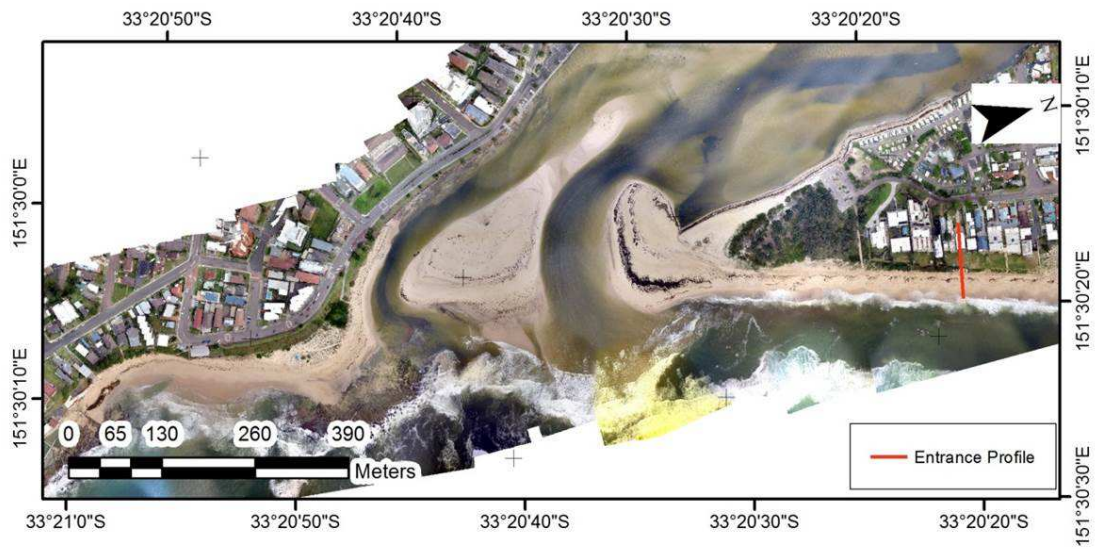
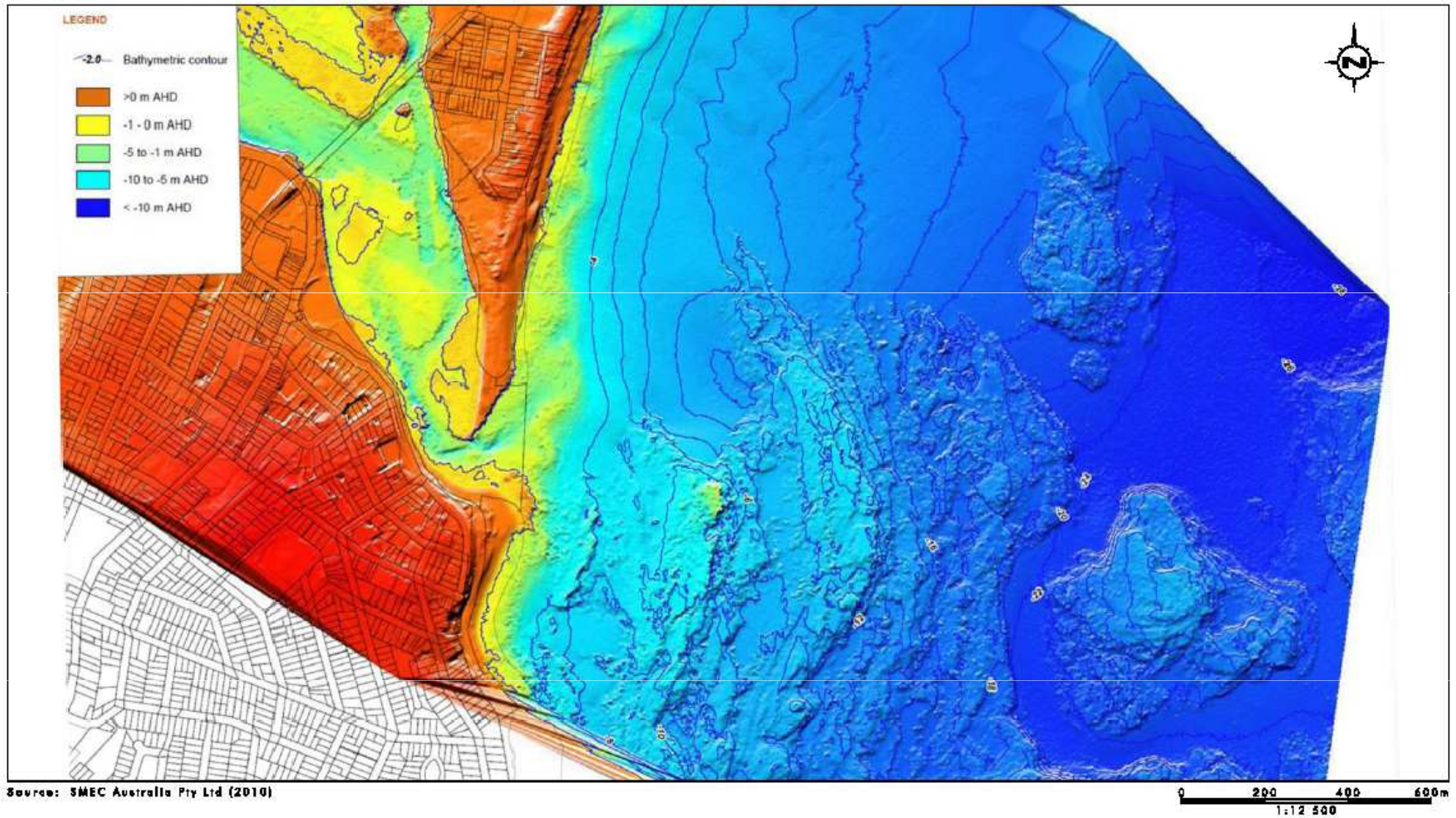


