



PUBLIC WORKS DEPARTMENT

TOWN OF WINCHESTER

189 Rowley Street

Winsted, CT 06098

Phone (860) 379-4101 Fax: (860) 738-3509

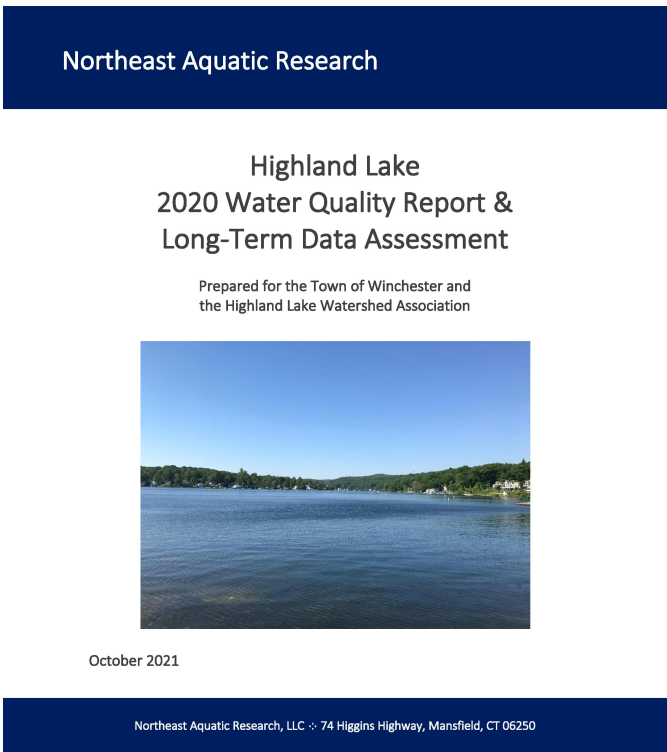
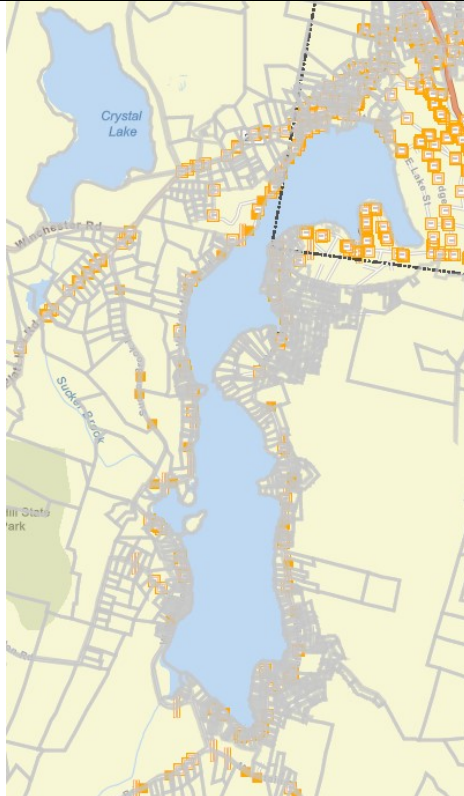

2022 Road and Infrastructure Improvement Bond			
Project Information Sheet			
Highland Lake Retrofit Program			
From		To	
Improvement Scheduled		FY 2023	
Estimated Cost/Town Share:	\$150,000	\$150,000	
Description of Existing Conditions			
Water Quality:			
Water quality has been monitored in Highland Lake since 2005 by Northeast Aquatic Research. Their 2021 Report indicates that “the Lake condition is relatively good overall;” however, “in the absence of efforts to reduce nutrient loads, the Lake condition will inevitably worsen over time at a rate faster than would occur in a natural, undeveloped watershed.”			
Mapping:			
In 2018, the Town had the catch basins located using high resolution GPS and this information is now shown on the Town Geographic Information System. The program located only the basin tops and has no information concerning condition.			
The mapping does not include location of outfalls into the Lake or their condition.			
The mapping does not include the connecting pipe/structures or their condition.			
The mapping does not identify easements or right of ways for structures that are outside of the Town Road right of ways.			

Photo 1. Water Quality Report Cover Page

Condition of Structures:	
Condition inspections has been completed by volunteers from the Highland Lake Watershed Association.	
The Drainage structures around the lake are generally in poor condition. The inlet structures are not suited to nutrient removal goals.	
There is no mechanism for scheduling or recording maintenance activities.	
The mechanisms for responding to citizen complaints are informal. Long term records of the complaints and responses are not available.	
Status of Maintenance	
The recent purchase of a modern road sweeper has allowed sweeping of the roads several times per year.	
The new road sweeper was purchased with the ability to vacuum the majority of catch basins. This was started last year and should continue.	
Individual Structures are maintained on an as-needed basis.	
Photo 2. Highland Lake Drainage Structures in GIS	

Proposed Improvements	
Description of Work	
1. drainage system inspection and location: <ul style="list-style-type: none">• outfalls• pipes and swales/channels• inlets	
2. Identify Storm Sewersheds/Drainage Areas.	
3. Identify Easement and other property line issues	
4. Rank importance of each Storm sewershed based on the size and condition of drainage system	
5. Establish list of proposed Retrofits	
6. Schedule Retrofits based on the condition of existing, complexity and complementary work on roads and other utilities.	
7. Create a system to record the installation and maintenance records for the Retrofits installed and other drainage structures.	
8. Create a system to record regular inspection of the stormsewer outfalls and other structures.	
- Photo 3. Holland Beach Parking Drainage Structure inspection 2003	



