NSW GOVERNMENT | Environment, Climate Change & Water

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A Guide to the Statutory Requirements for Temporary Coastal Protection Works

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ISBN 978 1 74232 606 1
DECCW 2010/230
April 2010

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Note for consultation draft

This document has been prepared to support consultation on the draft *Coastal Protection and Other Legislation Amendment Bill 2010*. The document refers to sections of the *Coastal Protection Act 1979* which this Bill proposes to include and/or amend.

This document has no statutory basis and current statutory requirements relating to the placement of sand or sandbags on beaches by landowners to reduce coastal erosion impacts should be followed. This may include requirements under the *Environmental Planning and Assessment Act 1979*, the *Crown Lands Act 1982*, the *Roads Act 1993,* the *Coastal Protection Act 1979*, the *Fisheries Management Act 1994* and the *Marine Parks Act 1997*. Details of these Acts can be found at www.legislation.nsw.gov.au.

Submissions invited

Please send your submissions on this consultation draft by email to:

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or posted to:

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Closing date for submissions

Submissions must be received by **5 pm, Friday 7 May 2010**.

1 Introduction

This Guide has been prepared to assist beachfront landowners and people acting on their behalf understand the requirements under the *Coastal Protection Act 1979* (the Act) and the associated gazetted Minister's Requirements for placing temporary coastal protection works. This document also provides guidance and advice to landowners to assist with placing these works.

The intent of temporary coastal protection works is to reduce the impacts of coastal erosion protection to a legally approved dwelling house or commercial building at immediate threat from coastal erosion whilst more permanent management solutions are considered and implemented. These works are not intended to compromise longer-term management of coastal hazard threats or result in adverse off-site environmental impacts.

These works can be placed under specified conditions for a limited period (up to 12 months), during which time the landowner or occupier should develop a longer term approach to managing erosion risks to their property. These works may also be damaged by wave action after they are placed and during the allowable placement period.

This Guide was correct at the date of publication. However statutory requirements may have changed since publication and these requirements take precedence over any information in this Guide. For information on current legislation, see www.legislation.nsw.gov.au.

2 Temporary coastal protection works

Temporary coastal protection works are defined under the Act (see section 55O) as material placed on a beach or a sand dune adjacent to a beach to mitigate coastal erosion impacts, where the materials comprise:

- sand, or fabric bags filled with sand, (other than sand taken from a beach in a marine park[1] or an aquatic reserve)[2]; or
- other objects or material prescribed by the regulations[3] (other than rocks, concrete, construction waste or other debris).:

The Act also specifies certain requirements relating to placing and maintaining these works. The works can only be placed:

- when beach erosion is occurring (where this is safe) or imminent,
- by or on behalf of a landowner or occupier to protect a dwelling house or commercial building from damage due to the erosion (except where the house or building was designed and constructed to accommodate the effects of such erosion, such as piled foundations),
- in accordance with any gazetted Minister's Requirements[4] or requirements in the regulations[5].
- for a period of up to 12 months (from the commencement of installation).

[1] For information on Marine Parks, including maps of park locations, visit www.mpa.nsw.gov.au
[2] Note that the Minister's Requirements specify that sand must not be taken from public land, including a beach
[3] Note – no other types of temporary coastal protection works are currently specified in the *Coastal Protection Regulation*
[4] Minister's Requirements are available at www.environment.nsw.gov.au/coasts/coastalerosionmgmt.htm
[5] Note – there are currently no applicable requirements in the *Coastal Protection Regulation*

Temporary coastal protection structures are not permitted for the protection of vegetated or hardstand land areas or other structures and infrastructure (for example freestanding garages, pools, sheds, laundries, outside toilets, gardens, verandas and landscaping works).

The Minister's Requirements state that for the purpose of the Act, erosion is imminent when:

- the dwelling (or nearest part of an external wall) is within 10 metres from the top of a sand dune erosion escarpment (the trigger condition) - refer Appendix 1 for typical examples of the top of a dune erosion escarpment feature; and
- no form of coastal protection currently exists (e.g. a seawall) seaward of the dwelling; and
- The significant offshore wave height is forecast to exceed 3 metres within the area where the works are to be placed, coinciding with predicted tides exceeding 1.8 m (at Fort Denison[6]); or
- the Bureau of Meteorology has issued either a Storm Tide and/or Dangerous Surf Warning, Tropical Cyclone Warning or Tropical Cyclone Watch covering the area where the works are to be placed.

The Minister's Requirements contain detailed specifications for various types or options of coastal protection works. These works are listed below in generally descending order of declining capacity to resist erosion and provide limited protection to a threatened dwelling. Further details are provided in section 6).

1. geotextile sand container revetment (Option 1)
2. sandbag revetment (Option 2)
3. sandbag toe protection (Option 3)
4. beach nourishment (placed sand) (Option 4).

