Coastal Erosion Investigation Area – Site Assessment

Methodology for conducting a site assessment in a Coastal Erosion Investigation Area

January 2021

V1.0

Tasmanian Government

ACKNOWLEDGEMENT

This document has been developed by Tasmania's Department of Premier and Cabinet, in collaboration with the Local Government Association of Tasmania, Department of State Growth, Department of Justice, Department of Primary Industries, Parks, Water and Environment, and the University of Tasmania.

DOCUMENT ACCEPTANCE AND RELEASE

This document is Version 1.0 of the *methodology for conducting a site assessment in a Coastal Erosion Investigation Area*. This is a managed document. For identification of amendments, each page contains a release number and a page number. Changes are only issued as a complete replacement; superseded versions should be removed from circulation.

DOCUMENT DEVELOPMENT HISTORY

VERSION CONTROL

Version	Date	Author	Reason	Sections
1.0	Jan 2021	DPAC, Office of Security and Emergency Management	Public release	All

Disclaimer

The information presented in this document is provided as an information source only. The Tasmanian Government makes no statements, representations or warranties about the accuracy or completeness of the information provided herein. The Tasmanian Government disclaims all responsibility and liability (including without limitation, liability for negligence) for all expenses, losses, damages or costs you might incur as a result of the information being inaccurate or incomplete in any way and for any reason.

CONTENTS

Overview

THIS GUIDE provides the methodology for a suitably qualified person to determine the applicable hazard band of sites within a Coastal Erosion Investigation Area.

The Coastal Erosion Hazard Code in the Tasmanian Planning Scheme and the *Director's Determination – Coastal Erosion Hazard Areas*[1] require that a report by a suitably qualified person is submitted to the relevant local council when lodging an application for a planning permit or authorisation for building work that relates to land in a Coastal Erosion Investigation Area. The report must:

(a) categorise the site in the relevant Coastal Erosion Hazard Band in accordance with the methodology in this document; and
(b) consider any matter specifically required by Performance Criteria in the Coastal Erosion Hazard Code.

COASTAL EROSION AND INVESTIGATION AREAS

Coastal erosion occurs when water, wind and general weather conditions wear away or destroy coastal land. The potential for coastal erosion to harm people, property, or valued aspects of the environment is referred to as a *hazard*.

International predictions provide estimates of the likely scenarios for sea level rise in 2050 and 2100[2]. As sea levels rise, scientific evidence suggests that extreme events, such as high tides and storm surges, will increase the rate of coastal erosion in susceptible areas.

To facilitate adaptation to these changes, land along the Tasmanian coastline has been classified within one of four Coastal Erosion Hazard Bands or as a Coastal Erosion Investigation Area (Table 1). Coastal Erosion Hazard Bands[3] describe the vulnerability of different parts of the Tasmanian coast to the effects of coastal erosion and inform decisions about planning and building in coastal areas.

Table 1: Defining Coastal Erosion Hazard Bands and Investigation Area

Acceptable	Area unlikely to be affected by coastal recession until after 2100
Low	Area vulnerable to coastal recession before 2100
Medium	Area vulnerable to coastal recession before 2050
High	Area vulnerable to coastal erosion now
Investigation Area	The vulnerability of the area to coastal recession is unknown

[1] issued under the *Building Act 2016*

[2] *http://www.environment.gov.au/climate-change/climate-science-data/climate-science/climate-change-future/sea-level*

[3] Detailed information about development of the hazard bands is available in the Coastal Erosion Mapping Technical Report, which is publicly available at www.dpac.tas.gov.au

If there is insufficient or incomplete information about an area to estimate how susceptible that land is to coastal erosion, it has been categorised as an ***investigation area***. Investigation areas are typically located outside coastal settlements or townships, and/or in areas that were not accessible when the classification process was carried out.

People who own properties in investigation areas must arrange for a site assessment to determine which hazard band applies to the land as part of preparing for any further development on that land.

For information about the development and operation of the hazard bands please refer to *Fact Sheet SPP9 – State Planning Provisions – Coastal Hazards* prepared by the Department of Justice's Planning Policy Unit.

COMPLETING A SITE ASSESSMENT

A suitably qualified person, defined in the Director's Determination as a geotechnical practitioner (refer Box 1), must be engaged to conduct a site assessment in accordance with the methodology detailed on pages 6-9 of this document.

Findings are to be recorded in the data sheet on pages 10-11 of this document and used to classify the site into a hazard band using the matrix at Appendix A.

