



## Toronto Inner Harbour Floatables Strategy

An adaptive management strategy to improve aesthetics for increased public enjoyment of the Toronto Waterfront.

Version 1.0 April 30, 2020

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## INTRODUCTION

### Strategy Focus

The City of Toronto waterfront is a world-class feature that is cherished by the millions of people that live, work and play nearby. While environmental conditions along the waterfront continue to improve, aesthetics and public perception of the health of this ecosystem are affected by plastics and other floating litter – known as floatables.

The need is for this Strategy to ensure a long-term plan for continued action. The intent is to create a long-term maintenance commitment by those with jurisdiction over the area, assisting in maintaining the aesthetic quality for users of the Toronto waterfront. The strategy is a living document that will embrace opportunities to work with interested stakeholders in adopting this program in other areas along the Lake Ontario waterfront beyond the Toronto Harbour. The Strategy will identify and provide support to ongoing maintenance and further improvement of the aesthetics on the waterfront through the removal of floatables pollution. Additionally, through the development of a collaborative strategy with stakeholders and agencies, several are coming together to create, adopt and implement the goals set out herein. This collaboration will be the first of its kind on the waterfront in Toronto and that alone is an incremental step towards continued protection of Toronto’s Inner Harbour.

The focus of this Strategy is to identify opportunities for the collection and removal of floatable debris from Lake Ontario within the City of Toronto’s Inner Harbour. By working collaboratively, multiple agencies can tackle floatables removal more efficiently and effectively to make a positive impact on both the aesthetics and environmental health of the inner harbour. The Strategy will outline actions that can be implemented by the stakeholders and partner groups that the Strategy has identified, as outlined on page 10.

It is widely recognized that the issues of floatables, marine plastic and water pollution are complex, with many sources and systems involved in creating the current situation (International Joint Commission, 2017; NOAA, 2020; Pettipas, Bernier, & Walker, 2016). The scope of this document is the development of a management strategy for current conditions of the Toronto Inner Harbour, and not intended to address the root causes of floatables pollution entering the harbour. As agencies continue the important work of reducing consumer plastics, improving waste management practices and retrofitting water systems, conditions may improve to the point where the actions outlined in this Strategy are no longer needed. Ongoing monitoring of collection rates as proposed action, will be used to evaluate the change in the volume of floatables over time.

### What Are Floatables?

The US EPA’s Beaches Environmental Assessment and Coastal Health (BEACH) Act defined floatable materials in 2000 as any foreign matter that may float or remain suspended in the water column (United States Congress, 2000). The term includes plastic, aluminum cans, wood products, bottles, and paper products.

Today, plastic is one of the most common types of floatable debris and is a significant environmental concern. Monitoring data suggest that the origin of these plastics is mainly land-based, from urban and storm runoff, sewer overflows, beach visitors, inadequate waste disposal and management, industrial activities, construction and illegal dumping (IUCN, 2020).

## Toronto Harbour Floatables

Floatables – definition for the purpose of this Strategy – does not include floating materials from Combined Sewer Outlets (CSO). This Strategy is not looking to deal with CSO output, but garbage only. The City of Toronto’s Wet Weather Flow Master Plan is a long-term plan that seeks to, among other things, address CSO (City of Toronto, 2017).

The origin of floatables is diverse and often non-point source, and because of the multitude of methods of entry into the aquatic ecosystem it will take the coordination of multiple agencies and actions to address the problem. At a local level, many agencies, environmental groups and residents are concerned about the presence of floatables in the Toronto Harbour. This Strategy has sought the collaboration and feedback of the Toronto and Region Remedial Action Plan (RAP), Ports Toronto, the City of Toronto departments, Harbourfront Centre and interest groups invested in and familiar with the situation such as the University of Toronto Trash Team and Swim Drink Fish.



