

6.0 Screening of CSO Control Alternatives

In Section 5.0, CSO Control Alternatives, the following options were presented as measures to abate the impacts of CSO flows at the Wellington Avenue CSO Facility:

- Implementation of the Nine Minimum Controls, as dictated by the EPA;
- Separation of the combined sewer system into separate sewer and stormwater systems;
- In-line storage within the existing system utilizing either tanks or oversized conduits to provide extra storage capacity;
- Off-line storage parallel to the existing system utilizing tanks, conduits, or underground tunnels;
- Satellite treatment of flow at specific CSO outfall locations;
- Elimination or relocation of CSO outfall(s); and
- Conveyance and treatment at the existing Water Pollution Control Plant (WPCP).

The alternatives listed above were presented schematically in Section 5.0. In this Section 6.0, each CSO control alternative is screened using a variety of criteria. The purpose of the screening process is to identify the alternatives that best meet CSO control objectives with the least overall impacts, and are thus worthy of further evaluation in subsequent report sections. Though not specifically listed in Section 5.0, No Action is also screened as an alternative in this Section 6.0. In Section 7.0, the screened alternatives undergo additional technical evaluation, including detailed analysis of hydraulic, siting, environmental, institutional and regulatory issues. Estimates of capital, operations, maintenance and present worth costs are provided for the preferred alternative in Section 8.0. Section 10.0 presents conceptual design criteria for the selected alternative.

6.1 Screening Criteria

Each alternative for the Wellington Avenue area will be assessed using six major screening criteria:

- Elimination of CSOs,
- Consequential Impacts,
- Cost Considerations,
- Environmental Issues,
- Technical Issues, and
- Implementation Issues.

Based on CSO Control Policy and regulatory enforcement, the overall program objective is to eliminate CSOs from occurring as opposed to reducing volume and contaminant loading. As a result, the elimination of CSOs has been made the controlling screening criterion. The five remaining screening criteria carry equal weight.

All major and sub-major screening criteria are listed in Table 6.1 (located at the end of this section) and are further described in the sections that follow.

6.1.1 Elimination of CSOs

As previously indicated, Elimination of CSOs from the Wellington Avenue CSO Facility was chosen as the controlling screening criterion due to CSO policy and regulatory requirements. For the purpose of this report, Elimination of CSOs is defined as prevention of CSOs resulting from a 1-year storm, consistent with a typical year of record for Newport.

6.1.2 Consequential Impacts

This criterion assesses the impact associated with implementation of a particular alternative, which can vary markedly among options for CSO abatement. In some cases, implementation may result in severe impacts that outweigh positive benefits. In others, the impacts could be perceived as minor; however, may be significant enough to result in selection of one alternative over another. The consequences of action or inaction have the most meaning when weighed against the Elimination of CSO criterion.

6.1.3 Cost Considerations

Capital and operation and maintenance costs will be assessed, including life cycle costs, which take into consideration variations in initial and annual costs from alternative to alternative. Additionally, energy use will be considered as part of this criterion. Alternatives that tend to have high overall costs or consume excessive amounts of energy will not be valued as high as those that do not.

6.1.4 Environmental Issues

Environmental issues that fall into one or more of the many subcategories listed below will be assessed as follows:

Land Use

Under this criterion, the impact on existing or planned land uses is assessed. This could be related to specific parcels on which facilities are constructed or tracts of land adjacent to such facilities. In addition, the following will be assessed: (1) the extent to which land is needed, (2) required easement area or land acquisition, (3) land use or conservation deed restrictions, and (4) zoning changes. Alternatives that fit with existing land uses and favor City property will receive positive consideration under this criterion.

Traffic and Site Access

Traffic delays will be assessed, whether related to temporary increases in construction trucking or to long term impacts to traffic patterns due to implementation of the alternative itself. Issues associated with site access, particularly those originating from construction of new access roads will also be assessed.

Utilities Relocation/Loss of Service

The impact of utility relocation, including the potential temporary loss of residential and business services will be evaluated as part of this criterion. The assessment will include consideration of disruption, displacement and reduction of quality of life.

Noise and Vibration

Noise and vibration concerns stem from construction activities and equipment installed as part of the alternative under evaluation. Operation of heavy construction equipment typically starts in the early morning hours and lasts well into the afternoon. Movement of the equipment over the ground can cause vibration as well as other construction activity such as compaction, blasting and pile driving. Installed equipment, such as back-up power generators, can also raise noise concerns. Sensitive receptors such as hospitals, schools, facilities for the elderly, libraries, etc could be impacted.

