Executive Summary

Post-Disaster Needs Assessment Hurricane Maria September 18, 2017

A Report by the Government of the Commonwealth of Dominica

Based upon an assessment of impacts to each affected sector, the Post-Disaster Needs Assessment concluded that Hurricane Maria resulted in total damages of EC$2.51 billion (US$931 million) and losses of EC$1.03 billion (US$382 million), which amounts to 226 percent of 2016 gross domestic product (GDP).

On September 18, 2017, Hurricane Maria hit Dominica with catastrophic effect. Hurricane Maria was one of the most rapidly intensifying storms in recent history, intensifying to a category 5 hurricane, roughly 24 hours after being upgraded from a tropical storm. As the hurricane passed over the center of the island, Dominica was exposed to extraordinary winds for more than three hours. This was accompanied by intense rainfall, which provoked flashfloods and landslides. The impacts of Hurricane Maria were severe for both the country's economy as well as the human development of its citizens. As of November 8, 2017, 30 persons had lost their lives as a result of Hurricane Maria (26 identified and 4 unidentified), and 34 were declared missing. A significant proportion of the labor force is unemployed as an immediate consequence of Maria, with estimates that the decline in the production of goods and services may continue for one to two years.

On October 9, 2017, the Government of the Commonwealth of Dominica presented an official request for a Post-Disaster Needs Assessment (PDNA), coordinated by the World Bank in conjunction with the UN, ECCB, the CDB, and the EU to assess the disaster impact to inform recovery and reconstruction needs. The main objective of the PDNA is to produce a reliable estimate of the disaster effects and impact of Hurricane Maria, and define a strategy for recovery. Specifically, the assessment aims to: (i) quantify damages and losses, including physical damages and socio-economic aspects; (ii) evaluate the overall impact of the disaster on the macro-economic and human development context of a country; and, (iii) identify recovery needs, priorities, and costs for a resilient recovery strategy.

The Post-Disaster Needs Assessment concluded that Hurricane Maria resulted in total damages of EC$2.51 billion (US$931 million) and losses of EC$1.03 billion (US$382 million), which amounts to 226 percent of 2016 gross domestic product (GDP). The identified recovery needs for reconstruction and resilience interventions, incorporating the principle of 'building back better' (BBB) where possible, amount to EC$3.69 billion (US$1.37 billion).

A summary of the damage, loss and needs by sector is detailed in Table 1. Disaster impacts are categorized into four groups: productive sectors, infrastructure, social sectors as well as cross-cutting themes.

Table 1: Summary of Damages, Losses and Recovery Needs by Sector

	DAMAGES (M)		LOSSES (M)		NEEDS (M)	
	US$	EC$	US$	EC$	US$	EC$
PRODUCTIVE SECTOR	**178**	**480**	**202**	**547**	**205**	**554**
Agriculture	55	149	124	336	88	239
Fisheries	2	7	1	1	3	7
Forestry	30	80			15	40
Commerce and Micro Business	70	190	7	19	73	197
Tourism	20	54	71	191	26	71
SOCIAL SECTOR	**444**	**1199**	**42**	**112**	**641**	**1730**
Housing	354	956	29	77	520	1403
Education	74	200	3	9	94	254
Health	11	30	7	19	22	60
Culture	5	14	3	8	5	13
INFRASTRUCTURE SECTOR	**306**	**826**	**137**	**370**	**509**	**1375**
Transport	182	492	53	142	302	815
Electricity	33	90	33	89	81	218
Water and Sanitation	24	65	40	107	56	152
Telecommunication	48	129	8	22	48	129
Airports and Port	19	51	3	9	23	61
CROSS-CUTTING	**3**	**8**	**1**	**2**	**13**	**35**
Disaster Risk Management	3	8	1	2	10	28
Environment					2	5
Gender					1	2
TOTAL	**931**	**2513**	**382**	**1031**	**1368**	**3693**

Human and Social Impact

Hurricane Maria will have direct negative impacts on employment, livelihoods, and consequently, poverty in Dominica. A total of EC$94.9 million in income and 3.1 million work days is estimated to be lost as a result of the disaster. Critical employment sectors such as agriculture and tourism will take up to 12 months to resume regular operations and therefore restoring livelihoods in these sectors will face significant time constraints. As a result, it is likely that there will be a 25 percent reduction in overall consumption, which will result in an increase in the poverty head count from 28.8 percent to 42.8 percent; while the number of indigent individuals will double from 2,253 to 4,731. Furthermore, almost 2,800 individuals considered vulnerable prior to Maria will fall below the poverty line. The Government of Dominica provides regular safety nets to poor and vulnerable populations and announced plans for programs to restore livelihoods, including a cash grant to subsistence farmers. Given the immense scale of the event however, current coverage of the regular safety net will need to be further expanded to help restore reduced consumption and lost income to pre-disaster levels. Approximately EC$22.11 million (US$8.19 million) is needed to finance a recovery for social protection to address these poverty impacts, including temporary scale-up of cash safety nets, expanding cash-for work, and increasing school feeding access. For increased resilience in the medium to long terms, measures to build household resilience; modernize service delivery, and ensure contingency financing for rapid scale up of the safety net system would be critical.