PUBLIC WORKS DEPARTMENT

TOWN OF WINCHESTER

189 Rowley Street

Winsted, CT 06098

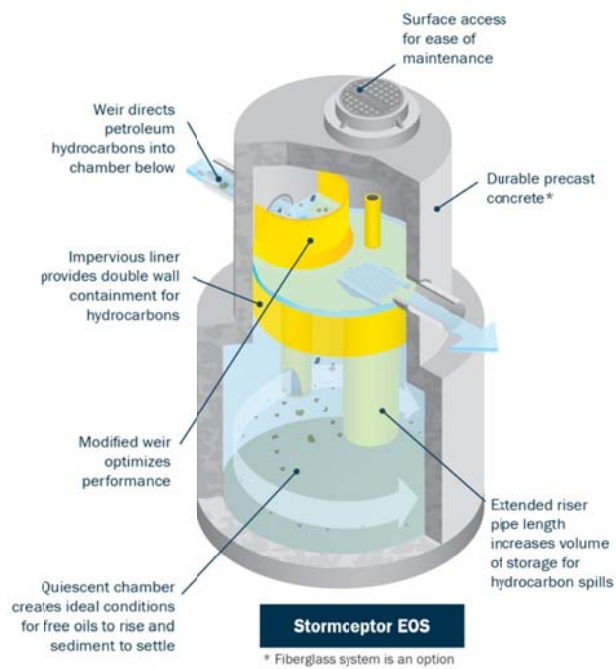
Phone (860) 379-4101 Fax: (860) 738-3509

2022 Road and Infrastructure Improvement Bond		
Information Sheet - Highland Lake Stormwater Quality Improvements		
Area 1 – Site 1		
Vicinity	849-851 East Wakefield Boulevard	
Improvement Scheduled	FY 2024	
Estimated Cost / Town Share	\$75,000	\$75,000
Description of Existing Conditions		
<p>The storm-water management system on East and West Wakefield Boulevard is comprised of many small storm-sewer systems that discharge roadway storm water directly to the Lake. In most cases, these systems are old, undersized, and in fair to poor condition. They offer no treatment of storm-water to help improve the water quality of Highland Lake.</p> <p>In the vicinity of 849 East Wakefield Boulevard, two catch basins collect runoff from a short length of the Boulevard. The stormwater is discharged through a short pipe to the top of an open channel that leads to the Lake. The channel is steep, in poor condition, and subject to erosion.</p>		
Description of Work		
<p>At Area 1 – Site 1 (vicinity of 849-851 East Wakefield Boulevard), the Town plans to construct the following improvements to collect and treat runoff before it is allowed to flow into Highland Lake. These improvements are shown on Figure 1:</p> <ol style="list-style-type: none">1. Remove the existing catch basins and storm sewers.2. Construct new catch basins with four-foot deep sumps for enhanced sediment storage capacity.3. Furnish and install a proprietary storm-water treatment chamber, which will trap debris and sediment and filter storm-water (see example in Figure 2).4. Construct new storm sewers that are properly sized for the anticipated flow rates.5. Construct a boulder cascade channel to convey storm water from the treatment device to Highland Lake. The channel will be designed to resist erosion and the cascade format will form a series of small pools on the way down the steep embankment to help slow the water down and trap sediments that bypass the treatment system.6. Pave the short section of roadway that is compromised by construction.		

Figure 1



Figure 2





PUBLIC WORKS DEPARTMENT

TOWN OF WINCHESTER

189 Rowley Street

Winsted, CT 06098

Phone (860) 379-4101 Fax: (860) 738-3509

2022 Road and Infrastructure Improvement Bond		
Information Sheet - Highland Lake Stormwater Quality Improvements		
Area 1 – Site 2		
Mountain Road		
Improvement Scheduled		FY 2024
Estimated Cost / Town Share	\$185,000	\$185,000
Description of Existing Conditions		
<p>Currently, there are no storm sewers on Mountain Road. Runoff generated on the pavement and adjacent shoulders runs down the edges of the roadway and onto East and West Wakefield Boulevards, where it enters storm sewers. There is no treatment of storm water on Mountain Road or on the Boulevards to help improve the water quality of Highland Lake.</p> <p>The area available to construct storm-water quality improvements is currently limited to the existing public highway corridor.</p>		
Description of Work		
<p>At Area 1 – Site 2 (Mountain Road), the Town plans to construct the following improvements to collect and treat runoff before it is allowed to flow into Highland Lake. These improvements are shown on Figures 1 and 2 on the following pages. Cooperation of the adjacent land owner (State of Connecticut) is required to grant permanent access for construction and maintenance:</p> <ol style="list-style-type: none">1. Construct three sets of catch basins to collect runoff from the roadway pavement. Catch basins will be equipped with four-foot deep sumps for enhanced sediment storage capacity.2. Runoff from each set of catch basins will be discharged onto State property for treatment.3. Construct a riprap-lined sediment forebay at each of the three discharges. The forebays will trap sediment, thereby pre-treating the runoff.4. Construct a bio-retention basin downstream of each forebay. The basins will have a mulch floor over a gravel substrate. A substantial amount of vegetation will be planted on the floor of each basin. The basins will be designed to spread the flow out and slow it down to allow for sediment deposition. The combination of seepage into the ground, settling out of suspended solids, and treatment by vegetation will reduce the amount of suspended solids and pollutants that eventually enter Highland Lake. Runoff that cannot seep into the ground will be allowed to overflow the basin and flow downhill, through natural woodland, toward West Wakefield Boulevard.		