Property owners are responsible for the construction, management and maintenance of works during their occupation along with the management of adverse off-site impacts caused by the works (such as end scour or increased erosion) and remediation of the site following the removal of works. Landowners are also responsible for ongoing public safety risks associated with these works.

The Act includes powers enabling an authorised officer of a public authority to issue an order requiring the works to be removed or modified if they are, in the officer's opinion:

- causing or likely to cause increased beach erosion, or
- limiting or likely to limit public access to a beach or headland, or
- posing or is likely to pose a threat to public safety.

3 Statutory requirements

Minister's Requirements have been gazetted under the *Coastal Protection Act 1979.* Temporary coastal protection works not complying with these Minister's Requirements are not authorised under this legislation and orders requiring their removal by the landowner may be issued under this Act.

Failure to follow these Minister's requirements when placing temporary coastal protection works is an offence under this Act and may result in penalties under the Act, as well as

[6] Tidal predictions are available at http://www.maritime.nsw.gov.au/docs/Tide_Tables.pdf

penalties for a breach of the *Environmental Planning and Assessment Act 1979* for development without consent and a breach of the *Crown Lands Act 1989* for unauthorised use of Crown land, where the works are located on Crown land.

All other relevant statutory requirements apply during the use of temporary coastal protection works, including:

- The *Environmental Planning and Assessment Act 1979*, particularly in relation to approvals required for the removal of trees to create access for placing temporary coastal protection works
- The *Occupational Health and Safety Act 2000*, particularly relating to ensuring that the placement of the temporary coastal protection works does not present a safety risk. The landowner and any person carrying out works on their behalf have responsibilities under this Act relating to safe work practices and safe workplaces. This is particularly important given the potential risks from placing these works (see section 7).
- The *State Emergency and Rescue Management Act 1989*, including powers allowing a police officer to direct a person to leave or not enter a danger area in an emergency. This may include an area where temporary coastal protection works are being or intended to be placed – these directions must be followed, which may impact on the placement of these works. A police officer may also direct the taking of safety measures in an emergency, including removing material presenting a public safety risk or interfering with the operations of emergency services. This may include the removal or modification of temporary coastal protection works.

4 Using public land

Where practical, temporary coastal protection works are to be located on private land. However, where this is not practical, the works may be located on public land (e.g. a beach) or a road reserve located on a beach or sand-dune adjacent to a beach, where there is no physical road in the road reserve.

It is acknowledged that site constraints on private land may prevent access for relevant machinery (where necessary) to place the works. In these circumstances, access will be permitted to the site via public land using designated beach access points for the purpose of accessing the site for construction, removal or remediation of adverse off-site impacts relating to temporary coastal protection works. Landowners will be required to notify the relevant public authority of their intention to access public land for these purposes prior to doing so.

Landowners or their contractors may use public land to access the location where works are to be placed for the purpose of placing or maintaining the works under the following conditions:

- Notify the local council by telephone that the public land is first used for the purpose of placing the works as soon as practical after the use has commenced[7]. This is in addition to notifying the council and the LPMA in writing within 7 days.
- Only existing access vehicular routes to any beach are to be used. Some access routes may not be suitable for some heavy machinery and this equipment should not be used under these circumstances; and
- Where existing access routes are blocked by a gate or similar structure, prior arrangements are to be made with the relevant public authority to unlock the gate to utilise the access routes; and

[7] Note: Other notification requirements are specified in section 55Q of the Act

- Any damage to assets on public land is rectified to the satisfaction of the relevant public authority within thirty (30) days; and
- The location where the works are being placed and any associated earthmoving equipment or other vehicles are operating for the purpose of placing the works is to be surrounded by an effective safety fence until the placement is complete; and
- Public safety risks from the use of earth moving equipment and other vehicles involved in placing the works are to be minimised. Where equipment or vehicles travel on a beach between a public road and the location of the works, a person must walk in front of the equipment.

The landowner will be responsible for ensuring the safety of the public in these areas when using public land to access the site for temporary coastal protection works. The landowner will also be responsible for remediating any public land areas damaged as a result of accessing the site.

Landowners who use public land for placing works are to notify the council[8] and the Land and Property Management Authority[9] (LPMA) in writing as soon as practical after use of public land has commenced and no later than seven days. Where works are placed on Crown Land, the landowner is to apply for a licence from LPMA within 30 days and pay the applicable licence fee.

5 Landowner preparation

It is recognised that temporary coastal protection works will be required during an emergency storm erosion situation which could develop very quickly often with limited advance warning (days). Although temporary coastal protection works cannot be guaranteed to protect a dwelling house during an emergency storm erosion event, the property owners level of preparedness to implement works may prove the difference between the relative level of success achieved in stemming the erosion threat. Where beachfront property owners are likely to meet requirements for undertaking such works (refer Section 2), it is strongly recommended that all reasonable measures are taken in advance to limit potential time delays including:

- Pre-purchasing and stockpiling of relevant resources (such as geotextiles, sandbags, sand) on the landowner's property;
- Knowledge of relevant plant and equipment suppliers who are aware of these Minister's Requirements; and
- Accessibility of appropriate personnel to undertake relevant works.
- Storm events can occur with limited warning and not all ocean storm events will result in significant beach erosion. Generally, more substantial beach erosion episodes can be expected when large ocean wave events coincide with high elevated ocean water levels (particularly spring tide conditions). In particular, significant beach erosion could be anticipated when the significant offshore wave height approaches 5 metres, directed onshore and coincident with predicted tides higher than 1.8 m (Fort Denison) and persisting over several high tide cycles.

