

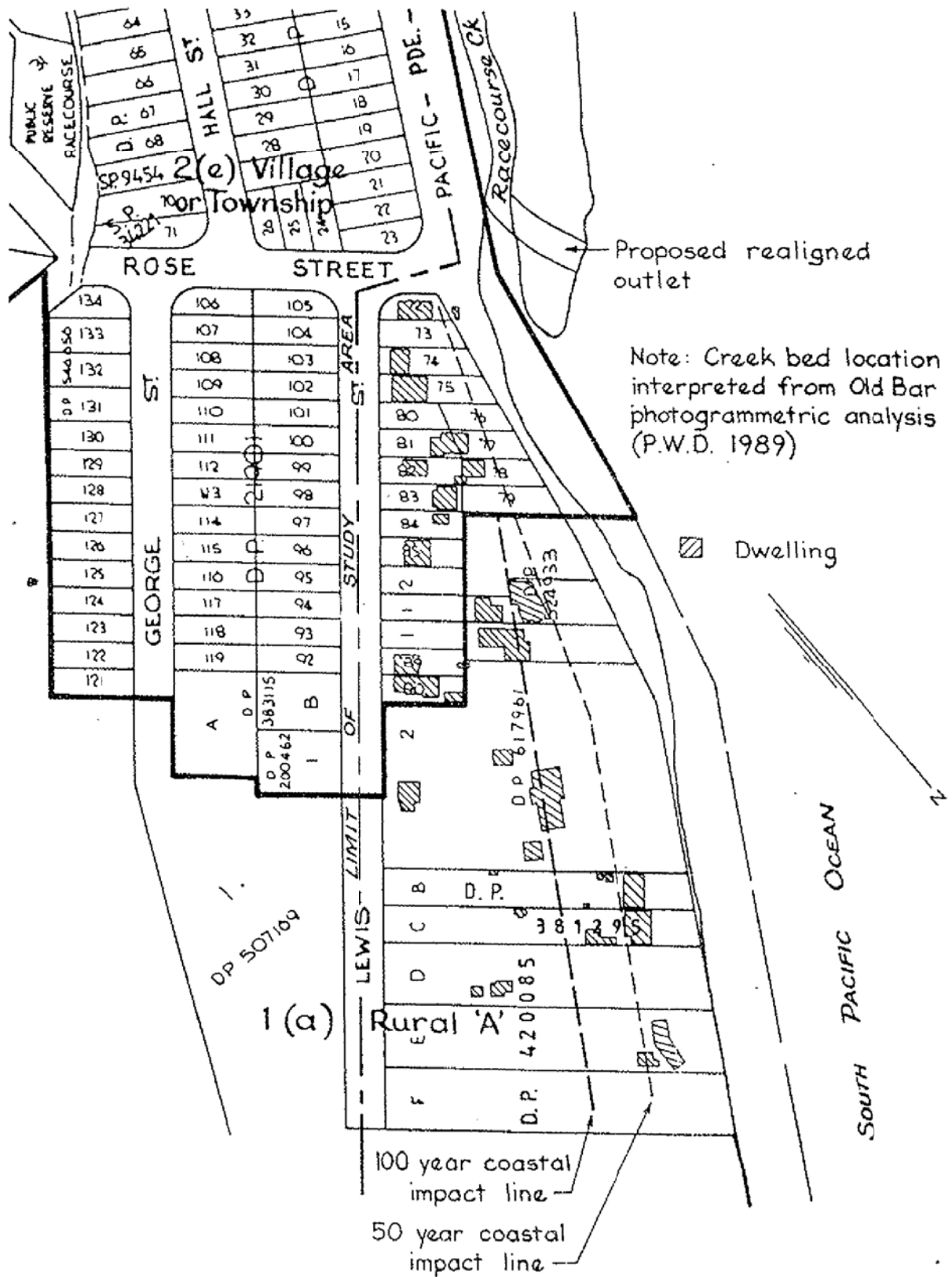
— Photogrammetry Profile
 (Varying colour indicates block,
 number indicates profile)



Greater Taree City Council
 Black Head to Crowdy Head
 Coastline Hazard Definition Study
 Sand Mining Activities and
 Photogrammetry Profiles

September 2010

Figure 3i



COASTLINE MANAGEMENT PLAN RACECOURSE CREEK/ LEWIS STREET OLD BAR



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Black Head to Crowdy Head
Coastline Hazard Definition Study
GTCC 50 and 100 Year
Coastal Hazard Lines (GTCC, 1990)

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Figure 4



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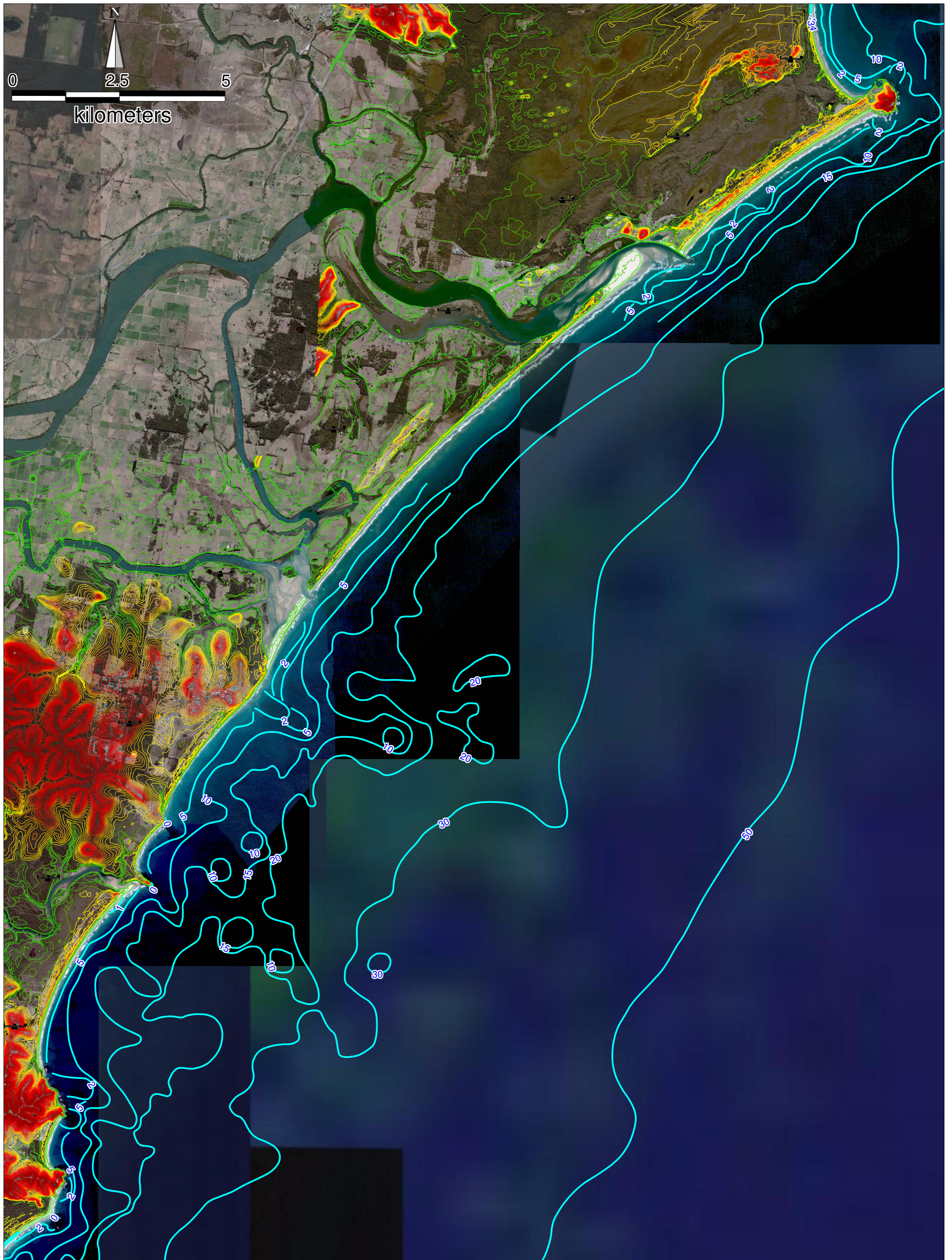


Greater Taree City Council
Black Head to Crowdy Head
Coastline Hazard Definition Study

Gabion wall and dune rehabilitation
works at Racecourse Creek entrance

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Figure 5



Contour Legend

Topographic Contour (mAHD)

1.0	5.0	9.0	13.0	17.0
2.0	6.0	10.0	14.0	18.0
3.0	7.0	11.0	15.0	19.0
4.0	8.0	12.0	16.0	20.0

[source: GTCC Airborne Laser Survey (ALS) 2005]

Bathymetric Contours (m Chart Datum)

5 (depth)

[source: Australian Hydrographic Survey, Aus Chart 810, 2001]

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Black Head to Crowdy Head
Coastline Hazard Definition Study

Digital Terrain Model and Bathymetry

September 2010

Figure 6

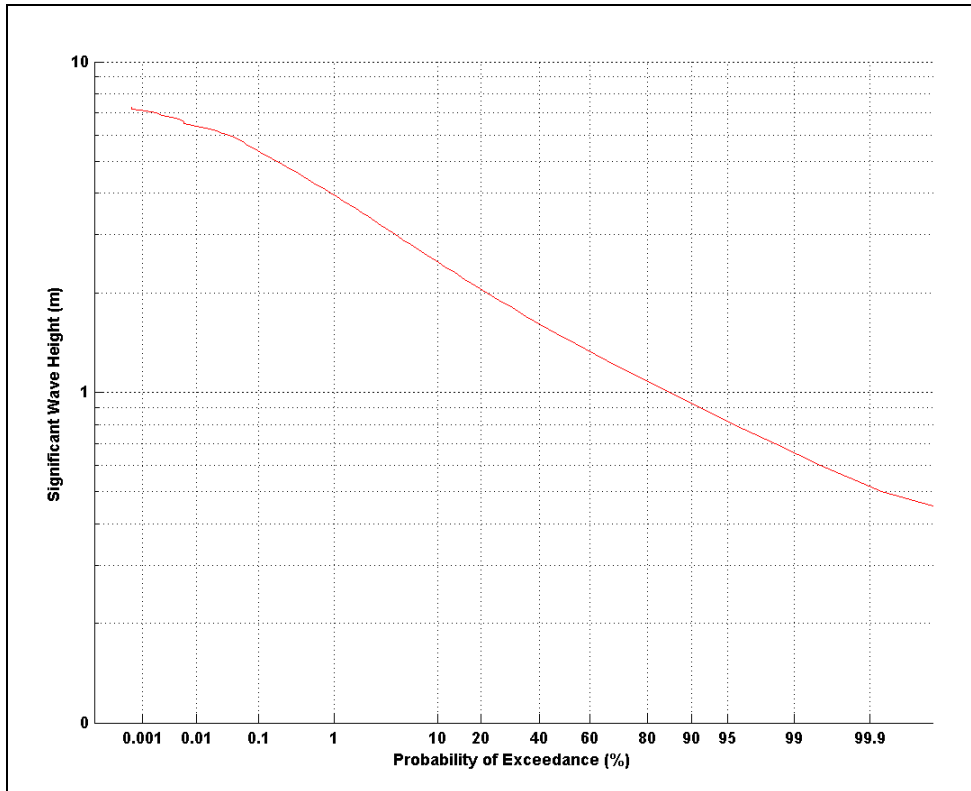


Figure 7. Significant Wave Height Exceedance for Crowdy Head, based on data collected from 1985 to 2008

