

DiVesta Civil Engineering Associates, Inc.

July 30, 2020

Mr. Eric Joosten
Chairman
Environmental Protection Commission
Town of Darien
2 Renshaw Road
Darien, CT 06820

Re: Oresman Subdivision – 49 Sunswyck Road, Darien, CT
EPC 5-2020

Dear Mr. Joosten:

The following is offered in response to review comments prepared by Mr. Joseph Canas, P.E. of Tighe & Bond, July 29, 2020, after reviewing our response to Mr. Steve Trinkaus' comments dated July 1, 2020, regarding the above referenced property.

Stormwater Management:

Operations and Maintenance Plans.

Please see the attached operations and maintenance plan for each of the two lots.

Cultec Inspection Access.

The overflow grates that will be located in the lawn area will be revised to a solid cap to eliminate having a grate that is set above the finished grade and a concrete collar around the grate. The use of a cap versus a screw on plug will provide a relief point if the detention system is overtaxed.

Pre-Treatment of Flow.

If the sumps in the catch basin are increased to four feet below the outlet pipe of the catch basin it will be very difficult for a homeowner to maintain. A typical post hole digger, which will most likely be used to clean the sumps, is 55 inches tall. The proposed catch basin as designed has the invert of the pipes a minimum of two feet from the grate therefore the bottom of the sump will be over six feet deep making it very difficult for a homeowner to maintain. If it is difficult to maintain the homeowner will not do it. The proposed design shows the catch basin in series with the junction box before the detention system and both have two foot sumps therefore there is a total of four feet within the two sumps.

Water Quality Volume.

Attached are print outs from the HydroCAD computer model indicating the volume of storage below the outlet inverts from the detention systems and showing that the Water Quality Volume was met for each detention system.

Determination of Infiltration Rates.

A percolation test at the required depth will be done. We used 50 percent of the infiltration rate from the field data. Within the HydroCAD computer model the exfiltration rate is based on the surface area, meaning the bottom area of the detention system.

Location of the Proposed Pool.

The pool location is a place holder at this time. The pool location can be adjusted to avoid the proposed detention system. The pool can be moved to the north; the pool can be reduced in size and shape.

Sump Pump and Footing Drains.

There will be a portion of the basement that will be on a crawl space. It is proposed to raise the house to reduce the depth of the basement in groundwater.

Level Spreader.

The Operations and Maintenance Plans discuss the required maintenance of the level spreader.

We trust that we satisfactorily addressed the comments from Mr. Canas, PE dated July 30, 2020.

Very Truly Yours,
DiVesta Civil Engineering Associates, Inc.



Douglas DiVesta, PE
President

DD/dd
20-015 – ltr Joosten 07-30-20

Enc.

CC: J. Pagliarulo
J. Canas, PE

Summary for Pond Det 1aa: Detention Basin # 1aa - Lot 1 Front Yard

Inflow Area = 0.140 ac, 45.62% Impervious, Inflow Depth = 2.17" for 2 year storm event event
 Inflow = 0.36 cfs @ 12.08 hrs, Volume= 0.025 af
 Outflow = 0.04 cfs @ 12.83 hrs, Volume= 0.025 af, Atten= 89%, Lag= 45.0 min
 Discarded = 0.01 cfs @ 10.84 hrs, Volume= 0.023 af
 Primary = 0.02 cfs @ 12.83 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 2
 Peak Elev= 48.68' @ 12.83 hrs Surf.Area= 467 sf Storage= 496 cf

Plug-Flow detention time= 286.2 min calculated for 0.025 af (100% of inflow)
 Center-of-Mass det. time= 286.1 min (1,095.1 - 808.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	47.10'	292 cf	18.67'W x 25.00'L x 2.71'H Field A 1,264 cf Overall - 534 cf Embedded = 730 cf x 40.0% Voids
#2A	47.60'	534 cf	Cultec R-280HD x 12 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 4 rows
		826 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	48.60'	2.0" Vert. Orifice/Grate C= 0.600
#2	Primary	48.60'	4.0" Vert. Orifice/Grate C= 0.600
#3	Discarded	47.10'	1.360 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.01 cfs @ 10.84 hrs HW=47.13' (Free Discharge)
 ↑**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.02 cfs @ 12.83 hrs HW=48.68' (Free Discharge)
 ↑**1=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.95 fps)
 ↓**2=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.95 fps)

