



Appendix A: Assessment Summaries for BMPs

HW Site ID#: 1	
Type of BMP: Constructed wetland	
Grant Funding Source/ID Number: 319/07-06	
Year Built: 2010	
Reference Plans: Hand Markup of BMP Location #5, Design Details Nicholas Street at Atlantic Ave. Cohasset, Massachusetts; last revised 12/07/09.	
Address: Nichols Rd and Atlantic Ave	
BMP Condition: Poor condition. Inlet clogged so water cannot enter BMP. Appears that water ponds on street and overflows into BMP.	Potential Retrofit: Add another pretreatment practice (e.g., forebay) to address sand/sediment. Needs vegetation maintenance to address invasive species.
Climate Change Risks: Protected from ocean by a sea wall approximately 5-6 feet high. Exposed to marsh to the east. Functional problem appears to be from lack of maintenance which caused erosion.	
Notes:	

GENERAL INFORMATION	Site Visit
Elevation: 5.11 ft.	Weather: Rain Within Past 24 hours
<p>BMP Plant Health: Salt Impacts. Lots of phragmites. Wall collapsed into forebay, possibly undercut by high water. Water in catch basin approx 2 feet below rim. Inlet from diversion manhole completely blocked. Appears that bmp is not functioning and all water is diverted to nearby wetland.</p>	Arrival Time: 12:05 PM
	Nearest Tide: High, 1:28 PM
	Observers: None
<p>Observed Constraints: None</p>	Date Assessed: 6/4/2015
	<p>Outfall Details</p>
	Outfall Observed: No
	<p>Outfall Notes: Did not find outfall structure, but clear indication of discharge.</p>
<p>Direction of Coastal Exposure: North</p>	<p>Outfall Photo:</p> 
<p>Coastal Barriers: Sea wall</p>	
<p>Condition of Shoreline: Large stone wall created on back side of beach on beach side of street. On the east side of bmp, there is a marsh.</p>	
<p>Storm Damage/Flooding: Yes</p>	
<p>High Groundwater: Yes</p>	
<p>Assessed by: JER/ESB</p>	

BMP Photos



Drainage Area Photos




Sand appears to wash over lower section of sea wall, across Atlantic Ave. from BMP.




Looking northwest on Atlantic Ave.



Looking southwest across Atlantic Ave. to the gravel wetland.

HW Site ID#: 2 Town: Cohasset	
Type of BMP: Rain garden	
Grant Funding Source/ID Number: 319/07-06	
Year Built: 2011	
Reference Plans: BMP Location #4, As Built Plan Opposite 37 Beach Street Cohasset, Massachusetts; last revised 09/06/11.	
Address: 44 Beach St	
BMP Condition: Slit in manhole/catch basin that outfalls to rain garden. BMP appears to be in good condition and functioning properly.	
Climate Change Risks: Located at the low point on road and immediately adjacent to wet areas. Seems likely that groundwater will impact rain garden benefits.	Potential Retrofit: Needs vegetation maintenance to address invasive species.
Notes:	

GENERAL INFORMATION	Site Visit
Elevation: 9.93 ft.	Weather: Rain Within Past 24 hours
BMP Plant Health: Salt Impacts. Overall good condition. Not clear what the planting scheme is, maybe bayberry. Immediately adjacent to rain garden are phragmites and BVW.	Arrival Time: 10:43 AM
	Nearest Tide: High, 1:28 PM. Tide gate.
	Observers: Sara Grady (MassBays)
Observed Constraints: New Development. New single family home under construction up the street. Adjacent homes appear to be new or recently redone.	Date Assessed: 6/4/2015
	Outfall Details
	Outfall Observed: No
	Outfall Notes: Could not locate outfall.
Direction of Coastal Exposure: Northwest	Outfall Photo: 
Coastal Barriers: Marsh	
Condition of Shoreline: Immediately adjacent to BVW and salt marsh.	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: JER/ESB	

BMP Photos





Drainage Area Photos



Periwinkle snail paths evident on rock, indicating high water.



HW Site ID#: 8/9 Town: Cohasset	
Type of BMP: Stormceptor, infiltration basin	
Grant Funding Source/ID Number: 319/10-04	
Year Built: 2011	
Reference Plans: Jerusalem Road at Atlantic Ave Drainage Improvements; last revised 10/01/10	
Address: Jerusalem Rd at Atlantic Ave	
BMP Condition: Swale overgrown with knotweed. Hard to see swale.	
Climate Change Risks: Infiltration basin is not a recommended practice here due to high groundwater. Also, significant Japanese Knotweed presence could limit conveyance and available storage in practice.	Potential Retrofit: Possible space for bioretention across the street, at a higher elevation and buffered from the marsh.
Notes: Three catch basins are full of sediment.	

GENERAL INFORMATION	Site Visit
Elevation: 8.9.0 ft.	Weather: Rain Within Past 24hours
BMP Plant Health: All knotweed all the time.	Arrival Time: 12:44 PM
	Nearest Tide: High, 1:29 PM
	Observers: None
Observed Constraints: None	Date Assessed: 6/4/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes:
Direction of Coastal Exposure: Southeast	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Marsh	
Condition of Shoreline: Discharges to small area of salt marsh and then out to open water, appears to be coastal pond or restricted tidal area. Open ocean is opposite side of Atlantic Ave in front of houses.	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: JER/ESB	

BMP Photos



Swale is in the knotweed, upland marsh area is to the left and salt marsh grass to the right.



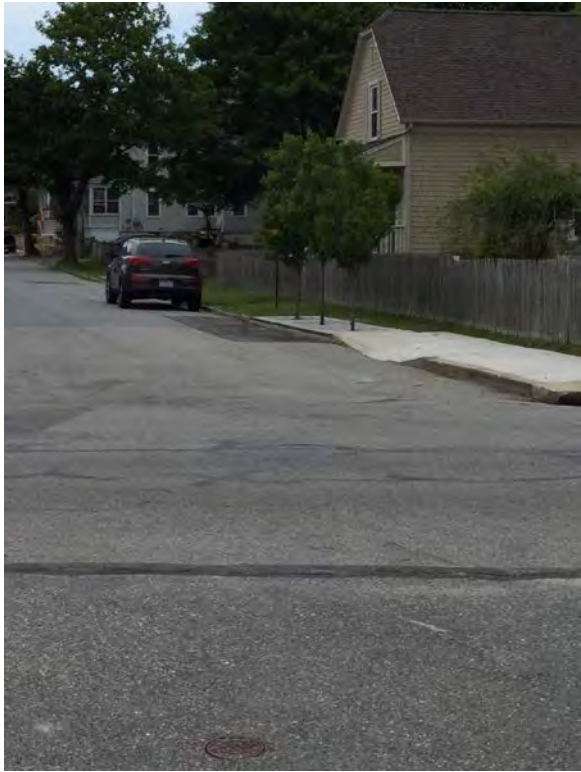
Three catch basins in the road discharge to swale (in the knotweed) across the street.