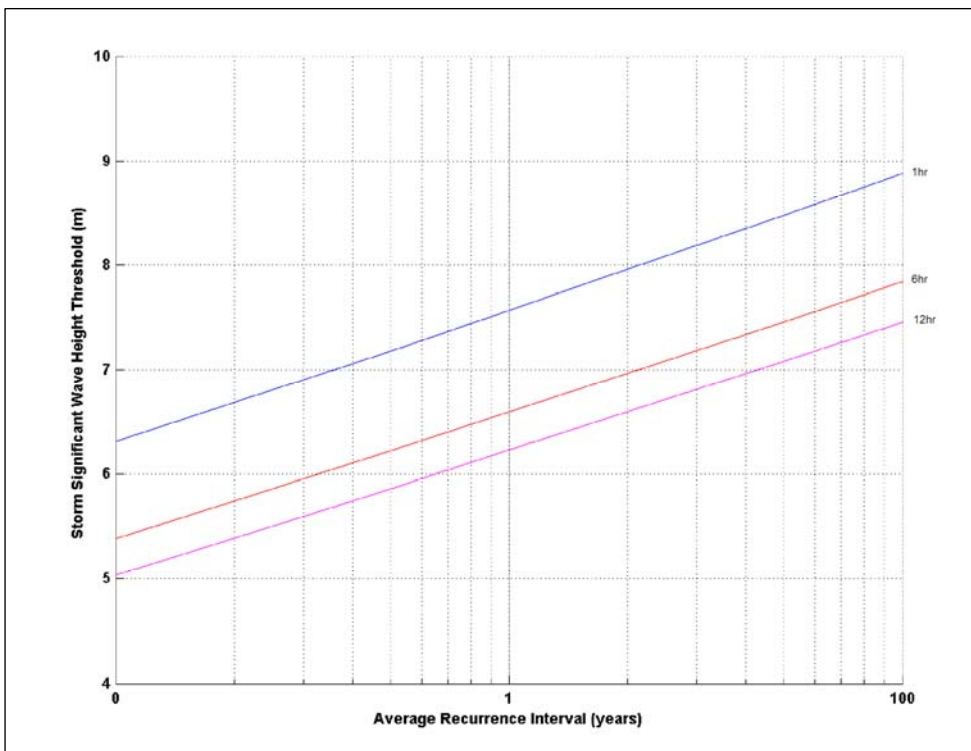


Figure 8. Relationship between significant wave height, duration and ARI for the Crowdy Head Waverider buoy data (1985 to 2008)

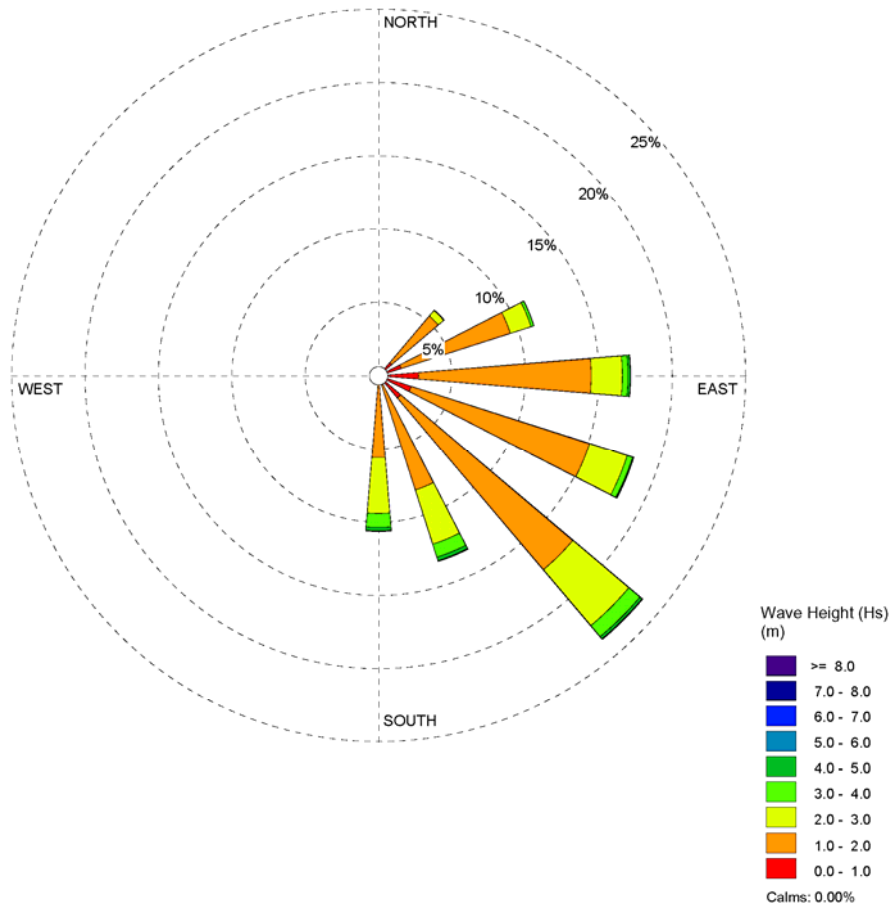


Figure 9. Wave rose for all hindcast directional Crowdy Head Wavebuoy data from October 1985 to December 1996

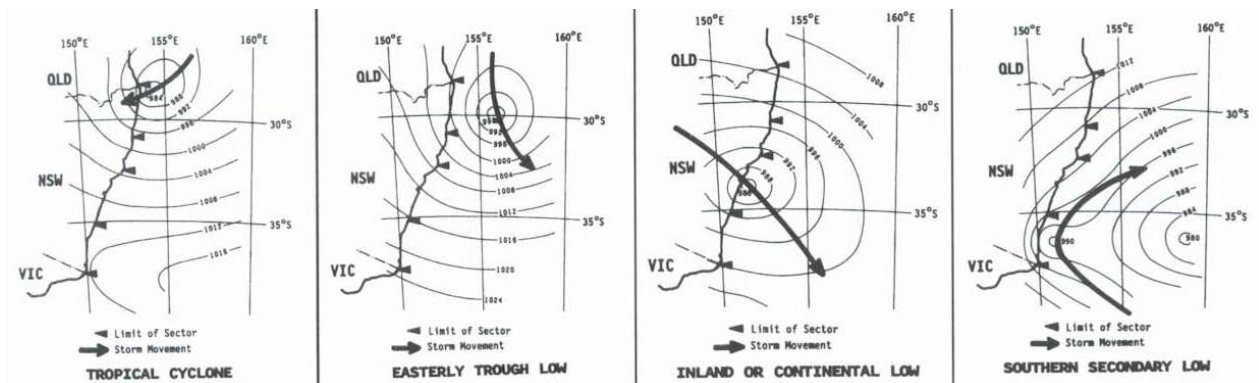


Figure 10. Typical synoptic patterns for tropical cyclones, easterly trough lows, inland trough/ continental lows, and southern secondary lows (after NSW Government, 1990)

