Watson Park

Monitoring and Maintenance Plan

1.0 Introduction:

The proposed restoration project will require periodic maintenance, replenishment and/or repairs. The salt marsh restoration area will require maintenance as storm and tidal events, predators, and/or ice remove salt marsh plant plugs, and the fiber rolls and buffer strip will need periodic repairs. The rock sill (i.e., salt marsh toe stabilization) and the earthen berm for flood protection collocated with the pedestrian path should also be monitored periodically to ensure continued success of the project. The intent of this Monitoring and Maintenance Plan is to outline the proposed monitoring and shoreline restoration steps that will be taken to ensure that the project is maintained, no damage to the surrounding resource areas occurs as a result of the maintenance activities, and the Conservation Commission is informed of all maintenance and monitoring activities. All work described below will be performed by the Town or, in the case of more technical analyses, by a hired consultant.

2.0 Quarterly and Episodic Monitoring:

The site will be visually inspected monthly through the first summer, and then quarterly for a period of three years, to assess any damage or changes that may have occurred to the shoreline restoration project. One of the main goals of the initial summer monthly monitoring will be to determine if boat wakes are causing damage to the restoration project; if so, the Town will coordinate with the Harbormaster and the Police Department to increase enforcement of the no wake zone. Additional episodic monitoring will occur immediately after a major storm event that is likely to have caused significant damage to the project area. Photographic records will be taken (from the same locations) at each inspection, which will be annotated with a brief written assessment for each inspection. Photographs will also be submitted to the Massachusetts MyCoast online portal, using the Coastal Resilience Tool, to further document the condition of the project over time. The quarterly reports shall be sent to Massachusetts Coastal Zone Management (CZM) and kept on file with the Braintree Conservation Department.

The Conservation Planner will conduct all quarterly monitoring; if issues arise that require an engineer to evaluate the project, an engineer from the Department of Public Works will be called in. The quarterly reports will be referenced when necessary, to support any maintenance or repairs. These quarterly reports will be also submitted to the Braintree Conservation Commission as part of the annual report discussed below.

Quarterly and episodic monitoring will include specific visual observations of the following:

1. **Salt marsh restoration area**
   a) Dead, dying or missing vegetation
   b) Attached macroalgae
   c) Extensive wrack deposits
   d) Goose excluders
   e) Signs of pedestrian trampling
   f) Signs of invasive species establishment
   g) Structural integrity stone sill
   h) Erosion and/or subsidence of salt marsh fill behind sill
   i) Erosion of tidal flat or salt marsh adjacent to restoration area
   j) Areas of standing water

Details related to what to look for and how to quantify each observation, and thresholds for further action are provided below. No special equipment is required to conduct the quarterly or episodic monitoring. When accessing the lower elevation portions of the site to observe the salt marsh restoration areas and the rock sill, monitors should utilize the stone headwall. Walking within the newly restored salt marsh area should not be necessary unless further action is required (see below). All visual observations can be made from below the rock sill.

In addition to the quarterly monitoring actions described below, the salt marsh restoration area should be checked more frequently immediately after project completion (i.e., weekly) to ensure that the goose excluders are effective and that the geese are not eating all the salt marsh plugs.

1A. Dead, dying or missing vegetation	
What to look for	During the growing season (May through October), note any brown, dead salt marsh plugs, or salt marsh plugs that failed to establish/grow. During the peak of the growing season (June through September), note any yellow, orange or browning leaves. Year round, note areas within the salt marsh restoration area that are bare (i.e., less than 1 plant every 1 foot).
How to Quantify	Estimate the affected area and describe the stress observed within the plants on the Quarterly Monitoring Form.
Threshold for Further Action	No action necessary during the first year. If less than 80% of the originally restored area has survived as of the first fall, those plants will be replaced the following spring. Each subsequent year, survival will be evaluated in the fall, and replanting conducted in the spring, if necessary. Replanting will be conducted by the DPW, in consultation with the Conservation Planner.

1B. Attached macroalgae	
What to look for	Live, attached macroalgae (i.e., seaweed), such as rockweed (*Fucus sp*.), sea lettuce (*Ulva sp.*), or Irish moss (*Chondrus crispus*). Note the type of macroalgae present, what substrate the macroalgae is attached to (e.g., the rock sill, the biodegradable erosion control blanket, the vegetation, etc.), and whether it appears to be adversely affecting plant growth.
How to Quantify	Note substrate the macroalgae is attached to (e.g., sill, erosion control blanket, etc.), estimate area of coverage, and identify the types of macroalgae present on the Quarterly Monitoring Form.
Threshold for Further Action	No action necessary for macroalgae attached to the rock sill. If attached to the erosion control blanket and no adverse impacts to vegetation are noted, no action is warranted. If, within 18 months of initial planting, macroalgae has attached to the erosion control blanket and is found to be smothering the new plantings, further assessment and consultation with CZM will be required to determine whether action is necessary.

1C. Extensive wrack deposits	
What to look for	An accumulation of any loose debris - seaweed, seagrasses, wood, and man-made materials (e.g., plastics, litter, fishing line, etc.) - deposited in the salt marsh restoration and/or nearby existing salt marsh areas. Also note whether the wrack deposits are persistent, or if they have washed away in subsequent high tides.
How to Quantify	Note the wrack's composition and extent, and estimate its depth (in inches) on the Quarterly Monitoring Form.

Threshold for Further Action	If wrack is persistent for more than a week and is found to be smothering new plantings it should be removed by hand. To the extent possible, removal should be performed from the outside edge of the restoration area, to avoid trampling and further adverse impacts to the new plants. If access to the interior portion of the planted area is necessary to remove problematic concentrations of wrack, care should be taken to avoid stepping directly on salt marsh plugs. If wrack is entirely natural materials, it can be deposited in the river downstream of the project area (to reduce the likelihood of having it simply float back onto the restored salt marsh). However, any invasive plant material in the wrack should be disposed of offsite. If composed primarily of man-made items, the debris should be removed from the site and disposed of properly.

1D. Goose excluders	
What to look for	Within the goose-excluder area, note any damage to the goose excluder fencing, the presence of geese, or indications of the presence of geese, including goose droppings, goose prints, and pulled out plugs, and/or actually seeing geese within the restoration areas.
How to Quantify	Describe the type and extent of any damage to the goose excluder fencing, and any signs of geese within the restoration areas (e.g., prints, droppings, pulled out plant plugs) on the Quarterly Monitoring Form. Additionally, note if the goose excluders appear to be ineffective (i.e., if geese were able to enter restoration area but goose excluder fencing was not damaged).
Threshold for Further Action	If there are signs of damage to the goose excluder fencing notify the Department of Public Works to repair damages. Goose excluders will be adjusted if there are indications that the existing arrangement is not effective at excluding geese.

1E. Signs of pedestrian trampling	
What to look for	Any signs of human disturbance in the salt marsh restoration area, including footprints, trampled pathways and damaged vegetation. Also, check for signs of damage to the split rail fence above the restoration areas.

How to Quantify	Note type of human disturbance observed, if any, on the Quarterly Monitoring Form. If area of disturbance is large (i.e., more than a few footprints) estimate area impacted and describe impact.
Threshold for Further Action	If trampling is observed, further signage will be added encouraging pedestrians to avoid entering the salt marsh restoration area. If trampling continues, the Town will add additional physical measures to deter walking within the area. If trampling is occurring as a result of monitoring activities, monitoring protocols will be revised.

1F. Signs of invasive species establishment	
What to look for	Within the salt marsh restoration area, the most likely invasive species are the common reed (*Phragmites australis*) and perennial pepperweed (*Lepidium latifolium*). *Phragmites australis* is a tall, perennial grass with long, wide, and flat leaves and grayish purple, dense, and silky plume-like flower heads, which appear from July to October. It is best to identify Phragmites introductions when shoots are still small (1 to 2 feet high) and present only as individuals (Figure 1), rather than a dense colony. Perennial pepperweed often occurs at the upper edges of salt marshes above the high tide line, frequently forming dense stands. Beginning in June and July, pepperweed produces white, four petalled flowers which grow in dense clusters (Figure 2).
How to Quantify	Note any evidence of invasive species establishment on the Quarterly Monitoring Form, including species, the general location of occurrence and how many stems (in the case of *Phragmites*) or estimate the area of coverage (in the case of pepperweed). Make note if action was taken.

