City of Lino Lakes
Environmental Board Meeting

June 24, 2015
6:30 p.m.

AGENDA

1. Call to Order

2. Approval of Agenda

3. Approval of Minutes

   May 27, 2015

4. Open Mike

5. Action Items

   A Proposed Ordinance 06-15

6. Discussion Items

   A. Comprehensive Stormwater Management Plan for Northeast Area Discussion

   B. Updates

7. Adjourn

CITY OF LINO LAKES
ENIVORMENTAL BOARD MINUTES

DATE	**:**	**May 27, 2015**
TIME STARTED	**:**	**6:31 P.M.**
TIME ENDED	**:**	**7:45 P.M.**
MEMBERS PRESENT	**:**	**Steve Heiskary, Paula Andrzejewski, Nancy Klebba, John Sullivan, Alex Schwartz**
MEMBERS ABSENT	**:**	**Barbra Bor**
STAFF PRESENT	**:**	**Marty Asleson, Dianne Hankee, K. C. Kye**

1. CALL TO ORDER AND ROLL CALL:

Mr. Heiskary called the Lino Lakes Environmental Board meeting to order at 6:31 p.m. on May 27, 2015.

2. APROVAL OF AGENDA

Mr. Heiskary propose to move the action item – Consider Feasibility Study for Storm-water Reuse/Matttamy Homes to the end of the meeting.

Mr. Asleson asked to add item C. Recycling Update to the discussion section.

Ms. Klebba made a MOTION to approve the revised agenda. Motion was supported by Mr. Sullivan.

3. APPROVAL OF MINUTES:

April 29, 2015

Mr. Sullivan made a MOTION to approve the April 29, 2015 Meeting Minutes. Motion was supported by Ms.Klebba. Motion carried 3 - 0.

4. OPEN MIKE

Mr. Heiskary declared Open Mike at 6:34 p.m.

There was no one present for Open Mike. Close Open Mike at 6:35 p.m.

DRAFT

5. ACTION ITEMS

A. Consider Feasibility Study of Stormwater Reuse /Mattamy Homes

Mr. Asleson stated that the term stormwater reuse is used to describe water that is collected on-site and utilized in a new application. The Mattamy proposed development called Watermark is still a concept plan but is in the study area.

Ms. Diane Hankee, city engineer from WSB, said the feasibility study will evaluate water reuse options at the proposed Matttamy development. Water reuse may include irrigation and infiltration systems within public open spaces. The purpose to water reuse is to utilize water resources sustainably, to use water as many times as feasible and to satisfy watershed volume reduction requirements.

Mr. Heiskary noted that this is a good time to do the study and the mentioned area does have drainage problems.

Ms. Hankee said that Mattamy Homes does have an interest in doing a stormwater reuse options.

Ms. Andrzejewski MOTION to recommend the feasibility study. Seconded by Mr. Schwartz and Mr. Sullivan. Motion carried 5-0

6. DISCUSSION ITEMS

A. Discussion of Integrated Water Management Plans for Local Government Units

Mr. Asleson discussed the increased awareness both locally and regionally of the surface water and groundwater resources.

Internally, city staff has been discussing with WSB, city engineer, opportunities for improving the efficient use of both surface water and groundwater resources. At this time staff is requesting that the Environmental Board make recommendations for a study that would address the relationship between growth, and water use. The study would produce an Integrated Water Management Plan.

Mr. Asleson introduce Ms. Diane Hankee, city engineer from WSB. The city did apply for the grant which is from the clean water fund from the Environmental and Natural Resources Trust Fund. The fund is for mainly for research not for implementation of the plan. The funding is quite competitive. The cities of Hugo and Rosemount are also included in this request. Funds would be available in 2016 and no local match funding is required.

Mr. Heiskary stated that we should let council know that the study was well received and the Environmental Board will look forward to the outcome.

DRAFT

A. <u>Foxborough Maintenance Update</u>

Maintenance fees come in every year and this year Critical Connection did come in and took care of the buckthorn and it is all gone.

B. Recycling Update

Mr. KC Kyle showed a PowerPoint presentation of the recycling efforts in Lino Lakes in 2014-2015.

- The city is on pace to reach the 2015 goal of (1836 tons)
- Added organic recycling at City offices and buildings
- Added furniture and mattress processing
- Recycling education at Senior assisted living and Lakewood Apts. And met with school district superintendents and principals
- Successful organic recycling at Corn Roast and Blue Heron Days festival

Mr. Asleson thanked Mr. KC Kyle for his year of intern service. Environmental Board thanked Mr. KC Kyle for his efforts and future is looking better because of the projects that have been implemented.

7. ADJOURNMENT

Ms. Andrzejewski made a MOTION to adjourn the meeting at 7:45 p.m. Motion was supported by Ms. Klebba. Motion carried 6 - 0.

Respectfully submitted,

Mary Fogarty
Office

DRAFT

ENVIRONMENTAL BOARD
AGENDA ITEM 5A

STAFF ORIGINATOR: Marty Asleson, Environmental Coordinator

MEETING DATE: June 24, 2015

REQUEST: Proposed Ordinance 06-15

APPLICANT: City of Lino Lakes

BACKGROUND

Under the "Non Point Discharge Elimination System (NPDES), Phase II", all Cities considered a "Municipal Separate Storm Water Sewer System"(MS4's), must address six minimum measures in required storm water pollution prevention programs. Cities must develop ordinances pertaining to the responsibilities outlined in the minimum control measures. A stormwater ordinance must address:

1. Implementation of proper erosion and sediment controls on sites over 1/2 acre
2. Requiring construction site operators to control erosion and sediment
3. Controls for chemicals, solid wastes and other wastes on construction sites
4. Procedures for site plan review of construction plans that consider potential water quality impacts
5. Procedures for the receipt and consideration of information submitted by the public
6. Sanctions to ensure compliance
7. Illicit Discharge Detection and Elimination
8. Implementation of post-construction runoff controls to the extent allowable by state or local law

In response to the MS4 requirements, city staff has drafted an updated stormwater ordinance revising City Code Section 1011 Relating to the Regulation of Stormwater, Erosion Control and Sediment Control for your consideration. The ordinance was updated to conform to the new RCWD rule changes.

RECOMMENDATION

Staff recommends approval of Proposed Ordinance 06-15.

ATTACHMENTS

1. Proposed Ordinance 06-15

1st Reading:	Publication:
2nd Reading:	Effective:

CITY OF LINO LAKES
ORDINANCE NO. 06-15

ORDINANCE REVISING CITY CODE SECTION 1011 RELATING TO THE REGULATION OF STORMWATER, EROSION AND SEDIMENT CONTROL

"The City Council of Lino Lakes ordains".

CHAPTER 1011: STORMWATER, EROSION AND SEDIMENT CONTROL REGULATIONS

Section

1011.001	Title
1011.002	Purpose
1011.003	Jurisdiction
1011.004	Statutory Authority
1011.005	Findings
1011.006	Definitions
1011.007	Applicability
1011.008	Exemptions
1011.009	Technical Reference
1011.010	Grading, Erosion and Sediment Control Requirements
1011.011	Stormwater Management Requirements
1011.012	Inspections and Maintenance
1011.013	Plan Review Prodecure
1011.014	Financial Securities
1011.015	Enforcement
1011.016	Abrogation and Greater Restrictions

GENERAL PROVISIONS

§ 1011.001 TITLE.

This chapter shall be known as the Lino Lakes Stormwater, Erosion and Sediment Control Chapter and will be referred to herein as this chapter.

§ 1011.002 PURPOSE.

The general purpose of this chapter is to set forth regulatory requirements for land development and land disturbing activities aimed at minimizing threats to public health, safety, public and

private property, and natural resources within the City from construction site erosion and post-construction stormwater runoff . Specific purposes are to establish performance standards that will:

1) Protect life and property from dangers associated with flooding;

2) Protect public and private property and the natural resources from damage resulting from runoff and construction site erosion;

3) Ensure land development that minimizes the generation of stormwater runoff volumes and peak rates and maximizes pervious areas for stormwater treatment;

4) Promote regional stormwater management by subwatershed;

5) Provide a single, consistent set of performance standards that apply to all developments;

6) Protect water quality from nutrients, heavy metals, bacteria, pathogens, debris, thermal stress, and other urban pollutants;

7) Promote infiltration and groundwater recharge;

8) Protect functional values of all types of natural water bodies (e.g., rivers, streams, wetlands, lakes, seasonal ponds); and

9) Sustain or enhance biodiversity (native plant and animal habitat) and support riparian ecosystems.

§ 1011.003 JURISDICTION.

The provisions of this chapter shall apply to all lands within the incorporated boundaries of Lino Lakes.

§ 1011.004 STATUTORY AUTHORIZATION.

This chapter is adopted pursuant to the authorization and policies contained in M.S. Chapters 103B, 103F, and 462 and Minn. Rules Chapters 7050, 7090, and 8410. This chapter is intended to meet the current construction site erosion and sediment control and post-construction stormwater management regulatory requirements for construction activity and small construction activity as defined in the standards of the NPDES construction general permit, as amended.

§ 1011.005 FINDINGS.

The city finds that uncontrolled stormwater runoff and construction site erosion from land development and land disturbing activity can have significant adverse impacts upon local and regional water resources diminishing the quality of public health, safety, public and private property, and natural resources of the city. Specifically, uncontrolled construction site erosion and stormwater runoff can:

1) Threaten public health, safety, property, and general welfare by increasing runoff volumes, peak flood flows, and overburdening storm sewers, drainage ways, and other storm drainage systems;

2) Diminish the capacity of lakes and streams to support fish, aquatic life, and recreational and water supply uses by increasing pollutant loadings of total sediment, suspended solids, nutrients, heavy metals, bacteria, pathogens, and other urban pollutants;

3) Degrade physical stream habitat by increasing stream bank erosion, increasing stream bed scour, diminishing groundwater recharge, diminishing stream base flows, and increasing stream temperatures;

4) Undermine floodplain management efforts by increasing the incidence and levels of flooding;

5) Alter wetland communities by changing wetland hydrology and increasing pollutant loading; and

6) Generate airborne particulate concentrations that are health threatening or may cause other damage to property or the environment.

§ 1011.006 DEFINITIONS.

Unless specifically defined below, words or phrases used in this chapter shall be interpreted so as to give them the same meaning as they have in common usage and to give this chapter its most reasonable application. For the purpose of this chapter, the words MUST and SHALL are mandatory and not permissive. All distances, unless otherwise specified, shall be measured horizontally. As used in this chapter, the following words and terms shall have the meanings ascribed to them in this section.

100-YEAR FLOOD ELEVATION. The elevation of water resulting from the Critical Duration Flood Event.

BEST MANAGEMENT PRACTICES (BMP's). Measures taken to minimize negative effects on water resources and systems as documented in the Minnesota Construction Site Erosion and Sediment Control Planning Handbook (MBWSR, 1988), *Protecting Water Quality in Urban Areas* (MPCA, 2000) and the *Minnesota Stormwater Manual* (MPCA, 2014) as amended.

BETTER SITE DESIGN (BSD). An approach to managing runoff that seeks to attain post development hydrology which mimics the undeveloped condition in terms of volume, rate and timing of runoff. The goals of *BETTER SITE DESIGN* include reducing the amount of impervious cover, increasing the amount of natural lands set aside for conservation, using pervious areas for more effective stormwater treatment, innovative grading and drainage techniques and through the review of every aspect of the project site planning process. *BETTER SITE DESIGN* involves techniques applied early in the design process to reduce impervious cover, conserve natural areas and use pervious areas to more effectively treat stormwater runoff and promote a treatment train approach to runoff management.

BIOFILTRATION. A stormwater quality and quantity BMP that utilizes vegetation and soil to filter and absorb pollutants including nutrients, hydrocarbons and metals and remove water

volume through evapotranspiration.

BRIDGE. A road, path, railroad or utility crossing over a waterbody, wetland, ditch, ravine, road, railroad or other obstacle.

BRIDGE SPAN. The clear span between the inside surfaces of a bridge's terminal supports.

CHANNEL. A perceptible natural or artificial depression, with a defined bed and banks that confine and conduct water flowing either continuously or periodically.

CONSTRUCTION ACTIVITY. Includes construction activity as defined in 40 C.F.R. pt. 122.26(b) (14)(x) and small construction activity as defined in 40 C.F.R. pt. 122.26(b)(15). This includes a disturbance to the land that results in a change in the topography, existing soil cover (both vegetative and non-vegetative), or the existing soil topography that may result in accelerated stormwater runoff , leading to soil erosion and movement of sediment into surface waters or drainage systems. Examples of *CONSTRUCTION ACTIVITY* may include clearing, grading, filling, and excavating. *CONSTRUCTION ACTIVITY* includes the disturbance of less than one acre of total land area that is a part of a larger common plan of development or sale if the larger common plan will ultimately disturb one acre or more.

CRITICAL DURATION FLOOD EVENT. The 100-year precipitation or snow melt event with a duration resulting in the maximum 100 year return period water surface elevation. The *CRITICAL DURATION FLOOD EVENT* is generally either the 100-year, 24 hour rainfall event as found in NOAA Atlas 14 or the ten-day snow melt event assumed to be 7.2 inches of runoff occurring on frozen ground (CN=100); however, other durations (e.g., 6-hour) may result in the maximum 100 year return period water surface elevation.

DETENTION BASIN. Any natural or man-made depression that stores stormwater runoff temporarily.

DEVELOPMENT. Any land-disturbing activity resulting in creation or reconstruction of impervious surface including, but not limited to, municipal road construction. Normal farming practices part of an ongoing farming operation shall not be considered *DEVELOPMENT*.

DRAINAGE SYSTEM. A system of open channel, pipe or tile, to drain property, including laterals, improvements, and improvements of outlets, which may or may not be a public system under the jurisdiction of a watershed district under Minnesota Statues Chapters 103B, 103D, or 103E.

EMERGENCY OVERFLOW (EOF). A primary overflow to pass flows above the design capacity around the principal outlet safely downstream without causing flooding.

EROSION AND SEDIMENT CONTROL PLAN. A plan of BMPs or equivalent measures designed to control runoff and erosion and to retain or control sediment on land during the period of land disturbance in accordance with the standards set forth in this chapter.

EROSION PREVENTION. Measures employed to prevent erosion including, but not limited to, soil stabilization practices, limited grading, mulch, temporary or permanent cover, and construction phasing.

EXCAVATION. The displacement or removal of soil, sediment or other material.

FILTRATION. A stormwater quality BMP that uses either natural media such as soil or vegetation or manufactured media to trap pollutants such as nutrients and particles in surface water.

FINAL STABILIZATION. All soil disturbing activities at the site have been completed and all soils have to be stabilized by a uniform perennial vegetative cover with a density of 70% over the entire pervious surface area, or other equivalent means necessary to prevent soil failure under erosive conditions.

FLOODPLAIN. The areas adjoining a waterbody that are inundated during the 100-year flood.

FLOODWAY. The channel of a watercourse, the bed of water basins and those portions of adjoining floodplains that must be kept free of encroachment to accommodate the 100-year flood.

FLOODWAY FRINGE. The area between the floodway and the boundary of the 100-year flood.

FREEBOARD. Vertical distance between the 100-year flood elevation or emergency overflow elevation of a water basin or watercourse and the elevation of the regulatory elevation of a structure.

IMPERVIOUS SURFACE. A compacted surface or a surface covered with material (i.e., gravel, asphalt, concrete, Class 5, etc.) that increases the depth of runoff compared to natural soils and land cover. Including but not limited to roads, driveways, parking areas, sidewalks and trails, patios, tennis courts, basketball courts, swimming pools, building roofs, covered decks, and other structures.

INFILTRATION. Water entering the ground through the soil.

LAND-DISTURBING ACTIVITY. Any disturbance to the ground surface that, through the action of wind or water, may result in soil erosion or the movement of sediment into waters, wetlands or storm sewers or onto adjacent property. *LAND-DISTURBING ACTIVITY* includes but is not limited to the demolition of a structure or surface, soil stripping, clearing, grubbing, grading, excavating, filling and the storage of soil or earth materials. The term does not include normal farming practices as part of an ongoing farming operation.

LANDLOCKED BASIN. A water basin lacking an outlet at an elevation at or below the water level produced by the critical duration flood event, generally the 10-day snowmelt event.

LOW ENTRY ELEVATION. The elevation of the lowest opening in a structure.

LOW FLOOR ELEVATION. The elevation of the lowest floor of a habitable or uninhabitable structure, which is often the elevation of the basement floor or walk-out level.

MILL, RECLAMATION AND OVERLAY. Removal of the top layer(s) of an impervious surface (e.g. roadway, parking lot, sport court) by mechanical means, followed by the placement of a new layer of impervious surface, without exposure of the underlying native soil.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER DISCHARGE PERMIT. A permit issued by the Minnesota Pollution Control

Agency that authorizes the discharge of pollutants to the waters of the State.

NATIONWIDE URBAN RUNOFF PROGRAM (NURP). *NATIONWIDE URBAN RUNOFF PROGRAM* Urban Runoff Program developed by the Environmental Protection Agency to study stormwater runoff from urban development.

ORDINARY HIGH WATER LEVEL (OHW). The highest water level elevation that has been maintained for a sufficiently long period of time to leave evidence upon the landscape. The *OHW* is commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. If an *OHW* has been established for a waterbody by the Minnesota Department of Natural Resources, it will constitute the *OHW* under this definition.

OWNER. The person or party possessing the title of the land on which the construction activities will occur; or if the construction activity is for a lease, easement, or mineral rights license holder, the party or individual identified as the lease, easement, or mineral rights license holder; or the contracting government agency responsible for the construction activity.

PUBLIC LINEAR PROJECT. A project involving a roadway, sidewalk, trail or utility not part of an industrial, commercial, institutional or residential development.

RECONSTRUCTION. Removal of an impervious surface such that the underlying structural aggregate base is effectively removed and the underlying native soil exposed.

SEASONAL HIGH WATER TABLE. The highest known seasonal elevation of groundwater as indicated by redoximorphic features such as mottling within the soil.

SATURATED SOIL. The highest seasonal elevation in the soil that is in a reduced chemical state because of soil voids being filled with water. Saturated soil is evidenced by the presence of mottled features or other information.

SEDIMENT CONTROL. Methods employed to prevent sediment from leaving the site. *SEDIMENT CONTROL* practices include silt fences, sediment traps, earth dikes, drainage swales, check dams, subsurface drains, pipe slope drains, storm drain inlet protection, and temporary or permanent sedimentation basins.

SHORELAND. Land located within the following distances from the ordinary high water elevation of public waters: 1. land within 1,000 feet from the normal high watermark of a lake, pond or flowage; and 2. Land within 300 feet of a river or stream or the landward size of a floodplain delineated by ordinance on the river or stream, whichever is greater.

STABILIZED. The exposed ground surface has been covered by appropriate materials such as mulch, staked sod, riprap, erosion control blanket, mats or other material that prevents erosion from occurring. Applying mulch, hydromulch, tackifier, polyacrylamide, or similar erosion prevention practices is not acceptable stabilization in temporary or permanent drainage ditches or areas where concentrated overland flow occurs. Grass seeding is not stabilization.

STANDARD PLATES. General drawings having or showing similar characteristics or qualities that are representative of a construction activity or practice.

STORMWATER. Defined under Minn. Rules 7077.0105, Subd. 41(b), meaning precipitation runoff, stormwater runoff, snowmelt runoff, and any other surface runoff and drainage.

STORMWATER FACILITY, PRIVATE. Any BMP that is maintained by a private property owner, or other private entity and not maintained by a public agency.

STORMWATER MANAGEMENT PLAN. A plan for the permanent management and control of runoff prepared and implemented in accordance with the standards set forth in this chapter.

STORMWATER POLLUTION PREVENTION PLAN. A document which describes the best management practices and activities to be implemented by a person or business to identify sources of pollution or contamination at a site and the actions to eliminate or reduce pollutant discharges to stormwater, stormwater conveyance systems, and/or waterbodies to the maximum extent practicable.

STORMWATER POND. Constructed basins placed in the landscape to capture stormwater runoff.

SURFACE WATERS. All streams, lakes, ponds, marshes, wetlands, reservoirs, springs, rivers, drainage systems, waterways, watercourses, and irrigation systems whether natural or artificial, public or private.

UNDERGROUND WATERS. Water contained below the surface of the earth in the saturated zone including, without limitation, all waters whether under confined, unconfined, or perched conditions, in near surface unconsolidated sediment or regolith, or in rock formations deeper underground. The term ground water shall be synonymous with underground water.

WATER QUANTITY BEST MANAGEMENT PRACTICE. The use of on-site runoff management practices such as biofiltration, infiltration, buffers/conservation areas, impervious disconnection, and greenway connections to satisfy stormwater management requirements.

WATERS OF THE STATE. As defined in M.S. § 115.01, Subd. 22, means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, reservoirs, aquifers, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface or underground, natural or artificial, public or private, which are contained within, flow through, or border upon the state or any portion thereof.

WETLAND. Land transitional between terrestrial and aquatic systems, as defined in Minnesota Statues § 103G.005, Subdivision 19.

§ 1011.007 APPLICABILITY.

All land disturbing activity may be subject to standard erosion and sediment control BMPs. A grading, erosion and sediment control permit and/or a stormwater management permit shall be required for projects that meet or exceed the thresholds established in §§ 1011.010 and 1011.011.

§ 1011.008 EXEMPTIONS.

The following land disturbing activities will be exempt from the grading, erosion and sediment control and stormwater management permit requirements of this chapter:

1) Cemetery graves.

2) Routine agricultural activity such as tilling, planting, or harvesting of agricultural, horticultural, or silvicultural (forestry) crops.

3) Emergency work necessary to protect life, limb, or property.

§ 1011.009 TECHNICAL REFERENCE.

The following documents shall be used for technical reference:

1) The Lino Lakes Surface Water Management Plan.

2) The Lino Lakes Engineering Design Details.

3) The Lino Lakes Standard City Specifications.

4) The Rice Creek Watershed District (RCWD) Rules.

5) The Vadnais Lakes Area Watershed Management Organization (VLAWMO) Rules.

GRADING, EROSION, AND SEDIMENT CONTROL

§ 1011.010 GRADING, EROSION AND SEDIMENT CONTROL REQUIREMENTS.

1) *Grading, erosion and sediment control (ESC).* A grading, erosion and sediment control (ESC) permit including a grading, erosion and sediment control plan shall be required for all proposed land disturbing activity unless otherwise exempted in this chapter that meets any or all of the following:

a. Includes excavation, filing, or stockpiling of erodible material in excess of 50 cubic yards per acre; and/or

b. Involves the laying, repairing, replacing, or enlarging of an underground utility, pipe or other facility, or the disturbance of road ditch, grass swale, or other open channel for a distance of 500 feet or more; or

c. Disturbs more than one acre of land or 10,000 square feet if within 300 feet of a lake, stream or wetland and drains towards it; or

d. A land disturbing activity, regardless of size, that the city determines is likely to cause an adverse impact to an environmentally sensitive area or other property.

2) *Grading, erosion and sediment control plan design standards*. Grading, erosion and sediment control plans must comply with the following criteria:

a. All plans shall be consistent with National Pollutant Discharge Elimination permit (NPDES) requirements, the Lino Lakes engineering design standards, the Lino Lakes stormwater

detail plates, and the filing or approval requirements of Rice Creek Watershed District, Vadnais Lakes Watershed Management Organization, Anoka County, Minnesota Department of Natural Resources, Minnesota Department of Transportation, Minnesota Pollution Control Agency, U.S. Army Corps of Engineers, State of Minnesota Stormwater Manual or other regulatory agencies.

b. Natural site topography and soil conditions must be specifically addressed to reduce erosion and sedimentation during construction and after project completion.

c. Site erosion and sediment control practices must be consistent with the Minnesota Pollution Control Agency document Protecting Water Quality in Urban Areas (2000), as amended, City-specific written design guidance, and be sufficient to retain sediment on-site.

d. The project must be phased as best possible to minimize disturbed areas and removal of existing vegetation until necessary for project progress.

e. The city may require additional erosion and sediment control measures on areas with a continuous slope leading to a sensitive, impaired or special water body, stream, ditch or wetland to assure retention of sediment on site.

f. When site restrictions do not allow for a temporary sediment basin or less than the required acreage is being developed, temporary sediment basins, where appropriate, are encouraged. They are not required in areas with steep slopes, highly erodible soils, or to take equivalent measures such as smaller basins, check dams, and vegetated buffer strips.

g. The plan must include conditions adequate to protect facilities to be used for post-construction stormwater infiltration.

h. The plan must include conditions to minimize off-site sediment transport on trucks and equipment, such as rock entrances.

i. The plan must minimize work in and adjacent to water bodies and wetlands.

j. Stable slopes shall be maintained throughout the construction process.

k. Steep slopes and the need for high cuts and fills shall be avoided (no slopes greater than 3(h): 1(v), except as approved by the City Engineer).

l. Protection shall be provided to minimize disturbance to surrounding soils, root systems and trunks of trees adjacent to site activity that are intended to be left standing.

m. Compaction of site soils shall be minimized.

n. All imported materials shall be approved by the City Engineer prior to placement on the site.

o. Appropriate on-site containment must be provided for all trash, solid waste, construction debris, floating debris, and hazardous materials. Disposal of collected sediment shall be deposited only in approved locations.

3) *Grading, erosion and sediment control (ESC) required exhibits*. The plan shall be prepared and signed by a duly licensed professional engineer in the State of Minnesota. The following

exhibits must accompany the permit application: two plan sets, full size (22 inches by 34 inches); one plan set, reduced to maximum size of 11 inches by 17 inches. Additional copies may be required in accordance with applicable zoning and subdivision provisions of city code. All plan sets shall also be submitted electronically in a .dwg format or as otherwise determined by the City Engineer. The minimum requirements of the grading, erosion, and sediment control plan shall be consistent with the most recent version of the NPDES permit requirements and include the following information:

a. Project name and type (residential, commercial, industrial, road construction, or other);

b. Project location;

c. County parcel identification number (legal description);

d. Names and addresses of the record owner, developer, land surveyor, engineer, designer of the plat, and any agents, contractors, and subcontractors who will be responsible for project implementation, including the name, address and phone number of the party responsible for maintenance of all erosion and sediment control measures;

e. Tabulation of construction implementation schedule, including: estimated start date, time frames, and schedules for each construction phase, and completion date;

f. Copies of permits or permit applications required by any other government entity or agencies including mitigation measures required as a result of any review for the project (e.g., wetland mitigation, EAW, EIS, archaeology survey);

g. *Existing conditions map*. An existing topographic site map, drawn to a legible scale and clearly labeled with a north arrow and date of preparation. The plan, based on a certificate of survey, shall include the following information:

1. Property lines and lot dimensions.

2. Existing zoning classifications for land within and abutting the development, including shoreland, floodway, floodway fringe, or general floodplain, and other natural resource overlay districts.

3. All buildings and outdoor uses including all dimensions and setbacks.

4. All public and private roads, interior roads, driveways and parking lots.

5. Show ordinary high water marks of all navigable waters, 100-year critical flood duration event elevations, and delineated wetland boundaries, if any. If not available, appropriate flood zone determination or wetland delineation, or both, may be required at the applicant's expense.

6. Identify all special waters and impaired waters, as identified in the most recent listing by the MPCA, within one mile of the project that receive runoff from the project.

7. Location of drainage areas, existing storm sewer facilities, including pipes, manholes, catch basins, ponds, swales and drainage channels within 100 feet of the subject property.

Existing pipe sizes, grades, rim and invert elevations, and normal and high water elevations must be included.

8. Existing contours at one foot intervals, shown as dashed lines for the subject property and extending 100 feet beyond the outside boundary of the proposed plat.

9. Steep slopes where areas with an average slope of more than 12% over a distance of at least 50 feet, or bluff areas as defined in the shoreland ordinance, whichever is applicable.

10. Wooded areas, high quality native plant communities, or other officially designated natural resource areas.

h. *Proposed conditions map*.

1. Maps identifying areas discussed in (3)(g)1 through (g)10 of this section.

2. Location, size, and approximate grade of proposed public sewer and water mains.

3. Elevations, sections, profiles, and details as needed to describe all natural and artificial features of the project.

4. Proposed grade contours at one-foot intervals shown as solid lines.

5. An estimate of the total volume (cubic yards) of materials proposed to be imported to or exported from the site.

6. Provisions for groundwater management (dewatering), including subsurface drains, disposals, ponding and flood controls.

7. Spot elevations at drainage break points and directional arrows indicating site swale and lot drainage.

8. Proposed lot lines, lot and block numbers, building style, building pad location and elevations at the lowest floor and garage slab, if applicable, for each lot.

9. Locations, sizes, grades, rim and invert elevations of all proposed stormwater facilities, including ponds, proposed to serve the subject property.

10. The location of all oversize, non-typical easements including conservation easements, if applicable.

11. Show the boundary of the 100 year flood elevations of all waterbodies.

12. Locations of all stormwater management practices, infiltration areas, and areas not to be disturbed during construction.

13. Normal water level, high water level, and emergency overflow elevations for the site and all associated ponding systems.

14. Location of areas where construction will be phased to minimize duration of exposed soil areas. Include map and calculations as necessary of areas of grubbing, clearing, tree removal,

grading, excavation, fill, and other disturbance; areas of soil or earth material storage; quantities of soil or earth material to be removed, placed, stored, or otherwise moved on site, and delineated limits of disturbance.

15. Location and type of all temporary and permanent erosion prevention, sediment control, stormwater runoff, and soil stabilization BMPs, along with procedures to be used to establish additional temporary BMPs as necessary for the site conditions during construction. Standard plates and/or specifications for the BMP's used on the project must be included in the final plans and specifications for the project. Location and design of temporary sediment basins where ten acres or more (five acres or more for special or impaired waters) are disturbed and drained to a single point. When site restrictions do not allow for a temporary sediment basin or less than the required acreage is being developed, temporary sediment basins where appropriate are encouraged, but not required in areas with steep slopes or highly erodible soils or to take equivalent measures such as smaller basins, check dams, and vegetated buffer strips.

16. Methods to be used for final stabilization of all exposed soil areas.

17. Documentation that the project applicant has applied for the NPDES permit from the Minnesota Pollution Control Agency (MPCA), when applicable.

18. A Stormwater Pollution Prevention Plan for projects that require an NPDES permit.

4) *Construction activity requirements*. Any activity subject to a permit under this chapter must conform to the standards of the NPDES general permit regarding construction-site erosion and sediment control.

5) *Inspections*. See also § 1101.012 Inspections and Maintenance of this chapter.

a. The applicant shall be responsible for inspection, maintenance and effectiveness of all erosion and sediment control measures until final soil stabilization is achieved.

b. The City may inspect the project site and require the applicant to provide additional erosion control measures as it determined conditions warrant.

6) *Final stabilization.*

a. Erosion and sediment control measures must be maintained until final vegetation and ground cover is established to a density of 70%.

b. All temporary erosion and sediment control BMPs will be removed after all disturbed areas have been permanently stabilized.

STORMWATER MANAGEMENT

§ 1011.011 STORMWATER MANAGEMENT REQUIREMENTS.

1) *Stormwater management*. A permit incorporating an approved stormwater management plan shall be required for all proposed land development activity including public linear projects, unless otherwise exempted in this chapter, which meets any or all of the following:

a. A development, redevelopment or reconstruction, except Public Linear Projects, that creates or reconstructs 10,000 square feet or more of impervious surface, including smaller individual sites that are part of a common plan of development that may be constructed at different times.

b. A subdivision of an area exceeding one acre. This includes subdivision for single-family residential, multi-unit residential, commercial, industrial, or institution development.

c. For Public Linear Projects, a permit is required to create or reconstruct 10,000 square feet or more of impervious surface through multiple phases or connected actions of a single project, as defined by the City.

d. The site is within the 100-year floodplain; within 1,000 feet of a public water or protected wetland; impacts a wetland; and/or within 300 feet of Rice Creek, Clearwater Creek, Hardwood Creek, or a public ditch.

e. Any land disturbing activity, regardless of size, that the city determines would otherwise cause an adverse impact to an environmentally sensitive area or other property.

f. Stormwater Management Requirements do not apply to development of an individual lot within a residential subdivision if it conforms to an approved development plan.

g. Stormwater Management Requirements do not apply to sidewalks and trails 10 feet wide or less that are bordered down-gradient by vegetated open space or vegetated filter strip with a minimum width of 5 feet as exempt from stormwater management permit requirements, however the grading, erosion and sediment control requirements are still effective.

h. Stormwater Management Requirements do not apply to Mill, Reclamation and Overlay projects that do not expose underlying soils.

i. Stormwater Management Requirements do not apply to Bridge Span projects are exempt from stormwater management permit requirements, however grading, erosion and sediment control requirements are still effective.

2) *Stormwater management performance standards*. Site plans for new development of any kind will be assessed for stormwater quantity control and stormwater quality management. The general policy on stormwater runoff rates is to reduce the impacts of development by maintaining predevelopment hydrological conditions in the following ways:

a. *Use of natural topography*. The applicant shall incorporate the use of natural topography and land cover such as natural swales and depressions as they exist before development to the degree that they can accommodate the additional flow of water without compromising the integrity or quality of the receiving waterbody.

b. *Minimize impact to natural features*. The development shall minimize impact to significant natural features. Applicant shall review the site for natural features protected under Lino Lakes, state or federal requirements, including steep slopes, wetlands, wooded areas, endangered or threatened species, or species of concern habitat, areas designated by the county biological survey, greenways, parks and open space, groundwater recharge areas, wellhead or surface water protection areas or regional stormwater pond locations.

c. *Conveyance system*. Wherever possible untreated and treated stormwater runoff shall be conveyed in facilities open to the atmosphere (e.g. swales, vegetated buffer strips, energy-dissipating structures, and the like) rather than through enclosed pipes, so as to decrease runoff velocity, allow for natural infiltration, allow suspended sediment particles to settle, and to remove pollutants.

d. *Proposed development design shall*:

1. Maintain or decrease runoff volume.

2. Decrease erosion and sedimentation.

3. Maintain or decrease flow frequency, duration, and peak runoff rates.

4. Increase infiltration (groundwater recharge) or filtration.

5. Maintain existing flow patterns.

6. Reduce time to peak flows by increasing the time of concentration to and through storm sewers.

7. Provide storage of stormwater runoff on site.

8. Avoid channel erosion.

9. The proposed project must not adversely affect water level off the site during or after construction.

10. The proposed activity may not reduce hydraulic efficiency of the drainage ways at any point up-gradient of the applicant's parcel boundary.

e. *Landlocked basins*. A landlocked basin may be provided an outlet only if it:

1. Retains a hydrologic regime that complies with the requirements of the local governmental unit (LGU) responsible for administration of the Wetland Conservation Act (WCA); and

2. Provides sufficient dead storage volume to retain back to back 100-year, 24-hour rainfalls and runoff; and

3. Does not create adverse downstream flooding or water quality conditions as a result of increased discharge rate or volume, or other factors.

f. All plans shall be consistent with National Pollutant Discharge Elimination permit (NPDES) requirements, the Lino Lakes engineering design standards, the Lino Lakes stormwater design standards, and the filing or approval requirements of Rice Creek Watershed District, Vadnais Lakes Watershed Management Organization, Anoka County, Minnesota Department of Natural Resources, Minnesota Department of Transportation, Minnesota Pollution Control Agency, U.S. Army Corps of Engineers, State of Minnesota Stormwater Manual or other regulatory agencies.

g. The City of Lino Lakes may develop a Comprehensive Stormwater Management Plan (CSMP) as an alternative way to meet the stormwater requirements of the local watershed agencies for development within a defined area and a common resource of concern (ROC). The CSMP will be submitted to the applicable watershed district for review and must comply with the requirements of the watershed district.

3) *Stormwater management plan modeling requirements.*

a. A hydrograph method or computer program based on Natural Resources Conservation Service Technical Release #20 (TR-20) and subsequent guidance must be used to analyze stormwater runoff for the design or analysis of flows and water levels within and off the project site. Composite curve numbers shall not include directly connected impervious surfaces.

b. In determining curve numbers to model runoff in the post-development condition, the hydrologic soil group (HSG) of areas within construction limits is to be shifted down one classification (or one-half classification for HSG A) to account for the impacts of grading on soil structure unless the project specifications incorporate soil amendments in accordance with Rice Creek Watershed District Soil Amendment guidelines.

c. The following curve numbers (Table 1) shall be utilized for modeling of those site areas not covered by impervious surface:

Table 1. Curve Numbers for Use with Pervious Areas

Hydrologic Soil Group	***Existing Runoff Curve Number****	***Post-Construction Runoff Curve Number*****	
		Undisturbed Land	***Disturbed Land***
A	39	39	49
B	61	61	74
C	74	74	80
D	80	80	80
* Curve numbers from USDA-NRCS, Technical Release 55 ** Rice Creek Watershed District 2013 Rules			

d. The analysis of flood levels, storage volumes, and discharge rates for waterbodies and stormwater management basins must include the NOAA Atlas 14 values, as amended, for the 2-year, 10-year and 100-year return period, 24-hour rainfall events and the 10-day snowmelt event, in order to identify the critical duration flood event. The ten-day snowmelt event is simulated by a 7.2-inch, ten-day spring runoff event during which it is assumed the ground is frozen solid and no infiltration occurs (CN set to 100 for all areas). The City Engineer may require analysis of additional precipitation durations to determine the critical duration flood event. Analysis of the 10-day snowmelt event is not required for stormwater management detention basins with a defined outlet elevation at or below the 100-year 24-hour event elevation.

