Selwyn Ave, Epsom VortCapture Gross Pollutant Trap Case Study

Soakage or infiltration is very prone to clogging from sediment and debris. Auckland city has over 2100 soak holes draining public roads in Epsom, Mt Eden Sandringham and Onehunga. Often these soak holes are the only disposal point for the runoff, therefore protection of these assets is important to the City. One method of protecting the soak hole is by installation a gross pollutant trap or GPT up stream of the soak hole. A gross pollutant trap is a stormwater treatment device designed to capture pollutants over 5mm in diameter.

Auckland City commissioned Morphum Environmental to evaluate various GPTs available to protect a new soak hole in an area of Epsom which was prone to repeated flooding. After evaluating all the available devices Morphum chose a VortCapture™.

The VortCapture™ is a stormwater treatment device designed for the removal of trash and organic debris from stormwater runoff. VortCapture is a uniquely designed full capture device. It removes all particles 5 mm and greater from treated flows, including neutrally buoyant material. It also effectively removes settleable solids and free-floating oil and grease.

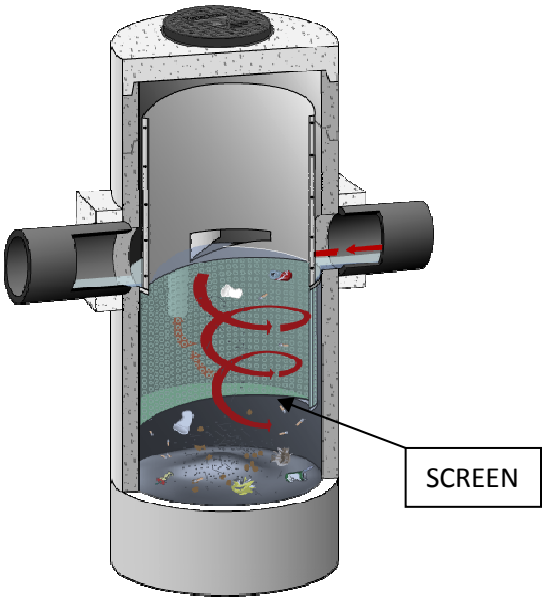

Figure 1: Vortcapture™

The internal components of the treatment device are made of marine grade aluminum and include a perforated screen with 4.8 mm diameter apertures. These

components are housed in a pre-cast concrete manhole. Due to its lightweight, compact design VortCapture™ is well suited for tight sites

VortCapture™ employs a screen design that maximizes hydraulic capacity and minimizes blinding. During operation, a tangential inlet causes stormwater to swirl in the circular treatment chamber (see figure 6). Buoyant materials migrate to the center of the treatment chamber and rise above the screen while non-floating pollutants are trapped in the sump below. The vortex action creates high tangential velocities across the face of the screen relative to the normal velocities through the screen. This indirect screening feature scours the screen, preventing the "stapling" of debris into apertures, which can clog screens and restrict flow.