Drainage Area Photos



Opposite side of the street. Potential retrofit location.



HW Site ID#: 11 Town: Fairhaven	
Type of BMP: Tree box filter	
Grant Funding Source/ID Number: 319/10-06	
Year Built: 2013	
Reference Plans: Northern Fairhaven / New Bedford Inner Harbor LID Stormwater Enhancements; dated 5/6/12	
Address: Alpine Ave (11A), Dover St (11B) and Morgan St (11C) at Sycamore St	
BMP Condition: Tree box filters in good condition.	
Climate Change Risks: This neighborhood would have benefitted from outreach. Neighbors opposed the tree box filters.	Potential Retrofit:
Notes:	

BMP Photos



Site 11A, Alpine Avenue. Trees installed.



Site 11B, Dover Street. Trees not installed.



Site 11C, Morgan Street. Trees not installed.

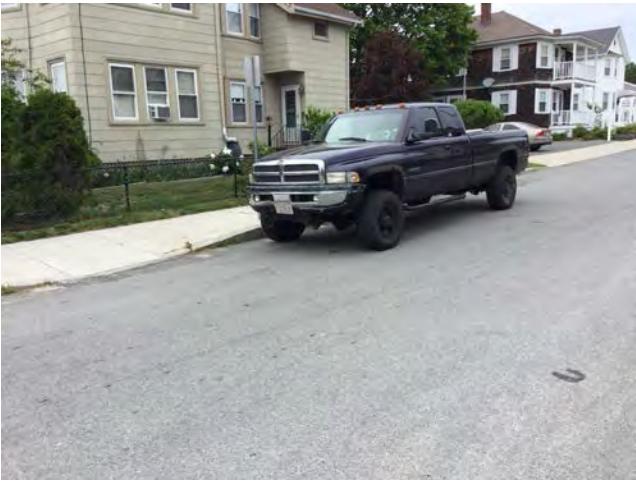
Drainage Area Photos




Site 11A, Alpine Ave.




Site 11B, Dover Street



Site 11C, Morgan Street

HW Site ID#: 15 Town: Fairhaven	
Type of BMP: Rain garden	
Grant Funding Source/ID Number: 319/09-04	
Year Built: 2012	
Reference Plans: Northern Fairhaven / New Bedford Inner Harbor LID Stormwater Enhancements; dated 9/24/09	
Address: Near corner of Pilgrim Ave and Cherry St	
BMP Condition: Rain Garden in good condition, with no debris or erosion.	
Climate Change Risks: Outfall possibly could have been sited at a higher elevaton to allow for a rise in sea level.	Potential Retrofit: Possibly raise outlet pipe in wall.
Notes: No level spreader in Bioretention. Rip rap inflow needs maintenance.	

GENERAL INFORMATION	Site Visit
Elevation: 5.00 ft.	Weather: Clear
BMP Plant Health: Sparse	Arrival Time: 11:16 AM
	Nearest Tide: High, 1:20 PM
	Observers: Elise Leduc (Woods Hole Group)
Observed Constraints: None	Date Assessed: 6/8/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes: Duck bill on outfall. Lots of trash near outfall.
Direction of Coastal Exposure: South	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Sea wall	
Condition of Shoreline: Sea wall in need of repairs/maintenance. Litter and debris.	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: ERK/ACK	

BMP Photos





Drainage Area Photos



Drains to catchbasin at rain garden outlet.



HW Site ID#: 16	
Type of BMP: Filtered catch basin	
Grant Funding Source/ID Number: 319/09-04	
Year Built: 2013	
Reference Plans: Northern Fairhaven / New Bedford Inner Harbor LID Stormwater Enhancements; dated 9/24/09	
Address: Near corner of Pilgrim Ave and Cherry St	
BMP Condition: Unknown. It was not possible to fully inspect the Ultrahydroclean unit.	
Climate Change Risks: The filtering mechanism of the practice potentially could be bypassed if water backs up through the catch basin. Outfall could have been sited at a higher elevation to allow for a rise in sea level.	Potential Retrofit:
Notes: Missing duck bill on outfall.	

GENERAL INFORMATION	Site Visit
Elevation: 4.00 ft.	Weather: Clear
BMP Plant Health: NA	Arrival Time: 11:16 AM
	Nearest Tide: High, 1:20 PM
	Observers: Elise Leduc (Woods Hole Group)
Observed Constraints: None	Date Assessed: 6/8/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes: No duck bill on outfall. Lots of trash near outfall.
Direction of Coastal Exposure: South	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Sea wall	
Condition of Shoreline: Sea wall in need of repairs/maintenance. Litter and debris.	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: ERK/ACK	

BMP Photos




Needs maintenance.



Drainage Area Photos



HW Site ID#: 17 Town: Provincetown	
Type of BMP: Combined Infiltration / Leaching CB	
Grant Funding Source/ID Number: 319/09-03	
Year Built: 2011	
Reference Plans: Bradford and Court Street Stormwater Improvements Plan - Court Street, Notes and Details, revised 7/29/09	
Address: Court St east of Commercial St	
BMP Condition: Good condition.	
Climate Change Risks: Elevated groundwater levels and potential wave action damage to structures during large storm event.	Potential Retrofit: None.
Notes: Standing water in pretreatment tank.	

BMP Photos



Looking towards water.



looking up the drainage area from the BMP



Inlet not built per design. Commercial Street is now porous asphalt. DMH is under trash can.


Drainage Area Photos




Two buildings in drainage area to practice.



Drainage area is only the road between Commercial Street and the beach, as well as two roofs.

