City Hall: 218-692-2688
Planning & Zoning: 218-692-2689
Fax: 218-692-2687

13888 Daggett Bay Rd
Crosslake, Minnesota 56442
www.cityofcrosslake.org

CITY OF CROSSLAKE

PLANNING COMMISSION/BOARD OF ADJUSTMENT
September 23, 2022
9:00 A.M.

Crosslake City Hall
13888 Daggett Bay Rd, Crosslake MN 56442
(218) 692-2689

PUBLIC HEARING NOTICE

Applicant: Highway 103 Storage Association

Authorized Agent: Chris Suedbeck

Site Location: 13529 County Rd 103, Crosslake, MN 56442

Variance for:

- Increase of impervious to 57.0% where 50% is allowed
- Parcel size of 1,472 square feet where 20,000 square feet are required

To construct and allow:

- One 8,832 square foot storage building containing 6 individual units of 32'x46' which could be sold individually
- Decrease in required parcel size

Notification: Pursuant to Minnesota Statutes Chapter 462, and the City of Crosslake Zoning Ordinance, you are hereby notified of a public hearing before the City of Crosslake Planning Commission/Board of Adjustment. Property owners have been notified according to MN State Statute 462 & published in the local newspaper. Please share this notice with any of your neighbors who may not have been notified by mail.

Information: Copies of the application and all maps, diagrams or documents are available at Crosslake City Hall or by contacting the Crosslake Planning & Zoning staff at 218-692-2689. Please submit your comments in writing including your name and mailing address to Crosslake City Hall or (crosslakepz@crosslake.net).

STAFF REPORT

Property Owner/Applicant: Highway 103 Storage Association

Parcel Number(s): 14320509

Application Submitted: August 11, 2022

Action Deadline: October 9, 2022

City 60 Day Extension Letter sent / Deadline: N/A / N/A

Applicant Extension Received / Request: N/A / N/A

City Council Date: N/A

Authorized Agent: Chris Suedbeck

Variance for:

- Increase of impervious to 57.0% where 50% is allowed
- Parcel size of 1,472 square feet where 20,000 square feet are required

To construct and allow:

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- Decrease in required parcel size

Current Zoning: Limited Commercial District

Existing Impervious Coverage:	**Proposed Impervious Coverage:**
51.5%	57.0%

- A stormwater management plan was submitted with the variance application
- No current septic system and no septic system proposed

Parcel History:

- Highway 103 Storage plat established in 2012
- Highway 103 Storage First Addition plat amended in 2016
- April 2006 – Conditional Use to construct storage buildings/units
- April 2006 – Subdivision Metes & Bounds
- May 2006 – Zoning Map Amendment
- May 2006 – Address
- May 2006 – Sign
- May 2006 – 80' x 180' Commercial storage building
- July 2007 – 46' x 160' Commercial storage building
- December 2010 – Sign
- April 2012 – Preliminary & Final plat
- May 2012 – Commercial PUD – Conditional Use
- April 2013 – 80' x 180' Commercial storage building

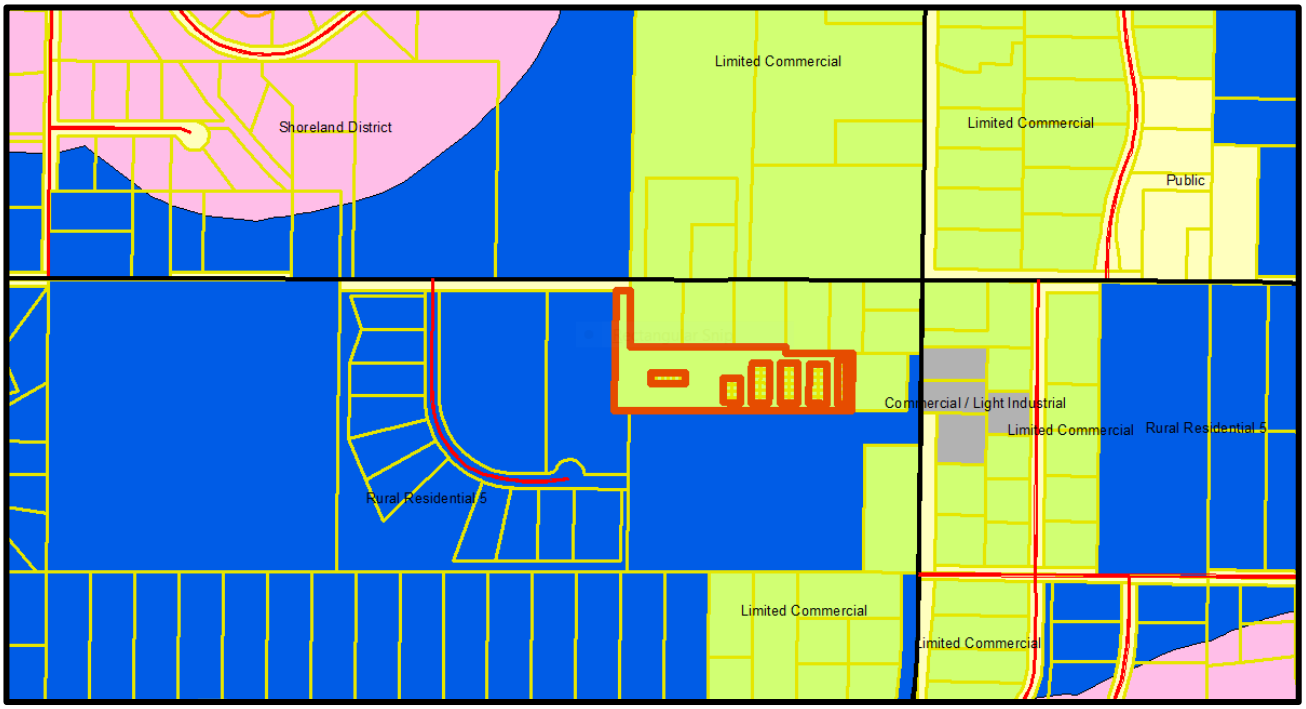
- July 2014 – 80’ x 180’ Commercial storage building
- May 2015 – 110’ x 80’ Commercial storage building
- September 2016 – Preliminary & Final Plat of Highway 103 Storage First Addition
- September 2016 – 230’ x 48’ Commercial storage building
- January 2022 – Variance denied for impervious and lot size
- No septic on the parcel

Agencies Notified and Responses Received:
County Highway Dept: No comment received before packet cutoff date
DNR: No comment received before packet cutoff date
City Engineer: N/A
Lake Association: No comment received before packet cutoff date
Township: N/A
Crosslake Public Works: No comment received before packet cutoff date
Crosslake Park, Recreation & Library: No comment received before packet cutoff date
Concerned Parties: No comment received before packet cutoff date

POSSIBLE MOTION:
To approve/table/deny the variance to allow:
- Increase of impervious to 57.0% where 50% is allowed
- Parcel size of 1,472 square feet where 20,000 square feet are required

To construct and allow:
- One 8,832 square foot storage building containing 6 individual units of 32’x46’ which could be sold individually
- Decrease in required parcel size

As shown on the certificate of survey dated 8-10-2022



HIGHWAY 103 STORAGE SECOND ADDITION

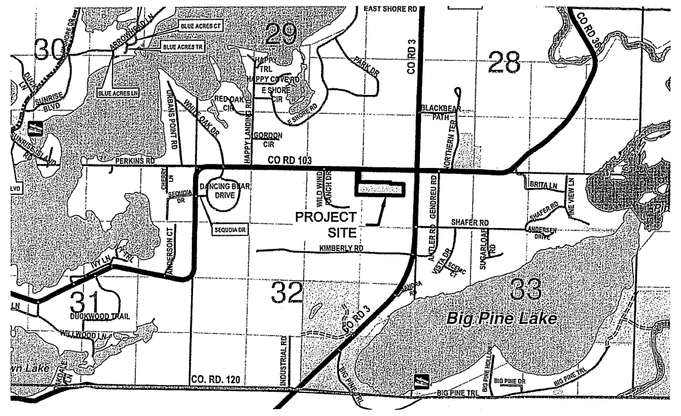
PRELIMINARY PLAT
SECTION 32, TOWNSHIP 137 NORTH, RANGE 27 WEST
CROW WING COUNTY, MINNESOTA
GROSS AREA = 318,760 SQ.FT. / 7.3 ACRES
AREA LESS EASEMENTS = 247,984 SQ.FT.

OWNER & DEVELOPER

Highway 103 Storage
Chris Suedbeck
672 Willow Grove Lane
Vadnais Heights, MN 55127
Property Address: 13529 Co. Rd 103, Crosslake, MN

SURVEYOR

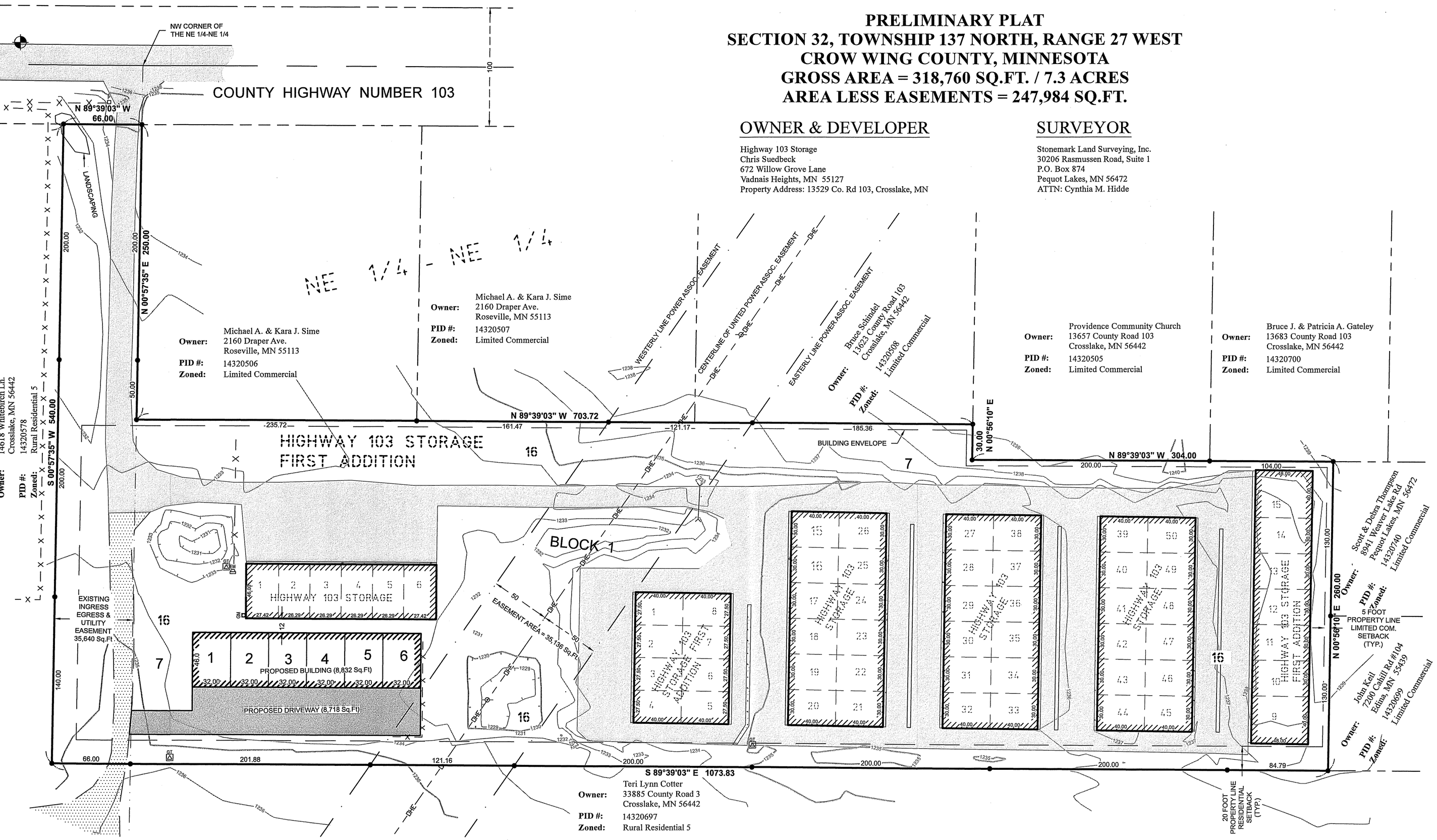
Stonemark Land Surveying, Inc.
30206 Rasmussen Road, Suite 1
P.O. Box 874
Pequot Lakes, MN 56472
ATTN: Cynthia M. Hidde



