Board of Adjustment
March 26, 2026
VAR-26-004

POPECOUNTY MINNESOTA

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STAFF REPORT

Applicant Information

Applicant: Jeremy Long

Application: Variance (VAR-26-004)

Zoning: Shoreland-General Development (S-GD)

Location: Lot 2, Fosse's Subdivision of Government Lot 4, Section 20, Township 125 (Minnewaska), Range 38, Pope County, Minnesota

DISCLAIMER: THIS MAP IS NOT A SUBSTITUTE FOR ACCURATE FIELD SURVEYS OR FOR LOCATING ACTUAL PROPERTY LINES AND ANY ADJACENT FEATURES.

Background

The applicant is proposing to re-construct a residential structure located on their Lake Minnewaska parcel. The parcel is undersized at 6,685 square feet, making it a Lot of Record as it was platted in 1920 (Fosse's Subdivision of Government Lot 4). The minimum lot size in this shoreland district is 20,000 square feet in area. Currently, the existing development covers 48.6% of the lot area. With the re-construction of the residential structure, the applicants are proposing to remove approximately 525 square feet of impervious coverage which would bring the impervious surface coverage down to 40%. However, as the total impervious coverage is over the allowed 25% on a Shoreland-General Development Lake, they seek consideration in the form of a variance.

To mitigate stormwater impacts, the applicant has submitted a stormwater management plan prepared by a licensed professional engineer, which includes construction of an infiltration basin.

Applicable Statutes

Local Ordinance

- Pope County Land Use Controls Ordinance
  - Section 10.10 Impervious Surface
    In addition to the listed requirements, no lot shall be covered by more than twenty-five (25) per cent with impervious surface. The County may vary the lot size pursuant to DNR standards where the lot is served by a public sewer system. No part of any lot less than thirty (30) feet wide, or on which there is easement or right-of-way for public or private travel, shall be used in computing minimum lot area.
  - Section 10.24 Erosion Control & Stormwater Management

    10.24.2 Impervious Surface Standards

    A. Maximum impervious surface coverage of parcels/lots shall not exceed the following:

Zoning District	Maximum Impervious Surface	Applicable Area	Requirements
• Shoreland-General Development • Shoreland-Recreational Development • Shoreland-Rivers & Streams	25%	Total lot area above the OHW	• Site Analysis of stormwater flows • 2 Erosion Control BMPs • Stormwater Management Plan
• Shoreland-Natural Environment	20%	Total lot area above the OHW	• Site Analysis of stormwater flows • 2 Erosion Control BMPs

Zoning District	Maximum Impervious Surface	Applicable Area	Requirements
			• Stormwater Management Plan
• Residential	25%	Total lot area	• Site Analysis of stormwater flows • 2 Erosion Control BMPs
• Non-Intensive Agriculture • Agriculture Protection	Not Applicable	Project area	• Site Analysis of stormwater flows • 2 Erosion Control BMPs
• Commercial • Industrial	Not Applicable	Parcel area	• Site Analysis of stormwater flows • 2 Erosion Control BMPs • Stormwater Management Plan

- Section 11.6 Variance from Standards

State Statute/Rule

- MN Statute Chapter 394 Planning, Development, Zoning *(enabling legislation)*
- Minnesota Statutes 394.36 *Nonconformities.*
- Minnesota Statutes 394.27 Subd 7 *Variances; practical difficulties*
- Minnesota Administrative Rules chapter 6120.3300 Zoning Provisions:

  Subpart 11. Storm water management. *Local governments must consider proper storm water management in all reviews, approvals, and permit issuances under shoreland management controls adopted under parts 6120.2500 to 6120.3900. The following general and specific standards must be incorporated into local government shoreland management controls and their administration.*

  A. The following are general standards:

  (1) When possible, existing natural drainageways, wetlands, and vegetated soil surfaces must be used to convey, store, filter, and retain storm water runoff before discharge to public waters.

  (2) Development must be planned and conducted in a manner that will minimize the extent of disturbed areas, runoff velocities, erosion potential, and reduce and delay runoff volumes. Disturbed areas must be stabilized and protected as soon as possible and facilities or methods used to retain sediment on the site.

  (3) When development density, topographic features, and soil and vegetation conditions are not sufficient to adequately handle storm water runoff using natural features and vegetation, various types of constructed facilities such as diversions, settling basins, skimming devices, dikes, waterways, and ponds may be used. Preference must be given to designs using surface drainage, vegetation, and infiltration rather than buried pipes and human-made materials and facilities.

B. The following are specific standards:

(1) Impervious surface coverage of lots must not exceed 25 percent of the lot area.

(2) When constructed facilities are used for storm water management, they must be designed and installed consistent with the field office technical guide of the local soil and water conservation districts.

(3) New constructed storm water outfalls to public waters must provide for filtering or settling of suspended solids and skimming of surface debris before discharge

- Minnesota Administrative Rules chapter 6120.3900 Subp. 3 *Variances*:

  Variances may only be granted in accordance with Minnesota Statutes, chapters 394 or 462, as applicable. They may not circumvent the general purposes and intent of the official controls. No variance may be granted that would allow any use that is prohibited in the zoning district in which the subject property is located. Conditions may be imposed in the granting of variances to ensure compliance and to protect adjacent properties and the public interest. In considering variance requests, boards of adjustment must also consider whether property owners have reasonable use of the lands without the variances, whether existing sewage treatment systems on the properties need upgrading before additional development is approved, whether the properties are used seasonally or year-round, whether variances are being requested solely on the basis of economic considerations, and the characteristics of development on adjacent properties.

Staff Comments

Staff offers the following comments for consideration:

Lot of Record

In the S-GD zoning district, the minimum lot area required on a riparian lot is 20,000 square feet. The parcel in question is approximately 6,685 square feet in area. Additionally, the parcel was created in 1920 with the approval of Fosse's Subdivision of Government Lot 4. Therefore, as parcel 08-0279-000 is less than 10,000 square feet and was established prior to April 5, 1972, the parcel is considered a Lot of Record according to the Pope County Land Use Controls Ordinance, Section 4.6.7.

Nonetheless, Lots of Record are not afforded a greater impervious surface coverage due to lot size limitations.

Impervious Surface and Stormwater

State shoreland rules and local ordinance limit impervious surface coverage to **25%** to reduce runoff, erosion, and pollutant loading to public waters.

While the proposed project reduces impervious surface from 48.6% to 40%, the property would remain significantly above the allowable standard.

The proposed stormwater management system includes an infiltration basin designed to capture approximately 186 cubic feet of runoff, equivalent to 1 inch of runoff from the impervious area (2,226 square feet).

The applicant proposes an infiltration basin designed to capture runoff from smaller storm events (approximately 1-inch rainfall). Modeling indicates effective treatment for small storm events but limited performance during larger events.

According to local ordinance (Section 10.24.4.B), the stormwater management system should include the following design standards:

1. *All stormwater management plans shall be designed for permanent on-site treatment of one inch of stormwater runoff on all impervious surface coverage on the lot.*
2. *All stormwater management systems shall be capable of safely passing a 2 year-24-hour storm event, before the runoff leaves the project site or enters surface waters.*

The proposed stormwater management system provides water quality benefits, but it does not sufficiently offset the impacts of exceeding the impervious surface standard, particularly during larger storm events.

Importantly, stormwater best management practices do not substitute for compliance with the 25% impervious surface limit established in ordinance and state shoreland rules.

While mitigation measures may be considered, they do not eliminate the need to meet variance criteria under Minnesota Statute 394.27, Subd. 7.

Comprehensive Plan Consistency

Based on Minnesota Statute 394.27 Subd. 7: A variance may be granted if it is in harmony with the general purposes and intent of the official control and when the variance is consistent with the comprehensive plan. The Comprehensive Plan supports protection of shoreland resources, maintenance of water quality, and orderly and sustainable development patterns.

Staff Analysis

A structure resulting in approximately 40% impervious surface coverage is inconsistent with these objectives and the intent of shoreland protections. While stormwater mitigation is proposed, such measures do not, by themselves, satisfy the statutory criteria required for granting a variance.

Practical Difficulty Analysis

A variance may be granted if enforcement of the zoning ordinance as applied to a particular piece of property would cause the landowner "practical difficulties." The standard for establishing a Practical Difficulty is as follows:

1. **Reasonableness**

The first factor is that the property owner proposes to use the property in a reasonable manner. This factor means that the landowner would like to use the property in a particular reasonable way but cannot do so under the rules of the ordinance. It does not mean that the land cannot be put to any reasonable use whatsoever without the variance. For example, this variance application is a request to exceed the impervious surface coverage limit so the owners may re-construct a residential structure on their property. The questions to be considered include:

- Is it reasonable to re-construct the residential structure on the lot?
- Is the impact of exceeding the 25% impervious surface coverage being properly mitigated?