# The Entrance - Post Storm 13/06/2016





Source: SMEC Australia Pty Ltd (2010)

FIGURE 1.1  
Detailed LADS Bathymetric Data



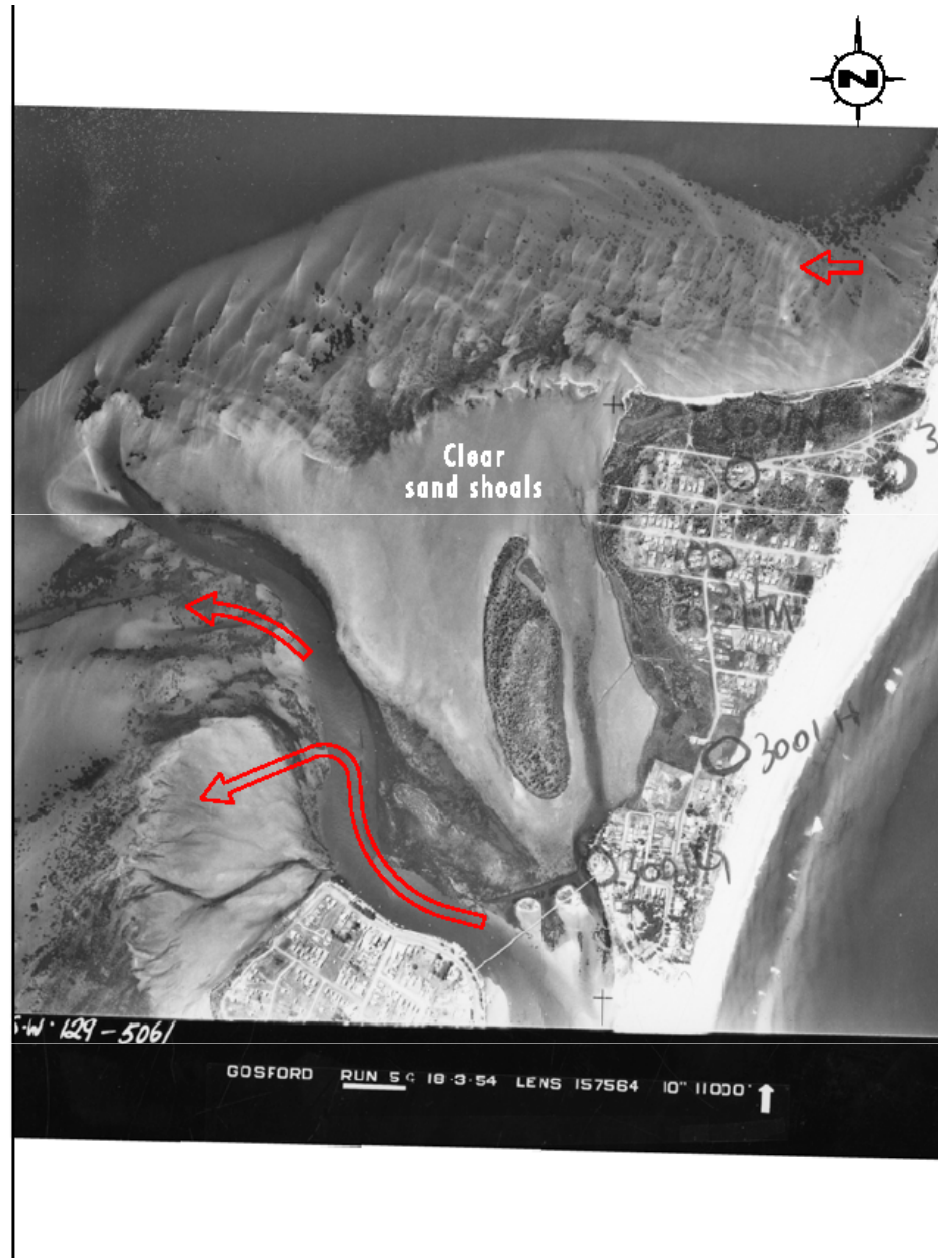
**1941**

- Active blowout transferring sand from North Entrance Beach (Curtis Pde area) across the barrier to outer edge of tidal delta
- Entrance closed. Long shore sediment transport building The Entrance Beach
- Very wide beach at North Entrance



### 1954

- Entrance open on southern side
- Sand stripped from The Entrance Beach and from outer tidal delta
- Extensive tidal flats off main channel on western side of tidal delta
- Limited delta activity to northern side



**1954**

- Active blowout continues at North Entrance
- Sand from blowout moving west across outer margin of delta
- Eastern side of delta strongly shoaled
- Wide beach at North Entrance, but low sand volume at The Entrance Beach