HW Site ID#: 18 Town: Provincetown	
<p>Type of BMP: Combined Infiltration / Leaching CB</p>	
<p>Grant Funding Source/ID Number: 319/09-03</p>	
<p>Year Built: 2011</p>	
<p>Reference Plans: Bradford Street Drainage Improvements Plan and Profile; dated June 2012</p>	
<p>Address: Bradford St, east of Hancock St to just east of corner of Kendall Lane</p>	
<p>BMP Condition: Standing water in catch basins, but they have sumps. No noticeable issues.</p>	
<p>Climate Change Risks: These underground systems were likely installed to reduce localized flooding. They are two streets back from the shoreline and relatively elevated, so not as at risk as some of the other Provincetown sites.</p>	<p>Potential Retrofit:</p>
<p>Notes:</p>	


GENERAL INFORMATION	Site Visit
Elevation: 1.59 ft.	Weather: Clear
BMP Plant Health: NA	Arrival Time: 5:22 PM
	Nearest Tide: Low, 3:04 PM
	Observers: None
Observed Constraints: None	Date Assessed: 5/29/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes: Duckbill on outlet pipe. Evidence of discharge.
Direction of Coastal Exposure: Southeast	<p>Outfall Photo:</p> 
Coastal Barriers: Other	
Condition of Shoreline: Good; Not close	
Storm Damage/Flooding: No	
High Groundwater: Unknown	
Assessed by: ACK/MW	

BMP Photos



Drainage Area Photos



HW Site ID#: 19a		Town: Hull
<p>Type of BMP: Subsurface infiltration chambers</p>		
<p>Grant Funding Source/ID Number: 319/08-06</p>		
<p>Year Built: 2012</p>		
<p>Reference Plans: Project Final Report - Stormwater BMPs at Straits Pond, Project Number 09-06/319</p>		
<p>Address: Richards Rd at Pond St</p>		
<p>BMP Condition: Disturbed area above chambers lacks stabilized veg. Covered by rocks and invasives.</p>	<p>Potential Retrofit:</p>	
<p>Climate Change Risks: The underground system is likely to address local flooding (area is a low point). Likely high groundwater, so subsurface infiltration is not ideal here. Need to size appropriately to account for lack of infiltration and/or assume detention only.</p>		
<p>Notes:</p>		

GENERAL INFORMATION	Site Visit
Elevation: 8.97 ft.	Weather: Clear
BMP Plant Health: NA	Arrival Time: 1:24 PM
	Nearest Tide: High, 1:29 PM
	Observers: None
Observed Constraints: None	Date Assessed: 6/4/2015
	Outfall Details
	Outfall Observed: No
	Outfall Notes:
	No Outfall Photo Available
Direction of Coastal Exposure: Northeast	
Coastal Barriers: Upland Veg Buffer	
Condition of Shoreline: Japanese knotweed and other shrubs and trees protect practice.	
Storm Damage/Flooding: No	
High Groundwater: No	
Assessed by: JER/ESB	

BMP Photos




Surface of practice area.



Drainage Area Photos



HW Site ID#: 19b		Town: Hull
<p>Type of BMP: Rain garden</p>		
<p>Grant Funding Source/ID Number: 319/08-06</p>		
<p>Year Built: 2012</p>		
<p>Reference Plans: Project Final Report - Stormwater BMPs at Straits Pond, Project Number 09-06/319</p>		
<p>Address: Richards Rd at Pond St</p>		
<p>BMP Condition: Forebay appears to be a deep sump catch basin with weir outlet, cut in basin structure. Flow enters by paved inlet. Flow goes to small rain garden, and overflows to existing drain pipes. Ponding on road as evidenced by sediments.</p>		
<p>Climate Change Risks: Could be affected by high groundwater and presence of invasive species.</p>	<p>Potential Retrofit:</p>	
<p>Notes:</p>		

BMP Photos





Drainage Area Photos



Looking upgradient on pond.



HW Site ID#: 22a		Town: Scituate
Type of BMP: Field stone plunge pool		
Grant Funding Source/ID Number: 319/06-06		
Year Built: 2009		
Reference Plans: Project Final Report - Herring River Coastal Low Impact Development Project, DEP Project #06-06/319		
Address: Parking lot across from golf course on Driftway		
BMP Condition: Appears to be in good condition. Erosion occurring to the right hand side of the outfall. Sediment deposits throughout BMP.	Potential Retrofit:	
Climate Change Risks: Erosion at outfall as a result of increased runoff in drainage area and/or coastal inundation.		
Notes: Road and large parking lot. Bike path along road.		

GENERAL INFORMATION	Site Visit
Elevation: 2.58 ft.	Weather: Rain Within Past 24hours
BMP Plant Health: Erosion Impacts. Logs established. Vegetation surrounding appears to be in good condition.	Arrival Time: 9:04 AM
	Nearest Tide: High, 1:44 PM
	Observers: Sara Grady (MassBays)
Observed Constraints: None	Date Assessed: 6/4/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes:
Direction of Coastal Exposure: Southwest	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Marsh	
Condition of Shoreline: Some erosion present.	
Storm Damage/Flooding: Yes	
High Groundwater: No	
Assessed by: JER/ESB	

BMP Photos



Erosion.



Vegetation.



Sedimentation.

Drainage Area Photos




Salt marsh.



Looking west on Driftway. Golf course across street.



Looking east on Driftway.

HW Site ID#: 22b		Town: Scituate
<p>Type of BMP: Rain garden</p>		
<p>Grant Funding Source/ID Number: 319/06-06</p>		
<p>Year Built: 2009</p>		
<p>Reference Plans: Project Final Report - Herring River Coastal Low Impact Development Project, DEP Project #06-06/319</p>		
<p>Address: Parking lot across from golf course on Driftway</p>		
<p>BMP Condition: Poor condition. Overgrown with grasses and other plants from nearby.</p>	<p>Potential Retrofit: Increase size of rain garden to capture more runoff and/or reduce impervious area in parking lot to increase benefit. Needs to be replanted.</p>	
<p>Climate Change Risks: Small depression in large parking lot. Protected by retaining wall. Minimal risks to climate change except more localized flooding.</p>	<p>Notes:</p>	

BMP Photos



Looking toward marsh.



Looking towards driftway.



Retaining wall between BMP and marsh.

Drainage Area Photos



Parking lot entrance.




Parking lot.



Ramp to marsh from parking lot.

HW Site ID#: 22c		Town: Scituate
<p>Type of BMP: Bioretention</p>		
<p>Grant Funding Source/ID Number: 319/06-06</p>		
<p>Year Built: 2009</p>		
<p>Reference Plans: Project Final Report - Herring River Coastal Low Impact Development Project, DEP Project #06-06/319</p>		
<p>Address: Adjacent to Driftway, east of Ladds Way development</p>		
<p>BMP Condition: Overgrown. Not maintained well. Still appears to be functioning. Forebay has significant sediment and debris. Overgrown outfall structure. Flared end of pipe has significant sediment. Needs cleaning,</p>	<p>Potential Retrofit:</p>	
<p>Climate Change Risks: Adjacent to marsh. Discharge is slightly above marsh, but no apparent high water issues. Water observed in base of overflow structure, at least 2 feet below grate.</p>		
<p>Notes: Structure appears to be functioning well but needs maintenance. Forebay full and spillway riprap embedded with sediment.</p>		

GENERAL INFORMATION	Site Visit
Elevation: 10.55 ft.	Weather: Rain Within Past 24 hours
BMP Plant Health: Good health.	Arrival Time: 9:56 AM
	Nearest Tide: High, 1:44 PM
	Observers: Sara Grady (Massbays)
Observed Constraints: None	Date Assessed: 6/4/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes: Note edge of spillway riprap on left and edge of marsh wrack in center right, indicating high tide.
Direction of Coastal Exposure: Southeast	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Marsh	
Condition of Shoreline: Healthy marsh	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: JER/ESB	

BMP Photos



Forebay full of sediment.



