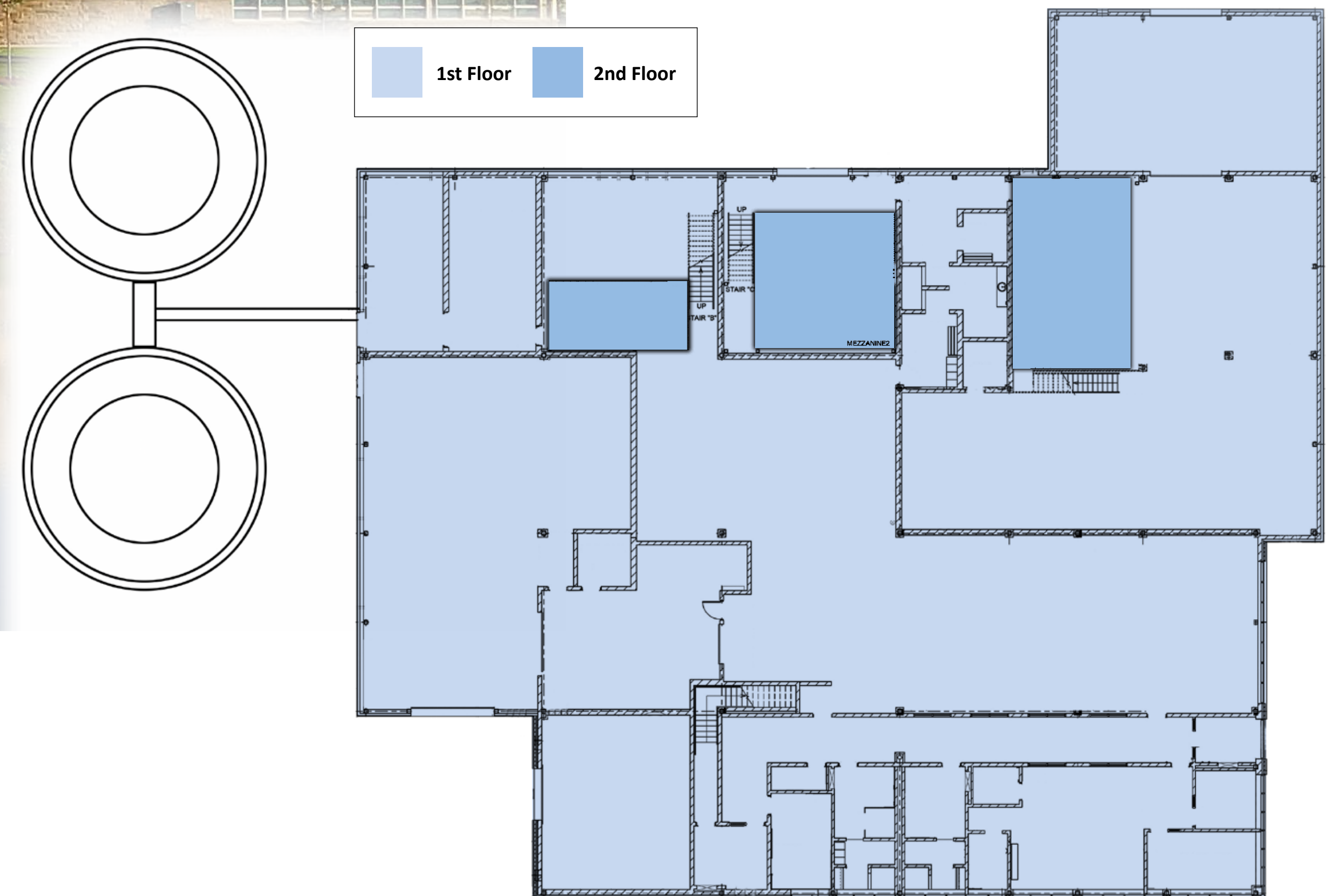


**T**he waste water treatment plant will treat groundwater and surface water pumped from the existing Port Granby Waste Management Facility during excavation of the waste and continue to treat the groundwater years into the future. The plant will also treat surface water collected at the long-term waste management facility during its construction and from within the engineered aboveground mound after it is built.

Using best-available technologies, the waste water treatment plant will remove a wide range of contaminants, improving the quality of water discharged into Lake Ontario.