4) *Water quality treatment.*

a. Land development activities creating impervious surface shall address the use of better site design (BSD) techniques as outlined in the Better Site Design and Low Impact Development sections of the Minnesota Stormwater Manual (MPCA, 2014 and subsequent revisions).

b. The water quality volume standard for all projects, except Public Linear projects, is determined as follows (Table 2):

Table 2. Required Water Quality Volume Calculations for New or Reconstructed Developments

BMP	***BMP Design Variation***	***Water Quality Treatment Volume Calculation [ft^3]***
Infiltration	Infiltration Feature	Impervious surface [ft^2] * 1.1 [in] / 12 [in/ft]
Water Reuse	Irrigation	Impervious surface [ft^2] * 1.1 [in] / 12 [in/ft]
Biofiltration	Underdrain	Impervious surface [ft^2] * 1.1 [in] / (0.65 * 12 [in/ft])
Filtration	Sand or Rock Filter	Impervious surface [ft^2] * 1.1 [in] / (0.50 * 12 [in/ft])
Stormwater Wetlands	Shallow Wetland	Impervious surface [ft^2] * 1.1 [in] / (0.40 * 12 [in/ft])
	Pond/Wetland	Impervious surface [ft^2] * 1.1 [in] / (0.55 * 12 [in/ft])
Stormwater Ponds	Wet Pond	Impervious surface [ft^2] * 1.1 [in] / (0.50 * 12 [in/ft])
	Multiple Pond	Impervious surface [ft^2] * 1.1 [in] / (0.60 * 12 [in/ft])

c. The required water quality treatment volume standard for Public Linear projects is determined as follows:

$$\text{Required Water Quality Treatment Volume [ft}^3\text{]} = \text{Area of New or Reconstructed Impervious Surface [ft}^2\text{]} \times 0.75\text{ [in]} \div 12\text{ [in/ft]}$$

d. Public linear projects shall meet the requirements of the Rice Creek Watershed District (RCWD) or Vadnais Lakes Area Water Management Organization (VLAWMO) as applicable.

e. Infiltration BMPs (see City BMP standard plates and design criteria) are to be incorporated in areas with A and B hydrologic soil groups. Stormwater from impervious surfaces other than rooftops must be pretreated before discharge to infiltration BMPs, to remove sediment and floatables, or other materials that would restrict the BMP's capacity or contaminate ground water.

f. If the project meets any of the following conditions listed in Table 3, infiltration is prohibited and the water quality volume requirements shall be provided the remaining options in Table 2.

Table 3. Specific conditions that may restrict infiltration.

Type	Specific Site Conditions
Potential Contamination	Potential Stormwater Hotspots [PSH]
	Contaminated Soils
	Vehicle Fueling and Maintenance Areas
Physical Limitations	Low Permeability Soils [HSG C and D]
	Bedrock within three vertical feet of bottom of infiltration area
	Seasonal High Water Table within three vertical feet of bottom of infiltration area
	Where soil infiltration tests are more than 8.3 inches per hour
Land Use Limitations	Utility Locations
	Adjacent Wells

g. BMPs must provide infiltration where feasible. If the City concurs that the infiltration BMPs are not feasible or directs that infiltration not be used, then any BMP may be chosen. If infiltration is feasible on-site, then a regionally-sited BMP must provide equivalent runoff volume reduction.

5) *Peak stormwater runoff control.*

a. Stormwater runoff rates for the proposed project at the site boundary, in aggregate, must not exceed existing runoff rates for the critical 2-, 10-, and 100-year frequency events.

b. Any increase in a critical event rate at a specific point of discharge from the site must be limited and cause no adverse down gradient impact. The project must meet the hydroperiod standards found in

c. Table 4 with respect to all down-gradient wetlands.

Table 4. Hydroperiod Standards

Wetland Susceptibility Class	Permitted Storm Bounce for 2-year and 10-year Event*	Inundation Period for 2-year Event*	Inundation Period for 10-year Event*
Highly Susceptible	Existing	Existing	Existing
Moderately Susceptible	Existing + 0.5-ft	Existing + 1 day	Existing + 7 days

Slightly Susceptible	Existing + 1.0 ft	Existing + 2 days	Existing + 14 days
Least Susceptible	No Limit	Existing + 7 days	Existing + 21 days
* Duration of 24-hours for the return periods utilizing NOAA Atlas 14 precipitation data. Source: Adapted from Rice Creek Watershed District 2013 Rules.			

d. Wetland Susceptibility Class is determined based on wetland type, as follows:

1. Highly susceptible wetland types include: sedge meadows, bogs, coniferous bogs, open bogs, calcareous fens, low prairies, coniferous swamps, lowland hardwood forests, and seasonally flooded water basins.

2. Moderately susceptible wetland types include: shrub-carrs, alder thickets, fresh (wet) meadows, and shallow & deep marshes.

3. Slightly susceptible wetland types include: floodplain forests and fresh wet meadows or shallow marshes dominated by cattail giant reed, reed canary grass or purple loosestrife.

4. Least susceptible wetland includes severely degraded wetlands. Examples of this condition include cultivated hydric soils, dredge/fill disposal sites and some gravel pits.

e. Exceptions. Rate control criteria of § 1011.011(5) may be waived if the site discharges directly to a water body with large storage capacity (such as a public water) that has a time-to-peak elevation greater than that for an on-site pond and the volume discharged from the on-site pond is negligible, relative to the volume of runoff entering the water body.

6) *Design criteria.*

a. *Infiltration BMPs*. Infiltration BMPs must be designed to provide:

1. Adequate pretreatment measures to remove sediment before runoff enters the primary infiltration area;

2. Drawdown within 48-hours or 72-hours from the end of a storm event, for surface or sub-surface features, respectively. Soil infiltration rates shall be based on the appropriate HSG classification and associated infiltration rates (

3. Table 5). Infiltration area will be limited to the horizontal areas subject to prolonged wetting;

Table 5. Soil Infiltration Rates

HSG	Soil Texture*	Corresponding Unified Soil Classification**		Infiltration Rate [in/hr]
A	Gravel	**GW**	Well-graded gravels, sandy gravels	**1.63**

	Sandy Gravel Silty Gravel	**GP**	Gap-graded or uniform gravels, sandy gravels	
		GM	Silty gravels, silty sandy gravels	
		SW	Well-graded gravelly sands	
	Sand Loamy Sand Sandy Loam	**SP**	Gap-graded or uniform sands, gravelly sands	**0.8**
B	Loam Silt Loam	**SM**	Silty sands, silty gravelly sands	**0.45**
		MH	Micaceous silts, diatomaceous silts, volcanic ash	**0.3**
C	Sandy Clay Loam	**ML**	Silts, very fine sands, silty or clayey fine sands	**0.2**
D	Clay Loam Silty Clay Loam Sandy clay Silty Clay Clay	**GC**	Clayey gravels, clayey sandy gravels	**0.06**
		SC	Clayey sands, clayey sandy gravels	
		CL	Low plasticity clays, sandy or silty clays	
		OL	Organic silts and clays of low plasticity	
		CH	Highly plastic clays and sandy clays	
		OH	Organic silts and clays of high plasticity	
Source: Adapted from the "Design Infiltration Rates" table from the Minnesota Stormwater Manual, MPCA (January 2014).				
* U.S. Department of Agriculture, Natural Resources Conservation Service, 2005. National Soil Survey Handbook, title 430-VI. (Online) Available: http://soils.usda.gov/technical/handbook/. ** ASTM standard D2487-00				

4. A minimum of three feet of separation from the seasonal high water table.

5. Design and placement in accordance with the 2007 Minnesota Department of Health guidance *Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas*.

b. *Water Reuse*. Water Reuse BMPs must be designed to provide:

1. A maximum irrigation rate of 1-inch per week over the irrigated lawn/turf grass area(s);

2. No greater than a 26 week (April 15th to October 15th) growing season; and

3. No increase in stormwater runoff from the irrigated area or project site.

4. The amount of water quality treatment volume credit given will be based upon the three year average of the volume irrigated, determined by the average of three years of monitoring records.

c. *Biofiltration and Filtration BMPs*. Biofiltration and filtration BMPs must be designed to provide:

1. Adequate pretreatment measures to remove sediment before runoff enters the primary bilfiltration area;

2. Drawdown within 48-hours or 72-hours from the end of the storm event for surface or sub-surface features, respectively;

3. A minimum of 12-inches of organic material or sand above the rock trench or draintile system; and

4. Drain tile system must be designed above the Seasonal High Water Table.

d. *Stormwater Ponds*. Stormwater ponds must be designed to provide:

1. Water quality features consistent with NURP criteria and city standard plate;

2. Permanent wet pool with dead storage at least equal to the runoff from a 2.5-inch rainfall over the area tributary to the pond; and

3. An outlet structure capable of preventing migration of floating debris and oils for at least the one-year storm.

4. An outlet structure to control the two-year, ten-year and 100-year frequency events to existing peak runoff sites; and

5. An identified overflow spill way sufficiently stabilized to convey flows greater than the 100-year critical storm event.

e. *Outfalls*. An outfall structure discharging to a wetland, public water or public water wetland must incorporate a stilling-basin, surge-basin, energy dissipater, placement of ungrouted natural rock riprap or other feature to minimize disturbance and erosion of natural shoreline and bed resulting from stormwater discharges.

f. *Freeboard Requirements*. All new residential, commercial, industrial and other habitable or non-habitable structures, and all stormwater basins, must be constructed so that the lowest floor and lowest entry elevations of structures comply with the following

g. Table 6:

Table 6. Low Floor and Low Entry Freeboard Requirements

	Regional Elevations	***Local Detention Basins & Wetlands***	***Infiltration Basins***	***Rain Gardens***	***Groundwater***

Elevation	100 year	EOF	100 year	EOF	Bottom	100 year	EOF	EOF	Seasonal High Level
Low Floor Freeboard	2-ft	1-ft	0-ft	N/A	0-ft	N/A	N/A	N/A	4-ft
Low Entry Freeboard	NA	NA	2-ft	1-ft	NA	2-ft	1-ft	0.5-ft	N/A

h. Within a landlocked basin, lowest floor elevations must be at least one foot above the surveyed basin overflow elevation. Where a structure is proposed below the runoff elevation of a land-locked basin, the low-floor elevation will be a minimum of two feet above the high water level as determined from an estimate of high water levels determined from the highest of either the 100-year, ten-day runoff event or back-to-back 100-year, 24-hour rainfalls. Aerial photos, vegetation, soils, and topography will be used to derive a "normal" water elevation for the basin for the purpose of computing the 100-year elevation.

7) *Drainage and utility easements.*

a. If a stormwater management plan involves direction of some or all runoff off of the site, it shall be the responsibility of the applicant to obtain from adjacent property owners any necessary easements or other property interests concerning flowage of water.

b. Easements are required for all stormwater management facilities, stormwater conveyances and on-site floodplain and shall extend a minimum of 10 feet beyond the basin's 100-year storm high water level elevation.

c. Easements are required for all outlet swales and ditches, and for overland overflow routes located downstream of basins located on site.

d. If the storm sewer is to be installed less than ten feet deep within private property, the easement shall be a minimum of 20 feet wide. If the storm sewer is ten feet or greater, the easement shall be twice as wide as the depth.

e. Easements necessary for maintenance vehicle access are required for all of the above where not directly available on a public road.

8) *Stormwater management plan required exhibits*. The stormwater management plan shall be prepared and signed by a duly licensed engineer in the State of Minnesota. The following exhibits must accompany the permit application: two plan sets, full size (22 inches by 34 inches); one plan set, reduced to maximum size of 11 inches by 17 inches. Additional copies may be required in accordance with applicable zoning and subdivision provisions of city code. All plan sets shall also be submitted electronically in a .dwg format or as otherwise determined by the City Engineer. The minimum information requirements of the Stormwater Management Plan shall be consistent with the most recent version of the NPDES permit requirements and include the following information:

a. A grading, erosion and sediment control plan and, for projects that require a NPDES permit, a Storm Water Pollution Prevention Plan (SWPPP) is required.

b. Stormwater Management Plan including existing and proposed hydrologic calculations for total runoff volume and peak discharge rates as described in this chapter, including:

1. A narrative including a project description, discussion of BMP selection, incorporation of infiltration BMPs, and revegetation plan for the project site.

2. Delineation of all drainage areas, including contributing runoff from off-site areas, proposed and existing subwatersheds on-site, emergency overflows, and drainage ways.

3. Existing, proposed, and total amount of impervious surfaces created by the project.

4. Existing and proposed runoff curve numbers.

5. Time of concentration used in calculations.

6. Existing and proposed total runoff volume and peak discharge rates for the 2-, 10-, and 100-year critical events utilizing NOAA Atlas 14.

c. Property of lines and delineation of lands under ownership of the applicant.

d. Locations of all stormwater management practices, infiltration areas, and areas not to be disturbed during construction.

e. Location of all drain tiles on the project site shall be identified.

f. Location and engineered designs for structural stormwater management practices including stormwater treatment devices that remove oil and floatable material (e.g., basin outlets with submerged inlets).

g. Normal water level, high water level, and emergency overflow elevations for the site and all ponding systems related to NAVD88.

h. Identification of existing and proposed one-foot contour elevations within the project site related to NAVD88.

i. Geotechnical analysis including soil borings at all proposed stormwater management facility locations.

j. Provisions for groundwater management (dewatering), including subsurface drains, disposals, ponding and flood controls.

k. Completed city worksheet explaining better site design techniques that were evaluated during project design, the results of the evaluation of each and for any techniques deemed infeasible.

l. A long-term maintenance plan and schedule for all permanent stormwater practices, along with the identity of the party responsible for the maintenance of the project. The maintenance responsibility must be memorialized in a document executed by the property owner in a form acceptable to the city and filed for record on the deed.

m. Before work is deemed complete, as-built plans must be submitted demonstrating that at the time of final stabilization, stormwater facilities conform to design specifications.

n. Other project site-specific submittal requirements as may be required by the city.

§ 1011.012 INSPECTIONS AND MAINTENANCE.

1) *Inspections*. The applicant is responsible for inspections and record keeping in accordance with the NPDES Permit requirements. The city shall conduct inspections on a regular basis to ensure that both stormwater and erosion and sediment control measures are properly installed and maintained prior to construction, during construction, and at the completion of the project. In all cases the inspectors will attempt to work with the applicant or developer to maintain proper stormwater management. Mandatory inspections, conducted by the city, are required as follows:

a. Before any land disturbing activity begins;

b. Five working days after footing inspections;

c. At the completion of the project; and

d. Prior to the release of financial securities.

2) *Post-construction inspection and maintenance of stormwater facilities.*

a. *Private stormwater facilities*. No private stormwater facility may be approved unless a maintenance agreement is provided that defines who will conduct maintenance, the type of maintenance, and the maintenance intervals. All private stormwater facilities shall be inspected by the owner and maintained in proper condition consistent with the performance standards for which they were originally designed.

1. *Facility access*. Access to all stormwater facilities must be inspected annually and maintained as necessary. It shall be the responsibility of the applicant to obtain any necessary easements or other property interests to allow access to the facilities for inspection or maintenance for both the responsible party and the city.

2. *Maintenance*. All settled materials from ponds, sumps, grit chambers, and other devices, including settled solids, shall be removed and properly disposed of once capacity is reduced by 30%.

3. *Inspection*. All private stormwater facilities must submit an as-built record plan of the facility and must provide documentation to the city of an inspection during construction, during the first year of operation, and at least once every five years thereafter. Private facilities are subject to city inspection at any time to ensure compliance.

b. *Public stormwater facilities.*

1. *Acceptance of publicly owned facilities*. Before work under the permit is deemed complete, as-builts and certification must be submitted demonstrating at the time of final stabilization that the stormwater facilities conform to design specifications. A final inspection shall be required before the city accepts ownership of the stormwater facilities.

2. *Inventory of stormwater facilities*. The city shall inventory and maintain a database for all public stormwater facilities within the city requiring maintenance to ensure compliance with this chapter.

3) *Maintenance*. The city shall perform maintenance of publicly owned stormwater facilities within the city as provided for in the local surface water management plan.

§ 1011.013 PLAN REVIEW PROCEDURE.

1) *Plan review*. The applicant shall not commence any construction activity subject to this chapter until the stormwater management plan and/or the grading, erosion and sediment control plan have been approved by the City. The submittal shall be processed in accordance with § 2 of the Zoning Ordinance or Chapter 1011 of City code as applicable. City approval is contingent on issuance of all other permits required by the city or other agencies having jurisdiction on the project. The following standards shall apply to all developments within the City:

a. Plan approval. If the city determines that the stormwater management plan and/or the grading, erosion and sediment control plan meets the requirements of this chapter, the city shall issue a plan approval valid for a specified period of time that authorizes the land disturbance activity contingent on the implementation and completion of this plan.

b. *Plan denial.* If the city determines that the plan does not meet the requirements of this chapter, the city shall not issue plan approval for the land disturbance activity. This plan must be resubmitted for approval before the land disturbance activity begins. All land use and building permits shall be suspended until the developer has an approved ESC or stormwater management permit.

c. *Modification of plan*. The applicant must amend the plan as necessary to include additional requirements such as additional or modified BMPs designed to correct problems identified or address situations whenever:

1. A change in design, construction, operation, maintenance, weather, or seasonal conditions that has a significant effect on the discharge or pollutants to surface waters or underground waters;

2. Inspections or investigations indicate the plans are not effective in eliminating or significantly minimizing the discharge or pollutants to surface waters or underground waters or that the discharges are causing water quality degradation;

3. The plan is not achieving the general objectives of minimizing pollutants in stormwater discharges associated with construction activity; or

4. The plan is not consistent with the terms and conditions of this chapter.

§ 1011.014 FINANCIAL SECURITIES.

The applicant shall be subject to the financial security provisions of the City of Lino Lakes Development Agreement, Site Improvement Performance Agreement and/or the Lino Lakes

Public Improvement Financing Policy, as applicable.

§ 1011.015 ENFORCEMENT.

1) *Notification of failure of the permit*. The city shall notify the permit holder of the failure of the permit's measures.

a. *Initial contact*. The initial contact will be to the party or parties listed on the application and/or the SWPPP as contacts. Except during an emergency action, 48 hours after notification by the city or 72 hours after the failure of erosion and sediment control measures, whichever is less, the city at its discretion may begin corrective work. Such notification should be in writing, but if it is verbal, a written notification should follow as quickly as practical. If after making a good faith effort to notify the responsible party or parties, the city has been unable to establish contact, the city may proceed with corrective work. There are conditions when time is of the essence in controlling erosion. During such a condition the city may take immediate action and then notify the applicant as soon as possible.

b. *Emergency action*. If circumstances exist such that non-compliance with this chapter poses an immediate danger to the public health, safety and welfare, as determined by the city, the city may take emergency preventative action. The city shall also take every reasonable action possible to contact and direct the applicant to take any necessary action. Any cost to the city may be recovered from the applicant's financial security.

c. *Erosion off site*. If erosion breaches the perimeter of the site, the applicant shall clean up and repair or supplement with functional BMPs within 24 hours of discovery or immediately as conditions allow. If, in the discretion of the city, the permit holder does not repair the damage caused by the erosion, the city may do the remedial work required and charge the cost to the applicant. When restoration to wetlands and other resources are required, the applicant shall be required to work with the appropriate agency to ensure that the work is done properly.

d. *Erosion into streets, wetlands, or water bodies.* If eroded soils (including tracked soils from construction activities) enter or appear likely to enter streets, wetlands, or other water bodies, cleanup and repair shall be immediate. The applicant shall provide all traffic control and flagging required to protect the traveling public during the cleanup operations.

e. *Failure to do corrective work.* When an applicant fails to conform to any provision of this policy within the time stipulated, the city may take the following actions:

1. Issue a stop work order, withhold the scheduling of inspections, and/or the issuance of a certificate of occupancy.

2. Revoke any permit issued by the city to the applicant for the site in question or any other of the applicant's sites within the city's jurisdiction.

3. Correct the deficiency or hire a contractor to correct the deficiency.

4. Require reimbursement to the city for all costs incurred in correcting stormwater pollution control deficiencies. If payment is not made within 30 days after costs are incurred by the city, payment will be made from the applicant's financial securities as described above.

5. If there is an insufficient financial amount in the applicant's financial securities as described above, then the city may assess the remaining amount against the property. As a condition of the permit, the owner shall waive notice of any assessment hearing to be conducted by the city, concur that the benefit to the property exceeds the amount of the proposed assessment, and waive all rights by virtue of M.S. § 429.081 to challenge the amount or validity of assessment.

2) *Enforcement*. The city shall be responsible for enforcing this chapter.

a. *Penalties*. Any person, firm, or corporation failing to comply with or violating any of these regulations shall be deemed guilty of a misdemeanor and be subject to a fine or imprisonment or both. All land use and building permits shall be suspended until the applicant has corrected the violation. Each day that a separate violation exists shall constitute a separate offense.

b. *Right-of-entry and inspection; powers*. The issuance of a permit constitutes a right-of-entry for the city or its contractor to enter upon the construction site. The applicant shall allow the city and their authorized representatives, upon presentation of credentials, to:

1. Enter upon the permitted site for the purpose of obtaining information, examination of records, conducting investigations or surveys;

2. Bring such equipment upon the permitted site as is necessary to conduct such surveys and investigations;

3. Examine and copy any books, papers, records, or memoranda pertaining to activities or records required to be kept under the terms and conditions of the permitted site;

4. Inspect the stormwater pollution control measures; and

5. Sample and monitor any items or activities pertaining to stormwater pollution control measures;

6. Correcting deficiencies in stormwater and erosion and sediment control measures.

§ 1011.016 ABROGATION AND GREATER RESTRICTIONS.

In the event of any conflict between the provisions of this chapter and the provisions of any other city ordinance adopted by the City Council, the more restrictive standard prevails.

Adopted by the Lino Lakes City Council this ____ day of _____, 2015.

The motion for the adoption of the foregoing ordinance was introduced by Council Member_____and was duly seconded by Council Member _____ and upon vote being taken thereon, the following voted in favor thereof:

The following voted against same:

_____
Jeff Reinert, Mayor

ATTEST:

_____
Julianne Bartell, City Clerk

ENVIRONMENTAL BOARD
AGENDA ITEM 6A

STAFF ORIGINATOR:	Marty Asleson, Environmental Coordinator
MEETING DATE:	June 24, 2015
REQUEST:	Discussion of Comprehensive Stormwater Management Plan for the Northeast Area of Lino Lakes, Minnesota

BACKGROUND

The northeast area of Lino Lakes is proposed for future development. The northeast area is 1430 acres of land, and along 35E, from Main Street at the southernmost point to almost 80th Street on the north side. The area for study purposes is divided up into four district areas. These areas are Hugo, east, west central, and west sub-watershed.

The drainage area is guided for residential, commercial, and industrial uses. The existing agricultural ditch system is inadequate for stormwater management purposes. To implement the City's Comprehensive Plan and facilitate development, the city is working with WSB and the Rice Creek Watershed District to develop a Comprehensive Stormwater Management Plan for this area.

For this area, the following has been developed:

1. Preliminary design information for the conveyance system and outfall.
2. Allowable peak discharge rates and stormwater storage to be provided for each sub-watershed within the City.
3. Analysis and description of stormwater treatment BMP's to be provided.
4. Discussion demonstrating downstream impacts will be mitigated or eliminated.
5. Anticipated plan to utilize or abandon existing public drainage systems.

RECOMMENDATION

None. Staff is requesting any comments the board may have concerning this study.

ATTACHMENTS

1. Comprehensive Stormwater Management Plan for the Northeast Area of Lino Lakes, Minnesota.

COMPREHENSIVE STORMWATER MANAGEMENT PLAN

FOR THE

NORTHEAST AREA OF LINO LAKES, MINNESOTA

June 11, 2015

Prepared By:

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CERTIFICATION

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.

Pete Willenbring, P.E. Reg. No. 15998

Adam Parker, P.E. Reg. No. 42733

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1. INTRODUCTION/PURPOSE

This Comprehensive Stormwater Management Plan (CSMP) has been developed to provide the City of Lino Lakes (the City) with direction on how to manage and discharge stormwater from a 1,430 acre area within the northeast area of Lino Lakes. This area is shown on **Figure 1**. As shown on this figure, the plan has broken out the 1,430 acre watershed into four distinct areas referenced as the Hugo, East, Central, and West sub-watershed. For this area, the following has been developed:

1. Preliminary design information for the conveyance system and outfall.
2. Allowable peak discharge rates and stormwater storage to be provided for each sub-watershed within the City.
3. Analysis and description of stormwater treatment BMPs to be provided.
4. Discussion demonstrating downstream impacts will be mitigated or eliminated.
5. Anticipated plan to utilize or abandon existing public drainage systems.

The implementation of this plan as outlined within this document is intended to allow development in this area to meet Rice Creek Watershed District (RCWD) Rules C.6 and C.7; appropriate RCWD rules regarding water quality treatment, rate, and volume control; TMDL requirements for Peltier Lake; and MDNR no-rise certificate requirements for new outlets to public waters.

2. BACKGROUND/NEED FOR PROJECT

A new outfall to Peltier Lake is needed to serve an area currently drained by Anoka County Ditch 55 and Anoka County Ditch 72, ditch systems that have had little or no maintenance since they were constructed in 1910 and do not provide drainage to allow for future land development within the study area.

Information relating to the existing and future land uses within the study area is provided on **Figures 2** and **3**, and related information tied to increase in impervious surface percentages is provided in **Table 1**.

Information relating to areas currently served by Anoka County Ditch 77 and 72 that have the potential to be served by this proposed outfall is shown on **Figure 4**.

Information relating to soils, depth to water table, and areas potentially suitable for infiltration based on these parameters is included in **Figure 5**.

SWMM hydrologic modeling files for the project for existing and proposed conditions are also available and can be sent upon request.

3. PROPOSED PLAN/IMPROVEMENTS

3.1. Conveyance System/Outlet

The proposed plan anticipates the construction of a new storm sewer outlet to serve the 1,430 acre drainage area shown on **Figure 1.** The preliminary alignment of the system was developed based in part on a sequencing analysis to determine the most appropriate outfall alignment to minimize impact on wetlands and/or other natural resources. The results of this sequencing analysis are provided in a document included as part of **Appendix A**.

The preliminary alignments for the piping system to be constructed primarily within the west sub-watershed, including the pipe size and invert elevations, are provided in **Figure 1**. Some additional selected design features of the system include the following:

- For the east sub-watershed, as development takes place, off-site drainage from the City of Hugo will be accommodated by developing appropriate conveyance systems that will carry water directed from the City of Hugo to the proposed new outlet under 35E. Since stormwater runoff from the City of Hugo crosses the municipal boundary at multiple locations, the design for these systems will need to be deferred until development takes place in these areas.

- It is anticipated a 60" RCP outlet will be jacked underneath 35E in the approximate location shown on **Figure 1**. Control structures will be in place upstream of this outlet to limit the rate to that specified in **Table 1**. At this and every other outfall into the conveyance system, control structures will be in place to limit the peak rate of runoff from each sub-watershed to those specified in **Table 1.**

- Gates will be installed at each control structure to allow stormwater to be retained for a period of time if water elevations in Peltier Lake are within one foot of its 100-year flood elevation and rising. The RCWD has recently established the 100-year flood elevation for Peltier Lake to be 887.2. Although modeling indicates that lake flood elevations will actually be reduced as a result of this project, the operation of these gates will provide added assurances that this outlet will have no impact on increasing flood levels in Peltier Lake for the 100-year critical duration event.

- Stormwater runoff directed across 35E will be conveyed westerly across the central sub-watershed through a series of ponds that will be constructed as part of the Mattamy development. Similar to all other outfalls into this conveyance system, the rate will be control by control structures that will limit the discharge rate to the peak rates identified in **Table 1**.

- For the west sub-watershed, it is anticipated a 72" RCP outfall will be installed along the alignments shown in **Figure 1.** As development takes places and stormwater ponds are constructed, control structures will be installed upstream of any outfalls into this conveyance system to manage peak rates of runoff to that shown in **Table 1**.

3.2. Stormwater Storage/Rate Control

Based on a review of a number of considerations, the design will allow a pass through discharge rate of 62 cfs or approximately .3 cfs an acre for areas draining from Hugo as currently documented by the City of Hugo's stormwater model and the RCWD's watershed model. The design will limit the peak discharge rate from the remaining areas within the City in this study area to .1 cfs an acre. This will result in a maximum peak discharge rate from this study area of no greater than 183 cfs.

In order to meet the rate restrictions of .1 cfs an acre for parcels within the City, a significant amount of stormwater storage will need to be provided to attenuate runoff rates to this prescribed level. **Table 1** provides information on the projected peak discharge rate from each sub-watershed and the corresponding live storage that will be provided within the sub-watersheds that are shown. As final plans for subdivisions are developed, the location of ponds along with the amount of storage provided will be better defined. However, in no case shall the discharge rate exceed the rates shown on **Table 1**.

3.3. Stormwater Treatment

A water quality analysis was completed that projected existing and future pollutant loadings from the study area. The analysis broke down pollutant loadings from each of the four sub-watersheds under existing conditions and for proposed conditions both prior to and after treatment was provided to RCWD standards. The results of this water quality analysis are show in **Table 2**. The analysis indicates that the pollutant loading from this watershed when fully developed will be significantly less than the pollutant loading that is currently being delivered to Peltier Lake under existing conditions.

Stormwater treatment will be provided for all runoff generated within the City within the study area prior to discharge into Peltier Lake. Furthermore, as part of the development of this stormwater treatment plan, an analysis was undertaken to define which areas within the study area were suitable for infiltration. This investigation revealed that approximately six percent of the watershed area was suitable for infiltration (see **Figure 5)**. The remaining areas will utilize other BMP practices such as "dead-pool" treatment to meet RCWD requirements.

For each sub-watershed, **Table 1** lists the amount of deadpool and water re-use/infiltration that will be required to provide adequate treatment for stormwater runoff to address RCWD water quality requirements and also reduce the phosphorus loading directed to Peltier Lake which is consistent with Peltier Lake TMDL requirements.

Based on this analysis, the City has also evaluated the location in which stormwater re-use could be used for irrigation in an attempt to reduce runoff volumes from this area. **Figure 6** highlights potential areas that could be used for this purpose. Based on the utilization of these areas, it is anticipated that up to 36 acre-feet of stormwater could be used for irrigation purposes over this 18 acre area. The actual amount of volume credit will be defined based on

actual records. Other opportunities for stormwater reuse or infiltration in other areas outside of this study area will continue to be evaluated by the City as part of other projects.

3.4. Mitigation of Downstream Impacts

This plan has been prepared with a primary focus of mitigating any downstream impacts that could occur as a result of the implementation of this project. Outlined below is a description highlighting how downstream impacts will be mitigated:

3.4.1. Peak Discharge Rate Management

Figure 7, 8 and **9** provide the results of a hydrologic analysis on the existing and proposed peak discharge rates from the study area, the existing and proposed peak elevations and discharge rates from Peltier Lake, and information documenting over time how the lake stage will be affected by the proposed outlet improvement.

Table 1 outlines the existing and proposed peak discharge rates from the study area. Based on a review of the above, proposed peak 2-, 10-, and 100-year discharge rates from this area will be significantly reduced compared to that developed as part of the existing conditions analysis.

3.4.2. Water Quality Impacts

The water quality modeling that was completed and summarized in **Table 2** indicates that under fully developed conditions, the phosphorus loading to Peltier Lake will be significantly reduced compared to that associated with existing conditions. This reduction loading in phosphorus loading meets RCWD requirements for water quality treatment and demonstrates progress in meeting the TMDL requirements for Peltier Lake.

3.4.3. Impact to Flood Elevations in Peltier Lake

An analysis of projected 100-year high water elevations for Peltier Lake was completed based on existing conditions and a proposed condition that would include the construction of this outlet along with associated stormwater storage, rate control, and treatment provisions. The analysis indicates that under existing conditions, the 100-year high water elevation for Peltier Lake reaches an elevation of 887.2. The hydrologic modeling analysis of the proposed condition indicates a future flood elevation of 887.08. This modeled reduction is based on the following factors:

1. The outlet improvement project proposed for the northeast Lino Lakes watershed will allow stormwater runoff from this area to be discharged into the late significantly before the peak elevation of Peltier Lake is reached, which is now approximately three days following the occurrence of the event.

2. The elevation versus time and discharge versus time hydrographs and their associated tabular data, document that additional runoff is directed over the Peltier Dam prior to the peak occurring instead of having the discharge from this watershed more closely correspond with the peak thereby adding flow at the most inopportune time.
3. A significant volume of runoff from this area will now be directed into Peltier Lake from this watershed after the peak occurs and during a time when the water levels in the lake are receding.

3.4.4. Impact to Structures around Peltier Lake

Based on the analysis included within this document, the flood levels in Peltier Lake will not be impacted and will not rise as a result of this project. Hydrologic modeling also indicates that the peak elevation in the lake could drop from 887.2 to 887.08. A GIS analysis of structures around the lake indicate that all structures are at or above these elevations, and as a result no downstream impact to structures or property is anticipated as a result of this project. **Appendix D** provides information relating to the location and elevation of structures adjacent to Peltier Lake

3.5. Management of Existing Public Drainage System

As part of the construction of this new drainage system, the existing Anoka County Ditch 55 and 72 drainage systems may be abandoned in selected areas. In cases where an abandonment proceeding is requested by the City, the City will take responsibility to provide drainage for the properties served by the system and will provide assurances that the level of service provided by the replacement system will equal or exceed the public ditch system.

Figure 4 shows the location of the existing public drainage systems within the study area that could be abandoned if deemed reasonable and appropriate.

Tables

Table 1: Hydrologic/Hydraulic Information for Northeast Lino Lakes Stormwater Management Plan

Watershed	Watershed Area (acres)	Cumulative Watershed Area (acres)	Impervious Surface To Be Added based on 2030 Plan (acres)	Anticipated Total Impervious Surface (acres)	Composite CN	Estimated Area Suitable for Infiltration (acres) *	Runoff from a 1.1 Inch Event for New Impervious Surface (ac-ft)	Runoff from a 2.5 Inch Event (for Alternative Compliance - Using CN) (ac-ft)	Runoff from a 2.5 Inch Event (for Alternative Compliance - Using Imperv. Surf) - Fully Develped Watersed (ac-ft)	Runoff from a 100-Year Rain Event (inches)	Runoff Volume from a 100-Year Rain Event (ac-ft)	Estimated Average Pond Bounce (ft)	Estimated Minimum Surface Area Needed for Live Storage AC[4]	Estimated Live Storage to be Provided 100-yr Event (ac-ft)	Maximum Q allowed from Watershed Including Upstream Untreated Flow	Existing Q Leaving Watershed - 2-year event	Proposed Condition Q to Leaving Watershed-2-year event	Existing Q Leaving Watershed - 10-year event	Proposed Condition Q Leaving Watershed -10-year event	Existing Q Leaving Watershed 100-Year Event	Proposed Condition Q Leaving Watershed 100-YR 24HR (7.2 IN)	Propsed Q Leaving Watershed for 100-Year 10-Day Snowmelt (7.2 IN)
HUGO	216	NA	71	71	77	NA	NA	NA	NA	4.54	82	NA	NA	NA	62[2]	NA	NA	NA	NA	NA	NA	NA
EAST	534	750	290	306	86	38	27	55	60	5.55	247	4.0	61.7	246	115	235	10	299	29	1143	84	69
CENTRAL (Mattamy Development Area)	438.8	1188.8	170	181	77	15	16	27	35	4.55	166	4.0	41.6	118	159	78	33	478	63	1022	134	91
WEST	229.3	1418.1	72	82	81	21	7	18	15	5.00	96	4.0	23.9	68	183	1241	45	2166	87	4050	183	120
Summary for Study Area	1418.1	1418.1	603	640	82	74	49	101	111	NA	591	NA	154.1	432	183	1241	45	2166	87	4050	183	120

Legend:

=computations not provided due to prior modeling or is considered not applicable.

=values listed subject to change based on actual development. Overall impact to Lake Peltier will be subject to rate criteria and storage based on new impervious surface created.

=updates since 4-13-15 submittal

Notes:

*Stated available infiltration area has been evaluated based on soil and depth to table only. Other considerations may also impact suitability.

Values provided in Columns E through Q based on Plan impervious assumptions provided in Columns C and D.