Figure 1

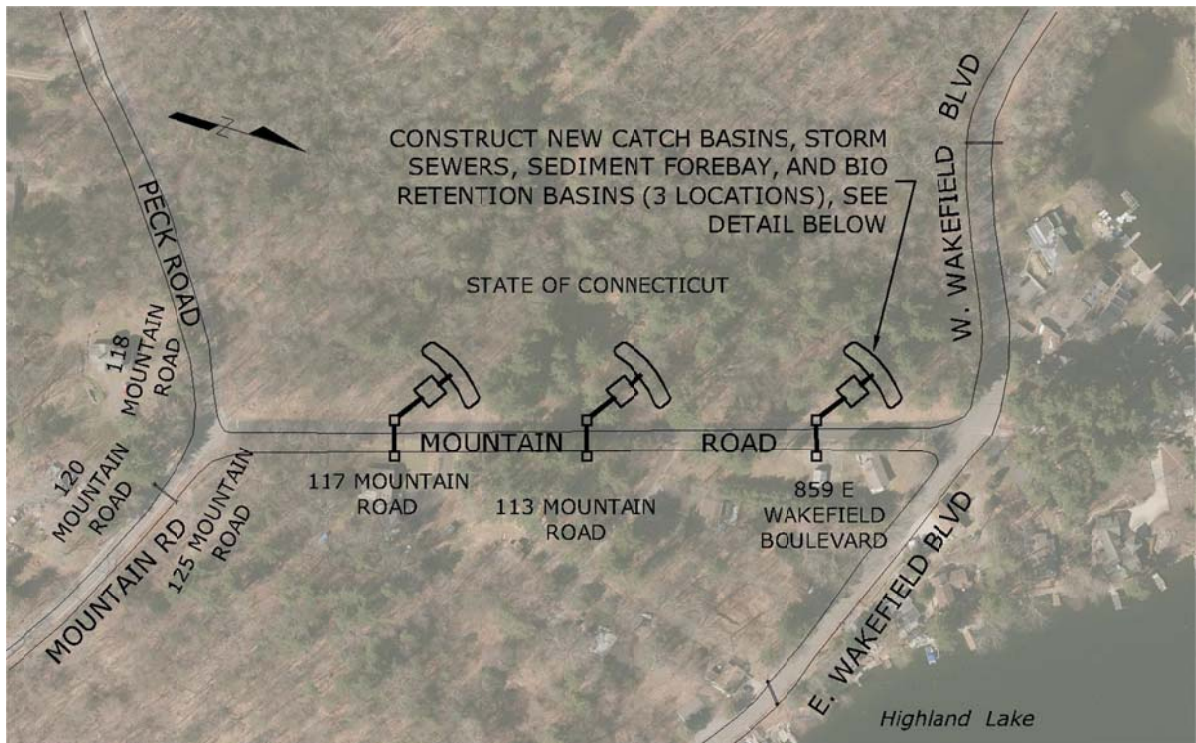
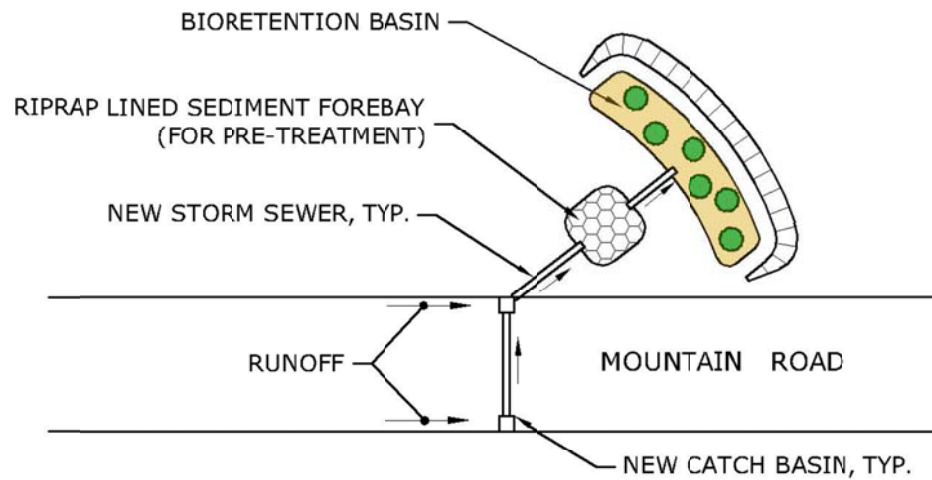


Figure 2



BIORETENTION BASIN DETAIL



PUBLIC WORKS DEPARTMENT

TOWN OF WINCHESTER

189 Rowley Street

Winsted, CT 06098

Phone (860) 379-4101 Fax: (860) 738-3509

2022 Road and Infrastructure Improvement Bond		
Information Sheet - Highland Lake Stormwater Quality Improvements		
Area 1 – Site 3		
Vicinity	Near 878 East Wakefield Boulevard	
Improvement Scheduled	FY 2024	
Estimated Cost / Town Share	\$87,000	\$87,000
Description of Existing Conditions		
<p>The storm-water management system on West Wakefield Boulevard is comprised of many small storm-sewer systems that discharge roadway storm water directly to the Lake. In most cases, these systems are old, undersized, and in fair to poor condition. They offer no treatment of storm-water to help improve the water quality of Highland Lake.</p> <p>In the vicinity of 878 East Wakefield Boulevard, a culvert conveys runoff from the south to the north side of the Boulevard. At this location, untreated roadway runoff also leaks off into an unlined channel which leads directly to the Lake.</p>		
Description of Work		
<p>At Area 1 – Site 3 (vicinity of 878 West Wakefield Boulevard), the Town plans to construct the following improvements to collect and treat runoff before it is allowed to flow into Highland Lake. These improvements are shown on Figure 1 on the following page:</p> <ol style="list-style-type: none">1. Remove the existing culvert and replace it with a new, properly-sized culvert.2. Construct riprap inlet protection to help prevent erosion.3. Furnish and install a proprietary storm-water treatment chamber, which will trap debris and sediment and filter storm-water (see example in Figure 2).4. Construct a step pool channel to convey storm water from the treatment device to Highland Lake. The channel will be designed to resist erosion through a framework of heavy rock lining and weirs, with vegetation along the edges. The pool-and-riffle format will form a series of small pools on the way down the embankment to help slow the water down and trap sediments that bypass the treatment system.5. Pave the short section of roadway that is compromised by construction.		