The Port Granby Project will relocate approximately 450,000 cubic metres of historic low-level radioactive waste and marginally contaminated soil from an existing waste management facility on the shoreline of Lake Ontario to a long-term waste management facility located 700 metres away from the lake, north of the current site. The historic waste resulted from radium and uranium refining operations of the former Crown Corporation, Eldorado Nuclear, and its private sector predecessors, which operated from the 1930s to 1988.

## Waste Water Collection

Waste water from within the mound (leachate), collection ponds/reservoirs and decontamination stations is pumped to an equalization pond. The water then enters the plant, where it is treated using a two-stage process – biological treatment (Stage 1) followed by reverse osmosis (Stage 2).



**Long-term waste management facility collection pond**



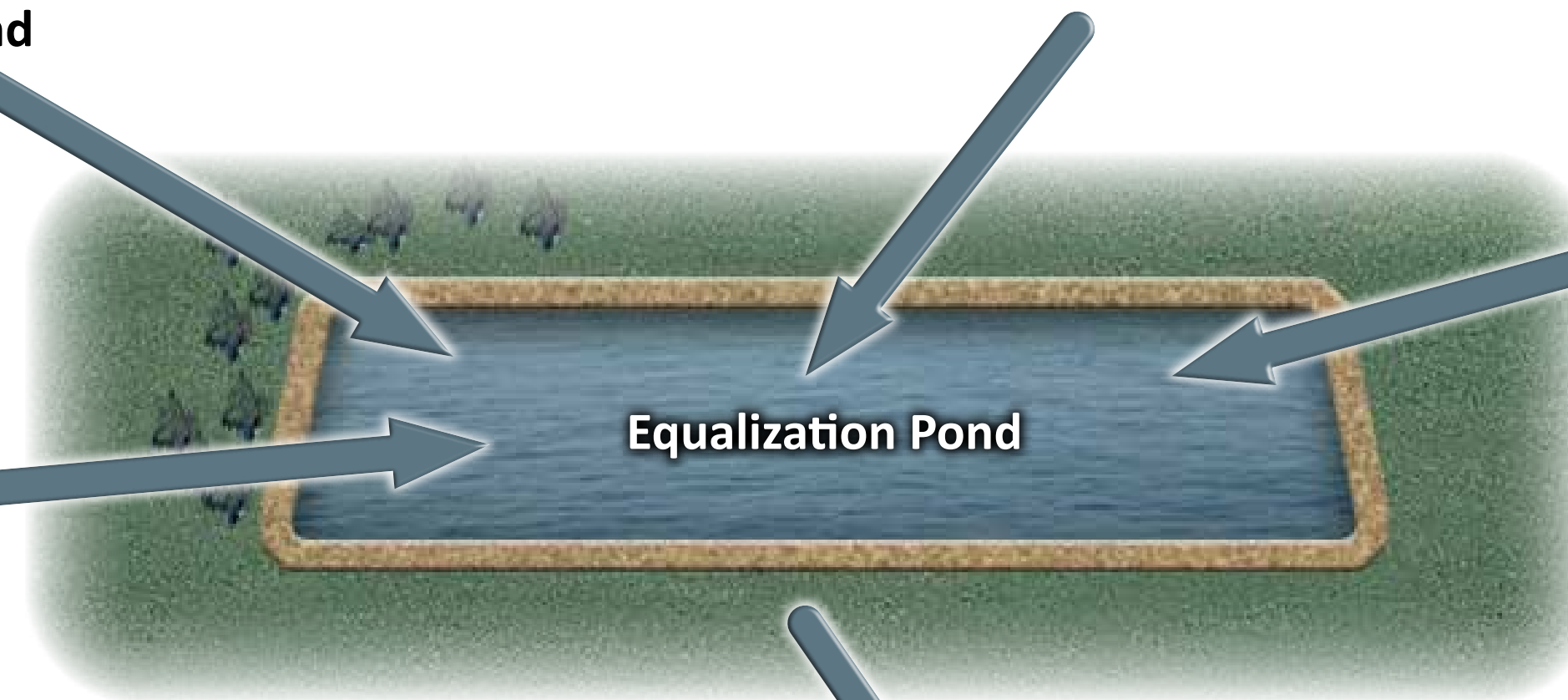
**Leachate pumped from within the aboveground mound**



**Decontamination station wash water**



**Existing waste water reservoirs and collection ponds**



**Equalization Pond**



**Drum Screen**

Waste water is fed through rotating, fine screens to separate debris, such as sticks and leaves. A tumbling action inside the drum screen dewater these separated solids. Removing solids at this stage protects equipment from being damaged later in the process. The waste water then proceeds to the Bioreactor Tank.

