



Bustins Island Village Corporation
Established 1913



CUMBERLAND COUNTY
SOIL & WATER
CONSERVATION DISTRICT

The Bustins Island Green Infrastructure Project

**A Maine Coastal Community Grant
September 2019 – June 2021**

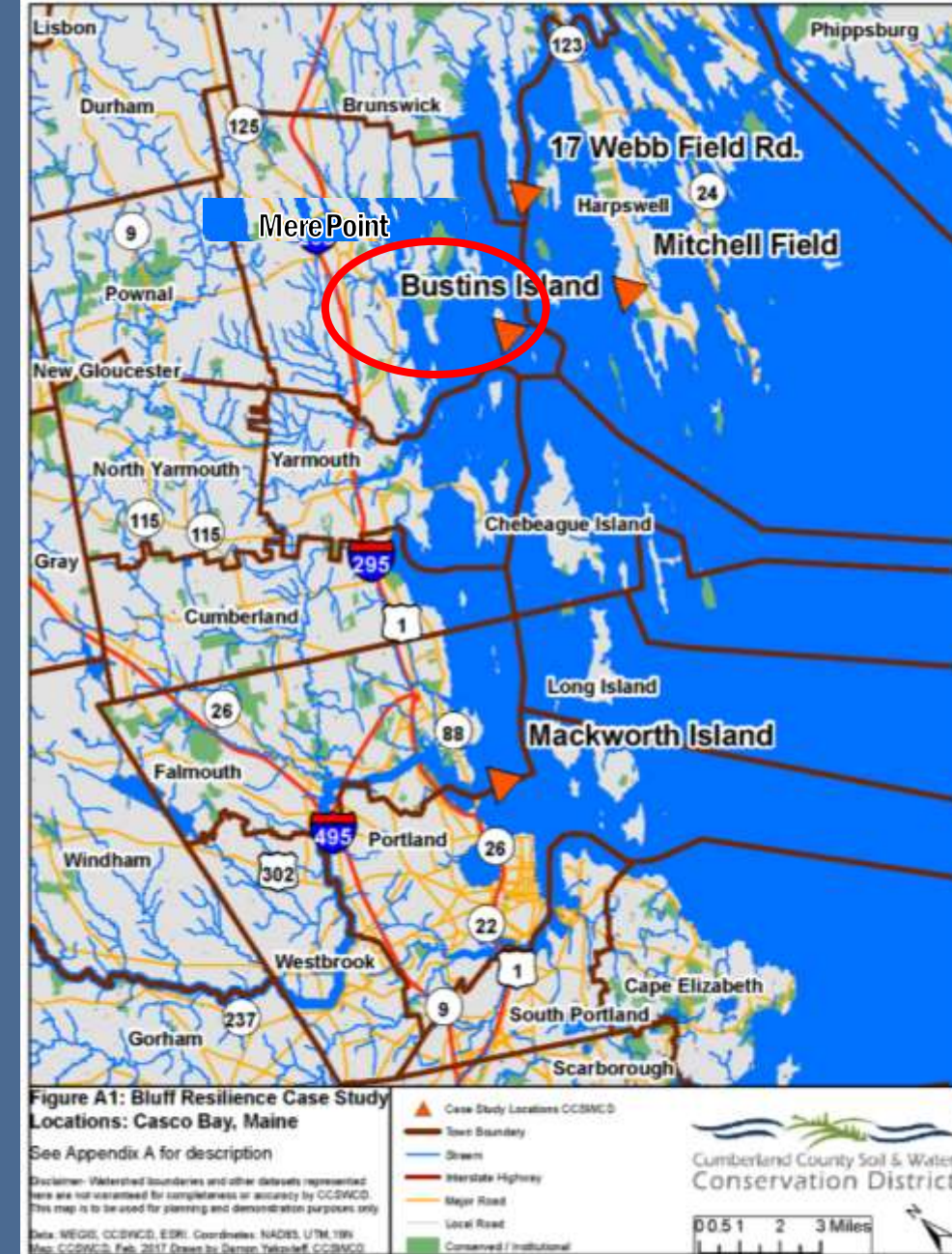
Presented for Casco Bay Coastal Academy by:
Christopher Baldwin, District Engineer,
CCSWCD
Damon Yakovleff, Environmental Planner,
CCSWCD

December 17, 2020



Bustins Island

- Off Coast of Freeport
- Unbridged Island, seasonal community
- Efforts to assess and reduce bluff erosion since 2016



Building on Previous Work

- NOAA-funded project to study bluff erosion in Casco Bay
- On-island efforts to assess & experiment

