which requires completion of a hazard substance assessment. Additional permits may be required if hazard substances are present.

The MPCA regulates the NPDES stormwater permitting program. An NPDES permit is required for construction projects that disturb 1 acre. The MPCA will also require a SWPPP.

The MDNR regulates work below the OHW level of public waters. The OHW level for Twin Lake is 869.9 feet (NAVD88). Because work would not occur below the OHW level, a Public Water Work Permit is not required.

RWMWD regulates the control of floodwater to ensure the preservation of floodplains and flood storage areas, improve water quality, preserve vegetation, alleviate identified erosion problems, ensure the preservation of wetland and creek buffers, and prevent erosion of shorelines and stream banks. A RWMWD permit will be required for Rule F – Erosion and Sediment Control.

5.2.1.3 Affected Property Owners

Site disturbance would be limited to the property at 154 Twin Lake Boulevard. Access to the site would be via a construction entrance constructed off Twin Lake Boulevard to the north of the site. Access may affect the shared driveway with 174 Twin Lake Boulevard, and permission would be required from the property owner to access the driveway.

5.2.1.4 Wetland/Upland Impacts

Based on the District's wetland inventory there do not appear to be any wetlands on the property. No temporary or permanent wetlands are anticipated for this modification.

5.2.1.5 Engineer's Opinion of Probable Cost

The engineer's opinion of probable cost is reported as a range of probable costs. The range reflects the level of uncertainty, unknowns, and risk associated with the level of design completed. The planning-level opinion of cost was developed by estimating the cost of land and property acquisition. Costs associated with property acquisition were obtained from the Ramsey County Property Records and Revenue department. This evaluation assumed an estimated acquisition cost of 125% of the estimated market value. The additional is intended to account for the cost of appraisals, and adjustments for market value.

Operation and maintenance costs were assumed to include routine vegetation management over a 30-year period. This equates to an estimated total project cost of $1,097,000 over a 30-year period, with an accuracy range of ($878,000 to $1,646,000). Appendix A includes a detailed discussion of Alternative 1, including assumptions used to develop the engineer's opinion of probable cost.

This alternative does not reduce the risk of lake shore and lawn damage or social impacts due to extended periods of high lake levels.

5.2.2 Alternative 2: Emergency Response Plan

The purpose of an Emergency Response Plan (ERP) is to describe the responsibilities for operation and emergency procedures to provide flood-risk reduction. Typically, an ERP defines responsible parties, contact information, and actions to be completed to mitigate flood damage for low homes or roadways adjacent to the lakes. The District's role is to develop these plans in coordination with the cities. The District may provide assistance with identifying conditions that pose a flood risk, or implement system modifications that facilitate emergency responses, such as furnishing sumps or constructing access to a site. The final ERP is adopted by the city responsible for implementing emergency responses defined in the plan.

Alternative 2 includes an evaluation of the development of a formal ERP for Twin Lake. This feasibility evaluation assumes that the ERP includes mobilization of temporary pumps, similar to the temporary measures implemented during the summer of 2019. The essence of the plan would formalize many of those actions taken.

The ERP includes temporary pumping from south of the railroad tracks into Waldo Pond, as shown on Figure 5-2. Temporary pumping would lower the water level in Twin Lake to elevation 872.3, which is the elevation of the controlled by the culvert below the railroad tracks. The railroad culvert was in place prior to Ramsey County establishing County Ditch 16 in 1918 (reference [14]).

The temporary pumping would discharge at maximum rate of 10 cubic feet per second (cfs) to until the water level is lowered and maintained at an elevation of 872.3. Pumping operations would follow an operating plan to reduce the added risk of impacts to structures downstream near Owasso Bain and on the Phalen Chain of Lakes. The operating plan would include conditions when pumping could occur when the increased risk of flooding downstream is minimized. This operating plan would require that the pumping be shut down, regardless of water levels in Twin Lake, should downstream flood levels be increased significantly. The operating plan would likely reflect the actions and permit requirements of the summer of 2019.

Figure 5-2 shows the location of the temporary pump, pump intake, pump discharge, and access easements required to implement the ERP. Emergency responses shown are subject to a right-of-entry agreement between the City of Little Canada and property owners for parcels shown on Figure 5-2.

LEGEND

- EXISTING 5' CONTOUR — 880
- EXISTING 1' CONTOUR — 881
- EXISTING 10" PETROLEUM PIPELINE — P — P
- EXISTING EASEMENTS
- RIGHT-OF-WAY
- PARCELS
- WETLAND — WT / WT

RAILROAD

872.30
INV 42 PEP

872.51
INV 18 PVC

871.71
INV 18 PVC

PARCEL ID:
313022440018

PARCEL ID:
313022440019

PARCEL ID:
32302233004

PARCEL ID:
323022330028

DRAINAGE EASEMENT

PUMP INTAKE

EDGE OF DELINEATED WETLAND

INTAKE LINE

TEMPORARY PUMP LOCATION

ACCESS EASEMENT

DISCHARGE LINE

FENCE

10" STEEL PETROLEUM PIPELINE APPROX. EL. 871.0'

870.20
INV 72 RCP

PUMP DISCHARGE

WALDO POND
NWL = 870.2
BOTTOM = 866.0

870.20
INV 48 RCP

INTERSTATE 694 SOUND BARRIER

3157 CENTERVILLE ROAD

3151 CENTERVILLE ROAD

3143 CENTERVILLE ROAD

3135 CENTERVILLE ROAD

CENTERVILLE ROAD

PARCEL LINES

SITE ACCESS

EASEMENT LINES

WESTBOUND INTERSTATE 694

EASTBOUND INTERSTATE 694

GOPHER STATE ONE CALL

GOPHER STATE ONE CALL:
CALL BEFORE YOU DIG.
1-800-252-1166

CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD-LOCATING ALL SITE UTILITIES, PRIVATE AND PUBLIC, PRIOR TO STARTING THE WORK. ALL UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ANY UTILITIES DAMAGED BY CONTRACTOR SHALL BE REPAIRED BY CONTRACTOR TO THE SATISFACTION OF THE UTILITY OWNER.

1 - PLAN: ALTERNATIVE 2 - EMERGENCY RESPONSE PLAN

N

0 60 120
SCALE IN FEET

NOTE:

LOCATIONS FOR ACCESS, TEMPORARAY PUMP, AND TEMPORARY PIPE TO BE COORDINATED WITH OWNERS.

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION

CLIENT
BID
CONSTRUCTION

RELEASED TO/FOR

A	B	C	0	1	2	3
DATE RELEASED						

BARR

Corporate Headquarters:
Minneapolis, Minnesota
Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
4300 MARKETPOINTE DRIVE
Suite 200
MINNEAPOLIS, MN 55435
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

Scale	AS SHOWN
Date	11/11/2019
Drawn	GWB
Checked	BJB
Designed	BJB
Approved	-

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

TWIN LAKE FLOOD-RISK MITIGATION FEASIBILITY STUDY

ALTERNATIVE 2 EMERGENCY RESPONSE PLAN

BARR PROJECT No.	23621200.19
CLIENT PROJECT No.	
DWG. No.	FIGURE 5-2
REV. No.	A

5.2.2.1 Floodplain Impacts

The District's stormwater model was used to evaluate the floodplain impacts on Twin Lake and downstream of the proposed temporary discharge location. Since Twin Lake is currently landlocked, discharge out of the lake would need to be controlled to prevent increases to downstream water bodies and minimize the increased risk of flooding downstream. For this evaluation, the following operating plan was assumed for the temporary pumps in an ERP:

1. Temporary pumps would be turned on if the water level in Twin Lake exceeds elevation 873.5.
2. The temporary pumps would be operated to convey a maximum of 10 cfs into Waldo Pond.
3. The temporary pumps would be shut off 12 hours prior to a forecasted rainfall event greater than 2 inches. The temporary pumps could be restarted after the water level in Waldo Pond begins to recede.
4. The temporary pumps would be operated to lower the lake level to 872.3, which is the invert elevation of the culvert below the railroad tracks.

A temporary connection to the MnDOT drainage system should be operated such that the additional discharge does not reduce the capacity of the interstate drainage system during a rainfall event. In addition, there are habitable structures downstream of the gravity outlet that are below the 100-year floodplain, as discussed in Section 2.1.2.1, even without additional proposed flow from Twin Lake. The District stormwater model indicates that the lowest homes at North Star Estates could be impacted by a 4-inch, 4-day rainfall event. Therefore, the operation of the temporary pumps must minimize the increased risk to habitable structures downstream.

The District's stormwater model indicates that the travel time from the proposed gravity outlet through the MnDOT system is approximately 6 hours. The water level in Gervais Creek will draw down to within 0.4 feet of the channel bottom at Owasso Boulevard approximately 12 hours after the pumping is stopped during dry weather conditions. Therefore, to prevent increased risk of flooding for North Star Estates or a reduction in the capacity of the I-694 storm sewer system, pumps would be turned off 12 hours prior to a forecasted 2-inch rainfall event. Pumps would be turned on after water levels in Waldo Pond begin to recede following the event. This proposed operation is consistent with the plan approved by MnDOT during the summer of 2019 (reference [24]), but does result in an increase to flood risk on the Phalen Chain.

The floodplain impacts, following the operation plan described above, were evaluated using the District's stormwater model. Three types of impacts were evaluated:

1. Impacts to the 100-year floodplain in Twin Lake
2. Impacts to the 100-year floodplain downstream of Twin Lake
3. Impacts to inundation duration in Twin Lake.

Twin Lake Elevation

The District's stormwater model was used to simulate Alternative 2 conditions in the Twin Lake watershed following the same methodology used to evaluate existing conditions discussed in Section 2.1.2.2. The District stormwater model was used to simulate rainfall from 1949 to 2018, assuming that the ERP was implemented when the water level reached elevation 873.5. The Twin Lake continuous modeling results for Alternative 2 are shown in Figure 5-3. As shown in Figure 5-3, the water level in Twin Lake would have triggered the ERP once. As a result, the 100-year water level (or 1-percent-annual-exceedance probability) is slightly lower, as shown in Figure 5-4.

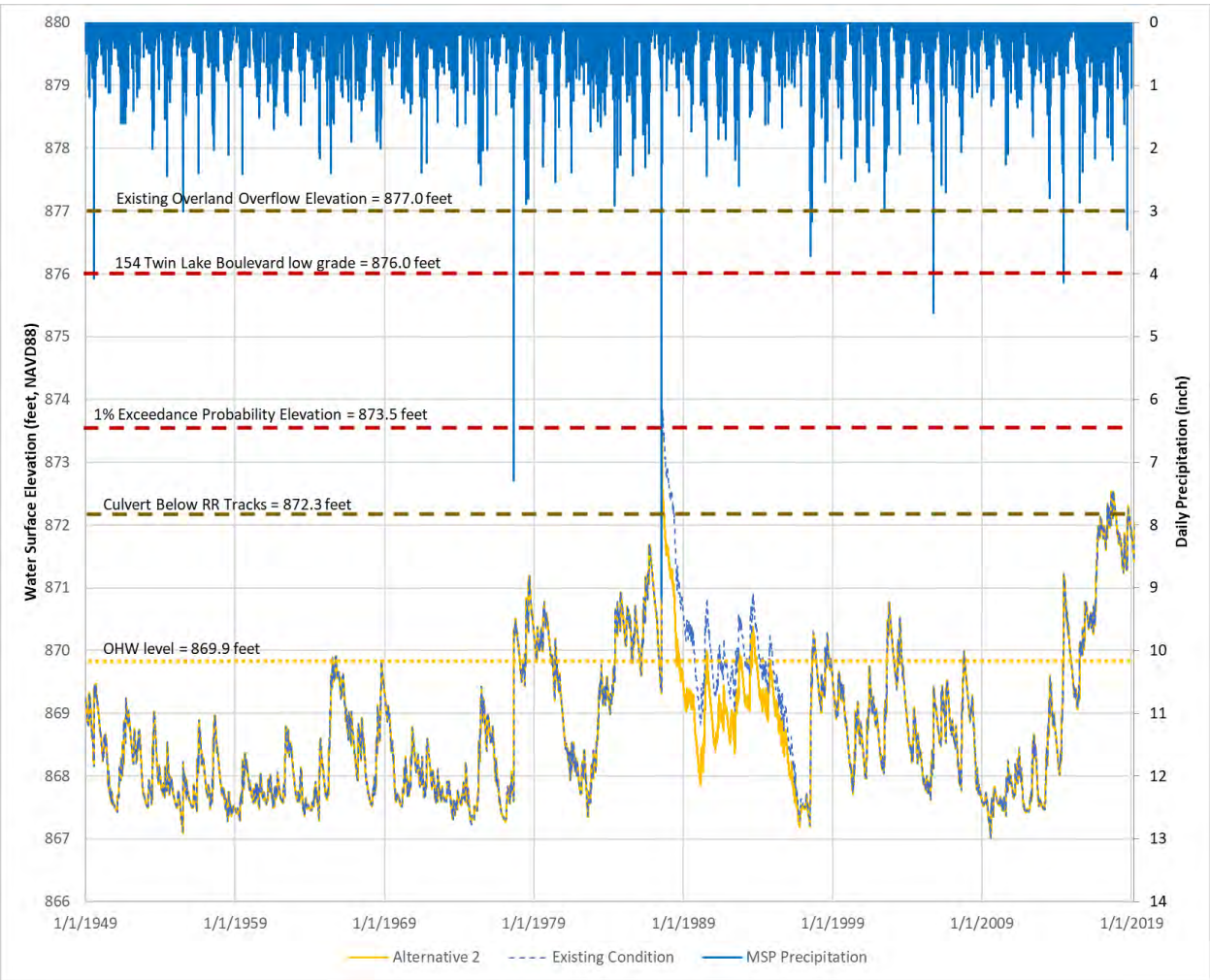


Figure 5-3 Alternative 2 Twin Lake Water Levels

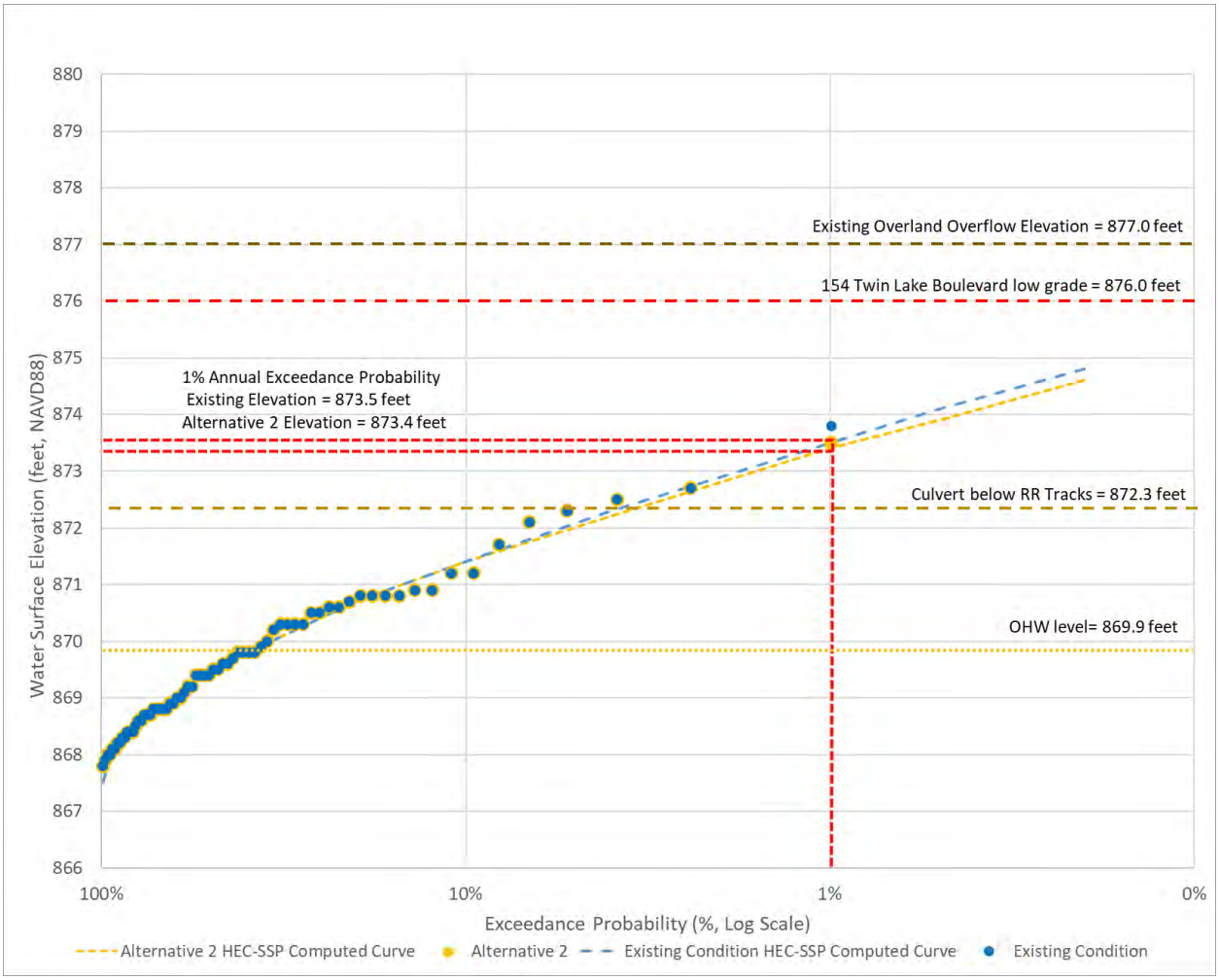


Figure 5-4 Alternative 2 Twin Lake Annual Exceedance

Twin Lake Inundation Duration

A stage-duration curve is a plot of the percentage of time the lake level exceeds a given elevation. Water bodies with highly variable elevations often have a steep curve, which indicates a quick return to the outlet elevation. Landlocked water bodies often have a flatter curve, which indicates a slower return to normal elevations.

Because historic continuous water-level measurements are not available for Twin Lake, the District stormwater model was used to generate a continuous time series of lake levels for the Alternative 2 condition. These are shown in Figure 5-3. The continuous simulation results were used to develop the stage-duration curve for Twin Lake, similar to the methodology followed for existing conditions described in Section 2.1.2.3. Simulation results indicate that the Alternative 2 outlet would reduce the duration (or percentage of time) that the lake level exceeds elevations above 872.3.

