

## Breakwater design

### Design wave height

1:100 year high water 1.99 m AHD  
 Sea bed level 1.00 m AHD  
 Allowance for erosion 0.80 m

Depth = 2.09 m (+ 0.3m sea level rise)

Wave height = 1.63 m = 2.81 m AHD wave crest, 0.78d  
 Wave set up 0.00 m  
 Design Wave height = 1.63 m = 2.81 m AHD (accounting for wave set up)

Note: Wave run up must be allowed for when determining height of breakwater crest (refer separate excel sheet for wave run up)

### Primary Armour

Unit weight  $w_r = 26 \text{ kN/m}^3$   
 Design wave height  $H = 1.63 \text{ m}$   
 Stability coefficient  $K_{RR} = 1.6$  quarry stone rough angular, 2 layers  
 Specific gravity  $S_r = 2.6$   
 $\cot \vartheta = \text{Slope } 1: 1.75$

$$W_{50} = \frac{w_r \cdot H^3}{K_{RR} \cdot (S_r - 1)^3 \cdot \cot \vartheta}$$

$W_{50} = 9.82 \text{ kN} = 982 \text{ kg}$   
 $1.0 \text{ t}$

requ. Diameter = 0.90 m adopt 0.9m-1.1m diameter primary rocks

### Secondary Armour

$W_{50} / 10 = 0.98 \text{ kN} = 98 \text{ kg}$   
 $0.1 \text{ t}$   
 requ. Diameter = 0.42 m adopt 0.4m-0.5m diameter secondary rocks

### Toe Rock

$W_{50} = 11.79 \text{ kN} = 1179 \text{ kg}$   
 $1.2 \text{ t}$   
 requ. Diameter = 0.95 m adopt 1.2m diameter toe rock