Note the vegetation.


Drainage Area Photos



Sign on pathway adjacent to BMP along marsh edge and nearby housing complex.




Marsh where the BMP discharges.


HW Site ID#: 25		Town: Sandwich
<p>Type of BMP: Bioretention sand filter</p>		
<p>Grant Funding Source/ID Number: 319/02-13</p>		
<p>Year Built: 2010</p>		
<p>Reference Plans: Mill Creek Estuary Stormwater Mitigation As-Builts, dated June 15, 2012</p>		
<p>Address: Tupper Rd north of Moody Dr</p>		
<p>BMP Condition: Bioretention well maintained.</p>	<p>Potential Retrofit:</p>	
<p>Climate Change Risks: Too close to groundwater to behave like a filter. Appears to be saturated all the time, so only surface storage is available (which helps with nitrogen removal).</p>		
<p>Notes:</p>		

BMP Photos



Drainage Area Photos	

HW Site ID#: 26 Town: Sandwich	
Type of BMP: Bioretention sand filter	
Grant Funding Source/ID Number: 319/02-13	
Year Built: 2010	
Reference Plans: Mill Creek Estuary Stormwater Mitigation As-Builts; dated June 15, 2012	
Address: Tupper Rd farther north of Moody and east of Old Tupper Rd	
BMP Condition: Bioretention well maintained.	
Climate Change Risks: With sea level rise, there will be less and less head (tailwater) and water will not be able to get into the practice.	Potential Retrofit: Suggest moving inlets or using larger inlets, or selecting a different practice.
Notes:	


GENERAL INFORMATION	Site Visit
Elevation: 7.12 ft.	Weather: Overcast
BMP Plant Health: Good	Arrival Time: 11:48 AM
	Nearest Tide: Low, 12:52 PM
	Observers: None
Observed Constraints: None	Date Assessed: 5/27/2015
	Outfall Details
	Outfall Observed: No
	Outfall Notes:
Direction of Coastal Exposure: North	<p data-bbox="813 982 971 1014">Outfall Photo:</p> 
Coastal Barriers: Too Far Away	
Condition of Shoreline: Too Far Away	
Storm Damage/Flooding: Yes	
High Groundwater: Yes	
Assessed by: ERK	

BMP Photos



Drainage Area Photos



HW Site ID#: 27		Town: Sandwich
<p>Type of BMP: Deep sump catch basin / leaching</p>		
<p>Grant Funding Source/ID Number: 319/02-13</p>		
<p>Year Built: 2009</p>		
<p>Reference Plans: Mill Creek Estuary Stormwater Mitigation As-Builts; dated June 15, 2012</p>		
<p>Address: Tupper Rd just SW of River St/ Tupper Rd just NW of River St</p>		
<p>BMP Condition: Unknown. Underground structures in middle of road not accessible.</p>		
<p>Climate Change Risks: Underground infiltration may not be a good choice at sites that have high ground water.</p>	<p>Potential Retrofit:</p>	
<p>Notes:</p>		

BMP Photos




Looking south.



Drainage Area Photos





HW Site ID#: 28 Town: Sandwich	
Type of BMP: Deep sump catch basin / leaching	
Grant Funding Source/ID Number: 319/02-13	
Year Built: 2011	
Reference Plans: Mill Creek Estuary Stormwater Mitigation As-Builts; dated June 15, 2012	
Address: Tupper Rd and Captain Ellis Way	
BMP Condition: Needs maintenance. Catch basin is full of sediment / grass clippings. Underground structures in middle of road not accessible.	
Climate Change Risks: Underground infiltration may not be a good choice at sites that have high ground water.	Potential Retrofit: Swales with checkdams along Captain Ellis Way could be an alternative.
Notes:	

BMP Photos



Drainage Area Photos	

HW Site ID#: 29 Town: Provincetown	
<p>Type of BMP: Deep sump catch basin / leaching</p>	
<p>Grant Funding Source/ID Number: CPR/10-14</p>	
<p>Year Built: 2010</p>	
<p>Reference Plans: 55 Commercial Street Stormwater Improvements Record Drawings; dated July 2010</p>	
<p>Address: 55 Commercial St in the parking lot</p>	
<p>BMP Condition: No evidence of problems, but probably sited in groundwater.</p>	
<p>Climate Change Risks: Rising groundwater may reduce infiltration capacity. Standing water in structures.</p>	<p>Potential Retrofit: No obvious retrofit opportunity.</p>
<p>Notes: Same groundwater rise issues as several other sites due to sea level rise, but sea wall in good shape.</p>	


GENERAL INFORMATION	Site Visit
Elevation: 4.24 ft.	Weather: Clear
BMP Plant Health: NA	Arrival Time: 3:50 PM
	Nearest Tide: Low, 3:04 PM
	Observers: None
Observed Constraints: Roadwork	Date Assessed: 5/29/2015
	Outfall Details
	Outfall Observed: No
	Outfall Notes: Buried.
Direction of Coastal Exposure: South	<p data-bbox="813 982 971 1014">Outfall Photo:</p> 
Coastal Barriers: Ret. Wall	
Condition of Shoreline: Beach looks pretty good. But parking surface quite deteriorated.	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: ACK/MW	


BMP Photos



Drainage Area Photos



HW Site ID#: 30		Town: Oak Bluffs
<p>Type of BMP: Rain garden/gravel wetland</p>		
<p>Grant Funding Source/ID Number: CPR/10-10</p>		
<p>Year Built: 2010</p>		
<p>Reference Plans: East Chop Drive Stormwater Pollution Prevention Construction Plans; dated March 23, 2010</p>		
<p>Address: Approx 64 East Chop Dr on Mill Sq Rd and East Chop Dr</p>		
<p>BMP Condition: BMP is in good working condition. In need of maintenance of plants and sediment removal. Outlet structure partially clogged with debris. Abutting large trees have died from root damage.</p>	<p>Potential Retrofit: Possible improvements may include additional plantings along the top of slope to expand the buffer between the roadway and the practice. An alternative to the paved flume for pretreatment may improve sedimentation concerns.</p>	
<p>Climate Change Risks: This practice may be subject to coastal over wash in an extreme event, but is moderately protected in the harbor from direct coastal storm influences. The site is highly influenced by tides as the bottom of the practice is below the high tide elevation. But the practice is lined so is not directly influenced by the tide.</p>	<p>Notes: Overall, this site is performing well but requires maintenance.</p>	