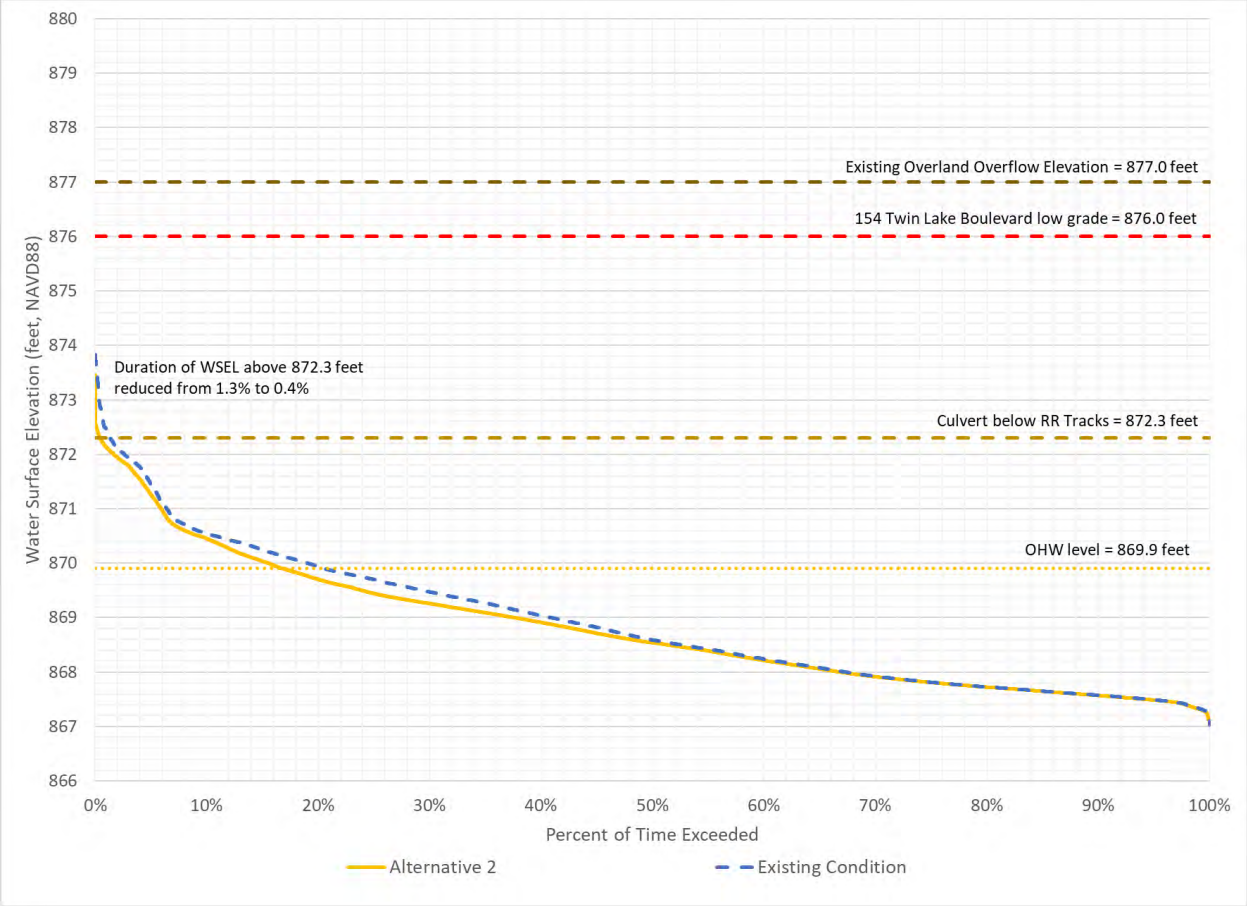


Figure 5-5 Alternative 2 Twin Lake Elevation-Duration Curve

Impacts to the Downstream Floodplain

Downstream impacts at Gervais Lake are summarized in Table 5-1. Following the proposed operational plan would mitigate impacts to the 100-year floodplain downstream of Twin Lake near North Star Estates. However, the operation plan would not mitigate change to the 100-year water level in the Phalen Chain of Lakes, and additional system modifications would be required to mitigate flood risk in the Phalen Chain of Lakes.

Table 5-1 Alternative 2 Floodplain Impacts

Location	Change in the 100-Year Water Surface Elevation (feet)
Twin Lake	(0.1)
Gervais Lake	0.01

Note(s):
(1) Additional system modifications on the Lake Phalen Chain would be required to mitigate increases to the 100-year floodplain.

5.2.2.2 Regulatory Approvals

The City of Little Canada would need to approve the final ERP for Twin Lake.

A drainage permit for a temporary connection to the state drainage system would be required by MnDOT. The drainage permit would include an operation and maintenance plan, pre-pumping and post-pumping photographs documenting the condition of the state drainage system, and a commitment to restore the MnDOT drainage system to pre-pumping conditions. MnDOT also requires an evaluation of impacts to floodplain elevations during the 100-year event.

The MDNR regulates pumping or actively managing discharge from a basin by operating gates or valves and will require an appropriation permit. The ERP is not anticipated to include work below the OHW level, and a project-specific Public Water Work Permit would not be required.

5.2.2.3 Affected Property Owners

Proposed ERP modifications would be located on the MnDOT right-of-way and parcel ID 313022440018, owned by Highpoint Ridge LLC and Frattalone Companies (reference [26]). Modifications in the ERP would also cross BP and Xcel utility easements.

Implementation of emergency responses would be subject to obtaining a right-of-entry agreement from Frattalone Companies and MnDOT. Coordination with property owners would be required to determine whether permanent site access could be constructed or whether a temporary access road would need to be constructed as part of emergency response actions.

5.2.2.4 Wetland/Upland Impacts

The total area of temporary disturbance for the emergency response modifications is approximately 0.8 acres. This area includes the footprint of the access road, temporary pump, pump intake, discharge line, and access easements. Based on the wetland delineation report (reference [27]) it is estimated that there would be 0.1 acres of temporary wetland impact. The total area of wetland impacts may change during the next phase of design and coordination with property owners regarding locations for temporary emergency response modifications.

Alternative 2 may result in impacts to the existing agricultural drainage or agricultural use of fields, which would need to be addressed in an agreement with the property owner. Due to the existing land use, it is not anticipated that Alternative 2 would result in removal of significant trees.

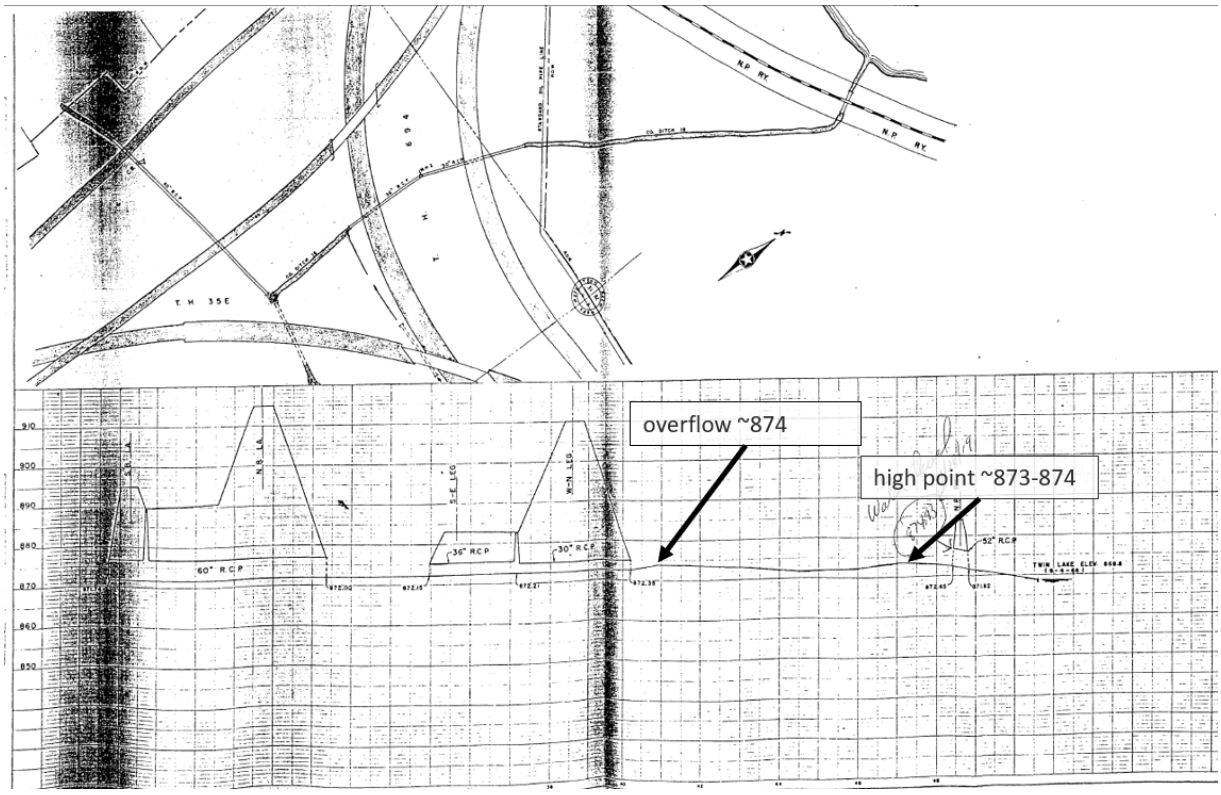
5.2.2.5 Engineer's Opinion of Probable Cost

The engineer's opinion of probable cost is reported as a range of probable costs. The range reflects the level of uncertainty, unknowns, and risk associated with the level of design completed. The opinion of probable cost assumes that an emergency response would be required three times within the next 30-year period. However, the frequency of implementation is dependent on changing climate conditions and rainfall patterns, which may result in mobilizing emergency measures more than three times.

Appendix A includes a detailed discussion of Alternative 2, including assumptions used to develop the engineer's opinion of probable cost. This equates to an estimated total project cost of $430,000 over a 30-year period, with an accuracy range of ($344,000 to $646,000).

5.2.3 Alternative 3: Gravity Outlet at Elevation 874.0

Alternative 3 is shown on Figure 5-7. The proposed outlet consists of grading a ditch from the wetland south of the railroad to the gravity outlet to Waldo Pond. An inlet elevation at 874.0 is located above the 100-year floodplain for Twin Lake, as described in Section 2.1.2.2. The location of the ditch would minimize impacts to the wetland and wetland buffer. An outlet elevation of 874.0 is also consistent with the available documentation for the county ditch system, which shows a highpoint in the ditch between the railroad tracks and I-694, as shown in Figure 5-6 (reference [14]).



Reference [14]

Figure 5-6 1966 Highpoint between I-694 and Railroad

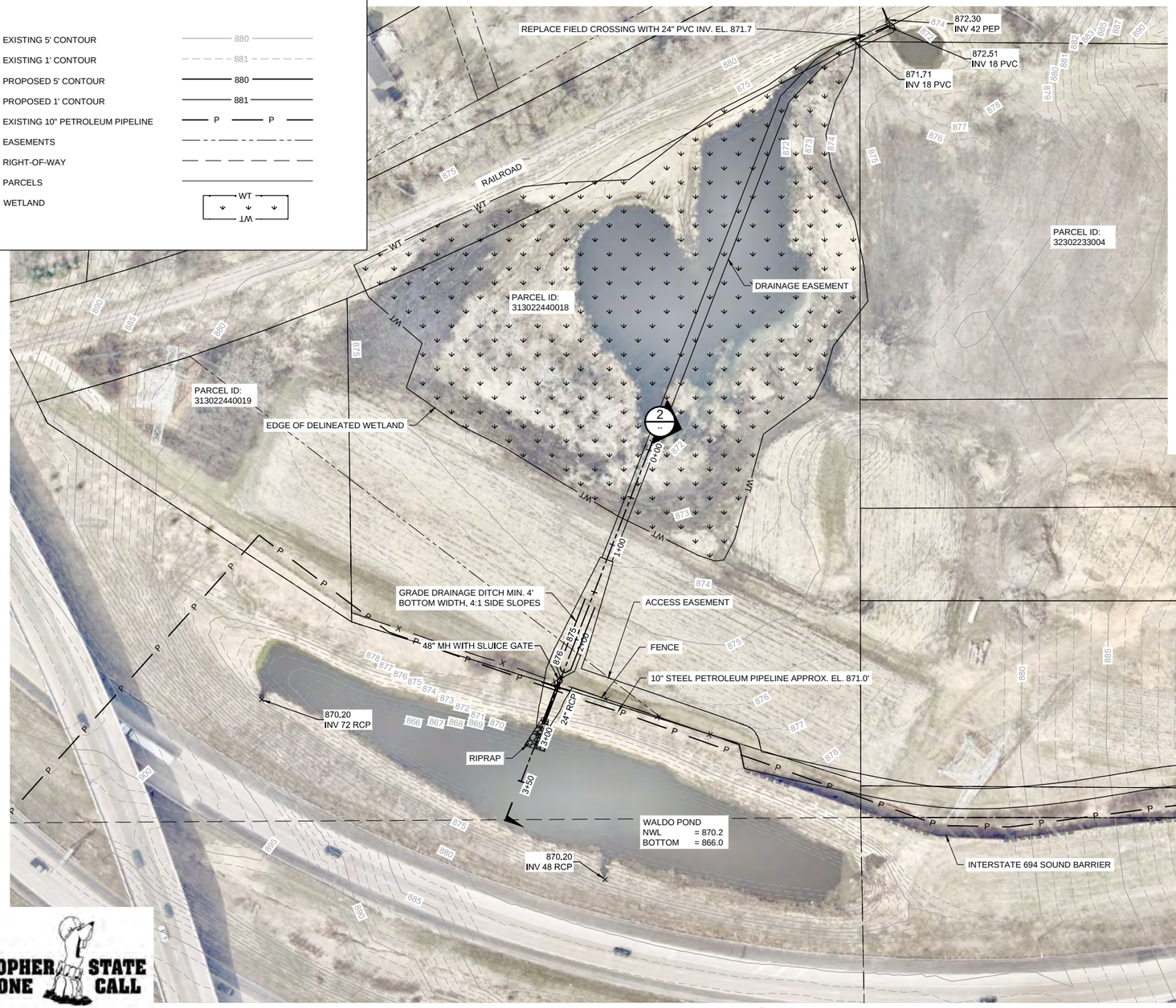
The Alternative 3 outlet to Waldo Pond consists of a minimum 24-inch pipe with a backflow preventer and gatewell. The location of the gatewell would be determined during final design, but MnDOT indicated that operable structures should be located within a permanent drainage easement outside of the MnDOT right-of-way. The outlet consists of a valve to control discharge through the connection. The ability to control the timing of discharge into the MnDOT system is necessary to minimize the increased risk of flooding downstream. Similarly, the alignment could change during final design based on discussions with the property owner and efforts to minimize wetland impacts and avoid utility conflicts. The alignment

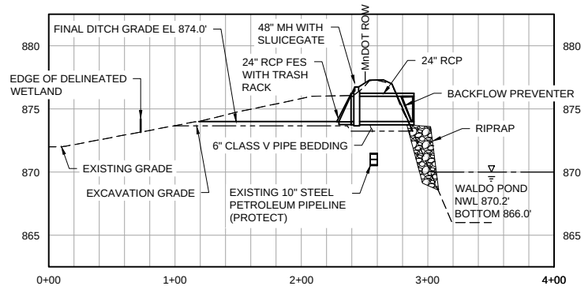
shown on Figure 5-7 generally follows the alignment shown on the original I-694 as-built drawings (reference [12]).

A backflow prevention device is included because if a large rainfall event occurred when the gate was open water could potentially flow from Waldo Pond into Twin Lake. Discharge from the highway drainage system into Twin Lake may have adverse water quality impacts and increase water levels in the lake. To mitigate the potential for discharge from the interstate drainage system back to Twin Lake, both a backflow prevention device and gate valve are recommended if this gravity outlet alternative is pursued. The system would require an operating plan with highlights of the plan discussed later in this section.

LEGEND

- EXISTING 5' CONTOUR — 880
- EXISTING 1' CONTOUR — 881
- PROPOSED 5' CONTOUR — 880
- PROPOSED 1' CONTOUR — 881
- EXISTING 10" PETROLEUM PIPELINE — P — P
- EASEMENTS
- RIGHT-OF-WAY
- PARCELS
- WETLAND — WT / WT





2 - PROFILE: ALTERNATIVE 3 - GRAVITY OUTLET AT ELEVATION 874.0'
1H:10V

0 60 120
SCALE IN FEET

1 - PLAN: ALTERNATIVE 3 - GRAVITY OUTLET AT ELEVATION 874.0'

N

0 60 120
SCALE IN FEET

NOTE:

LOCATIONS FOR ACCESS, TEMPORARAY PUMP, AND TEMPORARY PIPE TO BE COORDINATED WITH OWNERS.

GOPHER STATE ONE CALL

GOPHER STATE ONE CALL:
CALL BEFORE YOU DIG.
1-800-252-1166

CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD-LOCATING ALL SITE UTILITIES, PRIVATE AND PUBLIC, PRIOR TO STARTING THE WORK. ALL UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ANY UTILITIES DAMAGED BY CONTRACTOR SHALL BE REPAIRED BY CONTRACTOR TO THE SATISFACTION OF THE UTILITY OWNER.

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION

CLIENT
BID
CONSTRUCTION

RELEASED TO/FOR

A	B	C	0	1	2	3
DATE RELEASED						

BARR
Corporate Headquarters:
Minneapolis, Minnesota
Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
4300 MARKETPOINTE DRIVE
Suite 200
MINNEAPOLIS, MN 55435
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

Scale	AS SHOWN
Date	11/11/2019
Drawn	GWB
Checked	BJB
Designed	BJB
Approved	-

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

TWIN LAKE FLOOD-RISK MITIGATION FEASIBILITY STUDY

ALTERNATIVE 3
GRAVITY OUTLET AT ELEVATION 874.0'

BARR PROJECT No.	
23621200.19	
CLIENT PROJECT No.	
DWG. No.	REV. No.
FIGURE 5-7	A

CADD USER: Gareth W. Becker FILE: M:\DES\GN\23621200.00\23621200.00319_OPTION 3.DWG PLOT SCALE: 1:2 PLOT DATE: 11/22/2019 1:53 PM

5.2.3.1 Floodplain Impacts

The District's calibrated stormwater model, developed in XP-SWMM, was used to evaluate the floodplain impacts in Twin Lake and downstream of the proposed outlet. Since Twin Lake is currently landlocked, flow through the gravity outlet would need to be controlled to prevent increases to downstream water bodies. For this evaluation the following operational plan was assumed:

1. The gravity outlet would be opened if water levels in Twin Lake reach elevation 874.0.
2. The outlet would be closed 12 hours prior to a forecasted rainfall event greater than 2 inches. The outlet could be reopened after the water level in Waldo Pond begins to recede.
3. The gravity outlet would be closed the remainder of the year.

A connection to the MnDOT system should be operated such that the additional discharge does not reduce the capacity of the interstate drainage system during a rainfall event. In addition, as discussed in Section 2.1.2.1, there are habitable structures downstream of the gravity outlet that are below the 100-year floodplain even without additional flow from Twin Lake. The District stormwater model indicates that the lowest homes at North Star Estates could be impacted by a 4-inch, 4-day rainfall event. Therefore, the operation of the outlet must mitigate the risk to downstream habitable structures.

The District's stormwater model indicates that the travel time from the proposed gravity outlet through the MnDOT system is approximately 6 hours. During dry weather conditions, the water level in Gervais Creek will draw down to within 0.4 feet of the channel bottom at Owasso Boulevard approximately 12 hours after the pumping is stopped. Therefore, to prevent increased flood risk for North Star Estates or a reduction in the capacity of the I-694 storm sewer system, the gate valve would be closed 12 hours prior to a forecasted 2-inch rainfall event. The gate valve would be opened after water levels in Waldo pond begin to recede following the event.

Following the operation plan described above, three types of floodplain impacts were evaluated using the District's stormwater model:

1. Impacts to the 100-year floodplain in Twin Lake
2. Impacts to the 100-year floodplain downstream of Twin Lake
3. Impacts to the duration of inundation in Twin Lake

Twin Lake Elevation

The District's stormwater model was used to simulate Alternative 3 conditions in the Twin Lake watershed following the same methodology used to evaluate existing conditions discussed in Section 2.1.2.2. The District stormwater model was used to simulate rainfall from 1949 to 2018, assuming that stormwater was conveyed to Waldo pond when the water level reached elevation 874.0. The Twin Lake continuous modeling results for Alternative 3 are shown in Figure 5-8. As shown in Figure 5-8, the water level in Twin Lake would not have exceeded the outlet elevation between 1949 and 2018. As a result, the 100-year

water level (or 1-percent annual-exceedance probability) is the same as existing conditions, as shown in Figure 5-11.

