

5. Discussion

Three tsunami scenarios were modelled, each at three sea levels. These were a remote South American tsunami, representing the most probable tsunami risk facing Northland and two local/regional events caused by subduction zone earthquakes in the Tonga-Kermadec trench which represent worst case scenarios for Northland's tsunami risk. The sea levels were current MHWS and MHWS with sea level rises of 30 and 50 cm representing 50 and 100 year projection for sea level as assessed by the IPCC Fourth Assessment Report.

The remote South American tsunami is seen as the most probable event with a return period on the order of 50 years. At Mean High Water Spring this tsunami causes maximum water elevations of around 2m above MSL and up to 3m in some bays. The effect of the tsunami on Ahipara is mainly confined to the streambed although it is more extensive with the added impact of sea level rise. Likewise the impact of the tsunami on Taipa is mostly in the estuary. Although this does not cause significant

inundation in most places it does cause increased water speeds and would result in significant scouring of estuary channels and dunes. This is especially a concern for the SH10 bridge across the Taipa river in Taipa where water speed reach 5 m/s. A tsunami from South America takes over 15 hours to reach New Zealand providing some time for implementing contingency plans.

The two Tonga-Kermadec subduction zone events have a far longer return period. As regional events, however they have a far larger impact on Northland. The M_w 8.5 event causes wave heights of 4m or higher in places while the M_w 9.0 event causes waves of 8m or higher around much of the Northland coast. These events have the added concern of a far shorter length of time between the earthquake fault rupture and the arrival of the tsunami. The first wave hits the east coast of Northland around 70 minutes after the earthquake. Low lying areas of Ahipara, including the main road to the southern part of the community, are inundated by the M_w 8.5 event at MHWS even before the added impact of sea level rise. The M_w 9.0 event inundates extensive areas of Ahipara and much of the main road. Inundation of Taipa by the M_w 8.5 event is mainly confined to a streambed on the western edge. Water speeds in the river are considerably increased however. The M_w 9.0 event inundates all the low-lying areas of Taipa with high water speeds in many places.