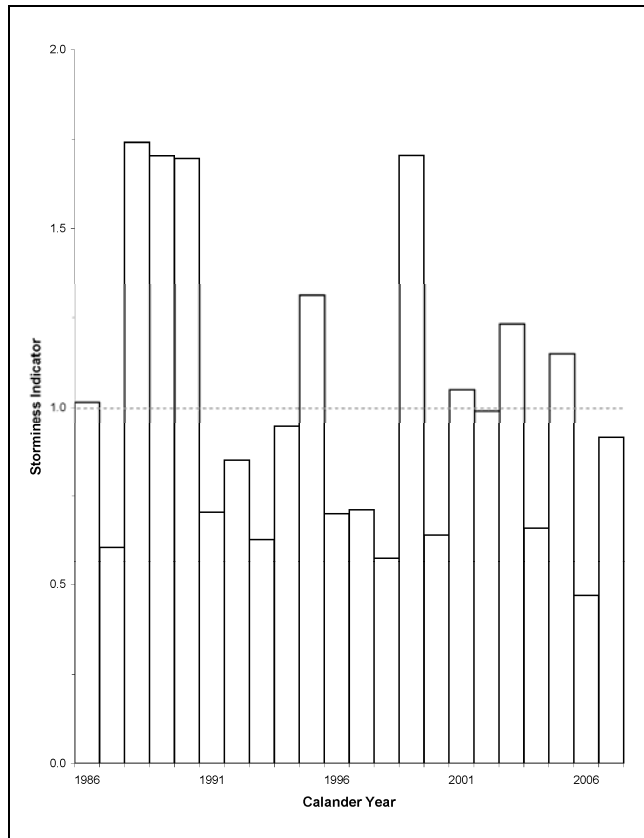


Figure 11. Yearly storminess indicator for 1986 to 2007

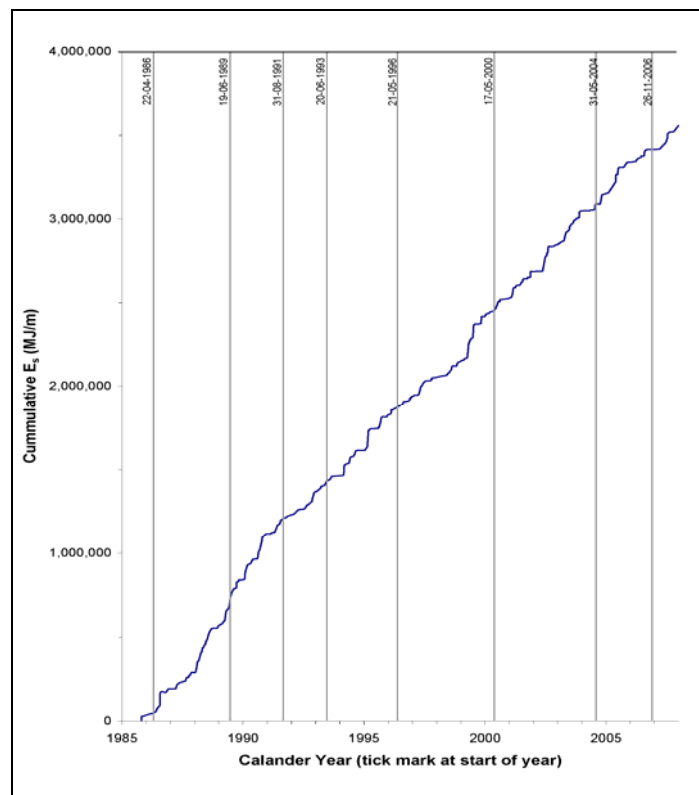


Figure 12. Cumulative storm energy per unit wave crest width for 1985 to 2005

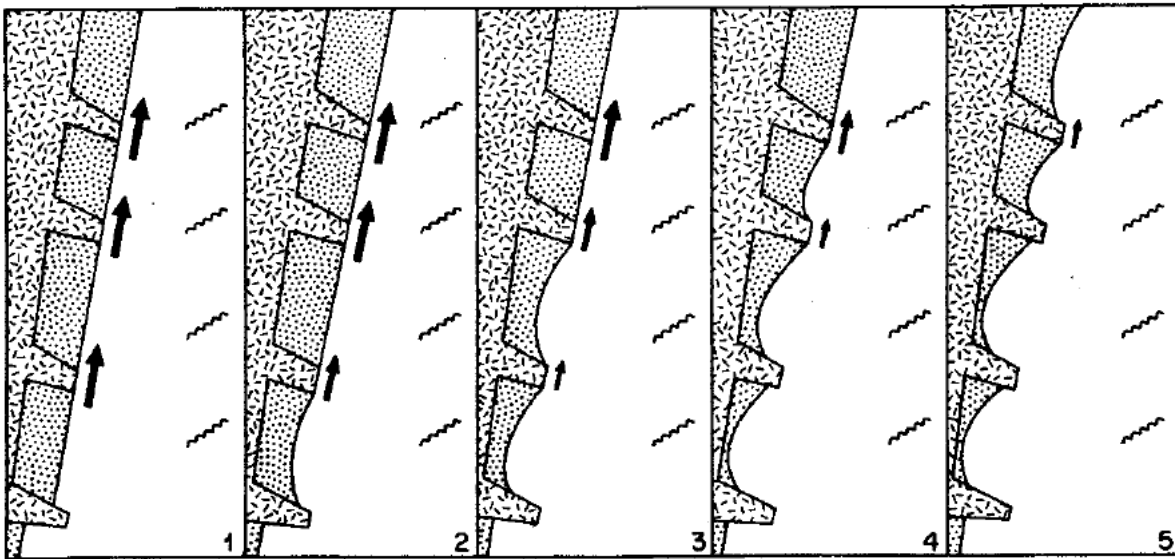
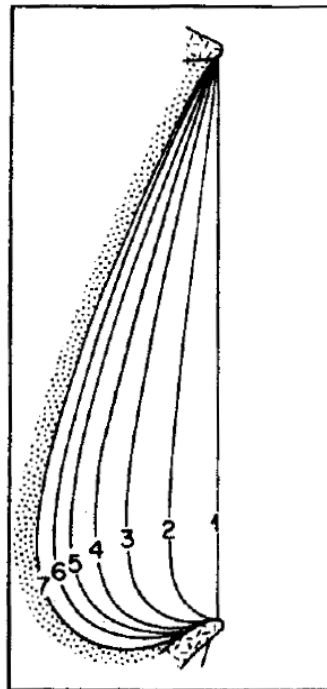
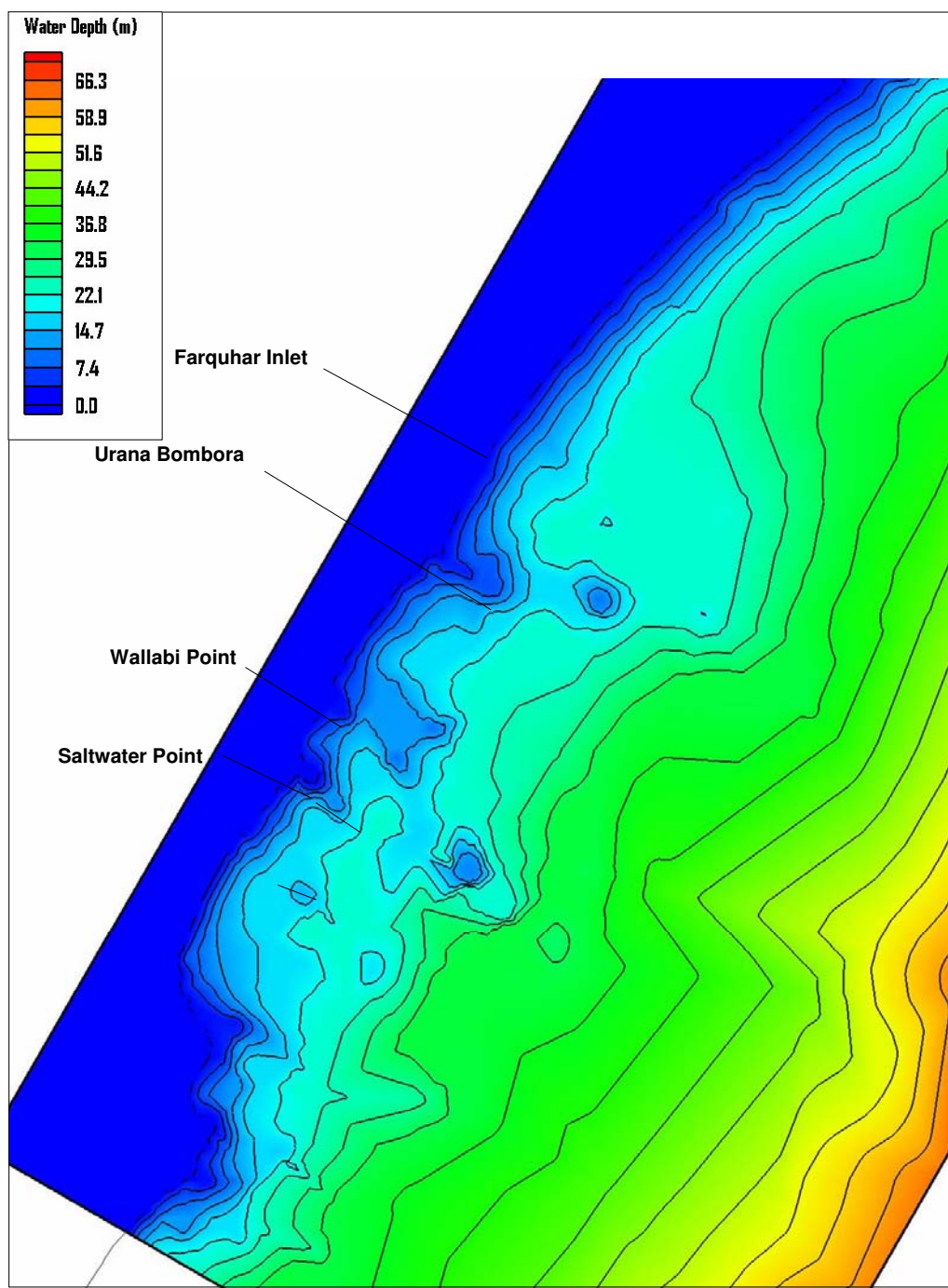


Figure 13. Successive stage in the evolution of coast with net northwards longshore sediment transport and progressive compartmentisation (after Stephens et al, 1981)

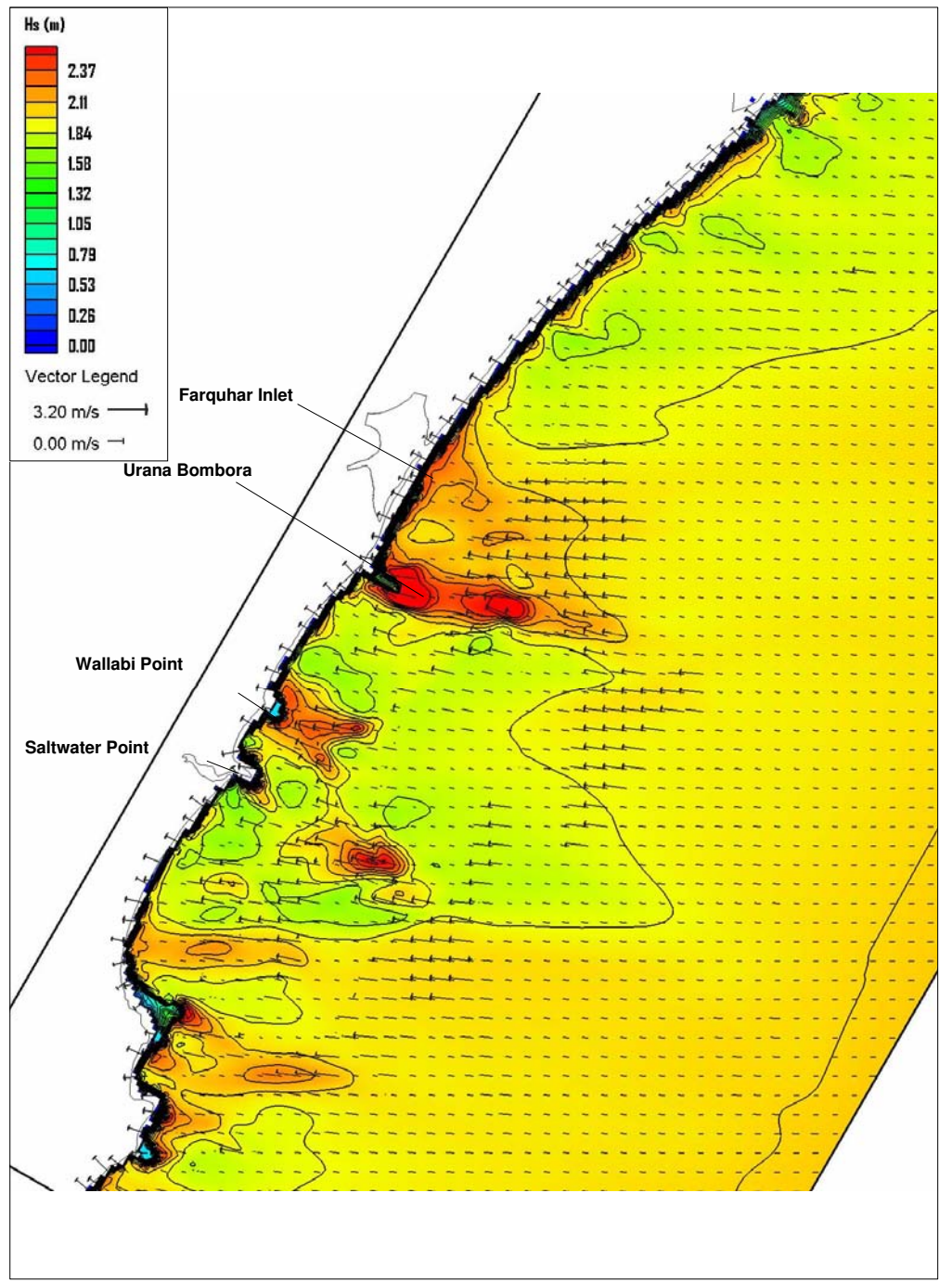


Note: Numbers indicate shoreline configurations at successive equal time periods. The numbers are located in the zone of most rapid erosion at each stage.

