BELIZE INFRASTRUCTURE ASSET MANAGEMENT FOR ENHANCED CLIMATE RESILIENCE

Columbia University, School of International and Public Affairs
Research Report for the United Nations Department of Economic and Social Affairs (UN DESA)

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Table of Contents

1. Acknowledgements

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1.1. Disclaimer

The analysis and conclusions presented in this report are those of the authors and do not necessarily reflect the views of the United Nations Department of Economic and Social Affairs (UN DESA) or the United Nations.

2. Project Overview

The Belize Infrastructure Asset Management (IAM) for Enhanced Climate Resilience project, undertaken with UN DESA, focuses on how infrastructure assets are managed across their full lifecycle. It uses the UN Diagnostic Tool to assess five areas: governance, data and systems, planning, budgeting, and implementation. The analysis looks at how institutions currently operate and where gaps make asset management less effective, especially around financing, coordination, and long-term planning. Based on this, the project puts forward targeted recommendations to improve how costs are managed over time, strengthen climate resilience, and make service delivery more reliable. The aim is to move toward a more structured and sustainable approach to infrastructure management that supports fiscal stability and aligns with the Sustainable Development Goals.

3. Introduction

Urban infrastructure in developing countries is often framed as a construction challenge, but the bigger issue comes after projects are built. Most lifecycle costs, around 60% to over 70% fall in the maintenance and operations phase[1] How these phases are managed determines whether infrastructure continues to deliver reliable access to services such as transport, healthcare, education, and water. In practice, many governments struggle to manage assets over time, which leads to deterioration, higher long-term costs, and uneven service delivery.

In response, the United Nations Department of Economic and Social Affairs (UN DESA) developed the Managing Infrastructure Assets for Sustainable Development handbook. It provides practical guidance for public officials on how to manage infrastructure systems more effectively and in line with international standards and the Sustainable Development Goals. The framework focuses on five areas: governance, data and systems, planning, budgeting, and implementation.

Building on this, UN DESA developed a diagnostic tool that allows governments to assess how infrastructure assets are currently managed across these areas. The tool helps identify gaps, highlight strengths, and bring systems closer to international practice.

UN DESA has applied this approach in countries such as Costa Rica, Gambia, Kenya, Lao PDR, Nepal, and Tanzania, and is looking to expand this work further particularly in countries facing capacity constraints and higher exposure to climate risks.

This project applies the IAM diagnostic tool in Belize. It is a capacity development and systems-strengthening instrument that assesses current capacity, identifies gaps, and sets out clear areas for improvement for IAM. It also feeds back into UN DESA's broader work by identifying how the tool can be adapted to future applications.

4. Methodology

This Capstone project was structured in four main phases, each building on the previous one. The first phase focused on developing a strong and aligned understanding of the UN DESA handbook and the diagnostic tool. This step was important to ensure that the team was clear on the framework, terminology, and expectations from the beginning. During this stage, the team also defined the criteria for selecting the country where the diagnostic would be applied. Initial meetings with the client were used to validate these criteria, align priorities, and discuss country selection. Belize was selected based on its exposure to climate risks, its ongoing engagement with infrastructure development partners, and the opportunity to apply the diagnostic tool in a context where systems are still evolving and institutional coordination remains a key challenge.

The geographic scope for this year's project was narrowed to the Caribbean region. The selection process prioritized countries that adopted policies in support of Infrastructure Asset Management (IAM) and had completed the initial UN DESA IAM workshops. After incorporating factors such as Open Data Inventory Index[2] and the potential for

[1] Summarized from reports of World Bank 2020, IMF 2019, FHWA 2018, ISO 2014, AECOM 2021, and Bechtel 2022.

[2] The Open Data Inventory (ODIN) measures the completeness of a country's statistical offerings and their adherence to international openness standards. In the 2024 assessment, Belize recorded a score of 52 and Jamaica a score of 60. Notably, while Jamaica's score has stagnated since 2020, Belize's score increased by 11 points, representing the fastest growth rate in the region (CaribData, 2025)

cross-country replicability, Belize was selected for the field research to help them develop and implement an AIM Action Plan, building on the government's focus on data-driven policy.

The second stage consisted of an extensive literature review and desktop research on the country, with a particular focus on key cities such as Belmopan, Belize City, and San Pedro. During this phase, the team mapped the main infrastructure sectors to define the analysis scope and identify priorities. They reviewed public documents, national plans, and international reports, then used this information to start filling the diagnostic tool and identify IAM information gaps, where data was limited or missing.

The third phase involved a field trip to Belize, where the team interviewed public, private, and multilateral stakeholders across infrastructure sectors. The goal was to gain insight into IAM practices beyond their formal design, validate desktop research findings, and gather missing or non-public information. This stage was critical for accurately applying the UN DESA diagnostic tool across its 14 categories to Belize's context.

The final phase consolidated all field trip inputs, triangulating qualitative and quantitative data sources to ensure accuracy. Key findings were classified, critical gaps in infrastructure asset management and good practices were identified through this evidence-based process, and practical recommendations were developed to expand UN DESA's capacity-building efforts in country-level IAM.

This study employed a mixed-methods research design, integrating both primary and secondary data sources. The research team analyzed publicly available information, including official documents such as laws, regulations, national and sectoral master plans, and public registries at ministerial and local levels. These secondary sources established a robust foundation for understanding Belize's institutional and regulatory framework. Primary data, collected through structured interviews during the field trip, further enriched the analysis by capturing operational insights and practical system dynamics.

The scope of the study focused on three key sectors: transportation, water, and sanitation. Within sanitation, the analysis distinguished between sewerage and solid waste management, as these are governed by different institutions and follow different management approaches. While the findings provide useful insights, other important sectors in Belize, such as energy and telecommunications were not covered in depth. A more comprehensive assessment would require extending the analysis to these areas.

Much of the information collected during interviews may be subject to bias, as it reflects the perspectives and assumptions of individual stakeholders. In some cases, interviewees may have emphasized certain points or omitted relevant information. To address this, structured interview guides (see Appendix 12.1) were used to ensure consistency across conversations, and insights were cross-checked across multiple sources.

The research followed ethical considerations, particularly during interviews and the fieldwork phase. All interviewees were fully informed about the project's nature, including its status as a student-led research initiative at Columbia University, distinct from UN DESA. This transparency was essential to clarify the purpose and use of findings, ensuring ethical engagement. Explicit consent was obtained before recording interviews, with the option to retract comments at any time. All interactions respected local context and norms, prioritizing careful listening and open dialogue.

To protect confidentiality and encourage candid input, findings are presented anonymously, with statements attributed only to generalized descriptors (e.g., role, sector, or institution type). While a full list of interviewees is included in the Contributors section, no individual is directly linked to specific statements or views.

5. Contextual Analysis

5.1. National Development Contextual Analysis

Belize is one of the smallest countries in the Americas, with a land area of 22,970 km² and a population of 397,483. In Central America, it borders Mexico and Guatemala, but maintains closer historical and institutional ties with Caribbean countries, particularly through CARICOM. The population is largely multiracial, with 51.7% identified as Mestizo (Mayan-European), 25.2% as Creole (African and Afro-European), 9.8% as Mayan, and 4.0% as Garifuna (Afro-Amerindian).[3] Belize operates as a unitary parliamentary democracy, with a centralized national government and two subnational levels: municipalities (seven towns and two cities, led by elected mayors) and rural village councils.

[3] Summarized from Statistical Institute of Belize (SIB). 2024. *2022 Population and Housing Census: Key Findings.* Belmopan: SIB. Retrieved from https://sib.org.bz/census/2022-census/.

Belize is classified as an upper-middle-income country by the World Bank, with a GDP of US$3.28 billion and a GDP per capita of US$7,988[4]. The economy is primarily driven by tourism and industry. The direct contribution of tourism to Belize's economy is around 11.8% of GDP, while its total contribution (considering its indirect and induced economic effects) can reach up to 40–45% of GDP.[5] The industry sector contributes approximately 16% of GDP, while the primary sector (agriculture, forestry, and fishing) account for around 8% of GDP. These sectors play a central role in shaping economic policy and infrastructure investment priorities.[6]

To guide long-term development, Belize has adopted Horizon 2030, a national development framework structured around four pillars: democratic governance, education for development, economic resilience, and healthy environment and population. This framework is supported by medium-term strategies, including #PlanBelize (2022–2026), which outlines priority areas such as poverty reduction, economic growth, environmental protection, and governance. Within this policy framework, infrastructure is positioned as a key enabler. Transport networks support economic activity and tourism, while water and sanitation systems are closely linked to public health outcomes and climate resilience.

At the same time, Belize faces several structural constraints. The country has a relatively small population, with a poverty rate of 35.7% as of 2023, and over 57% of the population living in rural areas.[7] It is also experiencing fiscal pressures, including multiple debt restructurings over the past two decades and a GDP contraction of 13.4% in 2020.[8] Belize is highly exposed to climate-related risks and ranks among the most vulnerable Small Island Developing States. Hurricanes, flooding, coastal erosion, and sea level rise pose ongoing risks, particularly in low-lying coastal areas where much of the country's infrastructure is concentrated.[9] These factors, combined with limited institutional capacity and reliance on external financing, create challenges for managing infrastructure in a consistent and lifecycle-oriented manner.

5.2. Assessment of Belize Infrastructure Asset Management (IAM) Status

Infrastructure Asset Management (IAM) in Belize remains in a developing stage. In some sectors, systems are relatively well developed. For example, Belize is often recognized for the performance of its water utility services. Operated by Belize Water Services (BWS), the system achieves near-universal access (98%) in national potable water service coverage and demonstrates strong operational performance, supported by technical capacity and the use of real-time digital monitoring in key areas.[10] At the planning level, the Public Sector Investment Programme (PSIP) provides a centralized and publicly accessible platform for infrastructure investment planning, which is updated on a quarterly basis. Infrastructure development is also guided by a well-defined legislative and policy framework, including national strategies such as Horizon 2030 and #PlanBelize, as well as sector-specific plans such as the National Sustainable Tourism Master Plan, the Comprehensive National Transportation Master Plan, and the Water Sector Adaptation Plan. These frameworks increasingly incorporate climate resilience considerations.

At the same time, several structural constraints continue to limit the development of a more consistent IAM approach. Maintenance practices remain largely reactive, with limited emphasis on preventive or lifecycle-based planning.[11] Government contracts typically include short-term guarantee provisions but do not consistently account for long-term maintenance responsibilities.[12] There are also differences in capacity across levels of government. Municipalities generally operate with anchored governance structures and stable revenue sources, while village councils face constraints in financing, technical capacity, and institutional support.[13] In addition, infrastructure investment remains highly dependent on external financing, with a large share of ongoing projects funded by international financial institutions and bilateral partners.[14] Opportunities exist to further enhance coordination across government agencies. Responsibilities for infrastructure planning and data management are spread across multiple ministries and statutory bodies, with no single system to align information or support integrated decision-making.[15]

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[4] World Bank. 2025. *World Development Indicators: Belize — GDP and GDP per capita.* Washington, D.C.: World Bank. Retrieved from https://data.worldbank.org/country/belize.
[5] World Bank. 2025. *Belize Blue Cities and Beyond Project: Project Appraisal Document.* Washington, D.C.: World Bank.
[6] World Bank. 2024. *World Development Indicators: Belize — Share of Economic Sectors in GDP, 2022.* Washington, D.C.: World Bank. Retrieved from https://data.worldbank.org/country/belize.
[7] World Bank. 2025. *Belize Blue Cities and Beyond Project: Project Appraisal Document.* Washington, D.C.: World Bank.
[8] World Bank. 2024. *Belize Public Expenditure Review.* Washington, D.C.: World Bank.
[9] *Ibid.*
[10] Based on interviews with senior officials at a central government ministry responsible for rural transformation and local government, Belize (March 18, 2026), and a senior environmental engineer at a multilateral development institution (February 19, 2026).
[11] International Monetary Fund (IMF). 2020. *Belize: Public Investment Management Assessment (PIMA).* Fiscal Affairs Department Technical Report, March 2020. Washington, D.C.: IMF.
[12] Interview with senior infrastructure and environmental planning professional (private sector), Belize (March 17 2026).
[13] International Monetary Fund (IMF). (2020). *Belize: Public Investment Management Assessment (PIMA).*
[14] *Ibid.*
[15] Interview with a development professional involved in international program implementation at a multilateral development organization (February 26, 2026).

5.3. Identification and Prioritization of Infrastructure Sectors

Before the Belize field research, a preliminary assessment identified key infrastructure sectors in small island developing states (SIDS) facing similar climate risks. The research initially focused on transportation, given its role in economic development and emergency evacuations. However, analysis showed that sewerage and drinking water systems are equally vital for daily operations and critical during hurricanes and floods. The scope was therefore expanded to include water and sanitation.

Electricity was excluded from this study because it operates on a cost-recovery, user-fee model, unlike transportation, water, and sanitation, which are often provided as essential, free, or subsidized services. This difference in funding and implementation led to a focus on the three basic service sectors, with electricity left for future research.

Belize's national development agenda prioritizes climate resilience and tourism as key strategic focus areas. The two themes are deeply intertwined: The majority of tourism activities in Belize are concentrated in coastal zones and islands (including Ambergris Caye, Caye Caulker, Belize City, and the South Eastern Coast) whose connectivity heavily relies on ground and water transportation,[16] while the tourism growth boom after COVID-19 poses threat on wastewater pollution and coastal degradation that can affect the primary natural assets on which the tourism industry depends. This logically leads to the prioritization of three infrastructure sectors: transportation, water, and sanitation. Both national planning documents and development partners consistently identify these sectors as foundational enablers for tourism growth and climate resilience in Belize.

The key infrastructure assets in these sectors are:

- **Transportation:** Key strategic ground transportation assets include the primary highway network: (i) the Philip Goldson Highway (connecting Belize City to the northern border with Mexico), (ii) the George Price Highway (linking the capital Belmopan to the western Cayo District and Guatemala border), and (iii) the Coastal Highway (connecting Belize City to Dangriga along the central coast). For water transportation, the Port of Belize and Port of Big Creek are the primary cargo entry ports, while water taxi terminals and ferry infrastructure serve as the main public transportation in Belize, connecting three main tourist destinations (Belize City, Caye Caulker, and San Pedro). For air transport, Philip Goldson International Airport is the sole international aviation gateway and a critical bottleneck for tourism growth, while 14 domestic aerodromes serve as the higher-end tourism hub, with Sir Barry Bowen Airport in Belize City, John Grief II Airport in San Pedro, Caye Caulker Airstrip, and Placencia Airstrip as the prominent hubs.[17]

- **Water:** Belize Water Services Limited (BWS) serves as the primary institutional entity for Belize's water infrastructure, functioning as the autonomous utility provider responsible for water treatment and distribution across 12 major urban systems.Meanwhile, rural water infrastructure is managed through approximately 109 community-managed potable water systems across approximately 190 villages, overseen by village water boards rather than BWS.[18] These systems are highly variable in quality and financial sustainability. Belize draws on two primary water source types. Urban areas rely predominantly on surface water (70% of urban supply),[19] with the Belize River being the key source for Belmopan and surrounds, and river/creek intakes serving other towns. Groundwater supplies an estimated 95% of rural freshwater needs and also serves towns in Corozal, Orange Walk, Cayo, and Toledo districts.[20] Most recently, the World Bank's approved Belize Blue Cities and Beyond Project (2025) is financing water supply network upgrades in Belize City, directly linking water asset quality to coastal urban resilience.

- **Sanitation**: In the sanitation sector, there is significant potential to expand and prioritize the waste management asset landscape. Centralized wastewater treatment systems are operational in only three locations: Belize City, Belmopan, and San Pedro, serving approximately 30-60% of residents within their respective service areas.[21] For solid waste infrastructure, Belize has only one major landfill that stores all end waste from around the country, which is currently approaching full capacity. In rural villages, there is effectively no formal solid waste collection system, and rely heavily on informal individual disposal practices.[22]

[16] IDB. 2018. Comprehensive National Transportation Master Plan for Belize (CNTMP) - Final Report.
[17] *Ibid.*
[18] Based on interviews with senior officials at a central government ministry responsible for rural transformation and local government, Belize (March 18, 2026)
[19] IDB. 2022. *Belize Water Supply and Modernization Program: Environmental and Social Assessment and Environmental and Social Management Plan.*
[20] *Ibid.*
[21] Extracted from IDB *Belize Water Supply and Modernization Program: Environmental and Social Assessment and Environmental and Social Management Plan* and interview with senior civil engineering professional (private sector), Belize (March 19, 2026).
[22] Interview with senior solid waste management official from BSWAMA (March 18, 2026).

5.4. Governance Structure: National Plan, National Government, Decentralization and Local Authorities

National Planning Framework

Infrastructure asset management (IAM) in Belize operates within a layered national planning architecture. At the apex is Horizon 2030, the National Development Framework for Belize (2010–2030), which provides the long-term strategic vision of a country where citizens live in harmony with their natural environment and enjoy a high quality of life. This long-term framework is translated into medium-term operational priorities through the #PlanBelize Medium-Term Development Strategy 2022–2026 (MTDS), which explicitly names infrastructure development as a core delivery vehicle across multiple strategic objectives, notably Economic Transformation, Protection of the Environment, and Good Governance. In addition to these overarching documents, Belize has also established sector-specific planning related to the three main sector areas:

- **Transportation:** The Comprehensive National Transportation Master Plan (2018) is the primary transportation sector planning document, encompassing all transport modes (roads, public transport, water taxis, ports, aviation, and logistics) with short, medium, and long-term action plans to 2035. The Public Roads Act (2011) is the primary legislative instrument governing construction, maintenance, and supervision of public roads, though it contains no provisions on climate risk assessment or resilience standards.

- **Water:** The National Integrated Water Resources Management Policy (2009) which established the foundational framework for coordinated, integrated management of the country's freshwater resources. The policy incorporates climate change considerations throughout and addresses a wider scope of water resources management including groundwater, watershed management, and transboundary water issues. It was accompanied by the National Integrated Water Resources Act (2011), which provides the legal framework for the conservation, control, and sustainable management of water resources. Just recently in February 2026, the Cabinet endorsed the National Water Resources Management Policy, Strategy, and Action Plan 2024–2034, a comprehensive update to the 2010 policy that provides a renewed roadmap for managing the nation's freshwater resources in a coordinated, evidence-based, and financially sustainable manner.

- **Sanitation:** The sanitation sector presents unique challenges, as its planning framework is currently less developed than those of the other sectors. This is due to fragmented legislation, the absence of a unified national strategy, and the sector's dual focus on wastewater and solid waste management, each governed by distinct institutional arrangements. A National Sanitation Master Plan is currently being developed with World Bank support under the Blue Cities and Beyond Project but does not yet exist as a completed document. However, for solid waste, The National Solid Waste Management Strategy & Implementation Plan (2015) provides guidance on the management of municipal, industrial, and hazardous waste, supported by The Solid Waste Management Authority Act that establishes BSWAMA and its mandate for regulating waste management, including construction and demolition waste. Nevertheless, there are currently Nine separate pieces of legislation currently governing various aspects of solid waste management in Belize, a fragmentation that BSWAMA is actively working to consolidate into an integrated framework.

National Government, Decentralization and Local Authorities

Belize is a unitary parliamentary democracy and constitutional monarchy. Despite its unitary character, governance in practice operates across multiple distinct levels, each with different degrees of authority, capacity, and relationship to infrastructure asset management.

- **Central Government:** the bicameral National Assembly (comprising the Senate and the House of Representatives) exercises legislative authority. Meanwhile the Cabinet, led by the Prime Minister, holds executive power. The central government retains ultimate legislative and financial authority over all public infrastructure and sets the policy framework within which all other levels operate.

- **Municipalities:** comprising two cities (Belize City and Belmopan) and seven towns (Corozal, Orange Walk, San Ignacio, San Pedro, Dangriga, Benque Viejo del Carmen, and Punta Gorda). Each is governed by an elected mayor and town or city council. Municipalities hold formal revenue-raising authority and bear defined responsibility for local infrastructure under the City or Town Council Act, including autonomy over municipal administration, market management, waste collection, and the maintenance of local tertiary roads. Financial oversight is exercised by the Ministry of Rural Transformation which conducts quarterly checks and annual reviews of municipal finances.

- **Rural Authorities (Village Councils):** There are approximately 190 village councils across the country, each managed by an elected village council. Village councils are elected every two years and hold a wide mandate covering community development, oversight of community water boards, and waste collection. However, we have not been able to confirm their ability to have revenue-raising and technical capacities to fund and deliver any public service delivery, which limits their role in systematic infrastructure planning or asset management.

- **The Alcalde System:** represents a distinct, customary governance layer that sits outside the formal municipal-village structure. Three Maya groups (Yucatec, Mopan, and Q'eqchi') are found primarily in the Toledo, Stann Creek, and southern Cayo Districts. Their governance is exercised through Alcaldes: hereditary or community-elected traditional leaders who hold recognised authority under the Alcaldes Act and exercise quasi-judicial and community governance functions. Clarifying and strengthening the alignment between their authority and the national government's Infrastructure Asset Management (IAM) recommended prudential practices could further enhance collaboration and effectiveness.