**FIGURE 1: THE TORONTO INNER HARBOUR IS DEFINED AS THE AREA SPANNING BETWEEN THE EASTERN AND WESTERN GAPS FROM THE TORONTO ISLANDS TO THE MAINLAND.**

## Marine Plastics and Debris in The Great Lakes

Water pollution and marine plastic is a growing global concern. The UN estimates that over 8 million tonnes of plastic end up in the world’s oceans every year, with much of it coming from urban rivers that carry plastic waste from cities worldwide to marine environments (United Nations, 2019). In 2010 about 8,000 tonnes of plastic waste entered oceans from land in Canada (Canadian Council of Ministers of the Environment, 2018). In Toronto, our rivers and creeks transport waste from all parts of the region to Lake Ontario. From there, debris continues through the St. Lawrence River to the Atlantic Ocean, contributing to the global marine plastic problem.

Floatables have negative impacts on habitat, wildlife, and recreational opportunities in the Great Lakes. Floating debris can cause damage to boats and can have a negative impact on tourism as tourists often use cleanliness as a key factor in selecting recreational sites (Driedger, Dürr, Mitchell, & Van Cappellen, 2015). Habitat and wildlife can be negatively impacted through entanglement, habitat loss, and even ingestion. Ingestion of plastics has been linked to internal bleeding, or blockage of digestive tract. Some plastics contaminants even persist in animal tissue, causing issues not only for the individual but for the entire aquatic food web (Canadian Council of Ministers of the Environment, 2018; Driedger et al., 2015; International Joint Commission, 2017). Floatables also can degrade into microplastics, small pieces of plastic debris <5 mm in size, through wave action and photodegradation.

### Public Perception of Floatables

The problem of floatables is inextricably linked to human behaviour. Littering is caused by individual people, and a direct source of floatables entering the Toronto Harbour. Litter surveys have revealed that single use plastic, such as food containers and cigarette butts, are some of the most frequently found debris (Driedger et al., 2015). In addition to behavioral change of individuals, there is appetite amongst the public to undertake change that will reduce production of single use plastic, and in turn, floatables. The City of Toronto implemented a survey regarding single use plastics and found that the number one reason why people used single use plastics was directly tied to business practices: “The shop or restaurant gives them to me without asking” and a close second “There are no reusable options provided to me by the restaurant or shop” (City of Toronto, 2019, p23). The survey also revealed that 75% of respondents expressed “consistent strong support for mandatory approaches to reduction of plastic bags, black plastic and Styrofoam containers” (City of Toronto 2019). Understanding human perception of plastic debris, and their willingness to engage in modifying behaviours to reduce plastic use are important components of this Strategy.

### Support of Existing Policy

The Toronto and Region Remedial Action Plan (Toronto RAP) team has recommended that the “degradation of aesthetics” Beneficial Use Impairment (BUI) be re-designated to “not impaired” status for the Toronto and Region Area of Concern (AOC). Degradation of aesthetics was initially listed as impaired due to excess foam and oil slicks from industrial discharges (e.g., pulp and paper mills and steel mills). Today however, aesthetic concerns are associated with excessive floating debris, odour, and unnatural turbidity. A three-year (2012, 2013 and 2015) study of aesthetic conditions across the Toronto and Region AOC, found that 94% of 1667 observations met the criteria for “excellent” or “good” aesthetic condition. Despite the proposed delisting, the Toronto RAP team is supporting and committed to ongoing initiatives to enhance and maintain improved aesthetics along the Toronto Waterfront. This Strategy is one of those commitments.

The Floatables Strategy supports existing policy that has been developed:

Long Term Waste Management Strategy (City of Toronto, 2016):

- Guiding Principles, #3 is “Prioritize our Community’s Health and Environment- The health of our residents and the environment is a priority in decision making to minimize negative impacts and to maximize the benefits.”