Staff Analysis

The property currently supports residential use. The applicant has not demonstrated that strict enforcement of the ordinance creates practical difficulties in using the property in a reasonable manner. The record does not establish that compliance with the impervious surface standard would prevent reasonable use of the property.

2. **Uniqueness**

The second factor is that the landowner's problem is due to circumstances unique to the property not caused by the landowner. The uniqueness generally relates to the physical characteristics of the particular piece of property, that is, to the land and not personal characteristics or preferences of the landowner. When considering this variance request to exceed the impervious surface limit, the focus of this factor is whether there is anything physically unique about the particular piece of property, such as sloping topography or other natural features like wetlands or trees that prevent the use from being in compliance.

Staff Analysis

The applicant has not demonstrated that physical characteristics of the land (such as topography, soils, or natural features) uniquely prevent compliance with the impervious surface standard. Substandard lot size alone does not constitute a unique physical circumstance under Minnesota variance law. The existing over-impervious condition is largely the result of prior development, not a unique physical limitation of the land itself.

3. **Essential Character**

The third factor is that the variance, if granted, will not alter the essential character of the locality. Under this factor, consider whether the resulting structure will be out of scale, out of place, or otherwise inconsistent with the surrounding area. For example, when thinking about this variance which relates to exceeding the impervious surface coverage limit, how will the use of the property look in relationship to others in the neighborhood, and if that fits in with the character of the area.

Staff Analysis

Allowing impervious surface coverage of approximately 40%, significantly exceeding the 25% standard, may contribute to cumulative impacts on water quality and runoff in the area. Granting the variance could undermine the intent of the shoreland ordinance and negatively affect the character of development over time.

Staff Recommendation

Having reviewed and considered the application, local ordinances, state statutes, and all comments received, staff finds that the applicant has not met the statutory criteria for practical difficulties, specifically:

- Reasonable use of the property is possible without the variance.
- The practical difficulty is not due to unique physical characteristics of the land.
- The requested variance represents a substantial deviation from ordinance standards that protect public waters.

Therefore, based on the considerations outlined above, denial of the application is warranted.

However, the public hearing as well as the applicant may offer additional facts that are not yet evident for the Board of Adjustment to consider. If the Board of Adjustment chooses to approve the variance despite the above findings, Staff recommends that the following conditions be considered:

1. That the variance to the impervious surface standard is limited to the scope of work as presented with the application, which allows the site to cover 40% of the lot area with impervious surface, and is specific to the areas as identified in the stormwater management plan as prepared and submitted by Rum River Land Surveyors and Engineers;
2. Construction of the infiltration basin shall be according to the design prepared by a professional engineer, landscape architect, or certified professional in stormwater quality and approved by the Land & Resource Management Director prior to installation;
3. Prior to issuance of a permit to construct an infiltration basin, Owner to agree to a management plan for the stormwater treatment system as prepared by the design professional;
4. That the variance is invalid, or expires, if the holder/Owner has not substantially completed the stormwater collection system within one year of issuance of construction activity permits relating to the residential structure;
5. If the variance expires due to noncompliance with construction of the stormwater collection system, then the Owner is to abate excess impervious surface areas upon receipt of notice of violation; and
6. A natural vegetation riparian buffer consisting of native trees, shrubs, low ground cover, and understory vegetation consistent with naturally vegetated shorelines in the area shall be installed and maintained within the shore impact zone of Lake Minnewaska, extending 37.5 feet landward from the ordinary high water level (OHWL). A viewing corridor not to exceed twenty-five (25) feet in width is permitted.
7. That County staff may enter onto the property at reasonable times and in a reasonable manner to ensure the variance holder is in compliance with the conditions as specified and all other applicable statutes, rules and ordinances.

Staff Findings

The Staff proposes the following findings of fact for consideration by the Board of Adjustment:

1. **Variance request consistent with purposes and intent of the official controls and the comprehensive plan:**

   Finding: The purpose of the stormwater management regulations in the County Ordinance, are to limit impacts to surface water quality and habitat, by development that generates additional stormwater runoff. Stormwater runoff from impervious surfaces carries sediment and nutrients from those surfaces, as well as nutrients and pollutants from lawns and landscaping, into the adjacent lakes and wetlands. By limiting the amount of impervious surface on a lot, these impacts from stormwater may also be limited. Emphasis on preventing non-point source pollution from stormwater in urban areas has led to the development of many best management practices that are designed to capture and treat runoff.

   The purpose of the impervious surface limitation is to protect water quality and reduce runoff. The proposed development would result in impervious coverage of approximately 40%, which exceeds the 25% standard by a substantial margin, and is therefore inconsistent with the intent of the ordinance and comprehensive plan.

2. **Use of property/structure is a reasonable use:**

   Finding: The property is currently used for residential purposes, and reasonable use can continue without granting the variance. The record does not demonstrate practical difficulties in complying with ordinance standards.

3. **Character of locality and detriment to neighboring properties:**

   Finding: Granting the variance would allow a significant increase above the permitted impervious surface standard and may contribute to adverse impacts on water quality and the long-term character of the shoreland area.

4. **Plight of the landowner is due to circumstances unique to the property and not self-created:**

   Finding: The applicant has not demonstrated that the need for the variance is due to unique physical characteristics of the land. The substandard lot size is a common condition in the area, and the existing over-impervious condition is the result of prior development.

Report Authors

Report has been prepared by Pope County Land & Resource Management staff with technical review by ChatGPT.

REPORT APPENDIX

- **Routing Sheet** *(Comments, concerns and conditions)*
- **Public Notice**
- **Supplemental Information**
  - **Attachment 1:** *Variance Application (Jeremy Long, 20 February 2026)*
  - **Attachment 2:** *Existing Drainage Divides (Rum River Land Surveyors and Engineers, 13 February 2026)*
  - **Attachment 3:** *Stormwater Management Plan (Rum River Land Surveyors and Engineers, 13 February 2026)*
  - **Attachment 4:** *Site Visit Photos (L&RM Staff, 16 March 2026)*
  - **Attachment 5:** *Shoreland & Floodplain Variance Guidance Series: Impervious Surfaces (MN DNR, 10 October 2012)*

Routing Sheet

Comments, Concerns and Conditions

Agency

MN DNR	No comment received.

County Department

Attorney	No comment received.
WCA Officer	*COMMENTS: I have no concerns from a WCA standpoint.*

Township

Minnewaska	No comment received.

Other Comments Received

No comment received.

Public Notice

POPE COUNTY LAND & RESOURCE MANAGEMENT
POPE COUNTY COURTHOUSE
130 E. MINNESOTA AVENUE
GLENWOOD, MINNESOTA 56334
(320) 634-7791

POPE COUNTY BOARD OF ADJUSTMENT
NOTICE OF PUBLIC HEARING FOR
VARIANCE REQUEST

Notice is hereby given that a Public Hearing will take place in conjunction with the Board of Adjustment meeting to be held at 6:00 pm or shortly thereafter on Thursday, March 26th, 2026 in the Pope County Courthouse to consider the following variance request.

Description of Request: Variance hearing on the application by Jeremy Long (VAR-26-004, Parcel#08-0279-000), if granted would allow applicants relief from the impervious surface coverage standard of 25% in a Shoreland-General Development (S-GD) zoning district per section 10.10 and 10.24 of the Pope County Land Use Controls Ordinance.

Legal Description/Site Location: Lot 2, Fosse's Subdivision of Government Lot 4, Section 20, Township 125 (Minnewaska), Range 38, Pope County, Minnesota.

Public participation will include an opportunity to:

1) submit written concerns and comment prior to the scheduled meeting. All such communications will be shared with the Board of Adjustment prior to or during the meeting;
2) submit concerns and comments via Pope County's Public Comment web map, go to https://www.popecountymn.gov, at the top of the page hover over Government, then under Board of Adjustment/Planning Advisory Commission, select Submit a Public Comment or type in the following link to access the Public Comment web map: (https://popecounty.maps.arcgis.com/apps/webappviewer/index.html?id=22a203912a864a77b4cdabe672e35e3f)
3) opportunity to review the staff prepared report via Pope County website;
4) observe and/or participate by providing verbal comments in the Public Hearing portion of the Board of Adjustment meeting.

Interested parties and citizens may contact the Land and Resource Management office for further information as to how to participate in the meeting. Thank you for your patience and consideration in this matter.

Dated: March 6, 2026
By: Jessica Hill, Zoning Administrator, Land & Resource Management

Supplemental Information

Supplemental Information Attachment 1:

Variance Application
(Jeremy Long, 20 February 2026)

POPE COUNTY
MINNESOTA

VARIANCE APPLICATION

L&RM FORM 18

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VARIANCE APPLICATION VAR-26-0004

variance allows a modification or variation of the provisions of the Pope County Land Use Controls Ordinance where it is determine
hat, by reason of exceptional circumstances, the strict enforcement of any provision of the ordinance would cause the landowne
ractical difficulty" (see Practical Difficulty Test on the following page).