5.5. Key Government Ministries and Agencies for IAM

Overarching Ministries

Over 20 ministries and statutory bodies having functions related to Infrastructure asset management in Belize. The following are the principal entities with overarching IAM relevance:

Ministry/Agency	Primary Responsibilities
Ministry of Finance, Economic Development and Investment (MFEDI)	Oversees budget preparation, the appropriation of capital funds, serves as the central executing unit (CEU) for major externally financed projects, and handles debt management and donor coordination.
Ministry of Economic Development (MED)	Manages the Public Sector Investment Programme (PSIP), the primary database and planning tool for all capital projects.
Ministry of Infrastructure Development and Housing (MIDH)	Designated executing agency for physical infrastructure construction, maintenance, and rehabilitation. MIDH just recently established a Road Maintenance Unit, the first institutionalised unit related to IAM, with the main task to conduct maintenance capacity for national roads.
Ministry of Rural Transformation, Community Development, Labour & Local Government (MRT)	Oversees the operational and financial governance of all nine municipalities and, through the village council structure, rural community infrastructure. For rural communities, it serves as the policy link between the national government and village councils on water systems, village roads, and community-level infrastructure.
Ministry of Sustainable Development, Climate Change and Disaster Risk Management	Holds cross-cutting authority over environmental policy, climate change mainstreaming, and disaster risk governance.

Sector-Specific Ministries

- **Transportation:** The Ministry of Infrastructure Development and Housing (MIDH) is the lead executing agency for the construction, alteration, maintenance, and supervision of all public roads. The Ministry of Youth, Sports & Transport (especially the Department of Transport) is responsible for transportation regulation, and vehicle licensing and permit. The Belize Ports Authority (BPA) is responsible for the planning, regulation, and supervision of maritime infrastructure including water taxi piers. The Belize Airports Authority (BAA) owns and operates all 16 public aerodromes in Belize. The Department of Civil Aviation (DCA) provides regulatory oversight for aviation safety and ICAO compliance.

- **Water:** Belize Water Services Limited (BWS) is the autonomous statutory provider of water and sewerage services across 12 major urban areas. It is the most operationally mature IAM entity in the country, with established maintenance systems, real-time digital monitoring, and a self-financing capital investment model. For rural water systems, The Ministry of Rural Transformation serves as the primary government interface for the 109 community potable water systems, managed on the ground by village water boards.

- **Sanitation:** Responsibilities are fragmented across The Belize Solid Waste Management Authority (BSWAMA), BWS, Ministry of Rural Transformation, the Department of Environment, and municipal councils without formal coordination mechanisms or a unified sanitation master plan. BWS manages the country's three centralised wastewater systems (in Belize City, Belmopan, and San Pedro) under its utility mandate, while BSWAMA is the statutory agency responsible for final disposal and transfer of solid waste.

5.6. Fiscal Allocation and Financial Framework for IAM in Belize

Revenue Sources

The central government of Belize generates revenue predominantly through taxation with three principal sources: taxes on goods and services, taxes on income and profits, and taxes on international trade. Total government revenues and grants stood at approximately 22.5% of GDP in FY2025/26, below the Caribbean peer average of 24.7%, reflecting a persistent structural revenue gap.[23]

Expenditure Allocation

Public expenditure in Belize averaged approximately 22.6% of total expenditures (or 6.1% of GDP) on capital investment. However, the number is highly volatile year-by-year, which can go as high as 31.6% of total expenditures in FY2020 and as low as 13.2% in FY2018.[24] This suggests that the capital investment expenditure is not coming from Belize's national budget itself, but from external financing received from donors in a particular fiscal year. Within the capital budget, the Ministry of Infrastructure Development and Housing (MIDH) consistently dominates, managing the largest share of capital investment.

Municipal Revenue and Financial Framework

Municipalities, such as Belize City and Belmopan, are Belize's most economically dynamic subnational entities, but their financial capacity remains significantly limited compared to the national government. The municipalities' revenue base comprises several streams. Own-source revenues include trade and business licences, traffic fines, property-related fees, and tourism-related services. Nevertheless, the central government still provides revenue transfers that are disbursed monthly to each municipality and village council through the Ministry of Rural Transformation.

Rural and Village-Level Finance

Village Councils possess the authority to collect property taxes, yet their fiscal capacity remains constrained by the percentage of revenues contributed by citizens. Additionally, Village Councils do not have the authority to levy other types of taxes or fees. On the other hand, Village Water Boards can collect user fees directly from community members to cover operational expenses, primarily electricity costs for pump operation. However, these fee levels are set at rates that are low, which may not be sufficient to cover operating costs. The stability of these fees can be affected by factors such as village council elections.

Role of Foreign Financing

External financing plays a structurally dominant role in Belize's public investment framework. The ongoing PSIP as of September 2025 shows that external sources account for 87.7% of project funding in Belize. The largest creditors in the ongoing PSIP are CDB (23.9%), IDB (14.3%), the Saudi Fund for Development (11.5%), OFID (5.8%), and the EXIM Bank of Taiwan (4.7%).[25] This structural reliance on external financing has several implications for IAM. First, IFI-funded projects are subject to external procurement rules that reduce the involvement of small and medium size domestic contractors. Second, donors have a large influence on shaping the domestic planning systems. Third, while IFI financing covers capital construction costs, inadequate financial planning and oversight at the post-construction stage result in insufficient funding for operations, maintenance, and asset management of assets throughout their lifecycle. Once a project closes, the asset's long-term maintenance obligation falls to the executing agency.

[23] World Bank. 2024. *Belize Public Expenditure Review.* Washington, D.C.: World Bank.
[24] *Ibid.*
[25] Ministry of Finance, Investment and Economic Transformation, Civil Aviation, and E-Governance of Belize. 2025. *Public Sector Investment Programme Report: Quarter Ended September 2025.* Belmopan: Government of Belize.

Gap on Maintenance Funding

The Government of Belize is committed to addressing the issue of underfunding of maintenance spending. The IMF PIMA assessment found that current maintenance budgets amounted to an average of only 0.88% of estimated public capital stock between 2016 and 2020, significantly below the internationally recommended range of 2–5% of asset value.[26] Capital repairs budgets were even lower, averaging only 0.07% of public capital stock over the same period.[27] Government-wide standardized methodologies for estimating maintenance needs remain under development, and a comprehensive, formalized maintenance system has not yet been universally adopted across all ministries. However, some sector-specific projects (water and road transportation) have begun to develop good practices that could serve as models for broader systematic asset management across government.

[26] IMF. 2020. *Belize: Public Investment Management Assessment (PIMA)*. Fiscal Affairs Department Technical Report, March 2020. Washington, D.C.: IMF.
[27] *Ibid.*

6. Analysis: Implementation of the UN Diagnostic IAM

6.1. Transport

6.1.1. Belize Transport IAM Governance

Transport asset management in Belize operates through a broad institutional structure with responsibilities shared across a large number of actors and no single unified cross-modal authority. The sector involves around 31 entities in total, including 8 ministries, 7 departments and internal units, 8 statutory bodies and agencies, 4 national committees, and 3 municipal authorities, each with responsibilities across different modes and functions (see Appendix 12.2 for transport sector institutional mapping). As a small state, Belize operates with limited civil service capacity, and several interviewees noted that ministries often work within separate institutional mandates, with overlapping responsibilities and limited formal mechanisms for cross-sector coordination. While agencies fulfill their respective roles, there is meaningful opportunity to strengthen integrated planning across the transport system.

At the ministerial level, seven ministries play a role in shaping transport policy, infrastructure, and financing. The Ministry of Youth, Sports, & Transport leads policy and regulation for road transport, while the Ministry of Infrastructure Development and Housing is responsible for roads and bridges. Aviation and tourism-related transport fall under the Ministry of Blue Economy and Civil Aviation, while the Ministry of Finance controls budget allocation and fiscal policy. The Ministry of Economic Development coordinates trade, investment, and engagement with external financing partners, while the Ministry of Agriculture and Environment provides oversight on environmental sustainability. The Ministry of Rural Transformation oversees municipal authorities, which are directly involved in local transport services.

It has been noted that the allocation of transport responsibilities across ministries may benefit from a clear understanding of their respective roles, responsibilities and clarification to optimize the efficiency and effectiveness of transport-related initiatives. In April 2025, a government press notice announced a change in ministry name to include “Transportation” under the Ministry of Constitution and Religious Affairs and Indigenous Affairs[28]. The notice did not explain how transport functions would be reassigned or divided. At the same time, the Ministry of Youth, Sports & Transport continued to operate with transport under its portfolio. Recent government communications also refer to a ministry with “Transportation” in relation to major initiatives such as the National Bus Company[29]. In practice, core functions, such as permitting, regulation, and oversight, remain with the Ministry of Youth, Sports & Transport through the Department of Transport.

We note that the description of the transport sector across various sources can be inconsistent. Specifically, government press releases often refer to a “Ministry of Transportation,”[30], while media reports may use the term “Ministry of Transport,”[31] which can lead to confusion regarding the exact institutional structure. Clarifying how responsibilities are distributed across government entities, along with improving communication around these roles, would help external stakeholders better understand transport IAM governance. While collaborative approaches across ministries are valuable for addressing complex, cross-cutting priorities, enhancing transparency around institutional roles and more clearly delineating responsibilities related to IAM could further strengthen accountability and institutional coherence.

At the departmental level, implementation and regulation are carried out through specialized units. The Department of Transport manages licensing, vehicle registration, and public bus routes, while the Department of Civil Aviation regulates air transport. Other relevant entities include Customs and Excise (for freight and cross-border flows), the Department of Environment (for environmental approvals of infrastructure projects), and the National Emergency Management Organization (NEMO), which coordinates transport and evacuation during emergencies.

[28] Government of Belize Press Office. (2025, April 2). *Press Release: Correction of Ministry Name*. Facebook. https://www.facebook.com/GOBPressOffice/posts/press-releasecorrection-of-ministry-namebelmopan-april-2-2025please-be-informed-/982283114093702/

[29] Greater Belize Media. (2026, February 16). *National bus company set for March merger*. https://www.greaterbelize.com/national-bus-company-set-for-march-merger/

[30] Government of Belize Press Office. (2026, March 1). *Ministry of transportation advises public that bus schedules remain unchanged*. https://www.pressoffice.gov.bz/ministry-of-transportation-advises-public-that-bus-schedules-remain-unchanged/

[31] Greater Belize Media. *Ibid.*

The system is further supported by statutory bodies, which regulate and manage specific sub-sectors. These include the National Transport Board (NTB), which licenses and organizes public passenger transport; the Belize Port Authority (BPA), which regulates maritime transport; and the Belize Airports Authority (BAA), which manages airport infrastructure. Additional bodies such as the Belize Tourism Board (BTB), Border Management Authority (BMA), International Merchant Marine Registry (IMMARBE), and BELTRAIDE influence transport through tourism, border management, shipping, and investment promotion.

At the committee level, specialized coordination functions exist but remain limited in scope. Bodies such as the Aviation Development Committee and tourism-related transport committees provide advisory and coordination roles for specific sub-sectors, but do not extend across the transport system as a whole.

Municipal and local governments also play a direct role in transport operations. City and town councils are responsible for local roads, traffic management, and in some cases licensing and enforcement within their jurisdictions. These responsibilities vary by location, with border towns and coastal municipalities also influencing cross-border and maritime transport activities.

The central government plays a central role in shaping governance. The Prime Minister holds multiple portfolios, including Finance and responsibilities related to infrastructure, bringing fiscal and policy decision-making close together. This arrangement supports high-level coordination, but it can also limit the degree of autonomy at the sector level. As a result, transport investment decisions tend to be influenced by broader government priorities, which may shift over time, rather than by demand-specific needs. A senior water resources expert with experience advising the government on hydrology and water systems flagged the resulting complexity during the interview: many different players, overlapping responsibilities, and a governance structure that challenges the efficiency of collective action.

Belize does not yet have a consolidated transport asset management policy. The Department of Transport establishes permitting requirements for public operators; however, there is currently limited specification of fleet standards, maintenance schedules, lifecycle requirements, or minimum vehicle conditions for private bus companies. Operators often rely on older imported US school buses, without formal policy requirements for maintenance planning, replacement cycles, or reporting on asset conditions. A National Road Development Strategy[32] was launched by the Ministry of Rural Transformation in January 2026, approximately two months before the interviews, which is a positive policy development. At the same time, multiple interviewees noted that effective implementation will depend on enforcement capacity and dedicated funding to ensure these strategies translate into practice. This reflects a broader pattern across sectors, where new policy frameworks create strong direction, but long-term results depend on sustained institutional support and follow-through.

More broadly, while climate resilience policies exist for transport infrastructure planning, their execution remains inconsistent. This presents an opportunity to codify and bind these considerations into national policy, ensuring they are uniformly applied rather than being driven ad hoc by ministerial initiatives or introduced as conditions by international financial institutions (IFI)s.

At the same time, some elements of the asset management process, particularly in stakeholder engagement, are more developed. The Ministry of Infrastructure Development and Housing (MIDH) and the Ministry of Rural Transformation (MRT) have established channels for community feedback, including email, phone, WhatsApp, and physical drop boxes, and conduct pre-project surveys to identify potential issues in advance. For example, prior to road works affecting several villages, baseline surveys were conducted to document existing conditions, and no major grievances were reported during implementation. Regular village meetings and communication with local leaders further support responsiveness. These practices introduce feedback mechanisms into project planning and implementation that could be formalized as part of a broader, system-wide asset management policy.

This project-based approach is also shaped by Belize's constitutional and institutional framework. Significant discretionary authority over infrastructure decisions is concentrated at the ministerial level, with limited statutory constraints or standardized policy requirements. As a result, transport planning may be sensitive to changes in leadership, electoral cycles, and evolving ministerial priorities, which can pose challenges for continuity, coordination, and long-term resilience.

[32] Breaking Belize News. (2026, January 22). *Ministry of rural transformation launches national rural development strategy*. https://www.breakingbelizenews.com/2026/01/22/ministry-of-rural-transformation-launches-national-rural-development-strategy/

Belize Bus Sector

A pertinent example of the governance limitations in the transport sector can be observed in Belize's bus sector. The system consists of over 30 private operators[33], each holding individual road service permits and operating routes independently, with limited coordination or oversight beyond basic regulatory functions. While the Ministry of Youth, Sports & Transport sets policy and the Department of Transport administers permits, there is an opportunity to strengthen system-wide planning, integration, and performance management through a more unified institutional approach.

This institutional structure is reflected in how services are delivered on the ground. Interviewees noted that performance monitoring in the private bus sector remains limited, with operators managing fleets independently and without standardized reporting or maintenance requirements. As described by a senior civil engineering professional, operations often follow a "run to failure" approach, where maintenance is carried out only when issues arise. He also characterized the sector as "one of the most under-funded, underserved sectors in society."

These challenges are also reflected in both fleet conditions and supporting infrastructure. Operators commonly rely on second-hand buses imported from the United States, often repurposed school buses, which are relatively affordable to acquire but tend to be older and require more frequent maintenance. At the same time, supporting infrastructure for bus services remains limited, with few formal bus stops, limited signage, and minimal terminal facilities, especially outside major urban areas. As a result, passengers often rely on informal boarding points, and service conditions can vary across locations. The absence of centralized data systems presents an opportunity for improvement, as it currently poses challenges in tracking key performance indicators such as ridership, fleet conditions, and service reliability at a system-wide level.

In response, the government has initiated an important reform through the creation of the BZ$50 million National Bus Company, structured as a public–private partnership with majority government ownership alongside participation from existing operators and institutional investors[34]. This initiative represents a significant step toward improving coordination in the sector and reflects a proactive effort to address long-standing structural challenges. By bringing operators under a more unified framework, the reform has the potential to support more centralized planning, standardized oversight, and clearer accountability.

As the transition is still in its early stages, its long-term impact will depend on how effectively it integrates existing operators and clarifies institutional responsibilities. Nonetheless, it creates a strong foundation for strengthening governance, improving coordination, and supporting better service delivery over time.

6.1.2. Belize Transport IAM Data & Systems

Due to the absence of a centralized public database or standardized disclosure framework for transport asset data in Belize, publicly available information remains limited across sub-sectors. While some formal systems exist, a consolidated national asset inventory has not yet been fully developed. As a result, this analysis draws primarily on stakeholder interviews and agency-level insights, focusing on key institutions where data systems are currently in place. These include MIDH for road infrastructure, BAA for aviation assets, and E-Transit as a pilot case for digitally enabled urban transport.

At the agency level, several data systems have been developed, though they currently operate independently. MIDH maintains a GIS-based registry for arterial roads, BAA manages an asset registry for its aerodrome network, and E-Transit tracks its two buses through onboard telematics. However, these systems have not yet been standardized or integrated across institutions. Consequently, each sub-sector maintains separate, partial records, presenting an opportunity to develop a more comprehensive national overview of transport infrastructure assets.

Outside these formal systems, data coverage remains more limited. The private bus sector, which serves the majority of commuters, does not currently maintain a formal asset inventory. Similarly, information on rural transport infrastructure is still developing. While MRT manages feeder and farm roads, a formal inventory system for village-level roads was not identified, and recent investments are not always consistently captured in digital registries.

[33]News 5 Live. (2026, February 17). *Belize modernizes transport with unified bus system* [Video]. Facebook. https://www.facebook.com/News5Live/videos/belize-modernizes-transport-with-unified-bus-system-tonight-belizes-public-trans/4407446042916543/
[34] Greater Belize Media. (2026, February 17). *$50M national bus company set to launch "for the people"*. https://www.greaterbelize.com/50m-national-bus-company-set-to-launch-for-the-people/

Limitations in data availability are also shaped by challenges in accessing key inputs for infrastructure planning. As noted by a senior infrastructure and environmental planning professional, essential data such as rainfall patterns, flooding risks, wind conditions, and solar exposure is often held across different agencies and is not always readily accessible. Strengthening access to this information would improve the ability to systematically incorporate environmental and climate considerations into infrastructure design and investment decisions.

A further area for improvement relates to the reliability of data used in planning and decision-making. In many cases, available data is incomplete or difficult to access. As described by a senior civil engineering professional, practitioners sometimes rely on "guesstimates" rather than field-verified information when data is unavailable. Strengthening data quality and accessibility would improve the accuracy of planning inputs and support more informed infrastructure design and investment decisions.

The distribution of data across agencies is also shaped by the broader institutional structure. For example, responsibilities for road infrastructure are shared across multiple entities, including MIDH, MRT, and the Ministry of Youth, Sports & Transport. As a result, it is not always immediately clear which agency holds specific datasets, and information is often dispersed across institutions. Strengthening coordination in how data is collected, stored, and shared would improve accessibility and support more consistent decision-making across the sector.

E-Transit represents the most advanced example of digital data use within the transport sector. Its system combines onboard telemetry, a POS ticketing platform, and a real-time bus tracking application. At present, however, this system remains limited in scale, covering only two buses on a single route, and data sharing beyond the project team is largely informal. In contrast, the private bus sector operates without a formal information system, relying primarily on cash-based transactions with no standardized tracking of ridership, fleet conditions, or operational performance. The recently established National Bus Company (NBC) creates an important opportunity to improve this situation. By consolidating operators under a more unified structure, it has the potential to support more standardized data collection and system-wide information management. While still in its early stages, this initiative provides a strong starting point for strengthening data systems and improving visibility across the sector.

Transparency in transport asset management is shaped by governance practices around information access and sharing. While agencies collect and manage operational data, standardized requirements for disclosure, inter-agency reporting, and public access are still developing. As a result, visibility into transport assets, system performance, and maintenance activities remains uneven across the sector, creating an opportunity to strengthen transparency and coordination.

At the institutional level, information sharing is largely based on informal arrangements rather than formal frameworks. Agencies typically respond to requests on a case-by-case basis, but standing agreements and system-wide reporting requirements are still limited. Strengthening these formal mechanisms would support more consistent information flows and make coordination less dependent on administrative processes and individual relationships.

Public disclosure practices also vary across agencies. Among transport institutions, the Belize Airports Authority provides some information on its website, including aerodrome listings and general updates. However, this remains limited in scope and is not yet part of a standardized reporting framework. Comparable information is not consistently available across other transport sub-sectors, highlighting an opportunity to strengthen transparency through more regular and standardized public reporting.

6.1.3. Belize Transport IAM Planning

Demand forecasting for transport infrastructure remains limited at the national level. In practice, capital investment is often shaped by the availability of external financing rather than projected demand. As noted by a development partner representative working on climate and energy programs and a project manager at a government infrastructure agency, infrastructure development "changes by the opportunity to raise funds,"[35] resulting in a reactive approach where projects are initiated when funding becomes available rather than through a systematic assessment of needs.

This planning dynamic is further shaped by limited demand data, particularly in the road-based public transport system. Without consistent information on ridership patterns, travel flows, or service usage, it is difficult to assess demand across routes or identify priority areas for investment, especially in rural and peri-urban regions. While initiatives such as E-Transit demonstrate the potential for more structured data collection through POS systems that capture ridership by passenger type, gender, and time, these systems remain limited in scale. In contrast, the aviation sector represents a more

[35] Interviews with a development partner representative (climate and energy portfolio) and a government project manager (infrastructure agency), Belize (March 18, 2026).

structured approach, where the Belize Airports Authority engages with airlines on a regular basis to coordinate scheduling, aligns infrastructure works with seasonal demand patterns, and is planning runway expansion in response to sustained passenger growth of approximately 600,000 annually, increasing at 3 to 5 percent per year[36].

