



## MEMORANDUM

**To:** Tisbury Open Space and Recreation Committee  
**From:** Rich Claytor, PE and Casey Chatelain  
**Date:** January 30, 2023  
**Re:** Veterans Memorial Park Drainage/Stormwater Control Measures  
Task 2: Site Reconnaissance and Drainage System Assessment

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### Introduction

On behalf of the Town of Tisbury Open Space and Recreation Committee, Horsley Witten Group, Inc. (HW) is working to identify opportunities for Veterans Memorial Park (the Park) to improve stormwater management while taking into consideration current and future uses of the park. Stormwater drainage to and within the site requires improvement, as currently site conditions after rainfall events at times conflicts with recreational uses of the park. For example, heavy rain during the Beach Road Music Festival in August 2022 delayed the festival and left the site in such poor condition that youth soccer was unable to use the field for the Fall 2022 season.

The objective of this project is to develop a Master Plan for Veterans Memorial Park. The goal of this task in particular is to conduct an assessment to identify initial opportunities for stormwater control measures (SCMs) designed to achieve stormwater volume reduction and water quality treatment for areas within the Park and abutting areas.

The HW Team completed an initial field reconnaissance of the Park and contributing drainage area in November 2022 and identified several potential SCMs which are described in more detail below. This memorandum summarizes the results of our field assessment of the drainage system, identified SCMs, GIS data collection, and initial pollutant removal potential of the identified sites.

### Existing Conditions

#### *Site Description*

Veterans Memorial Park sits on a 10.62 acre parcel owned by the Town of Tisbury between Beach Street, State Road, Causeway Road, and Lagoon Pond Road. The Beach Street entrance to the Park is approximately a five minute walk from the Steamship Authority Vineyard Haven Ferry Terminal. A public parking lot sits in the southeast corner of the parcel abutting salt marsh from the upper reaches of Mud Creek. Public amenities in the Park include soccer fields, two baseball/softball fields, a basketball court, a volleyball court, and a playground. An isolated

vegetated wetlands is located in the northwest corner of the Park and the Mud Creek salt marsh extends into the Park along the southern edge. Stormwater naturally accumulates in Veterans Memorial Park from rainfall within the park and from stormwater runoff from the surrounding impervious surfaces, leading to standing water and “swampy” areas long after a rainfall event has completed. A shallow depth to groundwater exists across the park as documented by the isolated wetland, low-lying elevation compared to Mud Creek and as illustrated in a draft Veterans Memorial Park Reconstruction Design Report from Environmental Partners Group in 2008.<sup>1</sup> This report detailed the discovery of peat (partially decayed wetlands vegetative matter) a mere 5 to 6 feet below grade surface and in the reconstruction design proposed grading the site to direct stormwater runoff to drains connected to a collector pipe or to the wetlands on site. This design was never implemented.

### *Current and Future Uses of Veterans Memorial Park*

Veterans Memorial Park is host to a number of recreational and non-recreational uses. Youth soccer utilizes the soccer fields every season except winter. According to interviews conducted by HW, youth soccer organizations appreciate the Park’s close proximity to the ferry terminal. Women’s and men’s softball leagues use the ball fields in the evenings from May through August. While the basketball court, volleyball court, and the playground are in use, interviews revealed that the use of these amenities is currently not what it could be potentially due to the “swampy” nature of that corner of the Park (Figure 1). Interviews conducted by HW revealed a desire to continue these recreational uses moving forward, potentially in different locations and to potentially expand the use of the Park by youth soccer by adding another field.



*Figure 1 Standing Water at the Park's Playground During Site Reconnaissance*

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<sup>1</sup> Environmental Partners Group

Other, non-recreational, uses of the park include the previously mentioned Beach Road Music Festival and a car show. The Beach Road Music Festival is an annual 3-day music festival at the Park that most recently attracted close to 10,000 people per day. The entire field is utilized during this event. The next Beach Road Music Festival will run August 25-August 27, 2023. The car show is an annual one-day event hosted by the Tisbury Fire Department to benefit the Fallen Firefighters Fund. This event, held each September, features a wide variety of vintage vehicles that are driven out onto the field for public viewing.

