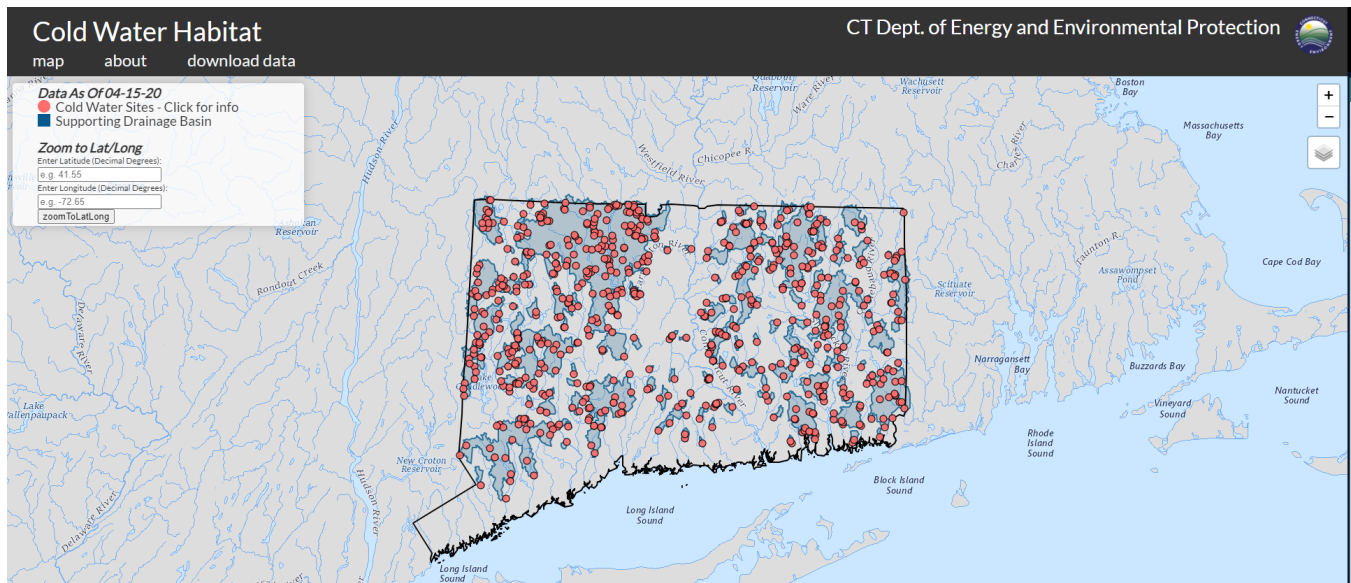


Mitigation: Cold Water Habitat

The following mitigation strategies promote cold water habitat. The Cold Water Stream Habitat Map Application can be used to identify cold water streams within CT at <https://portal.ct.gov/DEEP/Water/Inland-Water-Monitoring/Cold-Water-Stream-Habitat-Map>



THE ISSUE:

Coldwater streams are extremely important in maintaining biodiversity and improving water quality within a watershed. Coldwater habitats in Connecticut are determined from coldwater indicator fish species (brook trout & slimy sculpin) or a mean water temperature of under 18.3 degrees Celsius within the time frame of June– August. Macroinvertebrate surveys are an additional method to determine the quality of the cold water habitat.

Cold water streams can be impacted from a variety of sources including construction within the stream corridor. Examples of how construction impacts stream temperatures include, projects that include the installation of impervious surfaces which causes stormwater to heat up and then flow into the stream and the removal of natural vegetative cover that shades streams.

Increasing water temperature would be detrimental to the ecosystem that inhabits cold water streams and the overall quality of the system. Sensitive organisms can only exist in a limited range of temperature, therefore increasing the temperature could diminish entire species from the impacted stream. Higher water temperatures also reduce dissolved oxygen in the water, which can also adversely impact the aquatic life and cause a release in excess nutrients to the water which can lead to cyanobacteria blooms or hypoxia downstream. The purpose of this document is to provide guidance on recommended of BMPs to address when a project is within 100 feet of a cold water habitat.

HOW THIS RELATES TO LWRD REGULATORY PROGRAMS :

Flood Management: LWRD determines approval or denials of flood management certifications based on the projects consistency with state standards (CGS Sec. 25-68b to 25-68h) and criteria for preventing flood hazards to human life, health or property and with the provisions of the National Flood Insurance Program (NFIP) and municipal floodplain regulations; does not adversely affect fish populations or fish passage; and does not promote intensive use and development of flood prone areas. The increase in temperature of cold water streams would likely adversely impact fish populations within the stream, therefore this activity is inconsistent with CT's authorizing statutes.

