

Appendix G: Dune Stability Schema for Erosion Mapping

First pass, or “rule of thumb” erosion distance assessments are calculated by dividing the storm demand by the beach dune height. Nielsen et al. (1992) describes a more robust method, where a storm demand volume is converted to a horizontal distance by defining a zone of slope adjustment and a zone of reduced foundation capacity (Figure G-1).

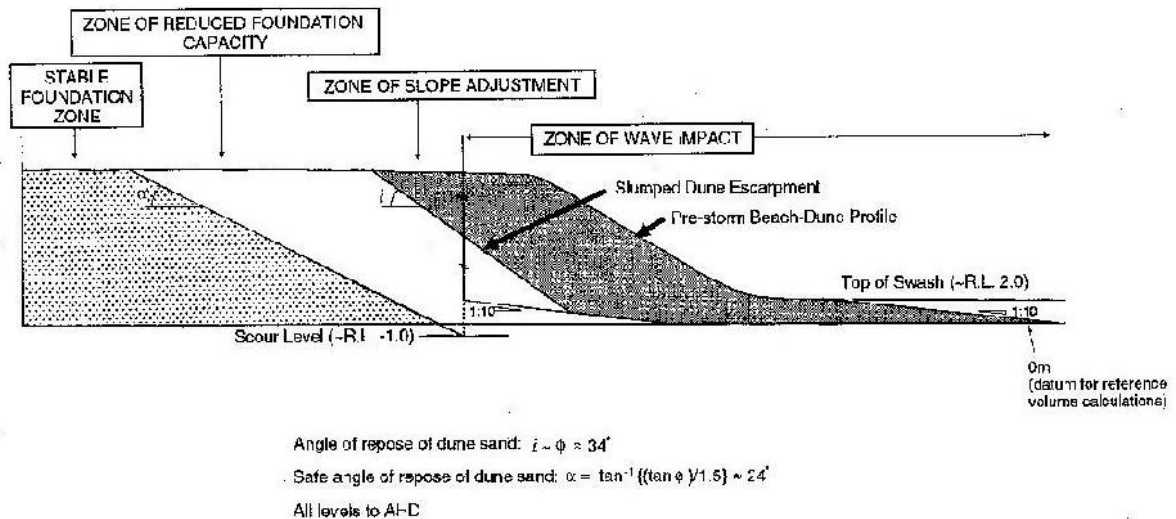


Figure G-1: Zone of slope adjustment (Nielsen et al, 1992)

Typically, a constant dune height is adopted for each beach when using this method, but this approach is not ideal because beach profiles are often irregular, and vary alongshore. Measured cross sections of each beach’s dune system were used for this investigation (instead of a constant dune height), to accurately determine the relationship between storm demand volumes and erosion distances (Figure G-2). All calculations were undertaken volumetrically rather than using the simplified empirical equations in Nielsen et al., (1992) to define the ZWI, ZSA and ZRFC. That is, it was not necessary to define an average ground level to solve for each of these zones.

The only inputs were storm demand, swash elevation, scour level and the angle of repose.

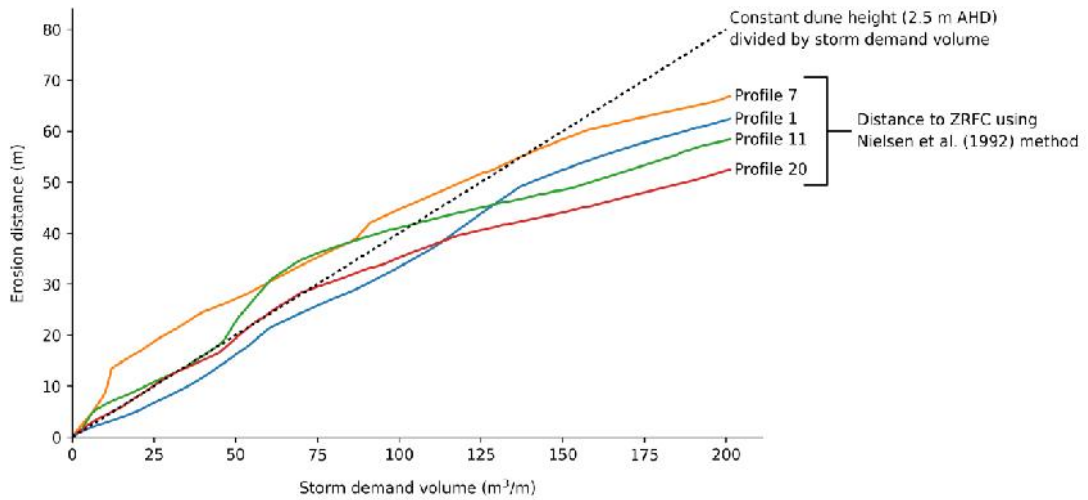


Figure G-2: Erosion distances for a range of storm demand volumes at Broulee Beach (block N)

The Nielsen et al. (1992) method assumes a swash elevation of 2 m AHD. Some of the beaches exposed to lower energy wave climates did not fit this model, so a swash elevation of 1 m AHD was adopted for the following sites:

- Maloneys Beach;
- Surfside Beach (east and west);
- Tomakin Cove; and
- Broulee Beach (southern section only).

The following values were assumed for all calculations:

- angle of repose of the dune sand: 34° (1V:1.48H)
- scour level: -1 m AHD
- eroded beach face slope: 5.7° (1V:10H)
- factor of safety: 1.5