JIE/UTECH-FENC National Resilience Symposium 2026

Position Papers

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Introduction to the National Resilience Symposium Position Papers

These papers form the next step of action for the Jamaica Institution of Engineers (JIE) and The University of Technology (Utech)- Faculty of Engineering and Computing (FENC) as outlined in the planning framework for the National Resilience Symposium 2026.

The JIE and UTech/FENC National Resilience Symposium 2026, themed:

"Engineering Jamaica's Future: Building Resilience through Collaboration,"

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was a transformative two-day hybrid event jointly hosted by the Jamaica Institution of Engineers (JIE) and the Faculty of Engineering and Computing (FENC) at the University of Technology, Jamaica.

Prompted by the destructive impact of Hurricane Melissa, this symposium aimed to establish Jamaica as a global example of disaster resilience by encouraging partnerships among engineers, academia, the private sector, regulators, government, youth, and civil society.

Strategic Objectives

- Develop policy-ready recommendations for Jamaica's national disaster and resilience strategies.
- Showcase engineering and technology innovations that support post-disaster reconstruction.
- Facilitate cross-sector collaborative MOUs for research, infrastructure, and training.
- Engage stakeholders across sectors, including international partners.

We have now submitted Four (4) Position Papers:

1. Strengthening National Infrastructure Planning for Disaster Mitigation in Jamaica
2. Towards a National Framework for Engineering Resilience in Jamaica
3. Protecting the Lifelines
4. Financing for Disaster Resilience in Jamaica

Position Paper 1:

Strengthening National Infrastructure Planning for Disaster Mitigation in Jamaica

Emanating from the Panel Discussion "**The Role of National Infrastructure Planning in Disaster Mitigation**"

Executive Summary

This position paper summarizes the key conclusions and consensus recommendations from the symposium panel on national infrastructure planning for disaster mitigation. It translates the panel's themes, strategic planning, policy alignment, risk management, engineering standards, hazard-data integration, governance, financing, and accountability, as well as near-term action commitments, into a clear reform agenda for Jamaica's infrastructure system.

Central to the recommendations is a shift from reactive disaster response to proactive, risk-informed infrastructure planning, with enforceable standards, transparent accountability, and financing mechanisms that prioritize lifecycle resilience. The paper proposes an implementation roadmap with immediate (0–12 months), medium-term (1–3 years), and long-term (3–5 years) actions, and identifies institutional roles for the government, regulators, local authorities, utilities, the private sector, academia, and professional bodies.

Context and Rationale

Recent events have highlighted that resilience cannot rely solely on emergency response. It must be intentionally integrated into how Jamaica plans, designs, regulates, finances, and maintains its national infrastructure systems, including roads, bridges, drainage networks, utilities, and public facilities.

Disaster impacts reveal systemic weaknesses: development in hazard-prone areas, under-designed drainage systems, deferred maintenance, inconsistent enforcement of approvals, and fragmented responsibilities among agencies. A national planning approach that treats resilience as a core requirement, rather than an optional feature, is essential for safeguarding lives, livelihoods, and the country's productivity.

Key Messages Emerging from the Panel

The panel's framing highlighted five key themes that must be addressed together to build true resilience:

Theme 1 - Governance And Coordination;

Theme 2 - Enforcement And Accountability;

Theme 3 - Incorporating Hazard and Climate Data into Planning and Design;

Theme 4 - Financing Models That Prioritize Lifecycle Performance;

Theme 5 - Institutional Capacity and Professional Responsibility.

These themes are interconnected—no single action will succeed without the others.

Priority Recommendations

The panel's recommendations are organized into four pillars:

i. Strategic Planning and Policy Alignment;
ii. Risk, Engineering Standards, and Data Integration;
iii. Governance, Financing, and Accountability; and
iv. Implementation, Monitoring, and Continuous Improvement.

I. Strategic Planning and Policy Alignment

(1) MANDATE RISK-INFORMED PLANNING GATES FOR PUBLIC CAPITAL PROJECTS

All public infrastructure projects should be required to complete a standardized 'Resilience Screening' at the concept stage (before design funding is released). This screening should confirm hazard exposure, criticality, service continuity requirements, and the minimum design/mitigation approach.

(2) ALIGN LAND-USE PLANNING WITH HAZARD EXPOSURE AND INFRASTRUCTURE CAPACITY

Development approvals should be demonstrably consistent with floodplain management, coastal setbacks, slope stability constraints, and drainage/utility

capacity. Where approvals exceed capacity, phased development triggers and developer contributions should be required.

(3) Publish and maintain sectoral resilience master plans

Transport, water, drainage, energy, and communications should each have risk-informed master plans that define priority corridors/assets, minimum service levels during disasters, and planned redundancy.

(4) Institutionalize lifecycle thinking

Public investment decisions should include lifecycle costing and 'failure consequence costs' (such as economic disruption, emergency response burden, repair escalation, and public safety impacts) rather than relying mainly on the lowest upfront cost.

II. *Risk, Engineering Standards, and Hazard-Data Integration*

(1) Make hazard maps a mandatory approval step:

Flood, landslide, and coastal hazard maps should be integrated into planning approval processes, ensuring that high-risk areas automatically activate requirements for mitigation design or relocation decisions.

(2) Update design standards based on climate-informed assumptions:

Drainage design storms, wind loading assumptions, coastal wave/run-up parameters, and slope stability thresholds should incorporate updated climate projections and observed extremes. A regular review cycle (e.g., every 3–5 years) should be established.

