

Tasman District Council  
Private Bag 4  
Richmond  
Nelson 7050

Attention: Peter Thomson

Dear Peter

## **Jackett Island - Action Plan for Interim Works**

### **1 Purpose**

On 23 March 2011 the Environment Court issued a decision which made findings about the impact of construction of the Motueka groyne in 1996 has had on the formation of the Motueka sandspit in its current location, which in turn is causing erosion to parts of Jackett Island. The proceeding was brought by the Van Dyke Family Trust over concerns about erosion occurring to their property and sought various enforcement orders against the Council. The Environment Court has not at this stage made any orders; rather it has issued an interim decision and given the parties an opportunity to address appropriate remedies.

In response to the decision Tasman District Council has engaged Mr Richard Reinen-Hamill, a senior coastal engineer with Tonkin & Taylor Ltd in Auckland to advise it in relation to whether emergency works are required to immediately address ongoing erosion on Jackett Island, and if so, what works are recommended to be undertaken and a timeline for such works.

### **2 Scope**

Our assessment has been made on the basis of a review of the evidence presented in the hearing and the background reports referred to as well as site inspections carried out on 8<sup>th</sup> April 2011 and 6<sup>th</sup> July 2011.

This report focuses on summarising the processes operating and the presentation of an Action Plan for Interim Works (APIW) to immediately address ongoing erosion fronting the Van Dyke property.

Erosion is occurring along other parts of Jackett Island. Currently there is insufficient data to determine the extent, rate and options for interim action. A separate process is currently being actioned to determine the historic changes from historic aerial photographs, similar to the process that was carried out in front of the Van Dyke property. We note that the outcomes of this process will be used in the consideration of a more comprehensive solution and may also support an extension of the interim work proposed in this Action Plan for Interim Works (APIW).



### 3 Current situation at Jackett Island

From the evidence and background reports it is clear that the elongation and landward movement of the Motueka spit over recent times has resulted in the landward migration of the outlet to the Moutere Inlet and erosion of the seaward side of Jackett Island (Verstappen, Attachment G, Mead, rebuttal).

From the geo-referenced high tide position at Jackett Island carried out by ASR, erosion rates have recently been in the order of -2 m to -4 m per year (refer Table 1) from 2000 to 2009.

**Table 1- Inferred rates of shoreline change at high tide in front of the Van Dyke property on Jackett Island (Based on Figure 9, Mead Rebuttal Evidence)**

Period		Interval (years)	Shoreline change (m)	Rate(m/yr) (-ve landward, +ve seaward)
from	to			
1940	1947	7	-10	-1.4
1947	1958	11	18	1.7
1958	1969	11	-6	-0.5
1969	1980	11	-4	-0.3
1980	1985	5	-10	-2.0
1985	2000	15	-2	-0.1
2000	2003	3	-12	-3.9
2003	2006	3	-7	-2.3
2006	2009	3	-12	-3.9

Based on this information the shoreline was eroding at a rate of around -0.2 m/yr from 1940 to 1985, although there was one period where accretion was observed. Long term erosion of around -1.3 m/yr took place from 1985 to 2009. Rates of up to -2.0 m/yr erosion were observed prior to 1985 and since 1985 rates have increased to up to -4.0 m/yr.

The Van Dykes have been carrying out works to reduce erosion of their property including sand/gravel push-ups, planting, timber groynes and most recently sand filled wool bales placed along the upper beach area.

Based on discussions with Ben and Miranda Van Dyke held during the site visit of 8 April 2011 the currents flowing past the beach along the outlet are the main transport mechanism for removing beach material from their frontage, although storm action at high tide erodes the upper beach and places sediment down the beach where it is then transported by current flows. From the site visit it is evident that sediment is moved both to the north and south from their property and the current focus of erosion is now slightly further south from their property.

Council has obtained LiDAR survey providing the most recent topographic information of the spit and Jackett Island (6-7 May 2008). This provided 0.5 m contour information above MSL -1 m. Figure 1 shows the 2008 contours and the inferred direction of alongshore transport as evidenced by the wider beach systems either side of the central area of Jackett Island.

It is likely that as the spit extends to the south it is providing slightly greater sheltering from wave energy than in previous years and sand movement to the north is likely to be a function of wave diffraction/refraction effects around the end of the spit as well as sand moved by flood tide flows.