Limited data availability also affects project preparation. Several interviewees noted that insufficient information at the pre-feasibility stage can constrain the accuracy of cost estimates and technical design, often leading to adjustments during implementation. This is also shaped by the structure of IFI-supported projects, which account for a large share of capital investment in the sector. Given limited domestic fiscal space, infrastructure development relies heavily on external financing from institutions such as the World Bank, Inter-American Development Bank, Caribbean Development Bank, and the European Union. As a result, project timing and scope are often influenced by funding availability, which can lead to a more opportunity-driven approach to investment. In addition, as noted by a senior civil engineering professional, such projects typically take around six years from preparation to completion, reflecting multi-stage approval and procurement processes that often span political cycles[37].

A more fundamental limitation lies in the limited integration of infrastructure asset management into the planning process. Current planning practices are primarily focused on the delivery of new infrastructure, with less emphasis on lifecycle considerations such as maintenance, asset performance, and long-term sustainability. As noted by a senior infrastructure professional, asset management is rarely budgeted for during project preparation, and once construction is completed, assets are often transferred to local authorities without dedicated funding or clear responsibility for ongoing maintenance[38].

In practice, this contributes to a reactive approach to infrastructure management, where maintenance is carried out only after failures occur rather than through planned, preventive strategies, as described by the senior civil engineering professional, a “run to failure” model, in which infrastructure is not systematically maintained until problems arise. While some IFI-supported projects include maintenance components, such as multi-year preventive maintenance requirements, these are typically introduced as conditions of external financing rather than as part of standard planning practice[39].

As a result, infrastructure planning remains primarily focused on asset creation rather than long-term sustainability, with lifecycle cost considerations not yet fully integrated into project design. This has significant implications for budgeting and implementation, as maintenance needs are not always fully accounted for in project cost estimates or medium-term expenditure planning. Adopting a stronger lifecycle approach would enhance long-term asset performance and support the integration of other priorities, such as climate resilience.

Belize faces notable climate risks, including flooding, sea level rise, and hurricanes. Belize City, in particular, is located in a low-lying coastal area and is frequently affected by flooding, especially during the hurricane season from June to November. Much of the existing transport infrastructure was not originally designed for these conditions, and strengthening long-term system resilience remains an important priority.

In recent years, climate resilience has been incorporated into several major infrastructure projects, often through requirements from international financial institutions such as the Caribbean Development Bank. These projects include design features that improve drainage, reduce flood risk, and strengthen structural durability. This reflects an important positive shift, although these practices are not yet consistently applied across the full transport sector. Coverage remains more limited in areas such as private bus operations, rural roads, and parts of airport infrastructure.

Efforts are also underway to improve drainage systems and elevate road levels in selected locations. However, these initiatives are not yet supported by a centralized system for tracking flooding patterns or climate-related risks. Relevant environmental data, such as rainfall and flood exposure, is often distributed across multiple agencies and is not always readily accessible, which can make it more difficult to plan and prioritize investments systematically.

Sustainability considerations are also visible at the fleet level. Much of the transport system relies on second-hand imported vehicles, including buses and trucks. These vehicles are often older, less fuel-efficient, and require more frequent maintenance, which can contribute to higher emissions and shorter operational lifespans. At present, formal standards governing vehicle age, emissions, and replacement cycles are still developing, creating an opportunity to better align infrastructure improvements with broader system sustainability goals.

[36] Interview with senior official at a national aviation authority, Belize (March 18, 2026).
[37] Interview with senior civil engineering professional with extensive experience in infrastructure design and project delivery (private sector), Belize (March 19, 2026).
[38] Interview with government infrastructure official, Belize (March 18, 2026).
[39] Interview with development partner representative (water and sanitation sector), Belize (March 16, 2026).

At the same time, Belize has taken steps to strengthen its overall climate policy framework. The Climate Change and Carbon Market Initiatives Act (2025)[40] establishes mechanisms for monitoring, reporting, and verifying emissions, as well as enabling participation in international carbon markets. While the legislation does not introduce sector-specific emissions standards, including for transport, it provides a foundation for more coordinated climate governance and data systems. Over time, these institutional developments may support the integration of sustainability considerations into infrastructure planning and investment decisions.

At the operational level, responses to climate risks are often managed on a case-by-case basis rather than through a fully system-wide approach. For example, E-Transit adjusts routes in response to flooding events as they occur, rather than through a predefined risk assessment or formal contingency planning system. While there are ongoing efforts to improve drainage and road conditions, these initiatives are generally implemented as specific responses to immediate needs, rather than as part of a coordinated long-term strategy. The Belize Airports Authority provides one example of more forward-looking planning, with Belmopan identified as a backup hub during extreme weather events. Expanding similar contingency planning across the broader transport sector would further strengthen resilience and service continuity.

At the project level, climate resilience is increasingly incorporated into infrastructure design, particularly in projects supported by IFIs. However, this has not yet translated into consistent system-wide practice. In some cases, resources allocated for resilience measures may be reprioritized during implementation, reflecting competing budgetary pressures. Strengthening formal monitoring and accountability mechanisms would help ensure that climate considerations move beyond individual projects and become more fully integrated into long-term planning and asset management frameworks.

The Philip Goldson Highway project illustrates this dynamic. Climate-resilient design elements were incorporated throughout the project lifecycle, largely as a condition of funding from the Caribbean Development Bank (CDB). This demonstrates the strong potential for integrating resilience into infrastructure design, while also showing that these practices are often advanced through external financing requirements rather than as standard system-wide practice. As noted by a senior infrastructure and environmental planning professional, “climate resilience is the buzzword for funding,” reflecting how resilience is closely linked to access to financing, even when implementation outcomes are not always fully consistent[41].

6.1.4. Belize Transport IAM Budgeting

Transport financing in Belize is shaped by constraints at multiple levels, including limited public funding, uneven revenue structures, and continued reliance on external support. These factors influence both the distribution of resources across the system and the ability of different actors to fund infrastructure and services over time.

At the national level, public transport is largely financed outside the government budget. Bus services are operated primarily by private companies, with limited public subsidy or direct financial support. While this reduces fiscal pressure on the government, it also places greater responsibility for investment and maintenance on private operators. In practice, this can limit the sector’s ability to reinvest and modernize. Interviewees noted that operators rely heavily on second-hand imported buses due to the high cost of new vehicles, while rising maintenance costs place additional pressure on already narrow operating margins.

A recent development that may begin to reshape this model is the creation of the National Bus Company, a BZ$50 million public–private partnership designed to consolidate the fragmented bus sector. Under this structure, the government holds approximately 45 percent ownership, participating operators collectively hold around 39 percent, and the remaining shares are allocated to institutional investors[42]. This represents a shift from fragmented, operator-level financing toward a more pooled and diversified capital structure. The NBC creates an important opportunity to improve access to financing, enable more coordinated investment, and support fleet modernization through economies of scale. By bringing together public oversight, private operational experience, and long-term institutional capital, it can provide a stronger and more stable financial foundation for the sector.

At the subnational level, financing capacity varies significantly. Municipalities receive budget allocations based on historical formulas that have not yet been fully updated to reflect current population growth or infrastructure needs. At the same time, financial oversight has strengthened. MRT conducts quarterly budget reviews and supports financial

[40] National Assembly of Belize. (2025). *Climate change and carbon market initiatives bill, 2025*. https://www.nationalassembly.gov.bz/wp-content/uploads/2025/09/Climate-Change-and-Carbon-Market-Initiatives-Bill-2025-.pdf
[41] Interview with senior infrastructure and environmental planning professional (private sector), Belize (March 19, 2026).
[42] Greater Belize Media. (2026, February 17). *$50M national bus company set to launch “for the people”*. https://www.greaterbelize.com/50m-national-bus-company-set-to-launch-for-the-people/

reporting, contributing to an increase in municipal revenue from approximately BZD 60 million in 2020[43] to an estimated BZD 111 million in 2026[44]. Municipal financial management has also been strengthened through digitization, with all nine municipalities expected to operate on digital accounting systems by 2025[45].

However, these improvements are not evenly distributed. At the village level, financing capacity remains shaped by the legal framework. Under the Village Councils Act (Chapter 88)[46], decentralization is formally structured. Village councils have limited revenue authority, collecting only minor fees such as liquor license fees, bylaw fines, and fundraising proceeds through the Village Fund. Unlike city and town councils, they cannot levy property taxes or impose broad-based taxes. As a result, they depend heavily on central government subsidies and grants, which restricts their ability to fund routine infrastructure maintenance and long-term improvements.

This uneven distribution of financing is also reflected in the rural road network. Historically, many rural roads were developed to support specific agricultural industries such as sugar, citrus, and banana production, and investment in these roads has remained closely linked to the economic performance of those sectors[47]. Roads serving more commercially active industries often receive more consistent funding and remain in better condition, while others, particularly farm access roads in less profitable or remote areas, face greater maintenance challenges and may become difficult to use during certain seasons. This means infrastructure conditions often reflect economic activity patterns rather than a consistent, system-wide funding approach, resulting in varying asset performance across regions.

External financing plays a dominant role in supporting capital investment. Many infrastructure projects rely on grants or concessional financing from international partners, and in some cases include funding for specific components such as maintenance. However, these arrangements are usually tied to individual projects and too often not sustained beyond the project lifecycle. As a result, funding for ongoing maintenance can remain uncertain and depends largely on the financial capacity of implementing agencies.

This reliance on externally financed, project-based funding also creates risks of budget reallocation. The World Bank's Belize Public Expenditure Review notes that capital budgets are not always fully executed as planned, as funds may be redirected due to changing priorities. This has directly affected project delivery in the transport sector. For example, under the World Bank's Climate Resilient Infrastructure Project (CRIP), designs for the Philip Goldson Highway were completed, but construction was subsequently cancelled when allocated funds were reprogrammed to support the COVID-19 response[48]. This shows how infrastructure investment can be affected even after significant preparation, reinforcing the importance of stronger continuity in capital planning and implementation.

Financing structures differ across transport sub-sectors. The Belize Airports Authority has a more stable funding base, generating revenue through user fees (e.g., landing and security charges) and supplementing it with public-private partnerships and external financing. In contrast, other transport sub-sectors face more limited and unstable financing. The Comprehensive National Transport Master Plan (CNTMP, 2018) highlights challenges in the public bus sector, where low ridership reduces revenue and reinvestment capacity, further affecting demand. Long-term financial sustainability could improve with structured public subsidies and better access to external financing. The road sector also faces pressures, with maintenance budgets covering only about 60 percent of needs, leading to asset deterioration. Inland waterways and water taxis operate with limited public funding and largely informal financing.

From an infrastructure asset management perspective, municipal bonds are significant because they match the maturity of the financing with the depreciation of infrastructure assets. Unlike project-based external financing, they can provide sustained funding across the asset lifecycle, including maintenance and rehabilitation. However, their use remains limited. This suggests the main opportunity lies not in financing availability, but in strengthening institutional capacity, implementation frameworks, and the ability to structure and manage these instruments effectively. Some interviewees also noted that this is partly shaped by existing practices, where maintenance is not always consistently prioritized in financial decision-making, which can limit the use of longer-term financing approaches[49].

[43] Approximately USD 30 million in 2026
[44] Approximately USD 55.2 million in 2026
[45] Interview with senior government official in a leadership role overseeing local government and municipal finance, Belize (March 18, 2026).
[46] Government of Belize. Village Councils Act. (Chapter 88, Revised Edition 2020).
[47] McNish, B., & Granada, I. (2013). *Transport Sector in Belize*. IDB..
https://publications.iadb.org/publications/english/document/Transport-Sector-in-Belize.pdf
[48] World Bank. (2024). *Belize Public Expenditure Review*.
https://thedocs.worldbank.org/en/doc/7b8bec6f9c262427c8b46dac4daaf3d8-0370012024/belize-public-expenditure-review
[49] Interviews with multiple stakeholders, including senior government officials, development partner representatives, and private sector infrastructure professionals, Belize (March 16-19, 2026).

Overall, the evidence suggests that transport financing remains uneven across actors and levels of government, with stronger funding capacity at the national and municipal levels and more limited resources at the local level. While new initiatives such as the NBC indicate a positive shift toward more coordinated and diversified financing models, the system as a whole still reflects fragmented funding streams and limited provision for long-term asset sustainability.

6.1.5. Belize Transport IAM Implementation

Implementation of transport infrastructure in Belize is shaped by centralized decision-making, capacity constraints, and the need for stronger links between project design and long-term asset management.

Decision-making is largely centralized, with capital allocation controlled at the Ministry of Finance and key operational decisions influenced at the municipal level. While technical input is present, it is not always consistently embedded in formal processes. In practice, decisions are often shaped by institutional priorities and professional judgment, rather than through fully standardized, evidence-based criteria.

These challenges are evident at the project design stage. Stakeholders noted that projects are sometimes approved before implementation requirements are fully defined[50]. Market studies may be limited, supplier capacity is not always fully assessed, and funding allocations do not always reflect the full project scope. As a result, constraints can be introduced early in the process and become more difficult to address once financial and political commitments are in place.

This contributes to an implementation gap between project approval and long-term outcomes. Commitments made during project preparation are not always systematically carried forward after completion, particularly in relation to maintenance and operational responsibilities. This reflects a broader pattern in which implementation remains more focused on project delivery, with less attention given to sustaining asset performance over time.

At the operational level, planning remains limited and largely reactive. Maintenance is widely described by stakeholders as “reactive, not preventative,”[51] reflecting a system in which interventions are often delayed until failures occur. One contributing factor is the structure of procurement contracts: assets are typically covered by a short guarantee period, after which responsibility shifts to the owning agency without a clearly defined plan or budget for ongoing maintenance. This creates a gap between construction and long-term asset management.

Coordination challenges also affect implementation. Transport corridors often carry multiple utilities, including electricity, telecommunications, and water, yet joint contingency and emergency response frameworks across these systems remain limited. Strengthening this coordination would reduce risks during disruptions, particularly during extreme weather events or natural disasters when cross-sector response is most critical.

Procurement processes remain an important factor in infrastructure delivery. While formal procedures exist, their application varies depending on the funding source. Projects supported by development partners typically follow stricter and more standardized processes due to external oversight, while locally funded projects are implemented with more flexibility. Procurement timelines can also be lengthy, with evaluation periods extending over several months, and decisions are often shaped by administrative compliance requirements alongside technical considerations.

These challenges are also influenced by the current capacity of the contractor market. Belize’s pool of specialized contractors, particularly for technical infrastructure works such as drainage, aviation, and electrical systems, remains limited. This also reflects broader structural conditions in the education and training system. Stakeholders have highlighted the absence of a domestic university-level civil engineering program and limited opportunities for advanced technical training. As a result, many students pursue education abroad, and not all return, which contributes to a persistent shortage of skilled professionals across the infrastructure lifecycle.

Mid-sized projects funding fall into a "grey area" that presents a particular constraint: too large for smaller local contractors, yet too small to attract larger firms or meet international financing thresholds[52]. Projects of around $1 million are often too large for small, local contractors, who may lack formal documentation or meet minimum turnover requirements to qualify for bidding. At the same time, these projects are too small to attract larger firms, which typically focus on contracts in the $10–$30 million range. As a result, there is a limited pool of eligible bidders for these mid-sized

[50] Based on interviews with senior civil engineering professionals, infrastructure planning professionals, and government officials, Belize (March 16-19, 2026).
[51] Based on interviews with a senior civil engineering professional, a senior government official in local government finance, and a municipal transport official, Belize (March 16-19, 2026).
[52] Interview with senior civil engineering professional with extensive experience in infrastructure design and project delivery (private sector), Belize (March 19, 2026).

contracts, leading to weak competition, delays in procurement, or projects not being executed at all. This particularly affects routine transport works, such as road maintenance and small upgrades, creating persistent gaps in delivery capacity.

Despite these challenges, several positive practices are emerging. E-Transit operates with a structured maintenance plan, including regular inspections, dedicated staff, and supporting infrastructure such as depots and charging systems. Similarly, MIDH has established a Road Maintenance Unit to support the ongoing upkeep of major roads. Belize Infrastructure Ltd. also plays an important role in supporting project implementation and promoting public-private partnerships. Expanding and consistently funding these practices would strengthen long-term asset management across the sector.

Overall, implementation in the transport sector remains largely project-focused and capacity-constrained, with opportunities to further strengthen coordination, procurement efficiency, and long-term asset management in order to improve the effectiveness and sustainability of infrastructure investments.

6.2. Water

6.2.1. Belize Water IAM Governance

Water management in Belize is characterized by a broad institutional landscape that includes national agencies, regulators, local government actors, and village-level systems. This multi-actor structure allows responsibilities to be distributed across different parts of the sector, but it also creates coordination challenges. Interview evidence suggests that responsibilities may overlap across agencies, and that this can complicate enforcement, decision-making, and accountability. In particular, fragmented mandates and recurring institutional "turf wars" appear to weaken coherence in sector governance.[53] At the rural level, village councils play a vital role in governance, particularly in the areas of local infrastructure and water systems.[54]

Belize has an established legal foundation for water management, including the 1993 legal framework for water resources and subsequent policy efforts for rural systems. However, implementation remains uneven. Existing legislation provides a basis for regulation, but interviewees emphasized that operational mechanisms have not always kept pace with legal provisions, and that overlapping laws can create uncertainty in practice.[55] Efforts to strengthen integrated water resources management have also faced institutional and governance constraints. More broadly, implementation gaps appear to reflect a combination of political turnover, limited institutional continuity, and insufficient follow-through on earlier reform recommendations[56].

Transparency and accountability mechanisms in the water sector are still developing. Monitoring and information gathering exist, but data remain fragmented across institutions and are not yet organized through a unified framework. One interviewee noted that the government captures some information on flood levels, but not many of the other variables needed for comprehensive water governance and planning.[57] This fragmentation limits transparency and constrains the sector's ability to support coordinated, evidence-based management.

At the level of sector performance, Belize has achieved very high levels of access to potable water. Interview evidence places national access at approximately 98–99 percent, suggesting strong overall coverage.[58] At the same time, access does not always translate into consistent service quality. Rural areas, in particular, face concerns over water quality, and broader performance challenges remain in relation to wastewater infrastructure, long-term system reliability, and protection of water resources.[59]

6.2.2. Belize Water IAM Data & Systems

Data and information systems in Belize's water sector remain uneven. In rural systems especially, the absence of consolidated information appears to constrain effective oversight. Available evidence suggests that asset-related information is incomplete, dispersed, and not consistently shared across responsible institutions. This weakens the ability of public actors to maintain a full picture of infrastructure assets, their condition, and future investment needs[60].

[53] Interview with a former public utilities sector official, Belize (March 16, 2026).
[54] Interviews with senior officials at a central government ministry responsible for rural transformation and local government, Belize (March 18, 2026)
[55] Interview with a former public utilities sector official. *Ibid.*
[56] *Ibid.*
[57] *Ibid.*
[58] *Ibid.*.
[59] *Ibid.*
[60] *Ibid.*

There are, however, signs of incremental progress. The Ministry of Rural Transformation reported the existence of a maintenance registry developed under a World Bank-supported initiative between 2011 and 2017, and noted that current efforts are focused on inventory creation and sustainability.[61] The Ministry also reported 109 potable water systems under its purview in rural areas, which points to some baseline asset mapping capacity.[62] Even so, these systems do not yet appear to form part of a fully integrated asset management information platform.

Monitoring arrangements are similarly partial. Flood-level monitoring exists, and water quality oversight is present through sector actors such as the Ministry of Health and emergency monitoring bodies.[63] However, interviewees emphasized that information collection remains fragmented and not sufficiently standardized. A more centralized and coordinated data system would improve transparency, support planning, and enable more systematic decision-making across the sector.

6.2.3. Belize Water IAM Planning

Water IAM planning in Belize reflects both tangible achievements and important structural constraints. Service coverage is broadly strong; however, notable disparities persist between urban and rural systems. Rural areas continue to face greater concerns related to service quality, while tariff structures and cost conditions vary across locations[64]. In towns, the National Water Company plays a central role, whereas rural systems rely more heavily on local arrangements and repair-oriented interventions.[65] This creates differentiated service realities across the country.

Demand forecasting does not appear to be systematically embedded in sector planning. The interviews point instead to a planning environment that is often shaped by immediate needs, donor-supported projects, and available institutional capacity rather than by comprehensive forward-looking demand models.[66] This limits the ability to anticipate future pressure on water systems, particularly in the context of climate stress, tourism growth, and uneven rural service conditions.

Capital allocation in the sector is determined by both domestic fiscal authorities and external financing partners. Investment continues through the national water company and donor-supported initiatives, but project preparation and implementation can be slow. One interviewee noted that infrastructure preparation for IFI-funded projects can take years, which affects the pace at which investments move from concept to delivery. In rural areas, the Ministry of Rural Transformation identified potable water systems as part of its wider infrastructure responsibilities, though its operations are more oriented toward repair than direct construction.[67]

Sustainability considerations are increasingly central to Belize's water sector, as climate vulnerabilities, aging infrastructure, and decentralized management drive the need for resilient, equitable, and climate-adaptive solutions. Interviewees pointed to environmental pressures, including pollution and water quality degradation, as ongoing concerns. Climate change is also adding new risks, while adaptation efforts remain difficult to institutionalize fully.[68] In San Pedro, technical solutions such as reverse osmosis have been introduced to address local supply challenges. At the policy level, sustainability is now being framed more explicitly through broader national strategies, including the National Rural Development Strategy, which includes climate resilience among its core axes.[69]

6.2.4. Belize Water IAM Budgeting

Budgeting in the water sector remains constrained by limited fiscal revenues, uneven cost recovery, and weak integration of lifecycle considerations into financial planning. Interview evidence suggests that user fees are generally set at levels that allow systems to recover costs, but not at levels sufficient to finance service expansion into underserved rural areas.[70] This creates a structural tension between affordability and investment capacity.