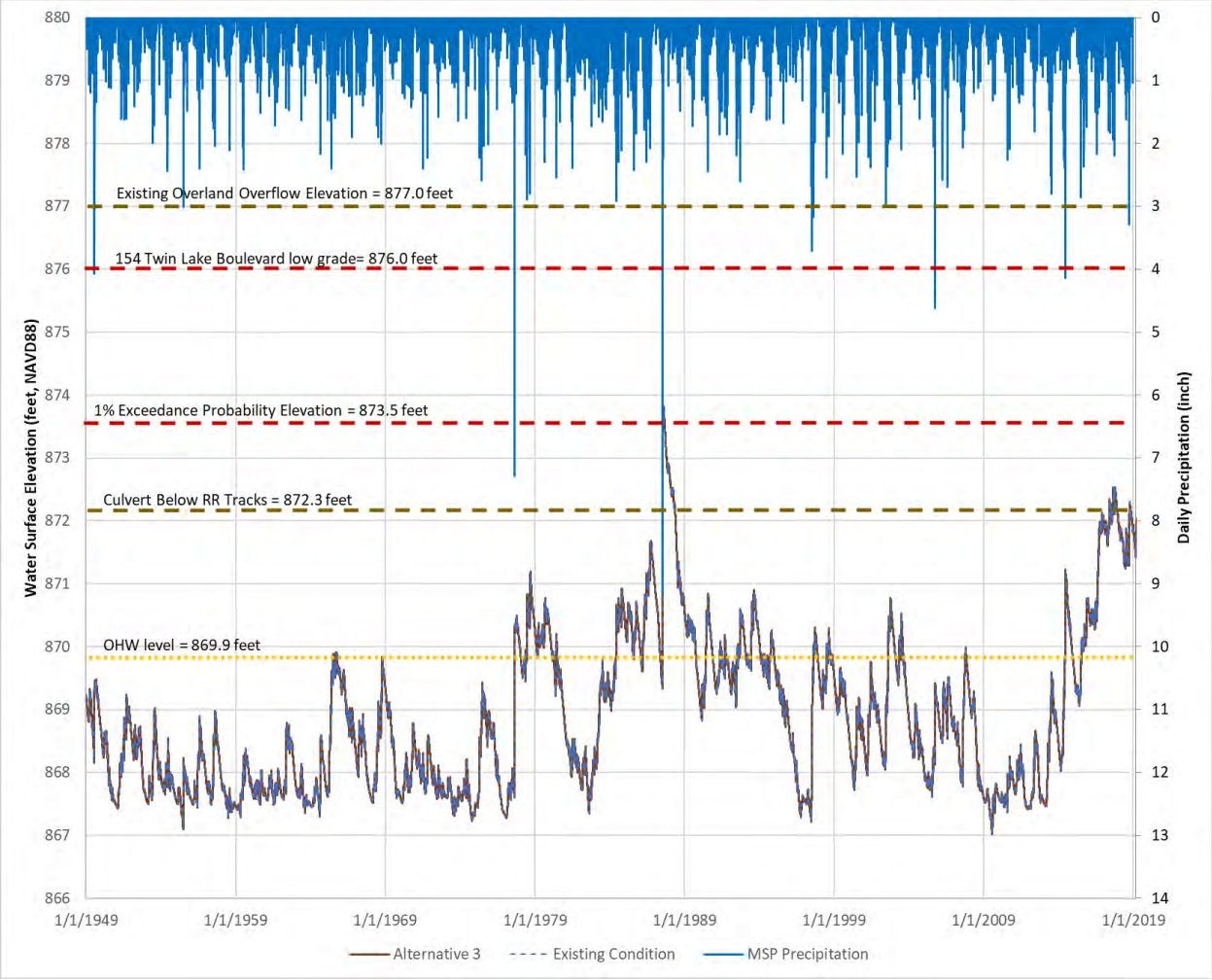


Figure 5-8 Alternative 3 Twin Lake Water Levels

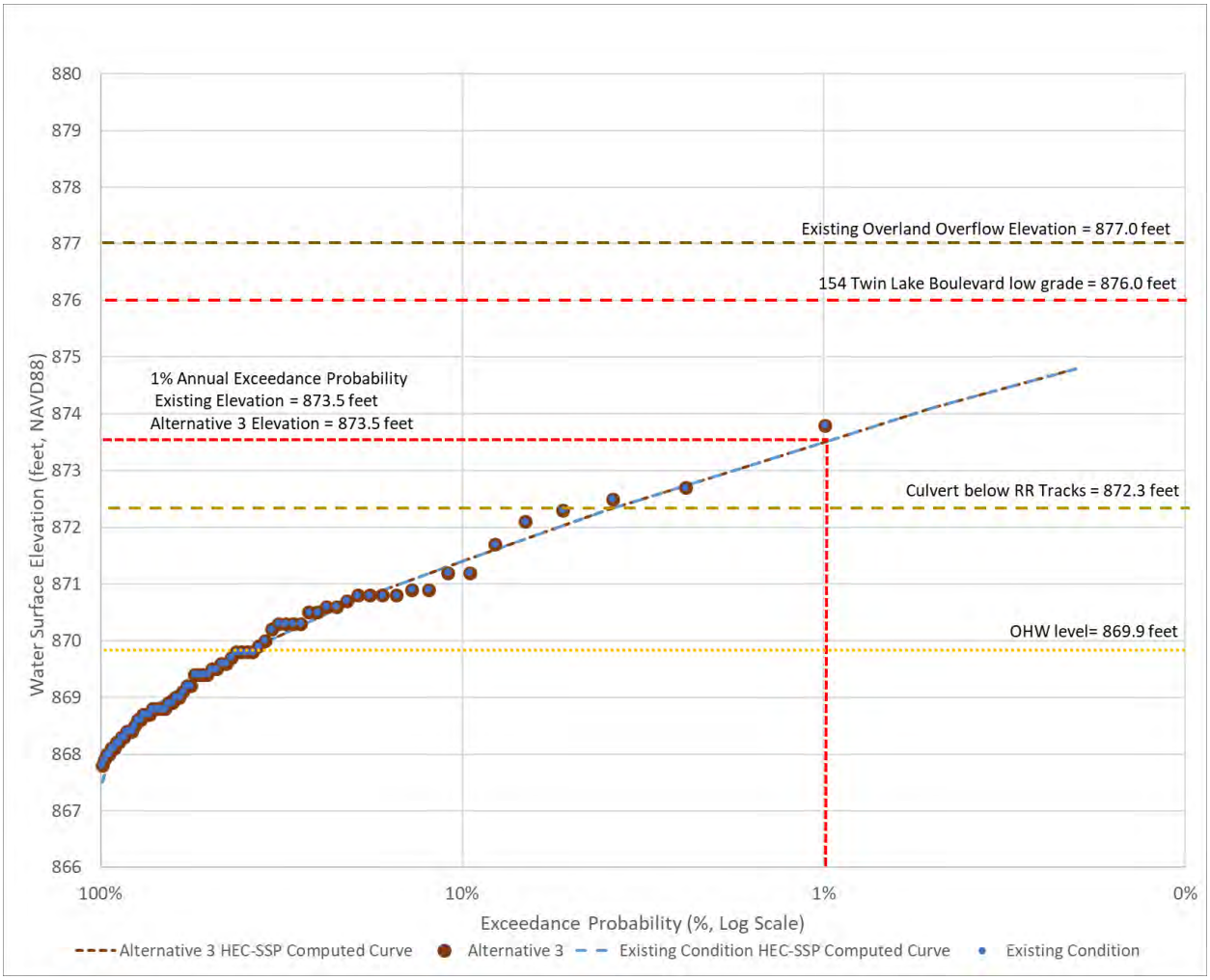


Figure 5-9 Alternative 3 Twin Lake Annual Exceedance

Twin Lake Inundation Duration

A stage-duration curve is a plot of the percentage of time the lake level exceeds a given elevation. Water bodies with highly variable elevations often have a steep curve, which indicates a quick return to the outlet elevation. Landlocked water bodies often have a flatter curve, which indicates a slower return to normal elevations.

The District stormwater model was used to generate a continuous time series of lake levels for the Alternative 3 condition; these are shown in Figure 5-8. The continuous simulation results were used to develop the stage-duration curve for Twin Lake, similar to the methodology followed for existing conditions described in Section 2.1.2.3.

Simulation results indicate that the Alternative 3 outlet would not change the duration (or percentage of time) that the lake level exceeds a given elevation during the period evaluated (1949–2018).

During the summer of 2019, the water level in Twin Lake exceeded 874.0, and the Alternative 3 outlet would have reduced the period that lake levels exceeded the proposed outlet elevation.

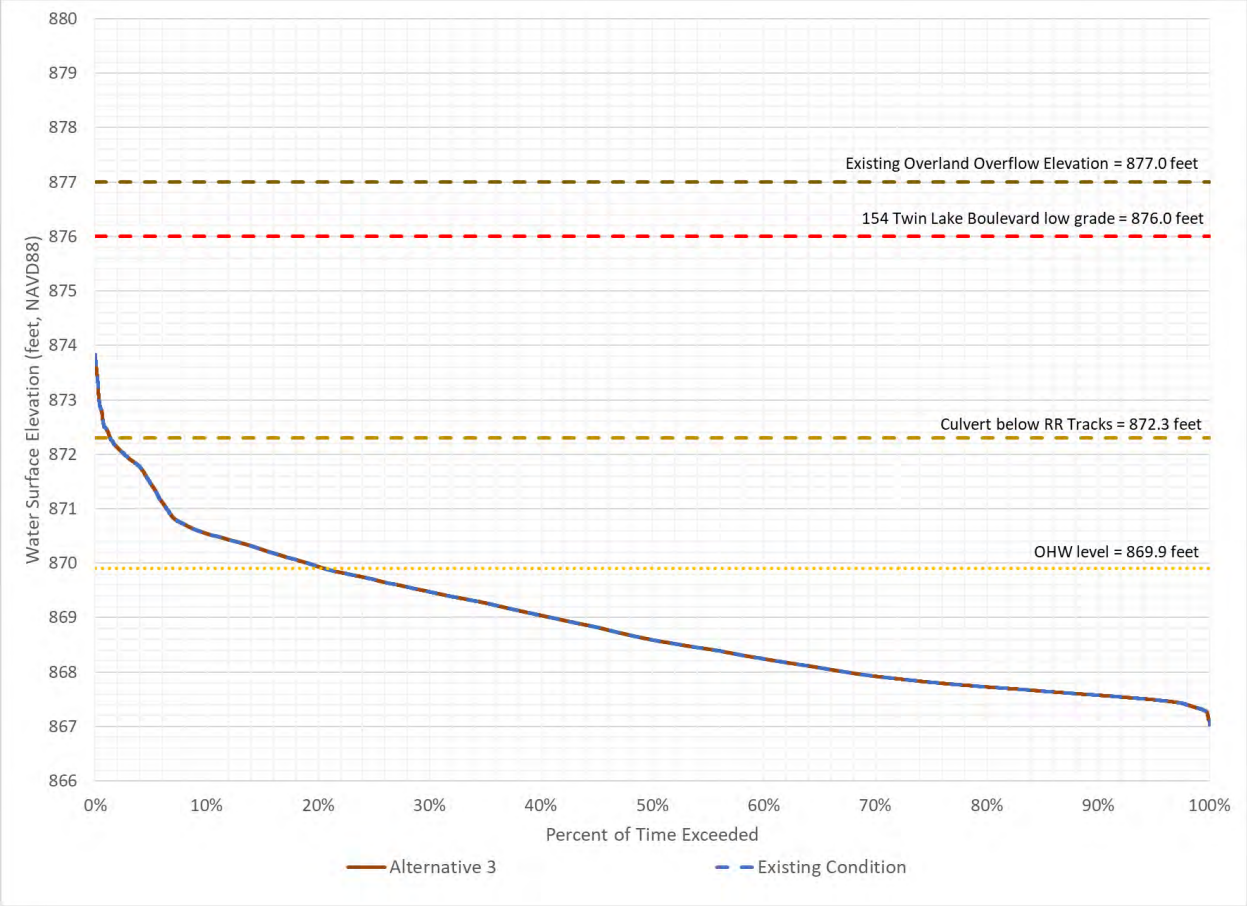


Figure 5-10 Alternative 3 Twin Lake Elevation-Duration Curve

Because the Alternative 3 outlet elevation is higher than the culvert below the railroad tracks, modifications to the outlet elevation, temporary pumping, or other methods would be required if water levels in Twin Lake needed to be lowered further.

Impacts to the Downstream Floodplain

The District stormwater model was used to calculate the 100-year floodplain impacts downstream of a new gravity outlet following the same methodology used to evaluate existing conditions described in Section 2.1.2.1. Downstream impacts at Gervais Lake are summarized in Table 5-2. Following the proposed operational plan would mitigate impacts to the 100-year floodplain downstream of Twin Lake. If discharge is required during the spring or summer months, there is potential for increase to the 100-year floodplain on the Phalen Chain of Lakes that would require additional mitigation.

Table 5-2 Alternative 3 Floodplain Impacts

Location	Change in the 100-Year Water Surface Elevation (Feet)
Twin Lake	0.00
Gervais Lake	0.01 [1]

Note(s):
(1) Additional system modifications on the Lake Phalen Chain would be required to mitigate increases to the 100-year floodplain.

5.2.3.2 Regulatory Approvals

A fill permit will be required by the City of Little Canada.

The MPCA regulates the NPDES stormwater permitting program. An NPDES permit is required for construction projects that disturb 1 acre. The MPCA will also require a SWPPP.

The MDNR regulates work below the OHW level of public waters. The OHW level for Twin Lake is 869.9 feet (NAVD88). Because work would not occur below the OHW level, a Public Water Work Permit is not required.

MDNR requires an appropriation permit for active management of a gravity outlet. If operation of gates or valves is not included in the final design, an appropriation permit would not be required. However, an appropriation permit would be needed if temporary pumping was done to lower the water level below 874.0

MnDOT regulates activities that impact the state drainage system. Reestablishing a connection to the MnDOT stormwater system would require a drainage permit from MnDOT. MnDOT would also require documentation of permanent easements for upstream infrastructure and an operations and maintenance plan. MnDOT would request that a gravity outlet be provided at the same elevation previously approved for the 1970 County Ditch 16 realignment. If an alternate elevation is proposed, supporting documentation for the deviation would also be required.

RWMWD regulates the control of floodwater to ensure the preservation of floodplains and flood storage areas, improve water quality, preserve vegetation, alleviate identified erosion problems, ensure the preservation of wetland and creek buffers, and prevent erosion of shorelines and stream banks. A RWMWD permit will be required for Rule C – Stormwater Management, Rule D – Flood Control, Rule E – Wetland Management, and Rule F – Erosion and Sediment Control.

5.2.3.3 Affected Property Owners

Proposed modifications would be located on MnDOT right-of-way and parcel ID 313022440018, which is owned by Highpoint Ridge LLC and Frattalone Companies. Modifications also include drainage improvements on BP and Xcel utility easements.

Construction of a drainage ditch on parcel ID 313022440018 is subject to obtaining a permanent drainage easement from the property owner. The proposed drainage ditch would be through existing agricultural land and result in a reduction of area that could be used for farming.

Site access would likely occur from Centerville Avenue. There is an existing access road to the Xcel transmission line that could be used for access. A permanent access road would be needed along the MnDOT right-of-way to access the gatewell.

5.2.3.4 Wetland/Upland Impacts

The total area of disturbance and drainage and access easements for the proposed outlet is approximately 0.8 acres. This area includes the footprint of the grading extents for the drainage ditch, gatewell, gravity pipe, and drainage and access easements. Based on the wetland delineation report (reference [27]), it is estimated that this alternative will not result in wetland impacts.

The District is the wetland permitting authority for this project and has a no-net-loss policy for wetlands within the District. If wetland impacts are identified during the next phase of design, a wetland replacement and mitigation plan would need to be developed during the next phase of design. It is possible that some wetland mitigation could occur adjacent to the existing wetland ditch pending coordination with the property owner.

Alternative 3 will result in permanent modifications to the area between the railroad tracks and Waldo Pond. It is anticipated that in reestablishing the ditch, permanent wetland impacts will be avoided or minimized. Alternative 3 will also result in permanent impacts to the existing agricultural drainage. Construction of the outlet and ditch would remove approximately 0.1 acres of existing agricultural area. Due to the existing land use, it is not anticipated that Alternative 3 would result in removal of significant trees.

5.2.3.5 Engineer's Opinion of Probable Cost

The engineer's opinion of probable cost is reported as a range of probable costs. The range reflects the level of uncertainty, unknowns, and risk associated with the level of design completed. The opinion of probable cost includes costs for construction, planning engineering and design, permitting, construction management, contingency, and operation and maintenance costs over a 30-year period. Maintenance requirements for Alternative 3 include yearly site inspections of the ditch and piped outlet through the embankment, vegetation maintenance, and inspections during periods when water is flowing through the outlet. The opinion of probable cost assumes that monitoring of discharge through the outlet would be required three times within the next 30-year period. However, the frequency of monitoring is dependent on changing climate conditions and rainfall patterns, which may result in monitoring more than three times.

Appendix A includes a detailed discussion of Alternative 3, including assumptions used to develop the engineer's opinion of probable cost. This equates to an estimated total project cost of $190,000 over a 30-year period, with an accuracy range of ($153,000 to $285,000).

5.2.4 Alternative 4: Gravity Outlet at Elevation 872.2

Alternative 4 is shown on Figure 5-11. The proposed outlet would consist of grading a ditch from the culvert below the railroad tracks to a new gravity outlet through the MnDOT berm to Waldo Pond. The location of the ditch would be selected to minimize impacts to the wetland and wetland buffer. The outlet to Waldo Pond would be 24-inch diameter pipe with a backflow preventer and gatewell. An outlet elevation of 872.2 is lower than the control elevations listed in available documentation for the county ditch system (references [14], [16]), which indicated there was a high point in the ditch between the railroad and I-694 at approximately elevation 874 as shown on Figure 5-6. However, elevation 872.2 is consistent with the inlet to the I-694 drainage system that was constructed in 1970 (reference [25]). The lower inlet elevation would provide the ability to lower water levels, relative to Alternative 3. It is important to note that placement of an outlet through the embankment any lower than this elevation would not appreciably lower the levels in Twin Lake, as the culvert under the railroad is at an elevation of 872.3. This elevation was established prior to establishment of the county ditch and serves as the water level control of the lake.

The piped connection through the embankment would consist of a valve to control discharge through the connection. The ability to control the timing of discharge into the MnDOT system is necessary to meet the project design criteria of not increasing discharge during the 2-, 10-, or 100-year events. In addition, North Star Estates, shown in Figure 2-6, has a history of flooding during intense rainfall events, and controlling the timing of when flow is discharged is necessary to minimize the increased risk of downstream impacts.

If the valve was open during large rainfall events, there would be potential for water to flow from Waldo Pond into Twin Lake. Discharge from the highway drainage system into Twin Lake may have adverse water quality impacts. Therefore, a backflow prevention device would be required on the downstream end of the outlet.

