

# Memorandum



To: Pam DeAndrea, CVRPC  
From: Watershed Consulting Associates, LLC  
Date: May 29, 2020  
Re: ***Berlin 100% Design Memo***

## ATTACHMENT:

- A-1 – 100% Design Plans**
- A-2 – Drainage Area Overview Map**
- A-3 – 100% Cost Estimates**
- A-4 – 100% Bid Documents**
- A-5 – 100% HydroCAD Modeling**
- A-6 – Bioretention Planting Plans**
- A-7 – Educational Sign**

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## 1. Introduction

Watershed Consulting Associates, LLC (Watershed) is pleased to submit this summary memo for the 100% designs for the Berlin Elementary School, the Berlin Fire Department, and the Chimney Sweep Fireplace Shop site all located in Berlin, VT. See Attachment A-1 for the 100% design plans. See Attachment A-2 for an overview map showing the drainage areas for these practices. Cost estimates for these projects are included as Attachment A-3. Also included are the 100% Bid Documents, 100% HydroCAD modeling, the bioretention planting plans, and a digital format educational sign (Attachments A-4 through A-7, respectively).

## 2. Berlin Elementary School

A bioretention practice has been designed for the Berlin Elementary School site. The design involves a swale that wraps around the parking area, a series of catch basins and pipes along the access drive, and a hydrodynamic separator for pre-treatment. The stormwater is then directed to the bioretention feature. Due to high groundwater identified during the development of the 30% plans and confirmed during further soils investigations during this final design process, an underdrain will be required for the feature. Please see the attached 100% plans for more details on the design of this project. It is expected that this project will reduce total phosphorus loading by 1.90 lbs annually. See Table 1.

**Table 1. Berlin Elementary School Project Summary.**

Total Drainage Area (Acres)	Impervious Cover Managed (acres)	Pervious Cover Managed (acres)	TP Load (lbs/yr)	TP Removal Efficiency (%)	TP Reduction (lbs/yr)
2.72	1.37	1.35	4.06	46.78%	1.9

The mapped drainage area and project location can be found in Attachment A-2. Cost estimates have been updated for this project to reflect the updates made during the 100% design revisions. Costs for this site are estimated at \$165,000. Itemized estimates can be found in Attachment A-3. A planting plan is included as Attachment A-6 and an educational sign is included as Attachment A-7.

### 3. Berlin Fire Department

A bioretention practice has been designed for the Berlin Fire Department. An underdrain is included in the design due to the high groundwater encountered on site during a soil assessment completed during the final design process. Drainage from the south side of the site will be collected and rerouted to the north where the bioretention practice will be located. Please see the attached 100% plans for more details on the design of this project. It is expected that this project will reduce total phosphorus loading by 0.7 lbs annually. See Table 2.

**Table 2. Berlin Fire Station Project Summary.**

Total Drainage Area (Acres)	Impervious Cover Managed (acres)	Pervious Cover Managed (acres)	TP Load (lbs/yr)	TP Removal Efficiency (%)	TP Reduction (lbs/yr)
0.81	0.53	0.28	1.46	46.1%	0.7

The mapped drainage area and project location can be found in Attachment A-2. The cost estimate has been updated for this project to reflect the updates made during the 100% design revisions. The cost for this site is estimated at \$106,000. Itemized estimates can be found in Attachment A-3. A planting plan is included as Attachment A-6.

### 4. Chimney Sweep Fireplace Shop

A subsurface sand filter is proposed for the Chimney Sweep site. This practice would manage significant drainage from the west of the site by intercepting the stormline that discharges to the Winooski River east of Chimney Sweep. Additional catchbasins are proposed on the Chimney Sweep site to direct drainage from the property to the system. It is expected that these projects will reduce total phosphorus loading by 5.7 lbs annually. See Table 3.

**Table 3. Chimney Sweep Project Summary.**

<b>Total Drainage Area (Acres)</b>	<b>Impervious Cover Managed (acres)</b>	<b>Pervious Cover Managed (acres)</b>	<b>TP Load (lbs/yr)</b>	<b>TP Removal Efficiency (%)</b>	<b>TP Reduction (lbs/yr)</b>
7.92	3.39	4.53	10.65	53.25%	5.7

The mapped drainage area and project location can be found in Attachment A-2. Cost estimates have been updated for this project to reflect the updates made during the 90% design revisions. Costs for this site are estimated at \$324,000. Itemized estimates can be found in Attachment A-3.

Please review these materials and contact us with any questions regarding this memorandum. Feel free to give us a call at (802) 497-2367, or email Andres at [Andres@watershedca.com](mailto:Andres@watershedca.com) with any questions.

Sincerely,



Andres Torizzo  
Principal



Kerrie Garvey  
GIS Manager