Following this, they are to prepare a coastal erosion investigation area report in accordance with the Coastal Erosion Hazard Code and *Director's Determination*.

Box 1: What is a Geotechnical Practitioner?

For the purposes of the *Director's Determination*:
A **geotechnical practitioner** includes people working in the following professions:

(a) an engineer-civil;
(b) a geotechnical engineer licensed as an engineer-civil acting within their area of competence;
(c) an engineering geologist with the qualifications and expertise specified in the Certificates by Qualified Persons for an Assessable Item Determination made by the Director of Building Control as amended or substituted from time to time, acting within their area of competence.

Site Assessment Methodology

QUESTION 1: HOW EXPOSED IS THE SITE TO WAVES?

Waves contribute to both coastal erosion (wearing away) and coastal accretion (build-up).
The power of waves in normal weather is different to the power of waves during storms. While high-energy storm waves cause shoreline erosion, the low-moderate energy waves experienced in normal weather can return sand and rebuild shorelines. The combination of waves, wind and currents significantly affects susceptibility to coastal erosion.

Swell-exposed or swell-sheltered?

In general, the more open the coast is, the more exposed it is to swell.

To determine whether the coast is exposed or sheltered, consider the following questions:

- *Is the shoreline directly exposed to the ocean?*
- *Are there waves on the shore in still calm weather?*

There are two categories of swell exposure:

Category	Description
Swell-exposed	A swell-exposed coast normally has wave activity on the shore, even in very calm weather These areas are subject to lower-energy normal weather waves and high-energy storm waves: that is, processes that both wear away and rebuild shorelines.
Swell-sheltered	On a swell-sheltered coast, there is typically very little wave activity in normal weather. While these areas are subject to erosion by wind-generated, high-energy waves, they are unlikely or slow to rebuild after erosion takes place, due to the absence of low-moderate energy wave activity in normal weather.

Coastal region?

Different sections of coastline are exposed to different levels of wave energy, influenced by characteristics such as wave height and direction. Waves in swell-exposed areas share similar characteristics along broad regional stretches. Without good local knowledge, long-term measurements or specialist expertise, it may be difficult to assess the characteristics of waves in swell-sheltered areas.

There are four main coastal regions: *(refer map on next page)*

Region	Description
North Coast	Extends from Woolnorth Point to Cape Portland
East Coast	Extends from Cape Portland to Cape Pillar
Storm Bay	Extends from Cape Pillar to South East Cape
South and West	Extends from South East Cape to Woolnorth Point

MAIN COASTAL REGIONS OF TASMANIA

QUESTION 2: IS THE GROUND MAINLY SAND, GRAVEL, CLAY OR ROCK?

The ground materials that make up shorelines comprise anything from hard rock to loose sand. The type of ground influences how susceptible the site is to wave energy and erosion.

The soil or sand that sits on top of the underlying ground material can vary in thickness, which may obscure the actual type of ground underneath. For example, some shorelines may appear to be composed of soft sand dunes, but the sand may be just a thin layer that covers a hard rock base.

Soft or hard ground?

There are five broad categories of coastal ground:

Category	Description
Soft, sandy or loose	Mainly sand and/or sandy soil or gravel that extends vertically down from the surface of the land to below sea level
Coarse boulder clay	Mainly friable (easily broken) claystone or sandstone, with hard bedrock boulders
Soft rock	Mainly friable (easily broken) claystone or sandstone
Sandy beach backed by hard rock	Hard rock platforms above sea level and sloping rock ramps, with sandy shorelines; may have superficial sand dunes with bedrock underneath
Hard rock	Hard rock platforms above sea level and sloping rock ramps, without sandy shorelines

Geological maps may help you to identify the type of ground on the site. These are available online and free of charge through LISTmap, an online mapping service available at www.thelist.tas.gov.au. The most useful scale of maps for this purpose are 1:25,000 or 1:50,000.

Man-made coastal defences?

Artificial coastal defences – such as man-made seawalls – also influence a site's vulnerability to the forces of coastal erosion.

Some coastal defences are more resilient than others. For example, a newly-constructed seawall that is made from steel or rock and concrete would be expected to have a lifespan of more than ten years, whereas a seawall made with timber or log piles would have an expected lifespan of less than ten years.

QUESTION 3: IS THE SITE FLAT, SLOPING OR ON A CLIFF?

The slope of a site affects the type and speed at which erosion is likely to occur. For the purposes of this guide, the slope of a property may be estimated and defined as a simple percentage.