INSTABILITY ASSESSMENT RATING DATA SHEET				
Shoreline: _____		Rater(s): _____		
Bluff/Total Marsh/Wood/Fish/Low Bank: _____		Date: _____		
Photo(s): _____				
Overall Bluff Condition		Good	Fair	Poor
BLUFF ASSESSMENT				
Category / Parameter / Measurement Method	Good (1)	Fair (2)	Poor (3)	Rating (1/2/3)
1. Hydrology (Barrel) / Ponding	No alteration of slope drainage that imp to project area. Drainage of bank has been modified.	If not modified, slope changes are minimal or none. Does not include any kind of hydrology or result in concentrated flow (pond drainage).	Drainage is not working to the slope site and has an adverse effect on bank. Seepage is present above the bank. Seepage may be present.	
2. Hydrology (Barrel) / Consolidated Soil	No apparent horizontal flow or consolidation of soil.	Some consolidation observed, but not significant. No visible signs of erosion or soil loss.	Consolidation is evident and soil loss is occurring.	
3. Hydrology (Barrel) / Land Use Change	Minimal area of previously settled agricultural or other uses in project area. Vegetation is well established.	Land development occurring or not yet established. Minimal area of previously settled agricultural or other uses in project area. Vegetation is well established.	Land use is a bare or partially settled agricultural or other uses in project area. Vegetation is sparse or non-existent.	
4. Hydrology (Barrel) / Distance to Coast	No erosion or adjustment to site (10' or more). No erosion or adjustment to site (10' or more).	No erosion or adjustment to site (10' or more). No erosion or adjustment to site (10' or more).	Recent erosion or adjustment to site boundary is 10' or more.	
5. Hydrology (Barrel) / Seepage	Seepage is not visible. Seepage is not visible.	Seepage is visible as a result of a small amount of water. Seepage is visible as a result of a small amount of water.	Seepage is visible as a result of a large amount of water. Seepage is visible as a result of a large amount of water.	
6. Geobotany (Vegetation) / Vegetation	High density of vegetation. High density of vegetation.	Medium density of vegetation. Medium density of vegetation.	Low density of vegetation. Low density of vegetation.	
7. Geobotany (Vegetation) / Riprap	Low density of riprap. Low density of riprap.	Medium density of riprap. Medium density of riprap.	High density of riprap. High density of riprap.	
8. Bank Slope	Slope angle 10% to 20%.	Slope angle 20% to 30%.	Slope angle 30% and greater or undercut.	
9. Bank Height vs. High Tide Elevation	High Tide Elevation is 10' above Top of Bank.	High Tide Elevation is 10' above Top of Bank.	High Tide Elevation is 10' below Top of Bank.	
10. Soil Properties (Moisture) / Stabilization	Soil is non-cohesive and/or highly erodible.	Soil is non-cohesive and/or highly erodible.	Soil is non-cohesive and/or highly erodible.	
11. Density of Root Bank Surface (Percentage) / Total Bank Height with Roots	Soil Density = 80-100%. Soil Density in Bank = 80-100%. Root Density/Height = 10-20%.	Soil Density = 60-80%. Soil Density in Bank = 60-80%. Root Density/Height = 10-20%.	Soil Density = 40-60%. Soil Density in Bank = 40-60%. Root Density/Height = 10-20%.	
12. Photos (1) Evidence of Erosion	Evidence of erosion and adjustment to site is present. Evidence of erosion and adjustment to site is present.	Evidence of erosion and adjustment to site is present. Evidence of erosion and adjustment to site is present.	Evidence of erosion and adjustment to site is present. Evidence of erosion and adjustment to site is present.	
Total Rating				



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Planting for Slope Stabilization on Maine's Coastal Bluffs

Coastal Bluffs—defined as “a steep shoreline slope formed in sediment (loose material such as clay, sand, and gravel) that has three feet or more of vertical elevation just above the high tide line” (Maine Geological Survey)—make up about 38% of Maine’s coastline. Unstable bluffs can erode slowly or suddenly collapse, forming landslides. Some amount of bluff erosion is expected, and is beneficial to replenishment of beaches and other shoreline areas. However, because of significant risks to life and property, landowners and shoreline managers may wish to temper the speed of bluff erosion and reduce the risk of sudden collapse.

The stability of a coastal bluff is influenced by interactions with both the land and sea. This guide includes information for one of the most critical factors affecting bluff erosion rates and overall stability: vegetation. When selecting plant varieties for slope stabilization, there are many factors to be considered, including salt tolerance, soil depth, and water availability. This guide recommends native Maine plants that can be used to stabilize coastal shorelines and that have been determined to be suitable for restoration that uses a living, natural shoreline instead of armoring (such as with rip rap). Plant species are organized by whether they are classified as woody or herbaceous and whether they are recommended for shallow soil (<18”) or deep soil (>18”).

It should be noted, however, that not all bluff shorelines are suitable for living shorelines. Prior to planting a living shoreline, see the Suitability Table (Table 1), to determine if your site is suitable. If a shoreline is not a suitable option for stabilization, root wads (also known as toe wood), as shown in Figure 1, may be used as an alternative. Root wads can help protect and armor exposed soil, particularly

COASTAL PLANTING GUIDE

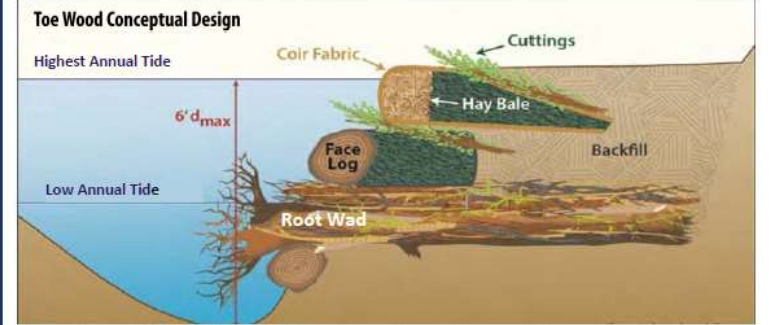


Figure 1. Root wads inserted into unstable banks can help protect bare soil from erosion. In areas not suitable for living shorelines, root wads can be an effective alternative. Image adapted from: Bayou Preservation Association, <http://www.preservingbayou.org/about-us/>.