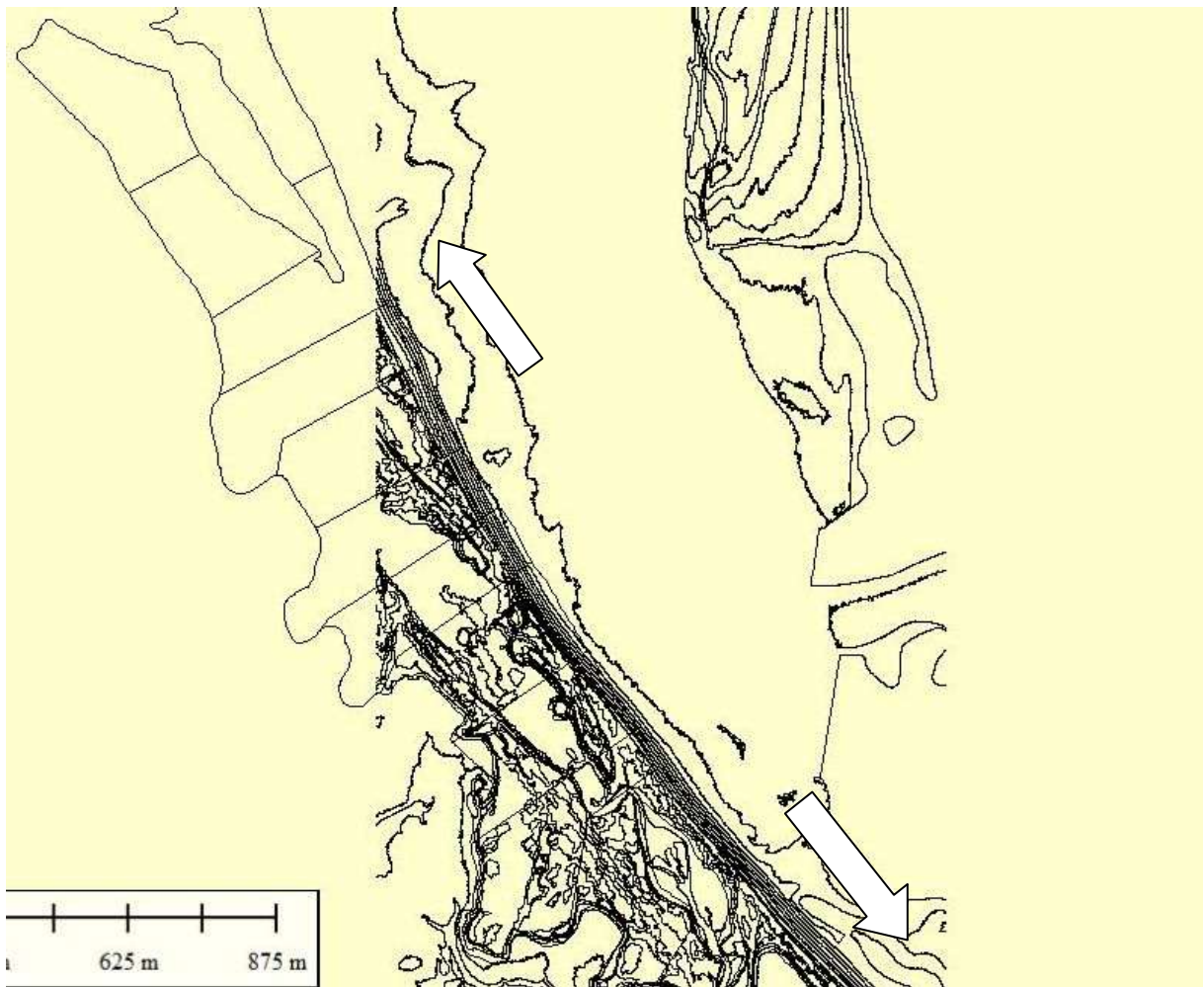


Figure 1- Contour information from LiDAR showing sediment movement alongshore away from central Jackett Island (LiDAR source from Tasman District Council)

## 4 Action Plan for Interim Works

The preferred interim works solution is based on Council taking responsibility for "holding the line" along the current upper beach alignment on the Van Dyke property. This means that Council will maintain the existing shoreline position, as currently defined by the existing sand filled wool bags.