TABLE 2 - SUMMARY OF WATER QUALITY ANALYSIS RESULTS

RUNOFF CALCULATION	AGRICULTURE	OPEN SPACE/MEADOW	URBAN OPEN	IMPERVIOUS AREA
CN	81	73	73	99
S	2.35	3.70	3.70	0.10
Ia	0.47	0.74	0.74	0.02
TP	0.32	0.11	0.11	0.10
Runoff from 1.1"	**0.13**	**0.03**	**0.03**	**0.99**

	TOTAL AREA	AGRICULTURE	OPEN SPACE/MEADOW	URBAN OPEN	IMPERVIOUS AREA	WEIGHTED CN	WEIGHTED TP	1.1" RUNOFF	TP LOAD
EXISTING CONDITIONS	[AC]	[AC]	[AC]	[AC]	[AC]		[mg/L]	[AC-FT]	[LBS]
HUGO	216	80	131	0	5	77	0.188	1.7	0.8
EAST	534	481	37	0	16	81	0.299	6.8	5.5
CENTRAL	438	375	52	0	11	81	0.290	5.2	4.1
WEST	229	124	95	0	10	78	0.223	2.5	1.5
TOTAL	**1417**	**1060**	**315**	**0**	**42**	**80**	**0.267**	**16.1**	**12.0**
							EXISTING IMPERVIOUS RUNOFF VOLUME =	**3.46**	**AC-FT**

	TOTAL AREA	AGRICULTURE	OPEN SPACE/MEADOW	URBAN OPEN	IMPERVIOUS AREA	WEIGHTED CN	WEIGHTED TP	1.1" RUNOFF	TP LOAD
PROPOSED CONDITIONS	[AC]	[AC]	[AC]	[AC]	[AC]		[mg/L]	[AC-FT]	[LBS]
HUGO*	216	80	131	0	5	77	0.188	1.7	0.8
EAST	534	0	83	145	306	88	0.104	25.8	7.3
CENTRAL	438	0	97	160	181	84	0.106	15.6	4.5
WEST	229	0	0	147	82	82	0.106	7.1	2.1
TOTAL	**1417**	**80**	**311**	**452**	**574**	**84**	**0.118**	**50.2**	**14.7**
*PROPOSED CONDITIONS ASSUME NO CHANGE IN POLLUTANT LOADING FROM THE CITY OF HUGO.							**PROPOSED IMPERVIOUS RUNOFF VOLUME =**	**47.2**	**AC-FT**

WATER QUALITY TREATMENT VOLUME REQUIREMENT	**43.8 AC-FT**
INCREASE IN TP WITHOUT TREATMENT	**2.8 LBS**
50% REDUCTION VIA WATER REUSE, TREATMENT POND OR INFILTRATION	**7.4 LBS**

Figures

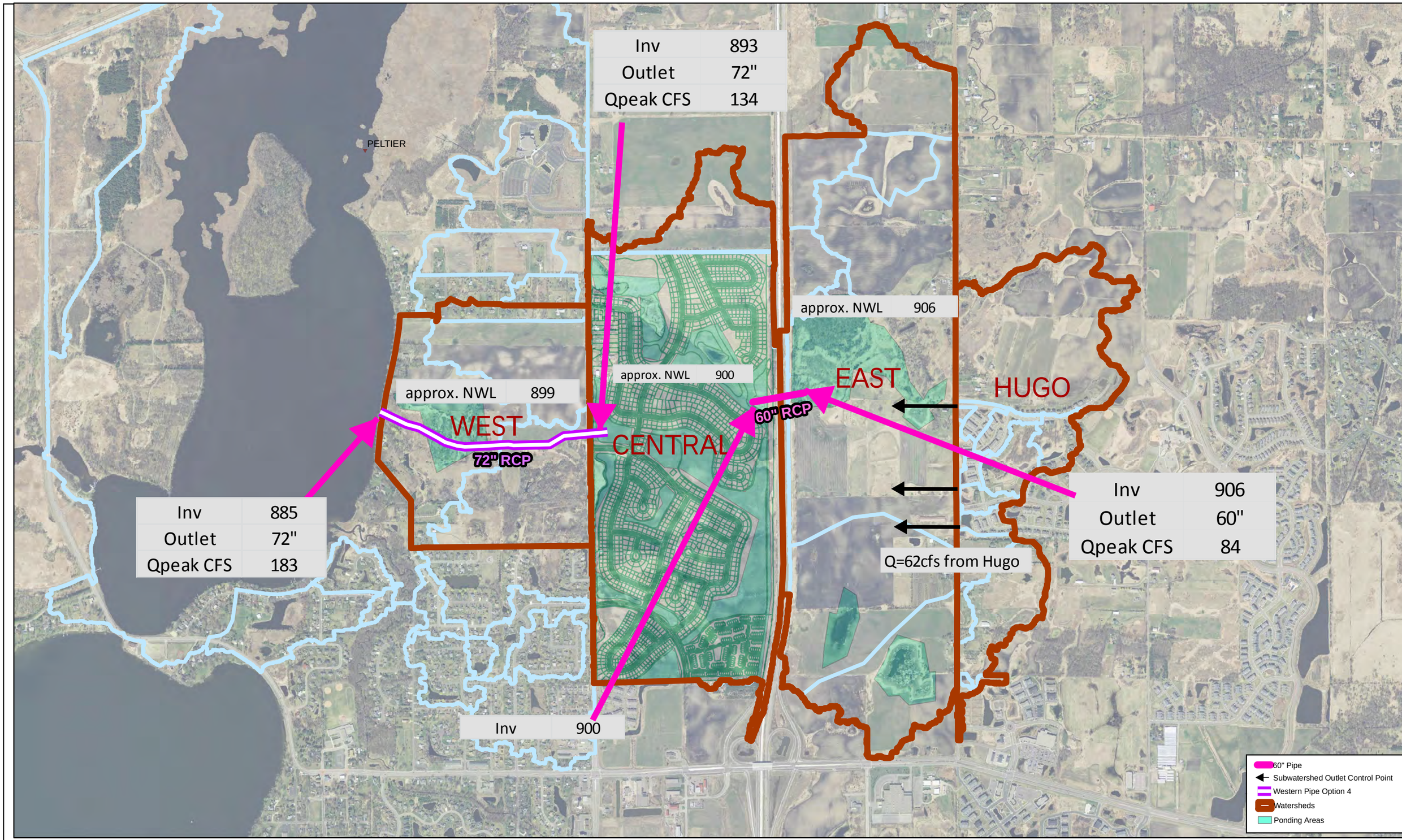

Figure 1: Watershed Map
Northeast Area Drainage Study
City of Lino Lakes MN CSMP

1 inch = 1,250 feet

N

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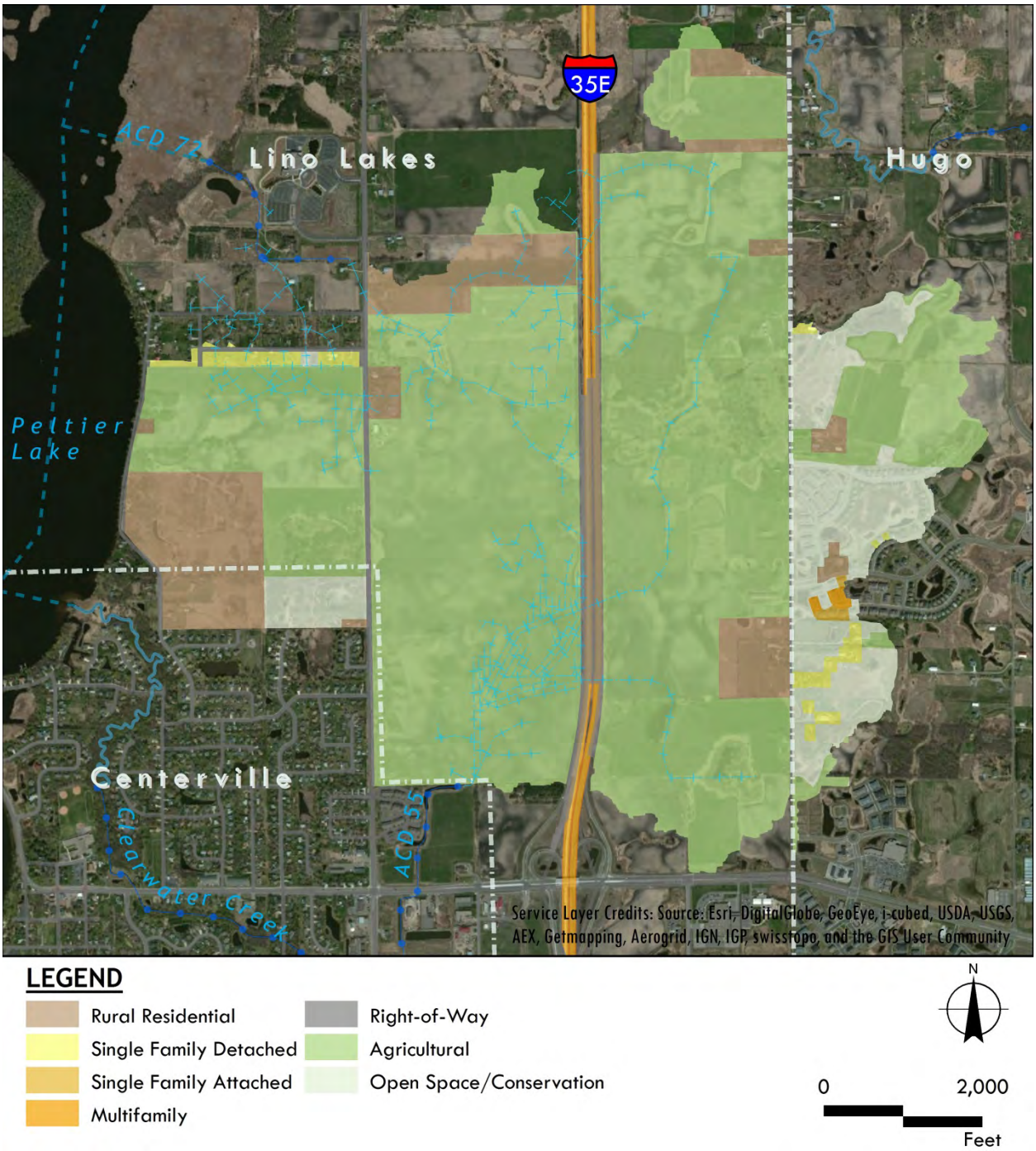


LEGEND

- Rural Residential
- Single Family Detached
- Single Family Attached
- Multifamily
- Right-of-Way
- Agricultural
- Open Space/Conservation

N

0 2,000 Feet

Figure 2. Existing Land Uses for the Study Area

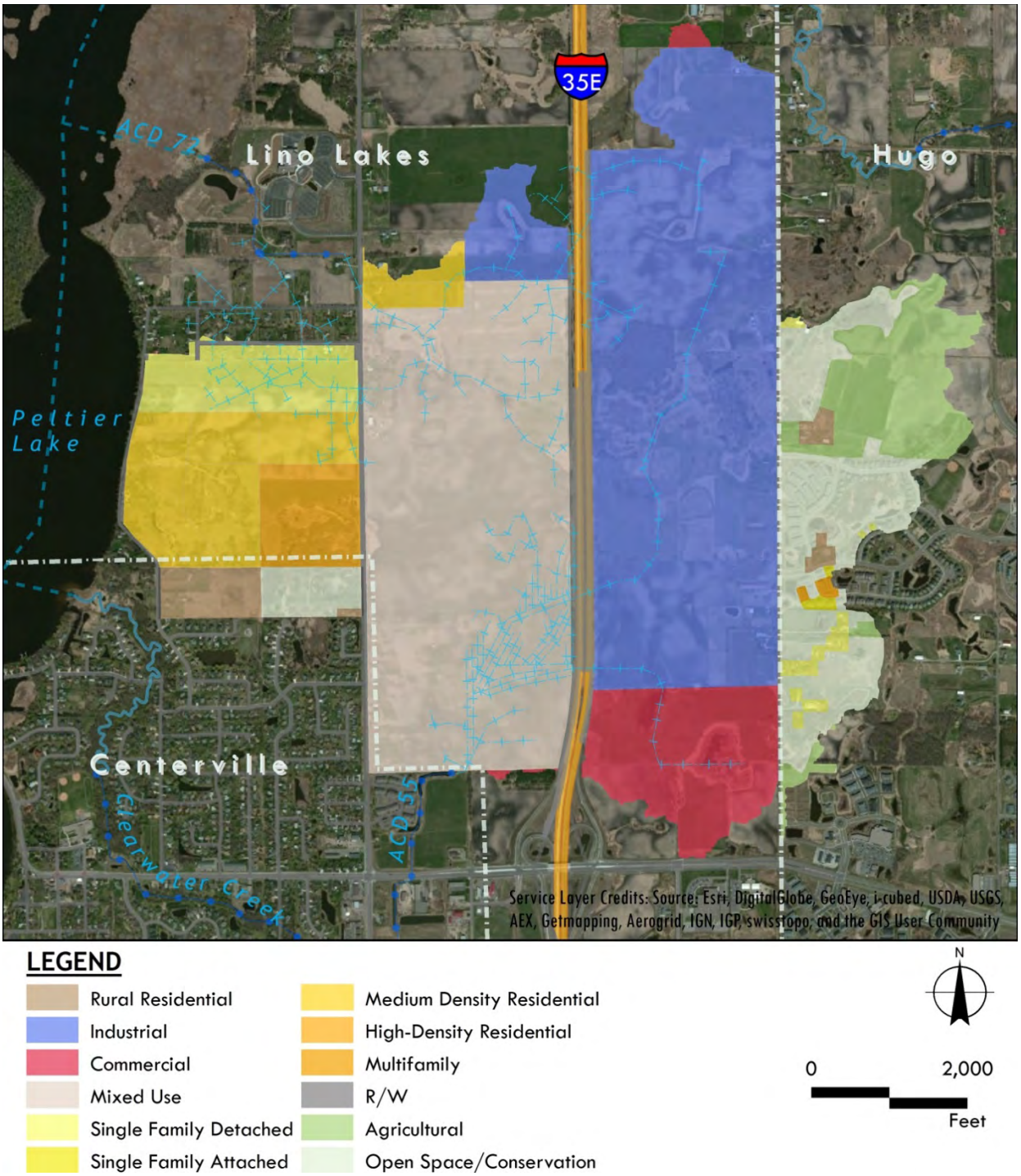
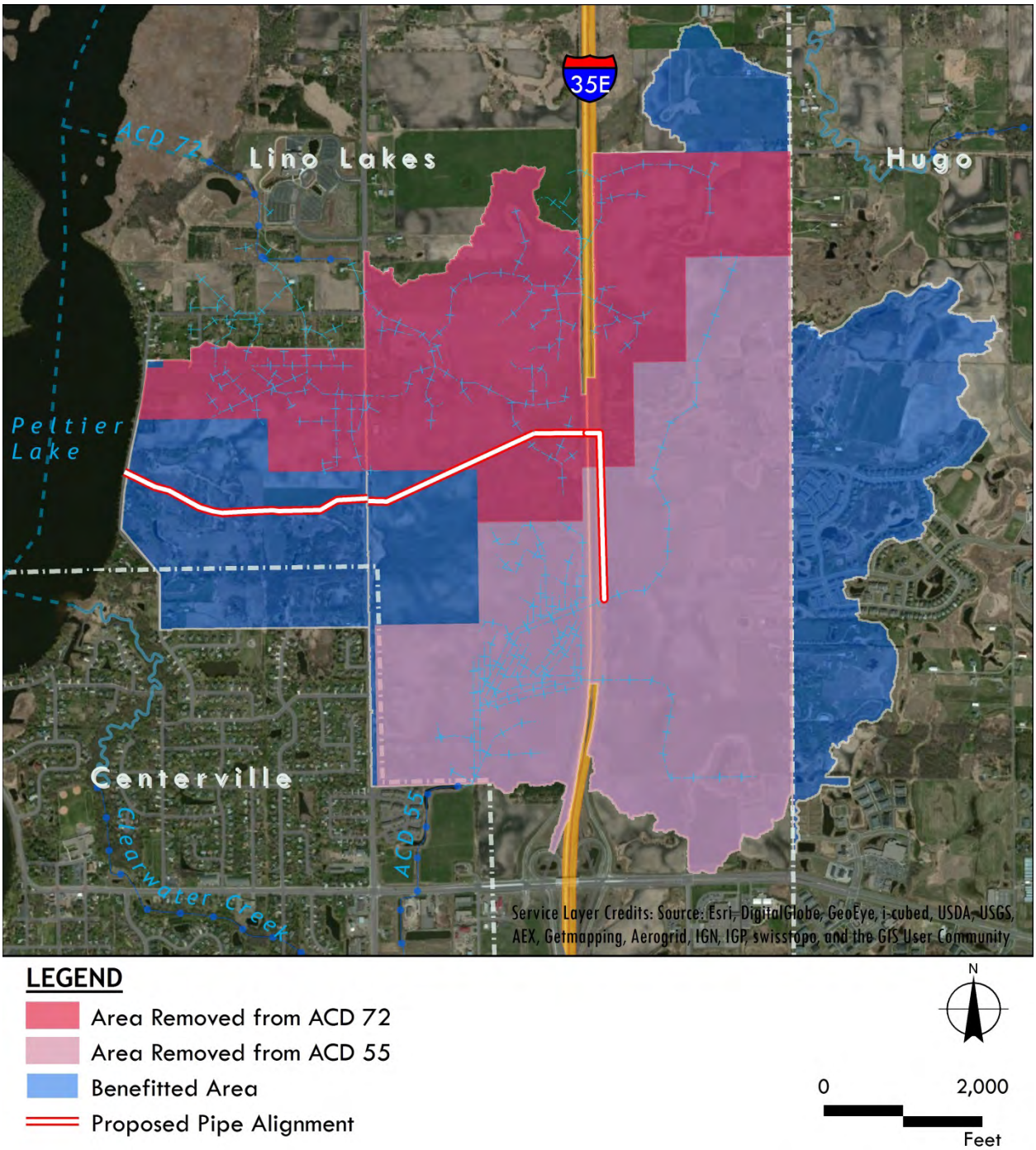


Figure 3. Future Land Uses for the Study Area



LEGEND

- Area Removed from ACD 72
- Area Removed from ACD 55
- Benefitted Area
- Proposed Pipe Alignment

N

0 2,000 Feet

Figure 4. Areas to be Served by Proposed Outfall that are Currently Served by Anoka County Ditch 55 and 72

Watershed	Area Potentially Suitable for Infiltration (Acres)
EAST	38
CENTRAL (Mattamy Development Area)	15
WEST	21

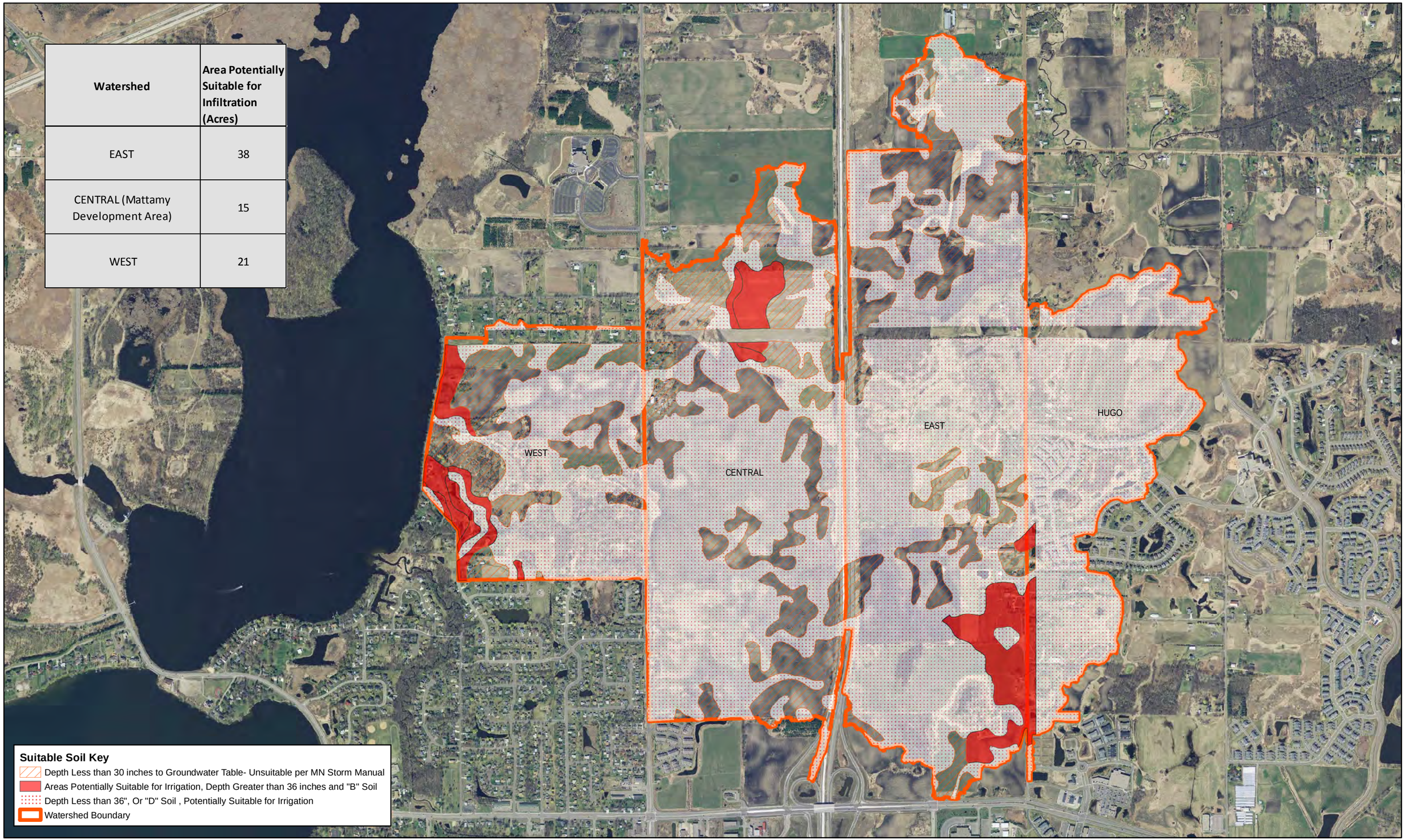


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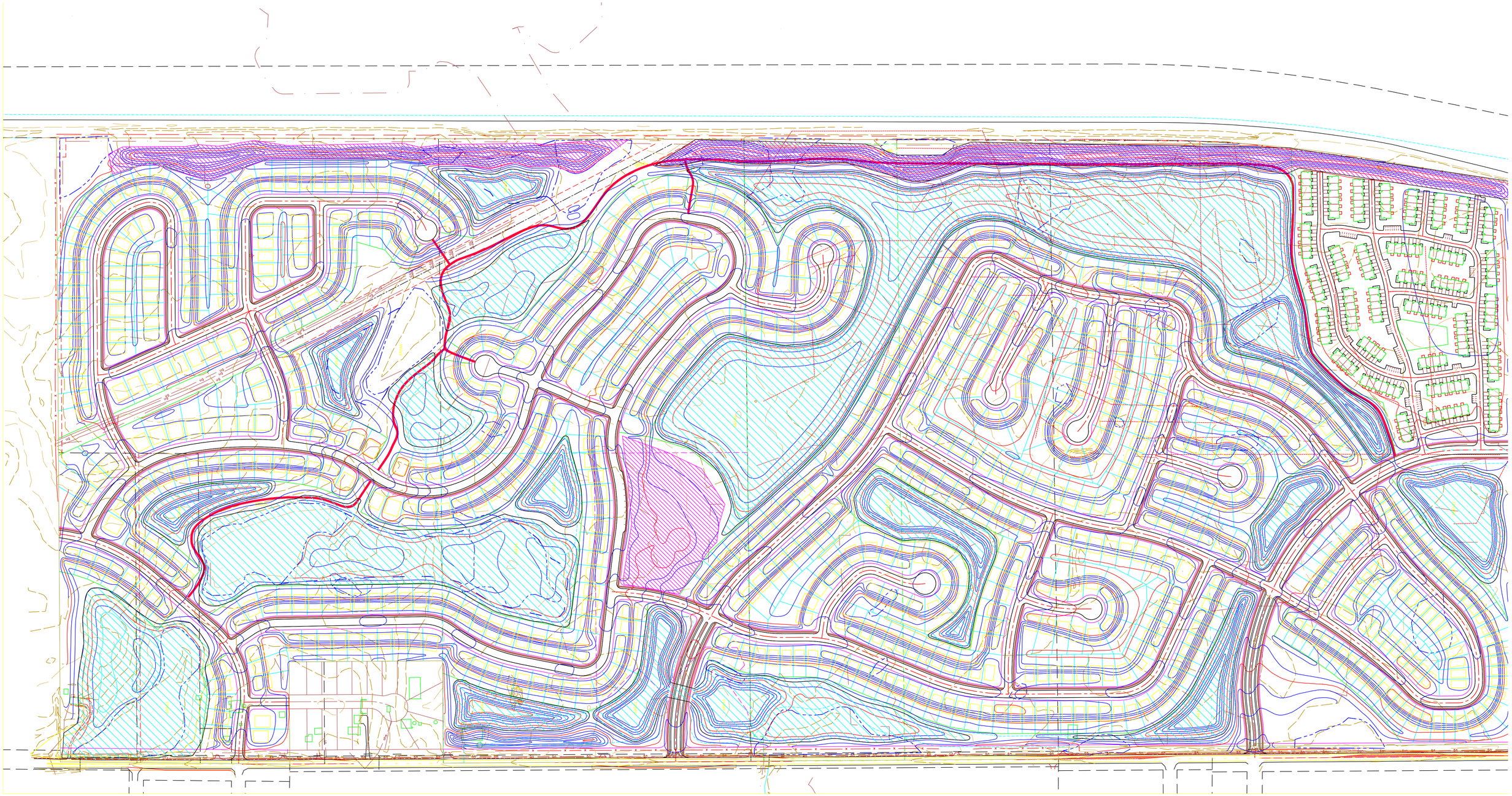
Figure 5: Areas Potentially Suitable for Infiltration
Northeast Area Drainage Study
City of Lino Lakes MN CSMP

1 inch = 1,200 feet

N



LIVE STORAGE PONDING AREAS = 80 AC
IRRIGATION REUSE AREAS = 20 AC

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NOTE: PROPOSED IMPROVEMENTS SHOWN ON THIS PLAN SUBJECT TO CHANGE. LOCATION OF IMPROVEMENTS ARE PLACED FOR DESIGN AND ESTIMATION PURPOSES ONLY.

0 100 200 Feet 1" = 200'

FIGURE 6 MATTAMY HOMES PONDING AND POTENTIAL IRRIGATION REUSE AREAS

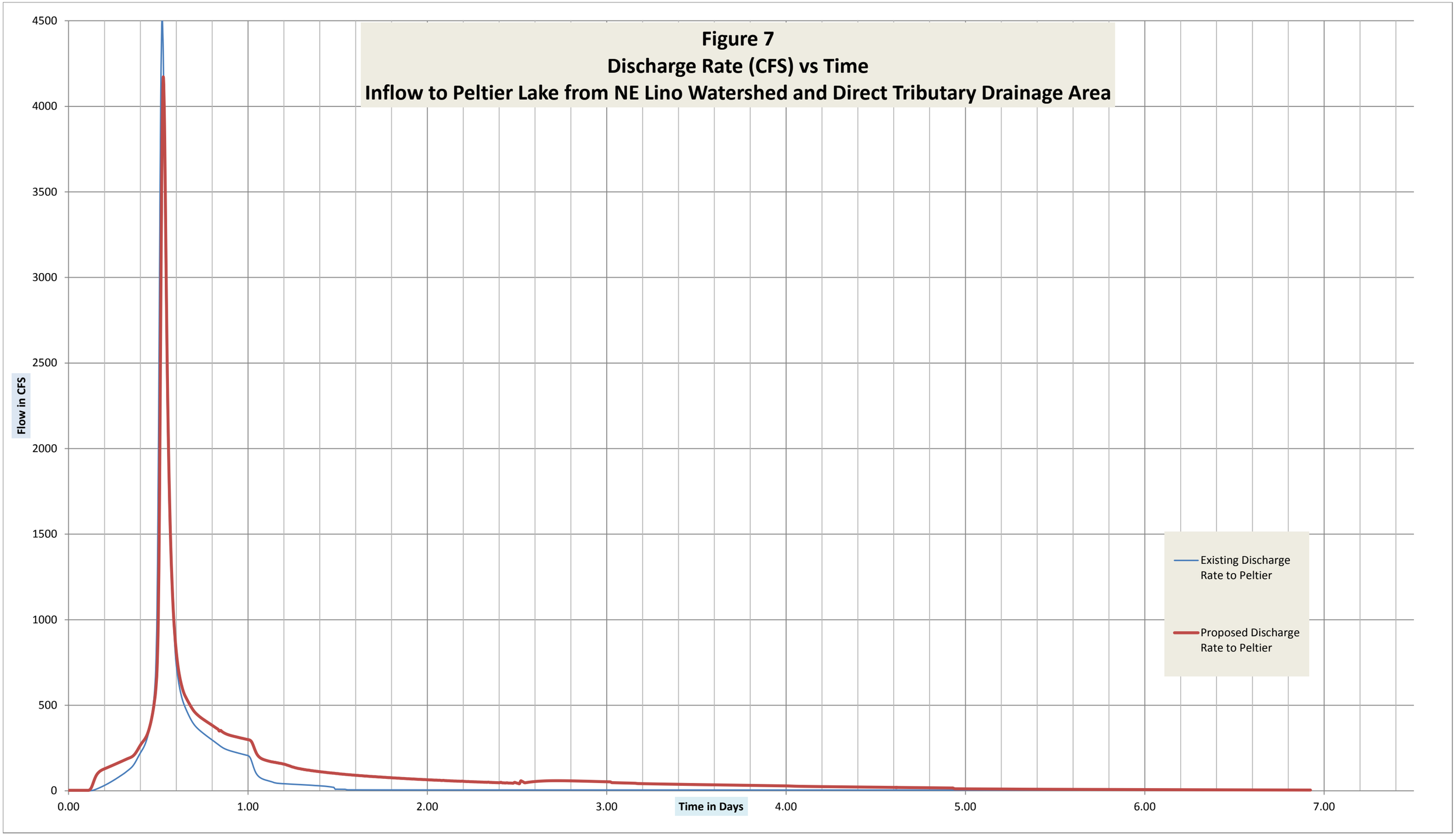
Figure 7
Discharge Rate (CFS) vs Time
Inflow to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area
Flow in CFS
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Time in Days
Existing Discharge Rate to Peltier
Proposed Discharge Rate to Peltier

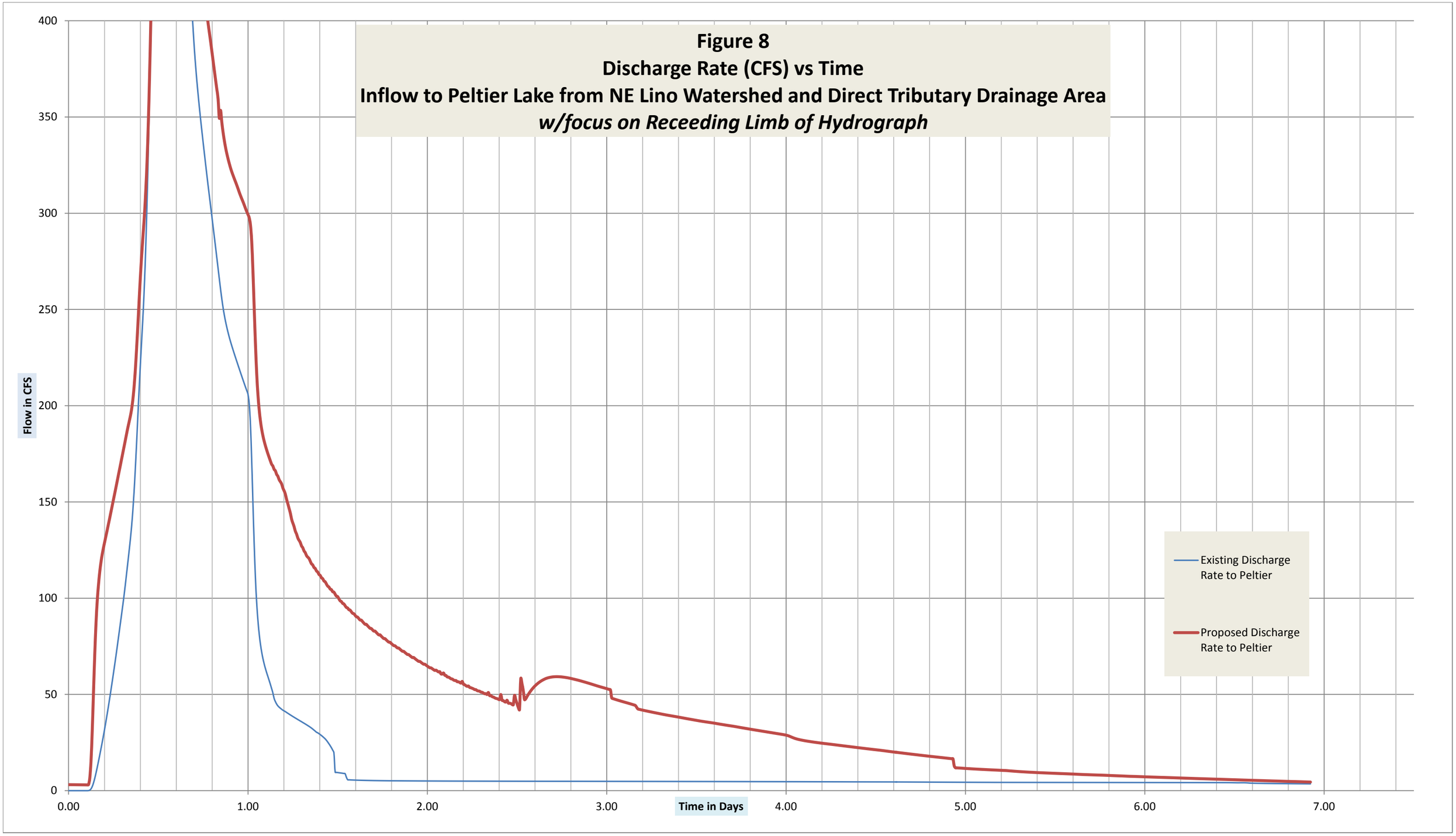
Figure 8
Discharge Rate (CFS) vs Time
Inflow to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area
w/focus on Receeding Limb of Hydrograph
Flow in CFS
400
350
300
250
200
150
100
50
0
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Time in Days
Existing Discharge Rate to Peltier
Proposed Discharge Rate to Peltier

Data for Figure 7 and 8: Inflow Discharge Rates and Volumes to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area