Macroeconomic Impact

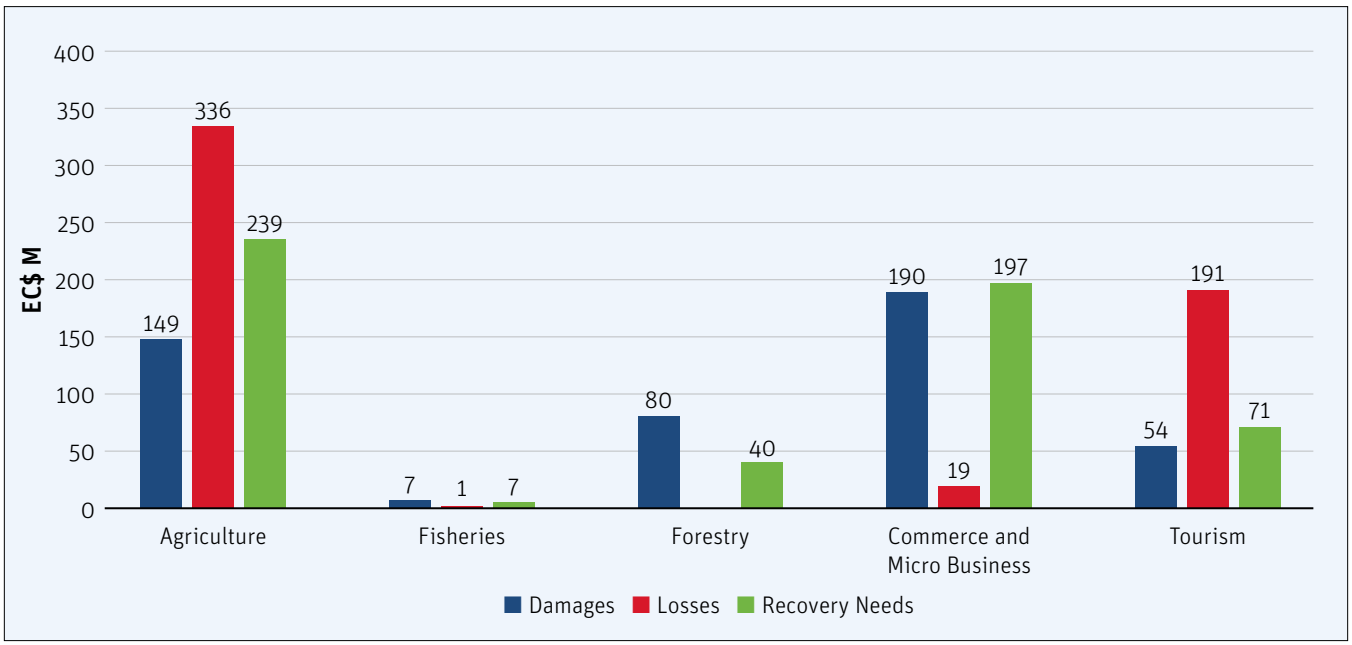
The economic impact scenario is based on the damages and losses of about US$ 1.37 billion, which is approximately 226 percent of the 2016 GDP. It is estimated that output would decline sharply in the last quarter of 2017 and by as much as 16 percent in 2018, which in turn will reduce the tax base that could worsen the fiscal balance to deficits of near 3 and 13 percent of GDP in FY2017/18 and FY2018/19, respectively. The external current account balance could deteriorate sharply, to a deficit of 21 percent of GDP in 2018. Hurricane Maria has thus resulted in significant negative impacts on the overall performance of the economy, and hence a full economic recovery will require a large effort from Dominica and support from the international community.

Sector Summaries

The following sector summaries present a brief review of sector impacts and damage profile resulting from the passage of Hurricane Maria. Most damages were sustained in the housing sector (38 percent), followed by the transport (20 percent) and education sector (7 percent). The greatest losses, as defined by changes in economic flows, were sustained in the agriculture sector (33 percent), followed by the tourism (19 percent) and transport sector (14 percent).

PRODUCTIVE SECTOR

Figure 1: Damage, Losses and Recovery Needs by Productive Subsectors (in EC$ M)



AGRICULTURE

Damages **EC$149.2M** (US$55.3)
Losses **EC$335.8M** (US$124.4)
Recovery Needs **EC$238.8M** (US$88.5)

The agricultural sector in Dominica is largely composed of small family farms and subsistence production from small plots locally referred to as kitchen gardens. Exports are limited and much of the agricultural production serves the local markets. Subsistence farmers augment their income through local sale of limited excess production.

Damage and losses in the agriculture sector were extensive affecting all aspects of agricultural production including crops, infrastructure, equipment and croplands. Livestock damage includes 45 percent of cattle, 65 percent pigs and over 90 percent chickens with an estimated value of EC$ 8.68M (US$3.21M). Crop losses were similarly high particularly with respect to basic foodstuffs such as root crops, vegetables, banana and plantain where crop destruction ranged from 80 to 100 percent. Tree crops, mango, avocado, citrus, bay and others. Total estimated damage and losses to crops is estimated at EC$ 350.6M (US$ 129.9M)

Much of the agricultural infrastructure and equipment was damaged or destroyed including buildings, animal husbandry facilities, agricultural roads and croplands. Sector recovery will depend heavily on the reconstruction of infrastructure in order to rehabilitate the sector and re-establish the farm to market transportation network. The ability of small farmers to recover will depend heavily on their access to funding resources as they rehabilitate their properties and re-establish their crop cycles. The estimated damage to infrastructure as a result of the storm is EC$ 95.6M (US$ 35.43M)

FISHERIES

Damages **EC$6.5M** (US$2.4)
Losses **EC$1.4M** (US$0.5)
Recovery Needs **EC$6.9M** (US$2.5)

The fisheries sector has been severely damaged affecting the basic livelihoods of approximately 2,200 fishers and others dependent on the sector. This is a vulnerable population as fisheries activities are largely artisanal in nature and fisheries exports are limited with much of the catch is sold for local consumption. This sector was recovering from significant damage and losses experienced in 2015 with the passage of Tropical Storm Erika.

In total 128 vessels are estimated to be damaged or destroyed. The total costs for repair and replacement of vessels and engines is estimated as EC$ 4.52M (US$ 1.68M). Other losses include fishing gear and vendor equipment estimated EC$ 0.87M (US$ 0.32M). Market vendors are mostly women and many have lost their basic tools such as cutting boards, coolers, knifes, etc.

