



O'Leary-Burke Civil Associates, PLC

CIVIL ENGINEERING | REGULATORY AND PERMIT PREPARATION | LAND SURVEYING | CONSTRUCTION SERVICES | LAND USE PLANNING

February 24, 2015

Megan Moir
Stormwater Plangineer
Burlington Public Works Department
234 Penny Lane
Burlington, VT 05401

Re: Stormwater Discharge Plan
SD Ireland - 140 Grove Street
Burlington, VT 05401

Dear Megan:

We are writing on behalf of SD Ireland (c/o Scott Ireland) to request a letter of approval (in order to submit the project for final plat review) for the Stormwater design of the proposed development at 140 Grove Street, Burlington. A state individual stormwater discharge permit has already been authorized (4773-INDS).

1. Project Description

The project is called "Ireland Property - 140 Grove Street". The project will involve the decommissioning of the SD Ireland concrete batch plant at 140 Grove Street, Burlington and the construction of a new 232 unit residential development complex on the 20.79 acre site. The proposed use of the site will reduce the overall impervious surfaces by 3.59 acres from 10.21 acres to 6.62 acres (35% reduction). This includes connecting all of the impervious surface runoff to the impaired Centennial Brook watershed (currently 3.67 acres) to the proposed stormwater system during large storm events. The project will also include the removal of a 60ft long culvert along Centennial Brook located at the existing northern entrance to the concrete facility. The removal of the culvert is at the request of the Burlington Conservation Board.

The parcel is bound by several residential buildings across Centennial Brook, the Winooski River, Ethan Allen Park, and The University of Vermont. The parcel is currently the site of the SD Ireland concrete batch plant. All existing stormwater on the site generally flows directly to Centennial Brook/Winooski River or to an existing infiltration pond located along the eastern boundary of the site.

The Chittenden County Soil Survey classifies the on-site soils primarily as Fu - fill land and Le - limerick silt loam. The limerick silt loam soils are classified as a class C soil. Due to the nature of the sites current use the proposed development area soils are generally made up of coarse fill soils suitable for industrial activity. All of the on-site soils were modeled as HSG Class C soils for the HydroCAD analysis.

2. Existing Conditions

The parcel is currently being used as the SD Ireland concrete batch plant. The site varies in topography; 68% - slopes less than 0.15, 20% - slopes greater than 0.30, and 12% - slopes between 0.15 and 0.30. The on-site soils were modeled as HSG Class C soils for all HydroCAD analysis. The site currently has approximately 10.21 acres of impervious coverage.

3. Existing Stormwater System

There is an existing stormwater infiltration pond located along the eastern property boundary that is being used to collect the runoff for approximately 5.44 acres of the existing impervious surfaces. The remaining impervious surfaces drain off the site into Centennial Brook (3.67 acres) and the Winooski River (1.10 acres).

Watershed	Impervious Acres	Drainage Path
Centennial Brook	3.67	Overbank directly to Centennial
Winooski River	1.10	Overbank directly to Winooski
Winooski River	5.44	Existing Stormwater Infiltration Pond

Total: 10.21 acres

4. Receiving Water

The site is divided into six (6) sections based on specific combinations of the following criteria; Dis-Connected Impervious vs Connected Impervious, Original vs. Proposed Centennial Brook Watershed, and Original vs. Proposed Winooski River Watershed. The dis-connected impervious areas have been designed and modeled to show, at a minimum the 0.9" water quality storm (WQv) can be sufficiently stored without the use of any overflow structures connected to the system. This is done by the use of sheet flow and rain gardens to provide as much recharge back into the original watersheds as possible. When a storm event larger than the water quality storm of 0.9" takes place, the sites watershed boundary shifts towards being completely within the Winooski Watershed. The watershed boundary shifting is due to the utilization of the overflow devices by the infiltration features within the Centennial Brook Watershed.