Although tide predictions are known well in advance, forecasting of storms and associated ocean wave conditions are only generally available with a reasonable accuracy some 2-4

[8] For council contact details, see www.dlg.nsw.gov.au. Notifications should be addressed to the council's General Manager

[9] To contact the LPMA, call 1300 052 637 or visit www.lands.nsw.gov.au/contact_us

days in advance. Weather forecast windows are typically no more than 180 hours (7.5 days) in advance. These are available from the United States National Oceanic and Atmospheric Administration Wave Watch III forecast model. The Australian Bureau of Meteorology[10] issues forecasts from wave modelling out to 48 hours (2 days) in advance. It should be noted that these forecasts for wave and water level conditions typically improve as the forecast window is reduced. Wind and wave direction are also important.

6 Construction advice

The Minister's requirements specify specific performance requirements to be met for temporary coastal protection works. Construction advice, which may assist in meeting these requirements, is provided below for the four options permitted (see section 2). Diagrams illustrating the construction methods for each option are also provided in Appendix 2.

6.1 Geotextile sand container revetment (Option 1)

To undertake this option, the following resources will be required:

- 0.75 m^3 geotextile containers for 'open coast' (0.35 m^3 for embayment/estuarine)
- sand to fill geotextile containers (imported or excavated from owner's property)
- filling frame
- hand held sewing machine
- large excavator (25–30 tonne) to trim, fill and place (with modified rock grab)
- small excavator for filling (optional additional resource to expedite construction).

A competent excavator operator may trim the slope to the required angle from either the crest or toe of the sand dune. Any sand trimmed during this stage from within the bounds of the owner's property may be stockpiled for geotextile container fill. If possible, the toe should be further excavated to allow a double-layer of geotextile containers to be 'buried' at the bottom course.

While the slope is being trimmed, an optional additional small excavator could be filling geotextile containers with sand in a filling frame. Empty geotextile containers are typically purchased as an open 'pillow' which is sealed shut on three of its four sides. The container is placed in a filling frame and filled with sand using an excavator. Once filled, the container is sewn closed using a hand held sewing machine. Geotextile container suppliers can supply filling frames and site sewing machines and provide advice on their use. Containers should be filled as close as possible to 100 per cent capacity for maximum hydraulic stability.

Finally, the filled containers are then lifted and placed using a modified rock grab on the trimming excavator. The rock grab is modified in such a way as to limit the stress on the geotextile during the lifting operation. It is not necessary to have a geotextile underlayer between the containers and the backing slope for these short-term emergency works.

It is recommended that skilled operators be contracted, particularly for the geocontainer filling, sewing and placement to expedite the works and ensure the best possible outcome. Indicative quantities of empty geotextile containers and sand fill volume required for Option 1 are provided for guidance only in Appendix 3.

It is not necessary for the geotextile fabric to be vandal resistant, as the works are only temporary.

[10] Bureau of Meteorology forecasts are available at www.bom.gov.au

6.2 Sandbag revetment (Option 2)

To undertake this option, the following resources will be required:

- unfilled polypropylene sandbags with ties
- purpose-built mechanical filling machine or cement truck (preferred option)
- hand-filling device, such as length of 200 mm pipe or a bucket (alternative option)
- sand to fill sandbags (imported or excavated from owner's property)
- excavator to trim and place.

A competent excavator operator may trim the slope to the correct angle from either the crest or toe of the sand dune. Any sand trimmed during this stage from within the bounds of the owner's property may be stockpiled for sandbag fill. If possible, the toe should be further excavated to allow a double-layer of sandbags to be 'buried' at the bottom two courses.

While the slope is being trimmed, sandbags should be filled with either the assistance of a mechanical filling machine or a hand-filling device. Empty plastic sandbags are also purchased as an open 'pillow' sealed shut on three of its four sides. Sandbags are then filled in situ and tied shut.

Although many types and sizes of sandbags are available, the preferred standard size is approximately 18 kg when filled with dry sand. For manual handling, larger sizes are not recommended as they can be too heavy to handle by one person. Filling sandbags by hand is arduous and time consuming; therefore filling by machines is preferred, particularly when time is of the essence.

It is recommended to only fill sandbags to two-thirds of their capacity and never overfill them. This allows overlap, which locks sandbags together. Once each sandbag has been filled with sand, they are to be tied shut using a pre-existing tie sewn into the top of the sandbag.

