SITE PHOTOGRAPHS – 2004 to 2010

Wyong Coastline Study Area

P1: Mechanism A – Indurated Sands.
Map Area G11: Toe erosion & progressive surficial soil slumping.

P2: Mechanism A – Indurated Sands.
Map Area G11: Toe erosion & progressive surficial soil slumping.

SITE PHOTOGRAPHS – 2004 to 2010

Wyong Coastline Study Area

P3: Mechanism B – Soil & Fill Creep on Slopes.
Map Area G6: Land instability occurring in fill & soil slope above Patonga Claystone bedrock in coastline recession zone.

P4: Mechanism B – Soil & Fill Creep on Slopes.
Map Area G6: Land instability occurring in fill & soil slope above Patonga Claystone bedrock in coastline recession zone.

Prepared: 31 May 2010

SITE PHOTOGRAPHS – 2004 to 2010

Wyong Coastline Study Area

P5: Mechanism C – Rock Block / Differential Weathering.
Map Areas G2 / G3: Sandstone rock falls due to ongoing differential weathering of claystone / softer bands within Patonga Claystone.

P6: Mechanism C – Rock Block / Differential Weathering.
Map Area G5: Sandstone rock falls due to ongoing differential weathering of claystone / softer bands within Patonga Claystone.

SITE PHOTOGRAPHS – 2004 to 2010

Wyong Coastline Study Area

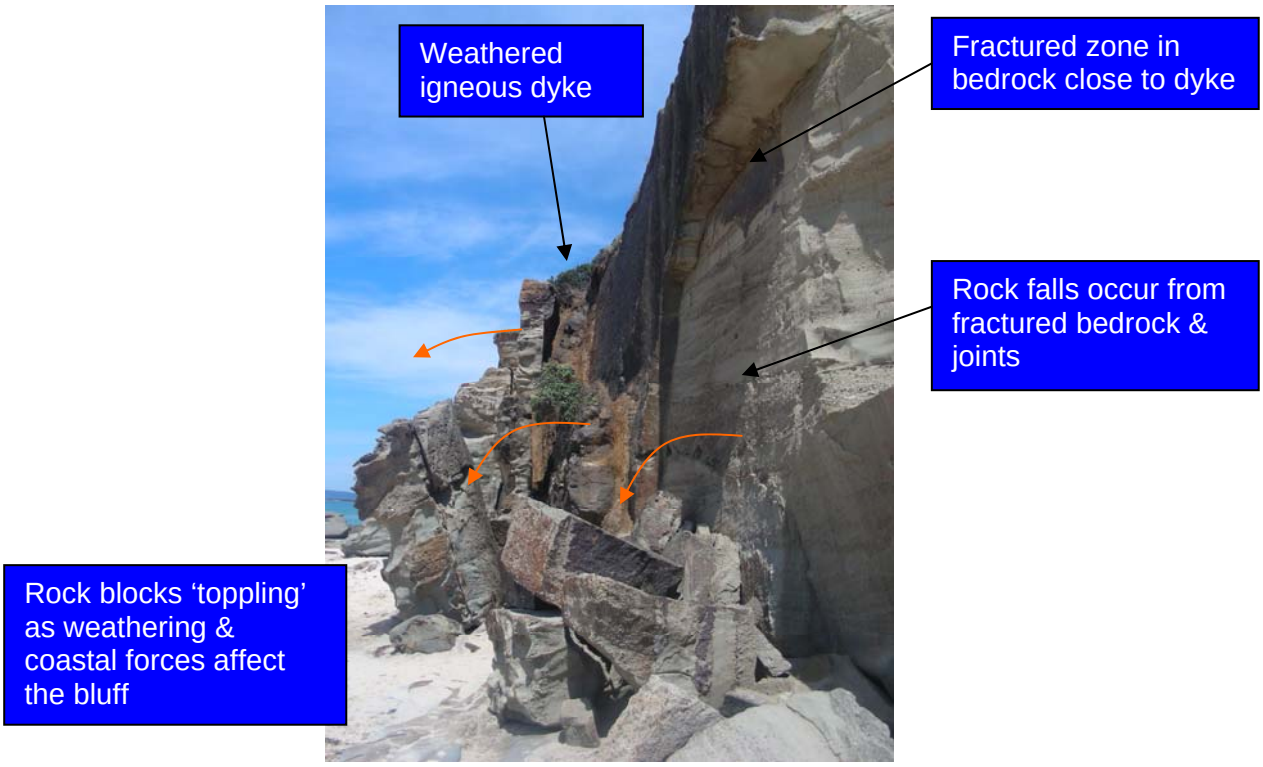
P7: Mechanism C – Rock Block / Differential Weathering.
Map Area G5: Sandstone rock falls due to ongoing differential weathering of claystone / softer bands within Patonga Claystone.