LEGEND

- EXISTING 5' CONTOUR — 880
- EXISTING 1' CONTOUR — 881
- PROPOSED 5' CONTOUR — 880
- PROPOSED 1' CONTOUR — 881
- EXISTING 10" PETROLEUM PIPELINE — P — P
- EASEMENTS
- RIGHT-OF-WAY
- PARCELS
- WETLAND — WT

REPLACE FIELD CROSSING WITH 24" PVC INV. EL. 871.7

872.30
INV 42 PEP

872.51
INV 18 PVC

871.71
INV 18 PVC

RAILROAD

DRAINAGE EASEMENT

PARCEL ID:
313022440018

PARCEL ID:
32302233004

PARCEL ID:
313022440019

EDGE OF DELINEATED WETLAND

GRADE DRAINAGE DITCH MIN. 4'
BOTTOM WIDTH, 4:1 SIDE SLOPES

48" MH WITH
SLUICEGATE

ACCESS EASEMENT

FENCE

10" STEEL PETROLEUM PIPELINE APPROX. EL. 871.0'

870.20
INV 72 RCP

24" RCP
L=100'

870.20
INV 48 RCP

WALDO POND
NWL = 870.2
BOTTOM = 866.0

INTERSTATE 694 SOUND BARRIER

PARCEL ID:
323022330028

3151 CENTERVILLE ROAD

3143 CENTERVILLE ROAD

3135 CENTERVILLE ROAD

CENTERVILLE ROAD

PARCEL LINES

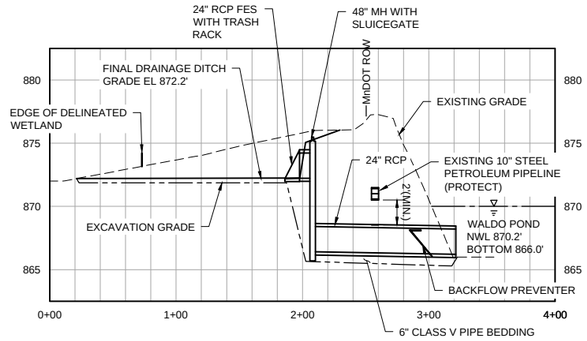
EASEMENT LINES

SITE ACCESS

WESTBOUND INTERSTATE 694

EASTBOUND INTERSTATE 694

2
-
PROFILE: OPTION 4 - GRAVITY OUTLET AT ELEVATION 872.2'
1H:10V



0 60 120
SCALE IN FEET

1
-
PLAN: ALTERNATIVE 4 - GRAVITY OUTLET AT ELEVATION 872.2'

0 60 120
SCALE IN FEET

NOTE:

LOCATIONS FOR ACCESS, TEMPORARAY PUMP, AND TEMPORARY PIPE TO BE COORDINATED WITH OWNERS.

GOPHER STATE ONE CALL

GOPHER STATE ONE CALL:
CALL BEFORE YOU DIG.
1-800-252-1166

CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD-LOCATING ALL SITE UTILITIES, PRIVATE AND PUBLIC, PRIOR TO STARTING THE WORK. ALL UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE. ANY UTILITIES DAMAGED BY CONTRACTOR SHALL BE REPAIRED BY CONTRACTOR TO THE SATISFACTION OF THE UTILITY OWNER.

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION

CLIENT
BID
CONSTRUCTION

RELEASED TO/FOR

A	B	C	0	1	2	3
DATE RELEASED						

BARR
Corporate Headquarters:
Minneapolis, Minnesota
Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
4300 MARKETPOINTE DRIVE
Suite 200
MINNEAPOLIS, MN 55435
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

Scale	AS SHOWN
Date	11/11/2019
Drawn	GWB
Checked	BJB
Designed	BJB
Approved	-

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

TWIN LAKE FLOOD-RISK MITIGATION FEASIBILITY STUDY

ALTERNATIVE 4
GRAVITY OUTLET AT ELEVATION 872.2'

BARR PROJECT No.	
23621200.19	
CLIENT PROJECT No.	
DWG. No.	REV. No.
FIGURE 5-11	A

5.2.4.1 Floodplain Impacts

The District's calibrated stormwater model, developed in XP-SWMM, was used to evaluate the floodplain impacts in Twin Lake and downstream of the proposed outlet. Since Twin Lake is currently landlocked, flow through the gravity outlet would need to be controlled to prevent increases to downstream water bodies.

The probability of large rainfall events in the late fall is less than during the spring and summer months. The period-of-record summary statistics for rainfall from the MDNR indicate that the average total monthly rainfall in November is 1.5 inches (reference [18]). In addition, Atlas 14 publishes a seasonality analysis, shown on Figure 5-12. The seasonality plot shows the percentage of rainfall events that exceed a given annual exceedance probability. The plot shows that during November, less than 1 percent of precipitation events exceeded the 24-hour duration 2-year event, which is 2.8-inches. While the Atlas 14 seasonality analysis is not a seasonal precipitation frequency estimate, it does illustrate that the risk of rainfall events that would result in flooding within North Star Estates is lower during the later fall months compared to the spring and summer months.

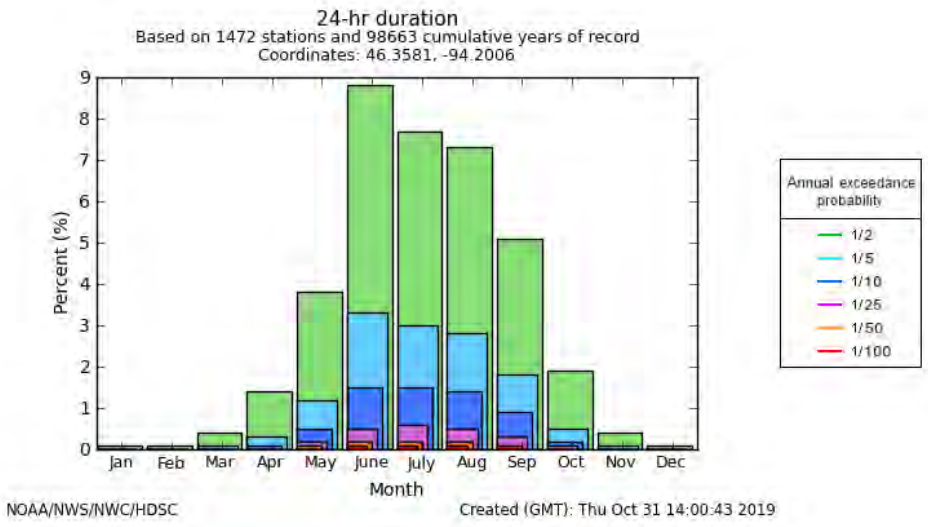


Figure 5-12 Seasonality Analysis

Seasonality analysis figure from Atlas 14. The figure shows the percentage of precipitation totals for a given duration that exceed the precipitation frequency estimate (reference [28]).

For this evaluation the following operational plan was assumed:

1. The gravity outlet would be opened from November 15–February 15 to allow a maximum of 10 cfs out of the system to lower the water level to 872.3 (the invert of the culvert below the railroad tracks).

2. The gravity outlet would be closed the remainder of the year under most normal rainfall and flooding conditions.

3. The outlet would be closed 12 hours prior to a forecasted rainfall event greater than 2 inches. The outlet could be reopened after the water level in Waldo Pond begins to recede.

4. The gravity outlet would be opened between February 16 and November 14 if any of the following occur:

    a. The water level in Twin Lake reaches 873.5

    b. The water level in Waldo Pond exceeds 877.0 and water is conveyed north into Twin Lake

    If the gravity outlet is opened during this period, it is assumed that it would be closed 12 hours prior to a forecasted rainfall event greater than 2 inches, and would remain closed until the water level in Waldo Pond begins to recede, the water level in Owasso Basin is within 0.4-feet of the outlet, and downstream water levels have receded.

If this alternative is selected, a detailed operating plan would need to be developed during the next phase of design to include the above mentioned in more detail. Continuous monitoring and adaptive control, such as the Opti-CMAC system, maybe incorporated into the design to automate operation of the gate based on the time of year and weather forecasts.

A connection to the MnDOT system should be operated such that the additional discharge does not reduce the capacity of the interstate drainage system during a rainfall event. In addition, as discussed in Section 2.1.2.1, there are habitable structures downstream of the gravity outlet that are below the 100-year floodplain even without additional proposed flow from Twin Lake. The District stormwater model indicates that the lowest homes at North Star Estates could be impacted by a 4-inch, 4-day rainfall event. Therefore, the operation of the outlet must mitigate the risk to downstream habitable structures.

The District's stormwater model indicates that during dry weather conditions the travel time from the proposed gravity outlet through the MnDOT system is approximately 6 hours and that the water level in Gervais Creek will draw down to within 0.4 feet of the channel bottom at Owasso Boulevard approximately 12 hours after the pumping is stopped. Therefore, to prevent increased risk of flooding for North Star Estates or a reduction in the capacity of the I-694 storm sewer system, the outlet would be closed 12 hours prior to a forecasted 2-inch rainfall event. The outlet could be opened after water levels in Waldo Pond begin to recede following the event. This proposed operation is consistent with the plan approved by MnDOT during the summer of 2019 (reference [24]).

Twin Lake Elevation

The District's stormwater model was used to simulate Alternative 4 conditions in the Twin Lake watershed, following the same methodology used to evaluate existing conditions discussed in Section 2.1.2.2. The District stormwater model was used to simulate rainfall from 1949 to 2018, assuming that the operation plan for the outlet was implemented. The Twin Lake continuous modeling results for Alternative 4 (Figure 5-13) show the water level in Twin Lake would have exceeded the outlet elevation between 1949 and 2018. As a result, the 100-year water level (or 1-percent-annual-exceedance probability) is lower than existing conditions, as shown in Figure 5-14.

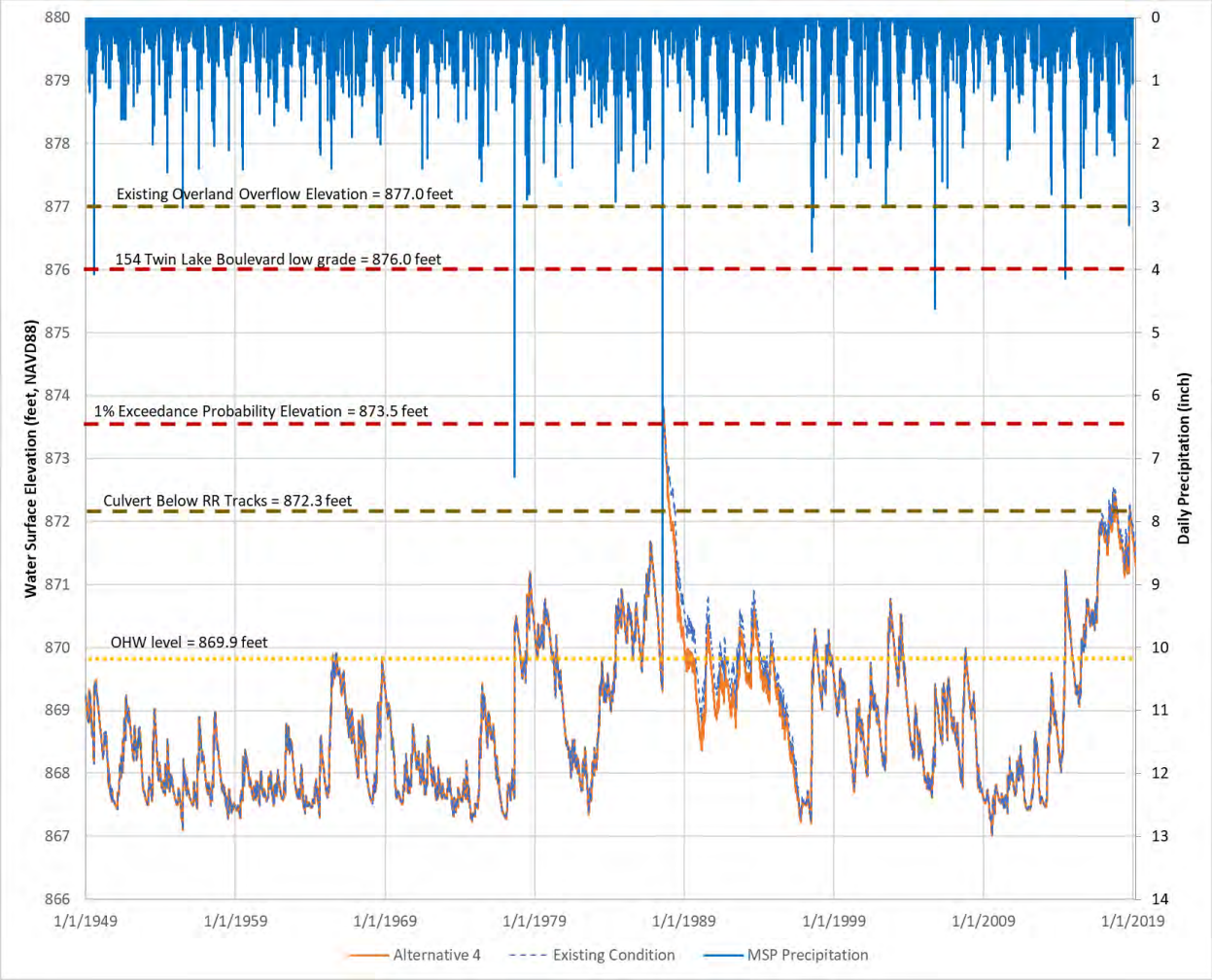


Figure 5-13 Alternative 4 Twin Lake Water Levels

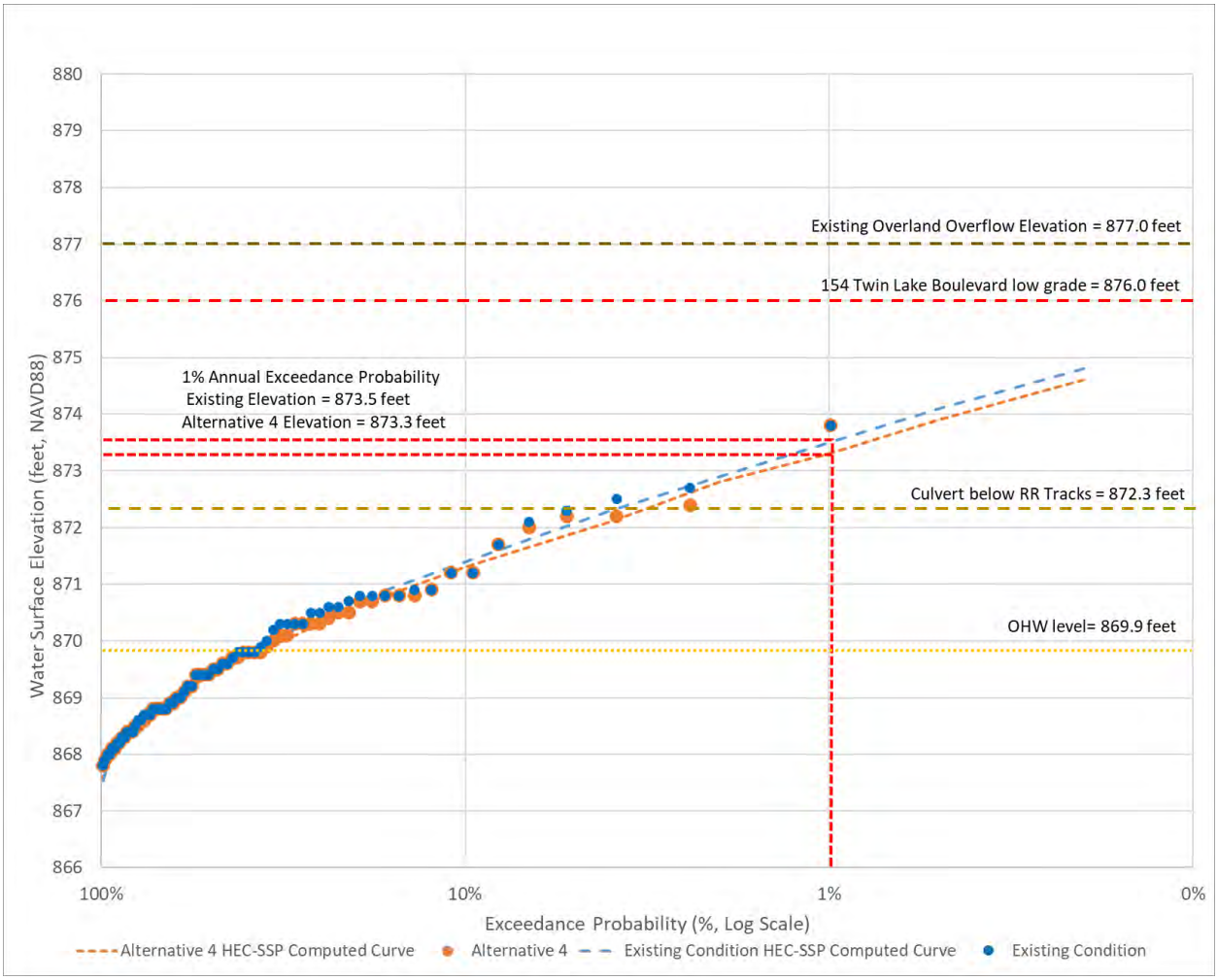


Figure 5-14 Alternative 4 Twin Lake Annual Exceedance

Twin Lake Inundation Duration

Similar to previous alternatives, the District stormwater model was used to generate a continuous time series of lake levels for the Alternative 4 condition, shown in Figure 5-13. The continuous simulation results were used to develop the stage-duration curve for Twin Lake, shown in Figure 5-15, similar to the methodology followed for existing conditions described in Section 2.1.2.3.

Simulation results indicate that the Alternative 4 outlet would reduce the duration (or percentage of time) that the lake level exceeds elevation 872.2 from 1.7-percent to 1.1-percent of the time during the period evaluated (1949–2018).