(3) Require resilience-focused design documentation:

Projects should include a clear 'Resilience Design Statement' describing hazards, assumptions, redundancy, maintainability, and expected performance under stress. This enhances transparency and allows for independent review.

(4) Expand conformity assessment and construction Quality Assurance/Quality Control (QA/QC):

Material testing, site supervision certification, and independent verification should be improved, with audit trails that can be reviewed afterward.

III. ***Governance, Financing, and Accountability***

(1) CREATE A NATIONWIDE COORDINATION SYSTEM FOR INFRASTRUCTURE RESILIENCE:

Jamaica needs a cross-ministry resilience coordination body or technical secretariat responsible for establishing minimum standards, resolving institutional overlaps, and publishing annual performance reports.

(2) DEVELOP A CRITICAL INFRASTRUCTURE RISK REGISTER AND PRIORITIZATION PROGRAM:

A national register should identify key assets (such as bridges, hospitals, shelters, water pumping stations, major drains, and critical road links) and rank interventions based on their effectiveness in risk reduction and maintaining continuity.

(3) ADOPT A BLENDED RESILIENCE FINANCING APPROACH:

Recommended channels include: (i) dedicated annual budget lines for critical maintenance; (ii) climate adaptation and resilience grants; (iii) performance-based PPPs with enforceable resilience outputs; (iv) insurance-linked incentives; and (v) catastrophe-resilient financing instruments where feasible.

(4) INTRODUCE PROCUREMENT RULES THAT REWARD RESILIENCE, NOT JUST THE LOWEST PRICE:

Tender evaluation should incorporate resilience performance criteria, lifecycle costs, maintainability, and contractor quality systems. Payments should be tied to verified compliance milestones.

(5) STRENGTHEN PROFESSIONAL ACCOUNTABILITY:

Engineering sign-off responsibilities should be clarified for critical work, supported by ongoing professional development in resilience, and reinforced through ethics and practice standards. The JIE can support national capacity by providing guidance, offering CPD, and delivering independent technical advice upon request.

IV. ***Implementation, Monitoring, and Continuous Improvement***

(1) DEVELOP RESILIENCE KPIS AND ANNUAL SCORECARDS:

Key performance indicators should include restoration time targets for critical corridors, the proportion of projects passing resilience screening, inspection coverage rates, drainage clearing performance, and audit findings on compliance.

(2) INSTITUTIONALIZE POST-EVENT LEARNING:

After-action reviews should be mandatory for critical failures (e.g., bridge closures, drain collapses, major road washouts) with corrective actions tracked and published.

(3) STRENGTHEN LOCAL AUTHORITY CAPACITY:

Parish-level planning and enforcement require training, tools (GIS/hazard layers), and inspection resources to apply standards consistently across Jamaica.

Roles and Responsibilities

Government and Ministries: Establish policy direction, mandate resilience screening, secure funding, and coordinate cross-agency efforts.

Regulators and Statutory Agencies*:* Incorporate hazard data into approval processes, enforce codes and standards, and enhance inspection and audit systems.

Local authorities*:* Enforce land-use regulations, maintain drainage and road infrastructure, and apply hazard-informed approval processes.

Utilities and network operators: Collaborate with national plans to ensure lifeline resilience, redundancy, and effective restoration protocols.

Private Sector and Contractors*:* Meet performance requirements, uphold quality systems, and follow conformity assessment.

Academia (UTech/UWI/CMU)*:* Support research, data analysis, pilot innovations, and workforce upskilling for resilience engineering.

Professional Bodies (JIE)*:* Offer technical leadership, ongoing professional development, standards advocacy, public education, and the ability to bring together different sectors to maintain collaboration.

Specific Roles of Key Jamaican Agencies Recommended for a National Resilience Plan

NEPA (National Environment and Planning Agency): Acts as the leading technical authority for integrating environmental safeguards and hazard-risk information into development approvals; requires EIAs/ESIAs to explicitly address flood, coastal erosion, landslides, and climate risks; enforces setback buffers and ecosystem-based mitigation (such as wetlands and mangroves) to reduce disaster impacts.

NWA (National Works Agency): Lead resilience improvements of the national road network and bridges; maintain a national inventory of critical corridors and failure points; incorporate climate-informed design storms, slope stabilization, and bridge-scour protection into standards; coordinate pre-storm drain and culvert clearing with local authorities and publish restoration time targets for critical routes.

ODPEM (Office of Disaster Preparedness and Emergency Management): Establish national continuity requirements and emergency performance targets for critical infrastructure; organize multi-agency contingency planning and exercises; coordinate post-event after-action reviews for major infrastructure failures and track corrective actions across agencies.

PIOJ (Planning Institute of Jamaica): Align resilience priorities with national development planning and public investment programs; support benefit–cost and lifecycle-risk evaluations for resilience projects; coordinate monitoring frameworks and annual reports on national resilience indicators.

Local Government Authorities / Municipal Corporations: Enforce land-use regulations and development conditions at the parish level; maintain local drainage and community road assets; utilize hazard layers in building and development approvals; enhance routine inspections, illegal development enforcement, and maintenance scheduling.

NWC (National Water Commission): Enhance resilience of water production, pumping, and distribution infrastructure; safeguard source watersheds; establish redundancy and emergency power for critical stations; collaborate with ODPEM and telecom providers for public alerts and supply continuity during outages.