Access to the site is highly dependent on both weather and tidal conditions. Furthermore, a rapid response is vital to ensure further land is not lost in the intervening period between the initial failure and the time taken to reinstate or replace the seawall. To this end it is important that the certain contingencies are considered and that careful planning is undertaken.

This Action Plan for Interim Works (APIW) outlines the purpose and operative period of the plan. It defines the key contacts in the event of failure of the seawall. It assigns responsibility to the organisations and/or people involved in its implementation. It outlines the remedial actions to be undertaken in the event of failure including any contingencies that may be required to gain access to the site and the location of special equipment and the source of any supplies that may be required. Finally, it describes the procedure for monitoring the condition of the seawall.

## 4.1 Purpose and operative period

The purpose of this APIW is to:

- a) Establish procedures to detect any damage that may occur, and
- b) Establish procedures to remedy any damage that may occur.

This APIW will be operative until such time as a permanent solution has been developed to remedy the problem, with an expectation that this could be in the order of 12 to 18 months.

## 4.2 Table of key contacts

Organisation	Name	Contact Number	Responsibilities
Property owner	Van Dyke Family Trust	(03) 546 8145	Nil
Tasman District Council	Peter Thomson (Engineering Manager)	(03) 543 8440 or 027 443 7331	Monitoring and inspection
	Gary Clark (Transportation Manager)	(03) 543 8437 or 027 263 1233	
	Selwyn Steedman (Transportation Network Engineer)	(03) 543 7213 or 027 246 0300	
Tonkin & Taylor	Mark Foley	(03) 546-2672 or 021-731-381	Overview / advice, Review
	Damian Velluppillai	(03) 546-2681 or 021-552-857	
	Richard Reinen-Hamill	(09) 355-6030 or 021-645-298	
Contractors	TBC TBC	TBC TBC	Implementation

## 4.3 Remedial works

### 4.3.1 Emergency response

Emergency remedial works were carried out as a result of a high tide and onshore storm over the weekend of 18 and 19 June 2011.

The preventative works included the following actions:

- Prior to the high tides a volume of sand and gravel was obtained from the recent accumulation adjacent to the Moutere inlet ground at the northern end of the island.
- This material was taken from the intertidal area below MHWS over an area of around 50 m to 100 m (alongshore) by 2 m to 5 m (cross shore) and a maximum depth of around 0.5 m. This was to ensure a diffuse effect at the extraction area and resulted in the extraction of around 100 to 200 m<sup>3</sup> of material.

- The sediments were transported along the beach below MHWS to the Van Dyke property and placed along the southern 100 m of the frontage at the upper beach level (edge of vegetation).

The resulting placement has resulted in a combined gravel/sand/silt bund along the southern half of the property protecting the bank and wool bales (refer Photograph 1) that appears to be providing reasonable wave protection and a volume of material on the upper beach and should provide sufficient protection while the geo bag option is progressed.



*Photograph 1 Completed emergency works as at 6 July 2011*

At the northern end of the property where sand had been excavated along the backshore by the Van Dykes to provide increased sand elevation in front of their dwelling, the low beach crest has been overtopped and sand infilling by wave overtopping was evident (refer Photograph 2).





*Photograph 2 Sand over wash at northern end of the property as at 6 July 2011*

#### 4.3.2 Short term interim works

To prevent further land loss it is proposed that a portion of the existing sand filled wool bags be removed and replaced with a structure made of robust geofabric sand filled bags.

These new bags are to be placed along the foreshore in front of the existing dwelling some 94.4 m along the property frontage extending from the southern boundary. The wall will extend slightly beyond the southern boundary with a short return. The return will be 10 m long and at a 30° angle to the main alignment of bags (refer Figure 2).

The geotextile bags will be placed along some 104.4 m. For context, the bags will extend from the southern boundary to around 20 m to the north of the second groyne shown in Photograph 3. The bags will be placed over a geotextile filter fabric that overlies a formed subgrade of beach sediments. The geotextile filter fabric will assist in reducing the loss of fines through the gaps between the bags.

The bags used will have a volume of 0.75 m<sup>3</sup> and will be made with 1,000 g/m<sup>2</sup> polyester. These bags are specified for their robust qualities and because they do not need specialist filling and lifting equipment. Beach sediments excavated to form the subgrade slope shall be retained on the beach and will be used to either backfill or be pushed up to provide a small berm on the seaward side of the bags.