**→ To Stage 1:  
Biological Treatment**



**Port Granby Project Waste Water Treatment Plant**



**Blending Tank**

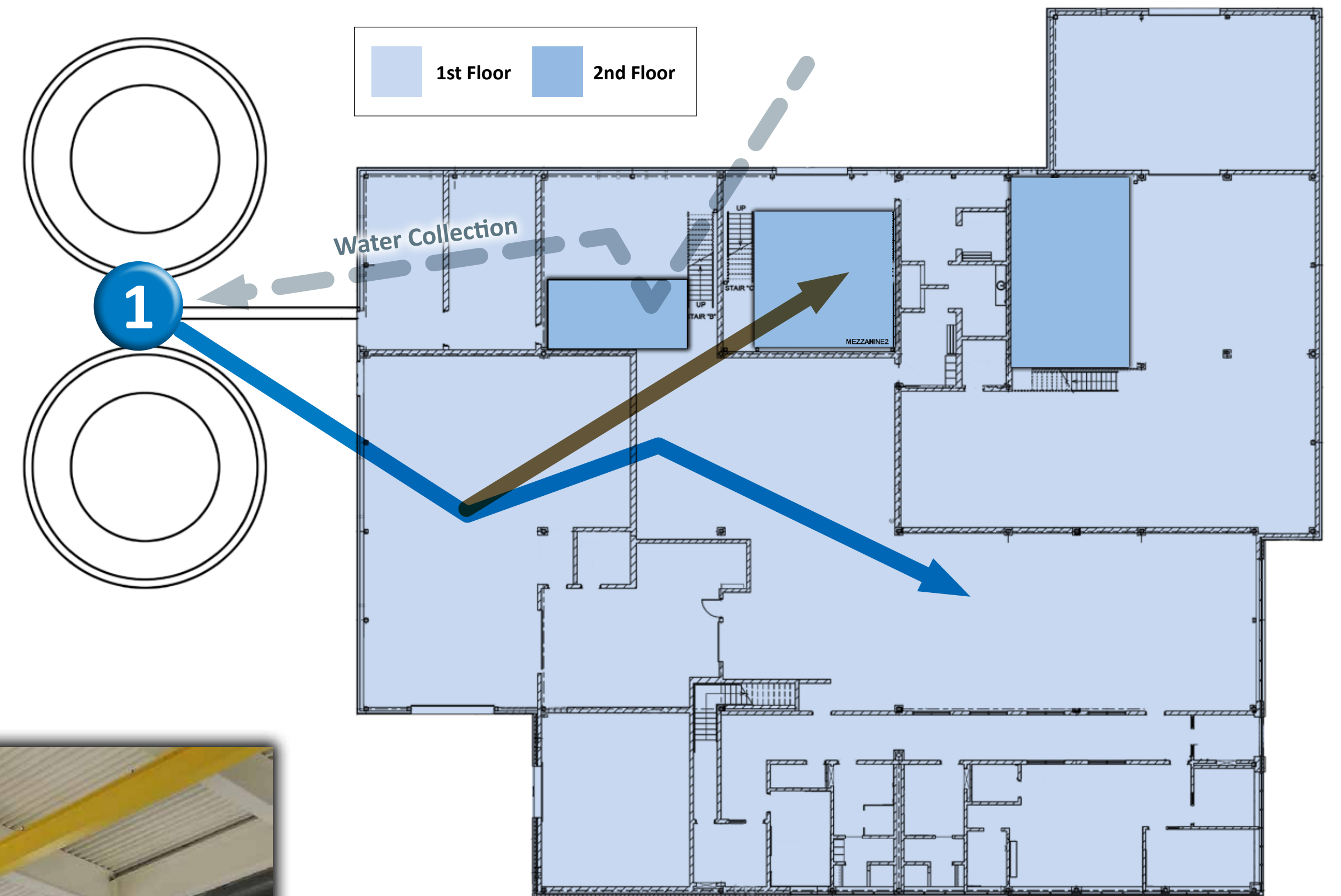
Waste water is kept in suspension to prevent solids from settling. The water then flows to the drum screen.