Historic and Archaeological Resources

Historic buildings and grounds and archaeologically significant areas could pose challenges for the implementation of certain alternatives. Preliminary field reconnaissance and exploratory excavations may be required to pinpoint buried resources, if such areas are encountered. According to Rhode Island Geographic Information System (RIGIS) mapping, there are more than 40 historic sites and more than 10 districts located in Newport, including Ocean Drive, Vanderbilt, the Breakers and Bellevue Avenue historic districts. Greater consideration will be given to alternatives that avoid impacting historic and archaeological resources.

Soils/Rock

The type of underground materials encountered can cause environmental concerns. Unsuitable bearing and backfill soils such as clays and peat need to be properly disposed. High groundwater levels need to be lowered and treatment is often necessary prior to discharge to a drainage system or surface water. The degree to which soils and groundwater need to be addressed is a site-specific issue; however, in most cases impacts can be mitigated. Rock and boulders can require blasting and care must be exercised in choosing explosives that do not pollute the environment.

Wetlands

As indicated on RIGIS mapping, areas of significant wetland resources exist along the coast of Newport. Wetland resources can also be found inland, located mostly to the south of Memorial Boulevard and east of Bellevue Avenue. Because of their environmental importance, wetland resources are protected by federal and state laws. Significant permitting would be required for any alternative involving construction within wetlands or wetland buffer zones. The screening will give preference to alternatives with the least impact to wetland resources.

Floodplains

Approximately 10 to 20 percent of Newport's land area is designated a 100-year flood zone per RIGIS mapping. Projects located within these zones require extensive permitting, with compensatory flood storage being a typical mitigation requirement. No known impact to floodplains would be associated with projects located outside of the 100-year flood zone.

Water Quality

Alternatives that require temporarily taking existing facilities out of service or causing an increase in CSO or SSO activities would adversely impact water quality during the construction period. Though overall water quality improvement would be the expected long term result of such alternatives, projects that cause short term increases in pollution would have negative impacts.

Air Quality

This screening criterion evaluates the short- and long-term air quality impacts associated with CSO alternatives. Short term impacts arise from dust, odors and emissions from heavy equipment. Long term impacts consist of emissions from equipment such as back-up power generators.

Threatened and Endangered Species

RIGIS maps identify four areas of rare species habitat in Newport. Almy Pond is the largest area identified. Alternatives that avoid such areas will be preferred compared to those that do not. As a minimum, any selected alternative would require more thorough threatened and endangered species research during the preliminary design phase.

Hazardous Materials

RIGIS mapping also identifies more than 50 sites containing potentially hazardous materials. The sites are scattered throughout Newport, with a concentration in the northern and central portions of the City. The type and extent of contamination is not indicated. Regardless, alternatives that avoid or have no impact on these sites would be considered favorable.

6.1.5 Technical Issues

The technical issues that will be part of the screening include:

Constructability

This criterion relates to the ease of construction. Alternatives that involve overly complex designs and specialized construction tend to drive up costs due to the limited number of contractors and machinery available to complete the work. Site conditions also play a part in constructability. Alternatives with unsuitable soils, extensive rock or high groundwater requiring extensive dewatering or rerouting of drainage patterns pose significant challenges compared to those that do not. Straightforward alternatives with few constructability issues will be ranked higher than alternatives that involve difficult site conditions and significant complexity.

Reliability

Reliability of the proposed solution is a significant technical issue. Components and systems must function properly when called upon to do so; however, alternatives involving significant equipment and automation are inherently less reliable than alternatives without them. Alternatives proposing systems with unknown or poor track records will not be favored.

Ease of Operations

Favorable alternatives will involve equipment and system components that are relatively easy to operate with a reasonable number of staff. Unfavorable alternatives would involve highly specialized systems that require extensive training.

6.1.6 Implementation Issues

The last screening criteria to be assessed relates to potential barriers to implementation.

Adaptability to Phased Construction

Phased construction of an alternative has many benefits. Such phasing can lessen the immediate financial impact on rate payers since overall costs are spread out over a longer timeframe. Phasing also spreads out the construction impacts on traffic and the inconvenience to residents and businesses. Segmenting in this fashion also allows adjustment of subsequent phases based on performance evaluations of current phases. Preferable alternatives will meet today's needs but also have the ability to adapt to future conditions.

