PHOSPHORUS EXPORT CONTROL PLAN

Long Lake Acres Subdivision Amendment
Naples, Maine

The following Phosphorus Export Plan has been prepared for the amendment to the Long Lake Acres Subdivision Amendment Project to evaluate the phosphorus export for the proposed additional two single family residential lots.

The development parcel is located on the east side of Route 302 and is accessed by Big Bear Lane. The project site is located on Lots 1 & 2 of the Long Lake Acres Subdivision that was approved by the Town of Naples planning board on December 21, 2000. The applicant proposes to create two additional lots (Lots 1A & 2A) out of the extra land on Lots 1 & 2. We've provided this plan to show that the proposed level spreader & stormwater buffers will provide sufficient treatment to reduce expected phosphorus export to an allowable level.

Flooding

The development area is not located within an area of flood hazard according to the Federal Insurance Rate Maps 230050 0005 B. See attached map.

Onsite Soils

The soils were delineated from the Cumberland County Medium Intensity Soil Survey as shown on the Soil Data Viewer on the NRCS website (See attached map). The soil survey reports the watershed soils are highly infiltrative hydrologic group A soils. The test pits that were excavated for septic suitability confirm that the underlying soils are gravelly, sandy loam. See attached map.

Water Quality (Phosphorus Export Calculations)

Best Management Practices (BMPs) will be implemented to reduce the impacts of site development on downstream water quality. The property is located in the Long Lake Watershed. Long Lake is identified by the MDEP as a lake most at risk from development.

The allowable per acre allocation of phosphorus export for the portion of the site that is within the Highland Lake Watershed is 0.029 lbs/acre of developable land. There are no wetlands on the proposed lots (see attached Wetland Report). There are approximately 2.09 developable acres within the two proposed lots that have an associated allocation of 0.06lbs/year of allowable phosphorus export.

A worksheet that summarizes the phosphorus export has been included in the calculations. A Stone Bermed Level Spreader/Buffer combination & a lot downstream of a residential lot were used to reduce the total expected phosphorus export to 0.042 lbs/year. This value is less than the allocated amount.

BMP Sizing

Forested Buffer with Level Lip Spreader

Level Spreader #1:
The buffer contains soils that are consistent with Soil Group A. *Table 5.5– Berm and Flow Path Length per Acre of Impervious Area* of the BMP manual shows that standard sizing for a 100' flow path requires that the berm length for a forested buffer must be 78' per acre of impervious area and 24' per acre of lawn. Evaluation of the watershed shows that it contains the following:

- 1,800 SF of Big Bear Drive
- 2,800 SF of driveway (200' x 14')
- 3,500 SF of roof, excess driveway & walkways for the first lot)
- 1,800 Sf of additional lawn/disturbed area adjacent to Big Bear
- 20,000 SF of lawn for the first lot

Impervious area = 0.19 Ac
Lawn area = 0.50 Ac

Standard sizing: 78 (0.19) + 24 (0.50)=14.8+12.0 = 26.8'. 27' would yield a treatment factor of 0.4.

Oversized to TF of 0.2: BMP_{TF}=0.4(BMP_{TF} / TF) = 0.4(27/0.2)=54'

Forested Buffer Adjacent to Residential Lot

Downgradient of Proposed Lot #2
The buffer contains soils that are consistent with Soil Group C sandy loam or loamy sand. *Table 5.3 – Buffer Flow Path Length Downgradient of a Single Family Residential Lot of the BMP manual* shows that standard sizing requires that the standard length of flow path for a forested buffer to be 35'. We are proposing a buffer with a minimum width of 100' long flow path which yields a treatment factor of 0.15:

TF = 0.4 (BMP_{st}/BMP_{TF})= 0.4(35/100)=0.14 (Minimum Treatment Factor of 0.15 will be used)

Summary
Based on the results of this evaluation, the proposed stormwater design is not expected to cause flooding, erosion or other significant adverse effects downstream of the site.

Prepared by,
Terradyn Consultants, LLC

Jeffrey D. Amos, P.E.

