M P ROGERS & ASSOCIATES PTY LTD

Our reference: J297/2:TSH:Letter 06053 Rev 1
Enquiries: Trent Hunt, direct line: 9444 4286

19 May 2006

Mr Peter Williams
NS Projects
Suite A7, 435 Roberts Rd
SUBIACO WA 6008

Dear Peter

CANAL ROCKS – RE-ASSESSMENT OF COASTAL SETBACK

In line with our proposal dated 17 February 2006 we have re-assessed the coastal setback
from the beach to the north-east of Lot 413 Smiths Beach. This assessment was made on the
request of the Shire of Busselton and in line with the recommendations of GHD.

This assessment of the coastal setback uses a different interpretation of the State Coastal
Planning Policy to the assessment previously completed by MRA and accepted by the
Department for Planning & Infrastructure. The different interpretation results in an increased
setback from 30 to 51 m.

We trust this meets your requirements. However, should you have any further queries please
feel free to contact our office.

Yours sincerely

Trent Hunt
for and on behalf of
M P Rogers & Associates Pty Ltd

May 2006

Canal Rocks Pty Ltd

Lot 413 Smiths Beach - Re-assessment of Coastal Setback

Job J297/2 Letter Report 06053 Rev 1
Record of Document Revisions

Rev	Purpose of Document	Prepared	Reviewed	Approved	Date
A	Draft for MRA review	T Hunt	C Doak	D Bobridge	12/05/06
0	Issued for Client use	T Hunt	C Doak	D Bobridge	15/05/06
1	Minor revisions and re-issued	T Hunt	C Doak	B Saunders	19/05/06

Limitations of this Document

This document has been prepared for use by the Client in accordance with the agreement between the Client and M P Rogers & Associates Pty Ltd. This agreement includes constraints on the scope, budget and time available for the services. The consulting services and this document have been completed with the degree of skill, care and diligence normally exercised by members of the engineering profession performing services of a similar nature. No other warranty, expressed or implied, is made as to the accuracy of the data and professional advice included. This document has not been prepared for use by parties other than the Client and its consulting advisers. It may not contain sufficient information for the purposes of other parties or for other uses.

M P Rogers & Associates takes no responsibility for the completeness or form of any subsequent copies of this document. Copying this document without the permission of the Client or M P Rogers & Associates Pty Ltd is not permitted.

Table of Contents

1. Introduction

M P Rogers & Associates (MRA) have previously made an assessment of the appropriate coastal setback at Lot 413 Smiths Beach, in consultation with the Department for Planning & Infrastructure (DPI). This assessment included the predominantly rocky coastline of the site, and the sandy beach to the north east of the Lot. MRA, DPI and engineers from GHD who are providing engineering advice to the Shire of Busselton (Shire) met to discuss this report in early 2006. The setback recommended by MRA was consequently approved by DPI in March 2006. This work is outlined in MRA (2006).

The Shire have subsequently requested that a section of the setback be re-assessed using a different interpretation of the State Coastal Planning Policy (SCPP). In particular the Shire wanted the S3 (sea level rise) component for the beach to the north east of the Lot re-assessed.

The proprietors of Lot 413, Canal Rocks Pty Ltd, therefore commissioned MRA to re-assess the S3 factor (Sea Level Rise) of the coastal setback to the requirements of the Shire. MRA met with the consulting engineers providing advice to the Shire (GHD) to discuss the re-assessment. GHD requested that the assessment be completed using a different interpretation of the SCPP.

It was decided that the S3 allowance could not be specifically revised without completing additional SBEACH modelling and revising the S1 allowance. This letter report presents the additional modelling work and presents the setback using the different interpretation of the SCPP.

2. SBEACH Modelling

2.1   Severe Storm Sequence

As outlined above, in order to re-assess the S3 factor, it was agreed that the S1 factor also be re-assessed. The sea level rise allowance could then be investigated by simply increasing the water levels by 0.38 m.