Infrastructural damages to the sector (both the government fisheries buildings as well as the fisheries cooperatives) are estimated to be EC$ 1.14M (US$ 0.42M). This includes damages to roofs, fuel pumps, ice-machine rooms, freezer storages and other supporting infrastructure.

FORESTRY

Damages **EC$80.2M** (US$29.7)
Recovery Needs **EC$40.2M** (US$14.9)

Compared to other Caribbean islands, Dominica is rich in forest resources. Steep topography limits access and timber processing is largely for local consumption. Approximately 27 percent of Dominican forest is designated as protected by a network of two forest reserves, three national parks and a protected forest. Dominican forests support the only population of the endemic parrot *Amazona imperialis* (Sisserou) which is recognized as critically endangered with as an estimated population of 250-350. The national park Morne Trois Pitons has been declared a UNESCO world heritage site. These forest resources are an important component of the Dominican tourism economy.

Hurricane winds and intense rainfall produced widespread damage to the forest system. Much of the forest was stripped of leaves and damaged and downed trees were widespread throughout the island. Selected tree removal will be required to reopen trails and protect property and water resources. Slope stabilization may be required to protect downstream assets and infrastructure. As much of the forest is under protected status, eco-tourism is a major contributor to the island's economy. Damage and losses to timber stocks and wildlife habitat is estimated to be EC$ 67.1M (US$ 24.84M). This does not include activities related toward assessing and recovering the Imperial Parrot population.

Damage to forestry support facilities such as trails, nurseries, public contact facilities and other structures was significant. Much of the infrastructure supports public use of protected areas and is a major component of the tourism industry. Infrastructure damage and losses is estimated to be EC$ 13.17M (US$ 4.87M).

COMMERCE/MICRO-BUSINESS

Damages **EC$190.1M** (US$70.4)
Losses **EC$18.5M** (US$6.9)
Recovery Needs **EC$197.1M** (US$73.0)

This sector represents an entrepreneurial economy comprising small businesses, vendors and service providers. Direct damages to infrastructure were significant and as many of these businesses are home based, damages are also reflected to a degree in housing impacts. In many cases, vendors are reliant on production from other sectors such as fisheries and agriculture and will remain unemployed until production resumes. Those employed in sale of goods will rely on the reestablishment of supply chains and a general stabilization of the economy. Damage and losses relate principally to loss of infrastructure , supplies and lost trade opportunity due lack of supply and changes in demands as customers re-focus their purchasing priorities.

TOURISM

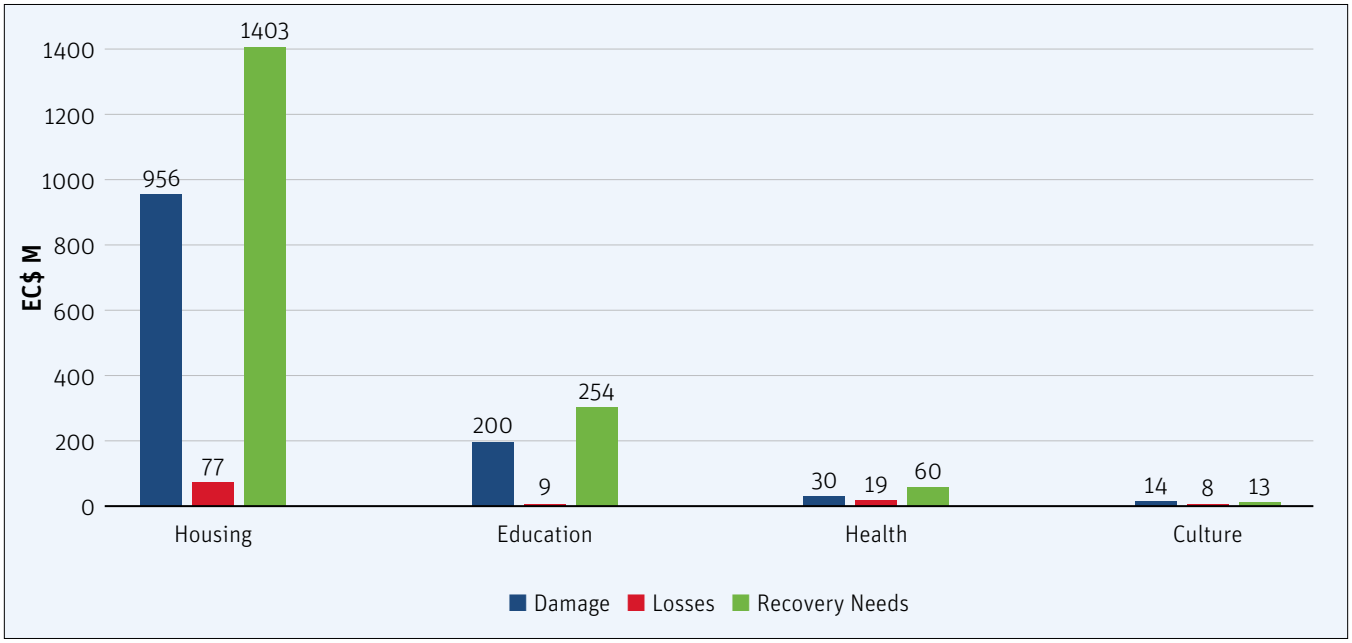
Damages **EC$54.4M** (US$20.2)
Losses **EC$191.1M** (US$70.8)
Recovery Needs **EC$70.7M** (US$26.2)

The heaviest damages linked directly to the tourism sector lies in hotel room stock. Out of a total of 909 rooms, 243 rooms are currently serving the market, 39 percent (358) are considered severely damaged and will not be back in service at least for a year, while 34 percent (308) may come back little by little within the year. The cruise season is currently considered lost, an EC$25 million source of spend in 2016, and tour operators, vendors, and other support services, such as taxis, have suffered EC$4.3 million (US$1.59 million) in damages. Hotel staff and support personnel are directly impacted as they deal with the strain of unemployment and the concurrent need to rehabilitate their own properties.