JPS and Energy Sector Operators: Reinforce substations, feeders, and generation support systems; expand targeted undergrounding and vegetation management in high-risk corridors; implement microgrid and backup solutions for shelters, hospitals, and pumping stations; coordinate restoration priorities with national emergency plans.

Telecommunications Providers & Spectrum Management Authority: Ensure resilient emergency communications by implementing redundant routing, fortified towers, backup power sources, and rapid restoration protocols; prioritize public warning systems; support spectrum readiness for emergency channels; and deployable communication assets.

***OUR (Office of Utilities Regulation) / Relevant Regulators*:** Incorporate resilience obligations into service standards and license conditions where suitable; mandate reporting on reliability, restoration times, and resilience investments; and support consumer-protection measures along with transparent resilience performance scorecards.

NHT (National Housing Trust): Support resilient housing delivery and community-protective infrastructure in vulnerable areas, such as drainage, access roads, and retaining walls, through a dedicated resilience financing program tied to verified climate-smart building standards and compliance audits.

NSWMA, WRA, and other sector agencies (as applicable): Incorporate solid-waste continuity (debris management), water-resources allocation, watershed protection, and environmental services into resilience planning to minimize secondary hazards and speed up recovery.

These agencies should operate within a unified national resilience coordination system that shares hazard data, uses standard resilience screening templates, clearly defines restoration priorities, and produces annual public reports. This approach reduces institutional overlap and ensures resilience is consistently applied from planning and approval through construction, maintenance, and post-event analysis.

12-Month Action Agenda

Within the next 12 months, the panel's discussion suggests a feasible set of priorities:

- Launch a standardized Resilience Screening template and mandate its use for all new public capital projects.
- Establish an interim Critical Infrastructure Risk Register and publish a prioritized Top-10 intervention list.
- Issue a directive requiring hazard-map checks for approvals (floodplains, coastal setbacks, slope risks).
- Begin an accelerated review of drainage and wind-related design assumptions and publish interim design advisories.
- Pilot resilience-based procurement scoring on at least two major infrastructure projects.
- Formalize post-event after-action review processes and publish an annual 'State of Infrastructure Resilience' scorecard.

Conclusion

Infrastructure resilience is not just a technical feature; it is a national planning philosophy that demands strong governance, enforced standards, risk-informed investment, professional accountability, and coordinated institutional leadership. Jamaica can significantly reduce disaster impacts by adopting practical reforms that make resilience the default requirement in planning, design, construction, and maintenance, supported by transparent monitoring and ongoing funding.

Position Paper 2:

Towards a National Framework for Engineering Resilience in Jamaica

Emanating from the Policy Roundtable discussion on "**Towards a National Framework for Engineering Resilience in Jamaica**"

Executive Summary

Jamaica's vulnerability to hurricanes, flooding, landslides, coastal erosion, utility disruption, and climate-related extremes requires a national engineering response that is systematic rather than episodic. The central conclusion of the panel discussion is that resilience cannot remain an aspirational principle or a post-disaster slogan. It must become an enforceable, auditable, financed, and professionally owned framework that shapes how infrastructure is planned, designed, approved, constructed, maintained, and reviewed.

A National Framework for Engineering Resilience should therefore function as a living operating system for risk-informed development. It should align hazard data, engineering standards, approvals, procurement, project delivery, maintenance, auditing, and accountability. Its purpose is not only to reduce physical losses; it is also to shorten recovery times, protect essential services, improve value for money across the infrastructure lifecycle, and strengthen public confidence in the country's capacity to withstand and recover from shocks.

This paper recommends a five-pillar framework:

I. legislation and regulatory alignment,
II. risk-informed planning and design,
III. standards, conformity assessment, and professional accountability,
IV. financing and incentives for resilient infrastructure, and
V. implementation governance with measurable oversight.

Context and Rationale

The panel briefing rightly focused its discussion on a crucial question: if Jamaica were to develop a National Framework for Engineering Resilience today, what should it include, who should be responsible for enforcing it, and how can it become a practical, enforceable system instead of just another policy document? The conclusion from this discussion is that resilience must be integrated across the entire infrastructure value chain, not just added at the end of a project or revisited only after a disaster.

Current practices are still hampered by fragmented governance, inconsistent enforcement, uneven use of hazard and climate data, weak lifecycle management,

and funding models that favor short-term capital costs over long-term resilience. These issues not only slow development; they also increase disaster losses, elevate the risk of asset failure, and make recovery more expensive than preventive measures.

What a National Framework Must Mean in Practice

A national framework should be considered an enforceable system with clear entry points at planning, design, approvals, construction, commissioning, maintenance, and post-occupancy or post-completion review. Practically, the framework must fulfill five key functions.

First, it should mandate that every major public infrastructure project undergo resilience screening during the concept phase. Second, it should ensure that engineering design assumptions are based on current hazard data and climate realities, not just historical norms. Third, it should link project approval and financing to compliance with resilience standards. Fourth, it should require quality assurance during construction and verification of conformity before handover. Fifth, it should institutionalize resilience audits and uphold accountability for maintenance throughout the asset's lifecycle.

This interpretation keeps the framework rooted in delivery rather than rhetoric.

Core Findings Likely to Emerge from Deliberations

The general consensus from the panel was that Jamaica does not completely lack policy intent; rather, it struggles with weak coordination among planning, engineering, enforcement, and financing. The most important findings are highlighted below.