### *Water Quality*

Veterans Memorial Park sits in the watershed for Lagoon Pond. Lagoon Pond is currently impaired and has a Total Maximum Daily Load (TMDL) for Total Nitrogen (TN) that was promulgated in 2015. Stormwater runoff from impervious surfaces contributes 11% of the controllable nitrogen sources to Lagoon Pond, which currently exceeds its TMDL by 16.18 kg TN per day, or 5,905.70 kg TN per year. The South End Basin, the sub-embayment that the Park contributes to, needs to see a TN reduction of 2.38 kg TN per day, or 868.7 kg TN per year.<sup>2</sup>

### **Previous Work**

Previous efforts have been undertaken for the area within and surrounding Veteran's Memorial Park to address both stormwater management and coastal resilience. This work has been coordinated by groups on the local, state, regional, and national level.

### *Drainage Master Plan*

In 2018, Environmental Partners Group developed a Drainage Master Plan on behalf of the Town of Tisbury. The Drainage Master Plan has two components – a mapping and assessment program for existing drainage system structures and a prioritization plan for solving drainage problems. The location of existing drainage system structures is an important component of the identification of the potential stormwater control measures identified in this memorandum. We were unable to secure the drainage system data in GIS which ultimately would be beneficial in advancing any stormwater concepts beyond the Park limits to the 30% Design Stage as part of the final Park Master Plan.

### *Tisbury MA Impervious Cover Disconnection (ICD) Project: An Integrated Stormwater Management Approach for Promoting Urban Community Sustainability and Resilience*

In March 2020 Paradigm Environmental, the University of New Hampshire Stormwater Center, and the Great Lakes Environmental Center published this report (the ICD report) for EPA Region 1 with funding from the EPA Southeast New England Program (SNEP). Specifically, the ICD report investigated the benefits of implementing cost-effective stormwater management strategies in Tisbury. Within the Appendices of the ICD Report, the University of New Hampshire Stormwater Center advanced concept designs for two related stormwater

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<sup>2</sup> Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs



management projects near and within Veterans Memorial Park. The first calls for a stone infiltration basin underneath the municipal parking lot between Beach Street and the Park. Discharge from the basin would be piped to the second project, which calls for the creation of a subsurface gravel wetland along the sidewalk swale along the eastern edge of the Park.<sup>3</sup>

*Evaluation of Coastal Processes and Storm Impacts to Support Resilient Planning and Mitigation Strategies for the Vineyard Haven Harbor Shoreline*

In June 2021 Applied Coastal Research and Engineering Inc., on behalf of the Town of Tisbury, developed conceptual flood protection designs for downtown Vineyard Haven using funding through the Massachusetts Office of Coastal Zone Management Coastal Resilience Grant Program (the CZM Report). The CZM report describes Lagoon Pond Road as containing “the lowest elevation storm tide pathways of all three regions evaluated within downtown Vineyard Haven.” In order to minimize this pathway, the CZM report calls for raising Lagoon Pond Road, raising the public parking lot in the southeast corner of the Park, and creating a berm to connect



Figure 2 Proposed Resilience Design (Courtesy of CZM Report)

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<sup>3</sup> Paradigm Environmental et al. Appendix F

parking lot to the higher elevations on the western side of the park (Figure 2).<sup>4</sup> Whether or not this proposed design is going to be implemented should be considered when evaluating the stormwater control measures identified in this memorandum.

#### *Massachusetts Department of Transportation Drainage Improvements on State Highway*

At the time of this draft memorandum, the Massachusetts Department of Transportation is due to present the design for drainage and stormwater improvements along State Road, Beach Street, and a portion of Beach Street Extension on January 30, 2023. Construction is due to begin in Spring 2024. This draft memorandum will be updated following HW attendance at this public hearing to reflect any proposed designs that will impact the effects of stormwater on Veterans Memorial Park.

#### **Stormwater Control Measures Identification**

On November 3, 2022 HW staff conducted a field reconnaissance of the Park and surrounding areas to conduct an initial assessment for potential opportunities for stormwater management. Several stormwater control measures (SCMs) were identified for installation to reduce runoff volume and achieve water quality treatment in areas adjacent to and within the Park. Prior to visiting, HW staff delineated the watershed draining to Veterans Memorial Park. HW staff came with an iPad pre-loaded with relevant GIS data, stormwater retrofit data collection forms, and the Tisbury Drainage Master Plan, a hand auger for soil evaluation, a magnetic manhole lid lifter to evaluate existing infrastructure, and a RTK GPS unit.

