Federal Ministry
for the Environment, Climate Action,
Nature Conservation and Nuclear Safety

BASELINE WASTE CHARACTERIZATION STUDY

COLLEGE STREET AND WESTBOURNE GHAUTS BASSETERRE, ST. KITTS

FEBRUARY 2026

ON BEHALF OF THE CLARENCE FITZROY BRYANT COLLEGE (CFBC)

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Department of Environment

Dedication

This report is dedicated to the memory of Dr. Leighton Naraine, the original Project Implementation Lead for the PROMAR initiative in Saint Kitts and Nevis, whose leadership and foresight were instrumental in initiating the national marine litter monitoring programme. His dedication to environmental protection and institutional development laid the groundwork upon which this baseline assessment was built. His legacy continues to guide the advancement of marine litter prevention efforts in the Federation.

Imprint

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The project team expresses its sincere gratitude to all participants, partner institutions, and supporting agencies for their valuable contributions and collaboration. Their technical support, institutional cooperation, and commitment were instrumental in the successful completion of this baseline waste characterisation study under the PROMAR initiative in Saint Kitts and Nevis.

Photo credits: PROMAR (CFBC)

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Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety

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The project team expresses its sincere appreciation to the St. Kitts Solid Waste Management Corporation for its collaboration, technical guidance, and continued institutional support throughout the implementation of the baseline monitoring activities. Special recognition is extended to the Department of Environment for its leadership in national policy coordination, government engagement, and institutional alignment in support of the PROMAR initiative. Their role has been essential in ensuring that the baseline monitoring framework contributes to national environmental policy development and the advancement of marine litter prevention and circular economy objectives in Saint Kitts and Nevis.

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1. Introduction

1.1 Marine Litter Context (Global and Regional)

Marine ecosystems provide essential ecological, economic, and social services, including food security, coastal protection, tourism, and livelihoods. These systems are increasingly threatened by marine litter, particularly plastic pollution, which has emerged as one of the most pervasive and persistent environmental challenges globally. Plastic debris is now found across all marine compartments - from surface waters and shorelines to sediments and deep-sea environments- posing risks to biodiversity, human health, and economic activity.

A significant proportion of marine plastic pollution originates from land-based sources, especially in coastal and river-adjacent urban areas. In Small Island Developing States (SIDS), such as those in the Caribbean, the proximity of settlements, markets, and transport infrastructure to coastlines and drainage systems increases the likelihood of plastic leakage into the marine environment. Single-use plastic packaging associated with food, beverages, and everyday consumer activities has been consistently identified as a dominant component of coastal and marine litter in the region.

Within the Caribbean context, ghauts and drainage channels function as direct conduits between inland human activity and the coastal zone. During rainfall events, accumulated waste can be mobilised through these channels, while during dry conditions, wind, pedestrian movement, and tidal action can redistribute lightweight plastic items toward shoreline outlets. Understanding these dynamics is essential for designing effective waste prevention and circular economy interventions.

1.2 PROMAR Context and Relevance to St. Kitts and Nevis

The *Prevention of Marine Litter in the Caribbean Sea (PROMAR)* project is a regional initiative funded by the German Federal Ministry for the Environment (BMUKN) and led by adelphi and the United Nations Environment Programme (UNEP) Cartagena Convention Secretariat. PROMAR seeks to reduce marine litter by addressing upstream sources of plastic waste, strengthening monitoring systems, piloting circular economy solutions, supporting policy dialogue, and raising stakeholder awareness.

PROMAR Phase II (2024–2026) focuses on implementation in selected Caribbean countries, including Saint Kitts and Nevis. The Federation's urban coastal configuration, reliance on marine and coastal ecosystems, and concentration of economic activity along the shoreline make it a relevant and informative case for baseline waste characterisation and intervention testing.

Within this framework, Saint Kitts and Nevis is implementing activities under four interlinked work packages:

WP I: Waste stream monitoring and baseline assessment

WP II: Testing and replication of circular economy solutions

WP III: Policy dialogue and extended producer responsibility

WP IV: Stakeholder engagement and awareness

The present study contributes directly to **WP I**, while providing the evidence base required to inform **WP II** interventions.

1.3 Purpose and Scope of the Baseline Assessment

The purpose of this baseline assessment is to **characterise the quantity, composition, and variability of plastic and other solid waste accumulating at selected ghaut outlets along the Basseterre bayfront.** Rather than producing a single-point estimate, the baseline is intended to capture **event-level variability**, including the influence of weather conditions and short-term anomalies.

This baseline serves three core functions:

- Establishing a **reference condition** against which future monitoring results can be compared;
- Identifying **dominant waste categories and pathways** relevant to intervention design; and

- Supporting evidence-based decision-making for **circular economy pilots under PROMAR WP II**.

The baseline should therefore be interpreted as a dynamic reference framework, expected to be refined through additional sampling and contextual data collection.

2. Methodology

2.1 Site Selection

Sampling sites were selected at the bayfront outlets of two major ghauts in central Basseterre: **Westbourne Street Ghaut** and **College Street Ghaut**. These locations were chosen based on their direct discharge into the coastal environment, proximity to dense urban activity, and accessibility for repeated monitoring.

The surrounding land uses include markets, food vending areas, residential dwellings, transport hubs, small retail establishments, and marine activity zones. This combination of uses creates multiple potential sources of plastic waste and makes the sites representative of urban coastal litter dynamics in Saint Kitts and Nevis.

Image 1: Mouth of Westbourne Ghaut on the Bay Road

Image 2: Mouth of College Street Ghaut on the Bay Road

2.2 Study Area Delineation

The monitored study area comprised two rectangular bayfront sections located at the seaward ends of the selected ghauts. Area dimensions were measured in the field and verified using satellite imagery.

- **Area 1 (Westbourne Street Ghaut):** 60 ft × 90 ft (18.29 m × 27.43 m), area = 501.7 m²
- **Area 2 (College Street Ghaut):** 75 ft × 140 ft (22.86 m × 42.67 m), area = 975.5 m²

The total monitored sampling area was therefore **1,477.2 m²**. Fixed spatial boundaries were maintained across all sampling events to ensure comparability.

2.3 Sampling Schedule and Conditions

Five shoreline plastic-litter sampling events were conducted between September and November 2025. Sampling dates were selected to capture variability across both **sunny and rainy conditions**, recognising the role of runoff and drainage flow in transporting waste through ghauts.

Sampling events were conducted as follows:

- Sample #1: 8 September 2025 (Sunny)
- Sample #2: 13 October 2025 (Rainy)
- Sample #3: 16 October 2025 (Rainy)
- Sample #4: 6 November 2025 (Sunny)
- Sample #5: 17 November 2025 (Sunny)

Weather conditions at the time of sampling were recorded and used as an explanatory variable during analysis.

2.4 Waste Collection and Sorting Procedure

During each sampling event, all visible waste items within the defined study areas were collected manually. The focus was on **inorganic waste**, particularly plastics, while organic materials such as vegetation, driftwood, and natural debris were excluded unless clearly associated with anthropogenic activity.

Collected items were sorted on-site into predefined material categories consistent with PROMAR protocols, including:

- Plastic (Consumption-related)
- Plastic (Everyday use)
- Plastic (Particulate)
- Paper and cardboard
- Glass
- Metal
- Other materials, where applicable

Each category was recorded by **item count** and **weight**. Items containing liquids were emptied prior to weighing, and visibly muddy items were cleaned where feasible to reduce measurement distortion.

Image 3: CFBC staff and students sorting waste at landfill

2.5 Data Recording and Analytical Approach

Data was recorded using standardised PROMAR sampling templates and compiled for analysis using spreadsheet-based tools. Descriptive statistics were used to characterise baseline conditions, including totals, proportions, and distribution summaries (minimum, quartiles, median, maximum, mean, and standard deviation).

Analyses were conducted both at the **event level** and across the combined dataset to assess variability and identify dominant waste profiles.

Image 4: Categorization of waste

2.6 Clean Coast Index (CCI)

A plastic-based **Clean Coast Index (CCI)** was calculated for each sampling event to provide a standardised indicator of shoreline cleanliness. Following Alkalay et al. (2007), the CCI was computed using plastic item density within the monitored area and scaled by a factor of 20 for interpretability.

CCI values were classified using established cleanliness categories ranging from "very clean" to "very dirty." The CCI was used as a comparative indicator across events rather than as a standalone measure of environmental quality.

2.7 Brand Identification Protocol

Brand identification was incorporated into the sampling protocol from Sample #4 onward. Only items with clearly identifiable and legible branding were recorded. Brand-mark data were treated as **indicative rather than representative**, recognising that a substantial proportion of plastic items are degraded, fragmented, or unbranded.

3. Data Analysis

Five shoreline plastic-litter sampling events were analysed for two bay-front ghaut mouths in Basseterre, St. Kitts (Samples #1 – #5: 8 September, 13 October, 16 October, 6 November and 17 November 2025).

The combined sampling area was calculated from two rectangular bay-front sections:

- Area 1 – end of Westbourne Street Ghaut (60 ft × 90 ft), and
- Area 2 – end of College Street Ghaut (75 ft × 140 ft)

The Google Map image (***Figure 1***) below illustrates the sample area for the 2 marked regions.

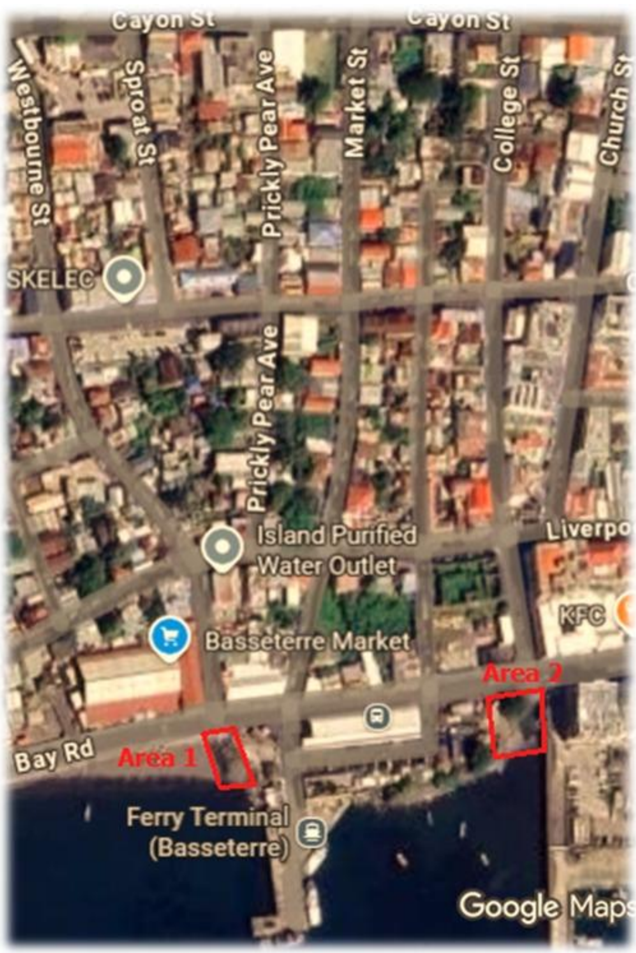

Image 5: Aerial View of sampled areas in the Port Zante Marina region

Using 1 ft = 0.3048 m, these dimensions convert to 18.29 m × 27.43 m (Area 1 = 501.7 m²) and 22.86 m × 42.67 m (Area 2 = 975.5 m²), respectively. The total monitored sampling area was therefore 1477.2 m².

The analysis used descriptive statistics to characterise baseline conditions, including totals, proportions (% by count and by weight), and distribution summaries (minimum, quartiles, median, maximum, mean and standard deviation). Results were also contrasted by recorded weather conditions (sunny vs rainy) because runoff and flow conditions are expected to influence the quantity and type of items transported through ghauts.

A plastic-based Clean Coast Index (CCI) was computed to provide a standardised indicator of litter density and beach cleanliness. Following Alkalay et al. (2007), *CCI* was calculated as: $CCI = plastic\ items\ per\ m^2 \times 20$, where $plastic\ items\ per\ m^2 = \frac{items\ counted}{total\ sampling\ area}$. The *CCI* scale was interpreted using the categories outlined in ***Table 1***.

Levels of Cleanliness in the Coastal Region	(1) Very clean No plastic waste is observed in the coastal region	(2) Clean Plastic waste is observed in only 10% of the coastal region	(3) Moderate Plastic waste is observed in only half of the coastal region	(4) Dirty Plastic waste is observed in only 80% of the coastal region	(5) Very dirty Plastic waste is observed covering over 80% of the coastal region
Clean Coast Index (*CCI*)	$0 \leq CCI < 2$	$2 \leq CCI < 5$	$5 \leq CCI < 10$	$10 \leq CCI < 20$	$CCI \geq 20$

Table 1: ***CCI Categories of Coastal Cleanliness***

Brand identification analysis was restricted to Samples #4 and #5 only, as brand-mark recording was implemented in those two collections. Brand results were treated as indicative (i.e., based on items with identifiable marks) rather than representative of all items collected.

4. Results

4.1 Summary of sampling events

Across all five sampling events, a total of 4,532 items were recorded with a combined measured weight of 232.062 lb (105,26 kg). ***Table 2*** summarises the event-level totals, including the proportion of plastics by count and by weight.

Sample	Date	Weather	Total items	Total weight (lb)	Plastic items	Plastic weight (lb)	Plastic share (count, %)	Plastic share (weight, %)
1	2025-09-08	Sunny	1015	85.625	1015	85.625	100.0	100.0
2	2025-10-13	Rainy	115	27.125	115	27.125	100.0	100.0
3	2025-10-16	Rainy	1100	29.062	1100	29.062	100.0	100.0
4	2025-11-06	Sunny	811	35.000	806	33.750	99.4	96.4
5	2025-11-17	Sunny	1491	55.250	1389	30.750	93.2	55.7

Table 2: ***Summary of sampling events***

4.2 Composition of collected waste (all samples combined)

Across the five events, plastics dominated the waste stream by count, with “Pl. (Consumption)” accounting for the largest share of items (see ***Table 3***). By weight, the leading contributors were “Pl. (Consumption)” and “Pl. (Everyday use)”, indicating that heavier plastic objects (e.g., bottles and household items) accounted for a substantial portion of mass even when counts were lower.

Material	Quantity	Weight	Share of items (%)	Share of weight (%)
Pl. (Consumption)	4122	116.000	91.0	50.0
Pl. (Everyday use)	219	84.062	4.8	36.2
Paper and cardboard	86	11.750	1.9	5.1
Pl. Particulate	84	6.250	1.9	2.7
Glass	12	11.000	0.3	4.7
Metal	9	3.000	0.2	1.3

Table 3: ***Distribution of collected materials***

4.3 Distribution of event totals (baseline variability)

The event totals varied substantially, reflecting day-to-day conditions (including weather) and indicating that a larger number of sampling events (≥8) would provide a more stable baseline estimate. ***Table 4*** presents the distribution summaries corresponding to box-and-whisker plot statistics (min, Q1, median, Q3, max) alongside mean and standard deviation.

Metric	n	Min	Q1	Median	Q3	Max	Mean	SD
Total items per event	5	115.000	811.000	1015.000	1100.000	1491.000	906.400	506.569
Total weight (lb) per event	5	27.125	29.062	35.000	55.250	85.625	46.413	24.592
CCI (plastic-based) per event	5	1.557	10.913	13.743	14.893	18.806	11.982	6.480

Table 4: ***Distribution summaries of count, weight and CCI***

4.4 Clean Coast Index (plastic-based)

Using the combined monitored area of 1477.2 m², the plastic-item density and CCI were computed for each event (***Table 5***). Across five events, four samples fell within the "dirty" category (CCI between 10 and 20), while one event (Sample #2) fell within the "very clean" category. This pattern illustrates that baseline cleanliness is not constant and supports the need for additional samples to improve baseline precision.

Sample	Plastic items	Density (items/m²)	CCI	CCI class
1	1015	$\frac{1015}{1477.2}$ = **0.687**	0.687 × 20 = **13.74**	Dirty
2	115	**0.078**	**1.56**	Very clean
3	1100	**0.745**	**14.89**	Dirty
4	806	**0.546**	**10.91**	Dirty
5	1389	**0.940**	**18.81**	Dirty

Table 5: ***Plastic-item density and CCI across sampling events***

4.5 Brand identification (Samples #4 and #5 only)

Brand-mark analysis was completed only for Samples #4 and #5. In Sample #4, 143 items had identifiable marks, yielding 33 identified brands. In Sample #5, 148 items had identifiable marks, yielding 22 identified brands. ***Figure 1*** and ***Figure 2*** illustrate the top ten brands by item count for each of these two samples.

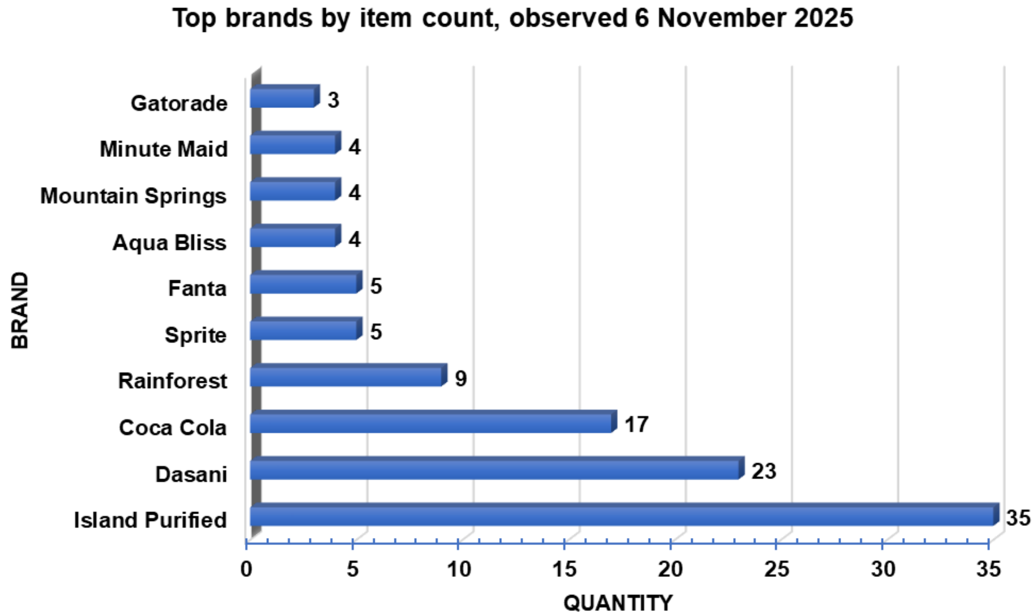

Table 6*: Top brands by item count (items with identifiable marks) in Sample #4*

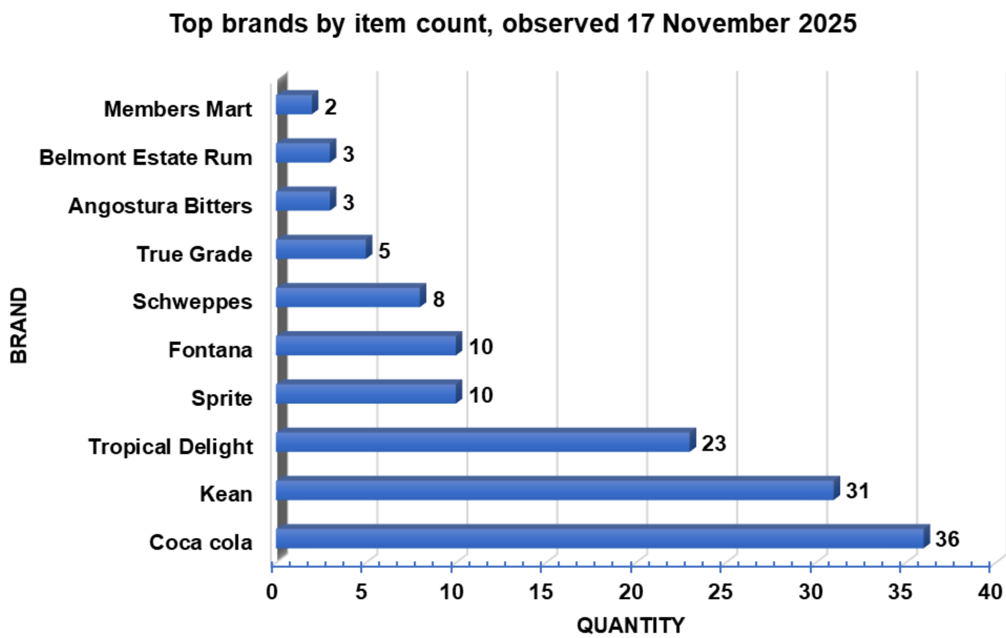

Table 7*: Top brands by item count (items with identifiable marks) in Sample #5*

5. Discussion

Five sampling events (Samples #1 to #5) were completed at the two bayfront ghaut outlets in Basseterre. Across these events, 4,532 items were recorded with a combined measured weight of 232.062 lbs over a combined sampling area of approximately 1,477.2 m². This section interprets the observed patterns, compares events, identifies anomalies, and outlines plausible factors.

5.1 Event-to-event variability and outliers

Totals varied substantially across events. Total items ranged from 115 (Sample #2) to 1,491 (Sample #5), while total weight ranged from 27.12 lb (Sample #2) to 85.62 lb (Sample #1). These spread supports treating the baseline as a set of values with spread and extremes, not a single-value best estimate, (OSPAR Commission CEMP Guidelines for Marine Monitoring and Assessment of Beach Litter (OSPAR Agreement 2020-02), updated 2025).

Item counts and weight do not move together perfectly. Sample #1 shows the highest total weight, consistent with bulky items being recorded, whereas Sample #3 shows a high item count with comparatively low weight, suggesting the presence of many small and lightweight items. This is typical where the litter stream contains both high-volume small packaging and occasional large objects, (Smith & Turrell, 2021).

5.2 Material profile: count-dominant versus weight-dominant categories

Pl. (Consumption) accounted for 4,122 items (91.0% of all items) and 116.00 lb (50.0% of total weight), indicating that frequent, small consumer packaging forms the primary baseline signal. Pl. (Everyday use) contributed 219 items (4.8%) but 84.06 lb (36.2%), showing that less frequent, bulkier items can dominate weight totals. Pl. Particulate contributed 84 items (1.9%) and 6.25 lb (2.7%), consistent with episodic fragmentation or mobilisation of small fragments during certain conditions such as storms, high-energy wave events, or increased runoff, (van Franeker et al., 2021).

Non-plastic materials were recorded mainly in Sample #5 (paper/cardboard and glass). While non-plastics represent a small portion of total items, they can materially influence event weights when present. This reinforces the need to report both counts and weights.

5.3 Weather-linked contrasts and transport mechanisms

In this dataset, sunny events ($n = 3$) summed to 3,317 items and 175.88 lb (mean 1105.7 items and 58.62 lb per event). Rainy events ($n = 2$) summed to 1,215 items and 56.19 lb (mean 607.5 items and 28.09 lb per event). With only five events, weather contrasts are indicative rather than definitive, but rainfall remains a plausible driver of short-term delivery through ghauts.

Two mechanisms can act together at ghaut outlets: (i) delivery via stormwater wash-off and channel transport during rainfall, (Schwenk et al., 2025) and (ii) local retention and re-distribution driven by wind, tides, and nearshore circulation, (Schreyers et al., 2024). These mechanisms can explain high counts with low weight in some events and elevated weight due to a few bulky objects in others.

5.4 Plastic density and Clean Coast Index interpretation for baseline monitoring

Plastic item density standardises results to the measured sampling area. Using the Clean Coast Index approach ($CCI = 20\ x\ plastic\ items\ per\ m^2$), four events fall within the 'Dirty' class. Sample #2 exhibits markedly lower litter density and was classified as "very clean" relative to the other sampling events. Enquiries with the St. Kitts Solid Waste Management Corporation confirmed that no targeted clean-up activity occurred in the period immediately preceding this sampling event. At present, no identifiable environmental, operational, or management variable can be conclusively linked to this anomaly. The result is therefore retained as a valid observation and treated as an outlier pending further sampling and contextual data.

5.5 Brand identification results and limitations (Samples #4 and #5 only)

Brand identification was recorded only in Samples #4 and #5. Marked items represented 17.6% of items in Sample #4 and 9.9% in Sample #5. In both samples, the marked subset was concentrated, with the five most common brands representing approximately 62.2% of marked items in Sample #4 and 74.3% in Sample #5 (See ***Table 6***).

Sample	Items with marks	% marked	Brands identified	Top 5 share of marked (%)	Top 3 brands (count)
#4	143	17.6%	33	62.2%	Island Purified (35), Dasani (23), Coca Cola (17)
#5	148	9.9%	22	74.3%	Coca Cola (36), Kean (31), Tropical Delight (23)

Table 8: *Brand identification summary (Samples #4 and #5 only)*

Brand-mark results are informative for stakeholder engagement but are not equivalent to the full litter stream because many items are unmarked, degraded, or too fragmented to attribute. Brand results should therefore be treated as indicative and expanded to additional events if brand attribution is expected to inform interventions.

5.6 Plausible drivers of the observed profile at the bayfront outlets

The dominance of Pl. (Consumption) is consistent with routine food-and-beverage activity at a high-use waterfront, (UNEP, 2021). Frequent leakage of small packaging can occur through inadequate containment at activity nodes, littering or overflow from bins, and transport through ghauts during run-off events, (Emmerik & Schwarz, 2019). The contribution of bulky items to high weight in Sample #1 is consistent with episodic dumping or mobilisation of larger household items from within the drainage network.

Sample #5 is notable for a higher contribution of non-plastic weight (paper/cardboard and glass), consistent with event-specific inputs such as beverage-related discards, breakage, or dumping. Differences in timing relative to clean-ups, tidal stage, and rainfall intensity are plausible drivers of between-event differences.

5.7 Recommendations to strengthen interpretation for the baseline-to-follow-up comparison

Additional sampling events (targeting eight or more) should be completed under a range of conditions to stabilise estimates and reduce the influence of one-day anomalies. Field metadata should be recorded consistently for each event (e.g., rainfall in the preceding 24-72 hours, wind conditions, tidal stage, and whether the area was cleaned shortly before sampling). Spreadsheet calculations should be checked to ensure that top-item summaries and weight tables are complete and free of reference errors. Where bulky non-plastic items are encountered, material categorisation should be verified to reduce the risk of misclassification affecting weight-based conclusions.

5.8 Site Context and Limitations

The Westbourne Ghaut and College Street Ghaut outlets discharge into a highly active urban bayfront environment in central Basseterre. Within approximately 200 metres of the sampling areas are multiple land uses, including a vegetable market, fish vending adjacent to the Westbourne Ghaut mouth, residential dwellings, bus and ferry terminals, bars and eateries (including fast-food outlets), small supermarkets, informal vendors, car parking areas, and embarkation points for recreational vessels. This concentration of commercial, transport, residential, and informal activities creates multiple and overlapping pathways for plastic waste generation and leakage into the marine environment, (Masiá et al., 2021).

The physical setting further facilitates transport of litter to the shoreline. Both ghauts function as direct conduits between inland activity areas and the bayfront, with natural land gradients towards sea level enabling movement of lightweight materials by runoff, wind, and gravity. Rainfall events can mobilise accumulated waste from streets, yards, and washing activities higher up the catchment, while wind and pedestrian activity can redistribute litter towards the ghaut mouths even under dry conditions.

Local waste management practices also influence observed accumulation. Insufficient bin provision, bin overflow, informal vending, and a focus on bin emptying rather than systematic manual clean-up of the bayfront contribute to ongoing litter leakage. In addition, bus and ferry hubs and marine recreation may generate waste with limited accountability for disposal.

Several unaccounted variables may affect individual sampling outcomes, including fluctuations in market activity, informal vending intensity, undocumented clean-ups, tidal stage, antecedent rainfall, and short-term behavioural changes. These factors can produce notable event-to-event variability in item counts and weights. However, such variability reflects the real operational complexity of urban coastal systems and does not undermine the study.

Despite these limitations, the site provides a suitable and informative setting for baseline assessment. Fixed sampling locations, recurring litter profiles, and consistent dominance of plastic consumption items indicate structural drivers rather than random effects. The baseline therefore offers a realistic reference against which future interventions and expanded sampling can be evaluated, with additional samples expected to stabilise estimates and strengthen comparative analyses.

Conclusion

This baseline waste characterisation study establishes the first structured and repeatable assessment of plastic waste accumulation at key bayfront ghaut outlets in Basseterre, Saint Kitts and Nevis. The results confirm the consistent presence and transport of plastic waste from inland urban catchments into the coastal environment, with plastic consumption items representing the dominant material category by count and a major contributor to environmental loading.

The observed continuity, composition, and recoverability of plastic waste provide clear evidence of a defined and accessible waste stream. This confirms the technical and operational feasibility of implementing circular economy interventions under PROMAR Work Package II. In response to these findings, efforts are already underway to develop localised material recovery and transformation pathways, including the conversion of recovered plastics into engineered composite materials such as plastic-based panels and structural substitutes, as well as their utilisation as feedstock within a dedicated fabrication laboratory (FabLab) environment. These initiatives are being designed to support practical national needs, including the production of sensory learning tools for neurodiverse students, laboratory implements for secondary schools, and other functional commodities identified through stakeholder engagement, including consultations with members of the Chamber of Commerce.

These circular manufacturing approaches represent a strategic transition from waste disposal to resource utilisation, directly addressing the root causes of plastic leakage while creating new opportunities for local production, educational support, and economic participation.

Under Work Package III, the baseline findings have strengthened national policy engagement and institutional coordination by providing empirical evidence of plastic waste transport pathways and accumulation patterns. This has supported ongoing collaboration with the Department of Environment in its role facilitating policy alignment, government engagement, and the advancement of circular economy and marine litter prevention strategies at the national level.

Under Work Package IV, the baseline monitoring activities have also contributed to increased stakeholder awareness and institutional engagement. The sampling and analysis process has provided practical demonstration of waste leakage dynamics and has supported outreach and dialogue with national partners, educational institutions, and private sector stakeholders. These activities are contributing to the development of a broader national understanding of plastic waste as both an environmental challenge and a recoverable resource.

Collectively, the baseline established through this study provides not only a technical reference condition for future monitoring but also a functional foundation for the implementation of PROMAR Work Packages II, III, and IV. The integration of monitoring, circular material recovery, policy engagement, and stakeholder participation represents a forward-looking approach to marine litter prevention in Saint Kitts and Nevis. This baseline therefore should mark the transition from assessment to implementation, supporting the development of a national circular economy framework.

Recommendations

7.1 Implementation of Plastic Recovery and Circular Manufacturing Systems (Work Package II)

The baseline confirms the presence of a continuous and recoverable plastic waste stream at bayfront ghaut outlets. Based on these findings, priority should be given to establishing structured recovery pathways to redirect plastic waste from the coastal environment into productive reuse.

This includes the development of localised plastic processing and fabrication capacity capable of converting recovered plastics into engineered materials such as composite panels, plastic lumber substitutes, and other structural and functional products. The planned establishment of a dedicated fabrication laboratory (FabLab) will serve as a central facility for material transformation and product development. This facility will support the production of locally needed items, including sensory learning tools for neurodiverse students, laboratory equipment for secondary schools, and other practical commodities aligned with national institutional and private sector needs.

These efforts will enable Saint Kitts and Nevis to transition from a waste disposal model to a circular resource utilisation model, directly reducing marine plastic leakage while supporting national manufacturing and educational infrastructure.

7.2 Expansion of Waste Stream Monitoring to Support Material Recovery Planning (Work Package I and II Integration)

To support circular manufacturing implementation, the baseline monitoring programme should be expanded to include additional sampling events and locations. This will improve the precision of material availability estimates and support operational planning for plastic recovery and processing.

Expanded monitoring will enable improved forecasting of material supply, optimisation of recovery logistics, and enhanced evaluation of intervention effectiveness over time.

7.3 Strengthening Policy Integration and Institutional Alignment (Work Package III)

The baseline findings provide empirical evidence of plastic waste transport pathways and accumulation dynamics within the urban coastal environment. These findings should continue to inform national policy dialogue and support the development of integrated waste management and circular economy frameworks.

Continued coordination with the Department of Environment will be essential to align monitoring, recovery, and manufacturing initiatives with national environmental policy objectives. This includes supporting the development of regulatory frameworks, institutional coordination mechanisms, and policy instruments that facilitate plastic recovery, reuse, and circular material flows.

7.4 Integration of Circular Manufacturing into National Educational and Institutional Systems (Work Package II and IV Integration)

The planned FabLab environment presents an opportunity to integrate circular economy principles into national educational and institutional systems. Recovered plastic materials can be used to produce functional tools, educational aids, and laboratory equipment, supporting national development priorities while demonstrating the practical value of circular manufacturing.

These activities will contribute to strengthening technical capacity, supporting educational institutions, and demonstrating scalable circular economy solutions within the national context.

7.5 Continued Stakeholder Engagement and Private Sector Integration (Work Package IV)

Stakeholder engagement should continue to support the identification of locally relevant product needs and ensure alignment between recovered material supply and national demand. Engagement with the Chamber of Commerce and other institutional partners will help ensure that circular manufacturing outputs address practical needs within education, industry, and public sector operations.

This approach will strengthen national ownership, support economic participation, and enhance the long-term sustainability of circular economy initiatives.

7.6 Installation of Fixed Basket Interception Systems at Ghaut Outlets

Baseline observations confirm that the ghauts in Basseterre function as intermittent drainage channels, conveying waste primarily during rainfall events rather than continuous flow conditions. As such, traditional river interception systems such as floating booms are not suitable for these environments due to their exposure to sudden high-velocity surge flows, structural vulnerability, and visual intrusion within the urban bayfront setting.

Instead, the installation of fixed basket-based interception systems integrated into structural frames secured to the vertical faces of ghaut outlet walls is recommended. These systems would function by capturing and retaining solid waste materials transported during rainfall events while allowing unrestricted water flow.

Basket interception systems offer several advantages within the local context:

- Reduced structural vulnerability during high-flow events, as water can pass through the basket mesh while retaining solid debris;
- Improved durability due to fixed structural mounting and reduced exposure to dynamic loading;
- Minimal visual impact on the coastal environment;
- Ease of maintenance, allowing baskets to be removed, emptied, and replaced periodically;
- Compatibility with intermittent flow conditions characteristic of ghauts.

Recovered materials can then be incorporated into the circular material recovery and fabrication processes being developed under PROMAR Work Package II, supporting the conversion of plastic waste into engineered products and reducing marine litter leakage.

Pilot installation of such systems at priority ghaut outlets is recommended to evaluate operational performance, maintenance requirements, and waste recovery efficiency.

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