Finally, the filled sandbags are then lifted and placed by either the trimming excavator or manually by hand (Step 3). The sandbag revetment is to be made using alternate courses of 'headers' and 'stretchers' against the trimmed slope; this brickwork format is known as English Bond. 'Headers' are sandbags placed end-on to the direction of wave attack, with the neck facing away; 'stretchers' are placed side-on, with the seam opposite the direction of wave action. The bottom course of sandbags are to be laid as 'headers', with the necks folded over and facing away from the direction of wave attack. A double-layer of sandbags should be placed seaward of the bottom two courses of the revetment.

Indicative quantities of empty sandbags and sand fill volume required for Option 2 are provided for guidance only in Appendix 3.

6.3 Sandbag toe protection (Option 3)

To undertake this option, the following resources would be required:

- unfilled polypropylene sandbags with ties
- purpose-built mechanical filling machine or cement truck (preferred option)
- hand-filling device, such as length of 200 mm pipe or a bucket (alternative option)
- sand to fill sandbags (imported or excavated from owner's property).

Due to the time constraints under which this work is carried out, it is not considered necessary to trim the sand dune face to a more stable batter angle as advised for Options 1 and 2. Sandbags should be filled and tied shut in accordance with the procedures advised for Option 2.

The filled sandbags are then lifted and dropped into place manually by hand. Personnel are to stand at the top of the dune crest and drop sandbags down to the toe of the sand dune. Considerable care should be taken when approaching the crest of the sand dune to avoid initiating a slip failure (collapse) of the dune face. As these works are considered ad-hoc, there is no recommended placement pattern. The more sandbags that can be dropped into the toe area of the escarpment, the greater the likelihood that coastal erosion might be reduced or limited, however, there is no guarantee as to the level of protection that can be provided.

Indicative quantities of empty sandbags and sand fill volume required for Option 3 are provided for guidance only in Appendix 3.

6.4 Beach nourishment (Option 4)

To undertake this option, the following resources will be required:

- sand to nourish the beach (imported or excavated from owner's property)
- excavator to trim.

Sand imported or excavated from the owner's property is placed directly on the erosion escarpment. Sand may be tipped onto the slope by a truck or progressively placed by an excavator. Indicative quantities of sand fill volume required for Option 4 are provided for guidance only in Appendix 3.

7 Minimising safety risks during installation

Two significant risks for personnel working on the property are drowning under elevated water levels during coastal storms and collapse of a steep sand dune face. Extreme care should be taken to only work at the toe of the structure during lower water levels. Typically, work will only be possible at the sand dune toe during the lower half of the tidal cycle. During severe storms with severe erosion, low tide access may also be limited. The available time to access the sand dune may be further limited by other coastal processes super-elevating the water level at the foreshore (i.e. wave set-up, wave run-up, wind set-up and barometric set-up). Wave action during storms can be unpredictable and waves significantly larger than average should be expected.