Institutional Constraints

Institutional constraints include matters related to political issues, public opinion and other non-technical factors that could impact project approval. While it is assumed that all alternatives will include an extensive public information and outreach campaign that tend to mitigate such concerns, highly controversial projects can quickly fall into disfavor and should be avoided. Alternatives that are less likely to be controversial, have minimal impact on sensitive stakeholders who could oppose the project, and have the fewest potential political issues, will be favored over those that tend to elicit these concerns.

Multiple Use Considerations

An alternative would be considered advantageous if it also could serve another beneficial purpose while also mitigating CSOs. Examples include parking facilities, recreational opportunities, public education, etc.

Schedule

Alternatives that are disruptive, complex, and have excessively long permitting and completion times could be costly and will quickly draw negative publicity. For this reason, alternatives with reasonable completion schedules will be screened favorably.

6.2 Screening of Alternatives

In this section, the criteria explained in Section 6.1 will be applied to the seven alternatives identified in Section 5.0, CSO Control Alternatives for the Wellington Avenue CSO Facility Tributary Area. Though not specifically included in Section 5.0, the No Action option is also assessed. Each criterion is evaluated for each alternative in terms of whether it meets, partially meets or does not meet project objectives. If a particular alternative meets objectives under a criterion, then no or minimal barriers to its implementation are envisioned. If the alternative partially meets objectives, then implementation challenges exist; however, they are not

insurmountable. If an alternative does not meet objectives, resolution is unlikely. A general discussion is included for each alternative. In some cases, specific explanation is provided for the selection of a particular constraint under certain criteria. Table 6.1 (located at the end of this section) lists each alternative and each criterion.

6.2.1 No Action

The No Action alternative consists of maintaining current CSO control practices. This would include continued implementation of the Nine Minimum Controls coupled with operation of the existing CSO control facility.

Though the City should be commended for the actions previously and currently being taken to protect the environment, in the long term this alternative would not address CSO policy and regulatory requirements for CSOs. It therefore does not meet the controlling screening criterion and should not be considered a viable alternative for further consideration.

6.2.2 Implementation of Nine Minimum Controls

Implementation of the Nine Minimum Controls is a subset of the No Action alternative. Its implementation would result in maintaining and continuing the City's efforts in this area. As reported in Section 5.0, Table 5.1, these efforts are significant and have resulted in much progress toward CSO control and reduction; however, for reasons mentioned in Section 6.2.1, this alternative, on its own, does not meet the controlling screening criterion.

6.2.3 Sewer Separation

Despite the separation projects completed to date, significant Infiltration/Inflow (I/I) is present in the sewer system tributary to the Wellington Avenue CSO Facility and contributes to high flows that cause CSOs. If additional separation were completed, it would consist of removal of sump pumps, roof leaders and drains on private property and catch basins on public property that are connected to the sanitary sewer. This work represents a significant cost and disruption to Newport residents. Due to the presence of substantial I/I, this separation is not likely to completely eliminate overflows. Further, since work would take place throughout the collection system tributary to the Wellington Avenue CSO Facility, traffic would be impacted, though the effect would be minimized through use of phased construction and 'No Dig' rehabilitation techniques. It is also likely that localized flooding would result in areas where drainage facilities are either not available or inadequately sized for the additional flow. In other areas, new storm drains would need to be constructed at considerable expense. Wetlands and historic/archaeological resources are also likely to be partially impacted. Since construction would take place throughout the Wellington Avenue CSO Facility Tributary Area, utility disruptions are likely. This alternative is also likely to require major reconstruction work on private property and therefore is expected to engender concerns and even opposition from the public and from political institutions. Although there are a number of partial impacts that may lead to its failure, costs are anticipated to be relatively low, which should lead to additional consideration of this alternative.

6.2.4 In-line Storage

Opportunities to use existing facilities for in-line storage purposes are minimal, as reserve capacity necessary for such use is not available in many areas. Construction of numerous in-line tanks or conduits throughout the collection system tributary to the Wellington Avenue CSO Facility would therefore become necessary. Storage tanks or conduits would be needed in the most congested and visible parts of the City, making this option less likely to achieve public and political support. Traffic concerns would be a partial concern as well as noise/vibration. Opportunities for deep utility construction due to the anticipated large size of the storage tanks give rise to utility conflicts and constructability concerns. Technically, the numbers of storage sites involved and the dimensions needed seem to pose significant challenges toward successful implementation of this alternative. It appears only a minimal number of sites would be practical and it is questionable whether sufficient storage volume would be achievable. Therefore, CSOs would not be completely eliminated. In addition to CSOs, sanitary sewer overflows and system backups are a likely consequence of inadequate in-line storage.