The previously run SBEACH profiles were therefore revised and re-run with 3 runs of a severe storm experienced in Fremantle in July 1996. Water level elevations during the storm were recorded in the Fremantle Fishing Boat Harbour, in approximately 5 m of water. Wave heights were recorded by the DPI's Waverider buoy located in 48 m of water south west of Rottnest Island.

The recommended input wave and water level conditions for the severe storm, previously supplied to MRA by the DPI, are included as Appendix A. The storm was input in deep water, with no factoring of the recommended input conditions to account for location or input depth. MRA believe this will result in overestimation of water levels in the nearshore.

GHD requested that only the previous 'Profile 1' be re-run, and that it be run with a reduced rock profile to more accurately reflect the entire stretch of beach. The reduced rock profile removed the rock in the nearshore zone. The profile was then run to estimate the recession due to a severe storm sequence. MRA were requested to measure the S1 allowance as the total recession of the MSL contour.

The output from the SBEACH modelling is presented in Figure 2.1. The output modelling reports from each of the runs are also included in Appendix B.

As requested, the recession of the mean sea level (MSL) contour was estimated, and is indicated in Figure 2.1. The total recession of the MSL contour was calculated as 18 m. It is important to note that the **total** recession of the MSL (0 mAHD) contour at the end of the storm sequence is not necessarily the same as the **maximum** recession included in the modelling report.

It is therefore recommended that the S1 allowance for this assessment is taken as 18 m.

2.2   Sea Level Rise

To assess the recession due to possible sea level rise in the coming 100 years, the water levels during the modelled storm were increased and the model re-run. The SCPP recommends using the most recent report by the Intergovernmental Panel on Climate Change (IPCC) Working Group to determine the sea level rise predicted by the mean of the median model. This currently suggests a 0.38 m sea level rise in the coming 100 years. The entire storm sequence modelled in Section 2.1 above was therefore increased by 0.38 m. Essentially, this will estimate the recession due to the severe storm sequence at the end of the planning period (100 years) assuming global sea level does rise 0.38 m.

In order to assess further erosion, the final eroded profile from the model run in Section 2.1 was input as the initial profile, and the model run with the elevated storm sequence. The results are presented in Figure 2.2. The run indicates further erosion of the dunes due to the increased water levels.

GHD advised that the recession due to possible sea level rise should be measured at the MSL contour. The modelling run indicates a total of 9 m recession of the MSL due to possible sea level rise. However, the maximum recession during the run was calculated as 13 m (see Appendix B). MRA were instructed to use this maximum recession, and 13 m will therefore be included as the S3 factor.

The model results also suggest there may be erosion at a higher elevation. The modelling report in Appendix B suggests there would be a similar maximum recession at the 3 mAHD contour to that predicted for the MSL (13 to 14 m).

3. Calculated Setback

This assessment has used different criteria to the previous assessment of the coastal setback at Smiths Beach (MRA 2006). The S1 and S3 allowances were outlined in the previous sections. GHD have also advised MRA that without more detailed photogrammetry they will recommend the Shire take a 20 m allowance for S2.

Using the criteria and methods outlined in this report the calculated setback is presented in Table 3.1.

Table 3.1   Mean Shoreline Movement and Total Accretion / Erosion Volumes (1976 – 2003)

Factor	Profile 1 –reduced rock profile
S1	18 m
S2	20 m
S3	13 m
Calculated Setback	**51 m**

The calculated setback using the criteria outlined in this report comes to 51 m. This setback should be measured from the Horizontal Setback Datum (HSD). At Smiths Beach this should be taken as the coastal vegetation line or the 3 mAHD contour, whichever is higher.

The setback calculated using this interpretation of the SCPP is greater than the recommended setback calculated by MRA (2006) and approved by DPI.

4. Summary

This letter report presents additional work completed to re-assess a coastal setback for the beach to the north-east of Lot 413, Smiths Beach. The setback for the rest of Lot 413 has been agreed.

This work used a different interpretation of the SCPP and different criteria to the previous assessment and has been completed in line with the recommendations of GHD. From this additional work the calculated coastal setback from the beach to the north east of Lot 413 has been estimated as 51 m. This is greater than the setback recommended by MRA and approved by DPI.

