

WATER PETAL CASE STUDY BERTSCHI SCIENCE WING + BULLITT CENTER

When Denis Hayes wants a building, you know it's going to push boundaries. As president of the Bullitt Foundation and coordinator of the first Earth Day, Denis set out not only to create the greenest office building in the world, but also to change the policy landscape to make it easier for future projects. The project teams from the Bullitt Center and the Bertschi School Science Wing (another Seattle Living Building) worked with local regulators to explore creative permitting approaches and potential paths toward Net Positive Water.

SYSTEMS

Though these two projects have deviated slightly in their water systems approach, there are core strategies that they have both found successful given their climatic context.

RAINWATER HARVESTING

Both buildings are designed to capture rainwater from their rooftop catchment areas and store it in underground cisterns before treating it. Though both systems are built, neither is currently permitted: if and when the Department of Health allows it, the buildings will begin drinking potable rainwater.

STORMWATER MANAGEMENT

Stormwater is collected from Bertschi's green roofs and combined with the stormwater that overflows from the potable water cistern. Bullitt relies on exterior bio-swales to infiltrate stormwater.

GREYWATER REUSE

Bullitt's greywater is treated in a constructed wetland, elevated on the third story of the building, before draining via gravity to replenish the water table. At Bertschi, the greywater from sinks is pumped through two filtration units to the indoor green wall for irrigation.

BLACKWATER TREATMENT

Blackwater at both Bullitt and Bertschi is collected and treated by composting toilets. The solids are collected by a local composting firm, and the leachate is sent to King County's Carnation facility, where it is filtered using natural processes and used to help restore a native wetland.

BERTSCHI SCHOOL SCIENCE WING

SIZE 1,225 SQUARE FEET

WATER USE INTENSITY (WUI)
2.8 GALLONS/SF/YEAR

AVERAGE WUI*
11.9 GALLONS/SF/YEAR

BULLITT CENTER

SIZE 56,000 SQUARE FEET

WATER USE INTENSITY (WUI)
5.03 GALLONS/SF/YEAR

AVERAGE WUI*
14.21 GALLONS/SF/YEAR

CLIMATE

TEMPERATE MARINE

38 inches of rain/year

155 days of precipitation/year

**Average WUI by building type according to Seattle 2030 District data*

BERTSCHI STORMWATER SYSTEM DIAGRAM

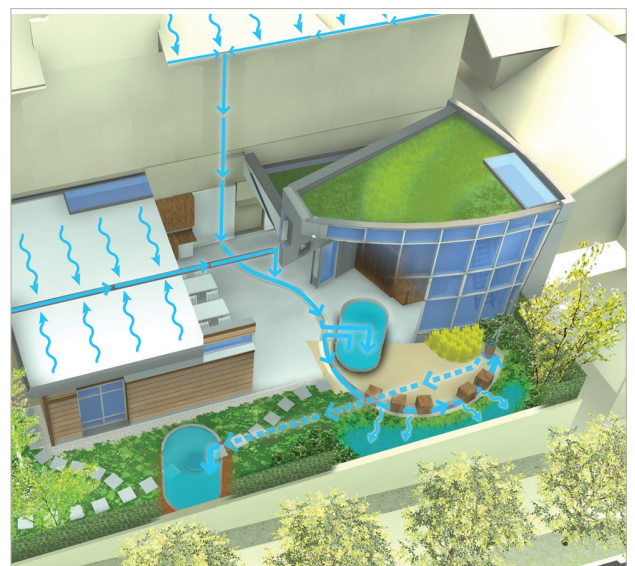


DIAGRAM COURTESY GGLO

WATER PETAL CASE STUDY POLICY SOLUTIONS

RAINWATER HARVESTING

King County grants permits to some residential homes to use rainwater as their sole source of potable water, but they first have to demonstrate that connecting to municipal sources entails hardship. Because both Bullitt and Bertschi are located in the populous Capitol Hill neighborhood north of downtown Seattle, it was impossible to pursue a permit through this mechanism.

After extensive consultation with local authorities, the project team decided that the best approach would be to become a certified public water system. In order to do this, they first had to design a system that complied with the state Department of Health's guidelines for potable water supplies for public systems, which are written for towns or municipalities and assume access to a dedicated staff and a lab.

The guidelines are broken into two categories: "surface water" and "groundwater." Rainwater harvesting falls under the category of surface water, which has more stringent treatment requirements than groundwater even though rainwater collected

from roofs is significantly cleaner. If the Department of Health or the EPA were to introduce a separate "rainwater" category into these guidelines, it may assist teams down the road.

If the Department of Health approves of Bullitt's rainwater harvesting system, there will be a final hurdle: Seattle Public Utilities will have to agree to allow a new public drinking water system within its jurisdiction before the building can make the jump to drinking rainwater. If this comes to fruition, Bertschi and other projects will also be able to follow this path.

BLACKWATER AND GREYWATER

According to Director Mark Buehrer of 2020 Engineering, the key to blackwater and greywater permitting is finding someone within the Authority Having Jurisdiction that trusts your practice. For Mark's work with Bertschi and Bullitt, that person was Chief Plumbing Inspector Dave Cantrell. If the water systems remain exclusively within the building envelope, Dave has jurisdiction and is able to guide teams through the permitting process. Dave had worked with 2020 Engineering many times in the past, and knew that he could count on them to design a capable (though in this case, unconventional) plumbing system.

However, once a water system leaves the building envelope, it falls under a totally different jurisdiction and set of guidelines. Because Bertschi kept all their greywater systems within the building envelope, they had a much easier time acquiring all of their permits. Bullitt's greywater system incorporated a constructed wetland on the building's exterior, which triggered unanticipated permitting issues. Though it took the project team over 18 months to forge through the uncharted regulatory territory, the wetlands were eventually permitted as a hybrid septic-drain field.

At left, a water systems diagram of the Bullitt Center. The purple and yellow lines denote permit jurisdictions.