P8: Mechanism D – Dyke Influenced Rock Recession.
Map Area G9: Sandstone bedrock undercut & rock falls near dyke.

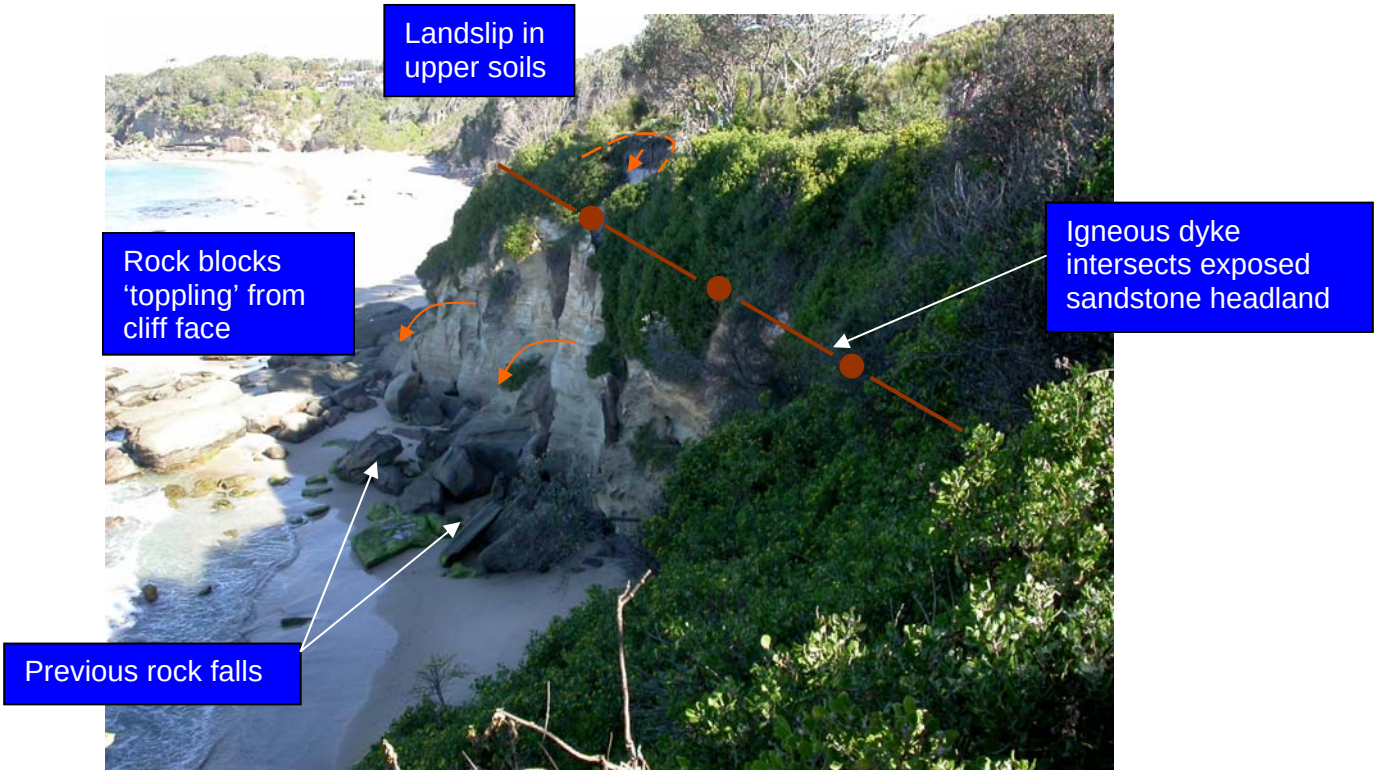
Prepared: 31 May 2010

SITE PHOTOGRAPHS – 2004 to 2010

Wyong Coastline Study Area



P9: Mechanism D – Dyke Influenced Rock Recession.
Map Area G9: Sandstone bedrock undercut & rock falls near dyke.