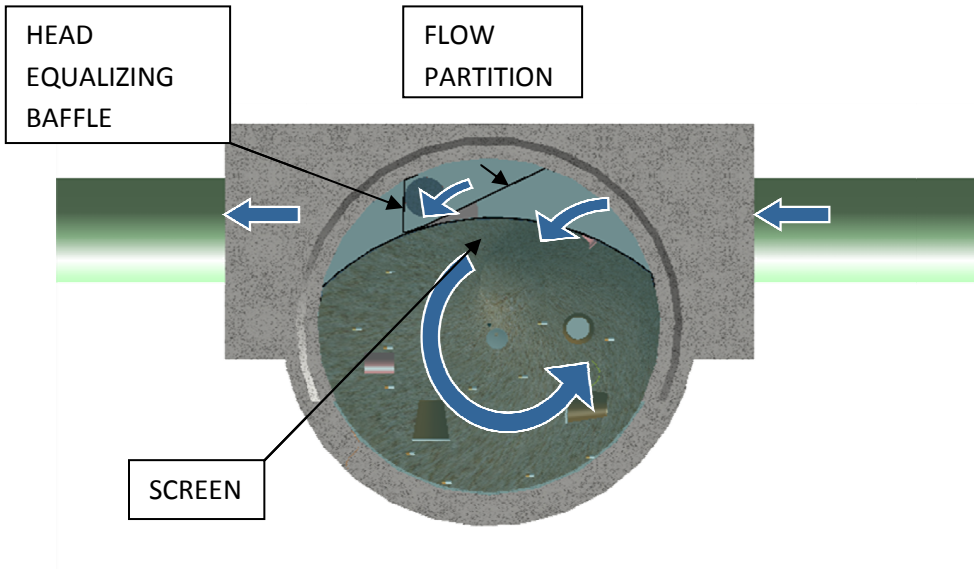

Figure 2: VortcaptureTM Plan shown

VortCapture™ was sized to treat a 1in 10 years storm, which was approximately 300 L/sec. At these flow rates all runoff is directed into the treatment chamber. At higher flow rates, a portion of the runoff spills over the flow partition and is diverted around the treatment chamber and screen, filling the head equalization chamber. This collapses the head differential between the treatment chamber and the outlet, resulting in a relatively constant flow rate in the treatment chamber even with a substantial increase in total flow through the system. This configuration reduces the potential for pulverization or washout of previously captured debris and sediment.

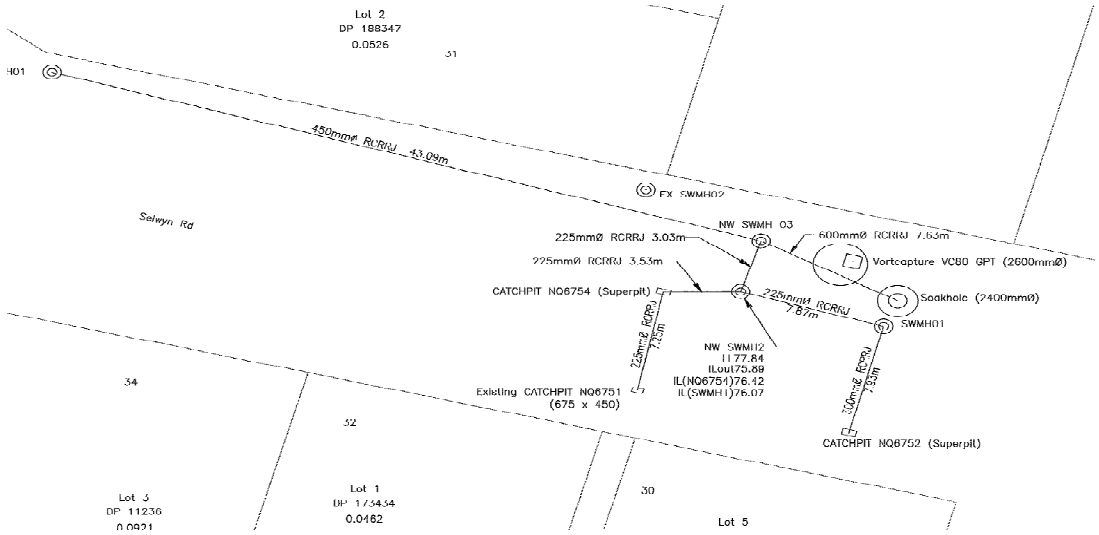

Figure 3: Selwyn Ave Plan View
Source: Morphum Environmental

Figure 7 shows the limited space available to install the device. Figure 8 shows the stage discharge curve for the VortCapture™ at Selwyn Ave. The blue line shows the flow and corresponding tail water from the water entering the swirl chamber. The yellow line is the total flow through the device including flows that pass over the flow partition. The tail water level should be used in the design of the reticulation system (Figure 8) assuming that this is the water service level of a reservoir.

