

CEEn-2018CPST-012

Centilium Engineering

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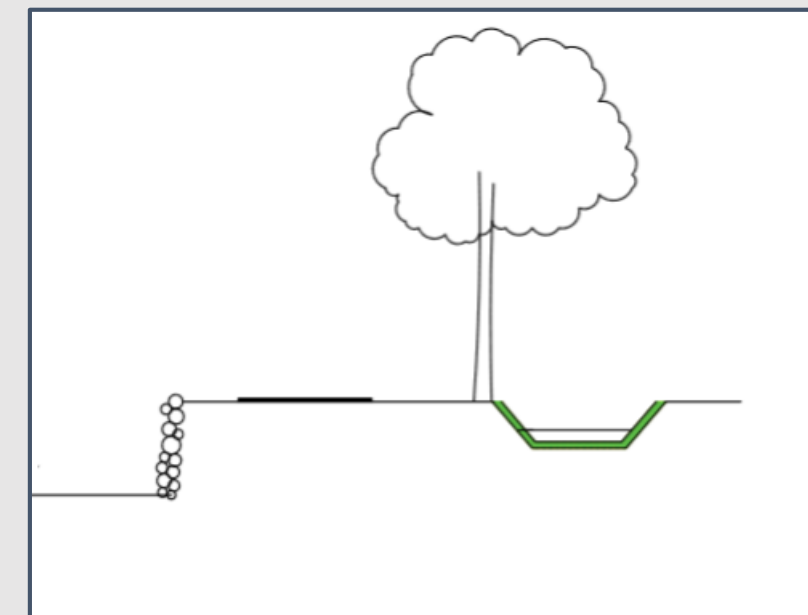
March 30, 2019

## Problem Statement

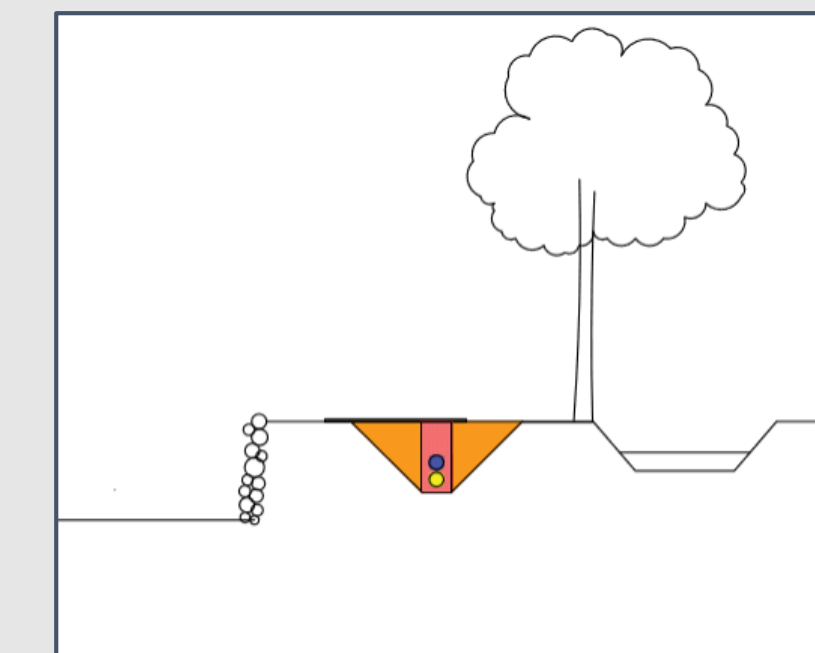
The canal located near Hobble Creek in Springville City, Utah, experienced a breaching failure. The canal spans approximately 2,000ft with an adjacent paved walking-trail and residential dwellings. Centilium Engineering Capstone (CEC) was selected by the City of Springville to analyze and model solutions to mitigate the breached ditch. CEC was also asked to evaluate several options to alter the current configuration of water flow from Strawberry Reservoir. To decrease stagnation and alge growth in the pond.