Damage to destinations, particularly parks and natural areas will significantly impact the recovery of the tourism sector. Dominica has adopted a eco-tourism based marketing strategy as the "Nature Island" and is known as a diving destination.

SOCIAL SECTOR

Figure 2: Damage, Losses and Recovery Needs by Social Subsectors (in EC$ M)



HOUSING

Damages **EC$955.7M** (US$354.0)
Losses **EC$76.9M** (US$28.5)
Recovery Needs **EC$1,403.3M** (US$519.8)

Damage in the housing sector was extensive with damage to approximately 90 percent of the housing stock. Of the 31,348 homes comprising the Dominican housing stock, a total of approximately 4,700 houses (15%) were identified as destroyed, approximately 23,500 of homes, (75%) were estimated to have incurred different levels of partial damage, and 3,135 (10%) were considered as not affected by the event.

Total damage to the housing sector is estimated at EC$956 million (US$354 million). This includes the replacement cost of destroyed houses, repair cost of partially damaged houses, and the replacement cost of household goods destroyed. Losses are estimated at EC$77 million (US$28.5 million) and include expected loss of rental income, the cost of demolition, rubble removal, and shelter expenses.

EDUCATION

Damages	**EC$199.7M** (US$74.0)
Losses	**EC$8.7M** (US$3.2)
Recovery Needs	**EC$254.3M** (US$94.2)

Educational facilities on the island, including daycare centers, suffered varying degrees of damage as a result of the storm. Of a total of 163 facilities, 67 (41 percent) suffered major damage and will require reconstruction. A total of 52 facilities will require major repair and 17 facilities will require minor repair. The remaining 27 facilities are reported without damage. Overall 83 percent of schools reported some level of damage. Additionally, some 20 schools are being used as shelters and will not return to service until people are relocated and the facilities are cleaned and repaired. An additional 73 preschools were affected with varying degrees of damage.

Damages include destruction of teaching materials, furniture and equipment and other educational resources. Overall some 13,575 students representing 100 percent of student population are affected. Apart from the damage and losses suffered, there is urgent need to restore educational services to salvage the current school year.

HEALTH

Damages	**EC$29.5M** (US$10.9)
Losses	**EC$18.8M** (US$7.0)
Recovery Needs	**EC$59.8M** (US$22.1)

Princess Margaret Hospital, Roseau, the only referral hospital in the health care system, sustained severe damage with 15 percent of its buildings totally destroyed leaving 53 percent able to function. Central medical stores lost the majority of medical supplies due to water damage but most medications were spared. Bed capacity was decreased by 95 beds. Medical equipment such as fluoroscopy, portable x-ray and all blood bank equipment were lost.

In La Plaine, a type III facility (health center) and 17 of 48 of the type I facilities, health clinics, were severely damaged. In Marigot, the health center and 12 of 49 of the satellite clinics were moderately damaged.

The Environmental Health Office sustained damage and some equipment was compromised. Water quality laboratory equipment was lost. The HIV program office has sustained damage, however most supplies and drugs are available and patients continue to access the nutrition program.

CULTURE

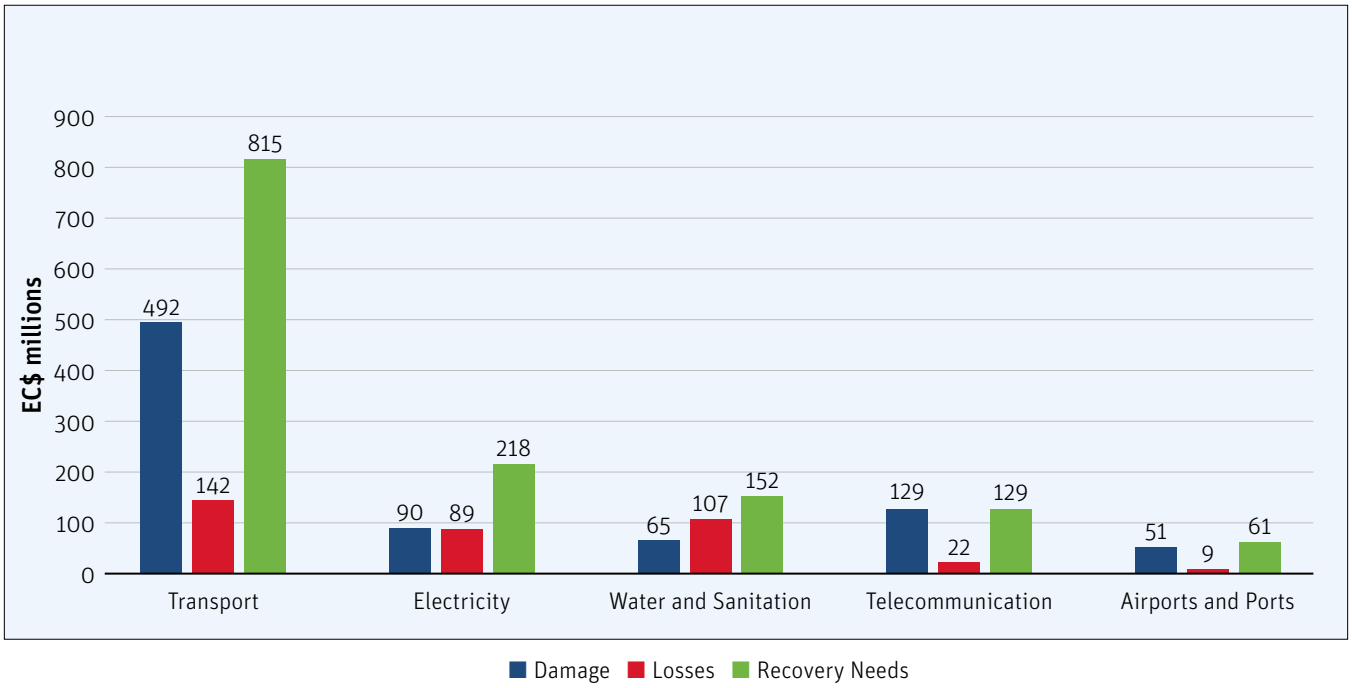
Damages	**EC$13.7M** (US$5.1)
Losses	**EC$7.9M** (US$2.9)
Recovery Needs	**EC$12.6M** (US$4.7)