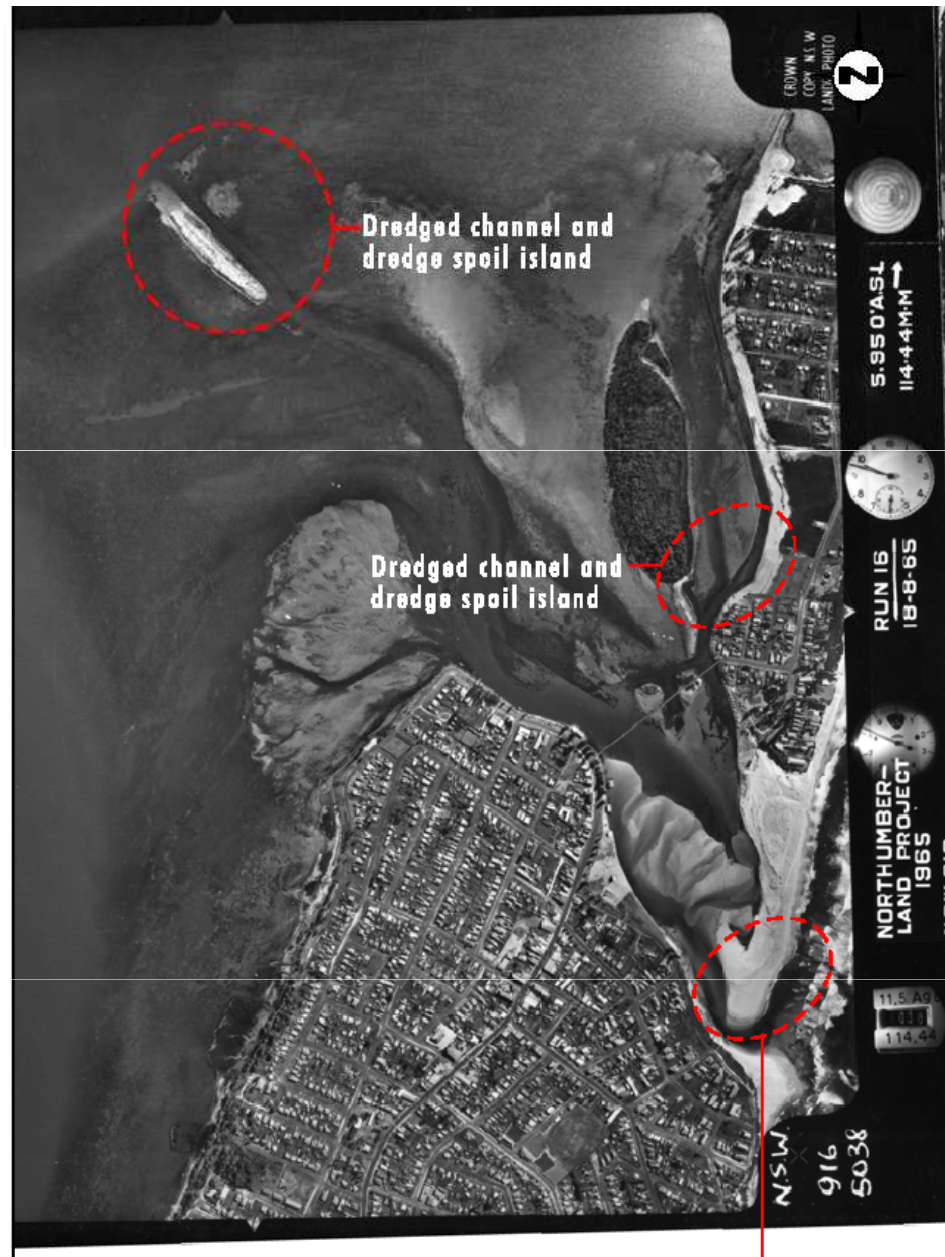
**1961**

- **New alignment of lake shore at North Entrance, with sea wall**
- **large bars in nearshore, storing sand; large rip cells off Hutton Rd and in front of blowout**



**1961**

- **Limited sand on The Entrance Beach; isolated from North Entrance by entrance channel**