GENERAL INFORMATION	Site Visit
Elevation: -1.65 ft.	Weather: Clear
BMP Plant Health: Plant trimming required but otherwise healthy. Some sediment damage. Weeding necessary and some invasive control required.	Arrival Time: 10:38 AM
	Nearest Tide: High, 10:36 AM
	Observers: None
Observed Constraints: None	Date Assessed: 6/14/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes:
Direction of Coastal Exposure: Southeast	<p data-bbox="813 984 971 1010">Outfall Photo:</p> 
Coastal Barriers: Sea wall	
Condition of Shoreline: Good; Sheet pile bulkhead in good condition	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: KMH/ACS	


BMP Photos



Drainage Area Photos



HW Site ID#: 31b		Town: Marion
Type of BMP: Bioretention		
Grant Funding Source/ID Number: CPR/05-01		
Year Built: 2005		
Reference Plans: Record Plan Island Wharf; dated 11/15/06		
Address: Parking lot north/ adjacent to Island Wharf Rd		
BMP Condition: Bioretention in good condition.		
Climate Change Risks: Raise outfall in outlet structure.	Potential Retrofit:	
Notes:		

GENERAL INFORMATION	Site Visit
Elevation: 0.33 ft.	Weather: Clear
BMP Plant Health: Good maintenance. Cutting out woody. Some erosion on vegetated berm but otherwise okay.	Arrival Time: 10:02 AM
	Nearest Tide: Low, 6:21 AM
	Observers: Kirk Bosma, Elise Leduc (Woods Hole Group)
Observed Constraints: None	Date Assessed: 6/8/2015
	Outfall Details
	Outfall Observed: Submerged
	Outfall Notes: Outfall underwater at mean high tide.
Direction of Coastal Exposure: Southeast	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Sea wall	
Condition of Shoreline: Minor erosion at back face of seawall	
Storm Damage/Flooding: Yes	
High Groundwater: Yes	
Assessed by: ERK/ACK	

BMP Photos



Manhole.



Bioretention.


Drainage Area Photos




Bioretention and parking area.



Eroded grass.

HW Site ID#: 31b		Town: Marion
Type of BMP: Bioretention		
Grant Funding Source/ID Number: CPR/05-01		
Year Built: 2005		
Reference Plans: Record Plan Island Wharf; dated 11/15/06		
Address: Parking lot north/ adjacent to Island Wharf Rd		
BMP Condition: Bioretention in good condition.		
Climate Change Risks: Raise outfall in outlet structure.	Potential Retrofit:	
Notes:		


GENERAL INFORMATION	Site Visit
Elevation: 0.98 ft.	Weather: Clear
BMP Plant Health: Plants are doing well	Arrival Time: 10:11 AM
	Nearest Tide: Low, 6:21 AM
	Observers: Kirk Bosma, Elise Leduc (Woods Hole Group)
Observed Constraints: None	Date Assessed: 6/8/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes: Eroded channel at outfall. Observed some flow.
Direction of Coastal Exposure: Southeast	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Sea wall	
Condition of Shoreline: Needs stabilization. Some evidence of overflow	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: ERK/ACK	

BMP Photos



Drainage Area Photos

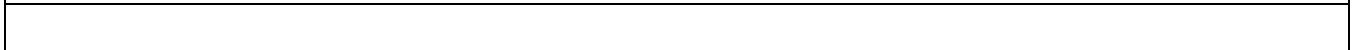
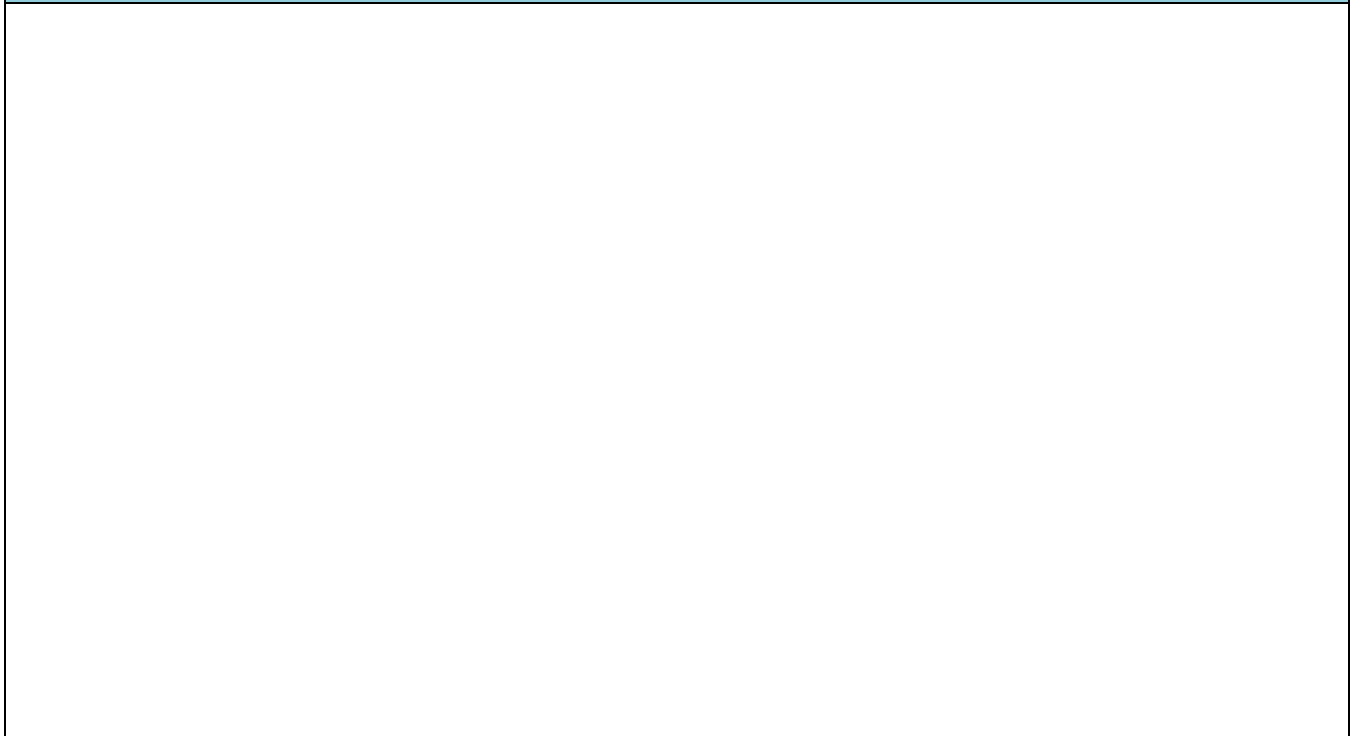


