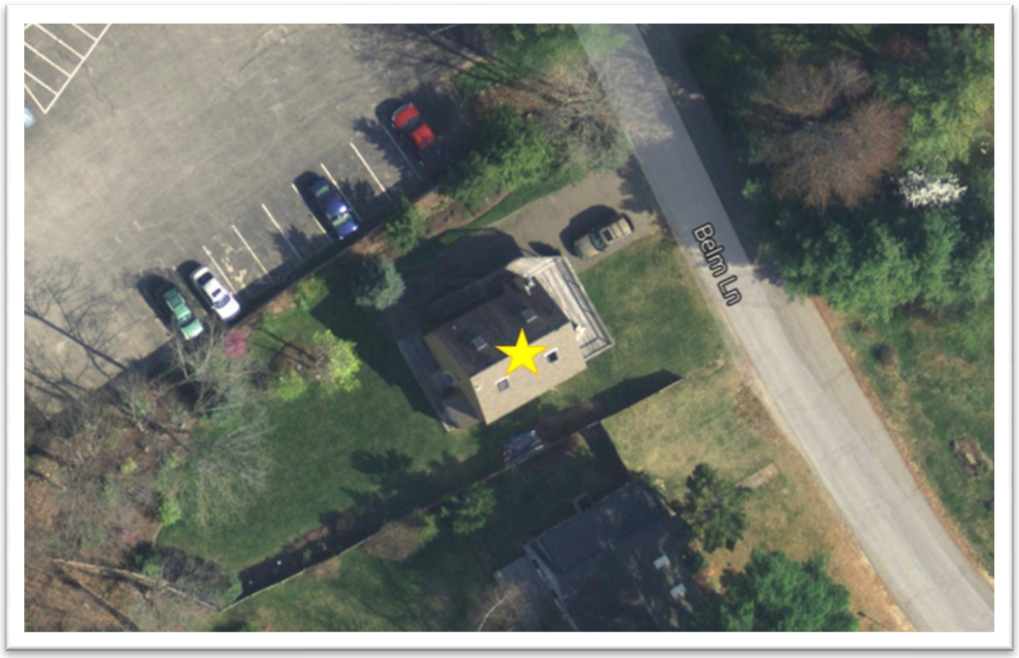
Ogunquit River Restoration Project

Technical Assistance Site Design Report

Prepared for:

Landowner

Belm Lane, Ogunquit, ME 03907



September 2014

Prepared by:

Laura Diemer, FB Environmental Associates

Site Location

This residential property is located along Belm Lane in Ogunquit, ME and is part of a neighborhood directly bordering the Ogunquit River just before it reaches the Atlantic Ocean.

Description of Problem

The owner was not home, but FBE personnel and local resident, Glenn Deletetsky, conducted a walkthrough of the property and found several potential areas for stormwater retrofits. Existing flower beds and some stone/riprap along the west and north side of the property help to slow stormwater flow and no obvious erosion was observed, but addition of rain gardens and restructured riprap trenches in key areas will help direct and infiltrate water during high precipitation events.

Stormwater runoff can contribute to nonpoint source (NPS) pollution, which is a term used to describe diffuse sources of pollution in surface and groundwater delivered to receiving waterbodies. Urban watersheds have a disproportionate amount of stormwater runoff from impervious surfaces (e.g. paved roads, sidewalks, parking lots, driveways, and rooftops) that prevent rain from percolating into the soil. These hard surfaces force rainwater to flow overland where it can collect a variety of pollutants, such as metals, winter sand and salt, pesticides, petroleum products, animal and human waste, fertilizers, and sediment. These pollutants are delivered to nearby waterbodies, bringing with them harmful bacteria, which can pose human health risks, and excess limiting nutrients, such as nitrogen and phosphorus, which can cause unwanted algal blooms.

Additionally, heavy precipitation events in urban watersheds can result in large water surges to receiving streams, which may be unable to accommodate the excess water. This can scour out streambeds and undercut banks, sending eroded sediment downstream to deposit as sand plumes and embed critical benthic habitat for aquatic macroinvertebrate communities. These disturbances to stream habitat and geomorphic structure pose a significant threat to the health and function of streams.