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[61] Interviews with senior officials at a central government ministry responsible for rural transformation and local government. *Ibid.*
[62] *Ibid.*
[63] Interview with former public utilities sector official, Belize (March 16, 2026)
[64] *Ibid.*
[65] Interviews with senior officials at a central government ministry responsible for rural transformation and local government, Belize (March 18, 2026) .
[66] Interview with former public utilities sector official, Belize (March 16, 2026)
[67] Interviews with senior officials at a central government ministry responsible for rural transformation and local government, Belize (March 18, 2026)
[68] Interview with former public utilities sector official, Belize (March 16, 2026)
[69] Interviews with senior officials at a central government ministry responsible for rural transformation and local government, Belize (March 18, 2026)
[70] Interview with former public utilities sector official, Belize (March 16, 2026)

Weak data systems further complicate budgeting. Where asset information and condition data are incomplete, project preparation becomes less precise, increasing the risk of cost overruns, scope reductions, or the exclusion of resilience measures during implementation. Interview evidence also suggests that maintenance is not always treated as a formal budget priority, which undermines the long-term performance of infrastructure assets and reinforces reactive operational patterns.

Rural water management relies heavily on water-related revenues, straining already limited financial resources, though broader local-government financial reforms, such as the Ministry of Rural Transformation's ongoing digitization of municipal accounting, quarterly and annual financial reviews, and improved oversight, may create enabling conditions over time.[71] While these reforms are not specific to the water sector alone, they may strengthen the broader institutional environment within which local water systems operate.

6.2.5. Belize Water IAM Implementation

Implementation dynamics in Belize's water sector largely reflect the broader institutional structure. Where responsibilities overlap and coordination is weak, project execution and service delivery can become slower and less predictable. Interviewees repeatedly emphasized that fragmentation across agencies affects enforcement and operational coherence.[72] Implementation challenges are both technical and institutional.

Operational practices continue to rely significantly on reactive rather than preventive maintenance. Evidence from the interviews indicates that maintenance is often undertaken in response to immediate deterioration or service needs, rather than according to a fully preventive asset management logic. At the same time, some foundational elements for more structured operations do exist, including maintenance registries, partial asset inventories, and ongoing repair responsibilities at the rural level.[73] These could improve operational planning if integrated into routine management.

Procurement remains a key implementation challenge. While procedures are formally established, they can be slow and resource-intensive, with timelines sometimes exceeding seven months. Mid-sized projects, which fall between the capacities of small and large contractors, are particularly difficult to deliver. Limited procurement capacity further delays project completion. Addressing these constraints would speed up implementation and improve the sector's responsiveness to infrastructure needs.

6.3. Sanitation/Waste Management

6.3.1. Belize Sanitation/Waste Management IAM Governance

Governance of the solid waste management sector in Belize is characterized by a centralized institutional structure, with responsibilities shared across multiple agencies and opportunities to strengthen system-wide coordination and capacity.

The Belize Solid Waste Management Authority (BSWAMA) serves as the national body responsible for solid waste management under the Ministry of Sustainable Development, Climate Change, and Solid Waste Management. It was initially established as a regulatory and monitoring agency, but following the collapse of its private sector partnership in 2017, it assumed a more active role in operating /facility management[74]. Despite this shift, its operating model remains largely contract-based: waste transfer and final disposal are carried out through external service providers, while municipalities retain responsibility for household collection. This division of responsibilities creates a multi-layered governance structure, with operational control shared among national authorities, private contractors, and local governments.

This structure is constrained by limited institutional capacity. BSWAMA operates with a team of approximately ten staff overseeing eleven active facilities nationwide, which limits its ability to manage operations, enforce standards, and expand coverage[75]. Planned expansion to a significantly larger network of facilities will require corresponding increases in staffing, financing, and technical capacity.

Solid waste management is largely separated from other infrastructure sectors, with minimal integration with utilities such as water services. Enforcement responsibilities are shared across multiple institutions, including the Department of Environment and the Ministry of Public Health, but are constrained by limited staffing and rely largely on informal coordination mechanisms. As a result, enforcement coverage and regulatory consistency vary across regions.

[71] Interviews with senior officials at a central government ministry responsible for rural transformation and local government, Belize (March 18, 2026)
[72] Interview with former public utilities sector official, Belize (March 16, 2026)
[73] Interviews with senior officials at a central government ministry responsible for rural transformation and local government, Belize (March 18, 2026)
[74] Interview with senior solid waste management official from BSWAMA, Belize (March 18, 2026).
[75] *Ibid.*

These coordination challenges are closely linked to the structure of the waste management system itself. In practice, solid waste in Belize was disposed of in open or partially controlled dumps without technical and environmental safeguards. In recent years, this has improved with the development and operation of sanitary landfills and transfer stations, including the Mile 24 Regional Sanitary Landfill, which began operations in August 2013. These investments have been concentrated along a central corridor, resulting in a system that is both improved and highly centralized. Outside this core service area, many communities continue to rely on smaller, less controlled dumpsites, including informal disposal practices. In these areas, waste recovery is often carried out by "an informal sector of micro-middle-men", who play a limited but important role in material recovery, often filling gaps in formal service provision despite operating under unsafe and unregulated conditions[76]. As a result, service coverage and system performance remain uneven across regions.

The legal framework supporting this structure is similarly distributed. In addition to the Solid Waste Management Authority Act, sector governance is shaped by the Environmental Protection Act and municipal legislation such as the Town Councils Act and Village Councils Act[77]. As noted by a senior solid waste management official, the sector is governed by multiple legal instruments, estimated at around nine separate laws and regulations, covering different aspects of waste management[78]. Together, these frameworks provide a strong basis for regulation, although responsibilities remain distributed across multiple institutions, creating opportunities to strengthen coordination at the governance level.

Solid waste management has been identified as a key development objective in Belize's long-term and medium-term planning frameworks, including the *Horizon 2030* and subsequent development strategies. These documents emphasize the importance of improving solid waste management systems and advancing more sustainable and coordinated sector development. While this policy recognition provides a clear strategic direction, translating these priorities into fully integrated governance structures and consistent implementation remains an ongoing process.

Transparency and accountability mechanisms are also still developing. Public reporting on system performance, including data on waste volumes, facility operations, and recovery rates, is not yet consistently available in a consolidated format. At the same time, community engagement mechanisms, primarily through village councils and the Ministry of Rural Transformation, are not systematically linked to national-level decision-making. As a result, feedback from local communities is not always fully captured or integrated into planning processes.

Overall, governance in the solid waste sector reflects a system that is relatively centralized in structure, with opportunities to strengthen institutional capacity and improve service coverage across regions. While foundational frameworks are in place, further improvements in system performance will depend on expanding operational capacity, strengthening implementation, and extending services beyond the central corridor.

6.3.2. Belize Sanitation/Waste Management IAM Data & Systems

Data on solid waste infrastructure in Belize is still developing in scope and coverage, particularly at the upstream and rural levels. BSWAMA's data collection begins at transfer and drop-off facilities, which means waste generation, collection volumes, and disposal patterns in villages and rural areas are not yet systematically tracked.

While the number of operational facilities is known, there is an opportunity to improve the consistency of documentation on their condition, capacity utilization, and maintenance status. Developing a consolidated national asset inventory would further enhance data standardization across facilities.

Estimates of system needs, such as the projected requirement for additional facilities, are often based on broad assessments rather than detailed spatial or demand analysis. Strengthening more granular and system-wide data would improve the ability to prioritize investments, plan facility expansion, and allocate resources more efficiently.

There is not yet a dedicated asset management information system for the solid waste sector. Operational information is maintained through internal records and coordination with contractors, but these processes are not fully standardized or integrated across agencies. This is also reflected in how operational data is collected. As noted by a senior solid waste management official, information on transfer operations and fleet performance is not systematically reported and relies largely on updates from contractors. Data on trips, tonnage, vehicle utilization, and maintenance history is not always consistently captured in a standardized format, which makes it more difficult to monitor system performance and identify operational inefficiencies.

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[76] Economist Intelligence Unit, Inclusive Recycling: Analysis of Waste Management and Recycling in Latin America and the Caribbean (London: The Economist Intelligence Unit, 2017), https://latitudr.org/wp-content/uploads/2017/05/EIU_Inclusive-Recycling_report-ENGLISH.pdf

[77] IDB. (2013). *Belize Policy Note: Water, Sanitation and Waste*. https://edc.gov.bz/wp-content/uploads/2016/10/IDBDOCS-_37765152-v1-BL_Policy_Note_Water__Sanitation_and_Waste.pdf

[78] Interview with senior solid waste management official from BSWAMA, Belize (March 18, 2026).

Consideration for the development of carbon market mechanisms underscores the importance of robust data systems. Belize's climate commitments include maintaining a national greenhouse gas inventory and a Measurement, Reporting, and Verification (MRV) system, which rely on accurate data from sectors such as solid waste, as outlined in its UNFCCC reporting and national climate strategies[79]. However, current limitations in waste data, including the absence of consistent tracking of waste volumes and landfill emissions, reduce the sector's ability to fully participate in these mechanisms.

Data exchange between BSWAMA and other institutions, such as the Department of Environment, the Ministry of Public Health, the Ministry of Rural Transformation, and municipalities, typically occurs on a case-by-case basis. Shared platforms, reporting standards, and formal protocols for regular data exchange and system-wide monitoring are still developing.

As a result, information is not always consistently used to support performance benchmarking, lifecycle planning, or budget prioritization. While data exists across different parts of the system, there is an opportunity to better organize and integrate it to support stronger evidence-based decision-making at the sector level.

6.3.3. Belize Sanitation/Waste Management IAM Planning

Planning in Belize's solid waste sector is guided by the potential to elevate service standards, enhance cross-sectoral coordination, and adopt a forward-looking approach to infrastructure dev

At the policy level, formal service standards remain limited. While the Solid Waste Management Authority Act establishes a minimum collection frequency of twice per week for residential waste, this represents the main national service benchmark. Standardized targets for service coverage, quality, rural access, and facility performance are still developing, and enforcement of existing standards remains uneven. As a result, service levels vary across municipalities and are not always monitored against a common framework.

These dynamics are reflected in the structure of service delivery. Responsibility for the system is divided between municipalities, which manage household collection, and BSWAMA, which oversees transfer and final disposal. In practice, this creates a separation in the service chain, with opportunities to strengthen coordination between collection and disposal functions. The impact is particularly visible in the urban–rural divide: while municipal areas generally benefit from organized collection services, many villages rely on open burning, illegal dumping, or informal private arrangements that operate outside formal regulatory systems.

Planning is also shaped by limited demand forecasting. Investment decisions, including landfill expansion and infrastructure development, are often driven by immediate capacity pressures rather than long-term projections of population growth, urbanization, tourism, or changes in waste composition. This reflects a broader pattern in which projects respond to short-term needs, creating an opportunity for more comprehensive and forward-looking planning.

A key underlying factor is the limited availability of upstream data. Waste generation is not yet systematically tracked at the village or household level, which makes it more difficult to estimate future collection demand, size transfer infrastructure, and prioritize investment geographically. While feasibility work has begun in areas such as methane capture and carbon credit development, the baseline data required to support these initiatives is still being developed, which has limited progress beyond early-stage exploration.

These planning challenges are closely linked to how investments are financed and prepared. Capital development in the sector remains heavily dependent on external financing, particularly from international financial institutions. The Mile 24 Regional Sanitary Landfill, for example, was developed with support from the Inter-American Development Bank[80]. Recent investments have similarly focused on landfill expansion and corridor-based systems. Domestic funding is more limited and is not yet structured as a stable, recurring sector budget, resulting in a planning approach that is often more project-driven than programmatic. The end of the previous public–private partnership arrangement in 2017 further reduced financing options, leaving an opportunity to develop a stronger framework for sustained private sector participation.

Project preparation processes also remain uneven. Cost estimates are often based on limited data, and feasibility studies do not always provide a sufficiently detailed basis for sequencing investments or projecting long-term costs. Potential revenue streams, including recycling markets or carbon credits, are frequently identified but remain at an early stage, without clearly defined business models or projected cash flows. Similarly, recent operational improvements, such as the

[79] National Assembly of Belize. (2025). *Climate change and carbon market initiatives bill, 2025*. https://www.nationalassembly.gov.bz/wp-content/uploads/2025/09/Climate-Change-and-Carbon-Market-Initiatives-Bill-2025-.pdf
[80] Inter-American Development Bank. (n.d.). *Solid Waste Management Project*. https://www.iadb.org/en/project/BL-L1006

addition of compactor trucks, support short-term service delivery but are not yet fully integrated into a long-term asset management or fleet renewal strategy.

Maintenance planning also remains an important area for improvement within this framework. As noted by a senior solid waste management official, current practice is often a "run to repairs" approach, where maintenance is carried out after issues arise rather than through preventive planning. Strengthening preventive maintenance would support a more complete lifecycle management approach, with assets managed through structured maintenance schedules and longer-term performance strategies.

As a result, sustainability considerations are not yet fully embedded in planning processes. While disposal within the formal system has improved, with waste directed to the national landfill and open burning prohibited at managed facilities, there is currently no operational methane capture or recovery system in place. At the same time, unmanaged dumpsites continue to operate outside the formal system, and emerging waste streams, such as used tires, remain difficult to regulate and process. Financial sustainability also presents an important area for improvement, as household waste services are largely provided without cost-recovery mechanisms, leaving the system reliant on government transfers and external financing.

Overall, planning in the solid waste sector remains largely reactive and capacity-constrained, with opportunities to better integrate data, demand forecasting, and long-term financing into a more unified planning framework. Strengthening data systems, establishing clear service standards, and developing a more structured, lifecycle-based planning approach will be critical to supporting sustainable system expansion.

6.3.4. Belize Sanitation/Waste Management IAM Budgeting

Financing for solid waste management in Belize is shaped by limited domestic resources, constrained revenue generation, and continued reliance on external funding, with important implications for system sustainability and long-term planning.

Publicly available financial information for the sector remains limited. While interview data suggests that the Belize Solid Waste Management Authority (BSWAMA) operates with an annual budget of approximately BZD 13 million[81] (note that this figure is not clearly reflected in published government expenditure documents). The absence of a consolidated and transparent operational budget makes it more difficult to assess how resources are allocated across staffing, contractor payments, and system operations, and highlights broader opportunities to strengthen financial visibility within the sector. At the same time, available evidence suggests that overall funding levels remain modest relative to sector needs. A large share of the national budget is committed to wages, debt service, and mandatory transfers, leaving limited fiscal space for discretionary spending in sectors such as solid waste management[82]. This creates structural constraints on the level of funding that can be allocated to BSWAMA beyond a basic subsidy.

At the revenue level, the sector has limited cost-recovery mechanisms. Household waste services are provided without user fees, meaning there is no dedicated revenue stream to support operations, maintenance, or capital investment. Available fiscal data indicates that tipping fees generate only a modest level of income, with government budget estimates showing approximately BZD 196,000 per year in recent periods[83]. This represents a relatively small contribution compared to overall system needs and highlights the limited role of own-source revenue in the sector's financing model.

As a result, solid waste management depends largely on government budget allocations and external financing. Capital investment, in particular, is highly project-based and supported primarily through international financial institutions. Major infrastructure development, including the Mile 24 Regional Sanitary Landfill, has been financed through such programs, alongside more recent investments in landfill expansion and corridor-based waste management systems[84]. While this model has supported significant improvements in disposal infrastructure, it does not always provide a stable or continuous funding base for system-wide expansion, maintenance, or asset renewal.

At the subnational level, financial responsibilities for waste collection are not always fully aligned with available resources. Municipal governments are responsible for collection in urban areas, while village councils are expected to manage waste services in rural communities. However, village councils have limited independent revenue sources, as

[81] Interview with senior solid waste management official from BSWAMA, Belize (March 18, 2026).
[82] World Bank. (2024). *Belize Public Expenditure Review*. https://thedocs.worldbank.org/en/doc/7b8bec6f9c262427c8b46dac4daaf3d8-0370012024/belize-public-expenditure-review
[83] Ministry of Finance, Government of Belize. (2025). *Draft Estimates of Revenue and Expenditure—Fiscal Year 2025/2026*. https://mof.gov.bz/wp-content/uploads/2025/05/Draft-Estimates-of-Revenue-and-Expenditure%E2%80%93Fiscal-Year-2025-2026.pdf
[84] *Ibid.*

they are not authorized to levy taxes or generate significant service-based income. This creates a gap between assigned responsibilities and implementation capacity, particularly in rural areas where services remain underfunded or limited.

Financial planning within the sector also does not yet consistently incorporate lifecycle costs. As noted by a senior solid waste management official, maintenance is not systematically budgeted, and expenditure is often directed toward reactive repairs, described as a "run to repairs" approach. Strengthening lifecycle budgeting would improve maintenance planning, reduce long-term costs, and support stronger infrastructure performance over time.

Opportunities to strengthen financial sustainability have not yet been fully developed. In contrast to the water sector, where services are supported by tariff-based cost recovery under a regulated framework,[85] solid waste management does not yet have a comparable system for revenue generation. Coordination with other utilities, such as Belize Water Services, also remains limited, creating further opportunities for more integrated infrastructure financing approaches and shared cost-recovery mechanisms. Overall, the sector's financing model remains shaped by limited domestic revenue, continued dependence on external funding, and the need for stronger integration of lifecycle costs into budgeting processes. Strengthening financial transparency, expanding cost-recovery mechanisms, and aligning funding with long-term asset management needs will be critical to supporting sustainable system development.

Carbon market mechanisms also represent a potential future revenue source. The Climate Change and Carbon Market Initiatives Act, 2025 establishes a national framework for carbon credit generation, including a registry and measurement, reporting, and verification systems[86]. While operational details are still under development, the framework creates a pathway for the solid waste sector to generate revenue from activities such as landfill methane capture at the Mile 24 facility and avoided emissions from dumpsite closures. These opportunities represent important potential for strengthening sector financing, though they are not yet operational and will require further development of data systems, regulatory frameworks, and project-level capacity before they can contribute more meaningfully.

6.3.5. Belize Sanitation/Waste Management IAM Implementation

Implementation of solid waste management in Belize is shaped by centralized decision-making, institutional capacity constraints, and an operational model that remains largely reactive, with important implications for service delivery, asset management, and system reliability.

At the institutional level, decision-making authority is concentrated within the Ministry of Sustainable Development, while BSWAMA is responsible for day-to-day operations. Capital funding decisions are controlled at the Ministry of Finance level. Within this structure, solid waste management often competes with other infrastructure sectors for attention and resources, which can affect the pace and scale of implementation.

Policy continuity has also been guided by the transition following the conclusion of the public–private partnership arrangement in 2017. Since that time, processes to formalize a successor service delivery framework have been ongoing, with BSWAMA operating within a dynamic institutional context while long-term modalities for service delivery and system expansion will need to continue to be progressively defined.

Enforcement capacity also remains limited. While the Department of Environment is responsible for regulatory compliance, staffing constraints affect consistent enforcement across the country. In practice, enforcement actions are often more reactive than guided by a structured risk-based or prioritization framework, which can lead to uneven application of standards.

Implementation challenges are also reflected in operational practices. Since 2017, BSWAMA's activities have largely focused on addressing immediate service needs, with more limited forward planning. A comprehensive preventive maintenance program, equipment replacement schedule, and standardized system for tracking contractor performance have not yet been fully established. As noted by a senior solid waste management official, operations often follow a "run to repairs" approach, where maintenance is undertaken after breakdowns occur. Strengthening preventive maintenance would improve system reliability and help reduce long-term costs.

These constraints are further shaped by gaps in technical and human capacity. Training needs remain significant[87], and operational staff frequently manage facilities and equipment without access to complete maintenance histories or standardized procedures. . Strengthening these systems would improve maintenance outcomes, reduce the deterioration

[85] National Assembly of Belize. (2025). *S.I. No. 51 of 2025: Water Industry (Tariffs) (Amendment) Byelaws, 2025*. https://www.nationalassembly.gov.bz/wp-content/uploads/2025/04/SI-No.-51-of-2025-Water-Industry-Tariffs-Amendment-Byelaws-2025.pdf
[86] National Assembly of Belize. (2025). *Climate change and carbon market initiatives bill, 2025*. https://www.nationalassembly.gov.bz/wp-content/uploads/2025/09/Climate-Change-and-Carbon-Market-Initiatives-Bill-2025-.pdf
[87] Interview with senior solid waste management official from BSWAMA, Belize (March 18, 2026).

of key components, extend asset lifespans, and lower repair costs, particularly for specialized equipment such as compactor trucks.

The implementation of carbon market opportunities will also depend on institutional capacity. Participation in carbon credit mechanisms requires project registration, emissions monitoring, and compliance with national MRV systems. These functions would place additional demands on BSWAMA's technical and administrative capacity, which is still developing at present.