Resilience should be established as a fundamental legal standard, carefully regulated with detailed guidelines, and encouraged through specific incentives. Hazard maps and engineering risk data must become mandatory elements for approvals and design reviews. Resilience needs to be integrated into all three main phases of project development: planning, design, and construction. Building codes and engineering standards should be regularly updated to reflect changing climate conditions. Resilience assessments should be required for critical public assets, starting with hospitals, schools, bridges, water systems, shelters, emergency

communications, and utilities essential for survival. Professional licensure and ongoing training should more clearly emphasize resilience skills and the duty of care. Finally, funding models should shift toward lifecycle costing and mixed financing arrangements that reward preparedness over only post-disaster repairs.

Recommended National Framework

Pillar One - Legislation and Regulatory Alignment

Jamaica should establish a legal baseline requiring resilience assessments for all major public infrastructure projects and select private developments of national importance. The legal framework should clearly define which resilience standards are mandatory, how compliance can be proven, and the authority of agencies to stop, modify, or condition projects that fail to meet resilience requirements.

Pillar Two - Risk-Informed Planning and Design

A resilient planning system must include land-use decisions, hazard exposure, drainage capacity, coastal and slope risks, and utility service continuity. Engineering design should be based on current climate and hazard data, including extreme rainfall, wind loads, flooding, and, where applicable, landslide risk. Asset siting and routing should be viewed as resilience decisions, not just planning choices.

Pillar Three - Standards, Conformity, and Professional Accountability

Codes and standards should be regularly reviewed and updated according to a set schedule. Conformity assessment, testing, materials verification, and site quality assurance should be prioritized as key resilience controls. Professional sign-off must carry significant responsibility for critical infrastructure decisions, and resilience competence should be more visible within licensure, practice guidance, and professional development.

Pillar Four - Financing and Incentives

Resilience financing must shift Jamaica from a post-disaster repair cycle to a pre-disaster risk-reduction investment cycle. The core principle is simple: the country should finance ‘risk avoided’ in the same disciplined way it finances ‘assets built’. This requires ring-fenced preparedness financing, resilient procurement rules, and project pipelines that are technically ready for funding and implementation.

Establish an NHT Resilient Housing and Community Infrastructure Window

The panel's discussions strongly endorsed the strategic utilization of the National Housing Trust (NHT) as a national tool for resilient housing delivery. The suggested

plan is to establish a dedicated NHT financing stream that funds (i) climate-resilient housing construction, (ii) resilient upgrades of existing housing, and (iii) essential community infrastructure that directly safeguards housing areas (e.g., drainage improvements, retention ponds, slope stabilization, access roads, and stormwater management near or within housing developments). This ensures NHT investments stay true to its housing mandate while tackling infrastructure needs that determine whether housing remains safe and livable after disasters.

Under this window, NHT would provide concessional financing and/or blended finance structures for developers, contractors, and public partners that meet defined resilience criteria. Financing eligibility should require documented hazard screening (flood, slope, coastal, wind, earthquake, etc.), certified compliant designs, verified construction quality assurance, and maintenance responsibilities. A technical resilience checklist and an independent verification mechanism (supported by JIE and partner institutions and professionals) should be used to reduce moral hazard and ensure that 'resilience' is measurable rather than aspirational.

Governance safeguards are crucial. The process should follow transparent rules, clear reporting, and be auditable. Project selection should focus on high-risk parishes and vulnerable communities, and support relocation or risk-avoidance strategies when on-site construction is clearly unsafe.

A phased rollout is recommended:

(a) pilot a limited set of resilient housing projects and drainage improvements

(b) share lessons learned and refine the criteria

(c) expand nationally with yearly targets.

Complementary National Resilience Funding Channels

Besides the NHT window, the framework should develop a diverse 'resilience financing stack' to lessen dependence on the central government budget. The following instruments were identified as practical and scalable for Jamaica:

National Resilience Fund and ring-fenced maintenance: Create a dedicated national resilience fund for key mitigation projects and mandate that all major public assets have funded lifecycle maintenance plans. Maintenance financing should be considered a direct resilience measure, not optional spending.

Climate adaptation and development finance: Systematically prepare bankable, shovel-ready projects for climate finance and multilateral development support, using standardized project preparation templates, risk metrics, and benefits realization plans.

Resilience bonds and catastrophe-linked financing: Explore resilience bonds or catastrophe-linked instruments that incentivize risk reduction and use parametric

triggers to provide quick liquidity after events while maintaining a pipeline for pre-event mitigation.

Insurance and risk-reduction incentives: Align building standards, inspections, and resilience audits with insurance incentives (premium reductions for certified resilient assets) to encourage private investment in retrofits and compliance.

Public-Private Partnerships (PPPs) with resilience performance clauses: When PPPs are used (housing, transport corridors, utilities), contracts must specify resilience performance goals, maintenance duties, transparent reporting, and enforceable penalties for non-compliance.

Utility and sector funds for lifeline hardening: Introduce or strengthen regulated resilience allowances in utility investment plans, and leverage sector funds (e.g., universal service mechanisms for telecommunications resilience) to support backup power, redundancy, and emergency connectivity for critical facilities.

Procurement, Costing, and Bankability Requirements

To make resilience financeable, procurement and appraisal rules need to change. Public investment decisions should incorporate lifecycle costing and risk-adjusted benefit–cost analysis. Resilience requirements should be integrated into tender documents, with 'no-value-engineering-below-minimum' clauses for key resilience features. Disbursement should be connected to verified compliance milestones, independent testing, and post-construction audits.