## Potential Solutions

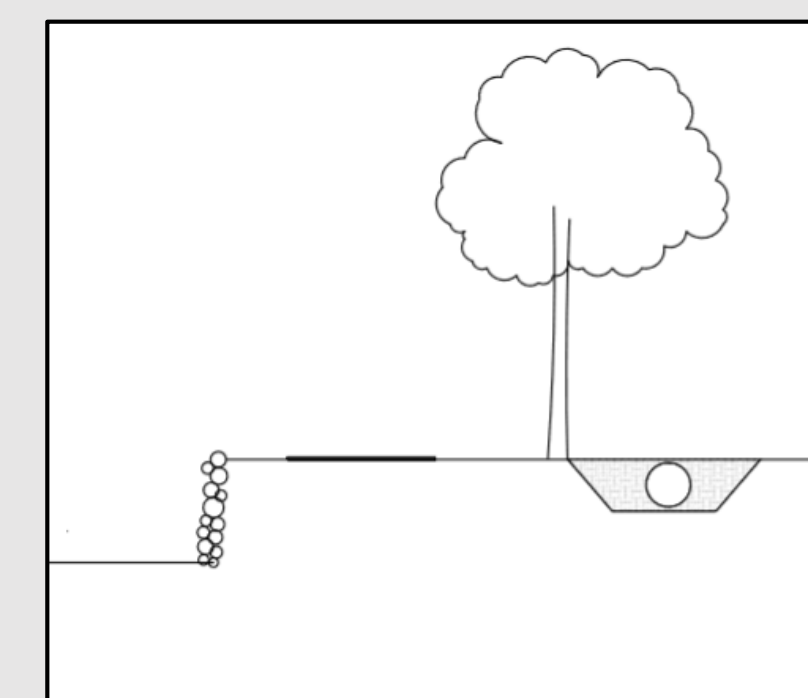


**Solution 1: Reline the canal with concrete or geo-membrane liner**

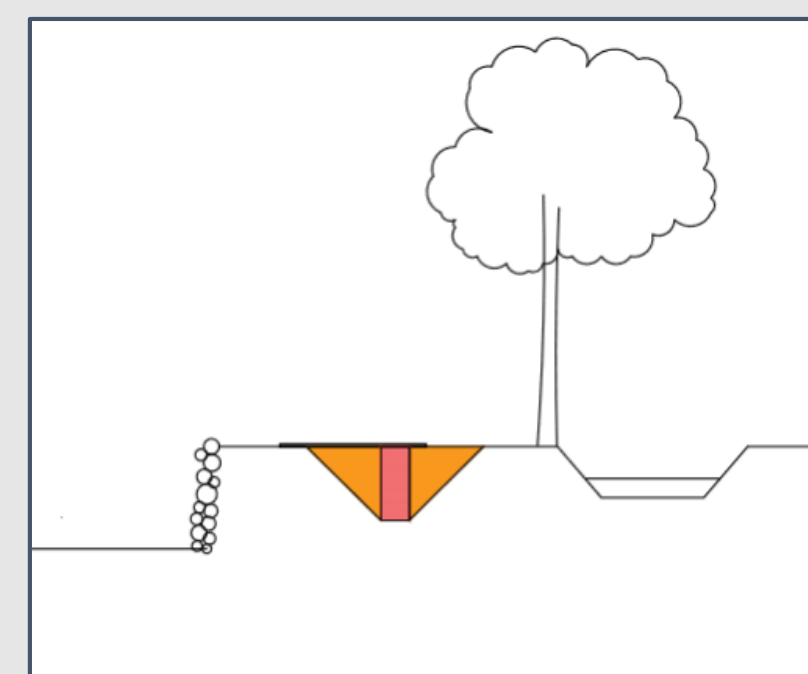
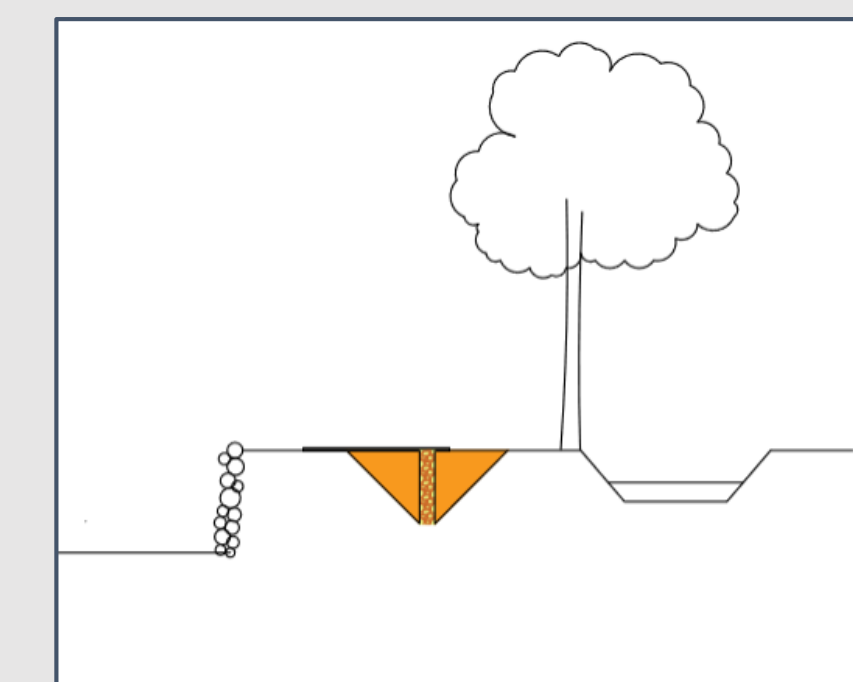


