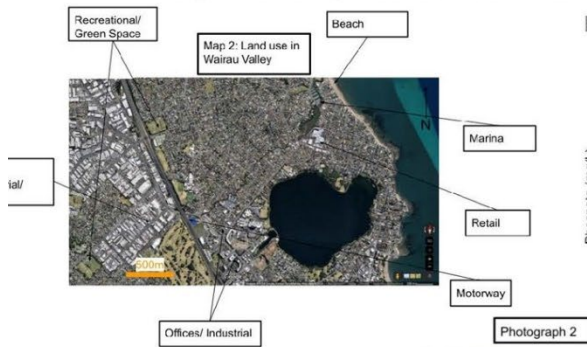


## How polluted is Wairau Creek?

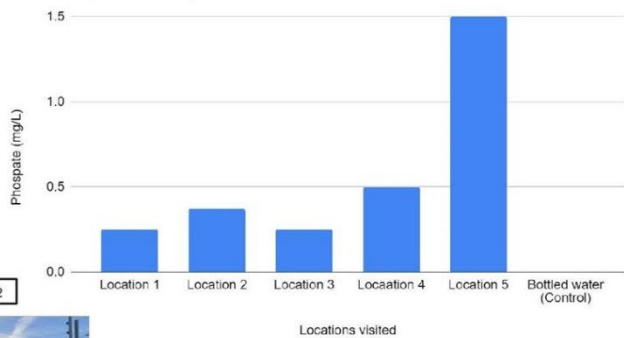
The Wairau Creek system runs through Wairau Valley, which is a mix of industrial and residential areas. Wairau Creek is known for its highly polluted rivers, and we wanted to confirm that. Stuff reporter Brad Flahive in 2019 said, "It's north Auckland's biggest industrial area, but Wairau Valley is causing a pollution crisis at local beaches and streams."



According to the results presented in Graph 2, it is very clear to see that Wairau Creek is polluted. At all locations, there is some amount of phosphate in the water; location 5 is the most polluted with 1.5 mg/L. Location 5 is the last before the creek flows into salt water and the different streams meet together, which is why the phosphate is so high because the runoff from the industrial area shown in Map 2 builds up to location 5, meaning each location contributes to the phosphate levels. At the end of 2018, Auckland Council believed ¼ of the industrial sites in Wairau Valley had the potential to pollute the waterways. As we can see in photograph 2, a boat business is washing a boat with chemicals, and the runoff is flowing into the drains at location 3, which is in the industrial area, and the water from here flows to location 5. Mr. [redacted], a business owner at Location 3, said they do try to capture their runoff using sediment traps, but this does not stop other pollution from entering the creek.

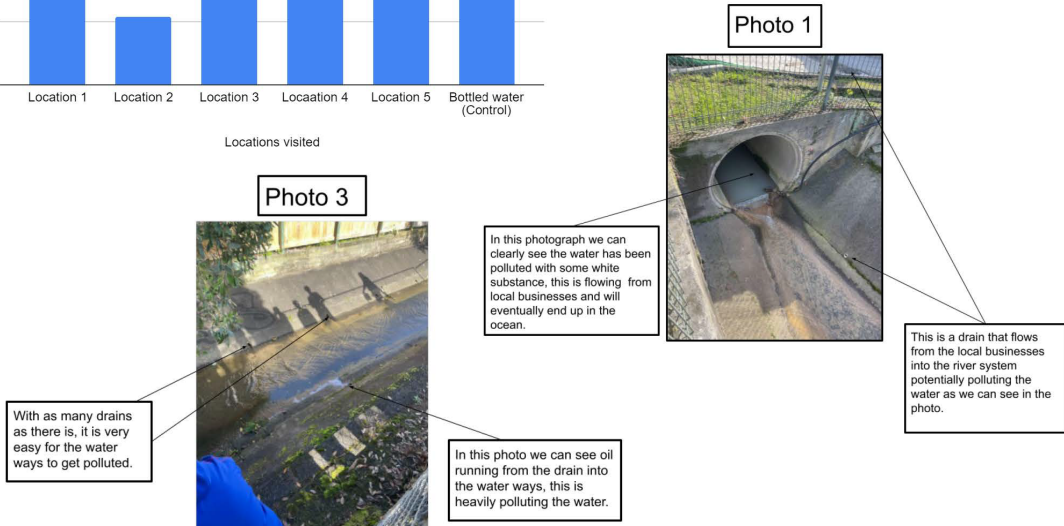
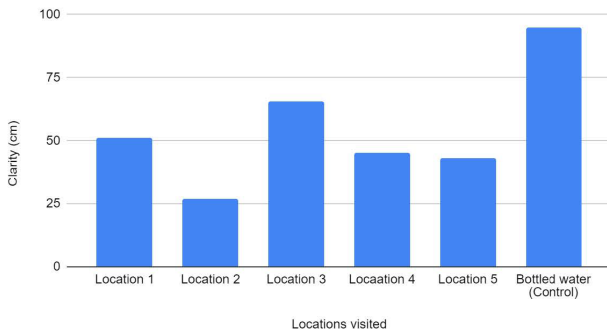