Worksheet 1
PPB calculations

Project name: Big Bear

Lake name: Long Lake

Town name: Naples

Standard Calculation

Watershed per acre phosphorus budget (Appendix C):	**PAPB**	0.029	lbs P/acre/year
Total acreage of development parcel:	**TA**	2.09	acres
NWI wetland acreage:	**WA**	0	acres
Steep slope acreage:	**SA**	0	acres
Existing developed area		0	acres
Project acreage: A = TA - (WA + SA)	**A**	2.09	acres
Project Phosphorus Budget: PPB = P x A	**PPB**	0.06061	**lbs P/year**

Big Bear
Pre-PPE and Post-PPE Calculations

Calculate phosphorus export from development for before and after treatment
Use as many sheets as needed for each development type (commercial, roads, residential lots, etc.)

Project name:_____ **Development type**: _____ Sheet # _____

Land Surface Type or Lot #(s) with description	Area (SF)	Acres or # of lots	Export Coefficient from Table 3.1 Table 3.2	Pre-treatment Algal Av. P Export (lbs P/year)	Treatment Factor for BMP(s) from Chapter 6	Post-treatment Algal Av. P Export (lbs P/year)	Notes
Lot 1a		1.0000	0.12	0.1200	0.2	0.0240	"A" soils with DW to buffer (18' LS to 15% slopes, 100' path)
Lot 2a		1.0000	0.12	0.1200	0.15	0.0180	"A" soils with DW to 100' buffer
				0.2400	**Total PostPPE (lbs P/year)**	0.0420	

Worksheet 4
Project Phosphorus Export Summary

Summarizing the project's algal available phosphorus export (PPE)

Project name: Highland Views

Project Phosphorus Budget - Worksheet 1	**PPB**	0.0606	lbs P / year
Total Pre-Treatment Phosphorus Export - Worksheet 2	**Pre-PPE**	0.2400	lbs P / year
Total Post-Treatment Phosphorus Export - Worksheet 2	**Post-PPE**	0.0420	6.11
			#VALUE!
Total Phosphorus Mitigation Credit - Worksheet 3	**TMC**	0.0000	lbs P / year
Project Phosphorus Export (Post-PPE - TMC)	**PPE**	0.0420	lbs P / year

Is the Project Phosphorus Export sufficiently reduced? (PPE< PPB)	-0.0186	lbs P / year

If PPE is less than or equal to PPB, the project meets its phosphorus budget (neg. #)
If PPE is more than PPB, more reduction in phosphorus export may be required (pos. #)