2019 Coastal Community Grant Project

- Funded by Maine Coastal Program
- Focus on managing upland runoff to reduce erosion rates on coastal bluffs
- Using low-cost, locally available methods suitable for islands
- Decentralized approach, “Low Impact Development” or LID



Project Area Bustins Island, Freeport



Bluff failure at location of arrow
Image source: CCSWCD



Figure A2: Bustins Island Overview See Appendix A for description
Disclaimer- Datasets represented here are not warranted for completeness or accuracy by CCSWCD. This map is to be used for planning and demonstration purposes only.
Data: MEGIS, CCSWCD, ESRI, MGS
Coordinates: NAD83, UTM Zone19N
Map: CCSWCD, May 2017
Drawn by Damon Yakovlev, CCSWCD

1 inch = 333 feet
0 0.05 0.1 0.2 Miles

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Project Goal:

To slow or capture stormwater runoff that now flows into the island's southeast sub-basin



Figure A2: Bustins Island Overview See Appendix A for description

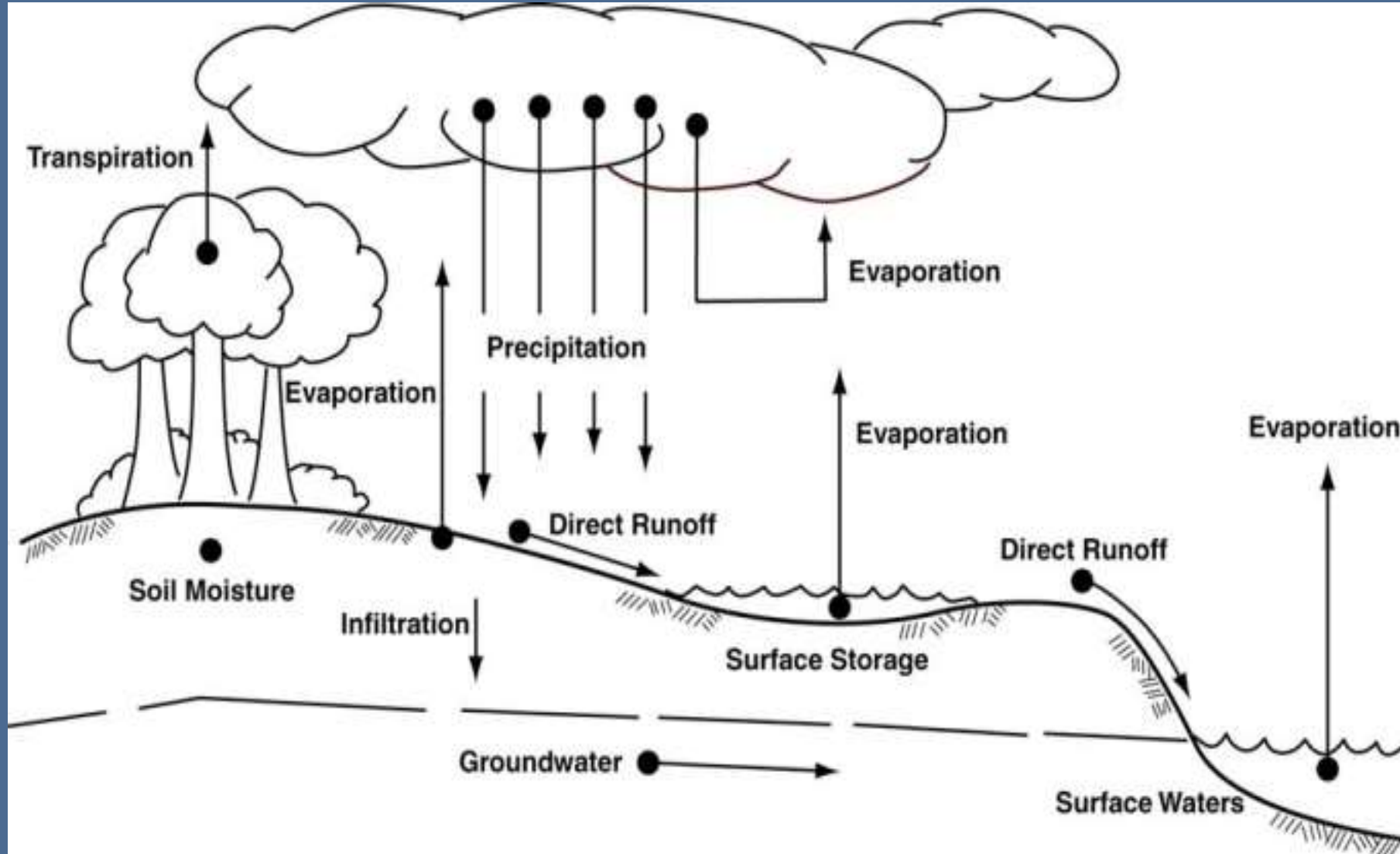
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- ▲ Bustins Sites
- Sub-Watershed (Acre)
- Bottle
- Unstable
- Highly Unstable
- Local Road



The water cycle



Project Method: Green Infrastructure

- Work with natural systems and materials to:
 - Recharge the aquifer
 - Protect coastal bluffs
 - Reduce road erosion
 - Restore habitats



Potential for solutions

- Upland areas carrying stormwater runoff
- Sloping land to work with
- Natural basins w/good drainage
- Unbuilt areas w/ good drainage