Inland Wetlands & Watercourses: LWRD bases decisions on these applications on the impact of proposed activities on the environment including wildlife and fisheries habitats, flooding and flood hazards, and whether there are alternatives to the proposed action that will cause less environmental impact. The statutes authorizing this permit are under CGS Sec 22a-36 through 22a-45a. Water temperature increases in cold water habitats impact fisheries habitats, therefore this activity is inconsistent with CT's authorizing statutes.

Water Diversion (Non-consumptive): When determining approval or denial on these applications the Department must consider those factors listed in the authorizing statutes and regulations including, but not limited to, the environmental effects of the diversion and whether the proposed diversion: 1) is necessary, 2) is consistent with long-range water resource management, 3) is consistent with the state plan of conservation and development adopted pursuant to part I of Chapter 297 of the Connecticut General Statutes, and 4) will not impair proper management and use of the water resources of the State. The authorizing statutes for this program consist of CGS Sec. 22a-365 through 22a-379. The increase in temperature of cold water streams would likely be inconsistent with the state plan of conservation and development and will impair water resources of the State.

401 Water Quality: DEEP must consider the effects of proposed discharges on ground and surface water quality and existing and designated uses of waters of the state when making decisions on these applications. Water quality is adversely affected from the increase in temperature in streams, therefore projects under this permit that impact stream temperature are inconsistent with Section 401 of the Federal Clean Water Act (33 U.S.S. 1314).

Mitigation: In some cases, it may be unavoidable to work outside of the 100 foot buffer from cold water stream habitats. Below are potential mitigation strategies to avoid increasing water temperature. Mitigation should be determined depending on the applicability and feasibility at the specific site.

SUGGESTED MITIGATION METHODS:

- Retention and restoration of streamside and bank native and resilient vegetation



- Limitation or prohibition of clearing/ mowing in areas in which coldwater streams are present