## Stage 1: Biological Treatment

**1**



**Bioreactor Tanks**  
Micro-organisms in the bioreactor tanks treat organic matter (ammonia nitrate), which is a contaminant specific to the Port Granby waste. Blowers facilitate aeration in the tanks to keep the micro-organisms alive, suspended and in contact with the waste water.



**Membrane Bioreactor System**

The waste water from the aeration tank, along with the micro-organisms, flows into membrane bioreactor tanks where activated sludge (settled micro-organisms) is separated from the biologically treated water. As the population of micro-organisms increases, excess activated sludge is moved to a centrifuge.



**Centrifuge**

In the centrifuge the force of rapid rotation separates the liquid content from the sludge. A polymer is mixed with the sludge to produce a moist solid referred to as cake. This material is collected into specially designed tote bags (right) for placement in the mound.



To Mound

Liquids to Stage 2: Reverse Osmosis Water Treatment

## Stage 2: Reverse Osmosis Water Treatment

2



### Reverse Osmosis Units

The biologically treated water enters the reverse osmosis system where contaminants such as radium, uranium and arsenic are removed. The water is forced under high pressure through a membrane. The contaminants are rejected by the membrane, and the treated water flows through to the pH adjustment tank.



### pH Adjustment Tank

Hydrochloric acid is added to the water to adjust the pH level.



### Automatic Sampler

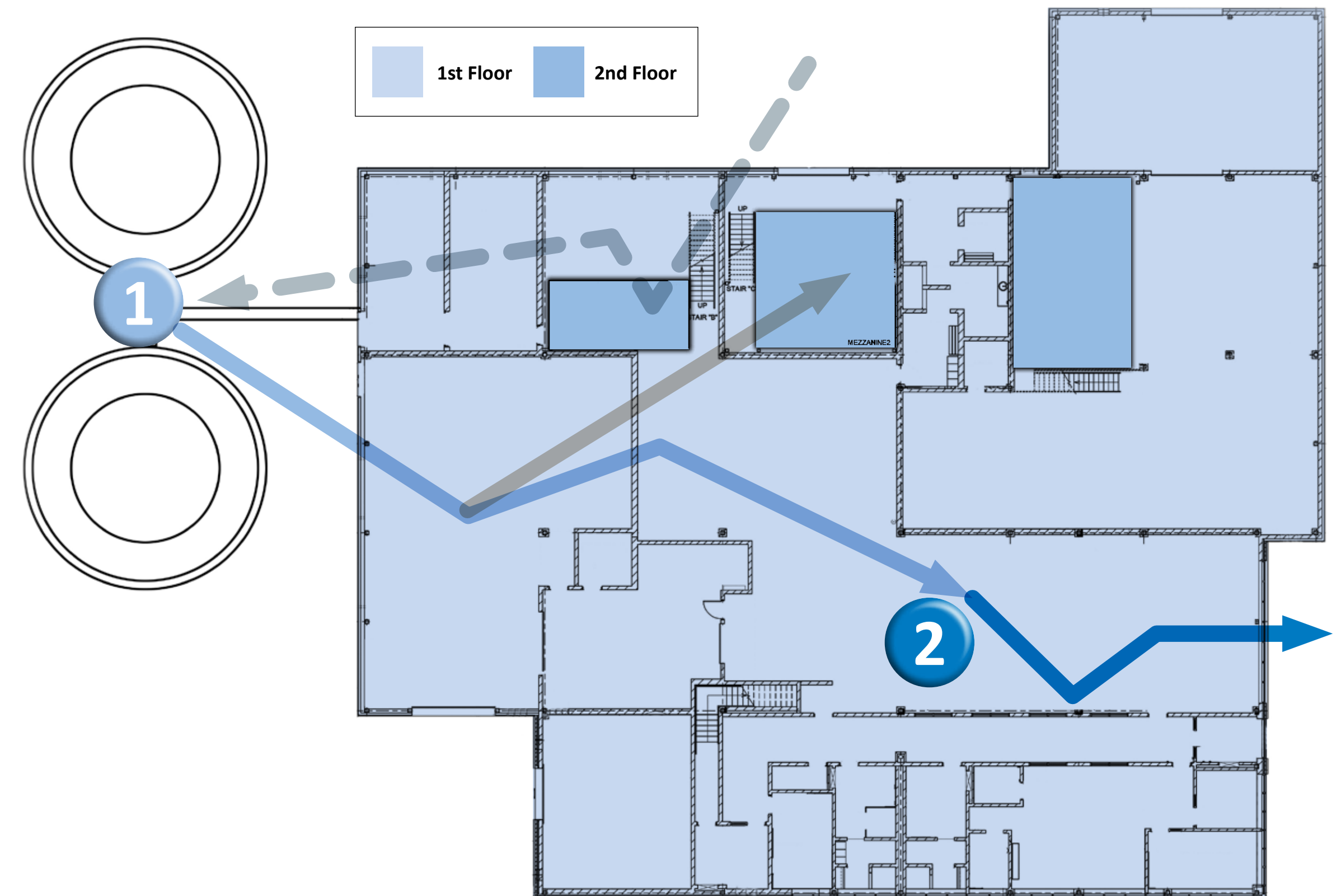
This composite sampling unit conducts testing at regular intervals before the water is discharged to Lake Ontario.