Heritage spaces such as the Dominica Museum, the Old Mill Cultural Centre and its outer buildings, and the Arawak House of Culture sustained damage such as roof, ceiling, window and other building elements as well as damage to equipment and collection holdings. The National Free Library lost all of its roofing with 98 percent of books sustaining water damage. Two important monuments around Roseau were impacted including *Neg Mawon*, which was damaged and Cecil Rawle which was partially destroyed. Other facilities damaged by the hurricane include sporting facilities such as soccer fields, cricket fields and ball courts. Other damage to structures include the High court/ registry, Parliament building, Physical Planning building.

With respect to livelihoods, of the approximately 500 artisans in the *Kalinago* Territory, around 98 percent have sustained damages or total destruction of their work spaces, and in some instances, their craft stock. In most cases these families only depended on craft sales.

INFRASTRUCTURE SECTOR

Figure 3: Damage, Losses and Recovery Needs by Infrastructure Subsectors (in EC$ M)



TRANSPORT

Damages	**EC$491.8** (US$182.2)
Losses	**EC$142.1** (US$52.6)
Recovery Needs	**EC$815.0** (US$302.0)

Damage and losses to the transportation sector included damage to roadways, bridges and adjacent structures. Roads across the island were covered by substantial amounts of tree and flooding debris, and a relatively moderate number of landslides or embankment failures were identified. The major damages were incurred at river crossings, where strong flash flooding carried substantial debris damaging crossings and bridges. In valleys and steep gullies, especially in the south and west, some structures were blocked and overtopped by 1-2 meters (m) of floodwater. Debris deposits of 1-4 m depth filled the riverbeds causing rivers to change course and erode abutments or approaches. The pavements, especially on improved roads with lined surface drainage, were generally undamaged, but more extensive damages were in-

curred on the less improved secondary and feeder road networks.

Six major bridges were seriously damaged and closed—three on the west coast and three in the south—and major erosion or washouts occurred over an estimated 19 km combined length. Vehicles were damaged by flooding and flying tree and building debris, with an estimated one to four percent destroyed and seven to ten percent damaged.

ELECTRICITY

Damages	**EC$89.6M** (US$33.2)
Losses	**EC$88.9M** (US$32.9)
Recovery Needs	**US$217.8M** (US$80.7)

Electricity service failed due to widespread damages to the transmission and distribution network. At least 75 percent of the network is down, although part may be recoverable, 80 to 90 percent of the transformers inspected are badly damaged and cannot be repaired. Damages to generation sites vary from moderate to severe. Specifically, at Fond Cole there are damages to the building structures and three generation units must be inspected and repaired (enclosures were lost). Sugar Loaf also suffered some damages to the building structures and to the electrical equipment (in the latter case caused by flooding).

The hydropower plant at Padu was damaged by 3 - 4 feet of mud and debris filling the power house. There is visible damage to control equipment, and there may be damage to hydromechanical equipment of the power house and to the electro-mechanical equipment.

The Trafalgar hydro-generation plant experienced only minor damages to the building structure and Laudat is intact. The water pipeline feeding the three hydropower stations from Freshwater Lake suffered damage at different sections along its length. There is severe damage at the beginning of the pipeline due to landslide and rock impacts, and valves were also damaged. Severe damage is suspected due to landslide along the road from Padu to Trafalgar, affecting a 10-15m section of the pipeline. Minor damage was observed near Padu including fractured support structures and misplaced pipeline sections. Losses in the sector relate to lost revenues from sales. These are estimated to be EC$ 88.94M (US$ 32.94M).

WATER AND SANITATION

Damages	**EC$64.8M** (US$24.0)
Losses	**EC$107.3M** (US$39.7)
Recovery Needs	**EC$151.9M** (US$56.3)

The 41 water supply areas were damaged by strong winds, flooding, landslides, falling trees and power outage, 16 were heavily damaged and 21 moderately damaged. Production and distribution pipelines were damaged or washed away, intake systems were blocked with sand and debris, and storage tanks, pumps, physical structures and access roads were damaged. Estimated damage to water supply infrastructure is EC$53.6 million (US$19.85M).

Damage to sanitation infrastructure amounted to an estimated EC$9.8 million (US$ 3.62M). Damage to the Roseau wastewater treatment plant affected 5,190 households and included lift stations, fore mains, manholes, interceptor pipes, sewer lines, three major bridge crossings, gravity mains and about 3,000 service connections. The Canefield and Jimmit sewerage systems were blocked by flood debris. On-site septic tank systems and latrines have been damaged and assessment is ongoing.

In solid waste management, the depleted infrastructure suffered further damage and the service has been interrupted. Two collection trucks were damaged and many private contractors stopped collecting waste. The Dominica Solid Waste Management Corporation (DSWMC) administrative facilities and roof of the office building were heavily damaged and the disposal site was severely damaged. Currently, irregular service has been established in Roseau but damages in road infrastructure, reduced capacity in DSWMC and a lack of available private contractors is restricting the recovery service countrywide.