Threshold for Further Action	If any *Phragmites australis* shoots or perennial pepperweed plants are identified within the salt marsh restoration area they will be promptly removed by hand; care should be taken to extract the entire root. This early hand removal will be conducted by the Conservation Planner during quarterly monitoring events, as invasives are observed. Removing invasive plants before they establish a dense colony is an important aspect of controlling their spread. To the extent possible, removal should be performed from the outside edge of the restoration area, to avoid trampling and further adverse impacts to the new plants. If access to the interior portion of the planted area is necessary to remove invasive species, care should be taken to avoid stepping directly on salt marsh plugs. Care should be taken to follow best practices when removing invasive plant material to reduce spread. This includes wearing low-tread footwear that does not hold soil, seeds, or other plant parts; remove soil, seeds, plant parts and other debris from shoes and clothing prior to leaving the area; inspect and clean equipment for soil, seeds, and plant parts before and after activities; and dispose of removed invasive plant material in designated areas, making sure material is tightly covered during transport so it does not fly off the back of the vehicle and spread along roadsides.

1G. Structural integrity of the stone sill	
What to look for	Any indications of structural failure, including but not limited to: voids between large stones (i.e., a lack small stones and shell hash in between stones), exposed filter fabric, and cracked or displaced large stones, signs of the sill slumping (i.e., top of sill no longer appears flat).
How to Quantify	Note whether any indicators of structural failure are present on the Quarterly Monitoring Form. Also, make note of general area(s) where issues were observed.

Threshold for Further Action	If large voids are present between stones, small stones and shell hash will be added to repair these spot locations. If there are indications that the large rocks within the sill are slumping, have been dislodged, or are failing in any capacity, a detailed engineering assessment of the sill will be conducted by the project engineer, Fuss & O'Neill, who will coordinate with the selected project contractor to determine next steps to repair the structural failures. If machinery is required on site to reset any of the stones, the Conservation Commission should be consulted as to whether additional environmental review is necessary.

1H. Erosion and/or subsidence of salt marsh fill behind sill	
What to look for	Note any slumping of the sediment behind the rock sill (i.e., within the salt marsh restoration area). Specifically, look for depressional areas, or drainage patterns or rivulets that would suggest water is draining from the restoration surface unevenly.
How to Quantify	Note whether any evidence of erosion and/or subsidence behind the rock sill was observed, and if so what type, using the Quarterly Monitoring Form. Estimate the size of the erosional or slumped area.
Threshold for Further Action	Minor slumping does not require any action. Slumping that is resulting in areas of standing water greater than 10 square feet or more than 2 inches deep at low tide (see 1J below) will require remediation. Erosional or slumped areas immediately behind the rock sill (e.g., caused by uneven drainage off the surface) should be refilled with compatible wetland soil. Ideally, soil can be brought in on foot using buckets and added manually taking care not to trample, crush or bury vegetation. Minor additions of sediment can be completed by the DPW in consultation with the Conservation Planner. If machinery is required on site to restore significant areas of erosion, the Conservation Commission should be consulted as to whether additional environmental review is necessary. Such actions may require hiring a qualified restoration contractor to complete the repairs.

1I. Erosion of tidal flat or salt marsh adjacent to restoration area	
What to look for	Note any scouring or depressional areas immediately in front of the rock sill that would signify erosion of the tidal flat is occurring. Additionally, note any erosion of the adjacent pre-existing salt marsh areas. Adjacent to the eastern marsh restoration lobe, erosion of the adjacent pre-existing marsh may manifest as calved off pieces of marsh peat, significant retreat of the marsh platform edge, or undercutting of the face of the marsh platform.
How to Quantify	Note whether any evidence of erosion in front of the rock sill was observed, and if so what type, using the Quarterly Monitoring Form. Estimate the vertical extent of erosion based on exposure of the toe stones. In addition, note whether erosion is occurring along the adjacent salt marsh, and if so, describe the approximate location and extent of erosion.
Threshold for Further Action	Minor erosion will not require action. If erosion of the coastal beach/tidal flat in front of the stone sill progresses to a point that the stability of the toe stones is compromised (see 1G above), beach nourishment may be necessary to ensure stability of the project. The engineering assessment described above in 1G will determine if this is necessary. If erosion of the adjacent salt marsh is occurring, the Conservation Commission will be consulted about how to proceed (e.g., install stabilization measures in front of the eroding marsh areas, adjust the terminal end of the rock sill, etc.).

1J. Areas of standing water	
What to look for	Pools of ponded water of any size within the salt marsh restoration area at low tide.
How to Quantify	Note the location, size (estimate diameter in feet) and persistence of the ponding (i.e., does pooling disappear before the next high tide? does pooling only occur on days with heavy rainfall?, etc.) on the Quarterly Monitoring Form.

Threshold for Further Action	If ponding persists within the salt marsh restoration area over multiple days/weeks, the ponding will be remediated by the addition of sediment (compatible with what was used during construction). Ideally, material can be brought in on foot using buckets and added manually taking care not to trample, crush or bury vegetation. Minor additions of sediment can be completed by the DPW in consultation with the Conservation Planner. If machinery is required on site to remediate large areas of pooling, the Conservation Commission should be consulted as to whether additional environmental review is necessary. Such actions may require hiring a qualified restoration contractor to complete the repairs.

Figure 1. **Examples of new growth in the common reed (*Phragmites australis*). The photo on the left is from April 15 in Plymouth (photo credit: www.salicicola.com). The photo on the right is from slightly later in the season once the initial leaves have unfurled (photo credit: Ohio State Weed Lab Archive, Ohio State University).**

Figure 2. **Detail of perennial pepperweed flowers (left; photo credit: MassAudubon) and leaves (right; photo credit: MassAudubon).**

2. Coastal bank stabilization

a) Area/extent of established vegetation
b) Notable areas of dead or dying vegetation
c) Dislodged components or coir debris
d) Evidence of invasive species
e) Evidence of new erosional areas

Details related to what to look for and how to quantify each observation, and thresholds for further action are provided below. No special equipment is required to conduct the quarterly or episodic monitoring. It may be possible to observe most of these conditions from the pedestrian path along the earth berm, from the headwall, or from the lower portion the site (i.e., coastal beach and tidal flat). When accessing the lower elevation portions of the site, monitors should utilize the stone headwall. Walking within the newly restored salt marsh area should not be necessary to observe the coastal bank. Walking across newly regraded and seeded areas of the coastal bank should be avoided where possible.

2A. Area/extent of established vegetation	
What to look for	Observe whether the vegetation in the planted areas within the regraded and restored coastal bank areas is healthy and has established well. Check to see if any areas of the coastal bank are bare/unvegetated.
How to Quantify	Note whether there are any bare or unvegetated areas using the Quarterly Monitoring Form. Estimate their size (in square feet) and note their general location.
Threshold for Further Action	Small unvegetated areas will not require any immediate action. If bare areas total more than 20% of the initially planted area, additional planting should be done.

2B. Notable areas of dead or dying vegetation	
What to look for	During the growing season (May through October), note any dead plantings or vegetation. During the peak of the growing season (June through September), note any yellow, orange or browning leaves. Note any evidence of drought stress along the coastal bank including browning or wilting leaves, dry vegetation, and dry soils.
How to Quantify	Estimate the affected area(s) and describe the stress observed within the plants on the Quarterly Monitoring Form.

Threshold for Further Action	No action necessary during the first year. If less than 80% of the originally restored area has survived as of the first fall, those plants will be replaced the following spring. Each subsequent year, survival will be evaluated in the fall, and replanting conducted in the spring, if necessary. Replanting will be conducted by the DPW, in consultation with the Conservation Planner. If drought stress is evident (and local rainfall conditions indicate drought conditions have be present) regular watering will be instituted until the drought is over and the plants are healthy; see Maintenance Plan in Section 4.0 below.

2C. Dislodged components or coir debris	
What to look for	Signs of damage to restoration components, such as erosion control blankets becoming torn or displaced, or dislodged wooded stakes or potted plantings.
How to Quantify	Make note of any dislodged restoration components or coir debris in the Quarterly Monitoring Form.
Threshold for Further Action	Remove any loose debris from the site. If coir material from the erosional control blankets or wooden stakes are dislodged, but the coastal bank is well vegetated and stable, these components do not need to be replaced. If erosion control blankets and or wooden staking becomes dislodged, but the coastal bank vegetation has not yet established, the project engineer, Fuss & O'Neill who will coordinate with the selected project contractor to determine next steps to replace these components. If potted plantings become dislodged but are still viable, replace planting in original location. Replanting will be conducted by the DPW, in consultation with the Conservation Planner.