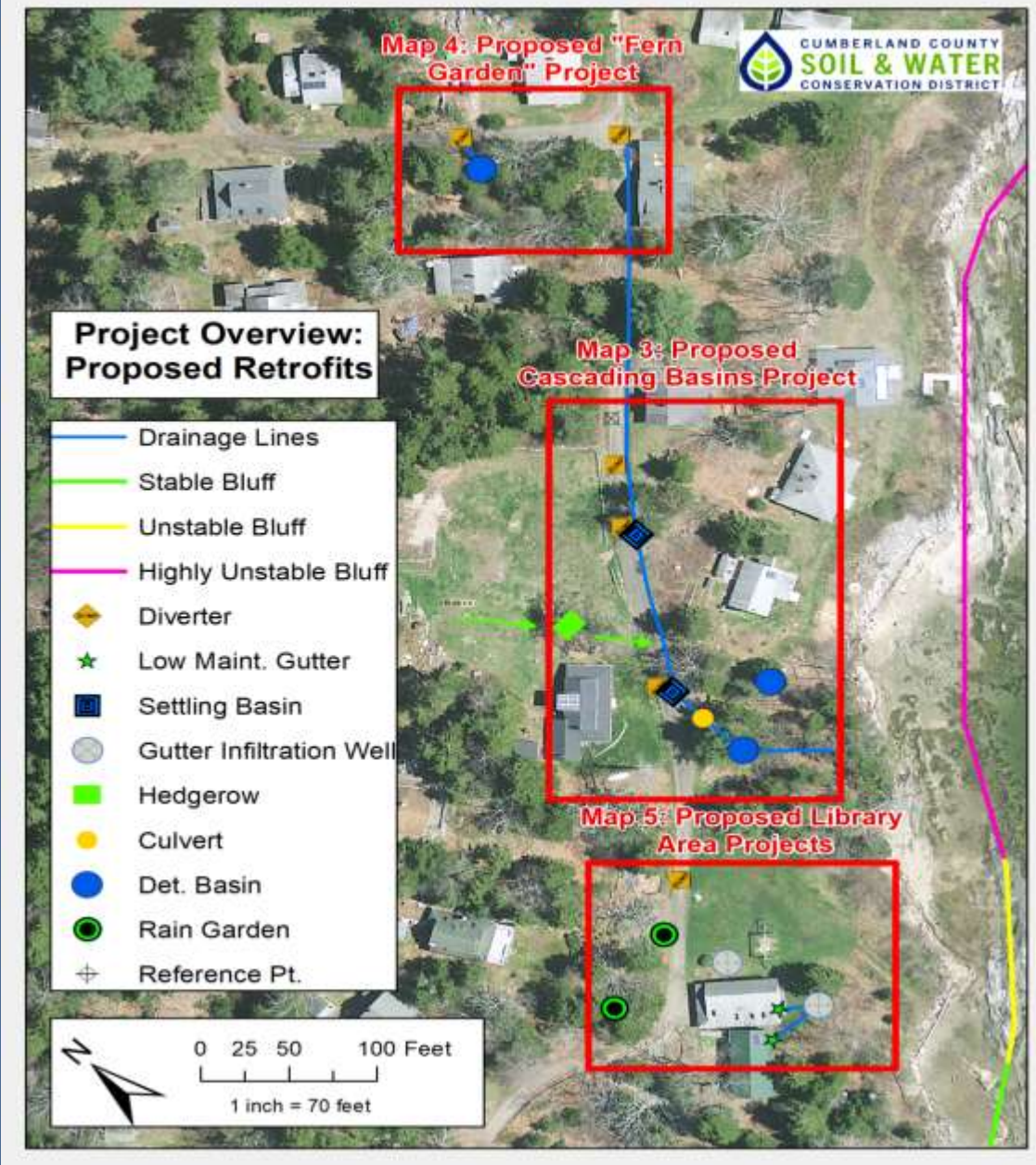
Conceptual Designs & Pilot Projects

PLEASE NOTE:

**CONCEPTS ARE FOR CONSIDERATION ONLY
PENDING LANDOWNER/BIVC PERMISSIONS**

Bustin islands: Green Infrastructure

- The Four R's:
 - Recharge the aquifer
 - Reduce road erosion
 - Restore habitats
 - Redirect runoff from coastal bluffs