**Solution 3b: Install 2 hdpe pipes to carry water from the pond and carry water to the pond to increase circulation in the cut-off wall**

**Solution 2: Encase the entire canal in HDPE pipe**



**Solution 4: Install a french drain and perforated pipe to remove the excess groundwater**

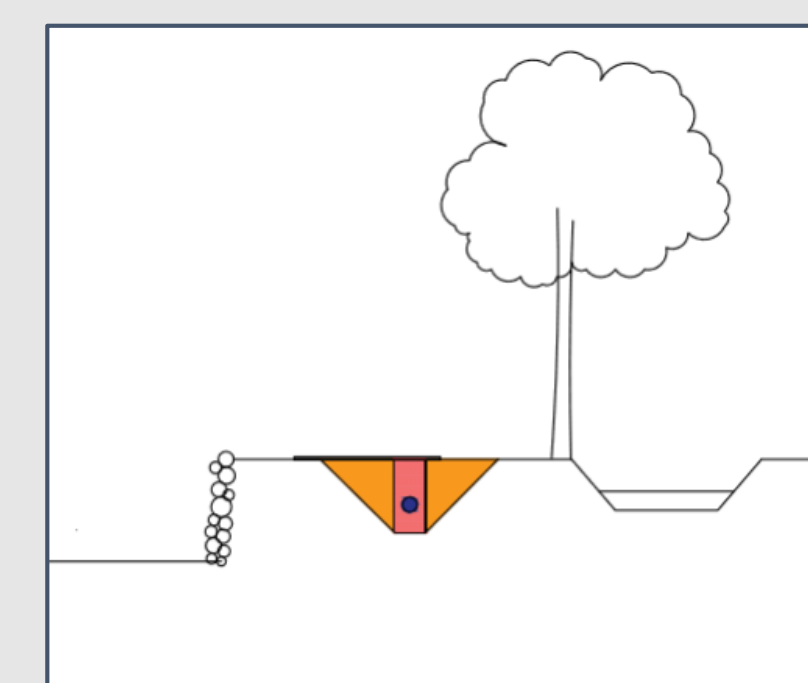


**Solution 3: Install a concrete cut-off wall running the length of the canal**



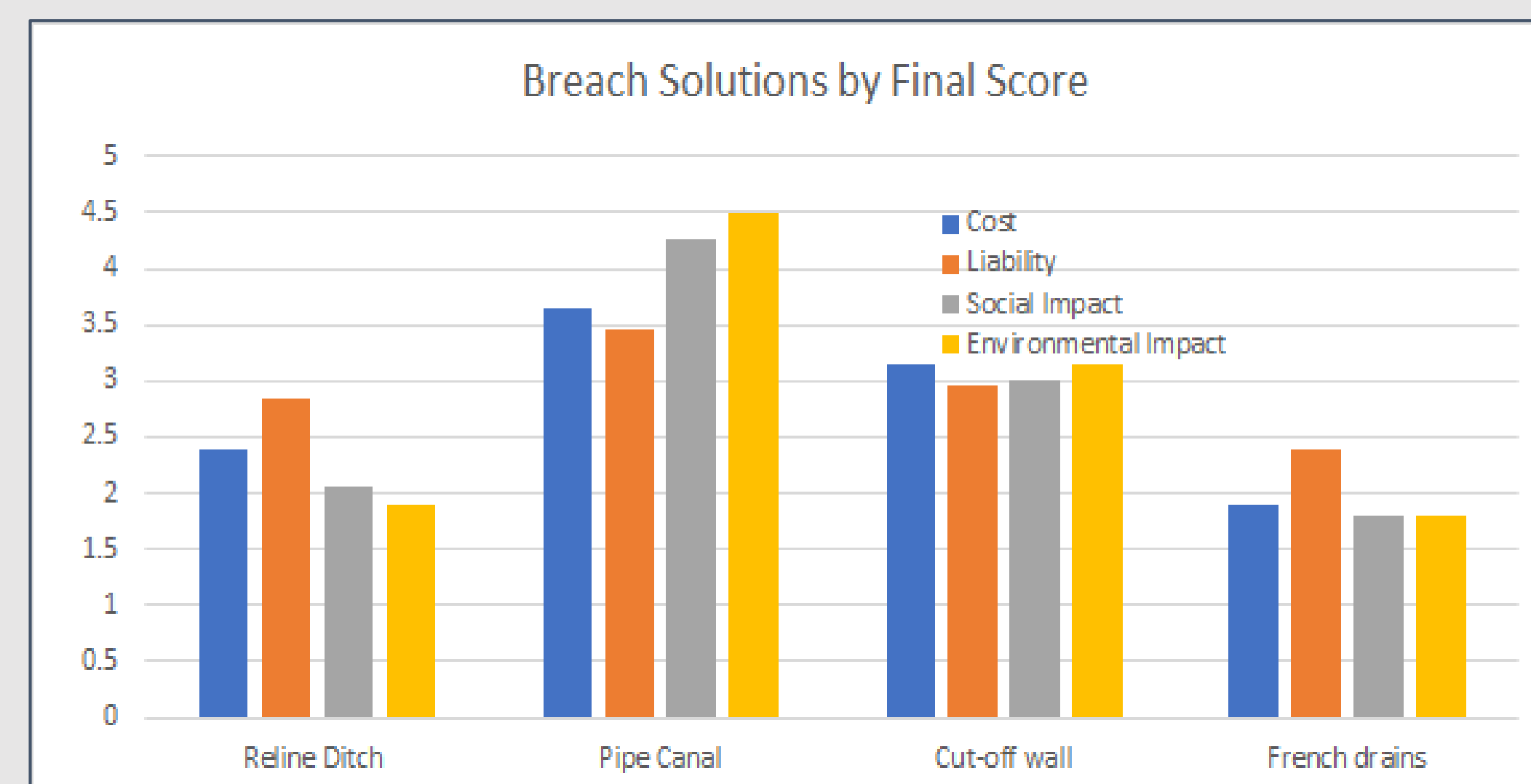
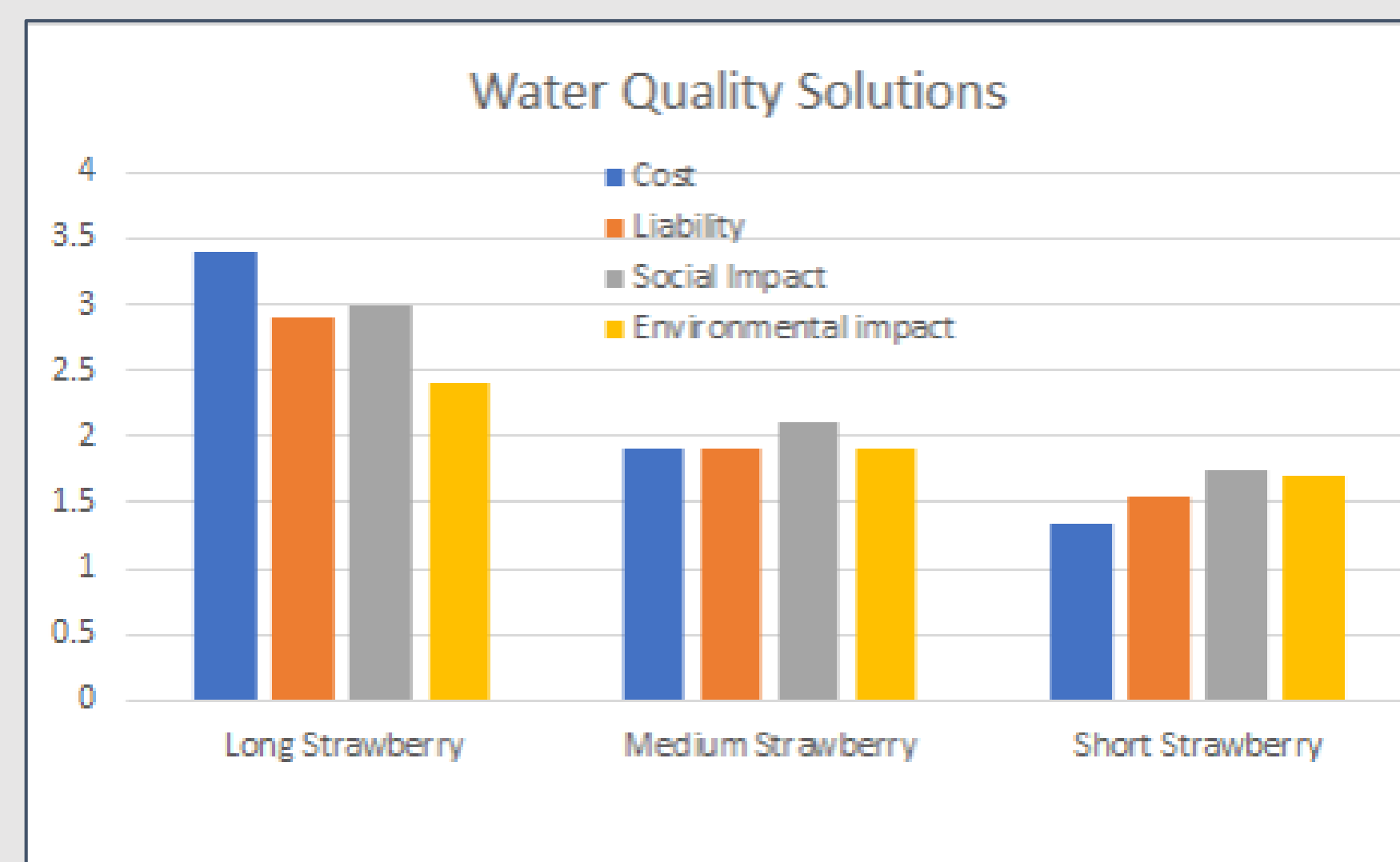
**Solution 5: Solution for water quality: pipe strawberry from the junction west of the canal to the east of the pond.**

**Solution 3a: Install HDPE pipe to carry the majority of the canal flow in the cut-off wall**



## Analysis

The potential solutions were analyzed according to their cost, implementation, social impact, environmental impact, aesthetic, environmental impact, and liability. The solutions were ranked by how well they scored in each category and a weighted average was taken to identify the optimal solutions. Some of the results are posted to the right. It was also considered what would happen if the canal were to overtop.



## Conclusion

The recommended solutions to mitigate the breach and improve water quality are solutions 3 and Solution 5. Solution 2 to mitigate the breach proved to be the most expensive solution initially, however, it eliminates the potential of overtopping. If the canal were to overtop, the expense to the city would be more than piping the canal. All other solutions presented run the risk of overtopping and, within minutes of canal flow being impeded by debris or fallen trees, flooding all of the residential basements south of the canal. Solution 5 is the most cost effective and minimizes negative effects while still providing improved water quality.