HW Site ID#: 31c		Town: Marion
Type of BMP: Bioretention		
Grant Funding Source/ID Number: CPR/05-01		
Year Built: 2005		
Reference Plans: Record Plan Island Wharf; dated 11/15/06		
Address: Parking lot north/ adjacent to Island Wharf Rd		
BMP Condition: Bioretention in good condition.		
Climate Change Risks: See 31a. Bioretention connected to outfall.	Potential Retrofit:	
Notes:		

BMP Photos




Drainage Area Photos



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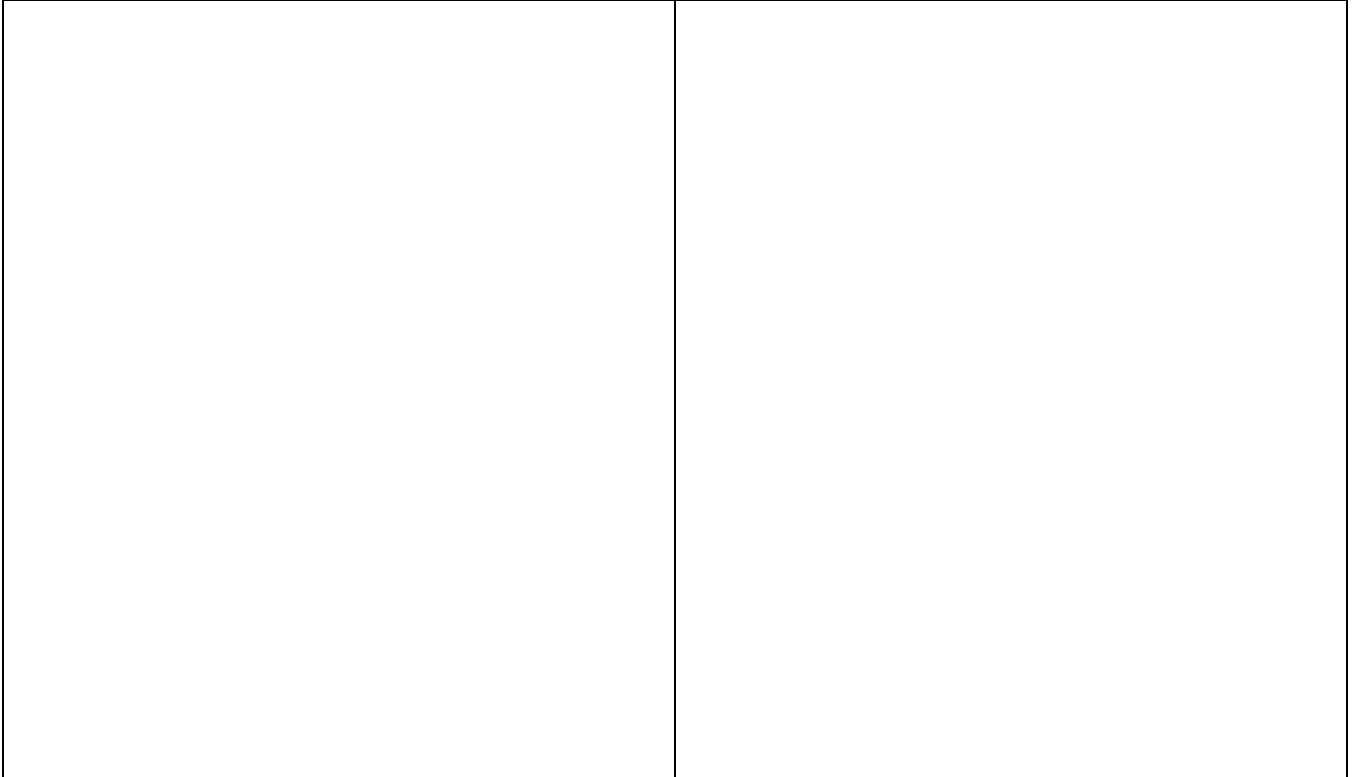



HW Site ID#: 31d		Town: Marion
<p>Type of BMP: Bioretention</p>		
<p>Grant Funding Source/ID Number: CPR/05-01</p>		
<p>Year Built: 2005</p>		
<p>Reference Plans: Record Plan Island Wharf; dated 11/15/06</p>		
<p>Address: Parking lot north/ adjacent to Island Wharf Rd</p>		
<p>BMP Condition: Bioretention in good condition. Water was heard running through the underdrain pipes.</p>	<p>Potential Retrofit:</p>	
<p>Climate Change Risks: See 31a. Bioretention connected to outfall.</p>	<p>Notes: Pretty significant flow from this under drain. Dry weather.</p>	


BMP Photos



Drainage Area Photos



HW Site ID#: 32a Town: Bourne	
<p>Type of BMP: Cultec infiltration</p>	
<p>Grant Funding Source/ID Number: CPR/14-04</p>	
<p>Year Built: 2014</p>	
<p>Reference Plans: Buttermilk Way Stormwater Improvements Record Drawing; dated 06/12/2014</p>	
<p>Address: Approx 14 Buttermilk Way</p>	
<p>BMP Condition: Unknown. It appears that settling tank is functioning but we are unable to access the underground infiltration chambers.</p>	<p>Potential Retrofit: Missed opportunity to incorporate vegetative filter in parking islands above chamber system to provide water quality treatment for nitrogen.</p>
<p>Climate Change Risks: Could be affected by high ground water, or backup from connected system.</p>	
<p>Notes:</p>	

GENERAL INFORMATION	Site Visit
Elevation: 2.39 ft.	Weather: Raining
BMP Plant Health: NA	Arrival Time: 1:18 PM
	Nearest Tide: High, 2:25 PM
	Observers: Elise Leduc (Woods Hole Group)
Observed Constraints: None	Date Assessed: 6/8/2015
	Outfall Details
	Outfall Observed: Connects to 32a
	Outfall Notes:
Direction of Coastal Exposure: Southwest	<p data-bbox="813 982 971 1014">Outfall Photo:</p> 
Coastal Barriers: Upland Veg Buffer	
Condition of Shoreline: in parking lot at restaurant, not immediately adjacent to shoreline.	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: ERK/ACK	


BMP Photos



Drainage Area Photos



HW Site ID#: 32b Town: Bourne	
<p>Type of BMP: Cultec infiltration</p>	
<p>Grant Funding Source/ID Number: CPR/14-04</p>	
<p>Year Built: 2014</p>	
<p>Reference Plans: Buttermilk Way Stormwater Improvements Record Drawing; dated 06/12/2014</p>	
<p>Address: Approx 14 Buttermilk Way</p>	
<p>BMP Condition: Unknown. It appears that settling tank is functioning but we are unable to access the underground infiltration chambers.</p>	<p>Potential Retrofit: Underground infiltration may not be a good choice at sites that have high ground water. Recommend duck bill on outfall.</p>
<p>Climate Change Risks: High groundwater, sea level rise will exacerbate the problem.</p>	
<p>Notes:</p>	