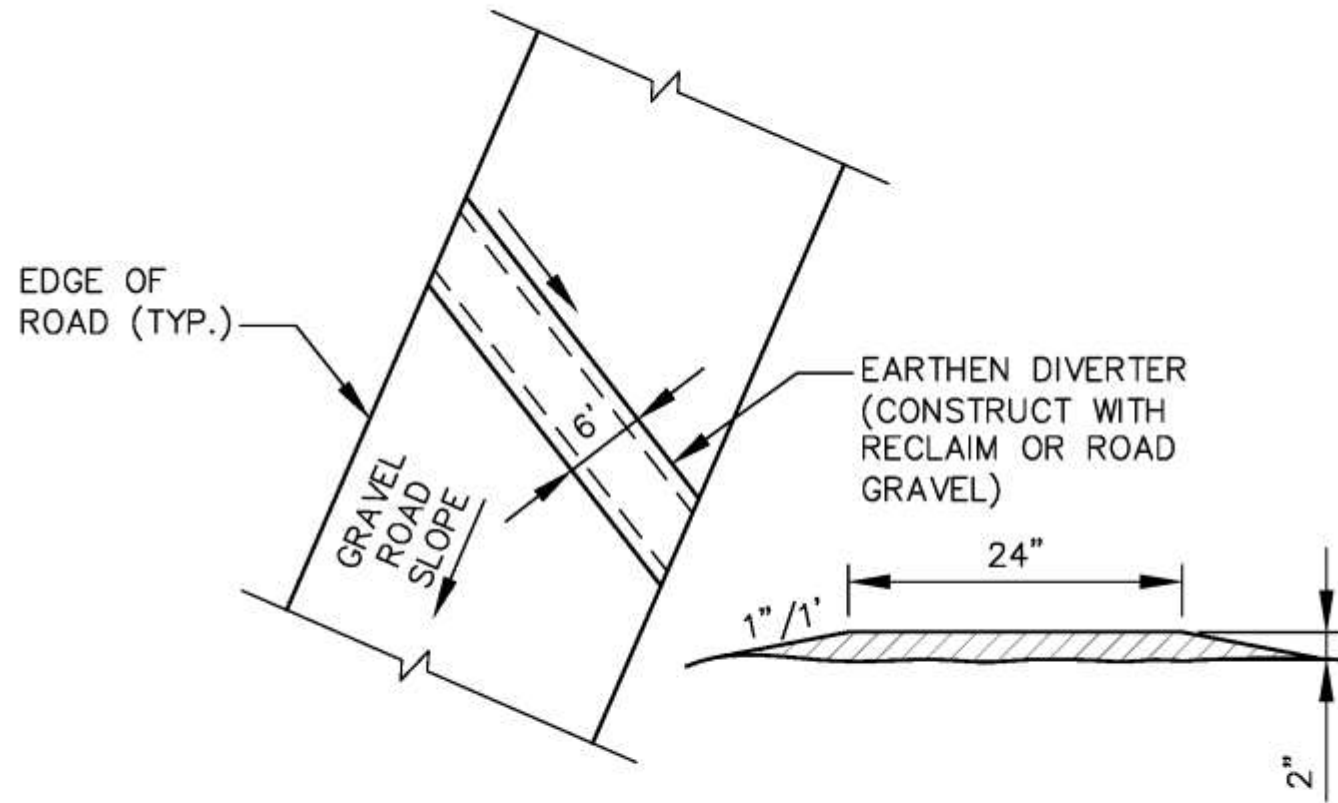


Proposed:

3 areas of focus to slow or capture stormwater now flowing into the island's southeast subbasin

Area 1 Proposed Solution: Divert road runoff into constructed & natural settling basins

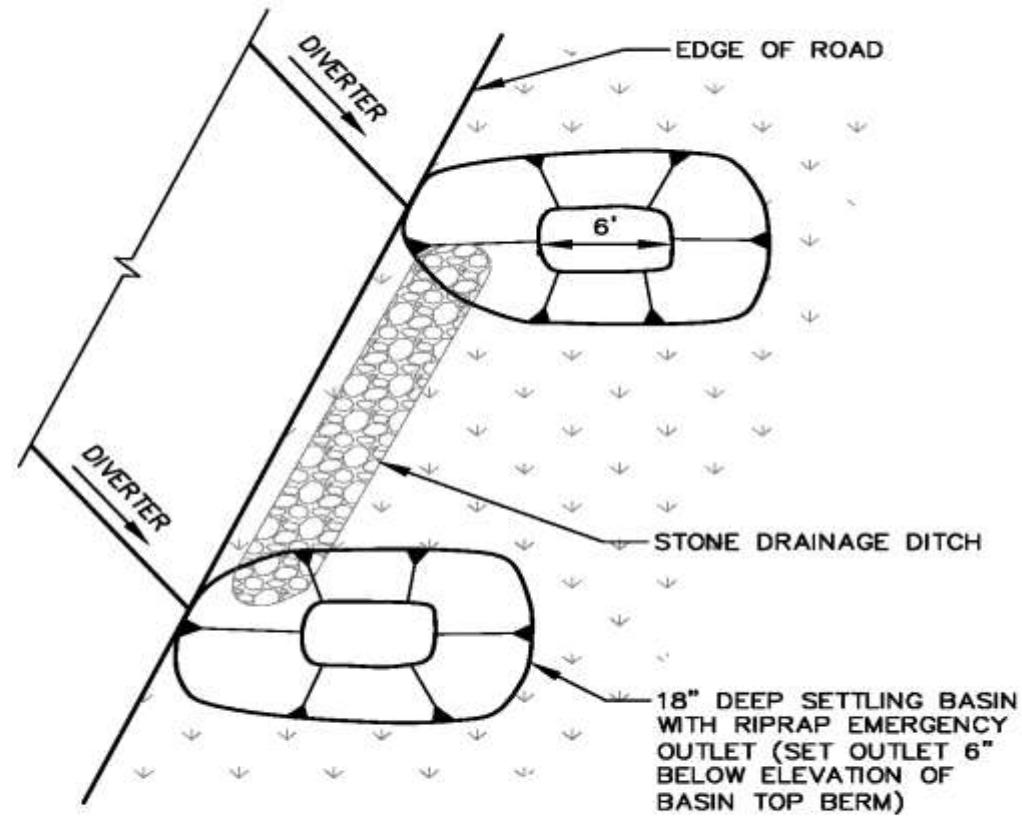




DIVERTER BERM
NOT TO SCALE

Pilot Project: Constructed roadside basin at top of road which now flows into ditch