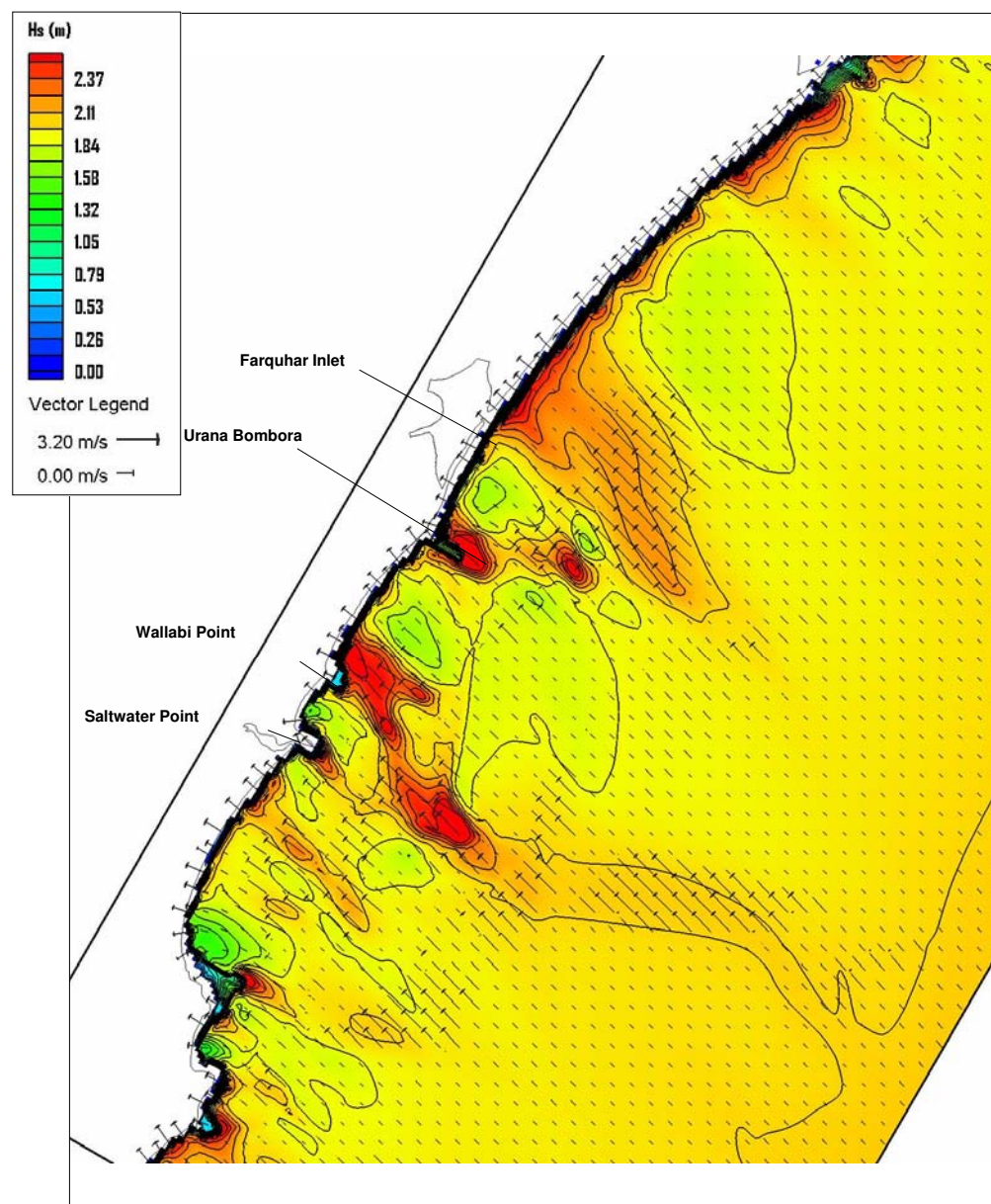
Figure 14. Evolution of a zeta form bay by costal erosion (after Stephens et al, 1981)



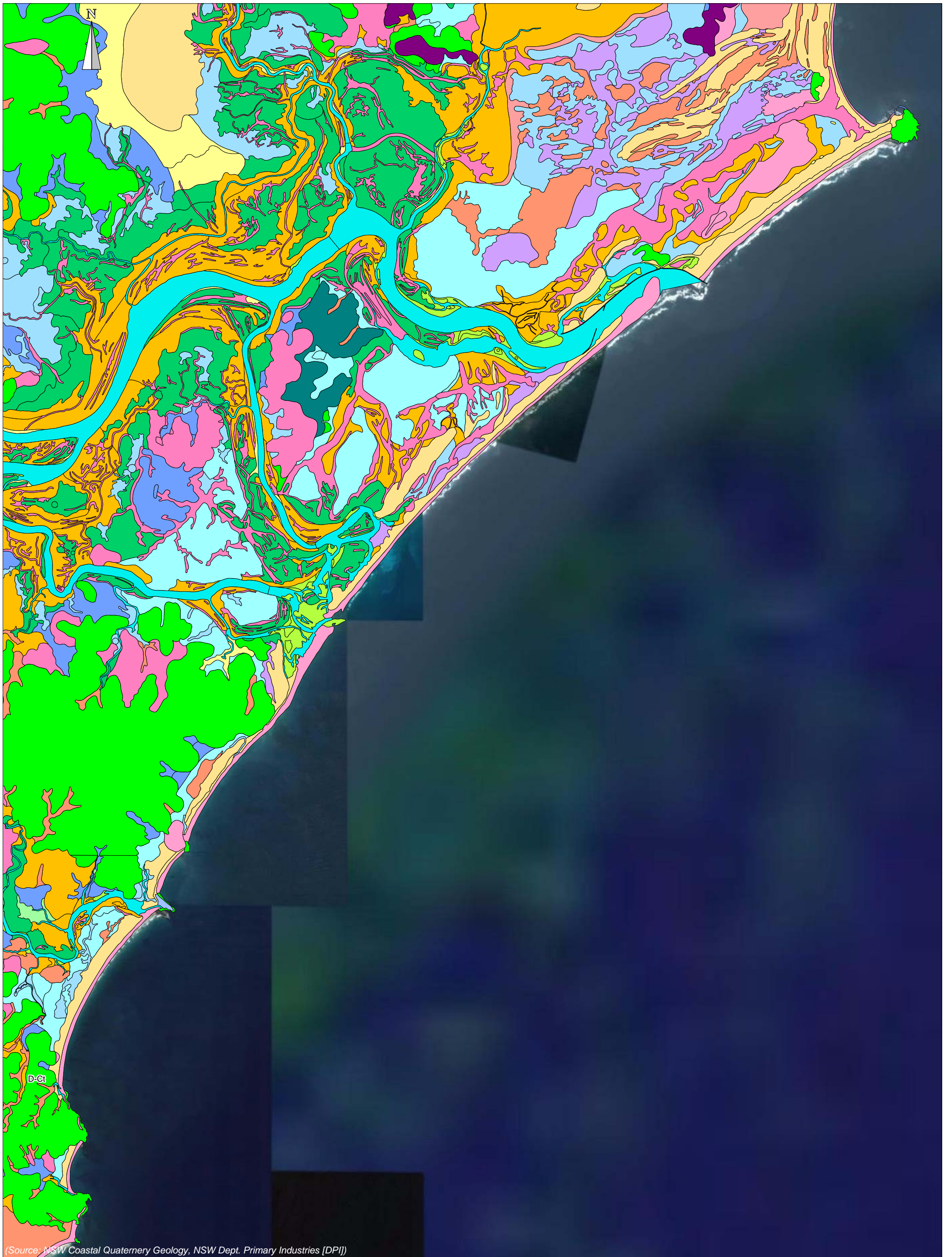
Model bathymetry



East Swell Direction (Hs=2.0m, Tp=12s)



South East Swell Direction (Hs=2.0m, Tp=12s)



(Source: NSW Coastal Quaternary Geology, NSW Dept. Primary Industries [DPI])

Coastal Geology Key - Quaternary Unit 1

- Coastal Barrier System
- Qhbd - Holocene dune
 - Qhbb - Holocene sandy beach
 - Qpbf - Pleistocene backbarrier flat
 - Qpbr - Pleistocene beach-ridge swale and dune delation hollow
 - Qpbr - Pleistocene barrier ridge
 - Qhef - Holocene tidal-delta flat
 - Qhec - Holocene estuarine channel
 - Qhei - Holocene interbarrier creek deposits
 - Qheb - Holocene estuarine in-channel bar & beach
 - Qhea - Holocene estuarine palaeochannel fill
 - Qhek - Holocene Coastal Lagoon
 - TQpat - Tertiary to Pleistocene high-level terrace
 - Qhbkw - Holocene Barrier Lake (Subaqueous)
 - Qhs - Holocene freshwater swamp
 - Qpu - Pleistocene undifferentiated
 - Qav - Quaternary (Undifferentiated) valley fill
 - Qavf - Quaternary undifferentiated alluvial & colluvial fan
 - Qml - Modern breakwaters, embankments & artificial levees
 - D-Ct - Devonian to Carboniferous sedimentary rocks (Tamworth Belt)