6.2.5 Off-line Storage

Options for off-line storage fall into two categories: centralized and de-centralized. Centralized storage would consist of a large tank in one location that is sized to store combined sewage such that CSOs are eliminated. The decentralized option is similar, except that multiple tanks would be used in several locations.

Centralized

A centralized storage tank to eliminate CSOs would be very large and would need a large parcel of land, preferably under the City's control. Spencer Park is an example of such a parcel. This alternative meets CSO policy and regulatory requirements; however, several constraints exist with respect to other screening criteria.

In spite of the tank size needed, this alternative is not expected to be more costly than others, though it is likely to impact the existing uses of the parkland on which it would be sited. Additional constraints also include: (1) floodplains, since the potential site is located within the 100-year flood zone; (2) constructability due to the possibility of encountering high groundwater and unsuitable soils, and specialized construction techniques for such items as dewatering and drainage control needed to build the tank on the parcel; (3) ease of operation given the additional monitoring and pumping equipment involved; and (4) public opposition and other institutional concerns due to potential parkland impacts and temporary loss of use. In spite of these constraints, this alternative is appropriate because it meets the controlling screening criterion for CSO elimination.

Decentralized

The decentralized alternative also meets the controlling screening criterion; however, the same constraints exist, with several taking on added severity due to the number of tanks involved. Though the parcels needed would be smaller than the size needed for the centralized alternative, more sites would be necessary. This would require Newport to purchase land and/or alter the use of several existing City-owned parcels. Most, if not all of the constraints associated with the centralized alternative would be multiplied by the number of sites needed. Also, the economy of scale associated with construction of a single centralized storage tank is lost by building several tanks at remote locations. In addition, the reliability and operability of this alternative becomes a

concern given the multiple locations involved. As previously indicated, this alternative meets the controlling screening criterion, but does have a higher level of complexity and cost than the centralized storage option.

6.2.6 Satellite Treatment

This alternative is similar to the storage alternative explained in Section 6.2.5, except immediate treatment of CSOs is involved versus holding and then discharging combined sewage flow back to the collection system for treatment at the existing WPCP. Treatment would likely take place at an upgraded Wellington CSO facility, or a newly located facility possibly operated in conjunction with Wellington. The treated effluent would be discharged through the same or a new CSO, or outfall. The alternative would have constraints that are similar to storage as well. Since treatment is involved and byproducts such as sludge and floatable materials would be produced, this alternative is also more complex, would be more difficult to construct and harder to operate than the storage options.

The satellite treatment alternative would not result in the elimination of CSOs since the treated effluent would be discharged through existing outlets or would require the permitting of new outfalls. This alternative would be subject to meeting water quality standards established by regulatory agencies.

6.2.7 Outfall Elimination/Relocation

Since the Wellington Avenue CSO Facility collection system lacks capacity to simply eliminate or relocate an outfall, this alternative is not feasible. If this alternative were implemented, combined sewerage would overflow from the piping network in another area, or would back-up into residences and businesses. Combined sewerage would still exit the system, so this alternative does not meet the Elimination of CSOs criterion. In order to meet that criterion, the combined sewer overflows at Wellington, the flows that currently exit the system there would need to be conveyed and discharged elsewhere. Either the flows would need to be conveyed to the Washington Street facility and the discharges increased there; or the flows would need to be conveyed to the existing WPCP, as discussed under the next item.

6.2.8 Conveyance and Treatment at the Existing WPCP

This alternative consists of construction of new interceptor sewers, pumping facilities, storage, and an expansion of the existing water pollution control plant (WPCP). It could involve wet weather blending, which consists of bypassing diluted, higher rates of flow around secondary or advanced treatment processes with lower hydraulic capacities and only receives primary treatment or disinfection. It is understood that bypassed flow during wet weather must be permitted by RIDEM and would have to meet the current RIPDES permit. It would also involve an increase in flow through the current effluent outfall and may require an amended flow limit in the RIPDES permit. Due to Ocean Sanctuaries Act limitations on additional effluent discharges through new or existing outfalls, regulatory approval for this alternative is unlikely.

The Conveyance and Treatment alternative would technically eliminate the CSO at Wellington, though this would be achieved only by shifting the discharge to the WPCP. An upgrade and expansion of the existing WPCP would be required. Further, extensive NPDES permitting would be necessary, which is not likely to lead to regulatory approvals. Other constraints exist, such as wetlands, floodplain, historic/archaeological and implementation concerns regarding the interceptor and piping facilities that are needed to convey the combined sewerage to the plant.