Stage-Area-Storage for Pond Det 1aa: Detention Basin # 1aa - Lot 1 Front Yard

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
47.10	467	0	49.70	467	805
47.15	467	9	49.75	467	815
47.20	467	19	49.80	467	825
47.25	467	28			
47.30	467	37			
47.35	467	47			
47.40	467	56			
47.45	467	65			
47.50	467	75			
47.55	467	84			
47.60	467	93			
47.65	467	113			
47.70	467	132			
47.75	467	152			
47.80	467	171			
47.85	467	190			
47.90	467	209			
47.95	467	228			
48.00	467	247			
48.05	467	266			
48.10	467	285			
48.15	467	304			
48.20	467	322			
48.25	467	341			
48.30	467	360			
48.35	467	378			
48.40	467	396			
48.45	467	414			
48.50	467	432			
48.55	467	450			
48.60	467	468			
48.65	467	486			
48.70	467	504			
48.75	467	521			
48.80	467	539			
48.85	467	556			
48.90	467	573			
48.95	467	590			
49.00	467	606			
49.05	467	623			
49.10	467	639			
49.15	467	655			
49.20	467	671			
49.25	467	686			
49.30	467	702			
49.35	467	717			
49.40	467	731			
49.45	467	745			
49.50	467	759			
49.55	467	771			
49.60	467	784			
49.65	467	795			

Summary for Pond Det 1: Detention Basin # 1 - Lot 1 Rear Yard

Inflow Area = 0.030 ac, 100.00% Impervious, Inflow Depth = 3.07" for 2 year storm event event
 Inflow = 0.10 cfs @ 12.07 hrs, Volume= 0.008 af
 Outflow = 0.04 cfs @ 11.96 hrs, Volume= 0.008 af, Atten= 57%, Lag= 0.0 min
 Discarded = 0.04 cfs @ 11.96 hrs, Volume= 0.008 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.04 hrs / 3
 Peak Elev= 46.33' @ 12.25 hrs Surf.Area= 1,065 sf Storage= 36 cf

Plug-Flow detention time= 4.7 min calculated for 0.008 af (100% of inflow)
 Center-of-Mass det. time= 4.9 min (759.8 - 754.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	46.25'	454 cf	15.00'W x 71.00'L x 1.54'H Field A 1,642 cf Overall - 506 cf Embedded = 1,136 cf x 40.0% Voids
#2A	46.75'	506 cf	Cultec C-100HD x 36 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 4 rows
		961 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	46.75'	4.0" Round Culvert L= 130.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.75' / 43.00' S= 0.0288 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf
#2	Discarded	46.25'	1.700 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.04 cfs @ 11.96 hrs HW=46.27' (Free Discharge)
 ↳2=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=46.25' (Free Discharge)
 ↳1=Culvert (Controls 0.00 cfs)

Stage-Area-Storage for Pond Det 1: Detention Basin # 1 - Lot 1 Rear Yard

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
46.25	1,065	0	47.29	1,065	654
46.27	1,065	9	47.31	1,065	669
46.29	1,065	17	47.33	1,065	684
46.31	1,065	26	47.35	1,065	699
46.33	1,065	34	47.37	1,065	714
46.35	1,065	43	47.39	1,065	728
46.37	1,065	51	47.41	1,065	743
46.39	1,065	60	47.43	1,065	757
46.41	1,065	68	47.45	1,065	771
46.43	1,065	77	47.47	1,065	785
46.45	1,065	85	47.49	1,065	799
46.47	1,065	94	47.51	1,065	812
46.49	1,065	102	47.53	1,065	825
46.51	1,065	111	47.55	1,065	838
46.53	1,065	119	47.57	1,065	850
46.55	1,065	128	47.59	1,065	862
46.57	1,065	136	47.61	1,065	874
46.59	1,065	145	47.63	1,065	885
46.61	1,065	153	47.65	1,065	896
46.63	1,065	162	47.67	1,065	906
46.65	1,065	170	47.69	1,065	916
46.67	1,065	179	47.71	1,065	925
46.69	1,065	187	47.73	1,065	934
46.71	1,065	196	47.75	1,065	943
46.73	1,065	204	47.77	1,065	951
46.75	1,065	213	47.79	1,065	960
46.77	1,065	230			
46.79	1,065	247			
46.81	1,065	264			
46.83	1,065	281			
46.85	1,065	298			
46.87	1,065	315			
46.89	1,065	331			
46.91	1,065	348			
46.93	1,065	365			
46.95	1,065	381			
46.97	1,065	397			
46.99	1,065	414			
47.01	1,065	430			
47.03	1,065	447			
47.05	1,065	463			
47.07	1,065	479			
47.09	1,065	496			
47.11	1,065	512			
47.13	1,065	528			
47.15	1,065	544			
47.17	1,065	560			
47.19	1,065	576			
47.21	1,065	592			
47.23	1,065	607			
47.25	1,065	623			
47.27	1,065	638			

Water Quality Volume (WQV) Calculations

Palladian Builders
49 Sunswyck Road
Darien, Connecticut
Dated: 02/18/20
Revised: 07/09/20

Water Quality Volume Calculations

Water Quality Volume (WQV) = ((1") (R) (A)) / 12

Where:

A = total area in square feet

R = 0.05 + 0.009 (I)

I = percent impervious cover

Proposed Site Development – Lot # 1 : Available Storage = 213 cu-ft @ elev 46.75 Sub-Catchment Post # 1 – Rear Yard

A = 1,305 sf (house roof)

I = 95%

R = 0.05 + 0.009 (95.0%)

R = 0.905

WQV = ((1") (R) (A)) / 12

WQV = ((1") (0.905) (1,305 sf)) / 12

WQV = 98 cu-ft (required)

Proposed Site Development – Lot # 1 : Available Storage = 247 cu-ft @ elev 48.0 Sub-Catchment Post # 1a – Front Yard

A = 6,090 sf (proposed driveway, house roof, lawn, woods)

I = 45.6% (2,778/6,090) = 45.6%

R = 0.05 + 0.009 (45.6%)

R = 0.46

WQV = ((1") (R) (A)) / 12

WQV = ((1") (0.46) (6,090 sf)) / 12

WQV = 234 cu-ft (required)

STORMWATER OPERATIONS
AND
MAINTENANCE PLAN
FOR
PALLADIAN BUILDERS
LOT # 1 – 49 SUNSWYCK ROAD
DARIEN, CONNECTICUT

JULY, 2020

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Executive Summary

Stormwater Management System Description

Operations and Maintenance of Stormwater Management System

Executive Summary – Lot # 1 – 49 Sunswyck Road, Darien

The stormwater management system has been designed so that the stormwater runoff from the site does not negatively impact the quality of the groundwater or the wetlands. In order to maintain the efficacy of these systems proper operation and maintenance procedures must be followed. This document provides guidance for performing that maintenance. In particular operating and maintenance procedures for the Best Management Practices (BMP's) as listed below are provided:

- Collect and treat the runoff at the source
- Provide deep sumps in the stormwater collection structures
- Preformed scour hole
- Subsurface detention systems
- Hoods on outlet pipes from the stormwater collection structures to retain floatables within the stormwater collection structures
- Level spreader

This document provides guidance for performing the maintenance necessary so that the stormwater management system continues to operate as designed to protect the groundwater or the wetlands.

Stormwater Management System Description

The development for this parcel consist of razing the existing detached garage and constructing a new single family house, a subsurface sewage disposal system, a stormwater management system and regrading associated with the construction of the new dwelling.

The stormwater management system for this property will be comprised of a series of catch basins with a conveyance system, junction boxes and subsurface detention systems, a preformed scour hole and level spreader.

System No. 1 – Subsurface Detention System

The subsurface detention system number one is located east of the front parking court. It consists of a series of Cultec Recharger 280's. There is a junction box with a series of orifices, which acts as a control release device located on the east end of the subsurface detention system. Runoff from a portion of the roof areas and the parking court will drain via a stormwater conveyance system consisting of a catch basin and pipe into a junction box then into the subsurface detention system. Runoff from a portion of the property that drains onto the driveway will be picked up in the catch basin. Once the runoff is metered out of the junction box it enters the preformed scour hole and then into the wetlands.

System No. 2 – Subsurface Detention System

Subsurface detention system number two is located on the west side of the house. It consists of a series of Cultec Contactor 100's. There is a junction box with an orifice, which acts as a control release device, located on the south end of the subsurface detention system. Runoff from the roof area is directed into one of two junction boxes located on either end of the detention system with deep sumps before entering the subsurface detention system. Once the runoff is metered out of the junction box it flows to a level spreader that is located further to the west where the runoff will sheet flow through wooded area and then into the wetlands.