2D. Evidence of invasive species	
What to look for	Common invasive species that can be found on coastal banks in Massachusetts include as common reed (*Phragmites australis*), common buckthorn (*Rhamnus cathartica*), Japanese honeysuckle (*Lonicera japonica*), Morrow's Honeysuckle (*Lonicera morrowii*), Japanese knotweed (*Fallopia japonica*), and oriental bittersweet (*Celastrus orbiculatus*). Signs of *Phragmites* colonization should be given special attention.

How to Quantify	Note any evidence of invasive species establishment on the Quarterly Monitoring Form, including species, the general location of occurrence and how many individuals or an estimate the area of coverage (depending on species). Make note if action was taken.
Threshold for Further Action	If any invasive plants are identified within the coastal bank restoration area they will be promptly removed by hand; care should be taken to extract the entire root. This early hand removal will be conducted by the Conservation Planner during quarterly monitoring events, as invasives are observed. Removing invasive plants before they establish a dense colony is an important aspect of controlling their spread. To the extent possible, removal should be performed from the outside edge of the restoration area, to avoid trampling and further adverse impacts to the new plants. If access to the interior portion of the planted area is necessary to remove invasive species, care should be taken to avoid stepping directly on plantings. Care should be taken to follow best practices when removing invasive plant material to reduce spread. This includes wearing low-tread footwear that does not hold soil, seeds, or other plant parts; remove soil, seeds, plant parts and other debris from shoes and clothing prior to leaving the area; inspect and clean equipment for soil, seeds, and plant parts before and after activities; and dispose of removed invasive plant material in designated areas, making sure material is tightly covered during transport so it does not fly off the back of the vehicle and spread along roadsides.

2E. Evidence of new erosional areas	
What to look for	Exposed soils (i.e., lack of vegetation), evidence of runoff or poor drainage from above, piles of slumped/eroded material at the toe of bank, and any landward movement of the top of bank.
How to Quantify	Areas lacking vegetation will already have been noted as part of 2A. Note whether there is evidence of new erosional areas, indicating the type (see “What to look for” above) on the Quarterly Monitoring Form. Also note the general location of occurrence, and estimate the area affected (in square feet).

Threshold for Further Action	If erosion is occurring due to stormwater runoff from above actions to address drainage on the site should be discussed with the project engineer, Fuss & O'Neill. If erosion has resulted in bare, unvegetated areas, repairs will be made to the erosion control blankets and affected area will be reseeded/planted.

3. Rocky intertidal shore enhancement area

a) Significant displacement of rocks
b) Evidence of colonization
c) Presence of invasive species
d) Evidence of scour from stormwater outfall

Details related to what to look for and how to quantify each observation, and thresholds for further action are provided below. No special equipment is required to conduct the quarterly or episodic monitoring. It is possible to observe most of these conditions from the coastal beach or inside the rocky intertidal shore. When accessing the lower elevation portions of the site, monitors should utilize the stone headwall. Walking within the newly restored salt marsh area should not be necessary to observe the rocky intertidal shore. Walking across newly regraded and seeded areas of the coastal bank should be avoided where possible.

3A. Significant displacement of rocks	
What to look for	Any movement of placed rocks within rocky intertidal restoration area. Note if any large stones are displaced, especially near the outfall pipe. Also note if any stones appear to have been moved by pedestrians (e.g., rocks in a pile or rocks missing from restoration area).
How to Quantify	Make note of number and general size of displaced rocks on the Quarterly Monitoring Form. Mark areas of damage on site diagram on the data sheet.
Threshold for Further Action	If rocks appear to be displaced by stormwater, Fuss & O'Neill should be contacted. If the displacement of rocks is determined to be related to human involvement, additional signage may need to be added emphasizing the importance rocky intertidal habitat and the need for rocks to remain in place.

3B. Evidence of colonization	
What to look for	Live, attached macroalgae (i.e., seaweed), such as rockweed (*Fucus sp*.), sea lettuce (*Ulva sp.*), or Irish moss (*Chondrus crispus*), as well as live shellfish and barnacles, such as periwinkles (*Littorina littorea*), oysters (*Crassostrea virginica*), and acorn barnacles (*Semibalanus balanoides*).
How to Quantify	Take photographs of areas colonized by marine biota. If identification is possible, note the type of macroalgae and shellfish present on Quarterly Monitoring Form.
Threshold for Further Action	No action necessary besides observing present species.

3C. Presence of invasive species	
What to look for	Note any marine invasive species. Mass CZMs Marine Invader Monitoring and Information Collaborative Projects provides information marine invasive species including crabs (*Carcinus maenas* and *Hemigrapus sanguineus*), shellfish (*Ostrea edulis*), crustaceans (*Caprella mutica and Palaemon elegans*), and marine algae (*Codium fragile,* and *Colpomenia*
How to Quantify	List invasive species present on Quarterly Monitoring Form.
Threshold for Further Action	If invasive species are identified take photos to document organism and their location. Photos can be uploaded to MassCZMs Marine Invader Monitoring and Information Collaborative (MIMIC) iNaturalist project website to record sightings.

3D. Evidence of scour from stormwater outfall	
What to look for	Signs of scour in front of the stormwater outfall including removal fine grained sediment and/or small, large stones being dislodged or moved, and/or increased velocity of stormwater discharge. Note and photograph any signs of scour or increased discharge velocity. Also note if discharge water is clear or turbid and if there are any odors, and note recent weather conditions (drought, increased rain, storms, etc.).
How to Quantify	Note any evidence of scour (as specified above) on the Quarterly Monitoring Form.
Threshold for Further Action	If signs of scour or an increase in discharge velocity, a thorough inspection of the check valve should be conducted to determine if increased scour is the result of a failing valve. If it is determined that the check valve is in full working order and there continues to be signs of scour, larger material or other energy dissipation options may be considered.

4. Stormwater outfall headwall

a) Significant displacement of headwall stones
b) Clogging or debris at or around outfall openings
c) Evidence of damage to the check valves
d) Evidence of erosion or scour adjacent to headwall

Details related to what to look for and how to quantify each observation, and thresholds for further action are provided below. No special equipment is required to conduct the quarterly or episodic monitoring. It is possible to observe most of these conditions from the coastal beach or inside the rocky intertidal shore. When accessing the lower elevation portions of the site, monitors should utilize the stone headwall. Walking within the newly restored salt marsh area should not be necessary to observe the headwall. Walking across newly regraded and seeded areas of the coastal bank should be avoided where possible. Caution should be taken when walking within the rocky intertidal shore to avoid slips, trips, and falls.

4A. Significant displacement of headwall stones	
What to look for	The position of stones in the headwall. Note if any stones appear to be out of alignment and/or if there are any gaps between the headwall and the outfall pipe.
How to Quantify	Note any signs of stone displacement (as specified above) on the Quarterly Monitoring Form. Note size and number of displaced stones and/or obvious gaps in the wall.
Threshold for Further Action	If headwall appears damaged and in need of repairs or other attention the Town Engineer will be contacted to further inspect the structure. If repairs are deemed necessary, the Town with coordinate with the engineer to determine an appropriate remedy.

4B. Clogging or debris at or around outfall openings	
What to look for	Any signs of debris build up within the outfall opening including but not limited to macro algae, sticks and other woody debris, leaves, rocks, sand and silt, and man-made objects (plastics, litter, etc.).
How to Quantify	Note any signs of debris build up (as specified above) on the Quarterly Monitoring Form. Note whether debris is obstructing flow.
Threshold for Further Action	If debris is observed within the pipe preventing water flow, the Braintree Department of Public Works Stormwater Manager will be notified to remove and properly dispose of the debris.

4C. Evidence of damage to the check valves	
What to look for	Symptoms of a failing valve including but not limited to loosened parts, emitting loud noises, inability to seal during high tide or discharge during low tide, and buildup of debris.
How to Quantify	Note any signs of check valve damage or failure (as specified above) on the Quarterly Monitoring Form.
Threshold for Further Action	To prevent failure of the valves, annual maintenance will be performed by the Department of Public Works on the valve including clearing debris, checking the seal, lubricating the valves, and ultimately replacement if needed.