Because this alternative makes partial use of existing land and facilities, and due to potential implementation at reasonable cost, this alternative may be worth further evaluation.

6.3 Costing Criteria

Most CSO control alternatives cannot reasonably meet the Elimination of CSOs criterion, so developing cost and performance data for each alternative was unnecessary; and screening was completed qualitatively rather than quantitatively. It should be noted that a qualitative assessment is permissible per EPA, LTCP guidance (EPA 832-B-95-002, Combined Sewer Overflows: Guidance for Long-Term Control Plan, US Environmental Protection Agency, September 1995). Section 3 of this guidance manual (Development and Evaluation of Alternatives for CSO Control) presents case studies of CSO Management plans that include initial screening assessments based on qualitative criteria (MWRA and Portland, OR; pages 3-68 to 3-79).

6.4 Results of Screening

After application of the screening criteria in the manner previously described, results were summarized in matrix form as presented in Table 6.1. A total of 22 screening criteria were evaluated for nine alternatives (accounting separately for the centralized and decentralized alternatives) resulting in 198 individual assessments, which were then analyzed cumulatively for each alternative.

As the table shows, the following alternatives have the least impact and are therefore worthy of additional consideration:

- Sewer Separation;
- In-Line Storage
- Off-Line Storage (centralized and decentralized)
- Conveyance and Treatment at Existing WPCP

Sewer separation, though only partially meeting the Elimination of CSOs criterion, will be further evaluated because of favorable costs and the potential for the use of specialized construction practices that minimize disturbance. The In-Line Storage alternative has consequential impact concerns; however, construction and environmental impacts are expected to be confined to localized areas. Centralized and decentralized storage alternatives also will be evaluated further. These alternatives were selected because they were viewed as less complex solutions that were relatively more reliable and easier to implement, operate and maintain compared to other options. Lastly, though having significant consequential impacts associated with increased flows to the WPCP and regulatory approval concerns, the conveyance and treatment alternative was retained for further consideration because of its relatively modest cost and strong potential to meet the Elimination of CSOs criterion. These four alternatives will be evaluated further in Section 7.0, Evaluation of Abatement Alternatives.

**TABLE 6.1
RESULTS OF SCREENING ANALYSIS**

CSO Abatement Alternative	Elimination of CSOs at Wellington	Consequential Impacts	Cost Considerations	Land Use	Traffic and Site Access	Utilities Relocation	Noise and Vibration	Historic and Archaeologic Resources	Soils/Rock	Wetlands	Floodplains	Water Quality	Air Quality	Threatened and Endangered Species	Hazardous Materials	Constructability	Reliability	Ease of Operation	Adaptability to Phased Implementation	Institutional Constraints	Multiple Use Considerations	Schedule	Future Evaluation Recommended
No Action ²	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	●	●	○	No
Nine Minimum Controls ²	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	●	●	○	No
Sewer Separation	◐	◐ ¹	○	◐	◐	◐	◐	○	◐	◐	○	◐	○	○	◐	○	◐	○	○	●	◐	◐	Yes
In-Line Storage	◐	●	◐	○	◐	◐	◐	◐	◐	◐	○	◐	○	○	◐	◐	○	○	○	●	◐	◐	Yes
Off-Line Storage																							
Centralized	○	○	○	◐	○	○	◐	○	◐	○	◐	○	○	○	○	◐	○	◐	◐	◐	○	◐	Yes
Decentralized	○	○	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	○	○	◐	◐	◐	◐	○	◐	○	◐	Yes
Satellite Treatment	●	●	◐	◐	◐	◐	◐	◐	◐	◐	◐	◐	○	○	○	◐	◐	◐	◐	●	◐	◐	No
Elimination or Relocation of CSOs	○	● ³	●	○	●	●	◐	◐	◐	●	○	●	○	○	◐	●	◐	◐	◐	●	◐	◐	No
Conveyance and Treatment at Existing WPCP	○	●	◐	◐	●	◐	◐	●	◐	◐	◐	◐	○	○	◐	●	◐	◐	◐	●	◐	◐	Yes

Key

- Meets Objective; No Known Impact
- ◐ Partially Meets Objective; Potential Partial Impact
- Does Not Meet Objective; Potential Severe Impact

Footnotes

¹Sewer separation will cause stormwater and potential pollution management issues associated with increased volume, construction of new systems, capacity constraints of the existing system and possible additional stormwater outfalls

²Evaluated on the basis of whether there would be a change to an existing negative impact.

³This alternative tends to only transfer the CSO impact to another location