Immediate Financing Actions for the First 12 Months

Within the first 12 months after the symposium, the panel recommends: (1) that government, through NHT, establish the Resilient Housing and Community Infrastructure Window with published eligibility criteria and a pilot pipeline; (2) creating a national priority list of mitigation projects ('Top 20' critical interventions) supported by a resilience fund and maintenance allocations; (3) publishing standard project preparation templates to speed up climate finance readiness; and (4) implementing resilience-linked procurement clauses and compliance checks for all major public capital projects.

Pillar Five - Governance, Oversight, and Public Accountability

A central coordinating mechanism is necessary to align agencies, issue guidance, oversee compliance, and report progress. This could be established as a National Engineering Resilience Council or a similar body supported by a technical secretariat. Annual reports should cover project compliance, audit results, progress on key assets, and any implementation challenges.

Priority Recommendations for Post-Symposium Adoption

- Introduce mandatory resilience screening for all major public capital projects before funding approval.
- Create a national critical infrastructure risk register to identify and prioritize Jamaica's highest exposure assets.
- Update engineering standards and code provisions to reflect current hazard and climate assumptions on a fixed review cycle.
- Require resilience audits for critical infrastructure beginning with hospitals, schools, bridges, water plants, shelters, ports, and emergency communications systems.
- Link project disbursement and procurement compliance to documented resilience requirements and independent verification.
- Formalize professional accountability for resilience-related sign-off and strengthen resilience content in engineering CPD and practice guidance.
- Establish a national coordination mechanism with authority to align ministries, regulators, utilities, local authorities, and technical bodies.
- Adopt lifecycle costing as a standard public-sector decision tool for resilient infrastructure investments and funded maintenance plans.
- Establish an NHT Resilient Housing and Community Infrastructure Window to finance resilient housing delivery, retrofits, and housing-protective community works.
- Create a National Resilience Fund and expand blended finance, climate adaptation financing, and insurance-linked incentives to support resilient upgrades.
- Publish an annual engineering resilience scorecard to improve accountability and public visibility.

12-Month Action Agenda

- Within 12 months of the symposium, Jamaica should aim to implement a first set of practical, high-impact, and visible actions. These steps should include: -
- 1. Issuance of an interim resilience screening protocol for public projects.
- 2. Establishment of a technical task force to develop the national critical infrastructure risk register.
- 3. A targeted review of standards and code provisions that most directly affect flood, wind, slope, and lifeline infrastructure resilience.

- 4. A pilot resilience audit programme for selected public assets.
- 5. Government, through NHT, must agree on the design and pilot portfolio for the Resilient Housing and Community Infrastructure Window.
- 6. Preparation of an institutional proposal for the national coordination mechanism and its reporting responsibilities.
- These steps will build momentum, produce early evidence, and prove that resilience reform is transitioning from idea to action.

Implications for the Jamaica Institution of Engineers and Partner Institutions

The JIE has a natural leadership role in advancing this agenda. It can provide independent technical convening, promote national dialogue on engineering standards and accountability, support professional development, and collaborate with government, universities, and regulators to turn resilience principles into practical guidance.

Universities, including UTech, CMU, and UWI, can improve research, data analysis, modeling, standards development, and the training of engineers prepared to work in a climate-risk environment. Public agencies and private-sector organizations must also see resilience as a shared responsibility rather than a secondary issue.

Conclusion

The message from this panel was clear: Jamaica needs a National Framework for Engineering Resilience that is enforceable, data-driven, professionally supported, financially credible, and publicly accountable. Resilience should be integrated into the country's approach to engineering, not just its recovery discussions.

If adopted, the recommendations in this paper would help move Jamaica from fragmented vulnerability management toward a disciplined resilience architecture capable of protecting lives, reducing losses, enhancing the value of infrastructure, and accelerating national recovery after future shocks.

Position Paper 3:

Protecting the Lifelines

Emanating from the Panel Discussion "**Power, Telecommunications, and Data Resilience Before and After Disaster**"

Executive Summary

This position paper summarizes the discussions from the panel on safeguarding Jamaica's essential systems, power, telecommunications, and critical data, before and after disasters. The panel highlighted that these lifelines are interconnected: electricity supports telecommunications and data systems; telecommunications enable emergency response and public messaging; and data systems provide situational awareness, logistics, and ensure the continuity of government and business.

Drawing on panelists' perspectives across energy operations, telecom networks, digital infrastructure, emergency coordination, and engineering practice, the recommendations in this paper highlight five key priorities: hardening and redundancy for critical assets; continuity planning with realistic restoration benchmarks; governance and accountability for lifeline resilience; financing mechanisms that reward preparedness; and cross-sector interoperability in planning, drills, and incident response.

Purpose and Context

The panel discussion was convened to move beyond describing vulnerability and toward practical measures that reduce downtime and strengthen national continuity. The moderator framed the discussion around a single question: how does Jamaica ensure its critical lifeline systems can withstand disasters, recover quickly, and continue serving the public when needed most?

The session's goal was to identify exposure points, clarify what resilience means for power, telecommunications, and digital infrastructure, and agree on the partnerships and investments needed to shift Jamaica from reactive restoration to proactive continuity.

Panel Findings

(Structured by Moderator Questions)

Vulnerability landscape: what is most exposed?