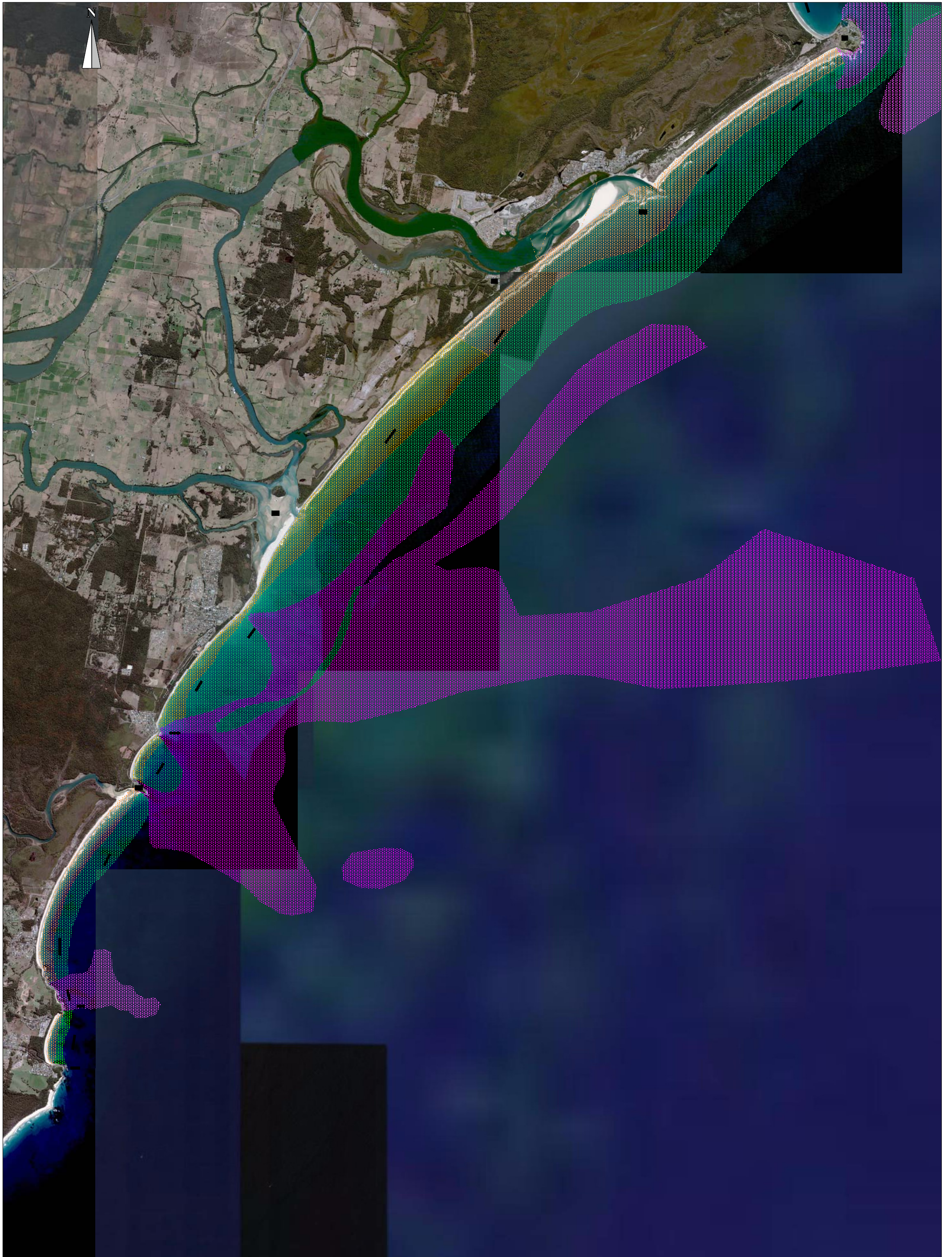


Greater Taree City Council
Black Head to Crowdy Head
Coastline Hazard Definition Study




Coastal Geology

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Figure 16



Source: SKP (1982)

-  Inner Nearshore Sediment
-  Outer Nearshore Sediment
-  Reef

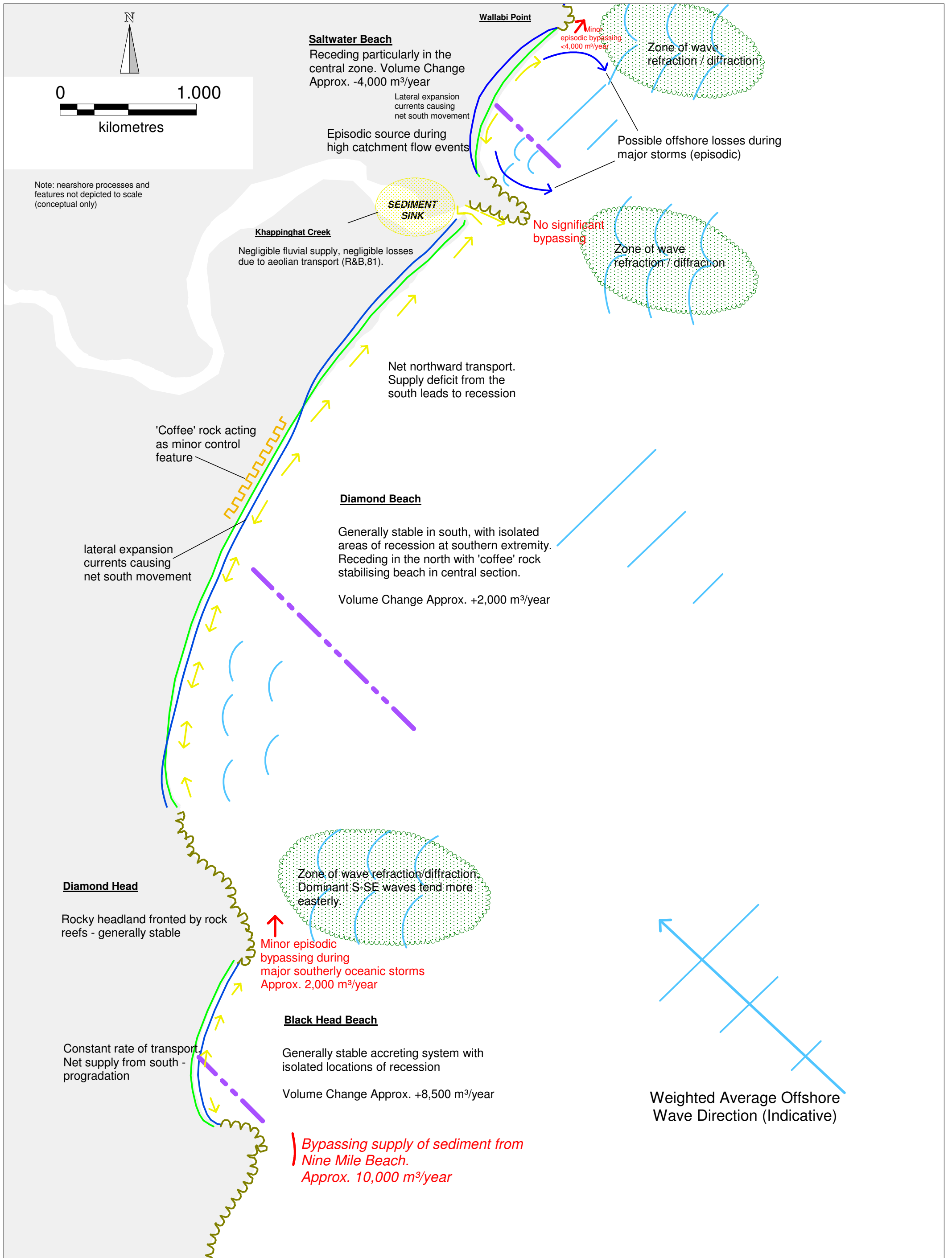


Greater Taree City Council
Black Head to Crowdy Head
Coastline Hazard Definition Study

Offshore Sediment Distribution

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Figure 17



LEGEND

- Net littoral transport (length indicative of relative significance)
- Bypassing (length indicative of relative significance)
- Current Shoreline Planform
- Conceptual Shoreline Planform Trend (based on historical movement). Does not indicate predicted future shoreline location

- Rocky coastline
- 'Soft-rock'
- Breakwater
- Reef
- Sediment Sink
- Diffraction/refraction shadow
- Rip cell
- Wave crest (indicative of direction)

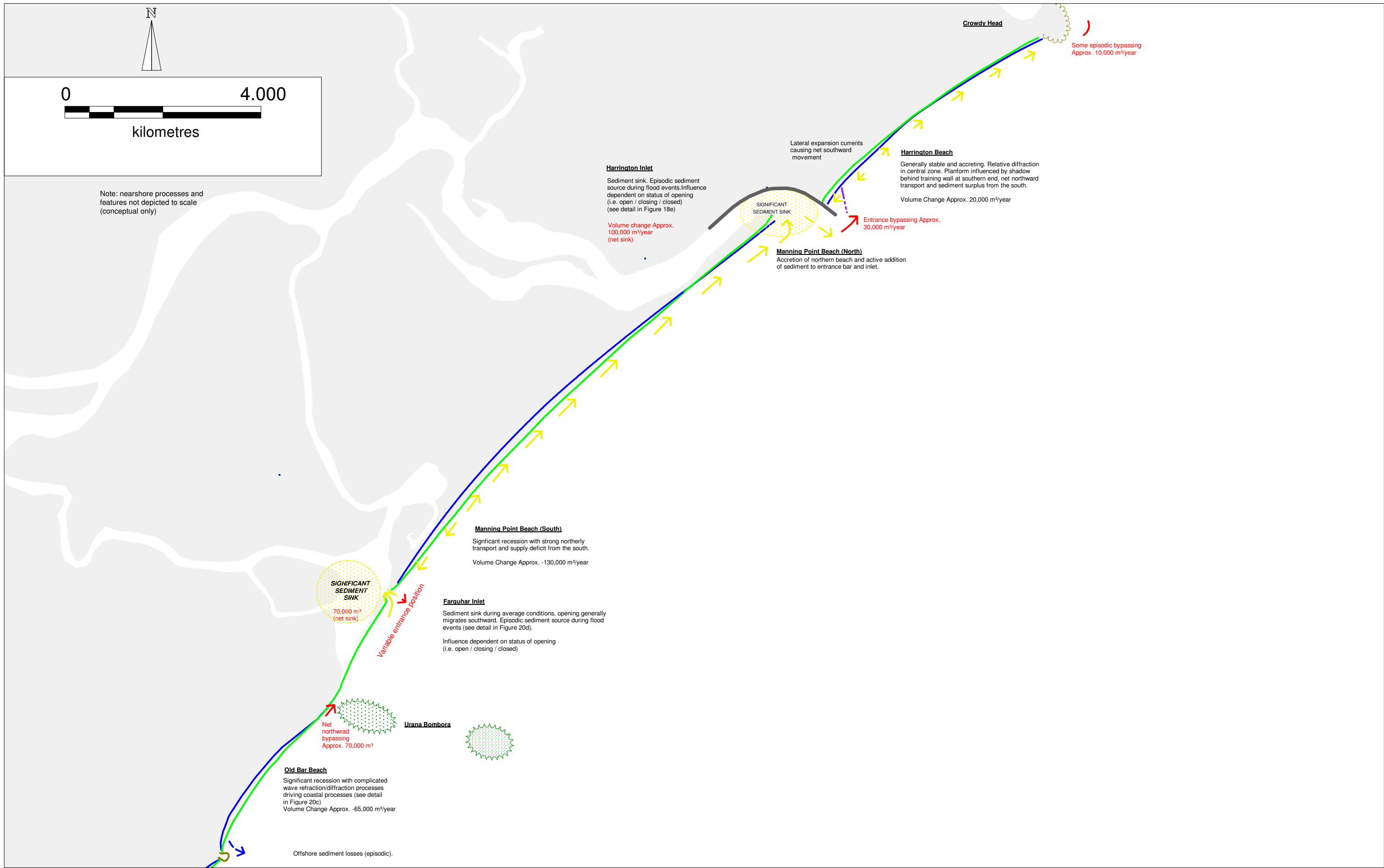


Greater Taree City Council
 Black Head to Crowdy Head
 Coastline Hazard Definition Study

Conceptual Coastal Processes Model

September 2010

Figure 18a



LEGEND

- Net littoral transport (length indicative of relative significance)
- Bypassing (length indicative of relative significance)
- Current Shoreline Planform
- Conceptual Shoreline Planform Trend (based on historical movement). Does not indicate predicted future shoreline location
- Rocky coastline
- 'Soft-rock'
- Breakwater
- Reef
- Sediment Sink
- Diffraction/refraction shadow
- Rip cell
- Wave crest (indicative of direction)

* Volume includes allowance for episodic offshore losses from Old Bar Beach. Relative magnitude not defined at present.