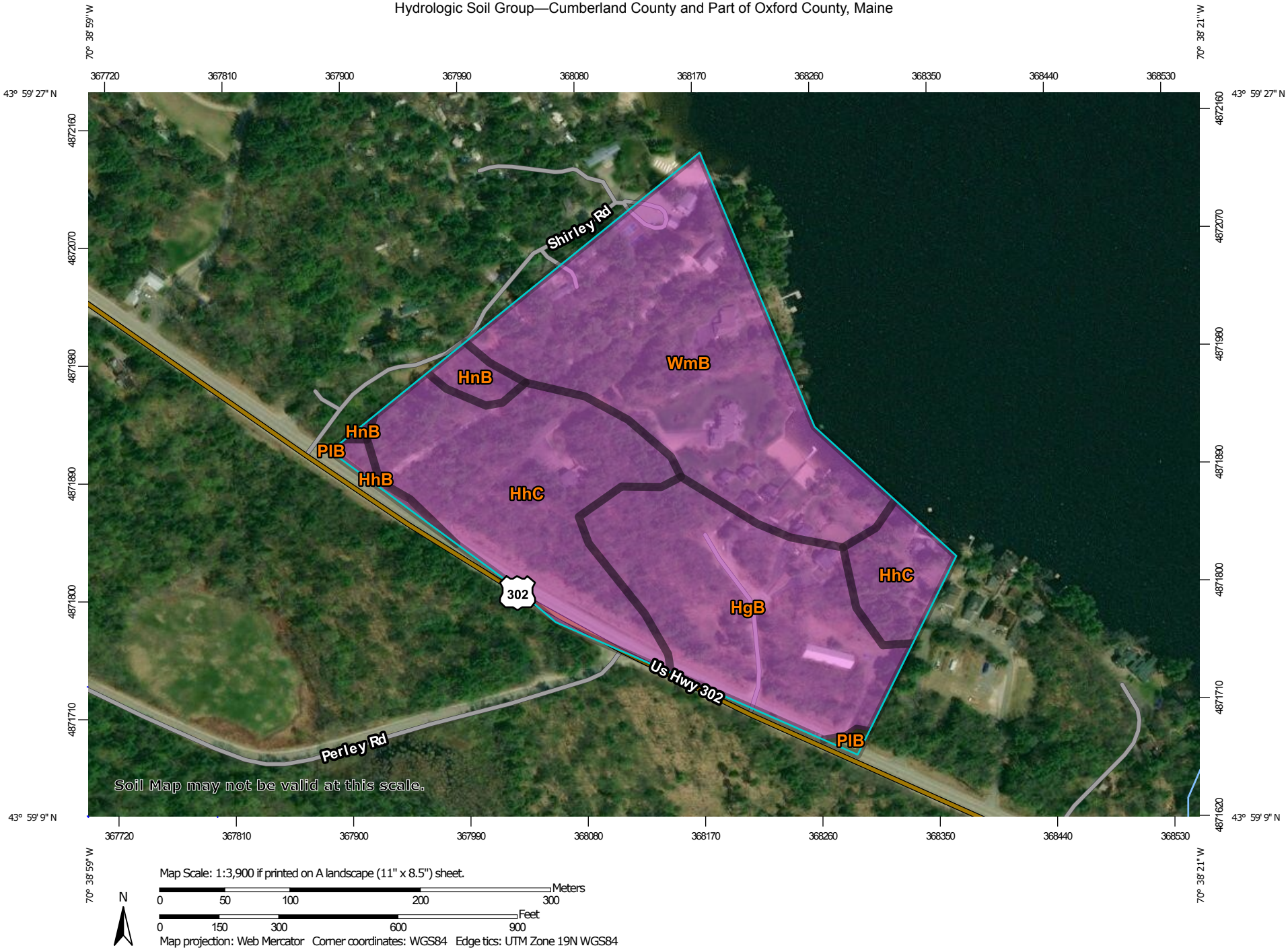
OTHERWISE:

Is the Post-Treatment Phosphorus Export less than 40% of the Pre-Treatment Export? It is equivalent to more than 60% removal efficiency. (Post-PPE < 40% Pre-PPE)	17.50%

If Post-PPE is less than 40% of Pre-PPE, a compensation fee may be appropriate at the cost of $22,733 per pound of phosphorus over budget. (see table 3 Phosphorus Compensation Fee in updated phosphorus manual) The compensation fee option is only available in some lake watersheds. Check with the DEP project manager or with the DEP Division of Watershed Management to see if the watershed in which the project is located is eligible before proposing a project that incorporates a compensation fee.

The following compensation fee must be paid $13,9*(PPE-PPB)	**N/A**

Hydrologic Soil Group—Cumberland County and Part of Oxford County, Maine



Map Scale: 1:3,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 15, Sep 6, 2018

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

Date(s) aerial images were photographed: Sep 5, 2013—Oct 22, 2017

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
HgB	Hermon sandy loam, 3 to 8 percent slopes	A	6.9	26.6%
HhB	Hermon sandy loam, 0 to 8 percent slopes, very stony	A	0.2	0.9%
HhC	Hermon sandy loam, 8 to 15 percent slopes, very stony	A	8.2	31.4%
HnB	Hinckley-Suffield complex, 3 to 8 percent slopes	A	0.5	1.9%
PlB	Peru fine sandy loam, 0 to 8 percent slopes, very stony	C/D	0.1	0.3%
WmB	Windsor loamy sand, 0 to 8 percent slopes	A	10.1	38.9%
Totals for Area of Interest			**26.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