Bar Graph 2: Phosphate at each location



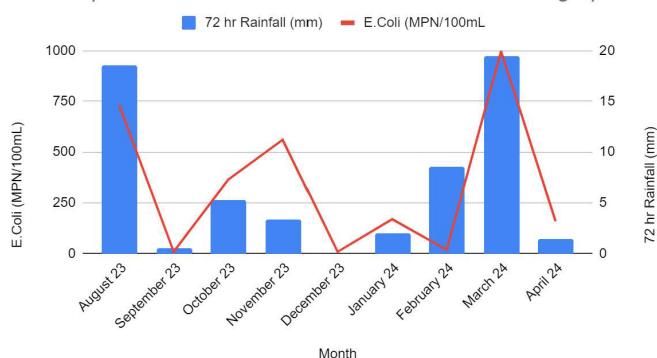
We can also see from our findings in Graph 1, the water clarity, that the creek is polluted. Compared to our control, the water is dirty at every location, with a clarity below 70 cm. The clarity at location 2 is the worst, at 27 cm; this is most likely because of the industrial area and the runoff shown in photo 2, with soap and chemicals making the water cloudy and discoloured. This is why the water clarity was impacted so heavily at location 2 in graph 1. We can also see in photo 1 the colour of the water at location 3 and the oil leakage in photo 3, These are both outcomes of their environment. An article in 2023 said blockages could often be caused by 'fatbergs' - a combination of fats, oils, and grease mixed with things like wipes and rags, which could also affect the clarity of the water.

Bar Graph 1: Clarity at each location



It is evident from the statistics in Graph 3 that E. coli pollution of Wairau Creek/Milford Marina Estuary is an additional problem. E. coli is a year-round indicator of wastewater and stormwater overflow pollution in the water. With 997 MPN/100 mL, March 2024 was the most polluted month, followed by August 2023 (730 MPN/100 mL). This is because, as Graph 3 illustrates, August and March have the most rainfall, which influences the levels of E. coli because of overflowing stormwater drains and significant runoff from urban residential property. With higher amounts of rainfall, the amount of E. coli in the waterways increases, which could mean there is a problem with the sewage and storm drains if they overflow so easily. Even with no rainfall in December, this tells us that there is E. coli in the water year round no matter the rainfall.

Bar Graph 3: Wairau creek outlet rainfall and E.Coli graph



The answer to the question 'Is Wairau Creek polluted?' is yes. From the data collected in Graph 2, the phosphate at location 5 is where all the build-up from the other locations comes from, causing the phosphate to skyrocket. The pollution comes from industrial areas, residential areas, and greenspace, as shown in map 2, giving us an idea of the pollution levels in the creek. The clarity of the creek overall was shocking, with the lowest being 27 cm compared to our control, which was 95 cm. This was caused by industrial runoff with a mix of chemicals and other contaminants flowing from local businesses. From the E. coli data collected, the higher the amount of rainfall there is, the more E. coli in the water, with the highest amount coming in March at 997 MPN/100 mL. But there is always E. coli in the water. As we could see in December with no rainfall, there is still E. coli in the waterways. Based on all the data we collected, it is clear that Wairau Creek is polluted.

Interviewing locals strengthened my understanding because it gave us information on the condition of the marina and beach. This is important because the creek ends at the beach. Some residents have been living there for 30 years and have seen the creek go from clean to dirty. This broadened our view of how long the creek has been dirty. But also, a few residents had been living there for short periods, and they were saying they had never seen the marina clean. The nitrate readings were not sensitive, which limits my understanding because it does not tell us about that type of pollution; we won't be able to know what areas are higher or lower polluted, so it minimizes our data bracket to 3 types of pollution. We visited several locations, which strengthened my understanding because we were able to see the different levels of pollution in different areas and see what effects the environment had on the water. This gave us a wide spread of results in our data. We only visited on one day of the year, which limits my understanding because it doesn't let us see if the data was going to be different if the weather changed, or if something else happened that could affect the amount of pollution.

Additionally, there were a few things that could have improved our data. The first is time, if we went down to the 5 sites and tested every day at the same time for a whole year, this would

have greatly improved our data because we would have been able to get more accurate data because of the longer time period. If we could buy better testing kits and other kits that were able to find other types of bacteria and pollution, it would have given us a greater understanding of the types of pollution that are in the river and more accurate accounts of where the pollution was coming from.