



# CLEAN CITIES, BLUE OCEAN

## Initial Solid Waste Management Assessment (ISWMA) | Dominican Republic



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Note: This report was developed by Clean Cities, Blue Ocean to inform the program's approach. The report was developed through desk research and represents the best available data accessible to the program.

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# 1. Introduction

From January 13-17, 2020, a Tetra Tech team composed of a marine biologist, four solid waste experts, and the CCBO Program Manager conducted an Initial Waste Management Assessment (IWMA) in the Province of Samaná, Dominican Republic (DR). The IWMA was conducted through meetings with multiple public and private sector stakeholders, site visits to four existing open-air dumps, and to two potential sanitary landfill locations. Consultative meetings included discussions with the Ministry of Environment and Natural Resources, Samaná Province Mayors, Federación Dominicana de Municipios (Dominican Federation of Municipalities, FEDOMU), Dominicana Limpia, the Tourism Cluster, potential private sector investors, and USAID/Dominican Republic Mission staff. A complete list of participants is included in Annex I. The team also observed curbside waste collection methods, waste transportation, roadside litter, and the degradation of streams/creeks and estuaries/deltas.

The assessment's main objectives were to assess existing SWM programs in the Province of Samaná, with the goal of identifying processes, or the lack of, that are the cause of marine plastic pollution—which will ultimately inform the program's Year One Work Plan. The IWMA provides an overview of Samaná's current SWM system capabilities and the clear need for a sustainable integrated waste management system that will help restore the province's natural environment and improve public health.

## 2. Background and Context

### 2.1 Waste Management in the Dominican Republic

The human, economic, and environmental costs of poor waste management in the DR are mounting. Citizens living adjacent to disposal sites face contaminated water and odors; tourism development is under threat from environmental pollution; and biodiversity is facing serious impacts from the waste in the Samaná Bay and Atlantic Ocean, which includes more than 1,500 humpback whales who inhabit the bay between December and March to breed and raise their young.

Because of these impacts, many national and local advocates have been compelled to action, but with the current infrastructure, regulatory environment, and financial system in place, they cannot enact or pay for improved SWM. Financing for improved infrastructure is critical if the DR is to shift from the current 352 informal and inefficient environmentally dangerous waste dumping sites to formal and better-managed waste collection, recycling, and disposal systems at the regional level.

Currently, there is no national law or legislation in place to govern solid waste management. The DR's National Law for the Integrated Management and Processing of Waste has been read by the legislature for nearly ten years, but it has not yet been approved (Initiative No. 06625-2016-2020-CD). If passed, the pending law would provide the legal framework necessary to improve the solid waste system and encourage investment in SWM systems, including material recycling facilities (MRFs), transfer

stations/aggregation points, and environmentally sound landfills. The law’s passage, however, is dependent on the Federal Government and implementation in the local provinces and municipalities. Further, effective rate design and other funding mechanisms must be put into place to pay for this advanced system.

The Dominican Republic is ripe for progress in 3Rs and SWM, with growing national and local buy-in to the need for change. Public, private, and civil sectors are increasingly willing to collaborate to find mutually beneficial solutions, and areas like Samaná can leverage their potential as high-profile destinations for international tourists and areas of important marine biodiversity to potentially attract the international attention required to access critical financing, providing economically feasible cost models. Samaná’s nascent tourism industry presents an opportunity to learn from other areas in the DR where waste management has become untenable and to create a model that can be replicated in high-capacity municipalities and urban areas.

## 2.2 The DR’s Pending National Solid Waste Management Law

The DR’s pending law on solid waste management, if passed, would establish several critical measures that are fundamental to development of an integrated SWM system. These include:

Table 1. New requirements under the National Solid Waste Law

Actor	Responsibilities and Conditions:
<b>National Government</b>	<ul style="list-style-type: none"> <li>● The Ministry of Environment and Natural Resources is empowered to administratively sanction serious and very serious infractions. In the case of less serious infractions, the administrative sanctioning faculty corresponds to the city councils and to the boards of the municipal districts.</li> <li>● Must establish a trust for the Integrated Management of Solid Waste to be financed with the Green Tax defined in Article 37 and with the fines of the serious and very serious offenses defined in this law.               <ul style="list-style-type: none"> <li>○ The administration of the trust will be integrated by a directive council, consisting of seven members (three from the Dominican state, three from the private sector, and one representing local governments).</li> </ul> </li> </ul>
<b>Municipalities and Municipal District Boards</b>	<ul style="list-style-type: none"> <li>● Must establish and implement a Municipal Plan for Comprehensive Waste Management that will guide the actions of the municipalities for the integrated management of waste in the municipality.</li> </ul>
	<ul style="list-style-type: none"> <li>● Must approve municipal ordinances to regulate the classification, selective collection and final disposal of waste, which must meet the objectives of this law, its regulations, and the National Plan for the Prevention and Integral Management of Solid Waste</li> </ul>
	<ul style="list-style-type: none"> <li>● Must ensure waste collection service is provided in a selective, accessible, periodic and efficient way for all inhabitants, as well as MRFs, with special emphasis on those of small- and medium-scale for the subsequent valuation.</li> </ul>

	<ul style="list-style-type: none"> <li>● The fare and payment system for the collection, transportation, transfer stations, final disposal sites and urban solid waste recovery plants is structured through service fees defined by the city council or district board correspondent. In the recovery plants, a base payment equivalent to \$750 Dominican pesos is established for each ton received.</li> </ul>
<b>Integrated Waste Management Generator</b>	<ul style="list-style-type: none"> <li>● Responsible for waste management from its generation to its final disposal, and should: <ul style="list-style-type: none"> <li>○ Reduce the generation of waste it produces;</li> <li>○ Separate the waste at the source; and</li> <li>○ Support the programs that the state promotes to sustainably manage the waste generated in the country.</li> </ul> </li> </ul>
<b>Urban solid waste generators</b>	<ul style="list-style-type: none"> <li>● Must progressively perform the separation of waste at the time according to the types of waste defined by this law (organic and inorganic material).</li> </ul>
<b>Service Providers (Haulers)</b>	<ul style="list-style-type: none"> <li>● Must be registered with the Ministry of Environment and Natural Resources and have the administrative authorization of the municipality or district board.</li> <li>● Must charge the municipal fee for the complete waste management service that includes collection, transportation, transfer, and final disposal by the municipality or municipal district board. <ul style="list-style-type: none"> <li>○ The funds raised by fees for the integrated management service of urban solid waste will be used for the maintenance and sustainability of the system and cannot be used for other purposes.</li> </ul> </li> </ul>
<b>Producers, importers, traders, and marketers</b>	<ul style="list-style-type: none"> <li>● Producers, importers, and marketers must organize and finance waste during the production, post-industrial, and post-consumption phases. The extended responsibility of producers, importers, and marketers is only applicable to the management of the waste listed and not to improper handling carried out by third parties authorized by the competent authority or to the payment of damages caused in the treatment, recovery or final provision made by third parties authorized by the competent authority.</li> <li>● Producers, importers, and traders subject to the extended liability regime must comply with all requirements of the law.</li> <li>● Producers of foam and plastic bottles will be obliged to join a specific program of extended producer responsibility to recover, treat, and dispose of the generated waste in a safe way.</li> </ul>
<b>Investment projects related to waste management</b>	<ul style="list-style-type: none"> <li>● Can enter the DR stock market for financing and must comply with the applicable sector legislation.</li> </ul>

If the law is passed, the National System for the Comprehensive Management of Waste will have a Coordinating Council to coordinate policies and plans for the prevention and comprehensive management of waste at the national level.

## 2.3 La Duquesa Municipal Landfill as Model for Change

La Duquesa Municipal Landfill (Duquesa) was originally constructed as a 300-acre landfill capable of receiving 3,500 tons per day of municipal solid waste generated by the Province of Santo Domingo, which accounts for approximately 35 percent of the national population. Duquesa poses multiple challenges, including informal/independent waste collectors retrieving recyclables, release of methane and odors into the atmosphere, and the contamination of waterways and groundwater. The use of daily cover is non-existent, allowing mammals, birds, insects or other arthropods (vectors) to scavenge alongside independent waste collectors. See *Annex II for a glossary of relevant terms*.

In late 2017, the government took control of the Duquesa Landfill from a Jamaican national who had operated the landfill for over a decade. The allegations for the seizure are related to non-compliance with environmental regulations, and on January 17, 2020, the President of the DR created the Presidential Commission for the Restructuring of the “Duquesa Open Sky Dump.” The Commission is composed of 15 institutions, including ministries, town halls, a district, and municipality board, with the purpose to implement three main actions including the rehabilitation of the site, its technical closure, and the planning for the construction of a new sanitary landfill for the disposal of wastes originating in Santo Domingo.

The environmental issues that led to the recent focus on the Duquesa Landfill can be seen as a catalyst for change in the way waste is handled in the DR. The federal government’s recognition of the long-term impacts and environmental hazards of operating an open dump in an urban area have put the rest of the country on notice, and the potential enactment of the National Solid Waste Law has the ability to establish a model that will lead to the development of regional sanitary landfills and the closure—and eventual mitigation—of all current open dumps on a country-wide basis. This action alone, even done gradually, will substantially reduce and mitigate the environmental impacts of these sites in the DR, as well as the leakage of plastics and other waste into waterways.

## 3. Assessment Findings

The following section provides an overview of IWMA findings resulting from desk research; in-country consultations (see Annex I for complete list); visits conducted to open dumps, potential landfill locations; tours through the municipalities of Las Terrenas, Samaná, and Sanchez and three Municipal Districts (i.e., Arroyo Barril, El Limon, and Las Galeras) to observe sources and generators of waste and recyclables, the collection system, sorting operations, and disposal sites and their conditions; and observations including local road conditions and potential aggregation and disposal sites.

Observations from Las Terrenas Dump included the outfall of a polluted stream into the Atlantic Ocean. Through the visit, the *Dominicana Limpia* staff provided a siting report that identified a potential location for a new landfill to serve Las Terrenas’ population (see Annex V and included estimated populations and associated waste generation for the three municipalities and municipal districts, Table 2).

Table 2. Populations and associated waste generation (in tons)

Municipality or Municipal District*	Total Population 2019 <sup>1</sup>	Waste Generation per Day (tons/day) 2019 <sup>1</sup>	Open Dump?
Las Terrenas	20,633	18.57	Yes
Samaná	36,376	32.74	Yes
-Arroyo Barril*	12,061	10.86	No
-El Limon*	7,697	6.93	Yes
-Las Galeras*	7,593	6.83	No
Sanchez	26,857	24.17	Yes
<b>Samaná Province</b>	<b>111,217</b>	<b>100.10</b>	

Source: Dominicana Limpia, Technical Memorandum

### 3.1 Open Dumps

Four open air dumps were visited, located in Las Terrenas, Samaná, Sanchez, and in the Municipal District of El Limon (see Annex III for photographs). All four dumps were found to largely lack supervision, proper disposal methods, environmental controls, and are sited in problematic locations. Of all the dumps, Sanchez was found to be causing the greatest levels of environmental degradation. Annex III contains photos of the visited dump sites, and Annex IV a map of Samaná Province and visited sites.



A small herd of cattle observed at the Sanchez open dump site. Photo: Cesar Leon/CCBO

Table 3. Open air dump sites and observations

Site	Observations
Sanchez	<ul style="list-style-type: none"> <li>• Located just west of the center of town and north of the Yuna River and the Lower Yuna Mangroves.</li> <li>• Waste disposed of at the Sanchez dump flows through adjacent rivers and streams and eventually into the delta that empties into the Samaná Bay, which is one of the largest estuaries in the Caribbean.</li> <li>• A small herd of 6 to 10 cattle were seen grazing on the waste in this open dump.</li> </ul>
Las Terrenas	<ul style="list-style-type: none"> <li>• Located just south of the center of town adjacent to streams and rivers that eventually release leachate and other waste materials into the ocean at one of</li> </ul>



	<p>the most prominent beaches in Las Terrenas.</p> <ul style="list-style-type: none"> <li>• Commonly and intentionally burns garbage to reduce its volume.</li> </ul>
Samaná Dump	<ul style="list-style-type: none"> <li>• Located just east of the center of town and is visible from Samaná Bay.</li> <li>• Waste disposed of at the Samaná dump originates in Arroyo Barril, Las Galeras, and the Municipality of Samaná.</li> </ul>
El Limon	<ul style="list-style-type: none"> <li>• Located just west of the center of town in the hills far from any river or streams.</li> <li>• The smallest of the four visited sites and a potential location for the siting of a new sanitary landfill to manage the waste of Samaná Province.</li> </ul>

### 3.2 Potential Landfill Locations

The two potential landfill locations visited during the IWMA included Las Terrenas, which was identified as part of a siting evaluation conducted by Dominicana Limpia and deemed appropriate by Mr. Flores Chang, Director of the Ministry of the Environment and Natural Resources. The second site visited was located adjacent to the El Limon dump. An overview of each site is provided below.

**Las Terrenas Landfill** - The potential landfill location is the result of a siting report identifying two potential locations for a landfill to serve the population of Las Terrenas (see Annex V). The site with the greatest potential is in the Yakeson Area, Loma del Burro, of Majagua, Samaná, Kilometer 12 of Bulevar del Atlántico. This site is about three miles from Majagual and about seven miles from Las Terrenas (see map in Annex IV). Initial site topographic assessments conducted by IWMA team indicate that such site may have potential for the development of a sanitary landfill. However, it is located on the western end of the Samaná Peninsula, which thwarts accessibility to those in the eastern end of Samaná Province such as Las Galeras and Samaná.

**El Limon Landfill** - The potential site is adjacent to the existing dump in El Limon, which is located west of the center of town (see map in Annex IV). Initial site topographic assessments conducted by the IWMA team indicate potential for the development of a sanitary landfill. Additionally, this site is centrally located, offering a disposal solution to the entire Province of Samaná.

### 3.3 Waste Collection/Recycling System

Waste collection in the Province of Samaná varies depending on the municipality. Samaná and Sanchez have covered, older model waste collection trucks and open top dump trucks. The other municipalities rely on a fleet of de-centralized haulers utilizing various sized trucks with flatbeds. These waste collection vehicles travel largely uncovered on both community roads and less populated roads on their way to the landfill, often leaving a trail of waste along the roadside, due to lack of tarping. Waste, including single use plastics, eventually ends up in rivers and streams, in the forest, backyards, on rooftops, alleys, ditches and roadsides.

Recycling or recovery of materials in the Province of Samaná occurs in one of two locations: 1) at the curb (in the case of commercial establishments), or 2) at the dump. When occurring at the curb, waste pickers usually open bags and only take materials that have commodity value, leaving all other waste at the curb. At the landfill, independent waste collectors collect materials atop the landfill. During the assessment team's visit to the four dumps, very few waste pickers were observed because of recent heavy rains. However, the incidence of "independent waste pickers" in Samaná Province is relatively low compared to other, more populated areas of the DR due to limited and difficult access to disposal sites, relative lack of market outlets for recyclables, and low volumes of materials generated. Materials that are currently being recovered include metal, glass bottles (e.g., Presidente Brewery), precious metals found in e-waste, and in limited cases, food waste and organics. The markets for other items including single-use and contaminated plastics and mixed paper, are limited to their reuse potential, or non-existent.

It is important to note that organized collection of residential generated waste is mostly absent throughout the province, largely due to a significant portion of the population being unable to afford such a service and/or being inaccessible to waste collection due to narrow streets and alleys. While this is a common phenomenon in developing economies, there are methods that could be used to expand solid waste and recycling services to a greater portion of the public through the use of small carts and local or neighborhood aggregations points where materials could be sorted and recovered, with the residual waste being picked up and taken to a landfill by the municipality. The relatively high percentage of organic material generated in Samaná represents a significant opportunity to be considered in the scoping of a new SWM system. The use of basic composting techniques, or potentially anaerobic digestion (allowing capture of natural gases emitted by the organic waste) could be used for agricultural purposes, while substantially reducing the amount of waste that would need to be handled at the landfill(s).

### 3.4 Women's Economic Empowerment and Current Opportunities

Women's education level in the DR is higher than that of men's; nevertheless, gender inequality permeates life in the DR. While more women are educated, far fewer work outside the home. This is reflected in the DR's low ranking on UNDP's 2018 Gender Inequality Index (ranked 104 out of 162 countries).<sup>1</sup> Additional gender inequality challenges are presented by gender ideologies, which sources report as revolving around machismo. Machismo, with its stereotyped gender identity of masculine dominance, aggression, and action contrasts with the gender identity for females, who are ideally non-aggressive, serve men, and nurture families.

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<sup>1</sup> In the DR, "24.3 percent of parliamentary seats are held by women, and 58.6 percent of adult women have reached at least a secondary level of education compared to 54.4 percent of their male counterparts. For every 100,000 live births, 92.0 women die from pregnancy related causes; and the adolescent birth rate is 94.3 births per 1,000 women of ages 15-19. Female participation in the labour market is 50.9 percent compared to 77.6 for men."

UNDP Human Development Report 2019:5, [http://hdr.undp.org/sites/all/themes/hdr\\_theme/country-notes/DOM.pdf](http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/DOM.pdf).

In regard to waste management and 3R practices, the DR's social gender dimorphism suggests that women are likely the household members who manage waste and, together with children, might be the primary participants in a recycling program. It also suggests that men should be involved because they exercise a degree of authority over women. Since some women do work outside the home, women might also be potential candidates for jobs at SWM facilities. CCBO recognizes the importance of ensuring that the jobs that women may potentially occupy are not seen as lowering their status even further or as serving solely tourists instead of local Samaná residents.

CCBO can support positive domestic and community dynamics through activities such as recycling programs with participatory education and community mobilization that raises awareness and provides information on how to address gender-based violence (GBV), including what men and boys can do. Activities such as these are critical as the country's gender ideology has helped to fuel the DR's high rate of femicide—which is the leading cause of death for females from 15-49 years old.<sup>2</sup> CCBO will work to avoid encouraging such violence; for example, by being cognizant of not providing jobs exclusively to girls and women, which might be seen as competing with males and consequently put girls and women at risk of male violence.

Other key considerations include Samaná's tourism sector and related community dynamics. Although the DR's economy is largely dependent upon tourism, it is a fraught subject in Samaná and different towns/cities in Samaná have different relationships with the tourist industry. For example, Samaná town has insisted on retaining control of the tourist trade locally, while Las Terrenas has been taken over by the tourist industry and has a large (at least 2,000 people) expatriate population. These dynamics result in differing consumption patterns and resulting waste, as well as vastly different local economies and demographics. In Samaná town, commercial sex work is reportedly almost negligible, while the tourist industry in Las Terrenas, together with the generally low incomes generated by most Dominicans working in tourism there, has spurred a thriving commercial sex sector, where children start in the occupation at an early age and some parents, striving to make ends meet, may strongly urge their young daughters to contribute to the household through commercial sex work. The impact of this on SWM is felt both in the types of waste generated in Las Terrenas, with its population of wealthier expatriates and tourist hotels/resorts; and Samaná, which has fewer resorts and reportedly much less opportunity or willingness at the current time for girls to participate in the commercial sex trade. While new SWM facilities and procedures could provide alternative livelihood for these girls and women, the positions must not, as mentioned earlier, put them at risk.

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<sup>2</sup> "Women's Rights Violations in the Dominican Republic," Latin America Bureau, March 2013. <https://lab.org.uk/dominican-republic-women-continue-to-face-discrimination>

## 4. Recommendations and Next Steps

The goal of a good waste management system is to achieve the 3Rs and convert the resources currently going to disposal to good use, in order to achieve as high of a diversion level as possible. In order to reach a high diversion goal, waste management strategies must consider the entire lifecycle of a product or material. By designing and managing materials with waste management principles in mind, the need for raw material and waste disposal can be reduced as producers are held responsible for their products and packaging, as well as consumers for their conscious purchasing and recycling habits.

Good waste management focuses on a “closed-loop” process where products are designed to be cycled safely back into the economy or environment, with post-consumer waste collected, recycled, and used to make new products. This closed-loop system not only heightens diversion levels but also helps communities achieve a local economy that operates efficiently, sustains good “living wage” jobs, and provides a measure of self-sufficiency. When considering programs and policies to implement, there are upstream (pre-consumption) and downstream (post-consumption) options to consider.

**Upstream options** - These focus on "source reduction," which is the practice of designing, manufacturing, purchasing, or using materials in ways that reduce the amount and/or toxicity of waste created. Source reduction also conserves resources and reduces pollution, including greenhouse gases that contribute to climate change. Upstream strategies include more significant, society-level changes such as extending the lifespan of consumer products, reducing product packaging, and increasing recycled content in products.

The main goals of upstream source reduction are to increase the useful life of consumer products, reduce the amount of waste in products and packaging, increase the recycled content of products and packaging, and make products and packaging more recyclable.

**Downstream options** - These options focus on reuse, recycle, organics diversion, and education. Reusing a product extends its “life” which in turn reduces the amount of raw material needed to be extracted, as well as reduces the amount of waste which eventually may be landfilled. Recycling involves taking a product or material at the end of its useful life and turning it into a usable raw material to make another product. Organics diversion refers to compostable organic material, including grass clippings, yard and food waste, wood, non-recyclable paper, and diverting it from being landfilled. Some examples of programs to increase organics diversion include green waste pick-ups and developing supermarket produce collection and composting. Participatory education involves informing and discussing with the public the importance of reducing waste; collaborating with the population segments most involved in waste to develop the most practical, easiest ways to recycle; and developing tools and resources, such as mobile apps, websites, seminars, courses, paper reminder materials, hotlines, and media so that waste separation is as easy as possible and people are inspired to make a difference.

While closure and mitigation of existing open dumps and the development of a new regional landfill are central to improving the long-term capacity and effectiveness of solid waste and recycling in Samaná, the ability to effectively aggregate and sort materials at an interim site is the most critical short-term need in the region. Under a long-term plan, each of the primary municipalities (hereinafter referred to as “wastesheds,”) should develop local transfer stations where solid waste and recyclables can be aggregated and sorted or recovered. Materials could be more effectively sorted to isolate recyclables with commodities value, items with reuse potential, materials with diversion potential (e.g., organics to compost) and residual waste that must be transported to a sanitary landfill.

In order to “close-the-loop” and increase diversion of solid waste, strategic planning is required for a variety of facilities that will accept, sort, process, transfer, and/or resell the “waste” materials, making them essential in the recovery of various resources currently being landfilled. This includes the procurement of scales (portable and in-ground) for collecting accurate data from new or existing infrastructure. An increase in solid waste infrastructure is critical if supplementary waste reduction programs are to be implemented. Facilities that constitute solid waste infrastructure include:

- **Material recovery facilities (MRFs) and transfer stations<sup>3</sup>** - The use of hand sorting and potentially a variety of automated equipment will make it possible for transfer stations/MRFs to separate recyclables by material type. After materials are separated, they can then be baled for transportation to recyclable processing facilities. Materials must be cleaned (i.e., contaminants removed) and separated in order to be marketable. Transfer stations provide the capability of consolidating non-recyclable materials into high-volume transfer trucks with higher capacities, thus conserving energy and minimizing vehicle trips;
- **Green waste/composting facilities** - Process organic materials by chipping, grinding, and drying (for use as daily cover at the landfill or for composting to create a media for fertilizer production or as a soil amendment); and
- **Construction and demolition recovery facilities (C&D)** - Construction and demolition facilities sort and recycle wood, concrete, drywall, metals, and other recyclables generated by the construction industry. With the use of automated equipment and manual labor, materials are separated into commodity piles providing clean materials for re-use.

Each of these facilities receive ‘waste’ in some form or another, whether it be a transfer station/MRF receiving recyclable materials as part of the waste stream; a C&D facility receiving only C&D debris such as wood, metal, and concrete; or a green waste facility receiving organics for composting. They all play a part in the infrastructure of a good solid waste system and can occur at one or multiple sites. Without a strong infrastructure to support the many stages in the life of a product, waste programs and policies will fall through the cracks and eventually the municipality will be unable to reach its desired diversion goals.

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<sup>3</sup> For the purposes of this report, a TS/MRF is defined as a facility that receives waste, where recyclables are recovered, and residual is placed in transfer trucks for final disposal.

## 4.1 Development of Recycling and Reuse Markets

Recycling and reuse markets for commodities including plastics, metals, glass, and fibers are limited in Samaná Province, in large part, due to the relatively low volumes of material being aggregated. Such markets are substantially driven by economies of scale, meaning that the more volume that can be collectively brokered, the higher the commodity price. The province's ability to aggregate materials at transfer stations and recycling facilities, where materials can be further processed and cleaned up, will increase the market value of certain materials like glass, higher value plastics (i.e., PET, HDPE, and LDPE) and metals. Lower value plastics (i.e., single use and multi-layer film packaging) are unlikely to have a market value beyond landfill cost avoidance (i.e., the cost of landfilling exceeds the value related to reuse). Having the ability to increase volumes of recyclable materials is almost entirely dependent on the ability to aggregate volumes in one or more central areas around the province.

It should be noted that Samaná's distance from the major population center of Santo Domingo, where most commodities would have their highest value, creates challenges due to transportation costs. To the degree that local markets can be developed, the value of the material segregated should increase. For instance, if Samaná collectively could guarantee a weekly or monthly volume of material to a market or individual company looking to increase recyclable content in their packaging products, a more dynamic market environment could be created.

## 4.2 Closure and Mitigation of Open Dumps

The federal government of the DR, through the potential enactment of the Solid Waste Law, is seeking to implement a model utilizing regional landfills throughout the country. While this would be a significant improvement to the current situation where environmentally sound facilities could serve as the destination of municipal solid waste generated in the future, it only represents half of the equation. A plan must be put into place to systematically migrate from the current open dump system to sanitary landfills. Part of that plan must include the closure and environmental mitigation of the legacy dumps, numbering more than 350, throughout the country. Such a plan must be developed by identifying specific watersheds and where municipal solid waste will be transported in the future, while at the same time closing and mitigating existing sites in those specific areas. In the case of Samaná Province, one regional landfill located in either of the two potential sites visited by the IWMA team generally possess the geologic and locational characteristics necessary to serve as the regional site (see Section 4.3). Along with the development of a new site, the five open dumps that CCBO visited, must be closed and mitigated.

## 4.3 Development of a Centrally Located Sanitary Landfill

The siting and development of a centrally located landfill for Samaná Province appears to be the goal of both the Federal Government (as stated in the proposed Solid Waste Management Law) and the collective of municipalities, as stated in CCBO's meeting with the Mayors and FEDOMU. The CCBO

assessment team toured two potential sites in Samaná, one in Las Terrenas and the other in El Limon. Both sites were deemed by the assessment team to have favorable geological characteristics and generally met siting requirements based on location, access, and terrain. Due to the location of the five major population centers in Samaná, one or more of the municipalities would likely incur greater operating costs to transport residual waste.

### *Disposal Site Funding Considerations*

The cost of development of a new landfill must also be combined with the cost to close and mitigate the current open dump sites. This type of process took place in the United States over several years following the passage of the Resource Conservation and Recovery Act (RCRA) in 1976. This was the first legislation that regulated waste and how it could be disposed. Over the years that followed, unlined landfills and open dumps needed to be phased out, through closure and mitigation, with those same watersheds being transitioned to a modern lined landfill with a number of minimum environmental health and safety standards, including but not limited to: landfill gas recovery, leachate collection and recirculation, minimum air quality standards, alternative daily cover of materials disposed, stormwater and runoff management and composite liners to prevent groundwater contamination. Tipping fees at new landfills constructed typically include the cost of development, ongoing operating costs (e.g., labor, equipment, etc.), with the additional environmental cost of closing and mitigating legacy landfills added on to the base cost per ton. As a result, rate design becomes a very important part of developing such an integrated system. Rate design methodology can also be used effectively to balance differential transportation fees among the municipalities in a more equitable manner (e.g., using combined transport and disposal cost) in projections and actual operating charges and tipping fees.

In order to attract private sector financing for waste infrastructure, including a regional landfill, financial projections will need to be inclusive of all development capital costs, as well as reasonable ongoing operating cost projections expressed on a per metric ton basis. Development capital costs may include but are not limited to land acquisition, siting and permitting, cell layout and design, and construction costs (inclusive of access roads and necessary utilities). The initial capital outlay may generally be funded by commercial or development bank funds of up to 60% leverage, with the remainder comprised of equity investment from an ownership group. Such arrangements, regardless of structure, would require tonnage guarantees of annual flow of material to the site over the projected life of the landfill (e.g., 20 or more years). The ongoing operating costs, including the debt coverage, would be funded by the per metric ton tipping fee paid for waste transported to the landfill.

## **4.4 Siting of Municipal Level Transfer Stations**

The implementation of a series of strategically located facilities would serve a variety of needs critical to a long-term sustainable solid waste and recycling system in Samaná, including: 1) creating a number of new, living wage jobs, under safe working conditions, at the local level; 2) enabling greater separation and improving the quantity and quality of commodities to gain higher market value; 3) the economy of scale necessary for each municipality to control its own destiny relative to long-term waste handling and

community education; 4) the ability to develop alternative markets for recoverable materials, and; 5) minimizing the amount of material and cost [associated with transportation and disposal] while saving valuable space at a new landfill.

## 4.5 Roadside Litter Removal

Litter on the highways in Samaná Province is significant and is among the first notable aspects to visitors in the area. According to *Dominicana Limpia*, the federal government is responsible for litter control on the highways throughout the DR. The Province should consider taking on this responsibility as a measure to provide a more environmentally friendly visual presentation. CCBO recommends initiating a program of highway (milepost) sponsorship (e.g. “Adopt a Highway”), where local businesses take responsibility for litter removal and control of certain portions of the highway system. Potential sponsors may include local businesses, particularly the tourism and hospitality industry. Samaná Province should also strongly consider financial sanctions related to litter as a deterrent for both locals and visitors to the region. Finally, the Province must investigate mandates related to tarping of vehicles hauling solid waste, which would go a long way toward improving the visual impact of the highways.

## 4.6 Social and Behavior Change

In Samaná, as in many other island nations, it is crucial that the local population understand and accept that good solid waste practices are as much or more for benefitting the local population and their communities as they are for improving the scenery that benefits the tourism sector. Formative research can be completed, conducted by local organizations/grantees, to inform how to approach this issue, identify key communities, how to best access them, and relevant community attributes.

Following, CCBO recommends a social and behavior change strategy be developed and vetted amongst a wide group of stakeholders, with local organizations and grantees supporting specific elements of the strategy. The strategy should outline ways, based on the research, to promote 3R practices and support enhanced SWM, for example by making recycling as easy as possible for community members (e.g., by placing trash bins and aggregation points in convenient locations), or working with grantees, municipal government, and schools to develop community mobilization/participatory education programs and events (e.g., a teach-in for local residents on the environment and SWM; neighborhood clean ups; school curricula; student essay contests on SWM). Participant group materials should be developed to discourage littering and encourage recycling and taking charge of neighborhood cleanliness. These may include reminder materials and resources on how to recycle, and perhaps a hotline for recycling questions or complaints about service. As noted in Section 3.4, participatory education and events should include components that raise awareness of key community issues, including GBV and what to do about it, as feasible.



## 4.7 Roadmap for Local Implementation of National Solid Waste Management Law

Following the formal passage of the DR's National Solid Waste Management Law, CCBO and its team of local consultants and advisors will provide support for effective implementation of the new law in Samaná Province, including through the development of relevant additional actions and timelines. In collaboration with local DR and Samaná public officials and program advisors, CCBO will outline the next steps associated with implementing the law, consistent with the legal framework, and formulate an implementation plan. Once provincial consensus and buy-in is obtained, CCBO will assist local authorities to implement the plan, using capacity building and social and behavior change principles. CCBO's focus in Year I will be to develop a reasonable path forward for a long-term Solid Waste Management Plan for Samaná, which will include providing support for the formalization of local policy to support future private sector engagement in enhanced solid waste management infrastructure.

## 5. Additional Information and Data Needs

The IWMA provides a snapshot of current challenges and recommended solutions for the purposes of programmatic planning, however additional information and data is required to conduct a more detailed waste management assessment that more fully assesses existing waste generation, recycling, and final disposal. Additional data needs will be determined by the activities proposed and approved in the DR Year One Work Plan, and may include:

- Up-to-date (most recent) **population numbers** for the entire Province of Samaná, including those in each municipality, municipal district, or any other area of the Samaná Peninsula
- Information on **seasonal population fluctuations**, if significant
- Total **metric tons disposed at open dumps** (annually) and annual estimate of per person waste generation (in kilograms)
- Estimated **waste generated (in tons) by key commercial/industrial actors** and classifications of types of waste produced
- **Socioeconomic demographics** of independent waste collectors and others working in the sector
- Approximate **number of hotel rooms and associated occupancy rates** and seasonal fluctuations, if significant
- Estimated **total number of cruise ships and associated passengers** expected to partake in land-based trips or excursions
- Estimated waste in-place (in metric tons) calculations to assess proper closure of dump sites
- Site-specific (Las Terrenas and El Limon) topographic and highway maps to evaluate more fully the potential waste capacity, geologic characteristics, access requirements, and estimated cost of infrastructure development
- Information to support social and behavior change strategy development, including information on **household level waste management roles** across varying ethnicities and social classes (who is responsible, what are their tasks, and the reasons for this division of labor)

Upon beginning implementation, CCBO will also begin collecting data as outlined in its programmatic Monitoring Evaluation and Learning (MEL) Plan, which includes performance indicators to measure the program's global and country-specific progress.

## Annex I. List of Organizations and Stakeholders Consulted

### USAID

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### DR Ministry of the Environment and Natural Resources

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Ministry of the Environment and Natural Resources  
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### Samaná Province

*Town Mayors from Las Terrenas,  
Las Galeras, and Samaná*

*Municipal District Mayors from Arroyo Barril, El  
Limon, and Sanchez*

Yocasta Green  
Provincial Director of the Environment in the  
Municipality of Samaná

**Federación Dominicana de Municipios (FEDOMU)**

Angel Mercedes, Federación Dominicana de Municipios (FEDOMU)

**Dominicana Limpia** representatives

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**Private Sector**

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Mariely Ponciano

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Santiago Camarena, Private Sector Investor

Sustainable Living Advocate, Las Terrenas

## Annex II. Glossary of Terms

**Dump or Open Dump** – A facility where waste is disposed by both the public sector and private individuals in an uncontrolled manner. Such sites generally lack even minimal environmental controls and can have a significant negative impact on the local community.

**Landfill** – A landfill typically means that a site has undergone some type of siting process to ensure that its environmental impacts to the community are minimized. Generally, a disposal site falling into this category involves the excavation of land to create a “cell” and the garbage is covered with soil on a regular basis to minimize odors and vectors. However, it may or may not include modern environmental controls such as methane and leachate collection systems, proper drainage for stormwater run-off and other controls. Minimal equipment is on site to compact the waste to preserve the capacity of the site.

**Sanitary Landfill** – A sanitary landfill is typically an engineered facility built to accommodate known or projected wastestreams over a long-term horizon. A site of this variety typically goes through a rigorous siting and environmental impact process, before being designed and constructed by engineering and solid waste professionals. A sanitary landfill has environmental systems in place to control methane and other air emissions, leachate, stormwater run-off and daily cover material and includes monitoring systems to maintain metrics for operating and reporting requirements. Such facilities are operated with modern equipment, including compaction of the waste to optimize the available “airspace” based on a “fill plan” or “fill sequence that places an economic value on the airspace.

**Transfer Station** – For the purposes of this document a transfer station is a facility where waste is aggregated by both the public sector and private individuals (self-haul) in a controlled manner. Materials separation occurs utilizing manual labor and automated equipment if possible. Recyclables are baled and sent to market. Residual waste is then transferred into larger vehicles and taken to a landfill for final disposal. This may include multiple streams including commercial and residential waste, recyclables, organics, and construction and demolitions debris. As used in this assessment, it is comparable to the term materials recovery facility (MRF).

**Wastesheds** – Areas where waste is produced, managed, and recovered/discarded.

# Annex III. Supporting Photographs from Site Visits

## Las Terrenas Open Dump





El Limon Open Dump





Samaná Open Dump



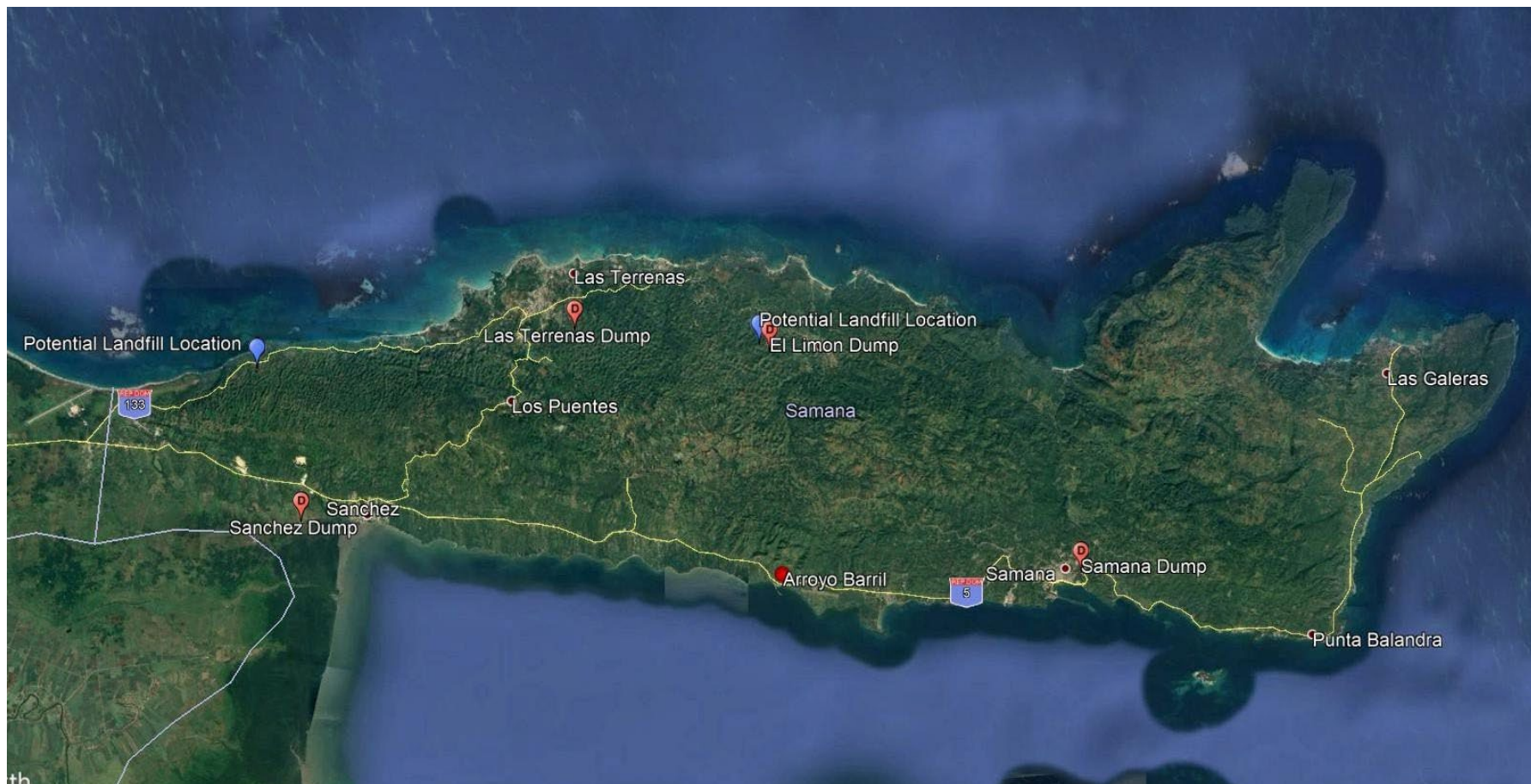
Sanchez Open Dump



Litter Observed in Road and Waterways



## Annex IV. Samaná Province Map



Base Map Source: Google Earth, February 2020

# Annex V. Dominicana Limpia Siting Report

**Source: Dominicana Limpia, conducted October 2019**

*Translation provided by CCBO, January 2020*

Technical Report

Unit - Municipal Management Directive

On October 16, 2019, a technical commission composed of the aforementioned team, headed to the municipality of Las Terrenas, Samaná, where it was received by the Mayor, Mr. Alex García, the Chairman of the Board of Vecinos El Paraíso de Eva, Mr. Felipe Luna, the Vice President of the Board of Vecinos de La Granja, Mr. Willie Roque and Mr. Jesus Iturralde, representatives of the Samaná Smiles Foundation, SSF.

**Objective of the Visit** - Take a tour throughout the municipality of Las Terrenas, to identify a possible plot of land, which would serve to move the current landfill, as the members of the different Boards of Vecinos of the municipality had several places previously identified. The survey was carried out in each of the proposed places in order to evaluate its potential to function properly as a site of final disposal and compliance with the minimum requirements required by current environmental laws.

**Situation Found** - Four possible locations were proposed, the first of which was located in La Granja's sector, near the location of the current landfill. It has approximately 136 land tasks and has a direct access road. According to the representatives of the Boards of Vecinos, the responsible party for the sale of it is the licensed Pichardo. The area of this land is very regular and of flat and little rugged morphology. It is located in the coordinates Latitude 19.293965, 19 17 38.27"N, Longitude 69.526188, 69 31 34.28 O.

The second proposed plot land is approximately 5 km ahead of the previous one, continuing along the same access road. This has approximately 326 terrain tasks. The responsible party for the sale of the land are the same owners, the Martinez family. The area of this plot of land is more rugged in its morphology, sometimes having slopes of approximately 60° inclination, which made it very difficult for us to make the route within the terrain, so the commission had to use animals as transport (horses) to explore all the terrain. It is located at coordinates Latitude 19.296437 19 17 47.17"N, Longitude 69.493270 69 29 35.77"O.

The third proposed plot of land is located in the section of Monte Negro, entering through the Atlantic Boulevard, at a distance of 6 km inward. This land has 300 tasks of area. The responsible person for the sale of it is Mr. Carmelo (son of the Owner). This land has two access roads. The area is shown with a uniform and unruddged morphology, but it must be noted that after that 6 km inward, at the end of it is where the area available for the final arrangement begins, the road needs a total conditioning, since it is in very precarious conditions for access in vehicles. It is located in the coordinates, Latitude 19.281232, 19 16.52.43" N, Longitude 69.486957, 69 29.13.04" O.

The fourth proposed plot land is located in the Yakeson area, loma del Burro, the Majagua, Samaná section, 12 km from the Atlantic Boulevard. The entrance of the access road is on the same boulevard and the land in question is approximately 500 meters from a road in good condition. The area of the land is 239,000.52 square meters. The plot of

land is not sold in its entirety, but a total of 113,220 square meters are available for sale. There is no body of water in the terrain nor the buffers where the project is intended to be carried out. The tour was made with the accompaniment of representatives of the Samaná Smiles Foundation and the owner of the land, Mr. Enrique Fermín.

**Recommendation and Conclusion** - After evaluating the four proposed plots of land proposed by the owner of the plots and the communities, represented by the presidents of Board of Vecinos de la Granja and El Paraíso de Eva, we understand that there are two possible potential options:

1. Even though it is 5 km inward from the boulevard, the third plot of land has favorable conditions, taking into account that the access road has at first some kind of structural condition that facilitates transport to the place, although after several kilometers, the conditions vary and there is greater difficulty of access to the road, but in short it was possible to verify that there are no bodies of water and it is about 5 km from the nearest villages.
2. The fourth and last plot of land visited is the one that presents the most conditions, since it is 5 km away from the area of Majagual and also about 12 km from the terrain, has a path in very good condition and does not have bodies of water either inside or in the buffer.