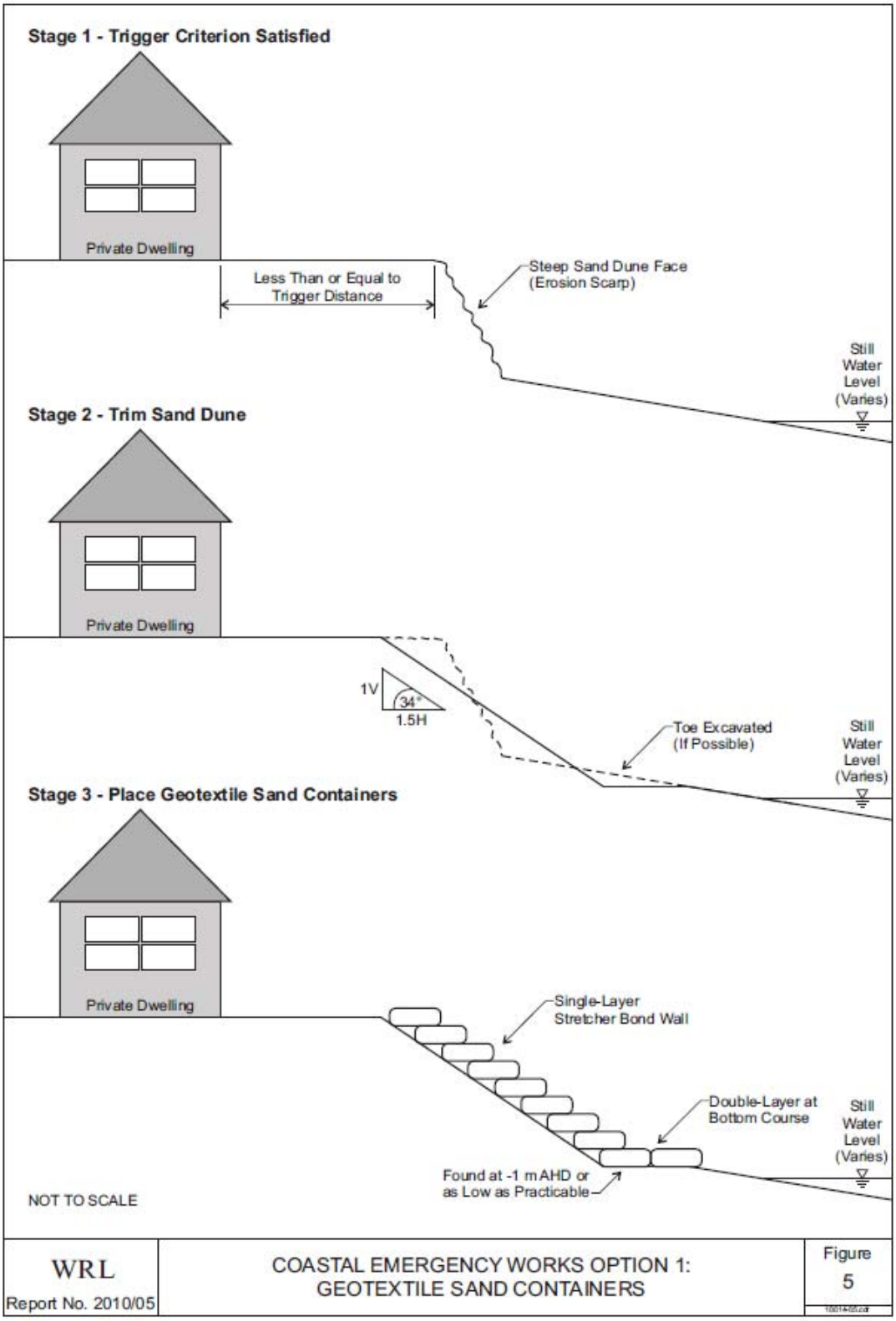
Care should also be taken when working around a steep sand dune face; if personnel step too close to the edge of the dune crest it may become unstable and collapse. If this occurs, there is risk of death by suffocation or crushing in buried sand. To alleviate this risk, the first action (where possible) in constructing temporary coastal protection works is to stabilise the sand dune face by trimming it to a more stable slope. The recommended slope for dry sand is approximately 34 degree to the horizontal or alternatively, 1 m (vertical) to 1.5 m (horizontal).

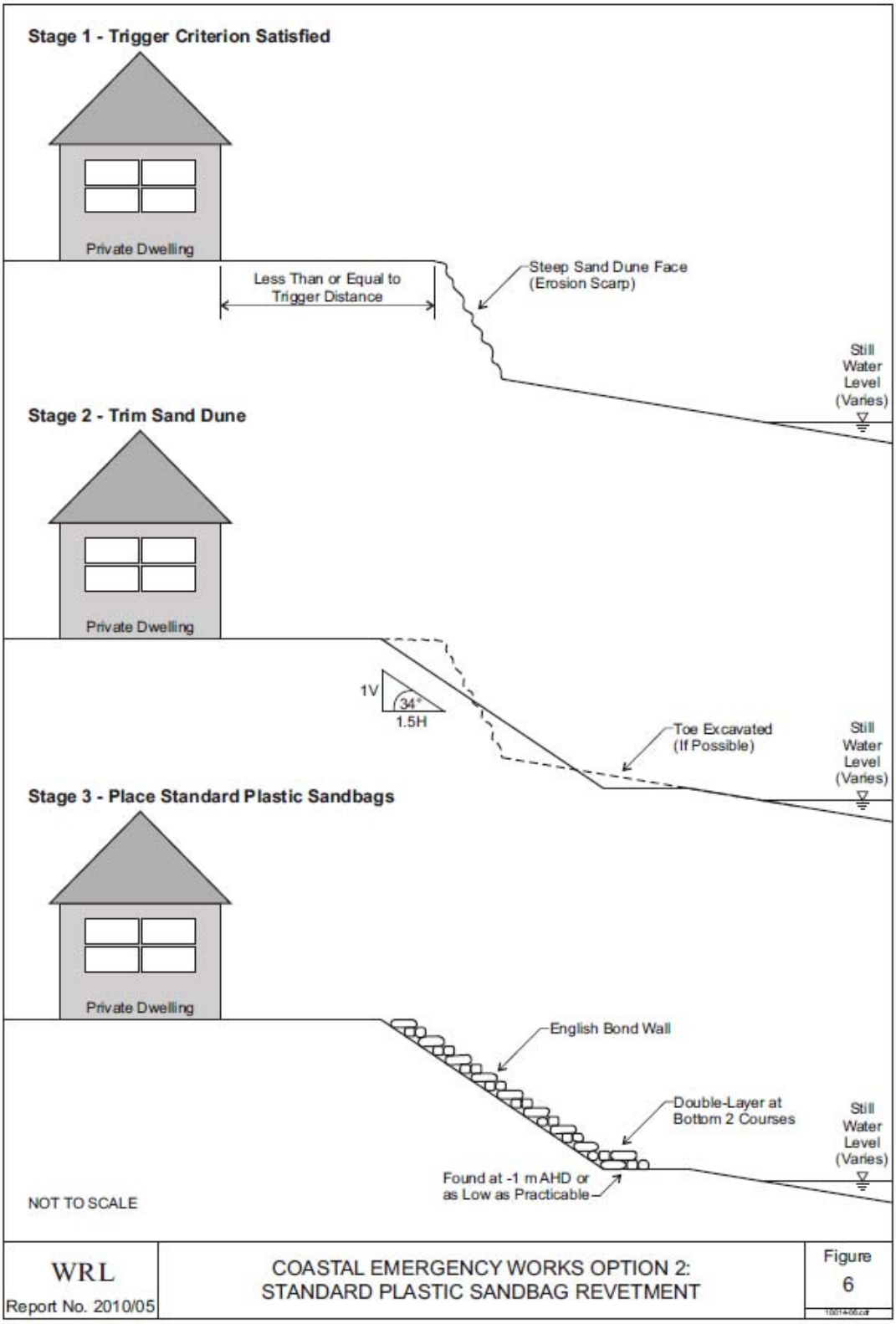
It is envisaged that most property owners will undertake temporary coastal protection works either directly before or after a large storm event when calmer conditions are likely to prevail, giving maximum possible access to the sand dune face. However, it may eventuate that the 'trigger condition' may not be satisfied until part-way through an emergency storm event. Under these circumstances, access and time will be limited and only Sandbag Toe Protection (Option 3) and Beach Nourishment (Option 4) are recommended.