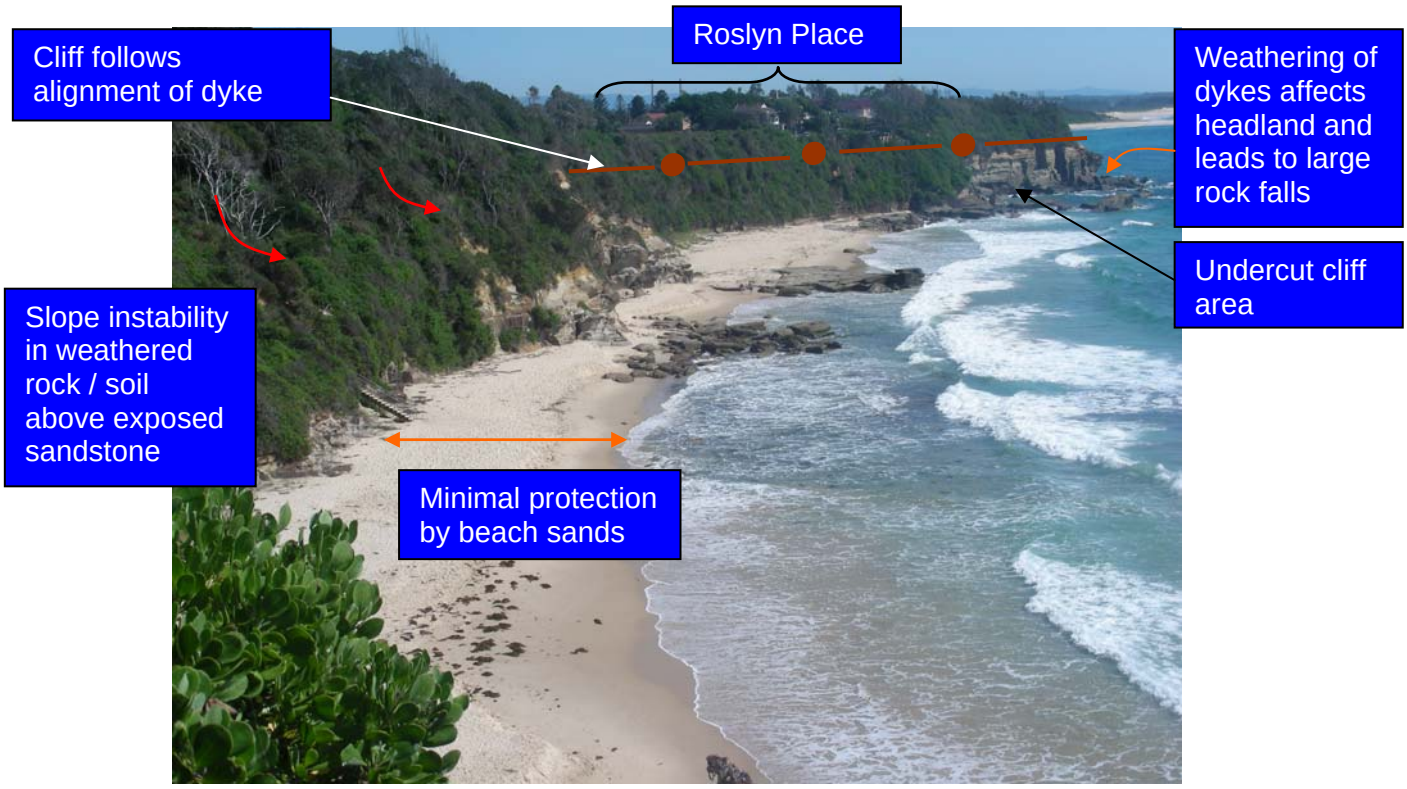
P10: Mechanism D – Dyke Influenced Rock Recession.
Map Area G12: Sandstone bedrock undercut & rock falls near dyke.

Prepared: 31 May 2010

SITE PHOTOGRAPHS – 2004 to 2010

Wyong Coastline Study Area

P11: Mechanism D – Dyke Influenced Rock Recession
Map Area G12: Sandstone bedrock undercut & rock falls near dyke.



P12: Mechanisms D & E – Dyke Influenced Rock Recession & Instability of Weathered Rock / Soil Slope.
Map Area G12: Sandstone undercut & rock falls near dyke. Weathered Patonga Claystone slope instability within coastline recession zone.