Time (10 min increment) - DAYS	Existing Conditions Input @ Peltier (CFS)	Volume using average between time increment (CF)	Cumulative Volume (CF)	Proposed Conditions Input Discharge @ Peltier (CFS)	Volume using average between time increment CF	Cumulative Volume (CF)	Difference in Volume CF
0.00	0	0	0	3.122	1873.2		
0.01	0	0	0	3.122	1870.5	3743.7	3743.7
0.01	0	0	0	3.113	1865.4	3735.9	3735.9
0.02	0	0	0	3.105	1860.6	3726	3726
0.03	0	0	0	3.097	1855.8	3716.4	3716.4
0.03	0	0	0	3.089	1850.7	3706.5	3706.5
0.04	0	0	0	3.08	1845.6	3696.3	3696.3
0.05	0	0	0	3.072	1840.8	3686.4	3686.4
0.06	0	0	0	3.064	1836	3676.8	3676.8
0.06	0	0	0	3.056	1830.9	3666.9	3666.9
0.07	0	0	0	3.047	1825.8	3656.7	3656.7
0.08	0	0	0	3.039	1821	3646.8	3646.8
0.08	0	0	0	3.031	1815.9	3636.9	3636.9
0.09	0	0	0	3.022	1810.8	3626.7	3626.7
0.10	0	0.6	0.6	3.014	1806	3616.8	3616.2
0.10	0.002	16.2	16.8	3.006	1846.8	3652.8	3636
0.11	0.052	103.5	119.7	3.15	2912.7	4759.5	4639.8
0.12	0.293	375	478.5	6.559	6642	9554.7	9076.2
0.13	0.957	951	1326	15.581	14169.6	20811.6	19485.6
0.13	2.213	1887	2838	31.651	24979.8	39149.4	36311.4
0.14	4.077	3159.9	5046.9	51.615	36780.6	61760.4	56713.5
0.15	6.456	4697.7	7857.6	70.987	47423.1	84203.7	76346.1
0.15	9.203	6415.5	11113.2	87.09	55743.9	103167	92053.8
0.16	12.182	8247.3	14662.8	98.723	61747.8	117491.7	102828.9
0.17	15.309	10152.9	18400.2	107.103	66247.8	127995.6	109595.4
0.17	18.534	12110.1	22263	113.723	69759.9	136007.7	113744.7
0.18	21.833	14113.8	26223.9	118.81	72511.8	142271.7	116047.8
0.19	25.213	16176.3	30290.1	122.896	74753.4	147265.2	116975.1
0.19	28.708	18315.3	34491.6	126.282	76687.8	151441.2	116949.6
0.20	32.343	20531.4	38846.7	129.344	78521.4	155209.2	116362.5
0.21	36.095	22822.8	43354.2	132.394	80348.1	158869.5	115515.3
0.22	39.981	25189.8	48012.6	135.433	82200	162548.1	114535.5
0.22	43.985	27626.1	52815.9	138.567	84063.6	166263.6	113447.7
0.23	48.102	30125.4	57751.5	141.645	85944.6	170008.2	112256.7
0.24	52.316	32681.7	62807.1	144.837	87852	173796.6	110989.5
0.24	56.623	35288.4	67970.1	148.003	89771.4	177623.4	109653.3
0.25	61.005	37942.8	73231.2	151.235	91674.6	181446	108214.8
0.26	65.471	40640.7	78583.5	154.347	93577.2	185251.8	106668.3
0.26	69.998	43407.6	84048.3	157.577	95512.5	189089.7	105041.4
0.27	74.694	46246.5	89654.1	160.798	97462.5	192975	103320.9
0.28	79.461	49117.2	95363.7	164.077	99403.5	196866	101502.3
0.28	84.263	52000.8	101118	167.268	101338.5	200742	99624
0.29	89.073	54894.6	106895.4	170.527	103291.5	204630	97734.6
0.30	93.909	57823.5	112718.1	173.778	105248.1	208539.6	95821.5
0.31	98.836	60867.9	118691.4	177.049	107202.3	212450.4	93759
0.31	104.057	64123.2	124991.1	180.292	109158	216360.3	91369.2
0.32	109.687	67532.7	131655.9	183.568	111133.8	220291.8	88635.9
0.33	115.422	70982.4	138515.1	186.878	113039.7	224173.5	85658.4
0.33	121.186	74475.3	145457.7	189.921	114837	227876.7	82419
0.34	127.065	78134.4	152609.7	192.869	116656.5	231493.5	78883.8
0.35	133.383	82231.5	160365.9	195.986	118837.2	235493.7	75127.8
0.35	140.722	87119.1	169350.6	200.138	121774.2	240611.4	71260.8
0.36	149.675	93028.2	180147.3	205.776	125758.8	247533	67385.7
0.37	160.419	99988.5	193016.7	213.42	130969.8	256728.6	63711.9
0.38	172.876	107797.2	207785.7	223.146	137329.2	268299	60513.3
0.38	186.448	116032.2	223829.4	234.618	144485.1	281814.3	57984.9
0.39	200.326	124225.2	240257.4	246.999	151981.8	296466.9	56209.5
0.40	213.758	131979.6	256204.8	259.607	159259.2	311241	55036.2
0.40	226.174	139271.4	271251	271.257	165829.2	325088.4	53837.4
0.41	238.064	146596.8	285868.2	281.507	171690.6	337519.8	51651.6
0.42	250.592	154824.9	301421.7	290.795	177399.9	349090.5	47668.8
0.42	265.491	164848.2	319673.1	300.538	183939.3	361339.2	41666.1
0.43	284.003	177116.7	341964.9	312.593	192035.4	375974.7	34009.8
0.44	306.386	191925.6	369042.3	327.525	202409.1	394444.5	25402.2
0.44	333.366	209649.6	401575.2	347.172	215601.3	418010.4	16435.2
0.45	365.466	230740.5	440390.1	371.499	231653.1	447254.4	6864.3
0.46	403.669	255979.5	486720	400.678	250860.3	482513.4	-4206.6
0.47	449.596	286749.6	542729.1	435.523	273735.3	524595.6	-18133.5
0.47	506.236	325821.3	612570.9	476.928	301346.7	575082	-37488.9
0.48	579.835	388459.2	714280.5	527.561	336181.5	637528.2	-76752.3
0.49	715.029	533633.7	922092.9	593.044	390672.6	726854.1	-195238.8
0.49	1063.75	875790	1409423.7	709.198	516542.7	907215.3	-502208.4
0.50	1855.55	1453887	2329677	1012.611	821894.4	1338437.1	-991239.9
0.51	2990.74	2117166	3571053	1727.037	1359370.5	2181264.9	-1389788.1
0.51	4066.48	2574645	4691811	2804.198	1977840	3337210.5	-1354600.5
0.52	4515.67	2644464	5219109	3788.602	2388016.5	4365856.5	-853252.5
0.53	4299.21	2389128	5033592	4171.453	2418432.9	4806449.4	-227142.6
0.53	3664.55	1977795	4366923	3889.99	2135919.3	4554352.2	187429.2
0.54	2928.1	1583205	3561000	3229.741	1745470.5	3881389.8	320389.8
0.55	2349.25	1282509	2865714	2588.494	1402187.1	3147657.6	281943.6
0.56	1925.78	1057962	2340471	2085.463	1140736.2	2542923.3	202452.3
0.56	1600.76	886827	1944789	1716.991	945369.3	2086105.5	141316.5
0.57	1355.33	756162	1642989	1434.24	797419.5	1742788.8	99799.8
0.58	1165.21	654567	1410729	1223.825	684775.8	1482195.3	71466.3
0.58	1016.68	570057.3	1224624.3	1058.761	599106.3	1283882.1	59257.8
0.59	883.511	496011.3	1066068.6	938.26	535708.5	1134814.8	68746.2
0.60	769.86	441621.6	937632.9	847.435	486753.6	1022462.1	84829.2
0.60	702.212	405419.1	847040.7	775.077	447918.3	934671.9	87631.2
0.61	649.185	376842.9	782262	717.984	417439.2	865357.5	83095.5
0.62	606.958	353595.9	730438.8	673.48	393400.5	810839.7	80400.9
0.62	571.695	334038.3	687634.2	637.855	373786.5	767187	79552.8
0.63	541.766	317906.1	651944.4	608.1	357255.3	731041.8	79097.4
0.64	517.921	304960.2	622866.3	582.751	343768.5	701023.8	78157.5
0.65	498.613	293844.3	598804.5	563.144	333346.5	677115	78310.5
0.65	480.868	283539.3	577383.6	548.011	324642.6	657989.1	80605.5
0.66	464.263	273836.7	557376	534.131	316413.6	641056.2	83680.2
0.67	448.526	264600	538436.7	520.581	308454	624867.6	86430.9
0.67	433.474	255882.3	520482.3	507.599	300774.3	609228.3	88746
0.68	419.467	247804.5	503686.8	494.982	293428.2	594202.5	90515.7
0.69	406.548	240488.1	488292.6	483.112	286569	579997.2	91704.6
0.69	395.079	234024.3	474512.4	472.118	280394.4	566963.4	92451
0.70	385.002	228375.6	462399.9	462.53	275080.5	555474.9	93075
0.71	376.25	223432.8	451808.4	454.405	270491.7	545572.2	93763.8
0.72	368.526	219006.6	442439.4	447.234	266387.1	536878.8	94439.4
0.72	361.496	214913.1	433919.7	440.723	262581	528968.1	95048.4
0.73	354.881	211056.6	425969.7	434.547	258989.4	521570.4	95600.7
0.74	348.641	207382.8	418439.4	428.751	255623.1	514612.5	96173.1
0.74	342.635	203828.4	411211.2	423.326	252464.4	508087.5	96876.3
0.75	336.793	200355.9	404184.3	418.222	249459.9	501924.3	97740
0.76	331.06	196938.6	397294.5	413.311	246479.7	495939.6	98645.1
0.76	325.402	193560.3	390498.9	408.288	243509.7	489989.4	99490.5
0.77	319.799	190241.7	383802	403.411	240604.5	484114.2	100312.2
0.78	314.34	187005	377246.7	398.604	237741.6	478346.1	101099.4
0.78	309.01	183810.9	370815.9	393.868	234903.9	472645.5	101829.6
0.79	303.693	180623.1	364434	389.145	232005.6	466909.5	102475.5
0.80	298.384	177426.9	358050	384.207	229027.8	461033.4	102983.4
0.81	293.039	174210.6	351637.5	379.219	226020	455047.8	103410.3
0.81	287.663	170976	345186.6	374.181	223030.8	449050.8	103864.2
0.82	282.257	167723.1	338699.1	369.255	220085.1	443115.9	104416.8
0.83	276.82	164451.9	332175	364.362	217133.4	437218.5	105043.5
0.83	271.353	161169.3	325621.2	359.416	212638.5	429771.9	104150.7
0.84	265.878	157916.4	319085.7	349.379	210856.5	423495	104409.3
0.85	260.51	154799.7	312716.1	353.476	210222.9	421079.4	108363.3
0.85	255.489	151945.5	306745.2	347.267	206813.1	417036	110290.8
0.86	250.996	149434.8	301380.3	342.11	203986.2	410799.3	109419
0.87	247.12	147263.7	296698.5	337.844	201602.7	405588.9	108890.4
0.87	243.759	145362.9	292626.6	334.165	199560.6	401163.3	108536.7
0.88	240.784	143661.3	289024.2	331.037	197803.2	397363.8	108339.6
0.89	238.087	142100.7	285762	328.307	196241.7	394044.9	108282.9
0.90	235.582	140658.3	282759	325.832	194811.3	391053	108294
0.90	233.279	139323.3	279981.6	323.539	193515.6	388326.9	108345.3
0.91	231.132	138054.9	277378.2	321.513	192374.4	385890	108511.8
0.92	229.051	136821.6	274876.5	319.735	191312.1	383686.5	108810
0.92	227.021	135614.4	272436	317.972	190287.6	381599.7	109163.7
0.93	225.027	134426.4	270040.8	316.32	189271.8	379559.4	109518.6
0.94	223.061	133252.8	267679.2	314.586	188210.4	377482.2	109803
0.94	221.115	132086.4	265339.2	312.782	187110.9	375321.3	109982.1
0.95	219.173	130925.4	263011.8	310.921	186027.9	373138.8	110127
0.96	217.245	129772.8	260698.2	309.172	185014.8	371042.7	110344.5
0.97	215.331	128629.5	258402.3	307.544	184057.2	369072	110669.7
0.97	213.434	127497.6	256127.1	305.98	183078.9	367136.1	111009
0.98	211.558	126379.8	253877.4	304.283	182044.2	365123.1	111245.7
0.99	209.708	125279.4	251659.2	302.531	181026	363070.2	111411
0.99	207.89	124146.6	249426	300.889	180072.3	361098.3	111672.3
1.00	205.932	122080.2	246226.8	299.352	179100.9	359173.2	112946.4
1.01	201.002	117327.9	239408.1	297.651	177483.6	356584.5	117176.4
1.01	190.091	108440.4	225768.3	293.961	173777.1	351260.7	125492.4
1.02	171.377	96115.2	204555.6	285.296	166506.9	340284	135728.4
1.03	149.007	83054.1	179169.3	269.727	156114.6	322621.5	143452.2
1.03	127.84	71441.4	154495.5	250.655	144848.4	300963	146467.5
1.04	110.298	62352	133793.4	232.173	134684.4	279532.8	145739.4
1.05	97.542	55779	118131	216.775	126758.1	261442.5	143311.5
1.06	88.388	50961.6	106740.6	205.752	121114.2	247872.3	141131.7
1.06	81.484	47301.9	98263.5	197.962	117032.1	238146.3	139882.8
1.07	76.189	44467.2	91769.1	192.145	113983.8	231015.9	139246.8
1.08	72.035	42214.5	86681.7	187.801	111656.7	225640.5	138958.8
1.08	68.68	40368	82582.5	184.388	109799.1	221455.8	138873.3
1.09	65.88	38804.4	79172.4	181.609	108245.4	218044.5	138872.1
1.10	63.468	37432.5	76236.9	179.209	106875.9	215121.3	138884.4
1.10	61.307	36177.6	73610.1	177.044	105624.3	212500.2	138890.1
1.11	59.285	34966.8	71144.4	175.037	104454.3	210078.6	138934.2
1.12	57.271	33740.1	68706.9	173.144	103341.9	207796.2	139089.3
1.13	55.196	32462.7	66202.8	171.329	102272.1	205614	139411.2
1.13	53.013	31131.9	63594.6	169.578	101469.6	203741.7	140147.1
1.14	50.76	29600.7	60732.6	168.654	100674.6	202144.2	141411.6
1.15	47.909	28261.8	57862.5	166.928	99937.2	200611.8	142749.3
1.15	46.297	27393.9	55655.7	166.196	99160.8	199098	143442.3
1.16	45.016	26727.6	54121.5	164.34	98313.3	197474.1	143352.6
1.17	44.076	26243.4	52971	163.371	97491	195804.3	142833.3
1.17	43.402	25874.4	52117.8	161.599	96639.6	194130.6	142012.8
1.18	42.846	25550.4	51424.8	160.533	95977.8	192617.4	141192.6
1.19	42.322	25243.8	50794.2	159.393	94999.2	190977	140182.8
1.19	41.824	24980.7	50224.5	157.271	93925.2	188924.4	138699.9
1.20	41.445	24757.2	49737.9	155.813	92973.3	186898.5	137160.6
1.21	41.079	24517.2	49274.4	154.098	91626.9	184600.2	135325.8
1.22	40.645	24258	48775.2	151.325	90125.1	181752	132976.8
1.22	40.215	24001.5	48259.5	149.092	88719.3	178844.4	130584.9
1.23	39.79	23748.9	47750.4	146.639	87268.2	175987.5	128237.1
1.24	39.373	23500.5	47249.4	144.255	85617	172885.2	125635.8
1.24	38.962	23255.1	46755.6	141.135	84062.1	169679.1	122923.5
1.25	38.555	23012.7	46267.8	139.072	82899	166961.1	120693.3
1.26	38.154	22774.5	45787.2	137.258	81625.5	164524.5	118737.3
1.26	37.761	22539.6	45314.1	134.827	80457.9	162083.4	116769.3

Data for Figure 7 and 8: Inflow Discharge Rates and Volumes to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area

Time (10 min increment) - DAYS	Existing Conditions Input @ Peltier (CFS)	Volume using average between time increment (CF)	Cumulative Volume (CF)	Proposed Conditions Input Discharge @ Peltier (CFS)	Volume using average between time increment CF	Cumulative Volume (CF)	Difference in Volume CF
1.27	37.371	22305.3	44844.9	133.366	79402.2	159860.1	115015.2
1.28	36.98	22071.6	44376.9	131.308	78412.5	157814.7	113437.8
1.28	36.592	21839.4	43911	130.067	77709.6	156122.1	112211.1
1.29	36.206	21608.4	43447.8	128.965	76833.6	154543.2	111095.4
1.30	35.822	21376.5	42984.9	127.147	76013.1	152846.7	109861.8
1.31	35.433	21143.1	42519.6	126.23	75236.4	151249.5	108729.9
1.31	35.044	20908.8	42051.9	124.558	74469.9	149706.3	107654.4
1.32	34.652	20670.9	41579.7	123.675	73743	148212.9	106633.2
1.33	34.251	20427.3	41098.2	122.135	73036.8	146779.8	105681.6
1.33	33.84	20178.3	40605.6	121.321	72591	145627.8	105022.2
1.34	33.421	19923.3	40101.6	120.649	71964.9	144555.9	104454.3
1.35	32.99	19651.2	39574.5	119.234	71127	143091.9	103517.4
1.35	32.514	19355.4	39006.6	117.856	70541.7	141668.7	102662.1
1.36	32.004	19043.7	38399.1	117.283	69968.1	140509.8	102110.7
1.37	31.475	18722.4	37766.1	115.944	69418.8	139386.9	101620.8
1.38	30.933	18390.9	37113.3	115.452	68877	138295.8	101182.5
1.38	30.37	18129.9	36520.8	114.138	68322.3	137199.3	100678.5
1.39	30.063	17906.4	36036.3	113.603	67781.1	136103.4	100067.1
1.40	29.625	17632.5	35538.9	112.334	67250.4	135031.5	99492.6
1.40	29.15	17337	34969.5	111.834	66731.4	133981.8	99012.3
1.41	28.64	17021.4	34358.4	110.604	66224.1	132955.5	98597.1
1.42	28.098	16686.3	33707.7	110.143	65726.1	131950.2	98242.5
1.42	27.523	16327.2	33013.5	108.944	65239.5	130965.6	97952.1
1.43	26.901	15916.5	32243.7	108.521	64759.8	129999.3	97755.6
1.44	26.154	15430.8	31347.3	107.345	64084.8	128844.6	97497.3
1.44	25.282	14891.1	30321.9	106.271	63622.2	127707	97385.1
1.45	24.355	14317.5	29208.6	105.803	63165.3	126787.5	97578.9
1.46	23.37	13700.7	28018.2	104.748	62754.3	125919.6	97901.4
1.47	22.299	13016.1	26716.8	104.433	62337.9	125092.2	98375.4
1.47	21.088	12208.2	25224.3	103.36	61956	124293.9	99069.6
1.48	19.606	8765.7	20973.9	103.16	61563.9	123519.9	102546
1.49	9.613	5737.2	14502.9	102.053	60929.1	122493	107990.1
1.49	9.511	5677.5	11414.7	101.044	60564	121493.1	110078.4
1.50	9.414	5619.9	11297.4	100.836	60151.8	120715.8	109418.4
1.51	9.319	5564.7	11184.6	99.67	59490.3	119642.1	108457.5
1.51	9.23	5512.5	11077.2	98.631	59065.8	118556.1	107478.9
1.52	9.145	5457.6	10970.1	98.255	58666.5	117732.3	106762.2
1.53	9.047	5395.5	10853.1	97.3	58296.3	116962.8	106109.7
1.53	8.938	5324.1	10719.6	97.021	57927.9	116224.2	105504.6
1.54	8.809	4744.2	10068.3	96.072	57382.5	115310.4	105242.1
1.55	7.005	3815.7	8559.9	95.203	57033	114415.5	105855.6
1.56	5.714	3405.3	7221	94.907	56682.6	113715.6	106494.6
1.56	5.637	3370.5	6775.8	94.035	56359.8	113042.4	106266.6
1.57	5.598	3349.5	6720	93.831	56034.3	112394.1	105674.1
1.58	5.567	3332.1	6681.6	92.95	55529.1	111563.4	104881.8
1.58	5.54	3316.2	6648.3	92.147	55228.5	110757.6	104109.3
1.59	5.514	3301.5	6617.7	91.948	54921.9	110150.4	103532.7
1.60	5.491	3287.7	6589.2	91.125	54448.2	109370.1	102780.9
1.60	5.468	3274.5	6562.2	90.369	54163.8	108612	102049.8
1.61	5.447	3262.2	6536.7	90.177	53871.3	108035.1	101498.4
1.62	5.427	3250.5	6512.7	89.394	53419.8	107291.1	100778.4
1.63	5.408	3239.4	6489.9	88.672	53184.6	106604.4	100114.5
1.63	5.39	3228.9	6468.3	88.61	52931.7	106116.3	99648
1.64	5.373	3219	6447.9	87.829	52482.3	105414	98966.1
1.65	5.357	3209.7	6428.7	87.112	52066.8	104549.1	98120.4
1.65	5.342	3200.7	6410.4	86.444	51861	103927.8	97517.4
1.66	5.327	3192	6392.7	86.426	51635.4	103496.4	97103.7
1.67	5.313	3183.9	6375.9	85.692	51210.6	102846	96470.1
1.67	5.3	3176.4	6360.3	85.01	50814.6	102025.2	95664.9
1.68	5.288	3168.9	6345.3	84.372	50581.8	101396.4	95051.1
1.69	5.275	3161.1	6330	84.234	50335.2	100917	94587
1.69	5.262	3153.9	6315	83.55	49938.6	100273.8	93958.8
1.70	5.251	3147.6	6301.5	82.912	49750.5	99689.1	93387.6
1.71	5.241	3141.9	6289.5	82.923	49539.9	99290.4	93000.9
1.72	5.232	3136.5	6278.4	82.21	49128.9	98668.8	92390.4
1.72	5.223	3131.1	6267.6	81.553	48748.2	97877.1	91609.5
1.73	5.214	3126	6257.1	80.941	48574.5	97322.7	91065.6
1.74	5.206	3121.2	6247.2	80.974	48376.5	96951	90703.8
1.74	5.198	3116.4	6237.6	80.281	47977.2	96353.7	90116.1
1.75	5.19	3111.9	6228.3	79.643	47607.3	95584.5	89356.2
1.76	5.183	3107.7	6219.6	79.048	47412.3	95019.6	88800
1.76	5.176	3103.5	6211.2	78.993	47199.9	94612.2	88401
1.77	5.169	3099.3	6202.8	78.34	46824.6	94024.5	87821.7
1.78	5.162	3095.4	6194.7	77.742	46481.7	93306.3	87111.6
1.78	5.156	3091.8	6187.2	77.197	46297.2	92778.9	86591.7
1.79	5.15	3088.2	6180	77.127	46090.5	92387.7	86207.7
1.80	5.144	3084.9	6173.1	76.508	45732	91822.5	85649.4
1.81	5.139	3081.6	6166.5	75.932	45396.6	91128.6	84962.1
1.81	5.133	3078.3	6159.9	75.39	45202.8	90599.4	84439.5
1.82	5.128	3075	6153.3	75.286	44994.9	90197.7	84044.4
1.83	5.122	3071.7	6146.7	74.697	44653.2	89648.1	83501.4
1.83	5.117	3068.7	6140.4	74.147	44476.8	89130	82989.6
1.84	5.112	3065.7	6134.4	74.109	44284.8	88761.6	82627.2
1.85	5.107	3063	6128.7	73.507	43938	88222.8	82094.1
1.85	5.103	3060.3	6123.3	72.953	43615.2	87553.2	81429.9
1.86	5.098	3057.6	6117.9	72.431	43443	87058.2	80940.3
1.87	5.094	3055.2	6112.8	72.379	43255.8	86698.8	80586
1.87	5.09	3052.8	6108	71.807	42923.1	86178.9	80070.9
1.88	5.086	3050.4	6103.2	71.27	42610.5	85533.6	79430.4
1.89	5.082	3048.3	6098.7	70.765	42441.6	85052.1	78953.4
1.90	5.079	3046.2	6094.5	70.707	42257.7	84699.3	78604.8
1.90	5.075	3043.8	6090	70.152	41937	84194.7	78104.7
1.91	5.071	3041.7	6085.5	69.638	41637	83574	77488.5
1.92	5.068	3039.6	6081.3	69.152	41508.6	83145.6	77064.3
1.92	5.064	3037.5	6077.1	69.21	41357.4	82866	76788.9
1.93	5.061	3035.7	6073.2	68.648	41032.5	82389.9	76316.7
1.94	5.058	3033.9	6069.6	68.127	40730.4	81762.9	75693.3
1.94	5.055	3031.8	6065.7	67.641	40446.3	81176.7	75111
1.95	5.051	3029.7	6061.5	67.18	40299.3	80745.6	74684.1
1.96	5.048	3027.9	6057.6	67.151	40136.1	80435.4	74377.8
1.97	5.045	3026.1	6054	66.636	39837.6	79973.7	73919.7
1.97	5.042	3024.6	6050.7	66.156	39557.4	79395	73344.3
1.98	5.04	3023.1	6047.7	65.702	39420	78977.4	72929.7
1.99	5.037	3021.3	6044.4	65.698	39265.5	78685.5	72641.1
1.99	5.034	3019.5	6040.8	65.187	38969.7	78235.2	72194.4
2.00	5.031	3018	6037.5	64.712	38693.1	77662.8	71625.3
2.01	5.029	3016.5	6034.5	64.265	38431.8	77124.9	71090.4
2.01	5.026	3014.7	6031.2	63.841	38289.9	76721.7	70690.5
2.02	5.023	3013.2	6027.9	63.792	38134.2	76424.1	70396.2
2.03	5.021	3011.7	6024.9	63.322	37861.5	75995.7	69970.8
2.03	5.018	3010.2	6021.9	62.883	37605	75466.5	69444.6
2.04	5.016	3009	6019.2	62.467	37524	75129	69109.8
2.05	5.014	3007.5	6016.5	62.613	37418.7	74942.7	68926.2
2.06	5.011	3006	6013.5	62.116	37142.4	74561.1	68547.6
2.06	5.009	3004.5	6010.5	61.692	37056.3	74198.7	68188.2
2.07	5.006	3003	6007.5	61.829	36743.1	73799.4	67791.9
2.08	5.004	3001.5	6004.5	60.648	36377.7	73120.8	67116.3
2.08	5.001	3000	6001.5	60.611	36528.3	72906	66904.5
2.09	4.999	2998.8	5998.8	61.15	36333.9	72862.2	66863.4
2.10	4.997	2997.6	5996.4	59.963	35940.3	72274.2	66277.8
2.10	4.995	2996.4	5994	59.838	35678.4	71618.7	65624.7
2.11	4.993	2995.2	5991.6	59.09	35425.2	71103.6	65112
2.12	4.991	2994	5989.2	58.994	35280.3	70705.5	64716.3
2.13	4.989	2992.8	5986.8	58.607	35020.2	70300.5	64313.7
2.13	4.987	2991.6	5984.4	58.127	34842.3	69862.5	63878.1
2.14	4.985	2990.4	5982	58.014	34661.1	69503.4	63521.4
2.15	4.983	2989.2	5979.6	57.523	34430.4	69091.5	63111.9
2.15	4.981	2988.3	5977.5	57.245	34336.2	68766.6	62789.1
2.16	4.98	2987.4	5975.7	57.209	34143	68479.2	62503.5
2.17	4.978	2986.2	5973.6	56.601	33952.2	68095.2	62121.6
2.17	4.976	2985	5971.2	56.573	33840	67792.2	61821
2.18	4.974	2984.1	5969.1	56.227	33634.8	67474.8	61505.7
2.19	4.973	2983.2	5967.3	55.889	33801.9	67436.7	61469.4
2.19	4.971	2982	5965.2	56.784	33622.5	67424.4	61459.2
2.20	4.969	2981.1	5963.1	55.291	33099.6	66722.1	60759
2.21	4.968	2980.2	5961.3	55.041	32871	65970.6	60009.3
2.22	4.966	2979	5959.2	54.529	32623.5	65494.5	59535.3
2.22	4.964	2978.1	5957.1	54.216	32584.5	65208	59250.9
2.23	4.963	2977.2	5955.3	54.399	32408.4	64992.9	59037.6
2.24	4.961	2976.3	5953.5	53.629	32129.7	64538.1	58584.6
2.24	4.96	2975.4	5951.7	53.47	31999.2	64128.9	58177.2
2.25	4.958	2974.5	5949.9	53.194	31835.4	63834.6	57884.7
2.26	4.957	2973.6	5948.1	52.924	31630.8	63466.2	57518.1
2.26	4.955	2972.7	5946.3	52.512	31501.2	63132	57185.7
2.27	4.954	2972.1	5944.8	52.492	31337.1	62838.3	56893.5
2.28	4.953	2971.2	5943.3	51.965	31129.5	62466.6	56523.3
2.28	4.951	2970.3	5941.5	51.8	31042.2	62171.7	56230.2
2.29	4.95	2969.4	5939.7	51.674	30861.9	61904.1	55964.4
2.30	4.948	2968.5	5937.9	51.199	30697.2	61559.1	55621.2
2.31	4.947	2967.9	5936.4	51.125	30556.2	61253.4	55317
2.31	4.946	2967	5934.9	50.729	30323.7	60879.9	54945
2.32	4.944	2966.1	5933.1	50.35	30229.5	60553.2	54620.1
2.33	4.943	2965.5	5931.6	50.415	30114.3	60343.8	54412.2
2.33	4.942	2964.6	5930.1	49.966	30294	60408.3	54478.2
2.34	4.94	2963.7	5928.3	51.014	30119.4	60413.4	54485.1
2.35	4.939	2963.1	5926.8	49.384	29646.9	59766.3	53839.5
2.35	4.938	2962.2	5925.3	49.439	29486.4	59133.3	53208
2.36	4.936	2961.3	5923.5	48.849	29247	58733.4	52809.9
2.37	4.935	2960.7	5922	48.641	29078.1	58325.1	52403.1
2.38	4.934	2960.1	5920.8	48.286	28873.5	57951.6	52030.8
2.38	4.933	2959.2	5919.3	47.959	28735.2	57608.7	51689.4
2.39	4.931	2958.3	5917.5	47.825	28601.4	57336.6	51419.1
2.40	4.93	2957.7	5916	47.513	28455	57056.4	51140.4
2.40	4.929	2956.8	5914.5	47.337	29191.2	57646.2	51731.7
2.41	4.927	2955.9	5912.7	49.967	29075.4	58266.6	52353.9
2.42	4.926	2955.3	5911.2	46.951	28134.3	57209.7	51298.5
2.42	4.925	2954.7	5910	46.83	27915	56049.3	50139.3
2.43	4.924	2954.1	5908.8	46.22	27686.1	55601.1	49692.3
2.44	4.923	2953.2	5907.3	46.067	27919.2	55605.3	49698
2.44	4.921	2952.3	5905.5	46.997	27750.6	55669.8	49764.3
2.45	4.92	2951.7	5904	45.505	27278.7	55029.3	49125.3
2.46	4.919	2951.1	5902.8	45.424	27216.6	54495.3	48592.5
2.47	4.918	2950.2	5901.3	45.298	27036.9	54253.5	48352.2
2.47	4.916	2949.3	5899.5	44.825	26832.3	53869.2	47969.7
2.48	4.915	2948.7	5898	44.616	28239.6	55071.9	49173.9
2.49	4.914	2948.1	5896.8	49.516	29037.6	57277.2	51380.4
2.49	4.913	2947.5	5895.6	47.276	27754.8	56792.4	50896.8
2.50	4.912	2946.9	5894.4	45.24	26553	54307.8	48413.4
2.51	4.911	2946	5892.9	43.27	25594.5	52147.5	46254.6
2.51	4.909	2945.1	5891.1	42.045	30070.8	55665.3	49774.2
2.52	4.908	2944.5	5889.6	58.191	34110	64180.8	58291.2
2.53	4.907	2943.9	5888.4	55.509	32289	66399	60510.6
2.53	4.906	2943.3	5887.2	52.121	29832.9	62121.9	56234.7

Data for Figure 7 and 8: Inflow Discharge Rates and Volumes to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area

Time (10 min increment) - DAYS	Existing Conditions Input @ Peltier (CFS)	Volume using average between time increment (CF)	Cumulative Volume (CF)	Proposed Conditions Input Discharge @ Peltier (CFS)	Volume using average between time increment CF	Cumulative Volume (CF)	Difference in Volume CF
2.54	4.905	2942.7	5886	47.322	28508.4	58341.3	52455.3
2.55	4.904	2941.8	5884.5	47.706	28973.1	57481.5	51597
2.56	4.902	2940.9	5882.7	48.871	29644.2	58617.3	52734.6
2.56	4.901	2940.3	5881.2	49.943	30261.6	59905.8	54024.6
2.57	4.9	2939.7	5880	50.929	30829.5	61091.1	55211.1
2.58	4.899	2939.1	5878.8	51.836	31351.8	62181.3	56302.5
2.58	4.898	2938.5	5877.6	52.67	31831.5	63183.3	57305.7
2.59	4.897	2937.9	5876.4	53.435	32271.3	64102.8	58226.4
2.60	4.896	2937	5874.9	54.136	32674.5	64945.8	59070.9
2.60	4.894	2936.1	5873.1	54.779	33043.5	65718	59844.9
2.61	4.893	2935.5	5871.6	55.366	33380.4	66423.9	60552.3
2.62	4.892	2934.9	5870.4	55.902	33687.6	67068	61197.6
2.63	4.891	2934.3	5869.2	56.39	33966.9	67654.5	61785.3
2.63	4.89	2933.7	5868	56.833	34220.4	68187.3	62319.3
2.64	4.889	2933.1	5866.8	57.235	34449.9	68670.3	62803.5
2.65	4.888	2932.5	5865.6	57.598	34656.9	69106.8	63241.2
2.65	4.887	2931.6	5864.1	57.925	34842.6	69499.5	63635.4
2.66	4.885	2930.7	5862.3	58.217	35002.5	69845.1	63982.8
2.67	4.884	2930.1	5860.8	58.458	35133.9	70136.4	64275.6
2.67	4.883	2929.5	5859.6	58.655	35241.9	70375.8	64516.2
2.68	4.882	2928.9	5858.4	58.818	35330.7	70572.6	64714.2
2.69	4.881	2928.3	5857.2	58.951	35402.4	70733.1	64875.9
2.69	4.88	2927.7	5856	59.057	35457.9	70860.3	65004.3
2.70	4.879	2927.1	5854.8	59.136	35497.8	70955.7	65100.9
2.71	4.878	2926.5	5853.6	59.19	35523.3	71021.1	65167.5
2.72	4.877	2925.9	5852.4	59.221	35535.3	71058.6	65206.2
2.72	4.876	2925	5850.9	59.23	35534.1	71069.4	65218.5
2.73	4.874	2924.1	5849.1	59.217	35522.4	71056.5	65207.4
2.74	4.873	2923.5	5847.6	59.191	35501.4	71023.8	65176.2
2.74	4.872	2922.9	5846.4	59.147	35469.6	70971	65124.6
2.75	4.871	2922.3	5845.2	59.085	35427.6	70897.2	65052
2.76	4.87	2921.7	5844	59.007	35378.4	70806	64962
2.76	4.869	2921.1	5842.8	58.921	35324.7	70703.1	64860.3
2.77	4.868	2920.5	5841.6	58.828	35265	70589.7	64748.1
2.78	4.867	2919.9	5840.4	58.722	35197.8	70462.8	64622.4
2.78	4.866	2919.3	5839.2	58.604	35124.3	70322.1	64482.9
2.79	4.865	2918.7	5838	58.477	35045.1	70169.4	64331.4
2.80	4.864	2917.8	5836.5	58.34	34959	70004.1	64167.6
2.81	4.862	2916.9	5834.7	58.19	34868.1	69827.1	63992.4
2.81	4.861	2916.3	5833.2	58.037	34775.7	69643.8	63810.6
2.82	4.86	2915.7	5832	57.882	34682.4	69458.1	63626.1
2.83	4.859	2915.1	5830.8	57.726	34588.5	69270.9	63440.1
2.83	4.858	2914.5	5829.6	57.569	34492.2	69080.7	63251.1
2.84	4.857	2913.9	5828.4	57.405	34390.8	68883	63054.6
2.85	4.856	2913.3	5827.2	57.231	34285.2	68676	62848.8
2.85	4.855	2912.7	5826	57.053	34176.3	68461.5	62635.5
2.86	4.854	2912.1	5824.8	56.868	34065.3	68241.6	62416.8
2.87	4.853	2911.2	5823.3	56.683	33954.6	68019.9	62196.6
2.88	4.851	2910.3	5821.5	56.499	33842.7	67797.3	61975.8
2.88	4.85	2909.7	5820	56.31	33728.4	67571.1	61751.1
2.89	4.849	2909.1	5818.8	56.118	33612.9	67341.3	61522.5
2.90	4.848	2908.5	5817.6	55.925	33496.5	67109.4	61291.8
2.90	4.847	2907.9	5816.4	55.73	33378.6	66875.1	61058.7
2.91	4.846	2907.3	5815.2	55.532	33258.6	66637.2	60822
2.92	4.845	2906.7	5814	55.33	33135.6	66394.2	60580.2
2.92	4.844	2906.1	5812.8	55.122	33011.1	66146.7	60333.9
2.93	4.843	2905.5	5811.6	54.915	32888.1	65899.2	60087.6
2.94	4.842	2904.9	5810.4	54.712	32767.2	65655.3	59844.9
2.94	4.841	2904.3	5809.2	54.512	32648.4	65415.6	59606.4
2.95	4.84	2903.7	5808	54.316	32531.7	65180.1	59372.1
2.96	4.839	2903.1	5806.8	54.123	32416.8	64948.5	59141.7
2.97	4.838	2902.5	5805.6	53.933	32303.4	64720.2	58914.6
2.97	4.837	2901.9	5804.4	53.745	32191.8	64495.2	58690.8
2.98	4.836	2901.3	5803.2	53.561	32081.7	64273.5	58470.3
2.99	4.835	2900.7	5802	53.378	31971.9	64053.6	58251.6
2.99	4.834	2900.1	5800.8	53.195	31859.1	63831	58030.2
3.00	4.833	2899.5	5799.6	53.002	31741.5	63600.6	57801
3.01	4.832	2898.9	5798.4	52.803	31620.6	63362.1	57563.7
3.01	4.831	2898	5796.9	52.599	31496.1	63116.7	57319.8
3.02	4.829	2897.1	5795.1	52.388	30192.9	61689	55893.9
3.03	4.828	2896.5	5793.6	48.255	28824.3	59017.2	53223.6
3.03	4.827	2895.9	5792.4	47.826	28632.9	57457.2	51664.8
3.04	4.826	2895.3	5791.2	47.617	28508.4	57141.3	51350.1
3.05	4.825	2895	5790.3	47.411	28385.4	56893.8	51103.5
3.06	4.825	2894.7	5789.7	47.207	28264.2	56649.6	50859.9
3.06	4.824	2894.1	5788.8	47.007	28145.1	56409.3	50620.5
3.07	4.823	2893.5	5787.6	46.81	28028.1	56173.2	50385.6
3.08	4.822	2892.9	5786.4	46.617	27912.6	55940.7	50154.3
3.08	4.821	2892.3	5785.2	46.425	27798.3	55710.9	49925.7
3.09	4.82	2891.7	5784	46.236	27685.8	55484.1	49700.1
3.10	4.819	2891.1	5782.8	46.05	27574.2	55260	49477.2
3.10	4.818	2890.5	5781.6	45.864	27464.1	55038.3	49256.7
3.11	4.817	2889.9	5780.4	45.683	27354.6	54818.7	49038.3
3.12	4.816	2889.3	5779.2	45.499	27243.6	54598.2	48819
3.13	4.815	2888.7	5778	45.313	27130.5	54374.1	48596.1
3.13	4.814	2888.1	5776.8	45.122	27014.1	54144.6	48367.8
3.14	4.813	2887.5	5775.6	44.925	26894.1	53908.2	48132.6
3.15	4.812	2886.9	5774.4	44.722	26769.9	53664	47889.6
3.15	4.811	2886.3	5773.2	44.511	26637.6	53407.5	47634.3
3.16	4.81	2885.7	5772	44.281	26294.1	52931.7	47159.7
3.17	4.809	2885.1	5770.8	43.366	25749.3	52043.4	46272.6
3.17	4.808	2884.5	5769.6	42.465	25421.4	51170.7	45401.1
3.18	4.807	2883.9	5768.4	42.273	25317.3	50738.7	44970.3
3.19	4.806	2883.3	5767.2	42.118	25226.4	50543.7	44776.5
3.19	4.805	2882.7	5766	41.97	25137.9	50364.3	44598.3
3.20	4.804	2882.1	5764.8	41.823	25051.5	50189.4	44424.6
3.21	4.803	2881.5	5763.6	41.682	24966.9	50018.4	44254.8
3.22	4.802	2880.9	5762.4	41.541	24883.2	49850.1	44087.7
3.22	4.801	2880.3	5761.2	41.403	24800.4	49683.6	43922.4
3.23	4.8	2879.7	5760	41.265	24717.6	49518	43758
3.24	4.799	2879.1	5758.8	41.127	24635.7	49353.3	43594.5
3.24	4.798	2878.5	5757.6	40.992	24555.3	49191	43433.4
3.25	4.797	2877.9	5756.4	40.859	24475.5	49030.8	43274.4
3.26	4.796	2877.3	5755.2	40.726	24395.7	48871.2	43116
3.26	4.795	2876.7	5754	40.593	24316.8	48712.5	42958.5
3.27	4.794	2876.1	5752.8	40.463	24238.8	48555.6	42802.8
3.28	4.793	2875.5	5751.6	40.333	24160.8	48399.6	42648
3.28	4.792	2874.9	5750.4	40.203	24083.1	48243.9	42493.5
3.29	4.791	2874.3	5749.2	40.074	24005.4	48088.5	42339.3
3.30	4.79	2873.7	5748	39.944	23927.4	47932.8	42184.8
3.31	4.789	2873.1	5746.8	39.814	23850.3	47777.7	42030.9
3.31	4.788	2872.5	5745.6	39.687	23774.7	47625	41879.4
3.32	4.787	2871.9	5744.4	39.562	23700.6	47475.3	41730.9
3.33	4.786	2871.3	5743.2	39.44	23627.7	47328.3	41585.1
3.33	4.785	2870.7	5742	39.319	23555.7	47183.4	41441.4
3.34	4.784	2870.1	5740.8	39.2	23485.5	47041.2	41300.4
3.35	4.783	2869.5	5739.6	39.085	23416.5	46902	41162.4
3.35	4.782	2868.9	5738.4	38.97	23348.4	46764.9	41026.5
3.36	4.781	2868.3	5737.2	38.858	23280.9	46629.3	40892.1
3.37	4.78	2867.7	5736	38.745	23214.3	46495.2	40759.2
3.38	4.779	2867.1	5734.8	38.636	23148.9	46363.2	40628.4
3.38	4.778	2866.5	5733.6	38.527	23082.9	46231.8	40498.2
3.39	4.777	2865.9	5732.4	38.416	23015.1	46098	40365.6
3.40	4.776	2865.3	5731.2	38.301	22944.9	45960	40228.8
3.40	4.775	2864.7	5730	38.182	22872.6	45817.5	40087.5
3.41	4.774	2864.1	5728.8	38.06	22799.7	45672.3	39943.5
3.42	4.773	2863.5	5727.6	37.939	22727.4	45527.1	39799.5
3.42	4.772	2862.6	5726.1	37.819	22654.8	45382.2	39656.1
3.43	4.77	2861.7	5724.3	37.697	22581.6	45236.4	39512.1
3.44	4.769	2861.1	5722.8	37.575	22509	45090.6	39367.8
3.44	4.768	2860.5	5721.6	37.455	22437.3	44946.3	39224.7
3.45	4.767	2859.9	5720.4	37.336	22368.3	44805.6	39085.2
3.46	4.766	2859.3	5719.2	37.225	22302	44670.3	38951.1
3.47	4.765	2858.7	5718	37.115	22235.1	44537.1	38819.1
3.47	4.764	2858.1	5716.8	37.002	22165.8	44400.9	38684.1
3.48	4.763	2857.5	5715.6	36.884	22095	44260.8	38545.2
3.49	4.762	2856.9	5714.4	36.766	22024.2	44119.2	38404.8
3.49	4.761	2856.3	5713.2	36.648	21954.3	43978.5	38265.3
3.50	4.76	2855.7	5712	36.533	21886.2	43840.5	38128.5
3.51	4.759	2855.1	5710.8	36.421	21819.3	43705.5	37994.7
3.51	4.758	2854.5	5709.6	36.31	21753.6	43572.9	37863.3
3.52	4.757	2853.9	5708.4	36.202	21689.7	43443.3	37734.9
3.53	4.756	2853.3	5707.2	36.097	21627.6	43317.3	37610.1
3.53	4.755	2852.7	5706	35.995	21567	43194.6	37488.6
3.54	4.754	2852.1	5704.8	35.895	21507	43074	37369.2
3.55	4.753	2851.5	5703.6	35.795	21447.3	42954.3	37250.7
3.56	4.752	2850.6	5702.1	35.696	21388.5	42835.8	37133.7
3.56	4.75	2849.7	5700.3	35.599	21330.3	42718.8	37018.5
3.57	4.749	2849.1	5698.8	35.502	21272.1	42602.4	36903.6
3.58	4.748	2848.5	5697.6	35.405	21214.2	42486.3	36788.7
3.58	4.747	2847.9	5696.4	35.309	21156.9	42371.1	36674.7
3.59	4.746	2847.3	5695.2	35.214	21099.3	42256.2	36561
3.60	4.745	2846.7	5694	35.117	21038.1	42137.4	36443.4
3.60	4.744	2845.8	5692.5	35.01	20971.8	42009.9	36317.4
3.61	4.742	2844.9	5690.7	34.896	20903.7	41875.5	36184.8
3.62	4.741	2844.3	5689.2	34.783	20836.2	41739.9	36050.7
3.63	4.74	2843.7	5688	34.671	20769.6	41605.8	35917.8
3.63	4.739	2843.1	5686.8	34.561	20704.2	41473.8	35787
3.64	4.738	2842.5	5685.6	34.453	20639.7	41343.9	35658.3
3.65	4.737	2841.9	5684.4	34.346	20576.1	41215.8	35531.4
3.65	4.736	2841	5682.9	34.241	20513.4	41089.5	35406.6
3.66	4.734	2840.1	5681.1	34.137	20451.3	40964.7	35283.6
3.67	4.733	2839.5	5679.6	34.034	20389.8	40841.1	35161.5
3.67	4.732	2838.9	5678.4	33.932	20328.9	40718.7	35040.3
3.68	4.731	2838.3	5677.2	33.831	20268.6	40597.5	34920.3
3.69	4.73	2837.7	5676	33.731	20208.9	40477.5	34801.5
3.69	4.729	2836.8	5674.5	33.632	20149.8	40358.7	34684.2
3.70	4.727	2835.9	5672.7	33.534	20089.5	40239.3	34566.6
3.71	4.726	2835.3	5671.2	33.431	20025.6	40115.1	34443.9
3.72	4.725	2834.7	5670	33.321	19958.7	39984.3	34314.3
3.72	4.724	2833.8	5668.5	33.208	19890.3	39849	34180.5
3.73	4.722	2832.9	5666.7	33.093	19821.6	39711.9	34045.2
3.74	4.721	2832.3	5665.2	32.979	19753.5	39575.1	33909.9
3.74	4.72	2831.7	5664	32.866	19686	39439.5	33775.5
3.75	4.719	2830.8	5662.5	32.754	19618.8	39304.8	33642.3
3.76	4.717	2829.9	5660.7	32.642	19551.9	39170.7	33510
3.76	4.716	2829	5658.9	32.531	19485.3	39037.2	33378.3
3.77	4.714	2828.1	5657.1	32.42	19418.4	38903.7	33246.6
3.78	4.713	2827.2	5655.3	32.308	19351.2	38769.6	33114.3
3.78	4.711	2826.3	5653.5	32.196	19284.6	38635.8	32982.3
3.79	4.71	2825.7	5652	32.086	19218	38502.6	32850.6
3.80	4.709	2824.8	5650.5	31.974	19151.1	38369.1	32718.6
3.81	4.707	2823.9	5648.7	31.863	19084.8	38235.9	32587.2

