CROSS CONSULTING ENGINEERS, P.C.
Peter H. Cross, P.E., L.S.
President
103 Fairfax Road, St. Albans, Vermont 05478-6271 • Tel. : 802.524.2113 • Fax: 802.524.9681
E-mail: pcross@crossconsultingengineers.com

HILLVIEW HEIGHTS SUBDIVISION – 2427 HILLVIEW RD

Stormwater Runoff Summary

CCE Project #: 20029
4/25/2023

Stormwater Treatment System Summary

The development associated with this project has been split up into 3 different subcatchments all discharging via 4 different points of interest to waters of the state eventually leading to Huntington River. Subcatchment 1 (1S) encompasses development associated with lots 1 and 2 and includes one point of interest (S/N 001). Runoff from 1S is conveyed to an infiltration basin on lot 1 and discharges to groundwater and overland at S/N 001. Subcatchment 2 (2S) includes all development on lots 3, 4 and 5 and a portion of the proposed road and one point of interest (S/N 002). Runoff from 2S is conveyed to a gravel wetland which discharges to municipal roadside ditching at S/N 002. Subcatchment 3 (3S) encompasses the remainder of the proposed road and all other development on lots 6 and 7. 3S includes two gravel wetlands and two points of interest (S/N 003 POI 1 and S/N 003 POI 2). Runoff is conveyed to one of the two gravel wetlands and discharges to an unnamed tributary of Huntington River at S/N 003 POI 1 and S/N 003 POI 2.

Subcatchment 1S and S/N 001

1S contains well drained sandy soils with high infiltration rates. Runoff from the development of lots 1 and 2 is conveyed to an infiltration basin on lot 1 via grass swales and a culvert. Test pits and infiltration testing provided the data required to appropriately size an underground infiltration chamber with extended detention above ground. The system is designed to both infiltrate runoff into the groundwater as well as discharge excess runoff from larger storm events at a decreased rate overland to wetlands off site. S/N 001 is the only discharge point without a direct conveyance to an unnamed tributary of Huntington River. The runoff discharging overland eventually leaves lot 1 to the north as sheet flow further infiltrating into the groundwater before eventually reaching wetlands. The following is a summary of discharge volumes for various storm events.

- 1” 24hr Storm: All runoff is infiltrated. No water discharges overland off site.
- 1yr 24hr Storm: All runoff is infiltrated. No water discharges overland off site.
- 10yr 24hr Storm: 92% of the runoff is infiltrated and 8% discharges overland.
    - The discharge volume decreases by 80% over predevelopment conditions.
    - The peak discharge rate decreases by 77% over predevelopment conditions.
- 25yr 24hr Storm: 95% of the runoff is infiltrated and 5% discharges overland.
    - The discharge volume decreases by 77% over predevelopment conditions.
    - The peak discharge rate increases from 0.03 cubic feet per second to 0.04 cubic feet per second.
- 100yr 24hr Storm: 56% of the runoff is infiltrated and 44% discharges overland.
    - The system was designed to manage the 100-year storm without failing or having its banks overflow. Minimizing peak outflows and volumes is not required for such large storm events.

Subcatchment 2S and S/N 002

2S contains a mixture of well drained and poorly drained soils disallowing infiltration treatment practices. When this is the case a gravel wetland is designed to treat and discharge runoff at a slower peak rate, but volume of runoff is assumed to not decrease given the soil conditions. The gravel wetland treating runoff from 2S, discharges via controlled outlet structure to a municipal roadside ditch with direct conveyance to an unnamed tributary of the Huntington River on site. No runoff is directed south of Hillview Rd or overland off site. The following is a summary of storm events and the treatment provided within 2S.

- 1" 24hr Storm: The entire 1" storm is filtered through the gravel cell with a center-of-mass detention time of 963.3 minutes. (State requires no bypassing of the gravel cell.)
- 1yr 24hr Storm: Is filtered through the gravel cell and detention pond with a center-of-mass detention time of 731.7 minutes. (State requires a minimum of 720 minutes.)
- 10yr 24hr Storm: (State requires a decrease in peak discharge rate.)
    - Predevelopment peak discharge rate: 10.71 cubic feet per second.
    - Post development peak discharge rate: 6.61 cubic feet fer second.
- 25yr 24hr Storm: (State does not require any modeling for the 25yr storm but the system was designed to handle such a storm.)
    - Predevelopment peak discharge rate: 14.52 cubic feet per second.
    - Post development peak discharge rate: 7.07 cubic feet fer second.
- 100yr 24hr Storm: (State does not require any modeling for the 100yr storm for sites with less than 10 acres of impervious but the system was designed to handle such a storm.)
    - Predevelopment peak discharge rate: 21.02 cubic feet per second.
    - Post development peak discharge rate: 17.94 cubic feet fer second.

Subcatchment 3S: S/N 003 POI 1 and S/N 003 POI 2

Like 2S, 3S contains a mixture of well drained and poorly drained soils disallowing infiltration treatment practices. Two gravel wetlands like the gravel wetland in 2S have been designed to treat and slow down runoff. Both wetland systems outlet via a controlled outlet structure and direct discharge to the same unnamed tributary of Huntington River. Both systems have been designed to accommodate both the 25yr and 100yr storms. Also provided on lot 7 is a simple disconnection area along the driveway and around the barn. This simple disconnection area provides some runoff infiltration prior to the gravel wetland allowing the gravel cell to be decreased in size. No runoff from 3S discharges overland off site. All runoff is routed to the unnamed tributary. The following is a summary of storm events and the treatment provided within 3S.

- 1" 24hr Storm:
    - POI 1: The entire 1" storm is filtered through the gravel cell with a center-of-mass detention time of 673.8 minutes. (State requires no bypassing of the gravel cell.)
    - POI 2: The entire 1" storm is filtered through the gravel cell with a center-of-mass detention time of 732.7 minutes. (State requires no bypassing of the gravel cell.)
- 1yr 24hr Storm:
    - POI 1: Is filtered through the gravel cell and detention pond with a center-of-mass detention time of 851.1 minutes. (State requires a minimum of 720 minutes.)
    - POI 2: Is filtered through the gravel cell and detention pond with a center-of-mass detention time of 753.8 minutes. (State requires a minimum of 720 minutes.)

- 10yr 24hr Storm: (State requires a decrease in peak discharge rate.)
    - Predevelopment peak discharge rate for POI 1 and POI 2: 1.96 cubic feet per second.
    - Post development peak discharge rate for POI 1 and POI 2: 1.85 cubic feet fer second.
- 25yr 24hr Storm: (State does not require any modeling for the 25yr storm but the systems were designed to handle such a storm.)
    - POI 1: Peak discharge decreases from 1.55cfs to 0.05cfs.
    - POI 2: Peak discharge decreases from 5.70cfs to 3.13cfs.
- 100yr 24hr Storm: (State does not require any modeling for the 100yr storm for sites with less than 10 acres of impervious but the systems were designed to handle such a storm.)
    - POI 1: Peak discharge decreases from 3.05cfs to 0.41cfs.
    - POI 2: Peak discharge decreases from 8.85cfs to 6.14cfs.