There are two categories of slope:

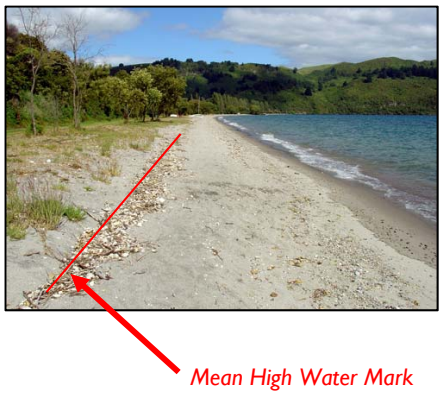
Category	Description
Flat to moderate	0% - 35%
Steep or on a cliff	36% or more [Note: 36% is equivalent to a 20° slope]

QUESTION 4: HOW CLOSE IS YOUR SITE TO THE MEAN HIGH WATER MARK?

The Mean High Water Mark is the highest line of regular wave wash on the shore during normal weather (not storms).

The easiest way to identify this is to find the line of debris (seaweed, dead wood etc.) that has washed up on the shore at high tide. Measure from this line to the closest boundary of the site within the investigation area.

If the site is on a cliff or steep hill overlooking a shoreline, measure from the edge of the cliff or line of vegetation to the closest boundary of the site.



Data sheet

Please record the results of your site assessment in this data sheet and include any other supporting information and photographic evidence.

CONTACT INFORMATION

Name			
Phone		Mobile or other phone	
Email			
Are you the landowner?	☐ YES	☐ NO	

SITE ADDRESS

Street number and name	
Suburb or town	

1. HOW EXPOSED IS THE SITE TO WAVES? *(see page 6-7)*

1.1 How would you categorise the swell exposure of your site? *(select one)*

☐ Swell-exposed	☐ Swell-sheltered

1.2 In which of the four coastal regions is your site located? *(select one)*

☐ North Coast	☐ East Coast	☐ Storm Bay	☐ South and West

ACTION Please attach and label TWO or more photographs and other information:

- ☐ 1: General photos that provide evidence of the swell exposure of your site
- ☐ 2: Photos taken from your site, looking out to sea, any surrounding islands or estuary

2. IS THE GROUND MAINLY SAND, GRAVEL, CLAY OR ROCK? *(see page 8)*

2.1 How would you categorise the ground on your site? *(select one)*

☐ Soft, sandy or loose	☐ Coarse boulder clay	☐ Soft rock	☐ Sandy beach backed by hard rock	☐ Hard rock

2.2 Is your site protected by a man-made coastal defence, such as a seawall? *(select one)*

☐ Yes – resilient (estimated lifespan **more** than 10 years)	☐ Yes – non-resilient (estimated lifespan **less** than 10 years)	☐ No protection

ACTION Please attach and label TWO or more photographs and other information:

- ☐ 1: Photos that provide evidence of the type of ground on your site
- ☐ 2: Photos and information about any man-made coastal defences protecting your site, if present

3. IS THE SITE FLAT, SLOPING OR ON A CLIFF? *(see page 9)*

How would you categorise the slope of your site? (select one)	
☐ Flat to moderate slope	☐ Steep or on a cliff

ACTION **Please attach and label TWO or more photographs and other information:**

- ☐ 1: Photos that provide evidence of the slope of your site
- ☐ 2: Any other supporting information, including the method used to calculate slope

4. HOW CLOSE IS YOUR SITE TO THE MEAN HIGH WATER MARK? *(see page 9)*

What is the shortest distance from the Mean High Water Mark to the boundary of your site?
metres (estimate to the nearest metre)

ACTION **Please attach and label TWO or more photographs and other information:**

- ☐ 1: Photos that support your estimate of distance to the Mean High Water Mark
- ☐ 2: A description that notes the exact distance of your site from Mean High Water Mark

5. ASSESS YOUR SITE'S HAZARD BAND CLASSIFICATION

Use answers to the questions above to find the relevant Hazard Band in in Appendix A. (select one)			
☐ HIGH	☐ MEDIUM	☐ LOW	☐ ACCEPTABLE