4D. Evidence of erosion or scour adjacent to headwall	
What to look for	Note any scouring or depressional areas immediately adjacent to the base of the headwall. Additionally, note any erosion of the adjacent coastal bank areas above the headwall.
How to Quantify	Note any evidence of erosion adjacent to the headwall using the Quarterly Monitoring Form. At the base of the headwall, estimate the vertical extent of erosion based on exposure of the headwall's foundation. In addition, note whether erosion is occurring along the adjacent coastal bank, and if so, describe the approximate location and extent of erosion.
Threshold for Further Action	Minor erosion will not require action. If erosion of the coastal beach/tidal flat in front of the headwall progresses to a point that the stability of the headwall is compromised, beach nourishment may be necessary to ensure stability of the structure. An engineering assessment would be required to determine if this is necessary. If erosion of the adjacent coastal bank is occurring, the Conservation Commission will be consulted about how to proceed (e.g., install erosion control blankets or fiber rolls, add additional plantings, etc.).

5. **Flood protection berm**
    a) Health of seeded and perennial vegetation
    b) Degradation due to pedestrian traffic
    c) Settlement or slumping of earthen fill
    d) Erosion, gullies or other indications of runoff problems
    e) Signs of invasive species establishment

Details related to what to look for and how to quantify each observation, and thresholds for further action are provided below. No special equipment is required to conduct the quarterly or episodic monitoring. It may be possible to observe most of these conditions from the pedestrian path along the earth berm, from the headwall, or from the baseball fields and other areas of the park adjacent to the berm. Walking within the newly restored salt marsh area should not be necessary to observe the earth berm. Walking across newly regraded and seeded areas of the coastal bank and rain garden should be avoided where possible.

5A. Health of seeded and perennial vegetation	
What to look for	During the growing season, note any brown, dead plug plantings, or plug plantings that failed to establish/grow on the seaward side of the berm. During the peak of the growing season (June through September), note any yellow, orange, or browning leaves. Year round, on both the seaward and landward side of the earthen berm, note areas that are bare and lacking any grasses.
How to Quantify	Note whether there are any bare or unvegetated areas using the Quarterly Monitoring Form. Estimate their size (in square feet) and note their general location.
Threshold for Further Action	If less than 80% of the vegetated areas on each side of the earthen berm have survived as of the first fall, those plants will be replaced the following spring. Each subsequent year, survival will be evaluated in the late-summer/early-fall, and replanting conducted in early to mid-fall or the following spring, if necessary. Replanting will be conducted by the DPW, in consultation with the Conservation Planner.

5B. Degradation due to pedestrian traffic	
What to look for	Any signs of human disturbance in the vegetated areas, including footprints, trampled pathways and damaged vegetation. Also check for damage to landscape edging along the edge of the pathway and/or for pathway material that has spilled or been dislodged onto the berm slope.

How to Quantify	Note type of human disturbance observed, if any, on the Quarterly Monitoring Form. If area of disturbance is large (i.e., more than a few footprints), estimate area impacted and describe impact. Also note whether damage to landscape edging has occurred and if so, note the general location.
Threshold for Further Action	If trampling is observed, further signage will be added encouraging pedestrians to avoid traversing the vegetated areas and to remain on the established pathways. If trampling continues, the Town will add additional physical measures to deter walking within the area (i.e., fencing). If landscape edging is damaged to the point of allowing pathway material to leave the footprint of the pathway, it will be replaced.

5C. Settlement or slumping of earthen fill	
What to look for	Note any slumping of the soil along the side slopes or within the pathway along the earthen berm. Specifically, look for depressional areas, or drainage patterns or rivulets that would suggest water is draining from the berm unevenly.
How to Quantify	Note whether any evidence of erosion was observed, and if so what type, using the Quarterly Monitoring Form. Estimate the size of the erosional or slumped area.
Threshold for Further Action	Minor slumping does not require any action. Slumping that has collapsed an area of the walkway will require remediation. Erosional or slumped areas should be refilled with material consisting of fine-grained sandy loam (i.e., similar to the material of original construction). Ideally, material can be brought in manually using a wheelbarrow or utilizing a small bobcat to avoid heavy machinery on/around the berm and raingarden. If machinery is required on site to restore significant areas of slumping, the Conservation Commission should be consulted as to whether additional environmental review is necessary.

5D. Erosion, gullies or other indications of runoff problems	
What to look for	Note any erosion, gullies or depressional areas along or adjacent to the earthen berm that appear to be water or runoff conveyances.
How to Quantify	Note whether any evidence of runoff problems was observed using the Quarterly Monitoring Form. If so, describe the approximate location and extent of these impacts.

Threshold for Further Action	Minor erosion or runoff gullies will not require action. If erosion of the earthen berm progresses to a point that the stability of berm or the walking path is compromised, the runoff is being directed towards the coastal bank and is resulting in adverse impacts there or if runoff impacts are adversely affecting the adjacent rain gardens, repairs may be necessary to ensure stability of the project. If erosion of the adjacent coastal bank is occurring, the Conservation Commission will be consulted about how to proceed.

5E. Signs of invasive species establishment	
What to look for	Common invasive species that can be found in coastal areas in Massachusetts include as common reed (*Phragmites australis*), common buckthorn (*Rhamnus cathartica*), Japanese honeysuckle (*Lonicera japonica*), Morrow's Honeysuckle (*Lonicera morrowii*), Japanese knotweed (*Fallopia japonica*), and oriental bittersweet (*Celastrus orbiculatus*). Signs of *Phragmites* colonization should be given special attention.
How to Quantify	Note any evidence of invasive species establishment on the Quarterly Monitoring Form, including species, the general location of occurrence and how many individuals or an estimate the area of coverage (depending on species). Make note if action was taken.
Threshold for Further Action	If any invasive plants are identified along the earthen berm they will be promptly removed by hand; care should be taken to extract the entire root. This early hand removal will be conducted by the Conservation Planner during quarterly monitoring events, as invasives are observed. Removing invasive plants before they establish a dense colony is an important aspect of controlling their spread. Care should be taken to follow best practices when removing invasive plant material to reduce spread. This includes wearing low-tread footwear that does not hold soil, seeds, or other plant parts; remove soil, seeds, plant parts and other debris from shoes and clothing prior to leaving the area; inspect and clean equipment for soil, seeds, and plant parts before and after activities; and dispose of removed invasive plant material in designated areas, making sure material is tightly covered during transport so it does not fly off the back of the vehicle and spread along roadsides.

6. **Rain gardens**
    a) Health of seeded and perennial vegetation
    b) Degradation due to pedestrian traffic
    c) Settlement or slumping of rain garden side slopes
    d) Blockage or damage to the vertical overflow/drainage pipes
    e) Trash build-up in rain gardens
    f) Signs of invasive species establishment
    g) Evidence of standing water

Details related what to look for and how to quantify each observation, and thresholds for further action are provided below. No special equipment is required to conduct the quarterly or episodic monitoring. It may be possible to observe most of these conditions from the pedestrian path along the earth berm, or from the baseball fields and other areas of the park adjacent to the berm. Walking within the newly restored salt marsh area should not be necessary to observe the earth berm. Walking across newly regraded and seeded areas of the coastal bank and rain garden should be avoided where possible.

In addition to the quarterly monitoring described below, the rain garden should also be checked after the first large rain event to ensure that it is functioning properly. Ideally, the rain gardens will also be observed during the first major rain event that co-occurs with high tide to observe how the inundated outfall pipes effect the drainage of the system.

6A. Health of seeded and perennial vegetation	
What to look for	During the growing season, note any brown, dead plug plantings, or plug plantings that failed to establish/grow in the rain garden. During the peak of the growing season (June through September), note any yellow, orange, or browning leaves. Year round, note areas that are bare and lacking any vegetation.
How to Quantify	Note whether there are any dead plants or bare or unvegetated areas using the Quarterly Monitoring Form. Estimate the size (in square feet) of bare areas and note their general location.
Threshold for Further Action	If less than 80% of the vegetated areas within the rain garden have survived as of the first fall, those plants will be replaced the following spring. Each subsequent year, survival will be evaluated in the late-summer/early-fall, and replanting conducted in early to mid-fall or the following spring, if necessary. Replanting will be conducted by the DPW, in consultation with the Conservation Planner.

6B. Degradation due to pedestrian traffic	
What to look for	Any signs of human disturbance in the rain garden, including footprints, trampled pathways and damaged vegetation.
How to Quantify	Note type of human disturbance observed, if any, on the Quarterly Monitoring Form. If area of disturbance is large (i.e., more than a few footprints), estimate area impacted and describe impact.
Threshold for Further Action	If trampling is observed, further signage will be added encouraging pedestrians to avoid traversing the rain garden and to remain on the established pathways. If trampling continues, the Town will add additional physical measures to deter walking within the area (i.e., fencing).