Procurement and supply chain limitations further affect implementation. BSWAMA relies heavily on contracted services for transport and equipment, but there is no well-established supplier base for specialized waste management equipment or spare parts[88]. Procurement and maintenance are often managed on a case-by-case basis, with constrained local technical expertise. While some equipment is acquired through authorized distributors with warranty support, ongoing servicing remains fragmented, which can lead to delays, higher costs, and continued reliance on reactive maintenance practices.

Coordination across service chain components presents opportunities for enhanced integration and operational efficiency. Municipalities are responsible for household waste collection, while BSWAMA manages transfer and final disposal. However, a formal operational framework linking these functions has not yet been fully established, and coordination is often managed informally. Strengthening these linkages would reduce inefficiencies at key handoff points between collection systems and transfer facilities.

At the local level, implementation gaps are most visible in rural areas. Village councils are formally responsible for waste collection but have limited financial and administrative capacity to procure services or manage operations. As a result, many communities rely on informal systems, including open dumping, burning, or privately arranged collection services. While these arrangements reflect clear local demand and existing delivery capacity, they operate outside formal regulatory oversight and are not yet integrated into the national system.

A related opportunity lies in developing a more structured approach to workforce transition. The shift from informal waste picking at dumpsites to formalized waste management systems has been identified as a policy objective, but a comprehensive plan for training, certification, and alternative livelihoods has not yet been fully developed.

Overall, implementation in the solid waste sector remains shaped by capacity constraints, fragmented operational arrangements, and a service model that is often reactive. While core institutional structures are in place, improving system performance will depend on strengthening technical capacity, formalizing operational frameworks, and moving toward more preventive and structured asset management practices.

[88] *Ibid.*

Box 1: Good Governance as a Foundation for Climate-Resilient Infrastructure: Caye Caulker Village Council, Belize

Caye Caulker is a low-lying island in the Caribbean Sea off the coast of Belize, highly vulnerable to the impacts of climate change, including sea level rise, coastal erosion, and increasingly frequent and intense hurricanes. As a small island community, its infrastructure, such as roads, drainage, coastal protection, and public facilities, is directly exposed to these climate risks, making robust local governance a critical foundation for climate resilience.

The Caye Caulker Village Council (CCVC) is a model of independent, community-driven local governance over infrastructure in Belize. The CCVC distinguished itself through disciplined operational practices: maintaining proper financial records, holding consistent weekly meetings, and submitting reports on time. These practices laid the groundwork for results formally recognized by Belize's Ministry of Rural Transformation, Community Development, Labour, and Local Government at its annual stakeholders recognition ceremony, and by 2024, the CCVC was honored again for its extraordinary governance, community stewardship, and steadfast dedication to fostering growth and prosperity.

Figure 1. Location of Caye Caulker, Belize

Source: United Nations Office for the Coordination of Humanitarian Affairs (OCHA), Belize Administrative Boundaries Map (2019). Accessed via ReliefWeb: https://reliefweb.int/

Note: Caye Caulker location market added by authors

7. Case Studies

7.1. Fiji Case Study

Background and Purpose of the Fiji Case Study

Belize and Fiji share a structurally similar risk profile as small, tourism-dependent economies where climate-related disasters such as tropical cyclones and flooding impose recurring economic costs, with annual average asset losses estimated at approximately 1 percent of GDP in Belize and 5 percent in Fiji, and where a single major event can cause damages equivalent to a quarter or more of annual GDP[89].

The comparative relevance of Fiji, however, extends beyond the similarity in hazard exposure. Over the past decade, Fiji has made deliberate, internationally recognized advances in integrating climate resilience into its infrastructure governance and planning architecture. Fiji's enactment of the *Climate Change Act 2021*, making it the first small island developing state to embed net-zero and mandatory infrastructure audit provisions in national law[90], its establishment of a dedicated roads authority with a formal asset management mandate under the *Fiji Roads Authority Act 2012*[91], and its mobilization of multilateral financing for climate-resilient water infrastructure together constitute a body of practice that Belize has yet to develop.

This case study examines Fiji's infrastructure asset management (IAM) performance through the five-pillar framework developed by UN DESA, Governance, Data & Systems, Planning, Budgeting, and Implementation, with a particular focus on how these pillars have been shaped by the imperative of climate resilience. The purpose is not to identify a perfect system but to extract transferable lessons for Belize, which currently exhibits significant deficiencies across all five pillars and lacks the institutional architecture to manage its growing climate-related infrastructure risks in a systematic manner.

7.1.1. Fiji IAM Governance

Fiji's most distinctive governance strength is the institutionalization of climate risk within its legal infrastructure framework. *The Climate Change Act 2021* mandates audits of public infrastructure and physical assets to assess climate resilience, requires climate-resilient design standards in building approvals, and charges the National Adaptation Plan Steering Committee with multi-sectoral coordination[92][93]. The establishment of the Fiji Roads Authority (FRA) as a corporate body consolidating all transport-related functions under a single institutional mandate represents a notable governance advantage for sustainable IAM. By centralizing data, technical expertise, human resources, and budgetary authority within one agency focused exclusively on road infrastructure, the FRA model enables a level of institutional specialization that fragmented, multi-sector ministries rarely achieve. This concentration of capacity is particularly significant given the role that land transport connectivity plays in Fiji's broader economic functioning, facilitating the movement of food, labor, and services across a geographically dispersed archipelago, not only through roads and bridges within the main islands but through the jetties and intermodal links that connect them to outlying island communities, and critically, in climate resilience. The FRA's institutional focus allows for the systematic integration of climate risk considerations into asset management planning, maintenance prioritization, and capital investment cycles, functions that are difficult to sustain when road infrastructure competes for attention and resources within broader government portfolios. In this respect, the FRA model illustrates how organizational design can itself be a driver of IAM capacity-building, enabling the accumulation of institutional knowledge, technical skills, and data assets that are essential for long-term infrastructure resilience[94].

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[89] World Bank & GFDRR. (2017). *Advancing Disaster Risk Finance in Belize*. GFDRR. https://www.gfdrr.org/sites/default/files/publication/125550-WP-DRFTA-Report-Belize-LowRes-PUBLIC.pdf (Belize annual average loss from hurricanes estimated at USD 17.9 million, or approximately 1 percent of GDP); Government of Fiji, World Bank, & GFDRR. (2017). Climate Vulnerability Assessment: Making Fiji Climate Resilient. World Bank Group / GFDRR. https://documents1.worldbank.org/curated/en/163081509454340771/pdf/120756-wp-public-nov-9-12p-wb-report-fa01-sp.pdf (Fiji annual average asset losses from floods and tropical cyclones estimated at approximately USD 225 million, or 5 percent of GDP).

[90] Parliament of Fiji. (2021). Climate Change Act 2021 (Act No. 43 of 2021). Laws of Fiji. https://www.parliament.gov.fj/wp-content/uploads/2021/09/Act-No.-43-Climate-Change.pdf

[91] Fiji Roads Authority Act 2012. Laws of Fiji. https://www.laws.gov.fj/Acts/DisplayAct/855. See also: Fiji Roads Authority Annual Report 2019/2020. Parliament of Fiji. https://www.parliament.gov.fj/wp-content/uploads/2024/08/92-Fiji-Roads-Authority-Annual-Report-2019%E2%80%932020.pdf

[92] *Ibid.,* Parliament of Fiji (2021), Climate Change Act 2021, ss. 65–74 (Part 11: Climate Change Adaptation and Resilient Development).

[93] ADB Law and Policy Reform Program. (2021). Climate Change Act, 2021 (Fiji). Asian Development Bank. https://lpr.adb.org/resource/climate-change-act-2021-fiji

[94] Fiji Roads Authority Act 2012; Fiji Roads Authority Annual Report 2019/2020, *op. cit.*

7.1.2. Fiji IAM Data & Systems

The FRA employs a GIS-based asset management system that captures road conditions, traffic volumes, and asset locations across approximately 11,000km of roads, over 1,000 bridges, 45 jetties, and 9,000 streetlights. This spatial data infrastructure enables condition-based decision-making and resource allocation[95]. The FRA actively trains and deploys GIS technicians in collaboration with the University of South Pacific[96], supporting domestic capacity for data-driven asset management. For the water sector, the Water Authority of Fiji (WAF) developed a long-horizon *Water Sector Strategy 2050* in 2024 that explicitly identifies data and systems upgrading, including real-time monitoring, pressure management, and leak detection, as foundational to long-term sustainability[97].

7.1.3. Fiji IAM Planning

Fiji has developed one of the more systematically documented planning frameworks for climate-resilient infrastructure in the Pacific Island region. The Climate Vulnerability Assessment (CVA) 2017, developed with the World Bank and Global Facility for Disaster Reduction and Recovery (GFDRR), translated climate risk projections into a costed, prioritized list of 125 investment interventions across roads, bridges, jetties, water supply, energy, and social infrastructure[98]. This provides a structured planning basis for capital allocation that links physical risk quantification to investment decisions, a key requirement of climate-responsive IAM.

At the sector level, the WAF's *Water Sector Strategy 2050* incorporates a 20-year planning horizon with demand forecasting, climate scenario analysis including saltwater intrusion and intensifying cyclones, and lifecycle cost planning[99]. The ADB-financed Fiji Transport Infrastructure Investment Sector Project similarly required the FRA to develop design and construction standards calibrated to climate and seismic risks[100]. The landmark Critical Bridges Resilience Project (2025) further embeds climate-resilient design standards, raising bridge heights and applying seismic-resilient ground improvement, within a formal asset management enhancement program for the FRA.[101]

Fiji's planning framework extends beyond engineered assets to incorporate natural infrastructure. Fiji's National Adaptation Plan (NAP) formally prioritizes nature-based solutions (NbS) as a core pillar of climate resilience, with the government constructing "nature-based seawalls," composite of structures combining boulder walls, mangroves, and vetiver grass, in vulnerable coastal communities[102], while mangroves along the coastline provide critical services including erosion prevention, protection of infrastructure from wave action, and flood buffering[103]. This bioshield function operates in tandem with coral reefs: mangroves trap sediment that would otherwise smother corals[104], while the reefs reduce wave energy before it reaches the shore, acting as a natural barrier against cyclone-driven waves, tsunamis, and coastal flooding[105]. In recognition of accelerating reef degradation, the Government of Fiji launched the One Million Coral Planting Program in 2020 in partnership with local villages, Secretariat Pacific Regional Environment Program (SPREP), and NGOs to restore compromised reef systems[106].

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[95] Fiji Roads Authority Annual Report 2019/2020, *op. cit.*

[96] USP's School of Engineering & Physics offers a Civil Engineering undergraduate program alongside Electrical & Electronic Engineering and Mechanical Engineering. However, only the Electrical & Electronic Engineering and Mechanical Engineering degrees have received accreditation from Engineering New Zealand, while the Civil Engineering program has not yet obtained external accreditation. University of the South Pacific. School of Engineering & Physics. *https://www.usp.ac.fj/school-of-engineering-physics/*

[97] Water Authority of Fiji. (2024, April). Fiji Water Sector Strategy 2050. WAF. *https://waterauthority.com.fj/wp-content/uploads/2024/04/Fiji-Water-Sector-Strategy-2050.pdf*

[98] Government of Fiji, World Bank, & GFDRR (2017), Climate Vulnerability Assessment: Making Fiji Climate Resilient, *op. cit.*

[99] Water Authority of Fiji (2024), Fiji Water Sector Strategy 2050, *op. cit.*

[100] Asian Development Bank. (2018). Transport Infrastructure Investment Sector Project: Fiji Roads Authority Design and Construction Standards Consultant's Report (TA8777-FIJ). ADB. *https://www.adb.org/projects/documents/fij-48141-001-tacr-0*

[101] World Bank. (2025, January 24). World Bank Supports Critical Infrastructure Benefitting More than Half a Million People in Fiji. World Bank Press Release.https://www.worldbank.org/en/news/press-release/2025/01/24/world-bank-supports-critical-infrastructure-benefitting-more-than-half-a-million-people-in-fiji

[102] NAP Global Network. (n.d.). Deep Roots for Community Resilience: A nature-based solution helping Fiji adapt to climate change. NAP GlobalNetwork. https://napglobalnetwork.org/stories/deep-roots-for-community-resilience-a-nature-based-solution-helping-fiji-adapt-to-climate-change

[103] Mamanuca Environment Society (MES Fiji). (n.d.). Mangrove/Wetland Ecosystems. MES Fiji. https://mesfiji.org/resources/environment/mangrovewetland-ecosystems

[104] World Wildlife Fund (WWF). (2024, July 25). Protecting Fiji's Mangroves with Local Communities. WWF. https://www.worldwildlife.org/news/stories/working-with-fijis-coastal-communities-to-protect-vital-mangrove-forests

[105] Corals for Conservation / Ocean Decade. (2024). *Launching Fiji's BULA Reef*. United Nations Ocean Decade. https://oceandecade.org/news/launching-fijis-bula-reef/

[106] Climate Investment Funds (CIF). (2024, May 27). Global Climate Action Programs (GCAP) Sub-Committee: NPC Investment Plan – Fiji. CIF. https://www.cif.org/sites/cif_enc/files/meeting-documents/gcap_sc.6_04_npc_investmentplan_fiji_05272024.pdf

7.1.4. Fiji IAM Budgeting

Fiji's budgeting framework institutionalizes maintenance as a separately identified and funded budget category, which constitutes a notable departure from the norm among comparable small developing states which prioritize politically visible new capital investment. The FRA's annual budget explicitly disaggregates maintenance from capital expenditure as distinct line items, with the 2025-2026 national budget allocating FJD 120 million[107] specifically for road maintenance and FJD 74 million for renewal and resealing, out of a total FRA allocation of FJD 388 million[108][109]. In terms of financing, Fiji has mobilized a diversified financing architecture for climate-resilient infrastructure, combining sovereign loans from ADB and the World Bank with Green Climate Fund (GCF) grants and government co-financing. The ADB-GCF Urban Water Supply and Wastewater Management Investment Program (total cost USD 405 million) represents a concrete example of blended finance that leverages concessional grant resources to de-risk and scale climate adaptation investments, a model the IMF has noted is consistent with Fiji's broader fiscal risk management approach[110][111]. Fiji's PIMA assessment also found that project appraisal incorporates climate and seismic risk considerations in cost estimates and risk registers, providing a stronger link between fiscal planning and physical vulnerability than is typical among comparable small states[112].

7.1.5. Fiji IAM Implementation

Fiji's implementation model for road and transport assets is built on an outsourced contract management structure, in which the FRA commissions private engineering firms as Principal Professional Engineering Services advisers, while retaining oversight, quality assurance, and risk register functions in-house[113]. This public-private model has helped Fiji access international technical capacity despite a limited domestic engineering workforce. For the water sector, the use of a Design-Build-Operate (DBO), one of the Public Private Partnership model in the ADB-financed water supply program[114], integrating construction, operation, and maintenance in a single long-term contract, has supported skill transfer to WAF engineers and introduced performance-based accountability into service delivery[115].

7.2. New York City Case Study

Background and Purpose of the New York City Case Study

Studying the IAM in New York City (NYC) can offer a singular valuable reference point for understanding how large, complex urban systems plan, finance, and manage infrastructure assets. As one of the world's most advanced cities, NYC operates a highly institutionalized IAM ecosystem anchored by its long-term capital planning, diversified financing mechanisms, and multi-agency coordination.

As Belize strengthens its national Infrastructure Asset Management framework, the New York City case could serve both as a reference model and as a point of comparison. While Belize faces different institutional capacities, fiscal constraints, and geographic vulnerabilities, NYC's experience highlights transferable principles, such as lifecycle-based planning, transparent capital budgeting, and the use of data to prioritize investments. The city's case can also be expected to provide insight into how IAM can function at scale under conditions of administrative fragmentation, complex urban infrastructure interdependencies, and increasing climate-related risks that demand integrated, cross-sector implementation mechanisms.

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[107] Equivalent to USD 54.7 million in 2026

[108] Equivalent to USD 174.5 million in 2026

[109] Republic of Fiji, Ministry of Finance. (2025). *2025–2026 National Budget Address*. Government of Fiji. https://www.finance.gov.fj/wp-content/uploads/2025/06/2025-2026-Budget-Address-2.pdf

[110] Asian Development Bank. (2019). Urban Water Supply and Wastewater Management Investment Program, Tranche 1 (Project No. 49001-003). ADB. https://www.adb.org/projects/49001-003/main

[111] Fiji Climate Change Portal. (2025). Fiji Urban Water Supply and Wastewater Management Investment Program. Government of Fiji. https://fijiclimatechangeportal.gov.fj/project/fiji-urban-water-supply-and-wastewater-management-investment-program/

[112] International Monetary Fund. (2025). Republic of Fiji: Public Investment Management Assessment (Technical Report). IMF. https://www.imf.org/-/media/files/publications/hls/2025/english/hlsea2025043.pdf

[113] Fiji Roads Authority Act 2012; Fiji Roads Authority Annual Report 2019/2020, *op. Cit.*

[114] While Design-Build (DB) and Build-Operate-Transfer (BOT) remain more widely used procurement models, DBO (Design-Build-Operate) is a comparatively newer arrangement, having been formally recognized as a standard contract form only with the release of NEC4 in 2017. ADB has been among the more deliberate adopters of the DBO model in the water and wastewater sector, developing a dedicated Standard Bidding Document for DBO Water and Wastewater (SBD DBO W/WW) and commissioning NEC to draft a consultative DBO contract in 2015. Its application is primarily oriented toward greenfield water and wastewater infrastructure.
NEC. (2017). *New NEC4 Design Build and Operate Contract (DBO)*. NEC Contracts. https://www.neccontract.com/news/new-nec4-design-build-and-operate-contract; Asian Development Bank. (n.d.). *User Guide for Design-Build-Operate Contracts for Water and Wastewater Greenfield Infrastructure Projects*. ADB. https://www.adb.org/sites/default/files/design-build-operate-guide.pdf

[115] Fiji Climate Change Portal (2025), Fiji Urban Water Supply and Wastewater Management Investment Program, *op. Cit.*

7.2.1. NYC IAM Governance

NYC's IAM system operates under a highly specialized, sector-based structure, with each asset class managed independently by its respective agency. This decentralized model reflects the scale and complexity of the city's infrastructure landscape, where governance is distributed across multiple entities.

The city's water supply and sewage treatment systems are overseen by the Department of Environmental Protection (DEP), which is responsible for managing reservoirs, monitoring water quality, maintaining the water distribution network, collecting water and sewer fees, operating wastewater treatment plants, and maintaining sewer networks and pump stations. The agency delivers 1 billion gallons of tap water to the population of the city through its 19 reservoirs and 3 controlled lakes spread across a nearly 2,000-square-mile watershed[116]. It also manages 14 sewage treatment plants located throughout the city, which handle both stormwater runoff and sanitary waste, treating approximately 1.3 billion gallons of wastewater each day collected through an extensive grid of sewer pipes of various sizes stretching over 7,400 miles[117]. The governance of the city's water and sewer infrastructure systems involves not only the DEP but also the Municipal Water Finance Authority (NYW) and the Water Board, both of which play important roles from the perspective of financial management. According to the Independent Budget Office (IBO), the city's water and wastewater utility system is funded by revenue it collects from water and sewer bills, for which rates are reviewed and set annually by the Water Board to ensure that the revenues are sufficient enough to meet the debt obligations of NYW and the operations and maintenance costs of the water system[118]. Thus, the water and sewer fees collected by the DEP serve not only as the source of repayment for the bond (Municipal Water Bonds) issued by the NYW, but also as the primary revenue covering the majority of the operating costs of these entities.

The city's management of solid waste falls under the jurisdiction of the Department of Sanitation (DSNY), which handles the collection and recycling of municipal solid waste, as well as the operation and maintenance of sanitation vehicles and waste-handling facilities. The agency collects 24 million pounds of trash, recycling, and compostable material every day, while managing a fleet of more than 2,000 rear-loading collection trucks, 450 mechanical brooms[119]. Waste management demands are met through a single, unified public authority with consistent standards across all boroughs. The governance is centralized, and municipally operated at scale.

Public transportation services in the city, including subways and buses, are managed by the Metropolitan Transportation Authority (MTA), a New York State–controlled entity, and therefore fall outside the jurisdiction of NYC[120]. The city's transportation infrastructure is managed by the Department of Transportation (DOT), which is responsible for day-to-day maintenance of the 6,300 miles of streets, 800 bridges and 4 tunnels throughout the city[121]. The agency leads street construction projects ranging from milling and repaving to full reconstruction of streets, sewer and water pipes, and other utilities, which require inter-agency coordination and approvals with entities such as DEP and utility companies[122]. This coordination is managed by the Street Works Coordination Group, led by the DOT, which includes representatives from DEP, Con Edison, carriers, and others. The group uses a joint permitting and data-sharing system to align construction schedules, confirm planned works, and monitor progress in real time. This model, combining central oversight with collaborative planning, minimizes duplication and disruption while optimizing infrastructure investments.