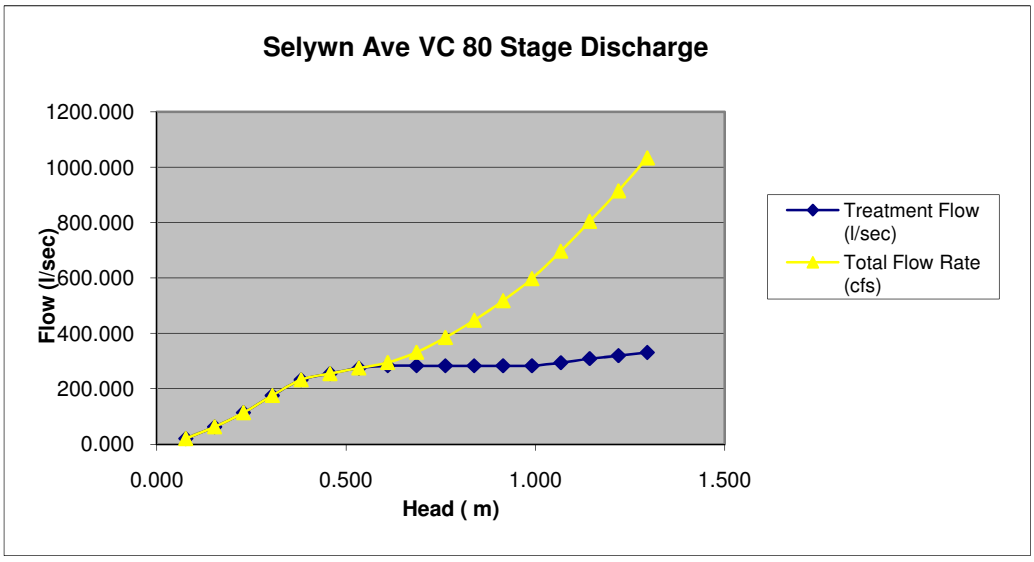

Figure 4: Selwyn Ave Staged Discharge Curve

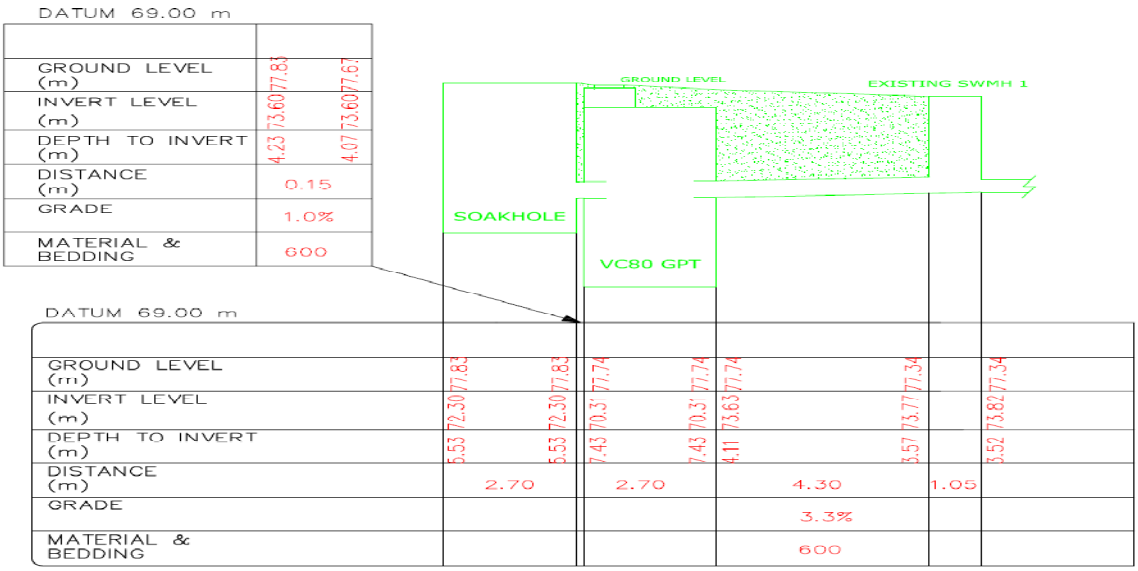

Figure 5: Selwyn Ave Staged Long Section
Source: Morphum Environmental

Figure 6: Selwyn Ave VortCapture