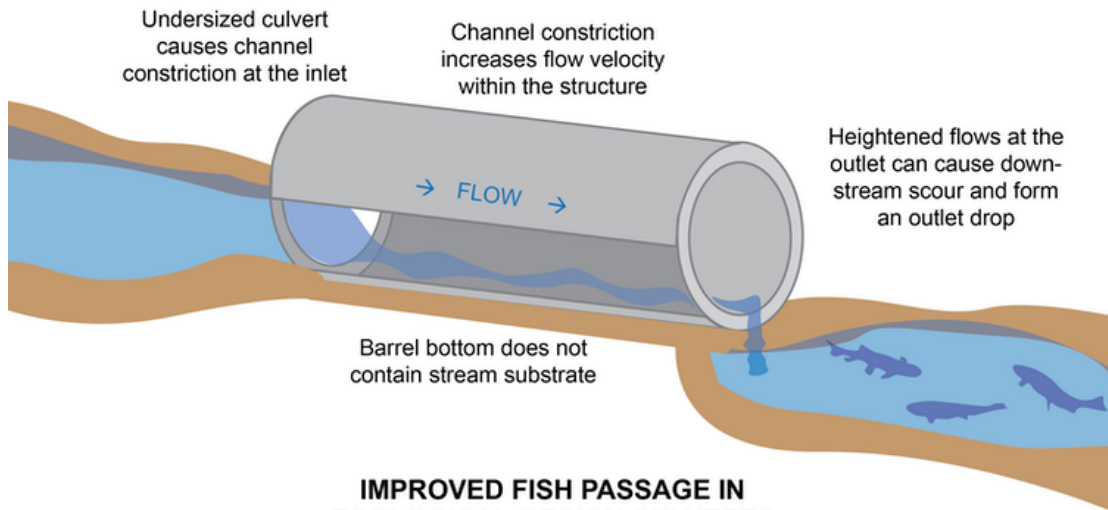


- Addition or retention of large woody debris within water bodies

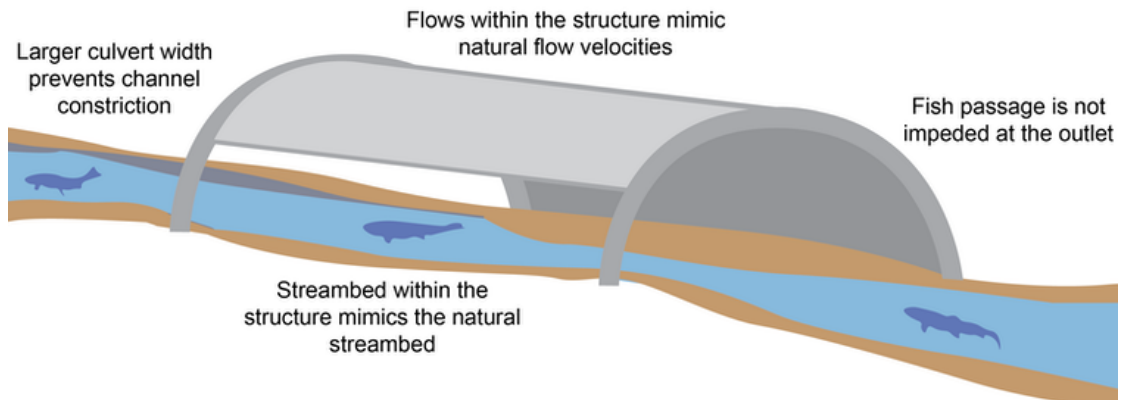


- Replace or retrofit perched and/or undersized culverts within streams

COMMON FISH PASSAGE ISSUES IN HYDRAULIC-DESIGN CULVERTS



IMPROVED FISH PASSAGE IN ECOLOGICAL-DESIGN CULVERTS

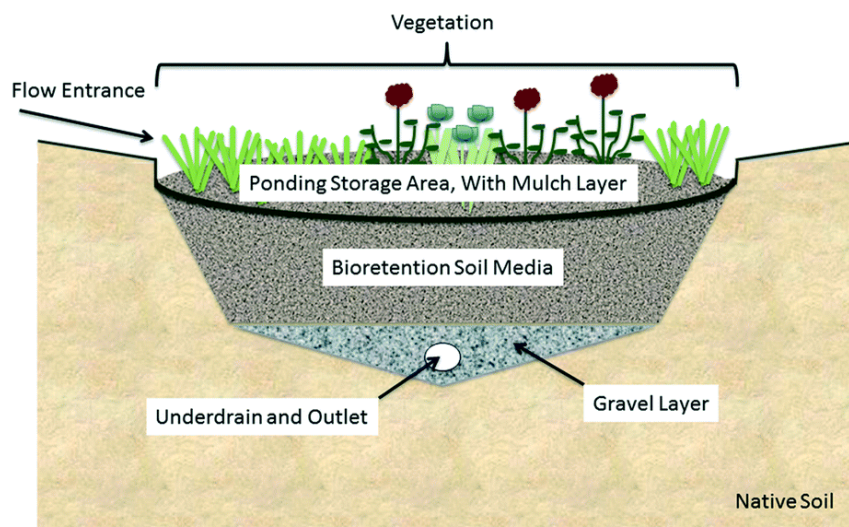


□ Install Stormwater BMP's

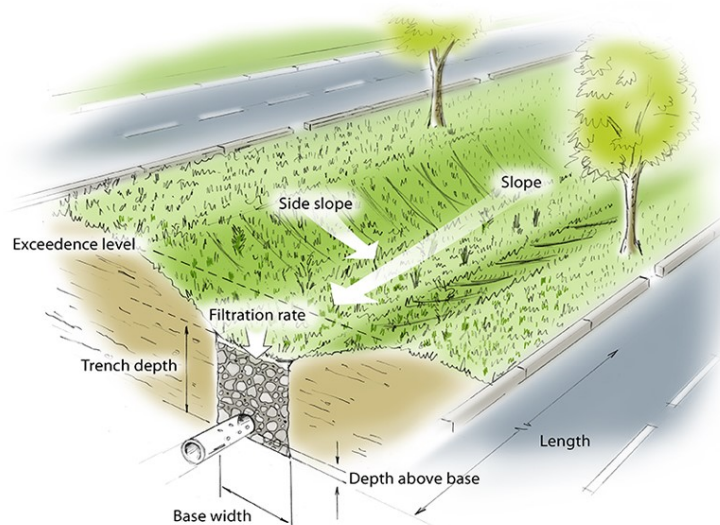
Vegetated filter strips



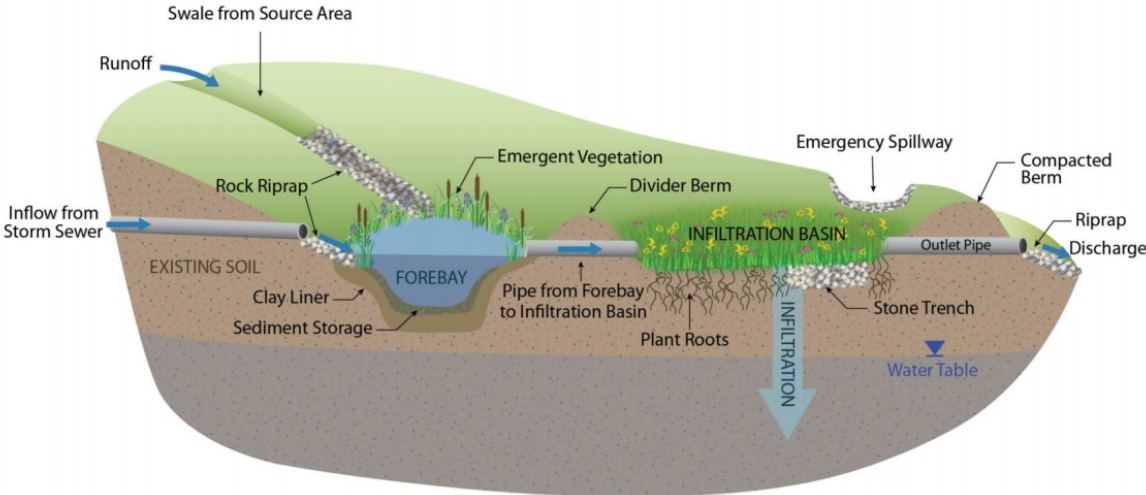
Bioretention areas or rain gardens



Dry and wet swales (lined if using for pretreatment)



Infiltration basins



Leaching catch basins



Drainage channels



Additional Methods:

- Limit impervious cover and Directly Connected Impervious Area/Effective Impervious Cover to Maximum Extent Practicable
- Maintain Tree Canopy
 - Minimizing tree removal
 - Selective clearing and pruning
 - Implement protective measures in areas of construction activity
- Establish Plantings within disturbed areas of 100 foot buffer that consist of or a combination of:
 - Fast growing tree species (Suggest avoiding size/ most fast growing species come smaller & are more adept to compacted fill slope installation & establishment.)
 - Native large growing, understory shrubs
 - Conservation/Wildflower Seed Mix with no mow signage
 - Incorporate Fiber rolls & live stakes into plantings
 - Ensure adequate soil preparation prior to any planting or seeding
- Slope Stabilization
 - Limit Rip Rap
 - Erosion Control Matting or other bio-degradable material in swales and other easily erodible areas, such as adjacent to headwalls.
