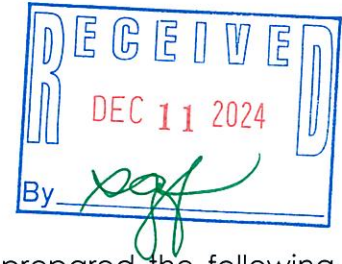


## Stormwater Management Report



### Introduction

On behalf of the Applicant, Tru Builders North, LLC, we have prepared the following Stormwater Management Report for a proposed backlot driveway development, located off Mountain Road in Raymond, Maine. The proposed development is located within the direct watershed of Crescent Lake; therefore, it must comply with the Stormwater Quality and Phosphorous Control Standards (Section 300-9.24) of the Town's Land Use Ordinance.

### Existing Site Conditions

The 3-acre parcel is identified as Map 15 Lot 81A, and is within the Rural Zoning District. The parcel is currently vacant and wooded and is surrounded by single-family residential lots. According to the U.S. Fish and Wildlife National Wetland Inventory online mapping tool, there are no wetlands located on the property. The property generally slopes from east to west at a consistent slope of approximately 12%. Onsite soils are mapped by the Cumberland County Soil Survey as primarily Hermon sandy loam, which is hydrologic Soil Group A. The proposed residential development is consistent with other land uses in the area.

### Proposed Site Development

Proposed site features are shown on the provided Site Plan. The proposed development includes a backlot driveway to create proper road frontage for the lot. This driveway is proposed to be 16 feet wide and approximately 425 feet long. There will be 0.14 acres of impervious area, and 0.30 acres of landscaped pervious area generated by this development. The proposed driveway will include ditching on its western side to capture all runoff from the proposed road to be directed to grassed underdrained soil filters for treatment and detention. The driveway will include a ditch on its eastern side to divert offsite runoff from entering the stormwater filters. Stormwater from the soil filters will be discharged to the west to natural drainage pathways.

### Phosphorous Analysis Narrative

The project phosphorus budget (PPB) was calculated using Worksheet 1 from the MDEP Phosphorus Control Manual Volume II and is included in the Attachments. The PPB provides the site-specific standard based on developable lot area for available phosphorus (P) that may be exported from the site from new development (after 1997). As shown on Worksheet 1, the site PPB is 0.114 lbs. P/year. Using Worksheet 2, Haley Ward estimated the Pre-treatment Phosphorus Export (Pre-PPE) of phosphorus to be exported







from the site annually given the site development proposed above. The site Pre-PPE is estimated at 0.305 lbs. P/ year, which is higher than the PPB calculated in Worksheet 1. In order to reduce the phosphorous export to allowable levels, two soil filters are proposed to provide stormwater quality treatment. These filters have been designed per the Maine Department of Environmental Protection's Best Management Practices Manual. Utilizing these filters to calculate the Post-treatment Phosphorus Export (Post-PPB) gives an estimated Post-PPB of 0.106 lbs. P/year. As the PPB is 0.11 lbs. of P/year and the Post-PPB at 0.106 lbs. P/year, no additional mitigation is necessary.

### **Phosphorous Treatment Structure Maintenance Considerations**

The property should maintain the soil filters per MaineDEP BMP Manual guidelines. Use of low phosphorus fertilizers are also recommended on the lawn area. Should the lot be developed further, the Town of Raymond may require that this phosphorous plan be updated to include all developed areas on the parcel.

### **Erosion Control and Sedimentation Control Measures**

Installation of temporary measures to control erosion and prevent silt/sediment from leaving the construction area will be required for the entire duration of the construction project. Silt fencing (or equivalent control devices) should be installed adjacent to, and down-slope, of all disturbed areas. The bottom of the silt fence geotextile fabric shall be anchored a minimum of six inches below grade. Silt fencing should be inspected on a weekly basis and after every major storm event to remove any build-up of silt and debris, as well as to verify performance of the silt fencing and/or other erosion control measures.

Damaged or improperly functioning control measures shall be repaired immediately. Areas of exposed soils created by erosion, other work activities, or similar actions shall be promptly reclaimed. Exposed soil shall be mulched with hay within one week of exposure. Hay mulch must be evenly spread on the ground in sufficient quantity to protect the ground from raindrop erosion but allow grass to penetrate the hay layer. The owner and his/her agents and contractors are responsible for consistent inspection and maintenance to ensure that erosion control and Best Management Practices are functioning properly.

### **Post-Construction Maintenance**

Long-term phosphorus control measures and maintenance activities require that temporary erosion control measures be safely removed on a timely basis. Maintenance activities shall ultimately be the responsibility of the property owner, as well as his/her agents and contractors. Inspection and maintenance shall follow MaineDEP BMP Manual guidelines to ensure the stormwater management features are functioning properly.