P13: Mechanism E – Instability of Weathered Rock / Soil Slope.
Map Area G12: Patonga Claystone weathered rock / residual soil slope instability, over Tuggerah Formation in coastline recession zone.

P14: Mechanism E – Instability of Weathered Rock / Soil Slope.
Map Area G12: Patonga Claystone weathered rock / residual soil slope instability, over Tuggerah Formation in coastline recession zone.

DRAWING NUMBER:	REVISION:
BM001G21	C

RECESSION MECHANISM SKETCHES NOTES

The following notes have been made to assist in the interpretation of the recession mechanism drawings, G21 to G23:

- The substrata shown on the drawings is indicative only.
- Φ = Material 'equivalent friction angle'.
- $\Phi^*_{(F.S.)}$ = Φ with an applied factor of safety, F.S.
  = $\tan^{-1}(\tan \Phi/F.S.)$
- The 'equivalent friction angles' assumed for the purposes of the mechanism analysis are shown in the following table.

Material	Geological Symbol	Φ
Surficial Soils / Fill	Qhs / Qhmf	32°
Indurated Sand	Qpa	43°
Cemented Sand	Qpa	40°
Patonga Claystone (predominantly claystone)	Rnp	35°
Patonga Claystone (predominantly sandstone)	Rnp	45°

The following assumptions have also been made in the recession mechanisms:

- Mechanism A: The maximum slope at which an indurated sand can stand for a short period [viz: < 3 months] is 45°.
- Mechanisms B & C: The surface slopes are indicative of the underlying predominant rock type [viz: sandstone or claystone] in the Patonga Claystone.
- The bedrock joint 'dip' is typically at 70° [to the horizontal], and at the spacing set out in the following table:

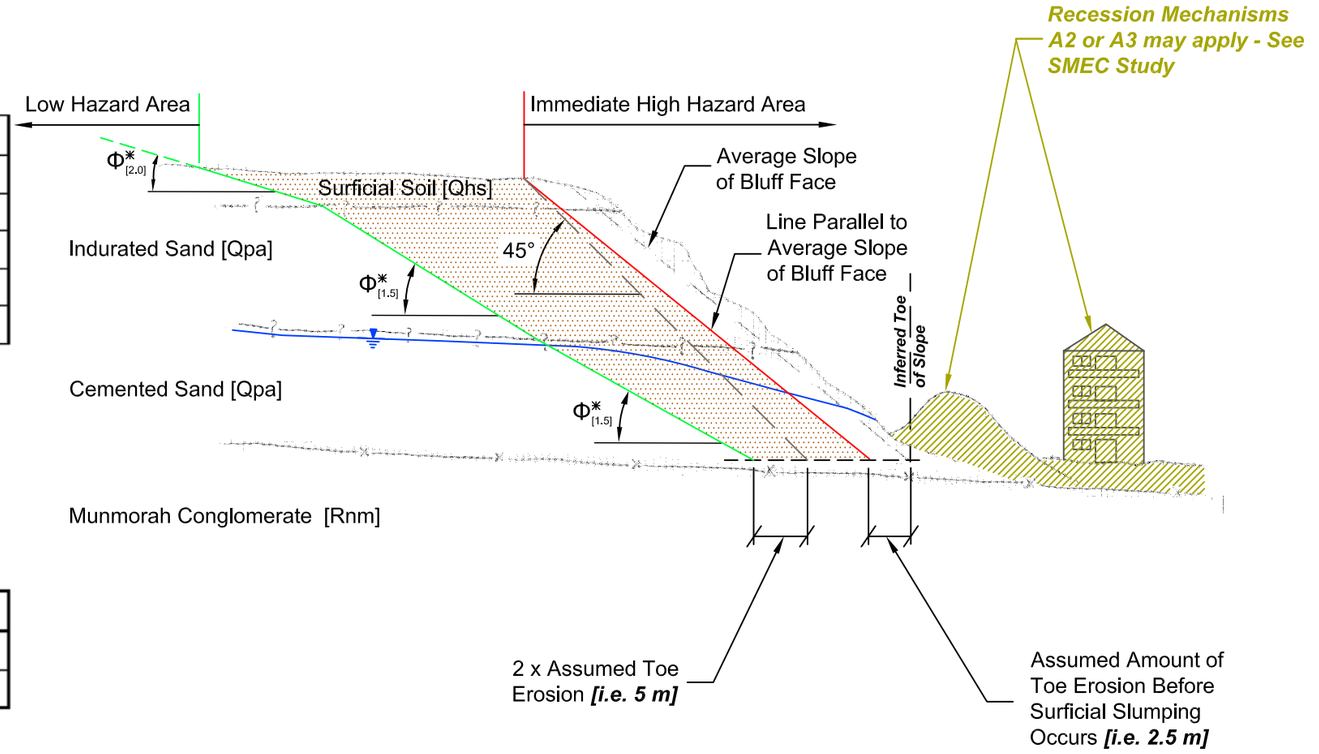
Rock Unit	Geological Symbol	Typical Joint Spacing
Patonga Claystone	Rnp	2 m
Tuggerah Formation	Rnu	4 m