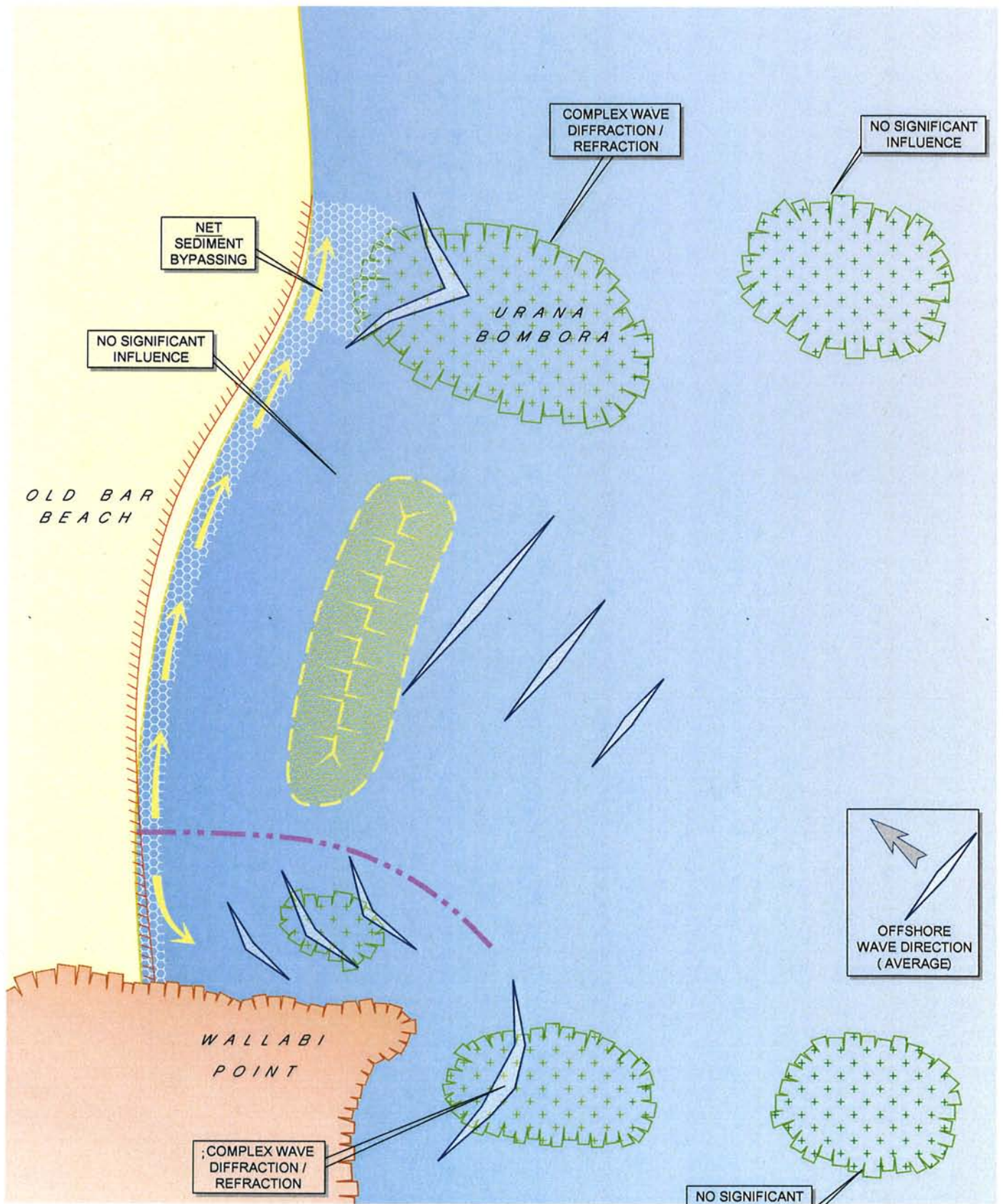


Greater Taree City Council
Black Head to Crowdy Head
Coastline Hazard Definition Study

Conceptual Coastal Processes Model

September 2010

Figure 18b



LEGEND

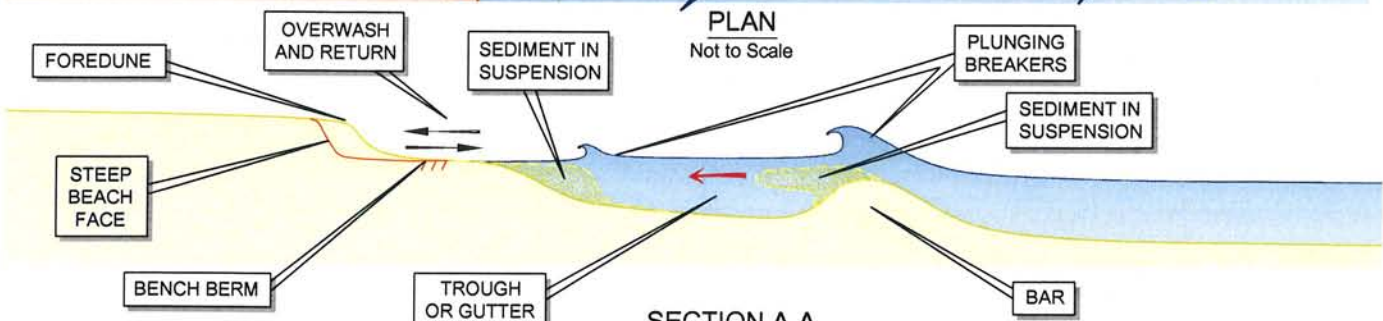
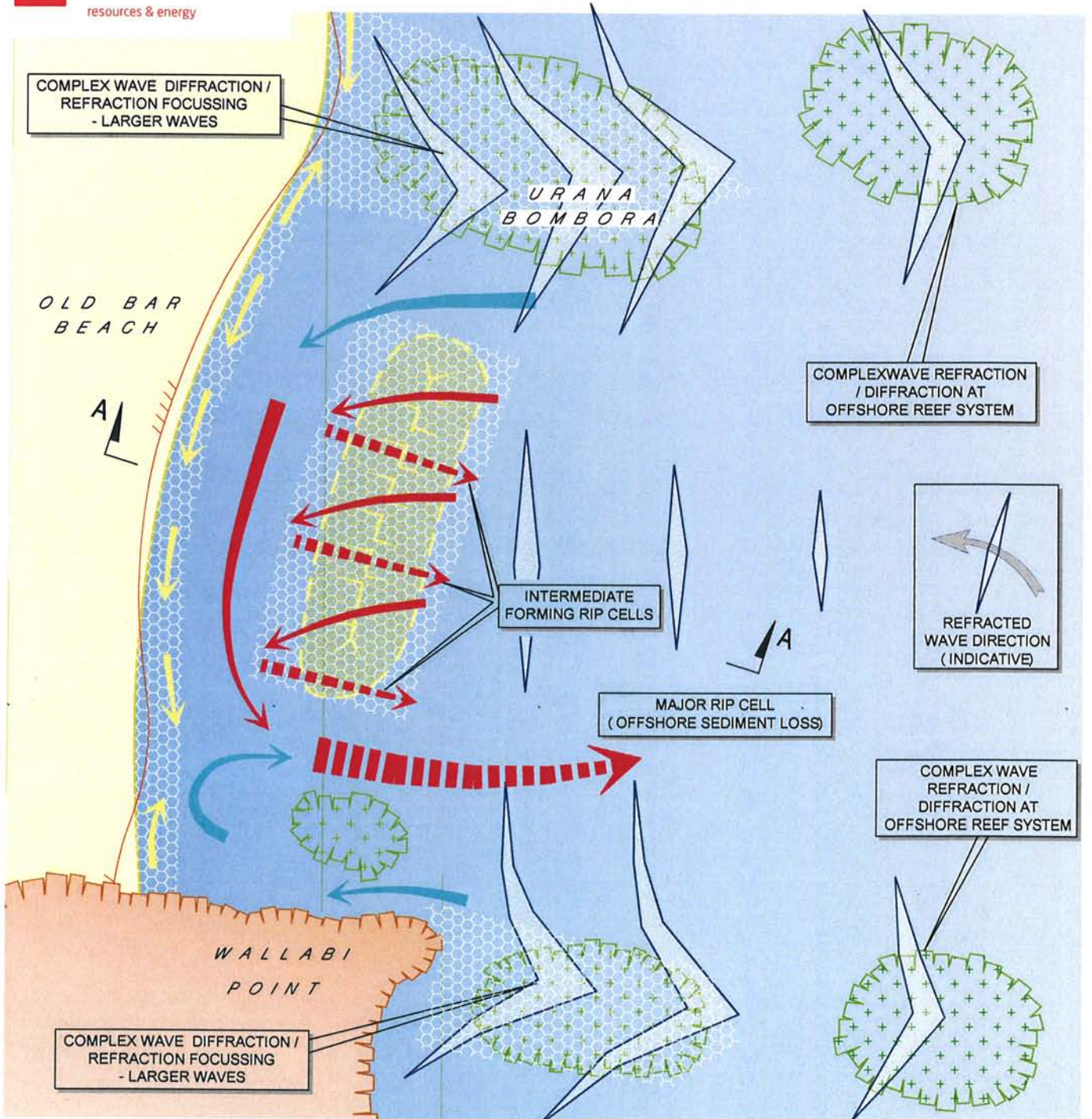
- SURF ZONE
- EXISTING SHORELINE
- RELOCATED SHORELINE POSITION
- ROCK SHORELINE