The Floatable Strategy’s goals and objectives are consistent with the following objectives set out in the Made in Ontario Environmental Plan:

- Under the Clean Water: Actions section, the plan states that the Province will “Review and update Ontario’s Great Lakes Strategy to continue to protect fish, parks, beaches, coastal wetlands and water by reducing plastic litter... to protect our aquatic ecosystems.” (p.12)
- Under the Reduce Litter and Waste: Actions section, the plan states that the Province will “Work with other provinces, territories and the federal government to develop a plastics strategy to reduce plastic waste and limit micro-plastics that can end up in our lakes and rivers.” (p.42)
- This plan also supports community involvement in litter prevention and cleanup, stating that the Province will “Develop future conservation leaders through supporting programs that will actively clean up litter in Ontario’s green spaces, including provincial parks, conservation areas and municipalities.” (p.43)

## VISION AND OBJECTIVES

### Vision

**A City of Toronto Inner Harbour that is free of floatable debris with a thriving aquatic ecosystem and abundant recreational opportunities.**

Through the creation of an adaptive management strategy that aims for virtual elimination of floatable debris in the Toronto Harbour we can move towards achieving this vision. It will take a multi-pronged approach, utilizing products, maintenance, education and outreach, policy, and monitoring to achieve this step.

Four objectives have been developed to classify actions that will be set into motion and to frame future needs.

### Objective 1: Products and Maintenance

**Implement novel products and maintenance regimes that will effectively remove floatables within and that will mitigate floatables from entering the Toronto Inner Harbour.**

To improve ecosystem health and BUIs in the inner harbour it is vital that floatables are prevented from entering the harbour, and those already present are removed. As mentioned earlier, the sources of floatables are diverse and so the methods to remove and mitigate the entry of those floatables must also be varied. Safety measures must be considered when collecting floatables. Some debris may pose a risk, for example biohazardous waste in the form of personal hygiene products. Surveys of floatable debris in the harbour (and in other regions) suggest that much of the debris present is from single use plastics (such as food packaging), therefore on-land mitigation tactics must be employed to prevent that litter from entering the water.

Preventing floatables from entering the harbour will take on-going effort and collaboration across stakeholders. Maintenance regimes such as waste pick-up frequency should be investigated to ensure they are effective and consistent among both private and municipal stakeholders. Infrastructure that is connected to the inner harbour should be maintained.

### Objective 2: Monitoring

**Track the volume of floatables to measure success of implementation and to identify potential additional actions**

For a program to be successful, it is crucial to have a method of measuring success. Monitoring will be implemented to determine the baseline of floatables in the harbour. This will help to inform the kinds of mitigation strategies that need to be implemented, as well as measure the impact of those strategies. A monitoring program will be developed in collaboration with the University of Toronto Trash Team.

### Objective 3: Public Education

**Develop education and awareness programs to improve negative behaviours that result in floatables entering the inner harbor.**

Research has revealed that many floatables are caused by human actions. Cigarette butts are overwhelmingly the most often collected item, followed by single use food-related litter (e.g., packaging and take-out containers). Education programs that target littering compliance have had demonstrated positive impact in other jurisdictions (see Thames River Program) and will be developed for the Toronto Inner Harbour to increase public compliance with

littering laws. Furthermore, programs should be developed targeting local businesses to promote awareness of the issues related to single use plastics, and to educate business owners of the public desire around plastic reduction.

## Objective 4: Policy

### **Coordinate this Strategy with municipal partners and other stakeholders to support relevant policy.**

Floatables and marine litter is a complex problem and will take coordination among multiple agencies to effectively address. There must be connections drawn with existing and future waste management policies at the municipal level, and best management practices among project partners at the ground level. Coordination and communication with businesses that are in the harbour in the development of that policy will help to reduce litter.

## ACTION PLAN

The achievement of this Strategy hinges on collaboration. The following section identifies the actions that can be assigned to each objective identified. These actions are detailed to indicate the intent, potential funding sources, and the partners and stakeholders required. It should be noted, however, that many of the actions in the Strategy will be constantly adapted based on the newest data and funding available. Therefore, this action plan must be considered a “living document”. The achievement of actions will inform tactics and approaches for new actions, resulting in a continuously adaptive regime.