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[116] New York City Department of Environmental Protection. *New York City Drinking Water Supply and Quality Report 2025*. New York: NYC DEP, 2025.
[117] New York City Department of Environmental Protection. "Wastewater Treatment System." *NYC.gov*. Accessed April 17, 2026. https://www.nyc.gov/site/dep/water/wastewater-treatment-system.page
[118] New York City Independent Budget Office. *New York City's Water and Sewer System: Examining Rate Setting and Billing Structures*. October 2024. https://www.ibo.nyc.ny.us/iboreports/new-york-citys-water-and-sewer-system-examining-rate-setting-and-billing-structures-october-2024.pdf.
[119] New York City Department of Sanitation. "About DSNY." *NYC.gov*. Accessed April 17, 2026. https://www.nyc.gov/site/dsny/about/about-dsny.page?utm_source=copilot.com
[120] Metropolitan Transportation Authority, "About the MTA," *MTA.info*, accessed April 17, 2026, https://www.mta.info/about.
[121] New York City Department of Transportation, "Infrastructure," *NYC.gov*, accessed April 17, 2026, https://www.nyc.gov/html/dot/html/infrastructure/infrastructure.shtml
[122] New York City Department of Transportation, "Capital Street Projects," *NYC.gov*, accessed April 17, 2026, https://www.nyc.gov/html/dot/html/infrastructure/capital-projects.shtml

7.2.2. NYC IAM Data & Systems

The city's IAM data management system reflects its sector-based governance, with each agency maintaining its own data architecture, standards, and update cycles. However, the city has established a cross-sector mechanism, authorized by the City Charter, to assess asset conditions across agencies.

This initiative, known as the Asset Information Management System (AIMS), provides a citywide framework for compiling an inventory of the major portions of its physical plant which are defined as all the assets and asset systems with a replacement cost of 10 million dollars or greater, and a useful life in excess of 10 years[123]. It also requires each agency to assess the condition of their assets and prepare maintenance schedules for those assets, and to publish the condition assessments and the maintenance schedules each year. It is worth noting that Table 1 provides a citywide breakdown of assets by class. While the table explicitly lists assets related to solid-waste management under the jurisdiction of DSNY and transportation infrastructure under DOT, it does not include water-supply or wastewater infrastructure managed by DEP. The assets covered by AIMS are limited to fixed facilities such as buildings, bridges, and roadways, excluding water mains, sewer conduits, treatment plants, and pumping stations. Despite this limitation in registered asset classes, AIMS remains the official cross-agency mechanism for aggregating infrastructure condition data in the city, serving as a financial integration system of the city.

[123] City of New York, Office of the Mayor. *Asset Information Management System (AIMS) Report: Executive Summary for Fiscal Year 2026*. New York: Office of the Mayor, October 20, 2025.

Table 1. Citywide Asset Classes by Agency

New York, Brooklyn, Queens Public Libraries	
Libraries	178
Public Office Buildings	1
Department of Education	
Primary Schools	849
Intermediate/Junior High Schools	207
High Schools	190
Administrative Buildings	12
Piers/Bulkheads	2
Day Care Centers	5
City University of New York	
Community College Buildings	85
Piers/Bulkheads	3
Parking Garages	1
Marinas/Docks	1
Police Department	
Precinct Houses	80
Police Buildings Non-Precinct	73
Piers/Bulkheads	1
Parking Garages	1
Marinas/Docks	4
Fire Department	
Fire Department Buildings	93
Piers/Bulkheads	3
Firehouses	217
Marinas/Docks	1
Fireboats	4
Administration for Children's Services	
Shelters	2
Non-Shelters	3
Juvenile Justice Buildings	5
Department of Homeless Services	
Shelters	55
Non-Shelters	2
Department of Correction	
Rikers Island Facilities/Utilities	38
Correction Facilities	1
Piers/Bulkheads	2
Marinas/Docks	1
Human Resources Administration	
Shelters	12
Non-Shelters	7
Department for the Aging	
Senior Center	10
Department of Cultural Affairs	
Museum/Gallery Facilities	70
Cultural Facilities	257
Walls	1
Park Bridges	1
Department of Small Business Services	
Shelters	1
Museum/Gallery Facilities	2
Terminals/Markets	56
Piers/Bulkheads	182
Pier Facilities	1
Parking Garages	1
Ferry Terminal Facilities	7
Marinas/Docks	15
Department of Health & Mental Hygiene	
Administrative Buildings	1
Clinics/Labs. Classrooms	21
Vehicle Maint./Storage Facilities	1
Animal Shelters	2
OCME Facilities	4
Health and Hospitals Corporation	
Hospital Buildings	86
Parking Garages	1
OCME Facilities	1
Department of Sanitation	
Piers/Bulkheads	22
Transfer Stations	9
Vehicle Maint./Storage Facilities	41
Fresh Kills Facilities	12
Parking Garages	1
Public Office Buildings	4
Bridges	11
Department of Transportation	
Bridge/Waterways	44
Highway Bridges and Tunnels	315
Highway Facilities	52
Streets and Arterials (miles)	6500
Street Lighting Systems	1
Traffic Signal Systems	1
Ferry Terminal Facilities	5
Piers/Bulkheads	27
Ferries/Barges	10
Pier Facilities	3
Parking Garages	8
Marinas/Docks	13
Department of Parks and Recreation	
Museum/Gallery Facilities	17
Piers/Bulkheads	172
Vehicle Maint./Storage Facilities	4
Pier Facilities	1
Ferry Terminal Facilities	1
Park Facilities	909
Stadium Facilities	3
Marinas/Docks	28
Walls	580
Park Bridges	124
Department of Citywide Administrative Services	
Piers/Bulkheads	13
Court Buildings	24
Public Office Buildings	26

The asset-condition data registered in AIMS are compiled for each asset class based on cyclical field surveys conducted by the respective agencies or external consultants. According to the FY 2026 report[124], building surveys were performed by the Department of Design and Construction; waterfront, retaining wall, bridge, and selected building surveys were performed by Gannett Fleming Inc. and its subconsultants; and the City's streets and highways were surveyed by DOT. To standardize the data collected through these surveys, AIMS establishes Technical Notes and Project Methodology, which define procedures such as importance classification, cost estimating, and life-cycle projections. This framework seems to

[124] City of New York, Office of the Mayor. *Asset Information Management System (AIMS) Report: Executive Summary for Fiscal Year 2026*. New York: Office of the Mayor, October 20, 2025.

provide an institutional foundation for data integration across agencies, ensuring methodological consistency in the city's IAM system.

7.2.3. NYC IAM Planning

The planning of IAM in the city begins with capital plans developed by each agency responsible for managing specific infrastructure assets. It is characterized by a bottom-up approach, where plans are first formulated at the agency level before being integrated into the broader citywide framework.

The submitted plans from each agency are consolidated by the New York City Office of Management and Budget (OMB). OMB sets investment priorities and integrates these plans into a unified citywide capital plan for IAM, based on criteria such as fiscal constraints and project urgency[125]. The Ten-Year Capital Strategy (TYCS) serves as the unified planning framework. It systematically outlines how the city will invest in major infrastructure over the next decade and is updated every two years[126]. One of TYCS's defining features is that the investment plan is organized by lifecycle category and service category. For example, according to the FY2026 TYCS[127], the city plans to invest $173.4 billion over the next ten years to improve infrastructure, including roads, schools, bridges, water and sewer facilities, parks, cultural centers, and transportation systems across the five boroughs. Figure 1 presents the breakdown of this total by lifecycle category, while Figure 2 shows the distribution by service category:

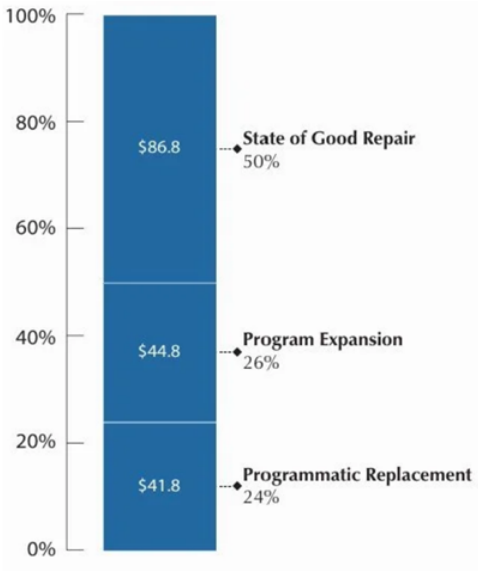


Figure 2. 2026-2035 TYCS Overview of $173.4 Billion in Planned Spending by Lifecycle Category

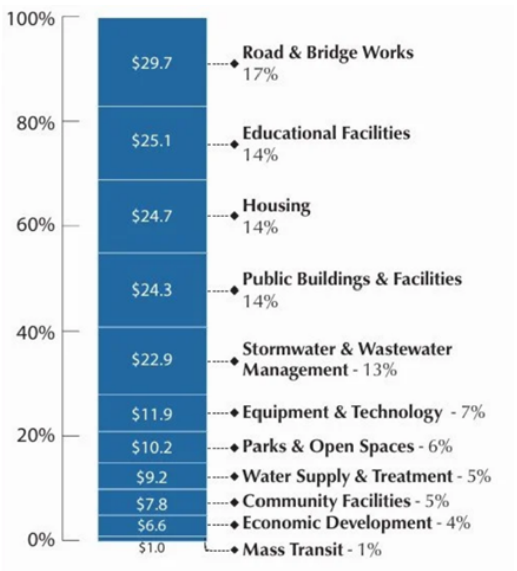


Figure 3. 2026-2035 TYCS Overview of $173.4 Billion in Planned Spending by Service Category

As shown in Figure 2, investments aimed at keeping existing infra assets in a safe and operable condition (State of Good Repair) account for half of the total amount. Meanwhile, investments for Programmatic Replacement, planned renewal based on asset life cycles and performance standards, and Program Expansion, new construction and expansion to meet emerging service demands, represent comparable shares, accounting for 24 percent and 26 percent, respectively. Figure 3 indicates that road and bridge works are planned to receive the largest allocation of funds ($29.7 billion). For the water sector, investment plans allocate 13 percent ($22.9 billion) to stormwater and wastewater management, and 5 percent ($9.2 billion) to water supply and treatment.

[125] New York City Office of Management and Budget, "Capital Budget," *NYC.gov*, accessed April 19, 2026, https://www.nyc.gov/content/omb/pages/what-we-do/capital-budget.
[126] New York City Office of Management and Budget, *Ten-Year Capital Strategy: Fiscal Years 2026–2035* (New York: NYC OMB, May 2025).
[127] *Ibid.*

7.2.4. NYC IAM Budgeting

The budget formulation for IAM in the city is based on the TYCS and the capital plan[128] subsequently developed by OMB. Building on these plans, OMB prepares the annual Capital Budget that determines year-to-year capital spending. This Capital Budget is established separately from the city's annual operating budget (or Expense Budget) and constitutes an essential funding source for implementing IAM[129].

According to the New York City Independent Budget Office, most of the city's capital spending is financed through money it borrows by issuing bonds, and as a result, the city had roughly $68 billion in outstanding debt as of 2013[130]. Furthermore, according to the FY 2026 TYCS, the city plans to secure 78 percent ($136.2 billion) of its $173.4 billion investment over the next decade through City Bonds and 19 percent ($32.8 billion) through Municipal Water Bonds[131]. Such a fiscal management approach that relies largely on bond issuance for funding can be viewed as carrying the risk of constraining budgets for other public services. However, it also represents a distinctive method available to major cities with strong creditworthiness, and is likely one of the key factors enabling the city to sustain long-term infrastructure investment in a stable and continuous manner.

7.2.5. NYC IAM Implementation

In the implementation phase of IAM in the city, OMB publishes the Capital Commitment Plan (CCP) to authorize commitments (awarded contracts registered with the City Comptroller) for each agency. Through this process, OMB clarifies when and to what extent the Capital Budget, which is formulated on TYCS, will actually be executed over the next five years[132]. As a result, the budgets for individual projects overseen by each agency are formally secured and translated into the implementation stage of the city's capital investment cycle.

CCP is developed using the detailed project-status data entered by each agency into the online Financial Management System (FMS)[133]. In this structure, FMS functions as a centralized ledger that consolidates financial information, including project status, expense budgets, funding sources, and contract registrations, managed by individual agencies. The CCP is thus derived from the FMS data, translating the city's capital planning into actionable commitments.

Furthermore, the NYC Capital Projects Dashboard[134] visualizes both CCP and FMS data, providing an integrated overview of project progress, budgets, and schedules across multiple agencies. By publicly disclosing budget execution and project performance, this tool serves as a core instrument for ensuring implementation transparency, and stands as one of the official documents for tracking the fiscal execution of IAM in the city.

That said, financial transparency represents only one dimension of IAM implementation. In a large metropolis such as NYC, where multiple agencies might operate within the same physical space, institutional and operational coordination mechanisms are indispensable. For instance, DOT has institutionalized street-works permits[135] to coordinate all entities involved in roadway excavation, including DEP, utility companies, telecommunication providers, and private contractors. Through this system, DOT takes the lead to prevent simultaneous construction by multiple agencies during underground work such as water, sewer, and power installations, thereby enhancing the efficiency of street-works operations across the city.

Another example of an inter-agency coordination mechanism is the Resilience Finance Task Force. Established in 2024, this body was convened as part of the city's response to escalating risks from climate change, with a mandate to coordinate planning and financing for coastal flood-protection infrastructure[136]. In addition to the administrative agencies that could serve as implementing bodies for coastal resilience projects such as DEP, NYC Parks, and the New York City

[128] New York City Office of Management and Budget, "Capital Budget," *NYC.gov*, accessed April 19, 2026, https://www.nyc.gov/content/omb/pages/what-we-do/capital-budget. .
[129] New York City Independent Budget Office, *Understanding New York City's Budget: A Guide to the Capital Budget* (New York: NYC IBO, June 2013).
[130] *Ibid.*
[131] New York City Office of Management and Budget, *Ten-Year Capital Strategy: Fiscal Years 2026–2035* (New York: NYC OMB, May 2025).
[132] City of New York, Office of Management and Budget, *Fiscal Year 2026 Executive Budget: Capital Commitment Plan, Version 1* (New York: Office of Management and Budget, April 2025).
[133] *Ibid.*
[134] City of New York, Mayor's Office of Operations, *NYC Capital Projects Dashboard* (New York: City of New York, 2025), https://www.nyc.gov/site/capitalprojects/index.page.
[135] New York City Department of Transportation, *Street Works Permits* (New York: NYC DOT, 2026), https://www.nyc.gov/html/dot/html/infrastructure/permits.shtml.
[136] City of New York, Office of the Mayor, *Securing a Resilient New York City: Funding and Financing Shoreline Protection* (New York: Office of the Mayor, February 2025).

Economic Development Corporation, the Task Force also brought together an expert group of leaders in finance, real estate, and business, and met several times during the fall of 2024 and winter of 2025. Its recommendations are expected to inform future work on inland storm-water-flooding mitigation, technical matters such as building and zoning codes, and policy tools like property buyouts in flood-prone areas[137].

[137] *Ibid.*

Box 2: NYC The East Side Coastal Resiliency Project

New York City's East Side Coastal Resiliency (ESCR) project illustrates what climate-integrated infrastructure planning looks like at the urban scale. Jointly funded by the City and the federal government, ESCR aims to reduce flood risk on Manhattan's East Side from East 25th street to Montgomery Street, with the project design integrating flood protection into the community fabric rather than walling off the neighborhood. The system spans 2.4 miles and combines raised parkland, floodwalls, 18 movable floodgates, including both swing and roller gates that remain open in fair weather and close only during strom events, and upgraded sewer infrastructure to manage inland rainfall runoff. The flood protection standard is calibrated to the region's worst-case anticipated 100-year strom in 2050, with an adaptive design that can accommodate an additional two feet of elevation should sea levels rise faster than current projections. At a total construction cost of $1.45 billion, the project is designed to protect over 110,000 Lower East Side residents, including 28,000 in public housing, and is expected to be completed by 2026[138].

Figure 4. NYC Integrated flood protection system

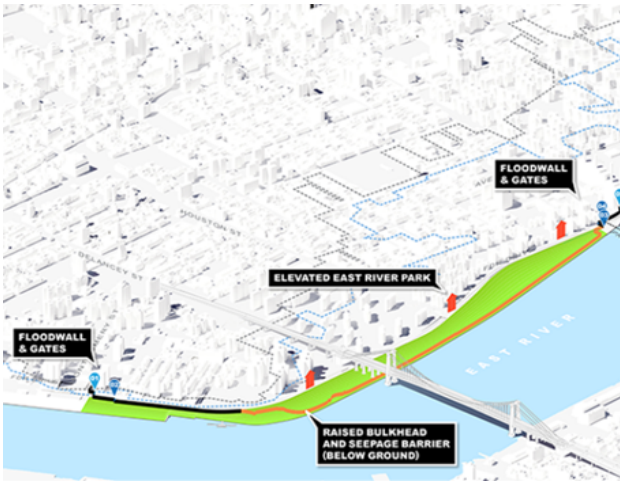


Figure 5. NYC Flood Gate System

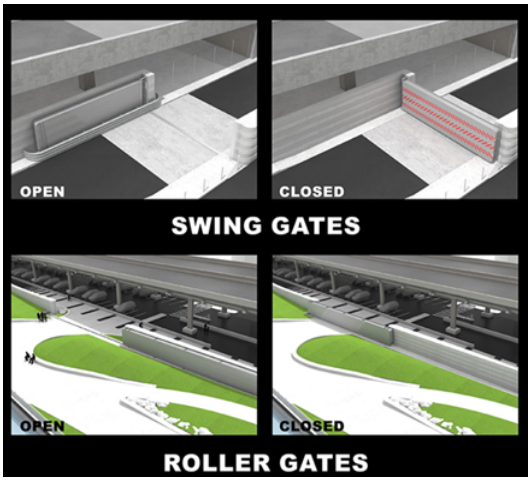
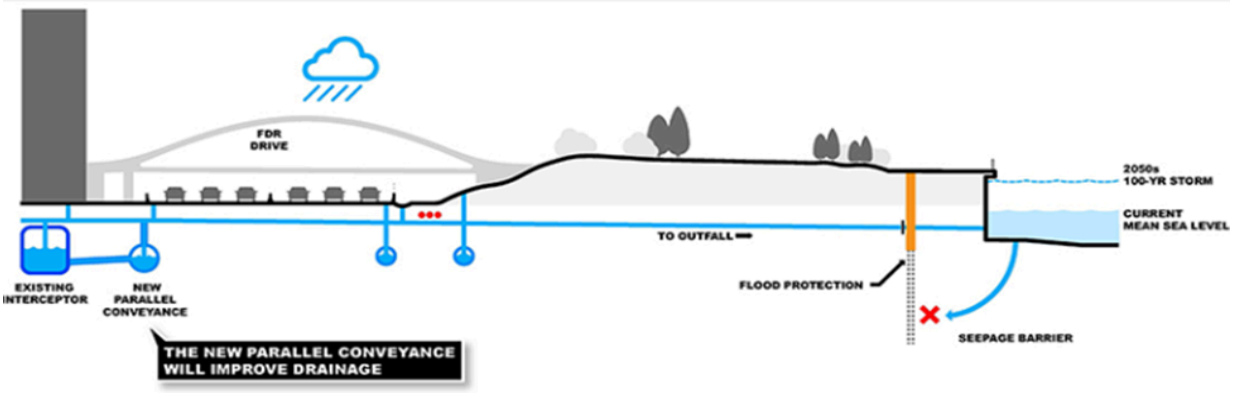


Figure 6. NYC Combined Sewer System



Source:

[138] New York City Department of Design and Construction. (n.d.). *East Side Coastal Resiliency*. NYC DDC. https://www.nyc.gov/site/escr/index.page

7.3. Changxing County, China, IAM Case Study

Background and Purpose of Changxing County Case Study

This case study examines transport infrastructure asset management in Changxing County, Zhejiang Province, China. Changxing is selected not as a benchmark for Belize in terms of income level or fiscal scale, but as an example of institutional practice at the county level. According to the latest officially reported county-level statistics compiled from China's National Bureau of Statistics, Changxing recorded a 2024 gross domestic product (GDP) of RMB 92.775[139] billion and a resident population of 635,371 in 2024[140]. Its policy relevance lies in demonstrating how a subnational jurisdiction with a mixed rural-urban economy and moderate population density can manage IAM, from road ownership, to planning, budgeting, maintenance, and intergovernmental coordination through structured infrastructure asset management systems.

According to the Ministry of Transport of the People's Republic of China, Changxing has established digital management coverage for 2,042 kilometers of rural roads and 794 bridges, while achieving 100 percent administrative village bus access and full township logistics coverage. These outcomes are important not because Belize should replicate the scale, but because they demonstrate a governance model linking asset inventory, service planning, and maintenance accountability.[141]

7.3.1. Changxing County IAM Governance

In Changxing County, rural road infrastructure is managed through a layered county–township–village governance structure that combines centralized technical oversight with localized operational response. The Changxing County Transport Bureau serves as the lead asset-management authority, responsible for network planning, technical standards, bridge safety, and maintenance programming. Township governments function as the coordination layer, consolidating local maintenance needs, supervising contractors, and verifying service disruptions. Village committees and designated road stewards provide first-line inspections and rapid reporting of hazards such as drainage blockage, pavement deterioration, and fallen trees. The effectiveness of this governance model lies in the clear division of responsibilities across administrative levels: the county leads strategy and financing, townships coordinate implementation, and villages provide real-time asset condition information. This layered structure improves accountability, shortens response time, and strengthens continuity across the rural transport network.