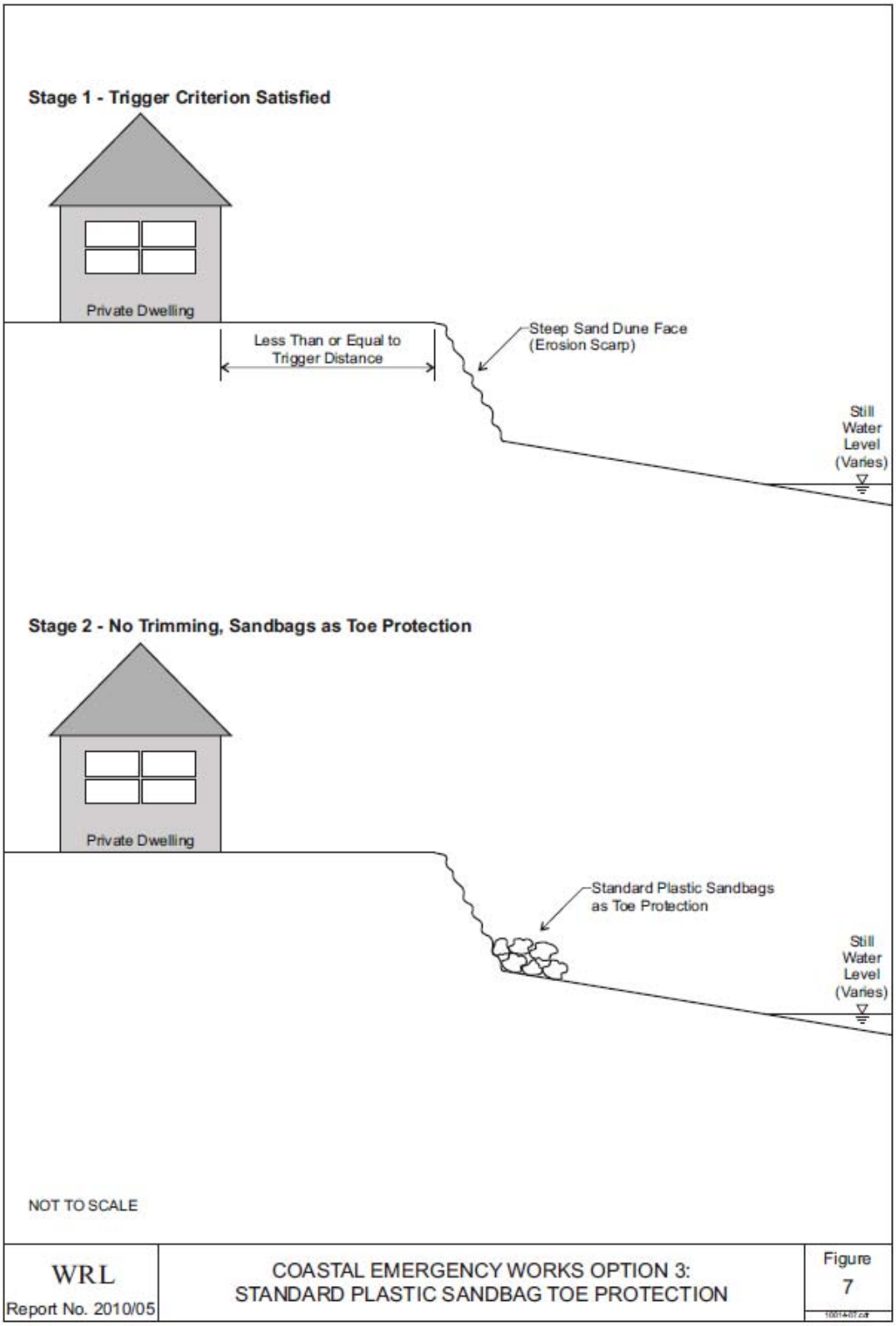
Appendix 1
Example of typical erosion escarpment features