VICINITY MAP
USED WITH PERMISSION

LEGEND

- — X — X — DENOTES EXISTING FENCE LINE
- DENOTES EDGE OF EXISTING BITUMINOUS
- DENOTES EDGE OF EXISTING GRAVEL
- DENOTES EDGE OF EXISTING CONCRETE
- 1208 — DENOTES EXISTING INTERMEDIATE CONTOURS
- 1208 — DENOTES EXISTING INTERMEDIATE CONTOURS (DEPRESSION)
- 1210 — DENOTES EXISTING INDEX CONTOURS
- 1210 — DENOTES EXISTING INDEX CONTOURS (DEPRESSION)
- DENOTES EXISTING UTILITY POLE
- — — OHE — DENOTES EXISTING OVERHEAD ELECTRIC CABLE
- DENOTES EXISTING ELECTRIC METER
- DENOTES EXISTING GROUND TRANSFORMER
- GV DENOTES EXISTING GAS VALVE
- DENOTES EXISTING PHONE PEDESTAL & PHONE BOX
- DENOTES EXISTING GAS METER
- DENOTES EXISTING CULVERT LOCATION
- DENOTES MONUMENT FOUND
- DENOTES IRON MONUMENT SET MARKED BY LICENSE No. 44881
- **BENCHMARK:** FOUND ½" REBAR, FLUSH WITH GROUND
  ELEV. = 1236.50



CONTOUR INFORMATION

Contours shown have been obtained using standard survey topographic methodologies on July 6, 2016.
Contour interval is 1 foot as shown on this drawing.

SOIL DATUM

The Crow Wing County Soils Survey indicates soil in the proposed platted area to be classified as "Graycalm loamy sand (D49A) & Graycalm loamy sand (D49B)".

UTILITIES

This project will not require any water or sewer development.

ZONING

Current zoning is Limited Commercial = LC.

LEGAL DESCRIPTION

Lot 16, Block 1, HIGHWAY 103 STORAGE FIRST ADDITION, according to the recorded plat thereof, Crow Wing County, Minnesota.

Subject to a power line easement in favor of United Power Association and subject to other easements, restrictions, and reservations of record.

Subject to access easement along westerly 66 feet of plat as depicted and also the utility easement also as depicted.

Also subject to mineral reservations of record, if any.

IMPERVIOUS CALCULATIONS

EXISTING	IMPERVIOUS AREA (sq.ft.)	Net Area (sq.ft)	Percent Impervious (sq.ft)
Existing Buildings	70,400	318,760	22.1%
Existing Concrete	5,901	318,760	1.9%
Existing Driveway	87,882	318,760	27.6%
Total	**164,183**	**318,760**	**51.5%**

IMPERVIOUS CALCULATIONS

PROPOSED	IMPERVIOUS AREA (sq.ft.)	Net Area (sq.ft)	Percent Impervious (sq.ft)
Existing & Proposed Buildings	79,232	318,760	24.9%
Existing & Proposed Concrete	5,901	318,760	1.9%
Existing & Proposed Driveway	96,600	318,760	30.3%
Total	**181,733**	**318,760**	**57.0%**

N

50 0 50 100

SCALE IN FEET
ON 22" X 34" SHEET

Notes:
1. The tracts shown and described herein must be approved by the local zoning authority before title is transferred and/or building permits obtained.
2. Contact "GOPHER ONE-CALL" 1-800-252-1166 prior to construction.
3. The information contained herein is subject to change without notice, including, without limitation, configuration of lots, structures, roads, recreational areas, amenities, etc.

ORIENTATION OF THIS BEARING SYSTEM IS BASED ON THE RECORDED PLAT OF HIGHWAY 103 STORAGE

30206 Rasmussen Road
Suite 1
P. O. Box 874
Pequot Lakes, MN 56472
218-568-4940
www.stonemarksurvey.com

I HEREBY CERTIFY THAT THIS SURVEY, PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER/LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MINNESOTA.
Signature
CYNTHIA M. HIDDE PLS#44881
DATE: 8/10/2022 LIC. NO. 44881

REVISIONS		
DESCRIPTION	BY	DATE
PER CITY COMMENTS	CMH	12-6-2021
Reduced size of proposed building	RJF	5-31-2022
Added existing impervious table	RJF	8-10-2022

PROJECT MANAGER: CMH
CHECKED BY: PAT
DRAWN BY: CMH
PROJECT No.: 21390
FILE NAME: PL21390.dwg
FIELD BOOK: BOOK na PG. na
DATE: 11-16-21
SCALE: HORZ. 1"=50' VERT. NONE

HIGHWAY 103 STORAGE SECOND ADDITION
PRELIMINARY PLAT
Highway 103 Storage
Chris Suedbeck
672 Willow Grove Lane
Vadnais Heights, MN 55127

SHEET 1 OF 1

Roger Forcelle 8/10/2022 10:13 AM - F:\Drawings\2021\21390 Suedbeck - Hwy 103 Storage\PL21390-1.dwg

Hwy. 103 Storage Association – Legal Declaration Changes

December 3, 2021

Crosslake City Council:

This letter is to confirm that on November 17, 2021, The Highway 103 Storage Association owners held a vote on adding six units to the association and increasing the number of units from 57 to 63. Owners were informed that this would require a change to the number of units identified in the association declaration documents.

This vote was via email in order to reach all 57 existing unit owners and consistent with past practices. Voting concluded on December 3rd, 2021. The vote passed with 87.7% in favor of changing the declaration to reflect 63 units and moving forward with the addition of the new building and units.

Best Regards,

Highway 103 Storage Association Board

Signed by:

12/9/21

Dennis West
Board President

12/9/21

Chris Suedbeck
Board Secretary

January 5, 2022
Revised February 1, 2022
Revised June 29, 2022

WIDSETH
ARCHITECTS ▪ ENGINEERS
SCIENTISTS ▪ SURVEYORS

Highway 103 Storage Assn
Attention: Chris Suedbeck
672 Willow Grove Lane
Vadnais Heights, Mn 55127

RE: Highway 103 Storage Stormwater Report, Cross Lake, MN

Dear Mr.Suedbeck:

Widseth has reviewed the site and prepared this summary of stormwater calculations completed for the Highway 103 Storage facility located in Crosslake, Minnesota. Highway 103 Storage Association plans to construct a 9,000 square foot storage building and associated driveway at their existing storage facility. The project site is located on a gravel road south of Highway 103 and west of Highway 3 in Crosslake. The site location is shown in Figure 1.

Existing Conditions

There are currently six storage buildings on the property with paved driveway access and 3 basins that collect surface runoff. The site is sloped to the basins in the central area of the site and one near the entrance on the west. The elevations on the property range from about 1239 in the east, to about 1234 in the center and east. The basin bottom elevations range from about 1229 to 1231.

According to the Natural Resource Conservation Service (NRCS) soils report, the soils at the site are Graycalm loamy sand and classified as Hydrologic Soil Group A with high hydraulic conductivity. Historically, runoff to the basins has rapidly infiltrated and not discharged from the site. The NRCS soil report for the site is provided in Attachment 1.

Proposed Conditions

Highway 103 Storage Association will construct a new 9,000 square foot storage building and paved driveway access from the gravel road. The site of the new building and parking surface will be graded to drain to the largest basin, on the south side near the middle of the site. The improvements will include a total increase in impervious surface of about 18,000 square feet.

Summary

The drainage areas are shown in the maps in Figure 2. Impervious areas were measured using the plat for the project. The only change between existing and proposed conditions is the addition of impervious surfaces to reflect the new building and pavement. Both existing and proposed conditions have been modeled using HydroCAD to calculate the existing and proposed discharge rates for 2-, 10-, and 100-year rainfall events.

Impervious Area Calculations

The total site impervious areas were measured to complete the form *Lot Impervious Coverage and Landscaping for Stormwater Worksheet.* The measured existing impervious area is 164,238 square feet and measured proposed new impervious area is 17,494 square feet, for a total of 181,733 after construction is completed. The total lot area is 318,760 square feet. This calculates a total of 51.5% and 57.0% existing and proposed impervious surfaces. The impervious coverage worksheet is provided in Attachment 2.

The impervious coverage worksheet calculates the equivalent of 1 inch of runoff from the site impervious surfaces to determine the required stormwater infiltration capacity for the site. The calculated runoff is 15,083 cubic feet.

The three basins at the property do not have an outlet, other than infiltration or overflows during an extreme rainfall. The basins provide a total of about 41,643 cubic feet of stormwater detention to exceed the required capacity.

Runoff Rate Calculations

The modeled peak runoff rate leaving the site is zero for all rainfall events for both existing and proposed conditions, indicating that the entire rainfall is captured, contained, and infiltrated in the existing basins and there is no increase in site runoff. The HydroCAD output is provided in Attachment 3.

High Water Level Evaluation

We evaluated the modeled high water level to determine the appropriate elevation for the storage building. The Existing and proposed high water levels for the three basins are:

- Basin 1: Existing = 1233.2, Proposed = 1233.4
- Basin 2 = Existing = 1234.3, Proposed = 1234.3
- Basin 3 = Existing = 1233.0, Proposed = 1233.0

The high water level increases by 0.2 feet for Basin 1 and is unchanged for basin 2 and 3. The proposed new building is adjacent to Basin 1, so the floor for the proposed building should be constructed at 1235.4 or higher to provide 2 feet of freeboard in relation to the modeled water levels. The freeboard separation is not as critical as in a residential situation because the garages are slab on grade construction and not inhabited.