'ariances from official zoning controls are defined under Minnesota Statute 394.27 and require the landowner to prove the propert
ould not otherwise be used or enjoyed in the proposed way by complying with the Pope County Land Use Controls Ordinance an
here will be no negative impact on surrounding properties.

'rior to submission of this application, please discuss your variance request with the Land and Resource Management department.

Applicant Information

Applicant Names: Jeremy Long

[redacted]

Property Description

Property Address	20046 Sunnyview Dr		City	Glenwood	State	MN	Zip 56334
Township Name	Minnewaska		Section	20	Twp	125	Range 38
Parcel No.	08-0279-000		Associated Parcel No.				

Project Narrative

What is the variance application for? Impervious

Provide written justification for request including discussion of how any potential conflicts with existing nearby land uses will be minimized:

We are requesting a variance to exceed the maximum allowable impervious surface coverage for our property at 20046 Sunnyview Drive. Please note the structure that will be torn down will be replaced with a structure that will provide more impervious coverage.

Pope County Land & Resource Manageme
130 East Minnesota Ave. | Glenwood, Minnesota 56334
Phone: (320) 634-7791 | Email: pub.lrm@popecountymn.go
Website: https://www.popecountymn.gov/land-resource-managemen

Practical Difficulty Test

variance may be granted if enforcement of the zoning ordinance as applied to a particular piece of property would cause th ındowner "practical difficulties." There is a three factor test for establishing practical difficulties. If the applicant does not satisfy a ıree factors of the test, then the variance should not be granted.

1. ***Reasonableness***

he first factor is that the property owner proposes to use the property in a reasonable manner. This factor means that the landowne ould like to use the property in a particular reasonable way but cannot do so under the rules of the ordinance. It does not mean the ıe land cannot be put to any reasonable use whatsoever without the variance.

2. ***Uniqueness***

he second factor is that the landowner's problem is due to circumstances unique to the property not caused by the landowner. Th niqueness generally relates to the physical characteristics of the particular piece of property, that is, to the land and not persone haracteristics or preferences of the landowner.

3. ***Essential Character***

he third factor is that the variance, if granted, will not alter the essential character of the locality. Under this factor, consider whethe ıe resulting structure will be out of scale, out of place, or otherwise inconsistent with the surrounding area.

Questions	Yes/No
Does your project satisfy all three factors of the Practical Difficulty Test?	

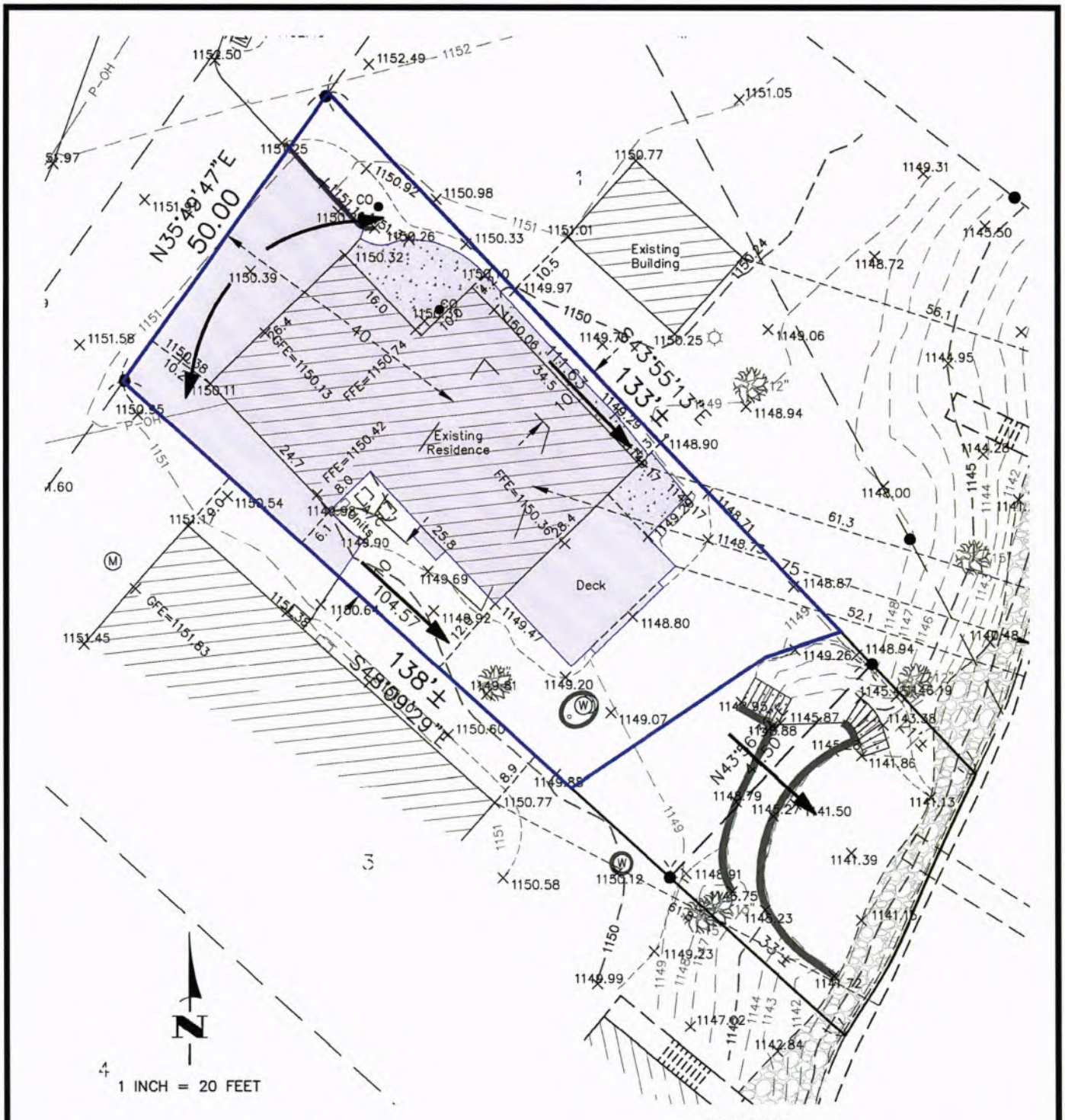
Please state how your project satisfies all three factors in the space provided below:

The property is intended to be used as it already has been. The structure to be built on the property will be of similar size to what is already there. The lot located at 20046 Sunnyview Drive is a small, narrow lot with unique constraints. We have partnered with a development team who specializes in lake property development to minimize adverse environmental impacts. Please see our water management plan to help minimize adverse environmental impacts. The improved structure will not alter the character of the neighborhood.

Pope County Land & Resource Manageme
130 East Minnesota Ave. | Glenwood, Minnesota 56334
Phone: (320) 634-7791 | Email: pub.lrm@popecountymn.go
Website: https://www.popecountymn.gov/land-resource-managemen

Supplemental Information Attachment 2:

Existing Drainage Divides
(Rum River Land Surveyors and Engineers, 13 February 2026)



EXISTING IMPERVIOUS SURFACE CALCULATIONS

Total Drainage Area = 4,338 Sq.Ft.

EXISTING IMPERVIOUS SURFACE = 2,788 Sq.Ft.

= Drainage Divide

= Drainage Direction

LEGEND

- = Denotes iron monument found
- —1149— = Denotes existing surface contour (1 foot interval)
- x1150.0 = Denotes existing elevation
- = Denotes well
- = Denotes utility pole
- P-OH = Denotes overhead utility line
- = Denotes light pole
- = Denotes septic manhole
- CO = Denotes septic cleanout
- = Denotes mailbox
- = Denotes deciduous tree
- = Denotes Concrete Surface
- = Denotes Rip Rap
- = Denotes Gravel Surface
- = Denotes building setback line per Pope County Zoning Ordinance

DATE	REVISION

DESIGNED BY: SMM
DRAWN BY: SMM
CHECKED BY: BP

RUM RIVER
LAND SURVEYORS + ENGINEERS
505 First Street, Princeton, MN 55371
O - 763.389.4476 RRLSE.com

FIGURE 1
EXISTING DRAINAGE DIVIDES
FOR
HOWARD HOMES INC.

DATE 02/13/26 FILE NO. P-3923.101

SHEET 1 OF 2 SHEETS

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Supplemental Information Attachment 3:

Stormwater Management Plan
(Rum River Land Surveyors and Engineers, 13 February 2026)

STORMWATER MANAGEMENT PLAN

For the

LONG RESIDENCE

Glenwood, Minnesota

February 13, 2026

RUM RIVER
LAND SURVEYORS + ENGINEERS

3601 Thurston Avenue
Anoka, Minnesota 55303
(763) 427-5860

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.