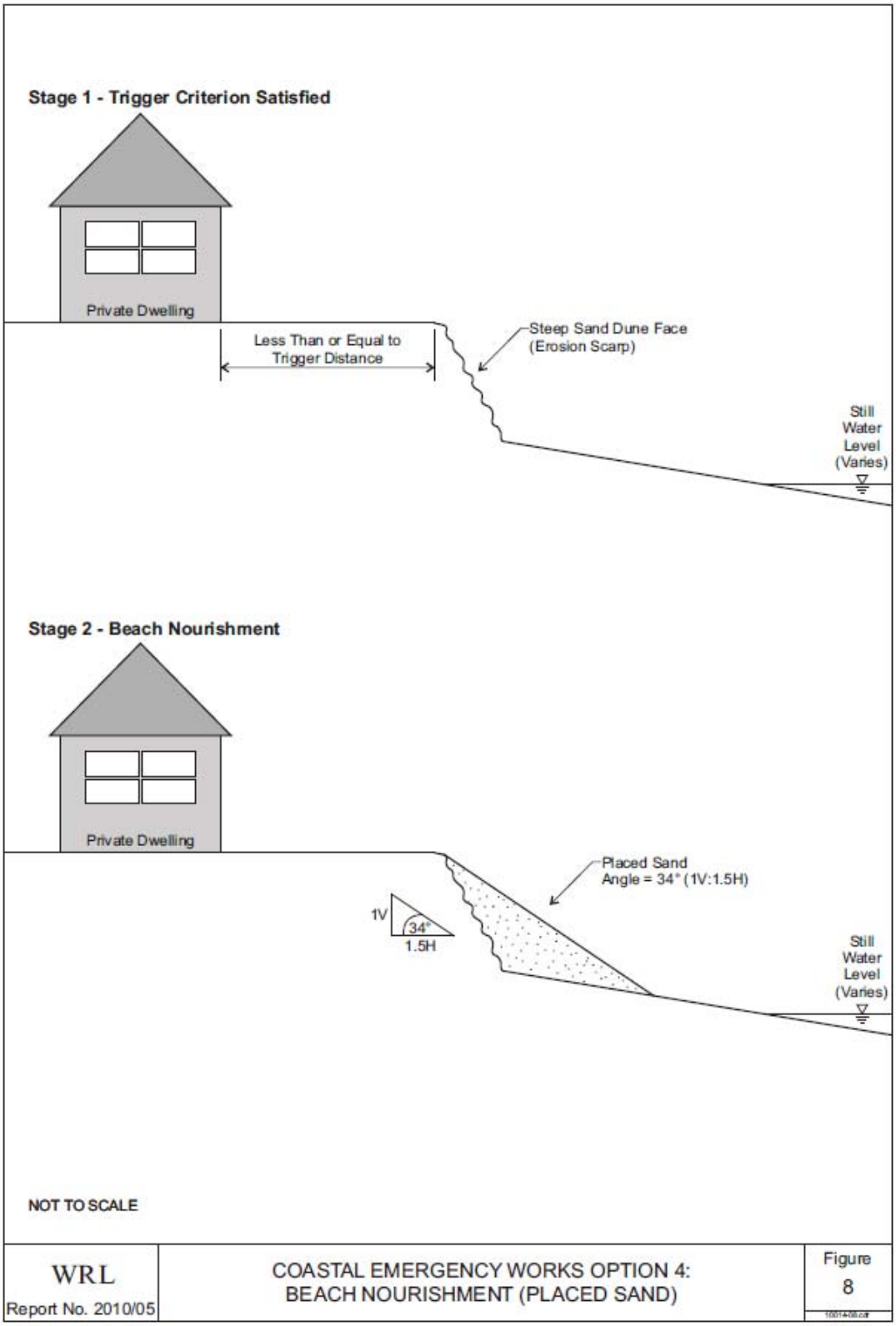
Appendix 2
Indicative working diagrams of acceptable temporary coastal protection works

Diagrams prepared by the Water Research Laboratory of the University of New South Wales and used with permission.