- Mechanism E: Where dykes are also present, the Immediate High hazard line is determined as per Mechanism D.
- Mechanisms D & E: The coastal recession zone 'angle of influence' theta [θ] for the Tuggerah Formation is related to the joint set 'dip', and in-situ bedrock stress state away from the coastal recession zone. The values assumed are set out in the following table:

Hazard Line	θ
Immediate High	70°
Low	45°

NOTES:

1. In specific locations, the actual joint spacing & angles may be different to the typical joint spacing and angles.
2. For more detailed information on the bluff recession mechanisms, hazard line relationships and the geological formations referred to in Drawings G21 to G23, see Tables B1 – B3 and the Geological Notes in the Appendix of this report.



MECHANISM "A1"

[Applies where Bluff is Exposed to Wave Attack]

METRES 0 2 4 6 8 10 20 30 METRES

SCALE 1 : 400

LEGEND

High and Medium Hazard Area
[Refer to Figure C3 and Table B3]

REVISION	DATE	DETAILS	CHECKED
C	31–05–2011	FINAL REPORT	AFS
B	21–05–2010	AMENDED NOTES, MECHANISM TITLE & IDENTIFIED SMEC STUDY AREA	AFS
A	11–05–2010	DRAFT ISSUE	AFS

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SHIRLEY CONSULTING ENGINEERS
PTY LTD ABN 65 001 224 728
CONSULTING & FORENSIC ENGINEERS
895 PACIFIC HIGHWAY
PYMBLE NSW 2073
Ph (02) 9449 5577
P.O. BOX 439
PYMBLE NSW 2073
Fax (02) 9449 5136
COLLEGE OF INVESTIGATIVE AND REMEDIAL CONSULTING ENGINEERS AUST.

FIELDWORK:	DRAWN:
SCE	WH

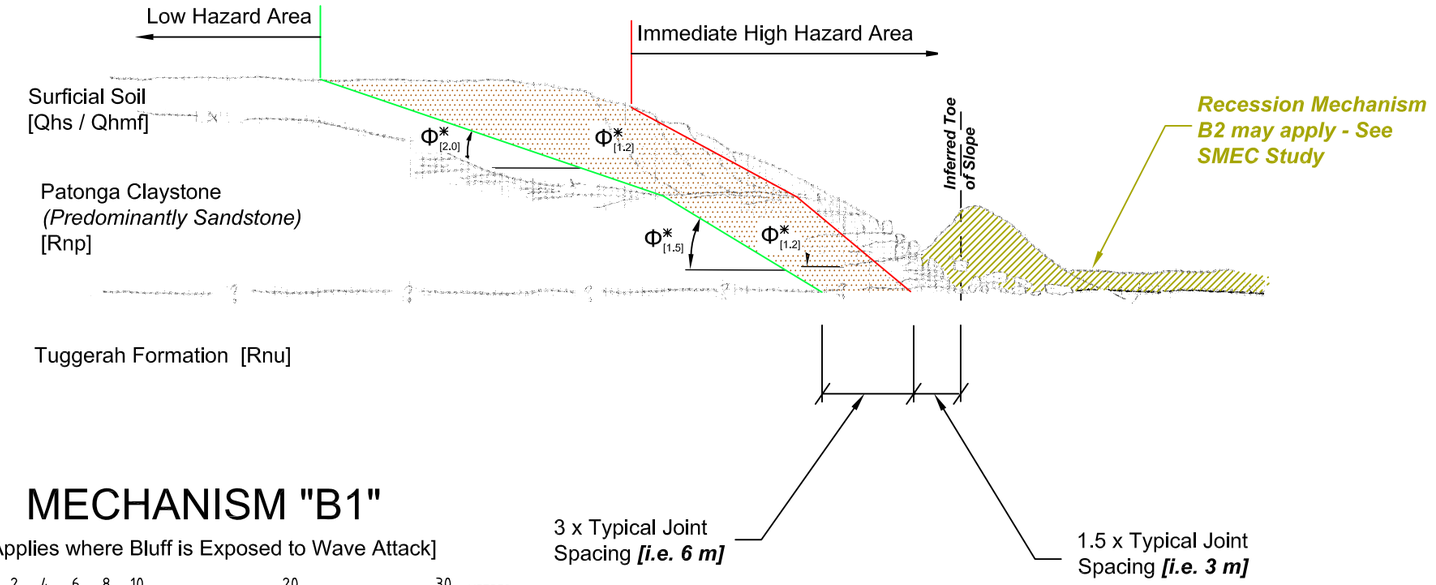
CHECKED:

DATE: 05-05-2010

TITLE: RECESSION MECHANISMS: INDURATED SANDS
COASTAL HAZARD MANAGEMENT STUDY

CLIENT: WYONG SHIRE COUNCIL

DRAWING NUMBER:	REVISION:
BM001G22	C

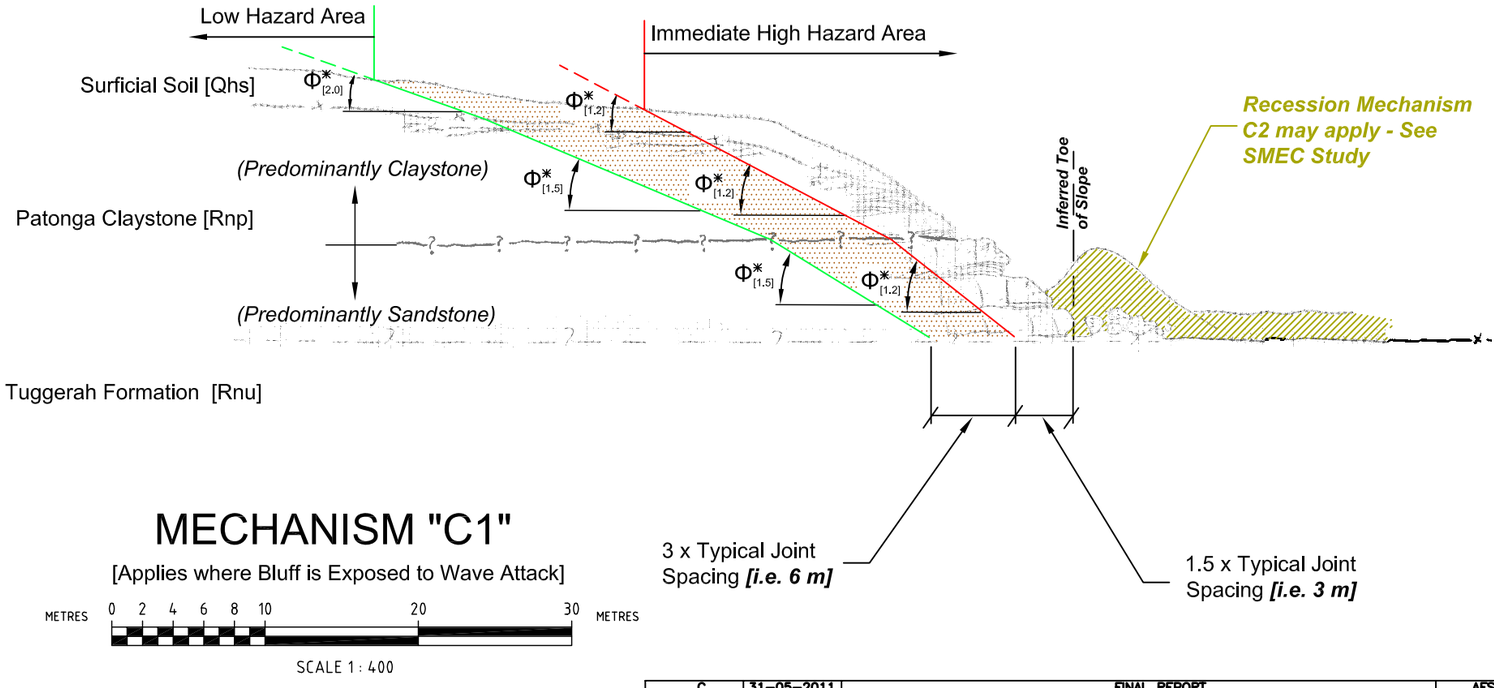


MECHANISM "B1"