Figure 1

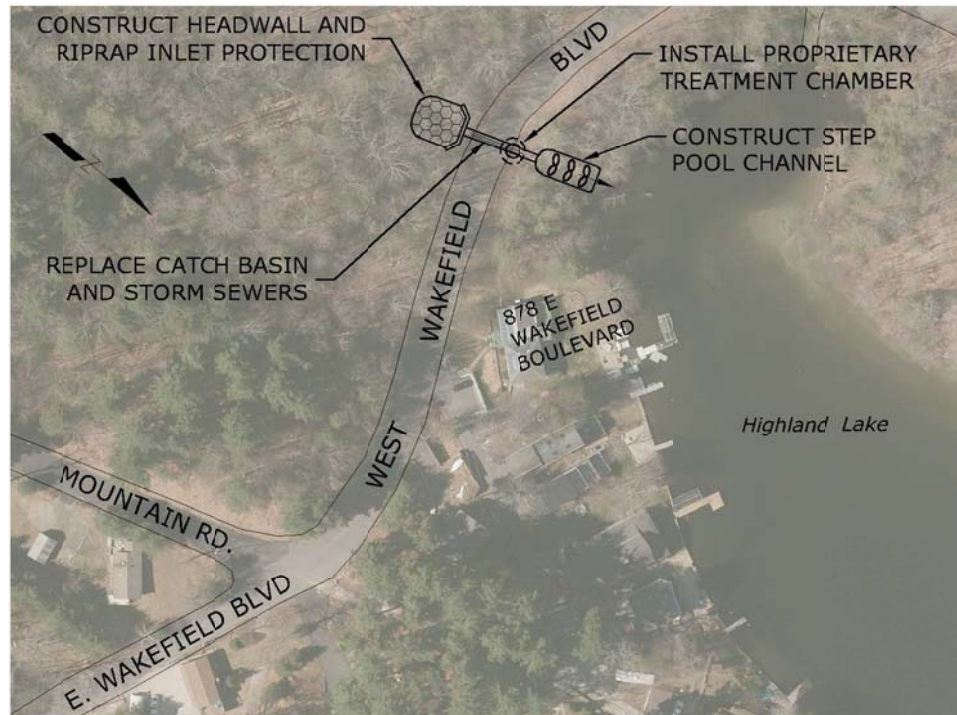
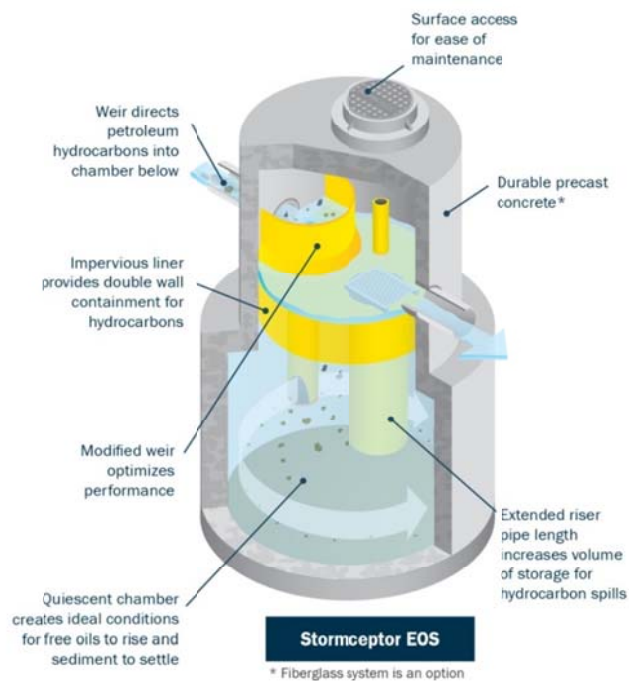


