ACCELERATION SPECTRA FROM GISBORNE - 2ZG SITE

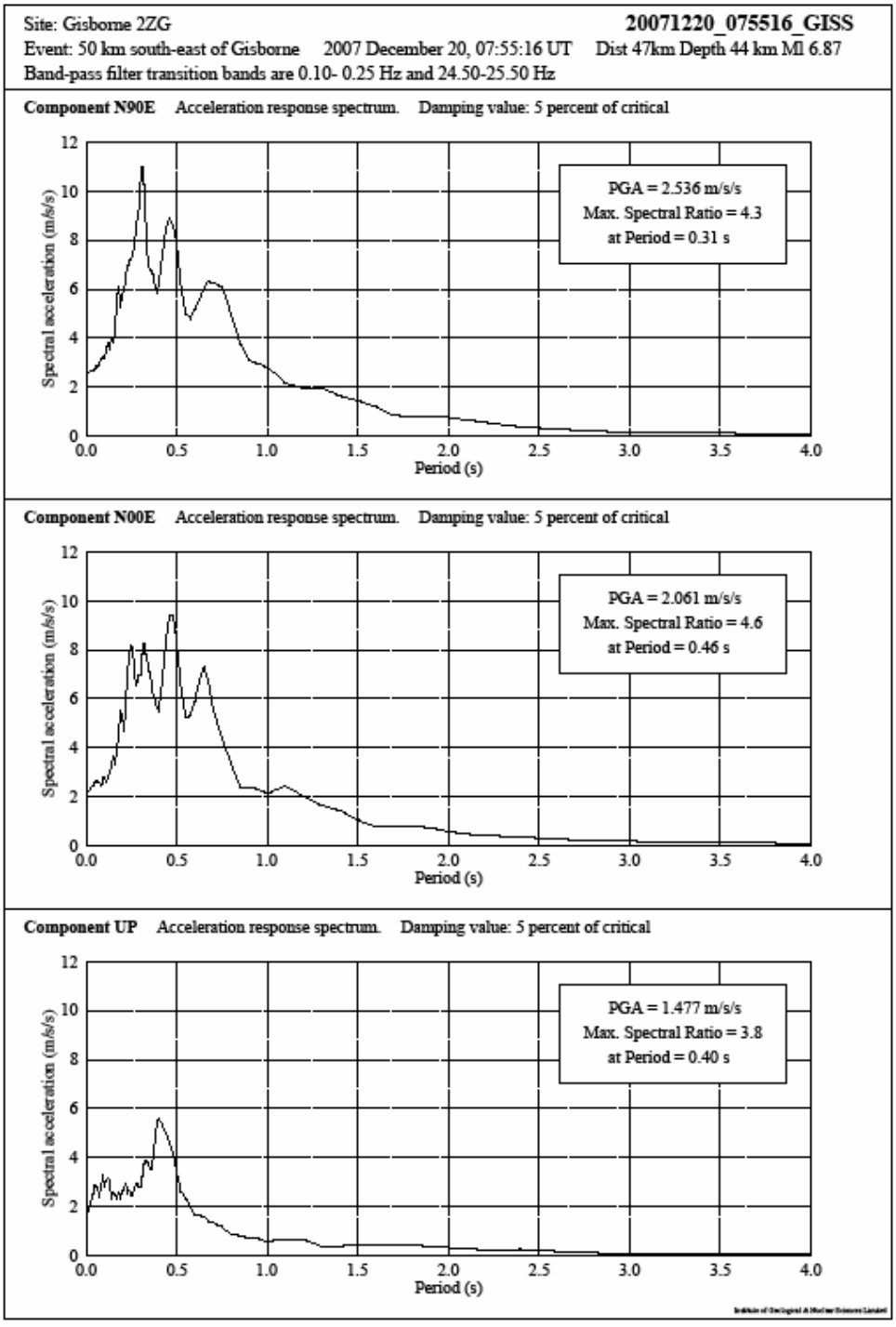

Figure 1: Three component spectra for Gisborne 2ZG record

The ground motion record from the above station has been reduced to motion spectra in the E/W orientation (primary component PGA=0.25g) and the N/S orientation (secondary component PGS 0.2g) with the vertical spectral response also presented for completeness). (Note: the orientation selected are not necessarily the most severe from any orientation – work is ongoing on this aspect).

The location of the recorder is two blocks south of the CDB and approximately 3 blocks east of the river. Site soil classification is considered to be Class D, although it is close to being Class E).