TELECOMMUNICATIONS

Damages	**EC$128.9M** (US$47.7)
Losses	**EC$22.4M** (US$8.3)
Recovery Needs	**EC$129.2M** (US$47.8)

Telecommunications services are managed by two service providers, Digicel and Flow. Much of the network provided by Flow is underground. Hurricane Maria resulted in

extensive and widespread damages to the telecommunications network and public ICT resources. All telecommunication services, except for amateur radio, were disabled from September 19 to 21. A total of 33 cellular sites were destroyed or severely damaged and the fiber-optic backbone was severed in several locations, leading to a nationwide loss of connectivity.

Damages to the network were caused by high winds and flooding. In Roseau, Flow headquarters was flooded with water, mud and debris, causing service outages and loss of equipment. Flooding and wind also destroyed support buildings, notably the main technical engineering building as well as exchange buildings owned by Flow. The satellite farm and the main television building for Flow were also heavily damaged by wind. Digicel did not report major damage to any building assets. However, Digicel operates a network based on overhead lines running on poles owned by DOMLEC, which were damaged extensively island-wide. Underground cable was damaged by flooding and scouring of trenches, but this damage is far more localized. Flow has restored much of the northern fiber backbone a month after Maria. For both providers, the southern backbone will pose a greater challenge to restore since the level of damage is much greater.

AIRPORTS AND PORTS

Damages	**EC$51.0M** (US$18.9)
Losses	**EC$8.8M** (US$3.3)
Recovery Needs	**EC$61.2M** (US$22.7)

The Dominican Air and Seaports Authority, has suffered damages to all of its assets, both in the Roseau area, at Douglas Charles International Airport, and in Portsmouth.

At the port of Woodridge Bay, all sheds lost their roofs and suffered other damages. The security fencing was compromised, windows in the main office building were blown out, the maintenance shed was destroyed, and electrical equipment and electronics were damaged. In Roseau, besides Woodridge Bay, the ferry terminal was severely damaged, both by heavy seas and river flooding. The damage incurred includes all electronic equipment, furniture, and vendor shops. The Roseau Cruise Ship Berth was also rendered inoperable, with railings, lighting, and the walkway being destroyed.

In Portsmouth, the cargo shed had similar damages, with the roof destroyed, though the main pier remained intact. Security fencing has been compromised. The Cabrits cruise ship berth, which features a full-fledged terminal building, was badly damaged, with the walkway of the pier destroyed, and the terminal building lost most of its roof.

At Douglas Charles Airport the terminal building was flooded resulting in the loss of all electronics, such as x-ray machines. The airport also suffered some damage to its tower, and related communications and navigation equipment.

At Canefield Airport, debris had to be cleared from the runway. The terminal lost a substantial part of its roof (as well as the building housing fire and ambulance services). The tower was more severely damaged than at Douglas Charles, and the fencing has come down in several places.

The shipping sector losses are relate primarily to the loss of traffic, some of it due to infrastructure damages and the government moratorium on charges for non-commercial activity. Since most of the port's shipments are now related to the relief and rebuild efforts after Maria, revenues are 25 percent of the baseline, indicating a 75 percent revenue loss. There is no income from cruise ships since there is no infrastructure to receive them.

Airport losses will accrue over time as reflected in the reduced tourism demand. With damage to tourism infrastructure and destination sites, reduced tourism demand is expected to reduce airport income from fees and taxes.

CROSS-CUTTING SECTORS

DISASTER RISK REDUCTION

Damages	**EC$8.1M** (US$3.0)
Losses	**EC$2.2M** (US$0.8)
Recovery Needs	**EC$27.6M** (US$10.2)

Damage to the police stations and their contents represents the largest impact with 11 of 17 police stations experiencing damage. Five of these 11 stations received significant damage and in two instances, the officers had to be relocated. There was also moderate damage to vehicles used by the officers.

Damage to the Fire and Ambulance Service as well as the meteorological and seismic stations was moderate to significant. Five out of the eight Fire and Ambulance stations and their contents suffered damaged, with four of them being classed as significant damage. All the seismic stations across the island have been reported as completely damaged and the hydro-meteorological stations across the island suffered moderate damages.

Losses relate primarily to the increase in operational expenses for the NEPO/EOC relating to the rental of additional vehicles for the security forces. The losses for the other agencies mainly comprise the additional costs incurred by the government to purchase generators and the associated fuel cost for their operation.

ENVIRONMENT

Recovery Needs **EC$4.8M** (US$1.8)

The damage to the environment is very high, with 80-90 percent of environmental resources significantly affected. Damage to forest resources was particularly severe and there is concern regarding the status of critical habitat supporting the highly endangered Sisserou, endemic to Dominica.

The impact of pollution from chemicals and fuels has not yet been assessed but likely low. There were no reports of leaking fuel storage facilities and other sources of pollution are associated with wastewater management and end user commodities such as fertilizers, agriculture chemicals and other commodities sold retail to consumers. There is no heavy industry on Dominica.

Natural resource damage will likely have high impacts to other economic sectors. Ecological services relating to water production, erosion control, land stabilization may require interventions. Tourism and agriculture will experience significant impacts as forest resources are integral to both sectors.

The recovery needs presented relate primarily to the execution of studies and monitoring programs to assess the storms impacts, monitor recovery and develop interventions as needs are identified.

GENDER

Recovery Needs **EC$2.2M** (US$0.8)

Since Hurricane Maria 1,862 persons are in 63 shelters, observational evidence suggests that there is a predominance of women, elderly persons, and children in the shelters. Site visits indicate that elderly women are doing the majority of the care work especially in the shelters. Respondents indicated that they were spending at least 18 hours per week on unpaid care work, which represents

a significant increase since the hurricane. Most of these elderly women (over 65) are also the head of household (HoHs), with households comprising on average five persons. Most of the elderly men in the shelters were on their own. In Marigot, St Andrew, many of the infirm were elderly men. There were concerns raised in shelters and by those who were able to move back to their communities in St David and St Andrew, that special care was needed for the elderly, persons living with disabilities and the mentally unstable.

