▸ BACKGROUND/DESCRIPTION OF CHALLENGE

Permitted development activities are transforming the landscape from its previous agricultural use to residential neighborhoods. This transformation changes the landscape – from soil and vegetation, to roofs, pavement and stormwater conveyance pipes – and increases the rate and energy at which runoff from rainfall events is delivered to natural resource areas, wetlands, stream, creeks and rivers. The increased rate and energy of runoff can be detrimental to the natural resource areas, causing erosion, channel down cutting, and bank failures.

▸ RESPONSE/SOLUTION IMPLEMENTED

The Real Time Control (RTC) system at Bethany Creek Falls was fully commissioned in Spring of 2016. Since coming on-line, Clean Water Services (District) has used the RTC System to make automated decisions on the timing, storage and release of stormwater runoff.

Hydromodification occurs along the entire hydrograph of the rainfall/runoff event for a given land form change. With this in mind, the District has undertaken initiatives to 1) examine and study the effects of hydromodification, and 2) develop and employ integrated strategies and tools to mitigate these effects. The RTC at Bethany Creek Falls is one of the tools employed by the District.

The RTC system is configured to anticipate the timing of future precipitation events, the precipitation forecast, and the resulting forecast volume of runoff to the facility from the contributing basin (Figure 1).
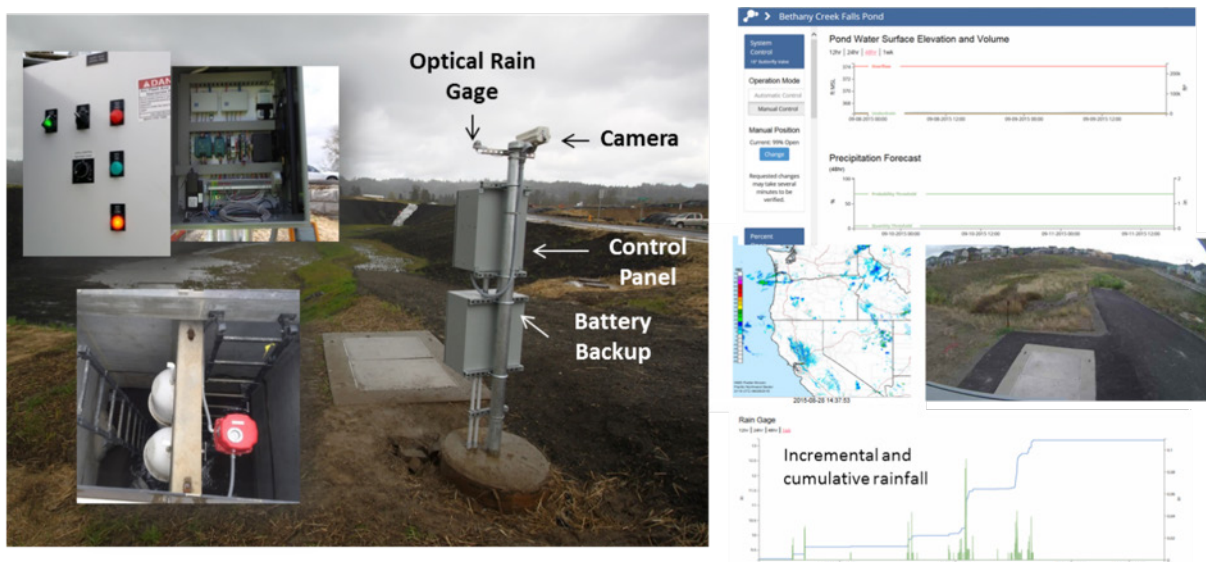

Figure 1. Real time control facility for stormwater runoff control in Clean Water Services.

This forecast information along with live, up to the minute monitoring data feeds, available storage volume, current storage volume, storage volume surface elevation, storage volume outlet flow rate, and other information, allows the District to automate decisions for the timing and rate of release of water from the storage

area. The decision to release water and the rate of release is programed into the RTC system to minimize the impact of stormwater runoff to the receiving streams. The system can also be managed manually through the online web portal (Figure 2).

▸ OUTCOME/LESSONS LEARNED

On May 13, 2017 the RTC system at Bethany Creek Falls received approximately 0.58 inches of rainfall after a brief dry weather period of less than 3 hours. The RTC system was able to mitigate multiple peak rainfall–run-off events, four in excess of 8 CFS, throughout the day, while maintaining a flat flow hydrograph in the receiving stream.

Figure 2. Smart system operational platform

Towards the end of May 13, 2017 the basin's response to rainfall produced 16 CFS of run-off. The RTC system effectively mitigated that run-off by providing automated storage and release of less than 0.8 CFS thereby providing protection of the receiving stream resource. The RTC System at Bethany Creek Falls provides cost effective protection of Bethany Creek, a community natural resource asset.
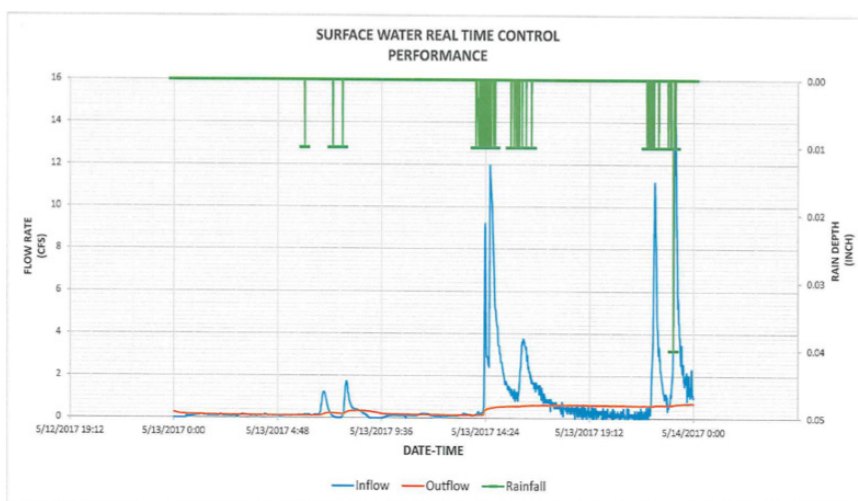

Figure 3. Surfacec water real time control performance.

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