

LittaTrap™

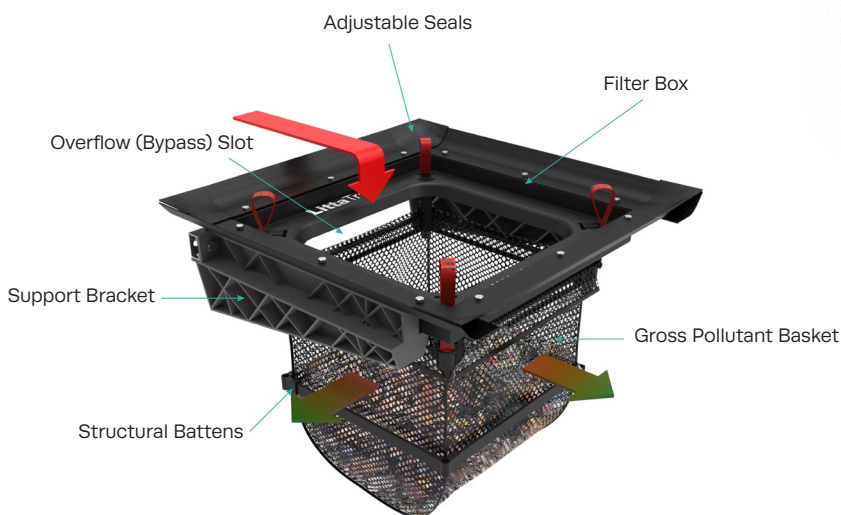
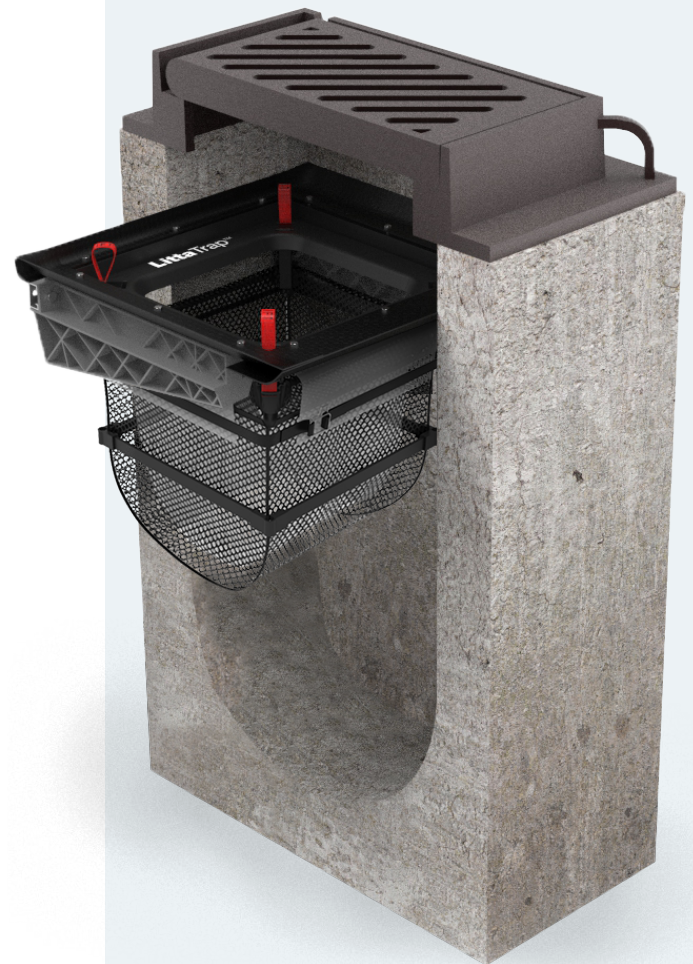
Toyota LittaTrap™ Pilot Results



TOYOTA

Plastic pollution has become a widespread issue, with an estimated 8 billion kilograms of plastic entering our oceans from land sources every year across the globe¹. Litter that enters storm drains is a significant contributor to the plastic pollution that flows into our oceans. Toyota is helping to capture litter entering stormwater systems by installing LittaTraps™ as part of a pilot to showcase how effectively they can help to achieve their wider environmental sustainability goals.