The bag dimensions are 1.6 m (length) by 1.2 m (wide) by 0.4 m (high) and have a filled mass of 1,400 kg. The bags are to be stacked as indicated in attached Figure 2 (see appendix A) with the long edge parallel to the seaward side of the property and overlapping the bag below by two thirds. The minimum height will be 1.2 m (equivalent to 3 bags in depth) and to a minimum length of 1.6 m (equivalent to 1 bag length). The bags will be stacked sequentially.

The existing timber groynes will be removed as part of these works and the timber either retained on site, or removed depending upon the requirements of the Van Dykes.

The initial approach to manage the remaining frontage to the north of the new geobags is to maintain the existing beach crest indicated by the blue line on the attached plan. This is to be done by a combination of using any competent wool bale bags taken from the southern end to form a base at the landward side of the beach crest and augmenting these bags by placing residual sand and gravel from the excavation required to found the geobags. Topping up and shaping of the beach crest shall be carried out to reduce the frequency of inundation, but this may still occur during extreme events, until a more permanent solution is developed and implemented. The lowest part of this area to the north will be increased in height by at least 1.5 m above MHWS to match the adjacent beach crest to the north formed from competent wool bales and residual sand and gravel from the excavation possibly augmented with imported sands and shingle.

Should this approach prove not effective, as defined by regular requirement to reshape and top-up the beach crest, or if there are additional bags able to be used during the initial construction period, the geotextile bag wall shall be extended to the end of the Van Dyke property with a 90 degree return detail at the northern property boundary.



*Photograph 3 - existing shoreline showing two timber groynes (8 April 2011)*

A detailed spill management plan will be required. All refuelling of plant used in the works will be performed outside of the CMA and on the mainland. An emergency spill kit will be carried on the excavator at all times.

#### **4.4 Sources of special equipment and materials**

Geobags will be sourced from a specialist geotextile supplier. Sand will be sourced from a Council supply and the bags will be filled and secured offsite. The works will be carried out by a local civil engineering contractor. For the initial works it is likely that the materials and construction equipment will be brought to site by barge. Alternatively bags and plant will be transported across the estuary at low tide.

For subsequent maintenance/re-building works a hydraulic excavator or similar plant may be brought to site via low tide access across the estuary. A supply of additional geotextile bags will be held by council for additional works should they be required.

**4.5 Monitoring procedure**

A procedure for monitoring the current position of the interim remedial works is required. The procedure recommended is outlined below and shown on Figure 1.

Installation of a two posts offset from the seaward edge of the geofabric bags by a distance of ten meters landward and 1 m within the property boundary. The offset would reduce their risk of removal. These posts provide the ability; as best as possible, to reinstate the geofabric bags at the correct location should failure occur. The location of the monitoring posts is indicated in attached Figure 2.

A topographic survey shall also be carried out prior to construction commencing to provide baseline information on the current location and state of the coastal edge. The survey shall extend from the southern to the northern inlet and generally extend from the edge of vegetation, or the crest of the erosion scarp down to low tide. At the Van Dyke property the survey shall extend 40 m landward of the existing bag wall. The survey shall record any significant changes in grade and significant features, such as the crest and toe of the erosion scarp, edge of vegetation, debris/wrack lines, structures and the transitions in beach slope.

After the geo-bag wall is constructed, regular site visits shall be carried out by the Council to the property to record any movement of or damage to the sand filled bags. These visits would occur every two weeks and after significant or onshore storm events or after high tides in excess of MHWS with strong onshore winds.

A dated photographic record of the property shoreline and the shoreline either side of the property shall be maintained by Council. The minimum location of photographic record is shown on Figure 1, with photo points at around 50 m centres in the vicinity of the van Dyke property, extending to 100 m further away from the property.

**5 Applicability**

This report has been prepared for the benefit of Tasman District Council with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:

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James Russell  
Water Resources Engineer

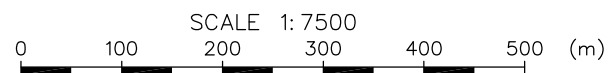
Richard Reinen-Hamill  
Senior Coastal Engineer

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## **Appendix A:        Figures**





LEGEND:



Photo Point Locations – Photos both ways of two weekly intervals and after significant events



Beach survey area from beach crest to low tide and extending 40m into Van Dyke property landward of geobag wall

NOTES:

1. Aerial photo and property boundaries Copyright 2002–2005 Terralink International Limited and its licensors.
2. Coordinate Datum in terms of New Zealand Map Grid NZMG49.