According to Zhejiang Online, Changxing has integrated 1,044 rural roads (2,042 km) and 794 bridges into a unified countywide governance framework. The system's strength lies in its county–township–village structure, which coordinates inspection, reporting, maintenance, and funding. Institutionalized through the "road chief system" (路长制), local officials are assigned responsibility for specific road segments and evaluated on maintenance performance. Modeled after the "river chief system," this framework ties maintenance accountability to administrative evaluations, improving coordination and service delivery across government levels[142]. Rather than relying on diffuse or overlapping mandates, the model assigns clear accountability to each asset segment. This reduces fragmented responsibility and enables consistent oversight across a geographically dispersed rural transport network.[143]

Changxing manages rural transport assets through a county-led digital system built on "one road, one file" and "one bridge, one file." The Changxing County Transport Bureau is the lead authority, responsible for maintaining the registry, setting standards, consolidating inspections, and prioritizing annual maintenance. Township governments and village stewards provide field reports, local demand signals, and rapid inspections, but do not independently set final priorities.

Each asset record includes ownership, condition, inspection history, and maintenance needs, while bridges follow structured review cycles. Under national regulations, county road bridges require monthly routine inspections, technical inspections every 1–3 years (depending on condition), and immediate checks after extreme weather events. Agencies supervise data quality, compliance, and response timeliness, with maintenance priorities based on engineering assessments, risk, service importance, and budget availability.

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[139] Approximately USD 13.5 billion, 2026

[140] CEIC Data. "GDP: Zhejiang: Huzhou: Changxing." Accessed April 19, 2026. https://www.ceicdata.com/en/china/gross-domestic-product-county-level-region/cn-gdp-zhejiang-huzhou-changxing.

[141] Ministry of Transport of the People's Republic of China, *"四好农村路"高质量发展典型案例：浙江省湖州市长兴县*, October 2023, accessed April 19, 2026, https://xxgk.mot.gov.cn/2020/jigou/glj/202310/P020250514394872177319.pdf.

[142] David P. Dolowitz, "The Rise and Transfer of the River Chief System: A Review of Chinese Water Governance and Its Potential to Transfer to the Global Community," Preprints (2024), https://www.preprints.org/manuscript/202406.0184/v1.

[143] *Zhejiang Online. "长兴县全面推行农村公路'路长制'纳入管理1044条2042公里农村公路." 浙江新闻, August 16, 2017. Accessed April 28, 2026. https://zjnews.zjol.com.cn/zjnews/hznews/201708/t20170816_4810446.shtml*

7.3.2. Changxing County IAM Data and Systems

In Changxing County, rural transport asset management is supported by a countywide digital information system that converts roads, bridges, and maintenance conditions into continuously usable management data rather than fragmented paper records. Under the locally implemented "one road, one file" (一路一档) and "one bridge, one file" (一桥一档) framework, each asset is assigned a unique digital profile containing location, route classification, length, pavement structure, construction year, traffic function, inspection history, maintenance interventions, and safety status. This allows managers to identify not only where an asset is located, but also how it is performing over time and when intervention is due. While national policy promotes these asset management frameworks and standards, counties implement and maintain them daily, aligning with China's model of central standards with decentralized execution[144].

The system's practical value is its ability to convert field observations into actionable maintenance priorities. Using mobile devices, township staff and maintenance teams report defects, such as potholes, shoulder erosion, blocked culverts, damaged guardrails, missing signage, or drainage overflow, directly from the site. Submitted issues are automatically geo-tagged, time-stamped, and assigned to the responsible unit, reducing the delay between identifying a problem and taking corrective action compared to traditional reporting methods. This approach aligns with Zhejiang's rural road modernization program, which prioritizes digital supervision, intelligent dispatch, and traceable work orders to enhance county transport governance.

7.3.3. Changxing County IAM Planning

In Changxing County, rural transport planning is implemented through a rolling asset-management programming cycle that links annual maintenance plans with medium-term capital investment plans rather than a purely reactive repair model.

The Changxing County Transport Bureau leads planning, creating countywide maintenance and upgrade plans based on asset conditions, service requests, and risks. Township governments provide local demand assessments to ensure county priorities match community needs. This approach balances data-driven operations with local input, avoiding reliance on reactive or complaint-based spending.

Roads supporting school transport, village bus routes, agricultural freight, e-commerce delivery, tourism access, or emergency vehicles receive higher planning priority because failure would generate wider economic and social disruption. Rather than asking only "which road is damaged," planners also ask "which road is most important to keep functioning."

The second planning input is risk-based climate and operational resilience. Assets located in flood-prone lowlands, poor-drainage corridors, steep slopes, or areas with aging bridges are assigned higher inspection frequency and preventive maintenance priority. As a result, annual plans can proactively fund culvert clearance, slope stabilization, bridge repairs, guardrail replacement, or drainage upgrades before the rainy season causes failures unlike waiting for assets to collapse or roads to become impassable.

Budget constraints are then reconciled through phased programming. Lower-cost preventive works (ditch cleaning, patching, vegetation clearance, drainage maintenance) are bundled into annual maintenance plans, while resurfacing, bridge strengthening, or widening projects are sequenced into medium-term capital programs. This planning structure improves fiscal discipline because it separates routine preservation needs from major rehabilitation projects, allowing scarce funds to be used more efficiently.

7.3.4. Changxing County IAM Budgeting

Changxing County draws on four distinct funding sources that together form a multi-source lifecycle financing system: central government transfer payments, provincial co-financing and performance grants, county-issued general bonds, and locally generated revenues. Each source serves a different purpose, operates under different rules, and depends on institutional arrangements embedded in China's intergovernmental fiscal system. Higher-level funding, particularly from central and provincial sources, is contingent on the county's ability to demonstrate road condition quality, maintenance effectiveness, and asset management capacity. This creates a positive feedback loop in which stronger performance secures greater financial inflows. As a result, budgeting in Changxing extends beyond resource allocation to function as a system of incentives, where financial sustainability is closely tied to continuous asset performance and proactive maintenance strategies.

[144] Katherine Atha et al., China's Smart Cities Development (Washington, DC: U.S.-China Economic and Security Review Commission, 2020), https://www.uscc.gov/sites/default/files/China_Smart_Cities_Development.pdf.

National earmarks and mandated maintenance floors

The foundational layer of Changxing's road maintenance finance comes from the central government in Beijing. Two streams flow downward through the intergovernmental system. The first is the vehicle purchase tax fund, a nationally collected levy on motor vehicle purchases that is redistributed to local governments for road investment and maintenance. Since 2021 alone, the central government has invested RMB 220 billion[145] from vehicle purchase tax funds in rural roads nationally, leveraging around RMB 2 trillion[146] in total social investment, with more than RMB 400 billion[147] spent specifically on maintenance[148]. The second stream derives from the 2009 reform that abolished separate highway maintenance fees and replaced them with a higher fuel excise tax, with a portion of receipts earmarked for road maintenance and transferred to county governments. Both streams are distributed through a performance-linked mechanism: the Changxing County Transport Bureau's 2024 work plan explicitly targets maintaining first place in Huzhou City and remaining in the first tier across Zhejiang Province for rural road condition quality, because counties that demonstrate measurable road condition outcomes receive larger transfer allocations.

The second stream derives from the 2009 fuel tax reform. When China abolished separate highway maintenance fees that year, the increased fuel excise became a central government tax collected nationally. The central government redistributes the full amount back to local governments through standardised transfer payments, with the principle that the nature of transport funds, their designated use, local budget procedures, and local spending responsibilities all remain unchanged from the previous system[149]. In practice, Zhejiang Province's Finance Department and Transport Department issue annual notices pre-allocating these central fuel tax reform transfers to cities and counties, where they are recorded under a designated "transport shared fiscal powers transfer payment revenue" budget line and must be spent on road and waterway transport purposes. The designated use restriction is imposed by central government policy from above, not created by the county. Changxing receives these funds but cannot increase or redirect them.

Provincial co-financing and performance grants

Zhejiang Province adds a second funding layer above the county budget. The province operates the *Four Good Rural Roads* (四好农村路) programme, which provides co-financing and performance-linked grants for construction, digitalization, and safety upgrades across county networks[150]. This provincial stream enables capital projects, such as resurfacing deteriorated roads, widening constrained corridors, replacing unsafe bridges, improving drainage capacity, that would exceed what routine county budgets can absorb. Changxing's status as a demonstration county for rural road quality within Zhejiang's ranking system makes it a consistent recipient of provincial co-financing.

County general bond issuance

For major capital projects, Changxing supplements routine maintenance budgets through county bond issuance and upper-level transport transfers. In 2024, the county allocated RMB 100 million[151] in newly issued general bonds to Four Good Rural Roads projects and received additional provincial and national transport development funds [152]. This layered financing structure enables the county to undertake larger resurfacing, bridge replacement, and drainage upgrading projects while maintaining stable routine maintenance expenditure.

Road-enabled indirect revenues and the "Rural Roads+" model

The third stream, and the most analytically distinctive element of the Changxing budgeting model, is the indirect revenue generated by the road network itself. Changxing's rural roads do not charge tolls. They are public goods that do not generate direct cost recovery. However, they enable economic activities that generate taxable revenues, and a portion of

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145 Approximately USD 30.6 billion, 2026

146 Approximately USD 277.8 billion, 2026

147 Approximately USD 55.6 billion

148 Luo Wangshu, "China Achieves Major Targets for Rural Road Development Ahead of Schedule," China Daily, August 20, 2025, https://www.chinadaily.com.cn/a/202508/20/WS68a564aaa310b236346f29aa.html.

149 "以'四好农村路'为抓手推进城乡融合发展——浙江长兴的实践探索" ["Promoting Urban–Rural Integration through 'Four Good Rural Roads': The Practice of Changxing, Zhejiang"], China Reform (中国改革网), http://chinareform.net/plus/view.php?aid=6670.

150 Zhejiang Provincial People's Government. *Implementation Opinions on Deepening the Reform of the Rural Road Management and Maintenance System* (浙江省人民政府办公厅关于深化农村公路管理养护体制改革实施意见), September 30, 2020. Accessed April 28, 2026. https://zjjcmspublic.oss-cn-hangzhou-zwynet-d01-a.internet.cloud.zj.gov.cn/jcms_files/jcms1/web3558/site/attach/0/84edb8865a4a4eada5c43eea945759a9.pdf.

151 Approximately USD 13.9 million, 2026

152 长兴县人民政府 (Changxing County People's Government), "长兴县推进农村公路高质量发展相关工作情况" ["Progress in Advancing High-Quality Development of Rural Roads in Changxing County"], January 2, 2025, http://www.zjcx.gov.cn/art/2025/1/2/art_1229518377_3995368.html.

those revenues returns to the county general budget, which is then appropriated back into infrastructure maintenance. This is the functional logic of the “Rural Roads+” model and represents the closest equivalent to a retained earnings mechanism for public road infrastructure.

All localities have developed innovative “rural road+” investment and financing models by integrating rural roads with commercial projects in relation to industries, industrial parks, rural tourism, and other economic activities. The first is rural tourism and leisure agriculture. Changxing’s scenic road corridors have made it a destination for leisure tourism from Hangzhou, Shanghai, and surrounding urban centres. Sanxin village within Changxing County was specifically featured in the November 2024 national white paper on rural roads as a photographic example of this integration, illustrating that the county is recognised at the national level as a demonstration case. The value-added taxes and business levies on tourism enterprises return to the local government budget. In Tuqiao township in Chongqing, after a loop road was completed, the township welcomed over 2 million tourist visits in the first half of one year alone, generating RMB 180 million in tourism revenue, with sales of primary agricultural products exceeding RMB 60 million[153].

The second stream is agricultural e-commerce and freight logistics. Improved transport infrastructure has paved a fast track for the development of rural e-commerce. Changxing County has developed its own county-level logistics nodes that consolidate agricultural product shipments and inbound deliveries. In Zhejiang, integrated delivery programmes reduced end-stage delivery costs in rural areas by about 15 percent[154], making logistics businesses operating on the county network more competitive and more profitable, and thus more productive as a source of local tax revenue. The

Through integrated rural logistics, e-commerce delivery, passenger transport, and freight coordination, the county has lowered last-mile delivery costs, expanded market access for agricultural producers, and reinforced rural supply chains. This approach ties infrastructure investment to economic performance, enabling road maintenance and logistics improvements to simultaneously support local industry, rural commerce, and long-term fiscal sustainability.

Budget prioritisation through cost avoidance

Changxing’s budgeting prioritizes low-cost preservation to avoid future liabilities, rather than deferring maintenance until costly reconstruction is unavoidable. The county transport bureau’s 2024 work plan reflects this orientation explicitly, prioritising upgrading of road maintenance quality and efficiency, applying new maintenance technologies, and ensuring national and provincial road maintenance inspection rankings remain at the top of Huzhou City[155]. The performance ranking system reinforces fiscal discipline. Deferring maintenance incurs opportunity costs: substandard road conditions that reduce future central and provincial transfer allocations, compounding the long-term fiscal burden of accelerated asset deterioration. Changxing County case provides evidence that well-budgeted infrastructures can be productive economic assets rather than an ongoing fiscal liabilities.

7.3.5. Changxing County IAM Implementation

In Changxing County, the effectiveness of implementation is determined not by who holds formal authority but by how daily maintenance tasks are executed, tracked, and verified in real time. An "intelligent management" system equips cleaning and maintenance vehicles with GPS tracking, field personnel with smart wristbands, and supervisors with real-time terminal analysis to enable dynamic oversight and closed-loop management. Unlike traditional periodic patrols, this system continuously monitors whether crews are on route, whether assigned work is being performed, and whether follow-up actions are completed[156].

In Changxing routine maintenance, such as ditch cleaning, roadside vegetation control, debris removal, surface patching, guardrail repair, and post-storm clearance, are integrated into a traceable execution process. The use of GPS-enabled vehicles and wearable devices allows supervisors to verify not only that a problem was reported but also that crews physically reached the site and completed the work.[1] This reduces the risk of maintenance orders being assigned but left unresolved. The model aligns with provincial standards that prioritize year-round road operability, ensuring roads remain passable, safe, and serviceable, not just defect-free.

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[153] He Yin, “Zoom into China’s Integrated Urban-Rural Development via Rural Roads,” China Daily (Qiushi), December 19, 2024, https://regional.chinadaily.com.cn/Qiushi/2024-12/19/c_1056739.htm.

[154] State Council Information Office of the People’s Republic of China, “China’s Rural Roads in the New Era,” November 29, 2024, http://english.scio.gov.cn/whitepapers/2024-11/29/content_117577430_5.html.

[155] 长兴县人民政府 (Changxing County People’s Government), “长兴县交通运输发展相关规划与资金安排情况” [“Transport Development Planning and Funding Arrangements in Changxing County”], http://www.zjcx.gov.cn/hzgov/front/s264/xxgk/jhzj/20240705/i3792333.html.

[156] Zhejiang Daily. “乡村振兴提速，看浙‘路’风景独好” [Rural Revitalization Gains Speed: Zhejiang’s Roads Show Unique Scenery]. September 14, 2022. Accessed April 19, 2026. https://zzhz.zjol.com.cn/lskb/zj/202209/t20220914_24796473.shtml.

A second feature is linking maintenance to service continuity. Zhejiang's digital tools, such as electronic payments for village buses, show that success is measured by keeping transport functional for residents, logistics, and public services, not just completing repairs. Clearing a culvert or stabilizing a shoulder is treated as preventive upkeep, since delays disrupt buses, school transport, deliveries, and emergency access.

China's national framework reinforces this approach. By the end of 2023, the country had over 4.6 million kilometers of rural roads, with 29,000 townships and villages connected by paved roads and bus service, maintained and improved over time rather than built outside of a robust IAM. For counties like Changxing, this national framework is significant insofar as it institutionalizes implementation as an ongoing operational mandate rather than a discrete, time-bound intervention.

The Changxing County case demonstrates that sustainable rural transport infrastructure asset management at the sub-national level can be achieved with systematic integration of governance, planning, financing, and maintenance within a unified lifecycle framework. Clear institutional accountability ensures consistent asset oversight; evidence-based planning directs resources toward priority needs; predictable financing supports both routine preservation and strategic upgrades; and technology-enabled implementation strengthens transparency and auditability.

8. Opportunities for IAM Implementation in Belize

The analysis across transport, water, and sanitation points to a clear opportunity to strengthen coordination in how infrastructure assets are managed across their lifecycle. While earlier sections highlighted these opportunities in governance, data, planning, and financing, this section turns to where practical improvements can realistically be made. The intention is not to introduce new structures, but rather to build incrementally on existing efforts, so that infrastructure is managed more consistently and with due consideration for climate risks.

Data and Systems

The most immediate opportunity for strengthening IAM in Belize is to build on existing data systems and move toward a unified, integrated and decision oriented asset registry. Belize can expand MIDH's GIS platform into a national registry covering roads, bridges, water, sanitation, and public assets. This can begin with a simple and standardized dataset, which can include asset type, location, condition, and responsible agency, and applied first to new and IFI-funded projects before scaling. Existing datasets such as road condition and climate overlays developed under World Bank-supported projects provide a starting point and can be extended to other sectors.[157] This approach allows Belize to shift from decentralized records to a shared baseline for planning without major upfront costs.

A second priority is linking operational and environmental data more directly to decision making. Belize already has workable examples: E-Transit's pilot tracks GPS, battery use, and ridership shows how real time data can support service planning. Similarly environmental data held by the Meteorological Service and CZMAI can be connected to infrastructure systems to better assess risks such as flooding and coastal exposure.[158][159] A practical step is to create a shared data layer without centralizing ownership so infrastructure and climate data can be used together for risk informed planning.

Finally, ongoing digitization at the municipal level offers a clear entry point for strengthening subnational data. The rollout of QuickBooks across all nine municipalities shows that standardized systems can be implemented at scale. Building on this, municipalities can incorporate basic asset tracking especially for local roads, drainage and sanitation and report through simple templates to a national system. Linking local and national data in this way would improve visibility of asset conditions across levels of government.

Governance

A starting point for improving governance in Belize is to formalize coordination across ministries and levels of government through a shared structured platform. This platform should set minimum standards for asset management, maintenance planning and data sharing amongst departments. Belize already has working examples (on small-scale) such

[157] World Bank & Global Facility for Disaster Reduction and Recovery. (n.d.). *Belize natural hazards and disaster risk assessment for improved road management, Phase II*. GFDRR Project Database. https://www.gfdrr.org/en/belize-natural-hazards-and-disaster-risk-assessment-improved-road-management-phase-ii
[158] Coastal Zone Management Authority and Institute (CZMAI). *Data Management Program Unit*. https://www.coastalzonebelize.org/data-management-program-unit/
[159] Ministry of Sustainable Development, Climate Change and Solid Waste Management. *National Meteorological Services*. Government of Belize. https://sustainabledevelopment.gov.bz/national-meteorological-services/

as the E-Transit technical committee, which was brought together by the Belize City Council, Department of Transport, Department of Energy, and the Public Utilities Commission. Scaling this approach beyond individual projects would improve consistency in how infrastructure decisions are made and implemented.

Transport sector roles could be further articulated within this governance framework to support greater clarity and coherence. Responsibilities across agencies span multiple functions, and continued refinement can help strengthen alignment in planning and maintenance. More explicit definition of functions would enhance coordination and accountability, while embedding these roles within a shared platform for standards and data exchange, could support more consistent implementation.

Clear assignment of maintenance responsibilities is also important. Assets are often transferred to municipalities without defined funding, condition records or accountability frameworks. This creates a persistent maintenance gap. This can be addressed by requiring lifecycle maintenance plans for all major projects under the PSIP, specifying for responsible entities and reporting requirements. Standard templates which are developed through Belize Infrastructure Ltd can make this requirement easy to apply. Since similar provisions already exist in IFI projects, this would be a straightforward extension rather than a new system.

Consistency in climate resilience standards is another gap that can be addressed through governance. At present resilience measures depend on donor requirements which leads to uneven application across projects. Introducing minimum resilience criteria within national guidelines, such as flood-resistant road design or protections against saltwater intrusion would standardize expectations across sectors. Fiji offers a useful benchmark where such standards are embedded in legislation like the Climate Change Act 2021[160]. Belize can begin with guidelines within existing frameworks and gradually formalize them over time.

The enactment of a zoning law could support the Government of Belize in establishing a comprehensive spatial planning framework for effective, long-term infrastructure asset management. A national zoning law would enable the government to designate transport corridors to enhance passenger safety and convenience and protect rights-of-way from unregulated encroachment, define water source protection zones to safeguard clean water assets from potential pollution nearby, and identify potential areas for subsidiary landfills to support the sole landfill that is nearing its full capacity. Currently, Belize's legislative landscape for land-use governance remains fragmented, and establishing a zoning law could provide an opportunity for regulation harmonization while elevating the quality of infrastructure asset management in Belize.

Planning

In Belize, infrastructure decisions are often driven by the availability of financing rather than evidence of need. Consequently, across the three sectors, projects tend to advance in silos without prioritizing synergy across investments. A useful step is to develop a national infrastructure climate vulnerability assessment that identifies the most exposed assets and estimates costs. This can draw on existing data from CZMAI, the Meteorological Service, and MIDH, and be linked to the PSIP cycle to guide investment decisions. Fiji's Climate Vulnerability Assessment (2017), which identified 125 priority interventions, shows how this can work in a small-state context.[161]

Climate risk should be integrated at the start of project planning rather than at later appraisal stages. Project concepts submitted to the PSIP can be required to include a basic climate risk screening, using existing hazard maps (flood, coastal erosion, storm surge) from CZMAI and the Meteorological Service. This would allow high-risk locations or designs to be flagged early and adjusted before detailed costing. Embedding this step at concept stage would make climate considerations part of initial project selection rather than an add-on later in the process.