- **Limited stabilisation of the sand spit across The Entrance - spinifex colonisation?**



**1965**

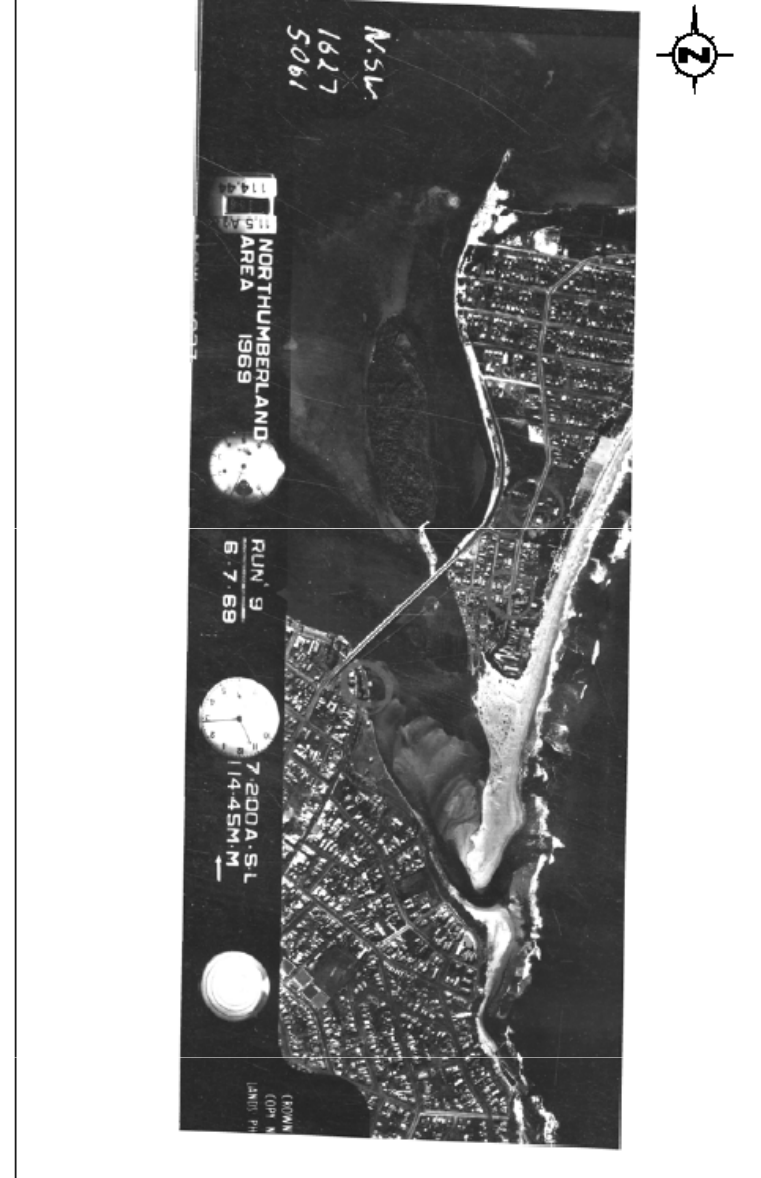
- Entrance shoal and spit trimmed by migrating channel
- Many small beach cusps, reduced rip cell circulation