## Conclusions and Recommendations

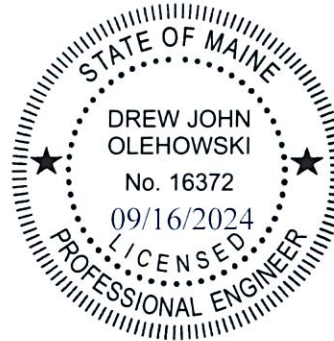
This study has found that the installation, inspection and maintenance of the proposed driveway and stormwater management features, as designed, is expected to meet the Phosphorus Export standards within Chapter 502 and will have a significant, negative impact on downstream areas.

Please feel free to call us if you have any questions concerning this study or require further assistance.

Sincerely,  
Haley Ward, Inc.

  
Drew Olehowski, PE  
Project Manager

DJO/jhw  
Enc.





## Worksheet 1 - PPB calculations

**Project Name:**

**Lake Watershed:**

**Town:**

### Standard Calculations

Watershed per acre phosphorus budget (Appendix C)	<b>PAPB</b>	0.032	lbs P/acre/year
Total acreage of development parcel:	<b>TA</b>	3.69	acres
NWI wetland acreage:	<b>WA</b>	0	acres
Steep slope acreage:	<b>SA</b>	0.1	acres
Project acreage: $A = TA - (WA + SA)$	<b>A</b>	3.59	acres
<b>Project Phosphorus Budget: <math>PPB = P \times A</math></b>	<b>PPB</b>	0.11488	<b>lbs P/year</b>

### Small Watershed Adjustment

If Project Acreage (A) is greater than the threshold acreage for the small watershed threshold (SWT, from pertinent lake and town info in the table in Appendix C), calculate an alternative PPB using the analysis below and use this value if it is less than the the Standard Calculation PPB.

Small Watershed Threshold (Appendix C):	<b>SWT</b>	228	acres
Project acreage:	<b>A</b>	0.9	acres
Allowable increase in town's share of annual phosphorus load to lake (Appendix C):	<b>FC</b>	29.54	lbs P/year
Area available for development (Appendix C):	<b>AAD</b>	2608	acres
Ratio of A to AAD ( $R = A/AAD$ )	<b>R</b>	N/A	

### Project Phosphorus Budget

<b>If <math>R &lt; 0.5</math>, <math>PPB = [(FC \times R)/2] + [FC/4]</math></b>	<b>PPB</b>	N/A	<b>lbs P/year</b>
<b>If <math>R &gt; 0.5</math>, <math>PPB = FC \times R</math></b>	<b>PPB</b>	N/A	<b>lbs P/year</b>

## Worksheet 2

### 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 with description	or Lot #(s)	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)	Description of BMPs
GRAVEL DRIVEWAY		0.14	1.75	0.245	0.25	0.06125	SOIL FILTER
ROAD SIDE SLOPES (LAWN, TYPE A SOIL)		0.1	0.2	0.02	0.25	0.005	SOIL FILTER
ROAD SIDE SLOPES (LAWN, TYPE A SOIL)		0.2	0.2	0.04	1	0.04	UNTREATED
				0	1	0	
				0	1	0	
			<b>Total Pre-PPE (lbs P/year)</b>	<b>0.305</b>	<b>Total PostPPE (lbs P/year)</b>	<b>0.10625</b>	



## WORKSHEET 4 - PROJECT PHOSPHORUS EXPORT SUMMARY

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

**Project Name:**

Project Phosphorus Budget - Worksheet 1	PPB	0.11	lbs P/year
Total Pre-Treatment Phosphorus Export - Worksheet 2	Pre-PPE	0.31	lbs P/year
Total Post-Treatment Phosphorus Export - Worksheet 2	Post-PPE	0.11	lbs P/year
Total Phosphorus Mitigation Credit - Worksheet 3	TMC	0.00	lbs P/year
Project Phosphorus Export (Post-PPE - TMC)	PPE	0.11	lbs P/year

**Is the Project Phosphorus Export  $\leq$  the Project Phosphorus Budget? (PPE  $\leq$  PPB)**

If **YES**, PPE is less than or equal to PPB and the project meets its phosphorus budget.

If **NO**, PPE is greater than PPB, more reduction in phosphorus export is required or the payment of a compensation fee may be an option

YES

The amount of phosphorus that needs further treatment or compensation

lbs P/year

**Has Project Phosphorus Export been sufficiently reduced?**

Is (Pre-PPE - Post-PPE)/Pre-PPE greater than 0.60?

If **YES**, in some watersheds the compensation fee is an available option.

If **NO**, more treatment must be provided. PPE must be further reduced.

The post-treatment phosphorus export must be less than 40% of the pre-treatment export (Post-PPE < 0.4\*Pre-PPE)

%

**If the project is located in a watershed that is eligible for a compensation fee (or is a residential subdivision with buffers), a compensation fee may be appropriate as follows:**

If Project Export has been reduced by greater than 60% and less than 75%, \$25,000 per pound minus \$833 per 1% Percent Export

If Project Export has been reduced by greater than 75%, \$12,500 per pound minus \$500 per 1% Project Export