During the site visit HW staff walked throughout the contributing watershed to the Park. Staff observed conditions within the Park, logged existing drainage infrastructure throughout the watershed, confirmed the extent of the watershed, identified and geolocated preliminary SCM opportunities, and observed constraints for those opportunities. Hand augering was completed in several locations, where feasible, to assess subsurface conditions. Following the site visit, HW staff refined or confirmed contributing drainage areas for each identified potential SCM (Figure 3).

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<sup>4</sup> Applied Coastal Research and Engineering, Inc.





*Figure 3 Drainage Areas for Proposed SCMs*

A total of 12 locations were identified for potential SCM installation. All but one, State Road Vacant Lot, is located on publicly owned property. 11 locations are distributed throughout the contributing watershed to the Park and within the Park itself. While these SCMs are relatively small, cumulatively they provide a significant amount of potential stormwater treatment and associated nitrogen removal. It is important to note that each SCM was analyzed in isolation. If an SCM is not installed, it will increase the stormwater flow to the next downgradient SCM, if applicable (Table 1). Decisions about which SCMs are likely to be installed should be made prior to advancing designs as it will impact SCM size, stormwater treatment availability, and nitrogen treatment.

*Table 1: Stormwater Control Measures: Site Connectivity*

| SCM             | SCM Type                                 | Next down-gradient SCM |
|-----------------|--|------------------------|
| Causeway Road 1 | Water Quality Swale                      | None                   |
| Causeway Road 2 | Constructed stormwater treatment wetland | None                   |

|                              |  |                       |
|------------------------------|--|-----------------------|
| Recreation Courts            | Constructed stormwater treatment wetland | None                  |
| Lagoon Pond Road Parking Lot | Bioretention island                      | None                  |
| Edgartown Road 1             | Water quality swale                      | State Road Vacant Lot |
| Edgartown Road 2             | Tree trench                              | Edgartown Road 1      |
| Edgartown Road 3             | Tree trench                              | Edgartown Road 2      |
| Edgartown Road 4             | Tree trench                              | Edgartown Road 3      |
| State Road Vacant Lot        | Subsurface infiltration chambers         | Causeway Road 1       |
| Beach Street Municipal Lot   | Gravel wetland                           | None                  |
| Low Point in Park            | Subsurface gravel wetlands               | None                  |

The last site, the Entire Park, was assessed as a standalone SCM. In other words, it was assessed as if none of the SCMs listed in Table 1 are installed. This option will require a substantial amount of investigation to determine its feasibility. However, it is worthy of consideration as it may provide a multitude of benefits including, but not limited to, keeping the Park dryer, maximizing nitrogen removal, allowing the Park to accommodate many uses, and increasing the storm resilience of the Park.

Within each of the SCM drainage areas staff calculated the amount of impervious surface and the stormwater runoff water quality treatment volume (WQv) for a 1-inch target that would flow to the SCM as a result of that impervious surface. This in turn was used to evaluate the potential stormwater treatment capability at each identified site (see Table 2). This evaluation shows that each of the identified SCMs is feasible from a stormwater treatment volume perspective. For more information regarding the identified SCMS, including their exact locations, drainage areas, and constraints, please see the attached Field Forms.

*Table 2: Stormwater Control Measures: Water Quality Treatment Volume Capability*

| SCM Name and Location | SCM Drainage Area Size (acres) | SCM WQv Target (1-inch runoff in ac-ft) | Estimated SCM Size (square feet) | Surface Area Available for WQv Treatment |
|-----------------------|--------------------------------|---|----------------------------------|--|
| Causeway Road 1       | 2.70                           | 0.10                                    | 750                              | 35%                                      |