The LittaTrap™ is an innovative catch basin insert that has been designed to capture litter, plastics and other debris such as contaminated sediment. The device is easily installed inside of a stormwater catch basin. The product has been laboratory tested and shown to capture 99% of trash debris (>5mm) and improve the capture of total suspended solids by the catch basin by 40%. This report presents the findings of the pilot across seven sites over the 100 days of capture.



¹ Parker, L. (2019, June 7). The world's plastic pollution crisis explained. National Geographic, available from: <https://www.nationalgeographic.com/environment/habitats/plastic-pollution/>

SITE ANALYSIS

A total of seven dealerships participated in this pilot study. Two sites from the North Shore area, two in Manukau, and three more dealerships from Warkworth, Papakura and Henderson which are shown in Figure 2. A total of twelve LittaTraps™ were installed and monitored over 100 days to determine the amount and type of litter coming from these locations.

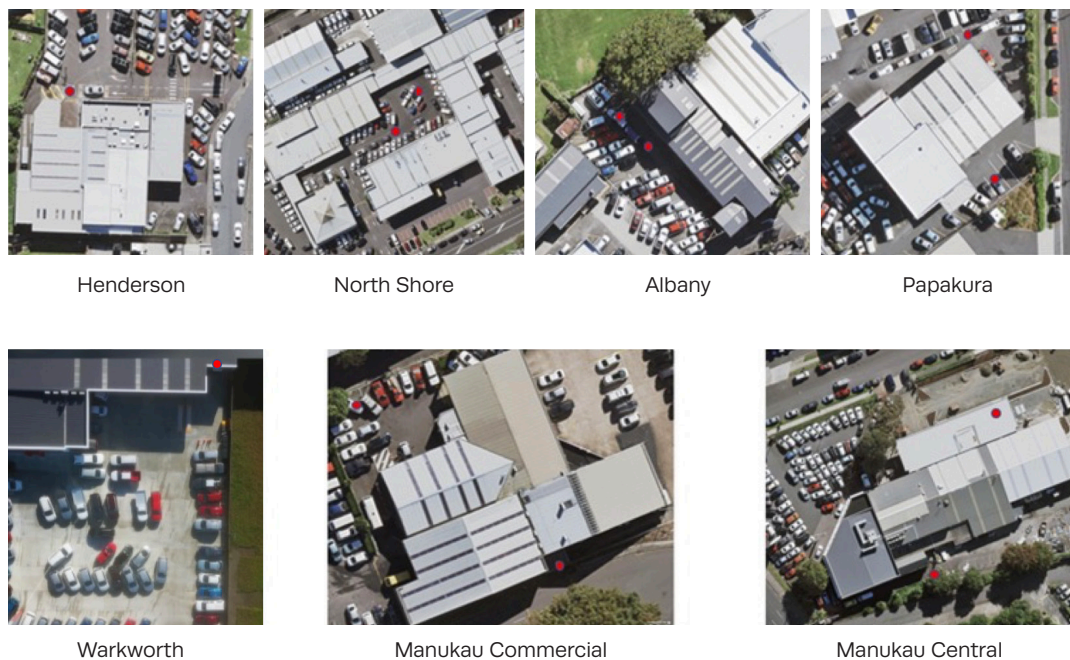


Figure 2 Seven dealerships with the location of each LittaTrap™ marked with red dots.

The stormwater drains at each dealership were specifically selected based on the presence of certain nearby amenities which are known hotspots for litter generation. These include smoking areas, parking and service zones as shown in Figure 3.