The following observations can be derived from the model:

Proposed Site

Drainage Area: 13.95 acres (607,688 SF)

Impervious: 6.62 acres (288,170 SF)

$WQ_v = 21,744 \text{ ft}^3$

50% WQ_v Permanent Pool Elevation: 160.0 ft (storage = 10,872 ft^3)

ii. Groundwater Recharge Treatment Standard

The recharge standard is met by using the percent area method to provide the adequate recharge necessary in order to preserve existing water table elevations. It should be noted that the project is reducing the amount of impervious surfaces on the site by 3.58 acres. Rooftop runoff from three of the large apartment buildings were modeled to show that the recharge standards are being met for class "C" soils. The grass channels were designed to meet the WQ_v standards in order to provide acceptable groundwater recharge.

$$Re_a = (F)(A)(I)$$

$$Re_a = 0.67 \text{ acres}$$

$$F = .10 \text{ (HSG Class C)}$$

$$A = 20.79 \text{ acres}$$

$$I = 32\%$$

Recharged Impervious Coverage:

Grassed Channel #1 (O-3)

Area: 0.49 acres

Impervious: 0.29 acres

Swale Dimensions: 5' wide bottom x 1' deep channel x 170' long

10 minute residence time required: 13.9 min provided - met

Grassed Channel #2 (O-3)

Area: 0.35 acres

Impervious: 0.29 acres

Swale Dimensions: 5' wide bottom x 1' deep channel x 170' long

10 minute residence time required: 14.6 min provided - met

Grassed Channel #3 (O-3)

Area: 0.25 acres

Impervious: 0.20 acres

Swale Dimensions: 5' wide bottom x 1' deep channel x 120' long

10 minute residence time required: 11.4 min provided - met

$$Re_a = 0.78 \text{ acres } (0.29 \text{ acres } +0.29 \text{ acres } +0.20 \text{ acres}) > 0.67 \text{ acres}$$

Along with the grassed swales modeled here to show they meet the WQv standards the project utilizes multiple rain gardens, additional grassed swales, and sheet flow techniques for even further groundwater recharge.

iii. Channel Protection Standard (1-year)

The channel protection volume is met by the design of the retrofitted detention pond. The small low flow orifice was sized to most closely model a 720 min center of mass detention time for the 1-year storm.

The existing site currently has 10.21 acres of impervious coverage draining to three different locations; the Winooski River, Centennial Brook, and the existing infiltration pond on the site. The 3.67 acres of impervious flowing to Centennial Brook has a 1-year pre-development peak flow of 12.29 cfs. The 1.10 acres of impervious flowing directly to the Winooski River has a 1-year pre-development peak flow of 4.03 cfs. The 5.44 acres of impervious flowing to the existing infiltration pond does not currently have an outlet so its pre-development discharge is 0.00 cfs, see model. By taking a conservative approach to the pre-development flows; the post-development flows were compared to the pre-development runoff only to the Winooski River (4.03 cfs). This was done because the proposed post-development system will only discharge directly to the Winooski River in large storm events. This design method shows the proposed stormwater system will not exceed the peak flows previously discharged to the Winooski River. The following summary is derived from the HydroCAD model:

Detention Pond (P-3)	
Predevelopment Flow	3.97 cfs
Post Development Flow	19.46 cfs
Routed Post Development Flow	0.36 cfs
Center of Mass Detention Time	742.30 min

iv. Overbank Flood Protection Standard (10-year)

The channel protection volume is met by the design of the retrofitted detention pond. The same predevelopment flow approach for the 10-yr overbank flood protection standard was used as the 1-yr standard. The following summary is derived from the HydroCAD model:

Detention Pond (P-3)

Predevelopment Flow	6.91 cfs
Post Development Flow	36.88 cfs
Routed Post Development Flow	2.86 cfs

v. Extreme Flood Protection Standard (QP100)

This criteria is not applicable since the new impervious coverage is less than 10 acres.

d. Manner of Discharge:

S/N 001: Stormwater runoff from roofs, driveways, parking areas, and sidewalks flows to a network of yard drains, rain gardens, grass channels, and catch basins where it is either infiltrated to the Centennial Brook watershed or routed to an extended wet detention pond discharging via controlled outlet structure to a wetland adjacent to the Winooski River.

Please find the following attachments for your review:

- USGS Map & Soils Map;
- Impervious Coverage and Breakdown;
- Pre-Development & Post-Development Flow Patterns;
- Electronic Version of HydroCad Model;
- Pertinent Plans Set;
- Annual Inspection Form;

We look forward to working with you on this project. If you have any questions or need additional information please let me know.

Sincerely,



Bryan Currier, E.I.