Conclusion

The added impervious surface on the site does not increase runoff from the site. The existing basins completely contain the runoff from all rainfall events up to and including a 100-year rainfall event.

Please contact me at (651) 358-2355 if you have any questions.

Sincerely,

Widseth, Smith, Nolting and Associates

Brian Kallio, PE
Civil/Water Resources Engineer

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.

Brian F. Kallio, PE
Lic. No. 25817

6/29/2022
Date

FIGURE 1

Site Location Map

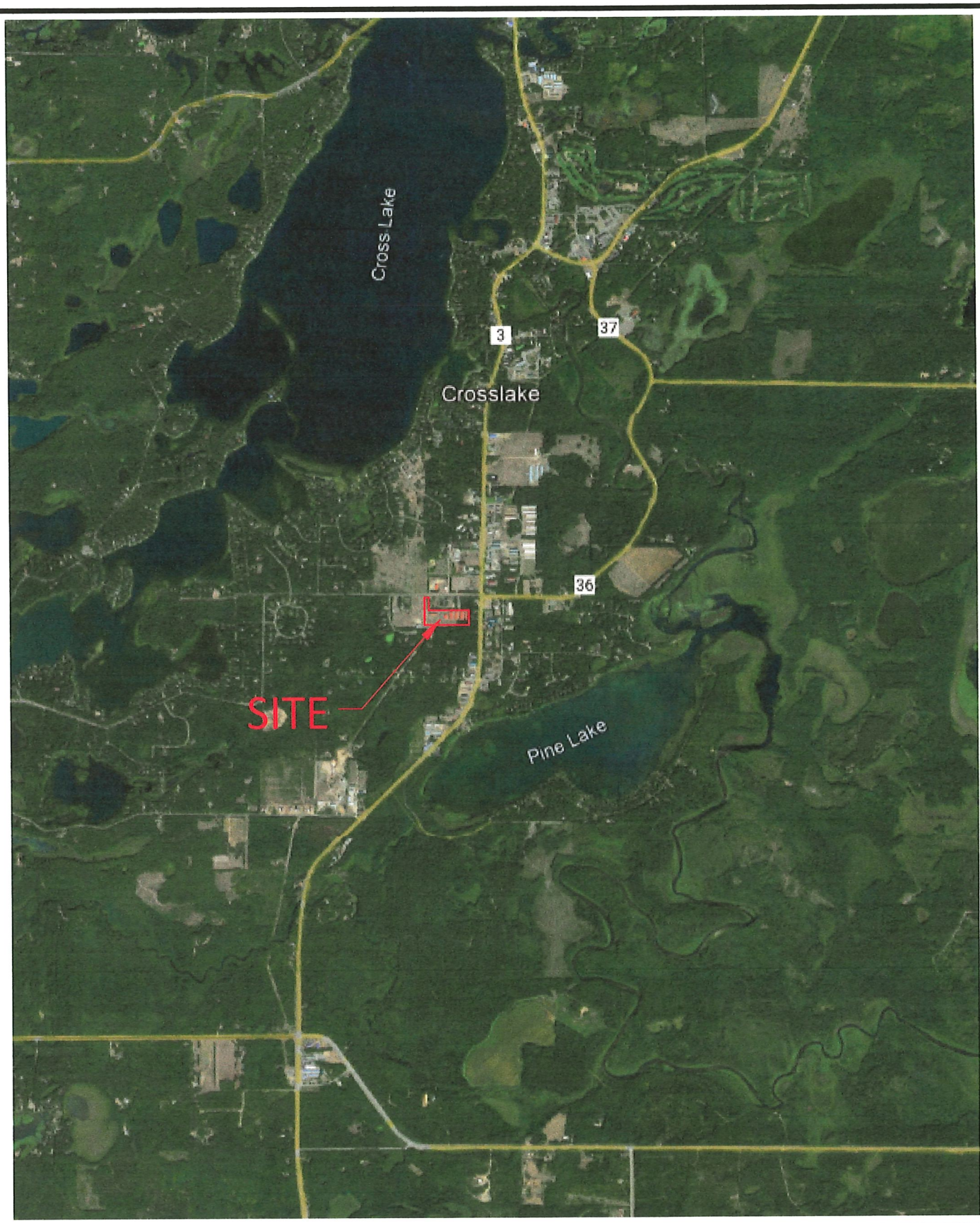
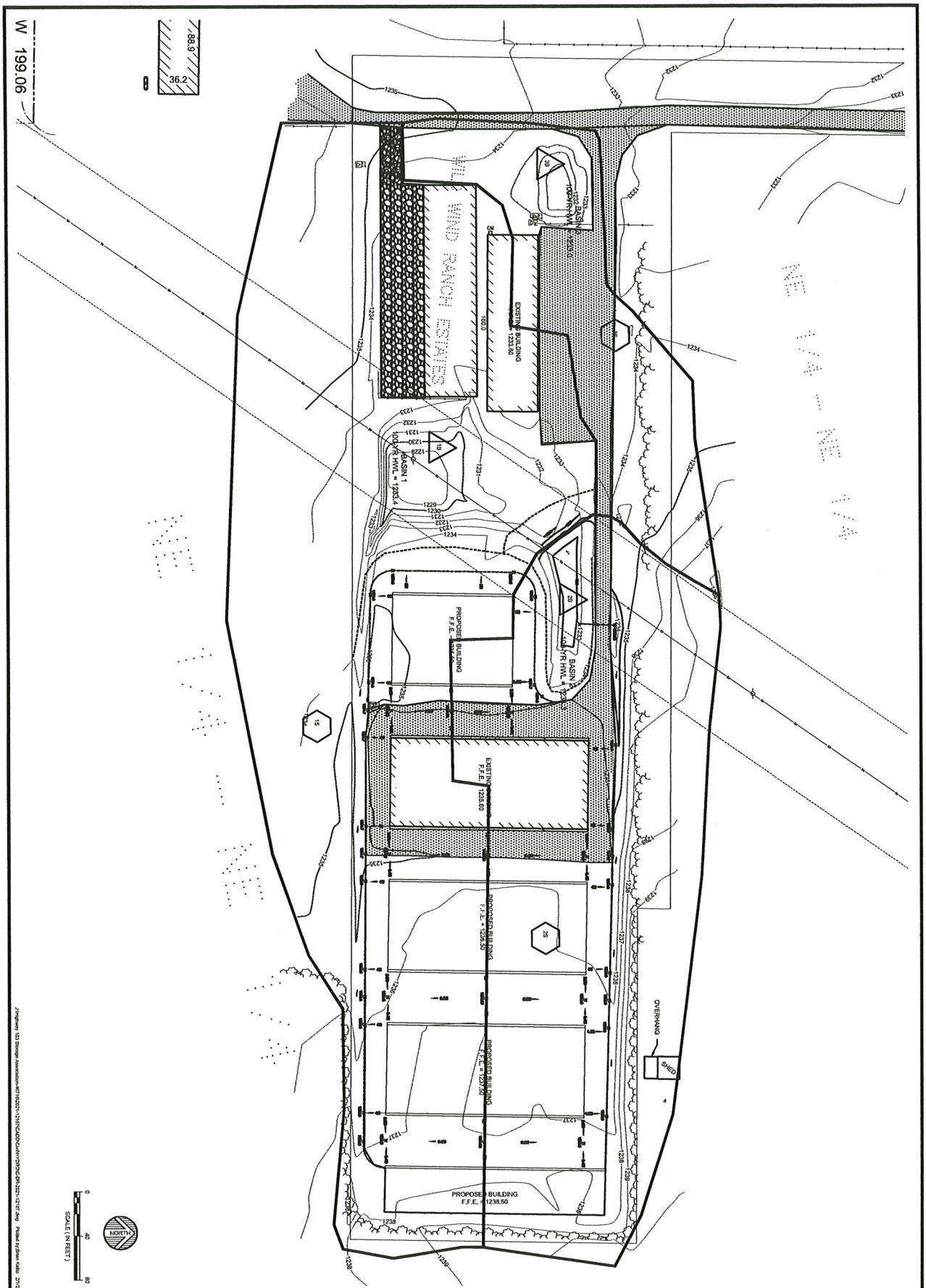


FIGURE 1	SITE LOCATION HIGHWAY 103 STORAGE	WiDSETH ARCHITECTS ▪ ENGINEERS ▪ SCIENTISTS ▪ SURVEYORS

FIGURE 2

Drainage Area Map



SHEET NO. FIG 2	HIGHWAY 103 STORAGE HIGHWAY 103 STORAGE ASSOCIATION CROSS LAKE, MN **DRAINAGE AREAS MAP**	DATE: 12/13/2021 SCALE: DRAWN BY: BFK CHECKED BY: BFK JOB NUMBER: 2021-12017	DATE	REV#	REVISION DESCRIPTION	BY	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 CIVIL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA. BRIAN KALLIO DATE: 12/13/2021 LIC. NO. 25417	WIDSETH ARCHITECTS • ENGINEERS • SCIENTISTS • SURVEYORS

ATTACHMENT 1

Soil Survey Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Crow Wing County, Minnesota

Highway 103 Storage

December 9, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,660 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Crow Wing County, Minnesota
Survey Area Data: Version 17, Sep 10, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 12, 2014—Aug 23, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
D49A	Graycalm loamy sand, 0 to 2 percent slopes	31.2	59.9%
D49B	Graycalm loamy sand, 2 to 8 percent slopes	20.6	39.5%
D79C	Graycalm-Rifle complex, 0 to 10 percent slopes	0.3	0.6%
Totals for Area of Interest		**52.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Crow Wing County, Minnesota

D49A—Graycalm loamy sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2dflg
Elevation: 660 to 1,710 feet
Mean annual precipitation: 25 to 33 inches
Mean annual air temperature: 37 to 48 degrees F
Frost-free period: 120 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Graycalm and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Graycalm

Setting

Landform: Flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile

A - 0 to 4 inches: loamy sand
Bw1 - 4 to 20 inches: loamy sand
Bw2 - 20 to 31 inches: sand
E and Bt - 31 to 79 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sloping Upland, Low AWC, Acid (G091AN008MN)
Other vegetative classification: Sloping Upland, Low AWC, Acid (G091AN008MN)
Hydric soil rating: No

Minor Components

Graycalm, moderately sloping

Percent of map unit: 10 percent
Landform: Flats
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sloping Upland, Low AWC, Acid (G091AN008MN)
Hydric soil rating: No

D49B—Graycalm loamy sand, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2dflh
Elevation: 660 to 1,710 feet
Mean annual precipitation: 25 to 33 inches
Mean annual air temperature: 37 to 48 degrees F
Frost-free period: 120 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Graycalm and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Graycalm

Setting

Landform: Rises
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Outwash

Typical profile

A - 0 to 4 inches: loamy sand
Bw1 - 4 to 20 inches: loamy sand
Bw2 - 20 to 31 inches: sand
E and Bt - 31 to 79 inches: sand