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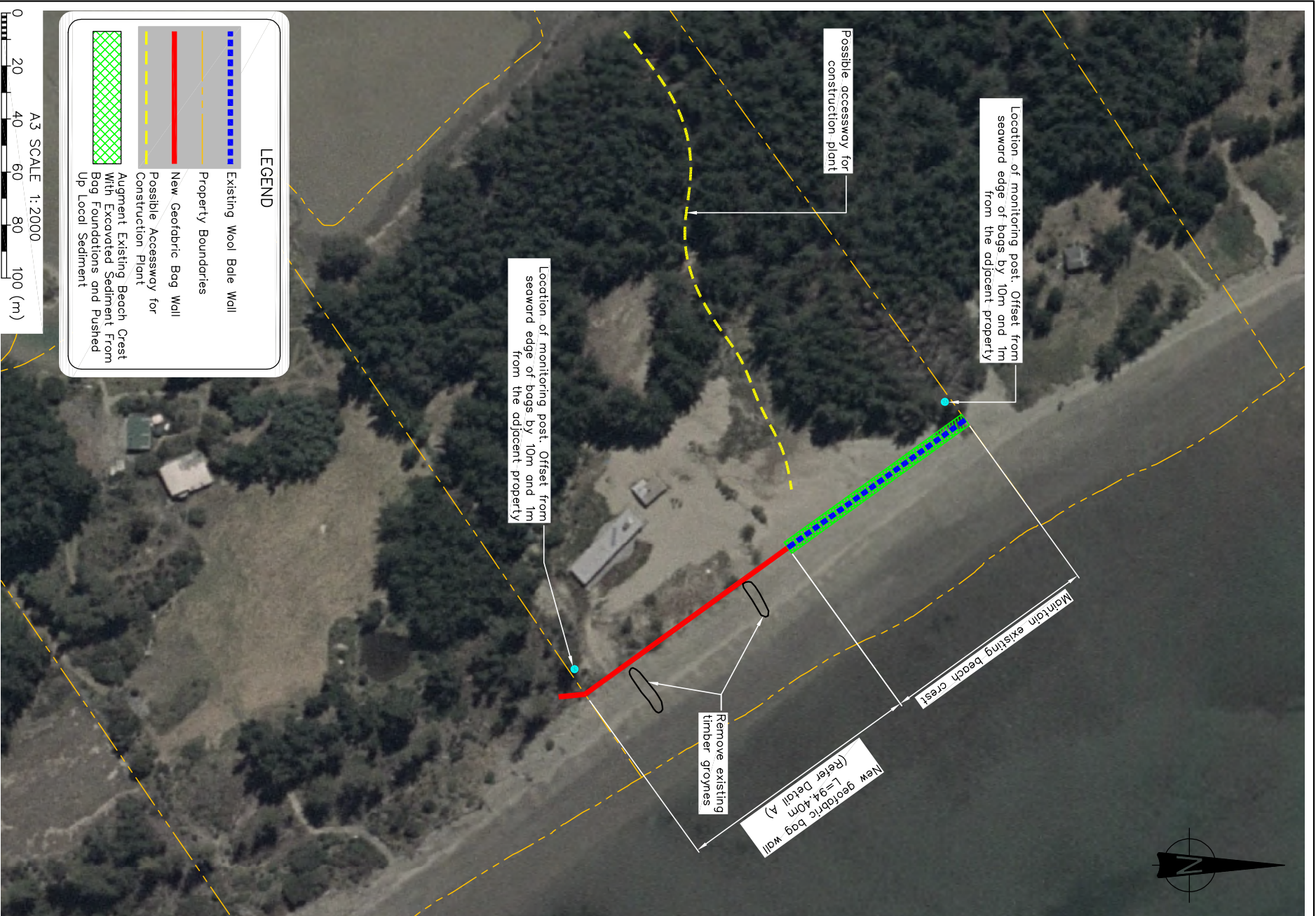
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TASMAN DISTRICT COUNCIL  
 ACTION PLAN FOR INTERIM WORKS  
 JACKETT ISLAND  
 Monitoring Plan