Data for Figure 7 and 8: Inflow Discharge Rates and Volumes to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area

Time (10 min increment) - DAYS	Existing Conditions Input @ Peltier (CFS)	Volume using average between time increment (CF)	Cumulative Volume (CF)	Proposed Conditions Input Discharge @ Peltier (CFS)	Volume using average between time increment CF	Cumulative Volume (CF)	Difference in Volume CF
3.81	4.706	2823.3	5647.2	31.753	19019.7	38104.5	32457.3
3.82	4.705	2822.4	5645.7	31.646	18956.1	37975.8	32330.1
3.83	4.703	2821.5	5643.9	31.541	18893.4	37849.5	32205.6
3.83	4.702	2820.9	5642.4	31.437	18830.7	37724.1	32081.7
3.84	4.701	2820	5640.9	31.332	18767.4	37598.1	31957.2
3.85	4.699	2819.1	5639.1	31.226	18703.8	37471.2	31832.1
3.85	4.698	2818.5	5637.6	31.12	18639.9	37343.7	31706.1
3.86	4.697	2817.9	5636.4	31.013	18576	37215.9	31579.5
3.87	4.696	2817.3	5635.2	30.907	18512.7	37088.7	31453.5
3.88	4.695	2816.7	5634	30.802	18450.3	36963	31329
3.88	4.694	2815.8	5632.5	30.699	18387.9	36838.2	31205.7
3.89	4.692	2814.9	5630.7	30.594	18324.9	36712.8	31082.1
3.90	4.691	2814.3	5629.2	30.489	18261.6	36586.5	30957.3
3.90	4.69	2813.7	5628	30.383	18198	36459.6	30831.6
3.91	4.689	2813.1	5626.8	30.277	18134.4	36332.4	30705.6
3.92	4.688	2812.5	5625.6	30.171	18070.5	36204.9	30579.3
3.92	4.687	2811.9	5624.4	30.064	18006.3	36076.8	30452.4
3.93	4.686	2811.3	5623.2	29.957	17942.1	35948.4	30325.2
3.94	4.685	2810.4	5621.7	29.85	17877.9	35820	30198.3
3.94	4.683	2809.5	5619.9	29.743	17814.6	35692.5	30072.6
3.95	4.682	2808.9	5618.4	29.639	17752.2	35566.8	29948.4
3.96	4.681	2808.3	5617.2	29.535	17690.1	35442.3	29825.1
3.97	4.68	2807.7	5616	29.432	17628	35318.1	29702.1
3.97	4.679	2807.1	5614.8	29.328	17564.7	35192.7	29577.9
3.98	4.678	2806.5	5613.6	29.221	17498.4	35063.1	29449.5
3.99	4.677	2805.9	5612.4	29.107	17427.9	34926.3	29313.9
3.99	4.676	2805	5610.9	28.986	17350.8	34778.7	29167.8
4.00	4.674	2804.1	5609.1	28.85	17260.5	34611.3	29002.2
4.01	4.673	2803.5	5607.6	28.685	17146.5	34407	28799.4
4.01	4.672	2802.9	5606.4	28.47	17005.8	34152.3	28545.9
4.02	4.671	2802.3	5605.2	28.216	16846.8	33852.6	28247.4
4.03	4.67	2801.7	5604	27.94	16682.7	33529.5	27925.5
4.03	4.669	2800.8	5602.5	27.669	16524.9	33207.6	27605.1
4.04	4.667	2799.9	5600.7	27.414	16378.5	32903.4	27302.7
4.05	4.666	2799.3	5599.2	27.181	16245.9	32624.4	27025.2
4.06	4.665	2798.4	5597.7	26.972	16128.3	32374.2	26776.5
4.06	4.663	2797.5	5595.9	26.789	16023.9	32152.2	26556.3
4.07	4.662	2796.6	5594.1	26.624	15929.4	31953.3	26359.2
4.08	4.66	2795.4	5592	26.474	15843	31772.4	26180.4
4.08	4.658	2794.2	5589.6	26.336	15762	31605	26015.4
4.09	4.656	2793.3	5587.5	26.204	15685.5	31447.5	25860
4.10	4.655	2792.4	5585.7	26.081	15613.5	31299	25713.3
4.10	4.653	2791.2	5583.6	25.964	15544.8	31158.3	25574.7
4.11	4.651	2790	5581.2	25.852	15479.7	31024.5	25443.3
4.12	4.649	2788.8	5578.8	25.747	15417.6	30897.3	25318.5
4.13	4.647	2787.6	5576.4	25.645	15357	30774.6	25198.2
4.13	4.645	2786.4	5574	25.545	15297	30654	25080
4.14	4.643	2785.5	5571.9	25.445	15237.9	30534.9	24963
4.15	4.642	2784.6	5570.1	25.348	15180.3	30418.2	24848.1
4.15	4.64	2783.4	5568	25.253	15124.2	30304.5	24736.5
4.16	4.638	2782.5	5565.9	25.161	15069.6	30193.8	24627.9
4.17	4.637	2781.6	5564.1	25.071	15015.9	30085.5	24521.4
4.17	4.635	2780.4	5562	24.982	14963.4	29979.3	24417.3
4.18	4.633	2779.5	5559.9	24.896	14912.1	29875.5	24315.6
4.19	4.632	2778.6	5558.1	24.811	14861.7	29773.8	24215.7
4.19	4.63	2777.7	5556.3	24.728	14812.2	29673.9	24117.6
4.20	4.629	2776.8	5554.5	24.646	14763.6	29575.8	24021.3
4.21	4.627	2775.6	5552.4	24.566	14715.6	29479.2	23926.8
4.22	4.625	2774.7	5550.3	24.486	14668.2	29383.8	23833.5
4.22	4.624	2773.8	5548.5	24.408	14621.4	29289.6	23741.1
4.23	4.622	2772.6	5546.4	24.33	14574.9	29196.3	23649.9
4.24	4.62	2771.7	5544.3	24.253	14529	29103.9	23559.6
4.24	4.619	2770.8	5542.5	24.177	14482.8	29011.8	23469.3
4.25	4.617	2769.9	5540.7	24.099	14436	28918.8	23378.1
4.26	4.616	2769	5538.9	24.021	14389.2	28825.2	23286.3
4.26	4.614	2767.8	5536.8	23.943	14341.8	28731	23194.2
4.27	4.612	2766.9	5534.7	23.863	14293.5	28635.3	23100.6
4.28	4.611	2766	5532.9	23.782	14244.9	28538.4	23005.5
4.28	4.609	2765.1	5531.1	23.701	14196.3	28441.2	22910.1
4.29	4.608	2764.2	5529.3	23.62	14147.7	28344	22814.7
4.30	4.606	2763	5527.2	23.539	14098.8	28246.5	22719.3
4.31	4.604	2762.1	5525.1	23.457	14049.9	28148.7	22623.6
4.31	4.603	2761.2	5523.3	23.376	14001.3	28051.2	22527.9
4.32	4.601	2759.7	5520.9	23.295	13953	27954.3	22433.4
4.33	4.598	2757.9	5517.6	23.215	13904.7	27857.7	22340.1
4.33	4.595	2756.1	5514	23.134	13855.8	27760.5	22246.5
4.34	4.592	2754.3	5510.4	23.052	13807.2	27663	22152.6
4.35	4.589	2752.8	5507.1	22.972	13759.2	27566.4	22059.3
4.35	4.587	2751.3	5504.1	22.892	13711.2	27470.4	21966.3
4.36	4.584	2749.8	5501.1	22.812	13663.2	27374.4	21873.3
4.37	4.582	2748.6	5498.4	22.732	13615.5	27278.7	21780.3
4.38	4.58	2747.4	5496	22.653	13568.1	27183.6	21687.6
4.38	4.578	2746.5	5493.9	22.574	13520.7	27088.8	21594.9
4.39	4.577	2745.6	5492.1	22.495	13473.3	26994	21501.9
4.40	4.575	2744.7	5490.3	22.416	13425.6	26898.9	21408.6
4.40	4.574	2743.8	5488.5	22.336	13378.2	26803.8	21315.3
4.41	4.572	2742.6	5486.4	22.258	13331.1	26709.3	21222.9
4.42	4.57	2741.7	5484.3	22.179	13284	26615.1	21130.8
4.42	4.569	2740.8	5482.5	22.101	13237.2	26521.2	21038.7
4.43	4.567	2739.9	5480.7	22.023	13190.4	26427.6	20946.9
4.44	4.566	2739.3	5479.2	21.945	13143.6	26334	20854.8
4.44	4.565	2738.4	5477.7	21.867	13096.8	26240.4	20762.7
4.45	4.563	2737.5	5475.9	21.789	13050.6	26147.4	20671.5
4.46	4.562	2736.9	5474.4	21.713	13005	26055.6	20581.2
4.47	4.561	2736	5472.9	21.637	12960	25965	20492.1
4.47	4.559	2735.1	5471.1	21.563	12915.3	25875.3	20404.2
4.48	4.558	2734.5	5469.6	21.488	12870.3	25785.6	20316
4.49	4.557	2733.9	5468.4	21.413	12825	25695.3	20226.9
4.49	4.556	2733	5466.9	21.337	12780	25605	20138.1
4.50	4.554	2732.1	5465.1	21.263	12735.6	25515.6	20050.5
4.51	4.553	2731.8	5463.9	21.189	12691.5	25427.1	19963.2
4.51	4.553	2731.2	5463	21.116	12647.7	25339.2	19876.2
4.52	4.551	2730.3	5461.5	21.043	12601.8	25249.5	19788
4.53	4.55	2729.4	5459.7	20.963	12553.2	25155	19695.3
4.53	4.548	2728.5	5457.9	20.881	12503.7	25056.9	19599
4.54	4.547	2727.9	5456.4	20.798	12453.3	24957	19500.6
4.55	4.546	2727.3	5455.2	20.713	12401.7	24855	19399.8
4.56	4.545	2727	5454.3	20.626	12349.8	24751.5	19297.2
4.56	4.545	2726.4	5453.4	20.54	12298.5	24648.3	19194.9
4.57	4.543	2725.2	5451.6	20.455	12248.1	24546.6	19095
4.58	4.541	2724.3	5449.5	20.372	12198.3	24446.4	18996.9
4.58	4.54	2723.1	5447.4	20.289	12148.8	24347.1	18899.7
4.59	4.537	2721.6	5444.7	20.207	12099.9	24248.7	18804
4.60	4.535	2720.1	5441.7	20.126	12051.6	24151.5	18709.8
4.60	4.532	2718.3	5438.4	20.046	12003.6	24055.2	18616.8
4.61	4.529	2716.5	5434.8	19.966	11956.2	23959.8	18525
4.62	4.526	2714.7	5431.2	19.888	11909.7	23865.9	18434.7
4.63	4.523	2712.9	5427.6	19.811	11863.2	23772.9	18345.3
4.63	4.52	2711.1	5424	19.733	11816.7	23679.9	18255.9
4.64	4.517	2709.3	5420.4	19.656	11770.5	23587.2	18166.8
4.65	4.514	2707.5	5416.8	19.579	11722.5	23493	18076.2
4.65	4.511	2705.7	5413.2	19.496	11674.2	23396.7	17983.5
4.66	4.508	2703.9	5409.6	19.418	11626.8	23301	17891.4
4.67	4.505	2702.1	5406	19.338	11578.8	23205.6	17799.6
4.67	4.502	2700.3	5402.4	19.258	11531.1	23109.9	17707.5
4.68	4.499	2698.5	5398.8	19.179	11484	23015.1	17616.3
4.69	4.496	2696.7	5395.2	19.101	11437.2	22921.2	17526
4.69	4.493	2694.9	5391.6	19.023	11391	22828.2	17436.6
4.70	4.49	2692.8	5387.7	18.947	11345.4	22736.4	17348.7
4.71	4.486	2690.7	5383.5	18.871	11300.4	22645.8	17262.3
4.72	4.483	2688.9	5379.6	18.797	11256.3	22556.7	17177.1
4.72	4.48	2687.1	5376	18.724	11211	22467.3	17091.3
4.73	4.477	2685.3	5372.4	18.646	11164.2	22375.2	17002.8
4.74	4.474	2683.5	5368.8	18.568	11117.1	22281.3	16912.5
4.74	4.471	2681.7	5365.2	18.489	11070.9	22188	16822.8
4.75	4.468	2679.9	5361.6	18.414	11025.9	22096.8	16735.2
4.76	4.465	2678.1	5358	18.339	10981.2	22007.1	16649.1
4.76	4.462	2676.3	5354.4	18.265	10937.1	21918.3	16563.9
4.77	4.459	2674.5	5350.8	18.192	10893.3	21830.4	16479.6
4.78	4.456	2672.7	5347.2	18.119	10849.5	21742.8	16395.6
4.78	4.453	2670.9	5343.6	18.046	10805.7	21655.2	16311.6
4.79	4.45	2669.1	5340	17.973	10762.2	21567.9	16227.9
4.80	4.447	2667.3	5336.4	17.901	10719	21481.2	16144.8
4.81	4.444	2665.5	5332.8	17.829	10675.8	21394.8	16062
4.81	4.441	2663.7	5329.2	17.757	10632.6	21308.4	15979.2
4.82	4.438	2661.9	5325.6	17.685	10589.4	21222	15896.4
4.83	4.435	2660.1	5322	17.613	10546.5	21135.9	15813.9
4.83	4.432	2658.3	5318.4	17.542	10503.6	21050.1	15731.7
4.84	4.429	2656.5	5314.8	17.47	10460.7	20964.3	15649.5
4.85	4.426	2655	5311.5	17.399	10418.1	20878.8	15567.3
4.85	4.424	2653.5	5308.5	17.328	10375.5	20793.6	15485.1
4.86	4.421	2651.7	5305.2	17.257	10332.9	20708.4	15403.2
4.87	4.418	2650.2	5301.9	17.186	10290.3	20623.2	15321.3
4.88	4.416	2648.4	5298.6	17.115	10247.7	20538	15239.4
4.88	4.412	2646.3	5294.7	17.044	10205.1	20452.8	15158.1
4.89	4.409	2644.8	5291.1	16.973	10162.8	20367.9	15076.8
4.90	4.407	2643.3	5288.1	16.903	10120.5	20283.3	14995.2
4.90	4.404	2641.5	5284.8	16.832	10077.9	20198.4	14913.6
4.91	4.401	2640	5281.5	16.761	10035.3	20113.2	14831.7
4.92	4.399	2638.2	5278.2	16.69	9991.8	20027.1	14748.9
4.92	4.395	2636.4	5274.6	16.616	9948	19939.8	14665.2
4.93	4.393	2635.2	5271.6	16.544	8821.2	18769.2	13497.6
4.94	4.391	2633.4	5268.6	12.86	7423.8	16245	10976.4
4.94	4.387	2631.3	5264.7	11.886	7121.1	14544.9	9280.2
4.95	4.384	2629.8	5261.1	11.851	7100.1	14221.2	8960.1
4.96	4.382	2628.3	5258.1	11.816	7079.1	14179.2	8921.1
4.97	4.379	2626.5	5254.8	11.781	7056.9	14136	8881.2
4.97	4.376	2625	5251.5	11.742	7029.6	14086.5	8835
4.98	4.374	2623.5	5248.5	11.69	6998.7	14028.3	8779.8
4.99	4.371	2621.7	5245.2	11.639	6969.6	13968.3	8723.1
4.99	4.368	2619.9	5241.6	11.593	6942.6	13912.2	8670.6
5.00	4.365	2618.4	5238.3	11.549	6917.1	13859.7	8621.4
5.01	4.363	2616.9	5235.3	11.508	6892.5	13809.6	8574.3
5.01	4.36	2615.4	5232.3	11.467	6868.5	13761	8528.7
5.02	4.358	2613.9	5229.3	11.428	6845.4	13713.9	8484.6
5.03	4.355	2612.4	5226.3	11.39	6822.6	13668	8441.7
5.03	4.353	2610.9	5223.3	11.352	6800.1	13622.7	8399.4
5.04	4.35	2609.4	5220.3	11.315	6777.9	13578	8357.7
5.05	4.348	2607.9	5217.3	11.278	6756	13533.9	8316.6
5.06	4.345	2606.4	5214.3	11.242	6734.4	13490.4	8276.1
5.06	4.343	2604.9	5211.3	11.206	6713.1	13447.5	8236.2
5.07	4.34	2603.4	5208.3	11.171	6692.4	13405.5	8197.2
5.08	4.338	2602.2	5205.6	11.137	6672	13364.4	8158.8

Data for Figure 7 and 8: Inflow Discharge Rates and Volumes to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area

Time (10 min increment) - DAYS	Existing Conditions Input @ Peltier (CFS)	Volume using average between time increment (CF)	Cumulative Volume (CF)	Proposed Conditions Input Discharge @ Peltier (CFS)	Volume using average between time increment CF	Cumulative Volume (CF)	Difference in Volume CF
5.08	4.336	2600.7	5202.9	11.103	6651.6	13323.6	8120.7
5.09	4.333	2599.2	5199.9	11.069	6631.2	13282.8	8082.9
5.10	4.331	2598	5197.2	11.035	6611.1	13242.3	8045.1
5.10	4.329	2597.1	5195.1	11.002	6591.3	13202.4	8007.3
5.11	4.328	2596.2	5193.3	10.969	6571.8	13163.1	7969.8
5.12	4.326	2595	5191.2	10.937	6552.3	13124.1	7932.9
5.13	4.324	2593.8	5188.8	10.904	6533.1	13085.4	7896.6
5.13	4.322	2591.7	5185.5	10.873	6514.2	13047.3	7861.8
5.14	4.317	2588.7	5180.4	10.841	6495	13009.2	7828.8
5.15	4.312	2586.3	5175	10.809	6476.1	12971.1	7796.1
5.15	4.309	2584.5	5170.8	10.778	6457.5	12933.6	7762.8
5.16	4.306	2583.3	5167.8	10.747	6438.9	12896.4	7728.6
5.17	4.305	2582.7	5166	10.716	6420.3	12859.2	7693.2
5.17	4.304	2582.1	5164.8	10.685	6401.7	12822	7657.2
5.18	4.303	2581.5	5163.6	10.654	6383.4	12785.1	7621.5
5.19	4.302	2580.9	5162.4	10.624	6365.1	12748.5	7586.1
5.19	4.301	2580.3	5161.2	10.593	6346.8	12711.9	7550.7
5.20	4.3	2580	5160.3	10.563	6328.8	12675.6	7515.3
5.21	4.3	2579.7	5159.7	10.533	6310.8	12639.6	7479.9
5.22	4.299	2579.1	5158.8	10.503	6292.8	12603.6	7444.8
5.22	4.298	2578.5	5157.6	10.473	6272.1	12564.9	7407.3
5.23	4.297	2578.2	5156.7	10.434	6244.2	12516.3	7359.6
5.24	4.297	2577.9	5156.1	10.38	6211.2	12455.4	7299.3
5.24	4.296	2577.3	5155.2	10.324	6178.8	12390	7234.8
5.25	4.295	2577	5154.3	10.272	6147.9	12326.7	7172.4
5.26	4.295	2576.7	5153.7	10.221	6117.6	12265.5	7111.8
5.26	4.294	2576.1	5152.8	10.171	6087.6	12205.2	7052.4
5.27	4.293	2575.8	5151.9	10.121	6057.9	12145.5	6993.6
5.28	4.293	2575.5	5151.3	10.072	6028.8	12086.7	6935.4
5.28	4.292	2574.9	5150.4	10.024	6000.6	12029.4	6879
5.29	4.291	2574.6	5149.5	9.978	5973.3	11973.9	6824.4
5.30	4.291	2574.3	5148.9	9.933	5946.9	11920.2	6771.3
5.31	4.29	2573.7	5148	9.89	5921.7	11868.6	6720.6
5.31	4.289	2573.4	5147.1	9.849	5897.1	11818.8	6671.7
5.32	4.289	2573.1	5146.5	9.808	5873.1	11770.2	6623.7
5.33	4.288	2572.5	5145.6	9.769	5849.7	11722.8	6577.2
5.33	4.287	2572.2	5144.7	9.73	5826.9	11676.6	6531.9
5.34	4.287	2571.9	5144.1	9.693	5804.7	11631.6	6487.5
5.35	4.286	2571.6	5143.5	9.656	5783.1	11587.8	6444.3
5.35	4.286	2571.3	5142.9	9.621	5762.1	11545.2	6402.3
5.36	4.285	2570.7	5142	9.586	5741.4	11503.5	6361.5
5.37	4.284	2570.4	5141.1	9.552	5721.6	11463	6321.9
5.38	4.284	2570.1	5140.5	9.52	5702.4	11424	6283.5
5.38	4.283	2569.5	5139.6	9.488	5683.2	11385.6	6246
5.39	4.282	2569.2	5138.7	9.456	5664.3	11347.5	6208.8
5.40	4.282	2568.9	5138.1	9.425	5646	11310.3	6172.2
5.40	4.281	2568.3	5137.2	9.395	5628	11274	6136.8
5.41	4.28	2568	5136.3	9.365	5610.3	11238.3	6102
5.42	4.28	2567.7	5135.7	9.336	5593.2	11203.5	6067.8
5.42	4.279	2567.1	5134.8	9.308	5576.1	11169.3	6034.5
5.43	4.278	2566.8	5133.9	9.279	5559	11135.1	6001.2
5.44	4.278	2566.5	5133.3	9.251	5542.5	11101.5	5968.2
5.44	4.277	2565.9	5132.4	9.224	5526.3	11068.8	5936.4
5.45	4.276	2565.6	5131.5	9.197	5510.1	11036.4	5904.9
5.46	4.276	2565.3	5130.9	9.17	5493.9	11004	5873.1
5.47	4.275	2564.7	5130	9.143	5478	10971.9	5841.9
5.47	4.274	2564.4	5129.1	9.117	5462.4	10940.4	5811.3
5.48	4.274	2564.1	5128.5	9.091	5446.8	10909.2	5780.7
5.49	4.273	2563.5	5127.6	9.065	5431.5	10878.3	5750.7
5.49	4.272	2563.2	5126.7	9.04	5416.2	10847.7	5721
5.50	4.272	2562.9	5126.1	9.014	5400.9	10817.1	5691
5.51	4.271	2562.3	5125.2	8.989	5385.6	10786.5	5661.3
5.51	4.27	2562	5124.3	8.963	5369.7	10755.3	5631
5.52	4.27	2561.7	5123.7	8.936	5353.2	10722.9	5599.2
5.53	4.269	2561.1	5122.8	8.908	5336.4	10689.6	5566.8
5.53	4.268	2560.8	5121.9	8.88	5320.8	10657.2	5535.3
5.54	4.268	2560.5	5121.3	8.856	5306.1	10626.9	5505.6
5.55	4.267	2559.9	5120.4	8.831	5291.4	10597.5	5477.1
5.56	4.266	2559.6	5119.5	8.807	5276.7	10568.1	5448.6
5.56	4.266	2559.3	5118.9	8.782	5261.4	10538.1	5419.2
5.57	4.265	2558.7	5118	8.756	5245.8	10507.2	5389.2
5.58	4.264	2558.4	5117.1	8.73	5229.9	10475.7	5358.6
5.58	4.264	2558.1	5116.5	8.703	5214	10443.9	5327.4
5.59	4.263	2557.5	5115.6	8.677	5198.1	10412.1	5296.5
5.60	4.262	2557.2	5114.7	8.65	5181	10379.1	5264.4
5.60	4.262	2556.9	5114.1	8.62	5162.4	10343.4	5229.3
5.61	4.261	2556.3	5113.2	8.588	5143.2	10305.6	5192.4
5.62	4.26	2556	5112.3	8.556	5124	10267.2	5154.9
5.63	4.26	2555.7	5111.7	8.524	5105.1	10229.1	5117.4
5.63	4.259	2555.1	5110.8	8.493	5086.8	10191.9	5081.1
5.64	4.258	2554.8	5109.9	8.463	5068.8	10155.6	5045.7
5.65	4.258	2554.5	5109.3	8.433	5051.7	10120.5	5011.2
5.65	4.257	2553.9	5108.4	8.406	5035.8	10087.5	4979.1
5.66	4.256	2553.6	5107.5	8.38	5020.5	10056.3	4948.8
5.67	4.256	2553.3	5106.9	8.355	5006.1	10026.6	4919.7
5.67	4.255	2552.7	5106	8.332	4992	9998.1	4892.1
5.68	4.254	2552.4	5105.1	8.308	4977.9	9969.9	4864.8
5.69	4.254	2552.1	5104.5	8.285	4964.1	9942	4837.5
5.69	4.253	2551.5	5103.6	8.262	4950.6	9914.7	4811.1
5.70	4.252	2551.2	5102.7	8.24	4937.1	9887.7	4785
5.71	4.252	2550.9	5102.1	8.217	4923.9	9861	4758.9
5.72	4.251	2550.3	5101.2	8.196	4911	9834.9	4733.7
5.72	4.25	2550	5100.3	8.174	4897.8	9808.8	4708.5
5.73	4.25	2549.7	5099.7	8.152	4885.2	9783	4683.3
5.74	4.249	2549.1	5098.8	8.132	4873.8	9759	4660.2
5.74	4.248	2548.8	5097.9	8.114	4862.1	9735.9	4638
5.75	4.248	2548.5	5097.3	8.093	4849.5	9711.6	4614.3
5.76	4.247	2547.9	5096.4	8.072	4836.6	9686.1	4589.7
5.76	4.246	2547.6	5095.5	8.05	4823.1	9659.7	4564.2
5.77	4.246	2547.3	5094.9	8.027	4808.7	9631.8	4536.9
5.78	4.245	2546.7	5094	8.002	4793.7	9602.4	4508.4
5.78	4.244	2546.4	5093.1	7.977	4777.8	9571.5	4478.4
5.79	4.244	2546.1	5092.5	7.949	4761	9538.8	4446.3
5.80	4.243	2545.5	5091.6	7.921	4744.5	9505.5	4413.9
5.81	4.242	2544.9	5090.4	7.894	4728	9472.5	4382.1
5.81	4.241	2544.6	5089.5	7.866	4711.2	9439.2	4349.7
5.82	4.241	2544.3	5088.9	7.838	4694.7	9405.9	4317
5.83	4.24	2543.7	5088	7.811	4678.8	9373.5	4285.5
5.83	4.239	2543.4	5087.1	7.785	4663.5	9342.3	4255.2
5.84	4.239	2543.1	5086.5	7.76	4647.9	9311.4	4224.9
5.85	4.238	2542.5	5085.6	7.733	4632.6	9280.5	4194.9
5.85	4.237	2542.2	5084.7	7.709	4618.5	9251.1	4166.4
5.86	4.237	2541.9	5084.1	7.686	4605	9223.5	4139.4
5.87	4.236	2541.3	5083.2	7.664	4590.9	9195.9	4112.7
5.88	4.235	2541	5082.3	7.639	4574.7	9165.6	4083.3
5.88	4.235	2540.7	5081.7	7.61	4557	9131.7	4050
5.89	4.234	2540.1	5080.8	7.58	4539	9096	4015.2
5.90	4.233	2539.5	5079.6	7.55	4521.3	9060.3	3980.7
5.90	4.232	2539.2	5078.7	7.521	4504.2	9025.5	3946.8
5.91	4.232	2538.9	5078.1	7.493	4489.2	8993.4	3915.3
5.92	4.231	2538.3	5077.2	7.471	4476.3	8965.5	3888.3
5.92	4.23	2538	5076.3	7.45	4463.7	8940	3863.7
5.93	4.23	2537.7	5075.7	7.429	4451.1	8914.8	3839.1
5.94	4.229	2537.1	5074.8	7.408	4438.8	8889.9	3815.1
5.94	4.228	2536.8	5073.9	7.388	4426.2	8865	3791.1
5.95	4.228	2536.5	5073.3	7.366	4413	8839.2	3765.9
5.96	4.227	2535.9	5072.4	7.344	4399.8	8812.8	3740.4
5.97	4.226	2535.3	5071.2	7.322	4386.6	8786.4	3715.2
5.97	4.225	2535	5070.3	7.3	4373.1	8759.7	3689.4
5.98	4.225	2534.7	5069.7	7.277	4359.3	8732.4	3662.7
5.99	4.224	2534.1	5068.8	7.254	4344.9	8704.2	3635.4
5.99	4.223	2533.8	5067.9	7.229	4329.9	8674.8	3606.9
6.00	4.223	2533.5	5067.3	7.204	4315.2	8645.1	3577.8
6.01	4.222	2532.9	5066.4	7.18	4300.8	8616	3549.6
6.01	4.221	2532.6	5065.5	7.156	4286.4	8587.2	3521.7
6.02	4.221	2532.3	5064.9	7.132	4272.3	8558.7	3493.8
6.03	4.22	2531.7	5064	7.109	4258.5	8530.8	3466.8
6.03	4.219	2531.1	5062.8	7.086	4245	8503.5	3440.7
6.04	4.218	2530.8	5061.9	7.064	4232.1	8477.1	3415.2
6.05	4.218	2530.5	5061.3	7.043	4219.5	8451.6	3390.3
6.06	4.217	2529.9	5060.4	7.022	4206.9	8426.4	3366
6.06	4.216	2529.6	5059.5	7.001	4194.6	8401.5	3342
6.07	4.216	2529.3	5058.9	6.981	4182.3	8376.9	3318
6.08	4.215	2528.7	5058	6.96	4170	8352.3	3294.3
6.08	4.214	2528.1	5056.8	6.94	4157.7	8327.7	3270.9
6.09	4.213	2527.8	5055.9	6.919	4145.1	8302.8	3246.9
6.10	4.213	2527.5	5055.3	6.898	4132.5	8277.6	3222.3
6.10	4.212	2526.9	5054.4	6.877	4120.2	8252.7	3198.3
6.11	4.211	2526.3	5053.2	6.857	4108.2	8228.4	3175.2
6.12	4.21	2526	5052.3	6.837	4095.9	8204.1	3151.8
6.13	4.21	2525.7	5051.7	6.816	4083.6	8179.5	3127.8
6.13	4.209	2525.1	5050.8	6.796	4071.3	8154.9	3104.1
6.14	4.208	2524.8	5049.9	6.775	4058.7	8130	3080.1
6.15	4.208	2524.5	5049.3	6.754	4046.1	8104.8	3055.5
6.15	4.207	2523.9	5048.4	6.733	4033.2	8079.3	3030.9
6.16	4.206	2523.3	5047.2	6.711	4019.7	8052.9	3005.7
6.17	4.205	2523	5046.3	6.688	4006.2	8025.9	2979.6
6.17	4.205	2522.7	5045.7	6.666	3993	7999.2	2953.5
6.18	4.204	2522.1	5044.8	6.644	3979.5	7972.5	2927.7
6.19	4.203	2521.8	5043.9	6.621	3966	7945.5	2901.6
6.19	4.203	2521.5	5043.3	6.599	3952.5	7918.5	2875.2
6.20	4.202	2520.9	5042.4	6.576	3938.7	7891.2	2848.8
6.21	4.201	2520.6	5041.5	6.553	3924.9	7863.6	2822.1
6.22	4.201	2520.3	5040.9	6.53	3911.4	7836.3	2795.4
6.22	4.2	2519.7	5040	6.508	3898.2	7809.6	2769.6
6.23	4.199	2519.1	5038.8	6.486	3885	7783.2	2744.4
6.24	4.198	2518.8	5037.9	6.464	3871.8	7756.8	2718.9
6.24	4.198	2518.5	5037.3	6.442	3858.6	7730.4	2693.1
6.25	4.197	2517.9	5036.4	6.42	3845.7	7704.3	2667.9
6.26	4.196	2517.6	5035.5	6.399	3832.8	7678.5	2643
6.26	4.196	2517.3	5034.9	6.377	3819.9	7652.7	2617.8
6.27	4.195	2516.7	5034	6.356	3807.3	7627.2	2593.2
6.28	4.194	2516.4	5033.1	6.335	3794.7	7602	2568.9
6.28	4.194	2516.1	5032.5	6.314	3782.1	7576.8	2544.3
6.29	4.193	2515.5	5031.6	6.293	3769.5	7551.6	2520
6.30	4.192	2515.2	5030.7	6.272	3757.2	7526.7	2496
6.31	4.192	2514.9	5030.1	6.252	3744.9	7502.1	2472
6.31	4.191	2514.3	5029.2	6.231	3732.3	7477.2	2448
6.32	4.19	2514	5028.3	6.21	3720	7452.3	2424
6.33	4.19	2513.7	5027.7	6.19	3708	7428	2400.3
6.33	4.189	2513.1	5026.8	6.17	3695.7	7403.7	2376.9
6.34	4.188	2512.5	5025.6	6.149	3683.4	7379.1	2353.5
6.35	4.187	2512.2	5024.7	6.129	3671.4	7354.8	2330.1

Data for Figure 7 and 8: Inflow Discharge Rates and Volumes to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area