Notable Features

- the sharp spikes present at around 0.35 seconds in the E/W component where Sa(0.35)≈1.15g.
- A less intense spike occurs in both records at approx T=0.5 sec with components Sa(0.5)≈0.87g E/W and Sa(0.5)≈0.93g N/S.
- Between the period ranges T=0.25 and T=0.7 both records indicate acceleration spectral levels generally in excess of 0.6g.
- Between T=1 and T=1.5 second, acceleration levels fall from 0.2g to 0.15g and rapidly continue to decline into the higher period ranges.

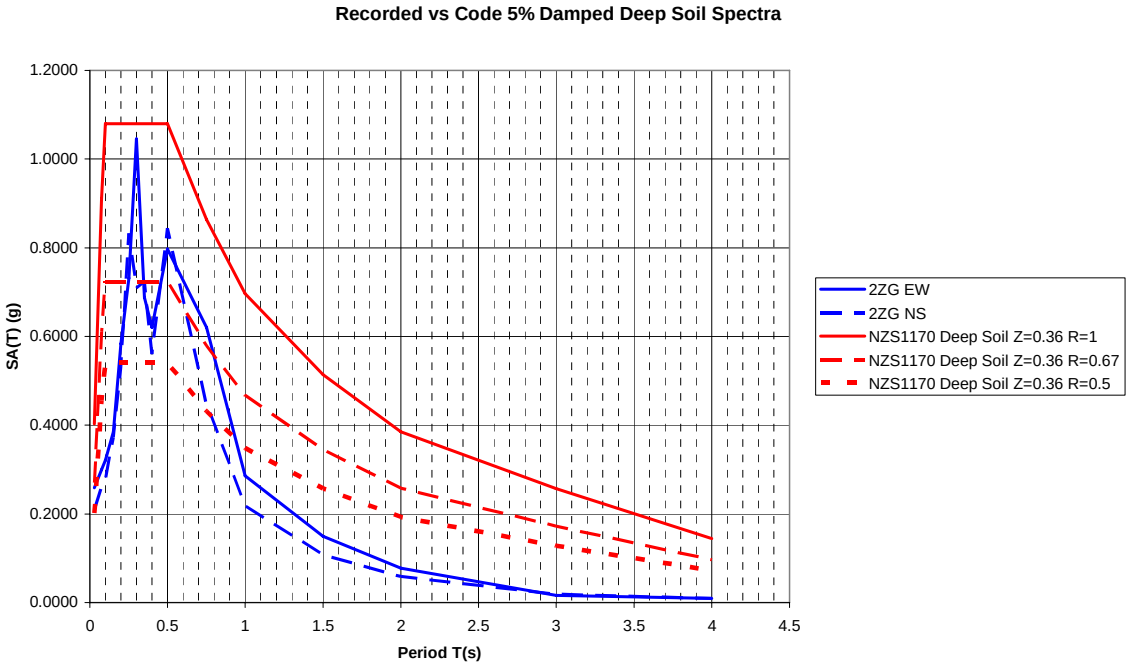

Figure 2: Recorded vs Code

The two components of the recorded record are compared with the Deep Soil ground motion spectra with R=1 (1/500), R=0.67 (1/150) and R=0.5 (1/100) (Note bracketed figures representing annual probabilities or exceedence).

Notable features:

- Within the period range T=0.25 to T=0.8, the measured response components are reasonably aligned with the R=0.67 ground motion projection, indicating that the motion could be considered to be approximately coincident with motions associated with a 1/150 annual probability or exceedence or motions approximately 2/3 those of ULS design level.
- The Sa(0.35) peak value is exception in that it approaches the 1/500 design value although is limited to a very narrow period band.
- Beyond T=1 second motions approximately align to R=0.25 (1/25) being levels of motion at which the onset of damage could be expected (while recognising that few elements and components will experience significant excitation over that period band.