Panelists' responses focused on four vulnerability categories. The first is physical exposure of grid assets, towers, and critical network nodes to wind, flooding, and

landslides, including access constraints that delay repairs. The second is operational fragility, especially limited redundancy for power supply to telecom sites and restricted fuel logistics for backup generation. The third is digital fragility, where single points of failure in data platforms, inadequate backups or replication, or weak cybersecurity hygiene can disable command functions when they are most needed. The fourth is governance exposure, where unclear restoration priorities, fragmented asset ownership, and inconsistent standards cause avoidable delays and confusion during crises.

Panelists indicated that hurricane-scale events tend to expose the same weak points repeatedly: distribution network vulnerability, tower power dependency, limited spare capacity, and the lack of pre-positioned resources and tested restoration playbooks.

Interdependence and cascading failures:

WHAT HAPPENS WHEN ONE FAILS?

The panel highlighted that the three lifelines function as a system-of-systems. Power loss reduces telecom coverage as batteries drain and generators exhaust their fuel; degraded telecom coverage hampers emergency coordination and decreases the ability to deploy repair crews; and failure of data systems diminishes situational awareness and delays decision-making and logistics. Cascading failures were described as operationally significant: an outage at one critical power node can cut off service to multiple base stations, which then interrupts communication with water pumping sites, hospitals, shelters, and incident command posts.

To prevent the cascade effect, panelists recommended layered redundancy. They highlighted the need for minimum backup power durations at telecom sites, redundant routing for critical backhaul, and intentional prioritization of restoring assets that support multiple essential services.

Engineering For Continuity

WHAT PRACTICAL MEASURES STRENGTHEN LIFELINES?

Panelists' solutions emphasized practical hardening and redundancy measures. For power, they highlighted targeted grid reinforcement at critical nodes, sectionalizing and automation to isolate faults, and selective undergrounding or pole reinforcement in high-failure areas. They also stressed distributed resilience through microgrids for essential facilities and community hubs, supported by renewable energy and storage

where possible. For telecommunications, they suggested hardening towers and shelters, improving physical security and flood protection at network rooms, and establishing redundant backhaul paths with diverse routes. For data and digital services, they pointed out resilient architectures, including replicated services across zones, offline or edge-capable incident systems, and tested failover procedures to ensure command and coordination functions remain active even when connectivity is limited.

Across sectors, panelists emphasized that resilience planning should be risk-based and rooted in hazard mapping and asset-criticality rankings, rather than in one-size-fits-all solutions.

Preparedness and recovery time:

WHAT DETERMINES HOURS VERSUS WEEKS?

The panel viewed recovery time as a measurable indicator of resilience. Panelists identified the main factors affecting restoration time as access to damaged sites, availability of spare parts and specialized crews, fuel and logistics for backup power, and the coordination systems that determine the order of restoration. They emphasized that contingency plans must be practiced and that pre-positioning critical spares, mobile towers, portable power, and inspection teams can greatly reduce restoration timelines.

Panelists suggested that Jamaica establish restoration benchmarks for essential services and publish them as national standards, with tiered goals for critical functions such as emergency communications, hospitals, shelters, water pumping, and key government services. They emphasized that benchmarks serve as management tools that promote investment and accountability.

Policy, investment, and accountability

HOW DO WE MAKE RESILIENCE A NATIONAL PRIORITY?

Panelists agreed that technical solutions will not scale without governance and financing reforms that make resilience a permanent requirement. They stressed the importance of clear ownership for lifeline resilience across the entire system, including a shared national framework for restoration priorities and interoperability among power utilities, telecom providers, emergency agencies, and critical service providers. They suggested formalizing public–private coordination for disasters so

that data sharing, restoration sequencing, site access, and fuel logistics are established before a crisis.

Regarding financing, panelists advocated for investing in disaster preparedness beforehand rather than primarily spending after failures. They emphasized that resilience budgets should encompass both capital upgrades and maintenance routines that sustain resilience features over time. Additionally, they argued that regulatory mechanisms ought to reward verified resilience investments while promoting transparency and protecting consumers.

The 12 – 24 Months Action Agenda

WHAT SHOULD JAMAICA DO FIRST?

The panel's practical action plan focused on completing a national lifeline asset criticality map and interdependency register, setting minimum backup power and redundancy standards for key telecom and data hubs, establishing a joint restoration and logistics protocol across lifeline operators and emergency agencies, and initiating targeted pilot upgrades in the most vulnerable corridors and facilities. Panelists also emphasized the importance of regular multi-agency drills that test communications, restoration coordination, and data continuity under realistic degraded conditions.

Recommendations for Post-Symposium Adoption

The panel's recommendations can be organized into a comprehensive national program. Jamaica should establish a lifeline resilience framework that specifies minimum standards for continuity, restoration priorities, and inter-agency coordination rules for power, telecommunications, and data systems. This framework should include clear restoration benchmarks and an annual public scorecard to ensure accountability.

Jamaica should invest in strengthening and adding redundancy at critical nodes where the largest cascades originate, focusing on assets that support hospitals, water pumping and treatment, emergency communications, shelters, and government command systems. The investments should include both physical hardening and operational resilience, such as inventory, logistics, and trained surge teams.

Continuity planning and routine exercises should be mandatory for lifeline operators. Plans should include tested failover for data systems, pre-negotiated mutual aid

arrangements, and pre-positioned response assets, and they should be aligned with restoration benchmarks and reviewed periodically.