### Verification

The treated water is then discharged through a pipe extending 120 metres into Lake Ontario. The treated water is regularly sampled to verify its quality.

To Lake Ontario



## Reverse Osmosis Residuals Management



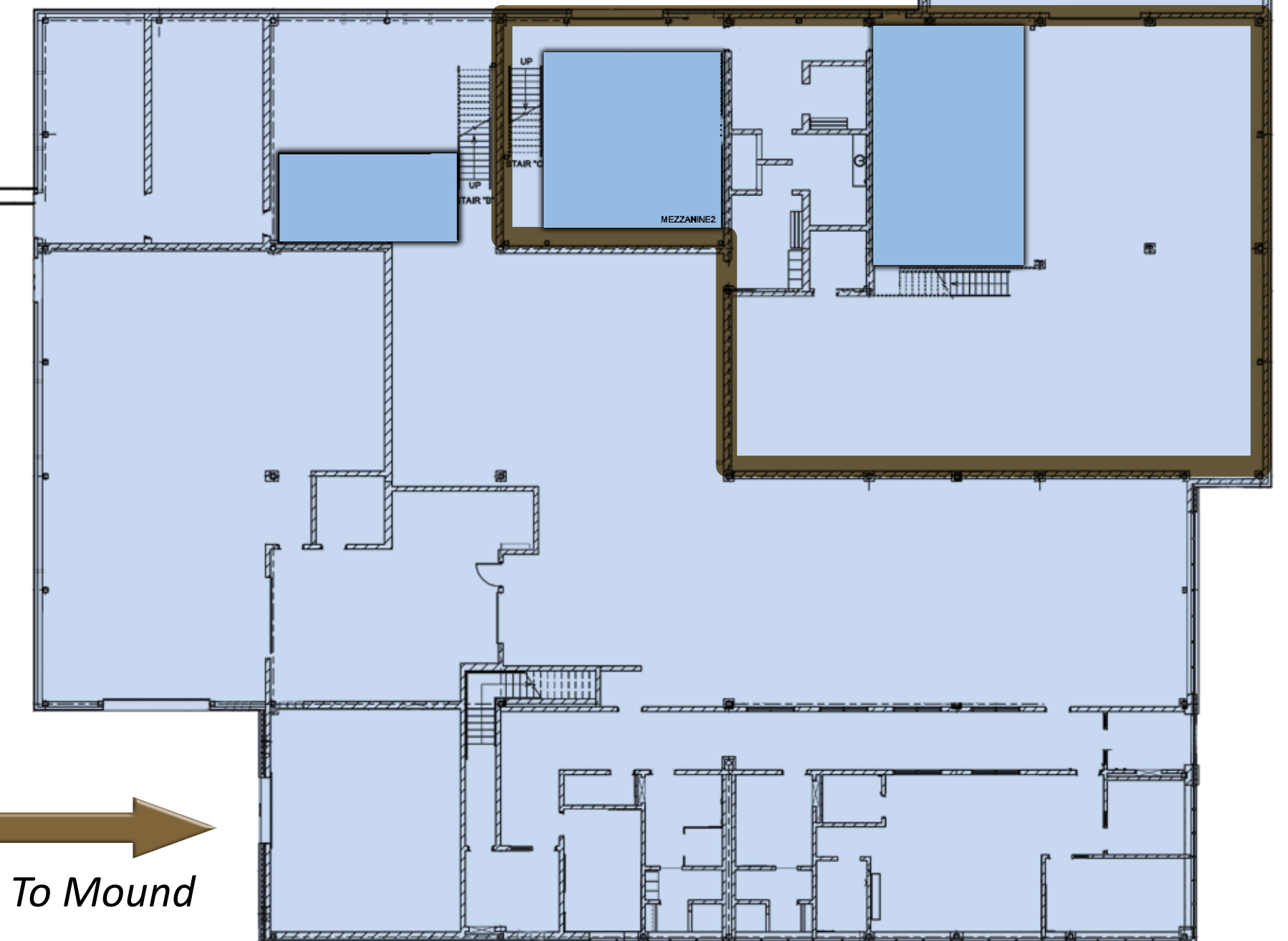
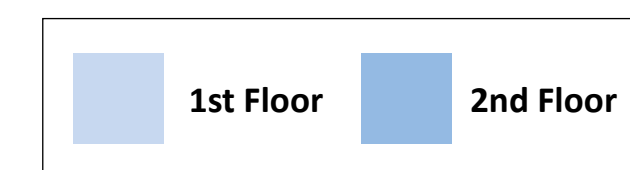
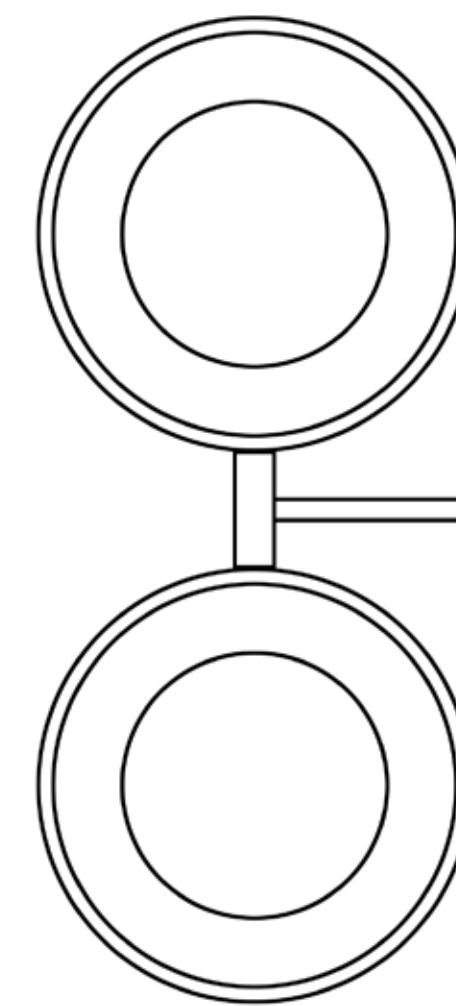
**Clarifier**  
Suspended solids from the reverse osmosis system are removed from the liquid and sent to the sludge thickening tank. The remaining liquid is sent to the evaporator.



**Sludge Thickening Tank**



**Filter Press**  
Sludge is filtered under mechanical pressure in filtration chambers. The sludge gradually accumulates in the chambers until filter cake is formed. The final compacted filter cake is discharged into collection bins for placement in the mound.



*To Mound*



**Evaporator**  
Remaining liquid from the clarifier is fed into an evaporator and passes across a heat source. The heat converts the water from liquid to vapour that is recycled back into the treatment process. The remaining watery mixture of insoluble matter is called slurry.



**Slurry Dryer**  
Slurry is fed to dryers, where it is dried through a boiling process. The dried product is discharged into specially designed tote bags (right) for placement in the mound. Vapour generated passes through a scrubber before being vented into the atmosphere.



*To Mound*