Site Selection for Stormwater Controls

Prepared by
OptiRTC, Inc.
98 N. Washington Street
Suite 210
Boston, MA 20114

Last Updated: 03/29/2021

98 N. Washington Street
Boston, MA 20114
1-844-OPTIRTC
www.optirtc.com

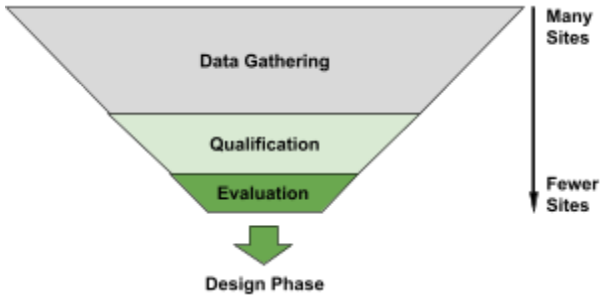
SITE EVALUATION OVERVIEW

FOR ACTIVE CONTROL SITES ON THE OPTI PLATFORM

INTRODUCTION

Preliminary site evaluation is the process of assessing existing stormwater management sites, based on the projected benefit that Opti technology will provide. The goal of this process is to apply a set of criteria to potential sites in order to determine which will be selected for further analysis. Opti has developed a number of tools to help with site evaluation, attached as appendices. This document serves as a guide for each step of planning and evaluation:

1. **Data Gathering**
   All available sites and information
2. **Qualification**
   Sites meeting the minimum requirements
3. **Evaluation**
   Sites best suited for Opti technology



Before starting, it is important to answer the following questions:

What is the overall goal of the project?	**Examples include:** Water Quality Credits, CSO Reduction, Flood Mitigation
How will benefits be defined?	**Examples include:** Treated Acres, Nitrogen Removal, Storage Volume
What are the geographic constraints?	**Examples include:** State/County/City Boundaries, Flood Zone Risk Areas, CSS or MS4 Areas

Once the above knowledge has been established, proceed to steps 1, 2, and 3 below.

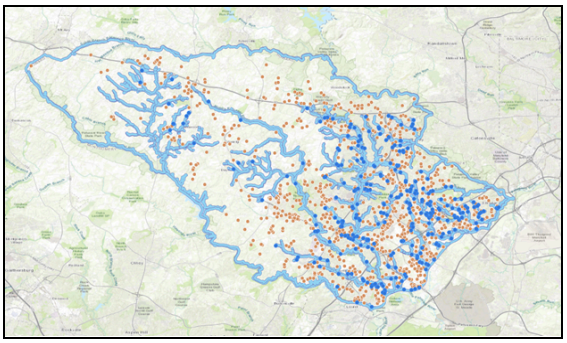
1. Data Gathering

Determine what data is needed and what data is available for existing stormwater sites. Aggregate data so that stormwater sites can be vetted based on criteria. Datasets includes but are not limited to:

- Public GIS layers (Federal, State, Local government)
- Property/Parcel Databases (Federal, State, Local government)
- Site Plans & Reports (provided by owner or public record)

98 N. Washington Street
Boston, MA 20114
1-844-OPTIRTC
www.optirtc.com

Data Gathering Example:



The map to the left displays data gathered to evaluate stormwater sites for a project in Howard County, MD. Data sources include:

- FEMA flood hazard areas
- County stormwater BMP database

This data was used to determine which sites were in close proximity to floodplains.

Figure 1: *Sourcing effort in Howard County, MD*

2. Qualification

Develop qualifying criteria and exclude ineligible sites. Eligible sites will be evaluated in Step

	Criteria	Example
Required Information	Minimum drainage area & impervious area	100 acres, 25% impervious
	Minimum storage capacity	1-year design storm
	Outlet structure compatibility with control equipment	Existing outlet structure in good condition, no structural repair is needed
Example of Additional Qualification Information	Year Built	After 1995
	Dam Safety Rating	Minimum 'A'
	Ownership	Public

3. Evaluation

This step refers to the Opti Site Evaluation Checklist, which can be made available by Opti upon request after Data Gathering and Qualification has been completed.

a. Record all site data and qualifying criteria in the "Site Data" tab on the checklist tool for all qualifying sites. Recent as-built drawings or an on-site survey are the best resource for this information, but in the absence of these resources a visual inspection via Google Earth is acceptable. If an on-site survey is required, Opti will provide specific instructions in the form of a survey checklist (See Appendix A).
b. Complete the "Stage Storage" tab on the checklist to determine controllable volume. (See Appendix B for guidance)

Controllable volume can typically be used to quantify benefits (e.g. flood control, CSO reduction, water quality) at a specific site. This is the volume of water which Opti will be able to control (see Figure 2). To compute controllable volume at a site, keep in mind:

- Controllable volume is the volume between the Opti controlled orifice and next passive outflow point.
- Stage-storage information for the facility (from Qualification stage) will be used along with the invert of the outflow point to determine controllable volume.