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sloping Upland, Low AWC, Acid (G091AN008MN)
Other vegetative classification: Sloping Upland, Low AWC, Acid (G091AN008MN)
Hydric soil rating: No

Minor Components

Graycalm, nearly level

Percent of map unit: 10 percent
Landform: Rises
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Sloping Upland, Low AWC, Acid (G091AN008MN)
Hydric soil rating: No

D79C—Graycalm-Rifle complex, 0 to 10 percent slopes

Map Unit Setting

National map unit symbol: 2ndr4
Elevation: 660 to 1,710 feet
Mean annual precipitation: 25 to 33 inches
Mean annual air temperature: 37 to 48 degrees F
Frost-free period: 120 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Graycalm and similar soils: 55 percent
Rifle, ponded, and similar soils: 15 percent
Graycalm, nearly level, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Graycalm

Setting

Landform: Rises
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear

Parent material: Outwash

Typical profile

A - 0 to 4 inches: loamy sand
Bw1 - 4 to 20 inches: loamy sand
Bw2 - 20 to 31 inches: sand
E and Bt - 31 to 79 inches: sand

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sloping Upland, Low AWC, Acid (G091AN008MN)
Other vegetative classification: Sloping Upland, Low AWC, Acid (G091AN008MN)
Hydric soil rating: No

Description of Rifle, Ponded

Setting

Landform: Rises
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material

Typical profile

Oi - 0 to 12 inches: peat
Oe - 12 to 43 inches: mucky peat
Oa1 - 43 to 59 inches: muck
Oa2 - 59 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 29.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Forage suitability group: Not Suited (G091AN024MN)
Other vegetative classification: Not Suited (G091AN024MN)
Hydric soil rating: Yes

Description of Graycalm, Nearly Level

Setting

Landform: Rises
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile

A - 0 to 4 inches: loamy sand
Bw1 - 4 to 20 inches: loamy sand
Bw2 - 20 to 31 inches: sand
E and Bt - 31 to 79 inches: sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sloping Upland, Low AWC, Acid (G091AN008MN)
Other vegetative classification: Sloping Upland, Low AWC, Acid (G091AN008MN)
Hydric soil rating: No

Minor Components

Wurtsmith

Percent of map unit: 10 percent
Landform: Rises
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Sloping Upland, Low AWC, Acid (G091AN008MN)
Hydric soil rating: No

Lougee

Percent of map unit: 5 percent
Landform: Rises

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Organic (G091AN014MN)
Hydric soil rating: Yes

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ATTACHMENT 2

Impervious Area Worksheet

Landowner / Parcel #: Highway 103 Storage Association Date: 12/9/21

Lot Impervious Surface Coverage & Landscaping for Stormwater Worksheet

Please use the table below to calculate your impervious surface coverage. Impervious coverage is limited to 25% of the total lot area. Calculate out all that apply to your situation. If a structure has odd dimensions or if using to size stormwater basins, multiple rows / sheets may be needed. If total imp. of irregular structure or driveway is known, just multiply by 1.

Existing Structures	Length (ft)		Width (ft)		Total (in sq. feet)
House, garage, shed Boathouse Greenhouse Other (Dog Kennel, etc.)	702 (ft)	X	100 (ft)	=	70,208 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
Driveways* & Landscaping:					
Driveway*, Parking Area, Apron, Boat Ramp, Sidewalk, Patio, Paving Stones, Landscaping (incl. plastic), Other	840 (ft)	X	100 (ft)	=	83,989 (sq ft)
	391 (ft)	X	26 (ft)	=	10,041 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
			Total Existing Impervious		164,238 **(sq ft)**
Proposed Structures					
House, garage, shed Boathouse Greenhouse Other (Dog Kennel, etc.)	46 (ft)	X	192 (ft)	=	8,832 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
Driveways* & Landscaping:	**Assumes a 12' wide driveway unless evidence to the contrary*				
Driveway*, Parking Area, Apron, Boat Ramp, Sidewalk, Patio, Paving Stones Landscaping (incl. plastic), Other	87 (ft)	X	100 (ft)	=	8,662 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
	(ft)	X	(ft)	=	0 (sq ft)
			Total Proposed Impervious		17,494 **(sq ft)**

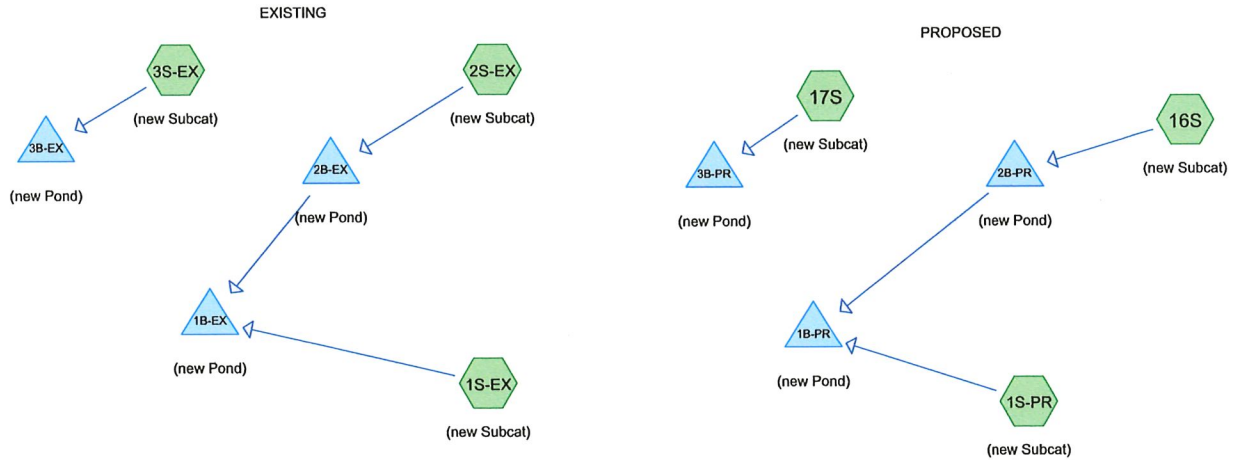
Total Lot Area (sq. ft.) = 318,760	**Total existing Impervious**	=	164,238 **(sq ft)**
	Total w/new Impervious	=	181,732 **(sq ft)**
	% existing impervious	=	51.5 %
	% w/new impervious	=	57.0 %

Simple Calculator for Approximating Size of Stormwater Practice & Amount of Phosphorus Reduction:

Total w/ new impervious:				**Storage volume: Gal / Cu ft** (= gal / 7.48)		**Bottom size (sq ft) of infiltration area by depth** 3"	6"	9"	12"	15"	18"
181,732	x	0.623 / 0.083 Gal / Cu ft	=	113,219 Gal	15,084 Cu ft	60,335 cu ft x 4	30,167 cu ft x 2	20,061 cu ft x 1.33	15,084 cu ft x 1	12,067 cu ft x 0.8	10,106 cu ft x 0.67
Total exst imp	=	164,238	x	0.0000366	= 6.01	**Existing phosphorous loading (lbs/yr)**					
Tot w/new imp	=	181,732	x	0.0000366	= 6.65	**Phosphorous reduction w/ stormwater mgmt**					
For rain barrels, use this formula to determine size/amount needed:				Roof area (sq ft)	x	0.5625	=	0	**Gallons generated from a 1" rain event**		

ATTACHMENT 3

HydroCAD Model Output



Subcat Reach Pond Link

Routing Diagram for 2021-12107-HCAD
Prepared by Widseth Smith Nolting, Printed 6/29/2022

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	MSE 24-hr	3	Default	24.00	1	2.58	2
2	10-yr	MSE 24-hr	3	Default	24.00	1	3.78	2
3	100-yr	MSE 24-hr	3	Default	24.00	1	6.20	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
9.742	39	>75% Grass cover, Good, HSG A (1S-EX, 1S-PR, 2S-EX, 3S-EX, 16S, 17S)
4.213	98	Unconnected pavement, HSG A (1S-EX, 1S-PR, 2S-EX, 3S-EX, 16S, 17S)
3.317	98	Unconnected roofs, HSG A (1S-EX, 1S-PR, 2S-EX, 3S-EX, 16S, 17S)
17.272	**65**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
17.272	HSG A	1S-EX, 1S-PR, 2S-EX, 3S-EX, 16S, 17S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
17.272		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
9.742	0.000	0.000	0.000	0.000	9.742	>75% Grass cover, Good	1S-EX, 1S-PR, 2S-EX, 3S-EX, 16S, 17S
4.213	0.000	0.000	0.000	0.000	4.213	Unconnected pavement	1S-EX, 1S-PR, 2S-EX, 3S-EX, 16S, 17S
3.317	0.000	0.000	0.000	0.000	3.317	Unconnected roofs	1S-EX, 1S-PR, 2S-EX, 3S-EX, 16S, 17S
17.272	**0.000**	**0.000**	**0.000**	**0.000**	**17.272**	**TOTAL AREA**	

Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S-EX: (new Subcat) Runoff Area=4.877 ac 36.23% Impervious Runoff Depth=0.20"
Flow Length=700' Slope=0.0130 '/' Tc=18.2 min CN=60 Runoff=0.50 cfs 0.080 af

Subcatchment1S-PR: (new Subcat) Runoff Area=4.877 ac 44.47% Impervious Runoff Depth=0.33"
Flow Length=700' Slope=0.0130 '/' Tc=18.2 min CN=65 Runoff=1.24 cfs 0.133 af

Subcatchment2S-EX: (new Subcat) Runoff Area=2.794 ac 52.00% Impervious Runoff Depth=0.49"
Flow Length=600' Slope=0.0100 '/' Tc=19.4 min CN=70 Runoff=1.28 cfs 0.115 af

Subcatchment3S-EX: (new Subcat) Runoff Area=0.965 ac 35.65% Impervious Runoff Depth=0.20"
Tc=0.0 min CN=60 Runoff=0.19 cfs 0.016 af

Subcatchment16S: (new Subcat) Runoff Area=2.794 ac 52.00% Impervious Runoff Depth=0.49"
Flow Length=600' Slope=0.0100 '/' Tc=19.4 min CN=70 Runoff=1.28 cfs 0.115 af

Subcatchment17S: (new Subcat) Runoff Area=0.965 ac 35.65% Impervious Runoff Depth=0.20"
Tc=0.0 min CN=60 Runoff=0.19 cfs 0.016 af

Pond 1B-EX: (new Pond) Peak Elev=1,229.40' Storage=0.025 af Inflow=0.50 cfs 0.080 af
Outflow=0.12 cfs 0.080 af

Pond 1B-PR: (new Pond) Peak Elev=1,229.80' Storage=0.057 af Inflow=1.24 cfs 0.133 af
Outflow=0.16 cfs 0.133 af

Pond 2B-EX: (new Pond) Peak Elev=1,233.02' Storage=0.062 af Inflow=1.28 cfs 0.115 af
Discarded=0.10 cfs 0.115 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.115 af

Pond 2B-PR: (new Pond) Peak Elev=1,233.02' Storage=0.062 af Inflow=1.28 cfs 0.115 af
Discarded=0.10 cfs 0.115 af Primary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.115 af