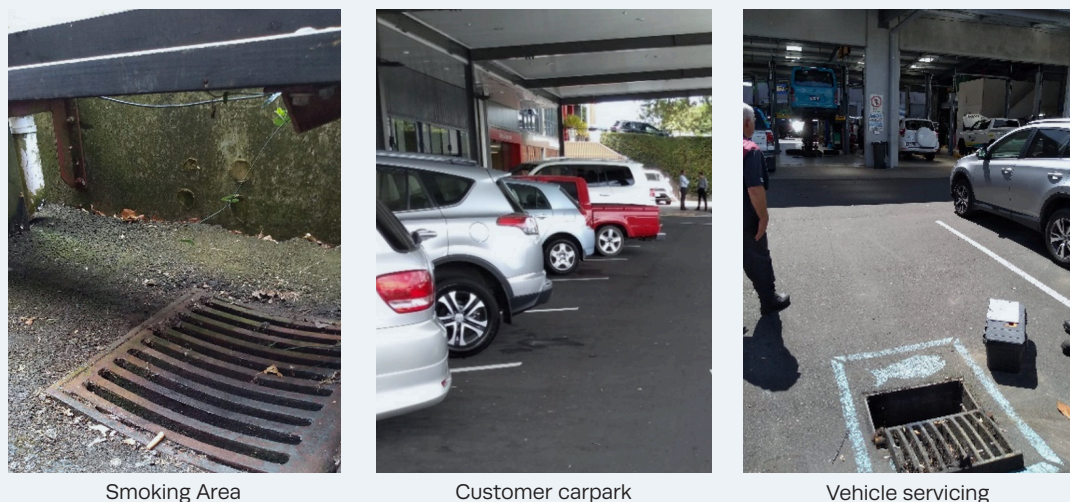


Figure 3 Catchment characteristics that correlate with high litter loading.

RESULTS

During the 100 days of the pilot, two sets of samples were collected – after 43 days and again after a further 57 days. After the first collection, there was a nationwide lockdown following the outbreak of COVID-19. The time when the nation was under level four lockdown procedures is not counted toward the collection dates due to the lack of human presence on these sites.

Despite our best efforts to prevent litter from entering stormwater systems, there are still factors present which lead to litter generation. These can often be simple processes such as wind carrying away litter before it can be recaptured or litter falling unnoticed when people exit their vehicle.

When the contents of the LittaTrap™ are collected the litter items are separated from other debris such as leaves, sticks and sediment. The litter is then further separated into various categories such as plastic, glass, metals, paper and so on as seen in Figure 4.



Figure 4 Litter separated into categories.

TYPES OF LITTER CAPTURED WITH BREAKDOWN OF PLASTIC CATEGORIES

The results show that 673 pieces of litter were captured during the first collection followed by 759 pieces of litter captured the second collection. This gives a total of 1,432 pieces of litter over 100 days of which 1,169 pieces were made of plastics. These pieces of litter and plastics would have otherwise entered the stormwater system where they would likely flow out to the sea, impacting the receiving environment.

The composition of the total litter and the percentage of plastics captured by the devices is shown in Figure 5. Cigarette butts are a type of single use plastic but are given their own category due to the amount found. The innovative design of the LittaTrap™ allows for adaptable use. This means that the device can be designed for specific land uses and the specific pollutant generated. Part of this design is making replacement parts readily available in the very rare case of damage to the unit. Minor damage was reported on two units and replacement baskets were fitted as part of the pilot.