Craig J. Jochum, P.E. | 23461 Lic. No. | February 13, 2026 Date

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2, 10, and 100-Year Storm Event

APPENDIX 2 PROPOSED CONDITIONS

ATLAS 14 Rainfall depths

APPENDIX 3 Calculations

Infiltration Basin Stage/Storage Table

SUMMARY OF RESULTS

GENERAL

This project will include the construction of a single-family residential development located at 20046 Sunny View Drive in Glenwood Minnesota. Pope County dictates the stormwater requirements for the site. The stormwater system is based on their guidelines.

DESIGN CONSIDERATIONS

In designing the proposed stormwater facilities for this site, the Soil Conservation Service (SCS) method of determining total and peak rates of runoff was utilized. The facilities were designed using the computer model "HydroCAD". The 24-hour MSE Type III rainfall distribution and Atlas 14 rainfall amounts were used in the model.

PERMANENT STORMWATER MANAGEMENT

Per the Pope County requires an infiltration volume equal to 1 inch of runoff from the impervious area is required. All Stormwater from the house is conveyed to an infiltration basin. The basin location is shown on Figure 1.

One inch of runoff from the impervious area is 186 cubic feet ((2,226 sq ft * (1 inch / 12 inches per foot)). The proposed infiltration pond meets this requirement. The infiltration basin provides a total volume of 186 cubic feet at the outlet elevation of 1148.90. The basins stage/storage table is included in Appendix 3. As shown on the table the basin has 186 cubic feet of storage at the outlet elevation of 1148.90.

Rate Control

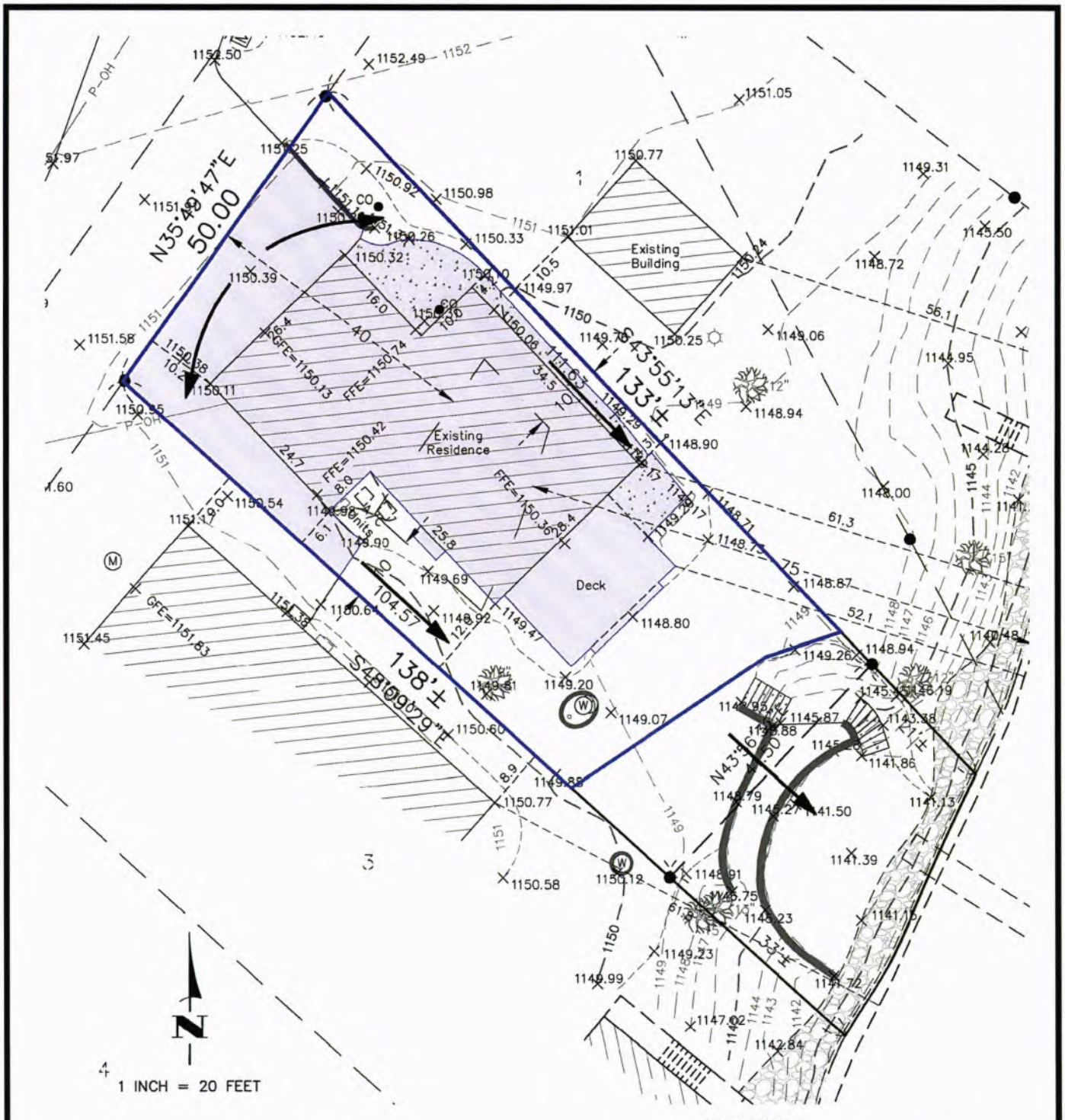
The existing residence will be removed and replaced with a new construction. The impervious area will be reduced 562 square feet with the reconstruction project. Appendix 1 includes the calculations for the existing and proposed conditions for the 2, 10, and 100-year storm events. Figure 1 shows the existing drainage divides and Figure 2 shows the proposed condition drainage divides that were used for the stormwater model. Below is a summary of the existing and proposed discharge rates for each storm.

2-year discharge Existing = 0.24 cfs
2- year discharge Proposed = .04 cfs

10-year discharge Existing = 0.43 cfs
10- year discharge Proposed = 0.34 cfs

2-year discharge Existing = 0.83 cfs
2- year discharge Proposed = 0.74 cfs

FIGURES



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- = Denotes building setback line per Pope County Zoning Ordinance

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EXISTING DRAINAGE DIVIDES
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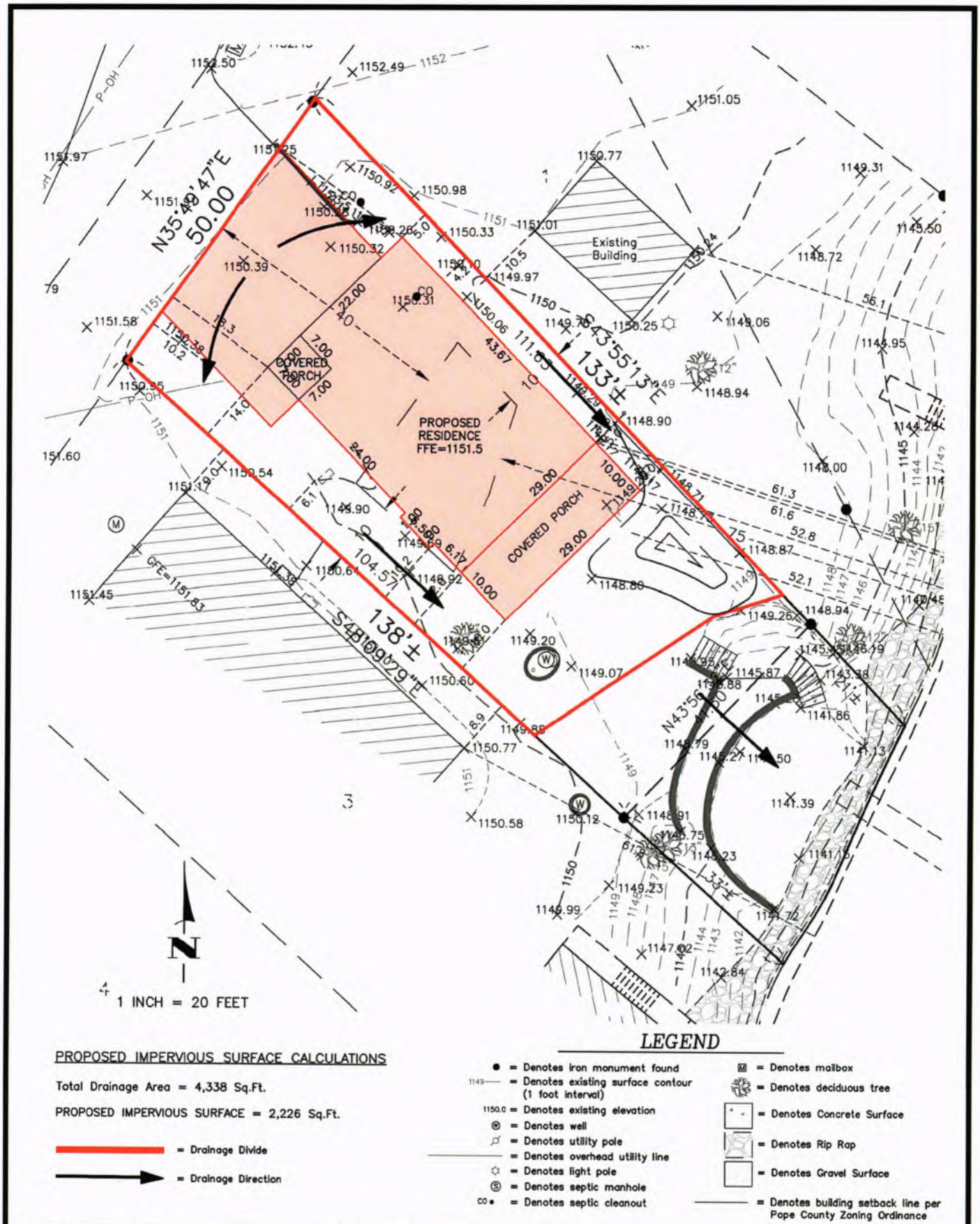

PROPOSED IMPERVIOUS SURFACE CALCULATIONS

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PROPOSED IMPERVIOUS SURFACE = 2,226 Sq.Ft.