4.1   References

MRA 2006. *Smiths Beach Location 413 Coastal Stability Study, R151 Rev 1.* Prepared for Canal Rocks Pty Ltd.

5. Figures

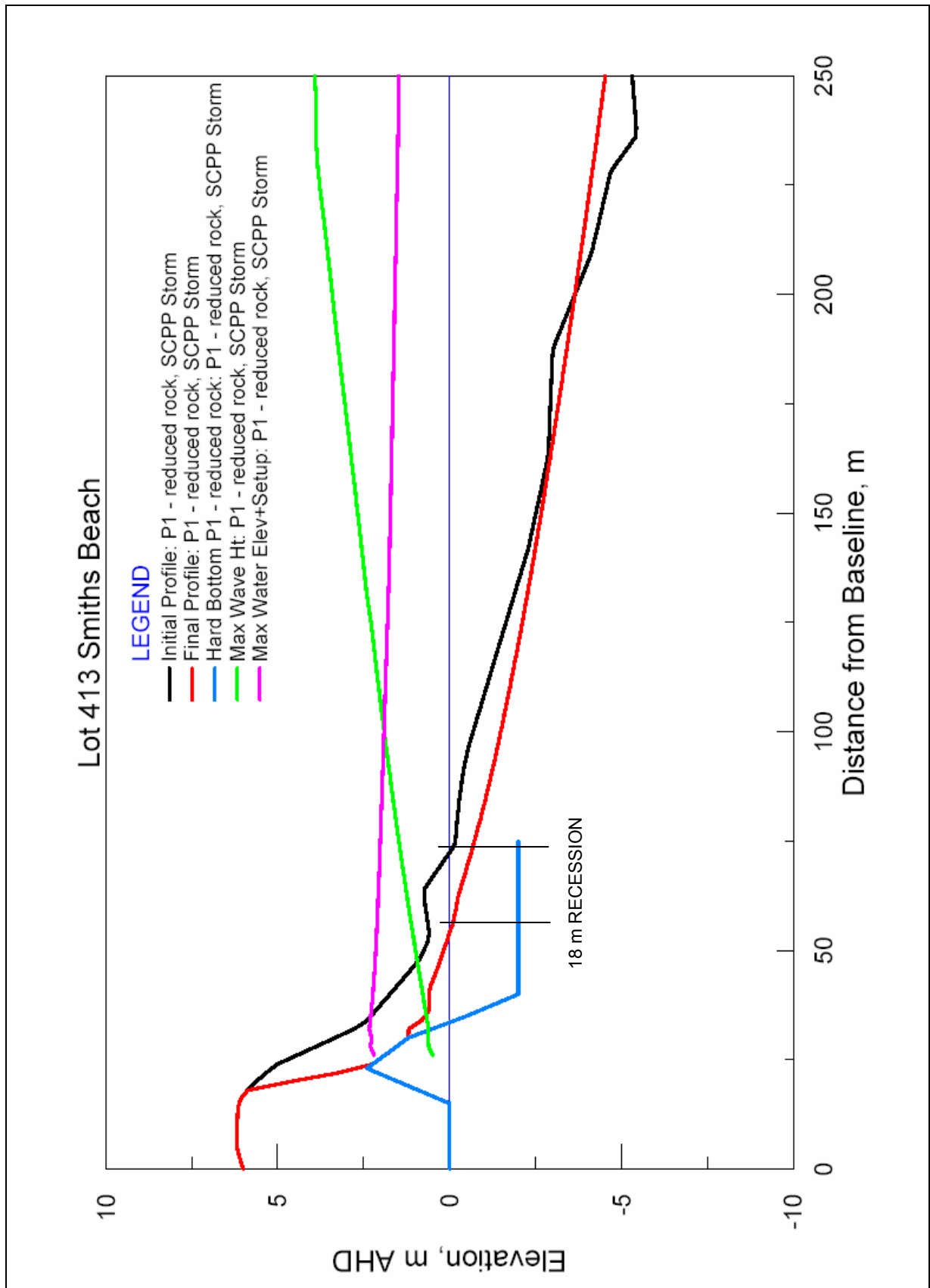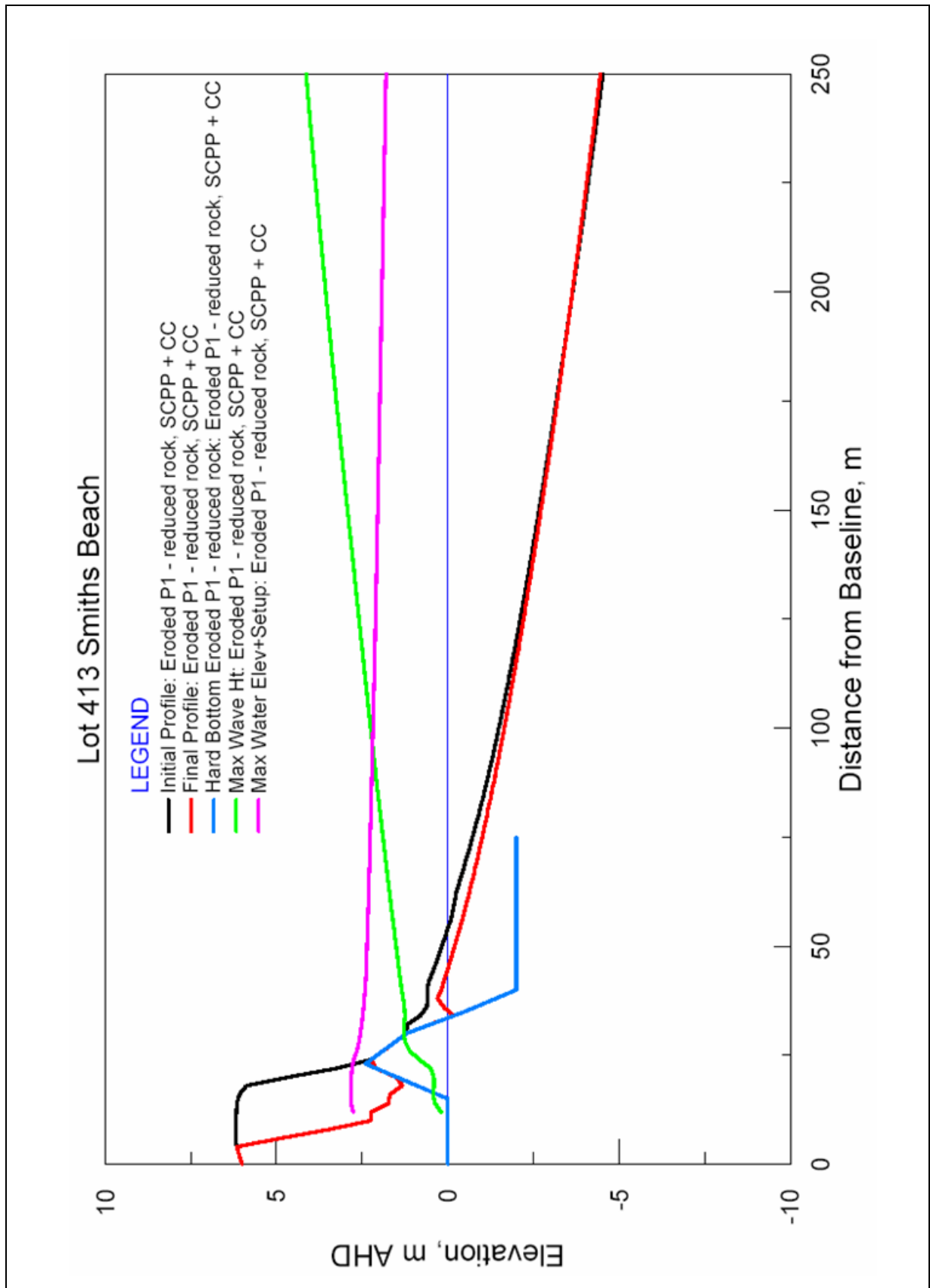# Figure 2.1   Recession Due to Severe Storm Sequence