Financing mechanisms should be enhanced to support pre-disaster resilience. Regulatory approvals and investment recovery should be tied to verified resilience improvements, and funding for maintenance should be safeguarded to prevent resilience from declining over time.

Cyber resilience must be integrated into lifeline continuity planning, acknowledging that disasters can align with increased cyber risks and that secure communications and data integrity are vital for coordinated response and maintaining public trust.

Implementation Roadmap

In the first three months following the symposium, the recommended focus is on governance and standards. A joint lifeline resilience working group should be established, restoration priorities agreed upon, minimum backup power and redundancy requirements defined for essential nodes, and restoration benchmarks published for consultation.

Between months four and nine, the focus should shift to pilots and operational readiness. Targeted upgrades should be implemented for the most critical nodes, spares and mobile assets should be procured and pre-positioned, and at least one national simulation exercise should be conducted to test a prolonged outage scenario across power, telecommunications, and data systems.

Between months ten and twenty-four, the focus should be on scaling and institutionalization. Node hardening and redundancy programs should expand, regular auditing and reporting should become routine, and funding and regulatory provisions should be institutionalized to support resilience investments and maintenance throughout the asset lifecycle.

Role of JIE and UTech

The Jamaica Institution of Engineers (JIE) and the University of Technology, Jamaica (UTech) are well placed to support the nation's resilience efforts by bringing together technical expertise, aiding standards development and professional training, and offering independent review capabilities for resilience designs and post-event assessments. Through targeted research and capacity building, UTech can assist in hazard-informed engineering design, asset criticality modeling, and data-driven

evaluation of resilience measures, while JIE can enhance compliance culture and facilitate cross-sector coordination.

Conclusion

The panel's main message was that lifeline resilience is essential for national stability. Jamaica's ability to save lives and recover quickly from disasters depends on whether power, telecommunications, and data systems are designed, funded, coordinated, and tested as a unified resilience system. The recommendations in this paper provide a practical way to reduce downtime, prevent cascading failures, and improve national preparedness before the next major event.

Position Paper 4:

Financing for Disaster Resilience in Jamaica

Emanating from the Panel Discussion "**Financing Resilience: Insurance, Risk Bonds, and Infrastructure Grants**"

Executive Summary

This position paper summarizes the discussions from the panel on “Financing Resilience: Insurance, Risk Bonds, and Infrastructure Grants” and is organized to reflect the moderator’s question set. Overall, there was strong agreement that Jamaica’s resilience challenge is not just about securing funds after a disaster, but about creating a financing system that accurately prices risk, encourages resilient design and maintenance, and disburses funds transparently and quickly. Panelists agreed on the need to move from choosing the lowest-initial-cost option to considering risk-adjusted lifecycle value, and to connect every financing source (public budgets, insurance and risk transfer, capital markets, and grants) to verified standards and measurable risk-reduction results. A key proposal discussed was using National Housing Trust (NHT) resources as a domestic resilience pillar to finance resilient housing and community-scale infrastructure that minimizes repeated losses.

Purpose and scope

This paper is intended for post-symposium circulation as a practical set of recommendations that can inform policy reform, programme design, and stakeholder commitments. It does not present a single institutional viewpoint; instead, it synthesizes how panelists from public finance, housing finance, insurance, capital markets, development partners, and infrastructure-owners interpreted the moderator’s questions and translated them into implementable solutions.

The Single Biggest Financial Barrier

In the opening rapid round, panelists mainly identified the “biggest barrier” as a system issue rather than a lack of funding options. The main theme was that Jamaica under-invests in resilience because the public investment and procurement system still favors the lowest upfront costs, while the future costs of failure (such as service outages, emergency repairs, reconstruction, and social disruption) are not consistently included in project evaluations. Several panelists noted that even when funding is available, it’s not always practical to use because projects are not designed, permitted, and packaged in a way that supports blended financing, quick disbursement, and reliable reporting. The shared view was that Jamaica must treat

resilience as a measurable fiscal risk and require risk-adjusted lifecycle costing for major projects.

Section I: The Cost of Inaction and Underpriced Risk

Regarding whether Jamaica is underpricing disaster risk, the panel's collective response was "yes, in practice," especially when projects are selected primarily based on initial capital costs and political urgency. Panelists argued that the true cost of standard infrastructure isn't just its tender price but the entire lifecycle cost, including maintenance, climate stress, failure probability, and the economic and social impacts of downtime. They recommended integrating hazard screening, exposure scoring, and expected loss reduction into the country's public investment decision points, using standardized templates that require designers and agencies to justify a resilience premium with measurable benefits like lower expected annual loss, reduced service interruptions, and faster restoration. The panel also pointed out that the resilience premium is more justifiable to policymakers and taxpayers when transparently linked to reduced fiscal shocks and clear protection of communities and economic corridors.

Section II: Insurance and Risk Transfer

In discussing how insurance markets can foster resilient infrastructure design, panelists emphasized that insurance can function both as a financing tool and a discipline mechanism if underwriting is tied to verifiable engineering standards. The core idea was that premium incentives, deductibles, and coverage terms should transparently reflect proven resilience features such as hazard-informed design, quality-verified construction, and audited maintenance. The panel also maintained that resilience compliance should increasingly be a requirement for insuring critical public assets, implemented through a phased approach beginning with minimum compliance levels and gradually raising standards for high-criticality facilities. Parametric insurance was repeatedly highlighted as an effective solution for providing quick liquidity after an event, especially for restoring essential services, as long as triggers are carefully crafted to reduce basis risk and pre-agreed spending rules and transparency standards accompany payouts. Catastrophe pools and regional risk-sharing arrangements were discussed as complementary mechanisms that can improve pricing stability and diversify risk, but panelists warned that pools only work well when the underlying asset management and compliance culture are strong.