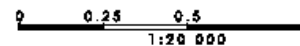
**1966**

- Dune blowout at North Entrance still active, diverting sand from the beach back to the lake shore
- Entrance channel almost closed, sand moving south along the southern part of North Entrance Beach and split, but limited transfer to The Entrance Beach



**1969**

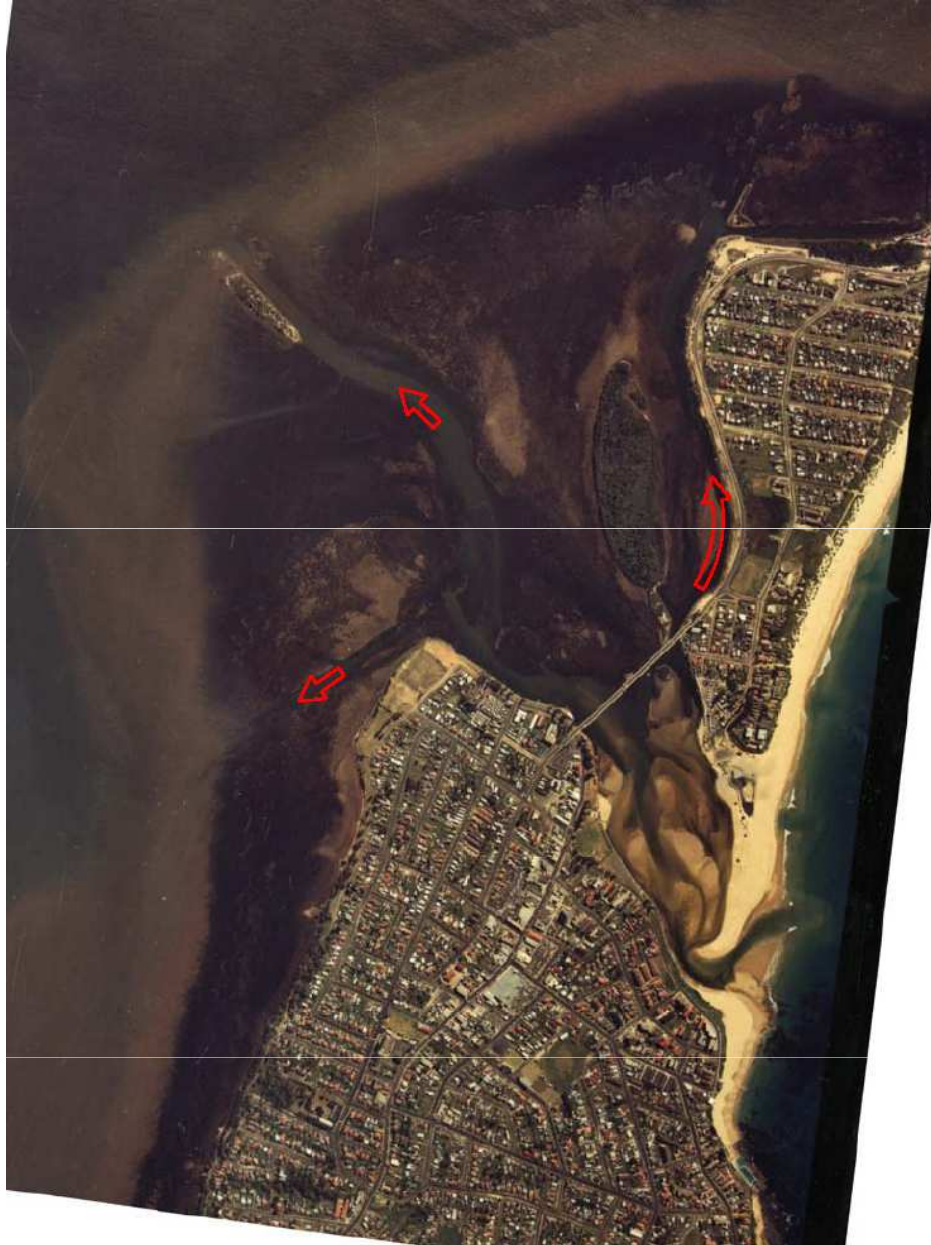
- Entrance open with wide channel on southern side
- Erosion of shoals in outer tidal delta
- Reduced sand volume south of entrance channel
- Open channel trimming spit to north
- Closely spaced rip cells on southern part of beach. Many cusps in surf club area