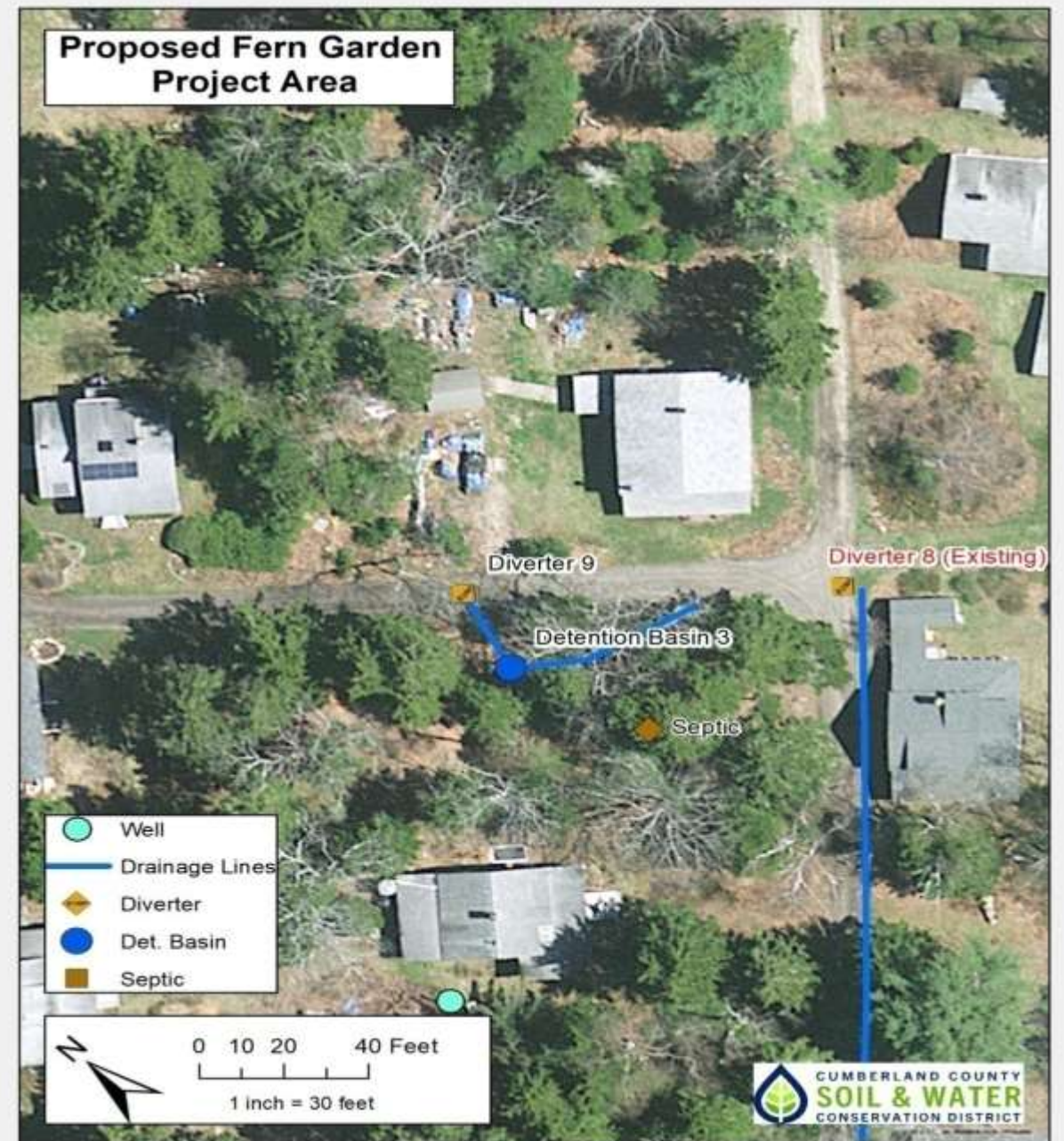


ROADSIDE SETTLING BASIN
NOT TO SCALE

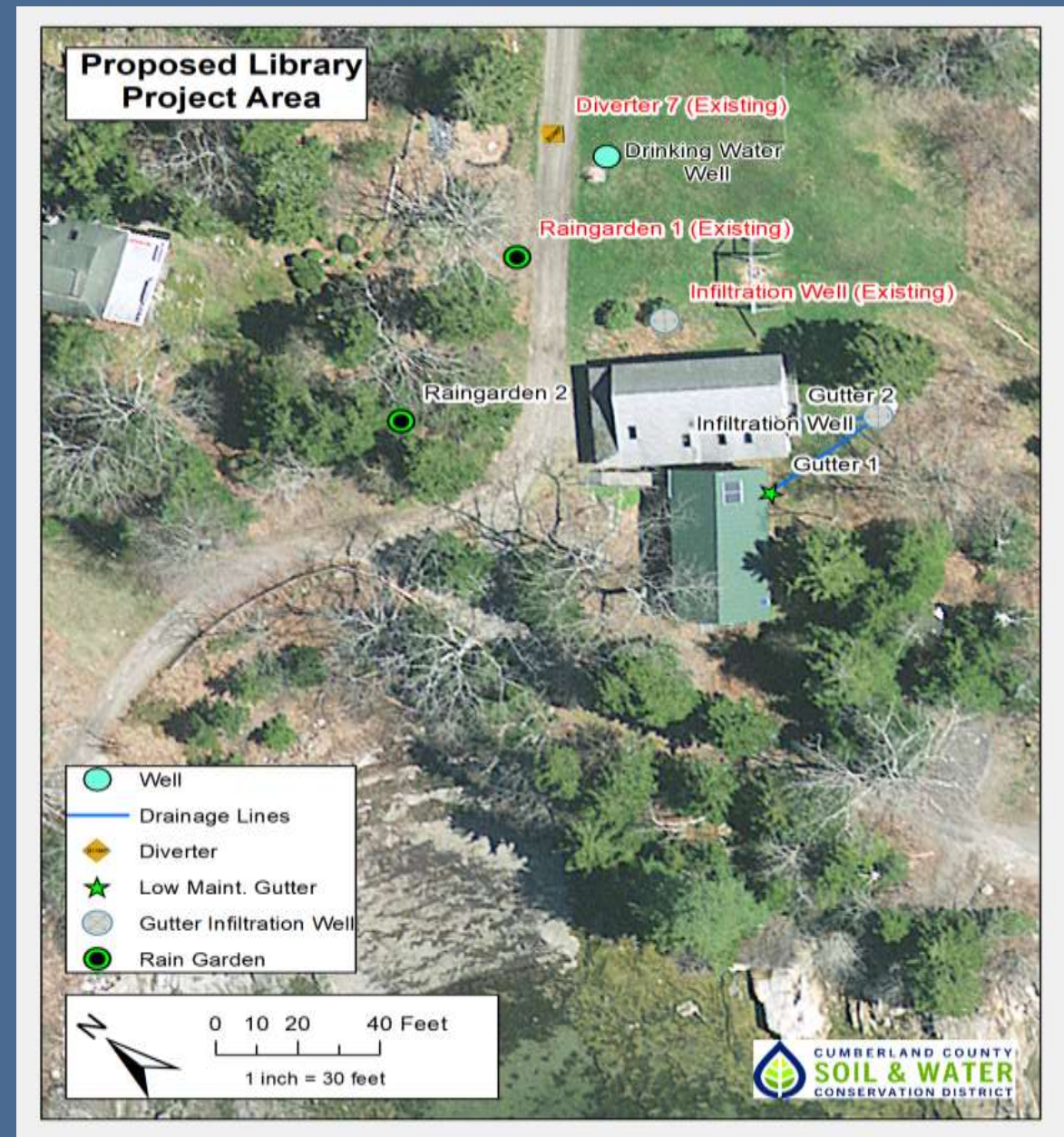
Pilot Project: Natural Settling Basins at System Outlet



