

lines. This is believed, however, to reflect an unreal situation, as in some cases the lines may be functional, however the individual house may have been destroyed.

The damage sustained has been estimated at EC\$30 million, with a replacement cost (direct cost) of EC\$42 million. This difference is accounted for by the fact that duties are now payable on the required equipment, whereas previously they were not. Estimates for the damages sustained by the other cellular providers have been made based on a preliminary estimate of the relative market share of these providers. This results in the following:

1. Digicel	EC\$10 million
2. AT&T	EC\$10 million
3. GNP	EC\$ 5 million

In all, this gives a total estimate of direct cost for this utility sector, of EC\$67 million.

In terms of indirect costs as a result of loss of revenue, the following can be noted:

- There have been some losses of revenue from the cellular telephone network. In the first day after the storm, it is assumed that 10-15% of cell sites were working in the two northernmost parishes. Two days after the event, 12 of 24 GSM sites were up and running. Two weeks later, 23 of 24 GSM sites were up and running. This leads to the assumption that on Day 1 following the event, cellular phone revenues would have been reduced by 90%. Between Day 2 and Day 7, cellular phone revenues would have been reduced by 50%. Between Day 7 and Day 14, revenues would have been reduced by 20%. After Day 14, revenue reductions would have been minimal (5%). These assumptions may be tempered by the fact that there has been significant increased cell phone usage since the hurricane. It is not, however, possible to quantify this increased usage at this stage.
- On average, residential customers pay EC\$60/month for land lines. Commercial customers can be expected to pay approximately EC\$105/month per phone. This equates to monthly revenues of EC\$2.4 million.
- Cell phone revenues are approximately 60% of land line revenues, or approximately EC\$33,000 per day.
- Prior to the hurricane, there were 27,500 residential lines and 7,500 business lines.
- No revenues are expected to be collected for the month of September throughout the island.
- It is assumed that by the end of September, 30% of all land lines will be in operation and that revenues may be collected for them.
- It has also been assumed that 50% of land lines will be restored between October and February, at a rate of 10% per month and that revenues may be collected for them.
- Finally, it has been assumed that the remaining 20% of lines, even if repaired within the six month window, will likely require a further six months before housing infrastructure has been upgraded to the point where land line fees may be charged.
- The total loss of revenue (indirect losses) from land lines over the next twelve (12) months will be EC\$57 million.

- The total loss of revenue (indirect losses) from cell phones as a result of the hurricane is estimated to be EC\$280,000. This includes a 40% markup to account for the other cellular operators.

The cable providers in Grenada are Cable Vision and Wee TV. Damage assessments carried out for this sub-sector total EC\$5 million. To replace this damaged equipment, which primarily consists of the lines, will require an estimated EC\$7.5 million. This service is not expected to be restored for another six months. Using a customer base of approximately 15,000 and at a monthly rate of EC\$60, the indirect losses are expected to be EC\$5.4 million. This estimate does not include losses from advertising revenues.

There are approximately eight (8) broadcasting stations in Grenada. All of these were out of service during and immediately after the storm. At the time of writing this report, three stations were partially back on the air. Based on discussions with the main operators, a figure of EC\$2 million can be assumed for the rehabilitation costs.

Roads and Drainage

A detailed field review of the road network throughout the island revealed that in general, with a few exceptions, the main roads were largely intact. This fact was largely due to the limited amount of rainfall that fell during the hurricane. Where damage and/or limitations to access occurred, it was primarily due to: land slippage; erosion; fallen trees and wave effects.

Land Slippage

Land slippage was observed at St. Paul's, where clean-up efforts took approximately three days. Other sites of slippage included River Road and Brizan. In addition, the effects of the storm worsened the effects of a major landslide that had occurred previously on the Western Main Road on the approach to Gouyave (Photo 8). This landslide occurred before the hurricane and urgently needs to be cleared and some slope stabilization works carried out.



Photo 8 Land Slippage at Gouyave Blocking Western Main Road

Mitigation strategies for this slide could include either some form of slope stabilization, or relocation of the roadway to a lower level with sea defence works to protect it. It is

estimated that the cost of repairs to this location is approximately EC\$12 million. No indirect costs have been assigned to this project, as the length of the diversion roadway is sufficiently short that it does not present a significant difference from the main route.

Erosion

Erosion of road edge was noted particularly at Grand Etang and Westerhaul (Photo 9). This type of road failure is characterised by removal of a section of the road, through the action of a slope failure. Remedial works should include a retaining wall, which would have to be designed on a site specific basis. Estimated costs to repair these two locations will be EC\$500,000.



Photo 9 **Erosion of Roadway at Westerhaul**

Fallen Trees

A number of roads were blocked by fallen trees all over the island (Photo 10). This phenomenon is discussed in the Environmental Section, where the prevalence of downed trees in the Grand Etang Forest Reserve was noted. Following the hurricane, the Ministry of Works sent out 15 crews to carry out clearing exercises island-wide. Each crew consists of a front end loader, a dump truck and labourers with chain saws. Estimated costs for this activity will be EC\$1.2 million.