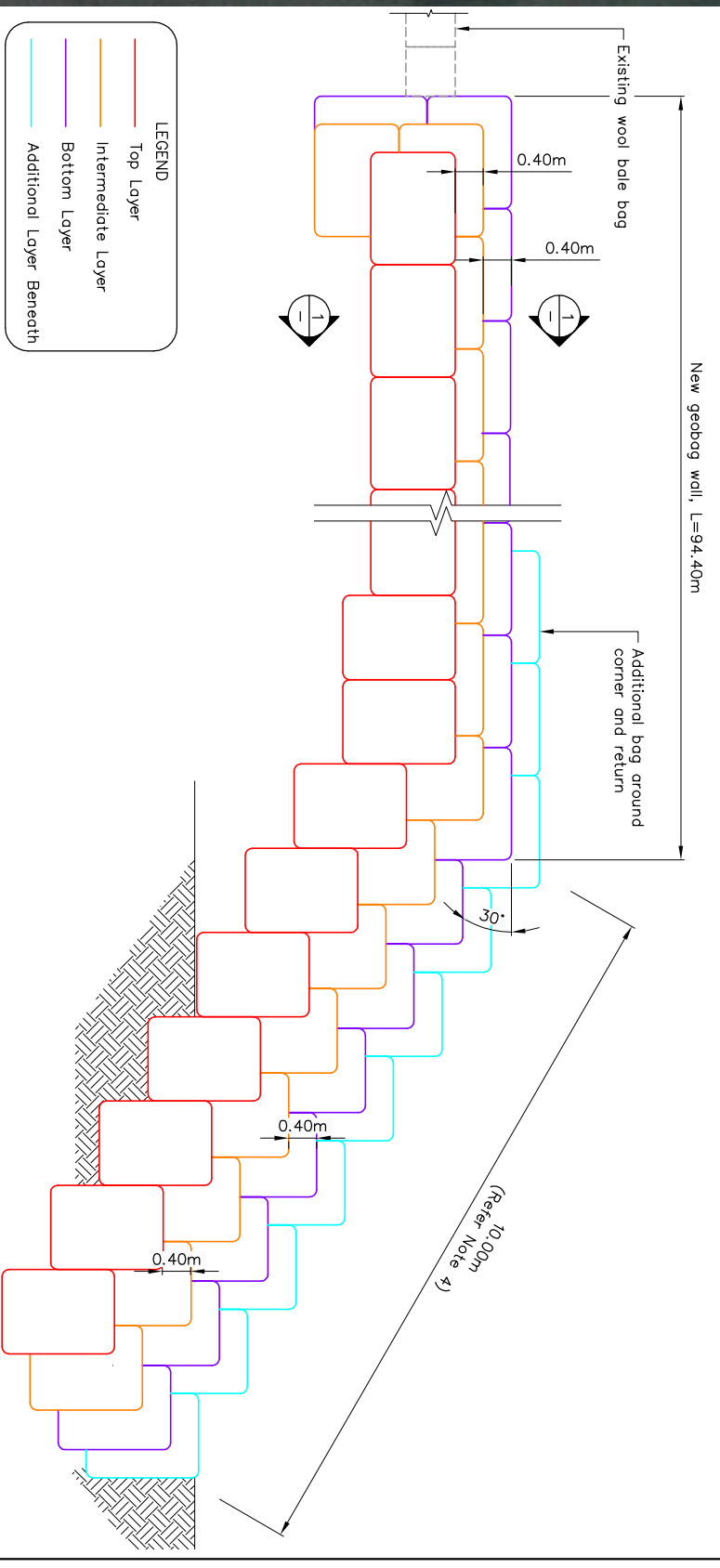
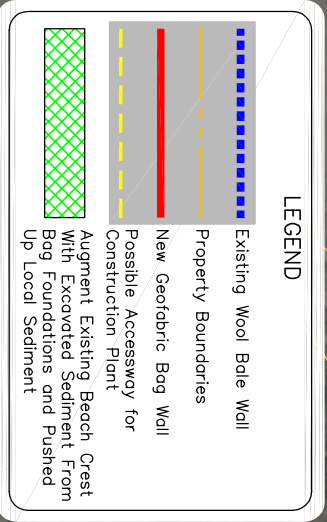
FIG. No. Figure 1