Pond 3B-EX: (new Pond) Peak Elev=1,230.74' Storage=0.005 af Inflow=0.19 cfs 0.016 af
Outflow=0.02 cfs 0.016 af

Pond 3B-PR: (new Pond) Peak Elev=1,230.74' Storage=0.005 af Inflow=0.19 cfs 0.016 af
Outflow=0.02 cfs 0.016 af

Total Runoff Area = 17.272 ac Runoff Volume = 0.475 af Average Runoff Depth = 0.33"
56.40% Pervious = 9.742 ac 43.60% Impervious = 7.530 ac

Summary for Subcatchment 1S-EX: (new Subcat)

Runoff = 0.50 cfs @ 12.44 hrs, Volume= 0.080 af, Depth= 0.20"
Routed to Pond 1B-EX : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.58"

Area (ac)	CN	Description
3.110	39	>75% Grass cover, Good, HSG A
0.830	98	Unconnected roofs, HSG A
0.937	98	Unconnected pavement, HSG A
4.877	60	Weighted Average
3.110		63.77% Pervious Area
1.767		36.23% Impervious Area
1.767		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0130	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.8	600	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.2	700	Total			

Summary for Subcatchment 1S-PR: (new Subcat)

Runoff = 1.24 cfs @ 12.35 hrs, Volume= 0.133 af, Depth= 0.33"
Routed to Pond 1B-PR : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.58"

Area (ac)	CN	Description
2.708	39	>75% Grass cover, Good, HSG A
1.033	98	Unconnected roofs, HSG A
1.136	98	Unconnected pavement, HSG A
4.877	65	Weighted Average
2.708		55.53% Pervious Area
2.169		44.47% Impervious Area
2.169		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0130	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.8	600	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.2	700	Total			

Summary for Subcatchment 2S-EX: (new Subcat)

Runoff = 1.28 cfs @ 12.34 hrs, Volume= 0.115 af, Depth= 0.49"
Routed to Pond 2B-EX : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.58"

Area (ac)	CN	Description
0.612	98	Unconnected roofs, HSG A
0.841	98	Unconnected pavement, HSG A
1.341	39	>75% Grass cover, Good, HSG A
2.794	70	Weighted Average
1.341		48.00% Pervious Area
1.453		52.00% Impervious Area
1.453		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.6	500	0.0100	1.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	600	Total			

Summary for Subcatchment 3S-EX: (new Subcat)

Runoff = 0.19 cfs @ 12.10 hrs, Volume= 0.016 af, Depth= 0.20"
Routed to Pond 3B-EX : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.58"

Area (ac)	CN	Description
0.229	98	Unconnected pavement, HSG A
0.115	98	Unconnected roofs, HSG A
0.621	39	>75% Grass cover, Good, HSG A
0.965	60	Weighted Average
0.621		64.35% Pervious Area
0.344		35.65% Impervious Area
0.344		100.00% Unconnected

Summary for Subcatchment 16S: (new Subcat)

Runoff = 1.28 cfs @ 12.34 hrs, Volume= 0.115 af, Depth= 0.49"
Routed to Pond 2B-PR : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.58"

Area (ac)	CN	Description
0.612	98	Unconnected roofs, HSG A
0.841	98	Unconnected pavement, HSG A
1.341	39	>75% Grass cover, Good, HSG A
2.794	70	Weighted Average
1.341		48.00% Pervious Area
1.453		52.00% Impervious Area
1.453		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.6	500	0.0100	1.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	600	Total			

Summary for Subcatchment 17S: (new Subcat)

Runoff = 0.19 cfs @ 12.10 hrs, Volume= 0.016 af, Depth= 0.20"
Routed to Pond 3B-PR : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-yr Rainfall=2.58"

Area (ac)	CN	Description
0.229	98	Unconnected pavement, HSG A
0.115	98	Unconnected roofs, HSG A
0.621	39	>75% Grass cover, Good, HSG A
0.965	60	Weighted Average
0.621		64.35% Pervious Area
0.344		35.65% Impervious Area
0.344		100.00% Unconnected

Summary for Pond 1B-EX: (new Pond)

Inflow Area = 7.671 ac, 41.98% Impervious, Inflow Depth = 0.12" for 2-yr event
Inflow = 0.50 cfs @ 12.44 hrs, Volume= 0.080 af
Outflow = 0.12 cfs @ 13.89 hrs, Volume= 0.080 af, Atten= 77%, Lag= 86.7 min
Discarded = 0.12 cfs @ 13.89 hrs, Volume= 0.080 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,229.40' @ 13.89 hrs Surf.Area= 0.071 ac Storage= 0.025 af

Plug-Flow detention time= 96.7 min calculated for 0.080 af (100% of inflow)
Center-of-Mass det. time= 96.7 min (1,010.7 - 914.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,229.00'	0.943 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,229.00	0.053	0.000	0.000
1,230.00	0.099	0.076	0.076
1,231.00	0.030	0.064	0.140
1,232.00	0.306	0.168	0.308
1,233.00	0.458	0.382	0.690
1,233.50	0.551	0.252	0.943

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,229.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,190.00' Phase-In= 0.01'

Discarded OutFlow Max=0.12 cfs @ 13.89 hrs HW=1,229.40' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.12 cfs)

Summary for Pond 1B-PR: (new Pond)

Inflow Area = 7.671 ac, 47.22% Impervious, Inflow Depth = 0.21" for 2-yr event
Inflow = 1.24 cfs @ 12.35 hrs, Volume= 0.133 af
Outflow = 0.16 cfs @ 14.06 hrs, Volume= 0.133 af, Atten= 87%, Lag= 102.6 min
Discarded = 0.16 cfs @ 14.06 hrs, Volume= 0.133 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,229.80' @ 14.06 hrs Surf.Area= 0.090 ac Storage= 0.057 af

Plug-Flow detention time= 191.4 min calculated for 0.133 af (100% of inflow)
Center-of-Mass det. time= 191.3 min (1,075.9 - 884.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,229.00'	0.943 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,229.00	0.053	0.000	0.000
1,230.00	0.099	0.076	0.076
1,231.00	0.030	0.064	0.140
1,232.00	0.306	0.168	0.308
1,233.00	0.458	0.382	0.690
1,233.50	0.551	0.252	0.943

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,229.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'

Discarded OutFlow Max=0.16 cfs @ 14.06 hrs HW=1,229.80' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.16 cfs)

Summary for Pond 2B-EX: (new Pond)

Inflow Area = 2.794 ac, 52.00% Impervious, Inflow Depth = 0.49" for 2-yr event
Inflow = 1.28 cfs @ 12.34 hrs, Volume= 0.115 af
Outflow = 0.10 cfs @ 15.08 hrs, Volume= 0.115 af, Atten= 92%, Lag= 164.8 min
Discarded = 0.10 cfs @ 15.08 hrs, Volume= 0.115 af
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Pond 1B-EX : (new Pond)

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,233.02' @ 15.08 hrs Surf.Area= 0.060 ac Storage= 0.062 af

Plug-Flow detention time= 340.1 min calculated for 0.115 af (100% of inflow)
Center-of-Mass det. time= 340.3 min (1,205.4 - 865.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,231.00'	0.246 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,231.00	0.001	0.000	0.000
1,232.00	0.031	0.016	0.016
1,233.00	0.058	0.044	0.061
1,234.00	0.150	0.104	0.164
1,234.50	0.177	0.082	0.246

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,231.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'
#2	Primary	1,234.00'	**20.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.10 cfs @ 15.08 hrs HW=1,233.02' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=1,231.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2B-PR: (new Pond)

Inflow Area = 2.794 ac, 52.00% Impervious, Inflow Depth = 0.49" for 2-yr event
Inflow = 1.28 cfs @ 12.34 hrs, Volume= 0.115 af
Outflow = 0.10 cfs @ 15.08 hrs, Volume= 0.115 af, Atten= 92%, Lag= 164.8 min
Discarded = 0.10 cfs @ 15.08 hrs, Volume= 0.115 af
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Pond 1B-PR : (new Pond)

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 1,233.02' @ 15.08 hrs Surf.Area= 0.060 ac Storage= 0.062 af

Plug-Flow detention time= 340.1 min calculated for 0.115 af (100% of inflow)
Center-of-Mass det. time= 340.3 min (1,205.4 - 865.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,231.00'	0.246 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,231.00	0.001	0.000	0.000
1,232.00	0.031	0.016	0.016
1,233.00	0.058	0.044	0.061
1,234.00	0.150	0.104	0.164
1,234.50	0.177	0.082	0.246

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,231.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'
#2	Primary	1,234.00'	**20.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.10 cfs @ 15.08 hrs HW=1,233.02' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=1,231.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3B-EX: (new Pond)

Inflow Area = 0.965 ac, 35.65% Impervious, Inflow Depth = 0.20" for 2-yr event
Inflow = 0.19 cfs @ 12.10 hrs, Volume= 0.016 af
Outflow = 0.02 cfs @ 13.54 hrs, Volume= 0.016 af, Atten= 88%, Lag= 86.0 min
Discarded = 0.02 cfs @ 13.54 hrs, Volume= 0.016 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,230.74' @ 13.54 hrs Surf.Area= 0.014 ac Storage= 0.005 af

Plug-Flow detention time= 131.4 min calculated for 0.016 af (100% of inflow)
Center-of-Mass det. time= 131.4 min (1,028.6 - 897.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,230.00'	0.152 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,230.00	0.001	0.000	0.000
1,231.00	0.018	0.010	0.010
1,232.00	0.040	0.029	0.038
1,233.00	0.087	0.063	0.102
1,233.50	0.112	0.050	0.152

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,230.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'

Discarded OutFlow Max=0.02 cfs @ 13.54 hrs HW=1,230.74' (Free Discharge)
↑**1=Exfiltration** (Controls 0.02 cfs)

Summary for Pond 3B-PR: (new Pond)

Inflow Area = 0.965 ac, 35.65% Impervious, Inflow Depth = 0.20" for 2-yr event
Inflow = 0.19 cfs @ 12.10 hrs, Volume= 0.016 af
Outflow = 0.02 cfs @ 13.54 hrs, Volume= 0.016 af, Atten= 88%, Lag= 86.0 min
Discarded = 0.02 cfs @ 13.54 hrs, Volume= 0.016 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,230.74' @ 13.54 hrs Surf.Area= 0.014 ac Storage= 0.005 af

Plug-Flow detention time= 131.4 min calculated for 0.016 af (100% of inflow)
Center-of-Mass det. time= 131.4 min (1,028.6 - 897.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,230.00'	0.152 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,230.00	0.001	0.000	0.000
1,231.00	0.018	0.010	0.010
1,232.00	0.040	0.029	0.038
1,233.00	0.087	0.063	0.102
1,233.50	0.112	0.050	0.152

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,230.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'

Discarded OutFlow Max=0.02 cfs @ 13.54 hrs HW=1,230.74' (Free Discharge)
↑**1=Exfiltration** (Controls 0.02 cfs)

Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S-EX: (new Subcat) Runoff Area=4.877 ac 36.23% Impervious Runoff Depth=0.66"
Flow Length=700' Slope=0.0130 '/' Tc=18.2 min CN=60 Runoff=2.95 cfs 0.267 af

Subcatchment1S-PR: (new Subcat) Runoff Area=4.877 ac 44.47% Impervious Runoff Depth=0.90"
Flow Length=700' Slope=0.0130 '/' Tc=18.2 min CN=65 Runoff=4.59 cfs 0.367 af

Subcatchment2S-EX: (new Subcat) Runoff Area=2.794 ac 52.00% Impervious Runoff Depth=1.19"
Flow Length=600' Slope=0.0100 '/' Tc=19.4 min CN=70 Runoff=3.57 cfs 0.276 af

Subcatchment3S-EX: (new Subcat) Runoff Area=0.965 ac 35.65% Impervious Runoff Depth=0.66"
Tc=0.0 min CN=60 Runoff=1.15 cfs 0.053 af

Subcatchment16S: (new Subcat) Runoff Area=2.794 ac 52.00% Impervious Runoff Depth=1.19"
Flow Length=600' Slope=0.0100 '/' Tc=19.4 min CN=70 Runoff=3.57 cfs 0.276 af

Subcatchment17S: (new Subcat) Runoff Area=0.965 ac 35.65% Impervious Runoff Depth=0.66"
Tc=0.0 min CN=60 Runoff=1.15 cfs 0.053 af

Pond 1B-EX: (new Pond) Peak Elev=1,231.15' Storage=0.148 af Inflow=2.95 cfs 0.267 af
Outflow=0.23 cfs 0.267 af

Pond 1B-PR: (new Pond) Peak Elev=1,231.53' Storage=0.196 af Inflow=4.59 cfs 0.367 af
Outflow=0.44 cfs 0.367 af

Pond 2B-EX: (new Pond) Peak Elev=1,233.98' Storage=0.161 af Inflow=3.57 cfs 0.276 af
Discarded=0.26 cfs 0.276 af Primary=0.00 cfs 0.000 af Outflow=0.26 cfs 0.276 af

Pond 2B-PR: (new Pond) Peak Elev=1,233.98' Storage=0.161 af Inflow=3.57 cfs 0.276 af
Discarded=0.26 cfs 0.276 af Primary=0.00 cfs 0.000 af Outflow=0.26 cfs 0.276 af

Pond 3B-EX: (new Pond) Peak Elev=1,231.67' Storage=0.026 af Inflow=1.15 cfs 0.053 af
Outflow=0.06 cfs 0.053 af

Pond 3B-PR: (new Pond) Peak Elev=1,231.67' Storage=0.026 af Inflow=1.15 cfs 0.053 af
Outflow=0.06 cfs 0.053 af

Total Runoff Area = 17.272 ac Runoff Volume = 1.292 af Average Runoff Depth = 0.90"
56.40% Pervious = 9.742 ac 43.60% Impervious = 7.530 ac

Summary for Subcatchment 1S-EX: (new Subcat)

Runoff = 2.95 cfs @ 12.32 hrs, Volume= 0.267 af, Depth= 0.66"
Routed to Pond 1B-EX : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=3.78"

Area (ac)	CN	Description
3.110	39	>75% Grass cover, Good, HSG A
0.830	98	Unconnected roofs, HSG A
0.937	98	Unconnected pavement, HSG A
4.877	60	Weighted Average
3.110		63.77% Pervious Area
1.767		36.23% Impervious Area
1.767		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0130	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.8	600	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.2	700	Total			

Summary for Subcatchment 1S-PR: (new Subcat)

Runoff = 4.59 cfs @ 12.31 hrs, Volume= 0.367 af, Depth= 0.90"
Routed to Pond 1B-PR : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=3.78"

Area (ac)	CN	Description
2.708	39	>75% Grass cover, Good, HSG A
1.033	98	Unconnected roofs, HSG A
1.136	98	Unconnected pavement, HSG A
4.877	65	Weighted Average
2.708		55.53% Pervious Area
2.169		44.47% Impervious Area
2.169		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0130	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.8	600	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.2	700	Total			

Summary for Subcatchment 2S-EX: (new Subcat)

Runoff = 3.57 cfs @ 12.31 hrs, Volume= 0.276 af, Depth= 1.19"
Routed to Pond 2B-EX : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=3.78"

Area (ac)	CN	Description
0.612	98	Unconnected roofs, HSG A
0.841	98	Unconnected pavement, HSG A
1.341	39	>75% Grass cover, Good, HSG A
2.794	70	Weighted Average
1.341		48.00% Pervious Area
1.453		52.00% Impervious Area
1.453		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.6	500	0.0100	1.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	600	Total			

Summary for Subcatchment 3S-EX: (new Subcat)

Runoff = 1.15 cfs @ 12.06 hrs, Volume= 0.053 af, Depth= 0.66"
Routed to Pond 3B-EX : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=3.78"

Area (ac)	CN	Description
0.229	98	Unconnected pavement, HSG A
0.115	98	Unconnected roofs, HSG A
0.621	39	>75% Grass cover, Good, HSG A
0.965	60	Weighted Average
0.621		64.35% Pervious Area
0.344		35.65% Impervious Area
0.344		100.00% Unconnected

Summary for Subcatchment 16S: (new Subcat)

Runoff = 3.57 cfs @ 12.31 hrs, Volume= 0.276 af, Depth= 1.19"
Routed to Pond 2B-PR : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=3.78"

Area (ac)	CN	Description
0.612	98	Unconnected roofs, HSG A
0.841	98	Unconnected pavement, HSG A
1.341	39	>75% Grass cover, Good, HSG A
2.794	70	Weighted Average
1.341		48.00% Pervious Area
1.453		52.00% Impervious Area
1.453		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.6	500	0.0100	1.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	600	Total			

Summary for Subcatchment 17S: (new Subcat)

Runoff = 1.15 cfs @ 12.06 hrs, Volume= 0.053 af, Depth= 0.66"
Routed to Pond 3B-PR : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-yr Rainfall=3.78"

Area (ac)	CN	Description
0.229	98	Unconnected pavement, HSG A
0.115	98	Unconnected roofs, HSG A
0.621	39	>75% Grass cover, Good, HSG A
0.965	60	Weighted Average
0.621		64.35% Pervious Area
0.344		35.65% Impervious Area
0.344		100.00% Unconnected

Summary for Pond 1B-EX: (new Pond)

Inflow Area = 7.671 ac, 41.98% Impervious, Inflow Depth = 0.42" for 10-yr event
Inflow = 2.95 cfs @ 12.32 hrs, Volume= 0.267 af
Outflow = 0.23 cfs @ 15.17 hrs, Volume= 0.267 af, Atten= 92%, Lag= 170.9 min
Discarded = 0.23 cfs @ 15.17 hrs, Volume= 0.267 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,231.15' @ 15.17 hrs Surf.Area= 0.072 ac Storage= 0.148 af

Plug-Flow detention time= 418.1 min calculated for 0.267 af (100% of inflow)
Center-of-Mass det. time= 418.0 min (1,286.7 - 868.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,229.00'	0.943 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,229.00	0.053	0.000	0.000
1,230.00	0.099	0.076	0.076
1,231.00	0.030	0.064	0.140
1,232.00	0.306	0.168	0.308
1,233.00	0.458	0.382	0.690
1,233.50	0.551	0.252	0.943

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,229.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,190.00' Phase-In= 0.01'

Discarded OutFlow Max=0.23 cfs @ 15.17 hrs HW=1,231.15' (Free Discharge)
↳**1=Exfiltration** (Controls 0.23 cfs)

Summary for Pond 1B-PR: (new Pond)

Inflow Area = 7.671 ac, 47.22% Impervious, Inflow Depth = 0.57" for 10-yr event
Inflow = 4.59 cfs @ 12.31 hrs, Volume= 0.367 af
Outflow = 0.44 cfs @ 13.78 hrs, Volume= 0.367 af, Atten= 90%, Lag= 88.7 min
Discarded = 0.44 cfs @ 13.78 hrs, Volume= 0.367 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,231.53' @ 13.78 hrs Surf.Area= 0.177 ac Storage= 0.196 af

Plug-Flow detention time= 348.1 min calculated for 0.367 af (100% of inflow)
Center-of-Mass det. time= 348.2 min (1,201.9 - 853.6)

Volume	Invert	Avail.Storage	Storage Description
#1	1,229.00'	0.943 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,229.00	0.053	0.000	0.000
1,230.00	0.099	0.076	0.076
1,231.00	0.030	0.064	0.140
1,232.00	0.306	0.168	0.308
1,233.00	0.458	0.382	0.690
1,233.50	0.551	0.252	0.943

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,229.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'

Discarded OutFlow Max=0.44 cfs @ 13.78 hrs HW=1,231.53' (Free Discharge)
↳**1=Exfiltration** (Controls 0.44 cfs)

Summary for Pond 2B-EX: (new Pond)

Inflow Area = 2.794 ac, 52.00% Impervious, Inflow Depth = 1.19" for 10-yr event
Inflow = 3.57 cfs @ 12.31 hrs, Volume= 0.276 af
Outflow = 0.26 cfs @ 13.94 hrs, Volume= 0.276 af, Atten= 93%, Lag= 97.9 min
Discarded = 0.26 cfs @ 13.94 hrs, Volume= 0.276 af
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Pond 1B-EX : (new Pond)

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,233.98' @ 13.94 hrs Surf.Area= 0.148 ac Storage= 0.161 af

Plug-Flow detention time= 393.8 min calculated for 0.276 af (100% of inflow)
Center-of-Mass det. time= 394.2 min (1,236.5 - 842.3)

Volume	Invert	Avail.Storage	Storage Description
#1	1,231.00'	0.246 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,231.00	0.001	0.000	0.000
1,232.00	0.031	0.016	0.016
1,233.00	0.058	0.044	0.061
1,234.00	0.150	0.104	0.164
1,234.50	0.177	0.082	0.246

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,231.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'
#2	Primary	1,234.00'	**20.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.26 cfs @ 13.94 hrs HW=1,233.98' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.26 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=1,231.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2B-PR: (new Pond)

Inflow Area = 2.794 ac, 52.00% Impervious, Inflow Depth = 1.19" for 10-yr event
Inflow = 3.57 cfs @ 12.31 hrs, Volume= 0.276 af
Outflow = 0.26 cfs @ 13.94 hrs, Volume= 0.276 af, Atten= 93%, Lag= 97.9 min
Discarded = 0.26 cfs @ 13.94 hrs, Volume= 0.276 af
Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af
Routed to Pond 1B-PR : (new Pond)

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 1,233.98' @ 13.94 hrs Surf.Area= 0.148 ac Storage= 0.161 af

Plug-Flow detention time= 393.8 min calculated for 0.276 af (100% of inflow)
Center-of-Mass det. time= 394.2 min (1,236.5 - 842.3)