[Applies where Bluff is Exposed to Wave Attack]

METRES 0 2 4 6 8 10 20 30 METRES

SCALE 1 : 400



MECHANISM "C1"

[Applies where Bluff is Exposed to Wave Attack]

METRES 0 2 4 6 8 10 20 30 METRES

SCALE 1 : 400

LEGEND

High and Medium Hazard Area
[Refer to Figure C3 and Table B3]

REVISION	DATE	DETAILS	CHECKED
C	31-05-2011	FINAL REPORT	AFS
B	21-05-2010	AMENDED MECHANISMS TITLE & IDENTIFIED SMEC STUDY AREA	AFS
A	11-05-2010	DRAFT ISSUE	AFS

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SHIRLEY CONSULTING ENGINEERS
PTY LTD ABN 65 001 224 728
CONSULTING & FORENSIC ENGINEERS
895 PACIFIC HIGHWAY
PYMBLE NSW 2073
Ph (02) 9449 5577
P.O. BOX 439
PYMBLE NSW 2073
Fax (02) 9449 5136
COLLEGE OF INVESTIGATIVE AND REMEDIAL CONSULTING ENGINEERS AUST.

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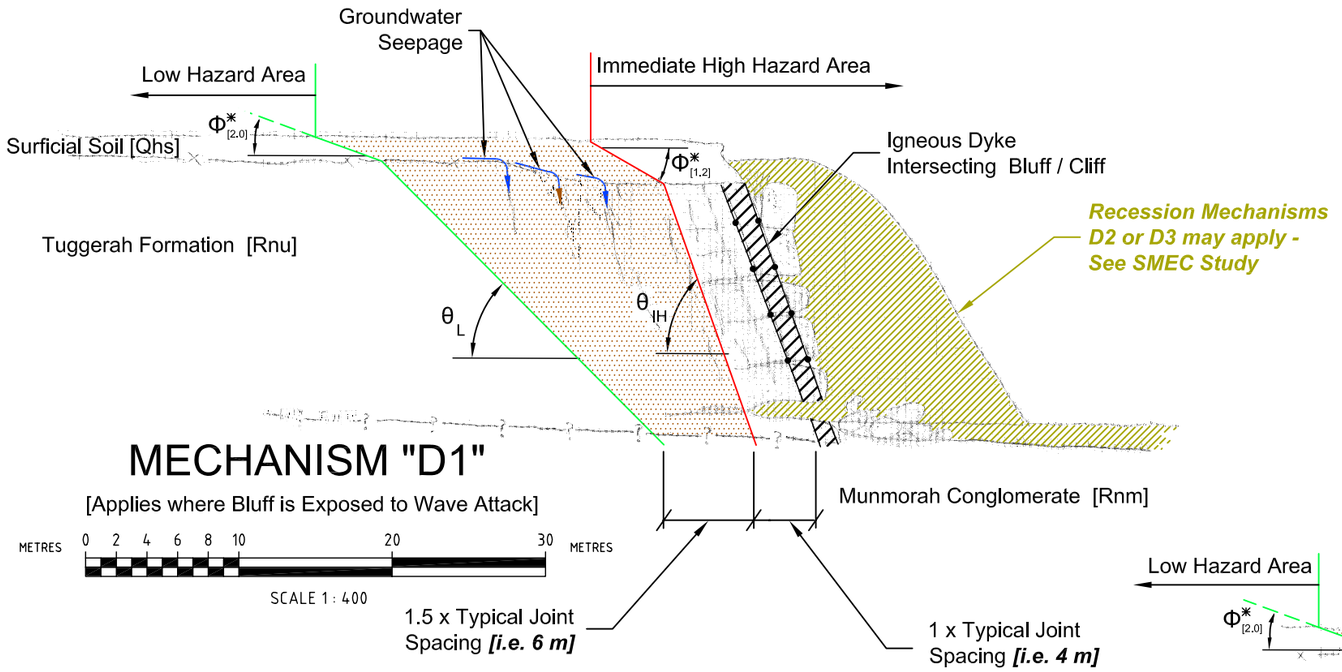
CHECKED:	
DATE: 05-05-2010	