Time (10 min increment) - DAYS	Existing Conditions Input @ Peltier (CFS)	Volume using average between time increment (CF)	Cumulative Volume (CF)	Proposed Conditions Input Discharge @ Peltier (CFS)	Volume using average between time increment CF	Cumulative Volume (CF)	Difference in Volume CF
6.35	4.187	2511.9	5024.1	6.109	3659.4	7330.8	2306.7
6.36	4.186	2511.3	5023.2	6.089	3647.4	7306.8	2283.6
6.37	4.185	2511	5022.3	6.069	3635.4	7282.8	2260.5
6.38	4.185	2510.7	5021.7	6.049	3623.4	7258.8	2237.1
6.38	4.184	2510.1	5020.8	6.029	3611.4	7234.8	2214
6.39	4.183	2509.8	5019.9	6.009	3599.4	7210.8	2190.9
6.40	4.183	2509.5	5019.3	5.989	3587.4	7186.8	2167.5
6.40	4.182	2508.9	5018.4	5.969	3575.4	7162.8	2144.4
6.41	4.181	2508.3	5017.2	5.949	3563.4	7138.8	2121.6
6.42	4.18	2508	5016.3	5.929	3551.4	7114.8	2098.5
6.42	4.18	2507.7	5015.7	5.909	3539.4	7090.8	2075.1
6.43	4.179	2507.1	5014.8	5.889	3527.4	7066.8	2052
6.44	4.178	2506.5	5013.6	5.869	3515.4	7042.8	2029.2
6.44	4.177	2505.9	5012.4	5.849	3503.4	7018.8	2006.4
6.45	4.176	2505	5010.9	5.829	3491.1	6994.5	1983.6
6.46	4.174	2502.9	5007.9	5.808	3478.2	6969.3	1961.4
6.47	4.169	2499.9	5002.8	5.786	3465.3	6943.5	1940.7
6.47	4.164	2496	4995.9	5.765	3452.4	6917.7	1921.8
6.48	4.156	2490.9	4986.9	5.743	3439.2	6891.6	1904.7
6.49	4.147	2485.2	4976.1	5.721	3426	6865.2	1889.1
6.49	4.137	2479.2	4964.4	5.699	3413.1	6839.1	1874.7
6.50	4.127	2472.9	4952.1	5.678	3400.5	6813.6	1861.5
6.51	4.116	2466.3	4939.2	5.657	3387.9	6788.4	1849.2
6.51	4.105	2461.8	4928.1	5.636	3375.3	6763.2	1835.1
6.52	4.101	2463	4924.8	5.615	3362.7	6738	1813.2
6.53	4.109	2467.5	4930.5	5.594	3350.1	6712.8	1782.3
6.53	4.116	2470.5	4938	5.573	3337.2	6687.3	1749.3
6.54	4.119	2471.7	4942.2	5.551	3324.3	6661.5	1719.3
6.55	4.12	2470.2	4941.9	5.53	3312	6636.3	1694.4
6.56	4.114	2462.4	4932.6	5.51	3299.7	6611.7	1679.1
6.56	4.094	2446.5	4908.9	5.489	3287.1	6586.8	1677.9
6.57	4.061	2424.3	4870.8	5.468	3274.8	6561.9	1691.1
6.58	4.02	2396.1	4820.4	5.448	3262.8	6537.6	1717.2
6.58	3.967	2368.8	4764.9	5.428	3250.5	6513.3	1748.4
6.59	3.929	2349.6	4718.4	5.407	3238.2	6488.7	1770.3
6.60	3.903	2336.1	4685.7	5.387	3226.2	6464.4	1778.7
6.60	3.884	2325.6	4661.7	5.367	3214.2	6440.4	1778.7
6.61	3.868	2316.9	4642.5	5.347	3202.2	6416.4	1773.9
6.62	3.855	2309.4	4626.3	5.327	3190.2	6392.4	1766.1
6.63	3.843	2302.5	4611.9	5.307	3178.5	6368.7	1756.8
6.63	3.832	2295.9	4598.4	5.288	3166.8	6345.3	1746.9
6.64	3.821	2289.6	4585.5	5.268	3154.8	6321.6	1736.1
6.65	3.811	2283.9	4573.5	5.248	3142.8	6297.6	1724.1
6.65	3.802	2278.2	4562.1	5.228	3131.1	6273.9	1711.8
6.66	3.792	2272.5	4550.7	5.209	3119.4	6250.5	1699.8
6.67	3.783	2266.8	4539.3	5.189	3107.7	6227.1	1687.8
6.67	3.773	2261.1	4527.9	5.17	3096	6203.7	1675.8
6.68	3.764	2256	4517.1	5.15	3084.3	6180.3	1663.2
6.69	3.756	2251.2	4507.2	5.131	3072.9	6157.2	1650
6.69	3.748	2246.4	4497.6	5.112	3061.2	6134.1	1636.5
6.70	3.74	2241.6	4488	5.092	3049.5	6110.7	1622.7
6.71	3.732	2236.8	4478.4	5.073	3038.1	6087.6	1609.2
6.72	3.724	2232.3	4469.1	5.054	3026.4	6064.5	1595.4
6.72	3.717	2227.8	4460.1	5.034	3014.7	6041.1	1581
6.73	3.709	2223.3	4451.1	5.015	3002.7	6017.4	1566.3
6.74	3.702	2218.8	4442.1	4.994	2990.4	5993.1	1551
6.74	3.694	2214.3	4433.1	4.974	2978.4	5968.8	1535.7
6.75	3.687	2210.1	4424.4	4.954	2966.4	5944.8	1520.4
6.76	3.68	2206.2	4416.3	4.934	2954.1	5920.5	1504.2
6.76	3.674	2202.6	4408.8	4.913	2941.5	5895.6	1486.8
6.77	3.668	2198.7	4401.3	4.892	2929.2	5870.7	1469.4
6.78	3.661	2194.8	4393.5	4.872	2917.5	5846.7	1453.2
6.78	3.655	2190.9	4385.7	4.853	2906.4	5823.9	1438.2
6.79	3.648	2187	4377.9	4.835	2895.9	5802.3	1424.4
6.80	3.642	2183.4	4370.4	4.818	2885.7	5781.6	1411.2
6.81	3.636	2179.8	4363.2	4.801	2875.2	5760.9	1397.7
6.81	3.63	2176.5	4356.3	4.783	2864.7	5739.9	1383.6
6.82	3.625	2173.2	4349.7	4.766	2854.2	5718.9	1369.2
6.83	3.619	2169.9	4343.1	4.748	2843.7	5697.9	1354.8
6.83	3.614	2166.9	4336.8	4.731	2833.2	5676.9	1340.1
6.84	3.609	2163.6	4330.5	4.713	2822.1	5655.3	1324.8
6.85	3.603	2160	4323.6	4.694	2811	5633.1	1309.5
6.85	3.597	2156.7	4316.7	4.676	2799.9	5610.9	1294.2
6.86	3.592	2153.7	4310.4	4.657	2788.5	5588.4	1278
6.87	3.587	2150.7	4304.4	4.638	2777.1	5565.6	1261.2
6.88	3.582	2148	4298.7	4.619	2765.4	5542.5	1243.8
6.88	3.578	2145.3	4293.3	4.599	2753.7	5519.1	1225.8
6.89	3.573	2142.3	4287.6	4.58	2742.3	5496	1208.4
6.90	3.568	2139.3	4281.6	4.561	2730.9	5473.2	1191.6
6.90	3.563	2136.3	4275.6	4.542	2719.2	5450.1	1174.5
6.91	3.558	2133.6	4269.9	4.522	2707.5	5426.7	1156.8
6.92	3.554	2131.2	4264.8	4.503	2696.1	5403.6	1138.8
6.92	3.55	2128.8	4260	4.484	2684.7	5380.8	1120.8
6.93	3.546	2126.4	4255.2	4.465	2673.6	5358.3	1103.1
6.94	3.542	2124	4250.4	4.447	2662.5	5336.1	1085.7
6.94	3.538	2121.3	4245.3	4.428	2651.1	5313.6	1068.3
6.95	3.533	2118.3	4239.6	4.409	2639.7	5290.8	1051.2
6.96	3.528	2115.9	4234.2	4.39	2628.3	5268	1033.8
6.97	3.525	2113.8	4229.7	4.371	2617.2	5245.5	1015.8
6.97	3.521	2111.7	4225.5	4.353	2606.1	5223.3	997.8
6.98	3.518	2109.6	4221.3	4.334	2594.7	5200.8	979.5
6.99	3.514	2107.2	4216.8	4.315	2583.6	5178.3	961.5
6.99	3.51	2104.5	4211.7	4.297	2572.5	5156.1	944.4
7.00	3.505	2102.1	4206.6	4.278	2561.1	5133.6	927
7.01	3.502	2100	4202.1	4.259	2550	5111.1	909
7.01	3.498	2097.9	4197.9	4.241	2538.9	5088.9	891
7.02	3.495	2096.1	4194	4.222	2527.8	5066.7	872.7
7.03	3.492	2094	4190.1	4.204	2516.7	5044.5	854.4
7.03	3.488	2091.6	4185.6	4.185	2505.6	5022.3	836.7
7.04	3.484	2089.2	4180.8	4.167	2494.8	5000.4	819.6
7.05	3.48	2087.1	4176.3	4.149	2484	4978.8	802.5
7.06	3.477	2085.3	4172.4	4.131	2473.2	4957.2	784.8
7.06	3.474	2083.5	4168.8	4.113	2462.7	4935.9	767.1
7.07	3.471	2081.4	4164.9	4.096	2452.2	4914.9	750
7.08	3.467	2079	4160.4	4.078	2441.7	4893.9	733.5
7.08	3.463	2077.2	4156.2	4.061	2431.2	4872.9	716.7
7.09	3.461	2076	4153.2	4.043	2420.7	4851.9	698.7
7.10	3.459	2074.5	4150.5	4.026	2410.5	4831.2	680.7
7.10	3.456	2072.7	4147.2	4.009	2400	4810.5	663.3
7.11	3.453	2070.6	4143.3	3.991	2389.5	4789.5	646.2
7.12	3.449	2068.5	4139.1	3.974	2379.3	4768.8	629.7
7.13	3.446	2067	4135.5	3.957	2368.8	4748.1	612.6
7.13	3.444	2065.5	4132.5	3.939	2358.3	4727.1	594.6
7.14	3.441	2063.7	4129.2	3.922	2347.8	4706.1	576.9
7.15	3.438	2061.9	4125.6	3.904	2337.3	4685.1	559.5
7.15	3.435	2060.1	4122	3.887	2326.8	4664.1	542.1
7.16	3.432	2058.3	4118.4	3.869	2316.3	4643.1	524.7
7.17	3.429	2056.8	4115.1	3.852	2305.8	4622.1	507
7.17	3.427	2055.3	4112.1	3.834	2295.3	4601.1	489
7.18	3.424	2053.8	4109.1	3.817	2285.1	4580.4	471.3
7.19	3.422	2052	4105.8	3.8	2275.2	4560.3	454.5
7.19	3.418	2049.9	4101.9	3.784	2265.6	4540.8	438.9
7.20	3.415	2048.4	4098.3	3.768	2256	4521.6	423.3
7.21	3.413	2047.2	4095.6	3.752	2246.4	4502.4	406.8
7.22	3.411	2045.7	4092.9	3.736	2236.5	4482.9	390
7.22	3.408	2043.9	4089.6	3.719	2226	4462.5	372.9
7.23	3.405	2042.1	4086	3.701	2214.9	4440.9	354.9
7.24	3.402	2040.6	4082.7	3.682	2203.2	4418.1	335.4
7.24	3.4	2039.4	4080	3.662	2191.5	4394.7	314.7
7.25	3.398	2037.9	4077.3	3.643	2180.1	4371.6	294.3
7.26	3.395	2036.1	4074	3.624	2168.4	4348.5	274.5
7.26	3.392	2034.9	4071	3.604	2156.7	4325.1	254.1
7.27	3.391	2034.3	4069.2	3.585	2145	4301.7	232.5
7.28	3.39	2033.4	4067.7	3.565	2133.3	4278.3	210.6
7.28	3.388	2031.9	4065.3	3.546	2121.9	4255.2	189.9
7.29	3.385	2030.1	4062	3.527	2110.2	4232.1	170.1
7.30	3.382	2028.9	4059	3.507	2098.5	4208.7	149.7
7.31	3.381	2028	4056.9	3.488	2070.9	4169.4	112.5
7.31	3.379	2026.8	4054.8	3.415	2046.9	4117.8	63
7.32	3.377	2025.3	4052.1	3.408	2042.4	4089.3	37.2
7.33	3.374	2023.5	4048.8	3.4	2037.9	4080.3	31.5
7.33	3.371	2022.3	4045.8	3.393	2034.6	4072.5	26.7
7.34	3.37	2021.4	4043.7	3.389	2032.2	4066.8	23.1
7.35	3.368	2020.2	4041.6	3.385	2029.8	4062	20.4
7.35	3.366	2018.4	4038.6	3.381	2027.4	4057.2	18.6
7.36	3.362	2016.9	4035.3	3.377	2025	4052.4	17.1
7.37	3.361	2016	4032.9	3.373	2022.6	4047.6	14.7
7.38	3.359	2014.8	4030.8	3.369	2020.2	4042.8	12
7.38	3.357	2013.3	4028.1	3.365	2017.5	4037.7	9.6
7.39	3.354	2011.8	4025.1	3.36	2014.8	4032.3	7.2
7.40	3.352	2010.9	4022.7	3.356	2012.1	4026.9	4.2
7.40	3.351	2010	4020.9	3.351	2009.1	4021.2	0.3
7.41	3.349	2008.5	4018.5	3.346	2006.4	4015.5	-3
7.42	3.346	2007	4015.5	3.342	2003.7	4010.1	-5.4
7.42	3.344	2005.8	4012.8	3.337	2001	4004.7	-8.1
7.43	3.342	2004.9	4010.7	3.333	1998.3	3999.3	-11.4
7.44	3.341	2003.7	4008.6	3.328	1995.6	3993.9	-14.7
7.44	3.338	2001.9	4005.6	3.324	1992.9	3988.5	-17.1
7.45	3.335	2000.7	4002.6	3.319	1990.2	3983.1	-19.5
7.46	3.334	2000.1	4000.8	3.315	1987.8	3978	-22.8
7.47	3.333	1999.2	3999.3	3.311	1985.4	3973.2	-26.1
7.47	3.331	1997.7	3996.9	3.307	1983	3968.4	-28.5
7.48	3.328	1996.2	3993.9	3.303	1980.6	3963.6	-30.3
7.49	3.326	1995.3	3991.5	3.299	1978.2	3958.8	-32.7
7.49	3.325	1994.4	3989.7	3.295	1975.5	3953.7	-36
7.50	3.323	1992.9	3987.3	3.29	1972.5	3948	-39.3
7.51	3.32	1991.7	3984.6	3.285	1969.5	3942	-42.6
7.51	3.319	1991.1	3982.8	3.28	1966.5	3936	-46.8
7.52	3.318	1990.2	3981.3	3.275	1963.5	3930	-51.3
7.53	3.316	1988.7	3978.9	3.27	1960.2	3923.7	-55.2
7.53	3.313	1987.5	3976.2	3.264	1956.6	3916.8	-59.4
7.54	3.312	1986.6	3974.1	3.258	1953.3	3909.9	-64.2
7.55	3.31	1985.4	3972	3.253	1950	3903.3	-68.7
7.56	3.308	1984.2	3969.6	3.247	1946.4	3896.4	-73.2
7.56	3.306	1983.3	3967.5	3.241	1942.8	3889.2	-78.3
7.57	3.305	1982.4	3965.7	3.235	1939.2	3882	-83.7
7.58	3.303	1981.2	3963.6	3.229	1935.6	3874.8	-88.8
7.58	3.301	1980	3961.2	3.223	1931.7	3867.3	-93.9
7.59	3.299	1979.1	3959.1	3.216	1927.8	3859.5	-99.6
7.60	3.298	1978.2	3957.3	3.21	1924.2	3852	-105.3
7.60	3.296	1977	3955.2	3.204	1920.3	3844.5	-110.7
7.61	3.294	1975.8	3952.8	3.197	1916.4	3836.7	-116.1
7.62	3.292	1974.9	3950.7	3.191	1912.8	3829.2	-121.5

Data for Figure 7 and 8: Inflow Discharge Rates and Volumes to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area

Time (10 min increment) - DAYS	Existing Conditions Input @ Peltier (CFS)	Volume using average between time increment (CF)	Cumulative Volume (CF)	Proposed Conditions Input Discharge @ Peltier (CFS)	Volume using average between time increment CF	Cumulative Volume (CF)	Difference in Volume CF
7.63	3.291	1974	3948.9	3.185	1908.9	3821.7	-127.2
7.63	3.289	1972.5	3946.5	3.178	1905.3	3814.2	-132.3
7.64	3.286	1971.3	3943.8	3.173	1902	3807.3	-136.5
7.65	3.285	1970.7	3942	3.167	1898.4	3800.4	-141.6
7.65	3.284	1969.8	3940.5	3.161	1894.8	3793.2	-147.3
7.66	3.282	1968.6	3938.4	3.155	1891.8	3786.6	-151.8
7.67	3.28	1967.7	3936.3	3.151	1889.4	3781.2	-155.1
7.67	3.279	1966.8	3934.5	3.147	1887	3776.4	-158.1
7.68	3.277	1965.6	3932.4	3.143	1884.6	3771.6	-160.8
7.69	3.275	1964.4	3930	3.139	1882.2	3766.8	-163.2
7.69	3.273	1963.5	3927.9	3.135	1879.8	3762	-165.9
7.70	3.272	1962.9	3926.4	3.131	1877.4	3757.2	-169.2
7.71	3.271	1961.7	3924.6	3.127	1874.7	3752.1	-172.5
7.72	3.268	1960.5	3922.2	3.122	1871.7	3746.4	-175.8
7.72	3.267	1959.9	3920.4	3.117	1868.7	3740.4	-180
7.73	3.266	1958.7	3918.6	3.112	1866	3734.7	-183.9
7.74	3.263	1957.5	3916.2	3.108	1863.3	3729.3	-186.9
7.74	3.262	1976.1	3933.6	3.103	1860.3	3723.6	-210
7.75	3.325	2038.2	4014.3	3.098	1857.3	3717.6	-296.7
7.76	3.469	2109.9	4148.1	3.093	1854.3	3711.6	-436.5
7.76	3.564	2154	4263.9	3.088	1851.3	3705.6	-558.3
7.77	3.616	2179.5	4333.5	3.083	1848.3	3699.6	-633.9
7.78	3.649	2195.1	4374.6	3.078	1845.3	3693.6	-681
7.78	3.668	2204.1	4399.2	3.073	1842.3	3687.6	-711.6
7.79	3.679	2209.2	4413.3	3.068	1839	3681.3	-732
7.80	3.685	2211.9	4421.1	3.062	1835.7	3674.7	-746.4
7.81	3.688	2213.4	4425.3	3.057	1832.7	3668.4	-756.9
7.81	3.69	2214.3	4427.7	3.052	1829.7	3662.4	-765.3
7.82	3.691	2214.6	4428.9	3.047	1826.7	3656.4	-772.5
7.83	3.691	2214.3	4428.9	3.042	1824	3650.7	-778.2
7.83	3.69	2214	4428.3	3.038	1821.3	3645.3	-783
7.84	3.69	2213.7	4427.7	3.033	1818.3	3639.6	-788.1
7.85	3.689	2213.1	4426.8	3.028	1815.3	3633.6	-793.2
7.85	3.688	2212.5	4425.6	3.023	1812.3	3627.6	-798
7.86	3.687	2211.9	4424.4	3.018	1809.3	3621.6	-802.8
7.87	3.686	2211.3	4423.2	3.013	1806.3	3615.6	-807.6
7.88	3.685	2211	4422.3	3.008	1803.3	3609.6	-812.7
7.88	3.685	2210.7	4421.7	3.003	1800.3	3603.6	-818.1
7.89	3.684	2210.1	4420.8	2.998	1797.3	3597.6	-823.2
7.90	3.683	2209.5	4419.6	2.993	1794.3	3591.6	-828
7.90	3.682	2208.9	4418.4	2.988	1791	3585.3	-833.1
7.91	3.681	2208.3	4417.2	2.982	1787.7	3578.7	-838.5
7.92	3.68	2207.7	4416	2.977	1784.4	3572.1	-843.9
7.92	3.679	2207.1	4414.8	2.971	1780.8	3565.2	-849.6
7.93	3.678	2206.8	4413.9	2.965	1777.2	3558	-855.9
7.94	3.678	2206.5	4413.3	2.959	1773.6	3550.8	-862.5
7.94	3.677	2205.9	4412.4	2.953	1770	3543.6	-868.8
7.95	3.676	2205.3	4411.2	2.947	1766.4	3536.4	-874.8
7.96	3.675	2204.7	4410	2.941	1762.8	3529.2	-880.8
7.97	3.674	2204.1	4408.8	2.935	1759.2	3522	-886.8
7.97	3.673	2203.5	4407.6	2.929	1755.6	3514.8	-892.8
7.98	3.672	2202.9	4406.4	2.923	1752	3507.6	-898.8
7.99	3.671	2202.6	4405.5	2.917	1748.4	3500.4	-905.1
7.99	3.671	2202.3	4404.9	2.911	1744.5	3492.9	-912
8.00	3.67	2201.7	4404	2.904	1740.6	3485.1	-918.9
8.01	3.669	2201.1	4402.8	2.898	1737	3477.6	-925.2
8.01	3.668	2200.5	4401.6	2.892	1733.1	3470.1	-931.5
8.02	3.667	2199.9	4400.4	2.885	1729.2	3462.3	-938.1
8.03	3.666	2199.3	4399.2	2.879	1725.6	3454.8	-944.4
8.03	3.665	2199	4398.3	2.873	1721.7	3447.3	-951
8.04	3.665	2198.7	4397.7	2.866	1717.8	3439.5	-958.2
8.05	3.664	2198.1	4396.8	2.86	1714.2	3432	-964.8
8.06	3.663	2197.5	4395.6	2.854	1710.6	3424.8	-970.8
8.06	3.662	2196.9	4394.4	2.848	1707	3417.6	-976.8
8.07	3.661	2196.3	4393.2	2.842	1703.7	3410.7	-982.5
8.08	3.66	2196	4392.3	2.837	1701	3404.7	-987.6
8.08	3.66	2195.7	4391.7	2.833	1698.6	3399.6	-992.1
8.09	3.659	2195.1	4390.8	2.829	1695.9	3394.5	-996.3
8.10	3.658	2194.5	4389.6	2.824	1693.2	3389.1	-1000.5
8.10	3.657	2193.9	4388.4	2.82	1690.5	3383.7	-1004.7
8.11	3.656	2193.6	4387.5	2.815	1687.8	3378.3	-1009.2
8.12	3.656	2193.3	4386.9	2.811	1685.1	3372.9	-1014
8.13	3.655	2192.7	4386	2.806	1682.4	3367.5	-1018.5
8.13	3.654	2192.1	4384.8	2.802	1679.7	3362.1	-1022.7
8.14	3.653	2191.5	4383.6	2.797	1676.7	3356.4	-1027.2
8.15	3.652	2191.2	4382.7	2.792	1674	3350.7	-1032
8.15	3.652	2190.9	4382.1	2.788	1671.3	3345.3	-1036.8
8.16	3.651	2190.3	4381.2	2.783	1668.6	3339.9	-1041.3
8.17	3.65	2189.7	4380	2.779	1665.9	3334.5	-1045.5
8.17	3.649	2189.1	4378.8	2.774	1663.2	3329.1	-1049.7
8.18	3.648	2188.8	4377.9	2.77	1660.5	3323.7	-1054.2
8.19	3.648	2188.5	4377.3	2.765	1657.5	3318	-1059.3
8.19	3.647	2187.9	4376.4	2.76	1654.5	3312	-1064.4
8.20	3.646	2187.3	4375.2	2.755	1651.8	3306.3	-1068.9
8.21	3.645	2187	4374.3	2.751	1649.1	3300.9	-1073.4
8.22	3.645	2186.7	4373.7	2.746	1646.4	3295.5	-1078.2
8.22	3.644	2186.1	4372.8	2.742	1643.7	3290.1	-1082.7
8.23	3.643	2185.5	4371.6	2.737	1640.7	3284.4	-1087.2
8.24	3.642	2185.2	4370.7	2.732	1638	3278.7	-1092
8.24	3.642	2184.9	4370.1	2.728	1635.3	3273.3	-1096.8
8.25	3.641	2184.3	4369.2	2.723	1632.3	3267.6	-1101.6
8.26	3.64	2183.7	4368	2.718	1629	3261.3	-1106.7
8.26	3.639	2183.4	4367.1	2.712	1625.7	3254.7	-1112.4
8.27	3.639	2183.1	4366.5	2.707	1622.7	3248.4	-1118.1
8.28	3.638	2182.5	4365.6	2.702	1619.4	3242.1	-1123.5
8.28	3.637	2182.2	4364.7	2.696	1616.1	3235.5	-1129.2
8.29	3.637	2181.9	4364.1	2.691	1612.8	3228.9	-1135.2
8.30	3.636	2181.6	4363.5	2.685	1609.5	3222.3	-1141.2
8.31	3.636	2181.3	4362.9	2.68	1606.2	3215.7	-1147.2
8.31	3.635	2181	4362.3	2.674	1602.6	3208.8	-1153.5
8.32	3.635	2180.7	4361.7	2.668	1599.3	3201.9	-1159.8
8.33	3.634	2141.1	4321.8	2.663	1596	3195.3	-1126.5
8.33	3.503	2058	4199.1	2.657	1592.4	3188.4	-1010.7
8.34	3.357	1986.6	4044.6	2.651	1588.8	3181.2	-863.4
8.35	3.265	1942.5	3929.1	2.645	1585.5	3174.3	-754.8
8.35	3.21	1916.4	3858.9	2.64	1582.2	3167.7	-691.2
8.36	3.178	1901.1	3817.5	2.634	1578.6	3160.8	-656.7
8.37	3.159	1892.4	3793.5	2.628	1575	3153.6	-639.9
8.38	3.149	1887	3779.4	2.622	1571.4	3146.4	-633
8.38	3.141	1883.1	3770.1	2.616	1567.8	3139.2	-630.9
8.39	3.136	1881	3764.1	2.61	1564.2	3132	-632.1
8.40	3.134	1880.1	3761.1	2.604	1560.9	3125.1	-636
8.40	3.133	1879.8	3759.9	2.599	1557.6	3118.5	-641.4
8.41	3.133	1879.5	3759.3	2.593	1554	3111.6	-647.7
8.42	3.132	1878.3	3757.8	2.587	1550.4	3104.4	-653.4
8.42	3.129	1876.5	3754.8	2.581	1546.8	3097.2	-657.6
8.43	3.126	1874.4	3750.9	2.575	1543.2	3090	-660.9
8.44	3.122	1872.6	3747	2.569	1539.6	3082.8	-664.2
8.44	3.12	1871.1	3743.7	2.563	1536	3075.6	-668.1
8.45	3.117	1869.6	3740.7	2.557	1532.7	3068.7	-672
8.46	3.115	1868.7	3738.3	2.552	1529.4	3062.1	-676.2
8.47	3.114	1867.8	3736.5	2.546	1525.8	3055.2	-681.3
8.47	3.112	1866.6	3734.4	2.54	1522.5	3048.3	-686.1
8.48	3.11	1865.7	3732.3	2.535	1519.5	3042	-690.3
8.49	3.109	1864.8	3730.5	2.53	1516.8	3036.3	-694.2
8.49	3.107	1863.6	3728.4	2.526	1514.1	3030.9	-697.5
8.50	3.105	1862.7	3726.3	2.521	1511.1	3025.2	-701.1
8.51	3.104	1861.8	3724.5	2.516	1508.1	3019.2	-705.3
8.51	3.102	1860.9	3722.7	2.511	1505.4	3013.5	-709.2
8.52	3.101	1860	3720.9	2.507	1502.7	3008.1	-712.8
8.53	3.099	1858.8	3718.8	2.502	1500	3002.7	-716.1
8.53	3.097	1857.9	3716.7	2.498	1497.6	2997.6	-719.1
8.54	3.096	1857	3714.9	2.494	1495.2	2992.8	-722.1
8.55	3.094	1855.8	3712.8	2.49	1492.8	2988	-724.8
8.56	3.092	1854.9	3710.7	2.486	1490.1	2982.9	-727.8
8.56	3.091	1854	3708.9	2.481	1487.1	2977.2	-731.7
8.57	3.089	1853.1	3707.1	2.476	1484.4	2971.5	-735.6
8.58	3.088	1852.2	3705.3	2.472	1481.7	2966.1	-739.2
8.58	3.086	1851.3	3703.5	2.467	1479	2960.7	-742.8
8.59	3.085	1850.7	3702	2.463	1476.6	2955.6	-746.4
8.60	3.084	1849.8	3700.5	2.459	1474.5	2951.1	-749.4
8.60	3.082	1848.9	3698.7	2.456	1472.7	2947.2	-751.5
8.61	3.081	1848	3696.9	2.453	1471.2	2943.9	-753
8.62	3.079	1847.1	3695.1	2.451	1469.7	2940.9	-754.2
8.63	3.078	1846.2	3693.3	2.448	1468.2	2937.9	-755.4
8.63	3.076	1845.3	3691.5	2.446	1466.7	2934.9	-756.6
8.64	3.075	1844.4	3689.7	2.443	1464.6	2931.3	-758.4
8.65	3.073	1843.5	3687.9	2.439	1462.5	2927.1	-760.8
8.65	3.072	1842.6	3686.1	2.436	1460.4	2922.9	-763.2
8.66	3.07	1841.7	3684.3	2.432	1458	2918.4	-765.9
8.67	3.069	1840.8	3682.5	2.428	1455.6	2913.6	-768.9
8.67	3.067	1839.9	3680.7	2.424	1452.9	2908.5	-772.2
8.68	3.066	1839	3678.9	2.419	1450.2	2903.1	-775.8
8.69	3.064	1838.1	3677.1	2.415	1447.8	2898	-779.1
8.69	3.063	1837.2	3675.3	2.411	1445.4	2893.2	-782.1
8.70	3.061	1836.3	3673.5	2.407	1443.3	2888.7	-784.8
8.71	3.06	1835.4	3671.7	2.404	1441.2	2884.5	-787.2
8.72	3.058	1834.5	3669.9	2.4	1439.1	2880.3	-789.6
8.72	3.057	1833.6	3668.1	2.397	1437	2876.1	-792
8.73	3.055	1832.7	3666.3	2.393	1434.6	2871.6	-794.7
8.74	3.054	1831.8	3664.5	2.389	1432.5	2867.1	-797.4
8.74	3.052	1830.9	3662.7	2.386	1430.7	2863.2	-799.5
8.75	3.051	1830.3	3661.2	2.383	1428.6	2859.3	-801.9
8.76	3.05	1829.4	3659.7	2.379	1426.2	2854.8	-804.9
8.76	3.048	1828.5	3657.9	2.375	1423.8	2850	-807.9
8.77	3.047	1827.6	3656.1	2.371	1421.1	2844.9	-811.2
8.78	3.045	1826.7	3654.3	2.366	1418.4	2839.5	-814.8
8.78	3.044	1825.8	3652.5	2.362	1415.7	2834.1	-818.4
8.79	3.042	1824.9	3650.7	2.357	1413	2828.7	-822
8.80	3.041	1824	3648.9	2.353	1410.3	2823.3	-825.6
8.81	3.039	1823.1	3647.1	2.348	1407.6	2817.9	-829.2
8.81	3.038	1822.2	3645.3	2.344	1405.2	2812.8	-832.5
8.82	3.036	1821	3643.2	2.34	1402.8	2808	-835.2
8.83	3.034	1820.1	3641.1	2.336	1400.7	2803.5	-837.6
8.83	3.033	1819.2	3639.3	2.333	1398.9	2799.6	-839.7
8.84	3.031	1818.3	3637.5	2.33	1396.8	2795.7	-841.8
8.85	3.03	1817.4	3635.7	2.326	1394.7	2791.5	-844.2
8.85	3.028	1816.5	3633.9	2.323	1392.6	2787.3	-846.6
8.86	3.027	1815.6	3632.1	2.319	1390.2	2782.8	-849.3
8.87	3.025	1814.7	3630.3	2.315	1387.5	2777.7	-852.6
8.88	3.024	1813.8	3628.5	2.31	1384.5	2772	-856.5
8.88	3.022	1812.9	3626.7	2.305	1381.2	2765.7	-861
8.89	3.021	1812.3	3625.2	2.299	1377.3	2758.5	-866.7

Data for Figure 7 and 8: Inflow Discharge Rates and Volumes to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area