1,486
Pieces of Litter

1,169
Pieces of Plastics

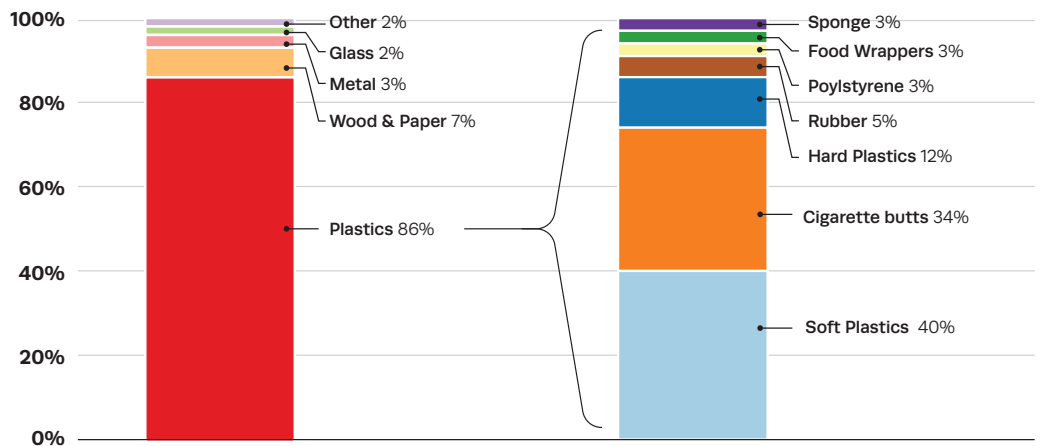


Figure 5 Litter Composition with detailed breakdown of plastic found in this pilot.

RESULTS & RECOMMENDATIONS

RESULTS

Cigarette butts are the most littered single pollution item worldwide², and so are usually found in large quantities in stormwater systems. This pilot captured a total of 400 cigarette butts with an example shown in Figure 6 where one collection contained many cigarette butts from a smoking area.

In this pilot the amount of soft plastic pieces captured outnumbered cigarette butts. Soft plastics are some of the most dangerous types of plastic pollution to wildlife because they easily break down to create microplastics which often contain chemical contaminants on their surface and are ingested by biota in rivers and marine environments.

Education and awareness campaigns are effective ways in communicating the efforts being made to reduce, reuse and prevent litter from becoming a pollutant. The use of LittaTraps™ can easily create this awareness and result in better environmental management and sustainability efforts from socially aware corporates. At the Albany dealership one of the LittaTraps™ was installed next to a smoking area which contained a noticeable amount of cigarette butts in stormwater pit prior to installation. A few employees observed and engaged in discussions with the installation crew at the time and so there was an understanding of what this device was aiming to achieve. After the litter was collected and counted the total amount at this site was the lowest of all the dealerships. This awareness is the most effective means of reducing the amount

of litter we generate. The LittaTrap™ then serves as a last resort for those other pieces of litter which may be polluted through unintended mistakes or blown around by wind. Together this results in effective sustainability programmes using a combination of awareness and infrastructure efforts to create a resilience in our environmental efforts.



Figure 6 A significant number of cigarette butts captured in a LittaTrap placed near to a smoking area.

By using the total captured litter value of 1,432 pieces over a 100-day period, a yearly loading rate of 467 pieces per trap can be estimated. Over the course of a full year it is expected that a total of 8,612 pieces of litter would be captured across just twelve catch pits. The two highest loading sites, Papakura and North Shore, have loading rates greater than one thousand pieces per year per pit. These sites are near drive through technician bays which may represent hotspots for litter generation through the normal day-to-day activities. A cost-benefit analysis points towards certain hotspots at each dealership be targeted for optimal use of budgets for maximum litter capture.

RECOMMENDATIONS

There are 63 Toyota dealerships across New Zealand. Ideally every catch pit at these dealerships would have a LittaTraps™ installed, however with a limited budget it is possible to maximise the effectiveness of capturing litter coming off these sites.

By installing four devices at each dealership and targeting the hotspots (Figure 7) could equate to 118,000 pieces of litter being caught each year based on these results. One hundred thousand of those items would be expected to be plastic.



Figure 7 Litter within leaves around a catch pit prior to the quick and easy installation of a LittaTrap™.

²Root, T. (2019, August 9). What's the World's most littered plastic item? Cigarette butts. National Geographic, available from: <https://www.nationalgeographic.com/environment/2019/08/cigarettes-story-of-plastic/>