Volume	Invert	Avail.Storage	Storage Description
#1	1,231.00'	0.246 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,231.00	0.001	0.000	0.000
1,232.00	0.031	0.016	0.016
1,233.00	0.058	0.044	0.061
1,234.00	0.150	0.104	0.164
1,234.50	0.177	0.082	0.246

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,231.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'
#2	Primary	1,234.00'	**20.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.26 cfs @ 13.94 hrs HW=1,233.98' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.26 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=1,231.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3B-EX: (new Pond)

Inflow Area = 0.965 ac, 35.65% Impervious, Inflow Depth = 0.66" for 10-yr event
Inflow = 1.15 cfs @ 12.06 hrs, Volume= 0.053 af
Outflow = 0.06 cfs @ 13.57 hrs, Volume= 0.053 af, Atten= 95%, Lag= 90.2 min
Discarded = 0.06 cfs @ 13.57 hrs, Volume= 0.053 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,231.67' @ 13.57 hrs Surf.Area= 0.033 ac Storage= 0.026 af

Plug-Flow detention time= 272.4 min calculated for 0.053 af (100% of inflow)
Center-of-Mass det. time= 272.5 min (1,124.3 - 851.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,230.00'	0.152 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,230.00	0.001	0.000	0.000
1,231.00	0.018	0.010	0.010
1,232.00	0.040	0.029	0.038
1,233.00	0.087	0.063	0.102
1,233.50	0.112	0.050	0.152

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,230.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'

Discarded OutFlow Max=0.06 cfs @ 13.57 hrs HW=1,231.67' (Free Discharge)
↑**1=Exfiltration** (Controls 0.06 cfs)

Summary for Pond 3B-PR: (new Pond)

Inflow Area = 0.965 ac, 35.65% Impervious, Inflow Depth = 0.66" for 10-yr event
Inflow = 1.15 cfs @ 12.06 hrs, Volume= 0.053 af
Outflow = 0.06 cfs @ 13.57 hrs, Volume= 0.053 af, Atten= 95%, Lag= 90.2 min
Discarded = 0.06 cfs @ 13.57 hrs, Volume= 0.053 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,231.67' @ 13.57 hrs Surf.Area= 0.033 ac Storage= 0.026 af

Plug-Flow detention time= 272.4 min calculated for 0.053 af (100% of inflow)
Center-of-Mass det. time= 272.5 min (1,124.3 - 851.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,230.00'	0.152 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,230.00	0.001	0.000	0.000
1,231.00	0.018	0.010	0.010
1,232.00	0.040	0.029	0.038
1,233.00	0.087	0.063	0.102
1,233.50	0.112	0.050	0.152

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,230.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'

Discarded OutFlow Max=0.06 cfs @ 13.57 hrs HW=1,231.67' (Free Discharge)
↑**1=Exfiltration** (Controls 0.06 cfs)

Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S-EX: (new Subcat) Runoff Area=4.877 ac 36.23% Impervious Runoff Depth=2.05"
Flow Length=700' Slope=0.0130 '/' Tc=18.2 min CN=60 Runoff=11.23 cfs 0.835 af

Subcatchment1S-PR: (new Subcat) Runoff Area=4.877 ac 44.47% Impervious Runoff Depth=2.50"
Flow Length=700' Slope=0.0130 '/' Tc=18.2 min CN=65 Runoff=14.01 cfs 1.015 af

Subcatchment2S-EX: (new Subcat) Runoff Area=2.794 ac 52.00% Impervious Runoff Depth=2.96"
Flow Length=600' Slope=0.0100 '/' Tc=19.4 min CN=70 Runoff=9.36 cfs 0.690 af

Subcatchment3S-EX: (new Subcat) Runoff Area=0.965 ac 35.65% Impervious Runoff Depth=2.05"
Tc=0.0 min CN=60 Runoff=4.12 cfs 0.165 af

Subcatchment16S: (new Subcat) Runoff Area=2.794 ac 52.00% Impervious Runoff Depth=2.96"
Flow Length=600' Slope=0.0100 '/' Tc=19.4 min CN=70 Runoff=9.36 cfs 0.690 af

Subcatchment17S: (new Subcat) Runoff Area=0.965 ac 35.65% Impervious Runoff Depth=2.05"
Tc=0.0 min CN=60 Runoff=4.12 cfs 0.165 af

Pond 1B-EX: (new Pond) Peak Elev=1,233.18' Storage=0.778 af Inflow=16.91 cfs 1.168 af
Outflow=0.94 cfs 1.168 af

Pond 1B-PR: (new Pond) Peak Elev=1,233.42' Storage=0.898 af Inflow=19.30 cfs 1.348 af
Outflow=1.14 cfs 1.348 af

Pond 2B-EX: (new Pond) Peak Elev=1,234.26' Storage=0.205 af Inflow=9.36 cfs 0.690 af
Discarded=0.29 cfs 0.357 af Primary=7.65 cfs 0.333 af Outflow=7.94 cfs 0.690 af

Pond 2B-PR: (new Pond) Peak Elev=1,234.26' Storage=0.205 af Inflow=9.36 cfs 0.690 af
Discarded=0.29 cfs 0.357 af Primary=7.65 cfs 0.333 af Outflow=7.94 cfs 0.690 af

Pond 3B-EX: (new Pond) Peak Elev=1,232.95' Storage=0.098 af Inflow=4.12 cfs 0.165 af
Outflow=0.15 cfs 0.165 af

Pond 3B-PR: (new Pond) Peak Elev=1,232.95' Storage=0.098 af Inflow=4.12 cfs 0.165 af
Outflow=0.15 cfs 0.165 af

Total Runoff Area = 17.272 ac Runoff Volume = 3.561 af Average Runoff Depth = 2.47"
56.40% Pervious = 9.742 ac 43.60% Impervious = 7.530 ac

Summary for Subcatchment 1S-EX: (new Subcat)

Runoff = 11.23 cfs @ 12.29 hrs, Volume= 0.835 af, Depth= 2.05"
Routed to Pond 1B-EX : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.20"

Area (ac)	CN	Description
3.110	39	>75% Grass cover, Good, HSG A
0.830	98	Unconnected roofs, HSG A
0.937	98	Unconnected pavement, HSG A
4.877	60	Weighted Average
3.110		63.77% Pervious Area
1.767		36.23% Impervious Area
1.767		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0130	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.8	600	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.2	700	Total			

Summary for Subcatchment 1S-PR: (new Subcat)

Runoff = 14.01 cfs @ 12.29 hrs, Volume= 1.015 af, Depth= 2.50"
Routed to Pond 1B-PR : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.20"

Area (ac)	CN	Description
2.708	39	>75% Grass cover, Good, HSG A
1.033	98	Unconnected roofs, HSG A
1.136	98	Unconnected pavement, HSG A
4.877	65	Weighted Average
2.708		55.53% Pervious Area
2.169		44.47% Impervious Area
2.169		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0130	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.8	600	0.0130	1.71		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.2	700	Total			

Summary for Subcatchment 2S-EX: (new Subcat)

Runoff = 9.36 cfs @ 12.30 hrs, Volume= 0.690 af, Depth= 2.96"
Routed to Pond 2B-EX : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.20"

Area (ac)	CN	Description
0.612	98	Unconnected roofs, HSG A
0.841	98	Unconnected pavement, HSG A
1.341	39	>75% Grass cover, Good, HSG A
2.794	70	Weighted Average
1.341		48.00% Pervious Area
1.453		52.00% Impervious Area
1.453		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.6	500	0.0100	1.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	600	Total			

Summary for Subcatchment 3S-EX: (new Subcat)

Runoff = 4.12 cfs @ 12.05 hrs, Volume= 0.165 af, Depth= 2.05"
Routed to Pond 3B-EX : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.20"

Area (ac)	CN	Description
0.229	98	Unconnected pavement, HSG A
0.115	98	Unconnected roofs, HSG A
0.621	39	>75% Grass cover, Good, HSG A
0.965	60	Weighted Average
0.621		64.35% Pervious Area
0.344		35.65% Impervious Area
0.344		100.00% Unconnected

Summary for Subcatchment 16S: (new Subcat)

Runoff = 9.36 cfs @ 12.30 hrs, Volume= 0.690 af, Depth= 2.96"
Routed to Pond 2B-PR : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.20"

Area (ac)	CN	Description
0.612	98	Unconnected roofs, HSG A
0.841	98	Unconnected pavement, HSG A
1.341	39	>75% Grass cover, Good, HSG A
2.794	70	Weighted Average
1.341		48.00% Pervious Area
1.453		52.00% Impervious Area
1.453		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.6	500	0.0100	1.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
19.4	600	Total			

Summary for Subcatchment 17S: (new Subcat)

Runoff = 4.12 cfs @ 12.05 hrs, Volume= 0.165 af, Depth= 2.05"
Routed to Pond 3B-PR : (new Pond)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-yr Rainfall=6.20"

Area (ac)	CN	Description
0.229	98	Unconnected pavement, HSG A
0.115	98	Unconnected roofs, HSG A
0.621	39	>75% Grass cover, Good, HSG A
0.965	60	Weighted Average
0.621		64.35% Pervious Area
0.344		35.65% Impervious Area
0.344		100.00% Unconnected

Summary for Pond 1B-EX: (new Pond)

Inflow Area = 7.671 ac, 41.98% Impervious, Inflow Depth = 1.83" for 100-yr event
Inflow = 16.91 cfs @ 12.38 hrs, Volume= 1.168 af
Outflow = 0.94 cfs @ 14.28 hrs, Volume= 1.168 af, Atten= 94%, Lag= 113.7 min
Discarded = 0.94 cfs @ 14.28 hrs, Volume= 1.168 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,233.18' @ 14.28 hrs Surf.Area= 0.492 ac Storage= 0.778 af

Plug-Flow detention time= 473.7 min calculated for 1.167 af (100% of inflow)
Center-of-Mass det. time= 474.1 min (1,294.6 - 820.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,229.00'	0.943 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,229.00	0.053	0.000	0.000
1,230.00	0.099	0.076	0.076
1,231.00	0.030	0.064	0.140
1,232.00	0.306	0.168	0.308
1,233.00	0.458	0.382	0.690
1,233.50	0.551	0.252	0.943

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,229.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,190.00' Phase-In= 0.01'

Discarded OutFlow Max=0.94 cfs @ 14.28 hrs HW=1,233.18' (Free Discharge)
↑**1=Exfiltration** (Controls 0.94 cfs)

Summary for Pond 1B-PR: (new Pond)

Inflow Area = 7.671 ac, 47.22% Impervious, Inflow Depth = 2.11" for 100-yr event
Inflow = 19.30 cfs @ 12.37 hrs, Volume= 1.348 af
Outflow = 1.14 cfs @ 14.05 hrs, Volume= 1.348 af, Atten= 94%, Lag= 100.7 min
Discarded = 1.14 cfs @ 14.05 hrs, Volume= 1.348 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,233.42' @ 14.05 hrs Surf.Area= 0.536 ac Storage= 0.898 af