Recommended Solutions

Install a series of stormwater Best Management Practices (BMPs) to slow down the flow of stormwater runoff from impervious surfaces at this residential property and encourage infiltration of water to the ground. We recommend four BMPs for this property, including three rain gardens (Areas 1 and 2) and a riprap trench (Area 2; Figure 1).

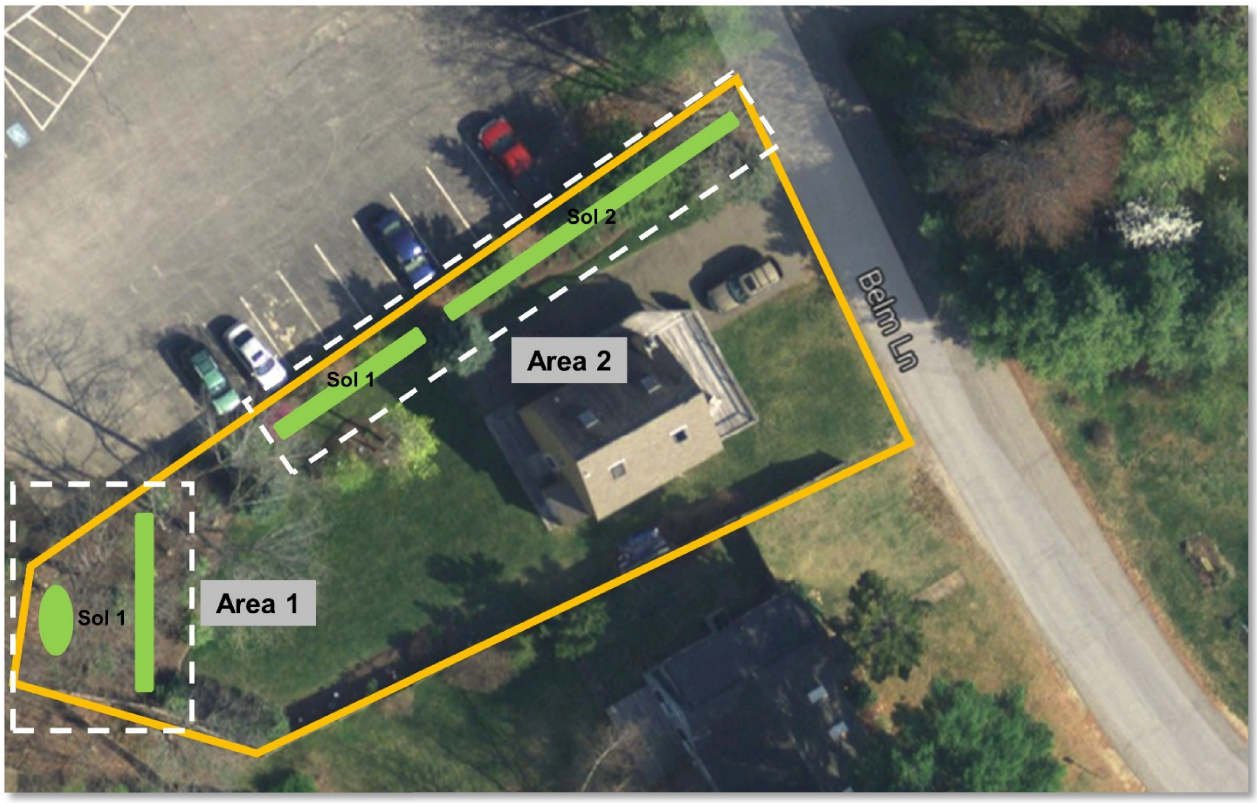


Figure 1. Location areas for recommended BMPs on residential property.

AREA 1

Solution 1 – Rain Gardens

It is recommended that a rain garden be installed in the back of the property to capture stormwater runoff (Figure 2). A series of flower beds already exist along the north and west sides of the property, which help with runoff. We recommend installing two rain gardens where a significant gap occurs in the flower bed series and where stormwater can be effectively slowed. A variety of flowering perennials that require full sun will be selected for this location.