### Actions Addressing Objective 1: Products and Maintenance

#### **1.1 Seabin Installation**

Install 28 Seabins at identified locations throughout Toronto’s Inner Harbour. Seabins are a technology that was developed in Australia for use at marinas to trap floatable debris. This use was extended to harbours through a piloted project in 2019 by Ports Toronto. With minor modifications to the implementation of the equipment, the pilot was determined to be successful. As a result, Ports Toronto, the City of Toronto and TRCA are seeking to have 28 more Seabins installed at identified locations throughout the harbour.

Partners: Ports Toronto, City of Toronto, University of Toronto Trash Team, TRCA

Funding: Application to Zero Plastic Waste Initiative and Great lakes Protection Initiative with contributing funds from PortsToronto, City of Toronto

#### **1.2 Storm Catchbasin Litter Protection**

Install storm sewer catchbasin litter collection technology. Catchment technology could be used to halt debris from entering the harbour through storm drain outlets. There is still, however, a need to pilot studies before this technology can be installed widely.

Partners: Toronto Water, PortsToronto

Funding: TBD (PortsToronto, City of Toronto, Grants)



### **1.3 Standardized Garbage Receptacles**

Identify standardized garbage receptacles to prevent wind-born debris from entering the harbour. Data suggests that a vector for debris in the Toronto Harbour is the result of wind. Trash from the shore is picked up by the wind and blown into the harbour. To mitigate this, trash bins should be standardized throughout the harbour and should include lids, bin straps, or other methods to prevent trash from blowing away. The land around the harbour, however, is largely privately owned and therefore the investigation and adoption of wind-proof trash receptacles will require the collaboration of private business owners, the City of Toronto, and Ports Toronto.

Partners: City of Toronto Solid Waste, Waterfront Secretariat

Funding: TBD (Private property owners, City of Toronto, Grants)

### **1.4 Investigate opportunity for end of pipe filtration technology**

End of pipe filtration technology refers to the many diverse methods of collecting debris at outlets into the harbour, for example at storm drains. Other jurisdictions have successfully employed novel technology such as storm sewer outlet nets. We must investigate and pilot the technology that would be most appropriate for the Toronto Harbour.

Partners: Toronto Water, RAP, TRCA

Funding: TBD (City of Toronto, Grants)

### **1.5 Investigate garbage pick-up regimes among both municipal and private stakeholders**

The land surrounding the harbour is a mix of privately-owned businesses and other stakeholders, and (to a smaller extent) publicly owned. Because of this patchwork of ownership, garbage collection is not only collected municipally but is also collected by private businesses. As mentioned in Action 1.3, garbage bins should be investigated as an opportunity to mitigate the entry of floatables into the harbour. Likewise, the regimes of garbage pick-up should also be investigated to determine where efficiencies can be found and prevent litter from overflowing.

Partners: City of Toronto, BIA, Local Stakeholders, TRCA

Funding: TBD

### **1.6 Investigate marine debris removal vessel and other unique technologies**

Technology has been developed to remove debris that is already in the water – like the Trash Wheels in Baltimore. PortsToronto is exploring opportunities to purchase a garbage collecting vessel. In addition, a design competition for novel marine debris removal technology, specific to the Toronto Inner Harbour context, will be held via a design competition through University of Toronto’s Faculty of Engineering. The design competition will be run by the University of Toronto Trash Team with PortsToronto as a client. The design that arises from the winner of the contest will be implemented through PortsToronto with collaboration from the University of Toronto Trash Team.

Partners: University of Toronto Trash Team, Ports Toronto, TRCA

Funding: TBD (Grants, PortsToronto, University of Toronto Trash Team, City of Toronto)

## Actions Addressing Objective 2: Monitoring

### 2.1 Monitor debris collected in Seabins

Monitoring of material collected in Seabins is necessary to identify the effectiveness, potential sources of debris and when they are no longer required or should be moved to alternate locations. Ideally over time, the number of Seabins required in the harbour will be reduced.

