



WATER PETAL CASE STUDY THE WILLOW SCHOOL CAMPUS

Mark Bierdon started the Willow School in 2002 as a place for children to establish core values and form an ethical relationship with each other and with nature. Since then, he has been working to design a campus based on the same ideals. By the time he began construction on his first Living Building in 2013 (the Health Wellness and Nutrition Center or HWNC), he already had two high-performing buildings on campus under his belt. His early commitment to regenerative design and values-based communication smoothed the permitting pathway for the HWNC team and future New Jersey projects looking to install constructed wetlands.

SYSTEMS

RAINWATER HARVESTING

Rainwater is collected from the building's roof and stored in a 50,000 gallon cistern. From there it is treated and stored in a day tank to be used for toilet flushing and hose bibs.

STORMWATER MANAGEMENT

Overflow from the cistern is conveyed to bioswales and rain gardens via a low flow channel, allowing maximum ground recharge. A small bridge over this channel allows the children to engage with the process.

GREYWATER + BLACKWATER TREATMENT

The Willow School treats all of its grey and blackwater on site, using an on-site subsurface constructed wetland followed by a recirculating sand filter. The constructed wetland contains 18" of gravel and is planted with a specific pallet of native New Jersey wetland plants. The system requires little maintenance and no machinery.

The 5,000 gallons per day of treated effluent is pumped to a pressure dosed infiltration field for the final treatment by plants and the microbial community in the soil. After the additional treatment and filtration provided by the soil column, extremely clean water enters the underlying aquifer. This treated water meets NJ standards for recreational quality water.

LOCATION

GLADSTONE, NJ

TYPE

K - 8 EDUCATION

SIZE

34 ACRES

DAILY OCCUPANTS

250 STUDENTS

WASTEWATER TREATED/DAY

5,000 GALLONS

CLIMATE

HUMID CONTINENTAL

50 inches of rain/year

79 days of precipitation/year

SIGNAGE ON CAMPUS

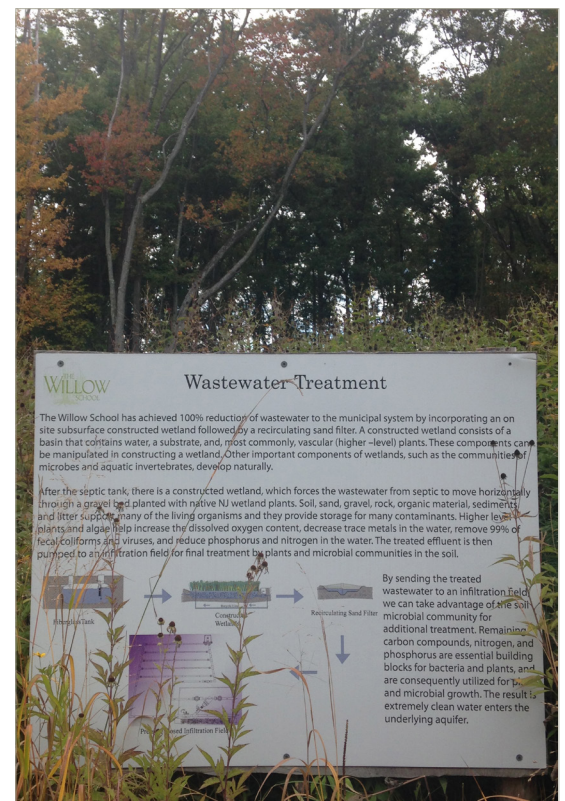


DIAGRAM COURTESY OF THE WILLOW SCHOOL

WATER PETAL CASE STUDY POLICY SOLUTIONS

WASTEWATER TREATMENT

In 2003, the team took the first constructed wetland system proposal in the country to the New Jersey Board of Health. The regulators there were interested in the system, but unable to find a permitting path forward due to the lack of precedence. The Board of Health recommended that the team present their plan at the county level; unfortunately, they encountered the same situation. After months of interested but ultimately powerless permitting agents, they landed at the Office of Alternative Treatment Systems within the New Jersey Department of Environmental Protection Division of Drinking Water, who agreed to hear their proposal.

WILLOW SCHOOL WATER SYSTEM

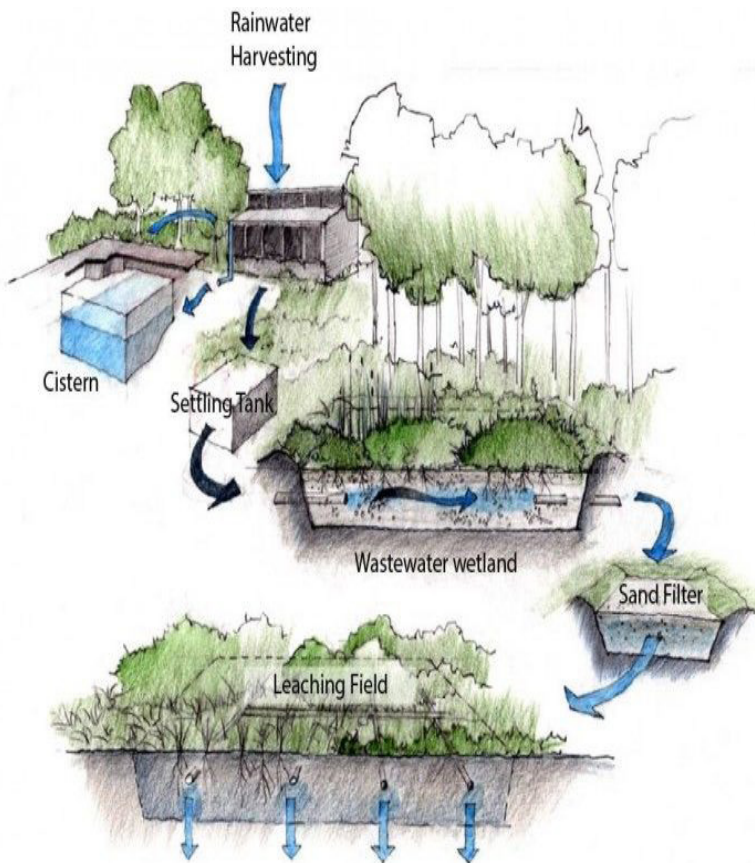


DIAGRAM COURTESY OF BACK TO NATURE
BLACK ARROWS INDICATE WASTEWATER

The team brought in consultants from around the region to explain their proposed system to the 30 regulators assembled by the Office of Alternative Treatment Systems. The regulators approved the plan with some alterations, and ultimately were supportive enough to streamline their administrative process so the team could meet their construction deadline.

Constructed wetlands were always the goal for the Willow School team, but they needed to specify an approved septic system before this jurisdiction would look at their design. They used this as an opportunity to establish a price point comparison between the two systems. This eventually provided a compelling case for constructed wetlands as it proved to be a less expensive option in the short and long term.

RAINWATER + GREYWATER

Though the team met with success in their onsite wastewater treatment goals, the team was unsuccessful in their pursuit to use treated rainwater for potable uses and treated greywater for non-potable uses such as dishwashing and toilet flushing. Unfortunately, the state ultimately did not feel comfortable with the health risks or the level of treatment that the team was able to provide on-site.

LASTING IMPACT

Despite these setbacks, the Willow School's political leadership has paved the way for other projects in the state and region. Now, when projects take a constructed wetland to the Department of Environmental Protection for permitting, the first question they get asked is: "Is this the same as the Willow School?" Once that's been established, the plans have an assured path forward. The DEP has even sent their building inspector to the Willow School design meetings so they can learn more about the system's complexities.