GENERAL INFORMATION	Site Visit
Elevation: 2.37 ft.	Weather: Raining
BMP Plant Health: NA	Arrival Time: 1:18 PM
	Nearest Tide: High, 2:25 PM
	Observers: Elise Leduc (Woods Hole Group)
Observed Constraints: None	Date Assessed: 6/8/2015
	Outfall Details
	Outfall Observed: Submerged
	Outfall Notes: Submerged. No duck bill.
Direction of Coastal Exposure: Southwest	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Upland Veg Buffer	
Condition of Shoreline: Exposed beach area at the outfall. Adjacent shoreline is protected by rip rap walls.	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: ERK/ACK	


BMP Photos



Drainage Area Photos



HW Site ID#: 33 Town: Kingston	
<p>Type of BMP: Subsurface infiltration chambers</p>	
<p>Grant Funding Source/ID Number: CPR/13-14</p>	
<p>Year Built: 2013</p>	
<p>Reference Plans: Jones River Estuary BMPs Phase 1; Funded Under CZM CPR '13; 6/29/13; Sheet1/3 Proj No. 12-228</p>	
<p>Address: Locus at end of River St near wharf, just northeast from harbormaster</p>	
<p>BMP Condition: Harbor master says working fine. Maybe getting overland flow bypassing lowest cb. Standing water in main leaching chamber. Uphill chambers and CBs seem fine.</p>	
<p>Climate Change Risks: Cleaning and maintenance for chambers is difficult. There are no inspection ports.</p>	<p>Potential Retrofit: Proposed rain garden (not constructed under this grant) is an ideal location to capture a portion of the parking lot runoff. Retrofit to capture manage sediment in parking/ boat ramp area. Install berm around trash dumpster.</p>
<p>Notes:</p>	

GENERAL INFORMATION	Site Visit
Elevation: 3.45 ft.	Weather: Clear
BMP Plant Health: NA	Arrival Time: 8:39 AM
	Nearest Tide: Low, 8:33 AM
	Observers: None
Observed Constraints: None	Date Assessed: 6/5/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes: Iron floc staining.
Direction of Coastal Exposure: East	<p data-bbox="813 982 971 1014">Outfall Photo:</p> 
Coastal Barriers: Ret. Wall	
Condition of Shoreline: At boat ramp, no marsh grass. No significant sign of erosion at outfall.	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: JER/ACK	

BMP Photos




Hooded outlet pipe.


Drainage Area Photos



Looking uphill at drainage area.



HW Site ID#: 34 Town: Kingston	
<p>Type of BMP: Two rain gardens with trench drain (for</p>	
<p>Grant Funding Source/ID Number: CPR/13-14</p>	
<p>Year Built: 2013</p>	
<p>Reference Plans: Jones River Estuary BMPs Phase 1; Funded Under CZM CPR '13; Kingston, MA; 6/29/13; Sheet 2/3 Proj No. 13-231</p>	
<p>Address: Locus at end of Delano Ave near water's edge</p>	
<p>BMP Condition: Raingardens look good. Trench drain clogged with sediment, organics. Erosion evidence in riprap overflow. Water in both raingarden inlets. Runoff passes clogged trench drain, overtops curb. Minor curb damage in rain garden near Delano (plow?).</p>	
<p>Climate Change Risks: None.</p>	<p>Potential Retrofit: Clean out trench drain. Stone overflow and stairs should be planted to stabilize slopes. Consider curb cuts to allow direct flow to raingarden in larger events to prevent backups/ ponding behind curb. Reduce sediment, debris from drainage area?</p>
<p>Notes: Love this retrofit, interesting design. Challenge is to keep trench drain unclogged. Need to ensure that maintenance happens or rain gardens will be bypassed and slope will erode. Not sure I saw wind impacts on plants, but perhaps foot traffic on berms.</p>	

GENERAL INFORMATION	Site Visit
Elevation: 7.78 ft.	Weather: Clear
BMP Plant Health: Good condition. Good coverage, except along berms. Needs typical maintenance to remove small invasive species.	Arrival Time: 9:26 AM
	Nearest Tide: Low, 8:33 AM
	Observers: None
Observed Constraints: None	Date Assessed: 6/5/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes: Erosion at bottom, along stairs and along riprap overflow.
Direction of Coastal Exposure: West	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Marsh	
Condition of Shoreline: Short distance to water/marsh.	
Storm Damage/Flooding: Yes	
High Groundwater: No	
Assessed by: JER/ACK	

BMP Photos

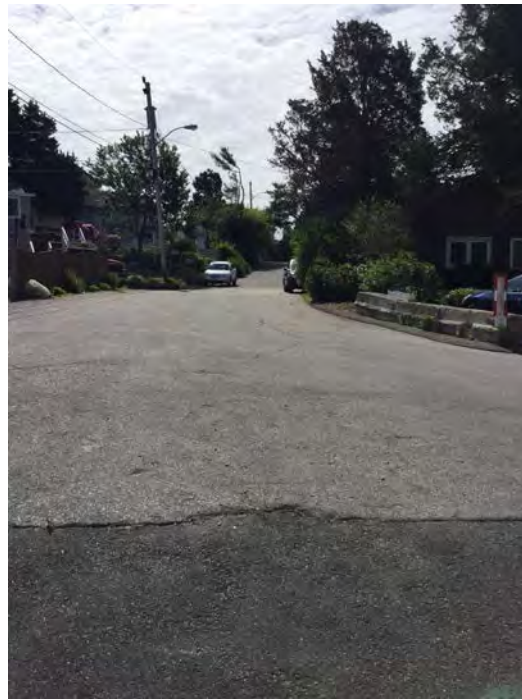


Rain garden immediately downgradient of Delano. Broken concrete curb.




Second rain garden.


Drainage Area Photos



Looking upstream towards Delano.