Partners: Ports Toronto, University of Toronto Trash Team, Swim Drink Fish, TRCA

Funding: Grants

### 2.2 Develop long-term monitoring framework with University of Toronto Trash Team that is consistent with the National Oceanic and Atmospheric Administration Marine Debris Program (2020)

Floatables are not only an issue in the Toronto Inner Harbour, but across the Great Lakes. A consistent monitoring framework will allow data to be shared and will help to create better mitigation tactics informed by the experience of others in different jurisdictions. Therefore, a framework for monitoring should be developed that is consistent with the NOAA Marine Debris Program. It is suggested that 2 frameworks be developed for use; one for scientific research and another for citizen science/volunteer clean-ups etc.

Partners: University of Toronto Trash Team, Swim Drink Fish, TRCA

Funding: Grants

### 2.3 Utilize monitoring to identify point-sources

Monitoring will identify the distribution and type of floatable debris in the Toronto Inner Harbour. These data can identify the origin of floatables so that mitigation tactics at the point source can be developed.

Partners: University of Toronto Trash Team, Swim Drink Fish, Ports Toronto, TRCA

Funding: TBD (Grants)

### 2.4 Monitor effectiveness of implemented products (objective 1)

New technology that is implemented must be monitored to determine effectiveness. This will provide crucial information to inform adaptation strategies: is the technology effective in the location where it was installed? Is the product still required? Is the product effective at reducing floatables? Each technology/product that is utilized will have a monitoring framework in place at the time of installation. This monitoring shall also support action 2.3, point source identification.

Partners: ALL (University of Toronto Trash Team, Swim Drink Fish, TRCA)

Funding: TBD (Grants)

### 2.5 Track effectiveness of Strategy and continually adapt management strategies and activities

The Floatable Strategy is intended to be a framework for an adaptive management strategy to address floatables in the Toronto Inner Harbour. As such, tracking the progress of goals and adapting activities based on the most recent data are vital to the Strategy success.

Partners: ALL

Funding: TBD (Grants)

## Actions Addressing Objective 3: Public Education

### 3.1 Develop program to increase public awareness of floatables and marine debris

The source of floatables can all be traced to human activity. Reducing floatables in the harbour cannot be accomplished without addressing human behaviour. Education programs will be designed that will target the general public, seeking to improve litter law compliance and increasing awareness of floatables. It is proposed that signs will be installed at publicly visible Seabin locations. These signs will inform the public about the issue of floatables, what the seabin does and ways they can be involved.

Partners: Swim Drink Fish, University of Toronto Trash Team, Ports Toronto, TRCA

Funding: TBD (Grants, GLPI and ZPWI current applications)

### 3.2 Develop outreach program targeting businesses in the Toronto Inner Harbour neighbourhood

The lands surrounding the Toronto Inner Harbour are the sites of many diverse businesses. Their cooperation will be key in the reduction of floatables in the harbour (see action 4.1). A program will be designed to educate businesses about the kinds of practices that can be implemented to reduce floatables. For example, the City of Toronto has undertaken surveys regarding single use plastics and found that the majority of responded cited that businesses provide single use plastics without providing any alternative options to their customers. This suggests that customers would be open to alternatives to single use plastics.

Partners: Business Improvement Area, TRCA, Waterfront Secretariat, Others

Funding: TBD (Grants)

### 3.3 Utilize partnerships to extend outreach to diverse audiences

There are many different communities and stakeholder groups that have an impact on floatables. In the interest of extending outreach and education to these varied groups, it is important to utilize the existing relationships that partners already have established. An example of this would be educational programs in schools and/or community cleanups across the relevant region.

Partners: ALL

Funding: TBD and existing budgets for everyday work.

## Actions Addressing Objective 4: Policy

### 4.1 Work with local BIA to develop guidelines and standards for the local businesses in the harbor

Partners: Business Improvement Area, Waterfront Secretariat, City of Toronto, TRCA

Funding: TBD (City of Toronto, Grants)

### 4.2 Monitoring data to be analyzed to determine potential policy development

Partners: University of Toronto Trash Team, Swim Drink Fish, TRCA

Funding: Grants

#### **4.3 Investigate municipal by-law to support garbage pick-up regimes among both municipal and private stakeholders**

The Waterfront of the Toronto Inner Harbour is a mix of private, municipal and federal ownership. As mentioned in Action 1.5 standardized pick-up, municipal by-laws should be investigated to support and formalize a set regimes of garbage pick-up to prevent litter from overflowing receptacles.

Partners: City of Toronto

Funding: TBD (City of Toronto)

## TIMELINE

Goals	Objectives	Timeline						
		2021	2023	2025	2027	2029	2031	2033
1. Products and Maintenance	1.1. Seabin installation	■						
	1.2. Storm catchbasin litter protection	■	■	■				
	1.3. Standardized garbage receptacles	■	■	■				
	1.4 Investigate opportunity for end of pipe filtration technology	■	■	■	■			
	1.5 Investigate garbage pick-up regimes among both municipal and private stakeholders.	■	■	■	■			
	1.6 Investigate marine debris removal vessel.	■	■					
2. Monitoring	2.1. Monitor debris collected in Seabins.	■	■	■	■	■	■	■
	2.2. Develop long-term monitoring framework with University of Toronto Trash Team that is consistent with the National Oceanic and Atmospheric Administration Marine Debris Program (2020).	■	■					
	2.3. Utilize monitoring to identify point-sources.	■	■	■	■	■	■	■
	2.4. Monitor effectiveness of implemented products (objective 1)	■	■	■	■	■	■	■
	2.5. Track effectiveness of Strategy and continually adapt management strategies and activities	■	■	■	■	■	■	■
3. Education and Training	3.1. Develop program to increase public awareness of floatables and marine debris.	■	■	■	■			
	3.2. Develop outreach program targeting businesses in the Toronto Inner Harbour neighbourhood.	■	■	■	■			
	1.1. Utilize partnerships to extend outreach to diverse audiences.	■	■	■	■	■	■	■
4. Policy	4.1. Work with local BIA to develop guidelines and standards for the local businesses in the harbor.	■	■	■				
	4.2. Monitoring data to be analyzed to determine potential policy development.	■	■	■	■	■	■	■
	4.3. Investigate municipal by-law to support garbage pick-up regimes among both municipal and private stakeholders.	■	■	■				

## STAKEHOLDERS AND PARTNERS

### Stakeholders

The groups, businesses or persons with a direct interest as they perform and are held to a prescribed mandate along Toronto's waterfront (business, public service, federally mandated roles etc). The stakeholders involved in the development and execution of this Strategy are:

- PortsToronto
- City of Toronto
  - Solid Waste Management
  - Parks Forestry and Recreation
  - Waterfront Secretariat
  - Toronto Water
  - By-law
- Harbourfront Centre

### Partners

Parties interested in or that have work focused on waterfront that is not mandated, however are critical in the successful implementation and development of this Strategy. Partners in this Strategy are:

- University of Toronto Trash Team
- Swim Drink Fish
- TRCA

### Future Potential Partners

As the implementation of the Strategy rolls out, it will be necessary to engage additional partners as needed. Provincial agencies such as Ministry of Environment Conservation and Parks is one example of a potential future partner.

## FUNDING

The production of this Strategy has been supported by a grant from Environment and Climate Change Canada and managed by Toronto and Region Conservation Authority, with operational funding support from the City of Toronto.

Key stakeholders and partners have provided their time to meet, review and supply necessary information to the Strategy at no cost.

Partners have also provided valuable resources and time supporting the development of the Strategy at no cost. Implementation of actions will be funded through our stakeholders and through the application of additional funding.

## CONCLUSION

Floatables are a complex problem that will take coordination across multiple jurisdictions to address. This Strategy represents a first step in that process, to bring together multiple stakeholders to carry out an adaptive management plan that will mitigate floatables in the Toronto Inner Harbour. Actions carried out in this plan will inform future actions and policy development. While the Strategy will not necessarily address floatables at the source, it will help to identify point sources and will provide grounds for complementary “on land” policy and programs.

