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**MEMORANDUM**

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**TO:** DAVID WHITE  
**FROM:** PAUL O'LEARY  
**SUBJECT:** GROVER STORMWATER COMMENTS  
**DATE:** JULY 6, 2012  
**CC:**

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David –

In response to Dean Grover's comments on the proposed stormwater system, please consider the following:

1. Mowing of grass channels –

The Vermont Stormwater Rules require that vegetation in dry swales be mowed as required during the growing season to maintain grass heights in the 4 to 6 inch range. It is our experience that the swales are usually mowed 2 to 4 times per season. We would not expect a conventional lawn mower to be used since it would have trouble conforming to the shape of the swale and typically mows closer than the 4 to 6 inch range specified. Generally a common string trimmer is used which, among other benefits, has no problem handling damp areas.

2. Grade of the Swale between Darkstar and the Shopping Center –

The existing swale along Darkstar has a minimal slope – less than 1 percent. With such a flat slope it is difficult to maintain a positive grade and some ponding along the swale would not be unusual. The Vermont Stormwater Rules do not specify a minimum slope, only a maximum (4%). The Rules do require that the temporary ponding in the swale be for a period of time that is less than 40 hours. In our case we would expect that the majority of the temporary ponded water will indeed drain within the required 40 hours with only small pockets of water remaining. The flat slope is beneficial in that it provides for a greater residence time and therefore better treatment but also has its negatives since the flat slope has the potential for stagnant water and other nuisance ponding. The characteristics of this swale have existed for a number of years and will not be affected in a negative way by the proposed Hannaford development.

3. Emergency Overflow Channel –

On those unusual occasions when very large storm events (50 and 100 year storms) occur it is expected that stormwater will discharge from the Hannaford

O'Leary-Burke Civil Associates, PLC

1 Corporate Drive, Suite #1 Essex Jct., VT 05452

802-878-9990 Fax 802-878-9989 [dwburke@olearyburke.com](mailto:dwburke@olearyburke.com)

site into the existing swale between the Hannaford property and the Darkstar property. To control the point of discharge a riprap swale has been shown from the low spot in the parking lot to the swale. The riprap swale was originally shown as being constructed with a 4' drop over a distance of 8'. The revised riprap swale now drops 4' over a distance of 28'. The flatter slope of the riprap swale will reduce velocity and minimize the potential for any bank erosion.

#### 4. Downstream Flooding During Very Large Storm Events -

The proposed project will increase the run-off from the property during very large storm events (25, 50, and 100-year events). The current State of Vermont Rules do not require a downstream analysis unless the site exceeds 10 acres of impervious area. The rationale is that sites with less than 10 acres of impervious will not typically have a significant impact on downstream properties.

In our case, just downstream of Commerce Park, Patrick Brook flows through an existing 4' tall x 7' wide concrete box culvert under Route 116. The elevation of Route 116 at this point is approximately 335.5' (about 2' lower than the Darkstar floor elevation). The flow capacity of the 4' x 7' box culvert is approximately 250 cfs. Considering the size of the watershed above the Route 116 culvert, we would expect that the limited flow capacity of the culvert would significantly diminish any downstream impacts from increased flows for Lot 15.