HW Site ID#: 35 Town: Duxbury	
<p>Type of BMP: Four subsurface chamber systems with</p>	
<p>Grant Funding Source/ID Number: CPR/13-02</p>	
<p>Year Built: 2013</p>	
<p>Reference Plans: Stormwater Mitigation Facilities for Bay Road Area 28, Duxbury, MA; 6/30/13; Sheet 1/1 Proj No. 13-230</p>	
<p>Address: Bay Rd just SW of Bayview Rd, Bay Rd just NE of Bayridge Lane</p>	
<p>BMP Condition: Practice is underground, so it is hard to determine the condition. Looks good from surface.</p>	
<p>Climate Change Risks: These practices are sitting in groundwater, but maybe that is ok if these are for detention only.</p>	<p>Potential Retrofit:</p>
<p>Notes:</p>	


GENERAL INFORMATION	Site Visit
Elevation: 8.04 ft.	Weather: Clear
BMP Plant Health: NA	Arrival Time: 2:10 PM
	Nearest Tide: Low, 3:42 PM
	Observers: None
Observed Constraints: Additional roadwork, installation of new catchbasins and possibly more underground storage, which could have changed drainage area.	Date Assessed: 6/13/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes:
Direction of Coastal Exposure: Southeast	Outfall Photo: 
Coastal Barriers: Marsh	
Condition of Shoreline: Stable outfall, but well-defined channel; marsh extensive	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: ACK	


BMP Photos



Drainage Area Photos



HW Site ID#: 37 Town: Plymouth	
<p>Type of BMP: Bioretention</p>	
<p>Grant Funding Source/ID Number: 319/04-09</p>	
<p>Year Built: 2009</p>	
<p>Reference Plans: Town of Plymouth Water Front Park Drainage Improvements Project Final s.319 Project Report; Project # 4-09/319; Prepared for MADEP Bureau of Resource Protection and U.S. EPA Region 1</p>	
<p>Address: Water Street, Plymouth MA</p>	
<p>BMP Condition: Covered by morning glory vines. Standing, stagnant water with algae near inflow point. Observation wells hidden. Overflow structure clogged, ponding. Outfall pipe clogged with debris. Evidence of overflow (green grass, scour at sidewalk).</p>	
<p>Climate Change Risks: Practice located directly adjacent to the water with significant exposure to wind.</p>	<p>Potential Retrofit: Needs vegetation maintenance to remove invasive species. Check if the underdrain is clogged. Clear debris from outfall pipe and outlet structure.</p>
<p>Notes:</p>	

GENERAL INFORMATION	Site Visit
Elevation: 4.63 ft.	Weather: Clear
BMP Plant Health: Plants in good condition, good coverage. Vines in bio should be removed. Slightly overgrown. Detritus should be removed.	Arrival Time: 10:46 AM
	Nearest Tide: High, 2:15 PM
	Observers: None
Observed Constraints: Other	Date Assessed: 6/5/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes: Rock and debris in outfall pipe.
Direction of Coastal Exposure: Northeast	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Sea wall	
Condition of Shoreline: Stabilized/ hardened.	
Storm Damage/Flooding: No	
High Groundwater: No	
Assessed by: JER/ACK	

BMP Photos




Green grass indicates overflow from bio. Erosion on other side of sidewalk where overland flow discharges to sea wall.



Overgrown, vines.

Drainage Area Photos



HW Site ID#: 40 Town: Barnstable	
Type of BMP: Bioretention	
Grant Funding Source/ID Number: /	
Year Built: 2010-2011	
Reference Plans: New Bathhouse and Garage, Sandy Neck Beach, Grading and Drainage Sheet C-8 Bid Set, 2010	
Address: Sandy Neck Rd, bathhouse and parking lot	
BMP Condition: Primary Bioretention in good condition. Second Bioretention needs some work on eroded slopes.	
Climate Change Risks: No recommendations. This practice is located a significant distance from the shoreline.	Potential Retrofit:
Notes:	


BMP Photos



Drainage Area Photos



HW Site ID#: 41 Town: Chelsea	
<p>Type of BMP: Two biofilter systems</p>	
<p>Grant Funding Source/ID Number: MET/</p>	
<p>Year Built: 2013</p>	
<p>Reference Plans: Stormwater System Retrofits MACE Public Housing Chelsea, Massachusetts; 12/18/13; Sheet C-1</p>	
<p>Address: Clinton St and Mill Court, Mace Housing Complex, Chelsea</p>	
<p>BMP Condition: Maintenance observed during our visit. Landscapers suggest mulch is deep and should be removed, replaced to lower elevation. Water is flowing over berms and carrying mulch into gravel spillways. Catch basin into lower basin is ponding, clogged.</p>	
<p>Climate Change Risks: Outfall elevation is very low in the marsh. Salt from snow piles dumped into bioretentions was likely a problem with plant survival.</p>	<p>Potential Retrofit:</p>
<p>Notes:</p>	

GENERAL INFORMATION	Site Visit
Elevation: 5.89 ft.	Weather: Rain Within Past 24hours
BMP Plant Health: Plants had been dying initially after installation but look healthy now.	Arrival Time: 2:50 PM
	Nearest Tide: High, 1:24 PM
	Observers: Julie Simpson (MIT Sea Grant)
Observed Constraints: None	Date Assessed: 6/4/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes: Outfall ditch has recently been riprapped for stabilization. Unclear if outfall is at near end or far end of riprapp.
Direction of Coastal Exposure: Northeast	Outfall Photo: 
Coastal Barriers: Marsh	
Condition of Shoreline: Highlight impacted marsh edge. Chain link fence along marsh edge. Vegetated buffer between lower practice and salt marsh grass is only a few feet. Outfall pipe discharges to marsh; Ditch has recently been stabilized with riprapp.	
Storm Damage/Flooding: No	
High Groundwater: Yes	
Assessed by: JER/ESB	

BMP Photos





Maintenance underway.



Drainage Area Photos



HW Site ID#: 44 Town: Plymouth	
Type of BMP: Bioretention, Subsurface infiltration	
Grant Funding Source/ID Number: CPR/2011	
Year Built: 2011	
Reference Plans: Pond Road Stormwater Improvements, dated March 2012	
Address: Pond Road, Plymouth	
BMP Condition: Bioretention in very good condition. Some sediment build-up on trench drain grate.	
Climate Change Risks: No recommendations. This practice is quite a bit higher than the adjacent water elevation.	Potential Retrofit:
Notes: Sediment fore bay needs to be cleaned out. Pretreat tanks do not have access manholes	

GENERAL INFORMATION	Site Visit
Elevation: 16.77 ft.	Weather: Overcast
BMP Plant Health: Good	Arrival Time: 2:30 PM
	Nearest Tide: High, 4:45 PM
	Observers: None
Observed Constraints: None	Date Assessed: 6/8/2015
	Outfall Details
	Outfall Observed: Yes
	Outfall Notes: Overflow in good condition
Direction of Coastal Exposure: Northeast	<p data-bbox="813 982 971 1010">Outfall Photo:</p> 
Coastal Barriers: Ret. Wall	
Condition of Shoreline: Great condition; local neighborhood association is responsible for beach maintenance.	
Storm Damage/Flooding: No	
High Groundwater: No	
Assessed by: ERK/ACK	

BMP Photos



Drainage Area Photos