Although the Strategy is named for and implies application for the Toronto Inner Harbour, much in line with the Vision, it is anticipated that the Strategy will invoke others to act resulting in application at a larger geographic level.

It important to understand that this Strategy is expected to continuously evolve. As actions are implemented, adjustments to existing actions, identification of new actions and identification of new partnerships and opportunities will arise.

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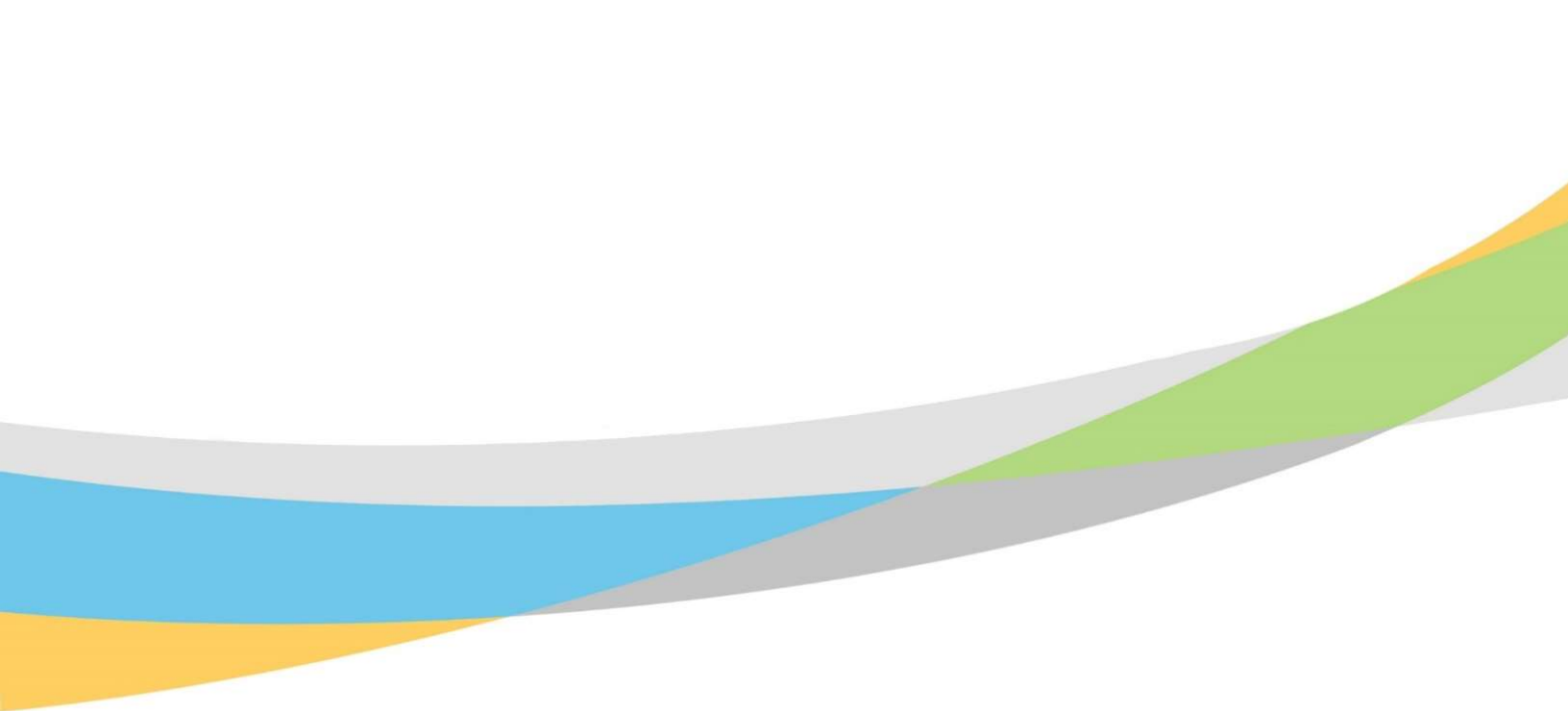
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