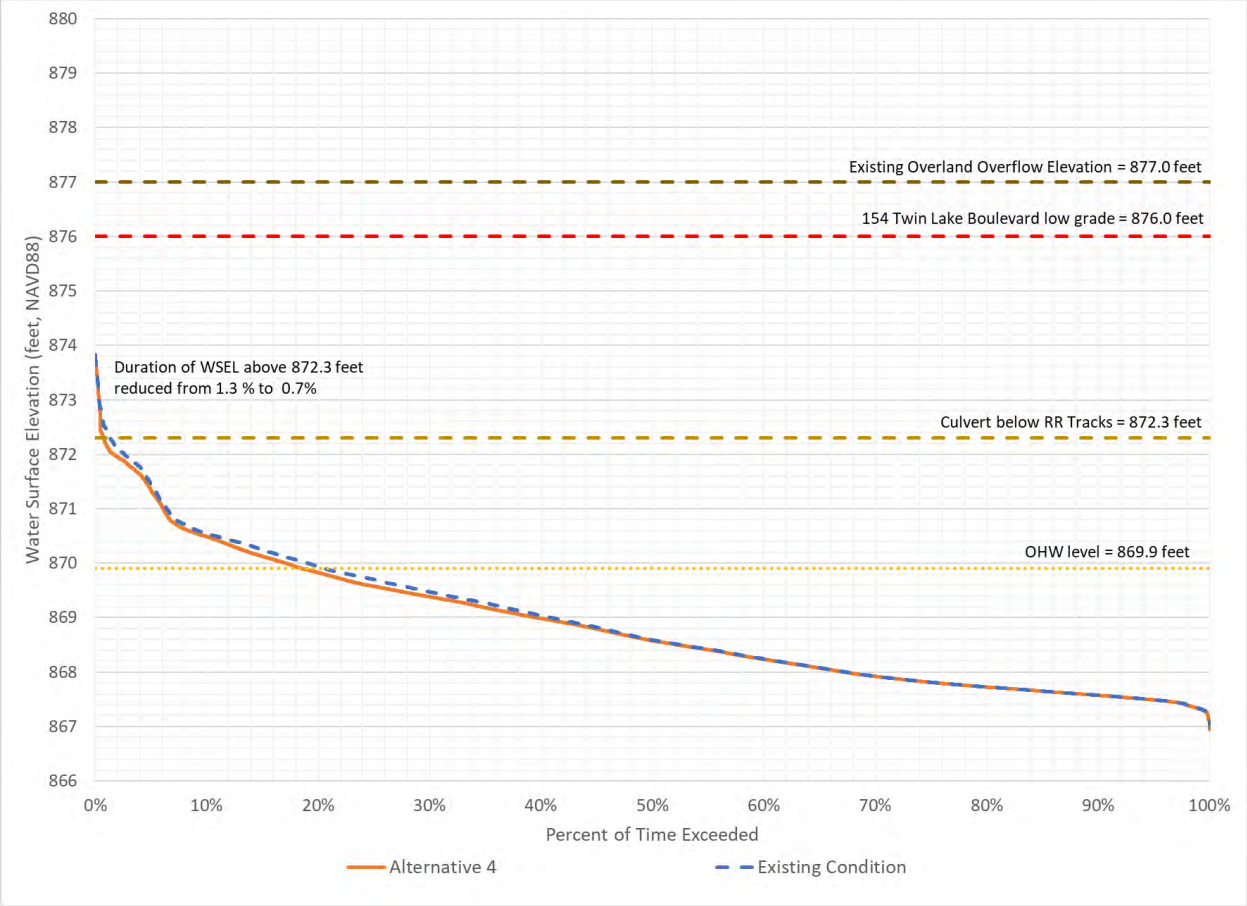


Figure 5-15 Alternative 4 Twin Lake Elevation-Duration Curve

Impacts to the Downstream Floodplain

The District stormwater model was used to calculate the 100-year floodplain impacts downstream of a new gravity outlet following the same methodology used to evaluate existing conditions described in Section 2.1.2.1. Downstream impacts at Gervais Lake are summarized in Table 5-3. Following the proposed operational plan would minimize increased risk to the 100-year floodplain of areas downstream of Twin Lake. If discharge is required during the spring or summer months, there is the potential for increase to the 100-year floodplain on the Phalen Chain of Lakes that would require additional attention during those operations.

Table 5-3 Alternative 4 Floodplain Impacts

Location	Change in the 100-Year Water Surface Elevation (feet)
Twin Lake	(0.2)
Gervais Lake	0.00 [1]

Note(s):
[1] There would be an increase to the 100-year water surface elevation if discharge is required during the spring or summer months.

5.2.4.2 Regulatory Approvals

The permits required for Alternative 4 will be similar to the permits required for Alternative 3, discussed in Section 5.2.3.2.

5.2.4.3 Affected Property Owners

The affected property owners for Alternative 4 will be similar to the property owners affected by Alternative 3, discussed in Section 5.2.3.3.

5.2.4.4 Wetland/Upland Impacts

The total area of disturbance and drainage and access easements for the proposed outlet is approximately 0.8 acres. This area includes the footprint of the grading extents for the drainage ditch, gatewell, gravity pipe, and drainage and access easements. Based on the wetland delineation report (reference [27]), it is estimated that approximately 0.1 acres of the existing wetland could be impacted by the proposed improvements. The total area of wetland impacts may change during the next phase of design as grading extents are optimized.

The District is the wetland permitting authority for this project and has a no-net-loss policy for wetlands within the District. Wetland replacement and mitigation plans would need to be developed during the next phase of design. It is possible that some wetland mitigation could occur adjacent to the existing wetland ditch pending coordination with the property owner.

Alternative 4 will result in permanent modifications to the area between the railroad tracks and Waldo Pond. It is anticipated that the design to reestablish the ditch will avoid or minimize permanent wetland impacts. Alternative 4 will also result in permanent impacts to the existing agricultural drainage. Construction of the outlet and ditch would remove approximately 0.2-acres of existing agricultural area. Due to the existing land use, it is not anticipated that Alternative 4 would result in removal of significant trees.

5.2.4.5 Engineer's Opinion of Probable Cost

The engineer's opinion of probable cost is reported as a range of probable costs. The range reflects the level of uncertainty, unknowns, and risk associated with the level of design completed. The opinion of probable cost includes costs for construction, planning engineering and design, permitting, construction

management, contingency, and operation and maintenance costs over a 30-year period. Maintenance requirements for Alternative 4 include yearly site inspections of the ditch and piped outlet through the embankment, vegetation maintenance, and operation of the gated outlet. The opinion of probable cost assumes that operation of the gatewell would be required three times within the next 30-year period. However, the frequency of operation is dependent on changing climate conditions and rainfall patterns, which may result in operation more than three times.

Appendix A includes a detailed discussion of Alternative 4, including assumptions used to develop the engineer's opinion of probable cost. This equates to an estimated total project cost of $267,000 over a 30-year period, with an accuracy range of ($214,000 to $401,000).

5.3 Conceptual Design Summary

Table 5-4 summarizes the design criteria (Section 3) and design goals (Section 4) for each of the four alternatives considered.

Table 5-4 Conceptual Design Summary

	Alternative 1: Remove Flood-Prone Structure	Alternative 2: Emergency Response Plan	Alternative 3: Gravity Outlet at Elevation 874.0	Alternative 4: Gravity Outlet at Elevation 872.2
Design Criteria				
No increase in peak runoff rate during 2-year, 10-year, or 100-year event	✓	✓ See Note 1	✓ See Note 1	✓ See Note 1
No increase in downstream 100-year elevations	✓ See Note 2	✗ See Note 2	✗ See Note 2	✓ See Note 2
Implement erosion and sediment controls	✓	✓	✓	✓
Avoid, minimize, and mitigate wetland impacts	✓ No impacts	✓ No impacts	✓ No impacts. See Note 3	✓ See Note 3
Minimum 2-foot vertical offset from petroleum pipeline	NA	✓	✓	✓
Pump or actively manage discharge will require MDNR appropriation permit	NA	✓ See Note 4	✓ See Note 4	✓ See Note 4
Flood-Risk Mitigation Goals				
Maximize freeboard between low home and 100-year water level	✗ See Note 5	✓	✗	✓
Minimize duration that inundation extends onto residential property	✗ See Note 6	✗ See Note 6	✗ See Note 6	✓
Minimize impacts to upland area	✗ See Note 7	✓	✓	✓
Provide flexibility for future optimization	✗ See Note 8	✗ See Note 8	✗ See Note 8	✓
Engineer's opinion of probable cost over a 30-year period	$878,000 - $1,646,000 $1,097,000	$344,000 - $646,000 $430,000	$153,000 - $285,000 $190,000	$214,000 - $401,000 $267,000

Note(s):

(1) If operation plan is developed for when temporary pump can be operated or gate can be opened. There may be periods when the pump is turned off or gate is closed to avoid increases to the peak discharge rate.

(2) Discharging any additional flow downstream changes flood-risk. Alternative 1 is the only alternative that does not change downstream flood-risk. Alternatives 2 and 3 result in increases to the 100-year floodplain in the Phalen Chain and would require downstream modifications to mitigate impacts to the 100-year flood elevation. Alternative 4 includes an operating plan to reduce the potential to downstream impacts to the 100-year floodplain. Adherence to the operating plan that is consistent with permitting requirements and hydrologic modeling will reduce that risk.

(3) Wetland impacts must be minimized during final design. Alternative 3 and Alternative 4 may have opportunity for wetland enhancement and ecosystem restoration for a wetland adjacent to agricultural field.

(4) MDNR appropriation permit is required prior to activating Alternative 2 temporary pump. An appropriation permit may not be required for Alternative 3 if operable gates are removed from the design. A long-term appropriation permit may be obtained for permanent outlet included in Alternative 4.

(5) Alternative 1 removes the low home.

(6) Alternative 1 does not reduce inundation duration. Alternative 2 only reduces the duration that inundation extends onto residential property when the water levels trigger implementation of emergency response measures. Alternative 3 does not reduce inundation duration for water levels below 874.0.

(7) Alternative 1 disturbs the most upland area, including relocation of existing home.

(8) Alternatives 1, 2, and 3 do not include permanent modifications that allow for flexibility to modify future management of lake levels. Alternative 4 would allow the outlet elevation to be increased in the future.

Alternatives 1 and 4 meet the minimum design criteria for approval from entities with permitting authority discussed in Section 3. Alternative 4 is the only alternative that also meets each of the flood-risk mitigation goals listed in Section 4.

Of the alternatives evaluated, a gravity outlet at elevation 872.2 (Alternative 4) reduces flood risk within Twin Lake, and, along with the operating plan, minimizes the increased risk of flooding downstream. Alternative 4 has a lower lifecycle cost compared to Alternatives 1 and 2 and a similar cost to Alternative 3.

If a gravity outlet at 872.2 is selected (i.e., Alternative 4), design optimizations to minimize impacts to the existing wetland and agricultural fields should be considered. During final design a detailed operational plan would need to be developed and approved by the City of Little Canada, MnDOT, and the MDNR. During final design of the selected alternative, ongoing coordination would be required with the City of Little Canada, MnDOT, MDNR, and the property owner of parcel ID 313022440018.

6 Recommendation

Alternative 4, gravity outlet at elevation 872.2, is recommended as the most feasible flood-risk mitigation alternative. This alternative would include a detailed operating plan that would describe when the valve associated with this alternative could be opened and when it should be closed. This recommendation is based on Twin Lake flood-risk mitigation objectives, as well as the assessment of downstream impacts, site and wetland impacts, and flexibility for long-term management. Alternatives 2, 3, and 4 all discharge additional water downstream and therefore increase the flood risk to properties along Gervais Creek and in the Phalen Chain. However, adherence to an operating plan developed consistent with permitting requirements and hydrologic modeling will reduce the risk for Alternative 4. The engineering assessment was based on information collected during a review of available data and preliminary site characterization.

Alternative 4 is a feasible project, consistent with the 2019 District Management Plan and based on available information and requirements of permitting jurisdictions. This BMP combination mitigates flood risk while protecting the water quality of Twin Lake.

The engineer's opinion of probable cost for the design, permitting, and construction of Alternative 4 is $226,000, with a potential range of $181,000 to $339,000, based on the current level of design. As plans and specifications for the recommended alternative are prepared, the District should continue to collaborate with City of Little Canada staff about design details and long-term maintenance. If the Board elects to pursue the project, it is recommended that coordination with the City of Little Canada start in the near-term to develop a cooperative agreement in advance of the project implementation. Over a 30-year period, necessary long-term maintenance is anticipated to be between $33,000 and $62,000.

7 References

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Appendix A

Engineer's Opinion of Probable Cost

1 Cost Estimate

Engineer's opinions of probable costs for design, permitting, and construction were developed for each flood-risk mitigation alternative. These opinions of costs, project reserves, contingency, documentation and discussion are intended to provide background information for feasibility alternatives assessment, analysis purposes and budget authorization by RWMWD. The cost of time escalation is not included in the opinions of probable cost. All costs are presented in 2019 US dollars.

Quantities were estimated with calculations based on available information. Dimensions, areas, and volumes for construction were estimated using Excel, GIS, CAD, and information from 2019 temporary pumping.

Unit costs are based on recent bid prices, published construction cost index resources, and similar stormwater projects. Unit process were developed and compared to similar project prices. Costs associated with Base Planning Engineering and Design (PED) are based on percentages of estimated construction cost and are within a range similar to those used in past projects designed by Barr. Costs associated with Construction Management (CM) are based on estimated costs to manage the construction process, based on Barr's experience with similar projects, but may change depending on the services that are provided during construction. The estimates also include Permitting and Regulatory Approvals, which is intended to account for additional planning, coordination, and mitigation costs that are likely to be incurred as the project is permitted with environmental agencies.

The opinions of cost include tasks and items related to engineering and design, permitting, and constructing each conceptual design. The opinions of cost do not include other tasks following construction of each alternative presented such as operations and maintenance, or monitoring.

Contingency used in these opinions of probable cost are intended to help identify an estimated construction cost amount for the minor items included in the current Project scope but have not yet been quantified or estimated directly during the feasibility evaluation. Stated another way, contingency is the resultant of the pluses and minuses that cannot be estimated at the level of project definition that exists. The contingency includes the cost of ancillary items not currently itemized in the quantity summaries but commonly identified in more detailed design and required for completeness of the work. A 35% contingency is applied to the estimated construction cost to account for the costs of these items.

Industry resources for cost estimating (*AACE International Recommended Practice No. 18R-97, and ASTM E2516-06 Standard Classification for Cost Estimate Classification System*) provide guidance on cost uncertainty, depending on the level of project design developed. The opinion of probable cost for the alternatives evaluated generally corresponds to a Class 4 estimate characterized by completion of limited engineering and use of deterministic estimating methods. As the level of design detail increases, the level of uncertainty is reduced. Figure A-1 provides a graphic representation of how uncertainty (or accuracy) of cost estimates can be expected to improve as more detailed design is developed.

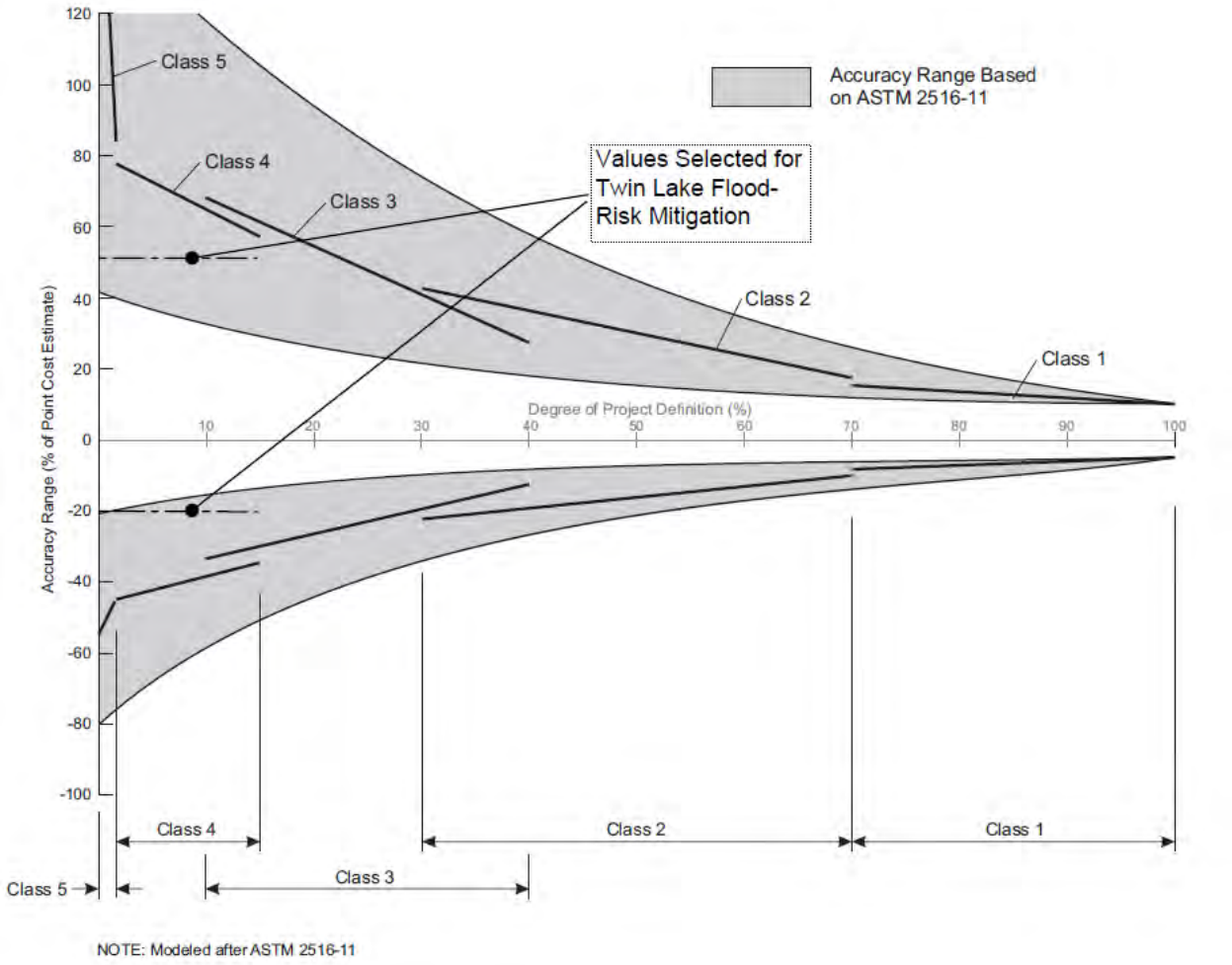


Figure A-1 Relationship between Cost Accuracy and Degree of Project Definition

At this early stage of design, the range of uncertainty of total project cost is high. Due to the early stage of design, it is standard practice to place a broad accuracy range around the point cost estimate.

The accuracy range is based on professional judgment considering the level of design completed, the complexity of the project, and the uncertainties in the project scope; the accuracy range does not include costs for future scope changes that are not part of the project as currently defined or risk contingency. The estimated accuracy range for this point estimate is -20% to +50%.

The opinion of probable cost provided is made on the basis of Barr Engineering's experience and qualifications and represents our best judgment as experienced and qualified professionals familiar with the project. It is acknowledged that additional investigations and additional site specific information that becomes available in the next stage of design may result in changes to the proposed configuration, cost and functioning of project features. This opinion is based on project-related information available to Barr Engineering at this time and includes a conceptual-level feasibility design of the project. The opinion of cost may change as more information becomes available and further design is completed. In addition, because we have no control over the eventual cost of labor, materials, equipment or services furnished by

others, or over the contractor's methods of determining prices, or over competitive bidding or market conditions, Barr Engineering cannot and does not guarantee that proposals, bids, or actual costs will not vary from the opinions of probable cost presented. If RWMWD wishes greater assurance as to the probable project cost, the RWMWD should authorize further investigation and design of a selected alternative.

Table A-1 provides a comparison of the opinion of costs for each of the five alternatives. Table A-2 through Table A-5 include opinion of cost for each design alternative, and Table A-6 includes opinion of cost for operation and maintenance over a 30-year period.

Table A-1 **Engineer's Opinion of Probable** Cost **–** Feasibility Estimate Summary

Flood-Risk Mitigation Alternative	Engineer's Opinion of Probable Cost ($)[1,3]	Engineer's Opinion of Probable Maintenance Cost Over a 30 Year Lifecycle ($)[2,3]	Total Project Cost ($)[3]
Alternative 1 Purchase Flood-Prone Structure	$874,000 - $1,638,000 $1,092,000	$4,000 - $8,000 $5,000	$878,000 - $1,646,000 $1,097,000
Alternative 2 Emergency Response Plan	$52,000 - $98,000 $65,000	$292,000 - $548,000 $365,000	$344,000 - $646,000 $430,000
Alternative 3 Gravity outlet at elevation 874.0	$132,000 - $246,000 $164,000	$21,000 - $39,000 $26,000	$153,000 - $285,000 $190,000
Alternative 4 Gravity outlet at elevation 872.2	$181,000 - $339,000 $226,000	$33,000 - $62,000 $41,000	$214,000 - $401,000 $267,000

Note(s):

(1) Approximate values based on available information. Costs are for construction costs for Alternatives 1, 3, and 4 and initial cost to develop ERP for Alternative 2. Estimated easement acquisition costs are included for all Alternatives based on information available. See Tables A-2 through A-5 for additional details.