 - Use compost and/or engineered soils in areas to be seeded
 - Engineered Slope
 - Articulated Concrete Blocks (not in the stream)
- Sheet Flow minimum distance
- Infiltration Practices pursuant to MS4 guidelines

Leaching Catch Basin

<https://megamanual.geosyntec.com/npsmanual/leachingcatchbasin.aspx>

Stormwater

[Design criteria for infiltration - Minnesota Stormwater Manual \(state.mn.us\)](#)

[The Connecticut Stormwater Quality Manual](#)

[Tahoe BMP: Maintenance](#)

Stream Bank Restoration

[Guidelines Streambank Restoration GSWCC Revised 2000.pdf](#)

[admin - Reedy Creek Stream Restoration Reedy Creek Stream Restoration \(reedycreekrestoration.com\)](#)

[Emerging investigator series: the role of vegetation in bioretention for stormwater treatment in the built environment: pollutant removal, hydrologic function, and ancillary benefits - Environmental Science: Water Research & Technology \(RSC Publishing\)](#)

[Stream Restoration Projects](#)

Picture Citations:

[stfs07.pdf \(warrenswcd.com\)](#)

[Lady Bird Lake | AustinTexas.gov](#)

[Sprucing up salmon habitat \(fishbio.com\)](#)

[Culverts – the major threat to fish you've probably never heard of \(theconversation.com\)](#)

[Facilities - Filter strip | Stormwater Partners](#)

[Emerging investigator series: the role of vegetation in bioretention for stormwater treatment in the built environment: pollutant removal, hydrologic function, and ancillary benefits - Environmental Science: Water Research & Technology \(RSC Publishing\)](#)

[Swale - xpdrainage 2016 Help Documentation - Innovyze Resource Center](#)

[Design criteria for infiltration - Minnesota Stormwater Manual \(state.mn.us\)](#)