- PLAN**
Not to Scale
- BREAKWALL
 - WAVES (INDICATIVE DIRECTION AND SCALE)
 - SAND BAR
 - OFFSHORE REEF

- DIFFRACTION SHADOW
- NET SEDIMENT TRANSPORT
- FLOW DIRECTION
- FLOW (RIP CELL DASHED)
- SUSPENDED SEDIMENTS



OLD BAR BEACH
LONG TERM AMBIENT CONDITIONS
CONCEPTUAL COASTAL PROCESSES MODEL

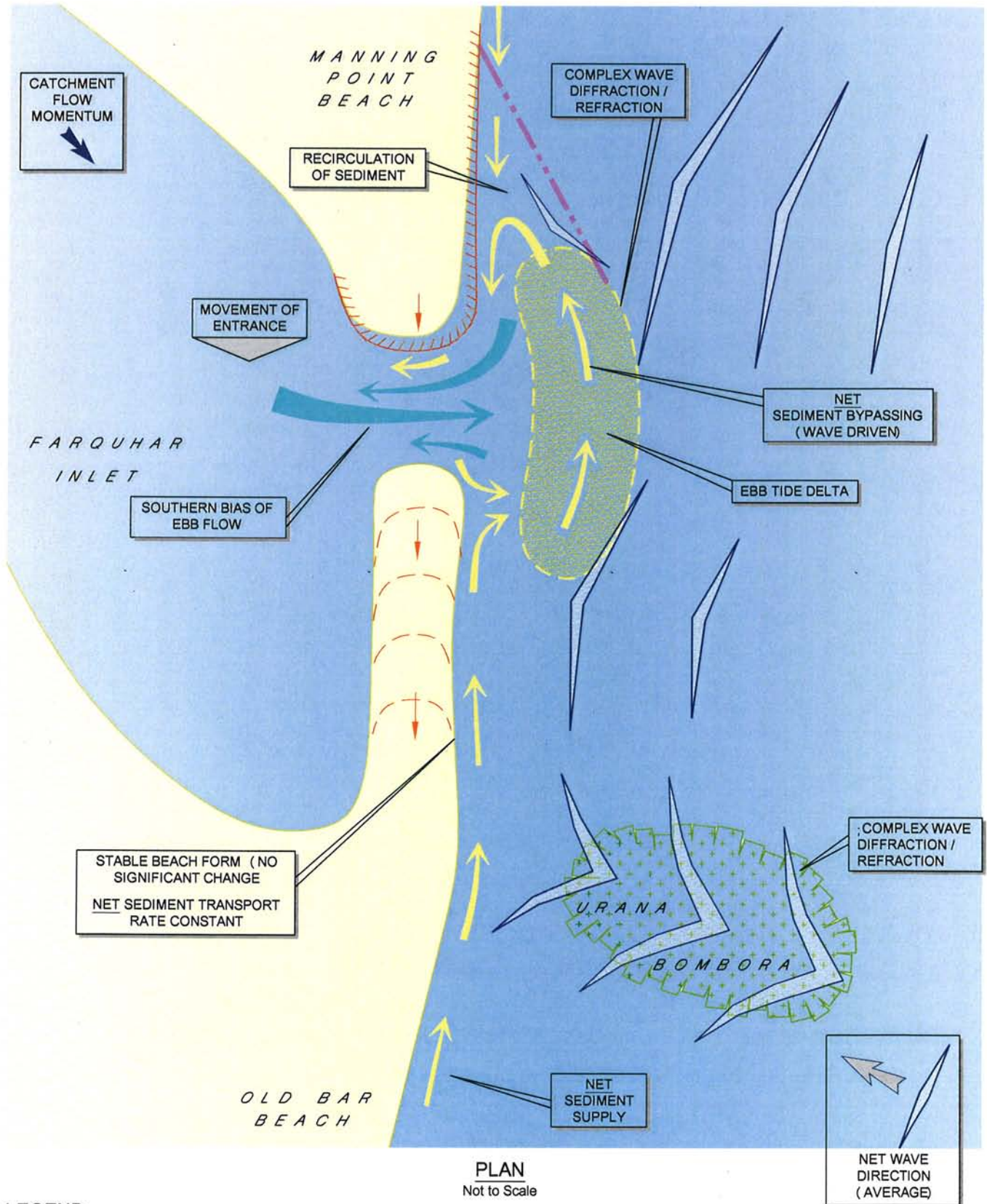


LEGEND

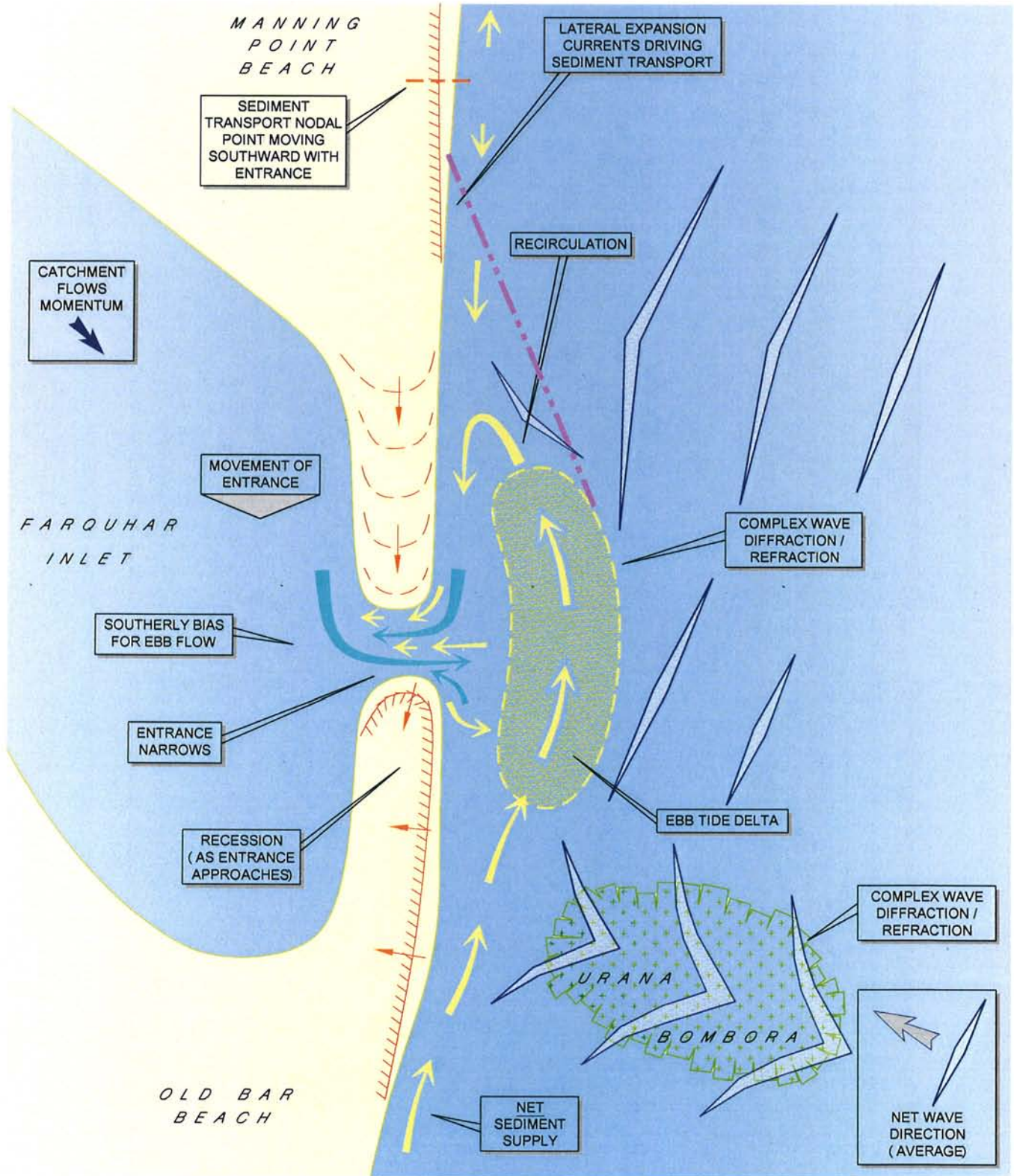
	SURF ZONE		BREAKWALL		DIFFRACTION SHADOW
	EXISTING SHORELINE		WAVES (INDICATIVE DIRECTION AND SCALE)		NET SEDIMENT TRANSPORT
	RELOCATED SHORELINE POSITION		SAND BAR		FLOW DIRECTION
	ROCK SHORELINE		OFFSHORE REEF		FLOW (RIP CELL DASHED)
					SUSPENDED SEDIMENTS



**OLD BAR BEACH
STORM EVENT CONDITIONS
CONCEPTUAL COASTAL PROCESSES MODEL**



MANNING RIVER SOUTHERN ENTRANCE 'OPEN' CONCEPTUAL COASTAL PROCESSES MODEL



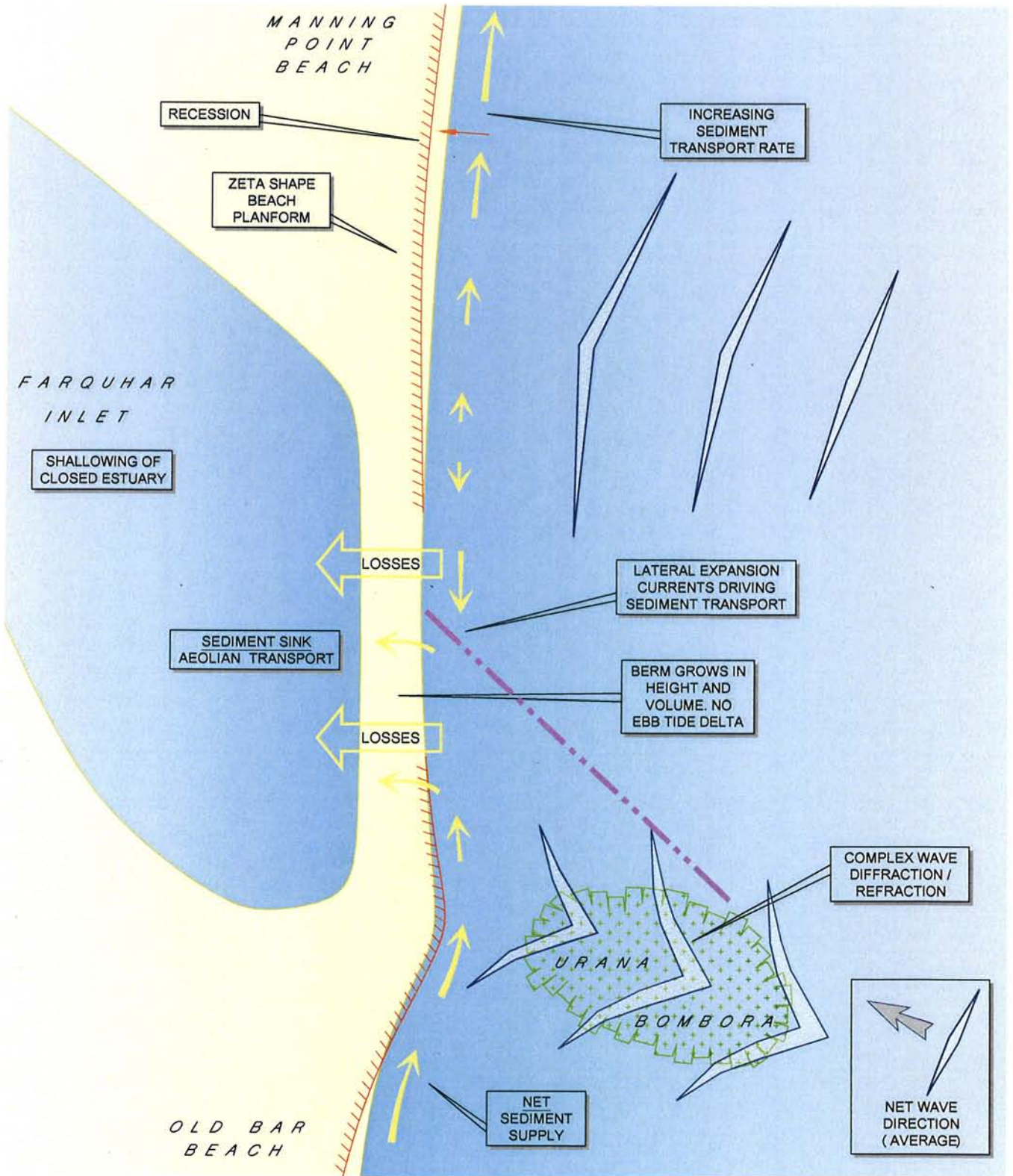
PLAN
Not to Scale

LEGEND

- | | | | | | |
|--|------------------------------|--|--|--|------------------------|
| | SURF ZONE | | BREAKWALL | | DIFFRACTION SHADOW |
| | EXISTING SHORELINE | | WAVES (INDICATIVE DIRECTION AND SCALE) | | NET SEDIMENT TRANSPORT |
| | RELOCATED SHORELINE POSITION | | SAND BAR | | FLOW DIRECTION |
| | ROCK SHORELINE | | OFFSHORE REEF | | FLOW (RIP CELL DASHED) |
| | | | | | SUSPENDED SEDIMENTS |