(2) Operation and maintenance costs include vegetation maintenance for Alternatives 1, 3, and 4. Implementation of emergency response measures for Alternative 2. Gatewell operation and monitoring for Alternatives 3 and 4. See Table A-6 for additional details.

(3) The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +50%.

2 References

American Society for Testing and Materials. 2006. ASTM E2516-06 Standard Classification for Cost Estimate Classification System. ASTM International, West Conshohocken, PA, DOI: 10.1520/E2516-06

Association for the Advancement of Cost Estimating. 2005. *AACE International Recommended Practice NO. 18R-97*, February 2, 2005

Table A-2 Engineer's Opinion of Probable Project Cost: Alternative 1 - Removal of Flood-Prone Structure

PREPARED BY: BARR ENGINEERING COMPANY

REV 1 SHEET: 1 OF 5

TWIN LAKE FLOOD-RISK MITIGATION FEASIBILITY STUDY
ENGINEER'S OPINION OF PROBABLE PROJECT COST
PROJECT: TWIN LAKE FLOOD-RISK MITIGATION
LOCATION: City of Little Canada, MN
PROJECT #: 23/62-1200.19-010

Engineer's Opinion of Probable Project Cost
Alternative 1 – Remove Flood-Prone Structure
Twin Lake Flood-Risk Mitigation

	Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
	A	Mobilization/Demobilization	L.S.	1	$ 3,300	$3,300.00	1,2,3,4,5
	B	Property acquisition	L.S.	1	$ 722,750	$722,750.00	1,2,3,4,5, 9
	C	Hazardous substance abatement, demolition, and utility	L.S.	1	$ 10,000	$10,000.00	1,2,3,4,5, 10
	D	Silt fence	L.F.	100	$ 3.50	$350.00	1,2,3,4,5
	E	Site restoration (seed)	Acre	1	$ 5,000.00	$6,000.00	1,2,3,4,5
		CONSTRUCTION SUBTOTAL				$742,000.00	1,2,3,4,5,8, 9, 10
		CONSTRUCTION CONTINGENCY (35%)				$260,000.00	1,5,8, 9, 10
		ESTIMATED CONSTRUCTION COST				$1,002,000.00	1,2,3,4,5,8, 9, 10
		PLANNING, ENGINEERING & DESIGN				$40,000.00	1,2,3,4,5,8, 9, 10
		PERMITTING & REGULATORY APPROVALS				$10,000.00	1,5,6,8, 9, 10
		CONSTRUCTION MANAGEMENT				$40,000.00	1,5,8, 9, 10
		ESTIMATED TOTAL PROJECT COST				$1,092,000.00	1,2,3,4,5,7,8, 9 ,10
		ESTIMATED ACCURACY RANGE	**-20%**			**$874,000.00**	5,7,8
			50%			**$1,638,000.00**	5,7,8

Notes

[1] Limited design work completed (10 - 15%).

[2] Quantities based on design work completed.

[3] Unit prices based on information available at this time.

[4] No soil borings collected. No wetland delineation completed in the field.

[5] This feasibility-level (Class 4, 10-15% design completion per ASTM E 2516-06) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +50%. The accuracy range is based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. The contingency and the accuracy range are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency. Operation and Maintenance costs are not included.

[6] Estimate assumes that wetland mitigation/replacement is not required. Included are the cost for agency communication and application preparation for a permit . If replacement/mitigation is required, the total cost may increase to approximately $10,000 plus an additional $100,000/acre of wetland disturbed.

[7] Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include maintenance, monitoring or additional tasks following constuction.

[8] Estimate costs are reported to nearest thousand dollars.

[9] Property value obtained from the Ramsey County Property Records and Revenue department. Property value multiplied by 1.25 to account for cost of appraisal and adjustment to market value.

[10] Hazard substance assessment and abatement investigation has not been completed. Presence of potential hazardous substances is not included in the estimate.

Table A-3 Engineer's Opinion of Probable Project Cost: Alternative 2 - Emergency Response

PREPARED BY: BARR ENGINEERING COMPANY	REV 1	SHEET: 2	OF	5

TWIN LAKE FLOOD-RISK MITIGATION FEASIBILITY STUDY
ENGINEER'S OPINION OF PROBABLE PROJECT COST
PROJECT: TWIN LAKE FLOOD-RISK MITIGATION
LOCATION: City of Little Canada, MN
PROJECT #: 23/62-1200.19-010

Engineer's Opinion of Probable Project Cost
Alternative 2 – Emergency Response Plan
Twin Lake Flood-Risk Mitigation

Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Develop ERP	L.S.	1	$ 15,000.00	$15,000.00	1,2
B	Easement Acquisition	Acre	0.8	$ 35,000.00	$28,000.00	1,2, 6
C	Agency coordination	L.S.	1	$ 5,000.00	$5,000.00	1,2, 7
	EMERGENCY RESPONSE PLAN SUBTOTAL				$48,000.00	1,2, 3, 4, 5
	EMERGENCY RESPONSE PLAN CONTINGENCY (35%)				$17,000.00	1,2, 3, 4, 5
	ESTIMATED EMERGENCY RESPONSE PLAN COST				$65,000.00	1,2,3,4,5, 6, 7
	ESTIMATED TOTAL PROJECT COST				$65,000.00	1,2,3,4,5, 6, 7
	ESTIMATED ACCURACY RANGE	**-20%**			**$52,000.00**	1,2,3,4,5, 6, 7
		50%			**$98,000.00**	1,2,3,4,5, 6, 7

Notes

[1] Limited design work completed (10 - 15%).

[2] Quantities based on design work completed.

[3] This feasibility-level (Class 4, 10-15% design completion per ASTM E 2516-06) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +50%. The accuracy range is based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. The contingency and the accuracy range are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency. Operation and Maintenance costs are not included.

[4] The estimated costs do not include maintenance, monitoring or additional tasks following emergency response.

[5] Estimate costs are reported to nearest thousand dollars.

[6] Property value obtained from the Ramsey County Property Records and Revenue department. Property value multiplied by 1.25 to account for cost of appraisal and adjustment to market value. Easesment assessment was not completed as part of this evaluation.

[7] Coordination with MnDOT, MDNR, and City of Little Canada while developing Emergency Response Plan. Does not include obtaining permits required to implement temporary emergency response items. Cost does not include wetland permitting mitigation/replacement. If wetland replacement/mitigation is required, the total cost may increase to approximately $10,000 plus an additional $100,000/acre of wetland disturbed.

Table A-4 Engineer's Opinion of Probable Project Cost: Alternative 3 – Gravity Outlet (874.0)

PREPARED BY: BARR ENGINEERING COMPANY

REV 1 SHEET: 3 OF 5

TWIN LAKE FLOOD-RISK MITIGATION FEASIBILITY STUDY
ENGINEER'S OPINION OF PROBABLE PROJECT COST
PROJECT: TWIN LAKE FLOOD-RISK MITIGATION
LOCATION: City of Little Canada, MN
PROJECT #: 23/62-1200.19-010

Engineer's Opinion of Probable Project Cost
Alternative 3– Gravity Outlet (874.0)
Twin Lake Flood-Risk Mitigation

Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	L.S.	1	$ 9,900.00	$9,900.00	1,2,3,4,5
B	Remove & replace chain link fence	L.F.	20	$ 15.00	$300.00	1,2,3,4,5
C	Rock erosion control construction entrance	Each	1	$ 1,500.00	$1,500.00	1,2,3,4,5
D	Erosion control silt fence	L.F.	100	$ 3.50	$350.00	1,2,3,4,5
E	Erosoion control blanket	S.Y.	700	$ 2.50	$1,750.00	1,2,3,4,5
F	Common excavation - embankment	C.Y.	40	$ 20.00	$800.00	1,2,3,4,5
G	Common excavation - ditch	C.Y.	60	$ 10.00	$600.00	1,2,3,4,5
H	Bedding	C.Y.	3	$ 35.00	$105.00	1,2,3,4,5
I	Backfill	C.Y.	37	$ 4.00	$148.00	1,2,3,4,5
J	Compaction	C.Y.	37	$ 3.50	$129.50	1,2,3,4,5
K	24-inch RCP	L.F.	45	$ 75.00	$3,375.00	1,2,3,4,5
L	Sluice gate	Each	1	$ 25,000.00	$25,000.00	1,2,3,4,5
M	48-inch manhole	L.F.	4	$ 375.00	$1,500.00	1,2,3,4,5
N	Inline backflow preventer	Each	1	$ 12,000.00	$12,000.00	1,2,3,4,5
O	Riprap	Ton	15	$ 95.00	$1,425.00	
P	Floating silt curtain	L.F.	100	$ 10.50	$1,050.00	1,2,3,4,5
	CONSTRUCTION SUBTOTAL				$60,000.00	1,2,3,4,5,8
	CONSTRUCTION CONTINGENCY (35%)				$21,000.00	1,5,8
	ESTIMATED CONSTRUCTION COST				$81,000.00	1,2,3,4,5,8
	PLANNING, ENGINEERING & DESIGN				$36,500.00	1,2,3,4,5,8
	PERMITTING & REGULATORY APPROVALS				$10,000.00	1,5,6,8
	EASEMENT ACQUISITION	Acre	0.8	$35,000.00	$28,000.00	9
	CONSTRUCTION MANAGEMENT				$8,000.00	1,5,8
	ESTIMATED TOTAL PROJECT COST				$164,000.00	1,2,3,4,5,7,8
	ESTIMATED ACCURACY RANGE	**-20%**			**$132,000.00**	5,7,8
		50%			**$246,000.00**	5,7,8

Notes

[1] Limited design work completed (10 - 15%).

[2] Quantities based on design work completed.

[3] Unit prices based on information available at this time.

[4] No soil borings collected.

[5] This feasibility-level (Class 4, 10-15% design completion per ASTM E 2516-06) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +50%. The accuracy range is based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. The contingency and the accuracy range are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency. Operation and Maintenance costs are not included.

[6] Estimate assumes that wetland mitigation/replacement is not required. Included are the cost for agency communication and application preparation for a permit . If replacement/mitigation is required, the total cost may increase to approximately $10,000 plus an additional $100,000/acre of wetland disturbed.

[7] Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include maintenance, monitoring or additional tasks following constuction.

[8] Estimate costs are reported to nearest thousand dollars.

[9] Property value obtained from the Ramsey County Property Records and Revenue department. Property value multiplied by 1.25 to account for cost of appraisal and adjustment to market value.

Table A-5 Engineer's Opinion of Probable Project Cost: Alternative 4 – Gravity Outlet (872.2)

PREPARED BY: BARR ENGINEERING COMPANY

REV 1 SHEET: 4 OF 5

TWIN LAKE FLOOD-RISK MITIGATION FEASIBILITY STUDY
ENGINEER'S OPINION OF PROBABLE PROJECT COST
PROJECT: TWIN LAKE FLOOD-RISK MITIGATION
LOCATION: City of Little Canada, MN
PROJECT #: 23/62-1200.19-010

Engineer's Opinion of Probable Project Cost
Alternative 4– Gravity Outlet (872.2)
Twin Lake Flood-Risk Mitigation

Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	L.S.	1	$ 14,100.00	$14,100.00	1,2,3,4,5
B	Manage Water	L.S.	1	$ 10,000.00	$10,000.00	1,2,3,4,5
C	Remove & replace chain link fence	L.F.	20	$ 15.00	$300.00	1,2,3,4,5
D	Rock erosion control construction entrance	Each	1	$ 1,500.00	$1,500.00	1,2,3,4,5
E	Erosion control silt fence	L.F.	100	$ 3.50	$350.00	1,2,3,4,5
F	Erosoion control blanket	S.Y.	750	$ 2.50	$1,875.00	1,2,3,4,5
G	Common excavation - embankment	C.Y.	580	$ 20.00	$11,600.00	1,2,3,4,5
H	Common excavation - ditch	C.Y.	150	$ 10.00	$1,500.00	1,2,3,4,5
I	Bedding	C.Y.	7	$ 35.00	$245.00	1,2,3,4,5
J	Backfill	C.Y.	573	$ 4.00	$2,292.00	1,2,3,4,5
K	Compaction	C.Y.	573	$ 3.50	$2,005.50	1,2,3,4,5
L	24-inch RCP	L.F.	110	$ 75.00	$8,250.00	1,2,3,4,5
M	Sluice gate	Each	1	$ 25,000.00	$25,000.00	1,2,3,4,5
N	48-inch manhole	L.F.	8	$ 375.00	$3,000.00	1,2,3,4,5
O	Inline backflow preventer	Each	1	$ 12,000.00	$12,000.00	1,2,3,4,5
P	Floating silt curtain	L.F.	100	$ 10.50	$1,050.00	1,2,3,4,5
	CONSTRUCTION SUBTOTAL				$95,000.00	1,2,3,4,5,8
	CONSTRUCTION CONTINGENCY (35%)				$33,000.00	1,5,8
	ESTIMATED CONSTRUCTION COST				$128,000.00	1,2,3,4,5,8
	PLANNING, ENGINEERING & DESIGN				$46,500.00	1,2,3,4,5,8
	PERMITTING & REGULATORY APPROVALS				$10,000.00	1,5,6,8
	EASEMENT ACQUISITION	Acre	0.8	$35,000.00	$28,000.00	9
	CONSTRUCTION MANAGEMENT				$13,000.00	1,5,8
	ESTIMATED TOTAL PROJECT COST				$226,000.00	1,2,3,4,5,7,8
	ESTIMATED ACCURACY RANGE	**-20%**			**$181,000.00**	5,7,8
		50%			**$339,000.00**	5,7,8

Notes

[1] Limited design work completed (10 - 15%).

[2] Quantities based on design work completed.

[3] Unit prices based on information available at this time.

[4] No soil borings collected.

[5] This feasibility-level (Class 4, 10-15% design completion per ASTM E 2516-06) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +50%. The accuracy range is based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. The contingency and the accuracy range are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency. Operation and Maintenance costs are not included.

[6] Estimate assumes that wetland mitigation/replacement is not required. Included are the cost for agency communication and application preparation for a permit . If replacement/mitigation is required, the total cost may increase to approximately $10,000 plus an additional $100,000/acre of wetland disturbed.

[7] Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include maintenance, monitoring or additional tasks following constuction.

[8] Estimate costs are reported to nearest thousand dollars.

[9] Property value obtained from the Ramsey County Property Records and Revenue department. Property value multiplied by 1.25 to account for cost of appraisal and adjustment to market value.

Table A-6 Engineer's Opinion of Probable Project Cost: 30-Year Operation and Maintenance

PREPARED BY: BARR ENGINEERING COMPANY

SHEET: 5 OF 5

TWIN LAKE FLOOD-RISK MITIGATION FEASIBILITY STUDY
ENGINEER'S OPINION OF PROBABLE PROJECT COST
PROJECT: TWIN LAKE FLOOD-RISK MITIGATION
LOCATION: City of Little Canada, MN
PROJECT #: 23/62-1200.19-010

Engineer's Opinion of Probable Project Cost
30-Year Operation and Maintenance Costs
Twin Lake Flood-Risk Mitigation

	Cat. No.	ITEM DESCRIPTION	Conversion	Alt. 1	Alt.2	Alt. 3	Alt. 4	NOTES
	A	Vegetation Maintenance ($40/hr)	2-4 hrs/yr	$ 3,600				1, 2, 3, 4
	B	Implement emergency response plan	once every 10 years		$ 270,000			1, 2, 3, 4
	C	Vegetation maintenance ($40/hr)	8-16 hrs/yr			$ 14,400		1, 2, 3, 4
	D	Vegetation maintenance ($40/hr)	16 - 24 hrs/yr				$ 24,000	1, 2, 3, 4
	E	Gatewell operation	once every 10-years			$ 4,800	$ 6,000	1, 2, 3, 4
		O&M SUBTOTAL		$ 4,000	$ 270,000	$ 19,000	$ 30,000	1, 2, 3, 4, 5
		O&M CONTINGENCY (35%)		$ 1,000	$ 95,000	$ 7,000	$ 11,000	1, 2, 3, 4, 5
		ESTIMATED O&M COST		$ 5,000	$ 365,000	$ 26,000	$ 41,000	1, 2, 3, 4, 5
		ESTIMATED ACCURACY RANGE		**$ 4,000**	**$ 292,000**	**$ 21,000**	**$ 33,000**	4, 5
		(-20% to 50%)		**$ 8,000**	**$ 548,000**	**$ 39,000**	**$ 62,000**	4, 5

Notes

[1] Limited design work completed (10 - 15%).

[2] Prices based on information available at this time.

[3] Vegetation maintenance of Alternative 1 is less than Alternatives 3 and 4 as surface footprint is smaller. Vegetation maintence for Alternative 3 is less than Alternative 4 because ditch section is smaller.

[4] This feasibility-level (Class 4, 10-15% design completion per ASTM E 2516-06) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. Contingency is an allowance for the net sum of costs that will be in the Final O&M Cost at the time of the completion of design, but are not included at this level of project definition. The estimated accuracy range for the Operation and Maintenance Cost as the project is defined is -20% to +50%. The accuracy range is based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. The contingency and the accuracy range are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.

[5] Estimate costs are reported to nearest thousand dollars.

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

resourceful. naturally. engineering and environmental consultants BARR

Memorandum

To:	Board of Managers and Staff
From:	Tina Carstens and Brad Lindaman
Subject:	Project and Program Status Report – December 2019
Date:	December 3, 2019

Twin Lake emergency response management 2019: (Barr project managers: Brad Lindaman and Erin Anderson Wenz; RWMWD project manager: Tina Carstens)

The purpose of this project is to provide engineering assistance and technical guidance to help cities in and around Twin Lake and West Vadnais Lake determine emergency flood response options for implementation.

Northern Dewatering has delivered and set up the discharge pipe and pumping system. However, overflows from West Vadnais Lake are minimal, and therefore no bypass pumping is currently occurring. The RWMWD will continue to monitor the area and initiate pumping, if necessary.

As expected, now that the bypass pumping is set up and operational, the City of Little Canada has stopped pumping Twin Lake and removed the pump from its location near the Twin Lake overflow berm.

Project feasibility studies

Beltline resiliency study (Barr project manager: Brandon Barnes; RWMWD project manager: Tina Carstens)

The purpose of this study is to evaluate system-level flood damage reduction options, including real-time mechanical alteration of Lake Phalen and Keller Lake channel outlet structures, as well as other critical system infrastructure, to actively manage stormwater runoff from flood-prone areas tributary to the Beltline storm sewer in an effort to reduce flood levels that would otherwise impact homes. The evaluation will use the RWMWD stormwater model to simulate system-level modifications to evaluate how adjustments to outlet structures during a flood event may be able to optimize the existing system performance to reduce flooding impacts to homes adjacent to RWMWD-managed water bodies.

The purpose of the Beltline resiliency study is to evaluate system-level modifications to reduce flood risk to habitable structures in flood-prone areas tributary to the Beltline storm sewer. System modifications are intended to demonstrate one option for mitigating flood risk that does not include purchasing flood-prone property. Other options may be considered. Prior to implementation, therefore, additional feasibility studies will likely be necessary to further evaluate system modifications included in the study to verify that the cost-effective and optimal modification has been identified.

This month, Barr provided draft documentation for system modifications described in the resiliency study for the RWMWD to review. Draft documentation includes a discussion of study organization, methodology, and potential system modifications. The draft report also includes a planning-level budget estimate for potential construction costs for each system modification, as well as a discussion of

sequencing considerations to minimize the potential for increases to the floodplain elevation downstream of system modifications.