Figure 2





PUBLIC WORKS DEPARTMENT

TOWN OF WINCHESTER

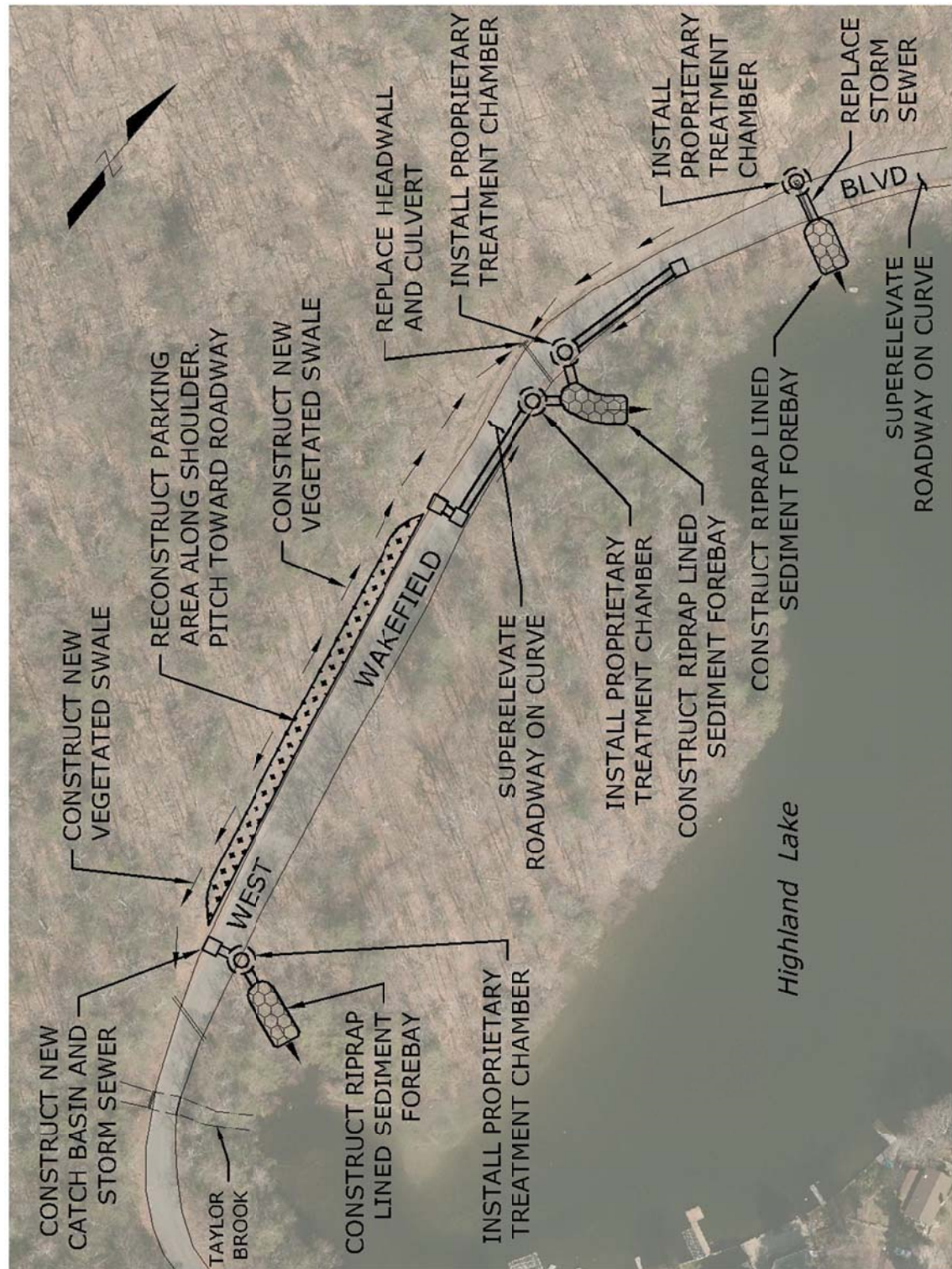
189 Rowley Street

Winsted, CT 06098

Phone (860) 379-4101 Fax: (860) 738-3509

2022 Road and Infrastructure Improvement Bond		
Information Sheet - Highland Lake Stormwater Quality Improvements		
Area 1 – Site 4		
Vicinity	Just North of Taylor Brook Crossing (Near State Beach Property)	
Improvement Scheduled		FY 2024
Estimated Cost / Town Share	\$329,000	\$329,000
Description of Existing Conditions		
<p>In this area, three culverts convey runoff from the west to the east side of West Wakefield Boulevard. The large quantity of runoff generated on the natural western slope complicates the treatment of runoff generated by the roadway pavement. The roadway runoff is much smaller in volume than the runoff generated on the western slope, but contains most of the pollutants that enter the Lake. Currently, runoff from these two sources is comingled and untreated.</p>		
Description of Work		
<p>At Area 1 – Site 4 (vicinity of Taylor Brook and State Beach), the Town plans to construct the following improvements to collect and treat runoff before it is allowed to flow into Highland Lake. These improvements are shown on Figure 1 on the following page:</p> <ol style="list-style-type: none">1. Create vegetated swales along the western side of the gravel parking area to bypass natural runoff from the western slopes around the paved areas. This action accommodates separation of the large volume of relatively clean runoff from the smaller volume of more-polluted roadway runoff.2. Reconstruct the gravel parking area to pitch toward the road so that runoff can be captured by the new storm sewer systems.3. Construct new catch basins with four-foot deep sumps for enhanced sediment storage capacity.4. Furnish and install three proprietary storm-water treatment chambers, which will trap debris and sediment and filter storm-water.5. Construct new storm sewers and culverts that are properly sized for the anticipated flow rates.6. Construct riprap-lined sediment forebays at the outlet of each treatment chamber to help trap sediment that bypasses the treatment systems.7. Superelevate the roadway on the north curve to improve vehicular safety and to opportunistically guide runoff to treatment chambers.		

