



# CASE STUDY

Community Life-Cycle Analysis for Stormwater Infrastructure Costs



## Kirkland Washington

CLASIC Case Studies showcase the variety of ways that the online tool can assist communities with stormwater project planning and decision-making.

### PROJECT INFORMATION

- ➔ Kirkland, WA
- ➔ Project Area – Approximately 110,000 sf, 2.92 acres

### Comparing Costs Across Technologies

The City of Kirkland's Surface Water Department staff are examining how to include water quality treatment and stormwater conveyance into a 2.92 acre area of redevelopment. Site improvements will include two facilities, including a new fire station and training building, a parking lot, access road drainage and site utilities. The City would like to plan for long-term, life-cycle costs of various stormwater technologies to provide financially responsible and effective stormwater management for their community.

#### The Question

From a cost standpoint, what are the tradeoffs of certain technologies to evaluate limited redevelopment space, and what are more sustainable investments when looking at lifecycle costs?

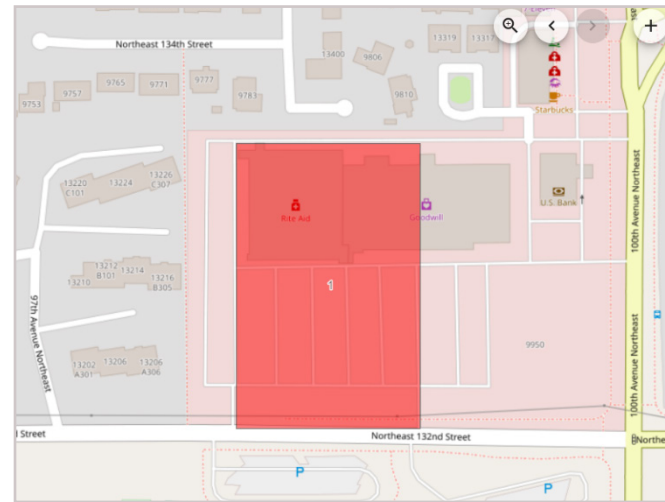
## CASE STUDY

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## CLASIC INPUTS

Scenarios selected include options for feasible stormwater uses on the area where the training facility will be built in the future to defer construction costs of a vault. The vault and pretreatment technology will be required once the two facilities are built. Scenarios selected include:

- Six small rain gardens – total area 0.14 acres
- One medium detention basin with one small sand filter for pretreatment – total area 0.72 acres
- One medium wet pond – total area 0.70 acres
- One large vault with 10 small sand filters – total area 0.13 acres



## CLASIC OUTPUTS

Lifecycle cost comparisons of the scenarios show the different total capital construction, maintenance, rehabilitation, and, annual average costs over a 30-year study period. CLASIC costs are built from national data and include national multipliers to adjust for regional cost differences. The detention basin and wet ponds are similar in annual average costs and other costs compared to the vault and six rain gardens.

**Table 1 Scenario Lifecycle Cost Comparisons (Present Value, 0% discount rate)**

Scenario Name (Number of technologies in parenthesis)	Total Cost (30 year study period)	Total Capital Cost	Total Maintenance Cost	Total Rehabilitation Cost	Annual Average
Rain Garden (6 small)	\$879,000	\$282,000	\$522,000	\$75,000	\$29,300
Detention Basin (1 medium) with Sand Filter (1 small)	\$226,400	\$52,000	\$167,400	\$7,000	\$7,547
Wet Pond (1 medium)*	\$177,000	\$42,000	\$135,000	\$0	\$5,900
Vault (1 large) with Sand Filter (10 small)	\$1,348,000	\$890,000	\$318,000	\$140,000	\$44,933

## APPLICATION

### *CLASIC Can Inform Decision Making*

CLASIC analyses help view different options for space constrained urban redevelopment. Land prices of the parcels can be significant. To maximize space, in this case study, rain gardens take up the least space and offer more pollution reduction and co-benefits (which CLASIC can also estimate but are not included in this case study).

The volume the Rain Garden Scenario captures is small, estimated to be 9,600 cubic feet (cf). The wet pond and detention basin scenarios take up about the same amount of space, and also capture approximately the same volume as the vault (approximately 100,000 cf).

The wet pond and detention basin are viable stormwater options until the construction of the proposed training facility begins; however, costs to “decommission” the detention basin or wet ponds are not included.

This lifecycle cost information can assist planners and decision-makers during the feasibility stage to determine the best opportunity for the location and the community as a whole.

**Table 2 Scenario Comparisons by Total Area and Total Volume Captured**

SCENARIO	TOTAL AREA IN ACRES	TOTAL VOLUME CAPTURED IN CUBIC FEET
Rain Gardens (6 Small)	0.14	9,600
Detention Basin (1 Medium) + Sand Filter (1 Small)	0.72	100,880
Wet Pond (1 Medium)	0.70	100,000
Vault (1 Large) + Sand Filters (10 Small)	0.13	134,772

**Users can input their own cost data into CLASIC for more place-based cost projections.**

*“The vault costs [in CLASIC] were significantly more than what we have experienced, and there are different types of detention structures (tanks, precast vaults) that are slightly less expensive.”*

*- Kirkland Senior Engineer*

➔ “We can use the **CLASIC** results to **plan** for project **costs** and **timelines** and to **propose** projects to local **decision makers**.”

Kirkland Senior Engineer

This case study is based on a hypothetical project in a real-world location. The project and results do not represent any actual construction or spending in the city listed.