Following RWMWD review, Barr will make changes to the draft document to address comments and provide a draft for the managers to review. A board workshop is planned in December to present the information summarized in the report. Details of that workshop will be offered soon.

Feasibility studies for the Owasso Basin bypass concept, Willow Creek flood reduction concept, and Ames Lake area concept (highlighted in the resiliency study report) are included in the draft 2020 engineering budget.

Twin Lake flood-risk mitigation feasibility study (Barr project manager: Brandon Barnes; RWMWD project manager: Tina Carstens)

The purpose of this study is to evaluate modifications that would reduce flood risk to habitable structures in the Twin Lake watershed in Little Canada and Vadnais Heights, Minnesota.

This period, Barr completed a draft of the Twin Lake flood-risk mitigation feasibility study. It is included in this December Board packet, and will be discussed at the December meeting.

Federal Emergency Management Agency (FEMA) flood mapping updates (Barr project manager: Brandon Barnes; RWMWD project manager: Tina Carstens)

The purpose of this project is to apply Minnesota Department of Natural Resources (DNR) grant funding to use the RWMWD's updated stormwater model in order to develop information required to update the FEMA floodplain maps.

We are still waiting to receive comments from the DNR on the hydraulic model inputs. Barr provided responses to DNR comments and updated models on August 29. The resubmittal included updates to supporting documentation to address DNR comments, minor updates to the models, and plans or survey information for inundation areas shown on the FEMA floodplain maps. In addition, we submitted preliminary floodway models for Kohlman Creek and the Lake Wabasso outlet. We are still waiting for final approval from the DNR on hydraulic model input parameters. As a result of the extended DNR comment period, the process for providing the DNR with information to update the floodplain maps was extended and will now continue through winter 2020.

West Vadnais lakes outlet permitting with the DNR (Barr project manager: Erin Anderson Wenz; RWMWD project manager: Tina Carstens)

The purpose of this project is to prepare and facilitate DNR permitting for the proposed lowering of the West Vadnais Lake outlet.

This period, Barr advanced project design by surveying critical points along the West Vadnais Lake outlet pipe alignment and further refining the location where the new, lower section of pipe will tie into an existing manhole upstream of the Minnesota Department of Transportation noise wall. In addition, Barr completed hydraulic modeling that estimates the benefit of lowering the outlet pipe in detail, as evaluated under the last 10 years of precipitation. We will compile this information into a technical memo in early December for project stakeholders to review.

Modeling of 500-year Atlas 14 district-wide (climate change scenario): flood map generation for future outreach efforts (Barr project manager: Brandon Barnes; RWMWD project manager: Tina Carstens)

The purpose of this project is to use measured water-surface elevations to verify and fine-tune water surface elevations calculated by the RWMWD stormwater model. Following validation, the model will be used to simulate larger rainfall events, including the 500-year rainfall depth. The confidence limit (or uncertainty) associated with the 500-year flood elevation will be used to develop inundation maps that will allow for evaluation of how future climate change may affect flood inundation areas within the RWMWD and will be used for discussion with stakeholders when evaluating future flood-risk reduction projects.

Barr received comments from the RWMWD regarding the draft figures. We are revising the figures to address these comments and anticipate providing the final version for three sets of figures in December. One set illustrates the uncertainty in the 100-year floodplain, one illustrates annual flood risk, and one shows flood risk over a 30-year period. The maps will be used in community outreach activities with the cities and other entities in the RWMWD.

Hillcrest Golf Course (multi-use) (Barr project manager: Erin Anderson Wenz; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to provide a memo and figures identifying and describing the existing land, water, and stormwater conditions throughout the Hillcrest Golf Course site that will help the City of Saint Paul create the Hillcrest master plan. The plan will determine future land uses and a new street network for the 112-acre former golf course on Saint Paul's East Side. In July, the Saint Paul city council approved bonds for the Saint Paul Port Authority to purchase the site.

This period, Barr continued evaluating existing conditions across the site, identifying significant trees and tree stands (burr oaks), and modeling runoff across the site through wetlands and offsite into Saint Paul and Maplewood storm sewer systems. This and other existing information about the site, including permitting implications of proposed development changes, is being compiled for use in the city's planning process. Work will continue through December.

Wetland restoration site search (Barr project manager: Karen Wold; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to conduct a desktop review to identify potential wetland restoration sites throughout the RWMWD. This project was initiated because the Minnesota Wetland Conservation Act rules and statute are changing their focus to allow wetland replacement in areas outside of the RWMWD, because there are no wetland banks within the RWMWD, and because the RWMWD has a "no net loss" policy for wetlands within its boundaries.

Barr is finalizing our memo of findings for the work described last month, and will provide the memo in December for the district staff to review. A workshop to discuss project findings and related next steps will be scheduled for January.

Monitoring water quality/project monitoring

Maplewood Mall monitoring (Barr project manager: Matt Kumka; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to assess functionality of the Maplewood Mall stormwater retrofit project as it enters its fifth year of total completion. Features that will be inspected include all stormwater infrastructure, plantings, and tree growth. The findings, including site improvement and maintenance recommendations, will be summarized and presented to the board.

This period, restoration work continued and was completed on four Maplewood Mall rain gardens (Beam, Southlawn, Southwest, and one of the West gardens) that were no longer draining properly.

Capital improvements

Wakefield Park/Frost Avenue stormwater project (Barr project manager: Michelle Kimble; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to work with the City of Maplewood and its consultants to develop a site plan that involves stormwater management features with associated educational elements for the northern portion of Wakefield Park.

Road reconstruction is now complete. Both basins are excavated, and storm sewer is installed. Final restoration of the basins, including all plantings, will happen in spring 2020. A weir modification is required in the grit chamber upstream of Wakefield Lake, which will likely occur over the winter when there is less base flow in the system. The RWMWD portion of the construction cost is approximately $550,000.

Target and Motel 6 stormwater retrofit projects (Barr project manager: Leslie DellAngelo; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to design, provide bid assistance for, and oversee construction of BMP retrofits at two Target retail stores and a Motel 6.

Conceptual designs for the two Target retail sites were presented to watershed staff. The conceptual design alternatives will be revised based on RWMWD comments in preparation for presenting the desired alternatives to Target representatives in January. We have also started developing conceptual designs for the Motel 6 retrofit, starting with a HydroCAD model to better understand the capacity issues of the existing storm-sewer network on the site.

Willow Pond continuous monitoring and adaptive control (CMAC) spent lime filter (Barr project manager: Erin Anderson Wenz; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to design, provide bid assistance for, and oversee construction of a spent lime filter that takes intermittent flow from Willow Pond in Roseville through the use of CMAC technology. The completed project will remove dissolved and particulate phosphorus to benefit Bennett Lake.

Barr completed final inspection and planting review at the site in mid-September. Trees and shrubs were reviewed for overall health. One tree and 12 shrubs identified as being in poor health were replaced by the contractor in October. The project is now complete, and the contract will be closed out with the contractor (Peterson Companies) soon. The contractor's final payment application is included with this month's bill list.

Aldrich Arena stormwater retrofit (Barr project manager: Matt Metzger; RWMWD project manager: Paige Ahlborg)

The purpose of this project is to incorporate green-infrastructure stormwater management into the Aldrich Arena campus renovations. The parking lot will be full-depth reclaimed by Ramsey County, which itself would not trigger the need for a RWMWD permit. The partnership between the RWMWD and Ramsey County will achieve treatment of runoff from the parking lots where none currently exists. A formalized joint powers agreement outlining the partnership cost-sharing, roles, and responsibilities was crafted between the RWMWD and Ramsey County.

Rain-garden grading, repair, and reconstruction are now complete. Plantings will be installed in 2020. This project, led by the county's design-build contract (Loeffler), has multiple stakeholders—requiring careful and continuous correspondence from Barr and the RWMWD. Construction will resume in spring 2020.

CIP project repair and maintenance

Kohlman Lake macrophyte management (Barr project manager: Keith Pilgrim; RWMWD project manager: Bill Bartodziej)

The purpose of this project is to develop a calibrated model that can be used to evaluate the effect of aquatic plant growth and aquatic plant harvesting on Kohlman Lake water quality.

The intended outcomes of this project are to 1) develop a working, calibrated model that can be used for Kohlman Lake and other RWMWD lakes to better understand the effect of aquatic plants and aquatic plant harvesting on lake water quality; and 2) publish the results of this study for Kohlman Lake and potentially other RWMWD lakes. The model has been rebuilt, and results are being tabulated. Compilation of the test results continued during this quarter. Data was also generated for inclusion in a *LakeLine* (North American Lake Management Society publication) article slated for publication in 2020. The modeling and data-processing aspect of this study should be complete by the end of 2019 or early 2020.

CIP maintenance/repairs 2020 project (Barr project manager: Greg Nelson; RWMWD project manager: Dave Vlasin)

The purpose of this project is to maintain the existing systems and infrastructure owned and operated by the RWMWD and to assist and facilitate stormwater pond cleanouts to allow other public entities to meet their municipal separate storm-sewer system (MS4) requirements.

The CIP maintenance/repairs 2020 project was advertised on November 22. Bids are to be received until December 5 and publically opened. Barr will present the bid results at the December 11 board meeting. As appropriate, the board should consider a motion to award the work to the lowest responsive and responsible bidder that meets the project's best interest. Assuming that the project is awarded at the board meeting, we will prepare the contracting documents in December and begin work in January 2020.

Natural Resources Update – Bill Bartodziej and Simba Blood

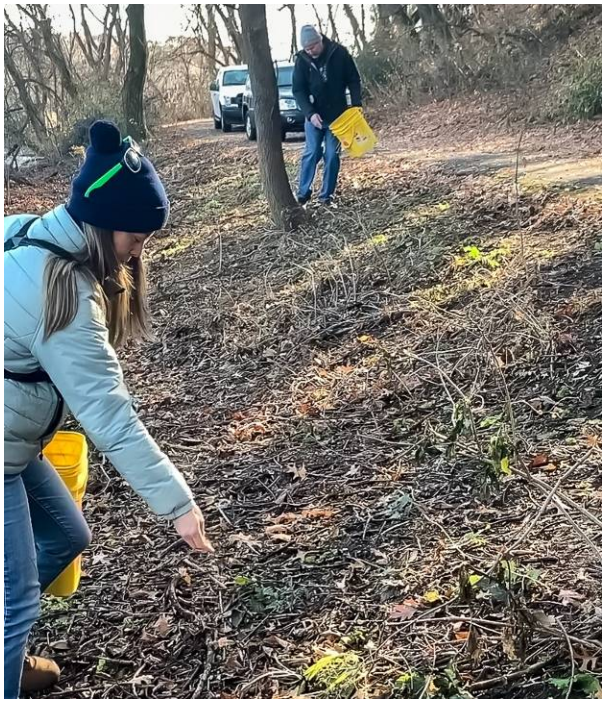
Wetland A – Buffer and Upland Restoration

Dormant seeding of a large wetland buffer segment (Phase II)

In late November, a day before the first substantial snowfall of the year, NR staff seeded over 1,200' of wetland buffer. This is the northern half of "Site F" on the map below. Thousands of buckthorn plants were removed from this area last winter. The general approach with dormant seeding is to lay the seed down on an open soil surface in the late fall/early winter. In doing this, the seed is exposed to moisture and numerous freeze-thaw cycles. This freezing and thawing, and the weight of the snow pack works the seed into the shallow soil layer. This type of winter exposure is necessary for the seed of certain plant species to germinate, especially wildflowers. Dormant seeding is a common practice used in ecological restoration, especially in colder climates.

After a heavy leaf cover was moved with an electric leaf blower, we hand broadcast three different seed mixes: 1) Savanna (part shade), 2) Woodland (shade), and 3) Wetland edge (saturated soil). In total, we introduced over 70 native plant species during this dormant seeding. We purchased stock from a local supplier, and in addition, we field collected pounds of seed from our restoration areas within the watershed. With our field collections, we target relatively rare and expensive seed. In the end, this improves the quality of our restorations and helps with the overall project budget. After the native seed is broadcast, we throw down a "cover crop" – a mix of winter wheat and oats. These annuals will germinate quickly in the spring and provide a temporary living blanket for erosion control. This cover also provides some protection to the young native plants which are relatively slow growing. The last step in the process is to apply a light straw layer over the seeded areas. This helps to hold the seed and soil in place, and facilitates germination in the spring. In addition to the seeding, in spring, native plugs will be installed in this buffer area with the assistance of hundreds of local students.

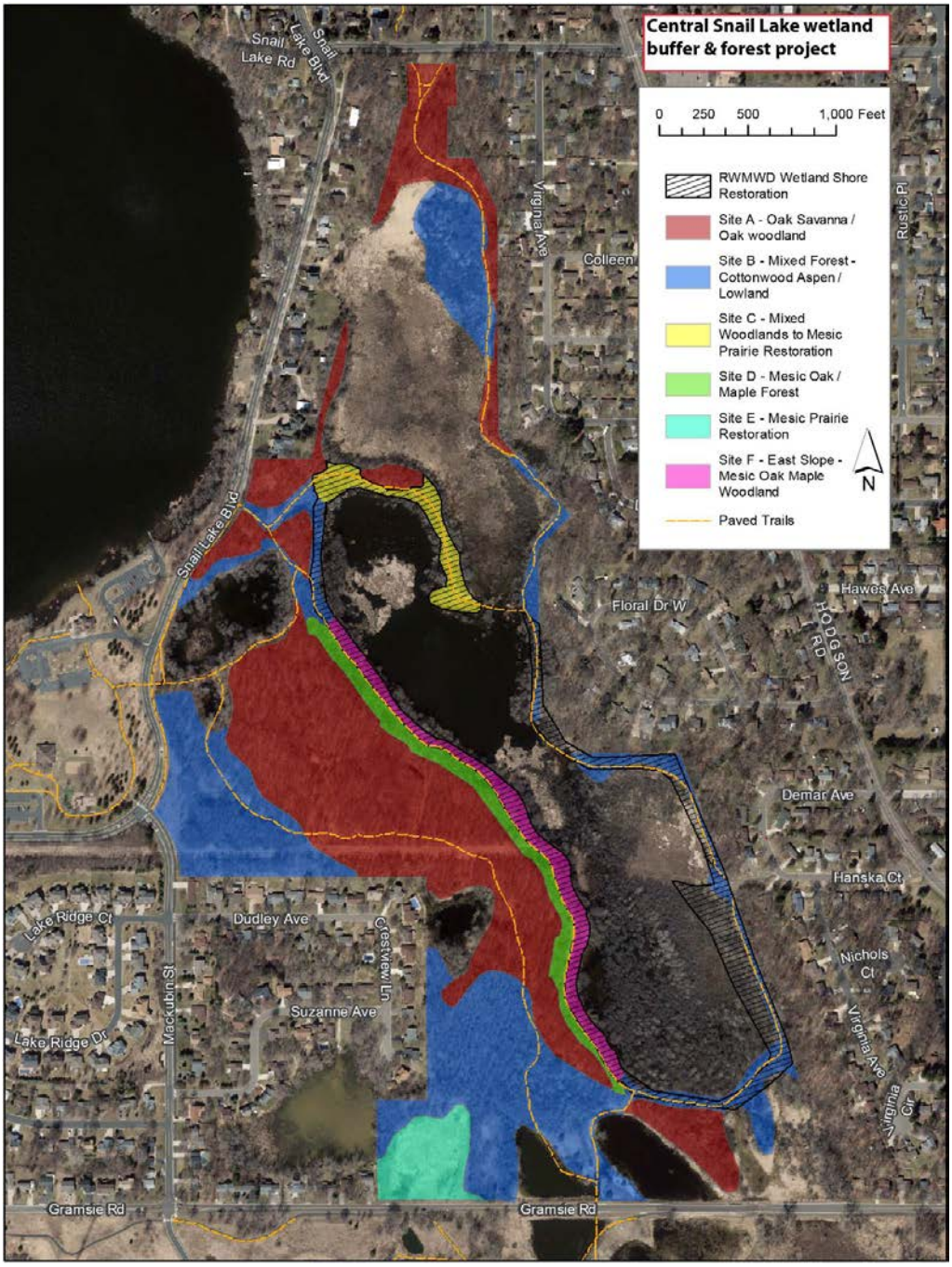
Natural resources technician, Matt Doneux, moves the leaf cover in preparation for seeding.



Seeding the savanna buffer area.

Over 70 native plant species were introduced through the dormant seeding process.

Weed free prairie straw is used to cover the newly seeded buffer areas.


Central Snail Lake wetland buffer & forest project
0 250 500 1,000 Feet
RWMWD Wetland Shore Restoration
Site A - Oak Savanna / Oak woodland
Site B - Mixed Forest - Cottonwood Aspen / Lowland
Site C - Mixed Woodlands to Mesic Prairie Restoration
Site D - Mesic Oak / Maple Forest
Site E - Mesic Prairie Restoration
Site F - East Slope - Mesic Oak Maple Woodland
Paved Trails
N
Snail Lake Rd
Snail Lake Blvd
Virginia Ave
Colleen
Rustic Pl
Floral Dr W
Hawes Ave
HODGSON RD
Demar Ave
Hanska Ct
Nichols Ct
Virginia Ave
Virginia Cir
Lake Ridge Ct
Dudley Ave
Crestview Ln
Mackubin St
Suzanne Ave
Lake Ridge Dr
Gramsie Rd
Gramsie Rd

Upland Restoration – Buckthorn Control

Mike Goodnature, Natural Resources Specialist, with Ramsey County provided us with an update on the buckthorn control. This work is being conducted with a contractor. Please see the map above to locate individual sites.

Progress by site:

Site A – 99% of buckthorn has been removed and stacked. Select amount of piles left to be burned this winter. Spring prescribed burn scheduled.

Site B – North portions of Site B have been hand cut buckthorn removal. Southern sections will be forestry mowed of buckthorn this winter. Re-sprouts will be foliar sprayed next season 2020.

Site C – Cleared of buckthorn and boxelder, seeded, mulched and planted by RWMWD.

Site D – buckthorn around 80% removed, hauled down to base of hill and will be stacked and burned this winter.

Site E – Prairie area was cleared and weeds were controlled. Site will be sprayed again, possibly burned and planted - spring 2020.

Site F – Around 50% of buckthorn and boxelder removed. Removal will continue this winter and stacked in concentrated piles and piles will be burned this winter. RWMWD will continue buffer restoration work after the buckthorn is cleared.

Piles of cut buckthorn in the wetland buffer – south side – Site F.

Public Involvement and Education Program – Sage Passi

Celebrating Our Watershed Community and "Champions" at the Annual Recognition Dinner

November is our traditional month to celebrate and thank our community for their contributions to clean water and healthy ecosystems and to honor their exceptional efforts within our watershed district. Preparing for this annual event begins months ahead as nominations are drafted, submitted and reviewed for our Watershed Excellence Awards and the Landscape Ecology Awards Program (LEAP). These preparations culminated on the evening of November 14 when we gathered for our annual dinner at Keller Golf Course Clubhouse to connect with our community of volunteers, partners, Board, staff, CAC, Master Water Stewards and friends to socialize, celebrate and honor our special awardees!

Roger Lake Stewardship: Scott Ramsay

Awards Created by Glass Artist, Eric Sommers

These are the Watershed Excellence award winners chosen for 2019:

Roger Lake Stewardship Watershed Excellence Award: Scott Ramsay
Recognizes an individual who has played a significant and long-term role in watershed management and demonstrated leadership in natural resources and water stewardship during his or her lifetime.