6C. Settlement or slumping of rain garden side slopes	
What to look for	Note any settlement or slumping of the soil along the rain garden side slopes. Specifically, look for depressional areas, or drainage patterns or rivulets that would suggest water is flowing into the rain garden unevenly.
How to Quantify	Note whether any evidence of erosion was observed, and if so what type, using the Quarterly Monitoring Form. Estimate the size of the erosional or slumped area.
Threshold for Further Action	Minor settlement or slumping does not require any action. Slumping that has collapsed an portion of the raingarden side slope may require remediation. Erosional or slumped areas should be refilled with fine-grained sandy loam (i.e., similar to the existing material). Ideally, material can be brought in manually using a wheelbarrow or utilizing a small bobcat to avoid heavy machinery on/around the berm and raingarden. If machinery is required on site to restore significant areas of slumping, the Conservation Commission should be consulted as to whether additional environmental review is necessary. If issue persists after side slopes have been reconstructed, the rain garden design may need to be reconsidered.

6D. Blockage or damage to the vertical overflow/drainage pipes	
What to look for	Visible damage to the overflow drainpipes (e.g., broken or missing pipe; broken, damaged or missing cap, etc.) Sticks, leaves, grass clippings, or other items that could cause blockages with the pipes.

How to Quantify	Note how many and which pipes are damaged (if any) and note the type of damage on the Quarterly Monitoring Form. Note if debris has built up around the pipe.
Threshold for Further Action	If debris has accumulated around the drainage pipe, remove it and dispose of it properly. If drainage pipes or caps have been damaged or are missing they will be replaced to ensure proper functioning of the rain garden drainage system (which is also the method of drainage for the whole park during a severe storm.

6E. Trash build-up in rain gardens	
What to look for	Accumulated trash, litter or other man-made objects (plastics, cans, etc.) or other items that could cause blockages with the pipes.
How to Quantify	Note on the Quarterly Monitoring Form whether trash build-up is occurring and if there is a particular location where it collects.
Threshold for Further Action	Remove and properly dispose of all trash and man-made debris off-site.

6F. Signs of invasive species establishment	
What to look for	Common invasive species that can be found in coastal areas in Massachusetts include as common reed (*Phragmites australis*), common buckthorn (*Rhamnus cathartica*), Japanese honeysuckle (*Lonicera japonica*), Morrow's Honeysuckle (*Lonicera morrowii*), Japanese knotweed (*Fallopia japonica*), and oriental bittersweet (*Celastrus orbiculatus*). In wetter areas, such as a rain garden, purple loosestrife (*Lythrum salicaria*) may also be problematic. Signs of *Phragmites* colonization should be given special attention.
How to Quantify	Note any evidence of invasive species establishment on the Quarterly Monitoring Form, including species, the general location of occurrence and how many individuals or an estimate the area of coverage (depending on species). Make note if action was taken.

Threshold for Further Action	If any invasive plants are identified within the rain garden they will be promptly removed by hand; care should be taken to extract the entire root. Removing invasive plants before they establish a dense colony is an important aspect of controlling their spread. Care should be taken to follow best practices when removing invasive plant material to reduce spread. This includes wearing low-tread footwear that does not hold soil, seeds, or other plant parts; remove soil, seeds, plant parts and other debris from shoes and clothing prior to leaving the area; inspect and clean equipment for soil, seeds, and plant parts before and after activities; and dispose of removed invasive plant material in designated areas, making sure material is tightly covered during transport so it does not fly off the back of the vehicle and spread along roadsides.

6G. Evidence of standing water	
What to look for	Water lasting over 48 hours after a rain event, indicating clogged surface layer, lack of percolation and/or a malfunctioning drainage pipe. Note the location and duration of standing water. Also, note if there are any signs of overflow or buildup from drainage pipes.
How to Quantify	Note the location, size (estimate diameter in feet) and persistence of the ponding (i.e., how many days after a rain event does ponding last, etc.) on the Quarterly Monitoring Form.
Threshold for Further Action	If ponding persists within the rain garden over multiple days/weeks, the ponding will be remediated by removing and replacing the soil media. Ideally, the work can be done manually, taking care not to trample, crush or bury vegetation within the rain garden, to the extent possible. If machinery is required on site to remediate large areas of pooling, the Conservation Commission should be consulted as to whether additional environmental review is necessary. If issue persists after soil media has been replaced, the rain garden design may need to be reconsidered.

3.0 Annual Monitoring:

3.1 Topographic surveys:

More detailed, quantitative elevation and vegetation surveys will be conducted annually for a period of three years, during late summer, when the salt marsh vegetation is likely at its most robust. Topographic shore-perpendicular profiles will be taken at 25-foot intervals across the project area using an RTK GPS. Each profile transect will begin at least 25 feet landward of the earthen berm (at the same location each time) and will extend at least 25 feet seaward of the toe of the rock sill. Start and end points for each transect will be pre-determined. Transect start points will be located in the field using an RTK GPS. The transect will then be surveyed with the surveyor navigating directly towards the end point location (with the exception of navigating around sensitive project components as noted in Figure 3 below). These transects will include points documenting the elevations of the filled salt marsh restoration area, as well as the top and seaward toe of the rock sill. Elevation cross-sections from successive years will be compared to determine if there are any significant erosion or elevation changes to the project area. The annual topographic surveys will be conducted by Woods Hole Group, or another qualified consulting firm.

While detailed data about topographic changes at the site are important to evaluate the success of the project and to identify any problems early, it is important that monitoring activities not contribute to degradation of the project, increase erosion along sloped areas, or destruction of vegetation. To avoid these impacts, although data will be collected along a linear transect, the monitor may need to walk around sensitive areas of the site and pick up the transect at the other side of a particular area (e.g., the salt marsh restoration areas). See diagram below in Figure 3 as an example. The X's in Figure 3 denote example survey points that can be taken by standing outside of the newly planted areas and reaching in with an RTK; the RTK will be set down within the sensitive area to capture the elevation, but the monitor/surveyor will not have to walk into that area.

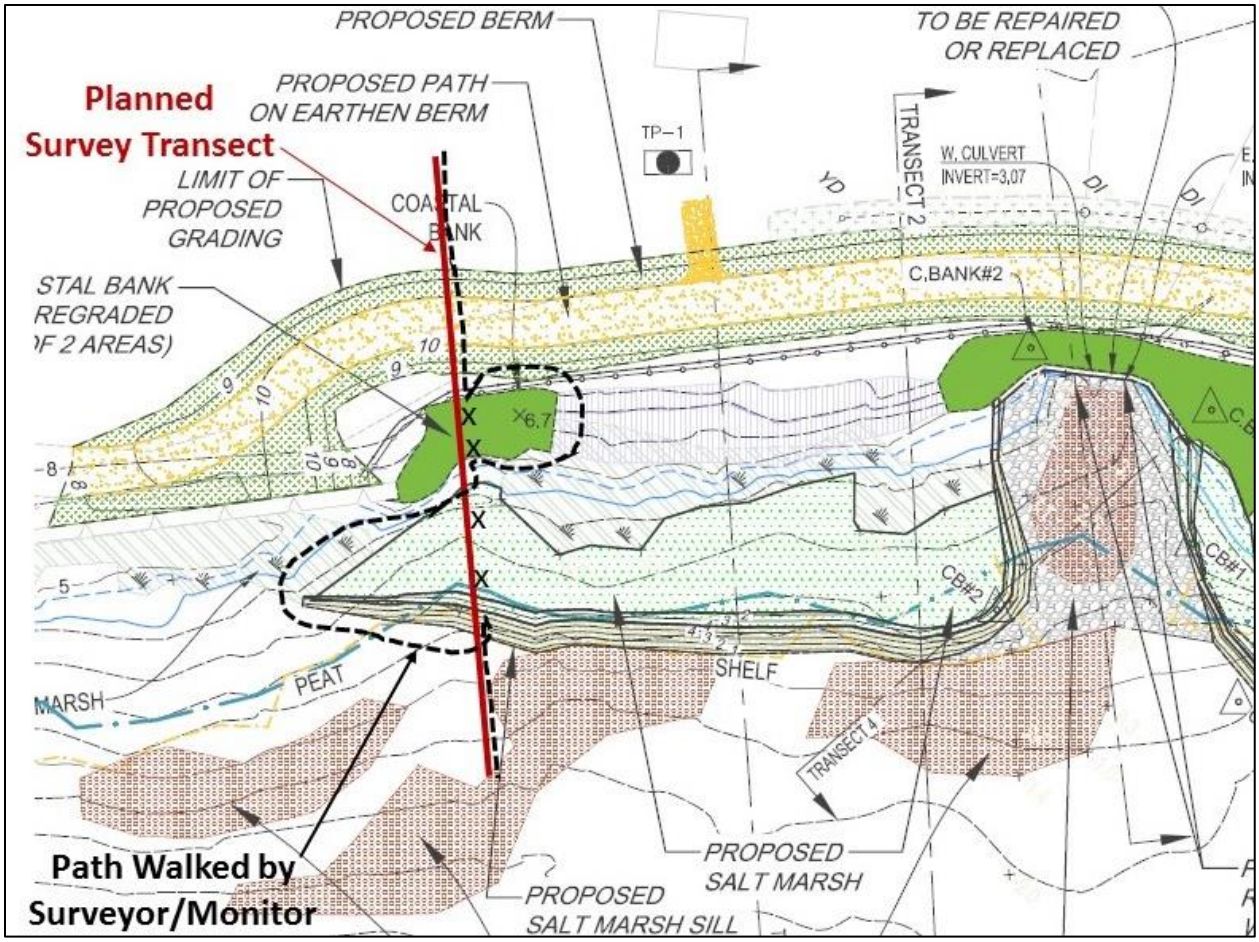


Figure 3. Example transect monitoring approach to avoid trampling newly planted areas.