Demand forecasting is limited across sectors. In transport ridership data is only available through the E-Transit pilot (which is at a very limited scale). Water IAM planning does not consistently account for population growth. In sanitation, expansion responds to immediate pressure instead of future demand. Existing data (such as E-Transit's POS ridership data and municipal financial records) can be used more directly in forecasting demand. Including basic forecasting requirements in the PSIP approval process can help ensure this happens.

Planning for resilience should also include the sustainable management of natural assets. Belize's coral reefs and mangroves provide an estimated USD 231–347 million each year in storm protection and avoided damage.[162] These

[160] Parliament of Fiji. (2021). Climate Change Act 2021 (Act No. 43 of 2021). Laws of Fiji. https://www.parliament.gov.fj/wp-content/uploads/2021/09/Act-No.-43-Climate-Change.pdf
[161] Government of Fiji, World Bank, & GFDRR (2017), Climate Vulnerability Assessment: Making Fiji Climate Resilient, *op. cit.*
[162] World Research Institute. *Belize's Coastal Capital: The Economic Contribution of Belize's Coral Reefs and Mangroves*. Washington, DC: World Resources Institute, 2008. https://www.wri.org/research/belizes-coastal-capital

assets sit outside current infrastructure planning frameworks. Environmental Impact Assessments for coastal projects can include estimates of impacts on these ecosystem services while using methods already developed by CZMAI and the Natural Capital Project. This would link infrastructure decisions more closely with the natural systems that protect them.

Budgeting

In case of budgeting, maintenance costs should be made visible at the time of project approval. Projects submitted through the PSIP can include clear estimates of annual maintenance needs along with identified funding sources. This helps ensure that future budgets account for these costs from the start and reduces gaps after construction. This approach aligns with practices used by the World Bank where lifecycle costing is integrated into public investment management to improve sustainability of infrastructure spending.[163]

Budgeting can also be strengthened by linking allocations to simple asset level information. For example, ministries and utilities can use basic condition ratings or service indicators to guide how maintenance funds are prioritized each year. Fiji provides a relevant example where asset condition data from its Climate Vulnerability Assessment is used to prioritize investments and guide budget allocation across sectors. Over time this helps direct funding toward assets that are most at risk and improves the efficiency of spending.

At the municipal level, structuring intergovernmental transfers to incentivize maintenance can improve outcomes. Earmarking a portion of intergovernmental transfers for routine maintenance or linking part of the allocation to basic reporting can encourage more consistent upkeep. For example, in Jamaica, the Parish Infrastructure Development Programme (PIDP) channels central government funding to parish-level infrastructure projects with clear requirements for planning, procurement and reporting. This strengthens accountability at the local level and shows how structured funding can improve infrastructure management.[164]

Implementation

Procurement is a key bottleneck across all three sectors. Mid-sized projects fall into a gap, they are too large for small local contractors but below IFI thresholds. A tiered procurement approach can address this. Belize Infrastructure Ltd. can support this segment by bundling similar projects across sectors or municipalities to attract better bids. A pre-qualified contractor roster with basic technical and environmental criteria can also reduce evaluation time and bring more consistency, especially for routine maintenance contracts that are currently handled case by case.

Post completion accountability can be strengthened. Across transport, water, and sanitation, assets are often handed over without fully specified maintenance plans or clearly assigned responsibility for upkeep. This can affect long-term performance and costs. Introducing lifecycle maintenance plans at project close-out, with a designated responsible agency, estimated annual costs, and a reporting schedule, would help address this. The PSIP already tracks capital projects and could be extended to monitor performance over the first 3–5 years after completion.

Capacity constraints cut across implementation. Belize has a small pool of civil engineers and infrastructure specialists, which affects procurement and project delivery. Short-term secondments between central ministries, municipalities, and IFI project teams can help transfer skills during implementation. Over time a structured public sector infrastructure career track, with links to institutions like the University of the West Indies and Caribbean Development Bank programs, can help build a stronger technical base.

9. Conclusion

The UN DESA IAM diagnostic tool, structured around five core pillars, with data as a prerequisite and planning as the most critical management phase, provided a key strategic framework for this study. Furthermore, stakeholder interviews reinforced that strong governance is fundamental. This requires clearly designated lead agencies and well-defined legal frameworks and guidelines. Indeed, stakeholder interviews highlighted that effective planning in infrastructure sectors is a factor of: clear governance, designated lead agencies, and enforceable legal frameworks and guidelines. In sectors characterized by overlapping or insufficient governance, the entire asset management lifecycle can be ineffective, from essential data collection and demand forecasting to project prioritization, budgeting, and maintenance. Consequently, management remains largely reactive rather than proactive.

[163] World Bank. *Public Investment Management Reference Guide*. https://documents1.worldbank.org/curated/en/548751582775237521/txt/Public-Investment-Management-Reference-Guide.txt
[164] IDB. *Jamaica: Parish Infrastructure Development Programme (PIDP)*.https://www.iadb.org/en/project/ja-l1049

This study found that climate resilience is often treated as an advanced layer, an ancillary component to be integrated only once a basic IAM system is fully operational. However, for a country like Belize, where climate-related shocks have a significant impact on GDP and while foundational systems are still under development, this study argues that rather than retrofitting climate resilience at a later stage of maturity, Belize can embed it as a core IAM design principle from the outset. As demonstrated by Fiji's experience, this approach is not only feasible but essential to foster climate resilience. It significantly reduces long-term fiscal and structural costs compared to retrofitting adaptation later. The following sections summarize the findings from applying this five-pillar framework to Belize.

Belize has the institutional foundation for resilient infrastructure asset management. The initiative is supported by dedicated public officials and a clear understanding of infrastructure needs across sectors. However, current government staffing resources may be insufficient to fully manage infrastructure maintenance operations. Limited local industrial and manufacturing capacity increases dependency on foreign suppliers for parts required for IAM, leading to prolonged lead times and reducing the overall performance and lifespan of infrastructure. Although public officials show strong commitment, gaps in technical education remain also a structural challenge, as key technical degrees are not widely available.

The IAM climate resilient framework is still evolving, with institutional mandates being clarified across ministries and evaluation mechanisms for existing policies yet to be fully developed. This emerging coordination landscape has limited the ability to plan, prioritize, and manage assets consistently over time. Nevertheless, recent sectoral plans suggest that a longer-term strategic vision is beginning to take shape in the country.

Overall infrastructure asset management has yet to be recognized as a strategic priority and shift from reactive rather than proactive. This can create inefficiencies and affect the long-term sustainability and quality of infrastructure services. Mechanisms for citizen engagement present an opportunity to better align infrastructure management with the needs and priorities of users. Addressing these areas will be essential to advancing data-driven asset management and supporting a shift toward more proactive and strategic decision-making.

Data and information systems for infrastructure assets in Belize are developing but not yet fully integrated. While registries exist for key assets such as landfills and transport fleets, they remain decentralized, and protocols for regular updates are not yet standardized, with individual knowledge often filling the gap. Data sharing tends to be demand-driven, with institutions requesting information on a project-by-project basis, reflecting a culture of data use that is still evolving toward more systematic exchange.

Existing information is not consistently digitized and inspection practices are not yet comprehensive or systematic. However there are active efforts underway to develop digital asset inventories which are supported by institutions such as the World Bank. Strengthening these digitized systems will improve the ability to monitor asset conditions, plan maintenance more effectively and make informed decisions.

Asset conditions and operational performance in Belize reflect a broader context in which infrastructure management has been shaped by constraints in resources and institutional capacity. A notable share of infrastructure assets are acquired second-hand, meaning they have already accumulated service life and depreciation at the point of purchase. For example, some vehicles in the bus fleet were estimated to be over 20 years old upon acquisition. This practice is largely a pragmatic response to fiscal realities, though it creates compounding challenges for sourcing replacement parts, long-term maintenance planning and the quality and reliability of service delivery.

A related opportunity lies in strengthening the culture of proactive and preventive maintenance. Across sectors currently the prevailing approach has tended toward operating assets until failure rather than intervening ahead of time. This is a pattern observed in both transportation and water infrastructure. Shifting this approach offers meaningful potential for cost savings as addressing issues early can prevent them from escalating into significantly more expensive interventions over time.

On the procurement side, there is significant potential to strengthen the contracting and vendor sourcing frameworks for maintenance services and work delivery. Belize's medium-scale infrastructure portfolio presents both structural and financial constraints, as asset maintenance and rehabilitation scopes frequently fall into a procurement gap: too large for local small-to-medium contractors yet insufficiently scaled to attract tier-one civil works contractors. This constrained contractor market limits competition and can adversely affect service delivery quality, maintenance cycle adherence, and works completion timelines. Closing this gap represents an opportunity to develop fit-for-purpose procurement frameworks tailored to Belize's infrastrucute assets, maintenance demand, and market capacity. Furthermore, strengthening maintenance evaluation methodologies through greater transparency, standardized scoring criteria, and

consistent tender documentation would improve confidence in procurement outcomes, support lifecycle cost-effectiveness, and promote more reliable maintenance delivery performance over time.

Finally, there is significant opportunity to strengthen fiscal capacity at the local level in ways that could improve operational performance. Rural councils, which currently rely heavily on government transfers, would benefit from more diversified and independent revenue streams whereas urban municipalities could also gain from expanded options for independent or fee-based financing. Building this fiscal resilience at the local level would improve the long-term sustainability and resilience of infrastructure service delivery.

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12. Appendix

12.1 Structured Interview Questions

IAM Five Pillars		Questions
Governance	G.1	How is responsibility for infrastructure asset management currently distributed across your agency and other government bodies? Are there formal mandates or legal frameworks that define these roles?
	G.2	How does your agency coordinate with other ministries and local authorities (e.g., Ministry of Infrastructure Development and Housing, Belize Water Services, City Councils) on infrastructure planning and maintenance? Are there coordination gaps?
	G.3	Are there existing policies or regulatory frameworks specifically addressing infrastructure asset management in the transportation, water, or sanitation sectors? If so, how effectively are they enforced?
	G.4	What specific strategies would be most effective for ensuring multi-stakeholder participation; and overcoming potential resistance to new asset management approaches within Belize's institutional context?
	G.5	How does your agency currently incorporate climate resilience considerations (hurricanes, flooding, sea-level rise) into infrastructure governance, policies, and investment decisions?
	G.6	What are the best/good practices that Belize's transportation, sanitation sectors and water services have learned that could be replicable and possibly scalable. What are the governance opportunities yet to be addressed?
	G.7	Project appraisal and ex post-evaluation are not commonly practiced in Belize, as these exercises are mostly implemented in donor-funded projects. How feasible would it be to implement these steps for all Belize infrastructure projects?
Data & Systems	D&S.1	Does your agency/organization maintain an asset registry or inventory for infrastructure under your management? If so, what information does it capture (location, condition, age, replacement cost), and how regularly is it updated?
	D&S.2	What are the most significant barriers to systematic data collection and management in your sector, including staffing shortages, outdated systems, or lack of standardized protocols? What is the current staffing capacity allocated to these functions?
	D&S.3	How does your agency currently share infrastructure data with other ministries or local governments? What technical or institutional barriers prevent greater cross-agency data integration and standardization?
	D&S.4	What critical data gaps currently limit effective infrastructure planning in your agency? What standardized frameworks, tools, or international support could help address these gaps within Belize's specific context?
	D&S.5	What is your view of developing a unified national infrastructure asset registry spanning transportation, water, and sanitation sectors? What would be the key prerequisites for making such a system operational?
	D&S.6	How can the Statistical Institute of Belize (SIB) and international organizations best support the strengthening of Belize's infrastructure data systems?
Planning	P.1	Does your agency have a strategic infrastructure asset management plan? If so, how does it incorporate lifecycle planning, demand forecasting, and climate risk assessments?

	P.2	How is climate risk exposure (hurricanes, flooding, sea-level rise) currently factored into infrastructure planning decisions across transportation, water, and sanitation sectors? Are there formal risk assessment tools or protocols in use?
	P.3	What are the main coordination challenges between central government agencies and local authorities (City Councils, Coastal Zone Management Authority) when planning infrastructure investments? How could these be addressed?
	P.4	How does Belize's tourism-driven economic growth create additional infrastructure planning pressures, particularly for transportation and coastal assets? How are these pressures currently being managed?
	P.5	What best practices from comparable small island developing states or climate-vulnerable countries (e.g., Fiji) could be applied to Belize's infrastructure planning context, particularly around nature-based solutions and dual-purpose asset design?
	P.6	In terms of lifecycle planning, how do you consider post-purchase costs when designing a budget plan for projects? In case it has not been considered, What are the primary barriers that make it difficult to adopt a whole lifecycle budgeting model?
Budgeting	B.1	How does your agency currently allocate budget between capital investment (new infrastructure) and operations and maintenance (O&M) of existing assets? What percentage increase in the O&M budget does your administration consider necessary?
	B.2	What are the most significant financial gaps in infrastructure project preparation, from securing funding sources to feasibility studies and approval timelines? How do these constraints affect project outcomes?
	B.3	To enhance Belize fiscal resilience from international funding (approximately 80% of infrastructure projects), what mechanisms would most effectively foster a transition toward domestic funding instruments for infrastructure asset management by 2027? (for example: public-private partnership, green/blue bonds, blended finance, etc.)
	B.4	How does your agency use the Public Sector Investment Programme (PSIP) to prioritize infrastructure investments? What improvements to PSIP could better integrate asset lifecycle costs and climate risk into budgeting decisions?
	B.5	What steps could be taken to develop financial expertise within technical IAM teams and foster interministerial coordination to prevent duplication of infrastructure expenditures?
Implementation	I.1	What are your agency's primary challenges in transitioning from reactive (post-disaster) to preventive maintenance practices for infrastructure assets, and what specific resources or institutional changes would make this transition feasible?
	I.2	How does your agency currently conduct infrastructure condition assessments and site inspections? What protocols, frequency schedules, and digital tools are used, and what are the main constraints limiting their effectiveness?
	I.3	What specific capacity-building initiatives are needed to address the critical shortage of personnel for systematic infrastructure data collection, asset management, and maintenance operations in your sector?
	I.4	What role do universities (University of Belize, Galen University) and international partners currently play in building IAM capacity for the airports, and what additional academic or technical partnerships would be most valuable?

	I.5	What mechanisms have proven most effective for public-private collaboration in Belize's infrastructure context, and how might these partnerships be strengthened to improve IAM outcomes and overcome implementation barriers?
	I.6	Based on your assessment, what is the level of service of infrastructure in Belize? Based on your view, how can it be improved further?
	I.7	How competitive is Belize's public procurement market (especially in transport, water, and sanitation sectors)? Do you find any limitations in terms of number of suppliers or quality?
	I.8	How competitive is Belize's public procurement market? Do you find any limitations in terms of number of suppliers or quality?
	I.9	When there is misalignment between project planning and project implementation, can you identify the common reason when a project starts to drift in quality as it moves from the planning phase to execution?
Sector-Specific Questions (Transportation)	T.1	Given the current state of Belize's transport infrastructure, what are the most urgent asset management priorities in the road and bridge network? How are climate risks (flooding, storm surge) currently embedded in transport infrastructure design and maintenance standards?
	T.2	How does the Ministry of Infrastructure Development and Housing coordinate with the Coastal Zone Management Authority on infrastructure planning and maintenance in coastal and climate-vulnerable areas?
Sector-Specific Questions (Water & Sanitation)	W&S. 1	Belize Water Services is viewed as a model of centralized IAM with strong maintenance and real-time monitoring. What are the key institutional, financial, and technical factors that have enabled this, and what challenges remain in scaling service delivery to all communities?
	W&S. 2	Sanitation governance in Belize is currently fragmented with unclear asset ownership and lifecycle responsibility. What institutional reforms or governance structures would most effectively clarify accountability and improve sanitation infrastructure management?
Cross-Cutting and Closing Questions	C.1	How does your agency currently engage with local communities and incorporate their climate-related concerns into infrastructure planning and maintenance? What mechanisms could strengthen community-based input into IAM decision-making?
	C.2	What governance mechanism would you prioritize to strengthen interagency coordination on infrastructure asset management across transportation, water, and sanitation sectors, and how should climate resilience be embedded as a standard requirement across all IAM processes?

12.2 Transport Sector Institutional Mapping

Belize Transport Sector: Institutional Governance Structure

Updated April 2026 | Sources: pressoffice.gov.bz, portauthority.bz, civilaviation.gov.bz, greaterbelize.com, belize.com

33 entities across 5 governance tiers | ★ = new or changed since 2018 CNTMP report

APEX — Cabinet / Prime Minister

Cabinet / Prime Minister — Hon. John Briceño
Sets national policy; approves major transport investments & legislation. Portfolio: Finance, Investment, Economic Transformation, Civil Aviation & E-Governance

TIER 1 — PRIMARY TRANSPORT MINISTRIES (direct mandate)

Ministry	
Constitution, Religious Affairs, Indigenous Affairs & Transportation ★ Road transport policy, bus permits, road users & indigenous peoples' affairs Min: Dr. Hon. Louis Zabaneh | CEO: Chester Williams	**Infrastructure Development & Housing** Builds & maintains all public roads, bridges & waterways Min: Hon. Julius Espat | CEO: Victor Espat

TIER 2 — TRANSPORT-LINKED MINISTRIES

Ministry		
Civil Aviation (under OPM / PM Briceño) ★ Civil aviation policy, international agreements & ICAO obligations CEO: Narda Garcia	**Tourism, Youth, Sports & Diaspora Relations ★** Tourism-linked transport; youth & sports access; diaspora connectivity Min: Hon. Anthony Mahler | MoS Youth/Sports: Hon. Devin Daly	**Public Utilities, Energy & Logistics ★** Logistics corridors, fuel supply & energy for transport infrastructure Min: Hon. Michel Chebat | MoS: Hon. Gilroy Usher
Finance, Investment & Economic Transformation Transport budget allocation, trade agreements & foreign investment policy Min: PM Briceño (Finance) | Financial Secretary: Joseph Waight	**Rural Transformation, Community Development & Local Government** Regulates municipal councils managing local transport & traffic Min: Hon. Oscar Requena	**Blue Economy & Marine Conservation ★** Maritime & waterway transport policy; marine conservation-linked access Min: Hon. Andre Perez

TIER 3 — DEPARTMENTS & INTERNAL UNITS

Department / Unit		
Dept. of Transport (DoT) Registers vehicles, issues bus route permits & enforces traffic laws Active · new Independence office opened Jan 2025	**Dept. of Civil Aviation (DCA/BDCA)** Regulates aviation safety, licensing & ICAO compliance; 15+ public aerodromes Active · under OPM/Civil Aviation portfolio	**Customs & Excise Department** Controls import of vehicles & transport equipment at borders Active · under Ministry of Finance
Dept. of Environment Issues environmental impact assessments (EIAs) for all transport projects Active	**NEMO** Coordinates emergency transport & evacuation using the road network Active · under Public Service & Disaster Risk Management	**Institute of Archaeology** Responsible for access roads within 9 archaeological reserves Active
Belize Coast Guard ★ Maritime security & safety oversight for coastal & inland waterways Active · NOT in 2018 chart; established 2005 as independent branch		

TIER 4 — STATUTORY BOARDS & AGENCIES

Board / Agency			
Transport Board ★ Advises on transport policy, fares, routes & operator licensing Reconstituted Apr 2025; under new Ministry (Dr. Zabaneh)	**Belize Port Authority (BPA) ★** Regulates maritime sector: ports, vessel safety & water taxis Now under Ministry of Public Utilities, Energy & Logistics	**Belize Airports Authority (BAA)** Owns & manages 16 public aerodromes; PGIA via concession co. Upgrading infra 2025; open-bid procurement reforms underway	**Belize Tourism Board (BTB)** Licenses local water vessels & regulates tour operator vehicles Active
Border Mgmt. Authority (BMA) Manages ports of entry; oversees cross-border movement of vehicles Active	**IMMARBE ★** Registers international merchant vessels under the Belize flag Now confirmed under Ministry of Finance (not Blue Economy)	**BELTRAIDE** Screens trade & investment projects that affect transport demand Active	**National Bus Company (NBC) ★** Consolidated national bus operator; PPP structure Launched March 1, 2026 · BZ$49.7M · 31 operators · NEW entity

TIER 5 — COMMITTEES

Committee		
Local Water Passenger Vessels Committee Licenses & sets standards for water taxis & local passenger boats Active	**Tour Operator Committee** Regulates tour operator vehicles, equipment & safety standards Active	**Aviation Development Committee (ADC)** Drives new airline routes to support tourism & economic growth Active
NBC Pro Tempore Advisory Committee ★ Established 2025 to set up the National Bus Company PPP Dissolved post-launch March 2026		

TIER 6 — MUNICIPAL BODIES (City & Town Councils)

Council		
Belize City Council (Traffic Dept.) Enforces traffic laws, manages on-street parking & local road maintenance Active	**Border Town Councils (Benque Viejo, Corozal)** Local road access & transport management at border crossing towns Active	**Coastal Town Councils (San Pedro, Dangriga)** Water & air access management for island and coastal communities Active