With Most primary schools closed, there have been reports of primary caregivers, who are mainly women, leaving children in the shelters under communal care, usually that of an elderly woman. Most secondary schools in Roseau have been opened but only for 4th and 5th formers, leaving adolescents 11-14 outside of schools.

As previously mentioned women represented 39 percent of the HoHs in Dominica. Site visit interviews highlighted that many women, particularly the elderly women HoHs, did not have housing insurance because they were living in family homes which were built by their parents. These women indicated they were unable to move out of the shelters because they did not have access to housing material or knowledge of where to source the material. In spite of this, their main concern was being able to pay for the labor needed to assist them in rebuilding.

76 percent of the women farmers interviewed reported that they were significantly impacted by the severe loss of tools and crops. However, in Marigot (St Andrew) and Warner (St. Paul) women reported having some root crops remaining, which they shared among the community and in shelters. Women reported that although they lost some livestock, the lack of feed, shelter and water is resulting in increased losses every day.

Access to health care has been compromised since the hurricane because all health centers around the island have been impacted. Since the Hurricane primary health services continue to be offered in buildings with only emergency repairs or in alternate premises. Many women interviewed indicated that increased communication was needed to make sure everyone was aware of where and how to access critical health services.

Recovery needs reflect the need for targeted assistance, particularly for single parent families headed by women, including material support for reconstruction needs; livelihood assistance, particularly for women farmers; gender training and psychological support.

Summary of Identified Priority Actions for Recovery

ESTIMATING RECOVERY NEEDS

Recovery needs are estimated based on the PDNA sectorial results for disaster effects and disaster impacts considering the following four components:

- Reconstruction of physical assets;
- Resumption of production, service delivery and access to goods and services;
- Restoration of governance and decision-making processes;
- Reduction of vulnerabilities and risks.

The short and medium-term recovery needs refer to measures required to address the current crisis while also providing access to basic services, temporary shelter and bringing communities' life and national and local institutions to normality. The longer-term recovery needs include measures to reduce the risk associated to weather related hazards and its possible impact in Dominica, including those of Climate Change, particularly in view of the likely increase in the frequency and severity of this type of phenomena.

The proposed needs also take into consideration the issues of governance, particularly those measures required to strengthen the capacity of national and local authorities across all sectors to implement and manage the recovery program, through additional expertise and human resources, equipment and information management systems to facilitate monitoring and inter-institutional coordination.

The identified needs include disaster risk reduction measures to build resilience and reduce the impact of future adverse hazards in the country. The proposed resilience interventions are integrated within each of the sectors as part of the proposed sectoral long-term measures, and are reflected as such in the matrix below outlining the recovery needs and budget.

The table below presents the proposed budget for recovery, totaling EC$ 3,693 million or US$ 1,368 million. The greatest needs are in the housing sector with 38% of all estimated needs, followed by transport with the 22% of the total. Other sectors with significant needs are Education, Electricity, Agriculture and Commerce.

Table 2: Prioritized Recovery Needs by Sector

Sector	Short term (<1 year) EC$ millions	Medium term (1-3 years) EC$ millions	Long term (3-5 years) EC$ millions	TOTAL EC$ millions	TOTAL US$ Millions
Agriculture	145	50	44	239	88
Fisheries	5	1		7	3
Forestry	33	6	2	40	15
Commerce and Micro Business	192	6	1	198	73
Tourism	6	22	43	71	26
Housing	48	1354	1	1403	520
Education	5	25	224	254	94
Health	44	4	12	60	22
Culture	10	2	1	13	5
Transport	287	334	195	815	302
Electricity	118	100		218	81
Water and Sanitation	68	64	19	152	56
Telecommunication	33	66	30	129	48
Airports and Port	37	14	11	61	23
Disaster Risk Management	0	15	13	28	10
Environment	3		1	5	2
Gender	1	1	0	2	1
TOTAL	**1,035**	**2,063**	**597**	**3,693**	**1,368**

The recovery needs include measures required in the short-term (up to 1 year), medium-term (1 to 3 years) and long-term (3 to 5 years).

RECOVERY CHALLENGES OF A SMALL ISLAND DEVELOPMENT STATE

Dominica, as any other Small Island Development State (SIDS), is particularly vulnerable to natural and manmade hazards, including those related to climate and its variability. The recovery strategy should consider realistic solutions to address specific capacity gaps with the view to reducing the frequency and magnitude of future disasters. Some of the key aspects relating to SIDS context that need to be considered include the following:

- Climate change could disproportionately magnify disaster risk in Dominica, due to rising temperatures and sea level and associated coastal erosion, flood and storm surge. Further, Dominica is also exposed to geological hazards (volcanoes, earthquakes, tsunamis and landslides).
- Economic growth driven by the tourism sector has led to an increase in hazard exposure, as private and public investments are concentrated in hazardous areas, such as cyclone prone coastlines. Small size, geographic dispersion and isolation from markets poses additional challenges to Dominica including the development of economies of scale, limiting its potential for diversification. A single disaster event can affect the entire territory or economy and cause a disproportionately high loss of GDP and capital as has been the case of Hurricane Maria that has affected all the economic and social sectors in Dominica.
- People's livelihoods are highly dependent on a healthy eco-system (coastal, marine, forests, wetlands), Hurricane Maria has caused a widespread destruction of these habitats, resulting in loss of livelihoods.
- Local governance mechanisms have a critical role to play to facilitate effective community risk management. However, the interface between local government and communities needs to be strengthened and national policies should facilitate this.

A TAILORED STRATEGY FOR DOMINICA

The issues discussed in this section are preliminary and based on the findings and recommendations made in the sector reports based on the PDNA, they will need to be further discussed and developed into a disaster recovery framework that would consider detailed planning and implementation of a comprehensive recovery intervention in Dominica.