Operations and Maintenance of Stormwater Management System

Stormwater System Operations and Maintenance Overview

Stormwater maintenance will be required for all components of the system which are described in the table below. Figure 1 shows the site and the stormwater systems and their locations. There is one catch basin, five junction boxes, one level spreader and one preformed scour hole.

The main areas of concern for system operations are: accumulation of debris and loss of capacity within the individual systems. To avoid these instances an operations and maintenance plan is provided below that lists a general summary of the stormwater systems (Table 1) and a summary of operations and maintenance for each of the features in the stormwater system (Table 2).

Table 1
Summary of Stormwater Systems

Item <i>Location on Site</i>	System Description/Purpose	Key System Inspection Points
Catch Basin (hooded and deep sumps) <i>Located within the driveway</i>	The catch basin is located to collect surface runoff and to convey the runoff to the subsurface detention system.	Blocking of the inlet capacity
Junction Boxes (hooded and deep sumps) <i>2 located on either end of the front detention system</i> <i>3 located on either end of the rear detention system</i>	The junction boxes are to collect additional sediment and debris before entering the detention systems.	Blocking of the outlet pipes and orifices
Preformed Scour Hole <i>Located at the end of the pipe from the junction box and the drainage pipe from the catch basins on the road.</i>	The preformed scour hole is to slow the velocity of the discharge from the two pipes before the runoff enters the wetlands.	The outlet end of the two pipes and rip rap within the scour hole.
Level Spreader <i>Located further to the west of the rear detention system</i>	The level spreader will spread the discharge out over a wide area which will provide a sheet flow versus a point discharge	The fix lip of the spreader and the ends
Subsurface Detention Systems <i>2 locations one in front of the house and one at the rear of the house</i>	The subsurface detention systems serve as a collection point for the surface runoff from the driveway, roof areas and a portion of the lawn area.	The caps over the units

Table 2

Summary of Stormwater System Operations & Maintenance Task Listed by Item

Item <i>Location on Side</i>	Frequency	What to do	
<p>Catch Basin (hooded and deep sumps) <i>Located in driveway</i></p>	<p>Every 6 months. Accumulated sediment and debris in the sump should be removed at a minimum yearly or when sediment levels reach 1/3 of the capacity of the basins.</p>	<p>Remove accumulated sediment in sump with a post hole digger or a small shovel will also remove all floating debris</p>	
<p>Junction Boxes (hooded and deep sumps) <i>2 located either end of the front detention system 3 located on either end of the rear detention system</i></p>	<p>Every 6 months. Accumulated sediment and debris in the sump should be removed at a minimum yearly or when sediment levels reach 1/3 of the capacity of the basins.</p>	<p>Remove accumulated sediment in sump with a post hole digger or a small shovel will also remove all floating debris</p>	
<p>Preformed Scour Hole <i>Located at the end of the pipe from the junction box and the drainage pipe from the catch basins on the road</i></p>	<p>Every 6 months. Accumulated sediment and debris in the sump area of the scour hole should be removed at a minimum yearly or when sediment level reaches 1/3 of the capacity of the sump area.</p>	<p>Remove accumulated sediment within the sump area with a hand shovel without disturbing the rip rap. Inspect for slope integrity and the rip rap.</p> <p>After large storm events conduct inspection and inspect the rip rap and repair rip rap as needed.</p>	
<p>Subsurface Detention Systems <i>2 locations one in the front yard and one in the rear yard</i></p>	<p>Inspection should occur annually.</p>	<p>Remove the caps at the end of the systems and visually inspect to determine if there is any accumulation of the sediment and debris.</p>	

<p>Level Spreader <i>Located further to west of the rear detention system</i></p>	<p>Every 6 months and after the winter freeze and thaw cycle to make sure the lip is level. Remove accumulate debris over the top of the spreader.</p>	<p>Inspect the lip of the spreader to ensure the lip is level and inspect the ends to ensure that runoff discharge does not go around the end of the lip.</p> <p>Remove any accumulated debris over the stone and lip.</p>	
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STORMWATER OPERATIONS
AND
MAINTENANCE PLAN
FOR
PALLADIAN BUILDERS
LOT # 2 – 49 SUNSWYCK ROAD
DARIEN, CONNECTICUT

JULY, 2020

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Executive Summary

Stormwater Management System Description

Operations and Maintenance of Stormwater Management System

Executive Summary – Lot # 2 – 49 Sunswyck Road, Darien

The stormwater management system has been designed so that the runoff from the site does not negatively impact the quality of the groundwater or the wetlands. In order to maintain the efficacy of this system proper operation and maintenance procedures must be followed. This document provides guidance for performing that maintenance. In particular operating and maintenance procedures for the Best Management Practices (BMP's) as listed below are provided:

- Collect and treat the runoff at the source
- Provide deep sumps in the stormwater collection structures
- Subsurface detention system
- Hoods on outlet pipes from the stormwater collection structures to retain floatables within the stormwater collection structures
- Level spreader

This document provides guidance for performing the maintenance necessary so that the stormwater management system continues to operate as designed to protect the groundwater or the wetlands.

Stormwater Management System Description

The development for this parcel consist of razing the existing dwelling and constructing a new single family residence, a subsurface sewage disposal system, a stormwater management system and regrading associated with the construction of the new dwelling.

The stormwater management system for this property will be comprised of a series of catch basins with a conveyance system, junction boxes and subsurface detention systems and a level spreader.

Subsurface Detention System

The subsurface detention system is located west of the dwelling. It consists of a series of Cultec Contactor 100's. There is a junction box with a series of orifices that act as a control release device located on the south end of the subsurface detention system. Runoff from a portion of the roof areas and the driveway will drain via a stormwater conveyance system consisting of catch basins and pipes into a junction box then into the subsurface detention system. Runoff from a portion of the property that drains onto the driveway will be picked up in the catch basins. A portion of the roof area will drain directly into the junction box located on the north end of the detention system. Once the runoff is metered out of the southern junction box it flows to a level spreader that is located further to the west where the runoff will sheet flow through wooded area and then into the wetlands.

Operations and Maintenance of Stormwater Management System

Stormwater System Operations and Maintenance Overview

Stormwater maintenance will be required for all components of the system which are described in the table below. Figure 1 shows the site and the stormwater systems and their locations. There are five catch basins, two junction boxes and one level spreader.

The main areas of concern for system operations are: accumulation of debris and loss of capacity within the individual system. To avoid these instances an operations and maintenance plan is provided below that lists a general summary of the stormwater systems (Table 1), summary of operations and maintenance for each of the features in the stormwater system (Table 2).

Table 1

Summary of Stormwater Systems

Item <i>Location on Site</i>	System Description/Purpose	Key System Inspection Points
Catch Basin (hooded and deep sumps) <i>3 basins located within the driveway</i>	The catch basin is located to collect surface runoff and to convey the runoff to the subsurface detention system.	Blocking of the inlet capacity
Junction Boxes (hooded and deep sumps) <i>2 located on either end of the detention system</i>	The junction boxes are to collect additional sediment and debris before entering the detention systems.	Blocking of the outlet pipes and orifices
Level Spreader <i>Located to the south of the detention system</i>	The level spreader will spread the discharge out over a wide area which will provide a sheet flow versus a point discharge	The fix lip of the spreader and the ends
Subsurface Detention System <i>Located west of the dwelling</i>	The subsurface detention system serves as a collection point for the surface runoff from the driveway, roof areas and a portion of the lawn area.	The caps over the units

Table 2

Summary of Stormwater System Operations & Maintenance Task Listed by Item

Item <i>Location on Side</i>	Frequency	What to do	
Catch Basin (hooded and deep sumps) 3 located in driveway	Every 6 months. Accumulated sediment and debris in the sump should be removed at a minimum yearly or when sediment levels reach 1/3 of the capacity of the basins.	Remove accumulated sediment in sump with a post hole digger or a small shovel will also remove all floating debris	
Junction Boxes (hooded and deep sumps) 2 located either end of the detention system	Every 6 months. Accumulated sediment and debris in the sump should be removed at a minimum yearly or when sediment levels reach 1/3 of the capacity of the basins.	Remove accumulated sediment in sump with a post hole digger or a small shovel will also remove all floating debris	
Subsurface Detention Systems 2 locations one in the front yard and one the rear yard	Inspection should occur annually.	Remove the caps at the end of the systems and visually inspect to determine if there is any accumulation of the sediment and debris.	
Level Spreader Located further to south of the detention system	Every 6 months and after the winter freeze and thaw cycle to make sure the lip is level. Remove accumulate debris over the top of the spreader.	Inspect the lip of the spreader to insure the lip is level and inspect the ends to insure that runoff discharge does not go around the end of the lip. Remove any accumulated debris over the stone and lip.	