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- = Denotes light pole
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FIGURE 2
PROPOSED DRAINAGE DIVIDES FOR HOWARD HOMES INC.

DATE 02/13/26 | FILE NO. P-3923.101

SHEET 2 OF 2 SHEETS

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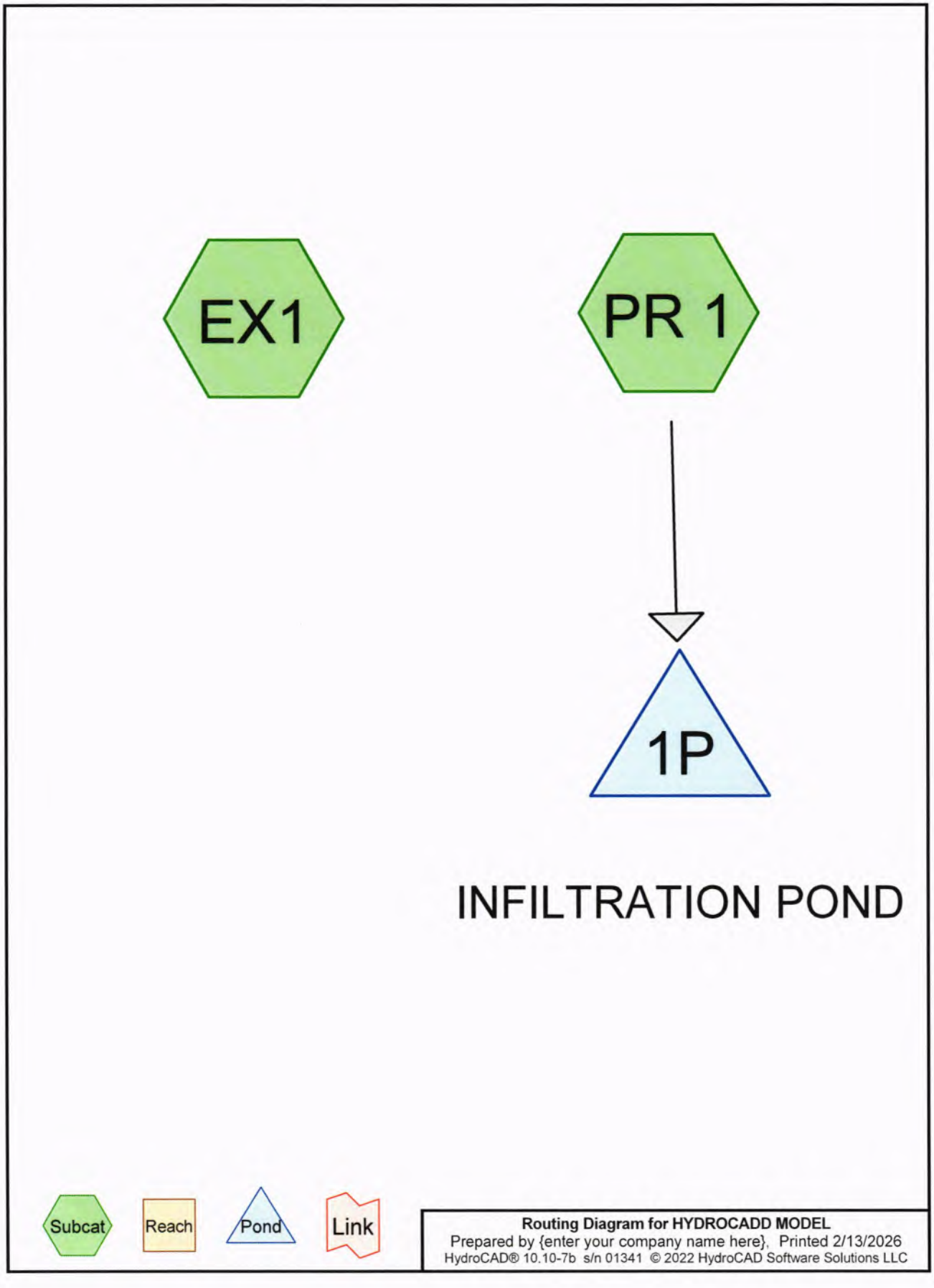
APPENDIX 1


EX1
PR 1
1P
INFILTRATION POND
Subcat
Reach
Pond
Link
Routing Diagram for HYDROCADD MODEL
Prepared by {enter your company name here}, Printed 2/13/2026
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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX1: Runoff Area=4,338 sf 64.27% Impervious Runoff Depth>1.18"
Tc=10.0 min CN=85 Runoff=0.19 cfs 0.010 af

Subcatchment PR 1: Runoff Area=4,338 sf 51.31% Impervious Runoff Depth>0.89"
Tc=10.0 min CN=80 Runoff=0.15 cfs 0.007 af

Pond 1P: INFILTRATION POND Peak Elev=948.92' Storage=192 cf Inflow=0.15 cfs 0.007 af
Discarded=0.01 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.004 af

Total Runoff Area = 0.199 ac Runoff Volume = 0.017 af Average Runoff Depth = 1.03"
42.21% Pervious = 0.084 ac 57.79% Impervious = 0.115 ac

Summary for Subcatchment EX1:

Runoff = 0.19 cfs @ 12.02 hrs, Volume= 0.010 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=2.63"

Area (sf)	CN	Description
2,788	98	Water Surface, HSG A
1,550	61	>75% Grass cover, Good, HSG B
4,338	85	Weighted Average
1,550		35.73% Pervious Area
2,788		64.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment PR 1:

Runoff = 0.15 cfs @ 12.02 hrs, Volume= 0.007 af, Depth> 0.89"
Routed to Pond 1P : INFILTRATION POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=2.63"

	Area (sf)	CN	Description
*	2,226	98	Impervious, HSG B
	2,112	61	>75% Grass cover, Good, HSG B
	4,338	80	Weighted Average
	2,112		48.69% Pervious Area
	2,226		51.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Pond 1P: INFILTRATION POND

Inflow Area = 0.100 ac, 51.31% Impervious, Inflow Depth > 0.89" for 2-year event
Inflow = 0.15 cfs @ 12.02 hrs, Volume= 0.007 af
Outflow = 0.01 cfs @ 13.82 hrs, Volume= 0.004 af, Atten= 95%, Lag= 108.0 min
Discarded = 0.01 cfs @ 13.82 hrs, Volume= 0.004 af
Primary = 0.00 cfs @ 13.82 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 948.92' @ 13.82 hrs Surf.Area= 301 sf Storage= 192 cf

Plug-Flow detention time= 232.4 min calculated for 0.004 af (50% of inflow)
Center-of-Mass det. time= 146.5 min (951.9 - 805.5)

Volume	Invert	Avail.Storage	Storage Description
#1	947.50'	250 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.50	11	0	0
948.00	71	21	21
949.00	321	196	217
949.10	350	34	250

Device	Routing	Invert	Outlet Devices
#1	Discarded	947.50'	**0.800 in/hr Exfiltration over Surface area**
#2	Primary	948.92'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.01 cfs @ 13.82 hrs HW=948.92' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 13.82 hrs HW=948.92' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.00 cfs @ 0.08 fps)

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX1: Runoff Area=4,338 sf 64.27% Impervious Runoff Depth>2.14"
Tc=10.0 min CN=85 Runoff=0.35 cfs 0.018 af

Subcatchment PR 1: Runoff Area=4,338 sf 51.31% Impervious Runoff Depth>1.75"
Tc=10.0 min CN=80 Runoff=0.29 cfs 0.015 af