3.2 Vegetation surveys:

For the annual vegetation surveys, the salt marsh restoration area will be surveyed to document the 1) area/extent of salt marsh vegetation, and 2) plant species present. To quantify the total area/extent of salt marsh vegetation, the perimeter of the vegetated area will be mapped using an RTK GPS. All plant species present within this area will be identified and documented. The annual vegetation surveys will be conducted by Woods Hole Group, or another qualified consulting firm.

While it is helpful to have annual data to assess the performance of the salt marsh restoration plantings, it is important to maintain a balance between the need to collect data and avoiding unnecessary impacts to the fragile newly planted area. To achieve this balance, detailed percentage coverage quadrats will only be evaluated at the end of the third growing season. This will involve two random 1 m^2 quadrats within the salt marsh restoration area along each of the topographic transects (for the western marsh lobe, this will include one in an area originally planted with high marsh species and one in an area originally planted with low marsh species; Figure 4); GPS coordinates of the center of each sampling quadrat will be collected. Data from the monitoring at the end of the third growing season will be compared to initial starting conditions immediately after planting to determine the trajectory of vegetation establishment within the project area. In addition to percent coverage, all plant species present within each quadrat will be documented.

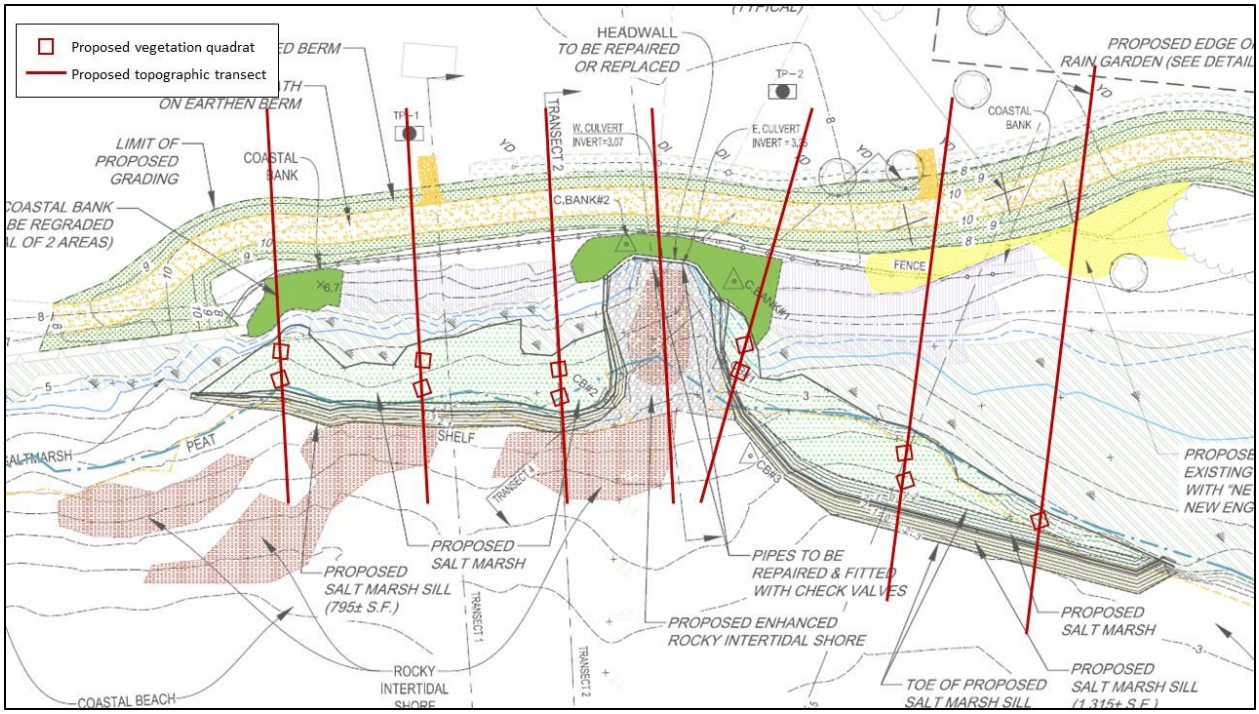


Figure 4. Proposed topographic transect and vegetation quadrat locations for annual monitoring.

4.0 Maintenance:

The intent of the maintenance plan is to provide the Town with ability to perform routine repairs and maintenance of the project without the need to file a Notice of Intent application each time that maintenance or repair is required. Maintenance activities will include but are not be limited to the following:

1. Entire project area:
    - Irrigation/Watering - Watering to promote plant growth and survival, especially during the first 2 years and during dry spells, will be important to the success of the project. Drought tolerant plantings and seed mixes have been recommended for this project. However, regular watering is critical during the first few weeks after seeding/planting and is very important during hot, dry weather during the first 2 growing seasons. When necessary, watering will be completed by the DPW by connecting hoses into the existing nearby water lines for the splash pad. To conserve water and reduce immediate evaporation, it is recommended to water early in the morning, between 5:00-7:00am.
    - Plant Replacement - Replanting and/or reseeding the salt marsh, coastal bank, earthen berm and/or rain garden areas if plants do not survive or become sparse. Lost vegetation will be replaced such that at least 80% of the target area within each of the earthen berm and rain garden project areas remains vegetated. Less than 80% of the targeted area being vegetated, as surveyed during a late-summer annual survey, will trigger the requirement for additional plantings. If certain plant species are more successful than others at this site, any necessary replacement plants will be comprised of the more successful species. When replacing plants, place the new planting in the same location. The best time to plant is early to mid-fall or in the early to mid-spring. Plants should be stockpiled in a safe location on-site and installed as soon as possible after purchase to increase survivorship. Pinelands Nursery is a good source for salt marsh plants, while New England Wetland Plants, Inc. and Sylvan Nursery, Inc. are good sources for the other native plants and seed mixes proposed for the site. The Conservation Department and the DPW will coordinate to acquire and install replacement plants, if necessary.
    - Hand weeding/removal of invasive species;
    - General clean-up measures conducted on an as-needed basis to recover debris related to the project (e.g., deteriorated coir material associated with erosional control blankets, goose excluder fencing, etc.)
    - Removal of accumulated trash and debris;
    - Regrading and/or placement of fill in slumping or eroded areas; and
2. Salt marsh restoration areas:
    - Repairs as necessary to the goose excluder fencing;
    - Removal of attached macroalgae or extensive wrack deposits from the salt marsh restoration area to avoid smothering the salt marsh vegetation. Any material removed from the salt marsh will be placed in the Weymouth Fore River; no organic material will be removed from the site;