Rain gardens are landscape depressions planted with native perennials that act as bioretention cells for stormwater treatment. Water flowing overland accumulates in the depression and allows the water to seep into the ground where it is filtered for nutrients, bacteria, and sediment.

Installing rain gardens requires minor excavation of the grass and underlying soil in order to create a small depression for water collection. The dug area is filled with a loam and compost mix before the plants are put in. The area is then covered with erosion control mulch to stabilize the soil and plants during storm events. Installation requires physical labor, a shovel, and wheelbarrow. For installation guidelines, see Maine Department of Environmental Protection's rain garden fact sheet: http://www.pwd.org/pdf/water_resources/conservation%20fact%20sheets/rain_garden.pdf.

Maintenance will include regular watering within the first few weeks of planting to ensure adequate plant establishment and occasional watering thereafter during dry conditions.

Table 1. Cost Estimates

Item	Cost ($USD)
*Loam (2 yds)**	$50
*Erosion control mulch (2 yds)**	$40
*Compost (2 yds)**	$60
*Native plantings**	$750
TOTAL	$900

**Price does not include delivery*

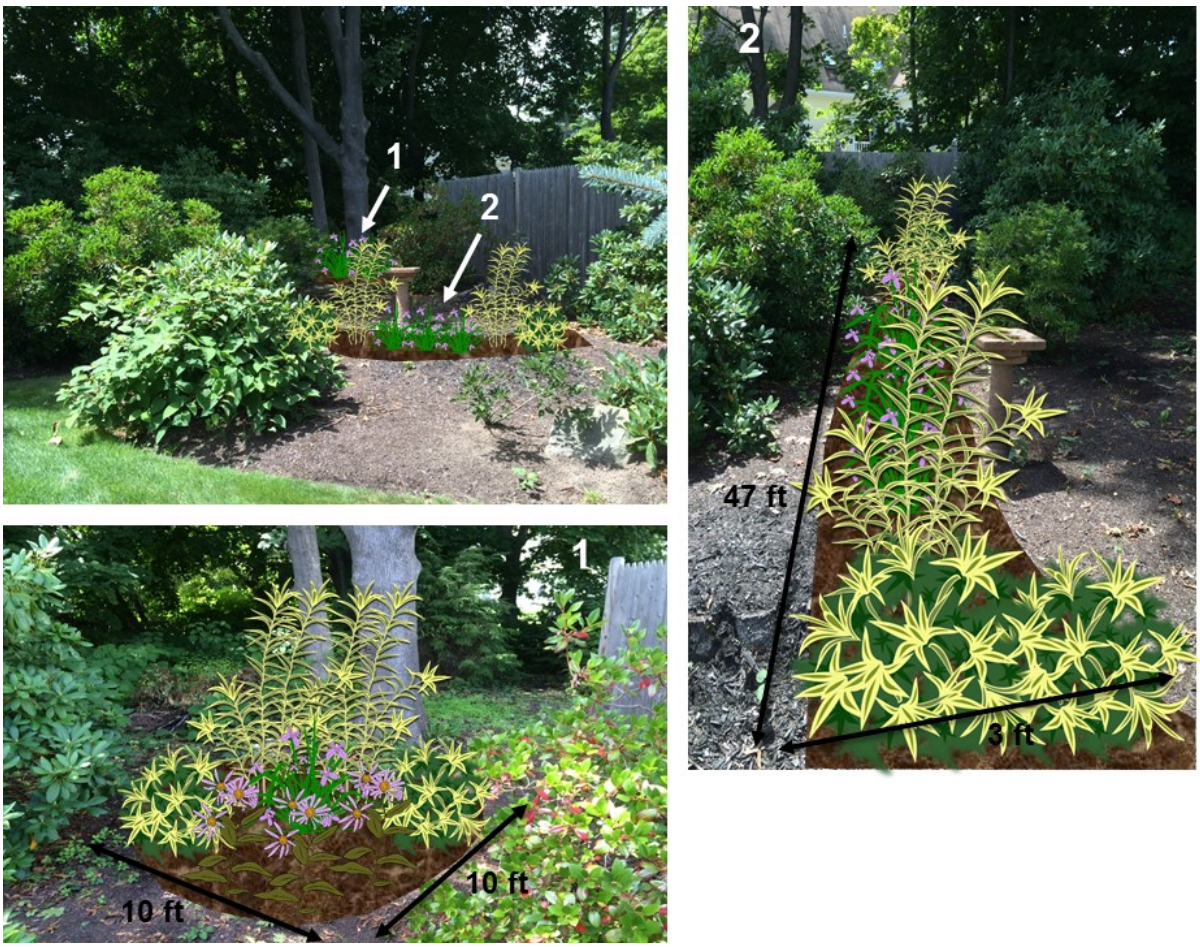


Figure 2. Area 1 (sub areas 1 and 2) recommended BMP installations.

AREA 2

Solution 1 – Rain Garden

It is recommended that a rain garden be installed along the north side of the property adjacent to (and not to replace) the existing flower bed (Figure 3). This is to help direct flow coming to the riprap trench to the east. The area should be dug down into a small depression and a variety of flowering perennials that require full sun should be planted in this location.

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Table 2. Cost Estimates

Item	**Cost ($USD)**
*Loam (1 yds)**	$25
*Erosion control mulch (2 yds)**	$40
*Compost (1 yd)**	$40
*Native plantings**	$200
TOTAL	$305

**Price does not include delivery*

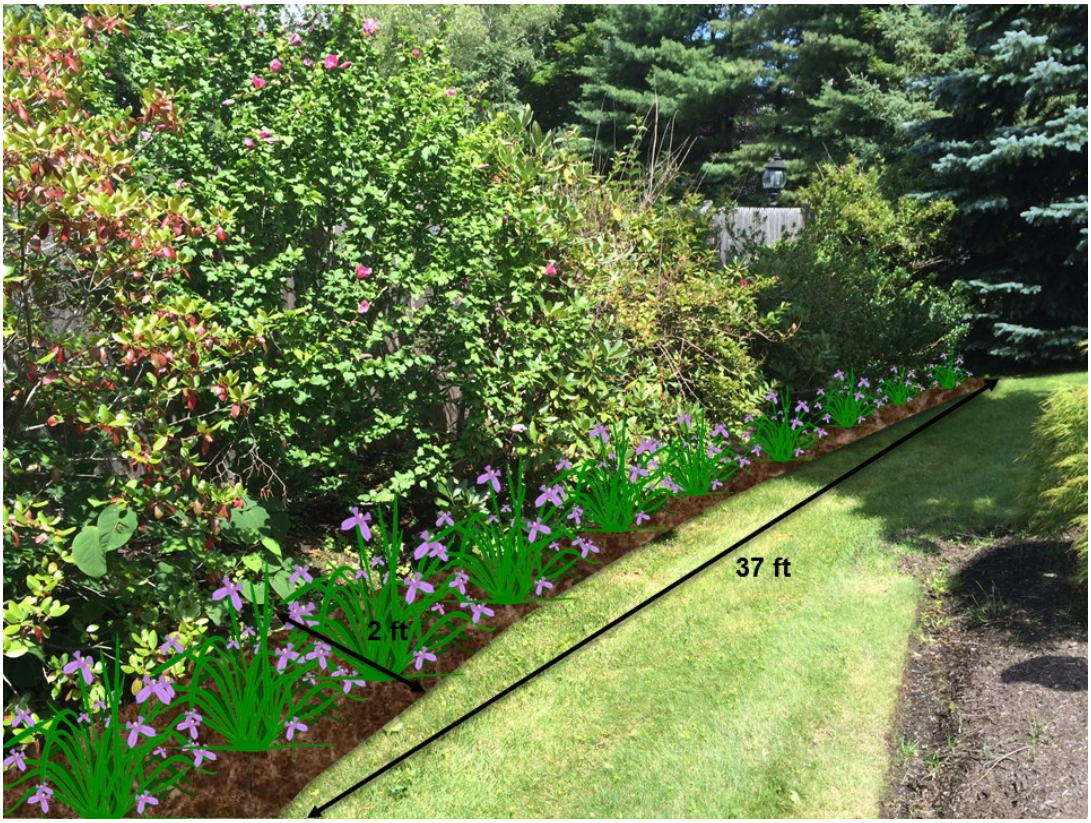

Figure 3. Area 2 recommended BMP installation.