Plug-Flow detention time= 453.6 min calculated for 1.347 af (100% of inflow)
Center-of-Mass det. time= 454.0 min (1,270.1 - 816.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,229.00'	0.943 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,229.00	0.053	0.000	0.000
1,230.00	0.099	0.076	0.076
1,231.00	0.030	0.064	0.140
1,232.00	0.306	0.168	0.308
1,233.00	0.458	0.382	0.690
1,233.50	0.551	0.252	0.943

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,229.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'

Discarded OutFlow Max=1.14 cfs @ 14.05 hrs HW=1,233.42' (Free Discharge)
↑**1=Exfiltration** (Controls 1.14 cfs)

Summary for Pond 2B-EX: (new Pond)

Inflow Area = 2.794 ac, 52.00% Impervious, Inflow Depth = 2.96" for 100-yr event
Inflow = 9.36 cfs @ 12.30 hrs, Volume= 0.690 af
Outflow = 7.94 cfs @ 12.41 hrs, Volume= 0.690 af, Atten= 15%, Lag= 7.0 min
Discarded = 0.29 cfs @ 12.41 hrs, Volume= 0.357 af
Primary = 7.65 cfs @ 12.41 hrs, Volume= 0.333 af
Routed to Pond 1B-EX : (new Pond)

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,234.26' @ 12.41 hrs Surf.Area= 0.164 ac Storage= 0.205 af

Plug-Flow detention time= 212.7 min calculated for 0.690 af (100% of inflow)
Center-of-Mass det. time= 213.3 min (1,035.7 - 822.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,231.00'	0.246 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,231.00	0.001	0.000	0.000
1,232.00	0.031	0.016	0.016
1,233.00	0.058	0.044	0.061
1,234.00	0.150	0.104	0.164
1,234.50	0.177	0.082	0.246

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,231.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'
#2	Primary	1,234.00'	**20.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.29 cfs @ 12.41 hrs HW=1,234.26' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.29 cfs)

Primary OutFlow Max=7.43 cfs @ 12.41 hrs HW=1,234.26' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 7.43 cfs @ 1.16 fps)

Summary for Pond 2B-PR: (new Pond)

Inflow Area = 2.794 ac, 52.00% Impervious, Inflow Depth = 2.96" for 100-yr event
Inflow = 9.36 cfs @ 12.30 hrs, Volume= 0.690 af
Outflow = 7.94 cfs @ 12.41 hrs, Volume= 0.690 af, Atten= 15%, Lag= 7.0 min
Discarded = 0.29 cfs @ 12.41 hrs, Volume= 0.357 af
Primary = 7.65 cfs @ 12.41 hrs, Volume= 0.333 af
Routed to Pond 1B-PR : (new Pond)

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 1,234.26' @ 12.41 hrs Surf.Area= 0.164 ac Storage= 0.205 af

Plug-Flow detention time= 212.7 min calculated for 0.690 af (100% of inflow)
Center-of-Mass det. time= 213.3 min (1,035.7 - 822.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,231.00'	0.246 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,231.00	0.001	0.000	0.000
1,232.00	0.031	0.016	0.016
1,233.00	0.058	0.044	0.061
1,234.00	0.150	0.104	0.164
1,234.50	0.177	0.082	0.246

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,231.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'
#2	Primary	1,234.00'	**20.0' long + 20.0 '/' SideZ x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.29 cfs @ 12.41 hrs HW=1,234.26' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.29 cfs)

Primary OutFlow Max=7.43 cfs @ 12.41 hrs HW=1,234.26' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 7.43 cfs @ 1.16 fps)

Summary for Pond 3B-EX: (new Pond)

Inflow Area = 0.965 ac, 35.65% Impervious, Inflow Depth = 2.05" for 100-yr event
Inflow = 4.12 cfs @ 12.05 hrs, Volume= 0.165 af
Outflow = 0.15 cfs @ 13.55 hrs, Volume= 0.165 af, Atten= 96%, Lag= 89.6 min
Discarded = 0.15 cfs @ 13.55 hrs, Volume= 0.165 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,232.95' @ 13.55 hrs Surf.Area= 0.085 ac Storage= 0.098 af

Plug-Flow detention time= 399.4 min calculated for 0.165 af (100% of inflow)
Center-of-Mass det. time= 399.8 min (1,221.6 - 821.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,230.00'	0.152 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
1,230.00	0.001	0.000	0.000
1,231.00	0.018	0.010	0.010
1,232.00	0.040	0.029	0.038
1,233.00	0.087	0.063	0.102
1,233.50	0.112	0.050	0.152

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,230.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'

Discarded OutFlow Max=0.15 cfs @ 13.55 hrs HW=1,232.95' (Free Discharge)
↑**1=Exfiltration** (Controls 0.15 cfs)

Summary for Pond 3B-PR: (new Pond)

Inflow Area = 0.965 ac, 35.65% Impervious, Inflow Depth = 2.05" for 100-yr event
Inflow = 4.12 cfs @ 12.05 hrs, Volume= 0.165 af
Outflow = 0.15 cfs @ 13.55 hrs, Volume= 0.165 af, Atten= 96%, Lag= 89.6 min
Discarded = 0.15 cfs @ 13.55 hrs, Volume= 0.165 af

Routing by Stor-Ind method, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 1,232.95' @ 13.55 hrs Surf.Area= 0.085 ac Storage= 0.098 af

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1,230.00	0.001	0.000	0.000
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1,233.50	0.112	0.050	0.152

Device	Routing	Invert	Outlet Devices
#1	Discarded	1,230.00'	**1.600 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 1,220.00' Phase-In= 0.01'

Discarded OutFlow Max=0.15 cfs @ 13.55 hrs HW=1,232.95' (Free Discharge)
↑**1=Exfiltration** (Controls 0.15 cfs)

Variance Application
Planning and Zoning Department
13888 Daggett Bay Road, Crosslake, MN 56442
218.692.2689 (Phone) 218.692.2687 (Fax) www.cityofcrosslake.org

Receipt Number: 771633 Permit Number 220158V

Property Owner(s): HIGHWAY 103 STORAGE
Mailing Address: 672 WILLOW GROVE LN VADNAIS HTS, MN 55127
Site Address: 13529 CO RD 103 CROSSLAKE, MN. 56442
Phone Number: 651-208-1222
E-Mail Address: CHRIS.SUDBECK@YAHOO.COM
Parcel Number(s): 14320509
Legal Description: LOT 16, BLK 1, HIGHWAY 103 STORAGE 1ST ADDN
Sec 32 Twp 137 Rge 26 ☐ 27 ☒ 28 ☐
Lake/River Name: N/A
Do you own land adjacent to this parcel(s)? ____ Yes X No
If yes list Parcel Number(s) ____
Authorized Agent: CHRIS SUDBECK
Agent Address: 672 WILLOW GROVE LN VADNAIS HTS, MN 55127
Agent Phone Number: 651-208-1222

Variances
(Check applicable requests)

- ☐ Lake/River Setback
- ☐ Road Right-of-Way Setback
- ☐ Bluff Setback
- ☐ Side Yard Setback
- ☐ Wetland Setback
- ☐ Septic Tank Setback
- ☐ Septic Drainfield Setback
- ☒ Impervious Coverage
  57.0% where 50% is required
- ☐ Accessory Structure
- ☐ Building Height
- ☐ Patio Size
- ☒ Parcel sizes
  1,472 sf where 20,00 sf is required
- ☐ ____

Signature of Property Owner(s) _____ Date 7/21/22
Signature of Authorized Agent(s) _____ Date 7/21/22

- All applications must be accompanied by a signed Certificate of Survey
- Fee $500 for Residential and Commercial Payable to "City of Crosslake" $500 App + $6 copies
- No decisions were made on an applicant's request at the DRT meeting. Submittal of an application after DRT does not constitute approval. Approval or denial of applications is determined by the Planning Commission/Board of Adjustment at a public meeting as per Minnesota Statute 462 and the City of Crosslake Land Use Ordinance.

For Office Use:
Application accepted by C.S. Date 8-11-2022 Land Use District LC
Lake Class na Septic: Compliance na SSTS Design na Installation na

Practical Difficulty Statement

Pursuant to City of Crosslake Ordinance Article 8 – Variances may be granted when it is found that strict enforcement of the Land Use Ordinance will result in a "practical difficulty".

Please answer the following questions regarding the "practical difficulty" for your variance request.

1. Is the Variance request in harmony with the purposed and intent of the Ordinance?
   Yes ☐ No ☐
   Why:
   Defer to the Planning Commission/Board of Adjustment

2. Is the Variance consistent with the Comprehensive Plan?
   Yes ☐ No ☐
   Why:
   Defer to the Planning Commission/Board of Adjustment

3. Is the property owner proposing to use the property in a reasonable manner not permitted by the Land Use Ordinance?
   Yes ■ No ☐
   Why:
   The owners are proposing to add a final building to the existing deevelopment which would exceed the impervious coverage limits.
   The property is not located near any lakes or streams and the existing drainage ponds along with new ditching will be sufficient to hold any addititional water runoff per our attached storm water plan.

4. Will the issuance of a Variance maintain the essential character of the locality?
   Yes ■ No ☐
   Why:
   The new building will be spaced in a fashion and match the exterior to maintain the harmony and appearance of the existing devlepment.
   The devlopment, by design, is not visible from the county road which it situated on and the new building will maintain this descrete appearance.

5. Is the need for a Variance due to circumstances unique to the property and not created by the property owner?
   Yes ■ No ☐
   Why:
   The location of the final building requires a separate entrance and driveway area sufficient to maneuver trailers.
   Locating the building in a diferent location to use existing blacktop is not possible due to a large powerline easement running through the property.

6. Does the need for a Variance involve more than economic considerations?
   Yes ■ No ☐
   Why:
   Addition of this new building will be beneficial to existing owners looking for larger units, it will be benficial to new ownwers looking to join our association and finally, it will be beneficial to the city by increasing the availability of larger privately owned storage units.
   Larger storage "condo" units such as the ones at our facility in high demand and short supply in the area.

City of Crosslake Planning Commission/Board of Adjustment

FINDINGS OF FACT

SUPPORTING / DENYING A VARIANCE REQUEST

A Variance may be granted by the Planning Commission/Board of Adjustment when it is found that strict enforcement of the Land Use Ordinance will result in a "practical difficulty" according to Minnesota Statute Chapter 462. The Planning Commission/Board of Adjustment should weigh each of the following questions to determine if the applicant has established that there are "practical difficulties" in complying with regulations and standards set forth in the Land Use Ordinance.

1. Is the Variance request in harmony with the purposes and intent of the Ordinance?
   Yes No
   Why:

2. Is the Variance consistent with the Comprehensive Plan?
   Yes No
   Why:

3. Is the property owner proposing to use the property in a reasonable manner not permitted by the Land Use Ordinance?
   Yes No
   Why:

4. Will the issuance of a Variance maintain the essential character of the locality?
Yes No
Why:

5. Is the need for a Variance due to circumstances unique to the property and not created by the property owner?
Yes No
Why?

6. Does the need for a Variance involve more than economic considerations?
Yes No
Why: