

An aerial photograph of a coastal city, likely Nassau, Bahamas. The image shows a harbor with several boats, including a large cruise ship and smaller vessels. The city features prominent blue-roofed buildings and a mix of urban infrastructure. The water is a deep blue, and the sky is clear.

# SUSTAINABLE NASSAU

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EMPOWERED  
PEOPLE,  
REVITALIZED  
CITY

ACTION  
PLAN









# SUSTAINABLE NASSAU

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EMPOWERED PEOPLE,  
REVITALIZED CITY

The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the Inter-American Development Bank, its Board of Directors, or the countries they represent.

ACTION  
PLAN



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# ABOUT THE PLAN

“Sustainable Nassau: Empowered People, Revitalized City” is a plan that links the past and the future for a city of many unexplored opportunities. While this Action Plan offers concrete proposals for future improvements in quality of life across social, economic, and environmental dimensions, it also considers the current and historic challenges faced by a small island developing state in the Latin American and Caribbean region in the 21st century. These challenges range from economic, cultural, and political, to more globalized problems such as natural disasters and climate change. This Action Plan represents the culmination of an intense research and assessment process carried out in collaboration between the Government of The Bahamas and the Inter-American Development Bank (IDB), and in parallel with the development of Vision 2040: The National Development Plan of The Bahamas. Through the IDB’s application of the Emerging and Sustainable Cities (ESC) methodology, these efforts are consolidated in this Action Plan for achieving a more sustainable urban life in the city of Nassau and New Providence Island.

The purpose of disseminating this Action Plan is twofold: (i) to serve as a guide and roadmap for decision-makers to take future actions for urban revitalization which will lead to a clean, green, equitable, and smart city; and (ii) to promote full transparency along the path towards improved urban sustainability and management while fostering greater public support and participation in the process. With the Action Plan made publicly available, citizens can engage in a democratic and open process in which people help guide their city on the road toward a better, safe, and prosperous future for themselves and future generations.

The way ahead is not an easy one for Nassau. The prospect for positive change is great, yet the urban sustainability challenges remain and will require commitment from the government and citizens to be surmounted. This Action Plan serves as a guide through the obstacles ahead and shows how Nassau can grow and flourish in a more sustainable and inclusive way. The IDB is confident that with strong public and private support and collaboration, and a shared vision, Nassau and New Providence Island can be transformed and become a model for urban sustainability in the Caribbean.

This Action Plan serves as a guide through the obstacles ahead and shows how Nassau can grow and flourish in a more sustainable and inclusive way.



NICOLA VIRGILL-ROLLE  
Director



# FOREWORD

The Government of The Bahamas is pleased to partner with the Inter-American Development Bank on the Emerging and Sustainable Cities Initiative. The Bahamas is at a crucial point of its development: balancing the goals of sustainable growth, efficient use of its resources, and tackling the challenges posed by climate change.

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Over 70% of the population of The Bahamas resides on the island of New Providence. The city of Nassau on the island of New Providence must fully harness its potential as the driver of urban sustainability, both economically and environmentally, if we are to see meaningful growth and development in The Bahamas. Partnerships and smart collaborations looking at how to balance economic prosperity and sustainable development are central to achieving this goal.

We know that the urban footprint of cities in the Caribbean and Latin America have been growing at previously unmatched rates. While these cities are growth engines for their economies, they are also challenged by the adverse effects of uncontrolled city growth which can lead to the unintended consequences of a higher incidence of criminal activity and poverty. Additionally, the effects of climate change present a significant risk to coastal cities.

Nassau, like other emerging cities, faces similar challenges: high levels of vulnerability to coastal intrusion; growth and expansion of the city of Nassau and urban sprawl to the rest of New Providence; elevated crime levels; and urban poverty. Sound urban planning, social engagement, well-structured institutions and frameworks, focused environmental responses and economic initiatives will be critical to successfully reversing these trends. It is our hope that the Sustainable Nassau Action Plan will provide a roadmap for the future development of Nassau. The focal point of this plan is the urban regeneration of Nassau through citizen engagement, and a focused long-term socio-economic outlook.

The inclusion of smart solutions that improve services as it relates to water, solid waste management, energy efficiency, governance, disaster management, and Over-the-Hill transformation, are integral to this exercise. We are confident that adaptation and transformation, with sound planning can help our people tackle the problems of everyday living.

The recommendations included in this Action Plan comprehensively address the identified challenges faced by Nassau — an emerging city seeking to grow in a sustainable manner. The Action Plan offers solutions for hazard risks to Nassau from climate change events such as sea level rise; looks at how land can be more productively utilised; advocates for the introduction of green spaces to augment liveability; and proposes innovative mechanisms to move people and goods. The initiative also tackles the difficult question of energy utilisation and prioritises the need for reform in funding, the modernisation of the energy infrastructure and the introduction of alternative energy sources. Safety and crime reduction strategies focused on community engagement and the integration of technology similarly feature heavily. Moreover, a successful city requires a sound governance framework, and the work on introducing some form of local government in Nassau is critical to reforming its political and business landscape.

As we usher in this new era of governance that restores confidence and hope in leadership, this Action Plan, which is a vital component of the National Development Plan, serves as a roadmap to a better Bahamas for its citizenry and specifically, for the residents of the country's capital.

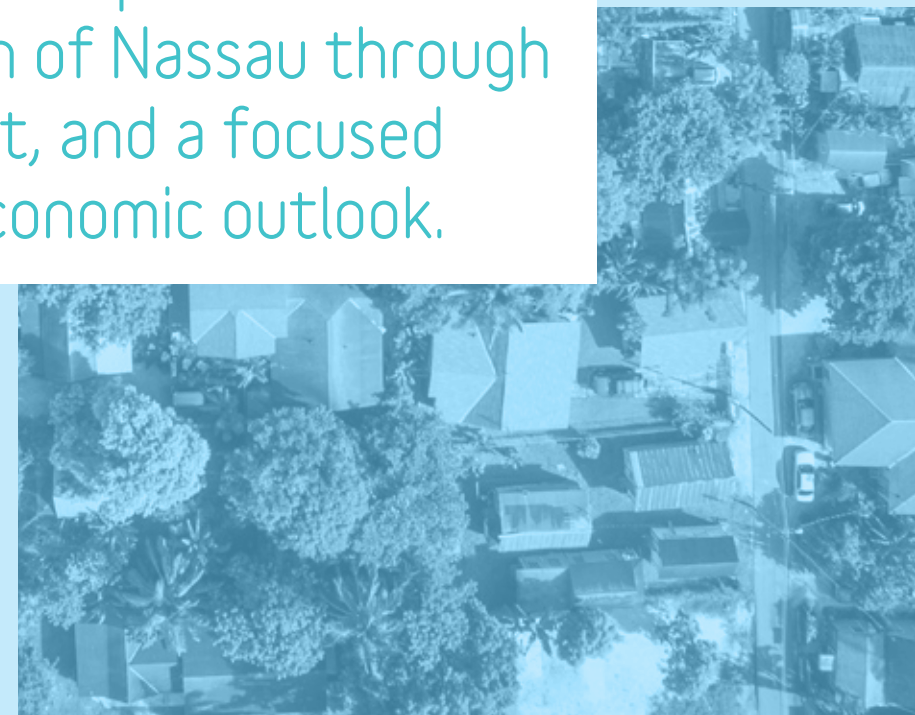
On behalf of the Government of the Commonwealth of The Bahamas, we would like to extend our gratitude to the Inter-American Development Bank, specifically, the Housing and Urban Development Division, for the opportunity to take part in this initiative. We would also like to thank the Economic Development and Planning Unit of the Office of the Prime Minister, and the other government and nongovernment organizations, including civil society and all those who were involved in producing this plan. I congratulate the team on a job well done.

---

Dr. Nicola Virgill-Rolle  
Director, The Economic Development and Planning Unit  
The Office of the Prime Minister

The focal point of this plan is the urban regeneration of Nassau through citizen engagement, and a focused long-term socio-economic outlook.

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This Action Plan would not have been possible without the partnerships, invaluable contributions of time, advice, opinions, and technical input from a plethora of individuals, public agencies, and community and private organizations. Of mention is the fruitful collaboration with and dedicated support from the Office of the Prime Minister and the Country Office of the IDB in Nassau.

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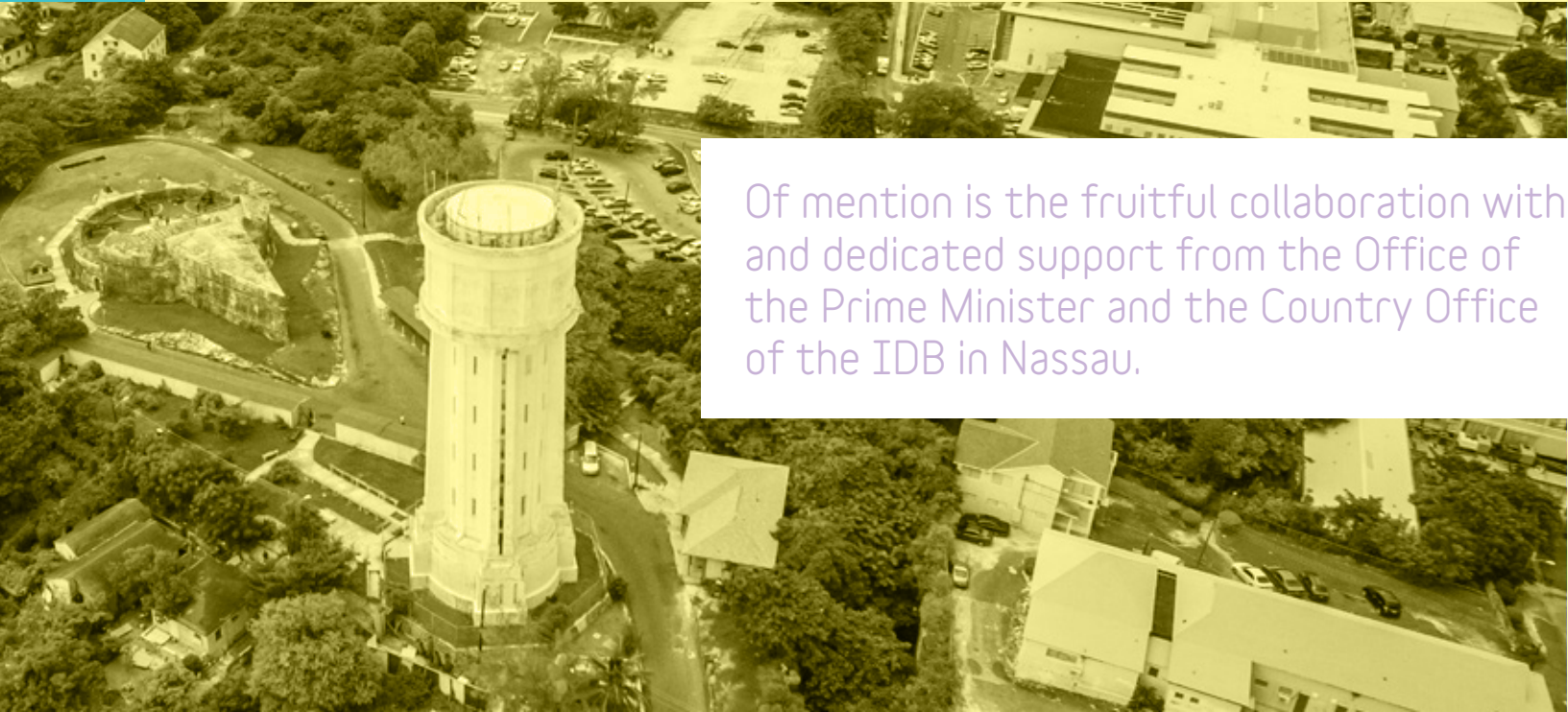
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Services  
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Department of Public Health  
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The Bahamas National Pride  
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The Bahamas National Trust  
The Bahamas Parks and Public  
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Of mention is the fruitful collaboration with and dedicated support from the Office of the Prime Minister and the Country Office of the IDB in Nassau.

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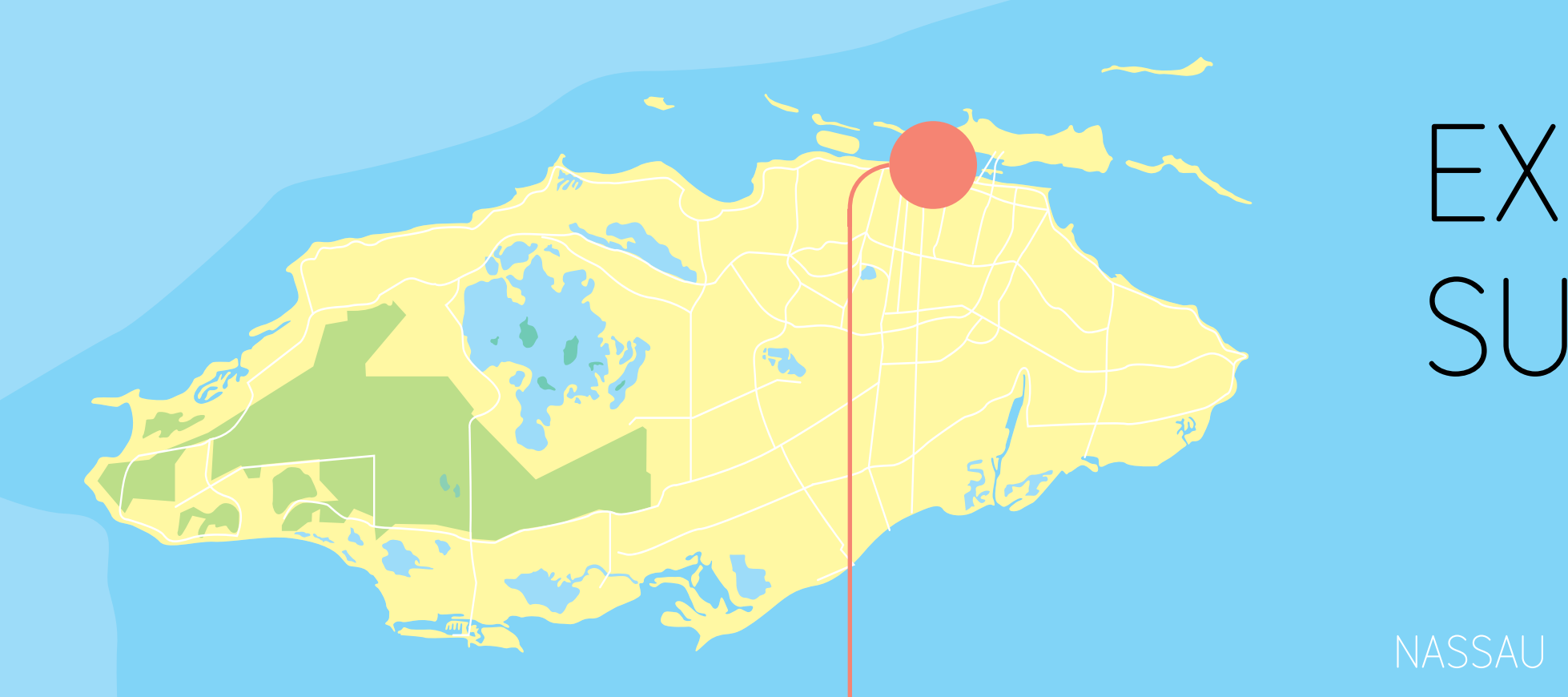
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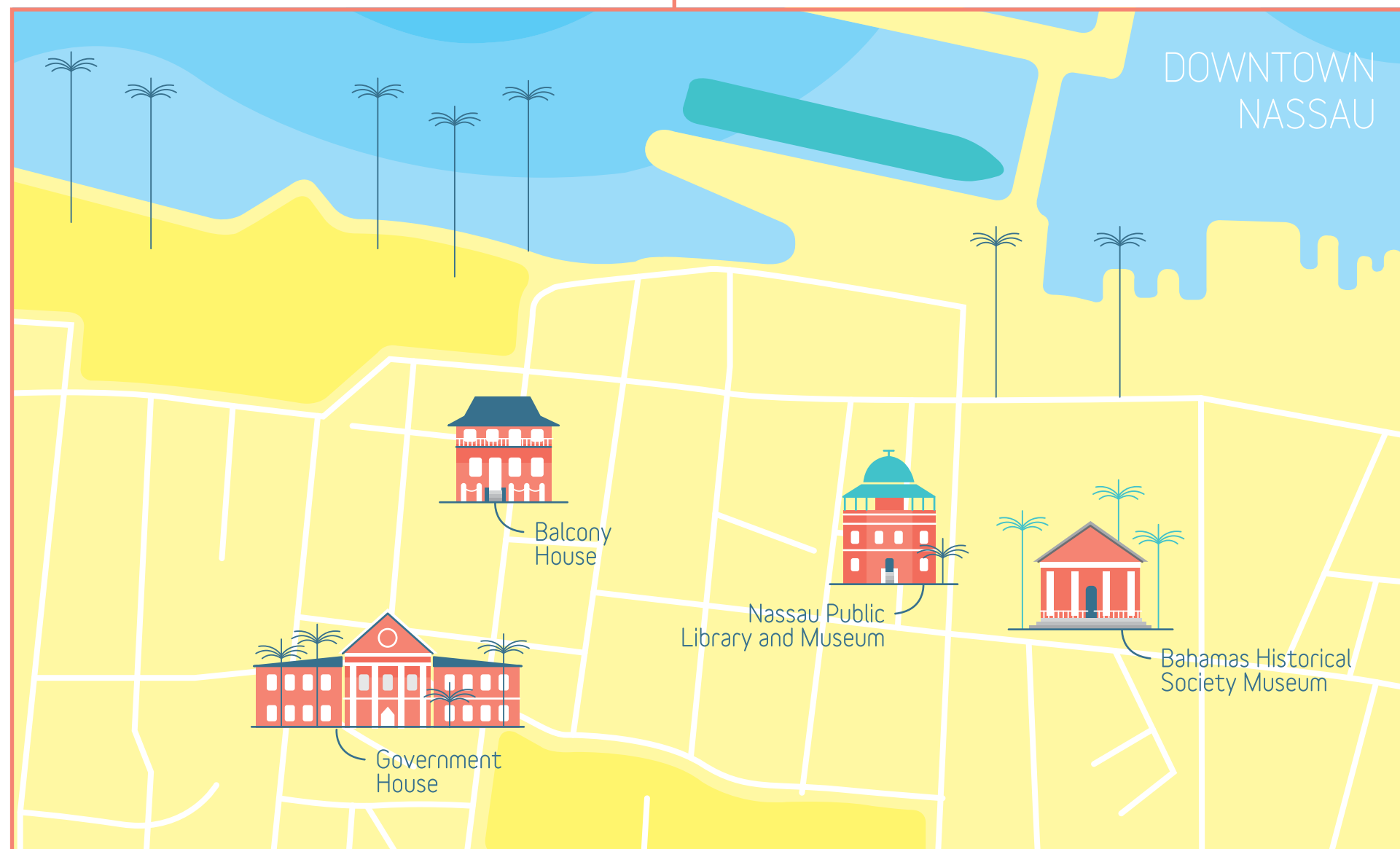




# EXECUTIVE SUMMARY

The ESC methodology takes an integrated approach to urban planning by assessing many topics related to a city's functioning, in 3 general dimensions of sustainability: environmental, urban, and fiscal/governance.

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The **Sustainable Nassau Action Plan** addresses the need for sustainable city growth in Nassau. Urban expansion, development, and sprawl have increased at an accelerated rate within Latin American and Caribbean (LAC) emerging cities. Without appropriate planning, this sprawl can lead to uncontrolled, chaotic, and unsustainable growth patterns amid fragile coastal and marine ecosystems. Nassau's changing population needs require the city to take corrective action to remedy and protect further against the negative effects of unplanned city growth on the island. The Sustainable Nassau Action Plan is a product of the Emerging Sustainable Cities (ESC) methodology and is informed by **extensive studies, research, and public consultation**.

These studies and this Action Plan consider Nassau at 2 different levels: New Providence Island (NPI) as a whole — given that **city growth has reached all corners of the island** — and Central Nassau, an area representing the historic centre of city life and consisting of 2 communities — Downtown Nassau and Over-the-Hill. These communities are divided by more than the natural ridge (known as Gregory's Archway) that borders Downtown and demarcates the passage into and out of the Over-the-Hill neighbourhoods. These historic neighbourhoods, including Grants Town and Bain Town, were initially established as freed slave settlements and maintain strong **historic and cultural significance** within the country. However, many areas of modern day Over-the-Hill Nassau today remain cut off from important city services and citizen resources. Considering the city of Nassau from these two perspectives is important since they are part and parcel of the urban, human, and environmental dynamics of this city-island.

The ESC methodology takes an integrated approach to urban planning by assessing many topics related to a city's functioning, in 3 general dimensions of sustainability: **environmental, urban, and fiscal/governance**. ESC's methodology is organized in a 2-stage, 6-phase process. Stage 1 starts with identifying Nassau's challenges by deploying a rapid assessment of **23 topics** related to the 3 dimensions of sustainability, followed by a public opinion and perceptions survey to gain **citizens' perception on** the same 23 topics.



These 23 topics are then prioritized to identify areas currently acting as bottlenecks to sustainable development. Finally, an Action Plan of prioritized interventions is formulated, containing a set of urban strategies for execution across the short, medium, and long-term. In stage 2, the execution phase begins with the preparation of pre-investment studies for the top priority investment projects.

ESC's methodology is based on the premise that urban development strategies that are **well-planned, integrated, and cross-sectoral** can ensure improvements in quality of life for citizens and help materialize a more **sustainable, resilient, and inclusive future** for LAC emerging cities. Good urban planning requires quality input and evidence-based decision making. As part of the ESC methodology, several studies were conducted to establish baseline data for Nassau across several sectors, and to create a basis upon which to structure this action plan. The studies and assessments that were conducted included: Greenhouse Gas (GHG) Inventory and Mitigation Study, Environmental Hazards and Risk Study, Urban Growth Study, Smart Cities Solutions Assessment, Energy Efficiency Study, General Assessment of Urban Mobility and Transport, Sector Characterization of Solid Waste Management, Urban Governance Options Study for NPI, an Urban Design Laboratory for Central Nassau, and a Public Opinion and Perceptions Survey for NPI.

The 23 ESC topics (water, air quality, transparency, etc.) were prioritized using multiple filters — environmental, economic, public opinion, and sector data and specialist expertise — in an effort to identify issues that pose the greatest challenges to Nassau's quest for sustainability. Ultimately, the prioritization process pointed to 6 critical areas for the city: **mobility / transport, energy, vulnerability to natural disasters, security, solid waste management, and sanitation and drainage.**

These 6 priority areas allude to some of the **key challenges** facing Nassuvians today such as: traffic congestion and GHG emissions from high rates of car ownership and inadequate public transportation, lack of renewable energy solutions, negative health and economic impacts from **natural disasters** and extreme weather events (exacerbated by **climate change**), crime and perceptions of safety impacting quality of life, unreliable and poorly functioning solid waste management, and poor drainage as exacerbated by **unplanned development**. Despite these problem areas, Nassau appears to be performing comparatively better in a number of topic areas, in terms of their challenge or contribution to future urban sustainability, including: health, digital connectivity, competitiveness of the economy, noise pollution and climate change mitigation. Challenges in these topic areas are at manageable levels and do not pose a direct threat to the **future sustainable development** of the island.

This document outlines **10 investment projects** aimed at improving the urban sustainability of Nassau. Each project is connected to one or more of the aforementioned priority topics as well as the United Nations Sustainable Development Goals. Furthermore, these projects have been grouped into 4 overarching strategic action areas that encapsulate the main themes of this Action Plan: **Resilient, Sustainable Nassau, Revitalized, Inclusive, and Competitive Nassau, Smart and Transparent Urban Governance, and People at the Centre.**

This Action Plan also focuses on citizen and community engagement, bringing decision-making about quality of life in Nassau closer to the people.

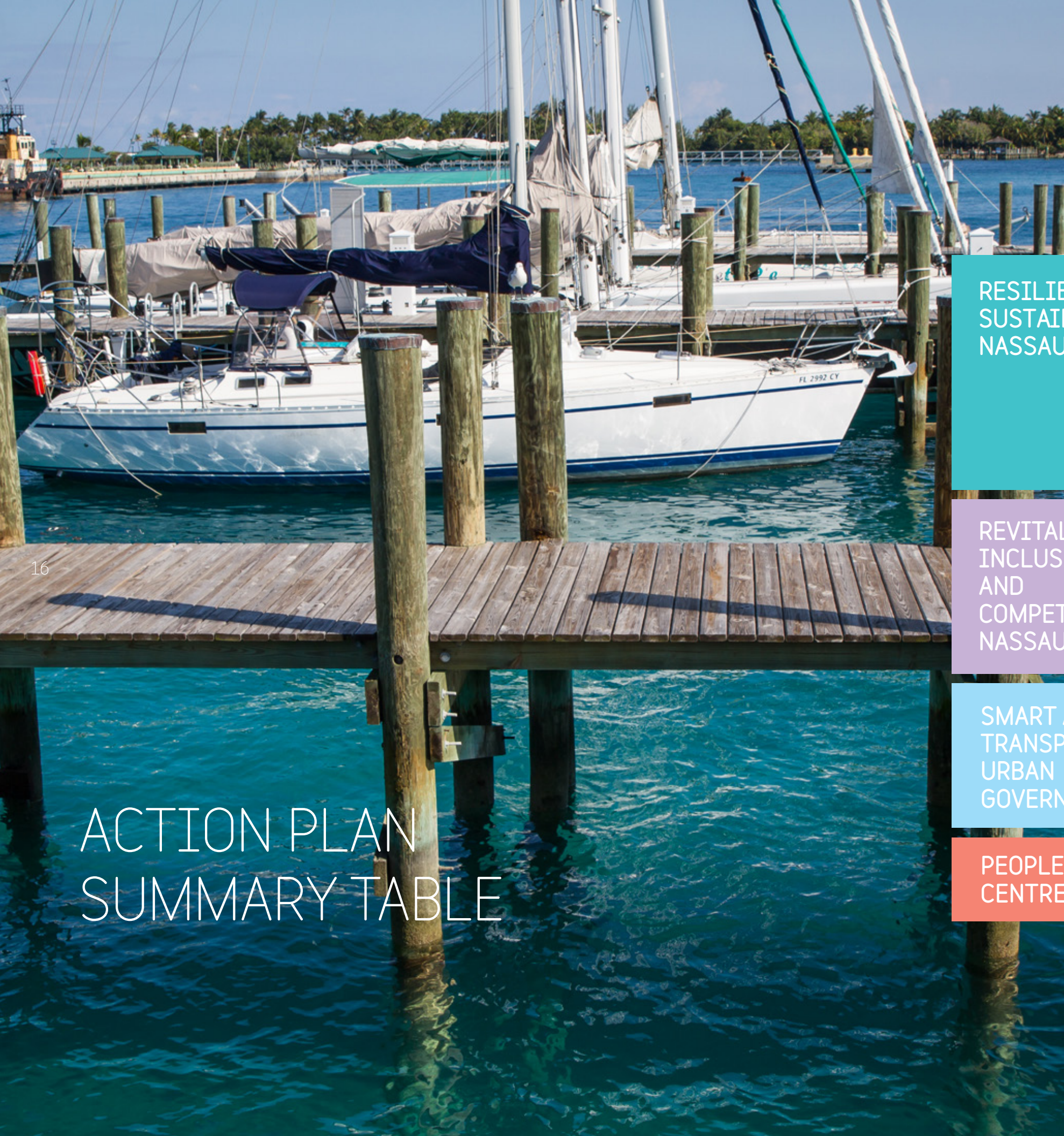
A snapshot of the recommendations contained in the Action Plan include: climate change safeguards for sea level rise and coastal zone intrusions, productive land utilisation to gain green spaces, frameworks that improve the logistics of transporting goods and people, modernisation of the energy sector and efficient energy consumption, urban revitalization to improve citizen quality of life, promotion of resilient infrastructure, a technical strategy to improve safety and reduce crime, development of an urban master plan and improvement in housing quality and land management, among others. This Action Plan also focuses on citizen and community engagement, bringing decision-making about quality of life in Nassau closer to the people.

The design, implementation, and management of these projects will ultimately rely on the will of the Bahamian people to keep their politicians and decision-makers accountable. The underlying theme of this Sustainable Nassau Action Plan is the need for better and transparent governance, which, in itself requires a citizenry that is **informed, aware, and engaged**. In short, **this Action Plan puts the Bahamian people at the centre.**

Good urban planning requires quality input and evidence-based decision making.







# ACTION PLAN SUMMARY TABLE

RESILIENT,  
SUSTAINABLE  
NASSAU

REVITALIZED,  
INCLUSIVE,  
AND  
COMPETITIVE  
NASSAU

SMART AND  
TRANSPARENT  
URBAN  
GOVERNANCE

PEOPLE AT THE  
CENTRE

1. Greening New  
Providence

2. Renew, Conserve  
Your Energy Nassau

3. Green, Zero  
Waste Nassau

4. Healthy City  
Nassau

5. Mobile and  
Connected Nassau

6. Nassau Urban  
Regeneration Project

7. Smart City  
Monitoring

8. Urban Planning  
for Sustainability

9. Responsive,  
Transparent, and  
Efficient Local  
Government

10. Empowered  
People, Empowered  
City

PRE-INVESTMENT

INVESTMENT

\$850,000

\$105,000,000

\$530,000

\$40,000,000

\$430,000

\$34,000,000

\$1,000,000

\$85,000,000

\$790,000

\$52,000,000

\$650,000

\$57,000,000

\$550,000

\$10,000,000

\$800,000

\$5,500,000

\$650,000

\$9,000,000

\$750,000

\$52,500,000

TOTAL

\$7,000,000

\$450,000,000



# UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

In the IDB's **Housing and Urban Development Division (HUD)**, we incorporate **sustainable development** and **climate change** objectives into our operations and technical assistance to client countries and cities. The UN Sustainable Development Goals (SDGs) are a source of guidance for our work, especially **SDG 11**, which aims to "Make cities and human settlements inclusive, safe, resilient and sustainable". We strive to meet these objectives and help cities in the region address urban challenges by providing solutions in: Housing and Neighborhood upgrading; Urban infrastructure development and management of urban services; Climate change and environmental protection in urban spaces; Urban innovations.







# ESC METHODOLOGY AND BACKGROUND

The main challenge facing the Latin America and Caribbean (LAC) region is extending the full benefits of sustainable and productive city growth to all residents of the region's dynamic cities. A city is full of complex, interdependent systems, and resolving any one of its challenges requires a comprehensive view of its components, their dynamics, and interactions. The IDB draws on more than 50 years of international development knowledge and experience to address the urban development challenges facing emerging cities today. Using a multi-disciplinary approach, the Bank's Housing and Urban Development (HUD) Division has implemented the Emerging and Sustainable Cities (ESC) methodology in over 75 cities in Latin American and the Caribbean. As one of HUD's analytical tools, the ESC methodology promotes environmental, urban, and fiscal sustainability through a more participative, representative, and transparent government.

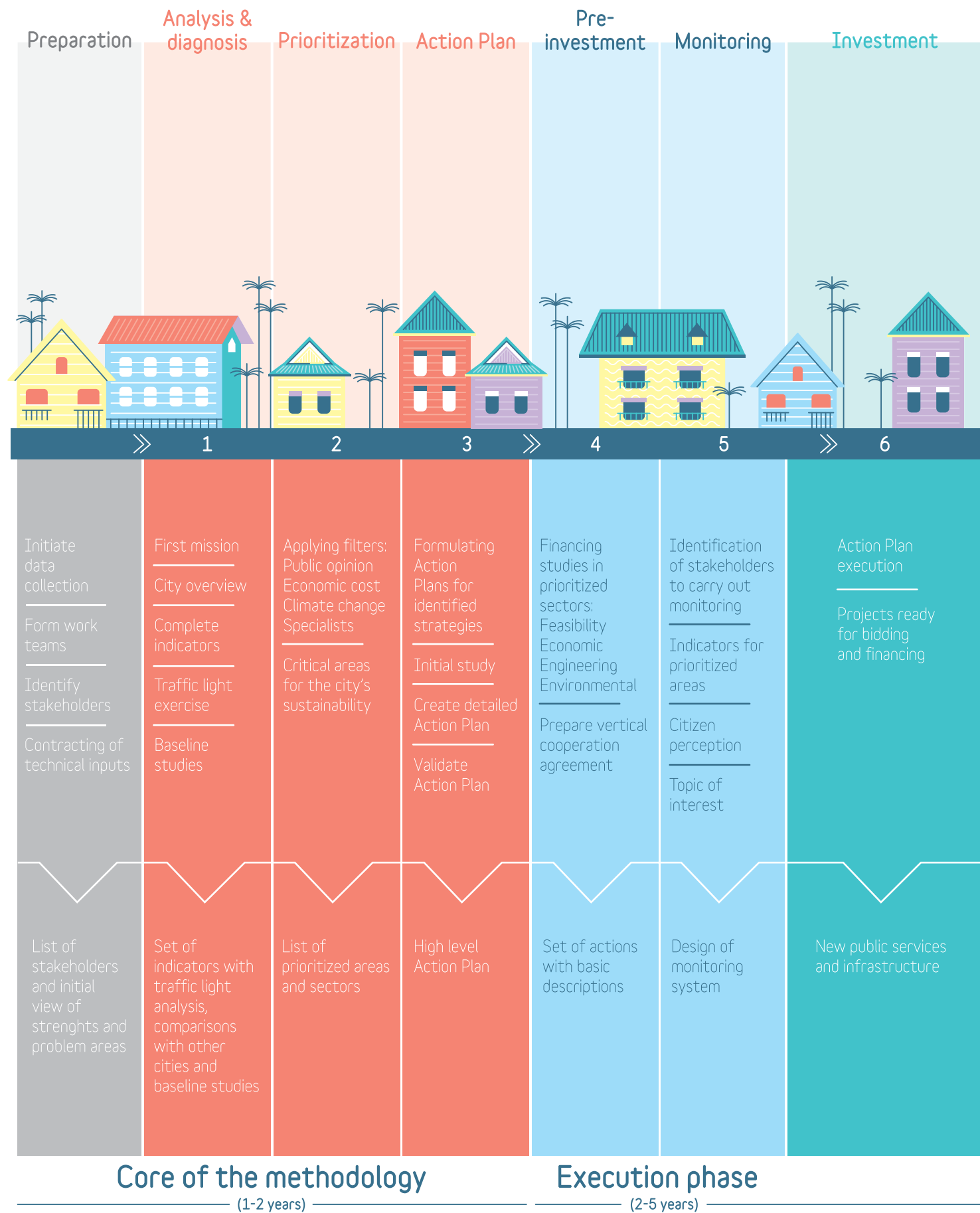
The ESC Initiative, a technical assistance program, was created by the IDB in 2010 in response to rapid and largely unregulated city growth in the LAC region that demanded attention for growing sustainability issues. The ESC methodology helps cities identify and prioritize actions to maximally improve their sustainability and residents' quality of life. These short, medium, and long-term actions are developed into a city's custom action plan for sustainable urban development. The methodology and the action plan together address 3 dimensions of sustainability: environmental sustainability and climate change, urban sustainability, and fiscal (financial) sustainability and governance.

The ESC methodology is action-oriented. This allows to quickly identify key problems and systematically prioritize them to implement appropriate solutions. The first phase of the ESC methodology includes a rapid assessment of 23 topic areas split among the 3 dimensions of sustainability (environmental, urban and fiscal) to identify which sectors of the city are performing well, which sectors are currently satisfactory but show signs of problems, and which sectors are performing poorly and require urgent attention. This assessment uses a stoplight system to classify the topic areas as green, yellow, or red based on a set of 117 indicators as well as qualitative information gathered through interviews and document reviews.

Next, the topic areas are further prioritized and assigned scores based on public opinion, climate change and disaster risk assessment, and multi-sector and economic criteria. Two (2) to five (5) topics earning high scores on this prioritization assessment are then selected for focus in the action plan in consultation with relevant government and community stakeholders. Once these priority action areas have been defined, further studies are conducted to generate more detailed analyses and studies to reveal the specific problems within the topics that should be addressed.

The ESC methodology helps cities identify and prioritize actions to maximally improve their sustainability and residents' quality of life.





PHASES

ACTIVITIES

DELIVERABLES

Well-planned cities with urban development strategies that are integrated and cross-sectoral in nature, can ensure improvements in the quality of life for citizens and help materialize a more sustainable, resilient, and inclusive future for emerging cities throughout LAC.

At this point in the ESC methodology, solutions are developed for the priority issues identified in the previous phase. An interdisciplinary team of consultants and specialists from the IDB works closely with a city's local authorities and stakeholders to develop a set of actions that will be both feasible and impactful on the priority sectors identified. These actions become formal strategies articulated in an action plan. Lastly, the pre-investment phase occurs followed by actual implementation of the action plan in conjunction with support to the establishment of a citizen-led monitoring system.

The entire ESC methodology unfolds over 6 phases and across 2 stages. This methodology is summarized in the adjacent infographic.

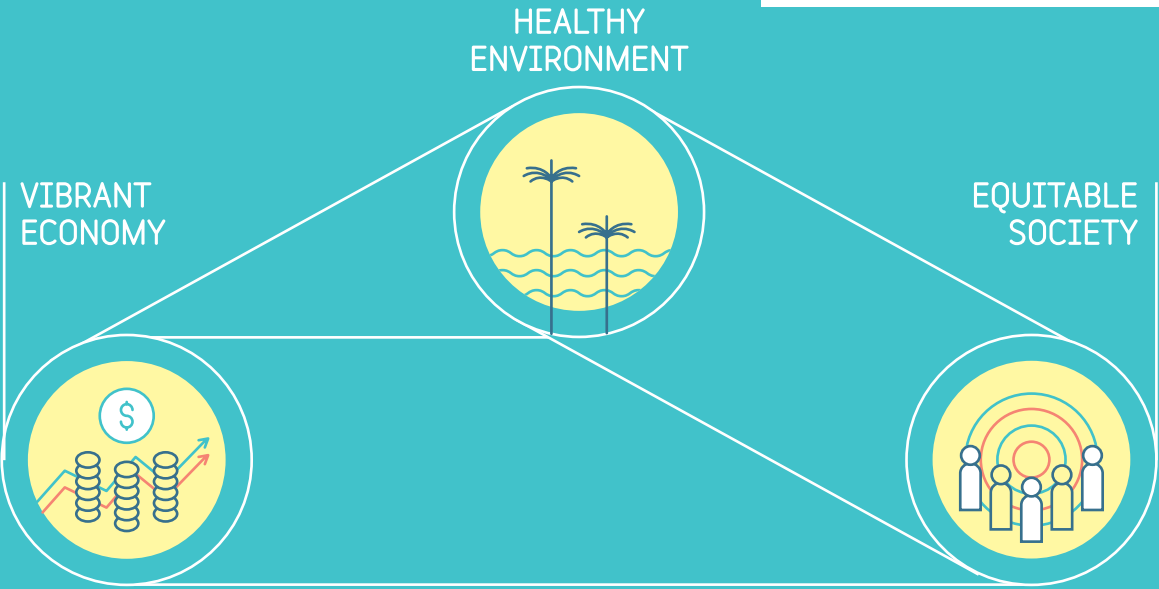
As more cities in the LAC region apply the ESC methodology to their planning, the network of sustainable cities, which already numbers more than 50 member cities, will continue to grow. Participation in the ESC network will allow cities throughout the region to utilize benchmarks and share experiences, knowledge, lessons learned, and best practices.

The contributions of the ESC methodology and action plans help local decision-makers in intermediate cities across the LAC region prioritize the most critical challenges and obstacles to sustainable development, while also providing the tools, resources, and mechanisms to achieve more coordinated and efficient planning. A critical element in this approach is also the rich knowledge transfer that occurs during dialogues between the IDB and local counterparts and stakeholders. The ESC approach also promotes inter-agency coordination across local and national governments and civil society, with the hope of generating consensus on planning priorities. By supplying the tools and instruments needed (such as this Action Plan) by cities to orient city planning and decision making in the direction of future sustainable development, the ESC approach encourages cities to focus on citizens and the quality of their lives. The methodology is based on the premise that well-planned cities with urban development strategies that are integrated and cross-sectoral in nature, can ensure improvements in the quality of life for citizens and help materialize a more sustainable, resilient, and inclusive future for emerging cities throughout LAC.



# WHAT IS A SUSTAINABLE CITY?

For something to be sustainable, it must last and be able to be reproduced in the future; and in the cities of today and tomorrow, it must have durability in social, economic, and environmental terms.

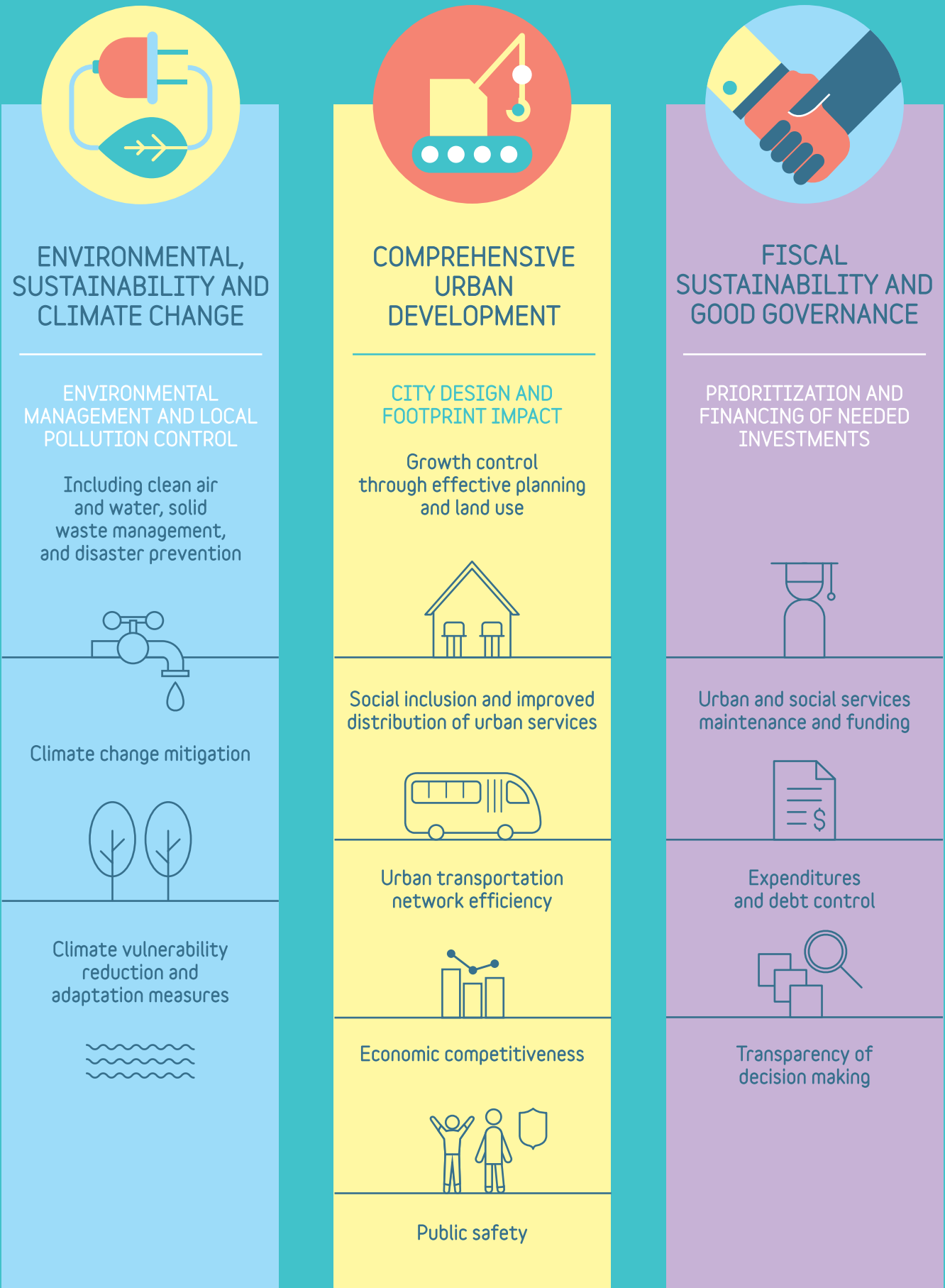


A sustainable city offers a high quality of life for its inhabitants; minimizes its impact on the environment and its natural resources; is adaptable to the effects of climate change; and has a local, fiscal, and administrative government capacity to maintain its economic growth and perform its duties with urban citizen participation. Above all, it does not compromise the well-being, resources, or opportunities for future generations.

With this definition in mind, ESC focuses on the 3 pillars of sustainability (shown in the figure to the right) when responding to the challenges of sustainable urban development.

The challenge facing many emerging and sustainable cities is balancing economic growth with the protection of the earth's vital resources. This is especially difficult in today's unsustainable global economy where more than 1 billion people are excluded from economic progress and the environment is suffering unrelenting damages from human activity. Protecting and enhancing ecological assets—the natural capital—is a priority when managing 'sustainable' urban growth.

ESC recognizes the 'bottom up' approach to sustainable development as a successful method for helping cities achieve more sustainable, efficient, and effective institutional frameworks, urban planning, and socio-economic development. Better technology, more data, more knowledge and experience, and greater awareness allow for better decision-making while opening the path towards change at the local level. Starting down the sustainable path at the local level is where it matters most, and where a significant difference can be made.





The ESC methodology has been a useful tool to help the government of The Bahamas prioritize the needs of its largest urban centre and focus the lens of future planning towards a more sustainable and resilient city.

# WHY NASSAU?

Nassau, Bahamas, became part of the Emerging and Sustainable Cities (ESC) network in 2015. As a growing urban centre and the economic engine of the country, Nassau was an obvious candidate for the application of the ESC methodology within the LAC region. In just 15 years (2000-2015), the NPI population increased by nearly 27%. ESC population growth models project that New Providence will continue growing, increasing 19% in the 2015-2030 period and increasing another 15% from 2030 to 2045.

Additionally, the IDB's commitment to manage climate change makes coastal cities like Nassau particularly important for the Bank to apply newly developed tools and methodologies. The ESC methodology has been a useful tool to help the government of The Bahamas prioritize the needs of its largest urban centre and focus the lens of future planning towards a more sustainable and resilient city. The following section provides broader relevant context for The Bahamas and the city of Nassau, including an overview of the primary urban challenges, the linkages between this Action Plan and other sustainable development work in the country, the vision for a sustainable Nassau, and a regional comparison of Nassau to other cities in the ESC network.

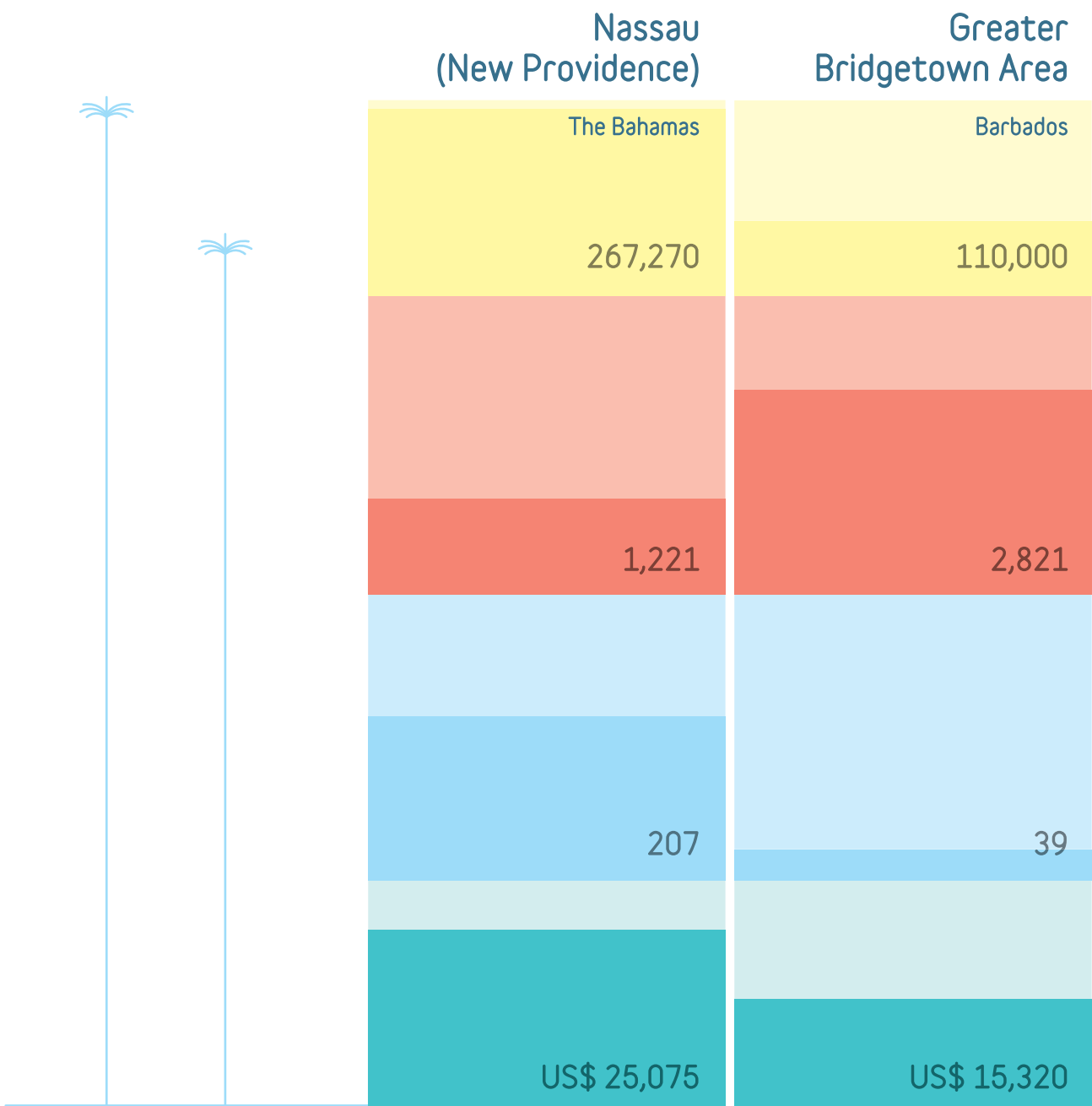


# REGIONAL COMPARISONS TO NASSAU

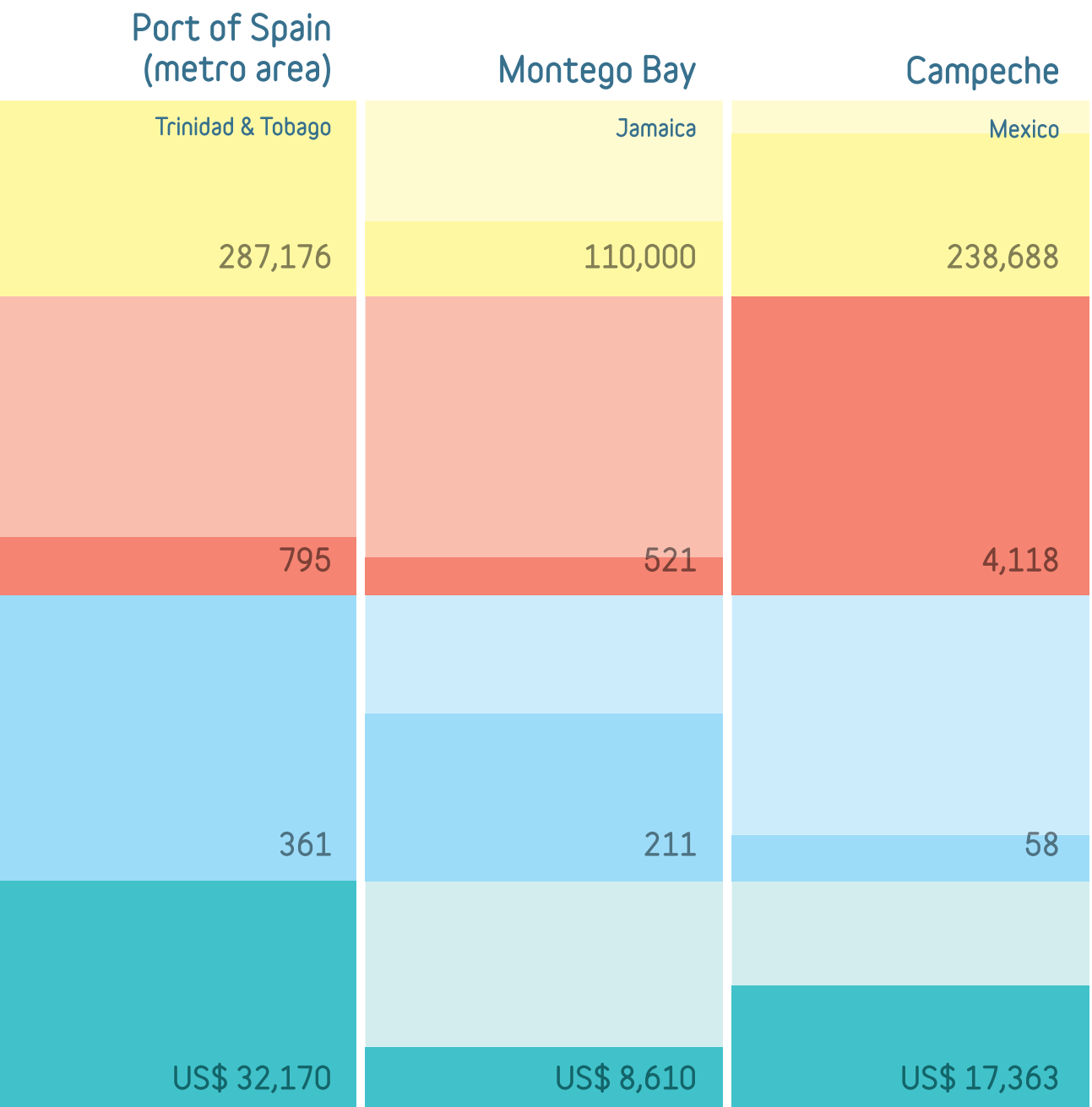
Population      Population density (inh/km2)  
Area (km2)      GDP per capita (2014 GDP per capita - PPP)\*

Source: ESCI Nassau, ESCI Campeche (2014), IMF WEO  
October 2015 & UN Population Division, Tradingeconomics.com  
\*national level data

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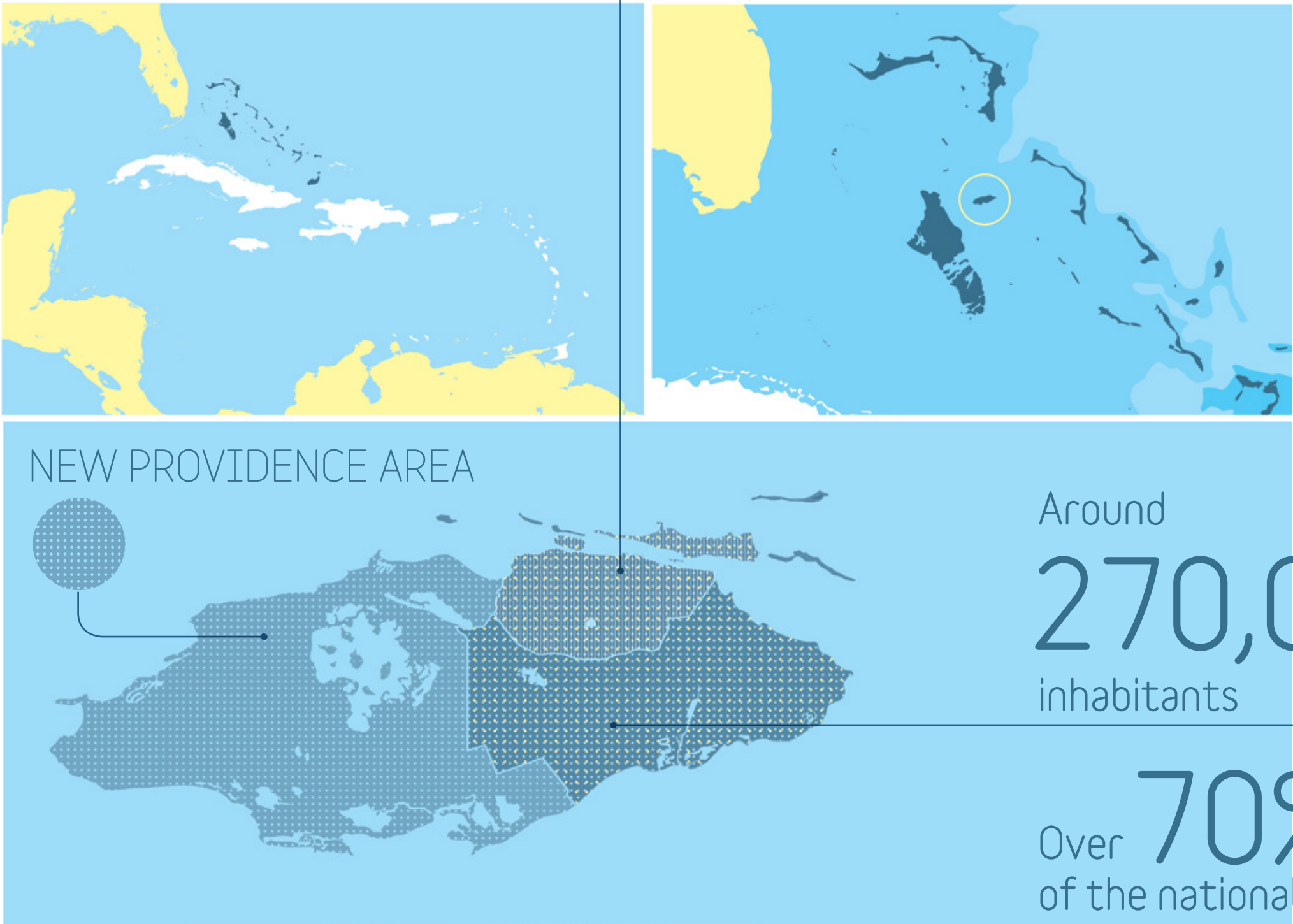


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# CONTEXT AND BACKGROUND



NASSAU  
AREA

## Geography, demography, and economy

The Bahamas is a Commonwealth island country with over 700 low-lying islands in an archipelago which covers 13,878 km<sup>2</sup>. The Bahamian islands are vulnerable to risks associated with climate change, such as sea level rise and flooding, coastal erosion, and increased intensity and frequency of extreme weather events. Hurricanes — like Irma in 2017 and Matthew in 2016 — and tropical storms threaten the Bahamas and the rest of the Caribbean with tragic frequency making it one of the most vulnerable regions on the planet. The entire Bahamian population lives within 25 km of a coastline, and 82.8% live in low elevation coastal zones (less than 10 m above sea level). These natural phenomena affect not just infrastructure and economies, but most importantly many lives, and are worsening with climate change.

Although over 20 of the islands are inhabited, most of the population lives in the capital city of Nassau on New Providence Island (NPI) (207 km<sup>2</sup>). As compared to other Bahamian islands, NPI is quite small despite being the most populous with an estimated 270,000 inhabitants — more than 70% of the national population. The population of NPI is predicted to further increase by another 100,000 inhabitants over the next 28 years with its share of the total population increasing from 70% to almost 80%.

The Bahamas enjoyed increased prosperity in the 20th Century as a diverse range of conventional economies developed on the islands. This included the sponge industry, the supply of shells for brooch-making and the export of pineapples. In the 1950s, the tourism and financial industries experienced success and continue to be key pillars of the Bahamian economy. As an import dependent and service based economy, The Bahamas generates roughly half its GDP through tourism, and in 2015, GDP was measured at US\$8.85 billion. The GDP/capita was US\$21,602 making The Bahamas one of the wealthiest countries in the Americas and the Caribbean. However, the country shows a comparatively high rate of income inequality as indicated by its Gini coefficient of 0.44. Typically, many Bahamians born outside of NPI move from the family islands to the country's economic and commercial urban hubs in Nassau and Freeport over time — a trend that mirrors the globally observed pattern of rural to urban migration, and the growth of larger cities.

Around  
**270,000**  
inhabitants

Over **70%**  
of the national  
population

GREATER  
NASSAU AREA



# Baja mar

(shallow waters)

Central Nassau still harbours much of Nassau's identity, culture, and urban development possibilities.

The Bahamas

32

## History and governance

The Bahamian islands were first discovered in the 4th Century by people who originally lived on the island now known as Cuba, and later settled by Lucayan settlers beginning in the 10th Century. In 1492, Christopher Columbus made land-fall on Watling's island on his first voyage from Europe. He noted the shallow waters surrounding the sandy beaches of the island and named the region 'baja mar' (shallow waters), from which country's name 'The Bahamas' is derived. Between 1718 and 1964, The Bahamas was governed under British colonial rule. Following US independence in the 1770s, British loyalists from the US arrived in The Bahamas with slaves from the American South and introduced a plantation-based economy. During their rule, British colonials were harassed by the French navy, the Spanish navy and privateers. Slaves were traded in an open market located in downtown Nassau until the abolition of the slave trade by Great Britain in 1807.

A 'Westminster' system of parliamentary democracy was inherited by The Bahamas as a member of Britain's colonial empire. As a Commonwealth country and a constitutional monarchy, it recognises Queen Elizabeth II as its Head of State as well as an elected Prime Minister, Members of Parliament that make up the House of Assembly and appointed members of the Senate. The Bahamas obtained responsibility for its internal political affairs in 1964 and 5 years later in 1969, Sir Lynden Pindling, leader of the Progressive Liberal Party (PLP), became the country's first Prime Minister who later led the nation through its transition from British colony to Independence in 1973. Pindling remained Prime Minister until 1992 and since then, the country's politics have been guided by a two-party system resulting in elected leaders from both the PLP and the Free National Movement (FNM).





# Urban Centre Nassau

The focus of this Action Plan is an area of NPI known as “historic” Central Nassau, which effectively represents 2 distinct but highly interconnected communities that at one time formed the centre of city life: Downtown Nassau and Over-the-Hill. The city of Nassau corresponds historically to the small area where Charles Towne arose in the 18th century. It was a stretch of some 15 blocks along the coast where the harbour and colonial buildings appeared (West and East Bay streets), by some 3 or 4 blocks perpendicular to the coast, ending the natural ridge. The town’s fabric was made up of English-style masonry houses aligned to the property line, placed on large plots of land with wide and well-shaded backyards. Beyond the ridge is an area generally known as ‘Over the Hill’, which today residents still refer to proudly by the names of the original settlements that started there, such as Bain Town, Grant’s Town, St. Michael, Centerville, St. Barnabas, Englerston, among others.

After 1950, the city expanded east and west along the northern coast and south from the traditional settlements of Over-the-Hill. The main instrument of transformation of the land was the ‘zoning order’, whereby owners, leaseholders, or the Government for Crown lands, would seek authorization for subdivisions, land uses, and construction for a plot of land. This process occurred in a piece-meal fashion that has defined the urbanization landscape of the island.

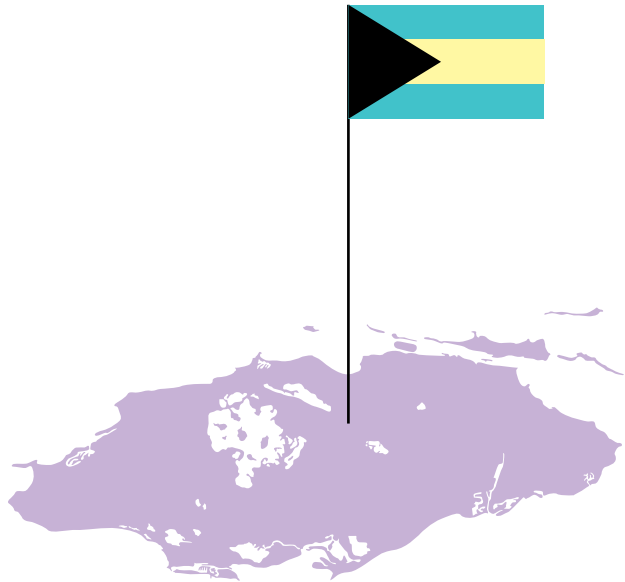
Central Nassau is divided by more than just the natural ridge and physical archway (Gregory’s Arch) that borders Downtown and demarcates the passage into the Over-the-Hill communities. Primarily, but not exclusively, made up of Bain Town and Grants Town, the historic Over-the-Hill communities were originally established as freed slave settlements in the 1800s and maintain strong historic and cultural significance among NPI residents. Today, several areas of the Over-the-Hill community are deteriorated with dilapidated building structures, lack of basic infrastructure such as water and sanitation networks, and a shortage of clean, safe public spaces. Although there is plenty of vacant land, apart from a handful of basketball courts, formal squares, parks, gardens, plazas or otherwise public gathering spaces are virtually non-existent. As Collins Wall once divided Black from White in this city, so the “Hill” seems to naturally isolate these neighbourhoods and segregate them socio-economically from the rest of the city. Likewise, Nassau’s Downtown strip, where cruise ships arrive daily with thousands of tourists, seems underutilised and disconnected from the rest of the island. Yet, together this Central Nassau area still harbours much of Nassau’s identity, culture, and urban development possibilities.



As a popular cruise ship destination in the Caribbean, Nassau is known for its colourful buildings, bustling Straw Market and Downtown shopping and various water-based activity options such as: diving, snorkelling and beachgoing. The Downtown neighbourhood retains much of its historic character made visible through Colonial landmarks and various pastel-coloured buildings characteristic of this British influence such as the pink-hued Government House and the distinct Octagonal Public Library Building. Nassau is a city with deep cultural roots and strong community connections; in fact, in December 2014, Nassau was designated as a Creative City of Crafts and Folk Arts by UNESCO. However, Downtown Nassau is almost entirely commercial today without homes and living spaces; the absence of residential real-estate is most obvious in the evenings when the main street becomes virtually empty, particularly east of East Street.

The relationship between these Central Nassau communities is both symbiotic and interdependent. The physical proximity of the neighbourhoods and exchanges of people, commerce and culture gave rise to many of Nassau’s beautiful buildings as well as a rich social and cultural heritage that is preserved to this day. Yet, overtime, the fluidity between Downtown Nassau and Over-the-Hill has diminished – Bay Street is primarily a place for commerce and tourism while **Bain and Grants Town** are densely populated low-income residential communities largely cut off from the island’s tourism economy. Instead, these Over-the-Hill neighbourhoods have become plagued with high rates of crime, poverty, and various social and health challenges that hinder the quality of life for its residents.

Although Bain and Grants Town are emphasized in this Action Plan, the authors are aware that Over the Hill is made up of many more communities, including Mason’s Addition, etc. The focus on Bain and Grants Town is linked directly to the fact that the Urban Design Lab, a study of this ESC process, conducted its assessment and small-scale urban design project in these areas and had regular engagement with neighborhood residents there.





# LINKS WITH NDP AND SUSTAINABLE ANDROS PROJECT

An integrated approach to implementing these 3 plans is pivotal to the sustainable development of The Bahamas to improve socio-economic and environmental conditions for all.

The Bahamas, a small island developing state, are confronted with the challenge of achieving growth and development that is sustainable. While the Bahamas remains one of the wealthiest countries in the Western Hemisphere, worrying trends in country's mainstay tourism and financial sectors, increasing unemployment rates, poverty, skill gaps, and incidences of crime threaten the country's overall development and prosperity. Effective resource management is critical to the future development of the country, and so the country finds itself at an important juncture: pursuing a path that leads to implementing actions connected to sustainable growth or continuing along the road to what appears to be socio-economic and environmental ruin.

Three (3) relevant initiatives have sought to transform the trajectory of the country in recent years, namely, the National Development Plan, the Sustainable Nassau Action Plan, and the Andros Master Plan.

The **National Development Plan (NDP)** is a comprehensive policy framework to guide government decision making in 4 key areas: (i) human capital; (ii) governance; (iii) infrastructure; and (iv) economy. The plan has identified and prioritized short, medium, and long-term goals for the country through a process of extensive research and public consultation. Every deliverable of the plan has integrated the sustainable development goals and the use of smart solutions to enhance services, productivity, and output. The National Development Plan is aimed at examining, identifying and establishing strategies that achieve outlined goals, as well as delineating the strains that have hindered universal development thus far. While the National Development Plan speaks to the country's needs, there are also core components of the plan that speak to the needs of specific islands.

The **Sustainable Nassau Action Plan** is a core component of the National Development Plan that speaks to the need for proper city management in Nassau. The rate of city growth in the Caribbean and Latin America has increased and, without proper planning, can lead to uncontrolled, chaotic and unsustainable growth patterns. The changing population needs of Nassau must be addressed in addition to

the various challenges for the island that have been created through this unplanned city growth. The Sustainable Nassau Action Plan, a product of the ESC methodology, has been informed by extensive studies, research, and public consultation.

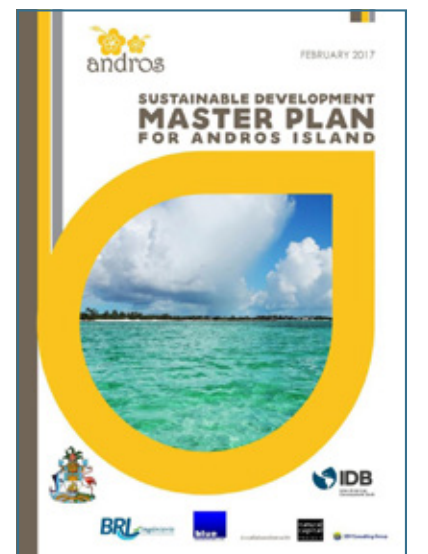
Recommendations outlined in this Action Plan include climate change safeguards where rising sea levels and coastal zone intrusions are concerned, productive land utilisation recommendations that implement more green spaces, and frameworks that improve the logistics of transporting goods and individuals. This Action Plan focuses on citizen and community engagement, and therefore, brings decision-making closer to the people. Other solutions offered by this Plan include the modernisation and reform of energy infrastructure, and the need for the implementation and use of alternative energy sources. Lastly, the initiative has tested a technical strategy to improve safety and reduce crime through an emergency notification pilot solution.

Nassau presents the dilemmas of an emerging city, whereas, Andros presents the dilemmas of an island that has been neglected and deprived of economic opportunity and investment, leading to gross underdevelopment. Like other islands, place-making and land management is noticeably absent. The disparities in the quality of life and available services among the various islands, are in part due to the high GDP per capita value that is indicative of the quality of life only for a few Bahamians.

The **Andros Master Plan** presents a timely approach to sustainable development for Andros Island through ecosystem-based development. The plan is built upon the strengths of the island's natural assets: for example, the world's third largest barrier reef; vast coppice, pine, and mangrove forests; and the highest density of blue holes in the Western Hemisphere. The plan also emphasizes the value in engaging heritage communities for tourism revenue streams. Through extensive research and public consultation, this plan offers public and private opportunities for investments, in addition to outlining land and sea zoning guidelines to the government. Community and citizen engagement is critical to the success of the implementation of this plan, with local stakeholders identifying "climate and coastal resilience; education and capacity building; food and water security; health and well-being; land tenure security, land use planning and enforcement; livelihoods and income equality; transportation for people and goods; and strengthening and enhancing local government as key to the future development of the island".

An integrated approach to implementing these 3 plans is pivotal to the sustainable development of The Bahamas to improve socio-economic and environmental conditions for all. These plans are evidence-based, results-oriented, and emphasize the need for countrywide reform. At their core, these plans have all attempted to answer the following questions: (i) where are we now as a people? (ii) where do we see ourselves in years to come? and (iii) how do we intend to get there?

Where are we now as a people?  
Where do we see ourselves in years to come?  
How do we intend to get there?



Human capital

Governance

Infrastructure

Economy



# WHAT IS SUSTAINABLE NASSAU?

Stakeholder consultations and subsequent buy-in are central to the success and sustainability of any city or community plan. Though the challenges faced by Central Nassau residents were discussed, it was also important to gain insight into what these residents both expected and desired for their city's future — for their lifetime and for generations to follow them. The consultations in preparation of this plan produced some definitions or visions for what a "Sustainable Nassau" might look like.

These stakeholder definitions were further analysed in conjunction with the other inputs and proposals in this Action Plan and a final vision statement was developed that encompasses the spirit of this plan and the vision of Nassuvians.

Sustainable Nassau is a safe, smart, responsive, and inclusive city that creates economic opportunities and improves community well-being, while empowering its residents and preserving cultural and natural resources – now and tomorrow.


In 35 words or less: Sustainable Nassau is...

An accountable, <sup>well managed</sup> living, planned, smart and open & democratic city which is able to adequately provide for the real needs of a growing population & economy in an ordered approach with wide citizen participation

a healthy and safe environment that is socially inclusive. It creates an sustainable environment for community and economic growth while preserving culture and natural resources for now and ~~future~~ tomorrow.

(A CITY THAT) TAKES CARE OF ITSELF THROUGH REHABILITATION, URBAN REGULATION, ~~ENTREPRENEURSHIP~~ ECONOMIC OPPORTUNITIES, AND OWNERSHIP OF BUSINESSES. A HUB OF ~~SOCIAL~~ SOCIAL AND CULTURAL ACTIVITIES FROM BAHAMIAN TO BAHAMIANS. A CITY THAT MAINTAINS ~~ITS~~ ITS ~~IDEAS~~ IDEAS AND SERVICES ~~BASED~~ HUMAN, NATURAL AND BUILT)



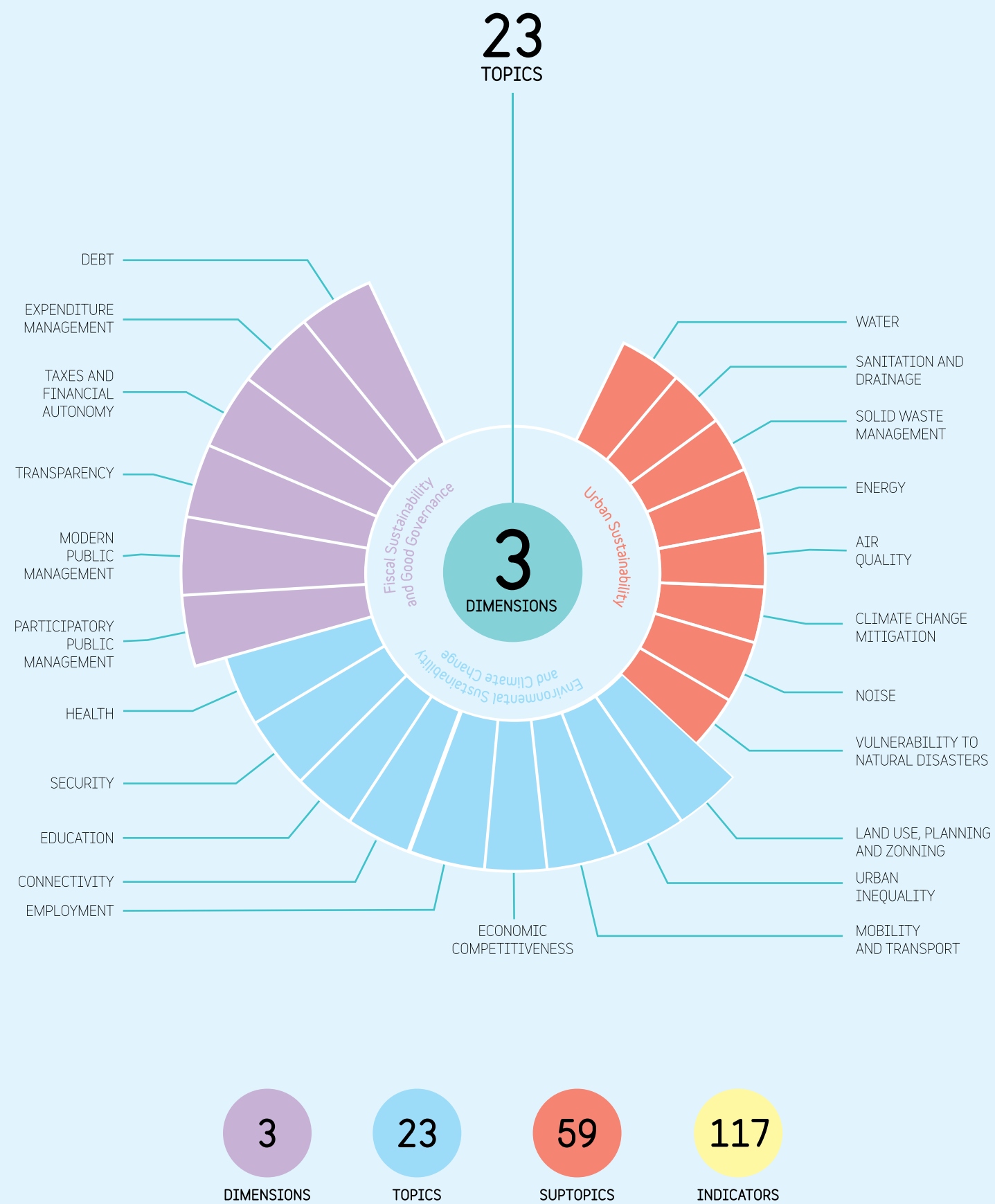


# A SNAPSHOT OF NASSAU: WHAT DO THE NUMBERS TELL US ABOUT SUSTAINABILITY?

It is critical to focus on key areas that can add the most value or are bottlenecks to sustainable development.

The ESC methodology takes an integrated approach to city planning by assessing many topics related to a city's functioning ultimately broken down into 3 overall dimensions of sustainability: environmental, urban, and fiscal/governance related. An important part of the ESC process includes the identification of priority action areas for a given city. While cities are complex and often face many challenges, it is critical to focus on key areas that can add the most value or are bottlenecks to sustainable development. As part of the process to identify Nassau's priority action areas, a rapid diagnostic assessment of 23 topics (all related to the 3 dimensions of sustainability) was conducted. The indicator analysis was further supported by a subsequent public opinion and perceptions survey issued to NPI citizens to ascertain their perceptions on the same 23 topics that were measured through technical indicators.







Using the results of the rapid diagnostic assessment, each of the 23 topics was assigned a colour using a stoplight classification system of red (critical), yellow (problematic), and green (satisfactory). This classification system is based on reference values from international standards and LAC regional averages, which assist in benchmarking local data indicators for emerging cities and classifying them into these 3 categories. The indicators for Nassau (or the next largest political-administrative or geographic coverage level for which data was available) were analysed by comparing them with the aforementioned reference values. In the case of Nassau, there was an even distribution of reds, yellows, and greens. Red indicators signalled issues of urgency for the city, while yellow indicators signalled issues that were not yet critical but likely to become problems in the future (i.e. unsustainable) if adjustments were not made soon (or, in some cases, issues that had been problems in the past and were improving, but not yet reached satisfactory levels).



Using the results of the rapid diagnostic assessment, each of the 23 topics was assigned a colour using a stoplight classification system of red, yellow, and green.

CRITICAL

UNSUSTAINABLE

SATISFACTORY

The public opinions and perceptions survey was administered to 1,050 residents in 2016. A representative and random sample using all 24 polling districts in NPI was used to mirror the demographic and socioeconomic profile of the island. There was an estimated sampling error of +/- 5% at the 95% confidence level. A combination of in-person (door to door) and telephone call interviews were used to complete the 1,050 surveys. In total the survey contained 87 questions covering the 23 topics covered by the ESC with the goal of gaining a comprehensive understanding of public perceptions on topics related to the present and future sustainability of the island.

The following pages highlight several topics from the collection of indicators and the public opinion survey, to portray some of the differences and similarities between the findings of the survey and the assessment. Key issues surrounding each topic are laid out in broad strokes and the discussion reveals how, in some cases, public perceptions can diverge from reality which gives rise to consideration of how public perceptions might influence policy and decision-making.





# QUALITATIVE AND QUANTITATIVE PERSPECTIVES ON PRIORITY ISSUES

The following pages provide a snapshot of some of the key issues found to be critical areas of concern for the future sustainability of Nassau categorized under the topic areas of: mobility and transport, energy, sanitation and drainage, vulnerability to natural disasters, citizen security, and solid waste management.



# MOBILITY AND TRANSPORTATION

## Public Opinion and Perceptions Survey Results



35% rate public transportation as “very good” / “good”, while 31% rate it as “very poor” / “poor”

66% never use public transportation, while 10% use it every day

Average travel times to work, school and into town for errands was 28.79, 26.93 and 39.53 minutes respectively

Cars are the most popular mode of transportation used (73%), followed by buses (19%); only 5% walk

Average walking time from home to nearest bus stop is 7.82 minutes

40% say they or a member of their household has been involved in a traffic accident in New Providence in the last 5 years, resulting in 24% being injured in the accident

29% felt driver distraction is the factor most responsible for traffic accidents

## ESC Data Indicators Collection



597

Kilometres of road per 100,000 population

0

Kilometres of road dedicated exclusively to public transit per 100,000 population

0

Kilometres of bicycle path per 100,000 population

10

Average age of public transport fleet (years)

0.14

Transportation fatalities per 1,000 population

0.38

Number of vehicles per capita

31

Average travel speed (km/hr) on primary thoroughfares during peak hours



# ENERGY

Public Opinion and Perceptions Survey Results



27% experience power outages in the home every week and 57% experience them every 1 – 3 months

Power surges occur monthly or on a more frequent basis for 25%

84% use energy efficient bulbs and 61% acquired refrigerators after 2008 (indicating improved energy-efficiency)

3% use solar or wind energy



50

ESC Data Indicators Collection



94.5%

Percentage (%) of the city's households with an authorized connection to electrical energy

43

Average length of electrical interruptions (seconds/customer)

# SANITATION AND DRAINAGE

Public Opinion and Perceptions Survey Results



68% have a pit latrine or septic tank and 71% rate the provision of sewage disposal services to their home as "good" / "very good"

In the last 12 months, 12% of respondents had problems with sanitation in their home, while 3% had a problem with sewage in the streets

33% experience flooding, mainly when it rains for a long period

For 13%, the most recent instance of flooding lasted several days



51

ESC Data Indicators Collection



11%

Percentage (%) of households with a home connection to the sewer system

<40%

Percentage (%) of wastewater that is treated according to national standards



# CITIZEN SECURITY / PUBLIC SAFETY

Public Opinion and Perceptions Survey Results



81% do not feel safe walking alone in NPI at night. 58% feel the level of safety is about the same as a year ago

42% have little to no confidence in the police

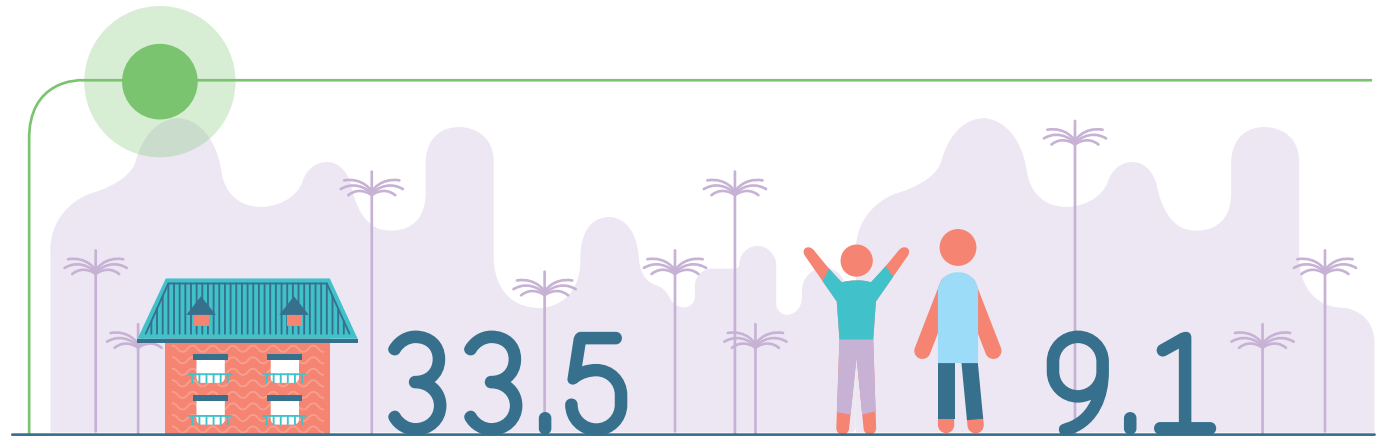
17% say they themselves or a relative have been a victim of crime in the past 12 months. Theft was the most common offense (47%)



ESC Data Indicators Collection



52



# NATURAL DISASTERS AND CLIMATE CHANGE

Public Opinion and Perceptions Survey Results



59% say severe weather events occur more often than before. Only 6% say they occur less often

54% feel that global climate change affects the climate of the area "a lot" / "quite a bit"

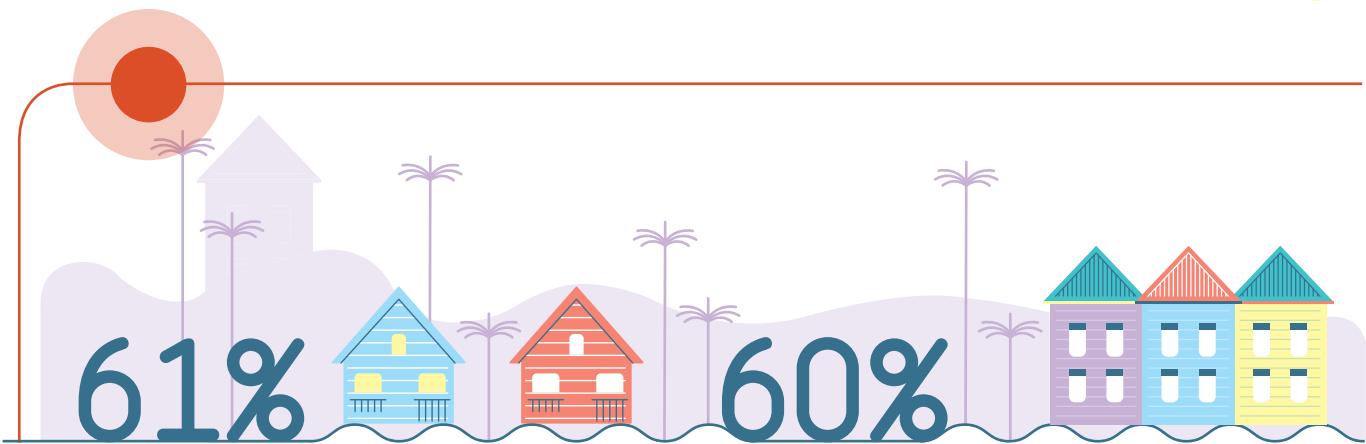
73% feel climate change had an impact on them and their family, while 23% feel it has no impact at all

Respondents feel that the Local Defense Force is the most prepared to deal with a natural disaster and the National Government is the least prepared

ESC Data Indicators Collection



53





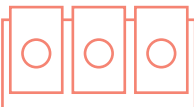
# SOLID WASTE MANAGEMENT

## Public Opinion and Perceptions Survey Results



60% describe their neighbourhood as “clean” / “very clean” and 7-8% described it as “dirty” / “very dirty”

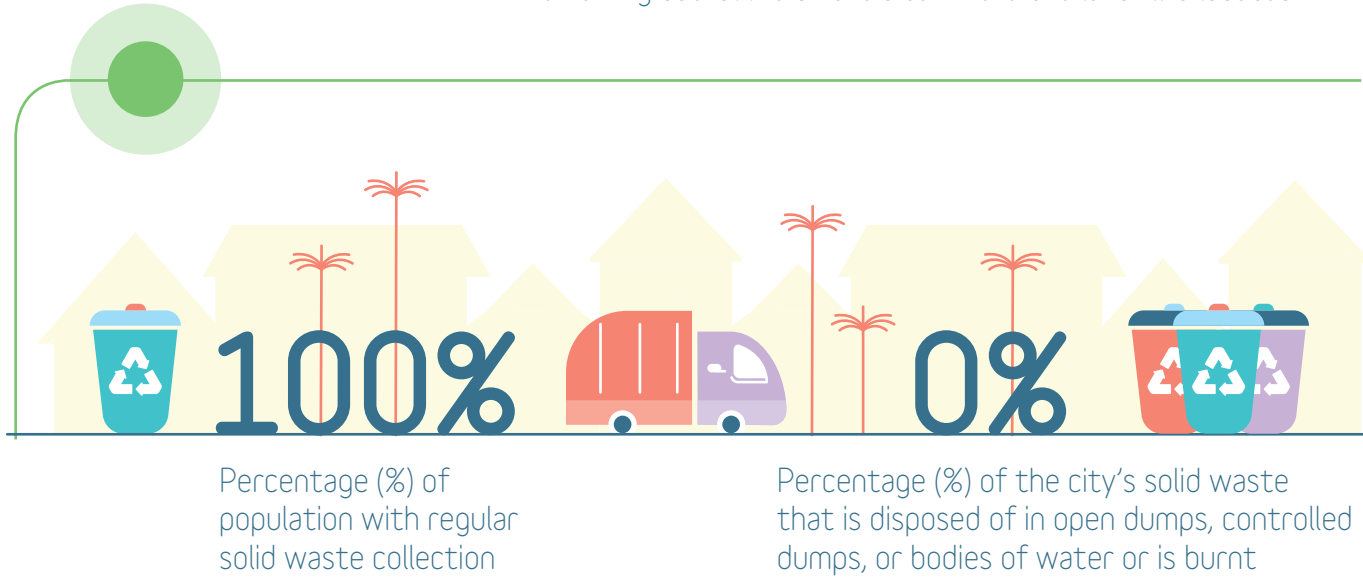
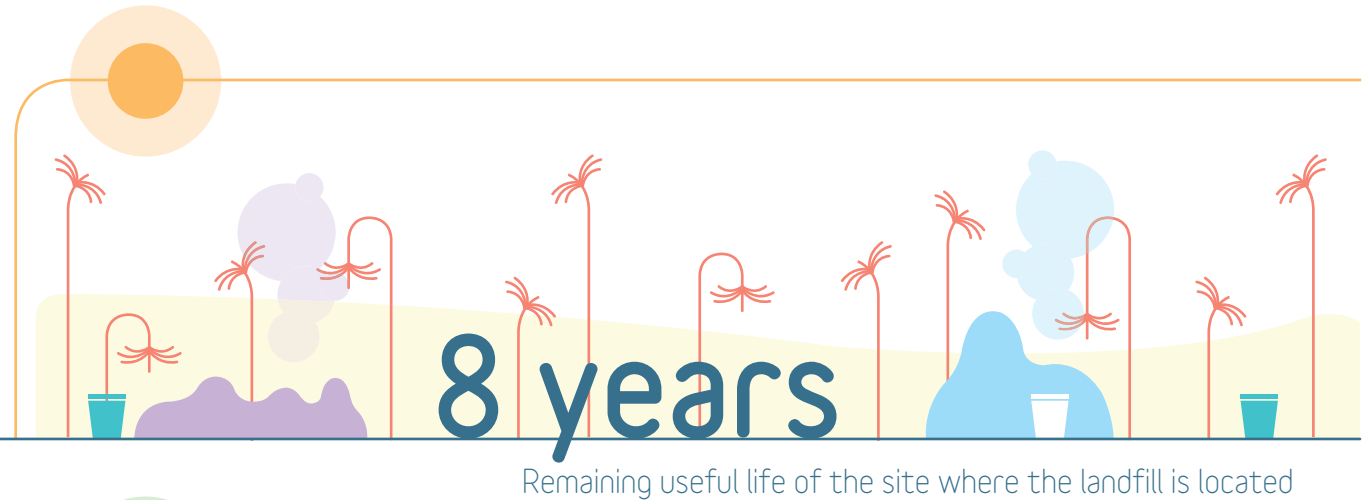
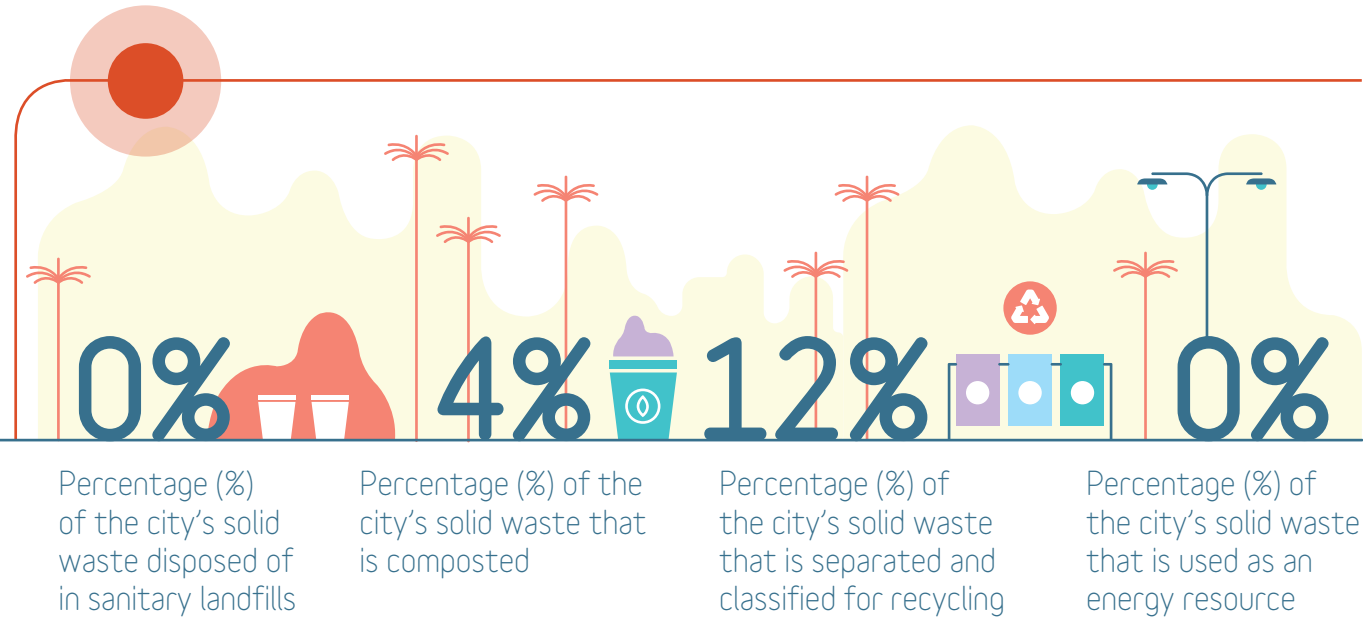
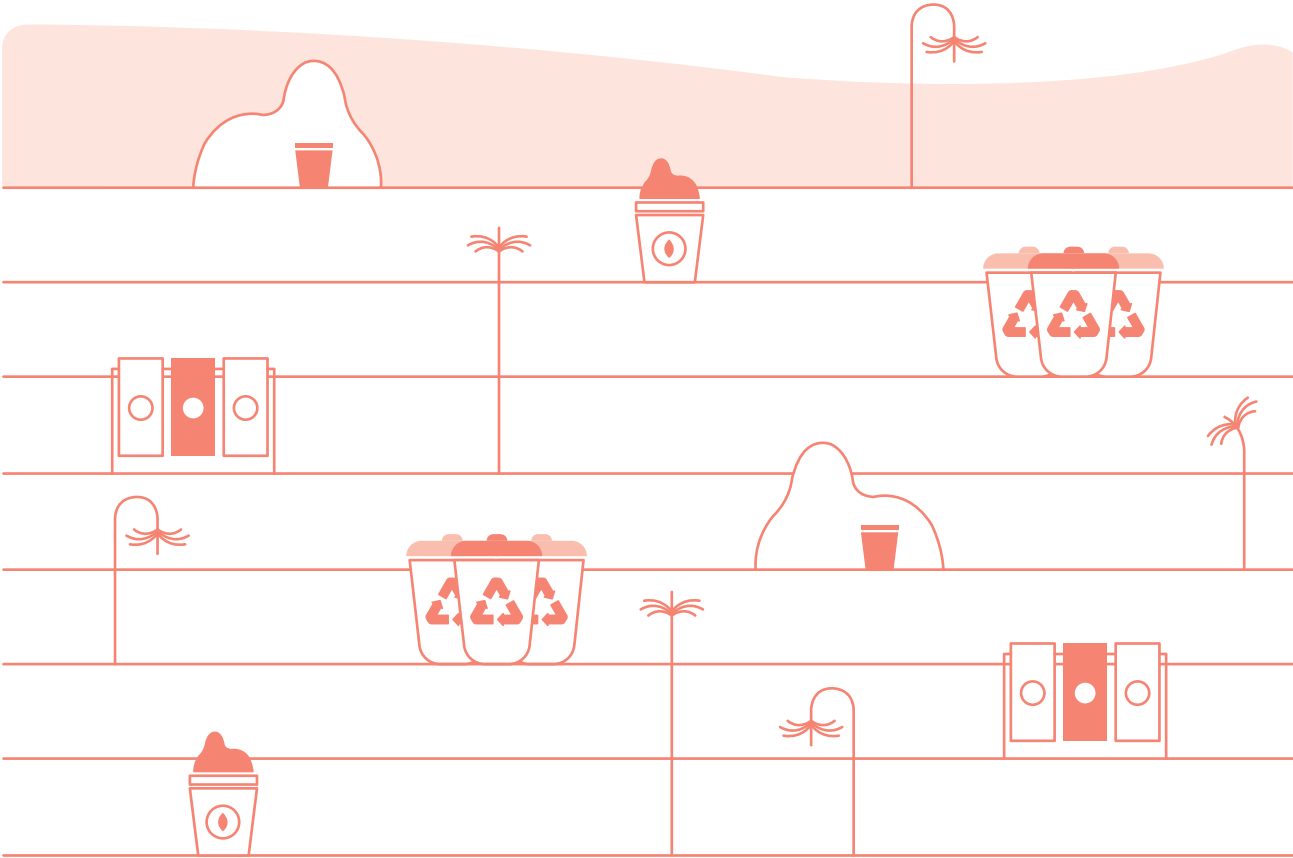
66% say residents’ behaviour is most responsible for the condition of the neighbourhood, followed by local government (16%)



For 98%, their garbage is collected by garbage truck, and 86% say their garbage is collected regularly



Only 11% separate recyclable materials, though the majority (92%) believe recycling positively impacts the environment





# PRIORITY AREAS AS REVEALED BY THE ESC METHODOLOGY

Ultimately, 6 priority areas for Nassau requiring immediate action were identified using the ESC methodology. The process for filtering the original 23 topic areas to arrive at these final 6 is described below.


The goal of the filtering process was to identify the topics that pose the most significant challenges to sustainability of Nassau/NPI as well as to identify key topics of importance that may not be part of local agendas at this time.

In order to perform this filtering process, the ESC methodology applies 5 distinct filters to the original 23 topic areas, including:

Limiting the number of priority topics helps cities concentrate their limited resources on those areas that are both most relevant to achieving urban sustainability and that have the greatest probability of yielding concrete results.

Using the above framework, each topic was assigned a score of 1 to 5 for each of the 5 separate filtering criteria stated above. These individual scores for each topic were then weighted and finally, summed together. The 23 topic areas could then be ranked using these summed scores with the highest scoring topic area given a rank of 1 out of 23. The topics ranked among the top third of the list were presented to the local ESC team as well as key Nassau stakeholders, including the Technical Advisory Committee created to guide the ESC process in Nassau, for further review and validation. With the agreement of the local Nassau team, the highest-ranking topic areas were whittled down to a smaller group of 6 topic priorities — each selected for more detailed analysis and solution strategies. Limiting the number of priority topics helps cities concentrate their limited resources on those areas that are both most relevant to achieving urban sustainability and that have the greatest probability of yielding concrete results.


1



Stoplight Indicators

Rated red, yellow, or green according to regional benchmarks


2



Public opinion survey

Rated according to public opinion on topics that most affect daily life

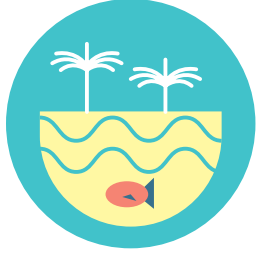
3



Economic impact

i.e., the quantifiable economic cost for Bahamian society, including the "cost of inaction"


4



Climate change and disaster risk

Also known as the environmental filter

5



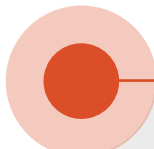
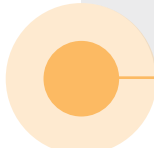
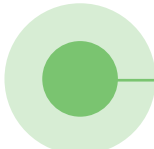
Multi-sectoral links

i.e., the level of interrelation among different topics for a given topic area





The 6 priority issues, in order, for Nassau and NPI that provide the basis for this Action Plan are:

RANKING OF PRIORITIZED TOPICS		LOWER	HIGHER	SCALE
		● ●	● ● ●	1 - 5
	Mobility / Transport	● ● ● ● ●	● ● ● ● ●	4.2
	Energy	● ● ● ● ●	● ● ● ● ●	4.0
	Vulnerability to Natural Disasters	● ● ● ● ●	● ● ● ● ●	3.7
	(Citizen) Security	● ● ● ● ●	● ● ● ● ●	3.5
	Sanitation and Drainage	● ● ● ● ●	● ● ● ● ●	3.5
	Solid Waste Management	● ● ● ● ●	● ● ● ● ●	3.5
	Transparency	● ● ● ● ●	● ● ● ● ●	3.4
	Education	● ● ● ● ●	● ● ● ● ●	3.2
	Water	● ● ● ● ●	● ● ● ● ●	3.1
	Air Quality	● ● ● ● ●	● ● ● ● ●	3.1
	Taxes and Financial Autonomy	● ● ● ● ●	● ● ● ● ●	3.1
	Employment	● ● ● ● ●	● ● ● ● ●	3.0
	Expenditure Management	● ● ● ● ●	● ● ● ● ●	3.0
	Land Use Planning and Zoning	● ● ● ● ●	● ● ● ● ●	3.0
	Participative Public Management	● ● ● ● ●	● ● ● ● ●	2.9
	Modern Public Management	● ● ● ● ●	● ● ● ● ●	2.9
	Debt	● ● ● ● ●	● ● ● ● ●	2.9
	Health	● ● ● ● ●	● ● ● ● ●	2.4
	Noise	● ● ● ● ●	● ● ● ● ●	2.4
	Urban Inequality	● ● ● ● ●	● ● ● ● ●	2.4
	Clima Change Mitigation	● ● ● ● ●	● ● ● ● ●	2.3
	Competitiveness of the economy	● ● ● ● ●	● ● ● ● ●	2.3
	Connectivity	● ● ● ● ●	● ● ● ● ●	1.9





# RESULTS OF ESC STUDIES ON NASSAU

Greenhouse Gas Emissions Inventory and Mitigation Analysis

Disaster Risk and Climate Change Vulnerability Assessment

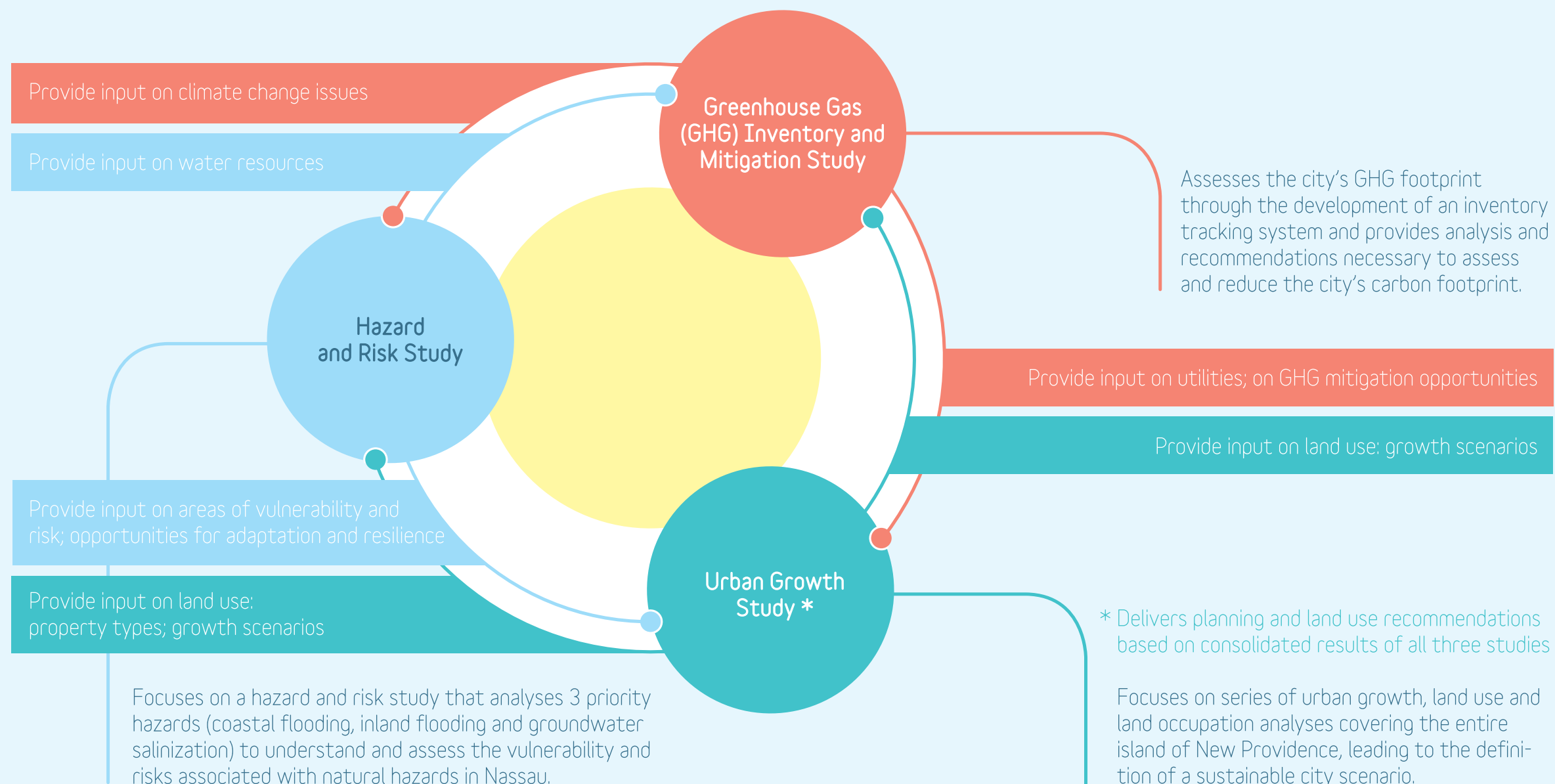
Historical and Current Urban Footprint and Future Urban Scenarios

A set of 3 systematic studies form the common basis for all cities that implement the ESC methodology. These 3 interrelated studies (described below) were commissioned for Nassau and provide the city with the information needed to adapt to and reduce its contribution to climate change, mitigate its vulnerability to natural hazards, and grow in a sustainable way in the years to come. These studies considered Nassau at 2 different levels for their analyses — New Providence Island and Central Nassau.

Through these studies, and a series of diagnostic and prospective analyses of the city's urban and natural systems, the IDB can contribute to Nassau's sustainable development by providing a robust scientific and quantitative foundation for decision-making. Each study establishes baseline measurements and uses these data to project ahead to year 2045 scenarios, effectively providing a more detailed level of data for Nassau than was previously available to the Government. In addition to informing the prioritization of action areas and the action plan itself, these studies serve as important planning tools that can facilitate decision-making by the Bahamian Government.

The 3 studies were conducted in Nassau between 2016 and 2017 by Environmental Resources Management Inc. (ERM), an international consulting firm focused on environmental planning research and analysis. ERM developed these 3 studies, namely the Greenhouse Gas Emissions Inventory and Mitigation Analysis, the Disaster Risk and Climate Change Vulnerability Assessment, and the Historical and Current Urban Footprint and Future Urban Scenarios, in close consultation with local and national stakeholders, as well as with IDB specialists. A brief description of each study type follows:





The following sections present summaries of the 3 studies, as well as summaries of several additional sectoral studies and diagnostics that were conducted to complement the diagnostic phase of the ESC methodology (mobility, water and sanitation, urban design, urban governance, solid waste management, energy efficiency and smart cities solutions).

The interrelationships among these 3 studies are demonstrated in the infographic above. Each study informed the others in specific ways, with the Urban Growth Study providing the most consolidated results. The Urban Growth Study presents growth projections for NPI based on 2 scenarios:

### Business-As-Usual (BAU)

Future growth continues along its current path, without any introduction of key sustainability policies or interventions

### Intelligent Growth

Intelligent growth is encouraged through strong planning policies and controls that promote integration of sustainability principles

\* These 2 distinct scenarios are referenced in each of the 3 study types.



# CLIMATE CHANGE AND NATURAL HAZARDS TERMINOLOGY

## A Carbon dioxide (CO<sub>2</sub>)

A colorless, odorless greenhouse gas. It is produced naturally when dead animals or plants decay, and it is used by plants during photosynthesis. People are adding carbon dioxide into the atmosphere, mostly by burning fossil fuels such as coal, oil, and natural gas. This extra carbon dioxide is the main cause of climate change. (EPA)

## B Greenhouse gas (GHG)

Also sometimes known as “heat trapping gases,” greenhouse gases are natural or manmade gases that trap heat in the atmosphere and contribute to the greenhouse effect (warming of the planetary surface). Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, and fluorinated gases. (EPA)

## C Climate change

A significant change in the Earth’s climate. The Earth is currently getting warmer because people are adding heat-trapping greenhouse gases to the atmosphere. The term “global warming” refers to warmer temperatures, while “climate change” refers to the broader set of changes that go along with warmer temperatures, including changes in weather patterns, the oceans, ice and snow, and ecosystems around the world. (EPA)

## D Global warming

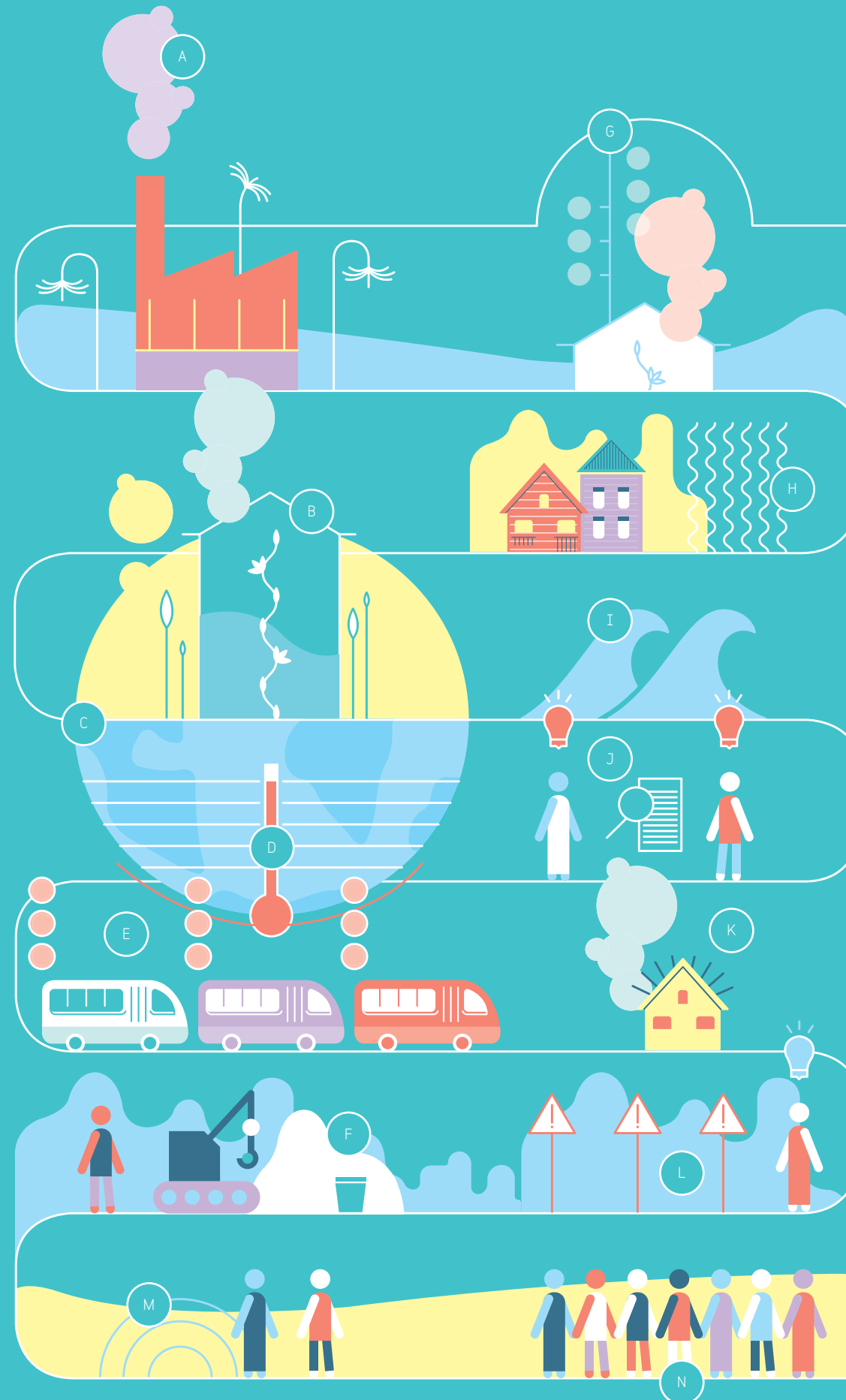
An increase in temperature near the surface of the Earth. Global warming has occurred in the distant past as the result of natural causes. However, the term is most often used to refer to recent and ongoing warming caused by people’s activities. Global warming leads to a bigger set of changes referred to as global climate change. (EPA)

## E Emissions

The release of a gas (such as carbon dioxide) or other substance into the air. (EPA)

## F Land Use and Land Use Change

Land use refers to the total of arrangements, activities, and inputs undertaken in a certain land cover type (a set of human actions). The term land use is also used in the sense of the social and economic purposes for which land is managed (e.g., grazing, timber extraction, and conservation). Land use change refers to a change in the use or management of land by humans, which may lead to a change in land cover. Land cover and land use change may have an impact on the surface reflection and absorption of sunlight, evapotranspiration, sources and sinks of greenhouse gases, or other properties of the climate system and could produce changes in the energy in the atmosphere due to GHG emissions and/or other impacts on climate, locally or globally. (IPCC)



## G Carbon dioxide equivalent (CO<sub>2</sub>e)

A unit of measurement that can be used to compare the emissions of various greenhouse gases based on how long they stay in the atmosphere and how much heat they can trap. For example, over a period of 100 years, 1 pound of methane will trap as much heat as 21 pounds of carbon dioxide. Thus, 1 pound of methane is equal to 21 pounds of carbon dioxide equivalents. (EPA)

## H Carbon footprint

The total amount of greenhouse gases that are emitted into the atmosphere each year by a person, family, building, organization, or company. A person’s carbon footprint includes greenhouse gas emissions from fuel that he or she burns directly, such as by heating a home or riding in a car. It also includes greenhouse gases that come from producing the goods or services that the person uses, including emissions from power plants that make electricity, factories that make products, and landfills where trash gets sent. (EPA)

## I Sea Level Rise (SLR)

As water gets warmer, it takes up more space. Each drop of water only expands by a little bit, but when you multiply this expansion over the entire depth of the ocean, it all adds up and causes sea level to rise. Sea level is also rising because melting glaciers and ice sheets are adding more water to the oceans. (EPA)

## J Adaptation

Taking actions to avoid, benefit from, or deal with current and future climate change. Adaptation can take place in advance (by planning before an impact occurs) or in response to changes that are already occurring. (EPA)

## K Hazard

The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources. (IPCC) Examples of natural hazards include floods, hurricanes, earthquakes, landslides, etc.

## L Mitigation (of natural hazard)

The lessening of the potential adverse impacts of physical hazards (including those that are human-induced) through actions that reduce hazard, exposure, and vulnerability. (IPCC)

## M Mitigation (of climate change)

A human intervention to reduce the sources or enhance the sinks of greenhouse gases. (IPCC)

## N Resilience

The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions. (IPCC)

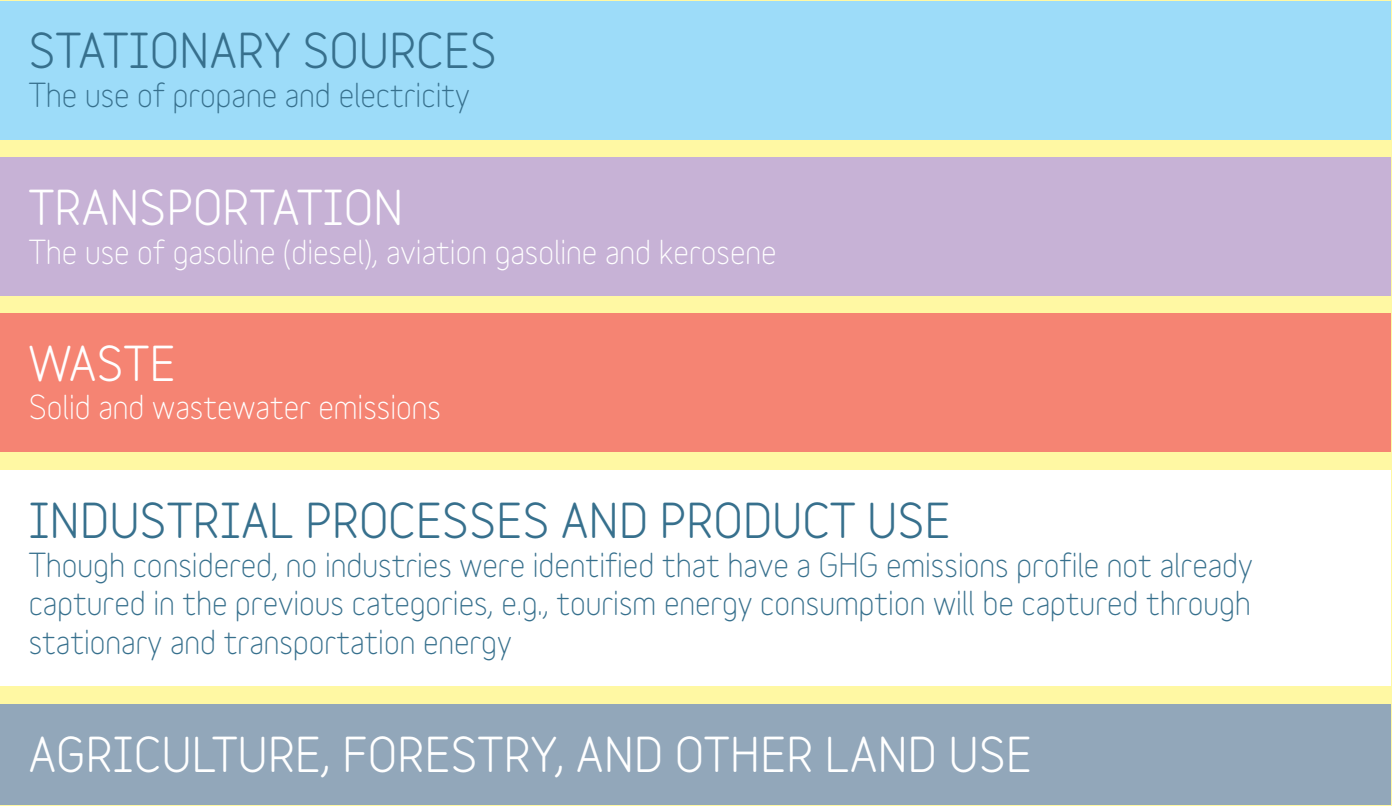
[Definitions obtained and adapted from IPCC and US EPA]



# GHG EMISSIONS INVENTORY AND MITIGATION ANALYSIS

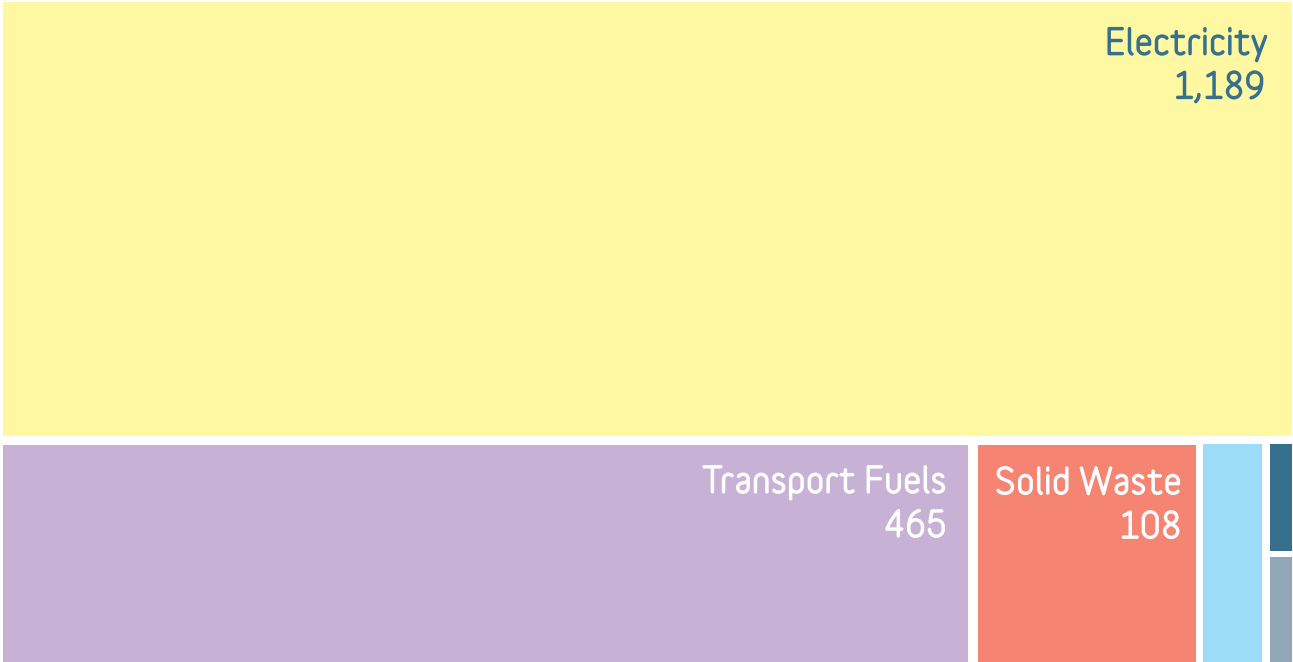
A climate change mitigation assessment was conducted in Nassau to identify the city's GHG footprint through the development of an inventory tracking system (started in 2014), further analysis, and proposed recommendations to better assess and reduce the city's carbon footprint. The GHG inventory was developed in accordance with The Global Protocol for Community Scale Greenhouse Gas Emissions Inventories (GPC) and was based on the geographical boundary of NPI.

66 The study considered the following emission sources:



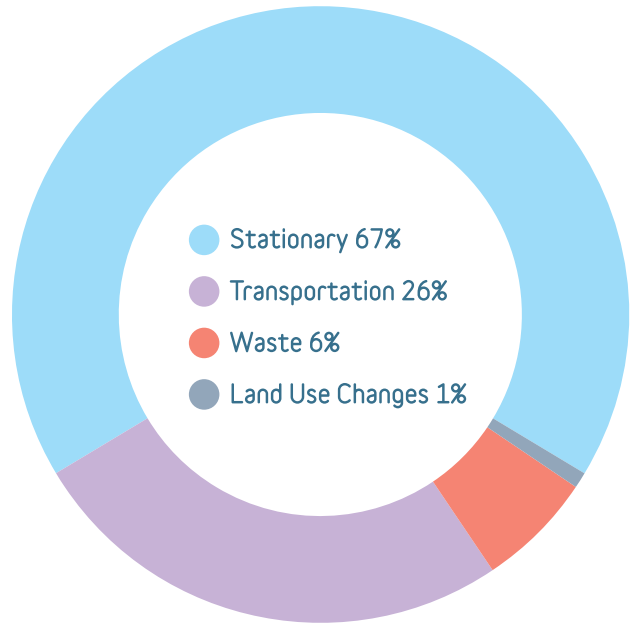
The results of the inventory tracking developed for 2014 are presented below:

## GHG emissions (ktCO<sub>2</sub>e) by sector



2014 Emissions by GPC Sector for New Providence Island

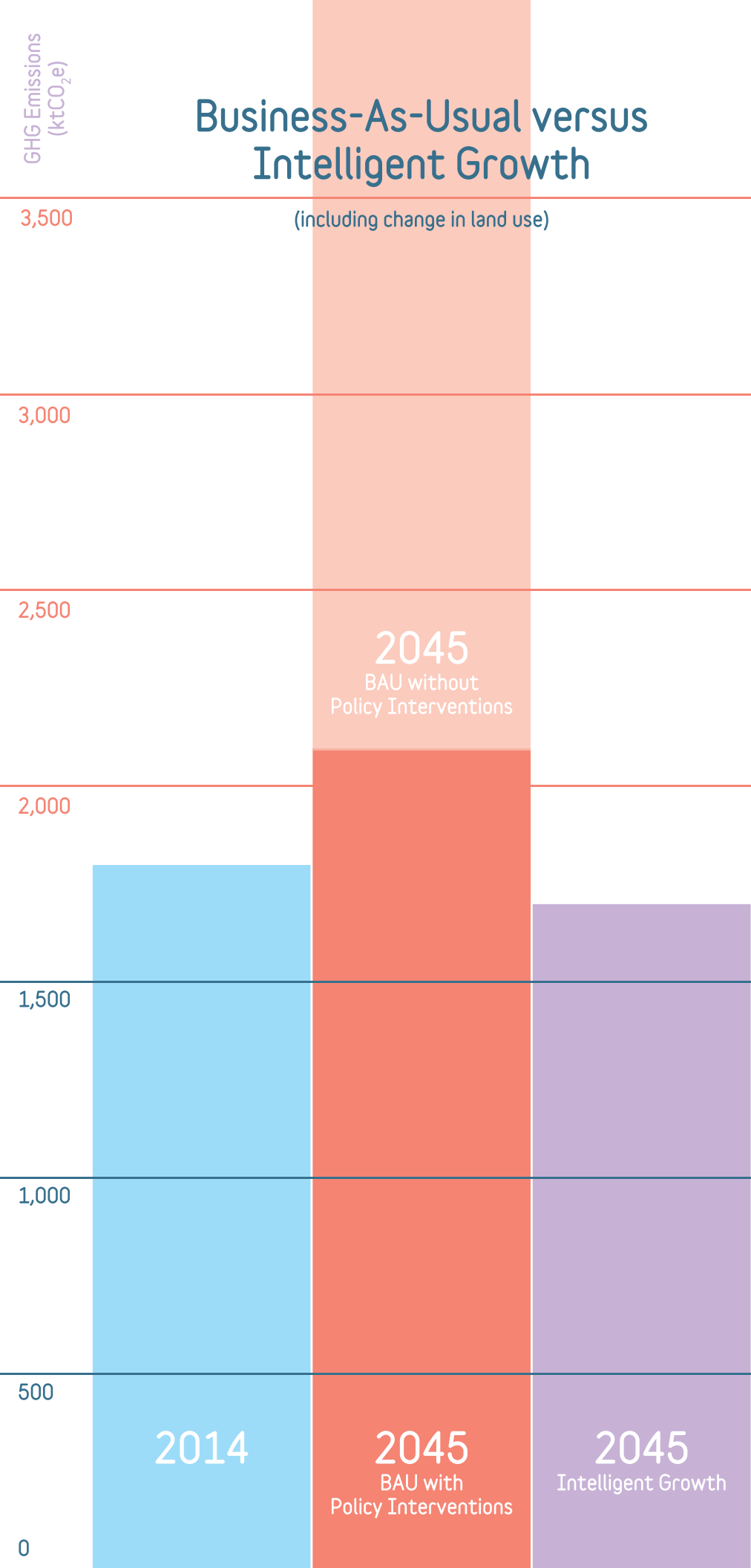
## Emissions by source (2014)



The total emissions in 2014 for the NPI study area were estimated to be approximately 1.81 million metric tons (Mt) of carbon dioxide equivalent emissions (CO<sub>2</sub>e), and the per capita emissions were 6.8 tons (t) CO<sub>2</sub>e (excluding land-use change, e.g., a change in activities occurring on land).

These values are comparable with other Caribbean cities.





20%

growth in GHG emissions by 2045

The study also considered future projections under 2 different scenarios based on scenarios developed in a parallel study on urban growth (see Section 4.3) which include:

**Business-As-Usual (BAU)** where future growth continues along its current path, and only accounting for existing Bahamian Government policies (noting that there is a strong commitment to energy reduction and GHG mitigation through its National Energy Policy) and **Intelligent Growth** where intelligent growth is encouraged through strong planning policies and controls that promote integration of sustainability principles.

The BAU and Intelligent Growth GHG projections are shown in the adjacent figure. The BAU shows a 20% growth in GHG emissions by 2045 (even accounting for the strong existing energy and GHG commitments), whereas the **Intelligent Growth scenario**, based on a series of interventions (additional to the policy interventions), shows an approximate **21% reduction in emissions from the BAU case. Transportation represents a significant opportunity for GHG reductions, and further reduction opportunities have been identified for electricity use, solid waste management and land use change** as follows:

## TRANSPORTATION

- Policies to manage and limit transport growth
- Improvement in efficiency of bus system and services
- Increased shift away from private vehicles
- Increased use of biofuels
- Densification (people and buildings closer together)
- Program to improve efficiency of marine craft
- Government car and van pooling

## ELECTRICITY

- Hotel energy efficiency program
- Municipal buildings energy efficiency
- Street lighting efficiency

## WASTE

- Increased reuse and recycling of materials, re-purposing, and diversion of waste from final disposal

## CHANGES IN LAND USE

- Densification - avoid further sprawling city development by having more people and buildings per m<sup>2</sup>



The estimated per capita emissions are currently at 6.8 tCO<sub>2</sub>e (tonnes of carbon dioxide equivalent) for NPI based on the 2014 inventory. These per capita emissions are projected to decrease by 14% in the BAU scenario principally due to the strong policies proposed through the Government's existing energy policy. Under the Intelligent growth scenario, the per capita emissions would decrease by an even greater 30% (compared to the 2014 baseline).

In support of the mitigation options identified, a prioritization and decision-making framework was presented using the marginal cost curve reduction (MACC) approach. A MACC allows for the identification of the best GHG mitigation interventions as well as an assessment of their economic performance. A MACC has been developed for **a suite of identified mitigation options** and the assessment shows that each of the mitigation options **not only reduce GHG emissions, but also provide economic benefits upon implementation**. All the identified options result in a positive economic return. It should be noted that the cost estimates and mitigations of GHG presented and the final MACC are illustrative, based on experience of similar cities. The results provide examples for decision-makers of the potential interventions available, the co-benefits associated with the potential mitigation options as well as a framework for next steps.

The study also identified some actions focused on improving the baseline data set and next steps for advancing the mitigation options. These actions can be found integrated into Chapter 5 (Action Plan).

All the identified options are net positive in terms of economic payback

6.8

tCO<sub>2</sub>e/person

5.8

tCO<sub>2</sub>e/person

4.7

tCO<sub>2</sub>e/person

Per capita GHG emissions  
(excludes land use change)

2014

2045

BAU with  
Policy Interventions

2045

Intelligent Growth

# DISASTER RISK AND CLIMATE CHANGE VULNERABILITY ASSESSMENT

By virtue of the fact that Nassau's urban areas have come to occupy the majority of the island, the area selected for this study comprises all of New Providence Island (including Paradise Island), collectively referred to as NPI. This study analyses 3 priority natural hazards that pose significant threats to NPI and Nassuvians — inland flooding, coastal flooding and groundwater salinization. The outcomes of this hazard and risk assessment were used to understand and evaluate the vulnerability of both infrastructure and human assets and the risks associated with these natural hazards. The prioritized hazards evaluated for NPI were selected based on a literature review of hazard event records and information, discussions with IDB specialists and key Bahamian stakeholders.

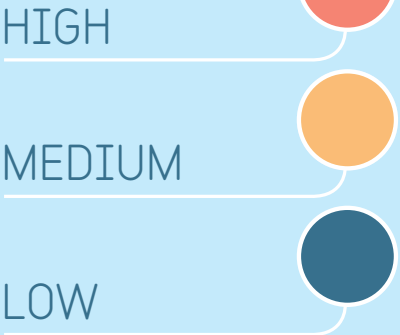
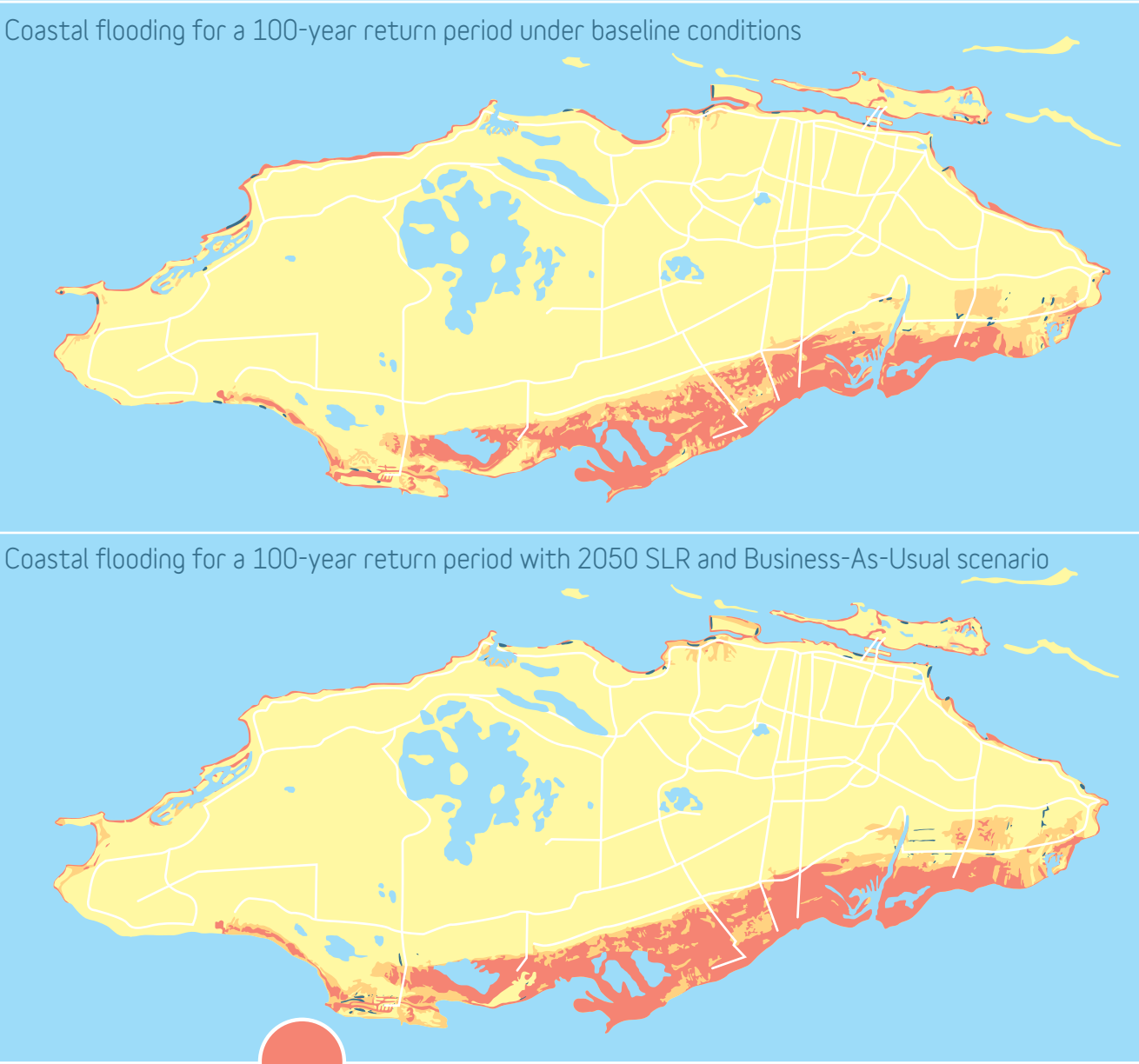
The hazard and risk assessment considered the evaluation of a series of current and future scenarios which include different conditions and factors that can produce impacts on economic and human assets. The process to evaluate hazard and risk in NPI under these scenarios consisted of:

- Identifying climate change projections (obtained from The Second National Communication Report of The Commonwealth of The Bahamas)
- Developing profiles for the prioritized hazards
- Assessing vulnerability (exposed buildings and population)
- Estimating losses and conducting an economic and population-based risk assessment
- Proposing and evaluating 5 mitigation/adaptation measures that can be implemented in high-risk areas.



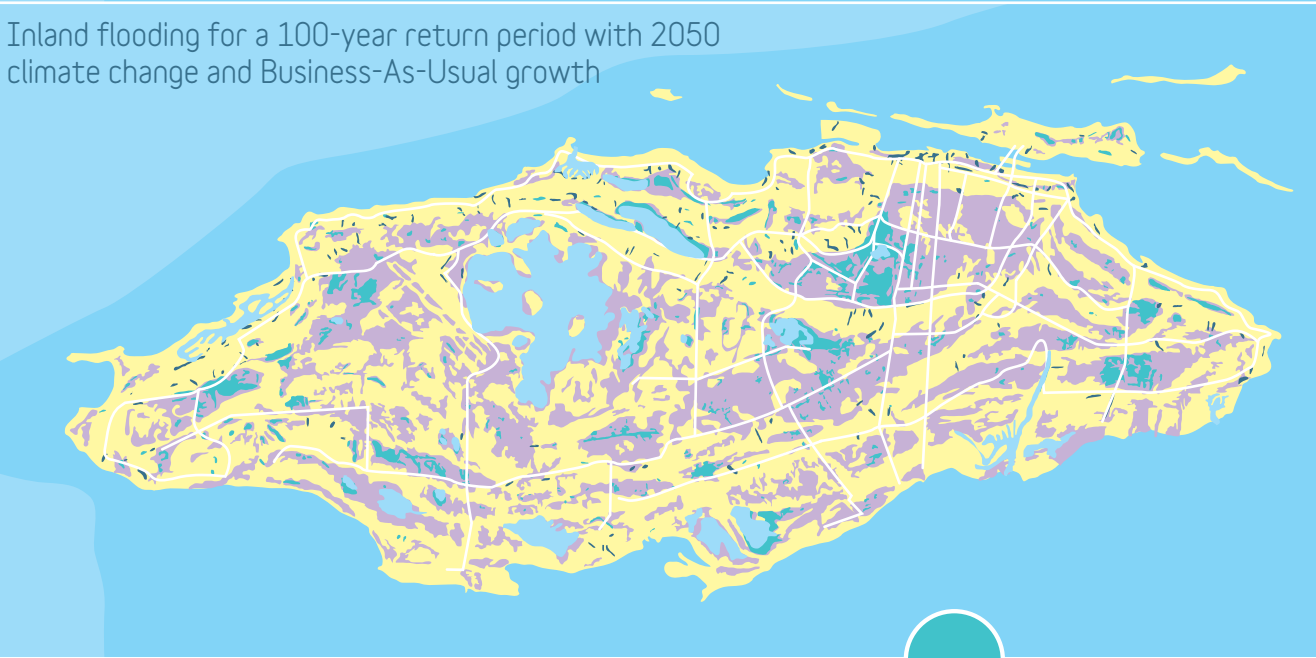
HAZARDS

**Coastal flooding** occurs most severely along the southern coast of NPI, where there are lower elevations and the predicted storm surge is the highest. For a coastal flooding event with a 100-year return period, and with projected sea level rise (SLR) to 2050, there is a large area of the island that could experience highly hazardous coastal flooding.



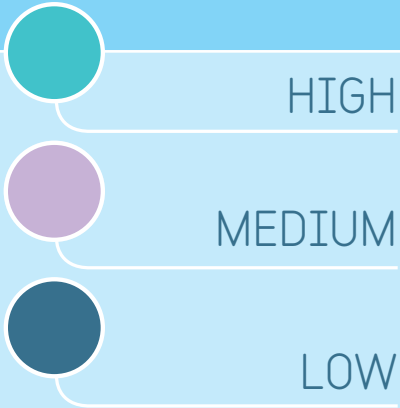
Assessment of **inland flooding** hazards indicate that with climate change and current land use, the total potential inundated area is estimated to be approximately 106 km<sup>2</sup> for a 100-year event. These areas vulnerable to flooding will change and may increase depending upon the future growth trajectory NPI may follow. The main drivers producing inland flooding are associated with urban development (mainly on the east side of NPI) that has generated an increase in impervious surfaces in the form of roads, buildings, parking lots, and shopping centres. Impervious surfaces do not allow absorption of water into the ground, and lead to waters running into other areas that can quickly become oversaturated. The soils of NPI are calcareous and sandy, making them highly permeable. These types of soils can quickly absorb water avoiding the formation of natural perennial streams. However, NPI's soils rapidly become saturated due to the high-water table and associated tidal influences on

Inland flooding for a 100-year return period under baseline conditions



groundwater levels, producing floods which are prolonged by the slow seepage process (flood waters trickling down to the sea), which is the only natural way to deal with the excess water runoff.

NPI is considered highly vulnerable to **groundwater salinization**, both because the freshwater lenses are being overexploited and due to contamination. Aquifers in NPI have been historically threatened and the projected reduction of precipitation and increase in population for the 2050 horizon would continue affecting freshwater availability and demand in NPI. In addition to groundwater salinization, groundwater resources in NPI are prone to natural and anthropogenic contamination given the nature of freshwater resources (high water table), soil, climate and geology (low-lying limestone) of NPI as well as the limited wastewater disposal network. Swamps and/or marshes are often used for waste disposal and untreated domestic wastes and effluents are directly discharged to groundwater, representing one of the main threats to groundwater resources in NPI.



\* Maps reinterpreted for publication purposes. For original maps please consult IDB Urban Dashboard.

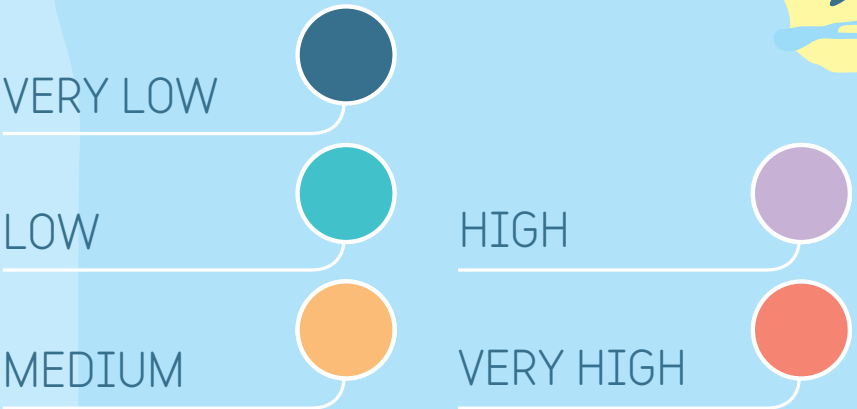
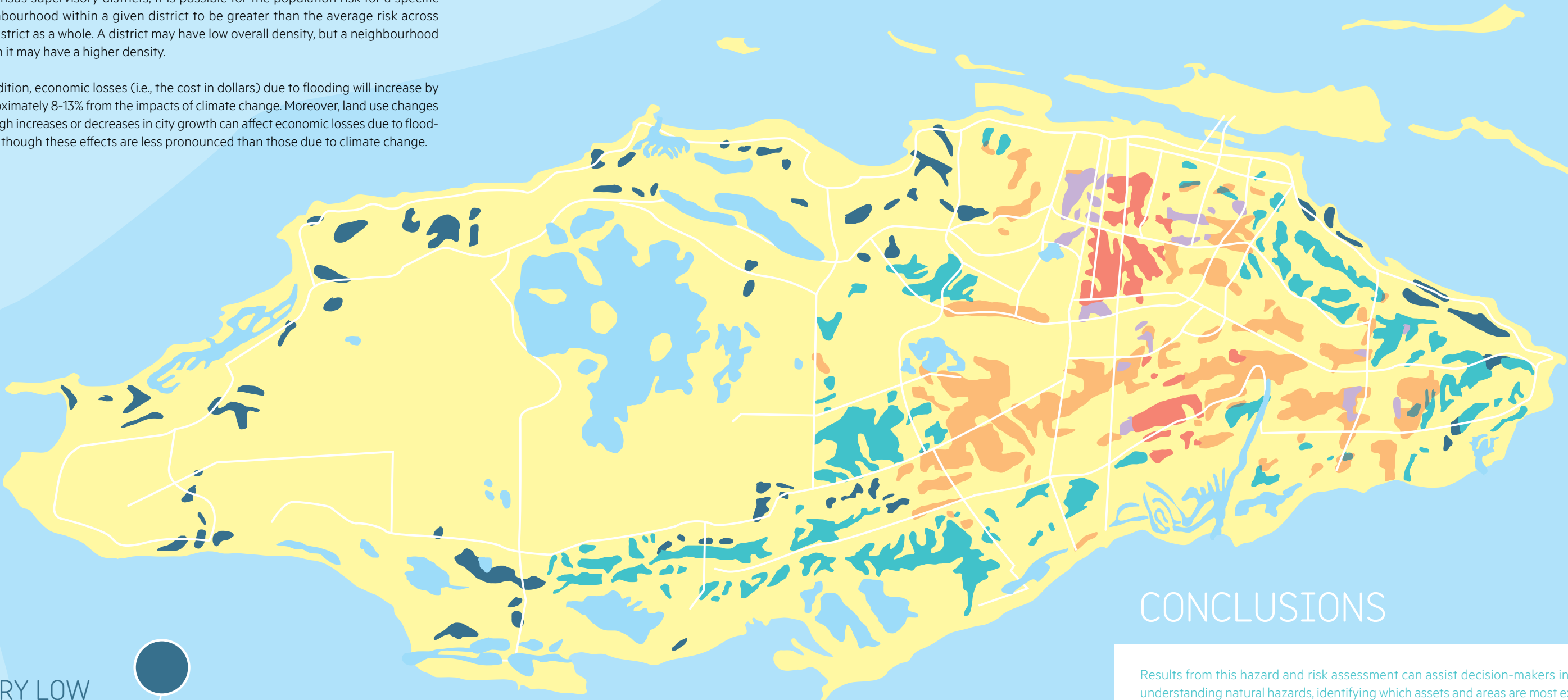


# RISKS

High-risk areas in NPI are classified based on their vulnerability to experience the most severe flooding, and tend to be concentrated in central parts of Nassau where there is low lying ground, high population density and a large number of buildings. Much of the western side of NPI has been assessed as a low-risk due to the comparatively low population density. Because population density is determined based on census supervisory districts, it is possible for the population risk for a specific neighbourhood within a given district to be greater than the average risk across the district as a whole. A district may have low overall density, but a neighbourhood within it may have a higher density.

In addition, economic losses (i.e., the cost in dollars) due to flooding will increase by approximately 8-13% from the impacts of climate change. Moreover, land use changes through increases or decreases in city growth can affect economic losses due to flooding, although these effects are less pronounced than those due to climate change.

Combined population and economic risk for a 100-year return period inland flood



\* Maps reinterpreted for publication purposes. For original maps please consult IDB Urban Dashboard.

# CONCLUSIONS

Results from this hazard and risk assessment can assist decision-makers in better understanding natural hazards, identifying which assets and areas are most exposed to the prioritized natural hazards, estimating the probabilistic damage and loss with and without climate change consideration, and by improving decision-making for risk mitigation to reduce infrastructure damage and loss of human life. This study also included a list of potential adaptation and mitigation measures that could be implemented to increase the resilience of NPI to the prioritized natural hazards and the expected exacerbation of these hazards produced by climate change. Cost-benefit analyses were conducted for 5 adaptation measures to illustrate the benefits and opportunities for adaptation and management.



# URBAN DEVELOPMENT TERMINOLOGY

## A URBAN

Of, relating to, characteristic of, or constituting a city. Urban areas are generally characterized by moderate and higher density residential development (i.e., three or more dwelling units per acre), commercial development, and industrial development, as well as the availability of public services required for that development, specifically central water and sewer, an extensive road network, public transit, and other such services (e.g., safety and emergency response). Development not providing such services may be nonurban or rural.

## B URBAN FOOTPRINT

The outline at the surface level of the total urbanised area of a territory.

## C URBAN DEVELOPMENT

The act of bringing about growth; the physical extension and/or construction of urban land uses, to include construction or alteration of a structure, making changes in use or appearance of land, dividing land into parcels, or creating or terminating rights of access.

## D URBAN DENSITY

The physical extension and/or construction of urban (city) land uses. Development activities include: subdivision of land; construction or alteration of structures, roads, utilities, and other facilities; installation of septic systems; grading; deposit of refuse, debris, or fill materials; and clearing of natural vegetative cover (with the exception of agricultural activities). Routine repair and maintenance activities are exempted.

## E DENSIFICATION

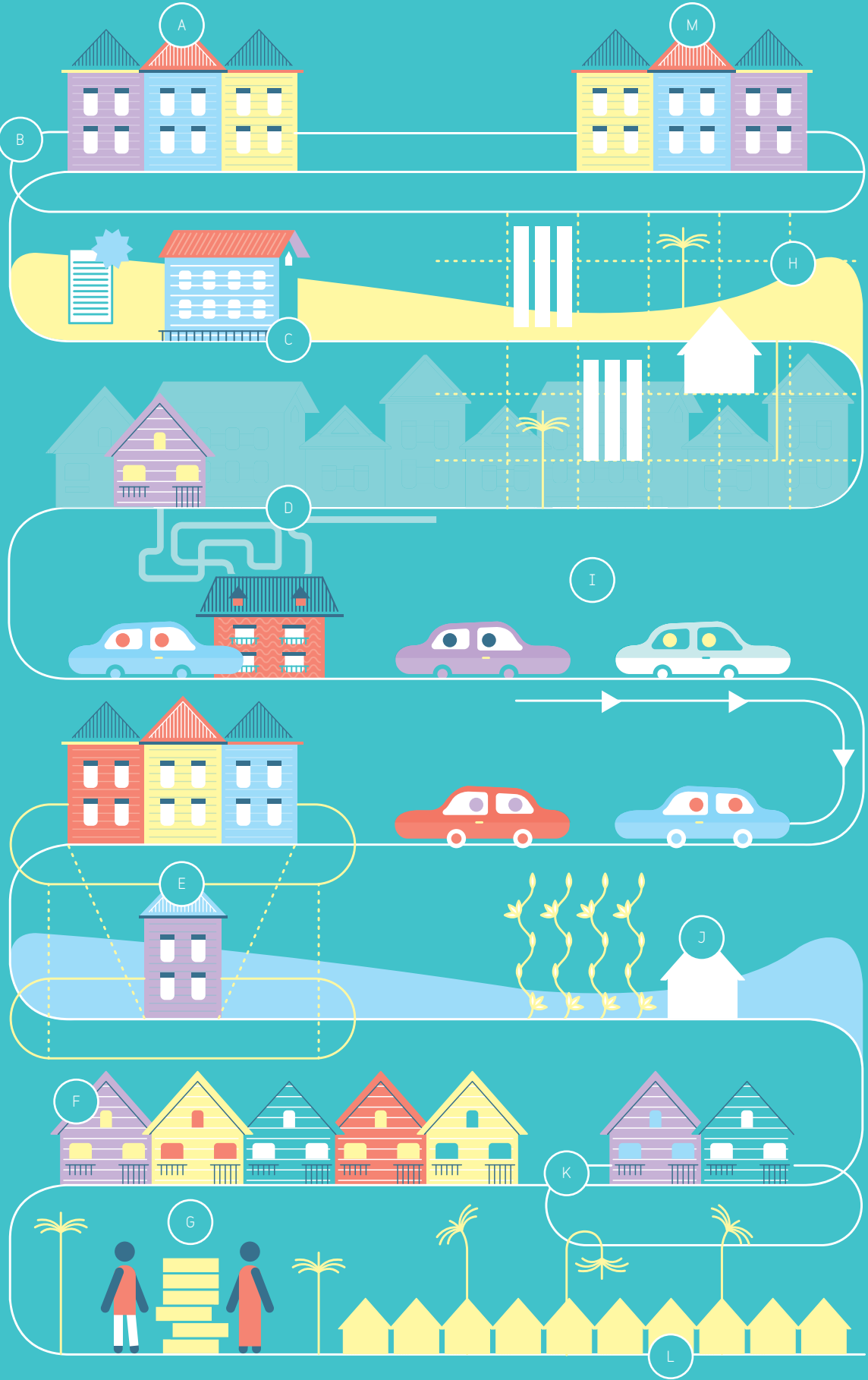
Compact growth that increases the ratio of residential units to land area.

## F URBAN GROWTH

Development that makes intensive use of land for the location of buildings, other structures, and impermeable surfaces to such a degree as to be incompatible with the primary use of such land for the production of food, fiber, or other agricultural products, or the extraction of mineral resources and that, when allowed to spread over wide areas, typically requires urban services.

## G BUILT ENVIRONMENT

The elements of the environment that are generally built or made by people as contrasted with natural processes.



## H SMART/INTELLIGENT GROWTH

Planning, regulatory, and development practices and techniques founded upon and promoting the following principles: 1) using land resources more efficiently through compact building forms, infill development, and moderation in street and parking standards in order to lessen land consumption and preserve natural resources; (2) supporting the location of stores, offices, residences, schools, recreational spaces, and other public facilities within walking distance of each other in compact neighborhoods that are designed to provide alternate opportunities for easier movement and interaction; (3) providing a variety of housing choices so that the young and old, single persons and families, and those of varying economic ability may find places to live; (4) supporting walking, cycling, and transit as attractive alternatives to driving; providing alternative routes that disperse, rather than concentrate, traffic congestion; and lowering traffic speeds in neighborhoods; (5) connecting infrastructure and development decisions to minimize future costs by creating neighborhoods where more people use existing services and facilities, and by integrating development and land use with transit routes and stations; and (6) improving the development review process and development standards so that developers are encouraged to apply the principles stated above.

## I URBANISATION

The process of people moving from rural areas to cities that results in the physical growth and development of urban areas (Science Daily)

## J LAND USE

The type of use activity occurring on a land parcel or within a building situated upon a land parcel.

## K ZONING

The process of classifying land into areas and districts, such areas and districts being generally referred to as “zones” and the prescribing and application in each area and district of regulations concerning building and structure designs, building and structure placement, and uses to which land, buildings, and structures within such designated areas and districts may be put.

## L SPRAWL

Haphazard growth or outward extension of a city resulting from uncontrolled or poorly managed development. (California Planning Roundtable) Typically characterized by low-density land-use patterns that are automobile-dependent, energy and land consumptive, and require a very high ratio of road surface to development served.

## M INFRASTRUCTURE

Man-made physical structures (facilities, buildings, public utilities and services, etc.) that allow society to function and sustain communities. Examples include buildings, roads, water pipelines, sewers, electric power lines, schools, parks, railways, and airports.

[Definitions obtained or adapted from the American Planning Association, unless otherwise noted]



# NASSAU'S URBAN FOOTPRINT AND FUTURE SCENARIOS

The island is home to approximately 270,000 people, which amounts to approximately two-thirds of the country's total population.

NPI is the country's centre of economic activity, human capital, and physical infrastructure. The island is home to approximately 270,000 people, which amounts to approximately two-thirds of the country's total population. The island possesses important natural, physical and economic assets — 354 hectares of green area per 100,000 residents, 84 hectares of public recreational space per 100,00 residents, 74.6 miles of coastline, and an infrastructure index quantitatively and qualitatively superior to the rest of LAC region. Located only a short distance away from the US market (179 miles or a 45-minute flight to Miami) NPI has also long benefited from a thriving tourism sector.

Despite these competitive advantages, NPI faces several financial, social and environmental challenges that severely threaten the island's future growth potential. To start, The Bahamas is on the brink of fiscal consolidation due to a high fiscal deficit, an elevated Debt-to-GDP ratio of 65%, and limited tax revenue streams. Aggravating these challenges, income distribution has progressively deteriorated, resulting in a Gini coefficient of 0.44. The latter results in visible levels of urban poverty throughout NPI, particularly in the Over-the-Hill neighbourhoods of Grants Town and Bain Town. Managing urban density in a sustainable way and successfully attracting residents back to the downtown Nassau core area, where the concentration of people can yield significant fiscal and environmental savings, are vexing challenges the island must confront.

New Providence

Urban Footprint

1776

1884

1938

1949

1969

1979

Water

Ocean

\* Maps reinterpreted for publication purposes. For original maps please consult IDB Urban Dashboard.

1884

1938

Evolution of the urban footprint from 1884 through 1979, per various historical maps

1949

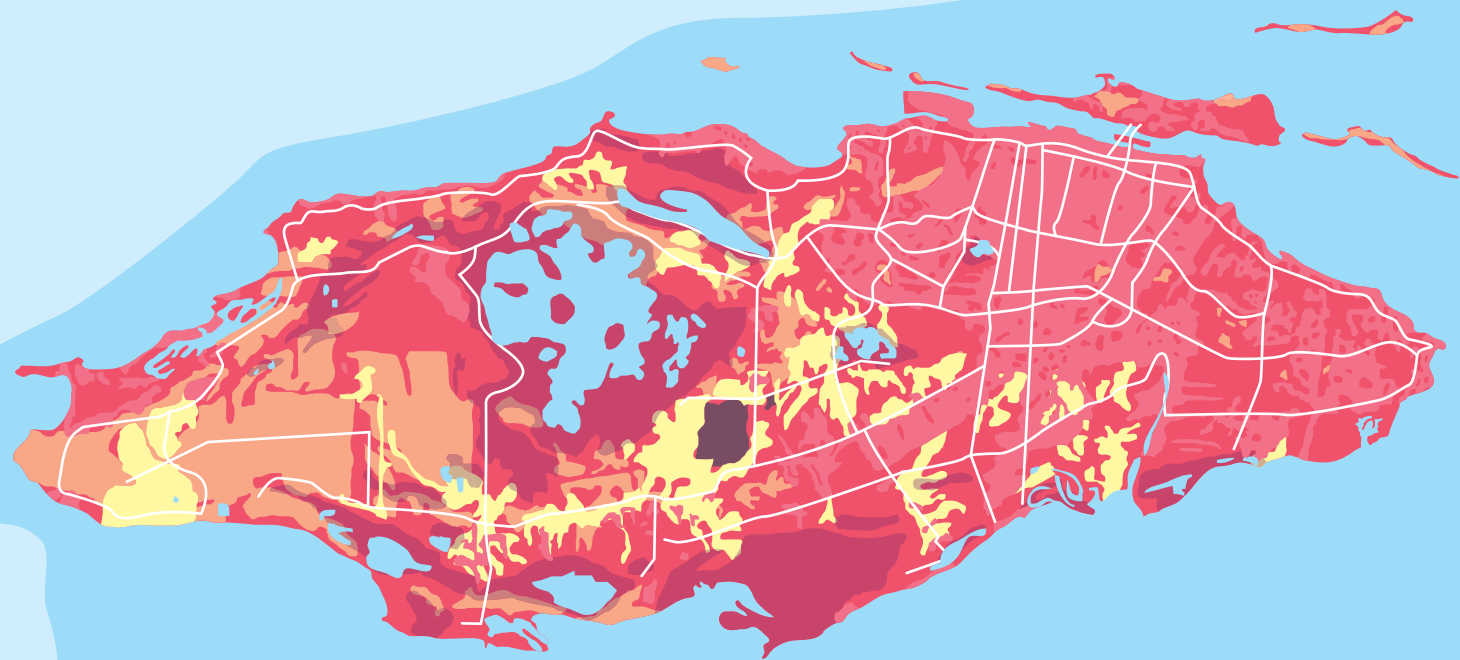
1969

1979

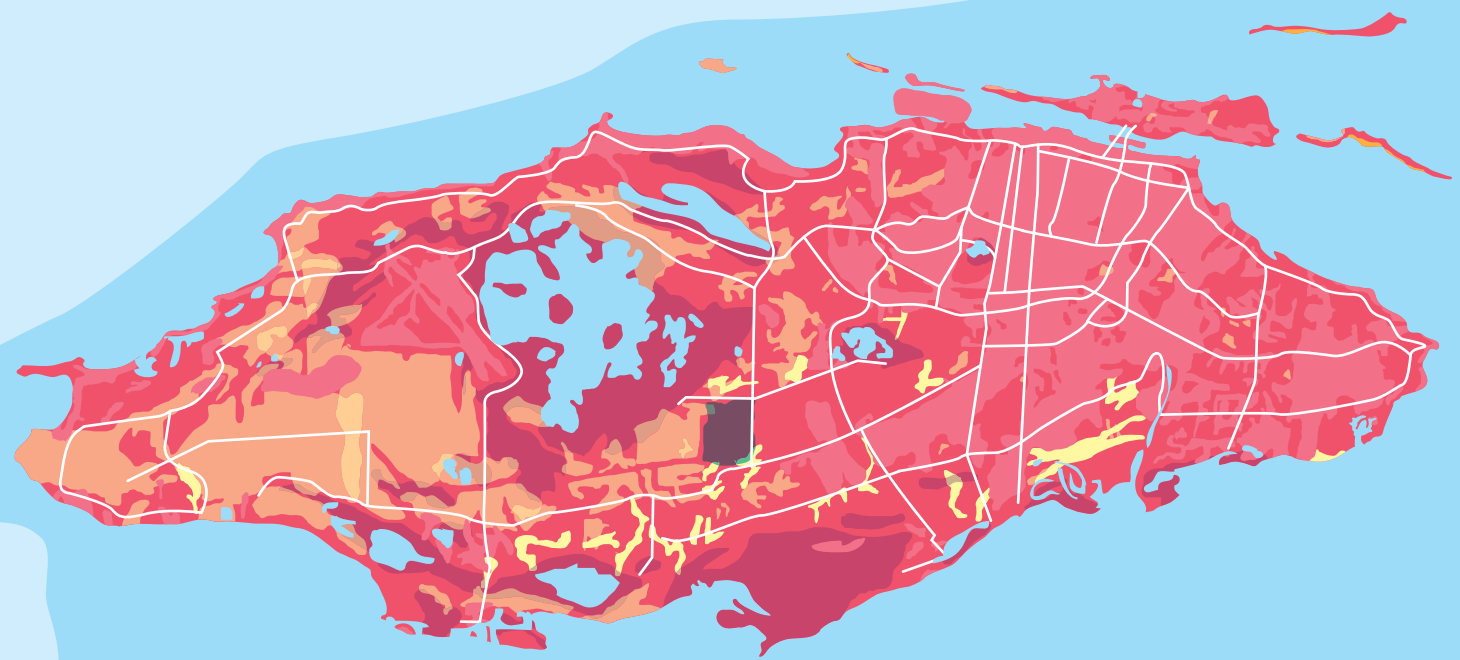


Evolution of land cover  
New Providence Island, Bahamas

1986

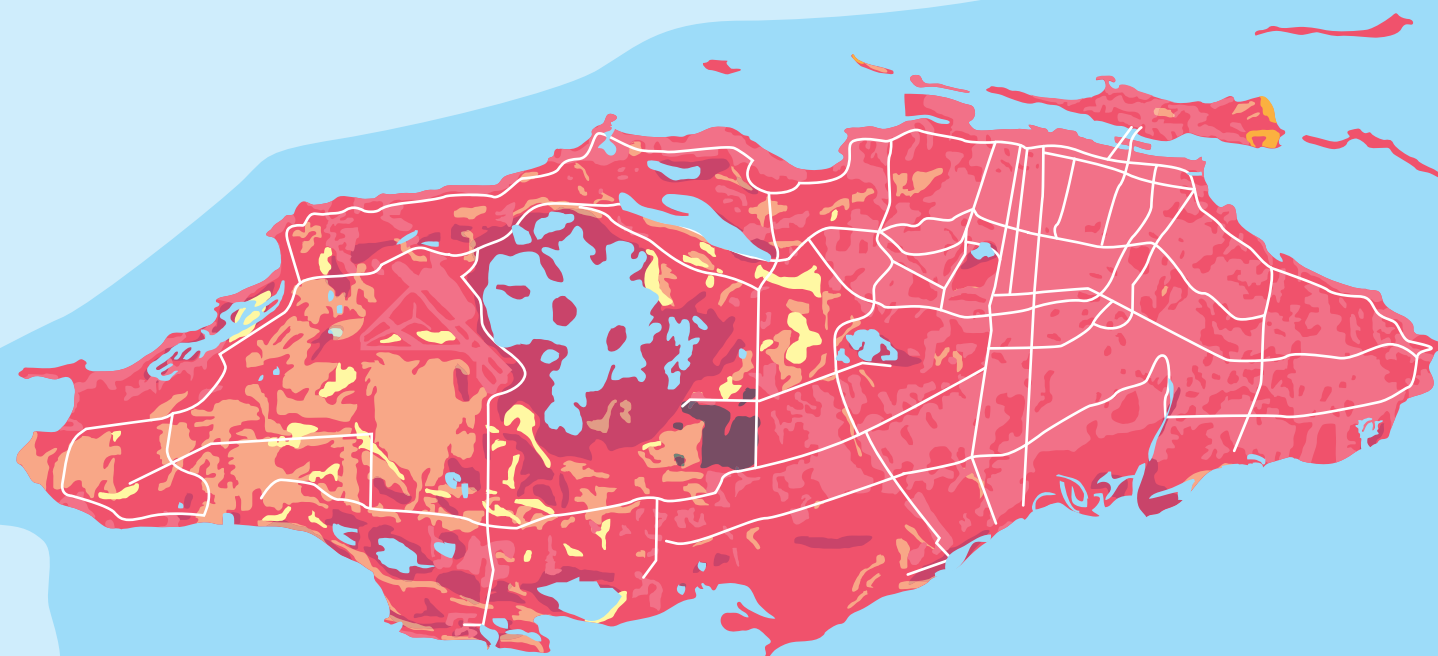


1995



\* Maps reinterpreted for publication purposes. For original maps please consult IDB Urban Dashboard.

2005



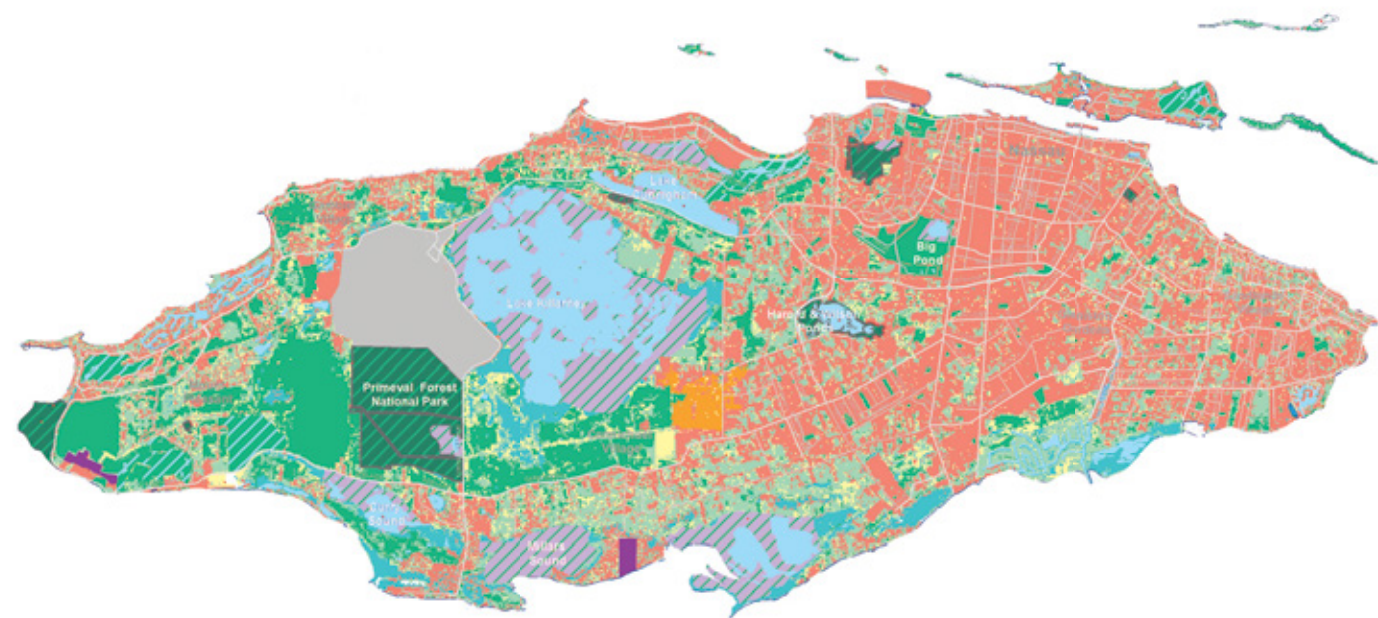
2014



- Forest
- Wetland
- Semivegetation
- Open
- Urban
- Agriculture
- Beach



# New Providence's Current Baseline Urban Footprint



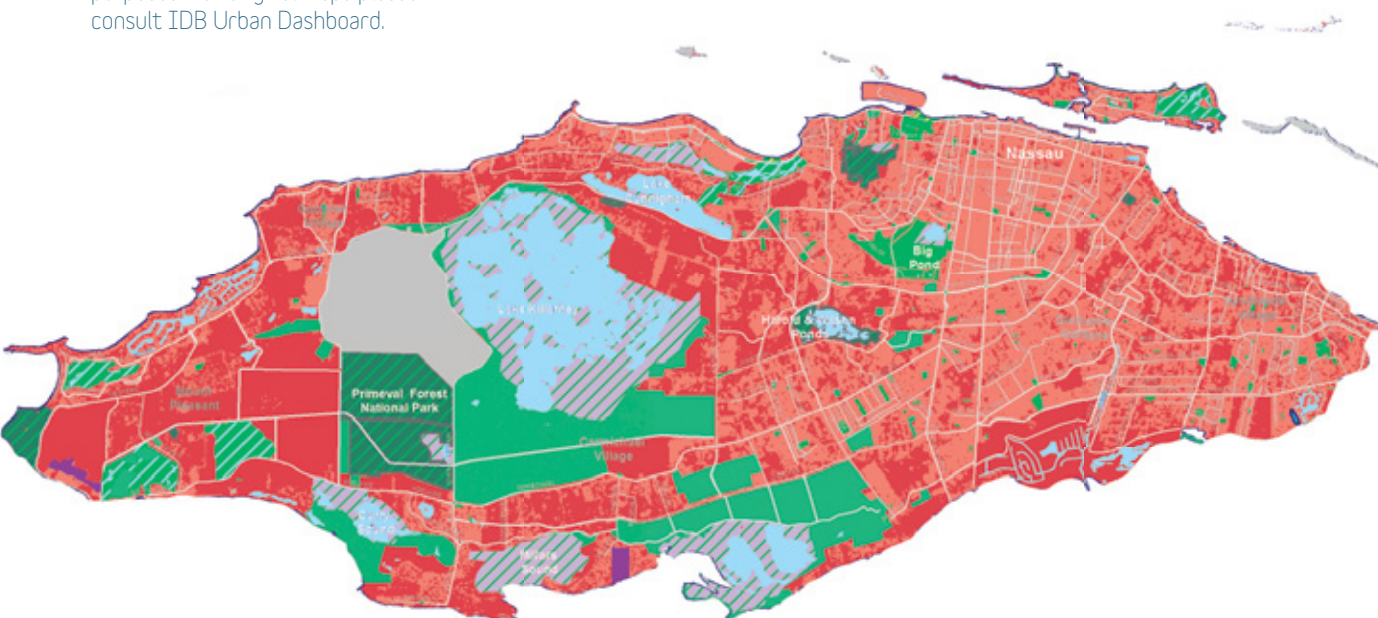
82



A review of the historical patterns of land cover, using satellite imagery of NPI over the period between 1986 and 2014, as well as consideration of current land use, revealed that all land cover/use types lost territory except for urban and semi-vegetated types. This meant that by 2014, the breakdown of NPI land use was as follows:

# New Providence's Future Business-As-Usual Urban Footprint for 2045

\* Maps reinterpreted for publication purposes. For original maps please consult IDB Urban Dashboard.



83



36%  
Urbanized areas

36%  
Natural areas

28%  
"At-risk" areas  
(cleared for development but not yet developed)



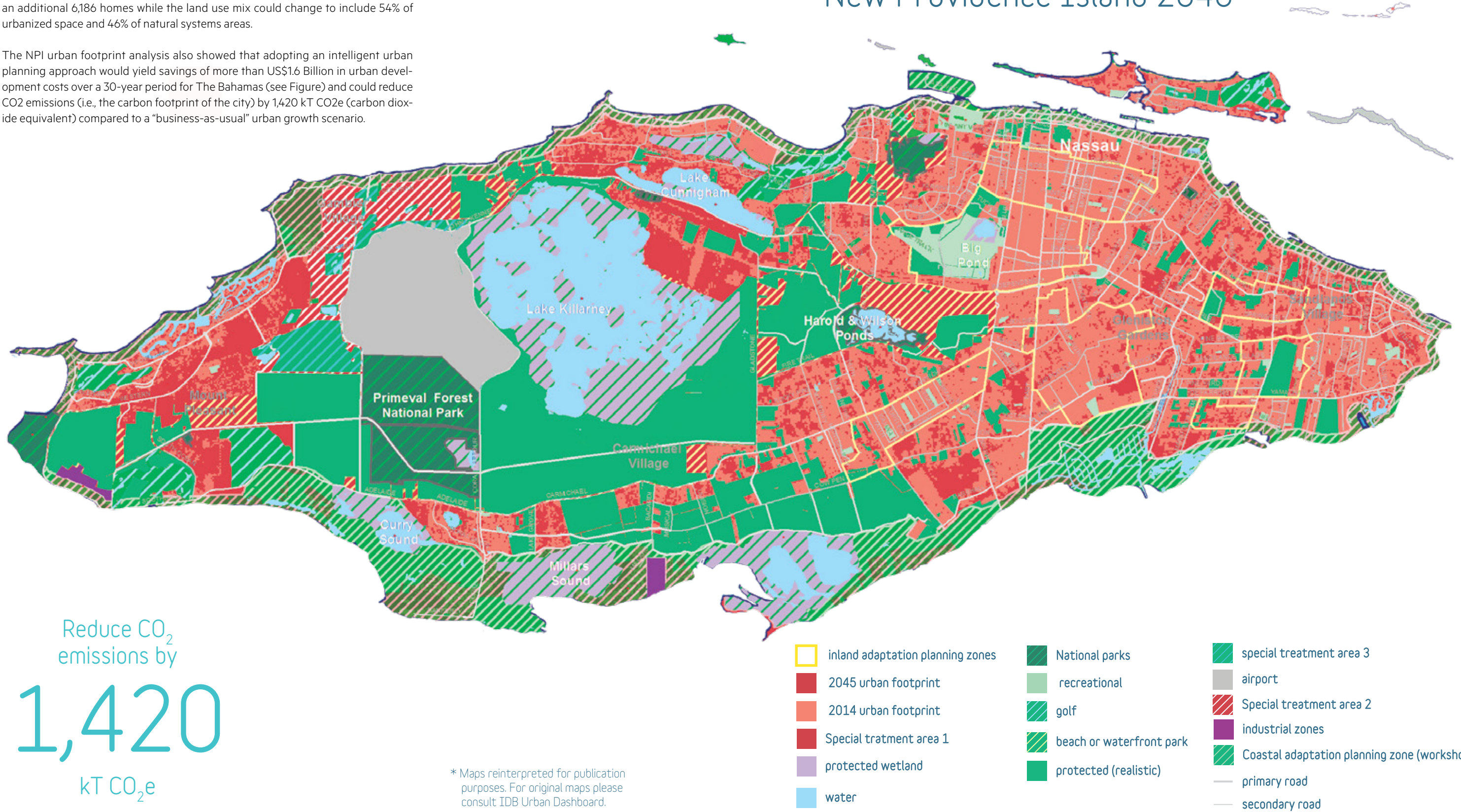
A rigorous analysis of the NPI urban footprint yielded significant evidence that the island should shift to a sustainable urban development trend in preparation for the expected 367,500 persons who will be living on the island by 2045. Under the **intelligent growth scenario**, the expected housing demand for 2045 can be met with an additional 6,186 homes while the land use mix could change to include 54% of urbanized space and 46% of natural systems areas.

The NPI urban footprint analysis also showed that adopting an intelligent urban planning approach would yield savings of more than US\$1.6 Billion in urban development costs over a 30-year period for The Bahamas (see Figure) and could reduce CO2 emissions (i.e., the carbon footprint of the city) by 1,420 kT CO2e (carbon dioxide equivalent) compared to a “business-as-usual” urban growth scenario.

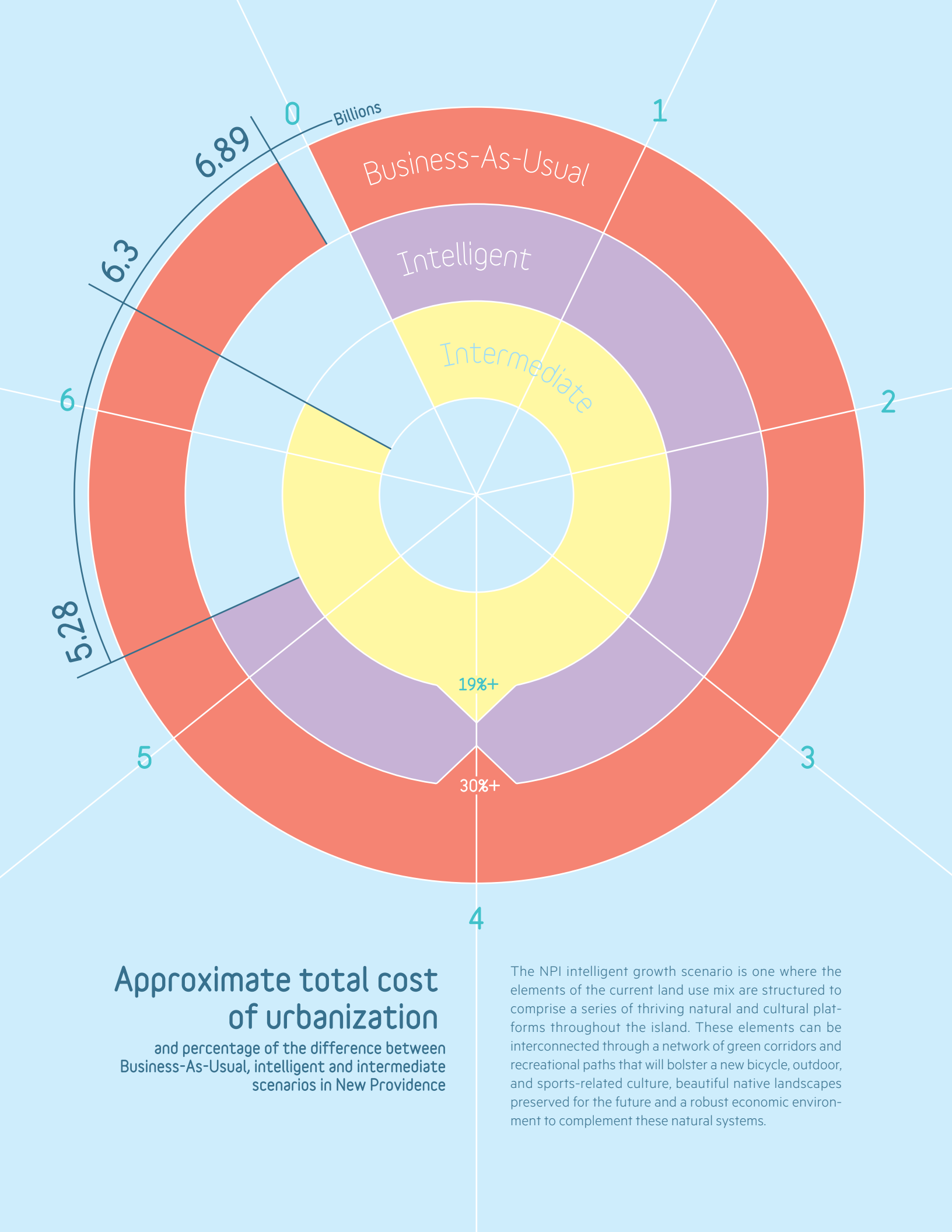
# Intelligent Growth Scenario, New Providence Island 2045

84

85







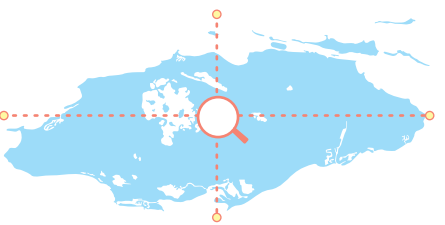
The urban footprint analysis also revealed several opportunities to improve urban land and population density management throughout NPI, which are outlined below:

### Develop an Urban Master Plan



The current city zoning system is not sufficiently capable of addressing the future challenges NPI faces to achieve balanced, sustainable urban development. The Urban Master Plan (for land use and land development) for NPI would provide a vision of sustainability for the future of its territory.

### Develop a land administration system in New Providence



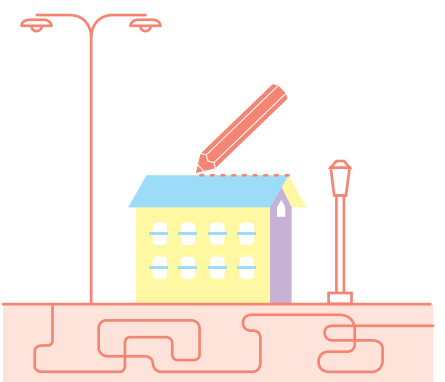
Currently, there is no functional ability to block areas for future development where climate change projections and environmental risk analysis dictate that urban development should be restrained. The most effective mechanism to support proper land administration is by establishing a **sector-area-planning framework**, within which different stakeholders (land owners, developers, purchasers, and the public interest represented by the Government) can ensure the benefits of urban development are maximized together with absorbing and/or mitigating any side effects from disorderly development.

### Create new sources for sustainable urban development



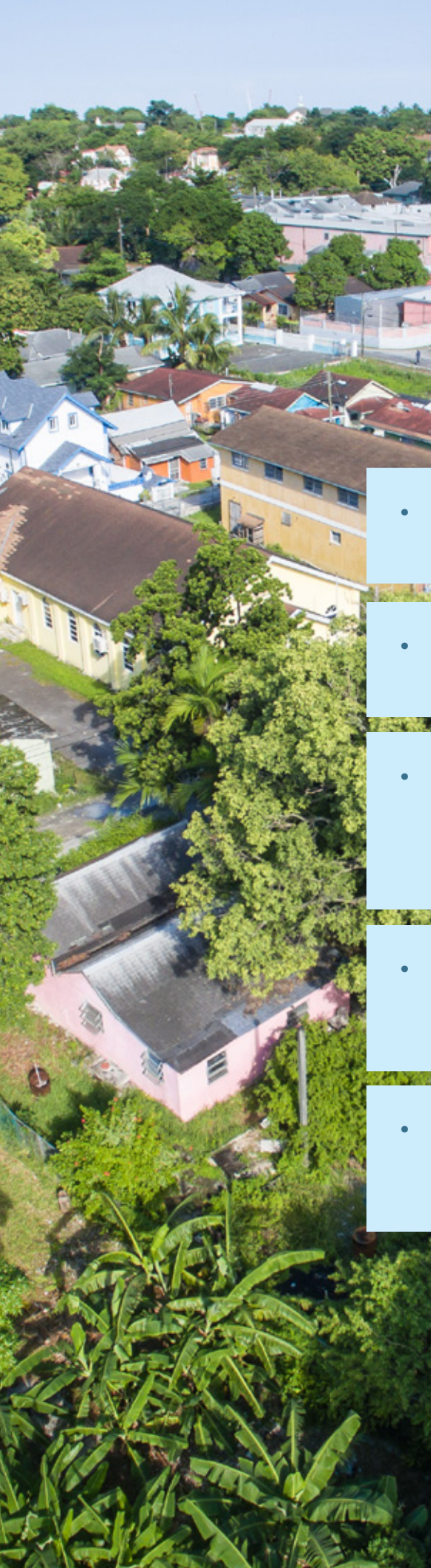
NPI has a record of low property tax revenue collection due to improper assessment and limited capture of capital gains from real estate investments. This can be at least partially attributed to certain elements of land taxation in The Bahamas plus the fact that easements in the land tax have been utilized to promote foreign direct investment. Land value capture and other forms of property and land taxation are critical options to harness resources for new public urban investments. It is necessary to start a comprehensive analysis of land and property taxation throughout NPI, to find ways in which property taxes, and the mechanisms whereby they are applied in the country can go beyond simply attracting foreign investment and become a source for sustainable urban development of Nassau.

### Broaden the scope of housing programs



There are significant gaps in the quality of housing and the surrounding built environment (man-made structures, features, and facilities that together form the environment in which people live and work) in Nassau, particularly for lower income families. Also, consideration needs to be given to the projected quantitative housing deficit for future populations, estimated at 98,979 new houses needed by 2045. Innovative settlement upgrading programs can add value to the existing private or cooperative housing developers to leverage resources and produce better residential settings. New programs could consider the strategic use of financial subsidies for housing and neighbourhood upgrading. Subsidies could be directed at improving housing materials, encouraging resilient designs, improving accessibility and mobility corridors and providing smart solutions for water catchment, energy consumption, solid waste management.





Urban sustainability can also be bolstered by: supporting inclusive urban economic growth initiatives, developing climate-resilient housing options for residents, improving equitable access among disenfranchised populations to higher quality housing and public city services, and creating more inclusive public spaces, such as parks, pedestrian streets and beaches.

Smart management of urban density would require:

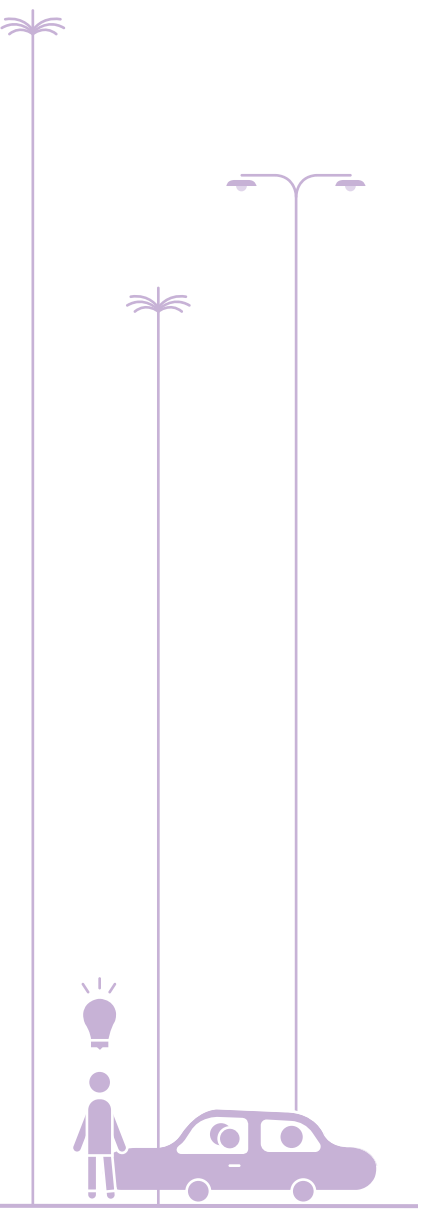
- An inclusive urban sustainable development strategy, emphasizing a resilient and sustainable regeneration of Downtown Nassau.
- Integrated housing, community, and mobility programs in addition to accessibility programs, especially for the Over-the-Hill neighbourhoods.
- Smart infrastructure solutions for sustainable urban development (e.g., rain water harvesting, energy-saving and/or solar-powered urban fixtures, adaptive beach and coastline installations, better and affordable Wi-Fi connectivity network).
- The creation of an entity, public and/or private, in charge of long-term urban planning and urban management for NPI, following international best practices.
- The consolidation of an integrated operations and control centre for disaster prevention, emergency response, and smart monitoring of traffic, citizen safety and weather events.

At the heart of creating a sustainable city lies the need for a clear, transparent and effective system of land administration. The Bahamas, while fully aware of the complexities of its situation in terms of land rights, tenure, taxes, environmental issues and other issues, does not appear to be working towards creating such a system currently. Urgent actions must be taken to develop a better system of land utilization and management within NPI.

# ADDITIONAL SECTOR DIAGNOSTICS

## Mobility and Transport

An effective mobility strategy for NPI would serve the needs of all residents and visitors, regardless of income, age, gender, employment or physical ability.



The current mobility and transport system in New Providence does not appear to be supporting the island’s economic, social, or environmental well-being. An overarching mobility strategy for the island is urgently required. The ongoing increase in private vehicle ownership and use continues to have a negative effect on citizen safety, air quality, overall quality of life, and citizen mobility. The existing road network is challenged by a lack of room to expand and traffic is often congested and chaotic. Congestion is a serious problem in that many intersections exceed their design capacity (Transportation Public Policy and Change in New Providence, Bahamas) particularly at noon and between 3:00 PM and 5:00 PM. These inefficiencies negatively impact the island’s economic productivity as working hours are lost, and the cost of operating vehicles to transport goods increases with extended travel times and fuel consumption. Congestion is also associated with harmful effects on societal behaviour, public health, and road safety which is further challenged by street designs that do not consider the needs of pedestrians and potential cyclists. In effect, the annual fatality rate resulting from road incidents in the Bahamas was 14.1 deaths per 100,000 individuals in 2014.

Increasing motorization rates (number of passenger cars per 1,000 inhabitants), lack of regulation and incentives for cleaner energy in transportation all contribute to CO2 emissions. Per capita CO2 emissions from fossil fuel use and cement production in The Bahamas was 11.06 tons in 2014 (Emission Database for Global Atmospheric Research) which is high compared to other small states. Some causal factors for these high emission rates appear to include the absence of emission standards regulations and enforcement and of mandatory maintenance for public and private vehicles. Other influencing factors are inadequate measures to improve the efficiency of traffic management and the transportation system.

NPI is also a major tourist destination with over 5 million visitors arriving annually since 2010, representing an opportunity, or potential demand, for mobility and transport services. An effective mobility strategy for NPI would serve the needs of all residents and visitors, regardless of income, age, gender, employment or physical ability.

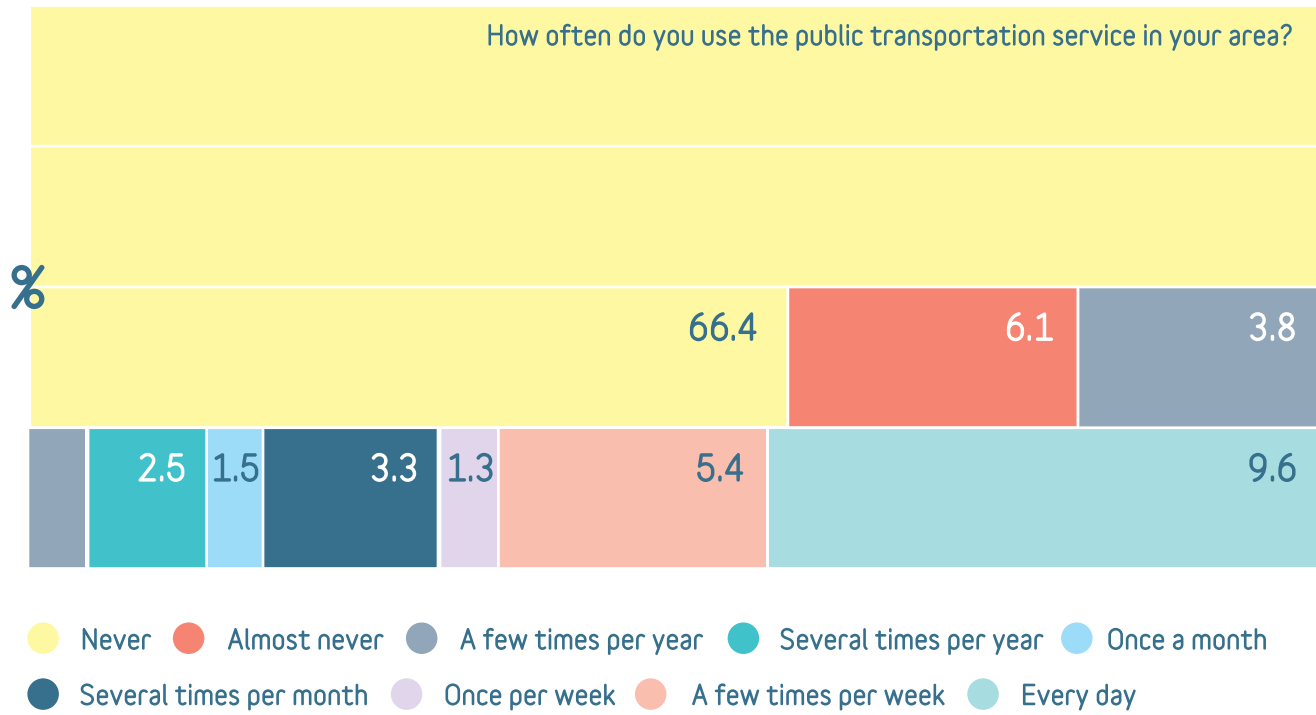




# Urban Transport

NPI mobility trends could be improved. Movement on the island occurs primarily by private car: in 2010, 3 out of every 4 trips in NPI was done by private vehicle. The remaining trips, or only 1 out of every 4, were done by public transport buses and other modes in 2010.

## Use of Public Transportation Service

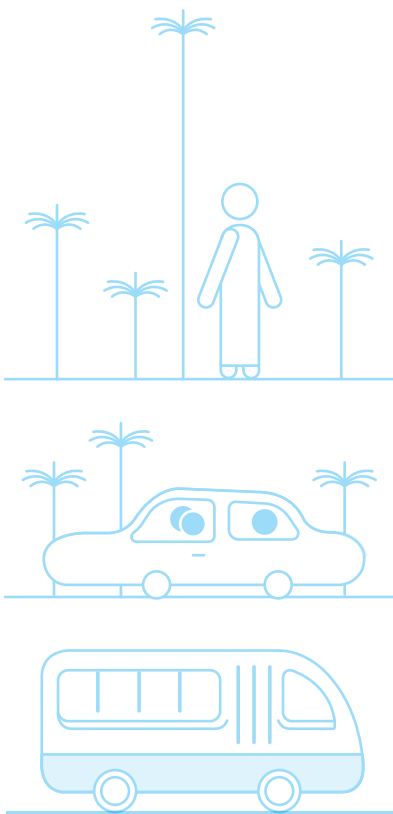


When asked, “Overall, how do you rate the public transportation system in your area?” there was almost an even split:





# Trend in main mode of transportation (2000 and 2010 census)

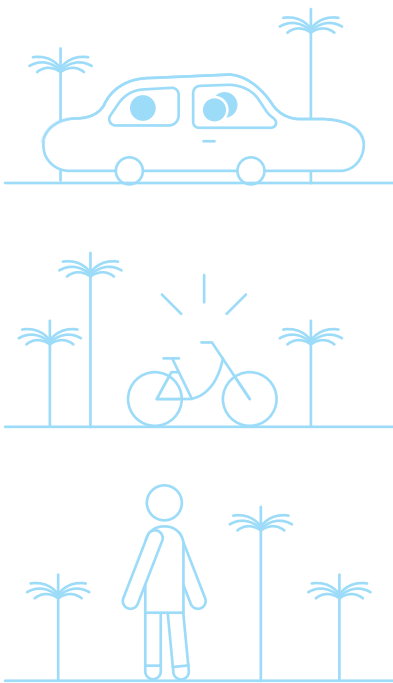


% using jitneys / buses

% using personal vehicles

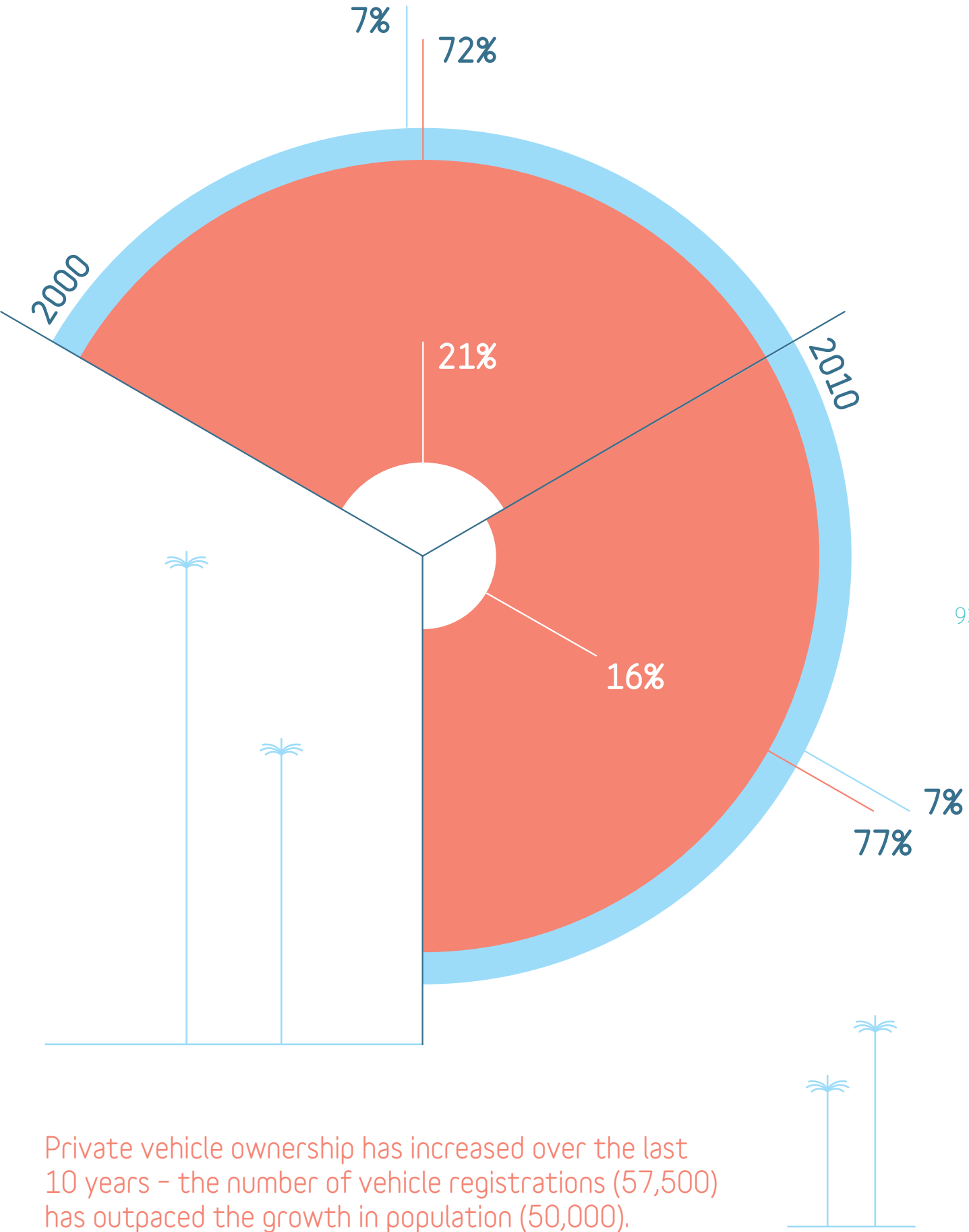
% using other

With an already low percentage of people using the public jitney/bus service as their primary mode of transportation, during the period between 2000 and 2010, this percentage decreased by 5%, while the percentage of people using personal vehicles increased by 5%.



Public transportation routes have remained essentially unchanged since 2000 despite new growth areas throughout NPI and changing citizen travel patterns. These inefficiencies in the public transport service contribute to the rise in private vehicle ownership which has increased over the last 10 years — the number of vehicle registrations (57,500) has outpaced the growth in population (50,000). Despite the correlation between car ownership and income, as well as high taxes on imported vehicles, ownership remains relatively high in various low-income districts of NPI. Furthermore, currently many parents drop off and pick up their children throughout the day by car at schools across NPI in part due to the absence of a national school bussing system.

The island's current car dependence, made worse by an inefficient public transportation system, will severely affect the island's ability to function productively because of increased road congestion. The total NPI population is expected to grow by approximately 27% between 2015 and 2040, and with the private vehicle being the dominant form of transportation, this population growth will lead to continued low-density residential development and dispersed land-use patterns, as well as increased dependency on private vehicles. Moreover, the age groups which are expected to increase the most in population size are the 50-64 year olds and those 65 years and older, with growth rates of 50% and 192% respectively from 2015 to 2040. This aging population stresses the need for improved public transport services and mobility in general, as car use among these demographics decreases because of aging and impairment.



Private vehicle ownership has increased over the last 10 years - the number of vehicle registrations (57,500) has outpaced the growth in population (50,000).



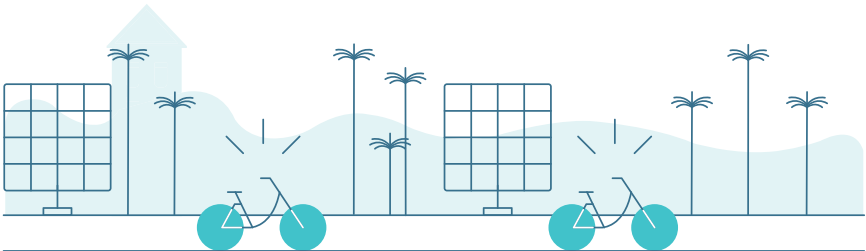
## Public Transport Service

The public transport system operates with little coordination, low quality standards, and limited accessibility for citizens. The system is not unified, and encourages competition between jitney operators who have little to no training in the delivery of public transport services. There are currently 23 NPI bus routes, although only 12 of them are actively served by jitney. Some 558 franchises have been issued for the 12 active routes, of which approximately 320 are active with buses in service. There are multiple franchises on each of the routes with each franchisee operating independently. This is a core issue with the current jitney system as franchisees gravitate to the more popular routes and there is no system to monitor the ownership of the franchises and route assignment. Moreover, jitney routes do not serve Paradise Island, a major concentration of resort developments with many employees and tourists. While routes extend to most parts of the island, their orientation is towards downtown Nassau. As such, there are no “cross-town/cross-island” routes which would allow bus users to travel directly from one part of the island to another. Instead, users wanting to travel across town must transfer through downtown, take a second bus, and pay a second fare.



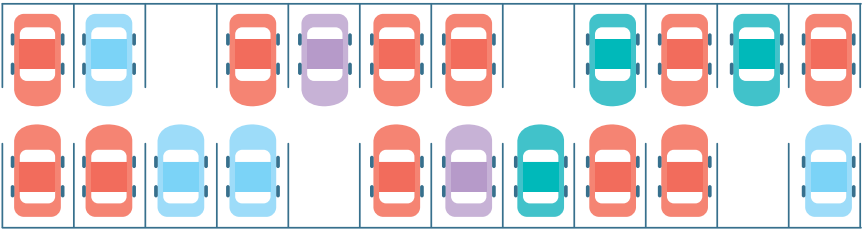
## Bikeability

Bicycle use in NPI is very low compared to other LAC countries despite the island’s relatively flat topography. There are virtually no facilities for bicycles (bike lanes, paths, parking facilities, etc.), and tourists are not encouraged to use them and are warned of the dangerous blind corners along the congested streets. The narrow roads in Nassau can make bicycle use dangerous and unpleasant. Without specific accommodations for bicycles and other small, light (non-) motorized vehicles, or a strategy to encourage their use, continued dominant reliance on the traditional automobile will continue. Introducing bike paths and bike rental systems, and thinking innovatively about climate-adapted bicycle-like alternatives for Nassau, can reduce car dependence by providing residents with a cost-competitive alternative to the car.



## Parking

Parking in Nassau is currently not regulated by zone, time of day, or price. There is high demand for parking in the downtown area from workers serving the government, commercial offices, and businesses in the area. Creating a pricing system for parking may help deter people from using their cars at congested times of days or for trips to downtown Nassau. The focus can then be on creating space for pedestrians, cyclists, and transport riders. In general, there is a need for better parking management.



## Walkability

There are limited and incomplete pedestrian facilities on most roads in terms of sidewalks, crosswalks and crossing controls at signalized intersections. In areas immediately outside of downtown, the sidewalk system is irregular and incomplete, and inadequate for pedestrian flows. This condition can lead to higher pedestrian accident rates and makes walking a less desirable form of mobility, influencing people to use cars. Walking is possible as sidewalks have been constructed along some primary and secondary streets, though to varying standards. However, there are few crosswalks or signalized crossings. It is evident that the streets in New Providence have been designed for vehicles, not people.



An efficient NPI bus system would be expected to decrease car dependence on the island. The development of a bus system that serves all destinations and all potential riders will contribute substantially to reducing car dependence and congestion. Also, physical adaptation of streets in Nassau to encourage walking and cycling are required for a better mobility of residents and visitors.



# Energy Efficiency

Energy coverage is sufficient in Nassau/New Providence Island, although residents face long electrical interruptions. Almost 100% of residents have an authorized connection to electrical energy, exceeding the ESC benchmark of 90%. However, the country's high dependence on imported oil to satisfy its energy demand for electricity generation and transport has caused the Bahamian Government to redirect its focus as far as energy efficiency is concerned. As part of the Energy Generation Expansion Plan, the government is supporting the use of alternative sources such as renewables and waste, and promoting energy conservation through energy efficiency. **Improving energy efficiency of public buildings and urban infrastructure will bring direct and indirect benefits to the Bahamian economy in the form of improved employment, currency savings, energy cost stability, and overall economic growth ranging from 0.25% to 1.1% of GDP per annum.**

A special study was conducted throughout NPI to identify and analyse current energy consumption from public lighting installations, government buildings, and the Water and Sewerage Corporation's pumping systems and office buildings. Preliminary opportunities and measures for improvements, energy savings potential, and greenhouse gas emissions reductions were also assessed.

## Government Buildings

An inventory of public buildings and facilities in Nassau was only partially available at the time this study was conducted. However, a general assessment was conducted, and proxy data were used when possible to evaluate the impacts of retrofitting public buildings and facilities in NPI.

Retrofitting existing buildings and replacing energy consuming equipment are critical for improving energy efficiency. **Energy costs can account for as much as 10% of a local government's annual operating budget, a proportion that is likely to grow as energy prices rise. For individual office buildings, energy costs can represent up to 30% variable costs, and constitute the single largest controllable operating cost.** Energy cost savings of 35% or more are possible for many existing buildings according to the U.S. Environmental Protection Agency. The average office building can reduce energy costs by 10-35% through low-cost energy efficiency measures and operational adjustments.

A partial retrofit typically involves the cost-effective replacement of inefficient equipment or components such as light fixtures, ventilators, air conditioners, pumps, and windows. **A partial retrofit package may entail moderate to significant costs, but can result in savings of up to 30% over a payback period of fewer than 5 years.**

**A comprehensive retrofit that entails upgrading a building's structure to reduce overall cooling and lighting loads can often yield energy savings of 40% or more,** but such retrofits are more expensive and complicated to implement than partial retrofits. Integrating Building Energy Management Systems into public buildings will ensure that the buildings are operating at their maximum level of efficiency and performance, and minimize wasted energy, which can reduce monthly expenses significantly.



# Public Lighting

**Currently, NPI has approximately 37,267 incandescent streetlights that consume 82,258 kWh daily, representing 1.65% of total national electricity sales.** Approximately 7.6% of these street lights are categorized as high efficiency technology because of the Light Emitting Diodes (LED) technologies implemented. LEDs, along with improved control and monitoring systems, present cities with an array of new options for high-quality, cost-effective lighting.

Street lighting can constitute a sizeable portion of a municipal government's electricity costs and greenhouse gas emissions. Retrofitting street lighting with more efficient and functional technology will reduce energy costs, mitigate greenhouse gas emissions, and enhance the overall performance and efficiency of the lighting systems. Retrofitting street lighting with innovative technology can be done in several ways including:

- REPLACE 34,446 INEFFICIENT STREET LAMPS WITH LED TECHNOLOGY
- Daily energy consumption would be reduced by 58% from 82,257 kWh to 34,777 kWh (in combination with the existing 2,821 LED street lamps already installed)
  - Over 17.3 million kWh would be saved annually
    - Equivalent to 13,277 tons CO2 emissions avoided annually)
  - Estimated investment: US\$16.8 million
  - Payback period estimated between 2.3 and 4 years
    - 2.3 years / Internal Rate of Return (IRR) of 44% / based on tariffs at 0.4 USD/kWh
    - 4 years / Internal Rate of Return (IRR) of 22% / based on tariffs at 0.2 USD/kWh
    - Approximately 20% of the estimated payback for these lights is from maintenance savings and 80% is from energy savings

- INSTALL PHOTOCELL TECHNOLOGY ACROSS STREET LAMP NETWORK TO CONTROL BRIGHTNESS
- Installing photocell control technology across the NPI streetlight network would allow lights to be turned on/off and dimmed/brightened as needed or on a dimming cycle, creating opportunities for energy savings
  - Over 19 million kWh would be saved annually
    - Equivalent to 14,617 tons of CO2 emissions avoided
  - Estimated investment: US\$20.2 million
  - Payback period estimated between 2.5 and 4.5 years
    - 2.5 years / IRR of 40% / based on tariffs at 0.4 USD/kWh
    - 4.5 years / IRR of 19% / based on tariffs at 0.2 USD/kWh

- COMBINING LED TECHNOLOGY WITH SOLAR PV TECHNOLOGY
- The solar public lighting system would combine LED lamps with solar photovoltaic (PV) technology to generate its own energy independent of the power grid, guaranteeing an autonomous power supply
  - Estimated investment: US\$117 million
  - Over 28.9 million kWh would be saved annually
    - Equivalent to 22,205 tons of CO2 emissions avoided annually
  - IRR could reach between 5-8% at an electricity tariff of 0.4 USD/kWh
  - The analysis shows negative returns at low electricity tariffs, but the project is attractive (with low IRR in the single digit range) at high electricity tariffs



# Water Utilities

The Water and Sewerage Corporation (WSC) is the main provider of water and sewerage services throughout NPI. The sewerage network is fragmented and dispersed, with multiple poorly maintained lift stations and treatment and disposal systems that have created environmental and health risks due to operational limitations. Past studies have reported elevated levels of groundwater contamination in NPI primarily because only 40% of wastewater is treated according to national standards.

**Currently, energy related costs account for between 30-40% of total water production costs in NPI. This means that providing safe drinking water and reliable wastewater services is highly energy-intensive.** However, approximately 98% of the population in urban areas and 86% of the population in suburban areas, have access to potable water. Approximately 80% of energy consumption is attributed to pumping and distributing water and wastewater. Water coverage appears to be insufficient in New Providence. Only 57% of households have home connections to the city's water network, while 77% benefit from sewer connections, and the remaining population uses septic tanks.

However, WSC is taking a proactive approach in improving energy efficiency. Energy efficient systems have been installed in their administrative buildings and water pumping stations. Programs with the IDB to reduce water lost to theft, leakage, and other means as well as to implement energy efficient programs are currently in place. One of the programs aims at cutting in half the water lost through leakages (by improving water pressure, quality, and volume).

Currently, energy related costs account for between 30-40% of total water production costs in NPI. This means that providing safe drinking water and reliable wastewater services is highly energy-intensive.

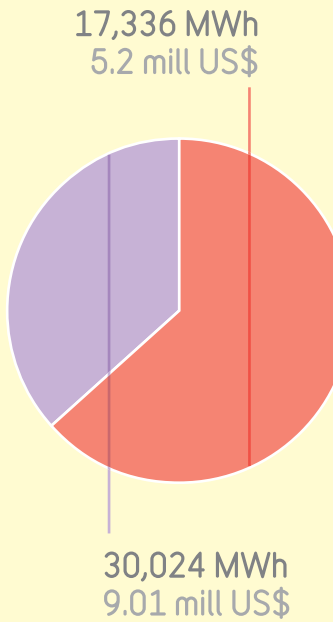


# Monetizing Energy Efficiency

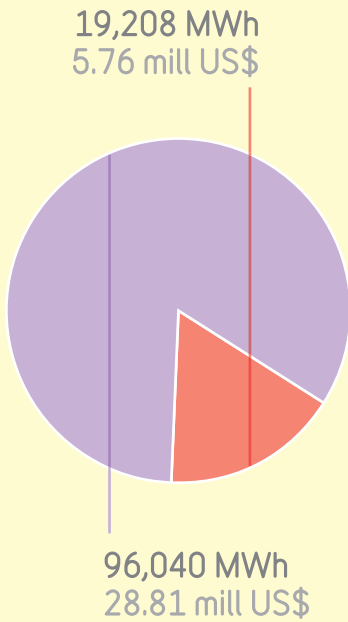
Improving energy efficiency of public assets such as buildings, street lighting, and water networks offer budgetary savings and environmental and socioeconomic benefits. However, challenges such as a lack of awareness and incentive misalignment, insufficient implementation capacity, and limited access to financing, limits energy efficiency investments in the public sector. The use of public-private partnerships is presented as the best mode of generating proper financing. Energy Savings Performance Contracts (ESPC) are commonly used forms of public-private partnerships that bring in technical skills, competencies, and knowledge. These contracts generally include the integration of a wide range of project services, facilitation of financing, and guarantees of project performance.

■ Annual Energy Consumption  
■ Potential Savings

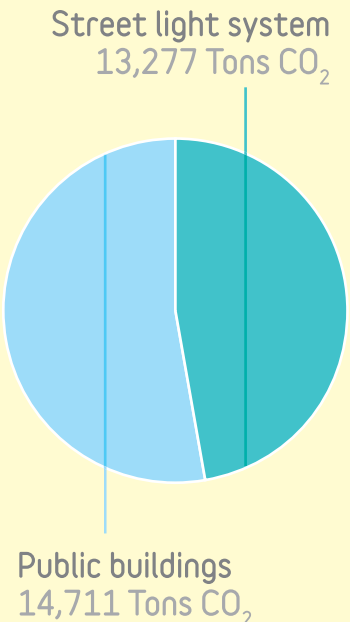
STREET LIGHTING SYSTEM



PUBLIC BUILDINGS



CO2 EMISSIONS REDUCTION



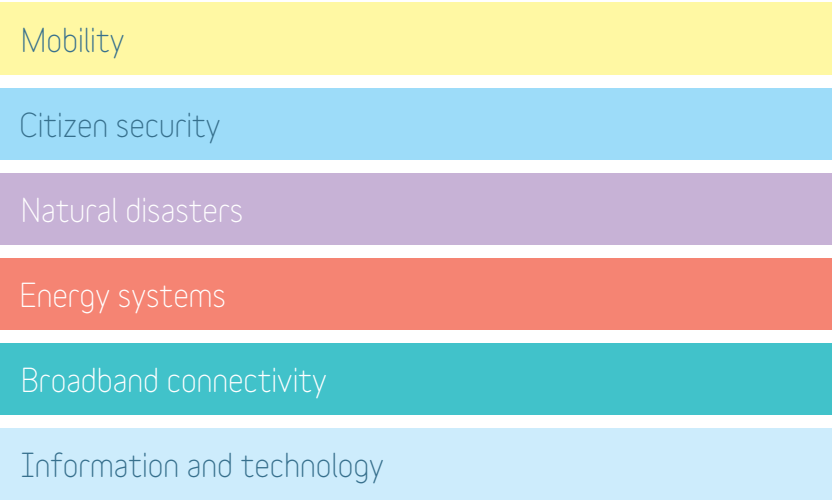
The financial incentives of energy efficient investments in the public sector are vast to be sure, but so are the social and environmental benefits. Based on the recommended improvements to public assets, the country could expect to use 36,544 MWh less in energy each year — an amount equivalent to 27,989 tons of CO2 emissions avoided. This energy reduction corresponds to public savings of around US\$11 million (varies based on electricity tariffs) and represents a conservative estimate of approximately 0.5% of total oil imports of The Bahamas. Therefore, these measures will reduce the Bahamian economy's demand for imported oil. By taking an aggressive and proactive approach to becoming energy efficient, New Providence would seize the opportunity to become one of the most energy efficient islands in The Caribbean.

Energy  
Baseline  
Study  
Aggregated Results  
@ 0.3 USD/kWh



# Smart City Solutions

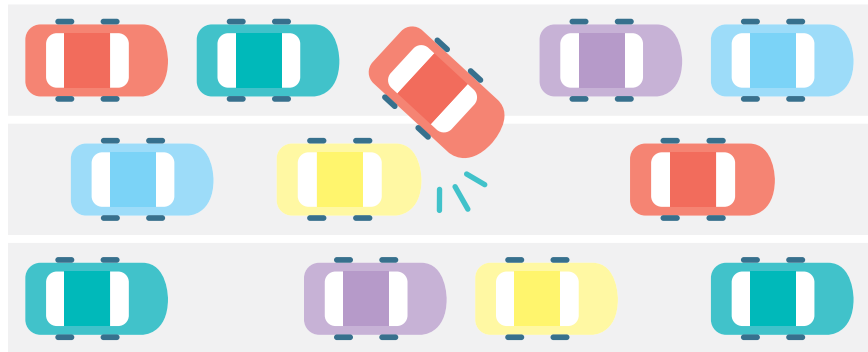
In 2016, a Smart City consultancy was conducted in Nassau, aimed at identifying NPI's main urban challenges and the areas where the implementation of smart technologies and applications would have the greatest impact for the city. The consultancy held meetings with key stakeholders and representatives from the country's public and private sectors, and performed a diagnosis considering the following areas and themes:



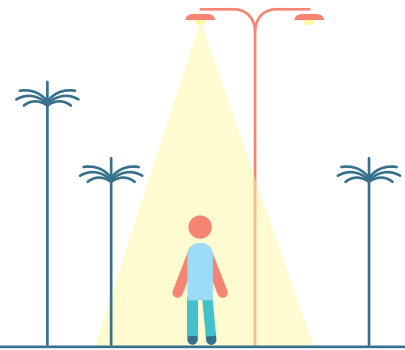
The assessment identified and prioritized the following challenges as **key opportunities for smart city interventions: traffic congestion and accidents, criminality against persons and properties, the vulnerability of natural disasters and climate change, emergency response, energy prices and power outages.**

## CHALLENGES

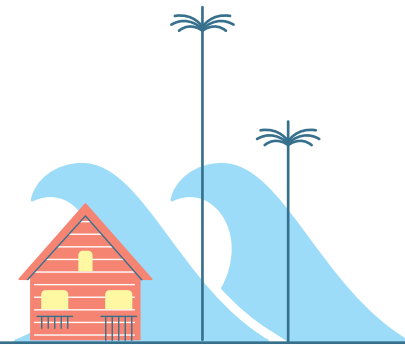
**Urban mobility.** NPI suffers from severe levels of traffic congestion, with recent increases in the number of fatalities, high transportation costs in the form of delays, loss of working hours and high vehicular operation costs. According to a report prepared by the Caribbean Civil Group Limited for the Downtown Nassau Partnership, speeds during peak flow average only 10 mph. There is currently no infrastructure in place to optimize and synchronize traffic light units and their signal timing, which are only adjusted manually every 6 months. The number of fatal victims is also cause for concern: **transportation fatalities already average 0.14 per 1,000 residents** and numbers have been rising over the past years. In 2015 alone, 55 people died as the result of traffic accidents in The Bahamas.



**Public safety and security** has been identified a top priority for the city of Nassau, whether protecting against crime, natural disasters or accidents. The public opinion survey conducted as part of the ESC methodology identified that only **17% of people felt safe walking in New Providence Island at night**. In addition, the mismatch between crime statistics and the general feeling of the population point to the possibility of underreported crimes in the city. Therefore, providing the government with adequate instruments to monitor the city, register violations and enforce the law is paramount. From petty street crime to violent assaults to complex financial offences, NPI can only tackle these varying acts of crime by implementing increasingly sophisticated technologies and processes.



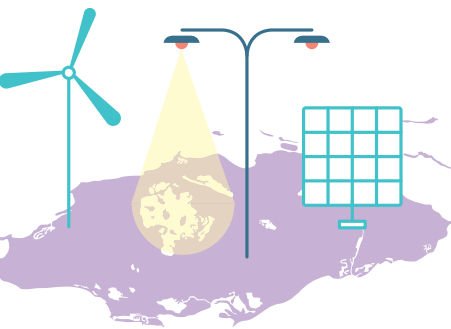
**Vulnerability to natural disasters, climate change and emergency response.** The Bahamas does not score well when it comes to measure such as: resilience to natural disasters and extreme weather, storm surge, flooding, heat and water stress caused by climate change. The weather observation network of sensors and stations is limited in coverage, and 50% of stations are entirely out of service. This represents a big opportunity to leverage new technological tools for disaster management prevention that could bring significant benefits for residents and build additional resilience to natural disasters. The city's existing Early Warning System is based on communication using differently coloured flags and can be enhanced through the adoption of innovative technologies and processes.



**Broadband connectivity, GIS and institutional strengthening.** One of the key bottlenecks of urban development within the ESC methodology is the development of **broadband connectivity** to enable the effective implementation of Smart City solutions. Substantial investment in the country's communications infrastructure has resulted in modern telecommunications networks. Yet, though the current level of connectivity is considered adequate given ESC international benchmarks, there is still room to improve the connectivity infrastructure in Bahamas. Specifically, there are opportunities to set up Wi-Fi connectivity in public spaces and integrate cameras and sensors into the network to offer smarter solutions for daily city management.



**Energy systems.** The Smart City consultancy was executed simultaneously and in alignment with an Energy Baseline Study for the city of Nassau. The Bahamas is highly dependent on imported fossil fuels, which account for approximately 19% of total country imports. Bahamas Power and Light Company (BPL) must provide service to a challenging geographic area which includes 23 islands (most of which are sparsely populated). This de-concentration makes the service costlier, resulting in high energy prices. Additionally, the reliability of the electric distribution system has been identified as a key challenge for the city of Nassau and is critically important for both utilities and customers. Although 94.5% of the population is connected to the electricity grid, the elevated number of outages compromises the reliability of the system, which in turn affects public health and safety, economic growth and development, and societal well-being. The total reliance on fossil fuels for energy generation is also a point of concern and a good opportunity to explore a more sustainable energy matrix through the use of renewable energy sources.





# THE “FOUNDATIONS” OF A SMART CITY

Regardless of the application, a Smart City solution involves processes, technologies, and people. From a technology standpoint, it invariably has four basic components:

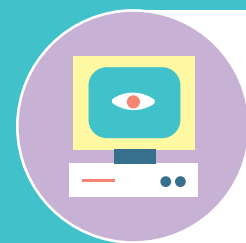
A Smart City is one that places people at the centre of development, incorporates Information and Communication Technologies into urban management, and uses these elements as tools to stimulate the design of an effective government that includes collaborative planning and citizen participation. By promoting integrated and sustainable development, Smart Cities become more innovative, competitive, attractive, and resilient, thus improving lives.

## Communication interfaces



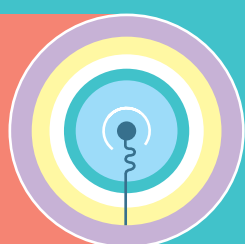
Services, web portal, mobile applications, etc., send and receive information from people and companies associated with Open Data platforms and e-government that favor participatory management and the transparency of the public structure.

## Integrated operation and control centres



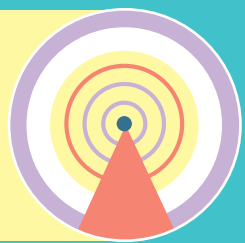
Integrated operation and control centers equipped with computers and software applications that receive, process, and analyse the data sent by the sensors, provide monitoring and display panels, manage devices remotely, and distribute information to departments, institutions, and the population.

## Sensors and connected devices



Capture different signs from the environment and send them through the networks to computers in the control and management centers of the cities, covering different thematic areas such as traffic, safety/security, assistance to the population, emergency situations, and natural disaster alerts.

## Connectivity infrastructure



Broadband Internet networks (fixed and/or mobile) to send and receive data.





# Solid Waste Management

Though NPI possesses many unique natural assets, the island faces significant challenges related to Solid Waste Management (SWM), most of which are not unlike those faced by many other Small Island Developing States (SIDS) in the region and elsewhere. These challenges, typical of growing cities globally, can pose threats to the environment and distinctive character of the island. Because NPI SWM systems are still in their infancy, there are significant development opportunities for Nassau in this realm.

Assessing SWM in Nassau was difficult due to the lack of available data. However, initial estimates were generated on waste composition in addition to projections for future waste generation.

The composition of the waste stream was estimated based on data from the base-line studies related to the generated waste stream and suggests that waste is mainly composed of construction and demolition waste, followed by residential waste and commercial waste.

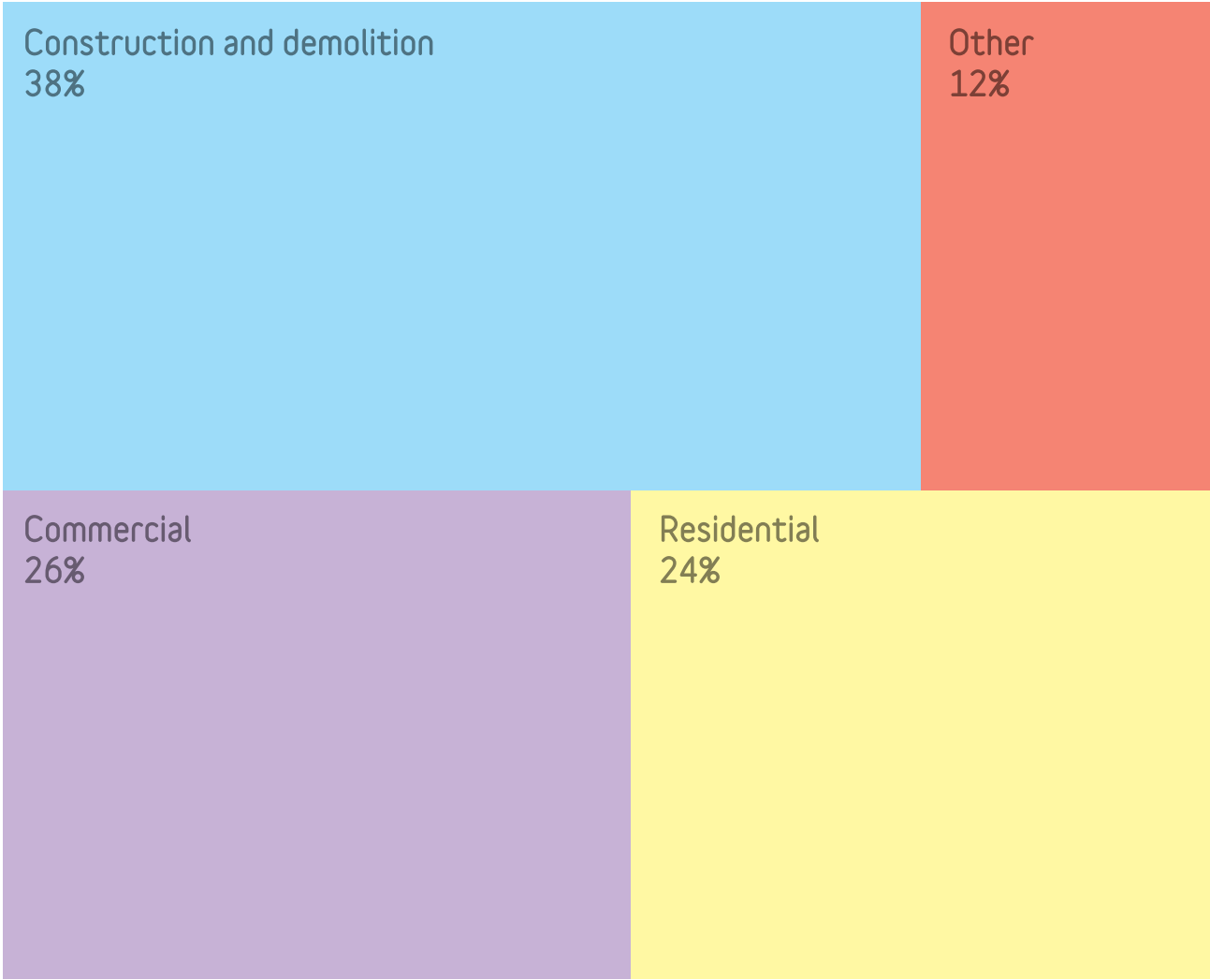
The NPI solid waste generation for 2016 was 280,000 tons per year, which is an average of 23,300 tons per month or 778 tons per day. Future projections are estimated to be:

2020: 315,142 TONS PER YEAR (AN AVERAGE OF 26,262 TONS PER MONTH OR AN AVERAGE OF 875 TONS PER DAY)
2025: 365,336 TONS PER YEAR (AN AVERAGE OF 30,445 TONS PER MONTH OR AN AVERAGE OF 1,015 TONS PER DAY)
2030: 423,525 TONS PER YEAR (AN AVERAGE OF 35,294 TONS PER MONTH OR AN AVERAGE OF 1,176 TONS PER DAY)

The estimated per capita production of solid waste according to the generation and population data for the City of Nassau (2017) is 2.8 kg per inhabitant per day (stable and floating population included).

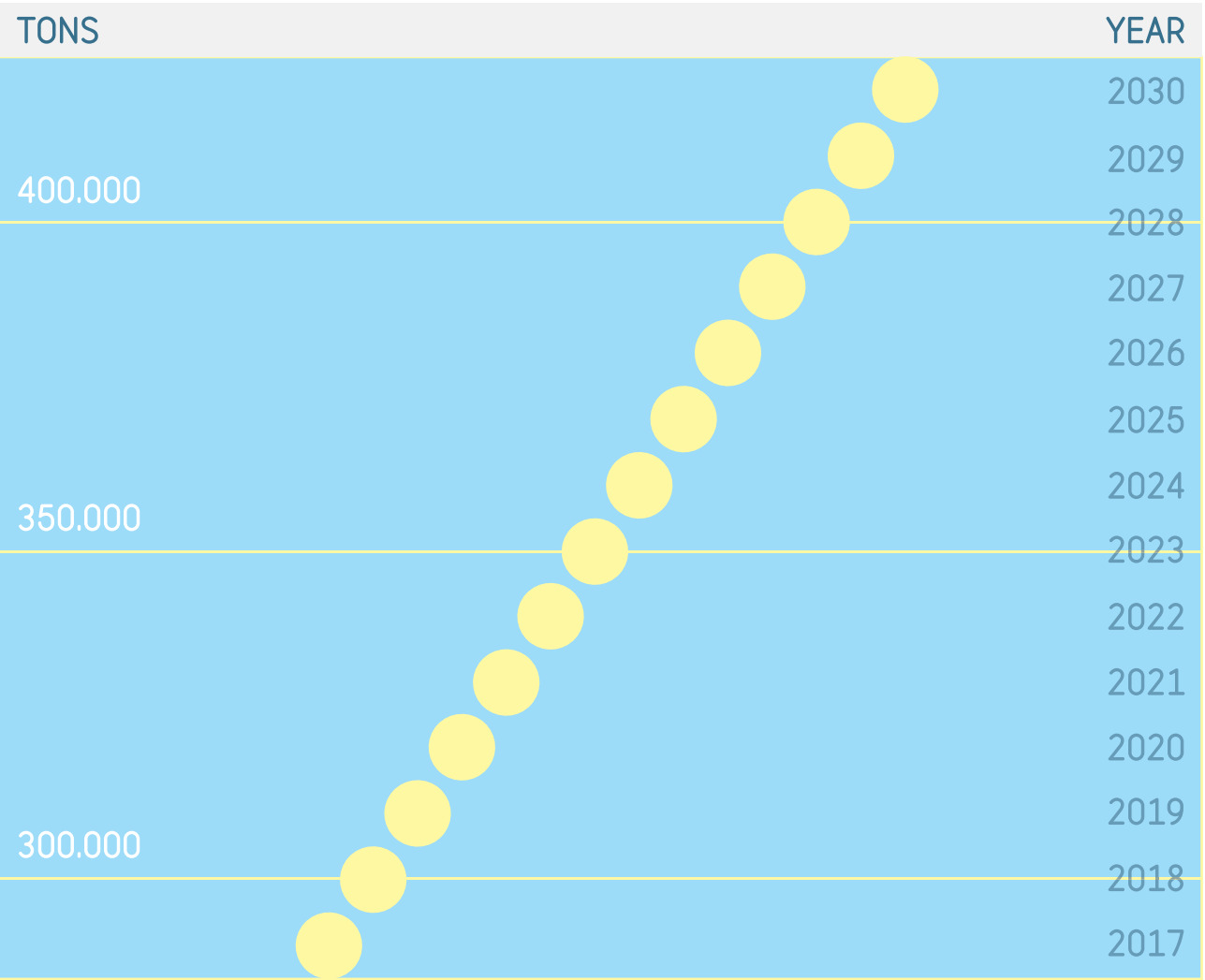
## Composition of Solid Waste Stream - Bahamas

Source: Renew Bahamas - ERM (2016)



## Projection of Solid Waste Generation - Bahamas

(2017-2030)





A categorized synopsis of some of the more significant challenges impacting the SWM sector are outlined below. These challenges can be classified into 3 categories: (1) institutional, regulatory and legal, (2) current practices (technical and operational) and infrastructure, and (3) financial and economic.

One urgent area of attention is disaster response — an appropriate Disaster Debris Management Plan compatible with any existing or future SWM system is desperately needed.

## Institutional, Regulatory and Legal Challenges

There is a need for a national solid waste management plan, which points to the even greater need for a comprehensive national policy framework along with operational plans. Legislation should be developed that engenders integrated and sustainable approaches to SWM, and in the case where there is already existing legislation, further enforcement is needed. One urgent area of attention is disaster response — an appropriate Disaster Debris Management Plan compatible with any existing or future SWM system is desperately needed.

The current approach to SWM is institutionally fragmented and not conducive to fostering integrated or sustainable approaches to SWM. Moreover, the current management and regulation of SWM on NPI depends on overlapping jurisdictions which lends itself to inefficiencies.

Notwithstanding existence of a recently drafted RFP for the management, remediation, and operation of the NPI dumpsite, another overarching institutional challenge is the apparent lack of political will, sense of urgency and high-level advocacy needed to catalyse proper SWM.

More broadly, there is also limited public awareness, education, communication and public engagement regarding proper SWM. A better public understanding is necessary of the linkages of SWM to and with tourism and the marine sector, health, climate change, behaviour, water and wastewater and the United Nations Sustainable Development Goals that the Bahamas is a party to. These represent a prelude to elevating consciousness — a necessary first step towards proper SWM in New Providence.

Underlying these institutional and regulatory challenges is a lack of recent solid waste (SW) baseline data (quantity and compositional characteristics) with which to reliably inform input parameters for waste flow models/projections; decision-making; policy direction; sustainable planning; etc. To improve this situation, a consistently functioning weighbridge, or truck scale, is required at the dump site along with periodic SW data collection and characterization studies.

## Current SWM Practices (Technical and Operational) and Infrastructure Challenges

These SWM challenges are related to current SWM practices or lack thereof, as well as challenges related to insufficient infrastructure and gaps in technical and operational approaches to SWM.

SW recovery is carried out primarily by the private sector in NPI, however, it is not done in an effective, collective or legislative-driven manner. Quantities collected are not enough to support valorisation efforts (reuse of waste by-products into useful or energy-producing products) or viable waste-trading networks. Little to no recycling is practiced and there is limited understanding surrounding technical and financial/economic opportunities for and/or barriers to recovery and recycling. In general, Public-Private Partnerships (PPP) using private contractors for SW collection, is inefficient, costly, lacks scientific rigor, and is done without optimized routing.

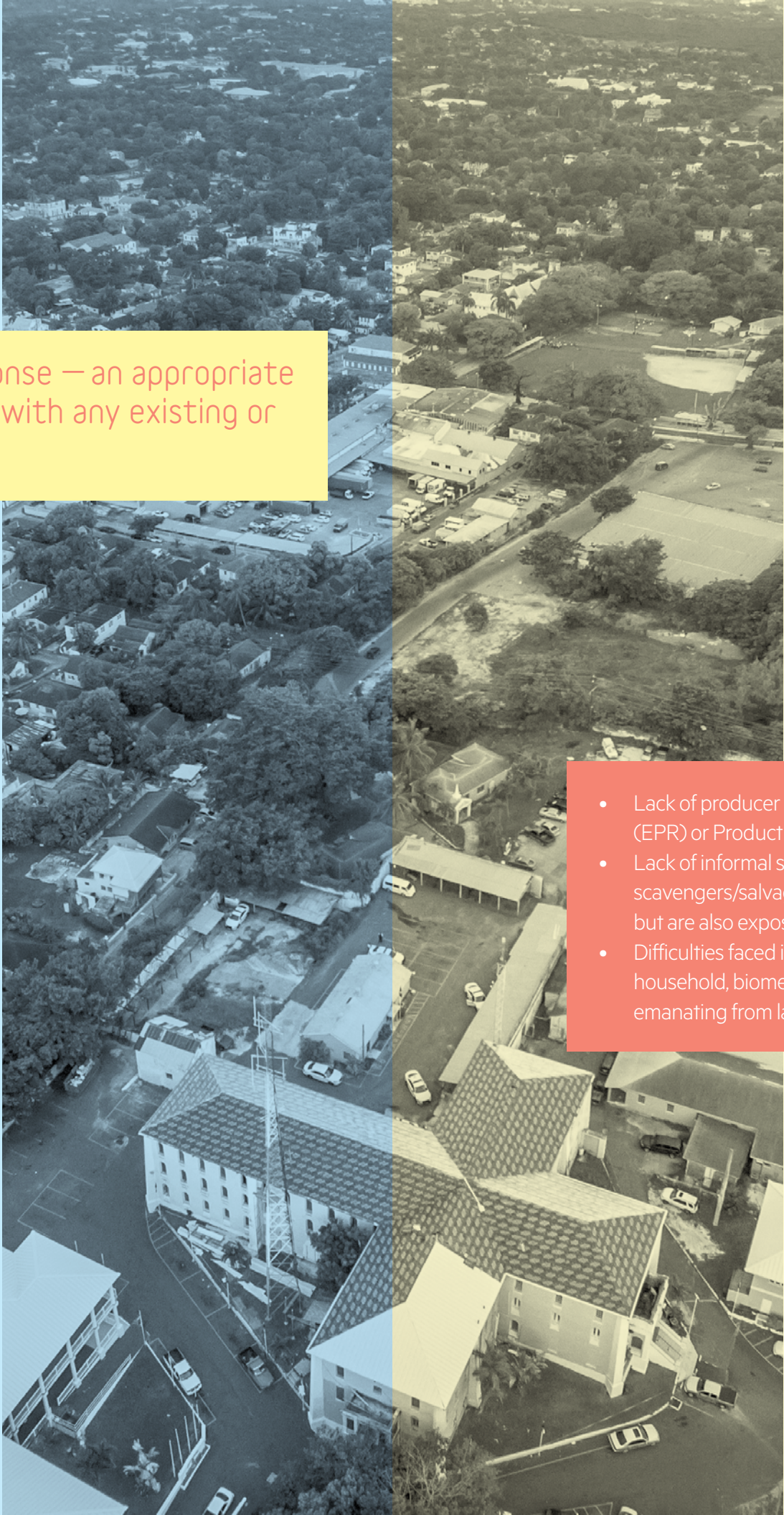
However, SW collection offers a few areas where improvements and efficiencies can be gained. SW collection is currently carried out with insufficient frequency (i.e., scheduled  $\leq$  once per week), lacks source-separated collection and is performed in a way that does not meet regional benchmarks in terms of coverage (i.e., number of people served as a % of total population).

Other operational and technical challenges that offer opportunities for making SW management more sustainable in NPI:

- Lack of producer take-back systems (also known as Extended Producer Responsibility (EPR) or Product Stewardship life-cycle approaches) to deal with SW.
- Lack of informal sector inclusion: the informal sector is comprised of unregulated SW scavengers/salvagers that frequent an unsecured controlled dumpsite for items of value, but are also exposed to and create health and public safety hazards, e.g., fires.
- Difficulties faced in treating particularly problematic hazardous waste streams (e.g., e-waste, household, biomedical and infectious), tyres and waste oil together with marine litter emanating from land-based sources of pollution.

Infrastructure gaps also exist and present challenges in catering to present (and future) SWM needs on aspects related to storage, collection, transportation, transfer, treatment and final disposal. The most significant challenge exists in the realm of final disposal that continues to be via open/uncontrolled dumps (typified by proliferation of indiscriminate disposal and illegal dumpsites) or the government-managed and operated Harold Road controlled dumpsite as opposed to a sanitary landfill as part of an Integrated Solid Waste Management (ISWM) system (with weighbridge/s, enterprise-wide accounting/fiscal management system, environmental monitoring, etc.).

Additionally, and notwithstanding the overall lack of success with landfilling as the cheapest form of final disposal, there is significant and urgent interest in more complex and expensive waste-to-energy (WtE) alternatives. However, there does not appear to be a corresponding urgency to increase national understanding of and guidelines on the viability of WtE as an alternative to conventional final disposal and use of waste as a renewable energy source.





# Financial and Economic Challenges

The financial and economic challenges centre around an insufficiency of financial and economic data related to SWM activities as well as insufficient holistic consideration given to proper and sustainable planning (financial, economic, environmental, social, infrastructure and policy). Any existing funding arrangements/mechanisms and costs for current SWM planning remain unclear. Any funds collected, e.g. for the tyre levy, and non-indexed tipping fees have been placed in and continue to be destined for Government’s Consolidated Fund. The budgetary system is devoid of the full costs and segregated accounting for SWM that would assist in ascertaining the true cost of SWM, e.g. cost per tonne disposed, cost per tonne collected, cost per capita, cost as a % of GDP, cost as a % of GDP per capita, etc., vis-à-vis implications towards full cost recovery. This data would also serve as a basis for benchmarking and comparison with proposed actions (e.g., revamped PPP arrangements).

Further exacerbating these challenges is a public viewpoint which does not fully value the resource potential of solid waste as a mitigation tool to defray SWM costs. A paradigm shift is needed in this regard for change to occur. Moreover, there is untapped potential for cross-subsidizing (i.e., paying for one activity that is losing money or making less money with the profits from another activity or product) the cost of SWM. Finally, there are gaps around the understanding and insufficient education of current financial and economic realities of existing SWM models as a basis for initiating change.

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# Sanitation and Drainage

In 2016 only  
**16%**  
of NPI households were connected to the WSC’s formal network

A series of diagnostic tools were used to assess the sanitation and drainage situation on NPI. A picture can be painted of the status of this sector especially as to its strengths, weaknesses, and opportunities for change, based on the data collected; the public opinion and perceptions survey; interviews with key stakeholders including the Water and Sewerage Corporation (WSC); and the results of the ESC prioritization process.

According to the Water and Sewerage Corporation (WSC), in 2016, only 16% of NPI households were connected to the WSC’s formal network; most residents use on-lot septic tanks and soak away pits. In the ESC public opinion and perceptions survey, 68% responded to using a pit latrine or septic tank. In such a densely urbanized area, this form of wastewater treatment can be hazardous and contaminate the ground-water if not properly regulated or maintained.

The percentage of wastewater that is treated according to national standards is less than 40%, a ratio that is unsustainable and concerning for public and environmental health. Treatment rates could increase considerably if treatment facilities were better maintained and/or kept operational — only 1 out of 9 facilities in New providence is effectively operational today. The absence of large-scale centralized sewage facilities, a limited coverage area, and inadequate maintenance of wastewater and sewage infrastructure, have led to system inefficiencies. The downtown area is particularly prone to blockages and sewage overflows where solid waste and debris build up, creating a public health hazard. Furthermore, proper treatment and disposal should be better regulated and enforced, given current conditions where wastewater is not always being treated properly before being disposed in deep injection wells. Attention should also be paid to rehabilitation and monitoring of the septage and sludge disposal site on Harold Road, where current conditions cause environmental and fire concerns.

As for drainage, 33% of respondents to the public opinion and perceptions survey revealed experiencing issues with flooding in their neighbourhood and immediate surroundings of their home. For those that said they experienced flooding, 21% indicated flooding occurs every time it rains, regardless of duration of rain; 40% indicated the flood lasted several days; and 48% indicated the flooding covered streets, sidewalks and/or yards. It is important to note that two-thirds of all respondents indicated they had not experienced flooding, representing a majority. However, flooding that does not drain away immediately, often exacerbated by solid waste issues and poor drainage infrastructure, suggests an important opportunity to improve health, safety and quality of life for Nassau residents. Stormwater runoff is also problematic — where proper infrastructure is in place, runoff is directed to soak fields, however, in the absence of proper infrastructure, runoff is directed through storm drains to disposal wells without any filter or treatment. Overall, these conditions present clear opportunities for targeting interventions aimed at reducing the frequency of flooding, particularly those from typical rain events.

Ultimately, ‘sanitation and drainage’ was ranked as the 6th most critical area for action in Nassau, in terms of the future urban sustainability of the island. Sanitation and drainage do not always have the same high visibility as other issues; they often remain hidden or unnoticed in the daily life of the average citizen Although sanitation and drainage were not ranked as high priorities in terms of public perception and “multisectorality” (impacts on other sectors), they do rank high according to regional benchmarks for the sector as well as for the economic losses of inaction in this sector. This area is in need of urgent attention, especially due to the multiplier effect of its interrelation with natural disasters and environmental hazards, as well as solid waste management, both of which are priority areas within this plan.





# Urban Challenges as identified by the Urban Design Lab

The Urban Design Lab (UDL) is a planning methodology that aims to integrate new strategies into urban planning and design while actively encourage community participation. The methodology was developed by the IDB in 2014 and has improved over time with staff members and students of the University of Technology of Vienna. In search of new, innovative planning techniques, the IDB is exploring a toolbox for integrated and participative planning by including a wide range of stakeholders into the design process. The UDL has been implemented in 17 cities throughout Latin America and the Caribbean and has contributed to the development of several ESC action plans throughout the region. The UDL in Nassau was carried out in collaboration with the University of The Bahamas and involved an in-depth and immersive community consultation process to identify the strengths, weaknesses, opportunities and challenges in Nassau, especially in the Over-the-Hill neighbourhoods of Bain Town and Grants Town.

## Need for urban regeneration and affordable housing

### Vacancy and mono-functionality in Downtown

In almost all historic city centres in Latin America and the Caribbean, vacancies can be found in historic city centres, and Nassau is no exception. The transition from a small Caribbean town into the widely sprawled city of today was accompanied by a shifting of functions and uses in the central areas. Bay Street was once the economic and commercial heart of Nassau, with traditional mixed-use neighbourhoods (commercial and residential). With the arrival of a cruise ship terminal and increased car dependency, residential uses shifted away from the centre. Former Bay Street inhabitants, many of higher income and connected to the historically land-owning families, moved to detached houses in the periphery of Nassau, leaving behind an area that transformed into a mono-functional and often derelict centre with little residential use.

### Grants Town and the Shortage of Housing

Grants Town is a low-density part of Nassau, with approximately 12 inhabitants per acre (30 per hectare), mostly living in single-family houses. With a shortage of housing opportunities, no affordable rental apartments, and no market for properties due to unresolved land title issues, the housing situation is complicated. Despite the central location of Grants Town, the area is currently not a highly desirable place to live for young families or elderly people as security concerns continue to be a problem. Although the community has been making commendable efforts in self-organizing and working together for improvement of the neighbourhood, safety continues to be a challenge for Grants Town residents.

### Missing improvement proposals and development plans led by public institutions

Even though there have been multiple upgrading and improvement plans for the central area, such as the EDAW Plan in 2006 or the Columbia University Plan from 1969, the essential parts of these proposals were never implemented. Currently there is no zoning and development plan in place, a fact that many participants of the workshops mentioned. The public sector is not leading, but rather reacting to private initiatives for urban development without leveraging public interest and validating the integrity of interventions. However, there is some encouragement with some important improvements having been undertaken locally such as the construction of Pompey Square led by the Nassau Downtown Partnership, and the neighbourhood renewal process around Graycliff Hotel in historic Charles Town.

## Disconnected public space

### Disconnection from the waterfront

The Caribbean coastline bordering Downtown Nassau is the most evident and iconic natural asset of the city. The urban beaches of Junkanoo Beach at the Western Esplanade on West Bay Street are in walking distance from the docks of Prince George Wharf, the cruise ship terminal, and inner city neighbourhoods. However, Nassau lacks connectivity between these areas, with a need for improvements in mobility infrastructure and systems to link key areas of interest. Also lacking is a continuous boardwalk at the waterfront to allow residents and visitors to appreciate the island's most precious and often under-appreciated natural asset. Currently, the seacoast is unattractive and a "backdoor" of the city that is inaccessible to residents. The existing downtown waterfront, Woodes Rodgers Walk, is very short (approximately 1300 ft long) and caters to mass tourism - mostly cruise ship visitors bringing little revenue to the city.

### Missing network of public spaces

The city is lacking a system of connected public spaces, making it unattractive to walk in the central area. Narrow sidewalks are challenging for pedestrians and the traditional cantilevers and arcades are disappearing due to inadequate building codes and weak enforcement. Important intersections and public spaces like parks and plazas could be better utilized for economic activities with a high frequency of clients, as is the case for the newly built Pompey Square in Downtown Nassau. Shaded pedestrian walkways connecting a sequence of plazas every 660 feet would not only make it more appealing to walk through Downtown Nassau, but would also create spaces that promote the interaction of neighbours, tourists and locals.

## Heritage value of buildings and places

Nassau has a great variety of historic buildings in the central area; these buildings are from different periods and include Forts, government buildings, and churches. The mixture of architectural styles portrays the local Caribbean identity and creates an attractive agglomeration of landmarks of cultural interest with exciting potential that has not yet been fully maximized. Beyond the rich architecture, neighbourhoods such as Grants Town are an important part of the social and cultural heritage of Nassau. This area houses several iconic homes and churches that together could be linked as part of a historic and religious trail, bringing together religious spaces that could serve the community in the social development of the neighbourhood.



# Citizen Security

In recent years, one of the main obstacles to human and economic development in the Caribbean region has been a persistent increase in the incidence of crime and violence (C&V). In The Bahamas, residents are increasingly concerned about the negative effects of crime on the social fabric, citizen quality of life and the economy — particularly tourism which accounts for more than half of the country’s GDP. This high incidence of C&V has been attributed to many factors including the growth of organized crime (particularly arms trafficking), a stagnant economy, high unemployment, and lack of opportunities for youths. Disaggregated crime data from the Royal Bahamas Police Force show that there have been continuous increases in the most violent crimes throughout NPI: murder, armed robbery and rape. According to UN data for 2015, the homicide rate was 38.4 per 100,000 people, higher than the 2014 average homicide rate for the Caribbean region of 16 per 100,000 inhabitants, and significantly higher than the global average of 6.2 per 100,000.

Recent research conducted by the University of The Bahamas in 2011 and 2016 indicated a high concentration of criminals based in the Over-the-Hill neighbourhoods (including Bain & Grants Town) of those criminals caught and jailed by police. Additionally, a 2016 IDB report on ‘Crime and Violence in The Bahamas’ observed that “police districts with the highest numbers of homicides were in the central, northeastern and southeastern districts”. Geo-spatial analyses show that these areas are also among the most densely populated and low-income constituencies on the island. These findings suggest that hotspot constituencies and schools should be the focus of targeted programmes aimed at reducing crime and the production of criminals. Additionally, tourists have been cautioned about transport and mobility in New Providence, such as in the “The Bahamas 2017 Crime & Safety Report”, which indicated that these Over-the-Hill communities in Nassau should be avoided, particularly at night. The report highlights the ‘Transportation-Safety Situation’ as a challenge in the country, most notably road safety and road conditions, including the lack of enforcement of traffic laws. According to the ESCI public opinion survey, 81% of respondents indicated they do not feel safe walking alone at night in New Providence.

The safety of residents (and tourists) is critical to the success of a ‘Sustainable Nassau’ and, as addressed in this Action Plan, interconnected to 2 out of 3 core areas: (i) revitalized, inclusive and competitive, and (ii) smart and transparent urban governance. Nonetheless, citizen security can be woven into every facet of a plan that defines a sustainable city. The ‘2017 Safe Cities Index’ by *The Economist Intelligence Unit* considers **infrastructure security** and **personal or physical security** as key components of sustainability in a rapidly urbanising world. Lack of security can inhibit a city’s competitiveness in many areas, such as productivity or the ease of doing business. Solutions that target the social, physical, and economic aspects of security, including for example community centres & co-working spaces, expanded sidewalks, better lighting, improved mobility (bikeability, public transit, walkability), and use of CCTV in public spaces such as car parks, can all improve safety and the perception of crime. Research highlights that investment in the “soft machinery”, for example the personnel behind the cameras, is what makes the difference (i.e., training, sufficient personnel monitoring and capacity of police to rapidly react when a crime occurs); and though cost intensive, it is most effective in the long run.

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**Infrastructure security** considers the built physical environment, such as city infrastructure and its vulnerability to disasters. On the input side, the index considers sub-indicators such as the quality of infrastructure as well as the enforcement of transport safety, while on the output side the number of vehicular accidents and pedestrian deaths are included.

**Personal or physical security** considers how at-risk citizens are from crime, violence and other man-made threats. Input indicators in this domain consider policies and decisions such as the level of police engagement, the use of data-driven crime prevention and the overall political stability. On the output side, the index considers the prevalence of petty and violent crime, safety perceptions, as well as new sub-indicators assessing the threat of civil unrest and conflict.



# Urban governance

The key findings on the topic of the island’s need for local governance in Nassau and NPI are summarised in the 10 points below:

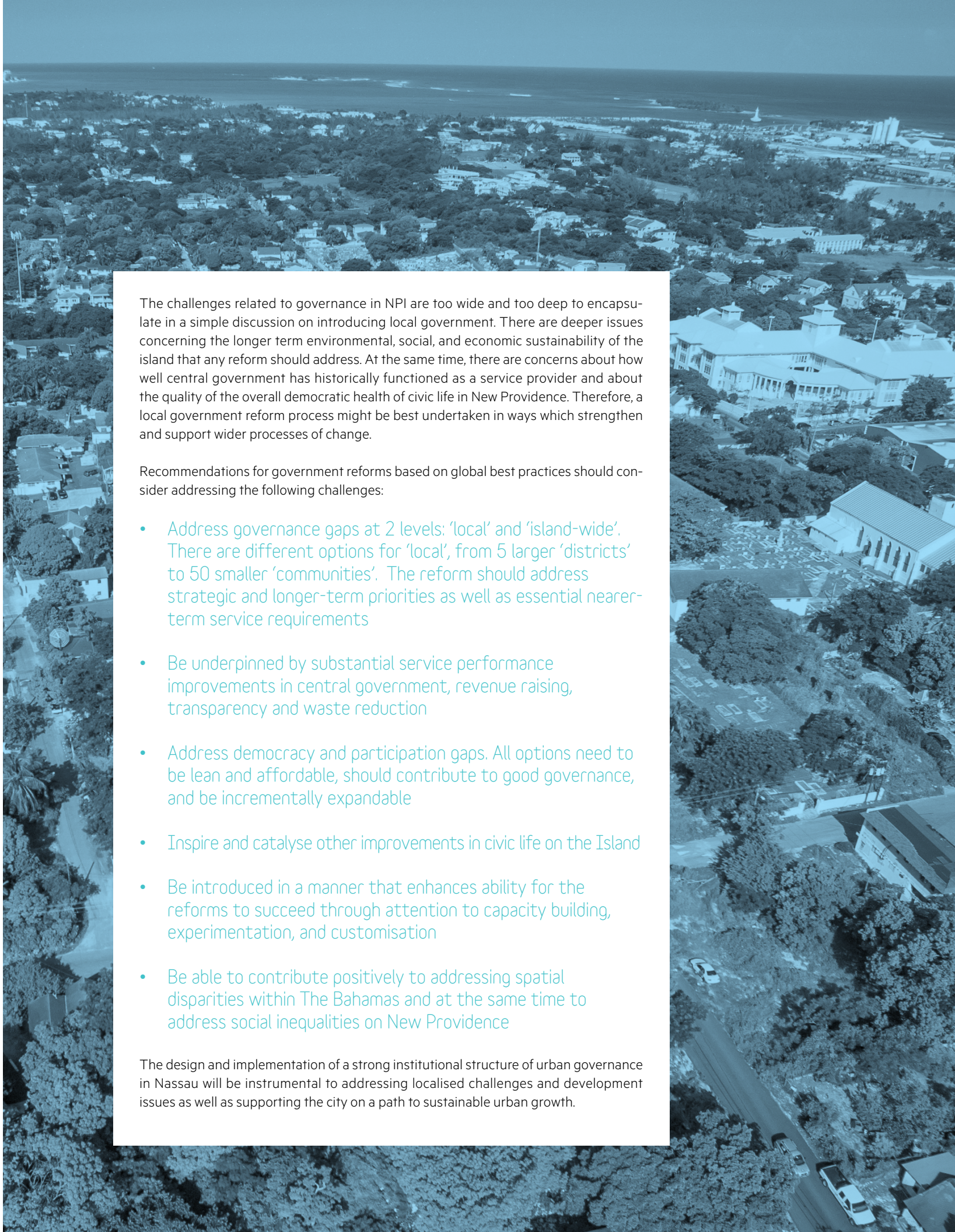
- No Local Government – No local Voice
- No Island-Wide Government – Coordination and Future Growth Planning Failures
- Inferior Quality of Services and Living Conditions, and Unresponsive Bureaucracies
- Lack of Enforcement and Follow-Up of Laws
- Perceptions of Favouritism
- Distorted Role of MPs
- Demand for Empowerment and the Growth of Informal Local Governance
- Low Levels of Investment and High Levels of Wasted Resources
- Lack of Placemaking and Place Management
- Lack of Civic Identity and Cohesion

The challenges related to governance in NPI are too wide and too deep to encapsulate in a simple discussion on introducing local government. There are deeper issues concerning the longer term environmental, social, and economic sustainability of the island that any reform should address. At the same time, there are concerns about how well central government has historically functioned as a service provider and about the quality of the overall democratic health of civic life in New Providence. Therefore, a local government reform process might be best undertaken in ways which strengthen and support wider processes of change.

Recommendations for government reforms based on global best practices should consider addressing the following challenges:

- Address governance gaps at 2 levels: ‘local’ and ‘island-wide’. There are different options for ‘local’, from 5 larger ‘districts’ to 50 smaller ‘communities’. The reform should address strategic and longer-term priorities as well as essential nearer-term service requirements
- Be underpinned by substantial service performance improvements in central government, revenue raising, transparency and waste reduction
- Address democracy and participation gaps. All options need to be lean and affordable, should contribute to good governance, and be incrementally expandable
- Inspire and catalyse other improvements in civic life on the Island
- Be introduced in a manner that enhances ability for the reforms to succeed through attention to capacity building, experimentation, and customisation
- Be able to contribute positively to addressing spatial disparities within The Bahamas and at the same time to address social inequalities on New Providence

The design and implementation of a strong institutional structure of urban governance in Nassau will be instrumental to addressing localised challenges and development issues as well as supporting the city on a path to sustainable urban growth.





# ACTION PLAN

## INTRODUCTION

The baseline studies on the carbon footprint, the environmental risks, and the urban footprint complemented by the diagnostic of key urban indicators, a public opinion survey, and the detailed special studies (urban mobility, energy efficiency, smart city solutions, solid waste management, and local governance) collectively revealed the urgent need to take actions placing NPI onto a path of urban sustainability.

These actions respond to the identified priorities and aim at tackling critical existing constraints. Carrying out the identified actions will enhance the quality of life for NPI residents, improve the environmental quality of coastal ecosystems, and reduce inequalities in access to housing and public spaces.

The actions have been identified through close consultation with stakeholders in Nassau. Therefore, they are not just the result of technical analysis, but also reflect the social and political sensitivities of the communities that live and work in NPI.

Taken as a whole, the NPI urban analysis rendered 4 strategic areas for urban sustainability:

Achieving a resilient and Sustainable Nassau/New Providence

Achieving a revitalized, inclusive, and competitive Nassau

Advancing towards a smart and transparent urban governance in Nassau

Putting people at the centre of the required actions to achieve urban sustainability

Thirty-seven (37) critical actions were identified, prioritized, and grouped into 10 significant investment projects or programs.

The essence of this action plan for Sustainable Nassau is based on the premise that to revitalize the city, we first need to empower its people to become the agents of change. Beginning at the household and neighbourhood levels, this change will define the new priorities for the community, the environment, the infrastructure, and the economy, to transform Nassau into a sustainable and inclusive city.

The strategic areas and projects that are proposed in this plan seek to put the city of Nassau on the track towards sustainability by emphasizing citizen safety, city innovation, accountable local governance, and inclusiveness for all neighbourhoods and public urban spaces, as well as leveraging the natural and cultural assets of Nassau within a more intelligent framework that will benefit present and future citizens.

That is why the title of this Action Plan is **Empowered People, Revitalized City**. The four (4) strategic areas and the related projects that follow provide the details on how this vision for urban sustainability in Nassau can be implemented.

4 STRATEGIC AREAS

37 ACTIONS

10 PROJECTS



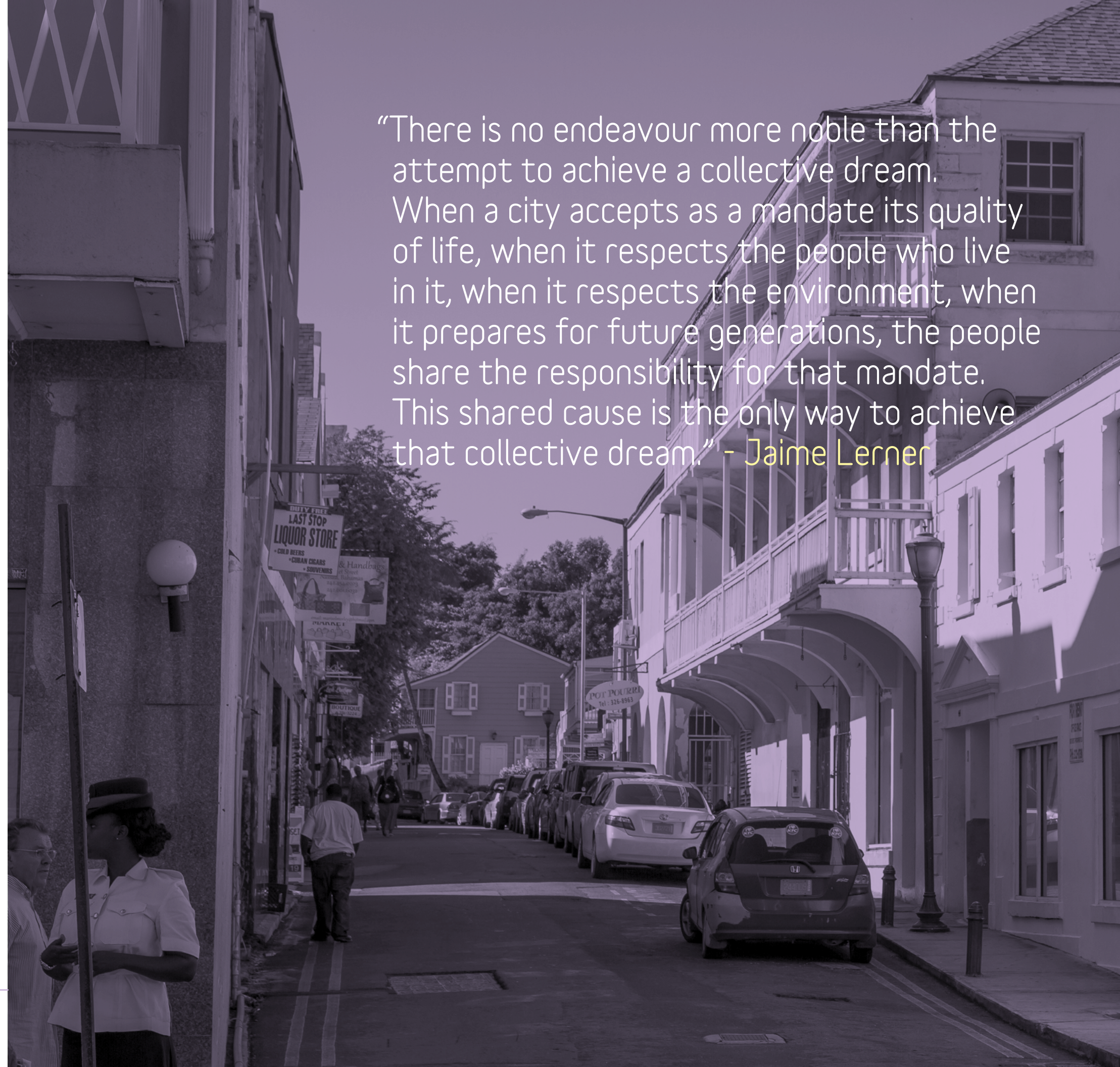
# STRATEGIES AND ACTIONS

## ACHIEVING A RESILIENT AND SUSTAINABLE NASSAU/ NEW PROVIDENCE

Urban sustainability in Nassau is dependent on protecting, preserving, and leveraging the city's natural assets and built infrastructure. The activities of citizens and businesses are in constant interaction with vulnerable environmental ecosystems. From ocean to coast, from coast to beach, from beaches to streets, from streets to buildings, it is necessary to take actions that will allow the city to withstand future natural disasters and ongoing stress created by intense human activity.

Four (4) projects were identified to increase resiliency and sustainability of the natural and built environment in Nassau.

“There is no endeavour more noble than the attempt to achieve a collective dream. When a city accepts as a mandate its quality of life, when it respects the people who live in it, when it respects the environment, when it prepares for future generations, the people share the responsibility for that mandate. This shared cause is the only way to achieve that collective dream.” - **Jaime Lerner**





# GREENING NEW PROVIDENCE (RESILIENCY TO CLIMATE CHANGE AND NATURAL DISASTERS)

It is clear from previous studies that natural disasters such as hurricanes, intensified by climate change, pose a significant cost to the people and the economy of The Bahamas. To address these vulnerabilities, an island-wide effort is required to reinforce the planning of coastal zones in New Providence. This includes a series of actions directed at restoring coral reefs and underwater plants, beach restoration, mangrove protection, infrastructure adjustments along beaches to withstand coastal flooding, as well as different street and drainage designs to deal with storm surges.

In parallel, actions are needed to better regulate residential construction along beaches in such a way that additional risks and vulnerabilities to coastal flooding are limited. Finally, building a resilient and environmentally sustainable Nassau requires the preservation of the city's scarce fresh water sources and their protection from salinization. These actions can be executed through available emerging technologies; however, it will be important that the technical solutions balance minimizing costs today with producing savings in the long run by preventing major expense on the impacts from future natural disasters and irrational land uses.



## ACTIONS

- Mangrove replanting
- Beach and coral reef restoration, protection and nourishment
- Replanting of native plants/ecosystems
- Removal of invasive species
- Encouragement of low impact development techniques (roofgardens, porous pavement, etc.)



- Improve flood protections for existing properties
- Restrict coastal development
- Restore buffer zones along waters



- Design and implement a coastal management plan
- Identify natural barriers to protect infrastructure from storm surges
- Regulations against development in low-lying and floodable areas



- Protection of water resources
- Perform hydro-census of all wells and septic systems
- Grey water reuse
- Home rainwater harvesting
- Drip irrigation
- Reduced runoff and water contamination
- Control mining of rock and sand and excavation of canals/waterways below water table





# RENEW, CONSERVE YOUR ENERGY NASSAU

The cost of generating electricity on an island like New Providence is very high compared to benchmarked efficient international standards. Thus, it is critical then to approach energy efficiency by applying a smart city approach to energy consumption. This approach must be “cascaded” to be applied first to “big” consumers of electricity, such as government buildings, hotels, large private office buildings, and high and middle-income residences; and then to small businesses and low-income residences. It is important that this approach be done in a careful manner to avoid economic strain to “smaller” consumers as they wait for the same benefits to reach them.

Another area of potentially significant savings is the retrofitting of street lamps to lower their energy consumption. Important consideration should also be given to the promotion of more efficient, energy-saving appliances in public and private spaces and buildings. These actions can be achieved by regulatory changes as well as targeted investment, with the aim of generating significant fiscal savings for the Government and expenditure savings for households in New Providence. Successful implementation of the type of actions proposed within this project should be measured, monitored, and assessed through the creation of a database that obtains data from the energy-saving devices. This monitoring should indicate cost savings and reduction of greenhouse gas (GHG) emissions. In short, energy efficiency should lead to a lower carbon footprint of the city.

## ACTIONS



Energy Efficiency Pilot Project:  
Retrofitting public buildings and  
LED street lamps (Smart Palms)



Government incentives for  
energy efficiency renovations and  
use of energy-saving appliances



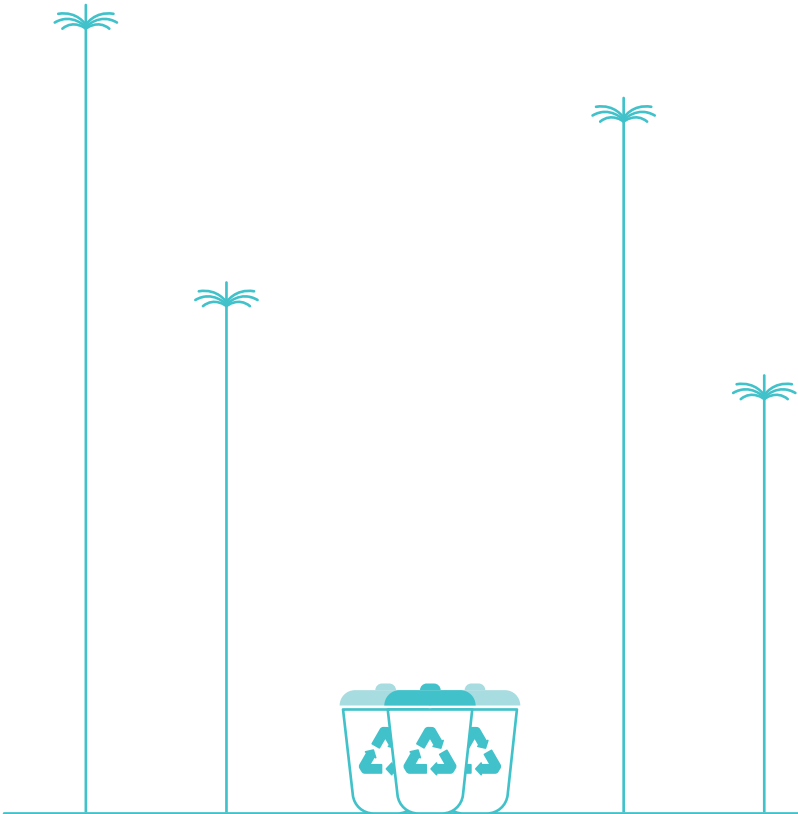
Improve data collection and  
perform an inventory update on  
GHG for New Providence Island



# GREEN, ZERO WASTE NASSAU

A rapid assessment of the NPI SWM system revealed a lack of an integrated approach to collecting, separating, processing, and disposing of waste in New Providence. This includes waste produced by the residents of Nassau, but also the solid waste that is generated by thousands of tourists that arrive in Nassau daily. Insufficient data and information on the basic physical, environmental, and economic parameters of the SWM system in New Providence impede the formulation of a new business model. The occurrence of frequent fires at the NPI landfill represent the most glaring manifestation of this currently deficient system.

To tackle the health and environmental vulnerabilities associated with incomplete solid waste management, it is necessary to implement actions in New Providence that will increase the occurrence of recycling, reusing, and sorting of waste at the source. These efforts should be complemented by an improvement of the island-wide trash collection system with the goal of meeting international best practices for medium-sized cities around the world. To the extent that a better organized system presents economic opportunities, earnest consideration should be given to engaging private sector companies to propose a new business model for an integrated SWM system. A series of considerations should be made in the event of a concession, such as the costs of collecting, processing, and disposing of several types of waste, the lowest tariff possible, the highest environmental standards, and the lowest carbon footprint that can be achieved.



## ACTIONS



- Residential Recycling:
  - Reuse and reduce
  - Sorting of waste
  - Composting



- Engage private sector for recycling opportunities
- Review environmental levies for private businesses
- Raise waste reduction requirements / standards for businesses and hotels



- Improve island-wide waste collection system
- Improve landfill management





# HEALTHY CITY NASSAU

Previous studies and recent projects have tried to assess and mitigate the shortcomings of the NPI drainage and sewage system. However, important gaps in coverage, reliability, and quality of such services still exist. These gaps in the construction and maintenance of infrastructure result in important health and environmental risks as well as intense flooding in the city of Nassau during episodes of torrential rain. The process of upgrading the sewers and drainage networks in Nassau requires actions directed at achieving a fully operationalized network, complemented by identifying open spaces to deal with water overflows in some public spaces. This affords the possibility of creating green infrastructure (retention ponds, etc.) that can have both a functional and recreational use (when dry) such as: parks and bike paths.

Actions taken to improve sanitation and drainage in New Providence should be accompanied by an aggressive program to minimize illegal dumping of solid waste, and reduce the amount of debris from storms that end up in sewer and drainage collectors. This could be achieved through the promotion of community-based drainage plans.