6. CERTIFICATION AND SIGNATURE (APPLICANT)

Date	
Name	
Signature	

Appendix A

Appendix A: Hazard band classification

REGION	SWELL EXPOSURE	TYPE OF GROUND	COASTAL DEFENCE	SLOPE	SHORTEST DISTANCE TO MEAN HIGH WATER MARK	HAZARD BAND
NORTH COAST	SWELL-EXPOSED	Soft, sandy or loose	YES: resilient	Not applicable	< 35 metres	LOW
					> 35 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 35 metres	HIGH
					35-75 metres	MEDIUM
					> 75 metres	ACCEPTABLE
			NO protection	Not applicable	< 35 metres	HIGH
					35-75 metres	MEDIUM
					> 75 metres	ACCEPTABLE
		Coarse boulder clay	YES: resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			NO protection	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
		Soft rock	YES: resilient	Not applicable	< 28 metres	LOW
					> 28 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
			NO protection	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
		Sandy beach backed by hard rock	YES: resilient	Not applicable	< 35 metres	LOW
					> 35 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 35 metres	HIGH
					> 35 metres	ACCEPTABLE
			NO protection	Not applicable	< 35 metres	HIGH
					> 35 metres	ACCEPTABLE
		Hard rock	YES: resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			YES: non-resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			NO protection	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
NORTH COAST	SWELL-PROTECTED	Soft, sandy or loose	YES: resilient	Not applicable	< 22 metres	LOW
					> 22 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 22 metres	HIGH
					22-49 metres	MEDIUM
					49-83 metres	LOW
					> 83 metres	ACCEPTABLE
			NO protection	Not applicable	< 22 metres	HIGH
					22-49 metres	MEDIUM
					49-83 metres	LOW
					> 83 metres	ACCEPTABLE
		Coarse boulder clay	YES: resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			NO protection	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
		Soft rock	YES: resilient	Not applicable	< 28 metres	LOW
					> 28 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
			NO protection	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
		Sandy beach backed by hard rock	YES: resilient	Not applicable	< 22 metres	LOW
					> 22 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 22 metres	MEDIUM
					> 22 metres	ACCEPTABLE
			NO protection	Not applicable	< 22 metres	MEDIUM
					> 22 metres	ACCEPTABLE
		Hard rock	YES: resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			YES: non-resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			No protection	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE

Appendix A: Hazard band classification

REGION	SWELL EXPOSURE	TYPE OF GROUND	COASTAL DEFENCE	SLOPE	SHORTEST DISTANCE TO MEAN HIGH WATER MARK	HAZARD BAND
EAST COAST	SWELL-EXPOSED	Soft, sandy or loose	YES: resilient	Not applicable	< 48 metres	LOW
					> 48 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 48 metres	HIGH
					48-88 metres	MEDIUM
					> 88 metres	ACCEPTABLE
			NO protection	Not applicable	< 48 metres	HIGH
					48-88 metres	MEDIUM
					> 88 metres	ACCEPTABLE
		Coarse boulder clay	YES: resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			NO protection	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
		Soft rock	YES: resilient	Not applicable	< 28 metres	LOW
					> 28 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
			NO protection	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
		Sandy beach backed by hard rock	YES: resilient	Not applicable	< 48 metres	LOW
					> 48 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 48 metres	HIGH
					> 48 metres	ACCEPTABLE
			NO protection	Not applicable	< 48 metres	HIGH
					> 48 metres	ACCEPTABLE
		Hard rock	YES: resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			YES: non-resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			NO protection	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
EAST COAST	SWELL-PROTECTED	Soft, sandy or loose	YES: resilient	Not applicable	< 22 metres	LOW
					> 22 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 22 metres	HIGH
					22-49 metres	MEDIUM
					49-83 metres	LOW
					> 83 metres	ACCEPTABLE
			NO protection	Not applicable	< 22 metres	HIGH
					22-49 metres	MEDIUM
					49-83 metres	LOW
					> 83 metres	ACCEPTABLE
		Coarse boulder clay	YES: resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			NO protection	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
		Soft rock	YES: resilient	Not applicable	< 28 metres	LOW
					> 28 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
			NO protection	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
		Sandy beach backed by hard rock	YES: resilient	Not applicable	< 22 metres	LOW
					> 22 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 22 metres	MEDIUM
					> 22 metres	ACCEPTABLE
			NO protection	Not applicable	< 22 metres	MEDIUM
					> 22 metres	ACCEPTABLE
		Hard rock	YES: resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			YES: non-resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			NO protection	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE

Appendix A: Hazard band classification

REGION	SWELL EXPOSURE	TYPE OF GROUND	COASTAL DEFENCE	SLOPE	SHORTEST DISTANCE TO MEAN HIGH WATER MARK	HAZARD BAND
STORM BAY	SWELL-EXPOSED	Soft, sandy or loose	YES: resilient	Not applicable	< 35 metres	LOW
					> 35 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 35 metres	HIGH
					35-75 metres	MEDIUM
					> 75 metres	ACCEPTABLE
			NO protection	Not applicable	< 35 metres	HIGH
					35-75 metres	MEDIUM
					> 75 metres	ACCEPTABLE
		Coarse boulder clay	YES: resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			NO protection	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
		Soft rock	YES: resilient	Not applicable	< 28 metres	LOW
					> 28 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
			NO protection	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
		Sandy beach backed by hard rock	YES: resilient	Not applicable	< 35 metres	LOW
					> 35 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 35 metres	HIGH
					> 35 metres	ACCEPTABLE
			NO protection	Not applicable	< 35 metres	HIGH
					> 35 metres	ACCEPTABLE
		Hard rock	YES: resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			YES: non-resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			NO protection	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
STORM BAY	SWELL-PROTECTED	Soft, sandy or loose	YES: resilient	Not applicable	< 22 metres	LOW
					> 22 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 22 metres	HIGH
					22-49 metres	MEDIUM
					49-83 metres	LOW
					> 83 metres	ACCEPTABLE
			NO protection	Not applicable	< 22 metres	HIGH
					22-49 metres	MEDIUM
					49-83 metres	LOW
					> 83 metres	ACCEPTABLE
		Coarse boulder clay	YES: resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			NO protection	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
		Soft rock	YES: resilient	Not applicable	< 28 metres	LOW
					> 28 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
			NO protection	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
		Sandy beach backed by hard rock	YES: resilient	Not applicable	< 22 metres	LOW
					> 22 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 22 metres	MEDIUM
					> 22 metres	ACCEPTABLE
			NO protection	Not applicable	< 22 metres	MEDIUM
					> 22 metres	ACCEPTABLE
		Hard rock	YES: resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			YES: non-resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			NO protection	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
SOUTH & WEST	SWELL-EXPOSED	Soft, sandy or loose	YES: resilient	Not applicable	< 73 metres	LOW
					> 73 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 73 metres	HIGH

Appendix A: Hazard band classification

REGION	SWELL EXPOSURE	TYPE OF GROUND	COASTAL DEFENCE	SLOPE	SHORTEST DISTANCE TO MEAN HIGH WATER MARK	HAZARD BAND
SOUTH & WEST					73-113 metres	MEDIUM
					> 113 metres	ACCEPTABLE
			NO protection	Not applicable	< 73 metres	HIGH
					73-113 metres	MEDIUM
					> 113 metres	ACCEPTABLE
		Coarse boulder clay	YES: resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			NO protection	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
		Soft rock	YES: resilient	Not applicable	< 28 metres	LOW
					> 28 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
			NO protection	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
		Sandy beach backed by hard rock	YES: resilient	Not applicable	< 73 metres	LOW
					> 73 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 73 metres	HIGH
					> 73 metres	ACCEPTABLE
			NO protection	Not applicable	< 73 metres	HIGH
					> 73 metres	ACCEPTABLE
		Hard rock	YES: resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			YES: non-resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	> 50 metres	LOW
					> 50 metres	ACCEPTABLE
			NO protection	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	> 50 metres	LOW
					> 50 metres	ACCEPTABLE
	SWELL-PROTECTED	Soft, sandy or loose	YES: resilient	Not applicable	< 22 metres	LOW
					> 22 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 22 metres	HIGH
					22-49 metres	MEDIUM
					49-83 metres	LOW
					> 83 metres	ACCEPTABLE
			NO protection	Not applicable	< 22 metres	HIGH
					22-49 metres	MEDIUM
					49-83 metres	LOW
					> 83 metres	ACCEPTABLE
		Coarse boulder clay	YES: resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
			NO protection	Not applicable	< 20 metres	LOW
					> 20 metres	ACCEPTABLE
		Soft rock	YES: resilient	Not applicable	< 28 metres	LOW
					> 28 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
			NO protection	Not applicable	< 28 metres	MEDIUM
					28-63 metres	LOW
					> 63 metres	ACCEPTABLE
		Sandy beach backed by hard rock	YES: resilient	Not applicable	< 22 metres	LOW
					> 22 metres	ACCEPTABLE
			YES: non-resilient	Not applicable	< 22 metres	MEDIUM
					> 22 metres	ACCEPTABLE
			NO protection	Not applicable	< 22 metres	MEDIUM
					> 22 metres	ACCEPTABLE
		Hard rock	YES: resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			YES: non-resilient	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE
			NO protection	Flat to moderate	Not applicable	ACCEPTABLE
				Steep or on a cliff	< 50 metres	LOW
					> 50 metres	ACCEPTABLE