Solution 2 – Riprap Trench

It is recommended that a riprap trench be installed along the north side of the property extending from the buffer planting to Belm Lane (Figure 4). A stone trench is already in place, but it may become more effective if the trench is widened slightly and replaced with clean stone. A riprap trench is used where native vegetation proves to be inadequate for stormwater infiltration and bank stabilization.

Installing a riprap trench involves creating a dug trench that funnels water, placing a filter fabric over the entire area to stabilize the soil, and layering with ¾" crushed stone to at least 3" thick. This layer is then topped with the riprap to a depth at least twice as thick as the average rock diameter. Any disturbed soil that is not riprapped should be covered with hay or erosion control mulch. For installation guidelines, refer to Maine Department of Environmental Protection's fact sheet: http://www.pwd.org/pdf/water_resources/conservation%20fact%20sheets/Lake%20Shoreline%20Riprap.pdf

Maintenance is minimal and may require occasional movement of displaced riprap after major storms.

Table 3. Cost Estimates

Item	Cost ($USD)
*¾" crushed stone (2 yds)**	$40
Non-woven geotextile fabric (378 sq. ft)	$57
*Riprap (14 tons)**	$840
TOTAL	$937

**Price does not include delivery*

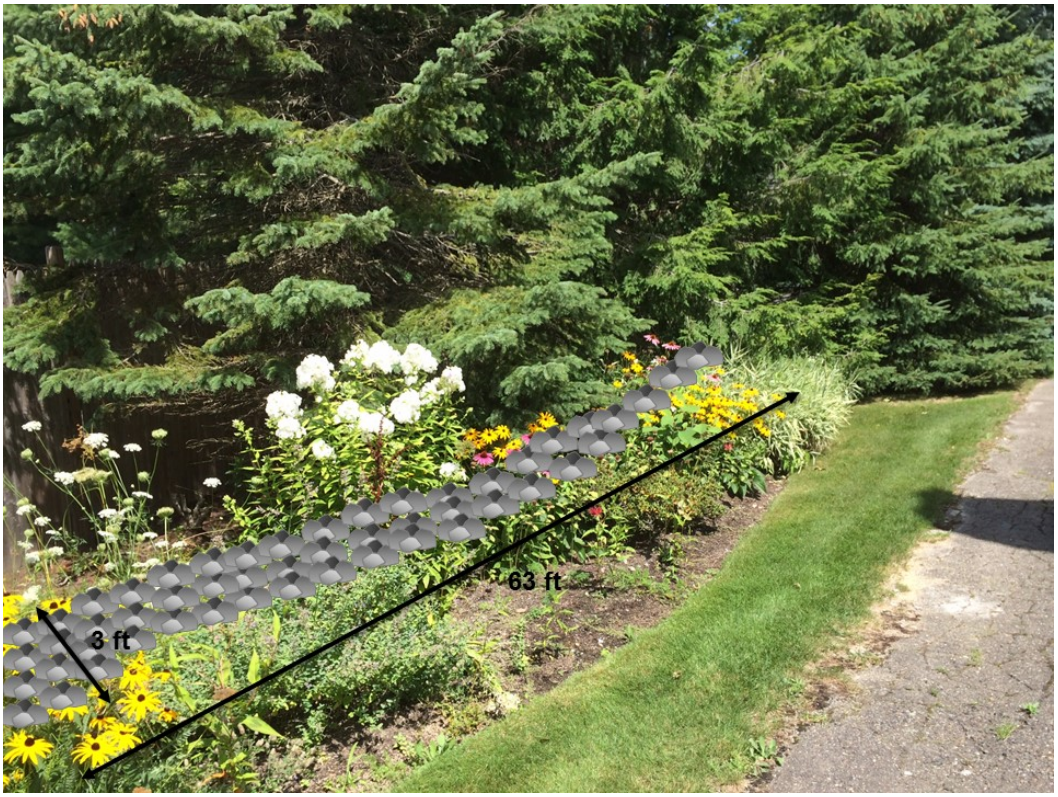

Figure 4. Area 2 recommended BMP installation.