Figure 2.2 Recession Due to Possible Sea Level Rise

6. Attachments

Attachment 1 Recommended Input Conditions for Severe Storm Sequence

Attachment 2 SBEACH Modelling Reports

Attachment 1 Recommended Input Conditions for Severe Storm Sequence

Appendix 1

Severe storm of July 1996, with parameters for use in SBEACH version2

Wave height tabulated - measured at 48m water depth. Randomised 20% variability
Wave period as tabulated
Water elevation as tabulated
Wind speed 20 m/sec.
Wind direction Zero.
Wave angle Zero.

Time (Hours)	Wave height (m)	Wave Period (sec)	Water Height (m above CD)
00	2.0	7.0	0.6
02	2.3	7.5	0.7
04	2.6	8.0	0.8
06	3.2	9.0	0.9
08	3.6	9.0	1.0
10	4.2	9.5	1.1
12	4.8	10.0	1.2
14	5.5	10.5	1.33
16	5.7	..	1.45
18	5.9	..	1.33
20	6.2	..	1.15
22	6.4	..	0.95
24	6.6	..	0.85
26	6.8	..	0.95
28	7.2	..	1.10
30	7.5	..	1.30
32	7.8	..	1.50
34	7.3	..	1.60
36	6.8	..	1.70
38	6.3	..	1.75
40	5.9	10.5	1.65
42	5.5	10.0	1.35
44	5.2	..	1.10
46	5.5	..	1.25
48	5.8	..	1.40
50	6.2	..	1.55
52	6.4	..	1.25
54	6.9	..	1.35
56	7.4	..	1.55
58	6.8	..	1.65
60	6.2	..	1.55
62	5.6	..	1.30
64	5.8	..	1.10
66	6.0	..	1.00
68	6.2	..	0.90
70	6.4	..	1.00
72	6.6	..	1.10
74	6.8	..	1.10
76	6.3	..	1.20
78	5.9	..	1.30
80	5.5	10.0	1.40
82	5.3	9.9	1.45
84	5.1	9.8	1.40
86	4.9	9.7	1.20
88	4.7	9.6	1.00
90	4.5	9.5	0.80
92	4.3	9.4	0.60
94	4.1	9.3	0.50
96	3.9	9.2	0.65
98	3.7	9.1	0.65
100	3.5	9.0	0.70
102	3.2	8.9	0.80
104	2.9	8.8	0.90
106	2.6	8.7	0.80
108	2.3	8.6	0.60
110	2.0	8.5	0.45

Attachment 2 SBEACH Modelling Reports

Report

Project: J297/1 - Smiths Beach

Reach: P1 - reduced rock

Storm: SCPP Storm

MODEL CONFIGURATION

INPUT UNITS (SI=1, AMERICAN CUST.=2): 1

NUMBER OF CALCULATION CELLS: 700

GRID TYPE (CONSTANT=0, VARIABLE=1): 1

NUMBER OF GRID CELL REGIONS: 1

NUMBER CELLS AND CELL WIDTH IN REGION 1: 700, 2.0

NUMBER OF TIME STEPS AND VALUE OF TIME STEP IN MINUTES: 4008, 5.0

TIME STEP(S) OF INTERMEDIATE OUTPUT 1:   1336

TIME STEP(S) OF INTERMEDIATE OUTPUT 2:   2672

 NO COMPARSION WITH MEASURED PROFILE.