Stage 1 - Trigger Criterion Satisfied
Private Dwelling
Less Than or Equal to
Trigger Distance
Steep Sand Dune Face
(Erosion Scarp)
Still
Water
Level
(Varies)
Stage 2 - Trim Sand Dune
Private Dwelling
1V
34°
1.5H
Toe Excavated
(If Possible)
Still
Water
Level
(Varies)
Stage 3 - Place Geotextile Sand Containers
Private Dwelling
Single-Layer
Stretcher Bond Wall
Double-Layer at
Bottom Course
Still
Water
Level
(Varies)
Found at -1 mAHD or
as Low as Practicable
NOT TO SCALE
WRL
Report No. 2010/05
COASTAL EMERGENCY WORKS OPTION 1:
GEOTEXTILE SAND CONTAINERS
Figure
5


Stage 1 - Trigger Criterion Satisfied
Private Dwelling
Less Than or Equal to
Trigger Distance
Steep Sand Dune Face
(Erosion Scarp)
Still
Water
Level
(Varies)
Stage 2 - Trim Sand Dune
Private Dwelling
1V
34°
1.5H
Toe Excavated
(If Possible)
Still
Water
Level
(Varies)
Stage 3 - Place Standard Plastic Sandbags
Private Dwelling
English Bond Wall
Double-Layer at
Bottom 2 Courses
Still
Water
Level
(Varies)
Found at -1 mAHD or
as Low as Practicable
NOT TO SCALE
WRL
Report No. 2010/05
COASTAL EMERGENCY WORKS OPTION 2:
STANDARD PLASTIC SANDBAG REVETMENT
Figure
6


Stage 1 - Trigger Criterion Satisfied
Private Dwelling
Less Than or Equal to
Trigger Distance
Steep Sand Dune Face
(Erosion Scarp)
Still
Water
Level
(Varies)
Stage 2 - No Trimming, Sandbags as Toe Protection
Private Dwelling
Standard Plastic Sandbags
as Toe Protection
Still
Water
Level
(Varies)
NOT TO SCALE
WRL
Report No. 2010/05
COASTAL EMERGENCY WORKS OPTION 3:
STANDARD PLASTIC SANDBAG TOE PROTECTION
Figure
7


Stage 1 - Trigger Criterion Satisfied
Private Dwelling
Less Than or Equal to
Trigger Distance
Steep Sand Dune Face
(Erosion Scarp)
Still
Water
Level
(Varies)
Stage 2 - Beach Nourishment
Private Dwelling
Placed Sand
Angle = 34° (1V:1.5H)
1V
34°
1.5H
Still
Water
Level
(Varies)
NOT TO SCALE
WRL
Report No. 2010/05
COASTAL EMERGENCY WORKS OPTION 4:
BEACH NOURISHMENT (PLACED SAND)
Figure
8

Appendix 3
Indicative material quantities for temporary coastal protection works

Note. The quantities advised are estimates only and are based on a property width of 15m and dune height of 6m above mean sea level.

Indicative Material Quantities for a Typical Property

Open Coast Region

Assumed Conditions:

Property Width:	15 m
Property Elevation:	+6 m AHD
Coastal Emergency Works Toe Elevation:	-1 m AHD

Option 1 Geotextile Sand Container Revetment

Quantity of 0.75 m^3 Geotextile Containers (No.):	150
Quantity of Sand Fill Volume (m^3):	110

Option 2 Standard Plastic Sandbag Revetment

Quantity of 825 × 350 mm Sandbags (No.):	2500
Quantity of Sand Fill Volume (m^3):	30

Option 3 Standard Plastic Sandbag Toe Protection

(Assuming the equivalent of four courses is placed)

Quantity of 825 × 350 mm Sandbags (No.):	200
Quantity of Sand Fill Volume (m^3):	3

Option 4 Beach Nourishment

(assuming typical storm cut: 80 m^3/m above AHD)

Quantity of Sand Fill Volume (m^3):	1200

(assuming design storm cut: 250 m^3/m above AHD)

Quantity of Sand Fill Volume (m^3):	3750

Embayment/Estuarine Region

Assumed Conditions:

Property Width:	15 m
Property Elevation:	+2 m AHD
Coastal Emergency Works Toe Elevation:	-1 m AHD

Option 1 Geotextile Sand Container Revetment

Quantity of 0.35 m^3 Geotextile Containers (No.):	150
Quantity of Sand Fill Volume (m^3):	50

Option 2 Standard Plastic Sandbag Revetment

Quantity of 825 × 350 mm Sandbags (No.):	1100
Quantity of Sand Fill Volume (m^3):	12.5

Option 3 Standard Plastic Sandbag Toe Protection

(Assuming the equivalent of two courses is placed)

Quantity of 825 × 350 mm Sandbags (No.):	100
Quantity of Sand Fill Volume (m^3):	1.5

Option 4 Beach Nourishment

(assuming typical storm cut: 20 m^3/m above AHD)

Quantity of Sand Fill Volume (m^3):	300

(assuming design storm cut: 100 m^3/m above AHD)

Quantity of Sand Fill Volume (m^3):	1500