Time (10 min increment) - DAYS	Existing Conditions Input @ Peltier (CFS)	Volume using average between time increment (CF)	Cumulative Volume (CF)	Proposed Conditions Input Discharge @ Peltier (CFS)	Volume using average between time increment CF	Cumulative Volume (CF)	Difference in Volume CF
8.90	3.02	1811.4	3623.7	2.292	1373.4	2750.7	-873
8.90	3.018	1810.5	3621.9	2.286	1370.1	2743.5	-878.4
8.91	3.017	1809.6	3620.1	2.281	1367.1	2737.2	-882.9
8.92	3.015	1808.7	3618.3	2.276	1364.4	2731.5	-886.8
8.92	3.014	1807.8	3616.5	2.272	1362	2726.4	-890.1
8.93	3.012	1806.9	3614.7	2.268	1359.3	2721.3	-893.4
8.94	3.011	1806	3612.9	2.263	1356	2715.3	-897.6
8.94	3.009	1805.1	3611.1	2.257	1352.1	2708.1	-903
8.95	3.008	1804.2	3609.3	2.25	1347.6	2699.7	-909.6
8.96	3.006	1803	3607.2	2.242	1343.4	2691	-916.2
8.97	3.004	1802.1	3605.1	2.236	1340.1	2683.5	-921.6
8.97	3.003	1801.2	3603.3	2.231	1337.4	2677.5	-925.8
8.98	3.001	1800.3	3601.5	2.227	1334.7	2672.1	-929.4
8.99	3	1799.4	3599.7	2.222	1331.7	2666.4	-933.3
8.99	2.998	1798.5	3597.9	2.217	1328.4	2660.1	-937.8
9.00	2.997	1797.6	3596.1	2.211	1325.1	2653.5	-942.6
9.01	2.995	1796.7	3594.3	2.206	1322.1	2647.2	-947.1
9.01	2.994	1795.8	3592.5	2.201	1319.1	2641.2	-951.3
9.02	2.992	1794.9	3590.7	2.196	1315.8	2634.9	-955.8
9.03	2.991	1794	3588.9	2.19	1312.5	2628.3	-960.6
9.03	2.989	1792.8	3586.8	2.185	1309.5	2622	-964.8
9.04	2.987	1791.9	3584.7	2.18	1306.2	2615.7	-969
9.05	2.986	1791	3582.9	2.174	1302.9	2609.1	-973.8
9.06	2.984	1790.1	3581.1	2.169	1299.6	2602.5	-978.6
9.06	2.983	1789.2	3579.3	2.163	1296.3	2595.9	-983.4
9.07	2.981	1788.3	3577.5	2.158	1293	2589.3	-988.2
9.08	2.98	1787.4	3575.7	2.152	1289.4	2582.4	-993.3
9.08	2.978	1786.5	3573.9	2.146	1285.8	2575.2	-998.7
9.09	2.977	1785.6	3572.1	2.14	1282.5	2568.3	-1003.8
9.10	2.975	1784.7	3570.3	2.135	1279.2	2561.7	-1008.6
9.10	2.974	1783.8	3568.5	2.129	1275.3	2554.5	-1014
9.11	2.972	1782.6	3566.4	2.122	1271.4	2546.7	-1019.7
9.12	2.97	1781.7	3564.3	2.116	1267.5	2538.9	-1025.4
9.13	2.969	1780.8	3562.5	2.109	1263.6	2531.1	-1031.4
9.13	2.967	1779.9	3560.7	2.103	1260	2523.6	-1037.1
9.14	2.966	1779	3558.9	2.097	1256.4	2516.4	-1042.5
9.15	2.964	1778.1	3557.1	2.091	1252.5	2508.9	-1048.2
9.15	2.963	1777.2	3555.3	2.084	1248.6	2501.1	-1054.2
9.16	2.961	1776.3	3553.5	2.078	1244.7	2493.3	-1060.2
9.17	2.96	1775.1	3551.4	2.071	1240.8	2485.5	-1065.9
9.17	2.957	1773.9	3549	2.065	1237.5	2478.3	-1070.7
9.18	2.956	1773	3546.9	2.06	1234.2	2471.7	-1075.2
9.19	2.954	1772.1	3545.1	2.054	1230.9	2465.1	-1080
9.19	2.953	1771.2	3543.3	2.049	1227.6	2458.5	-1084.8
9.20	2.951	1770.3	3541.5	2.043	1223.7	2451.3	-1090.2
9.21	2.95	1769.4	3539.7	2.036	1219.5	2443.2	-1096.5
9.22	2.948	1768.5	3537.9	2.029	1215.3	2434.8	-1103.1
9.22	2.947	1767.6	3536.1	2.022	1211.4	2426.7	-1109.4
9.23	2.945	1766.7	3534.3	2.016	1208.1	2419.5	-1114.8
9.24	2.944	1765.5	3532.2	2.011	1205.1	2413.2	-1119
9.24	2.941	1764.3	3529.8	2.006	1201.8	2406.9	-1122.9
9.25	2.94	1763.4	3527.7	2	1197.9	2399.7	-1128
9.26	2.938	1762.5	3525.9	1.993	1193.7	2391.6	-1134.3
9.26	2.937	1761.6	3524.1	1.986	1189.2	2382.9	-1141.2
9.27	2.935	1760.7	3522.3	1.978	1184.7	2373.9	-1148.4
9.28	2.934	1759.5	3520.2	1.971	1180.5	2365.2	-1155
9.28	2.931	1758.3	3517.8	1.964	1176.3	2356.8	-1161
9.29	2.93	1757.4	3515.7	1.957	1172.1	2348.4	-1167.3
9.30	2.928	1756.5	3513.9	1.95	1167.6	2339.7	-1174.2
9.31	2.927	1755.6	3512.1	1.942	1163.1	2330.7	-1181.4
9.31	2.925	1754.7	3510.3	1.935	1159.2	2322.3	-1188
9.32	2.924	1753.8	3508.5	1.929	1155.9	2315.1	-1193.4
9.33	2.922	1752.9	3506.7	1.924	1152.9	2308.8	-1197.9
9.33	2.921	1751.7	3504.6	1.919	1149.9	2302.8	-1201.8
9.34	2.918	1750.5	3502.2	1.914	1146.9	2296.8	-1205.4
9.35	2.917	1749.6	3500.1	1.909	1144.2	2291.1	-1209
9.35	2.915	1748.7	3498.3	1.905	1141.8	2286	-1212.3
9.36	2.914	1747.8	3496.5	1.901	1139.4	2281.2	-1215.3
9.37	2.912	1746.9	3494.7	1.897	1137	2276.4	-1218.3
9.38	2.911	1746	3492.9	1.893	1134.9	2271.9	-1221
9.38	2.909	1745.1	3491.1	1.89	1133.1	2268	-1223.1
9.39	2.908	1743.9	3489	1.887	1131	2264.1	-1224.9
9.40	2.905	1742.7	3486.6	1.883	1128.6	2259.6	-1227
9.40	2.904	1741.8	3484.5	1.879	1126.2	2254.8	-1229.7
9.41	2.902	1740.9	3482.7	1.875	1123.8	2250	-1232.7
9.42	2.901	1740	3480.9	1.871	1121.1	2244.9	-1236
9.42	2.899	1739.1	3479.1	1.866	1117.8	2238.9	-1240.2
9.43	2.898	1738.2	3477.3	1.86	1114.8	2232.6	-1244.7
9.44	2.896	1737.3	3475.5	1.856	1111.8	2226.6	-1248.9
9.44	2.895	1736.4	3473.7	1.85	1108.8	2220.6	-1253.1
9.45	2.893	1735.5	3471.9	1.846	1106.1	2214.9	-1257
9.46	2.892	1734.3	3469.8	1.841	1103.1	2209.2	-1260.6
9.47	2.889	1733.1	3467.4	1.836	1100.1	2203.2	-1264.2
9.47	2.888	1732.2	3465.3	1.831	1097.1	2197.2	-1268.1
9.48	2.886	1731.3	3463.5	1.826	1094.1	2191.2	-1272.3
9.49	2.885	1730.4	3461.7	1.821	1091.1	2185.2	-1276.5
9.49	2.883	1729.5	3459.9	1.816	1087.8	2178.9	-1281
9.50	2.882	1728.3	3457.8	1.81	1084.2	2172	-1285.8
9.51	2.879	1727.4	3455.7	1.804	1080.9	2165.1	-1290.6
9.51	2.879	1726.5	3453.9	1.799	1077.9	2158.8	-1295.1
9.52	2.876	1725.3	3451.8	1.794	1075.2	2153.1	-1298.7
9.53	2.875	1724.4	3449.7	1.79	1072.8	2148	-1301.7
9.53	2.873	1723.5	3447.9	1.786	1070.4	2143.2	-1304.7
9.54	2.872	1722.6	3446.1	1.782	1068.3	2138.7	-1307.4
9.55	2.87	1721.7	3444.3	1.779	1066.2	2134.5	-1309.8
9.56	2.869	1720.5	3442.2	1.775	1063.8	2130	-1312.2
9.56	2.866	1719.3	3439.8	1.771	1061.4	2125.2	-1314.6
9.57	2.865	1718.4	3437.7	1.767	1059	2120.4	-1317.3
9.58	2.863	1717.5	3435.9	1.763	1056.6	2115.6	-1320.3
9.58	2.862	1716.6	3434.1	1.759	1053.9	2110.5	-1323.6
9.59	2.86	1715.7	3432.3	1.754	1050.9	2104.8	-1327.5
9.60	2.859	1714.8	3430.5	1.749	1047.9	2098.8	-1331.7
9.60	2.857	1713.6	3428.4	1.744	1044.6	2092.5	-1335.9
9.61	2.855	1712.4	3426	1.738	1041.3	2085.9	-1340.1
9.62	2.853	1711.5	3423.9	1.733	1038	2079.3	-1344.6
9.63	2.852	1710.6	3422.1	1.727	1034.7	2072.7	-1349.4
9.63	2.85	1709.7	3420.3	1.722	1031.4	2066.1	-1354.2
9.64	2.849	1708.8	3418.5	1.716	1028.1	2059.5	-1359
9.65	2.847	1707.6	3416.4	1.711	1024.8	2052.9	-1363.5
9.65	2.845	1706.7	3414.3	1.705	1021.5	2046.3	-1368
9.66	2.844	1705.8	3412.5	1.7	1018.2	2039.7	-1372.8
9.67	2.842	1704.6	3410.4	1.694	1015.2	2033.4	-1377
9.67	2.84	1703.4	3408	1.69	1012.5	2027.7	-1380.3
9.68	2.838	1702.2	3405.6	1.685	1009.2	2021.7	-1383.9
9.69	2.836	1701.3	3403.5	1.679	1005.9	2015.1	-1388.4
9.69	2.835	1702.8	3404.1	1.674	1003.2	2009.1	-1395
9.70	2.841	1706.1	3408.9	1.67	1000.5	2003.7	-1405.2
9.71	2.846	1708.8	3414.9	1.665	997.8	1998.3	-1416.6
9.72	2.85	1710	3418.8	1.661	995.4	1993.2	-1425.6
9.72	2.85	1710	3420	1.657	993	1988.4	-1431.6
9.73	2.85	1709.1	3419.1	1.653	990.9	1983.9	-1435.2
9.74	2.847	1707.9	3417	1.65	988.8	1979.7	-1437.3
9.74	2.846	1707	3414.9	1.646	986.7	1975.5	-1439.4
9.75	2.844	1705.8	3412.8	1.643	984.9	1971.6	-1441.2
9.76	2.842	1704.6	3410.4	1.64	983.1	1968	-1442.4
9.76	2.84	1703.7	3408.3	1.637	981.3	1964.4	-1443.9
9.77	2.839	1702.5	3406.2	1.634	979.2	1960.5	-1445.7
9.78	2.836	1701.3	3403.8	1.63	977.1	1956.3	-1447.5
9.78	2.835	1700.4	3401.7	1.627	975.3	1952.4	-1449.3
9.79	2.833	1699.2	3399.6	1.624	973.5	1948.8	-1450.8
9.80	2.831	1698	3397.2	1.621	971.7	1945.2	-1452
9.81	2.829	1696.8	3394.8	1.618	969.9	1941.6	-1453.2
9.81	2.827	1695.9	3392.7	1.615	967.8	1937.7	-1455
9.82	2.826	1694.7	3390.6	1.611	965.4	1933.2	-1457.4
9.83	2.823	1693.5	3388.2	1.607	963	1928.4	-1459.8
9.83	2.822	1692.6	3386.1	1.603	960.6	1923.6	-1462.5
9.84	2.82	1691.4	3384	1.599	957.9	1918.5	-1465.5
9.85	2.818	1690.2	3381.6	1.594	954.9	1912.8	-1468.8
9.85	2.816	1689.3	3379.5	1.589	952.2	1907.1	-1472.4
9.86	2.815	1688.1	3377.4	1.585	949.5	1901.7	-1475.7
9.87	2.812	1686.9	3375	1.58	946.5	1896	-1479
9.88	2.811	1685.7	3372.6	1.575	943.8	1890.3	-1482.3
9.88	2.808	1684.5	3370.2	1.571	941.4	1885.2	-1485
9.89	2.807	1683.6	3368.1	1.567	939	1880.4	-1487.7
9.90	2.805	1682.4	3366	1.563	936.6	1875.6	-1490.4
9.90	2.803	1681.2	3363.6	1.559	934.5	1871.1	-1492.5
9.91	2.801	1680.3	3361.5	1.556	932.7	1867.2	-1494.3
9.92	2.8	1679.4	3359.7	1.553	930.9	1863.6	-1496.1
9.92	2.798	1678.2	3357.6	1.55	929.1	1860	-1497.6
9.93	2.796	1677	3355.2	1.547	927.3	1856.4	-1498.8
9.94	2.794	1675.8	3352.8	1.544	925.8	1853.1	-1499.7
9.94	2.792	1674.9	3350.7	1.542	924.3	1850.1	-1500.6
9.95	2.791	1673.7	3348.6	1.539	922.5	1846.8	-1501.8
9.96	2.788	1672.5	3346.2	1.536	920.7	1843.2	-1503
9.97	2.787	1671.9	3344.4	1.533	918.9	1839.6	-1504.8
9.97	2.786	1673.4	3345.3	1.53	917.4	1836.3	-1509
9.98	2.792	1676.1	3349.5	1.528	915.9	1833.3	-1516.2
9.99	2.795	1676.1	3352.2	1.525	914.1	1830	-1522.2
9.99	2.792	1673.4	3349.5	1.522	912.3	1826.4	-1523.1
10.00	2.786	1670.1	3343.5	1.519	910.2	1822.5	-1521
10.01	2.781	1667.4	3337.5	1.515	908.1	1818.3	-1519.2
10.01	2.777	1665	3332.4	1.512	906.3	1814.4	-1518
10.02	2.773	1663.2	3328.2	1.509	904.5	1810.8	-1517.4
10.03	2.771	1661.7	3324.9	1.506	902.7	1807.2	-1517.7
10.03	2.768	1660.5	3322.2	1.503	900.9	1803.6	-1518.6
10.04	2.767	1659.3	3319.8	1.5	899.1	1800	-1519.8
10.05	2.764	1658.1	3317.4	1.497	897.3	1796.4	-1521
10.06	2.763	1656.9	3315	1.494	895.5	1792.8	-1522.2
10.06	2.76	1655.7	3312.6	1.491	893.7	1789.2	-1523.4
10.07	2.759	1654.5	3310.2	1.488	892.2	1785.9	-1524.3
10.08	2.756	1653	3307.5	1.486	890.7	1782.9	-1524.6
10.08	2.754	1652.1	3305.1	1.483	888.9	1779.6	-1525.5
10.09	2.753	1650.9	3303	1.48	887.4	1776.3	-1526.7
10.10	2.75	1649.7	3300.6	1.478	885.9	1773.3	-1527.3
10.10	2.749	1648.5	3298.2	1.475	884.1	1770	-1528.2
10.11	2.746	1647.3	3295.8	1.472	882.6	1766.7	-1529.1
10.12	2.745	1646.1	3293.4	1.47	881.4	1764	-1529.4
10.13	2.742	1644.9	3291	1.468	879.9	1761.3	-1529.7
10.13	2.741	1644	3288.9	1.465	878.4	1758.3	-1530.6
10.14	2.739	1642.8	3286.8	1.463	877.2	1755.6	-1531.2
10.15	2.737	1641.6	3284.4	1.461	876.3	1753.5	-1530.9
10.15	2.735	1640.4	3282	1.46	876.3	1752.6	-1529.4
10.16	2.733	1639.2	3279.6	1.461	876.6	1752.9	-1526.7

Data for Figure 7 and 8: Inflow Discharge Rates and Volumes to Peltier Lake from NE Lino Watershed and Direct Tributary Drainage Area

Time (10 min increment) - DAYS	Existing Conditions Input @ Peltier (CFS)	Volume using average between time increment (CF)	Cumulative Volume (CF)	Proposed Conditions Input Discharge @ Peltier (CFS)	Volume using average between time increment CF	Cumulative Volume (CF)	Difference in Volume CF
10.17	2.731	1638	3277.2	1.461	876.9	1753.5	-1523.7
10.17	2.729	1637.1	3275.1	1.462	877.2	1754.1	-1521
10.18	2.728	1635.9	3273	1.462	876.9	1754.1	-1518.9
10.19	2.725	1634.7	3270.6	1.461	876.3	1753.2	-1517.4
10.19	2.724	1633.5	3268.2	1.46	875.7	1752	-1516.2
10.20	2.721	1632.3	3265.8	1.459	874.8	1750.5	-1515.3
10.21	2.72	1631.1	3263.4	1.457	873.3	1748.1	-1515.3
10.22	2.717	1629.6	3260.7	1.454	871.5	1744.8	-1515.9
10.22	2.715	1628.7	3258.3	1.451	869.7	1741.2	-1517.1
10.23	2.714	1627.5	3256.2	1.448	867.9	1737.6	-1518.6
10.24	2.711	1626.3	3253.8	1.445	866.1	1734	-1519.8
10.24	2.71	1624.8	3251.1	1.442	864	1730.1	-1521
10.25	2.706	1623.3	3248.1	1.438	1242.9	2106.9	-1141.2
10.26	2.705	1622.1	3245.4	2.705	1622.1	2865	-380.4
10.26	2.702	1620.9	3243	2.702	1620.9	3243	0
10.27	2.701	1620	3240.9	2.701	1620	3240.9	0
10.28	2.699	1618.8	3238.8	2.699	1618.8	3238.8	0
10.28	2.697	1617.3	3236.1	2.697	1617.3	3236.1	0
10.29	2.694	1615.5	3232.8	2.694	1615.5	3232.8	0
10.30	2.691	1613.7	3229.2	2.691	1613.7	3229.2	0
10.31	2.688	1611	3224.7	2.688	1611	3224.7	0
10.31	2.682	1608.3	3219.3	2.682	1608.3	3219.3	0
10.32	2.679	1605.6	3213.9	2.679	1605.6	3213.9	0
10.33	2.673	1602.6	3208.2	2.673	1602.6	3208.2	0
10.33	2.669	1599.6	3202.2	2.669	1599.6	3202.2	0
10.34	2.663	1596.3	3195.9	2.663	1596.3	3195.9	0
10.35	2.658	1593.6	3189.9	2.658	1593.6	3189.9	0
10.35	2.654	1590.6	3184.2	2.654	1590.6	3184.2	0
10.36	2.648	1587.6	3178.2	2.648	1587.6	3178.2	0
10.37	2.644	1584.6	3172.2	2.644	1584.6	3172.2	0
10.38	2.638	1581.9	3166.5	2.638	1581.9	3166.5	0
10.38	2.635	1579.2	3161.1	2.635	1579.2	3161.1	0
10.39	2.629	1576.2	3155.4	2.629	1576.2	3155.4	0
10.40	2.625	1573.8	3150	2.625	1573.8	3150	0
10.40	2.621	1570.8	3144.6	2.621	1570.8	3144.6	0
10.41	2.615	1568.1	3138.9	2.615	1568.1	3138.9	0
10.42	2.612	1565.4	3133.5	2.612	1565.4	3133.5	0
10.42	2.606	1562.7	3128.1	2.606	1562.7	3128.1	0
10.43	2.603	1560.3	3123	2.603	1560.3	3123	0
10.44	2.598	1557.9	3118.2	2.598	1557.9	3118.2	0
10.44	2.595	1555.8	3113.7	2.595	1555.8	3113.7	0
10.45	2.591	1552.8	3108.6	2.591	1552.8	3108.6	0
10.46	2.585	1550.4	3103.2	2.585	1550.4	3103.2	0
10.47	2.583	1548	3098.4	2.583	1548	3098.4	0
10.47	2.577	1545.6	3093.6	2.577	1545.6	3093.6	0
10.48	2.575	1543.5	3089.1	2.575	1543.5	3089.1	0
10.49	2.57	1541.1	3084.6	2.57	1541.1	3084.6	0
10.49	2.567	1539	3080.1	2.567	1539	3080.1	0
10.50	2.563	1536.3	3075.3	2.563	1536.3	3075.3	0
10.51	2.558	1534.2	3070.5	2.558	1534.2	3070.5	0
10.51	2.556	1532.1	3066.3	2.556	1532.1	3066.3	0
10.52	2.551	1530	3062.1	2.551	1530	3062.1	0
10.53	2.549	1528.2	3058.2	2.549	1528.2	3058.2	0
10.53	2.545	1525.8	3054	2.545	1525.8	3054	0
10.54	2.541	1523.7	3049.5	2.541	1523.7	3049.5	0
10.55	2.538	1521.3	3045	2.538	1521.3	3045	0
10.56	2.533	1519.5	3040.8	2.533	1519.5	3040.8	0
10.56	2.532	1517.7	3037.2	2.532	1517.7	3037.2	0
10.57	2.527	1515.3	3033	2.527	1515.3	3033	0
10.58	2.524	1513.5	3028.8	2.524	1513.5	3028.8	0
10.58	2.521	1511.4	3024.9	2.521	1511.4	3024.9	0
10.59	2.517	1509.6	3021	2.517	1509.6	3021	0
10.60	2.515	1507.5	3017.1	2.515	1507.5	3017.1	0
10.60	2.51	1505.7	3013.2	2.51	1505.7	3013.2	0
10.61	2.509	1504.2	3009.9	2.509	1504.2	3009.9	0
10.62	2.505	1501.8	3006	2.505	1501.8	3006	0
10.63	2.501	1500	3001.8	2.501	1500	3001.8	0
10.63	2.499	1498.2	2998.2	2.499	1498.2	2998.2	0
10.64	2.495	1496.4	2994.6	2.495	1496.4	2994.6	0
10.65	2.493	1494.9	2991.3	2.493	1494.9	2991.3	0
10.65	2.49	1493.1	2988	2.49	1493.1	2988	0
10.66	2.487	1491.3	2984.4	2.487	1491.3	2984.4	0
10.67	2.484	1489.2	2980.5	2.484	1489.2	2980.5	0
10.67	2.48	1487.7	2976.9	2.48	1487.7	2976.9	0
10.68	2.479	1486.2	2973.9	2.479	1486.2	2973.9	0
10.69	2.475	1484.4	2970.6	2.475	1484.4	2970.6	0
10.69	2.473	1482.9	2967.3	2.473	1482.9	2967.3	0
10.70	2.47	1480.8	2963.7	2.47	1480.8	2963.7	0
10.71	2.466	1479.3	2960.1	2.466	1479.3	2960.1	0
10.72	2.465	1477.8	2957.1	2.465	1477.8	2957.1	0
10.72	2.461	1476.3	2954.1	2.461	1476.3	2954.1	0
10.73	2.46	1475.1	2951.4	2.46	1475.1	2951.4	0
10.74	2.457	1473.3	2948.4	2.457	1473.3	2948.4	0
10.74	2.454	1471.8	2945.1	2.454	1471.8	2945.1	0
10.75	2.452	1470	2941.8	2.452	1470	2941.8	0
10.76	2.448	1468.5	2938.5	2.448	1468.5	2938.5	0
10.76	2.447	1467.3	2935.8	2.447	1467.3	2935.8	0
10.77	2.444	1465.5	2932.8	2.444	1465.5	2932.8	0
10.78	2.441	1464.3	2929.8	2.441	1464.3	2929.8	0
10.78	2.44	1462.8	2927.1	2.44	1462.8	2927.1	0
10.79	2.436	1461.3	2924.1	2.436	1461.3	2924.1	0
10.80	2.435	1460.1	2921.4	2.435	1460.1	2921.4	0
10.81	2.432	1458.3	2918.4	2.432	1458.3	2918.4	0
10.81	2.429	1457.1	2915.4	2.429	1457.1	2915.4	0
10.82	2.428	1455.9	2913	2.428	1455.9	2913	0
10.83	2.425	1454.7	2910.6	2.425	1454.7	2910.6	0
10.83	2.424	1453.5	2908.2	2.424	1453.5	2908.2	0
10.84	2.421	1451.7	2905.2	2.421	1451.7	2905.2	0
10.85	2.418	1450.5	2902.2	2.418	1450.5	2902.2	0
10.85	2.417	1449.3	2899.8	2.417	1449.3	2899.8	0
10.86	2.414	1448.1	2897.4	2.414	1448.1	2897.4	0
10.87	2.413	1446.9	2895	2.413	1446.9	2895	0
10.88	2.41	1445.1	2892	2.41	1445.1	2892	0
10.88	2.407	1444.2	2889.3	2.407	1444.2	2889.3	0
10.89	2.407	1443	2887.2	2.407	1443	2887.2	0
10.90	2.403	1441.5	2884.5	2.403	1441.5	2884.5	0
10.90	2.402	1440.6	2882.1	2.402	1440.6	2882.1	0
10.91	2.4	1439.1	2879.7	2.4	1439.1	2879.7	0
10.92	2.397	1438.2	2877.3	2.397	1438.2	2877.3	0
10.92	2.397	1437	2875.2	2.397	1437	2875.2	0
10.93	2.393	1435.5	2872.5	2.393	1435.5	2872.5	0
10.94	2.392	1434.6	2870.1	2.392	1434.6	2870.1	0
10.94	2.39	1433.1	2867.7	2.39	1433.1	2867.7	0
10.95	2.387	1432.2	2865.3	2.387	1432.2	2865.3	0
10.96	2.387	1431.3	2863.5	2.387	1431.3	2863.5	0
10.97	2.384	1429.8	2861.1	2.384	1429.8	2861.1	0
10.97	2.382	1428.9	2858.7	2.382	1428.9	2858.7	0
10.98	2.381	1427.7	2856.6	2.381	1427.7	2856.6	0
10.99	2.378	713.4	2141.1	2.378	713.4	2141.1	0
Total CF		43580266			62881742.4		
Total AF		**1000.47**			1443.57		

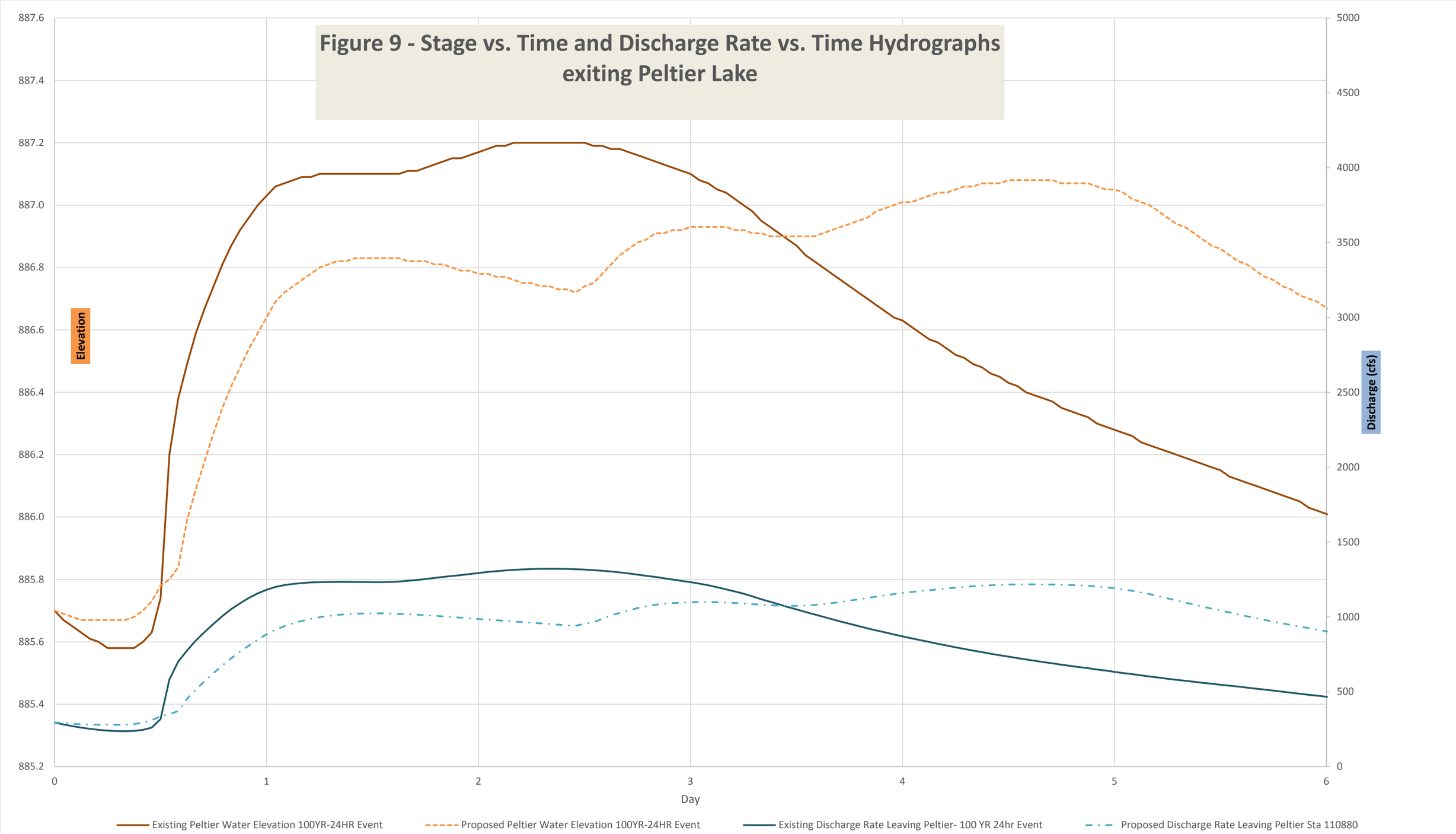
Figure 9 - Stage vs. Time and Discharge Rate vs. Time Hydrographs exiting Peltier Lake
Elevation
Discharge (cfs)
Day
887.6
887.4
887.2
887.0
886.8
886.6
886.4
886.2
886.0
885.8
885.6
885.4
885.2
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0
1
2
3
4
5
6
Existing Peltier Water Elevation 100YR-24HR Event
Proposed Peltier Water Elevation 100YR-24HR Event
Existing Discharge Rate Leaving Peltier- 100 YR 24hr Event
Proposed Discharge Rate Leaving Peltier Sta 110880

TABLE XXX EXISTING VS. PROPOSED WATER ELEVATION AND DISCHARGE RATE LEAVING PELTIER

Time (1 hr increment) DAYS	Existing Peltier Water Elevation 100YR-24HR Event	Proposed Peltier Water Elevation 100YR-24HR Event	Existing Discharge Rate Leaving Peltier- 100 YR 24hr Event	Proposed Discharge Rate Leaving Peltier Sta 110880	Difference
0.00	885.7	885.7	294.92	294.86	0.06
0.04	885.67	885.69	281.32	292.29	-10.97
0.08	885.65	885.68	270.45	286.14	-15.69
0.13	885.63	885.67	260.63	282.83	-22.2
0.17	885.61	885.67	252.07	281.1	-29.03
0.21	885.6	885.67	245.28	279.74	-34.46
0.25	885.58	885.67	240.21	281.39	-41.18
0.29	885.58	885.67	237.07	279.49	-42.42
0.33	885.58	885.67	236.25	279.89	-43.64
0.38	885.58	885.68	238.28	284.44	-46.16
0.42	885.6	885.7	245.48	293.91	-48.43
0.46	885.63	885.73	260.59	309.37	-48.78
0.50	885.74	885.78	317.06	336.73	-19.67
0.54	886.2	885.8	582.33	350.15	232.18
0.58	886.38	885.84	701.86	370.4	331.46
0.63	886.49	885.99	776.23	452.42	323.81
0.67	886.59	886.09	842.71	514.32	328.39
0.71	886.67	886.18	899.95	571.38	328.57
0.75	886.74	886.27	954.34	625.12	329.22
0.79	886.81	886.35	1005.64	676	329.64
0.83	886.87	886.42	1051.54	723.7	327.84
0.88	886.92	886.48	1091.37	767.88	323.49
0.92	886.96	886.54	1126.58	808.87	317.71
0.96	887	886.59	1157.25	847.57	309.68
1.00	887.03	886.64	1181.55	883.66	297.89
1.04	887.06	886.69	1200.32	914.68	285.64
1.08	887.07	886.72	1212.02	937.5	274.52
1.13	887.08	886.74	1220.38	956.6	263.78
1.17	887.09	886.76	1226.18	972.99	253.19
1.21	887.09	886.78	1229.99	986.8	243.19
1.25	887.1	886.8	1232.34	997.88	234.46
1.29	887.1	886.81	1233.55	1006.45	227.1
1.33	887.1	886.82	1234.17	1012.99	221.18
1.38	887.1	886.82	1233.83	1017.82	216.01
1.42	887.1	886.83	1233.57	1021.12	212.45
1.46	887.1	886.83	1233.21	1023.07	210.14
1.50	887.1	886.83	1232.18	1023.87	208.31
1.54	887.1	886.83	1231.98	1023.55	208.43
1.58	887.1	886.83	1232.87	1022.34	210.53
1.63	887.1	886.83	1235.87	1020.36	215.51
1.67	887.11	886.82	1240.77	1017.82	222.95
1.71	887.11	886.82	1246.41	1014.77	231.64
1.75	887.12	886.82	1252.92	1011.32	241.6
1.79	887.13	886.81	1259.8	1007.52	252.28
1.83	887.14	886.81	1266.7	1003.45	263.25
1.88	887.15	886.8	1273.34	999.18	274.16
1.92	887.15	886.79	1279.47	994.73	284.74
1.96	887.16	886.79	1285.79	990.32	295.47
2.00	887.17	886.78	1293.03	985.89	307.14
2.04	887.18	886.78	1299.89	981.57	318.32
2.08	887.19	886.77	1305.63	977.46	328.17
2.13	887.19	886.77	1310.32	973.39	336.93
2.17	887.2	886.76	1314.02	969.18	344.84
2.21	887.2	886.75	1317	965.07	351.93
2.25	887.2	886.75	1319.35	960.92	358.43
2.29	887.2	886.74	1320.72	956.77	363.95
2.33	887.2	886.74	1321.24	952.58	368.66
2.38	887.2	886.73	1321.04	948.28	372.76
2.42	887.2	886.73	1320.05	944.4	375.65
2.46	887.2	886.72	1318.28	941.2	377.08
2.50	887.2	886.74	1315.73	953.82	361.91
2.54	887.19	886.75	1312.37	965.14	347.23
2.58	887.19	886.78	1308.18	986.06	322.12
2.63	887.18	886.81	1303.12	1010.49	292.63
2.67	887.18	886.84	1297.02	1027	270.02
2.71	887.17	886.86	1290.23	1043.11	247.12
2.75	887.16	886.88	1282.14	1058.91	223.23

TABLE XXX EXISTING VS. PROPOSED WATER ELEVATION AND DISCHARGE RATE LEAVING PELTIER

Time (1 hr increment) DAYS	Existing Peltier Water Elevation 100YR-24HR Event	Proposed Peltier Water Elevation 100YR-24HR Event	Existing Discharge Rate Leaving Peltier- 100 YR 24hr Event	Proposed Discharge Rate Leaving Peltier Sta 110880	Difference
2.79	887.15	886.89	1274.28	1071.71	202.57
2.83	887.14	886.91	1266.65	1080.99	185.66
2.88	887.13	886.91	1258.06	1087.74	170.32
2.92	887.12	886.92	1249.2	1092.17	157.03
2.96	887.11	886.92	1240.51	1095.41	145.1
3.00	887.1	886.93	1231.89	1097.52	134.37
3.04	887.08	886.93	1222.4	1099.41	122.99
3.08	887.07	886.93	1211.24	1099.78	111.46
3.13	887.05	886.93	1198.13	1098.36	99.77
3.17	887.04	886.93	1184.21	1096.18	88.03
3.21	887.02	886.92	1169.94	1092.56	77.38
3.25	887	886.92	1154.8	1088.86	65.94
3.29	886.98	886.91	1137.01	1085.09	51.92
3.33	886.95	886.91	1118.51	1081.28	37.23
3.38	886.93	886.9	1100.89	1077.83	23.06
3.42	886.91	886.9	1083.74	1075.46	8.28
3.46	886.89	886.9	1066.46	1074.26	-7.8
3.50	886.87	886.9	1049.8	1074.44	-24.64
3.54	886.84	886.9	1033.08	1076.03	-42.95
3.58	886.82	886.9	1016.58	1079.67	-63.09
3.63	886.8	886.91	1000.65	1085	-84.35
3.67	886.78	886.92	984.48	1092.33	-107.85
3.71	886.76	886.93	969.08	1100.3	-131.22
3.75	886.74	886.94	953.7	1108.66	-154.96
3.79	886.72	886.95	938.77	1117.31	-178.54
3.83	886.7	886.96	924.36	1126.22	-201.86
3.87	886.68	886.98	910.29	1135.52	-225.23
3.92	886.66	886.99	896.63	1143.81	-247.18
3.96	886.64	887	883.17	1151.96	-268.79
4.00	886.63	887.01	870.08	1159.61	-289.53
4.04	886.61	887.01	857.19	1166.4	-309.21
4.08	886.59	887.02	844.55	1172.88	-328.33
4.12	886.57	887.03	832.57	1178.35	-345.78
4.17	886.56	887.04	820.33	1184.02	-363.69
4.21	886.54	887.04	808.49	1189.92	-381.43
4.25	886.52	887.05	797.28	1195.42	-398.14
4.29	886.51	887.06	785.86	1200.31	-414.45
4.33	886.49	887.06	775.12	1204.62	-429.5
4.38	886.48	887.07	764.56	1208.29	-443.73
4.42	886.46	887.07	753.86	1211.28	-457.42
4.46	886.45	887.07	744	1213.68	-469.68
4.50	886.43	887.08	734.35	1215.72	-481.37
4.54	886.42	887.08	724.9	1216.74	-491.84
4.58	886.4	887.08	715.66	1217.36	-501.7
4.63	886.39	887.08	706.62	1217.13	-510.51
4.67	886.38	887.08	697.81	1216.75	-518.94
4.71	886.37	887.08	689.61	1215.92	-526.31
4.75	886.35	887.07	681.13	1214.62	-533.49
4.79	886.34	887.07	673.21	1212.98	-539.77
4.83	886.33	887.07	665.18	1210.88	-545.7
4.88	886.32	887.07	657.44	1207.85	-550.41
4.92	886.3	887.06	649.18	1203.35	-554.17
4.96	886.29	887.05	641.24	1197.6	-556.36
5.00	886.28	887.05	633.21	1191.13	-557.92
5.04	886.27	887.04	625.22	1182.89	-557.67
5.08	886.26	887.02	617.26	1173.7	-556.44
5.13	886.24	887.01	609.35	1163.3	-553.95
5.17	886.23	887	601.58	1151.87	-550.29
5.21	886.22	886.98	594.36	1138.12	-543.76
5.25	886.21	886.96	586.95	1123.69	-536.74
5.29	886.2	886.94	580.08	1109.89	-529.81
5.33	886.19	886.93	573.33	1096	-522.67
5.38	886.18	886.91	566.65	1082.3	-515.65
5.42	886.17	886.89	559.77	1068.7	-508.93
5.46	886.16	886.87	553.45	1055.3	-501.85
5.50	886.15	886.86	547.14	1042.52	-495.38
5.54	886.13	886.84	540.83	1029.66	-488.83

TABLE XXX EXISTING VS. PROPOSED WATER ELEVATION AND DISCHARGE RATE LEAVING PELTIER

Time (1 hr increment) DAYS	Existing Peltier Water Elevation 100YR-24HR Event	Proposed Peltier Water Elevation 100YR-24HR Event	Existing Discharge Rate Leaving Peltier- 100 YR 24hr Event	Proposed Discharge Rate Leaving Peltier Sta 110880	Difference
5.58	886.12	886.82	534.4	1016.8	-482.4
5.63	886.11	886.81	527.6	1004.18	-476.58
5.67	886.1	886.79	521.04	991.82	-470.78
5.71	886.09	886.77	514.3	979.83	-465.53
5.75	886.08	886.76	507.38	968.07	-460.69
5.79	886.07	886.74	500.19	956.78	-456.59
5.83	886.06	886.73	493.35	945.8	-452.45
5.88	886.05	886.71	486.6	935.14	-448.54
5.92	886.03	886.7	479.68	924.82	-445.14
5.96	886.02	886.69	473.24	914.38	-441.14
6.00	886.01	886.67	466.67	904.21	-437.54
6.04	886	886.66	460.49	894.42	-433.93
6.08	885.99	886.65	453.19	884.82	-431.63
6.13	885.98	886.63	445.8	875.1	-429.3
6.17	885.96	886.62	438.84	865.98	-427.14
6.21	885.95	886.61	432.74	857.29	-424.55
6.25	885.94	886.6	426.66	848.6	-421.94
6.29	885.93	886.58	420.87	840.48	-419.61
6.33	885.92	886.57	415.68	832.5	-416.82
6.38	885.91	886.56	410.42	824.94	-414.52
6.42	885.9	886.55	405.39	817.52	-412.13
6.46	885.9	886.54	400.58	810.5	-409.92
6.50	885.89	886.53	395.99	803.23	-407.24
6.54	885.88	886.52	391.55	795.88	-404.33
6.58	885.87	886.51	387.22	788.82	-401.6
6.63	885.86	886.5	383.06	781.82	-398.76
6.67	885.86	886.49	378.85	774.95	-396.1
6.71	885.85	886.48	374.77	768.49	-393.72
6.75	885.84	886.47	370.79	761.98	-391.19
6.79	885.83	886.46	366.86	755.04	-388.18
6.83	885.83	886.45	363.02	748.12	-385.1
6.88	885.82	886.44	359.25	741.46	-382.21
6.92	885.81	886.43	355.6	734.92	-379.32
6.96	885.81	886.42	352.05	728.32	-376.27

APPENDIX A

WSB & Associates, Inc.
engineering • planning • environmental • construction

701 Xenia Avenue South
Suite 300
Minneapolis, MN 55416
Tel: 763-541-4800
Fax: 763-541-1700

Memorandum

To: ***Nicholas Tomczik, Rice Creek Watershed District***

From: ***Alison Harwood, WSB & Associates, Inc.***
Dustin Simonson, WSB & Associates, Inc.

CC: ***Pete Willenbring, WSB & Associates, Inc.***

Date: ***January 22, 2015***

Re: ***Outlet Alternatives***
Northeast Area Drainage Study
WSB Project No. 2029-79

The City of Lino Lakes is proposing to create a drainage channel between Interstate 35E (I-35E) and Peltier Lake. Lino Lakes is considering different alternatives to complete this project.

Two pipe options are being looked at for placement within the Mattamy Homes parcel. These are listed as Eastern Pipe Option 1 and 2 on the attached **Figure 2**. Eastern Pipe Option 1 flows northwest through the Mattamy Homes parcel until it straightens out on the north end and under 20th Avenue. Eastern Pipe Option 2 starts in the same location as Eastern Pipe Option 1. From there Option 2 will flow southwest and continue under 20th Avenue. West of 20th Avenue, multiple options for continuing the drainage are available. These options are summarized below:

Proposed Action:
The proposed action is to create a drainage channel from I-35E to Peltier Lake.