PROFILE ELEVATION CONTOUR 1:   3.00

PROFILE ELEVATION CONTOUR 2:   2.00

PROFILE ELEVATION CONTOUR 3:   0.00

PROFILE EROSION DEPTH 1:   0.01

PROFILE EROSION DEPTH 2:   0.05

PROFILE EROSION DEPTH 3:   0.10

REFERENCE ELEVATION: 2.00

TRANSPORT RATE COEFFICIENT (m^4/N): 1.75E-6

COEFFICIENT FOR SLOPE DEPENDENT TERM (m^2/s): 0.0020

TRANSPORT RATE DECAY COEFFICIENT MULTIPLIER: 0.50

WATER TEMPERATURE IN DEGREES C : 16.0

WAVE TYPE (MONOCHROMATIC=1, IRREGULAR=2): 2

WAVE HEIGHT AND PERIOD INPUT (CONSTANT=0, VARIABLE=1): 1

TIME STEP OF VARIABLE WAVE HEIGHT AND PERIOD INPUT IN MINUTES: 120.0

WAVE ANGLE INPUT (CONSTANT=0, VARIABLE=1): 0

CONSTANT WAVE ANGLE: 0.0

WATER DEPTH OF INPUT WAVES (DEEP WATER = 0.0):   0.0

SEED VALUE FOR WAVE HEIGHT RANDOMIZER AND % VARIABILITY: 4567, 20.0

TOTAL WATER ELEVATION INPUT (CONSTANT=0, VARIABLE=1): 1

TIME STEP OF VARIABLE TOTAL WATER ELEVATION INPUT IN MINUTES: 120.0

WIND SPEED AND ANGLE INPUT (CONSTANT=0, VARIABLE=1): 0

CONSTANT WIND SPEED AND ANGLE: 20.0, 0.0

TYPE OF INPUT PROFILE (ARBITRARY=1, SCHEMATIZED=2): 1

DEPTH CORRESPONDING TO LANDWARD END OF SURF ZONE: 0.30

EFFECTIVE GRAIN SIZE DIAMETER IN MILLIMETERS: 0.31

MAXIMUM PROFILE SLOPE PRIOR TO AVALANCHING IN DEGREES: 45.0

 NO BEACH FILL IS PRESENT.

 NO SEAWALL IS PRESENT.

 HARD BOTTOM IS PRESENT.

_____

 COMPUTED RESULTS

 DIFFERENCE IN TOTAL VOLUME BETWEEN FINAL AND INITIAL PROFILES:

   -0.4 m^3/m

 MAXIMUM VALUE OF WATER ELEVATION + SETUP FOR SIMULATION

 2.33 m

 TIME STEP AND POSITION ON PROFILE AT WHICH MAXIMUM VALUE
 OF WATER ELEVATION + SETUP OCCURRED

438,   32.0 m
MAXIMUM ESTIMATED RUNUP ELEVATION: 3.37 m
(REFERENCED TO VERTICAL DATUM)

POSITION OF LANDWARD MOST OCCURRENCE OF A   0.01 m EROSION DEPTH:
   20.0 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A   0.01 m EROSION DEPTH:
   17.6 m

POSITION OF LANDWARD MOST OCCURRENCE OF A   0.05 m EROSION DEPTH:
   20.0 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A   0.05 m EROSION DEPTH:
   17.6 m

POSITION OF LANDWARD MOST OCCURRENCE OF A   0.10 m EROSION DEPTH:
   20.0 m

DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A   0.10 m EROSION DEPTH:
   17.6 m

MAXIMUM RECESSION OF THE   3.00 m ELEVATION CONTOUR:
  9.30 m

MAXIMUM RECESSION OF THE   2.00 m ELEVATION CONTOUR:
 12.23 m

MAXIMUM RECESSION OF THE   0.00 m ELEVATION CONTOUR:
 18.27 m

Report

Project: J297/1 - Smiths Beach

Reach: Eroded P1 - reduced rock

Storm: SCPP + CC

MODEL CONFIGURATION

INPUT UNITS (SI=1, AMERICAN CUST.=2): 1

NUMBER OF CALCULATION CELLS: 700

GRID TYPE (CONSTANT=0, VARIABLE=1): 1

NUMBER OF GRID CELL REGIONS: 1

NUMBER CELLS AND CELL WIDTH IN REGION 1: 700, 2.0

NUMBER OF TIME STEPS AND VALUE OF TIME STEP IN MINUTES: 4008, 5.0

TIME STEP(S) OF INTERMEDIATE OUTPUT 1: 1336

TIME STEP(S) OF INTERMEDIATE OUTPUT 2: 2672

 NO COMPARSION WITH MEASURED PROFILE.