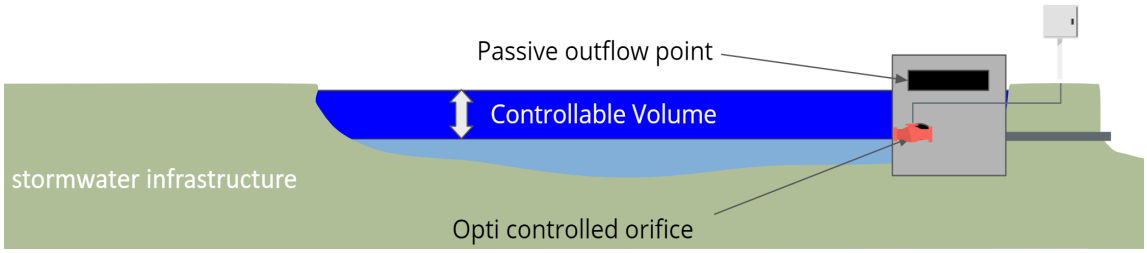


Figure 2: *Controllable volume diagram*

c. Conduct a review of local stormwater regulations to determine which regulations could impact the project. Record regulatory information in "Stage Storage" tab of the checklist. If the facility is located in a region under a NPDES permit or consent decree, review local regulations to ensure compliance goals are met. Other types of regulations to check include:
   - Dam safety requirements
   - Water quality crediting (process and requirements)
   - Receiving stream use (temperature and flow requirements)
   - Underground conveyance regulations (e.g. freeboard, flow rates, etc.)

If advanced modeling is required, see Appendix C for guidance.

Preliminary site evaluation is needed to determine potential benefits provided by an Opti enhancement. Design considerations should also include additional work that may be needed to bring the pond into compliance with current regulations (e.g. pretreatment forebays, vegetation).

APPENDICES

(A) *Site Survey Requirements*. This provides detailed information requirements if an on-site survey is necessary for site qualification.
(B) *Stage Storage Requirements*. This provides specific requirements for stage storage information.
(C) *Modeling with Opti*. This provides guidance on incorporating Opti behaviors and benefits into hydraulic and hydrologic models.

98 N. Washington Street
Boston, MA 20114
1-844-OPTIRTC
www.optirtc.com

APPENDIX A

Site Survey Requirements

If additional site information is needed, conduct a topographic validation survey to verify that present conditions at the site reflect the information included on the record drawings or other sources of site data. Specifically, confirm the following information:

- Elevation, size, and material of all headwalls and pipes entering and exiting the pond/basin.
- Elevation, size, and material of all outlet control structures (including the size and shape of all weirs, orifices, pipes, as well as material, length, slopes, and inverts).
- Basin elevations to confirm stage-storage information for existing facility (if needed). This includes:
    - Top of embankment
    - 5–10 points around outlet structure
- Place a utility one-call and note the location of any existing underground utilities within the site boundaries.
- For line-power systems: mark tie-in points to overhead power lines.
- For solar-power systems: identify treeline and potential cover locations.
- Provide 3D point information and identify the general location of the shot on the as-built drawings for the site (AutoCAD file).

Survey will be used to create approximate stage-storage volumes at associated elevations.

98 N. Washington Street
Boston, MA 20114
1-844-OPTIRTC
www.optirtc.com

APPENDIX B

Stage Storage Requirements

Necessary Facility Information	**Notes**
Stage-storage	Detailed stage-storage curve, denoting the following key elevations: - Reservoir Bottom - Permanent Pool - 10-yr Elevation - 100-yr Elevation - Underdrain Invert - Overflow Invert - Top of Embankment - Outlet Structure Bottom - Outlet Structure Top - Required Freeboard Elevation - Emergency Spillway Invert
Outlet structure conditions	Orifice sizes, elevations, and overflow dimensions.

98 N. Washington Street
Boston, MA 20114
1-844-OPTIRTC
www.optirtc.com

APPENDIX C

Modeling with Opti

1) Hydraulic / Hydrologic Models:

Model proposed site Opti conditions (orifice, controllable volume, etc) to ensure regulatory compliance and ensure proposed conditions are adequate. Depending on the location, either single-event or continuous models may be appropriate. Use this analysis to confirm:

Existing (pre-Opti) Facility Design:	**Proposed (with Opti) Facility Design:**
• Meeting freeboard, conveyance, and other regulatory requirements • Design water surface elevations of required storms (i.e. 2-, 10, 100-year) • Design flow rates for required storms or required rainfall record	• Maximum control volume benefit • Design water surface elevations of required storms • Outlet sizing and alterations (weir wall, blocking an orifice, etc.) • Design flow rates for required storms or required rainfall record

Perform modeling while considering:

- Freeboard and conveyance regulations
- Can controllable volume be increased?
- Is the orifice sized properly to convey flow?
- Can the maximum controllable volume be increased without further construction?

Modeling softwares that can be used to in hydraulic evaluation of CMAC projects include:

- Tools such as HydroCAD and TR-20 can be used to model a very simplified version of Opti performance for design storms of interest. These models use single event design storms and are typically used to model extreme conditions (e.g. valve 100%, valve 100% closed) for regulatory compliance.
- WWHM can be used in the Pacific Northwest to model a more accurate representation of Opti performance using continuous simulation. This effort requires the WWHM-Opti plug-in.

Required modeling scenarios vary by location and regulatory agency. Opti will be available throughout the sourcing process for consultation, and will review the Benefit Analysis upon receiving final results.

Opti can assist partners with watershed-scale modeling of software to determine optimization potential using active controls. Watershed scale modeling efforts are generally performed using HEC-RAS and EPA SWMM.