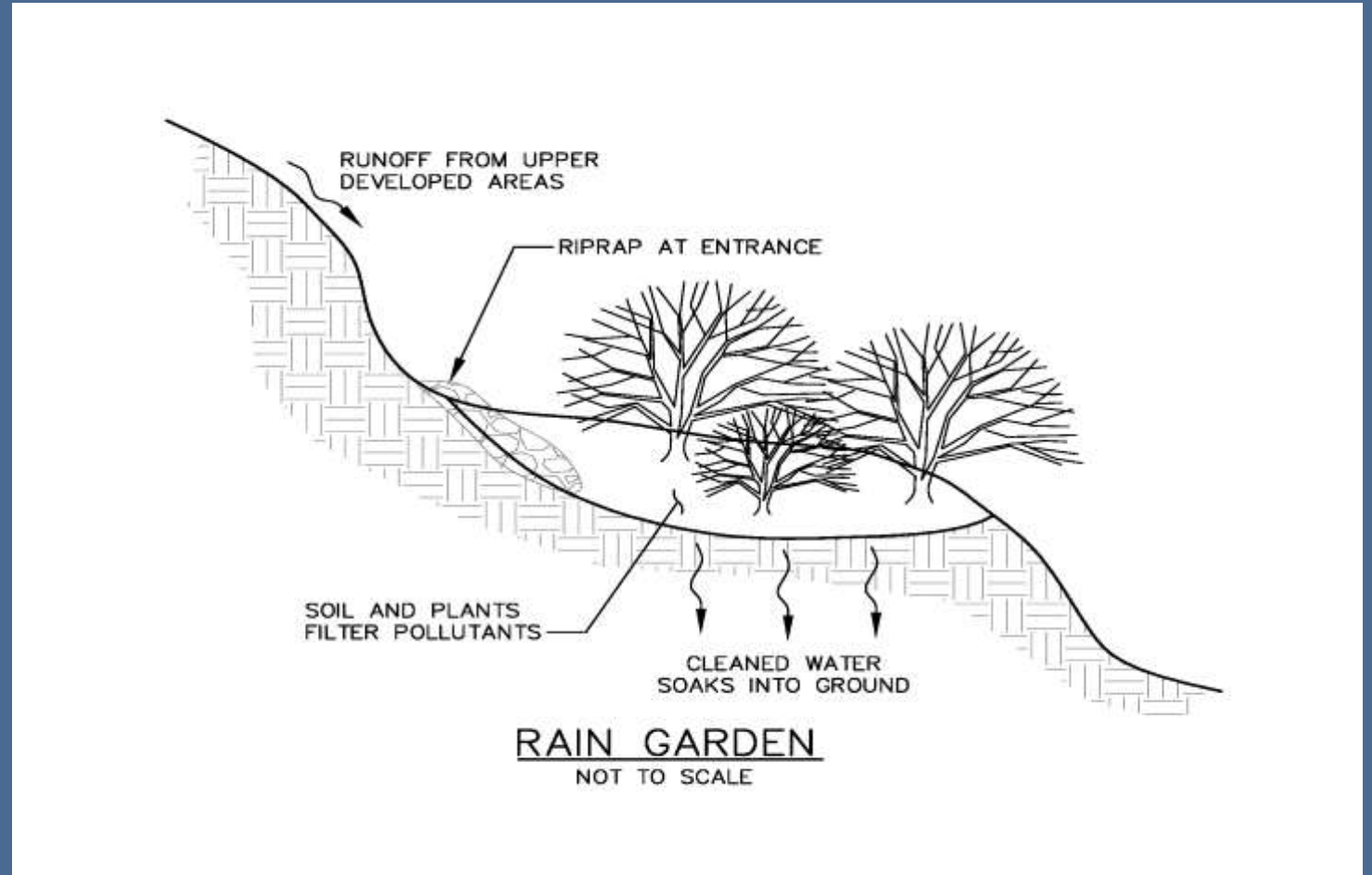
Area 2 Proposed Concept: Divert road runoff into constructed settling/infiltration basin “Fern Garden”