PROFILE ELEVATION CONTOUR 1: 3.00

PROFILE ELEVATION CONTOUR 2: 2.00

PROFILE ELEVATION CONTOUR 3: 0.00

PROFILE EROSION DEPTH 1: 0.01

PROFILE EROSION DEPTH 2: 0.05

PROFILE EROSION DEPTH 3: 0.10

REFERENCE ELEVATION: 0.00

TRANSPORT RATE COEFFICIENT (m^4/N): 1.75E-6

COEFFICIENT FOR SLOPE DEPENDENT TERM (m^2/s): 0.0020

TRANSPORT RATE DECAY COEFFICIENT MULTIPLIER: 0.50

WATER TEMPERATURE IN DEGREES C : 16.0

WAVE TYPE (MONOCHROMATIC=1, IRREGULAR=2): 2

WAVE HEIGHT AND PERIOD INPUT (CONSTANT=0, VARIABLE=1): 1

TIME STEP OF VARIABLE WAVE HEIGHT AND PERIOD INPUT IN MINUTES: 120.0

WAVE ANGLE INPUT (CONSTANT=0, VARIABLE=1): 0

CONSTANT WAVE ANGLE: 0.0

WATER DEPTH OF INPUT WAVES (DEEP WATER = 0.0): 0.0

SEED VALUE FOR WAVE HEIGHT RANDOMIZER AND % VARIABILITY: 4567, 20.0

TOTAL WATER ELEVATION INPUT (CONSTANT=0, VARIABLE=1): 1

TIME STEP OF VARIABLE TOTAL WATER ELEVATION INPUT IN MINUTES: 120.0

WIND SPEED AND ANGLE INPUT (CONSTANT=0, VARIABLE=1): 0

CONSTANT WIND SPEED AND ANGLE: 20.0, 0.0

TYPE OF INPUT PROFILE (ARBITRARY=1, SCHEMATIZED=2): 1

DEPTH CORRESPONDING TO LANDWARD END OF SURF ZONE: 0.30

EFFECTIVE GRAIN SIZE DIAMETER IN MILLIMETERS: 0.31

MAXIMUM PROFILE SLOPE PRIOR TO AVALANCHING IN DEGREES: 45.0

 NO BEACH FILL IS PRESENT.

 NO SEAWALL IS PRESENT.

 HARD BOTTOM IS PRESENT.

_____

 COMPUTED RESULTS

 DIFFERENCE IN TOTAL VOLUME BETWEEN FINAL AND INITIAL PROFILES:

   2.4 m^3/m

 MAXIMUM VALUE OF WATER ELEVATION + SETUP FOR SIMULATION

 2.82 m

 TIME STEP AND POSITION ON PROFILE AT WHICH MAXIMUM VALUE

 OF WATER ELEVATION + SETUP OCCURRED

3125,   16.0 m

MAXIMUM ESTIMATED RUNUP ELEVATION: 3.75 m

 (REFERENCED TO VERTICAL DATUM)

POSITION OF LANDWARD MOST OCCURRENCE OF A   0.01 m EROSION DEPTH:

   6.0 m

 DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A   0.01 m EROSION DEPTH:

   48.1 m

POSITION OF LANDWARD MOST OCCURRENCE OF A   0.05 m EROSION DEPTH:

   6.0 m

 DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A   0.05 m EROSION DEPTH:

   48.1 m

POSITION OF LANDWARD MOST OCCURRENCE OF A   0.10 m EROSION DEPTH:

   6.0 m

 DISTANCE FROM POSITION OF REFERENCE ELEVATION ON INITIAL PROFILE
TO POSITION OF LANDWARD MOST OCCURRENCE OF A   0.10 m EROSION DEPTH:

   48.1 m

MAXIMUM RECESSION OF THE   3.00 m ELEVATION CONTOUR:
 13.87 m

MAXIMUM RECESSION OF THE   2.00 m ELEVATION CONTOUR:
 0.00 m

MAXIMUM RECESSION OF THE   0.00 m ELEVATION CONTOUR:
 13.00 m