Outstanding Partner Watershed Excellence Award: Michael Schumann (Ramsey County)
Recognizes an individual, group or business that effectively collaborates to achieve exceptional results in water resources management in Ramsey-Washington Metro Watershed District.

Outstanding Educator Watershed Excellence Award: Aloun Phoulavan (Art teacher)
Recognizes a teacher, educator or youth organizer who has demonstrated exceptional commitment and capacity to engage youth in watershed education and stewardship initiatives.

Rain Garden Champion Watershed Excellence Award: John Denham (Grace Church)
Recognizes an individual, organization or business that demonstrates exceptional leadership in the promotion and support of rain gardens in Ramsey-Washington Metro Watershed District.

Construction Stewardship Watershed Excellence Award: Ben Lato (Weiss Builders)
Recognizes an individual, organization or company that demonstrates exceptional efforts and leadership in implementing sediment and erosion control practices at a construction site.

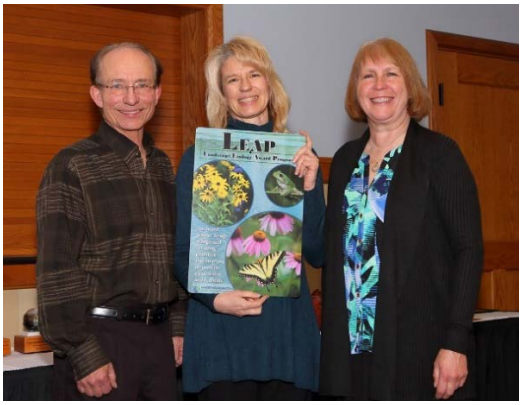
Citizen Catalyst Watershed Excellence Award: Karen Wold

Recognizes an individual or organization that effectively facilitates citizen participation efforts to improve and protect water quality and encourage conservation.

Landscape Ecology Awards for Projects in Shoreview, White Bear Lake and North St. Paul

The Landscape Ecology Awards Program recognizes landowners and managers in our watershed district, including private residences as well as public and commercial properties, who use management practices that support clean water and wildlife habitat. Three LEAP Awards were presented at the event.

Patrick and Jamie Willoughby (above) were awarded a LEAP Award for their innovative rainwater project in a turf-minimizing home landscape in Shoreview (above right).



Connie Taillon, environmental specialist for White Bear Lake (above) accepts a LEAP Award for the city's Edgewater Prairie Restoration Project that transformed a large bituminous area at 1850 Buerkle Road.

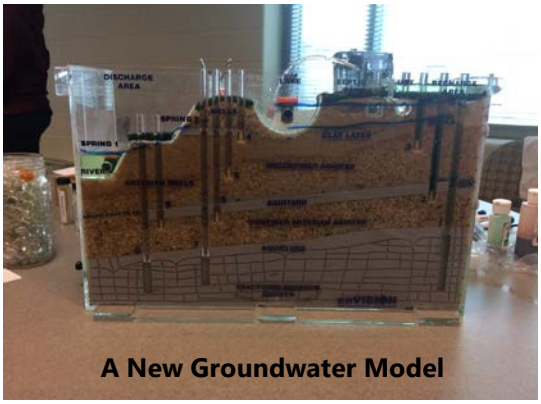
The Rotary Club of North St. Paul received a LEAP award for their vibrant pollinator-supporting rain garden in Rotary Park. Ann Conzemas and Noemi Trevino accepted the award.

Winter Maintenance Training for Parking Lots and Sidewalks - Smart Salting workshop

RWMWD partnered with Fortin Consultants and VLAWMO to hold a Smart Salting workshop for city and county staff at the Ramsey County Public Works facility on November 7. This training is updated each year to include the latest technology, research and tips to help public and private property managers, city, parks and facilities staff apply best practices in their winter care of parking lots and sidewalks to protect our local water bodies.

Lauren Schulzetenberg (Fortin Consultants) and Jason Grode (City of Andover Parks Supervisor) co-taught the course that gave the participants the opportunity to earn a Level I Certification for Snow and Ice Control Best Practices from the Minnesota Pollution Control Agency through an optional test at the end of the course. Certified individuals are listed on the MPCA website. Funding was provided by the MPCA through a grant from US EPA, Section 319 Nonpoint Source Management Fund.

Master Water Stewards Begin Training Course at Wellstone Center



RWMWD's new Master Water Stewards team met with other stewards from the East Metro area on Saturday, November 16 to begin their training by rotating through a series of hands-on stations covering non-point source pollution and watersheds, climate change, calculating your water footprint, groundwater issues using a new model and other topics. Halfway through the morning, each team participated in a discussion with their sponsoring organization (watershed, city or agency) about their own water policies and relationships with partnering agencies and engaged in a brief brainstorming/Q&A session about potential capstone projects.

Workshop: Climate of Creativity: Connecting Arts and Environmental Action

Left: Stacy Levy's installation "Inventory: Rain and the River" Right: Stacy Levy's "Watershed Pantry"

Sage attended a workshop sponsored by the University of Minnesota on November 6 at Hennepin Theatre Trust to connect people and organizations working at the intersections of arts, culture, and the environment. The event brought many organizations and individual artists together who are using a variety of forms of art as catalysts to inspire environmental action. The event was set up to facilitate conversations and explore perspectives from a range of experiences and cultural traditions and to inspire participants to consider new ideas and solutions they find most impactful or urgent including new cross-sector partnerships.

The five hour workshop incorporated opportunities for sharing and networking in groups and in one on one conversations, hands on activities, a dynamic keynote speaker, and a thought-provoking

panel discussion. It was energizing to be in a room with so many people locally engaged in this kind of work across many different sectors.

The keynote speaker and the panel were especially pertinent to our work in the watershed. Stacy Levy is recognized as one of the nation's most exciting and innovative environmental artists. She is a prolific Philadelphia sculpture artist who creates large-scale public installations in rivers, parks, streets, parking lots, airports, public building and nature centers on many water, climate change and ecologically related themes. She often collaborates with engineers, landscape architects and ecologists to find artful solutions to site issues.

To see her many creative projects, go to her website: https://www.stacylevy.com/

The panel participants were Christine Baumler, Sharon Day, Dr. Bonnie Keeler, Kevin Reich, and moderator Kristel Porter. Christine Baumler is a University of Minnesota professor of art who spent a year as a resident artist with RWMWD and currently serves as resident artist for Capitol Region Watershed District. Sharon Day is the Executive Director of the Indigenous Peoples Task Force and an Ojibwe musician, writer and artist who leads Nibi Walks along the country's waterways. Bonnie Keeler is Assistant Professor at the Minnesota Humphrey School of Public Affairs and is affiliated with the Center for Science Technology and Environmental Policy, the Institute for the Environment and the Natural Capital Project. She works at the intersection of sustainability and environmental economics, with an expertise in water management and policy. Kevin Reich is a Council Member for District 1 in Minneapolis. Kristel Porter is the Program Director for MN Renewables Now.

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Informational Items

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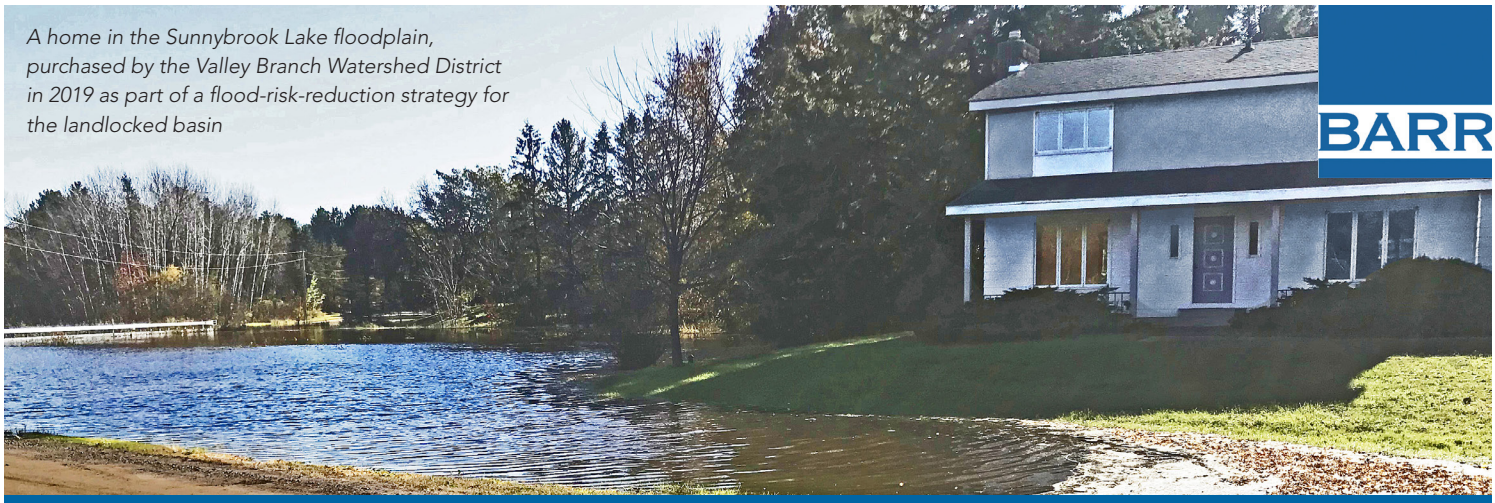

A home in the Sunnybrook Lake floodplain, purchased by the Valley Branch Watershed District in 2019 as part of a flood-risk-reduction strategy for the landlocked basin

BARR

WATERSHED MOMENT

a publication of Barr Engineering Co. for watershed districts and watershed management organizations

Welcome to the *Watershed Moment*—a Barr Engineering Co. newsletter specifically for watershed districts and watershed management organizations. Inside you'll find articles on flood management, shallow lake management, and chlorides. We hope this information is helpful in your management of water resources.

We're looking forward to attending the Minnesota Association of Watershed Districts (MAWD) Annual Conference, December 5–7 in Alexandria, and hope you'll attend one of our presentations (listed below). We also hope you'll stop by our booth.

If you're not able to make it to MAWD, but have a problem we can help you with, feel free to give us a call:

Jen Koehler, 952-832-2750, jkoehler@barr.com

visit us at MAWD | booth #39 | platinum sponsor

FRIDAY, DECEMBER 6

- **Geomorphic and Habitat Assessments of Trout Streams in the Lower Minnesota River Watershed District.** Concurrent General Session, 10–10:40 a.m., Lake Miltona A + B (Linda Loomis, LMRWD; Joe Magner and Brenda DeZiel, University of Minnesota; Jeff Weiss, Barr Engineering Co.; Della Schall Young, Young Environmental)
- **The Role of Aquatic Plants in Shallow Lake Reclamation.** Concurrent General Session, 11–11:40 a.m., Lake Osakis (Keith Pilgrim and Janna Kieffer, Barr Engineering Co.)

2019: a rainy season

No matter where you live in Minnesota, it's been tough to come in out of the rain. According to Department of Natural Resources (DNR) information, the Twin Cities area is well on its way to experiencing its wettest year since 1871. By November 1, the area had received 39.06 inches of precipitation. The record is 40.32 inches, set in 2016. And, the effects of this year's precipitation are compounded by the fact that the last 5 years are the wettest in Minnesota history.

The result of all this rain can be seen in lake levels and stream flows. According to the DNR, after rain events in the third and fourth weeks of September, 72% of gaged lakes had elevations above their historic average. And, September elevations for over 64% of these "above-average" lakes were more than a half-foot higher than average.

Additionally, with all that precipitation, groundwater recharge rates are also above average. Barr assisted the Metropolitan Council with updating the Metro Model 3 groundwater model, which includes data through 2016. The results indicate that across the 11-county metro area, groundwater recharge rates for the past 5 years (2012–2016) are 15% higher than the long-term average (1988–2016); in some areas they are significantly higher. We anticipate updating the model again when 2019 data becomes available.

Like you, we've had a busy year— assisting our clients with the problems that come with so much water. Read on to see a variety of efforts we've made to help our clients stay dry.

also in this issue ...

pumping and purchasing

With numerous landlocked basins, the Valley Branch Watershed District (VBWD) has been hit particularly hard with flooding this year. Right now, water levels at some lakes are at or near their 100-year flood levels. On some of these basins, homes are at risk of flooding and roads and highways have been underwater.

As the District's engineer, Barr has worked with private and public partners to pump down water levels on several lakes—in one case the water has been pumped to a storage area with a high infiltration rate; two other lakes have been pumped to a system that conveys runoff to the St. Croix River.

In the Sunnybrook Lake area, where water is particularly problematic, VBWD has obtained a bond to purchase the lowest homes. "It is a fail-safe approach," said John Hanson, Barr engineer. However, it comes with the challenges of determining what to do with the homes and abandoning the septic systems and wells. Barr is helping VBWD navigate those problems as well.

modeling and monitoring

With a rapid spring snowmelt and rainfall in early 2019, Barr recognized the potential for regional flooding in the Ramsey-Washington Metro Watershed District (RWMWD) starting in early March. We used existing computer models of the watershed to run a series of snowmelt event scenarios, with depths ranging from 3 inches (the minimum anticipated runoff depth) to 7.2 inches (the 100-year, 10-day snowmelt event). Using these model results, we created a suite of charts showing structures and roadways at risk of flooding depending on the snowmelt event. This rapid response to flooding concerns allowed this information to be shared with the RWMWD's municipalities to help them anticipate and plan for potential flooding problems.

RWMWD staff continued to monitor water levels in areas perceived to be at greatest risk, comparing changing water surface elevations to the modeling results. By late March, updated charts showing the actual monitored water levels of each water body were sent to the municipalities to show how these areas were faring during the snowmelt event—again, helping them with ongoing flood planning and response efforts.

In VBWD, we've used 60 years of data to do long-term continuous modeling, evaluating flood protection strategies in flood-prone areas. "We've been able to evaluate protection strategies, quantify benefits to properties with low homes, and understand consequences

Street flooding in Lake Elmo (spring 2019)

to downstream lakes to find the best approach for protecting properties—whether it's optimizing flood storage, constructing an outlet, designing a ring levee, or raising the house," said Hanson.

Over in the city of Edina, Barr staff modeled and monitored water levels in multiple problem areas. In all cases, these efforts were very instructive. Results showed that infrastructure was not working as intended. "If you model and monitor," said Barr scientist Sarah Stratton, "you can find out if systems are working the way they're designed."

technical support and communication

Stratton has also provided technical support to an Edina citizen task force charged with helping develop a flood-risk-reduction strategy for the city. According to Stratton, the task force is looking at a number of recommendations beyond flood mitigation. These include community education and communication—sharing information about general flood resources as well as services the city can provide.

planning ahead

The National Oceanic and Atmospheric Administration's (NOAA) Climate Prediction Center winter outlook anticipates higher-than-normal precipitation in Minnesota from December through February. In light of the flooding conditions in 2019 and concern about continued flooding in 2020, Barr engineers met to discuss the variety of flooding issues across the different watershed districts and municipalities. Part of the purpose was to prepare for what is certain to be a difficult spring—and unpredictable years ahead. Said Barr engineer Scott Sobiech,"We need to be planning for the future: 20 years down the road."

If you need help with short- or long-term planning—or with any of the other services noted above—contact Erin Anderson Wenz, 952-832-2805, eandersonwenz@barr.com.

The exposed lake bottom of Normandale Lake after drawdown (September 2018)

shallow lake management: sometimes it requires a layered approach

Aquatic plants, fish, phytoplankton (algae), zooplankton: they're all part of a lake's aquatic community; but, how they interact and affect nutrient cycling is unique to each lake. That's why, when it comes to lake management, one size does not fit all. And, sometimes, more than one approach is required.

Normandale Lake is a shallow, 100-acre lake located along Nine Mile Creek in Bloomington, Minnesota. The lake is an important amenity within Normandale Lake Park, which includes a widely used trail and amphitheater. Poor water quality, frequent algal blooms, and an abundance of invasive curly-leaf pondweed in the lake prompted strong public support for improvements.

The first step in addressing the lake's problems was to model its complex biological system. Working on behalf of the Nine Mile Creek Watershed District (NMCWD), Barr used a hydrodynamic, ecological, and water quality model developed in Denmark (GOTM-FABM) to simulate nutrient cycling and aquatic plant growth in the lake. The modeling effort helped to identify and quantify the significant role that aquatic plants play in phosphorus uptake in Normandale Lake. However, curly-leaf pondweed, which adds to phosphorus with an early die-off in mid-summer, was threatening the plant community by outcompeting native species. Internal loading from the sediments was also found to be a problem, as well as the presence of a significant carp population.

To address the curly-leaf pondweed, NMCWD began drawing down Normandale Lake by installing a permanent bypass pipe and pumping. The goal of the drawdown was to freeze the lake sediment, killing the curly-leaf pondweed. The lake was fully drawn down by early November, and by mid-February 2019 the top 15–24 inches of lake sediment were frozen.

The drawdown was effective in managing the curly-leaf pondweed, but also temporarily impacted the entire plant community. That meant fewer plants to take up phosphorus from lake inflows and internal loading. "Although an alum treatment was already planned to control internal loading, the treatment was timed for the spring immediately following the drawdown to prevent potential algal blooms and allow the aquatic plant community to recover," said Janna Kieffer, Barr engineer.

Another component of lake restoration is the management of bottom-feeding carp, which stir up lake sediments. NMCWD is now working with Carp Solutions to track the carp; this provides more information about the carp population and its movements and will aid in capture and removal efforts.

While there is plenty of science behind the approach taken at Normandale Lake, Kieffer notes that shallow lake management sometimes requires experimentation. "Often times, we can't confidently predict how certain management activities will affect overall water quality or clarity because there are complicated biological and chemical processes occurring that are impacted by numerous factors," said Kieffer. "So we need to anticipate and be prepared when the lake response may not materialize in the manner expected. By trying various lake management techniques—drawdowns, oxygen injection systems, alum treatments, carp management, herbicides—watershed management organizations are helping to add to the knowledge base of shallow lake management in Minnesota."

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chlorides—new tools on the way

With the increasing trend in chloride concentrations in lakes, wetlands, streams, and groundwater, the Minnesota Pollution Control Agency (MPCA) has published a draft *Statewide Chloride Management Plan* (https://www.pca.state.mn.us/sites/default/files/wq-s1-94.pdf). This document focuses not only on the role of road salt and water softeners in chloride impairment, but includes information and guidance on the use of dust suppressants and fertilizers.

The MPCA is also working with Barr and Fortin Consulting to create a tool that will give users access to information about chloride sources in their jurisdiction, as well as guidance on mitigation strategies, depending on the source. According to Greg Wilson, Barr engineer, the ultimate goal is to create a database solution that interfaces with GIS so that users can look at their area on a map, identify chloride sources, get guidance on appropriate mitigation measures, and calculate the percent of chloride reduction with each measure.

"A watershed district might query the map to see all the cities within their boundaries and decide what they want to work on collaboratively," said Wilson. "The tool will give them the opportunity to identify where the major sources of chloride are and come up with a plan of attack."

Road salt: A major contributor to chloride problems, but not the only one

Wilson says the first-of-its-kind tool should be available by the winter of 2020 or spring of 2021.

Wilson is also currently working with a group of technical professionals on a white paper that addresses chlorides and impacts on groundwater. "We're trying to raise awareness that we've got increasing levels of chloride in groundwater, not just surface waters, and the potential for the same kinds of problems that can impact our water resources and our drinking water supply," he said. Watch for that paper to be published soon by the Minnesota Groundwater Association (http://www.mgwa.org). For more information, contact Greg Wilson, 952-832-2672, gwilson@barr.com.