All the 17 sectors assessed after the disastrous event of Hurricane Maria in Dominica are important and contribute in different ways to support the socio-economic development of the country. They have been clustered in four main categories: social sectors, productive sectors, infrastructure sectors and the cross-cutting issues. As indicated earlier, some of them have been heavily impacted and may need to be looked at in a prioritized manner:

HOUSING RECONSTRUCTION

Housing is the most affected sector and one of the most important and challenging areas for recovery as this provides shelter and security to the families, but also, quite often they also include small businesses that are part of the income generation mechanism. The Government plan for the recovery and rebuilding of the housing sector, outlined by the Prime Minister on October 16, 2017 comprises: (i) waiver of duties on construction materials for six months; (ii) convening power to ensure faster insurance payouts and lower bank charges; and, (iii) repair and rebuilding of schools, clinics, hospitals and homes in a climate-resilient way.

It is critical that a comprehensive National Housing Reconstruction Program is developed and implemented to replace what was damaged and lost. The options for post-disaster housing programs that have been adopted elsewhere include a cash approach, owner-driven reconstruction, community-driven reconstruction, and agency-driven reconstruction. Depending on the selected alternative, the homeowner, community and agency would have different levels of control on funds and management of the project. This could be linked to different capacity building processes to incorporate not only the affected community but also small to medium locally based enterprises who could be integrated to the reconstruction program thus offering them an opportunity for income generation.

INFRASTRUCTURE

Reconstruction of damaged infrastructure such as roads, water and sanitation, electricity will focus in the short run in quickly providing access to the communities to markets, schools, health centres and repairing basis services such as provision of water, sanitation and electricity. The geographical setting and the widespread location of small towns and infrastructure pose an additional burden in the recovery planning and implementation as it would be difficult to benefit from economies of scale by clustering different communities in a single reconstruction scheme. In the intermediate and long run, focus should be in making the necessary studies and assessments to make sure that detailed engineering designs of major interventions will be undertaken as a pre-requisite to procuring civil works making all infrastructure disaster resilient.

For solid waste management services, recovery and improvement are needed in both facilities and processes. This includes reestablishing services throughout the island, re-building and strengthening what was an already depleted service to an adequate level, and introducing cost saving and resilient systems that allow for decentralized public and private sector waste storage, transfer, and operation, especially in hard to reach areas.

LIVELIHOODS

Gender-responsive livelihoods programs will focus on empowering men and women through national and community-level training for climate resilient agriculture and by supporting the creation of value chains that reduce food insecurity among vulnerable groups. The recovery programme provides the opportunity to prepare agricultural workers to engage in value-added activities, based on the restoration of the natural environment.

Some 10,000 persons were involved in micro businesses in the formal and informal sector, their economic activity ranged from such activities as barbering, baking of goods, seamstresses, cosmeticians, mechanics and the repair of household items. They would require support to refinance their businesses as part of the recovery programme.

DISASTER RISK REDUCTION

With climate change on the rise, Dominica will be faced with disasters of increasing magnitude and intensity thus ex-ante preparedness for recovery is a must. Focus should be in proactively building regional and national institutional arrangements, communication, coordination and planning capacities to ensure timely and resilient recovery, including contingency planning to assure business continuity not only from the private sector but most importantly from the public sector.

Resilient reconstruction requires strengthening the interface between national and local governments and the communities to enhance community risk management and design strategies that are more responsive to community needs. The growing urban centres in Dominica need also dedicated attention to make sure that risk sensitive land use and plans are used for and orderly and safe growth of the cities.

The long-term recovery strategy proposed includes disaster risk reduction measures to build resilience and reduce the impact of future hazards. The proposed disaster risk reduction interventions are integrated within each of the sectors as part of the proposed sectoral long-term measures.

GUIDING PRINCIPLES

- Key aspect of the recovery strategy should be underpinned by approaches that will retain skilled people within the country.
- Use the opportunity which the disaster presents to prepare persons to engage in value-added activities, based on the restoration of the natural environment.
- Support entrepreneurial activity that kick-starts the agricultural production for niche markets and adds value in the production process, such as in the development of specialty bananas or other fruits.
- Engage the people in the development of the recovery strategies and measures, through consultative processes.
- Seek the support of the diaspora community for the recovery process—they are a rich source of both human and financial resources.
- Ensure that resilience to climate change is built into all new development initiatives and into the reconstruction of damaged infrastructure, public or private.

- The disaster should provide an opportunity for the regulation of land use adopting measures for conserving energy and strengthening the management of forest resources.
- Most vulnerable people (low income, women headed households, people living with disabilities) will be given priority in recovery assistance.
- Gender sensitive and participatory approaches promoted in all interventions.

IMPLEMENTATION ARRANGEMENTS

Recovery is multi sectoral in nature. It includes reconstruction of physical assets, restoration of livelihoods, and re-establishment of social and community services. This work requires the collective efforts of all governments' ministries, private sector actors, the civil society and national and international organizations.

While it is recognized that recovery should be implemented under the strong leadership of the national government, other partners can bring technical skills and experiences that will improve the quality of recovery. The recovery strategy should be inclusive and participatory, integrating national and local authorities, the affected communities, community organizations, women's groups, traditional authorities and other relevant local actors.

To this end, establishing a recovery agency that has a short-term mandate, strengthens the country's public service, and has credible leadership is a good alternative to be considered by national authorities. This agency could improve the following aspects:

- Overall coordination to maximize the impact of new resources avoiding overlap, duplication of efforts and conflicting projects.
- Sequencing of projects to bring benefits earlier than otherwise.
- Ensure a smooth roll out of projects as all supporting activities could be handled by one, focused body
- Ensure that all donor-funded rebuilding activities are carried out to a high standard of transparency and financial accountability.

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