

## **Living Machine™ FAQs**

### **What is a Living Machine and why did we install one at our building?**

A Living Machine™ is an engineered wetland treatment system that uses plants and microorganisms to treat and filter wastewater, transforming it to clean water for a variety of non-potable end uses. At 525 Golden Gate, the Living Machine system uses engineered Tidal Wetland technology to treat all of the building's wastewater and redistributes the treated water throughout the building for toilet flushing purposes.

The Living Machine also creates functional and beautiful green space that transforms the building lobby and streetscape into a high-profile, educational experience for SFPUC employees and visitors to enjoy.

### **How much water does the Living Machine save?**

By installing a Living Machine, our building's water use is reduced by approximately 65%, saving 800,000 gallons of drinking water per year.

### **After five years of operation, is the Living Machine still treating up to 800,000 gallon of water per year?**

Yes, on average.

### **How much did the living machine cost?**

The cost to build and install the Living Machine was approximately 1 million dollars. This does not include operation and maintenance costs.

### **Were there any challenges while building the living machine?**

The greatest challenge with building the machine was making sure that the Tidal Wetland technology was able to fit within the building foot print.

### **How does the Living Machine supply water to only the toilets?**

525 Golden Gate is equipped with dual-plumbing. This means there is a distribution system serving the potable uses, like drinking fountains and sinks, and a separate distribution system serving the non-potable uses, namely toilets. The non-potable distribution system is colored purple for easy identification. If you venture to the basement level by the locker rooms, you will see the purple pipe system running along the ceiling.

### **How accelerated is our Tidal Wetland from a natural tide?**

There are 4 tides per 24 hour period in natural wetlands, two high tides and two low tides. The Living Machine Tidal Wetlands use 12 cycles per day that mimic the tides, accelerating the natural process by 3 times.

### **What is the gravel media? Is it different in the cells on Polk and inside the building?**

The gravel media used in the Living Machine planters is called Lightweight Expanded Shale Aggregate (LESA). The LESA provides a surface for the microorganisms that treat

the wastewater to live. There are several planters within and outside the building that are not part of the Living Machine and they have dark colored stone which is not LESA.

**Is it safe to drink the building's tap water?**

Yes! The Living Machine system is **not** directly connected to the potable water system.

The building's plumbing system was inspected by two independent engineer firms, SFPUC Wastewater Enterprise Employees, and San Francisco Department of Building Inspection (SFDBI) Inspectors, and was signed off by all parties to be safe. In addition, the San Francisco Department of Public Health (SFDPH) will be providing ongoing oversight to ensure that the Living Machine system is operated safely and does not pose any risk to public health.

A requirement of SFPUC, SFDPH, and SFDBI is the completion of a cross-connection test to ensure that Living Machine water is only being supplied to toilets and that all other plumbing fixtures in the building are being supplied with municipal water. The cross-connection test also confirms that Living Machine water is not being mixed with municipal water. The cross-connection test is conducted before the building is opened and then every 4 years.

**Is the Living Machine water safe?**

Yes, the Living Machine creates water that is high quality and safe for non-potable purposes. The process water is treated to strict standards set by the San Francisco Department of Public Health (SFDPH) and meets California's Recycled Water Quality Standards for tertiary recycled water (Title 22 of the California Code of Regulations). Tertiary recycled water is permitted to be used for over 40 end uses, including toilet flushing.

The Living Machine system has a 24-hour a day water quality monitoring system that can divert Living Machine water to the sewer if it does not meet the strict disinfection requirements of the SFDPH. When this happens, municipal drinking water will be used as a back-up and supplied until the Living Machine water meets the required water quality levels.

**Can water that is in the Living Machine Wetland cells overflow into the lobby or sidewalk?**

No, water being treated by the Living Machine will never overflow into the lobby or sidewalk. The water levels of the wetland cells on Golden Gate Ave., Polk Street, and the building lobby are continuously monitored by the Living Machine Control Panel in the building's basement. The Control Panel ensures that water is always at least 4" below the top of the soil, and at least 12" below the top of the planter boxes. In addition, every wetland cell has emergency overflows that are located at a lower elevation than the top of the planter boxes that will divert water to the combined sewer system.

**Can I touch the plants in the Living Machine Cells?**

Yes, it is perfectly safe to touch the plants. Only the roots of the plants are in contact with the Living Machine water. All parts of the plants that are above ground are never in contact with the wastewater and therefore are safe to touch. But we ask you to treat them kindly as some of them by new plants trying to establish themselves in the planter boxes.

**Will odors be an issue?**

No, odors should not be an issue. During the wastewater treatment process, the wastewater is always below the ground surface, and therefore odors not able to become airborne. There are also subsurface vents that are connected to every tank and wetland cell that intercept odors and divert them to the roof of the building with odor scrubbers.

**Who is responsible for operating the system?**

The Living Machine is being operated by a Grade V Wastewater Treatment Plant Operator. The operator has received extensive training on how to operate and maintain our Living Machine and receives assistance, when needed, from the Chief Building Engineer, three other WWT Wastewater Treatment Plant Operators, and Living Machines Inc.

**How often is the living machine monitored?**

The Living Machine is monitored every day by the operators. The operators collect and sample the water 5 days a week (Monday-Friday), test for total coliform bacteria 3 days and week, and submit results to SFPUC monthly.

**Since SFPUC “paved the way for passing ordinances requiring on-site recycling,” how many projects are approved to date?**

To date, there are approximately 43 approved projects in San Francisco under the on-site recycling ordinance.