Figure 1





PUBLIC WORKS DEPARTMENT

TOWN OF WINCHESTER

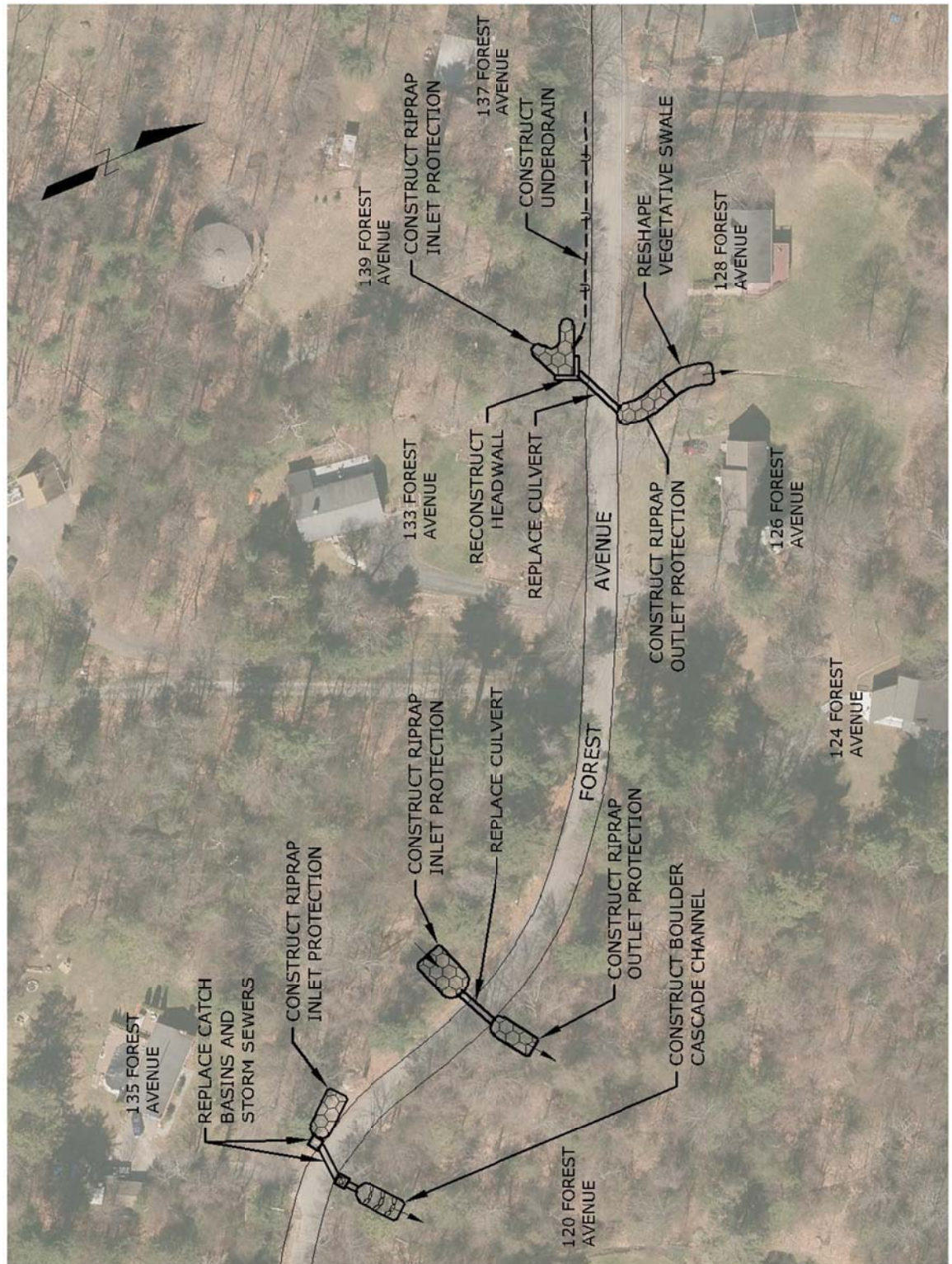
189 Rowley Street

Winsted, CT 06098

Phone (860) 379-4101 Fax: (860) 738-3509

2022 Road and Infrastructure Improvement Bond		
Information Sheet - Highland Lake Stormwater Quality Improvements		
Area 2 – Site 1		
Vicinity	Forest Avenue	
Improvement Scheduled	FY 2025	
Estimated Cost / Town Share	\$90,000	\$90,000
Description of Existing Conditions		
<p>Forest Avenue traverses an east-facing slope on its way from West Wakefield Boulevard to Reaching Hill Road. The terrain is relatively steep. The roadway shelf is cut into the slope on the south side and filled onto the slope on the north side. Four culverts convey seasonal watercourses from the south to the north side of the road along the length of Forest Avenue. The culverts appear undersized and there is evidence of erosion at the inlets and outlets of the culverts, where flow velocity is the highest. The four seasonal watercourses eventually reach West Wakefield Boulevard, where storm sewers collect and convey runoff directly to Highland Lake without benefit of treatment.</p>		
Description of Work		
<p>At Area 2 – Site 1 (Forest Avenue), the proposed work includes replacement of culverts and armoring of the inlet and outlet aprons with riprap to forestall erosion as shown in Figure 1 on the following page. The following activities are proposed:</p> <ol style="list-style-type: none"> 1. Remove and replace roadway culverts with properly sized conduits. 2. Construct riprap inlet and outlet aprons to armor the areas where streamflow velocity is highest. 3. Reform downstream channels, where, appropriate to help minimize erosion. 4. Construct underdrains, where necessary to minimize winter icing problems, which will reduce the amount of sand and salt that must be applied. <p>Note: the working space available within the Town right-of-way is very limited. It is likely that cooperation of adjacent land owners will be required for access to work on private property.</p>		

Figure 1





PUBLIC WORKS DEPARTMENT

TOWN OF WINCHESTER

189 Rowley Street

Winsted, CT 06098

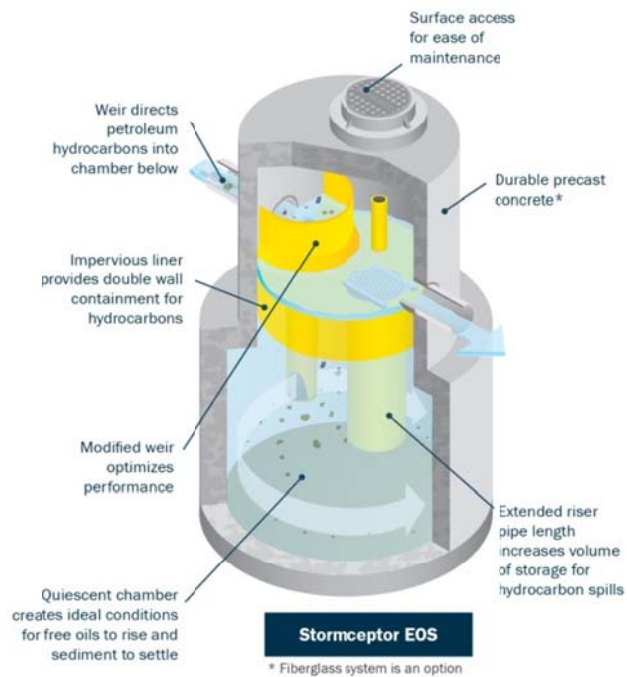
Phone (860) 379-4101 Fax: (860) 738-3509

