SUMMARY ASSESSMENT OF DAMAGE AND NEEDS: TRANSPORT SECTOR

A. Sector Overview[1]

1. Tropical Cyclone Pam affected transport infrastructure—particularly roads, airports, wharves and jetties—in Shefa and Tafea provinces, and some outer islands. Ongoing development and adequate maintenance of transport infrastructure are critical to facilitate trade for economic growth and restore socioeconomic activities to pre-cyclone levels.

2. **Roads**. Vanuatu has an estimated 1,776 kilometers (km) of roads; 234 km are sealed, 1,142 km are gravel, and 400 km are simple earth roads. The total road length in Shefa and Tafea provinces is 539 km. There are 158 km of sealed roads (all in Shefa province); 279 km of gravel roads (93 km in Shefa and 186 km in Tafea province); and 102 km of earth roads (72 km in Shefa and 30 km in Tafea province).

3. Shefa's main highway is the 130-km sealed Efate ring road, which traverses a combination of hilly to flat and low-lying coastal terrain. The ring road is the only road servicing the rural population (29,150 people) with a link to the capital Port Vila (55,525 people). It is critical for the transportation of agriculture products to market in Port Vila, and for access to the central hospital and central business district. Several tourist sites are also accessible via the ring road. The government maintains the ring road through the Public Works Department (PWD) of the Ministry of Infrastructure and Public Utilities. National contractors managed through the PWD carry out maintenance works using small and medium-scale contracting and labor-based technology.[2]

4. **Airports**. Vanuatu has 29 airports. Airports Vanuatu operates the three main airports at Port Vila (Bauerfield), Luganville (Pekoa), and Tanna (Whitegrass). The other 26 are domestic airfields regulated by the Civil Aviation Authority of Vanuatu, and operated and maintained by the PWD. The Bauerfield airport is Vanuatu's principal international gateway and handles about 250,000 international passengers per year. The runway can accommodate most commercial aircraft, although some (i.e., Boeing 767 and 777 and Airbus A330) have weight restrictions and others (i.e., Boeing 747 and Airbus A380) require a runway extension. Projections of passenger numbers and accommodation capacity indicate that, with improvements, Bauerfield can cope with demand for at least 20 years (until 2025) (footnote 1). Airports Vanuatu is contracting consultants to prepare a master plan for Bauerfield improvements. Tropical Cyclone Pam had minimal impact on the airports, closing those in affected areas for only 1 day. The World Bank is funding the Vanuatu Aviation Infrastructure Project.

5. **Seaports**. Vanuatu has 64 populated islands, and depends heavily on water transport for the movement of cargo and passengers. Poorly maintained wharves and jetties constrain vessels from calling at many destinations in all but ideal weather conditions—restricting cargo and passenger movement and increasing waiting times and costs. In some cases, vessels are prevented from reaching rural areas altogether. Inadequate and unsafe facilities also inhibit safe passenger embarkation and result in the loss of goods when ships are unable to berth at ports.[3]

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[1] Government of Vanuatu and Pacific Region Infrastructure Facility. 2015. *Vanuatu Infrastructure Strategic Investment Plan, 2015–2024*. Port Vila.

[2] The participation of the local private sector in road maintenance and construction contracts was introduced recently (2012). Before this concept, the PWD was maintaining the transport infrastructure by force account.

[3] When ships are unable to berth at the ports, goods must be transferred by small craft to and from ships anchored at sea.

6. Remote outer-island communities are among the poorest in Vanuatu. They are widely dispersed, with low passenger and cargo demand, which undermines the viability of the private shipping providers that service these locations. To maintain commercial viability, operators are often forced to shift to routes with sufficient passenger and cargo volumes, or to reduce the frequency of ship calls to increase demand. This results in low trade volumes in remote areas. Without strategic, measured attention to outer-island shipping and transport, poverty is unlikely to decline, and out-migration is almost certain to increase. The Interisland Shipping Support Project, financed by the Government of New Zealand and the Asian Development Bank (ADB),[4] seeks to strengthen interisland shipping infrastructure and establish a strategic subsidized shipping scheme to service remote islands in Vanuatu. The PWD maintains the government-owned domestic wharves and jetties using small- to medium-sized contracting, outsourced to local contractors.

B. Damage Overview

7. Tropical Cyclone Pam heavily affected transport infrastructure, particularly roads. Heavy rainfall and destructive high storm surges caused severe flooding and widespread damage in Tafea and Shefa provinces and some outer islands. A combination of large flood flows and debris accumulation caused washouts and extensive damage to bridges, approach roads, piers, abutments, riverbanks, and service connections. The debris accumulation at bridges, coupled with water pressure from floodwaters, disconnected the bridges from the approach roads and washed out many major bridge components (e.g., culverts with headwalls completely collapsed or were washed away because of the flooding and/or storm surges). The floodwaters caused a change in flow patterns for many rivers and streams. The Efate ring road was the most severely affected road. About 19 km of the road suffered extensive pavement damage, as roadside drains were blocked or silted with accumulated sediment and debris. Several road sections are open to single lane traffic only because of wave scouring and a major landslide at Klems Hill.

8. Damage to airports, wharves, and jetties in the affected areas was minimal; and no reports were made of damage to vehicles, ships, and aircraft at these ports. Transportation was disrupted for weeks for some 132,000 people in Shefa and Tafea provinces because of fallen trees and damage to the connecting roads. International and domestic flights resumed after a 1-day airport closure. Cruise liners, international cargo ships, and domestic vessels and ferries resumed sailing 1 day after the cyclone.