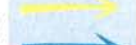
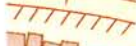







**MANNING RIVER SOUTHERN ENTRANCE 'CLOSING'
CONCEPTUAL COASTAL PROCESSES MODEL**

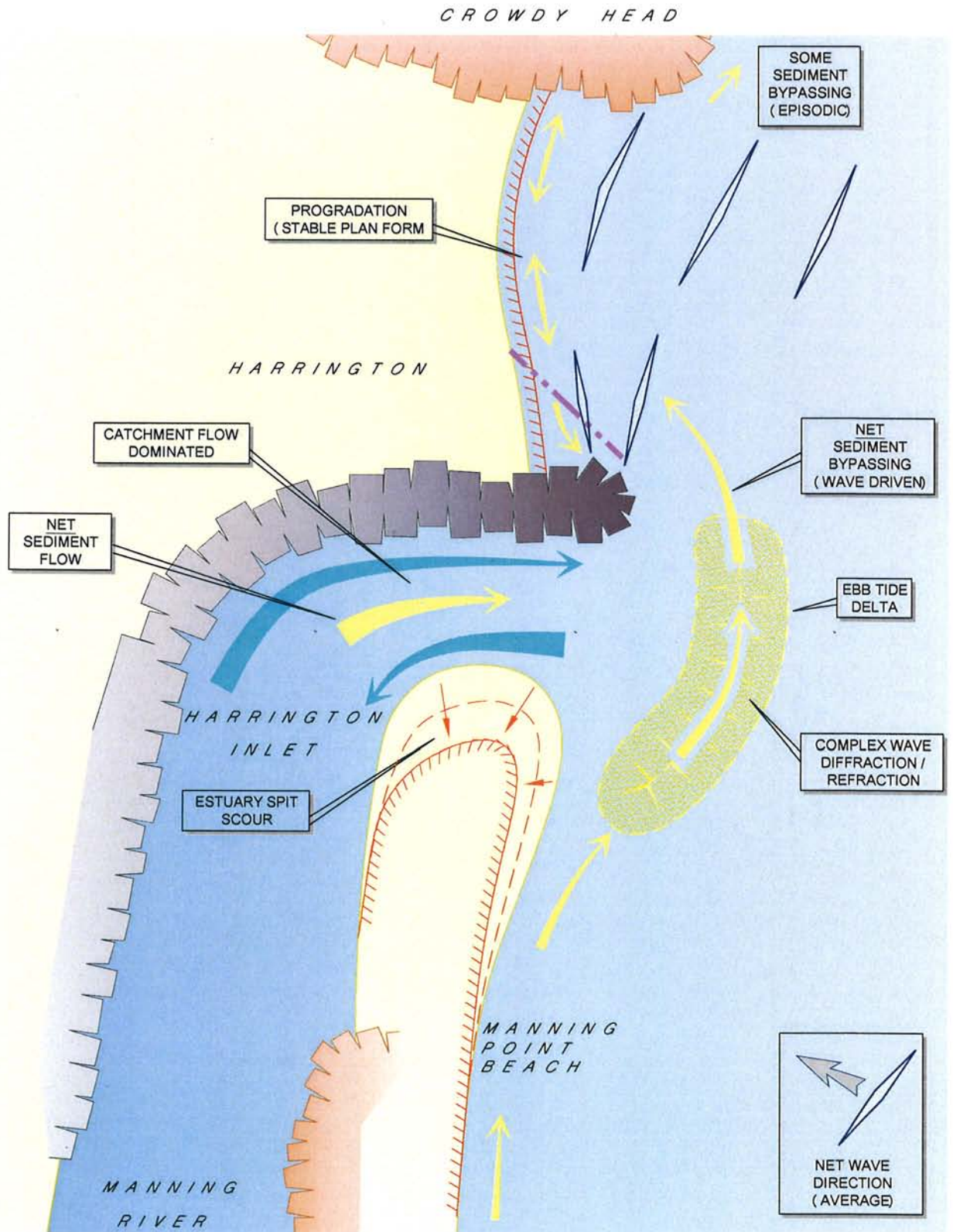


PLAN
Not to Scale

LEGEND

- | | | | | | |
|---|------------------------------|---|--|--|------------------------|
|  | SURF ZONE |  | BREAKWALL |  | DIFFRACTION SHADOW |
|  | EXISTING SHORELINE |  | WAVES (INDICATIVE DIRECTION AND SCALE) |  | NET SEDIMENT TRANSPORT |
|  | RELOCATED SHORELINE POSITION |  | SAND BAR |  | FLOW DIRECTION |
|  | ROCK SHORELINE |  | OFFSHORE REEF |  | FLOW (RIP CELL DASHED) |
| | | | | | SUSPENDED SEDIMENTS |

MANNING RIVER SOUTHERN ENTRANCE 'CLOSED'
CONCEPTUAL COASTAL PROCESSES MODEL



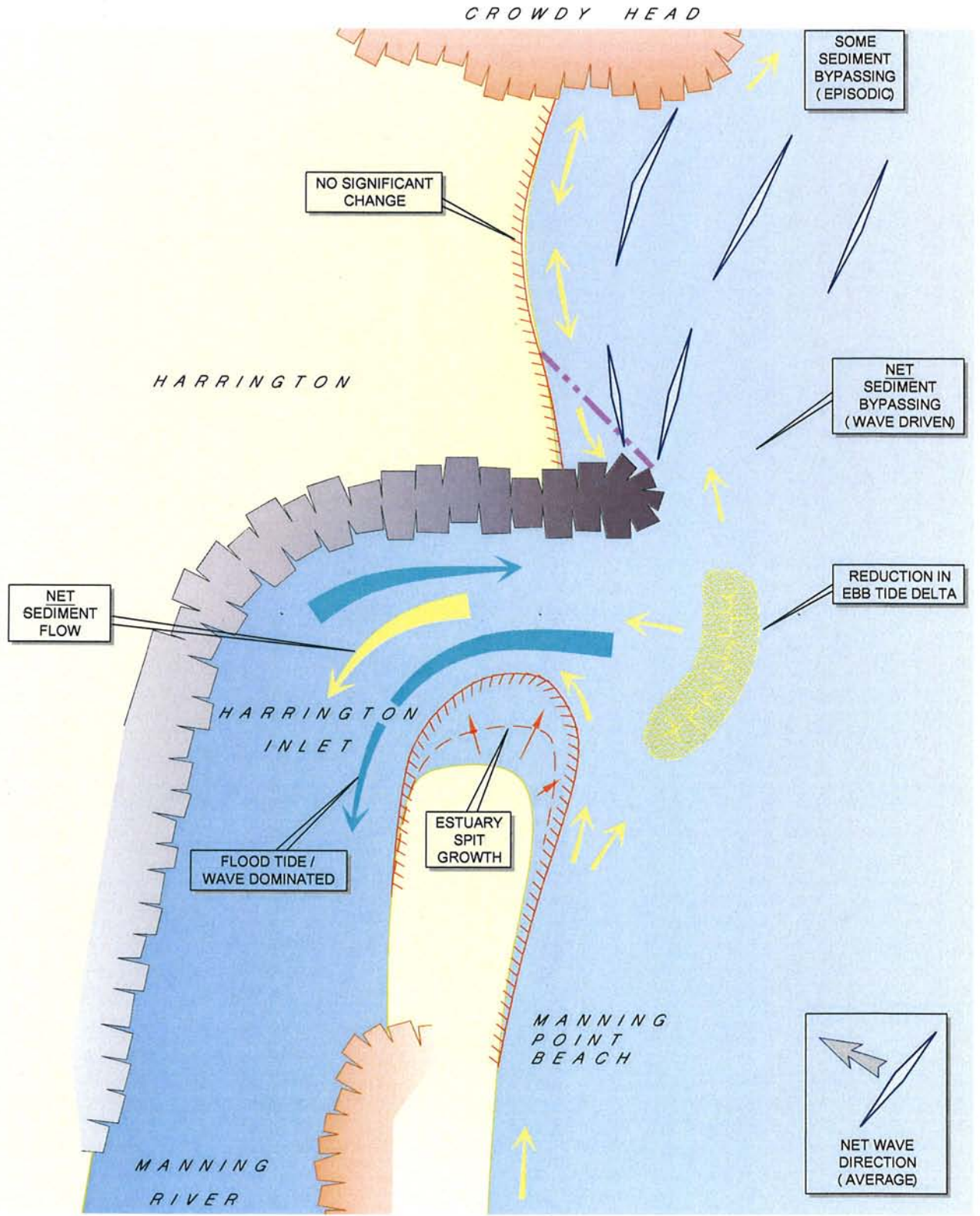
PLAN
Not to Scale

LEGEND

- | | | | | | |
|--|------------------------------|--|--|--|------------------------|
| | SURF ZONE | | BREAKWALL | | DIFFRACTION SHADOW |
| | EXISTING SHORELINE | | WAVES (INDICATIVE DIRECTION AND SCALE) | | NET SEDIMENT TRANSPORT |
| | RELOCATED SHORELINE POSITION | | SAND BAR | | FLOW DIRECTION |
| | ROCK SHORELINE | | OFFSHORE REEF | | FLOW (RIP CELL DASHED) |
| | | | | | SUSPENDED SEDIMENTS |

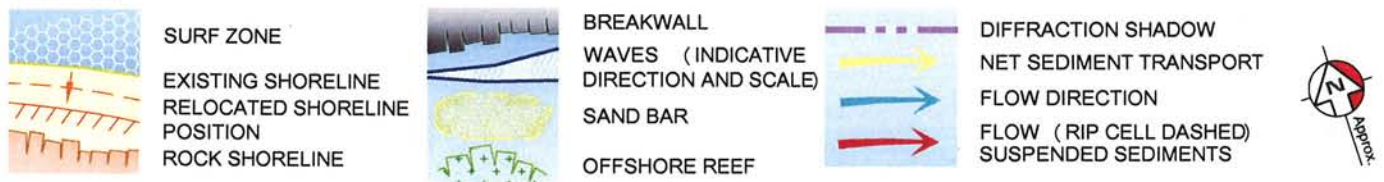
**MANNING RIVER NORTHERN ENTRANCE 'OPEN'
CONCEPTUAL COASTAL PROCESSES MODEL**





PLAN
Not to Scale

LEGEND



**MANNING RIVER NORTHERN ENTRANCE 'CLOSING'
CONCEPTUAL COASTAL PROCESSES MODEL**