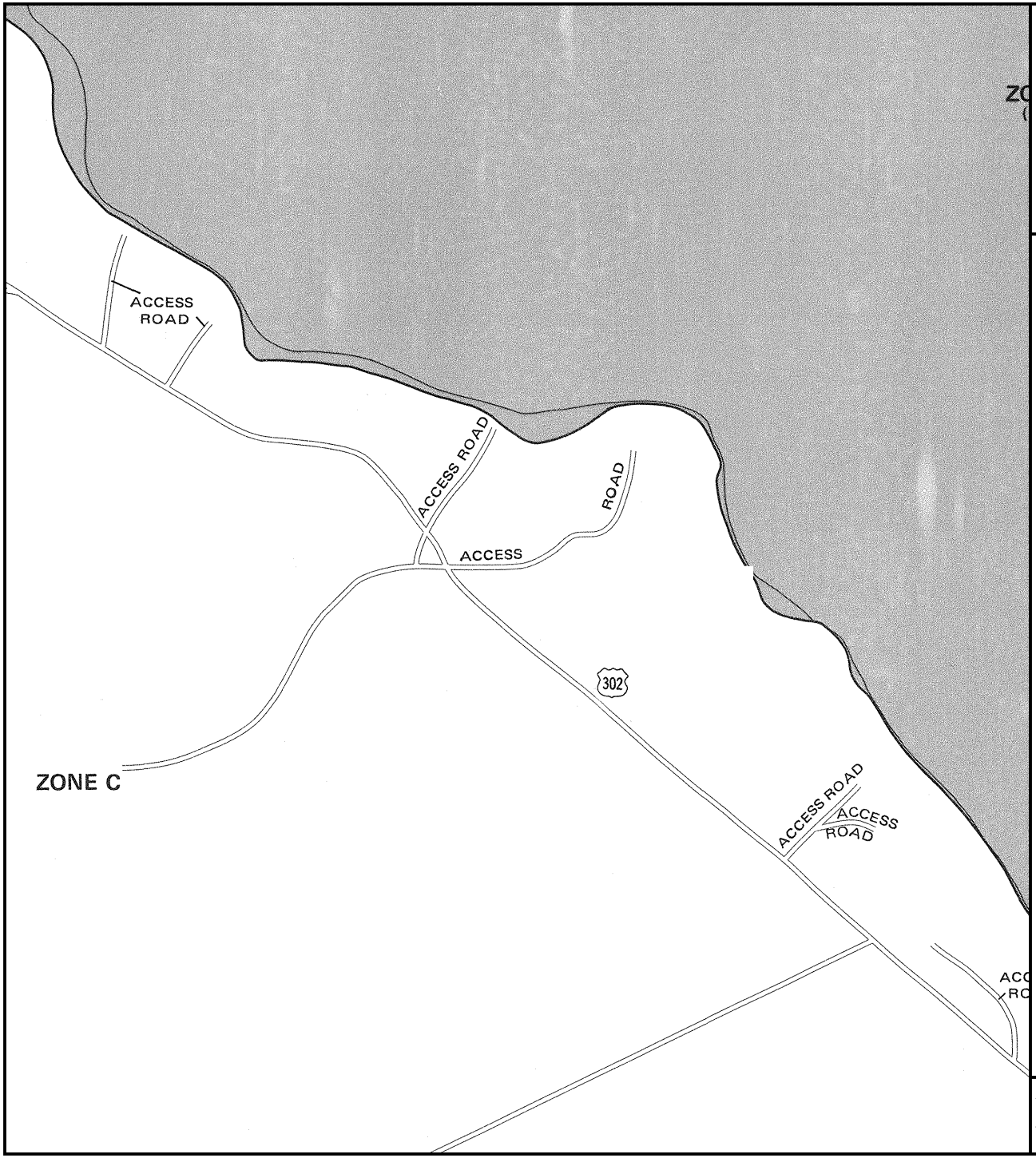
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



PROXIMATE SCALE

800 0 800 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
NAPLES, MAINE
CUMBERLAND COUNTY

PANEL 5 OF 25
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
230050 0005 B

EFFECTIVE DATE:
APRIL 1, 1982

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov