

DRAINAGE CALCULATIONS, HYDRAULICS & HYDROLOGY REPORT



**EAST LYME TREE SERVICE
1122 & 1124 HARTFORD TURNPIKE
WATERFORD, CT**

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CLA Engineers, Inc

**EAST LYME TREE SERVICE
1122 & 1124 HARTFORD TURNPIKE
WATERFORD, CT**

A development is proposed for East Lyme Tree Services for 1122 & 1124 Hartford Turnpike. The property is zoned IP-3, and every use in this district requires a Special Permit. The project proposes to develop the site to be used by East Lyme Tree Services. The two lots will be combined into one lot, as part of the approval process.

The site presently contains an existing residence and an existing garage. The existing residence will remain, will be renovated, and will continue to be used as a residence. The existing garage will remain and will be utilized by East Lyme Tree Services for storage of equipment. There is an existing chicken coop on the site which will remain as an accessory use to the existing residence.

East Lyme Tree Services will utilize the majority of the rear of the site for storage of their trucks and equipment.

PROPOSED HYDRAULICS

There will be one on-site drainage area for the proposed development area. Please see the attached plans entitled Drainage Area Map. There is no off-site drainage flow to the development area.

Both the existing and the proposed conditions for the development site have been analyzed for the 2-year, 10-year, 25-year, and 100-year design storms. The SCS TR-55 method is used for the sizing of the water quality basin. The following are the summary tables for the 2-year, 10-year, 25-year, and 100-year design storms showing first the existing conditions, then the proposed conditions for the drainage area after passing thru the proposed Water Quality Basin. The calculations show that there will be an overall decrease in runoff leaving the site. The following are the results of the computer model.

Flows to and from the Water Quality Basin

	<u>2-year</u>	<u>10-year</u>	<u>25-year</u>	<u>100-year</u>
Existing to basin	0.676 cfs	1.937 cfs	2.858 cfs	4.397 cfs
Proposed from basin	0.000 cfs	0.000 cfs	0.000 cfs	1.649 cfs

Flows to Route 85

	<u>2-year</u>	<u>10-year</u>	<u>25-year</u>	<u>100-year</u>
Existing	0.558 cfs	1.360 cfs	1.922 cfs	2.853 cfs
Proposed	0.645 cfs	1.217 cfs	1.589 cfs	2.160 cfs

*Hydrographs for these results can be found in the Appendix

CT GUIDELINES FOR SOIL EROSION & SEDIMENTATION CONTROL

The 2002 CT Guidelines for Soil Erosion & Sedimentation Control applies to the construction phase of the project. A detailed erosion and sediment control plan has been provided in the site development plans. The proposed Water Quality Basins have been designed to function as a sedimentation trap during stabilization, and then as a water quality basin to provide permanent water quality treatment for the life of the facility.

The first calculation required by the Guidelines is for the sediment storage volume (SSV). The sediment storage volume is the calculation for one year of predicted sediment load. The calculations for the Temporary Sediment Traps in each Drainage Area are shown below.

Drainage Area

$$SSV = A(134CY/Acre)$$

$$A = 1.1 \text{ ACRES}$$

$$SSV = 147 \text{ CY} = \underline{\underline{3,970 \text{ CF}}}$$

The second calculation required by the Guidelines is for wet storage volume (WSV). The wet storage volume is the volume in the basin that is located below the riprap for the level spreader outlet of the basin. The volume of the wet storage is required to be half of the required SSV. The required wet storage volumes for each Drainage Area are shown below along with the dry storage volumes (DSV).

$$\begin{aligned} \text{WSV} &= \text{DSV} = \text{SSV}/2 \\ &= \underline{1,985 \text{ CF}} \end{aligned}$$

The total storage volume (TSV) required is the dry storage volume plus the wet storage volume:

Drainage Area 1

$$\begin{aligned} \text{TSV} &= \text{DSV} + \text{WSV} \\ &= \underline{1,985 \text{ CF}} \end{aligned}$$

The combined volumes required for the Sedimentation Basin (not including the storage area in the swales) in each Drainage Area are as follows:

Drainage Area (Outlet Elev. = 164.5)

Sedimentation Trap

1,985 CF of Wet Storage Volume	5,660 CF Provided
1,985 CF of Dry Storage Volume	5,850 CF Provided
3,970 CF of Total Volume Required	11,510 CF Total Provided

CONNECTICUT STORMWATER QUALITY MANUAL

WATER QUALITY BASIN:

The Water Quality Basins have been designed to function as sedimentation traps during stabilization, and then as Water Quality Basins and permanent water quality treatment for the life of the facility.

The Connecticut 2004 Stormwater Quality Manual (Manual) applies to the post construction phase, for the operation of the facility. The temporary sediment traps have been designed to function as Water Quality Basins after the site is stabilized. They meet all the criteria of the Connecticut Stormwater Quality Manual for a Water Quality Basin. Due to low slopes and a decrease in runoff in Drainage Area 2, it can be assumed that the Water Quality Volume is treated before leaving the site.

Drainage Area

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

$$A = 1.1 \text{ Acres}$$

$$R = 0.05 + 0.009(I)$$

$$I = 0.5 \text{ Acres} / 1.1 \text{ Acres} = 0.46 \quad (46\%)$$

$$R = 0.46$$

$$WQV = 0.042 \text{ Ac-Ft} = 1,837 \text{ CF (Required)}$$

$$11,510 \text{ CF (Provided)}$$

Once development of the site is completed, there will be a decrease in runoff from the site. The temporary sedimentation basins provide ample wet and dry volume storage to meet the requirements of the 2002 CT Guidelines for Soil & Sedimentation Control. The temporary sedimentation basins will provide over two times the volume required by the Guidelines. Like wise, the permanent Water Quality Basin exceeds the post construction requirements of the Connecticut 2004

Stormwater Quality Manual. The permanent Water Quality Basin will provide over four times the volume required by the Manual.

As the calculations show that there will be no stormwater leaving the proposed stormwater management system (water quality basin), up to and including the 25 year, for the Stormwater Basin, the anticipated pollutant removal rate is 100%.

(https://www.unh.edu/unhsc/sites/default/files/media/ms4_permit_nomographs_sheet_final_2020.pdf) The University of New Hampshire's research reveals that efficiency removal for typical pollutants of concern such as TSS, N, P, and zinc is directly tied to the volume of stormwater that is held and infiltrated. The research reveals that if a 2 inch depth of runoff from a site's impervious surface is held and infiltrated by a given BMP, the reduction in these pollutants is 99-100%. On this site, the Stormwater Basin will contain up to and including the 10 year storm event. Thus, CLA believes that pollutant removal rates for pollutants of concern will be greater than 99% and there will be no increase in releases of pollutants to the wetlands system.