2022 Road and Infrastructure Improvement Bond		
Information Sheet - Highland Lake Stormwater Quality Improvements		
Area 3 – Site 1		
Vicinity	West Wakefield Boulevard at Forest Avenue	
Improvement Scheduled	FY 2026	
Estimated Cost / Town Share	\$110,000	\$110,000
Description of Existing Conditions		
<p>Runoff from the lower third of Forest Avenue and lands up and downslope finds its way to the intersection of Forest Avenue and West Wakefield Boulevard. Three catch basins at this intersection collect runoff from Forest Avenue and a portion of West Wakefield Boulevard.</p> <p>From the intersection, runoff is directly conveyed to Highland Lake, through private property, by storm sewer.</p> <p>Currently, there are no provisions for the treatment of storm water before it is allowed to enter the Lake.</p>		
Description of Work		
<p>At Area 3 – Site 1 (Forest Avenue / West Wakefield Boulevard intersection), the Town plans to construct the following improvements to collect and treat runoff before it is allowed to flow into Highland Lake. These improvements are shown in Figure 1 on the following page:</p> <ol style="list-style-type: none">1. Remove the existing catch basins and storm sewers.2. Construct new catch basins with four-foot deep sumps for enhanced sediment storage capacity.3. Furnish and install a proprietary storm-water treatment chamber, which will trap debris and sediment and filter storm-water (see example in Figure 2 on the following page).4. Construct new storm sewers that are properly sized for the anticipated flow rates.5. Construct a new storm sewer, through private property, from the treatment chamber on West Wakefield Boulevard to the Lake (this property is presently utilized as a beachfront; hence, an open channel would be highly impactful to use of the property).6. Pave the short section of roadway that is compromised by construction.		

Figure 1



Figure 2





PUBLIC WORKS DEPARTMENT

TOWN OF WINCHESTER

189 Rowley Street

Winsted, CT 06098

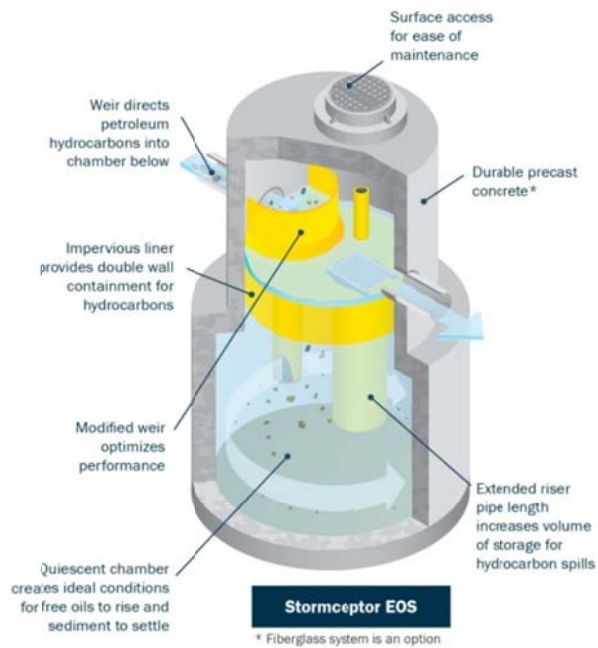
Phone (860) 379-4101 Fax: (860) 738-3509

2022 Road and Infrastructure Improvement Bond		
Information Sheet - Highland Lake Stormwater Quality Improvements		
Area 3 – Site 2		
Vicinity	West Wakefield Boulevard at Forest Avenue	
Improvement Scheduled		FY 2026
Estimated Cost / Town Share	\$103,000	\$103,000
Description of Existing Conditions		
<p>Runoff from the upper reaches of Forest Avenue and lands up and downslope finds its way to West Wakefield Boulevard in vicinity of Houses #607 and #608. Two catch basins are located in the roadway sag between these two houses. The catch basins collect runoff from a portion of West Wakefield Boulevard.</p> <p>From West Wakefield Boulevard, runoff is directly conveyed to Highland Lake, through private property, by storm sewer. Currently, there are no provisions for the treatment of storm water before it is allowed to enter the Lake.</p>		
Description of Work		
<p>At Area 3 – Site 2 (Vicinity Houses #607 and #608), the Town plans to construct the following improvements to collect and treat runoff before it is allowed to flow into Highland Lake. These improvements are shown in Figure 1 on the following page:</p> <ol style="list-style-type: none">1. Remove the existing catch basins and storm sewers.2. Construct new catch basins with four-foot deep sumps for enhanced sediment storage capacity.3. Furnish and install a proprietary storm-water treatment chamber, which will trap debris and sediment and filter storm-water (see example in Figure 2 on the following page). The tributary drainage area is extensive; hence the treatment system will be large.4. Construct new storm sewers that are properly sized for the anticipated flow rates.5. Construct a new storm sewer, through private property, from the treatment chamber on West Wakefield Boulevard to the Lake. This aspect of the work will be complicated by difficult access, presence of sewer utilities in the street, developed property, and the presence of a retaining wall along the easterly side of the Boulevard.6. Pave the short section of roadway that is compromised by construction.		