3. Coastal bank stabilization areas:
4. Rocky intertidal shore enhancement area
5. Stormwater outfall headwall
    - Removal of any accumulated sediment or debris from around the overflow/drainage pipes;
    - General maintenance as needed to maintain functioning, freely flowing stormwater outfall pipes.
6. Flood protection berm
    - Mowing - It is important not to mow the rain garden more than once a year. By design, plants in rain gardens are meant to thrive throughout the growing season. Lush vegetation is an important component of the rain garden, allowing the garden to capture nutrients and allow stormwater to infiltrate. Mowing should only be conducted after the end of the growing season in late October or November. Once the vegetation has been mowed, it is critically important to rake and remove all cut vegetation and grass clippings from the rain garden. Fresh grass clippings are high in nitrogen, prevent stormwater from being able to infiltrate, and will clog overflow/drainage pipes. When mowing near the rain garden, use a mulching blade and point the mower discharge away from the rain garden to prevent grass clippings from clogging the system.
7. Rain gardens
    - Trimming, Pruning and Weeding - The monitoring and maintenance schedule outlined above includes tasks that will need to be completed to ensure that the rain garden will continue to function properly. Trimming and pruning of excess vegetation will occasionally be necessary. Dead, dying, diseased, or hazardous vegetation (vines, etc.) should be trimmed and removed as it occurs. The rain garden may require frequent weeding during the first few years as seed and plug plantings become established; the Braintree Garden Club may be able to assist with regular weeding tasks. Weeding should be limited to invasive and exotic species that tend to overwhelm native plant communities. Weeding should be conducted by hand, chemical herbicides should be avoided.
    - Mowing - It is important not to mow the rain garden more than once a year. By design, plants in rain gardens are meant to thrive throughout the growing season. Lush vegetation is an important component of the rain garden, allowing the garden to capture nutrients and allow stormwater to infiltrate. Mowing should only be conducted after the end of the growing season in late October or November. Once the vegetation has been mowed, it is critically important to rake and remove all cut vegetation and grass clippings from the rain garden. Fresh grass clippings are high in nitrogen, prevent stormwater from being able to infiltrate, and will clog overflow/drainage pipes. When mowing near the rain garden, use a mulching blade and point the mower discharge away from the rain garden to prevent grass clippings from clogging the system.

- Discharge Pipe Inspection and Maintenance - A well-designed rain garden requires minimal care. However, just like any other landscape feature, it requires some maintenance to keep it functioning properly. Storm water flowing into the rain garden can carry with it various types of debris which can clog the soil medium, drainage pipes, and slow infiltration. As previously mentioned, it is important to only mow the rain garden once a year, rake out all debris, and aim mower discharges away from the rain garden when mowing turf grass nearby. In addition to keeping grass clippings from accumulating in the rain garden, it is important to check for debris build up around or inside of the inlets and overflow pipes during monthly and/or quarterly monitoring. If debris buildup is observed, remove any leaves, sticks, or other items that may have accumulated. Keeping the areas in and around the around the discharge pipes clear will help the rain garden continue to absorb, redirect, and discharge treated storm water in an efficient manner.
- Avoiding Damage to the Discharge Pipes - When mowing the rain garden, it will be important to use care to prevent damage to the regularly spaced discharge pipes. While it may be possible to mow the side slopes of the rain garden with a tilt-deck mower, care should be taken not to mow over and damage or destroy the discharge pipes. It is recommended that areas directly abutting the pipes be weed-whacked to avoid accidental damage. Should accidental damage occur, the damaged discharge pipe will need to be removed and replaced in order to ensure that the rain garden can continue to function and drain properly.

Quarterly monitoring form

Watson Park – Quarterly Monitoring Form **Date:**
Salt Marsh **Observer(s):**

1A: Dead, dying or missing vegetation
Was evidence of dead or dying vegetation observed? □ Yes □ No
If yes, describe observations: _____
Estimated area of dead or dying vegetation (square feet): _____

1B: Attached macroalgae
Is there attached macroalgae in the salt marsh area? □ Yes □ No
If yes, what is it attached to? □ Rock sill □ ECB □ Vegetation □ Other (specify): _____
Estimated area of coverage (square feet): _____
Species present: _____ _____

1C: Extensive wrack deposits
Are wrack deposits present within the salt marsh? □ Yes □ No
What is the wrack composed of (e.g., macroalgae, plastic debris, *Phragmites* stalks, etc.)?: _____
Estimated average wrack depth (in):

1D: Goose excluders
Was evidence damage to the goose excluders observed? □ Yes □ No
If yes, describe the type and extent of damage: _____
_____
Is there evidence of geese within excluders? □ Goose prints □ Droppings □ Uprooted plugs
Do goose excluders appear to be working effectively? □ Yes □ No

1E: Signs of pedestrian trampling
Were signs of human disturbance observed within the salt marsh area? □ Yes □ No
If yes, describe: _____
Estimated area of disturbance (square feet) if more than a few footprints: _____

1F: Signs of invasive species establishment
Are invasive plants present within the salt marsh? □ Yes □ No
Common reed (*Phragmites australis*) – number of stems: ___ Other species?:
Pepperweed (*Lepidium latifolium*) – area of coverage (square feet): _____ _____
Was action taken? □ Yes □ No If so, specify: _____

1G: Structural integrity of the stone sill
Were any indicators of structural failure observed? □ Yes □ No
If yes, note type and location of structural failure: _____

1H: Erosion of salt marsh fill behind sill
Was any evidence of erosion behind the rock sill observed? □ Yes □ No
If yes, estimate size of erosional or slumped area (square feet): _____

1I: Erosion of tidal flat or salt marsh adjacent to restoration area
Was any evidence of erosion of the tidal flat or salt marsh observed? □ Yes □ No
If erosion is occurring in the tidal flat fronting the sill, estimate vertical extent of erosion (in): _____
If erosion is occurring in adjacent salt marsh describe location and extent: _____
_____

1J: Areas of standing water
Was ponded water observed within the salt marsh restoration area at low tide? □ Yes □ No
If yes, estimate the number of locations and size (diameter in ft): _____
Make note of persistence (e.g., does it disappear before next high tide? Only on rainy days?, etc.)
_____

Watson Park – Quarterly Monitoring Form **Date:**
Coastal Bank **Observer(s):**

2A: Area/extent of established vegetation
Were any areas of bare/unvegetated coastal bank observed? □ Yes □ No
If yes, describe observations:
Estimated area of bare/unvegetated coastal bank (square feet): _____

2B: Dead, dying or missing vegetation
Was evidence of dead or dying vegetation observed? □ Yes □ No
If yes, describe observations: _____
Estimated area of dead or dying vegetation (square feet): _____

2C: Dislodged components or coir debris
Were any dislodged restoration components (e.g., coir material) observed? □ Yes □ No
If yes, describe observations:_____

2D: Evidence of invasive species
Are invasive plants present within the coastal bank? □ Yes □ No

Location and area of coverage (square feet):	Location	Area (sf)
Common reed (*Phragmites australis*) –	_____	_____
Common buckthorn (*Rhamnus cathrartica*) –	_____	_____
Japanese honeysuckle (*Lonerica japonica*) –	_____	_____
Morrow's Honeysuckle (*Lonicera morrowii*) –	_____	_____
Japanese knotweed (*Fallopia japonica*) –	_____	_____
Oriental bittersweet (*Celastrus orbiculatus*) –	_____	_____
Other (note species):	_____	_____

2E Evidence of new erosional area
Were there any indictors of new erosion along the coastal bank? □ Yes □ No
If yes, note location and area of impact (square feet) of erosion:
_____
Characterize the erosional impact: □ Lack of vegetation □ Poor drainage
□ Slumped/eroded material at toe of bank
□ Landward erosion of top of bank
□ Other: _____

Watson Park – Quarterly Monitoring Form **Date:**
Rocky Intertidal Shore **Observer(s):**

3A: Significant displacement of rocks

Was any movement of placed rocks within rocky intertidal area observed? □ Yes □ No
If yes, note number and size of displaced rocks: _____
Is the cause known? □ Storm impact □ Human action □ Other: _____ □ Unknown

3B Evidence of colonization

Is there attached macroalgae in the rocky intertidal area? □ Yes □ No
Estimated area of coverage (square feet): _____ Species present: _____
_____

Are there marine invertebrates (e.g.., oysters, barnacles, etc.) in the rocky intertidal area? □ Yes □ No
Estimated area of coverage (square feet): _____ Species present: _____
_____

3C Presence of invasive species

Are any marine invasive species present within the rocky intertidal shore? □ Yes □ No
If yes, note species: _____
_____
_____

3D Evidence of scour from stormwater outfall

Was evidence of scour in front of the stormwater outfall observed? □ Yes □ No
If yes describe observations: _____

Watson Park – Quarterly Monitoring Form **Date:**
Stormwater Outfall Headwall **Observer(s):**

4A: Significant displacement of rocks

Were any stones out of alignment? □ Yes □ No

Were any gaps between the headwall and the outfall pipe observed? □ Yes □ No

If yes to either, note number and size of displaced stones and/or gaps in the wall:

_____

4B: Clogging or debris at or around outfall openings

Were any signs of debris build up within the outfall observed? □ Yes □ No

If yes, note the composition of debris: _____

Is the debris obstructing flow? □ Yes □ No

4C Evidence of damage to the check valve

Were any indicators of check valve failure observed? □ Yes □ No

If yes, note observations: _____

4D: Evidence of erosion or scour adjacent to headwall

Was any evidence of erosion or scour adjacent to the headwall observed? □ Yes □ No

If erosion is occurring at the base of the headwall, estimate vertical extent of erosion (in): _____

If erosion is occurring in adjacent coastal bank describe location and extent: _____

_____

Watson Park – Quarterly Monitoring Form **Date:**
Flood Protection Berm **Observer(s):**

5A: Health of seeded and perennial vegetation

Were any areas of bare/unvegetated flood protection berm observed? □ Yes □ No
If yes, describe observations: _____
Estimated area of bare/unvegetated portions of earther berm (square feet): _____

5B: Degradation due to pedestrian traffic

Were signs of human disturbance observed within the flood protection berm? □ Yes □ No
If yes, describe: _____
Estimated area of disturbance (square feet) if more than a few footprints: _____
Was any damage to the landscape edging along pedestrian path observed? □ Yes □ No

5C: Settlement or slumping of earthen fill

Was any evidence of erosion along the flood protection berm observed? □ Yes □ No
If yes, describe: _____
Estimated size of erosional or slumped area (square feet): _____

5D: Erosion, gullies or other indications of runoff problems

Were any indicators of erosion or other runoff problems observed? □ Yes □ No
If yes, describe: _____
Location and estimated area of erosion or runoff gully (square feet): _____
_____

5E: Signs of invasive species establishment

Are invasive plants present within the flood protection berm? □ Yes □ No

Location and area of coverage (square feet):	Location	Area (sf)
Common reed (*Phragmites australis*) –	_____	_____
Common buckthorn (*Rhamnus cathrartica*) –	_____	_____
Japanese honeysuckle (*Lonerica japonica*) –	_____	_____
Morrow's Honeysuckle (*Lonicera morrowii*) –	_____	_____
Japanese knotweed (*Fallopia japonica*) –	_____	_____
Oriental bittersweet (*Celastrus orbiculatus*) –	_____	_____
Other (note species):	_____	_____

Watson Park – Quarterly Monitoring Form **Date:**
Rain Gardens **Observer(s):**

6A: Health of seeded and perennial vegetation

Was evidence of dead or dying vegetation observed? □ Yes □ No
If yes, describe observations: _____
Estimated area of dead or dying vegetation (square feet): _____

Were any areas of bare/unvegetated rain garden observed? □ Yes □ No
If yes, describe observations: _____
Estimated area of bare/unvegetated rain garden (square feet): _____

6B: Degradation due to pedestrian traffic

Were signs of human disturbance observed within the rain gardens? □ Yes □ No
If yes, describe: _____
Estimated area of disturbance (square feet) if more than a few footprints: _____

6C: Settlement or slumping of earthen fill

Was any evidence of settlement or slumping within the rain gardens observed? □ Yes □ No
If yes, estimate size of erosional or slumped area (square feet): _____

6D: Blockage or damage to the vertical overflow/drainage pipes

Were any indicators of damage to the drainage pipes observed? □ Yes □ No
If yes, how many and which drainage pipe(s) are damaged? _____

6E: Trash build-up in rain gardens

Has trash or debris built up around the drainage pipe(s)or in rain gardens? □ Yes □ No
If yes, describe observations: _____

6F: Signs of invasive species establishment

Are invasive plants present within the rain gardens? □ Yes □ No

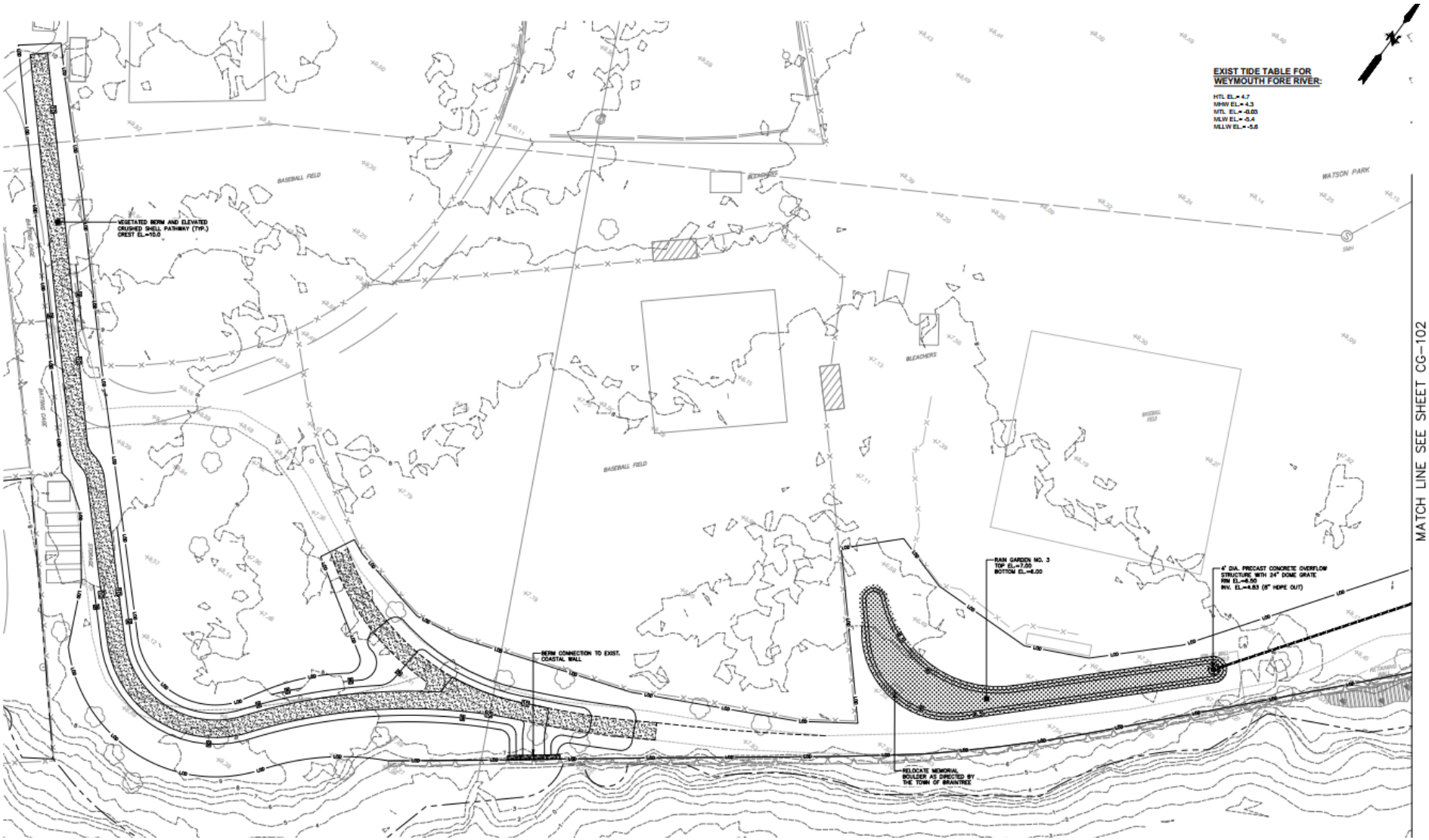
Location and area of coverage (square feet):	Location	Area (sf)
Common reed (*Phragmites australis*) –	_____	_____
Common buckthorn (*Rhamnus cathrartica*) –	_____	_____
Japanese honeysuckle (*Lonerica japonica*) –	_____	_____
Morrow's Honeysuckle (*Lonicera morrowii*) –	_____	_____
Japanese knotweed (*Fallopia japonica*) –	_____	_____
Oriental bittersweet (*Celastrus orbiculatus*) –	_____	_____
Purple loosestrife (*Lythrum salicaria*) -	_____	_____
Other (note species):	_____	_____

6G: Evidence of standing water

Was ponded water observed within the rain gardens 48 hours after a rain event? □ Yes □ No
If yes, estimate the number of locations and size (diameter in ft): _____
Make note of persistence (e.g., how many days after a rain event does it last?, etc.)
_____

Watson Park – Quarterly Monitoring Form
Site Diagram – Southwest Section

Date:
Observer(s):



Watson Park – Quarterly Monitoring Form
Site Diagram – Northeast Section

Date:
Observer(s):