Pond 1P: INFILTRATION POND Peak Elev=948.98' Storage=209 cf Inflow=0.29 cfs 0.015 af
Discarded=0.01 cfs 0.004 af Primary=0.26 cfs 0.006 af Outflow=0.27 cfs 0.010 af

Total Runoff Area = 0.199 ac Runoff Volume = 0.032 af Average Runoff Depth = 1.94"
42.21% Pervious = 0.084 ac 57.79% Impervious = 0.115 ac

Summary for Subcatchment EX1:

Runoff = 0.35 cfs @ 12.01 hrs, Volume= 0.018 af, Depth> 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=3.83"

Area (sf)	CN	Description
2,788	98	Water Surface, HSG A
1,550	61	>75% Grass cover, Good, HSG B
4,338	85	Weighted Average
1,550		35.73% Pervious Area
2,788		64.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment PR 1:

Runoff = 0.29 cfs @ 12.02 hrs, Volume= 0.015 af, Depth> 1.75"
Routed to Pond 1P : INFILTRATION POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=3.83"

	Area (sf)	CN	Description
*	2,226	98	Impervious, HSG B
	2,112	61	>75% Grass cover, Good, HSG B
	4,338	80	Weighted Average
	2,112		48.69% Pervious Area
	2,226		51.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Pond 1P: INFILTRATION POND

Inflow Area = 0.100 ac, 51.31% Impervious, Inflow Depth > 1.75" for 10-year event
Inflow = 0.29 cfs @ 12.02 hrs, Volume= 0.015 af
Outflow = 0.27 cfs @ 12.07 hrs, Volume= 0.010 af, Atten= 7%, Lag= 3.4 min
Discarded = 0.01 cfs @ 12.07 hrs, Volume= 0.004 af
Primary = 0.26 cfs @ 12.07 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 948.98' @ 12.07 hrs Surf.Area= 315 sf Storage= 209 cf

Plug-Flow detention time= 110.9 min calculated for 0.010 af (70% of inflow)
Center-of-Mass det. time= 42.4 min (833.7 - 791.3)

Volume	Invert	Avail.Storage	Storage Description
#1	947.50'	250 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.50	11	0	0
948.00	71	21	21
949.00	321	196	217
949.10	350	34	250

Device	Routing	Invert	Outlet Devices
#1	Discarded	947.50'	**0.800 in/hr Exfiltration over Surface area**
#2	Primary	948.92'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.01 cfs @ 12.07 hrs HW=948.96' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.23 cfs @ 12.07 hrs HW=948.96' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.23 cfs @ 0.52 fps)

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX1: Runoff Area=4,338 sf 64.27% Impervious Runoff Depth>4.23"
Tc=10.0 min CN=85 Runoff=0.66 cfs 0.035 af

Subcatchment PR 1: Runoff Area=4,338 sf 51.31% Impervious Runoff Depth>3.71"
Tc=10.0 min CN=80 Runoff=0.59 cfs 0.031 af

Pond 1P: INFILTRATION POND Peak Elev=949.00' Storage=217 cf Inflow=0.59 cfs 0.031 af
Discarded=0.01 cfs 0.005 af Primary=0.58 cfs 0.022 af Outflow=0.59 cfs 0.026 af

Total Runoff Area = 0.199 ac Runoff Volume = 0.066 af Average Runoff Depth = 3.97"
42.21% Pervious = 0.084 ac 57.79% Impervious = 0.115 ac

Summary for Subcatchment EX1:

Runoff = 0.66 cfs @ 12.01 hrs, Volume= 0.035 af, Depth> 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year Rainfall=6.23"

Area (sf)	CN	Description
2,788	98	Water Surface, HSG A
1,550	61	>75% Grass cover, Good, HSG B
4,338	85	Weighted Average
1,550		35.73% Pervious Area
2,788		64.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Subcatchment PR 1:

Runoff = 0.59 cfs @ 12.01 hrs, Volume= 0.031 af, Depth> 3.71"
Routed to Pond 1P : INFILTRATION POND

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year Rainfall=6.23"

	Area (sf)	CN	Description
*	2,226	98	Impervious, HSG B
	2,112	61	>75% Grass cover, Good, HSG B
	4,338	80	Weighted Average
	2,112		48.69% Pervious Area
	2,226		51.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Summary for Pond 1P: INFILTRATION POND

Inflow Area = 0.100 ac, 51.31% Impervious, Inflow Depth > 3.71" for 100-year event
Inflow = 0.59 cfs @ 12.01 hrs, Volume= 0.031 af
Outflow = 0.59 cfs @ 12.02 hrs, Volume= 0.026 af, Atten= 1%, Lag= 0.7 min
Discarded = 0.01 cfs @ 12.02 hrs, Volume= 0.005 af
Primary = 0.58 cfs @ 12.02 hrs, Volume= 0.022 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 949.00' @ 12.02 hrs Surf.Area= 321 sf Storage= 217 cf

Plug-Flow detention time= 64.0 min calculated for 0.026 af (85% of inflow)
Center-of-Mass det. time= 20.5 min (795.3 - 774.8)

Volume	Invert	Avail.Storage	Storage Description
#1	947.50'	250 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.50	11	0	0
948.00	71	21	21
949.00	321	196	217
949.10	350	34	250

Device	Routing	Invert	Outlet Devices
#1	Discarded	947.50'	**0.800 in/hr Exfiltration over Surface area**
#2	Primary	948.92'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.01 cfs @ 12.02 hrs HW=949.00' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.57 cfs @ 12.02 hrs HW=949.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.57 cfs @ 0.71 fps)