C. Government's Sector Recovery Strategy

9. The government led a joint rapid post-disaster needs assessment with development partners to estimate the damage and conduct a loss assessment. The assessment report identified the short-term (0–12 months) and medium- to long-term (0–4 years) recovery and reconstruction needs for each sector. For transport, including public and private sector shares, recovery and reconstruction needs have been estimated at $34 million.[5] The sector will require short- to long-term resources to reconstruct improved, more disaster-resilient, and climate-proof infrastructure by adopting "build back better" principles.[6]

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[4] ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loan, Administration of Grant, and Technical Assistance to the Republic of Vanuatu for the Interisland Shipping Support Project*. Manila.

[5] Government of Vanuatu. 2015. *Vanuatu Post Disaster Needs Assessment: Tropical Cyclone Pam, March 2015*. Port Vila.

[6] Build back better (BBB) concept (i) promotes a decentralized and participatory approach to reconstruction, (ii) uses local skills, institutions and resources, (iii) adopts climate and disaster risk reduction measures into reconstruction

10. **Short-term needs (up to 12 months).** The short-term needs involve immediate and transitional measures to resume the delivery of transportation services in the affected areas until the reconstruction and/or replacement of damaged structures is completed. Short-term interventions include immediate restoration works to provide access and connectivity to road users, de-silting of blocked drains, and provision of remedial measures or blocking water from entering landslide areas. The government, through its recurrent budget, has undertaken most of these works and is keeping roads open to traffic. It has used its existing resources and funds to engage national contractors following its own emergency procurement processes. Existing labor-based contractors were issued with contract variations to clear the fallen trees and debris to open access for delivery of emergency relief supplies. The engineering and equipment assistance provided by the Australian and New Zealand Defense Forces were instrumental in opening access on the outer islands.

11. **Medium- to long-term needs (up to 48 months).** The medium- and long-term needs involve rehabilitation, reconstruction, or upgrading of transport infrastructure and roads works following build back better principles. Thorough site surveys and assessments with geotechnical investigations will lead to robust detailed engineering designs that apply international best-standards and practices. Detailed engineering designs will include disaster-resilient and climate-proof elements (for seismic activity, cyclones, and floods), including technical specifications for strengthened structures and protection works. Reputable, experienced, and qualified contractors will be procured, through competitive bidding processes under standard sample bidding documents, and larger procurement packages will be carefully planned and executed.

D. Ensuing Project

12. At the request of the Government of Vanuatu, ADB's Board of Directors approved the Cyclone Pam Road Reconstruction Project on 25 November 2015. The financing and grant agreements were signed on 1 March 2016 and became effective on 3 March 2016. The project required transport infrastructure in damaged locations on the Efate ring road reconstructed, and climate and disaster resilience improved. The project scope included (i) 10 km of road rehabilitated; (ii) eight major stream crossings and their approach roads rehabilitated and protected;[7] (iii) minor damage to nine bridges or box culverts and causeways repaired, and debris cleared;[8] (iv) 200 meters (m) of river channel realigned (upstream and downstream), and river training structures constructed; (v) 1,000 m of sealed pavement protected against erosion from storm surges; (vi) 8 km of roadside and crossroad drainage improved; (vii) six culvert headwalls reconstructed; (viii) 250 m of guardrail reconstructed; (ix) 180 m of riverbanks protected; (x) a 100 m by 50 m landslide at Klems Hill restored, and the road pavement protected; and (xi) a 600 m-long concrete longitudinal roadside drain at Klems Hill improved.

13. The design and supervision consultants (DSCs) for the project were selected in June 2016. Upon mobilization of the consultants on 6 July 2016, the DSCs carried out a detailed technical investigation on the Efate ring road, comprising geotechnical investigation, topography, and bathymetric survey; and determined the actual extent of damage to the road. The detailed assessment of the damage required expansion of the project scope to bring the road back to its pre-cyclone state, while including climate- and disaster-resilient requirements. The expanded scope includes four additional sites on the road and revision to the scope of two sites already

processes to lessen vulnerability to future risks, (iv) promotes the recovery of local livelihoods, and (vi) enables a more cost-effective and sustainable recovery.

[7] The bridges include Mele, Prima, Creek Ai, Marona, Lamin, Malatia, Pangpang, and Rentapau.

[8] The bridges include Eton Dry Creek, Eton Beach, La Cressonnaire, Havana, Tanoliu, Sara, Epule, Epau, and Neslep.

included in the project. The government requested additional financing from ADB to scale up the project and to include the expanded scope identified during site investigations of the project. The expanded scope under the additional financing will include:

(i) Work conducted on additional locations on the Efate ring road damaged by TCP:
    (a) 6.2 km of the Tassikiri road section upgraded, including drainage improvement;
    (b) management of Prima floodplain developed to manage floodwaters in the Prima (La Colle) River catchment near Prima Bridge;
    (c) Tanoliu and Ulei bridges reconstructed; and
    (d) drainage at Saama improved.

(ii) Scope of work for two of the damaged sites in the original project changed because of the extent of damage and unforeseen ground conditions:
    (a) **Epule Bridge**. The bridge was to be repaired in the original project, but it now requires reconstruction with an improved road alignment.
    (b) **Marona Bridge**. Boreholes under geotechnical investigations terminated at a depth of 20 meters. However, data interpretation and analysis showed that the soils underneath were undergoing liquefaction. The boreholes need to be driven down to at least 30 meters to confirm the founding material for bridge piles.