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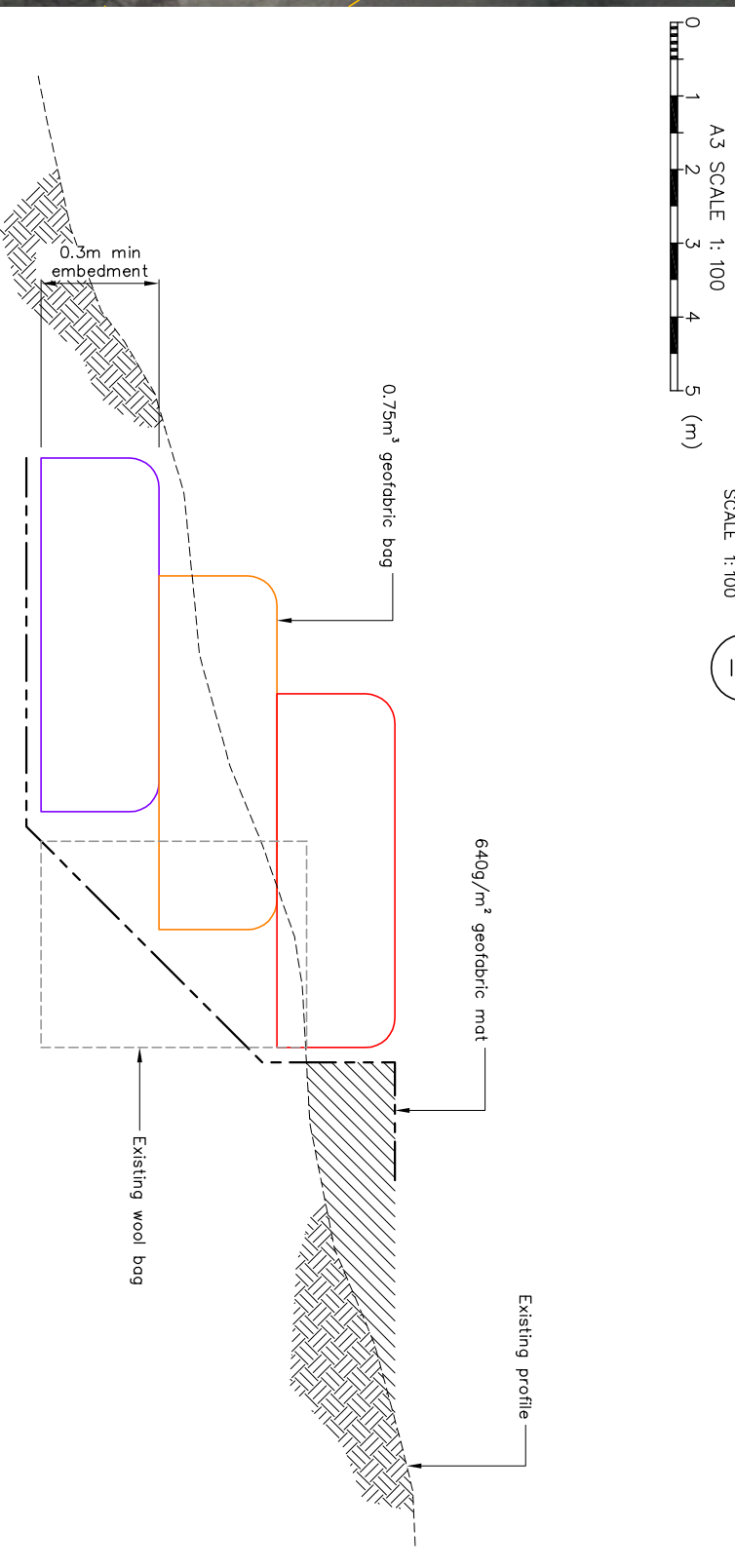




- NOTES:
1. All dimensions are in metres unless noted otherwise.
  2. Aerial photo sourced from Terralink International (Copyright 2002-2005 Terralink International Limited and its licensors).
  3. At least one bag length of bottom layer to extend landward of edge of existing erosion scarp on wall return.
  4. Bag depth required at this location and at corner.



DETAIL A NEW GEOFABRIC BAG WALL PLAN  
SCALE 1:100



SECTION 1 TYPICAL  
SCALE 1:25

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CADFILE : 27882-F2.dwg	
SCALES (AT A3 SIZE)	
AS SHOWN	
PROJECT No.	27882

TASMAN DISTRICT COUNCIL  
ACTION PLAN FOR INTERIM WORKS  
JACKETT ISLAND  
New Geofabric Bag 'with 30 Degree Return' Layout Plan and Details  
FIG. No. Figure 2