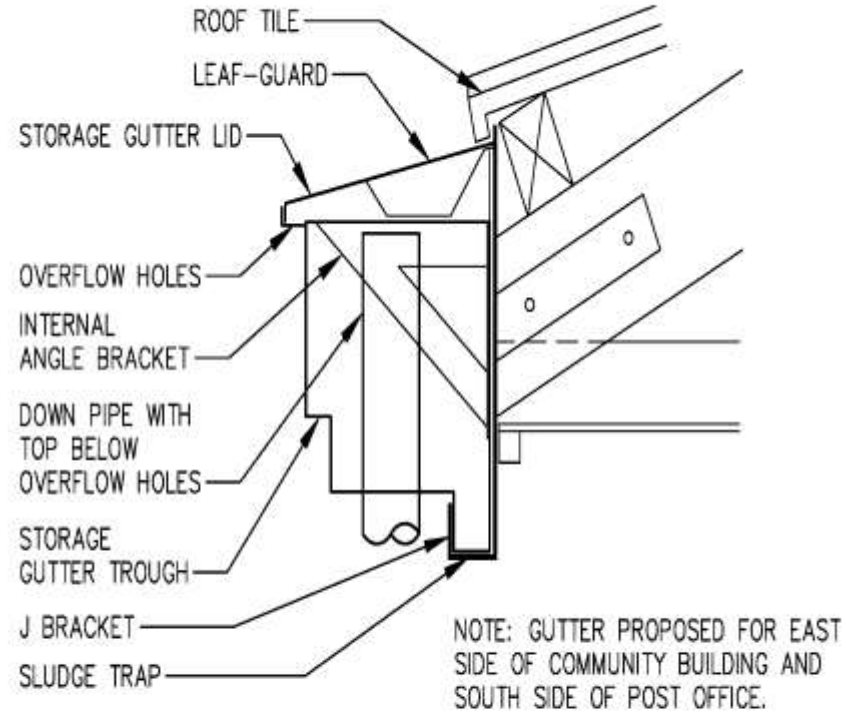
Area 3 Proposed Solution: Reduce runoff from hill across from post office and from building roof



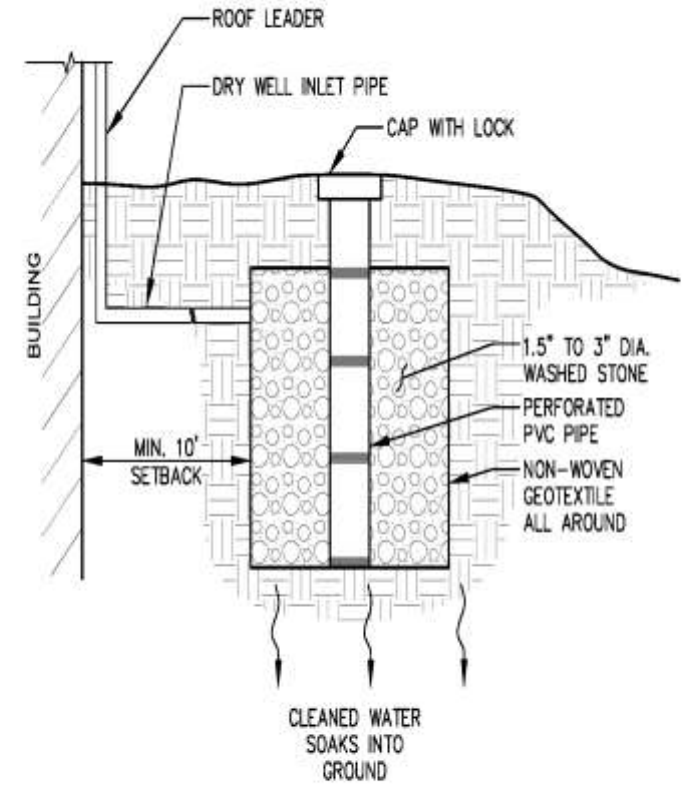
Pilot Project: Capture runoff from hill in rain garden – Plan to add additional gardens



Options: Low-maintenance gutter on back of building and infiltration well OR drip lines into dry well



LOW MAINTENANCE GUTTER
NOT TO SCALE



GUTTER INFILTRATION WELL
NOT TO SCALE

Next Steps

- **Continue site assessments in Spring, 2021**
- **Project team to prioritize proposed projects in consultation with B.I.V.C. Board of Overseers and landowners**
- **Based on prioritization, CCSWCD to develop detailed designs, with operation and maintenance plans, for spring/fall 2021 implementation (w/ landowner permission and with funding if needed)**
- **Develop native plant lists and propagate plants**



Questions?

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