Project Purpose and Need
The purpose of the project is to address a failing tile and ditch system that currently exists west of I-35E within the benefitted area. The design generally consists of the installation of a 48 inch pipe under I-35E to carry water overflowing from the watersheds east of I-35E to the west toward Peltier Lake. The pipe size is then upsized to a 72 inch to carry water from areas tributary to the system on the west side of I-35E to Peltier Lake.

Wetland Review
Wetlands within the project area were determined using both Level 1 and Level 2 methods. Level 2 wetland delineations were received from Rice Creek Watershed District for various locations within the project area. Remaining areas adjacent to the proposed alternatives were evaluated using Level 1 methods, which included an aerial photo review (1991 – 2013) and review of desktop data (NWI, DNR Public Waters, Soil Survey, Contours). **Figure 1** shows the

data used in the Level 1 analysis along with the proposed wetland boundaries. Historic aerial photos of the area are attached (**Appendix B**).

The alternatives analysis also considered the Wetland Preservation Corridor that has been established by the City of Lino Lakes.

Based on the results of the Level 1 delineation, a Level 2 delineation may need to be performed during the growing season adjacent to the preferred pipe alignment. This will ensure that the pipe is placed in a manner that avoids or minimizes wetland impacts.

Sequencing Analysis
WSB & Associates has completed an analysis of a range of alternatives consistent with WCA Rules 8420.0325 and 8420.0520.

The preferred alternative will ultimately connect to a system under I-35E. The preferred alternative will collect overflow from this system; therefore impacts to wetlands east of I-35W are not anticipated.

Major differences between the alternatives west of I-35E are based on pipe or open channel options. Alternative impact comparisons are detailed in **Table 1**. Each of the alternatives described below are shown on **Figure 2**.

Alternative 1:
Western Pipe/Open Channel Option 1 (Northern-most option): This option will use Eastern Pipe Option 1. At the 20th Avenue connection a pipe or open channel will connect to the eastern pipe and continue its flow west to Peltier Lake. The individual benefits and drawback of this option area summarized below and shown on the attached figure:

Benefits of this option:
- Minimal temporary wetland impacts anticipated with pipe placement. Because a pipe would be used, no secondary impacts resulting from lateral effect area expected.
- No impacts to Wetland Preservation Corridor.

Drawbacks of this option:
- Wetland impacts could occur with an open channel option as a result of secondary drainage (lateral effect). This effect would need to be calculated and impacts would require replacement at an estimated 2:1 ratio.
- More difficult to get drainage from southern portion of western parcel to the north.
- Western parcel property owner prefers an option that utilizes more of the low land to the south of the parcel.
- Private property impacts to the parcels north of the boundary are possible.

Alternative 2/4:
Western Pipe Option 2 & 4 (central pipe): Through the Mattamy Homes parcel, the pipe could use Eastern Pipe Option 1 or Eastern Pipe Option 2. The Eastern Pipe Option 2 is likely the more appropriate connection. The pipes would then connect to the western parcel under 20th Avenue. From 20th Avenue, the piping could go one of two ways using Western Pipe Option 2 or

Western Pipe Option 4. Option 2 in the western parcel would skirt north around a large wetland and continue to Peltier Lake. Option 4 in the western parcel would skirt south around a large wetland and continue to Peltier Lake. The large wetland in the west central portion of the parcel could be avoided by both options.

Benefits of this option:

- Minimal temporary wetland impacts anticipated with pipe placement. Because a pipe would be used, no secondary impacts resulting from lateral effect area expected.
- No impacts to Wetland Preservation Corridor.
- Can easily drain north and south sections of western parcel.

Drawbacks of this option:

- Western parcel property owner prefers an option that utilizes more of the low land to the south of the parcel.
    - Option 4 utilizes more low area than Option 2

Alternative 3:
Western Pipe Option 3 (Southern pipe): Through the Eastern Parcel, the pipe could use Eastern Pipe Option 1 or Eastern Pipe Option 2 and connect under 20th Avenue to Western Pipe Option 3. Eastern Pipe Option 2 is likely the more appropriate option in the eastern parcel. The pipe would travel south along 20th Avenue to near the southern border of the parcel and then move west/northwest through the narrowest portion of the wetland located in the southeast corner of the parcel. The pipe would outlet to Peltier Lake.

Benefits of this option:

- Utilizes the low areas of the parcel (landowner preference).
- No permanent impacts to Wetland Preservation Corridor.

Drawbacks of this option:

- Results in at least 9,165 sf of temporary wetland impacts.
- Less direct connection to the outlet at 20th Avenue.

Preferred Alternative:
Based on the alternatives analysis, WSB & Associates would recommend using Alternative Eastern Pipe Option 2 in combination with Western Pipe Option 2 (**Figure 3**). As described above, this alternative allows for both the north and south sections of the western parcel to be drained and avoids wetland impacts.

Table 1. Alternative impacts analysis for those alternatives serving the current land uses (+ = Positive effect, - = Adverse effect, 0 = No effect)

	Alternative				
Resource Category	Alternative 1 (Northernmost Option/Open Channel)	Alternative 2 (Central Option/Pipe)	Alternative 3 (Southern Option/Pipe)	Alternative 4 (Central Option/Pipe)	Notes
Aesthetic Values	+	0	0	0	The open channel drainage option may allow the establishment of riparian vegetation.
Community Growth	+	+	+	+	All options facilitate future mixed-use and low, medium, or high density housing developments.
Existing/Potential Land Use	+	+	+	+	Future developments will likely diversify land use from current agricultural use.
Farmland/food supply	-	-	-	-	All options will result in reduced agricultural land use.
Tax Revenues	+	+	+	+	Housing developments will provide a new tax base.
Wetlands (w/est. wetland impacts)	0	0	- (9,165 sq ft, temporary)	0	Options 1, 2, and 4 avoid wetland impacts. Option 3 requires 9,165 sq ft of temporary impacts to install pipes.

Resources not included in the summary table, based on an overall no effect for all alternatives include: Business/Home Relocations, Property Values, Flooding, Recreation, Terrestrial Habitat, Aquatic Habitat, Habitat Diversity and Interspersion, Water Quality, Groundwater, Soils, Secondary and Cumulative Effects, Endangered Species, Noise Levels, Transportation, Public Health, Public Facilities and Employment, Business Activity, Energy, Mineral Needs, Air Quality, Water Supply, Navigation, Historical/Archeological, Wild and Scenic Rivers, State Listed Impaired, and Shoreline Processes

Conclusion:
On behalf of the City of Lino Lakes, we request your review and approval of the Level 1 wetland delineation as well as the sequencing analysis. If you require additional information in order to complete your review, please contact us at 763-231-4847 or 763-270-3475 or email at aharwood@wsbeng.com or dsimonson@wsbeng.com.

Attachments

Appendix A
Figure 1: Level 1 Delineated Wetlands
Figure 2: Outlet Alternatives
Figure 3: Preferred Outlet Alternative

Appendix B
Historic Aerial Photos

Appendix A

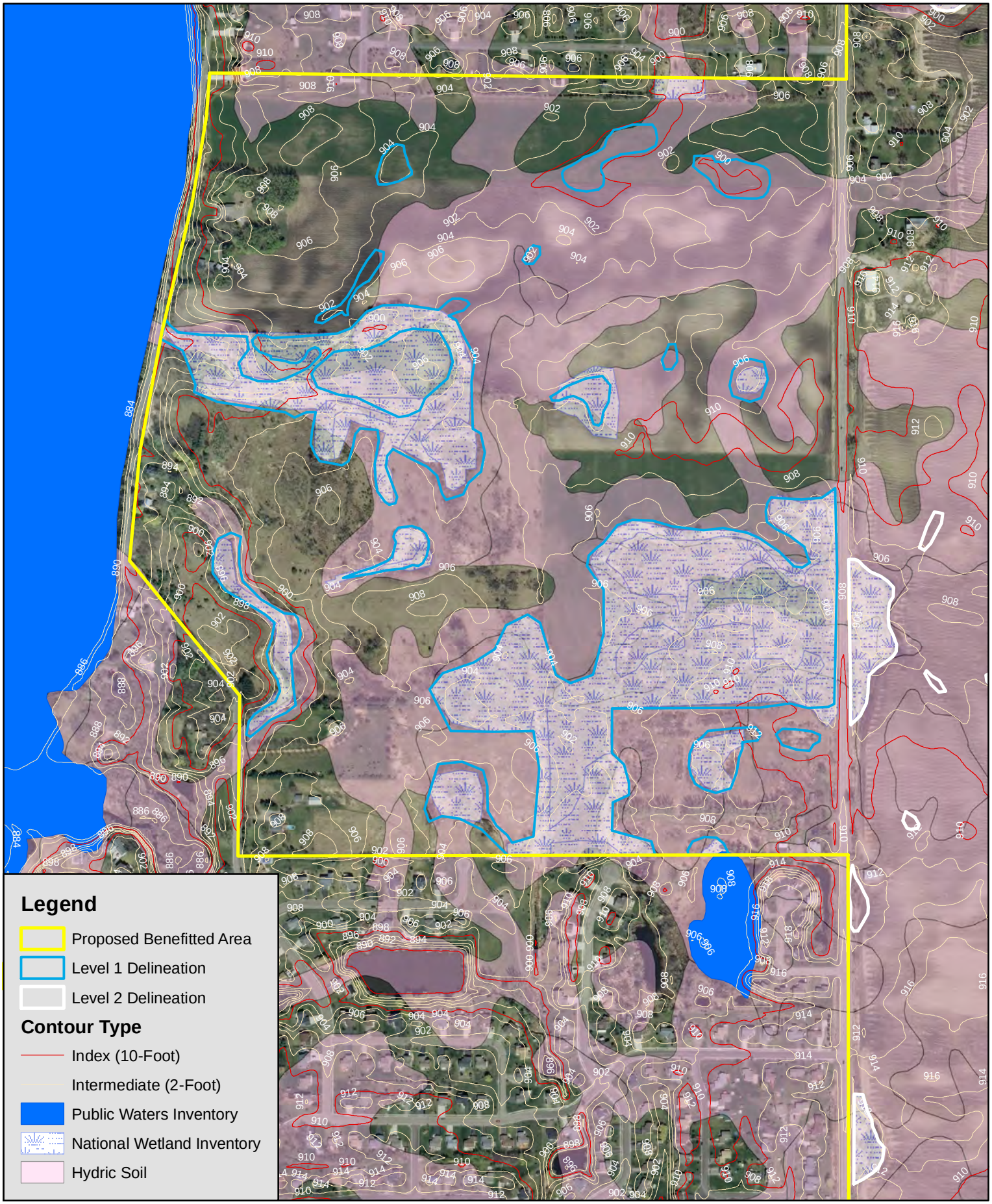

Figure 1: Level 1 Delineated Wetlands
Northeast Area Drainage Study
City of Lino Lakes MN

0 550 1,100 Feet

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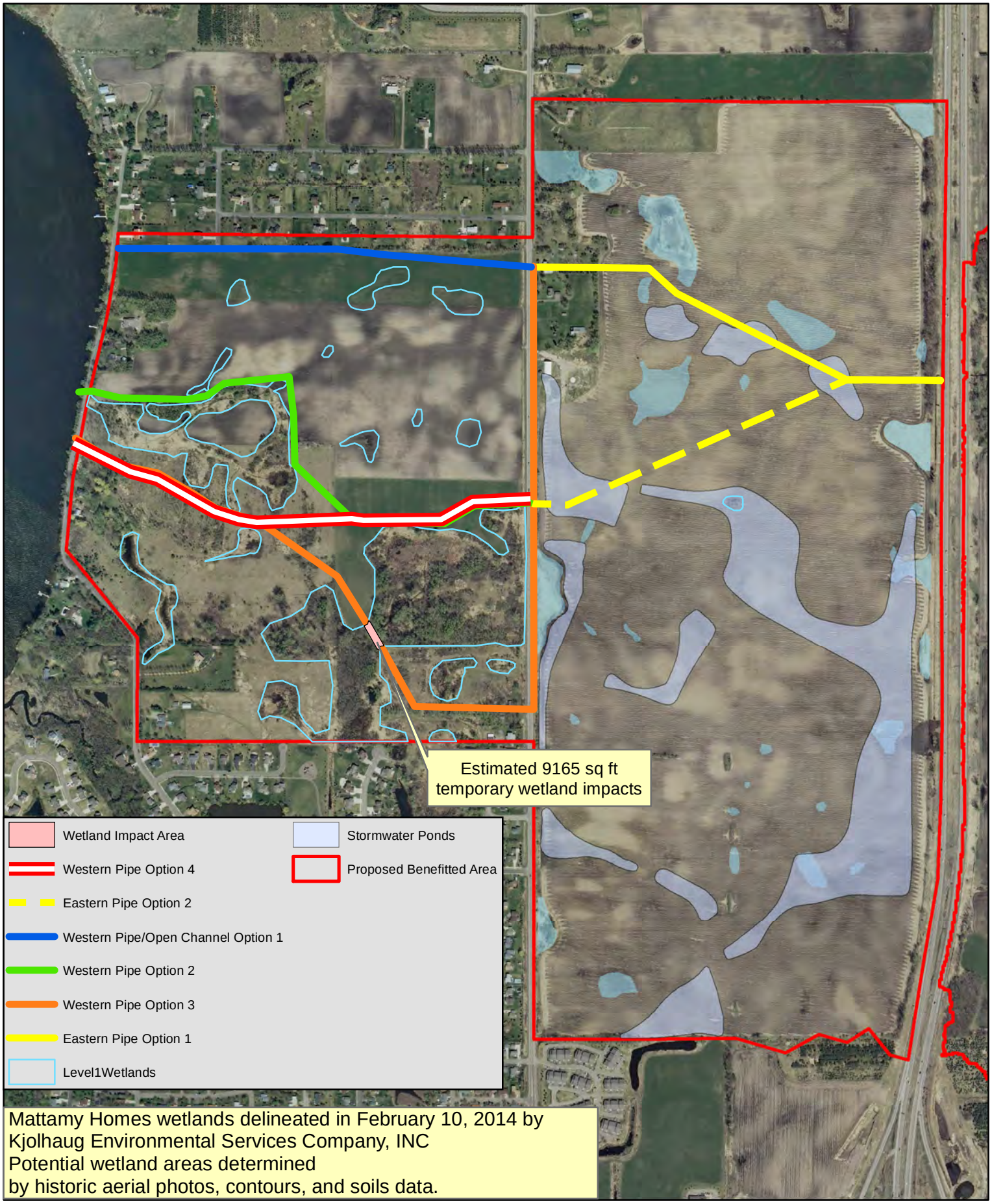

*Pipe alignments shown to not represent final design.

Figure 2: Outlet Alternatives
Northeast Area Drainage Study
City of Lino Lakes MN

0 900 1,800 Feet

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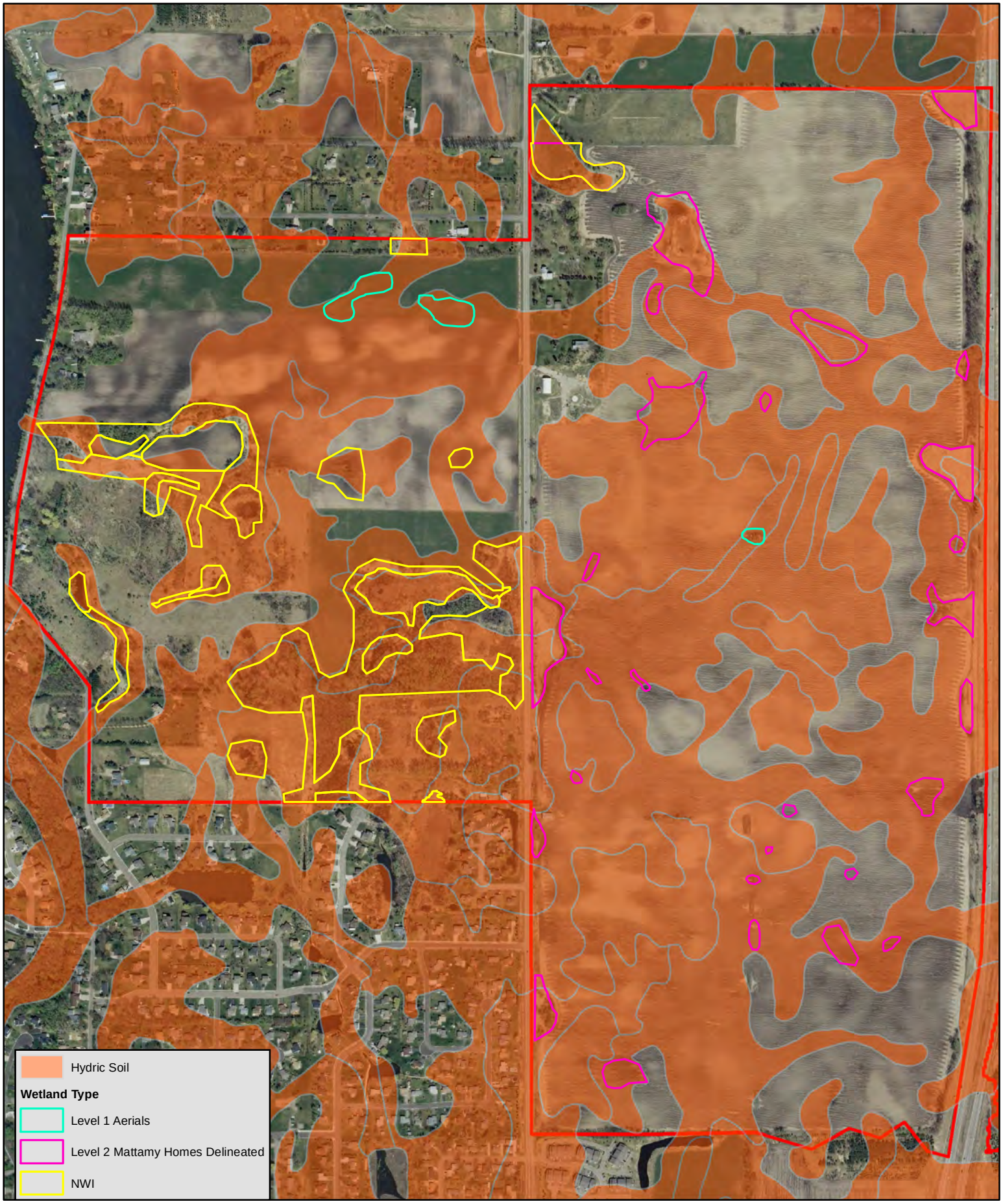

Figure 3. Hydric Soils and NWI
Northeast Area Drainage Study
City of Lino Lakes MN

0 800 1,600 Feet

N

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Appendix B

Figure 2a. 1991 Aerial
Northeast Area Drainage Study
City of Lino Lakes MN

0 550 1,100 Feet

N

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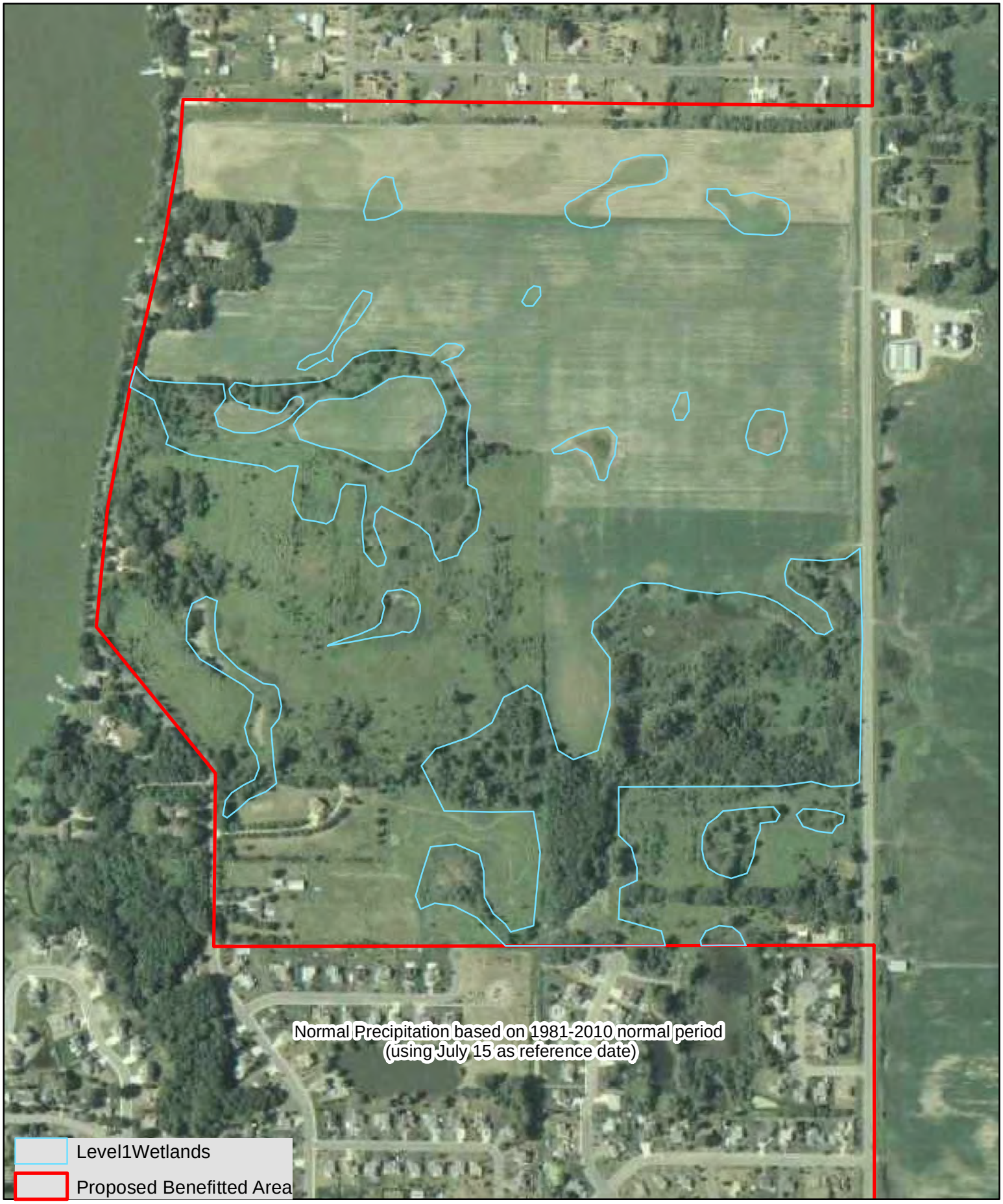

Figure 2b. 2006 Aerial
Northeast Area Drainage Study
City of Lino Lakes MN

0 550 1,100 Feet

N

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Figure 2c. 2009 Aerial
Northeast Area Drainage Study
City of Lino Lakes MN

0 550 1,100 Feet

N

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Figure 2d. 2010 Aerial
Northeast Area Drainage Study
City of Lino Lakes MN

0 550 1,100 Feet

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Figure 2e. 2011 Aerial
Northeast Area Drainage Study
City of Lino Lakes MN

0 550 1,100 Feet

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Figure 2f. 2013 Aerial
Northeast Area Drainage Study
City of Lino Lakes MN

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APPENDIX B

T35
8' berm
MOD to 50' to get to 16'

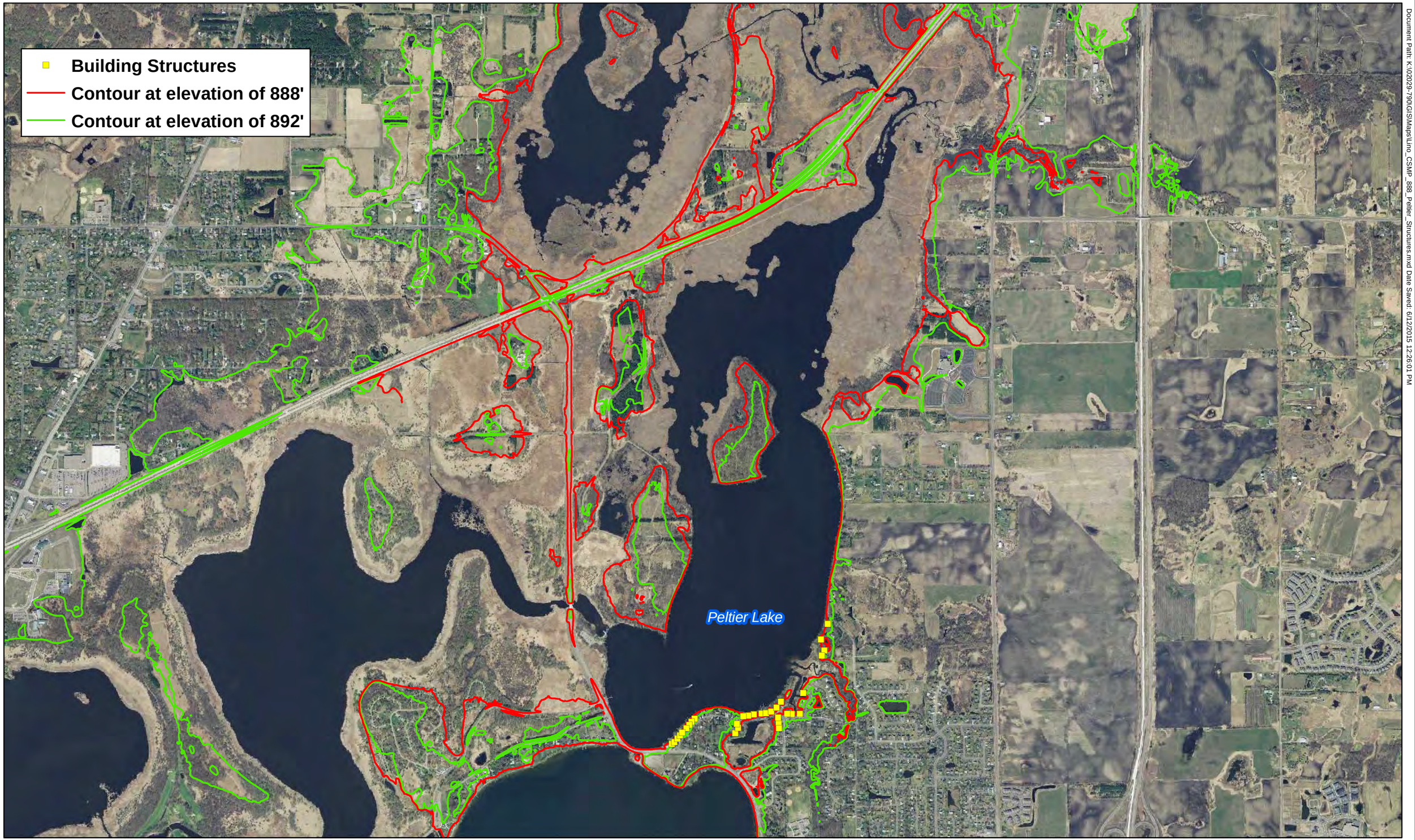
APPENDIX C

	B	C	D	E	F	G	H	I
4								
5	**Modeled Condition**	**Hugo**	**East**	**Central**	**West**	**At Peltier Lake**	**Input Notes**	**Model Notes**
6	**Drainage Area**	**216**	**534**	**441**	**230**	**1415**		
7	Existing Conditions Peak Discharge (cfs) - Hydrologic Routing Only	441	765	619	592	2079	This is taken as the peak of the sum of the hydrographs for all subcatchments within each area. For subcatchments with areas split by the proposed outlet boundary, a ratio (drainage area within CSMP/total) should be applied to the hydrograph. For some subcatchments a ratio of the total runoff is not reflective of the hydrologic characteristics within the CSMP. An example is MRC_RC_Peltier_001 (existing discharge is skewed by CN for Peltier Lake). In these instances the subcatchments should be split in the existing conditions model along CSMP lines and appropriate hydrologic inputs entered for each area.	Revisions needed to MRC_RC_PELTIER_001 in existing conditions model. Subsequent changes may be needed to reflect this change in this spreadsheet.
8	Existing Conditions Area Peak Discharge (cfs/acre) - Hydrologic Routing Only	2.05	1.43	1.41	2.57	1.47	Calculate A / drainage area	
9	Developed Conditions (No Storage) Peak Discharge (cfs) - Hydrologic Routing Only	441	1125	1163	601	3316	This value is calculated similar to A, except for the proposed condition.	Note that HUGO should be the same for existing and proposed because the subcatchment characteristics haven't changed. It currently isn't in the tabs, but that is likely due to model errors that have been since resolved by Adam.
10	Developed Conditions (No Storage) Area Peak Discharge (cfs/acre) - Hydrologic Routing Only	2.05	2.11	2.64	2.61	2.34	Calculate C / drainage area	
11	Required Peak Discharge (cfs) Reduction to Maintain Existing Conditions	0	360	544	9	1237	Calculate C - A	
12	Required Area Peak Discharge Reduction (cfs/acre) to Maintain Existing Conditions	0.00	0.67	1.23	0.04	0.87	Calculate D-B	

	B	C	D	E	F	G	H	I
4								
5	**Modeled Condition**	**Hugo**	**East**	**Central**	**West**	**At Peltier Lake**	**Input Notes**	**Model Notes**
6	**Drainage Area**	**216**	**534**	**441**	**230**	**1415**		
13	Developed Conditions With Storage Peak Discharge (cfs) for Assessing Rule Compliance - Hydrologic Routing Only	441	56	75	43	454	From Model; Simulate Regional Storage to Achieve Rate Reduction of E; Extract Hydrographs At Locations with model nodes without hydraulic routing; Assess Affect of Storage Ensures Peak Rate Control Compliance; If this is less than A shows rate control compliance. This is calculate as the peak of the sum of the hydrographs leaving the proposed storage nodes within the proposed model, with no further hydraulic routing.	Since no proposed storage is needed for Hugo, this value is the same as C. Some of the outlets are very unstable. The rational behind the rating curve outlet should be explained. Check that subcatchments go directly to modeled storage without constraining the discharge with hydraulic routing. Many portions of ACD72 have been kept in the northern part of the East Region and similarly the new infrastructure on the south side. If these are to be kept the conduit sizes should be increased so they are not constricting discharge.
14	Developed Conditions With Storage Area Peak Discharge (cfs/area) for Assessing Rule Compliance - Hydrologic Routing Only	2.05	0.10	0.17	0.19	0.32	Calculate G / Drainage Area If this is less than B for Peltier Lake shows rate control compliance	
15	Increase (Decrease) in Existing Conditions Peak Discharge (cfs) with Storage (Hydrologic Routing Only)	0	(709)	(544)	(549)	(1625)	Calculate G-A If less than zero have excess storage than needed for rate control rule compliance	
16	Increase (Decrease) in Existing Conditions Area Peak Discharge (cfs/acre) with Storage (Hydrologic Routing Only)	0.00	(1.33)	(1.24)	(2.39)	(1.15)	Calculate H - B If less than zero have excess storage than required by rate control rule compliance	
17	Existing Conditions Peak Discharge (cfs) - With Hydraulic Routing Tile and Storage in Place (Clearwater Creek, New Drainage Area, ACD 72)					261	This should be calculated as the peak of the sum of the discharges leaving the CSMP that are in conduits or directly entering peltier lake. This is assuming that subcatchments leaving the CSMP area and entering other systems will have a negligible impact on discharge after hydraulic routing through other systems.	
18	Existing Conditions Peak Discharge (cfs/acre) - With Hydraulic Routing Tile and Storage in Place (Clearwater Creek, New Drainage Area, ACD 72)					0.18	This is the rate being controlled to, to avoide adverse impact to Peltier Lake. If row 20 is less than this number, peak discharge is ok. Timing needs to be checked in HEC-RAS model.	
19	Developed Conditions Peak Discharge (cfs) - With Hydraulic Routing and Storage in Place Required Reduction					183	peak of discharge leaving the CSMP.	

	B	C	D	E	F	G	H	I
4								
5	**Modeled Condition**	**Hugo**	**East**	**Central**	**West**	**At Peltier Lake**	**Input Notes**	**Model Notes**
6	**Drainage Area**	**216**	**534**	**441**	**230**	**1415**		
20	Developed Conditions Peak Discharge (cfs/acre) - With Hydraulic Routing and Storage in Place Required Reduction					0.13	Based on Current CSMP Model	
21	Peak Discharge (cfs) Increase (Reduction) As If Tile Is in Place and Peak Rate Control Rule Compliance					(79)	Calculate M- K If this is positive, there is an increase in the rate of peak discharge to Peltier Lake	
22	Existing Conditions Discharge Leaving Peltier Lake (cfs)					1321	From HEC-RAS model	
23	Proposed Conditions Discharge Leaving Peltier Lake (cfs)					1202	From HEC-RAS model using RS 110880. Model used: Rice Creekl NE Lino Development 5/30/15 Project.	
24	Change in Discharge Downstream of Peltier Lake (cfs)					(119.64)	Q-P Need to check downstream for adverse consquences if rate increases	
25	Existing Conditions Peltier Lake Peak Elevation (feet)					887.20	From HEC-RAS model ; Note this differs slightly from the frequency analysis of lake levels	
26	Proposed Conditions Peltier Lake Peak Elevation (feet)					887.06	From HEC-RAS model	
27	Increase in Peltier Lake Peak Elevation (feet)					(0.14)	T-S	

APPENDIX D



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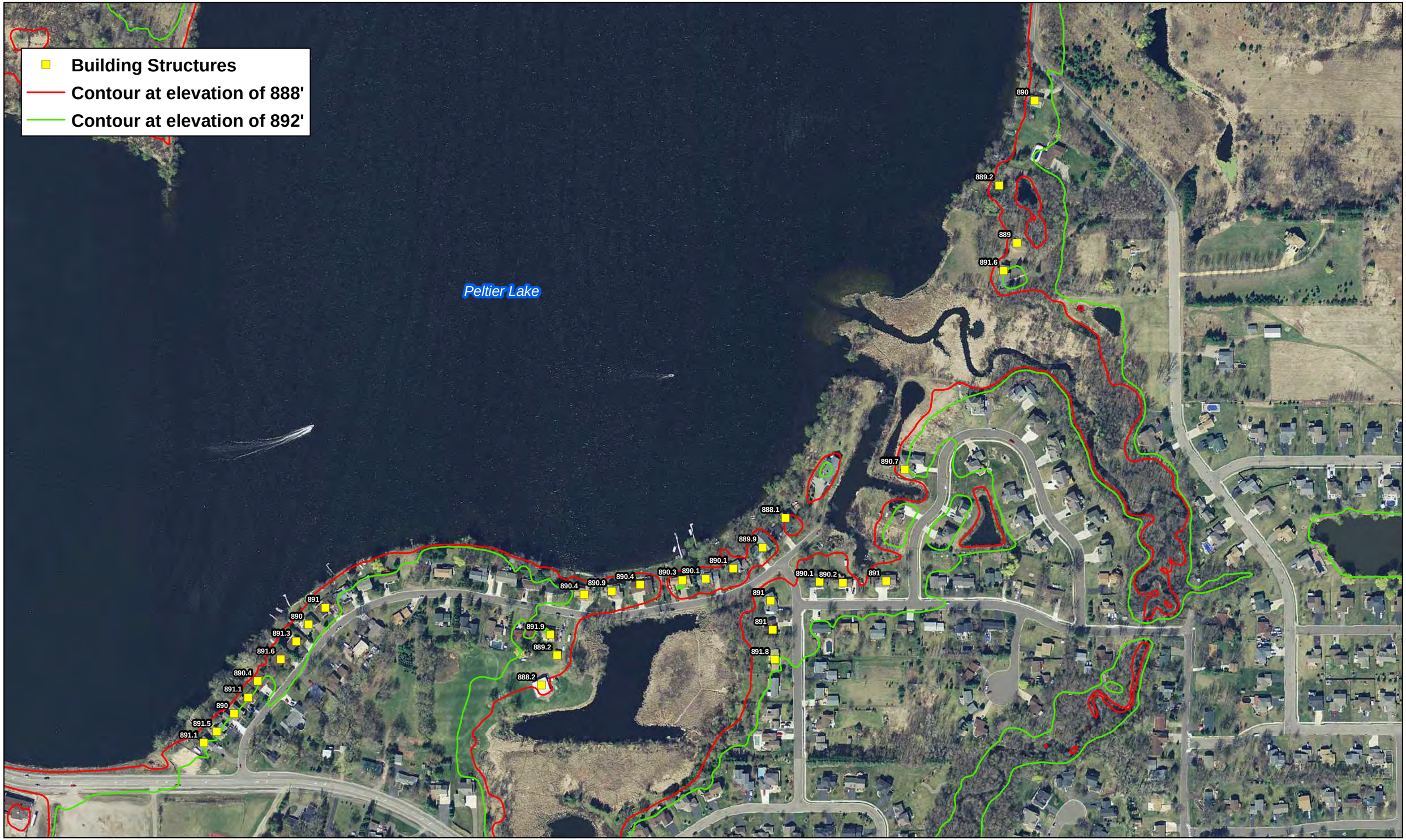
Peltier Lake HWL Analysis - 888'-892' Elevation
Building Structures
City of Lino Lakes MN

1 inch = 1,600 feet

N



Peltier Lake HWL Analysis - 888'-892' Elevation
Building Structures
City of Lino Lakes MN

1 inch = 300 feet

N

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0	0	271.0400	889.2390
0	0	270.9730	889.0190
0	0	271.7740	891.6470
0	0	271.5840	891.0240
0	0	271.3410	890.2260
0	0	271.3040	890.1050
0	0	271.5840	891.0240
0	0	271.5630	890.9550
0	0	271.3650	890.3050
0	0	271.2980	890.0850
0	0	271.3080	890.1180
0	0	271.2300	889.8620
0	0	271.8310	891.8340
0	0	270.7380	888.2480
0	0	271.0210	889.1770
0	0	271.8420	891.8700
0	0	271.4080	890.4460
0	0	271.5540	890.9250
0	0	271.4090	890.4490
0	0	271.5630	890.9550
0	0	271.2780	890.0200
0	0	271.6550	891.2570
0	0	271.7690	891.6310
0	0	271.6200	891.1420
0	0	271.7300	891.5030
0	0	271.2780	890.0200
0	0	271.6100	891.1090
0	0	271.3790	890.3510
0	0	271.4900	890.7150
0	0	0.0000	888.0510