|                                 |       |       |        |      |
|---------------------------------|-------|-------|--------|------|
| Causeway Road 2                 | 6.02  | 0.15  | 3,275  | 100% |
| Recreation Courts               | 21.28 | 0.53  | 10,225 | 88%  |
| Lagoon Pond Road<br>Parking Lot | 0.45  | 0.01  | 260    | 100% |
| Edgartown Road 1                | 4.07  | 0.11  | 355    | 14%  |
| Edgartown Road 2                | 0.66  | 0.003 | 66     | 100% |
| Edgartown Road 3                | 2.02  | 0.01  | 161    | 100% |
| Edgartown Road 4                | 0.55  | 0.004 | 77     | 100% |
| State Road Vacant<br>Lot        | 17.88 | 0.08  | 1,691  | 100% |
| Low Point in Park               | 0.39  | 1,029 | 515    | 100% |
| Beach Street<br>Municipal Lot   | 4.7   | 0.26  | 1,515  | 100% |
| Entire Park                     | 62.84 | 1.88  | 45,600 | 100% |

In addition to evaluating their feasibility, HW evaluated the nitrogen removal potential for each SCM (Table 3). This analysis involved determining the stormwater-related nitrogen load entering each SCM and determining the percent removal potential for each SCM type utilizing methodology in accordance with the Massachusetts Small MS4 General Permit.<sup>5</sup>

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<sup>5</sup> United States Environmental Protection Agency



*Table 3: Stormwater Control Measures: Potential Nitrogen Removal*

| SCM                          | Entering stormwater-related nitrogen load (kg/year) | Nitrogen Removal Potential (kg/year) |
|------------------------------|---|--------------------------------------|
| Causeway Road 1              | 4.6   | 1.5                                  |
| Causeway Road 2              | 10.2  | 10.0                                 |
| Recreation Courts            | 21.4  | 18.5                                 |
| Lagoon Pond Road Parking Lot | 0.6   | 0.6                                  |
| Edgartown Road 1             | 7.0   | 0.9                                  |
| Edgartown Road 2             | 0.7   | 0.7                                  |
| Edgartown Road 3             | 3.8   | 3.7                                  |
| Edgartown Road 4             | 1.1   | 1.1                                  |
| State Road Vacant Lot        | 29.3  | 28.8                                 |
| Low Point                    | 1.6   | 1.1                                  |
| Beach Street Municipal Lot   | 15.5  | 10.5                                 |
| Entire Park                  | 227.2   | 222.6                                |

The stormwater-related nitrogen load draining to the whole Park on an annual basis accounts for approximately 26% of the excess stormwater nitrogen load to the South End Basin. Applying the performance curves from the Massachusetts Small MS4 General Permit, underground chambers beneath the Park will lead to a reduction of 222.630 kg/year of nitrogen, which is 25.6% of the excess stormwater nitrogen load to the South End Basin. As stated earlier this analysis assumes that none of the other SCMs described in this memorandum and accompanying field forms have been installed.

The remaining SCMs combined account for about 11% of the South End Basin's excess stormwater-related nitrogen load. If all of them were to be installed it would account for 8% of the stormwater-related nitrogen reductions required for the South End Basin. It is important to note that simple infiltration of surface runoff will achieve minimal removal of nitrogen. In order to achieve the estimated nitrogen removal from the performance curves in the MS4 General Permit, SCMs of this type need to be designed with a nitrogen removing filter media such as a wood-chip layer or other carbon source.

## References

Applied Coastal Research and Engineering, Inc. CZM Coastal Resilience Grant Program: Evaluation of Coastal Processes and Storm Impacts to Support Resilient Planning and Mitigation Strategies for the Vineyard Haven Shoreline. June 2021.

Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs. Final Lagoon Pond Estuarine System Total Maximum Daily Loads for Total Nitrogen. July 2015.

Environmental Partners Group. Draft Veterans Memorial Park Reconstruction Design Report and QA/QC Plan. August 27, 2008.

Paradigm Environmental, University of New Hampshire Stormwater Center, and Great Lakes Environmental Center. Tisbury MA Impervious Cover Disconnection (ICD) Project: An Integrated Stormwater Management Approach for Promoting Urban Community Sustainability and Resilience. March 27, 2020

United States Environmental Protection Agency National Pollutant Discharge Elimination System. General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems In Massachusetts: Authorization to Discharge Under the National Pollutant Discharge Elimination System. Appendix F. December 7, 2020/