APPENDIX 2

NOAA Atlas 14, Volume 8, Version 2
Location name: Glenwood, Minnesota, USA*
Latitude: 45.6173°, Longitude: -95.4681°
Elevation: 1144 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.340 (0.263-0.441)	0.410 (0.317-0.533)	0.529 (0.408-0.689)	0.630 (0.483-0.824)	0.774 (0.575-1.04)	0.888 (0.645-1.20)	1.00 (0.706-1.39)	1.12 (0.760-1.59)	1.29 (0.839-1.86)	1.42 (0.899-2.06)
10-min	0.497 (0.385-0.646)	0.601 (0.465-0.781)	0.775 (0.597-1.01)	0.923 (0.708-1.21)	1.13 (0.842-1.52)	1.30 (0.944-1.76)	1.47 (1.03-2.03)	1.65 (1.11-2.32)	1.89 (1.23-2.72)	2.08 (1.32-3.02)
15-min	0.606 (0.470-0.788)	0.733 (0.567-0.953)	0.945 (0.728-1.23)	1.12 (0.863-1.47)	1.38 (1.03-1.86)	1.58 (1.15-2.15)	1.79 (1.26-2.48)	2.01 (1.36-2.83)	2.30 (1.50-3.31)	2.53 (1.60-3.68)
30-min	0.844 (0.654-1.10)	1.02 (0.792-1.33)	1.32 (1.02-1.72)	1.58 (1.21-2.06)	1.94 (1.44-2.60)	2.22 (1.61-3.01)	2.51 (1.76-3.46)	2.80 (1.89-3.95)	3.21 (2.08-4.61)	3.52 (2.23-5.11)
60-min	1.07 (0.832-1.40)	1.30 (1.00-1.69)	1.68 (1.30-2.19)	2.02 (1.55-2.64)	2.51 (1.87-3.39)	2.91 (2.12-3.96)	3.33 (2.34-4.61)	3.77 (2.55-5.33)	4.38 (2.86-6.32)	4.87 (3.09-7.08)
2-hr	1.30 (1.02-1.67)	1.57 (1.23-2.01)	2.04 (1.59-2.62)	2.46 (1.91-3.17)	3.08 (2.34-4.12)	3.60 (2.66-4.85)	4.15 (2.96-5.68)	4.74 (3.25-6.62)	5.56 (3.67-7.93)	6.23 (3.99-8.92)
3-hr	1.44 (1.14-1.83)	1.72 (1.36-2.19)	2.23 (1.76-2.84)	2.70 (2.11-3.45)	3.41 (2.62-4.55)	4.01 (3.00-5.38)	4.66 (3.36-6.36)	5.37 (3.72-7.46)	6.38 (4.25-9.03)	7.19 (4.65-10.2)
6-hr	1.70 (1.36-2.12)	2.00 (1.60-2.50)	2.56 (2.04-3.22)	3.09 (2.45-3.89)	3.91 (3.05-5.16)	4.62 (3.50-6.11)	5.39 (3.94-7.26)	6.23 (4.38-8.55)	7.45 (5.03-10.4)	8.45 (5.53-11.8)
12-hr	1.96 (1.59-2.42)	2.31 (1.87-2.85)	2.93 (2.37-3.62)	3.50 (2.81-4.34)	4.35 (3.42-5.62)	5.07 (3.88-6.59)	5.84 (4.32-7.73)	6.68 (4.74-9.00)	7.87 (5.37-10.8)	8.83 (5.85-12.2)
24-hr	2.28 (1.88-2.77)	2.63 (2.16-3.20)	3.26 (2.67-3.97)	3.83 (3.12-4.68)	4.70 (3.74-5.98)	5.44 (4.22-6.96)	6.23 (4.67-8.11)	7.08 (5.10-9.41)	8.30 (5.75-11.2)	9.29 (6.24-12.6)
2-day	2.58 (2.15-3.08)	2.97 (2.47-3.55)	3.66 (3.03-4.38)	4.28 (3.53-5.14)	5.20 (4.19-6.49)	5.97 (4.68-7.50)	6.79 (5.15-8.69)	7.67 (5.58-10.0)	8.91 (6.24-11.9)	9.91 (6.74-13.3)
3-day	2.79 (2.35-3.31)	3.22 (2.70-3.82)	3.97 (3.32-4.72)	4.63 (3.85-5.52)	5.60 (4.54-6.91)	6.40 (5.06-7.96)	7.25 (5.54-9.18)	8.15 (5.98-10.5)	9.41 (6.64-12.4)	10.4 (7.14-13.8)
4-day	2.99 (2.53-3.52)	3.45 (2.91-4.06)	4.23 (3.56-5.00)	4.92 (4.12-5.84)	5.93 (4.83-7.26)	6.75 (5.36-8.33)	7.61 (5.84-9.57)	8.52 (6.28-10.9)	9.78 (6.93-12.8)	10.8 (7.43-14.2)
7-day	3.54 (3.02-4.12)	4.05 (3.46-4.71)	4.91 (4.18-5.72)	5.64 (4.78-6.60)	6.69 (5.49-8.05)	7.53 (6.04-9.15)	8.40 (6.51-10.4)	9.30 (6.92-11.8)	10.5 (7.54-13.6)	11.5 (8.00-15.0)
10-day	4.05 (3.49-4.68)	4.60 (3.95-5.31)	5.50 (4.72-6.37)	6.27 (5.34-7.28)	7.35 (6.06-8.75)	8.20 (6.61-9.86)	9.06 (7.06-11.1)	9.95 (7.45-12.5)	11.2 (8.03-14.3)	12.1 (8.48-15.6)
20-day	5.53 (4.83-6.28)	6.19 (5.40-7.03)	7.25 (6.30-8.25)	8.12 (7.02-9.27)	9.30 (7.77-10.8)	10.2 (8.33-12.0)	11.1 (8.76-13.3)	12.0 (9.09-14.7)	13.2 (9.60-16.5)	14.0 (9.98-17.9)
30-day	6.76 (5.95-7.60)	7.53 (6.62-8.48)	8.76 (7.68-9.88)	9.75 (8.50-11.0)	11.1 (9.30-12.7)	12.0 (9.91-14.0)	13.0 (10.3-15.4)	13.9 (10.6-16.9)	15.1 (11.1-18.7)	15.9 (11.4-20.1)
45-day	8.28 (7.36-9.23)	9.25 (8.20-10.3)	10.8 (9.50-12.0)	11.9 (10.5-13.4)	13.5 (11.4-15.3)	14.6 (12.1-16.8)	15.6 (12.5-18.3)	16.6 (12.7-19.9)	17.8 (13.1-21.8)	18.6 (13.4-23.2)
60-day	9.57 (8.55-10.6)	10.7 (9.57-11.9)	12.5 (11.1-13.9)	13.9 (12.3-15.4)	15.6 (13.3-17.6)	16.8 (14.0-19.2)	18.0 (14.4-20.9)	19.0 (14.7-22.6)	20.2 (15.0-24.6)	21.0 (15.3-26.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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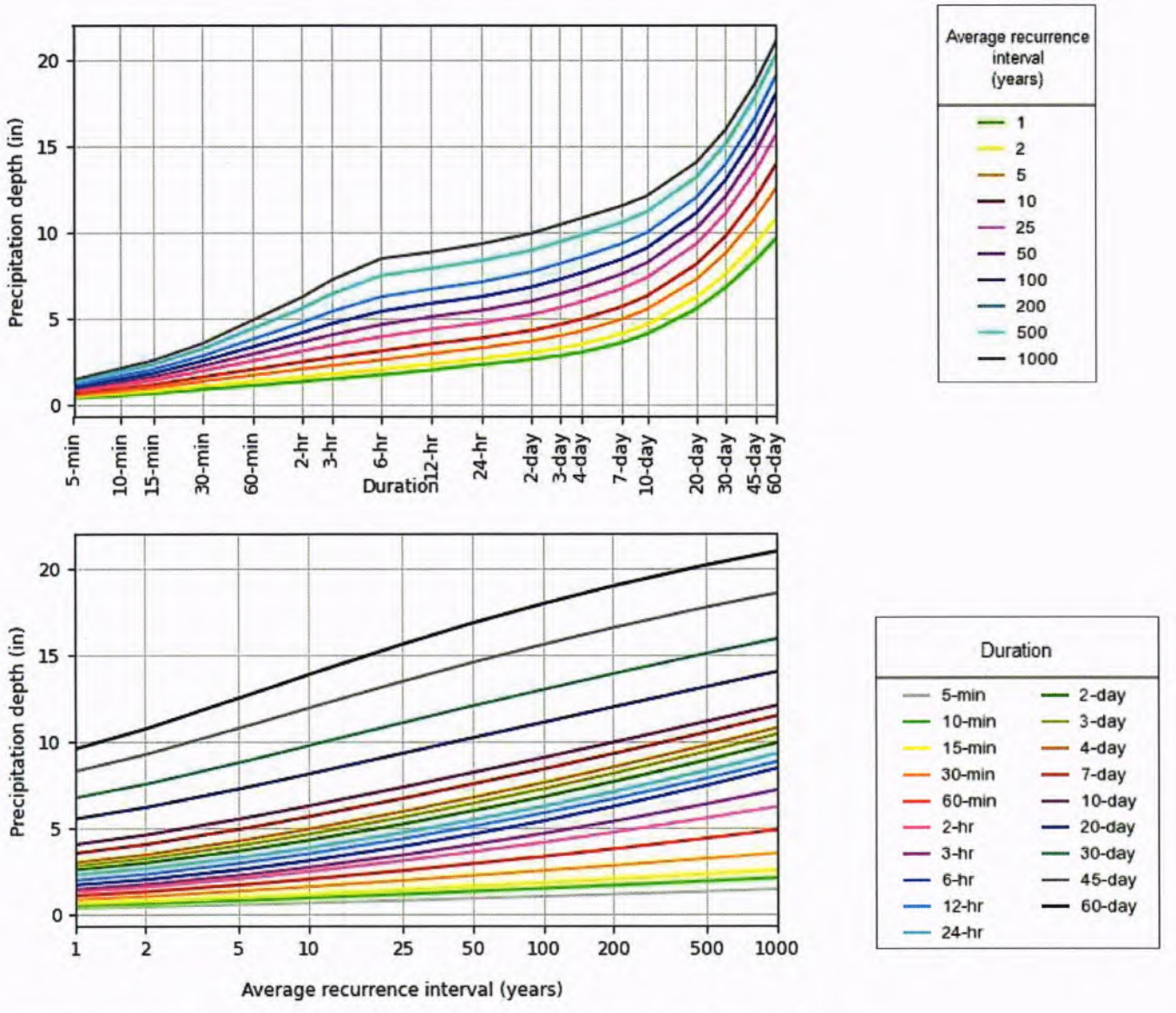
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 45.6173°, Longitude: -95.4681°



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Maps & aerials

Small scale terrain

Large scale terrain

Large scale map

Large scale aerial

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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
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Disclaimer

APPENDIX 3

Stage-Area-Storage for Pond 1P: INFILTRATION POND

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
1,147.50	11	0
1,147.52	13	0
1,147.54	16	1
1,147.56	18	1
1,147.58	21	1
1,147.60	23	2
1,147.62	25	2
1,147.64	28	3
1,147.66	30	3
1,147.68	33	4
1,147.70	35	5
1,147.72	37	5
1,147.74	40	6
1,147.76	42	7
1,147.78	45	8
1,147.80	47	9
1,147.82	49	10
1,147.84	52	11
1,147.86	54	12
1,147.88	57	13
1,147.90	59	14
1,147.92	61	15
1,147.94	64	16
1,147.96	66	18
1,147.98	69	19
1,148.00	71	21
1,148.02	76	22
1,148.04	81	24
1,148.06	86	25
1,148.08	91	27
1,148.10	96	29
1,148.12	101	31
1,148.14	106	33
1,148.16	111	35
1,148.18	116	37
1,148.20	121	40
1,148.22	126	42
1,148.24	131	45
1,148.26	136	47
1,148.28	141	50
1,148.30	146	53
1,148.32	151	56
1,148.34	156	59
1,148.36	161	62
1,148.38	166	66
1,148.40	171	69
1,148.42	176	72
1,148.44	181	76
1,148.46	186	80
1,148.48	191	83
1,148.50	196	87
1,148.52	201	91
1,148.54	206	95
1,148.56	211	99
1,148.58	216	104
1,148.60	221	108
1,148.62	226	113
1,148.64	231	117
1,148.66	236	122
1,148.68	241	127
1,148.70	246	131
1,148.72	251	136
1,148.74	256	141
1,148.76	261	147
1,148.78	266	152
1,148.80	271	157
1,148.82	276	163
1,148.84	281	168
1,148.86	286	174
1,148.88	291	180
1,148.90	296	186
1,148.92	301	192
1,148.94	306	198
1,148.96	311	204
1,148.98	316	210
1,149.00	321	217
1,149.02	327	223
1,149.04	333	230
1,149.06	338	236
1,149.08	344	243
1,149.10	**350**	**250**