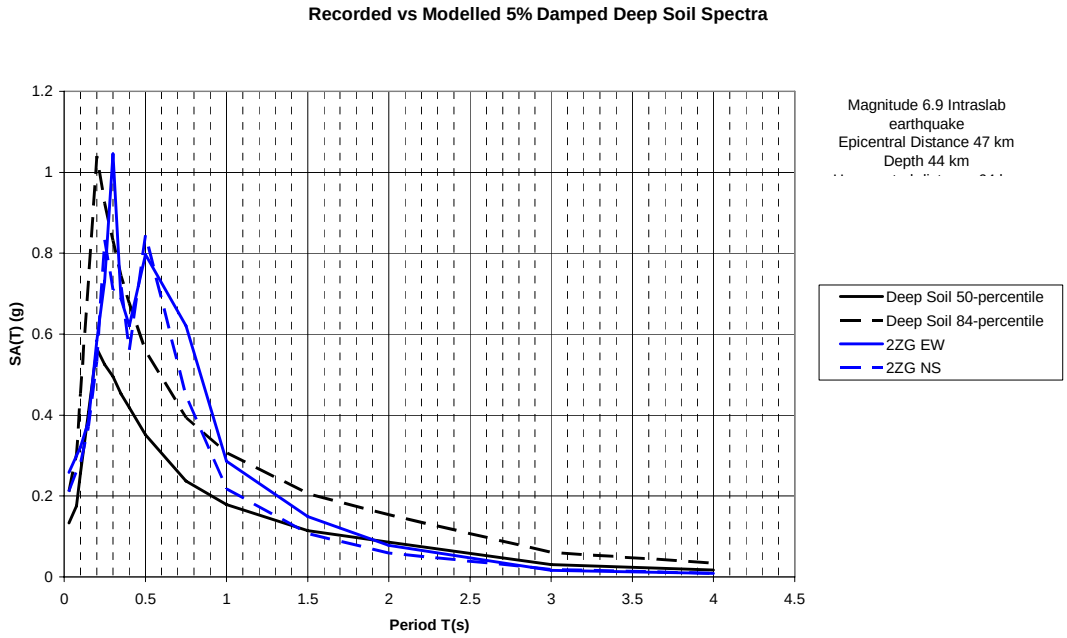

Figure 3: Recorded vs Modelled

The two component records are compared with those projected by running the event (location, depth, magnitude and earthquake type) through the NZ seismic hazard model.

Notable features:

- The recorded accelerations match relatively closely the 84% deep soil projections in the short period range T<0.4 seconds, exceed the projected motions over the mid period range 0.4<T<1 second and are below projected motions for the long period range T>1 second.
- The stronger motions within the mid-period range are abnormal and not included in the model

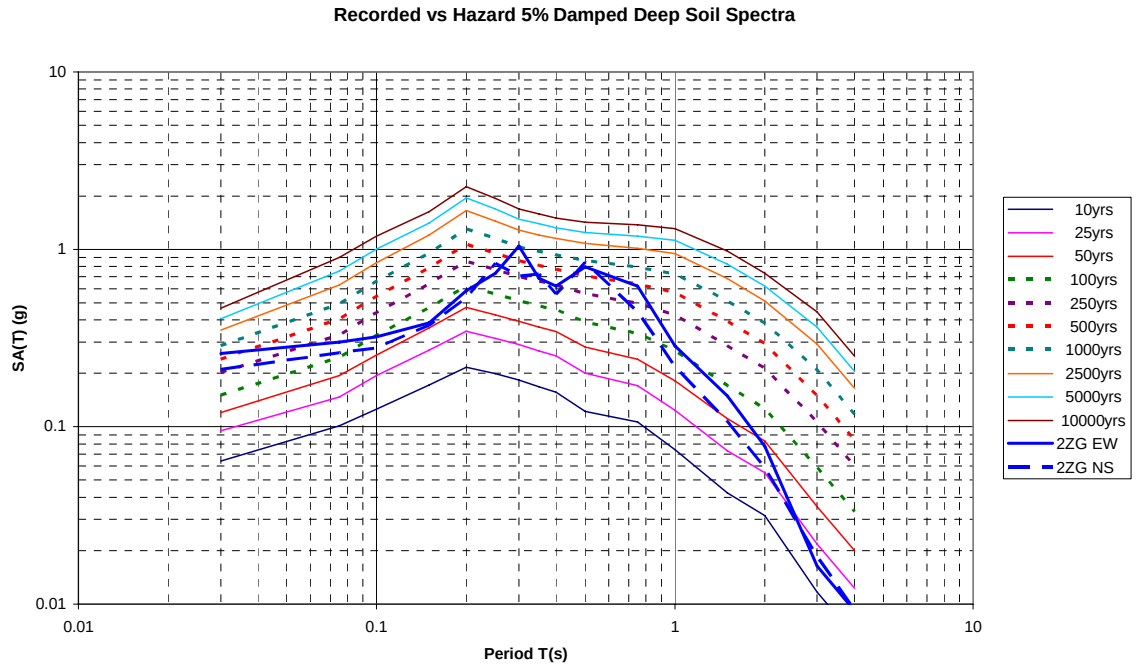

Figure 4: Recorded vs Hazard

The recorded motions have been superimposed over various hazard spectra for visual comparison.

Notable features:

- The recorded values are deficient in both short (T<0.4 sec) and long (T>1 sec) ranges, but relative strong within the mid-period range where motions align approximately with motions expected from an event with an annual probability of exceedence of 1/250.