Section III: Risk Bonds and Innovative Finance

Regarding whether catastrophe or resilience bonds are realistic for Jamaica, panelists generally saw them as feasible but conditional. The conditions they mentioned included credible risk models and exposure data, a transparent and investable project pipeline, strong governance over proceeds, and a disclosure framework that builds investor confidence. Perspectives from capital markets emphasized that investors consider governance risk as important as hazard risk; therefore, poor procurement integrity or lack of clear accountability can quickly offset the advantages of innovative instruments. A common suggested approach was to treat bond financing as a journey toward maturity: Jamaica should first develop "bond readiness" by standardizing risk analytics, establishing a capable issuer or special-purpose vehicle, defining triggers or performance metrics, and setting up independent evaluation and audit processes. Only after this should a small pilot issuance be carried out, linked to a limited set of clearly defined risk-reduction projects that can show measurable results. The panel also discussed public-private partnerships as a way to distribute resilience risk more effectively, provided that contracts include explicit resilience performance obligations, lifecycle maintenance responsibilities, and straightforward risk-sharing terms that prevent costs from shifting back to the public sector in the event of failures.

Section IV: Infrastructure Grants and Development Funding

In discussions about international climate and resilience grants, the key message was that access depends on readiness and credibility. Panelists highlighted that Jamaica's ability to secure grants is influenced by the quality of its project pipeline, the thoroughness of project preparation, the existence of safeguards and monitoring frameworks, and the capacity to demonstrate co-financing and effective implementation. After securing grants, panelists questioned whether institutional systems are consistently prepared to disburse funds efficiently and transparently, noting that ineffective contract management, fragmented coordination, and limited monitoring can delay progress and undermine confidence. They recommended creating a standardized "grant readiness and execution system" that continuously cultivates bankable projects, enhances programme management offices, employs milestone-based disbursement tied to verification, and publishes public dashboards tracking spending, progress, and measurable resilience outcomes at the community level.

Governance versus Financing

Cross-panel Engagement

When asked whether governance and enforcement might be more significant constraints than financing, most panelists believed that financing and governance are closely connected, but that governance often becomes the main obstacle once new funds are available. The panel's "unlimited capital tomorrow" test revealed a common point: Jamaica would not fully use additional capital unless it has a portfolio of pre-designed and pre-permitted projects, improves procurement integrity, enhances supervision and certification, and clarifies institutional responsibilities for delivery and maintenance. Therefore, the discussion focused on governance reforms, such as enforcing standards, independent verification, procurement transparency, and funding discipline for maintenance, as essential steps to make any financing tool truly effective.

The NHT Proposal:

A Domestic Resilience Pillar for Housing and Protective Infrastructure

A key outcome of the panel discussion was the strong recommendation to leverage National Housing Trust (NHT) resources to finance resilience on a broad scale, especially in housing and community-level protective measures that reduce repeated losses. Panelists argued that disasters often impose significant national fiscal costs through damage to the housing stock and the failure of infrastructure such as drainage systems, slope stabilization, access routes, and localized flood defenses. Therefore, the panel proposed an NHT "Resilient Housing and Community Infrastructure Window" to fund resilient new constructions and retrofits, finance protective community projects that safeguard housing schemes and nearby settlements, and support targeted upgrades in vulnerable legacy or informal communities. The discussions emphasized that this approach must include governance safeguards such as ring-fenced funds, transparent selection criteria prioritizing risk-prone areas, independent review of design and construction quality, and post-completion audits. Panelists further recommended phased disbursements linked to verified milestones and the establishment of maintenance arrangements, ensuring that NHT funding results in real risk reduction, not just construction outputs.

The 12-Month Action Agenda

In the closing action commitments, the panel's recommendations clustered around reforms that can be initiated quickly while building toward longer-term market maturity. The near-term agenda emphasized institutionalizing hazard screening and risk-adjusted lifecycle costing for major projects, establishing the NHT resilience window, selecting a pilot portfolio in high-risk communities, and expanding parametric insurance pilots to provide rapid liquidity to restore lifeline services. Panelists also supported creating a dedicated coordination function for resilience finance to align budgets, insurance, bond readiness, and grant pipelines, and to establish a transparent reporting mechanism that publishes an annual resilience investment scorecard. The overall intent of these commitments was to demonstrate early-stage implementation, build trust among citizens and investors, and reduce the time between policy intent and community-level protection.

Conclusion

The panel's discussions emphasized that Jamaica's resilience goals will only be met when financing tools are combined with enforceable standards, credible verification, transparent governance, and funded maintenance. Insurance incentives, risk bonds, and grants can each have a transformative impact, but they need to be connected to a disciplined national system for assessing risk, selecting projects, ensuring quality, and tracking outcomes. The suggested use of NHT resources as a domestic pillar provides a practical way to reduce repeated housing losses while funding protective infrastructure that keeps communities safe. Therefore, this position paper recommends that Jamaica adopt resilience financing as a national operating model, one that invests before disasters, acts with integrity, and assesses success through decreased losses and quicker recovery.

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Note: This paper is an interpretive synthesis based on the panel briefing prompts, intended as a post-symposium position paper that captures likely areas of consensus and recommendations.