Supplemental Information Attachment 4:

Site Visit Photos
(L&RM Staff, 16 March 2026)

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Supplemental Information Attachment 5:

Shoreland & Floodplain Variance Guidance Series: Impervious Surfaces
(MN DNR, 10 October 2012)

Minnesota
DEPARTMENT OF NATURAL RESOURCES

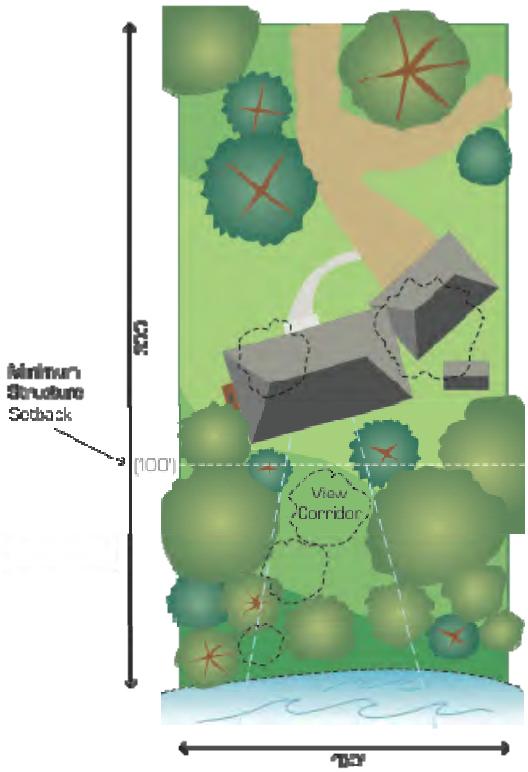
Shoreland & Floodplain *Variance Guidance Series*

Impervious Surfaces

This is one of a series of examples developed as guidance for considering variance requests along lakes and rivers. Consult your local shoreland and floodplain ordinances.

Why are impervious surface coverage limits important?

In the protection of water quality, the management of rainwater on individual lots is one of our most important tasks. Rainwater that does not infiltrate into the ground or evaporate runs downhill to lakes, wetlands, or rivers. As impervious surface coverage increases, the rate and amount of runoff and pollutants entering public waters increases. When runoff from impervious surface coverage is not addressed, pollution increases and the diversity of aquatic life is reduced. Local governments have limited discretion to deviate from - or grant a variance to - impervious surface limits. They may do so only if *all* of the variance criteria established in state statutes and their local ordinances are met. In evaluating such requests, local governments must examine the facts, determine whether all statutory and local criteria are satisfied, and develop findings to support the decision. If granted, local governments may impose conditions to protect resources. An example impervious surface variance request, with considerations, is provided below.



Example Impervious Surface Variance Request

A property owner wishes to build a large lakehome on a conforming lot. The lake lot includes a private driveway with a spur to the neighbor's lot, which was placed to avoid an adjacent wetland. The building plans for the new construction plus the existing private road spur to the neighbor's property would exceed the impervious surface limit provision in the local ordinance.

Considerations for Findings

A good record and findings help keep communities out of lawsuits and help them prevail if they find themselves in one. In evaluating the facts and developing findings for this variance request, *all* of the following statutory criteria must be satisfied, in addition to any local criteria:

- **Is the variance *in harmony with the purposes and intent of the ordinance*?**
  Considering a variance request is a balancing test that requires weighing the need of an individual property owner against the purposes of the shoreland regulations for protecting the public interest. These purposes are derived from Minnesota Shoreland Rules, which established impervious surface caps to prevent excessive runoff from constructed surfaces. Such excessive runoff causes erosion, transport of pollutants to public waters thereby degrading water quality. ***Considerations:*** *Will deviating from the required limit on this property undermine the purposes and intent of the ordinance? Why or why not? Is it possible to mitigate the consequences of additional impervious surface on-site such that additional runoff will not be produced? Would this mitigation be in harmony with the purposes and intent of the ordinance? Why or why not?*
- **Is the variance *consistent with the comprehensive plan*?**
  The local comprehensive plan establishes a framework for achieving a community's vision for the future. Most plans contain goals and policies for protecting natural resources and shorelands, as well as maps that identify areas of high risk or with high ecological value where development should be avoided. The variance request must be considered with these goals and policies in mind. Maps should be consulted to determine if the property is within any areas identified for protection. ***Considerations:*** *Which goals and policies apply? Is allowing additional impervious surface and runoff consistent with these goals and policies? Why or why not?*

- **Are there *unique circumstances* to the property not created by the landowner?**
  Unique circumstances relate to physical characteristics of the land - such as lot dimensions, steep slopes, poor soils, wetlands, and trees. These *do not* include physical limitations or personal circumstances created by the property owner that prevent compliance with the impervious surface provision, such as size of home or design preferences. Consider what distinguishes this property from other shoreland properties to justify why the applicant should be able to deviate from the provision when others must comply. ***Considerations:*** *What physical characteristics are unique to this property that prevent compliance with the requirement? Were any difficulties in meeting the impervious surface limit created by some action of the applicant? Has the applicant demonstrated no other feasible alternatives exist that would not require a variance, such as increasing the setback to reduce driveway length or reducing the lakehome's footprint?*
- ***Will the variance, if granted, alter the essential character of the locality?***
  Consider the size of the proposed structure, the extent of encroachment, and how it relates to the shoreline and hydrology of the riparian area. A large addition located close to the shoreline can detract from the natural appearance and character of the lake and its riparian areas and degrade water quality by altering topography, drainage, and vegetation in the riparian area, negatively affecting recreational, natural, and economic values. ***Considerations:*** *Does the variance provide minimal relief or a substantial deviation from the required setback? Does it affect the natural appearance of the shore from the lake? Does it affect the hydrology of the riparian area?*
- **Does the proposal put property to use in a *reasonable manner*?**
  Examine the reasons that the variance is requested and evaluate them in light of the purposes of the local shoreland ordinance and the public water resource at stake. Since the impervious surface cap is generally intended to reduce runoff to public waters, it may not be appropriate to allow large areas of constructed surfaces so close to the water. ***Considerations:*** *Has the applicant demonstrated that the proposed construction is reasonable in this location given the sensitive nature of the area and the purposes of the regulations? Why or why not?*

Note: *The last three criteria address practical difficulties. Economic considerations alone cannot create practical difficulties*

Range of Outcomes

Based on the findings, several outcomes can occur:

- If the applicant fails to prove that *all* criteria above are met, then the variance must be denied. For example, the local government could find that the building plans itself created the circumstances necessary for a variance rather than the any unique physical characteristics of the property.
- If the applicant demonstrates that *all* criteria are met, then the variance may be granted. For example, the local government could find that the construction footprint is reasonable, the circumstances are unique given the adjacent wetland, and the minor deviation in the impervious surface coverage does not alter the hydrology of the area (as determined through runoff calculations).
- If the variance is granted and the impervious surface in any way alters the hydrology of the area, then conditions may be imposed, such as to increase the structure setback from the lake by 15 feet to reduce the extent of the driveway and minimize the amount of impervious surface coverage over the limit.

Conditions on Variances

If findings support granting the variance, consideration must be given to the impacts on the public water and the riparian area and appropriate conditions to mitigate them. Conditions must be directly related and roughly proportional to the impacts created by the variance. Several examples are provided below:

- Modify construction designs (to minimize impact);
- Use permeable pavement systems for walkways, driveways, or parking areas (to reduce effective impervious surface area and infiltrate runoff);
- Direct rain gutter discharges away from the public waters and into infiltration basins (to reduce connected impervious coverage to allow additional areas for infiltration);
- Preserve and restore shoreline vegetation in a natural state (to intercept and filter runoff coming from structures and driveways); and/or
- Increase setbacks from the ordinary high water level (to provide infiltration near public waters).

More information at: www.dnr.state.mn.us/waters/watermgmt_section/shoreland/variances.html