Figure 1



Figure 2





PUBLIC WORKS DEPARTMENT

TOWN OF WINCHESTER

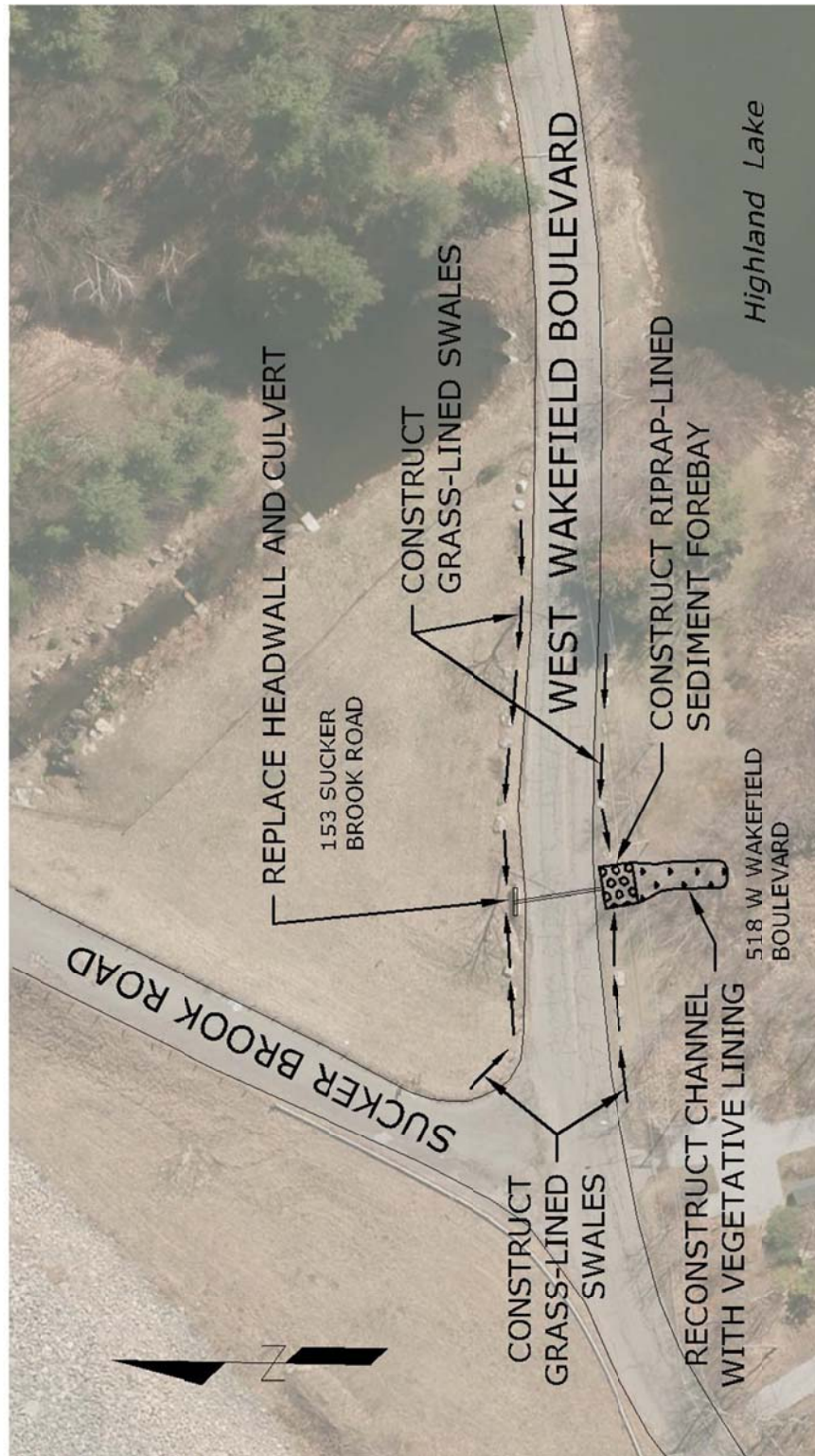
189 Rowley Street

Winsted, CT 06098

Phone (860) 379-4101 Fax: (860) 738-3509

2022 Road and Infrastructure Improvement Bond		
Information Sheet - Highland Lake Stormwater Quality Improvements		
Area 4 – Site 1		
Vicinity	Just north of intersection of Sucker Brook Road and West Wakefield Boulevard	
Improvement Scheduled	FY 2025	
Estimated Cost / Town Share	\$52,000	\$52,000
Description of Existing Conditions		
<p>This area accepts runoff from the lower extremities of Sucker Brook Road and from a portion of West Wakefield Boulevard. A conventional road culvert carries runoff from the north to the south side of the Boulevard.</p> <p>The tributary drainage area is fairly small; hence expedient treatment practices should be feasible. However, the opportunity for retrofitting the site with treatment practices is severely limited by flat grades and very little elevation drop from the roadway to the normal water level of Highland Lake.</p>		
Description of Work		
<p>At Area 4 – Site 1 (Vicinity of Sucker Brook Road / West Wakefield Boulevard intersection) the Town proposes the following work, which is depicted in Figure 1 on the following page:</p> <ol style="list-style-type: none">1. Remove the existing culvert and head wall. Replace with a new properly-sized culvert and a new, modern head wall.2. Construct modern roadside barrier protection (guide railing instead of the existing boulders).3. Construct a riprap-lined sediment forebay at the outlet. This forebay will help trap sediment.4. Widen and deepen the outlet channel and protect it with new vegetation selected to resist erosion and help treat roadway runoff. This aspect of the work will be complicated by the need for a temporary cofferdam and excavation dewatering measures.5. Construct grass-lined swales on both sides of the roadway to help treat roadway runoff.		

Figure 1



Total Town Share Estimate - \$450,000