## ACTIONS

- Protection and conservation of green spaces and natural rain water drainage areas



- Improve sewage system and enforce regulations against illegal dumping
- Sewage disposal regulation and enforcement
- Maintenance and cleaning of drainage systems
- Create community-based drainage plans



- Maintenance and management of current sewage infrastructure

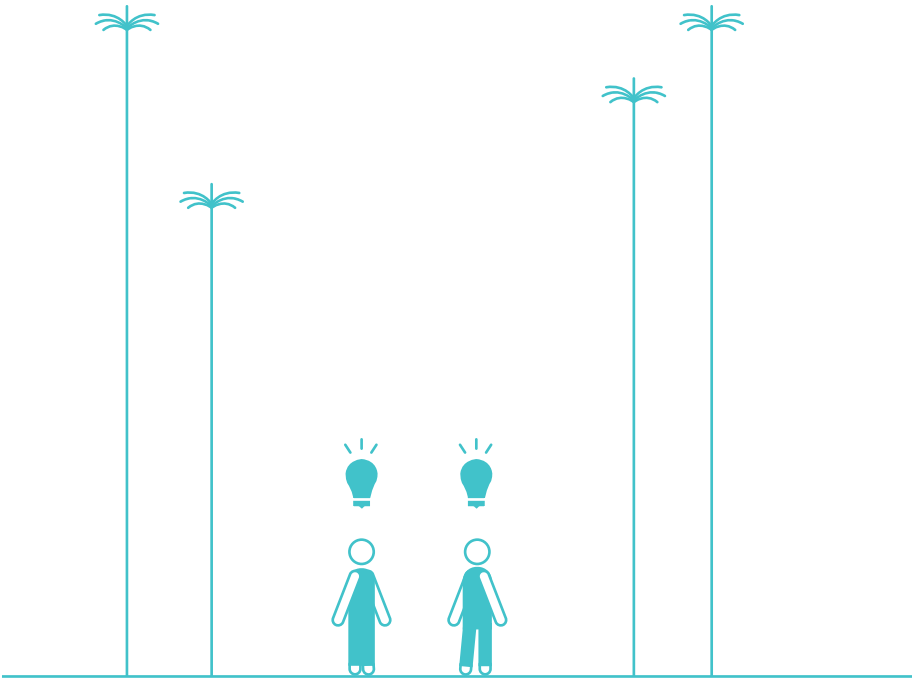




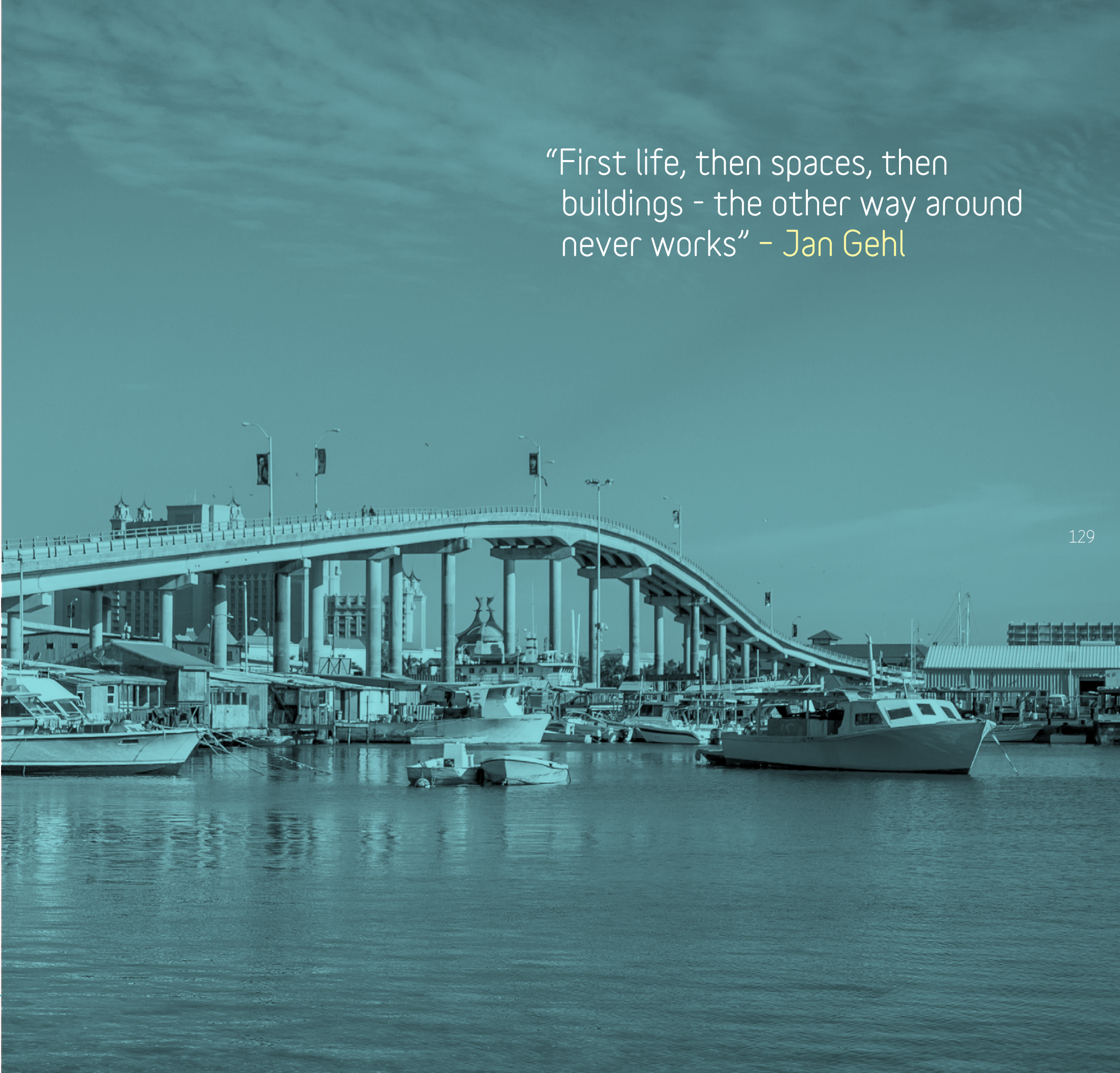
# ACHIEVING A REVITALIZED, INCLUSIVE, AND COMPETITIVE NASSAU

The urban footprint study and the Urban Design Lab exercise both revealed that there is significant potential for upgrades and regeneration initiatives to take place in Nassau’s downtown and the Over-the-Hill communities, like those being introduced in other emerging intermediate cities around the world such as: Mar del Plata (Argentina), Montería (Colombia), and Asunción (Paraguay).

These features span topics ranging from sustainable human mobility (including city walkability and bikeability) to better connectivity, urban transportation, renovation of green public spaces, refurbishing of community buildings, housing upgrades, smart city solutions for more efficient energy consumption, water consumption, and solid waste disposal. Three (3) priority projects were identified to maximize regeneration potential of Nassau.



“First life, then spaces, then buildings - the other way around never works” – Jan Gehl










# MOBILE AND CONNECTED NASSAU

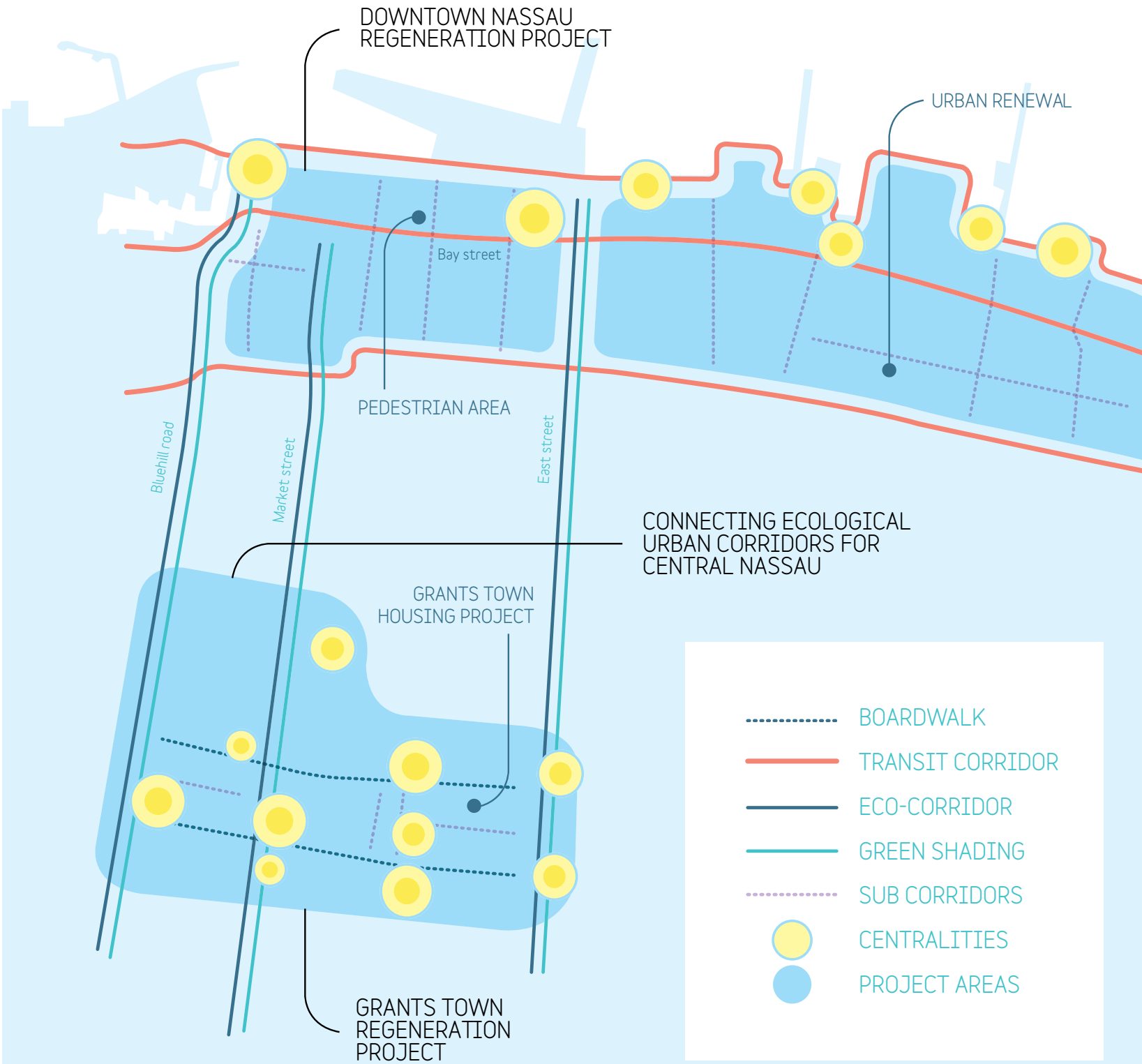
The mobility study indicates the unification and reorganization of the NPI bus system is long overdue. Such changes should be accompanied by significant improvements in quality, reliability, and operational efficiency.

Key elements of a redesigned sustainable mobility program in NPI related to urban public transport include: implementation and enforcement of higher operational standards, route consolidation, implementation of a unified / automated payment system, the use of GPS to monitor service in real time, availability of free Wi-Fi on buses, and incorporation of local art on buses and at bus stops.

## ACTIONS

- 
  - Revision of New Providence transportation policies and bylaws
- 
  - Introduce disincentives for private car usage
  - Encourage micro-transport, ride sharing, carpooling, and ride sourcing
- 
  - Improvement of urban street furniture
  - CCTV and free WiFi in public spaces (including bus stops)
  - Improve pedestrian infrastructure and connectivity for pedestrians and cyclists
- 
  - Introduce Complete Streets concept into land and transport planning
  - Introduce small and large-scale public art to create positive image of public transport
- 
  - Unification of the bus system
  - Bus service and reliability improvements
  - Free WiFi on buses and GPS tracking of buses
  - Creation of designated bus stops and safe waiting areas
  - Branding and marketing of new bus system to increase ridership

These actions to modernize the public transportation system throughout NPI should be supplemented with upgrades made to the island's main roadways and other physical corridors. Specifically, this includes improving pedestrian and cyclist infrastructure, establishing proper sidewalks, retrofitting street intersections, upgrading street furniture, and ensuring that this infrastructure is suitable for residents of all physical abilities. Cost-effective upgrades to these main thoroughfares should include upgrading streets lamps and traffic lights, installing Wi-Fi hotspots and device-charging station, and providing shade and seat benches wherever possible.





## NASSAU URBAN REGENERATION PROJECT

As identified by the Urban Design Lab exercise, there is an opportunity to upgrade the downtown area (the main tourist and commercial corridor) and the Over-the-Hill communities (the most disadvantaged population of the city). Regenerating the downtown neighbourhood must include the upgrading of the northern waterfront by building a boardwalk from Cable Beach to the 2 bridges leading to Paradise Island. The boardwalk would provide a significant and continuous public community space for social interaction as well as opportunities for citizens to interact with the water. Additionally, a boardwalk would offer opportunities for local economic development and incremental opportunities for retail establishments to locate downtown. Lastly, the creation of flexible commercial rental spaces for diverse types of vendors and other small businesses was revealed as an important element of any Downtown Nassau revitalization effort necessary to expand the local economy.

An emphasis on the revitalization of 'Historic Nassau' is also needed, and the designation of a formal historic district could be useful for guiding development in the area through special building guidelines and protections. A Grants Town — Bain Town neighbourhood revitalization effort could introduce significant improvements to housing, public services, and community spaces and buildings. Historic buildings could be rehabilitated, as well as those representing traditional architectural styles and heritage value. Housing upgrades to basic structures could be complemented with smart features for improved water and energy consumption, broadband connectivity, and solid waste disposal. In public community spaces, resilient urban furniture and Wi-Fi hotspots with flexible mobile designs can also be incorporated. Whenever possible, retrofitting of community buildings should consider affordable elements such as better shading and cooling (e.g., passive ventilation), solar panel roof, rain water harvesting, and Wi-Fi connectivity.

Finally, the Nassau Regeneration program should contain a plan to link all existing ecological corridors (green spaces and other natural assets). For this to occur, it would first be necessary to map and then connect all open green spaces in the city by means of natural (e.g., greenway or path) or artificial (e.g., pedestrian bridge) links and connectors. The network of open green spaces would allow for higher levels of citizen recreation, easier mobility throughout the city of Nassau, and overall improved circulation throughout NPI.

## ACTIONS



### DOWNTOWN REGENERATION PROJECT:

- Waterfront and Boardwalk Development Project
- Revitalization and densification of the urban fabric
- Walkable downtown and human scale mobility
- Creative Nassau Co-Working space
- Downtown Nassau Zoning and Form-Based Plan



### GRANTS TOWN REGENERATION PROJECT:

- Grants Town housing upgrading project
- Toolbox for green public space development
- Community empowerment and local economic development
- Grants Town community education and innovation initiative



### CONNECTING ECOLOGICAL URBAN CORRIDORS FOR CENTRAL NASSAU:

- Densification of corridors using urban norms/standards
- Creation of urban ecosystem and connecting open spaces with walkable/bikeable corridors





# SMART CITY MONITORING

The environmental risk and urban footprint diagnostic studies both provided clear recommendations signalling the risks that natural disasters impose on the quality of life and the urban infrastructure throughout Nassau. Much of this risk and the associated costs could be reduced by introducing improved disaster prevention programs guided by cost-effective smart city solutions.

One key component of such a project is the inception of an Early Warning System (EWS) like those being used in comparable cities around the world such as Goiania (Brazil), Rio de Janeiro (Brazil), and Orlando (USA). At the core of an EWS is an intelligent software that provides an automated communication platform to activate early responders, inform citizens directly of specifically located risks and hazards, and provide targeted guidance to guidance and officials that can facilitate preparation and prevention of damage to citizens and property.

The other component of a NPI smart city solutions project is the creation of an Integrated Operations Control Centre (IOCC), a feature employed as a best practice among smart cities globally that allows for real time monitoring of the city through easily integrated software and hardware elements. Areas that could benefit from improved city monitoring include, but are not limited to: crime prevention, remote control of street lamps, remote and automated manipulation of traffic light stations, responsiveness to traffic accidents, health emergencies, fire emergencies, use of connectivity devices (Wi-Fi hotspots, street cameras, tablets, and cell phones) for citizen security and crowd control, and smart parking and automated traffic enforcement. The existence of an IOCC can also generate a significant amount of real time “big data” that can allow NPI to develop valuable mobile applications (apps) that can improve efficiency and quality of city life for various types of users within the island, including individuals, public agencies, and private businesses.

## ACTIONS



- Implement an early warning system for disaster prevention



### CREATE AN INTEGRATED OPERATIONS CONTROL CENTRE FOR NEW PROVIDENCE:

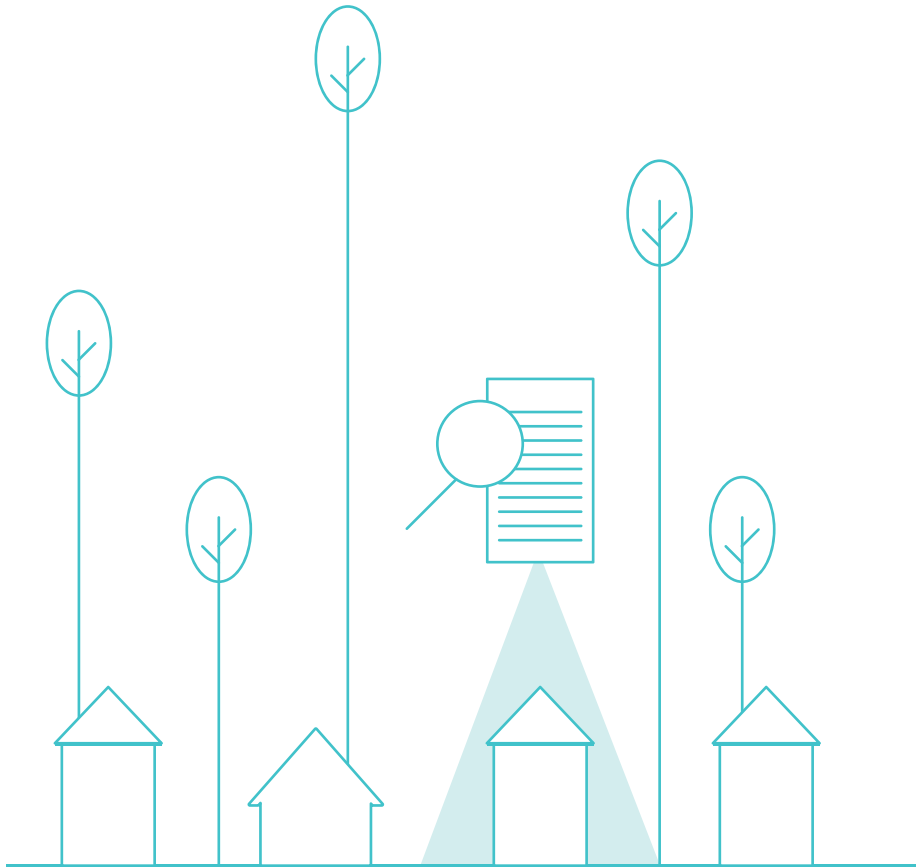
- Enhanced crime prevention system with new cameras
- Remote control of lights and energy systems
- Traffic signal control system
- Video surveillance of vulnerable areas and landfill
- Monitoring of WiFi hotspots
- Complete GIS database
- Energy management systems
- Enhanced computer-aided dispatch systems for emergencies
- Smart parking and automated traffic enforcement
- Electricity outage and distribution management system



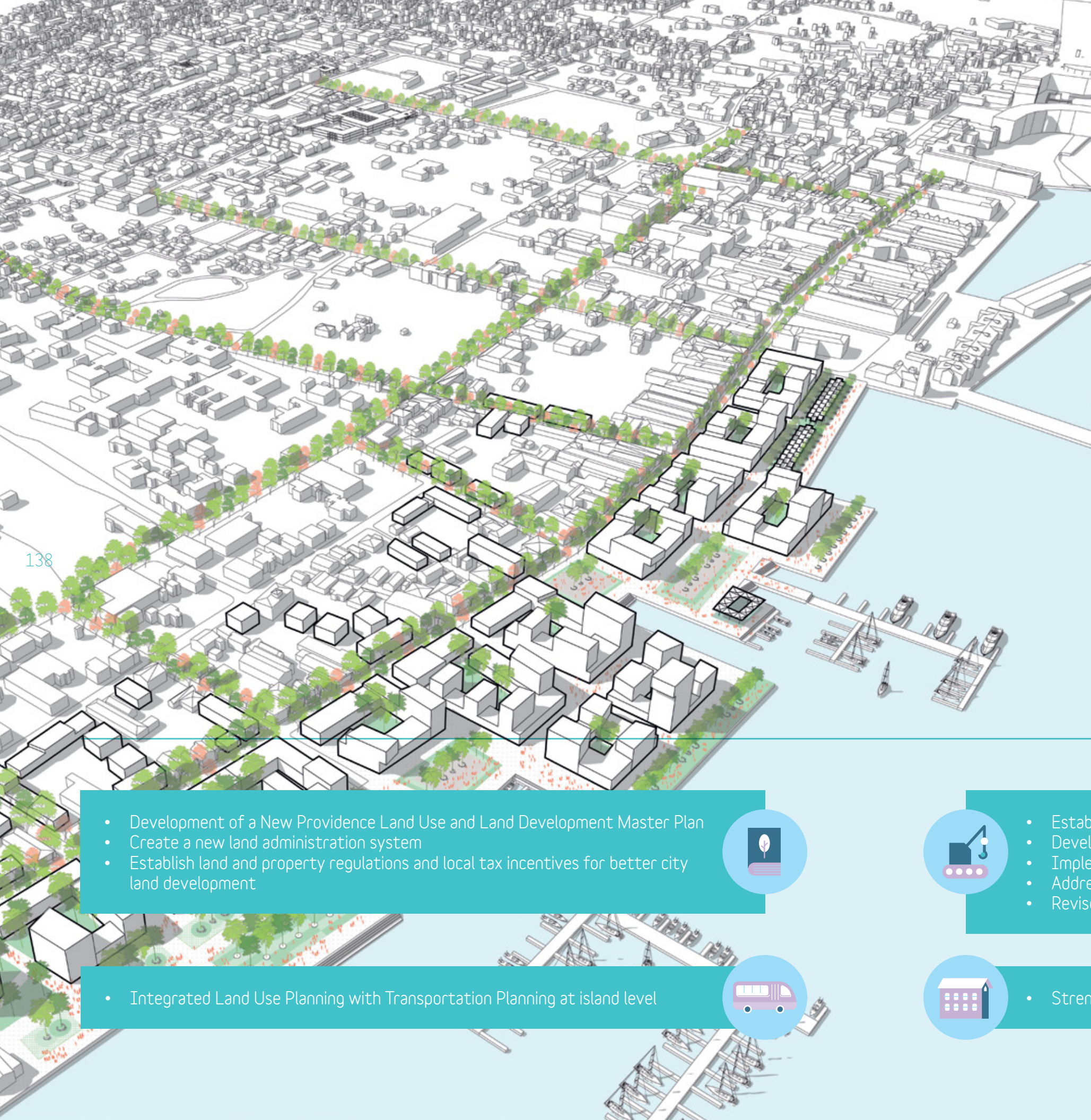


ADVANCING TOWARDS  
A SMART AND  
TRANSPARENT URBAN  
GOVERNANCE IN NASSAU

“By far the greatest and most admirable form  
of wisdom is that needed to plan and beautify  
cities and human communities.” - **Socrates**







## URBAN PLANNING FOR SUSTAINABILITY

The urban footprint analysis and interactions with institutional stakeholders and community representatives revealed that Nassau is a city growing incrementally within the limits of NPI but lacking an urban master plan for long term land use. As such, the urban planning function given to Town and Country Planning is limited to issuing construction permits and promoting residential and commercial construction, with limited attention to urban regulations to protect public spaces for recreation or circulation. This relates to standards for sidewalk width, building setbacks, parking allowances and restrictions, requirements to plan for green spaces and community facilities, among others. The city's lack of an urban master plan is perhaps most evident in Downtown Nassau.

A proposed project to address these shortcomings includes introducing a land development plan for NPI that will assign coherent land uses to specific areas while preserving vulnerable natural assets such as: beaches, parks, and other public spaces. One component of this project envisions strengthening land management through a Geographic Information System (GIS) that would allow for better collection, storage, analysis, and use of land data that can improve decision-making for the development of the island. Another element involves establishing "sector-area" or "small area" urban planning units that can be subject to more detailed urban plans and planning through targeted land uses, zoning ordinances, smart residential densification guidelines, and a building code that considers the implications of climate change for the adaptation of existing buildings, houses, and future construction. A third aspect of a coherent city planning project consists of integrating the land use planning with the long-term plans for roads and public transportation, with the clear objective of minimizing travel time, maximizing accessibility, and reducing the carbon footprint of vehicle use.

## ACTIONS

- Development of a New Providence Land Use and Land Development Master Plan
- Create a new land administration system
- Establish land and property regulations and local tax incentives for better city land development



- Integrated Land Use Planning with Transportation Planning at island level



- Establish a sector-area or small-area urban planning framework
- Develop land use plan and zoning
- Implement smart growth policies
- Address building and construction design standards/regulations
- Revise building codes



- Strengthen Government's role in housing sector regulation





# RESPONSIVE, TRANSPARENT, AND EFFICIENT LOCAL GOVERNMENT

A dedicated study on local governance issues and relevant options for Nassau/NPI provided clear indications that both central government and community stakeholders perceive value in the existence of a form of accountable and transparent local government. This local government would administer matters pertaining to the provision of local services and improvements to the quality of life in Nassau. While the shape and form of local government could follow any of several institutional and political designs, many of residents' demands can be addressed through a dedicated local government. These demands include improving community services and amenities such as parks, community centres, streets, sidewalks, garbage collection, community policing, and promotion of small businesses.



## ACTIONS

A project to bolster local government would first include establishing an acceptable local government framework that can provide effective checks and balances to ensure the city is delivering high quality services to the communities and businesses throughout NPI. Another central component would address the necessary budget resources that could be transferred from the central government, and alternatively or complementarily the capacity to raise local revenue to cover the costs of providing services to the various NPI communities. Such a system should be accompanied by transparent reporting on how expenditures are allocated. Next, the plan should cover the coordination required between the local administration and the central government ministries regarding large infrastructure projects, health facilities, and education facilities. Creating a single-window portal for responding effectively to citizens and businesses could also be a component for improving service delivery. Finally, a communications and public access to information plan, accessible through mobile devices, would provide sufficient transparency about the performance of local government, allowing access to local government information.

- New Providence Local Government Framework
- Institute local governance on New Providence Island
- Develop local level government and a body to provide checks and balances on national government actions



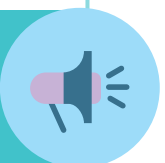
- Establish an island-wide urban planning and development administration office
- Develop a single window approach to citizen engagement with local government



- Enforcement of fiscal policies
- Improvement of reporting system of government spending to ensure proper checks and balances



- Freedom of Information Act revised, implemented, enforced
- Develop or improve government websites, applications for smart phones



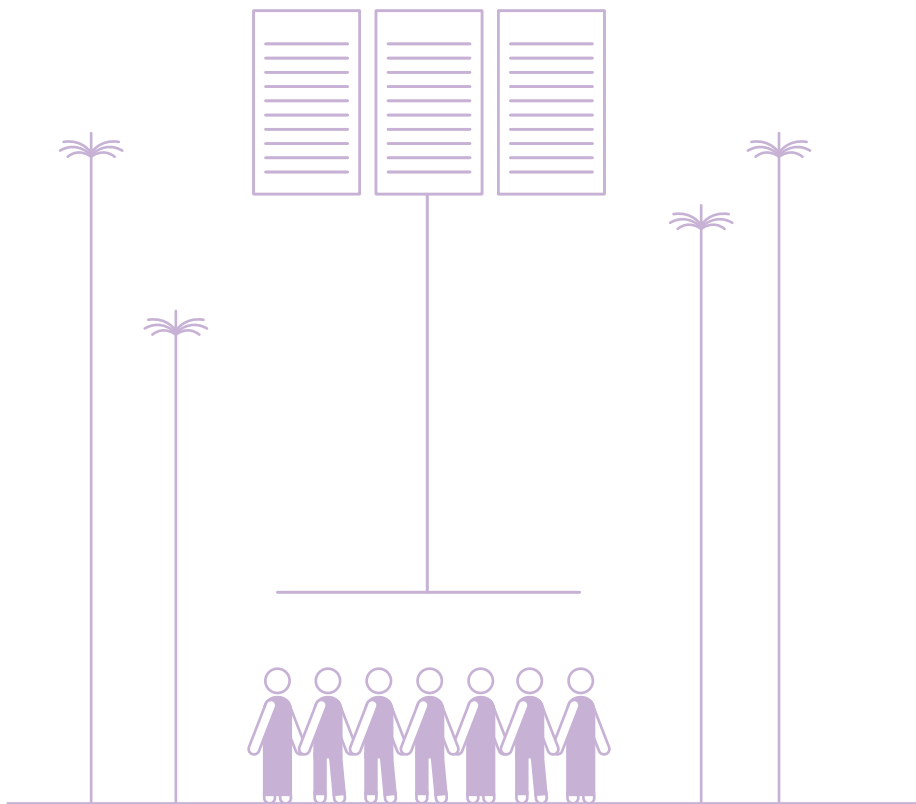
- Executive Coordination Office for New Providence
- Upgrade government ministries to be more efficient and effective





PUTTING PEOPLE AT THE  
CENTRE OF THE ACTIONS  
REQUIRED TO ACHIEVE  
URBAN SUSTAINABILITY

“Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody.”  
- Jane Jacobs





# EMPOWERED PEOPLE, EMPOWERED CITY

For the technical and institutional solutions recommended by this Action Plan for Sustainable Nassau to work, the city’s people must be engaged, educated and empowered to claim a better quality of life. Gaps in skills, knowledge, and information must be addressed first to guarantee true accountability in all aspects of city life.

Empowering Nassau citizens would include a significant skills development and training component aimed at young people to support job opportunities in fields created by rapidly emerging technologies, particularly in the service sectors in which The Bahamas is competitive. Another component should cover a series of educational and public awareness campaigns, in areas such as disaster readiness/prevention; smart mobility using alternative transportation modes; water conservation; energy consumption; and recycling of solid waste; and environmental quality at the community level and in public spaces. Reinforcement and supplementation should be provided to school curricula in environmental education and government and citizen responsibilities (e.g., civics). Finally, there should be a focus on the strategic use of social media through schools for lifelong-learning about urban sustainability, better city living, and local governance could be included in a project to empower young people. The proposed project would have a comparatively low cost and would be complementary to the objectives of the National Development Plan and the Vision 2040 for The Bahamas.



- Skills for the jobs of today and tomorrow resulting from emerging technologies and developing economic sectors



- Public awareness campaigns for disaster preparedness: tree trimming, evacuation routes, etc.
- Develop a tropical storm/hurricane preparedness and evacuation plan



- Public awareness and education on transportation alternatives in New Providence



- Water and environmental conservation education
- Energy efficiency education campaign
- Public campaign for recycling and energy efficiency
- Environmental educational programs for all ages in schools and communities
- School curriculum revision for civics government functions



- Public awareness programs using social media
- Schools used for lifelong learning - education programs
- Expansion of Youth in Parliament program
- Develop a Nassau Citizens Board





# IMPLEMENTATION TIMELINE AND ESTIMATED COSTS OF INVESTMENT

Using a comparative cost approach, a tentative costing of the projects required to materialize this Action Plan was calculated. The costing estimate covers the 4 key strategic projects including:

Resilient and Sustainable Nassau

Revitalized, Inclusive and Competitive Nassau

Smart and Transparent Urban Governance

People at the Centre

The estimated total cost of all proposed actions in this plan would amount to US\$7 million in necessary pre-investment studies and **US\$450 million in investment projects**, which can be expensed over a period of 17-20 years. These total cost estimates have also been prioritized as short, medium and long term, considering limitations on fiscal resources and suggesting a relative urgency and possible sequencing.

Specific actions have been grouped and arranged around 10 investment projects and programs that seek to respond to each strategic priority over the long run. The 37 identified actions can become components of those 10 projects or, alternatively, be executed as stand-alone studies or investments.

The following detailed matrix seeks to provide a coherent framework to guide the priorities, projects and actions for the urban sustainability of Nassau.

\$7 million

STUDIES

\$450 million

INVESTMENTS



# Action Plan for Sustainable Nassau: Projects, Actions, and Costs

PRIORITY

LONG-TERM

MEDIUM-TERM

SHORT-TERM

ESC PRIORITY AREA(S)

MOBILITY & TRANSPORT

VULNERABILITY TO NATURAL DISASTERS

ENERGY

CITIZEN SECURITY

SANITATION & DRAINAGE

SOLID WASTE MANAGEMENT

UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

CLEAN WATER AND SANITATION6

AFFORDABLE AND CLEAN ENERGY7

DECENT WORK AND ECONOMIC GROWTH8

INDUSTRY, INNOVATION AND INFRASTRUCTURE9

SUSTAINABLE CITIES AND COMMUNITIES11

RESPONSIBLE CONSUMPTION AND PRODUCTION12

CLIMATE ACTION13

PEACE, JUSTICE AND STRONG INSTITUTIONS16

POTENTIAL SOURCE OF FINANCING

PUBLICPUB

PRIVATEPVT

ACTIONS		EXPECTED RESULT	AMOUNT	
			PRE-INVESTMENT	INVESTMENT

RESILIENT, SUSTAINABLE NASSAU

GREENING NEW PROVIDENCE (RESILIENCY TO CLIMATE CHANGE AND NATURAL DISASTERS)

PUB	Mangrove replanting; beach and coral reef restoration, protection and nourishment, replanting of native plants/ecosystems; removal of invasive species, encouragement of low impact development techniques (roof gardens, porous pavement, etc.).	New Providence coastal ecosystem improved.	\$150,000	\$30,000,000
PUB	Improve flooding protections for existing properties, restrict coastal development and restore buffer zones along waters.	Street drainage system improved.	\$150,000	\$25,000,000
PUB	Design and implement a coastal management plan, identify natural barriers to protect infrastructure from storm surges, regulations against development in low-lying and floodable areas.	New Providence coastal ecosystem improved.	\$250,000	
PUB	Protection of water resources, perform hydro-census of all wells and septic systems, grey water reuse, home rainwater harvesting, drip irrigation, reduced runoff and water contamination, control mining of rock and sand and excavation of canals/waterways below water table.	Fresh water quality improved.	\$300,000	\$50,000,000



ACTIONS	EXPECTED RESULT	AMOUNT	
		PRE-INVESTMENT	INVESTMENT

## REVITALIZED, INCLUSIVE, AND COMPETITIVE NASSAU

### MOBILE AND CONNECTED NASSAU

PUB	Revision of New Providence transportation policies and bylaws.	Urban mobility improved.	\$90,000	
PUB	Unification of the bus system, bus service and reliability improvements, free WiFi on buses and GPS tracking of buses, creation of designated bus stops and safe waiting areas, branding and marketing of new bus system to increase ridership.	Efficiency, quality, cost, and connectivity of public transportation improved.	\$250,000	\$30,000,000
PUB	Improvement of urban street furniture, CCTV and free WiFi in public spaces (including bus stops), improve pedestrian infrastructure and connectivity for pedestrians and cyclists.	Human mobility improved.	\$250,000	\$20,000,000
PUB	Introduce disincentives for private car usage, encourage micro-transport, ride sharing, carpooling, and ride sourcing.	Human mobility improved.	\$100,000	\$1,000,000
PVT	Introduce Complete Streets concept into land and transport planning, small and large-scale public art to create positive image of public transport.	Quality of public transportation improved.	\$100,000	\$1,000,000

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### NASSAU URBAN REGENERATION PROJECT

PVT	Downtown Regeneration Project: Waterfront and Boardwalk Development Project, revitalization and densification of the urban fabric, walkable downtown and human scale mobility, Creative Nassau Co-Working space, Downtown Nassau Zoning and Form-Based Plan.	Quality of public urban space improved.	\$200,000	\$15,000,000
PUB	Grants Town Regeneration Project: Grants Town housing upgrading project, toolbox for green public space development, community empowerment and local economic development, Grants Town community education and innovation initiative.	Quality of life in over the hill community improved.	\$250,000	\$30,000,000
PUB	Connecting ecological urban corridors for Central Nassau: Densification of corridors using urban norms/standards, creation of urban ecosystem and connecting open spaces with walkable/bikeable corridors.	Quality of public urban space improved.	\$200,000	\$12,000,000

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### SMART CITY MONITORING

PUB	Implement an early warning system for disaster prevention.	Impact and cost of natural disasters reduced.	\$250,000	\$2,000,000
PVT	Create an Integrated Operations Control Center for New Providence: Enhances crime prevention system with new cameras; remote control of lights and energy systems; traffic signal control system; video surveillance of vulnerable areas and landfill; monitoring of WiFi hotspots; complete GIS database; energy management systems; enhanced computer-aided dispatch systems for emergencies; smart parking and automated traffic enforcement; electricity outage and distribution management system.	Urban logistics and citizen satisfaction with urban services improved.	\$300,000	\$8,000,000

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## SMART AND TRANSPARENT URBAN GOVERNANCE

### URBAN PLANNING FOR SUSTAINABILITY

PUB	Development of a New Providence Land Use and Land Development Master Plan, create a new land administration system, establish land and property regulations and local tax incentives for better city land development.	Long-term urban planning improved.	\$250,000	\$2,000,000
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PUB	Establish a sector-area or small-area urban planning framework, develop land use plan, zoning; implement smart growth policies; address building and construction design standards/regulations and revise building codes.	Town planning upgraded.	\$150,000	\$1,500,000
PUB	Integrated Land Use Planning with Transportation Planning at island level.	Human mobility improved.	\$200,000	\$1,000,000
PUB	Strengthen Government's role in housing sector regulation.	Housing quality improved.	\$200,000	\$1,000,000

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### RESPONSIVE, TRANSPARENT, AND EFFICIENT LOCAL GOVERNMENT

PUB	New Providence Local Government Framework, institute local governance on New Providence Island, develop local level government and a body to provide checks and balances on national government actions.	Island-wide governance in New Providence modernized.	\$200,000	\$5,000,000
PUB	Enforcement of fiscal policies, improvement of reporting system of government spending to ensure proper checks and balances.	Fiscal transparency increased.	\$150,000	\$1,000,000
PUB	Executive Coordination Office for New Providence, upgrade government ministries to be more efficient and effective.	Island-wide governance in New Providence improved.	\$100,000	\$1,000,000
PUB	Establish an island-wide urban planning and development administration office, develop and single window approach to citizen engagement with local government.	Urban logistics and citizen satisfaction with urban services improved.	\$100,000	\$1,500,000
PUB	Freedom of Information Act revised, implemented, enforced; develop or improve government websites, applications for smart phones, etc.	Government transparency increased.	\$100,000	\$500,000

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## PEOPLE AT THE CENTRE

### EMPOWERED PEOPLE, EMPOWERED CITY

PUB	Skills for the jobs of today and tomorrow resulting from emerging technologies and developing economic sectors	Improved labour force and reduced unemployment		\$50,000,000
PUB	Public awareness campaigns for disaster preparedness: tree cutting, evacuation routes, etc.; Develop a tropical storm/hurricane preparedness and evacuation plan.	Impact and cost of natural disasters reduced.	\$250,000	\$500,000
PUB	Public awareness and education on transportation alternatives in New Providence.	Urban logistics and citizen satisfaction with urban services improved.	\$100,000	\$500,000
PUB	Water and environmental conservation education, energy efficiency education campaign, public campaign for recycling and energy efficiency, environmental educational programs for all ages in schools and communities, school curriculum revision for civics and how government works.	Urban logistics and citizen satisfaction with urban services improved.	\$250,000	\$1,000,000
PUB	Public awareness programs using social media, schools used for lifelong learning - education programs, expansion of Youth in Parliament program, develop a Nassau Citizens Board.	Government transparency increased.	\$150,000	\$500,000

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TOTAL	\$7,000,000	\$450,000,000
PRIVATE	\$1,330,000	\$88,000,000
PUBLIC	\$5,670,000	\$362,000,000
AVERAGE YEARLY COST	\$411,764.71	\$26,470,588.24



# CONCLUSIONS AND NEXT STEPS

The intention is that the realization of this Action Plan, developed through a process of public engagement, is monitored by an independent, non-governmental system of citizen follow-up. Tracking the implementation of the Action Plan and the sector indicators over time becomes a good tool to promote accountability and increases transparency and efficiency in public administration. Citizens can be empowered by monitoring the progress achieved by their elected officials, including whether actions are both being implemented on schedule and having the desired impact.

152 The monitoring system should track results and impacts, and to do so, it must receive periodic inputs from various government agencies and departments along with public opinion data. Data should be made publicly available online where citizens can view and track the Action Plan's progress, as well as offer feedback about the types of information they would like to see. By taking a more proactive and participatory role in government, citizens are directly contributing to the positive development they seek.

This Action Plan and the myriad data produced from ESC will continue to serve as useful references for the further development and finalization of the Bahamas' National Development Plan — Vision 2040. Beyond this Action Plan, the IDB plans to assist Nassau in designing 2 or 3 top priority interventions through pre-investment studies and analyses; as well as support to identify external funds to accompany the key interventions recommended in this action plan. However, implementation of the Action Plan will require a cross-sectoral approach to project preparation, delivery, and supervision that includes representatives of all relevant government agencies and private (businesses as well as community) stakeholders. Multi-sector collaboration and coordination, and especially public participation, are keys to the Action Plan's success and are necessary for the proposed projects to achieve the expected impact that leads to an empowered, sustainable, and revitalized Nassau.

SUSTAINABLE NASSAU ACTION PLAN





