Beaches are a key component of Surfside’s cultural identity, yet this symbol is not as clean as could be. Sewerage, long thought to be the culprit of pollution at East Surfside Beach, is only partially to blame. Oil spills, industrial discharge of toxic waste, trash, and even unsafe levels of treated sewage are well-known and obvious sources of pollution to Pearl Bay and its ring of beaches. However, the chief culprit of beach pollution in Pearl Bay is stormwater.

Automobile fluids, fertilizers, dog droppings, litter, the heavy metals contained in exhaust, and a myriad of other contaminants that spill onto paved surfaces all wash in the stormwater system. Catchments, areas of land that drain to a common point, channel stormwater through pipes and dump the unfiltered runoff directly into the sea. The problem of unfiltered stormwater is exacerbated by land development, which alters natural catchments, eliminates natural sponges and filters for stormwater (such as wetlands), and introduces pollutants.

Surfside and its beaches sit at the foot of the Silver Creek Catchment. This paper looks at the problem of stormwater pollution in the Silver Creek Catchment and addresses the following questions: What causes stormwater to become polluted and eventually contaminate East Surfside Beach? What are the possible health effects to surfers, swimmers, and the wider community? And what is being done to manage this problem?

**The Silver Creek Catchment**

Stormwater beach pollution has dramatically affected East Surfside Beach (also known as East Beach), primarily through the overflow of stormwater from the Silver Creek Lagoon. During heavy rain the lagoon discharges at the northern end of East Beach through Chatwin Park to the Pearl Sea. The Silver Creek Lagoon has three major contributing waterways: the Silver Creek, the Durras Arm, and the Cabbage Tree Creek. According to the Surfside Coastal Stormwater Management Plan (SCSMP), the total area of these catchments is 3,416.3 hectares. This paper will focus on the Silver Creek Catchment or sub catchment 3 as defined by the SCSMP.

The Silver Creek Catchment has been under heavy stress from development for over a hundred years. Development expanded into natural floodplains and created hard surfaces that left stormwater runoff increasingly unchecked. The physical constraints of the area further compounded the problem. The steep escarpment to the west, bounded by the Pearl Sea to the east, left little room for Surfside to expand, putting extra development pressure on already over-developed land.

**Causes of stormwater pollution at East Surfside Beach**

In order to understand why stormwater becomes polluted and eventually ends up polluting East Beach, it is necessary to study the Silver Creek Catchment. What enters the catchment will most likely end up at the ocean discharge point when enough rain is washed through. This is as simple as water running downhill and finding the most direct path to the lowest point, in this case, the ocean.

The physical characteristics of the Silver Creek Catchment are a large contributor to the problem of stormwater pollution at East Beach. The Silver Creek Catchment is characterized by a steep escarpment to the west, with heavy rainfalls averaging 1,100–1,600mm per year. This leads to many high-velocity streams that have extremely limited discharge capacity and often cause severe flooding. The catchment rivers generally run west to east, while major roads and the railway run north to south, creating unnatural obstructions to the flow and exacerbating problem flooding. Overdevelopment and an increase in non-porous surfaces, such as asphalt, further compound the drainage problem.

The government has identified the Silver Creek Catchment as one of its likely stormwater “hotspots” due to the presence of sewerage overflows. The sewerage system overflows at many different locations after heavy rainfall, with the points of discharge varying with each storm. Sewerage overflow that eventually makes its way to East Beach has serious potential health effects.

**Potential health effects to surfers and swimmers at East Surfside Beach**

The health effect of contaminated stormwater to surfers and swimmers is the same as diseases caused by sewage. Water quality tests taken by SeaWatch, the government body responsible for monitoring beaches, show evidence of danger to surfers and swimmers. According to SeaWatch, waters are unsuitable for swimming if

* The median fecal coliform density exceeds 150 cfu/100 mL for 5 samples taken at regular intervals not exceeding 1 month; or
* The second highest sample contains equal to or greater than 600 cfu/100 mL for 5 samples taken at regular intervals not exceeding 1 month.
* The median enterococci density exceeds 35 cfu/100 mL for 5 samples taken at regular intervals not exceeding 1 month; or
* The second highest sample contains equal to or greater than 100 cfu/100 mL for 5 samples taken at regular intervals not exceeding 1 month.

Fecal coliform and enterococci are both bacteria. Fecal coliforms inhabit the intestines of humans and other mammals and are present in feces. They are indicative of pollution from sewerage and other sources such as stormwater. They have a relatively short life span in salt water and if detected indicate a recent contamination. Enterococci are used to indicate the extent of fecal contamination in recreational waters. They are different from Fecal coliforms in that they are much more tolerant of seawater and their survival time in the marine environment is similar to the survival time of some pathogens.

**Management of the problem and potential remedies**

Prior to the 1990s, the focus on beach pollution from the government and the EPA had been on outflows from sewerage treatment plants along the coast. The larger urban beaches were believed to be primarily contaminated by the sewerage treatment plants run by State Water.

Though sewage pollutes coastal beaches, particularly when it is discharged untreated, it is now fairly well accepted that stormwater is the most significant cause of beach pollution. Yet studies that scientifically prove the causes of stormwater pollution to East Beach are insufficient or do not exist. The Stormwater Trust Fund was established to address this problem through management plans such as the WCSMP. In reality, being able to pinpoint the causes of pollution in any catchment the size of Silver Creek is probably unrealistic. Stormwater infrastructures are underground and inaccessible, and rarely examined except when a problem arises.

The water quality testing at East Beach done by SeaWatch needs examining. Fecal coliform and enterococci levels are indicators of fecal contamination only, and there is much debate within the scientific community as to the usefulness of these in making assessments of public health risk.

The controversy surrounding the effectiveness of current testing methods in determining public health risks clearly indicates a need for improvement. The associated high cost and newly developing technology for testing are a part of the problem. Testing for enterococci and fecal coliforms is relatively cheap and easy. However, there is enough debate on the effectiveness of this testing that safe levels at East Beach have not been established. In addition, testing is only done during the summer, ignoring the winter months.

Beyond the controversy of testing for health risks and the limitations of absolutely identifying pollution sources, there is consensus that the Silver Creek Catchment is stressed beyond its capabilities. This problem must be confronted soon if the Surfside public wants clean and healthy beaches. The larger issue is what can be done to help prevent future pollution from entering the stormwater system.

**Conclusion**

Overdevelopment, lack of an effective stormwater management plan, and the physical constraints of the area all contribute to the pollution of East Surfside Beach. Effective abatement measures could include routine physical upkeep of the stormwater system, including re-engineering of the stormwater catchment, debris removal, routine inspections, and identification and removal of known pollutant sources. Measures to minimize the contamination of road runoff, such as street cleaning, could also be helpful. More effective, standardized water quality testing is also critical to ensure public health. Finally, and perhaps most importantly, there needs to be a public will to address this problem.