TITLE: **RECESSION MECHANISMS: SOIL & FILL CREEP ON SLOPES AND ROCK BLOCK DIFFERENTIAL WEATHERING**
COASTAL HAZARD MANAGEMENT STUDY

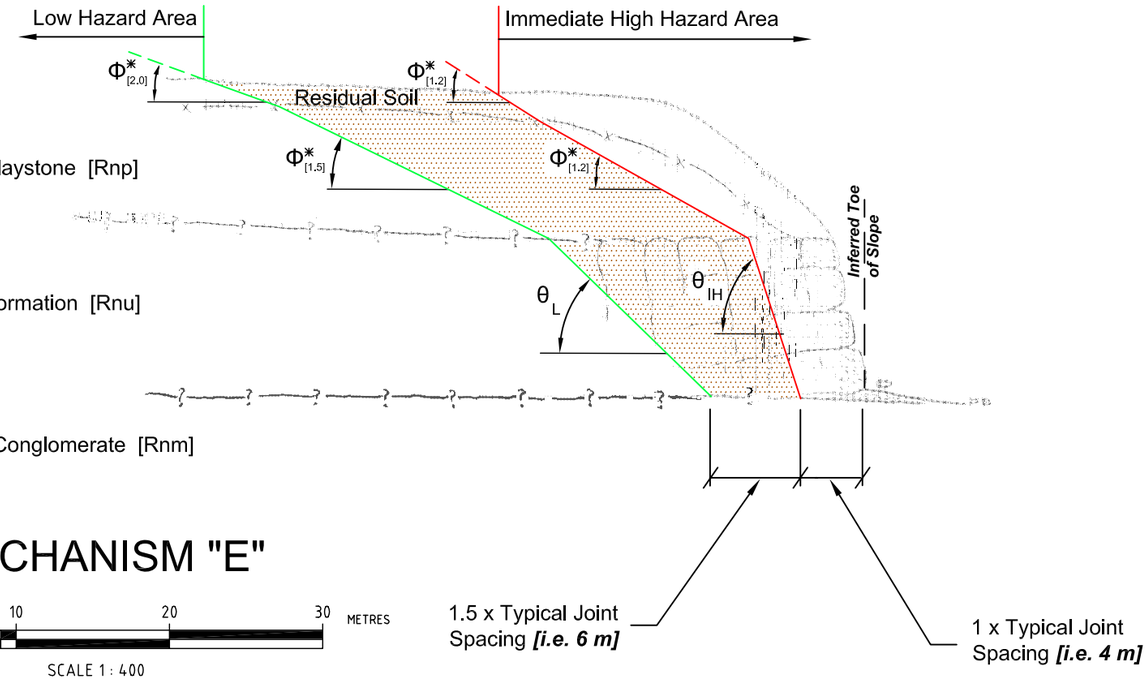
CLIENT: **WYONG SHIRE COUNCIL**

DRAWING NUMBER:	REVISION:
BM001G23	C



MECHANISM "D1"

[Applies where Bluff is Exposed to Wave Attack]



MECHANISM "E"

LEGEND

High and Medium Hazard Area
[Refer to Figure C3 and Table B3]

θ_L or θ_{IH} = The Angle of Influence of Coastline Recession Processes in the Tuggerah Formation. The Subscript Denotes the Low or Immediate High Hazard Line.

REVISION	DATE	DETAILS	CHECKED
C	31–05–2011	FINAL REPORT	AFS
B	21–05–2010	AMENDED MECHANISMS TITLE & IDENTIFIED SMEC STUDY AREA	AFS
A	11–05–2010	DRAFT ISSUE	AFS

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SHIRLEY CONSULTING ENGINEERS
PTY LTD ABN 65 001 224 728
CONSULTING & FORENSIC ENGINEERS
895 PACIFIC HIGHWAY
PYMBLE NSW 2073
Ph (02) 9449 5577
P.O. BOX 439
PYMBLE NSW 2073
Fax (02) 9449 5136
COLLEGE OF INVESTIGATIVE AND REMEDIAL CONSULTING ENGINEERS AUST.

FIELDWORK:	DRAWN:
SCE	WH

CHECKED:

DATE: 05-05-2010

TITLE: **RECESSION MECHANISMS: DYKE INDUCED ROCK RECESSION AND INSTABILITY OF WEATHERED ROCK SLOPE**
COASTAL HAZARD MANAGEMENT STUDY

CLIENT: **WYONG SHIRE COUNCIL**