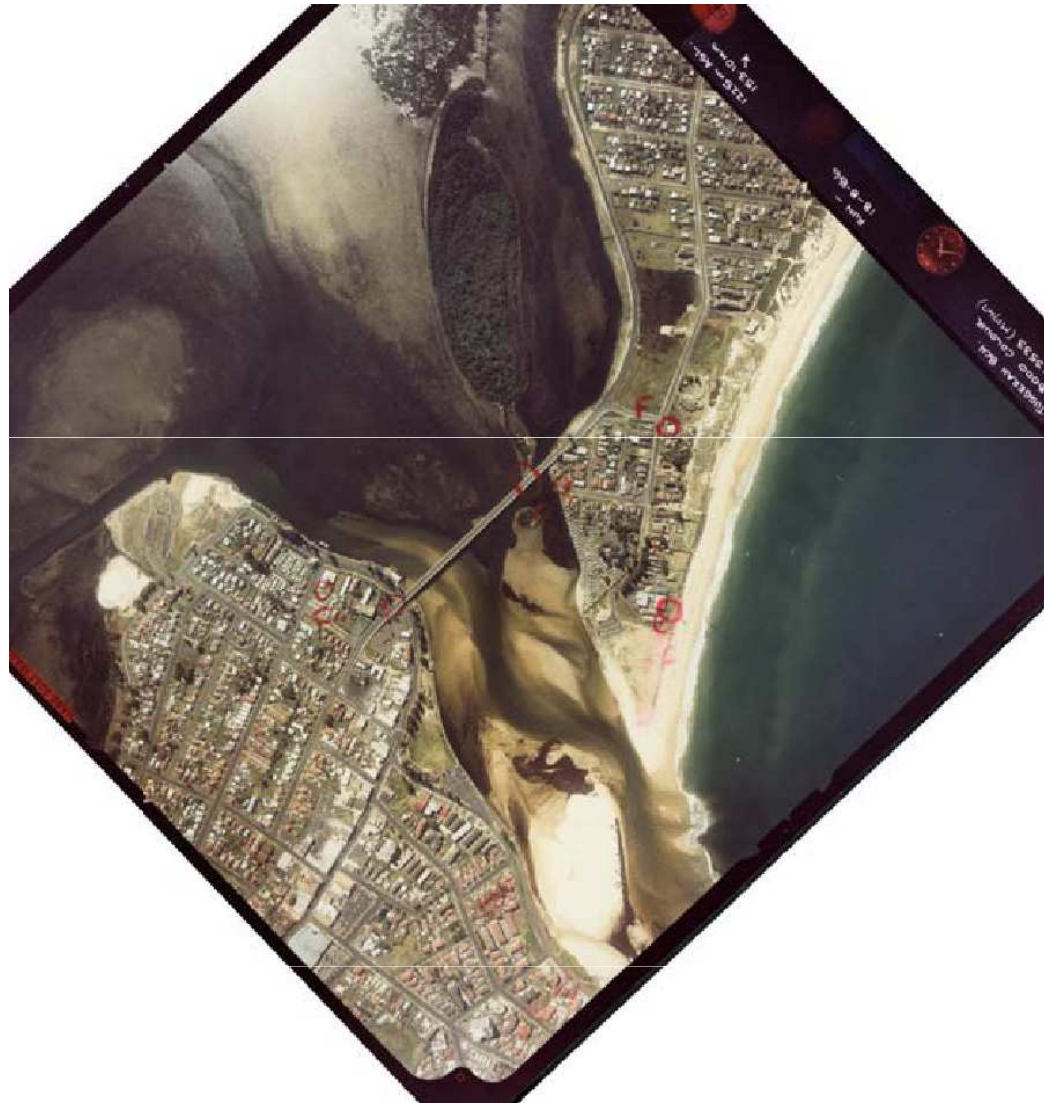
**1978**

- Entrance open with wide channel
- Sand spit severely depleted from entrance channel migration and storm bite into the frontal dune



**1982**

- **Multiple dredged channels - outside and inside the bridge**
- **Accretion on ocean side of the entrance spit. Some recovery of shoaling in the entrance outside of the bridge**
- **The Entrance Beach in accreted condition**



## **1986**

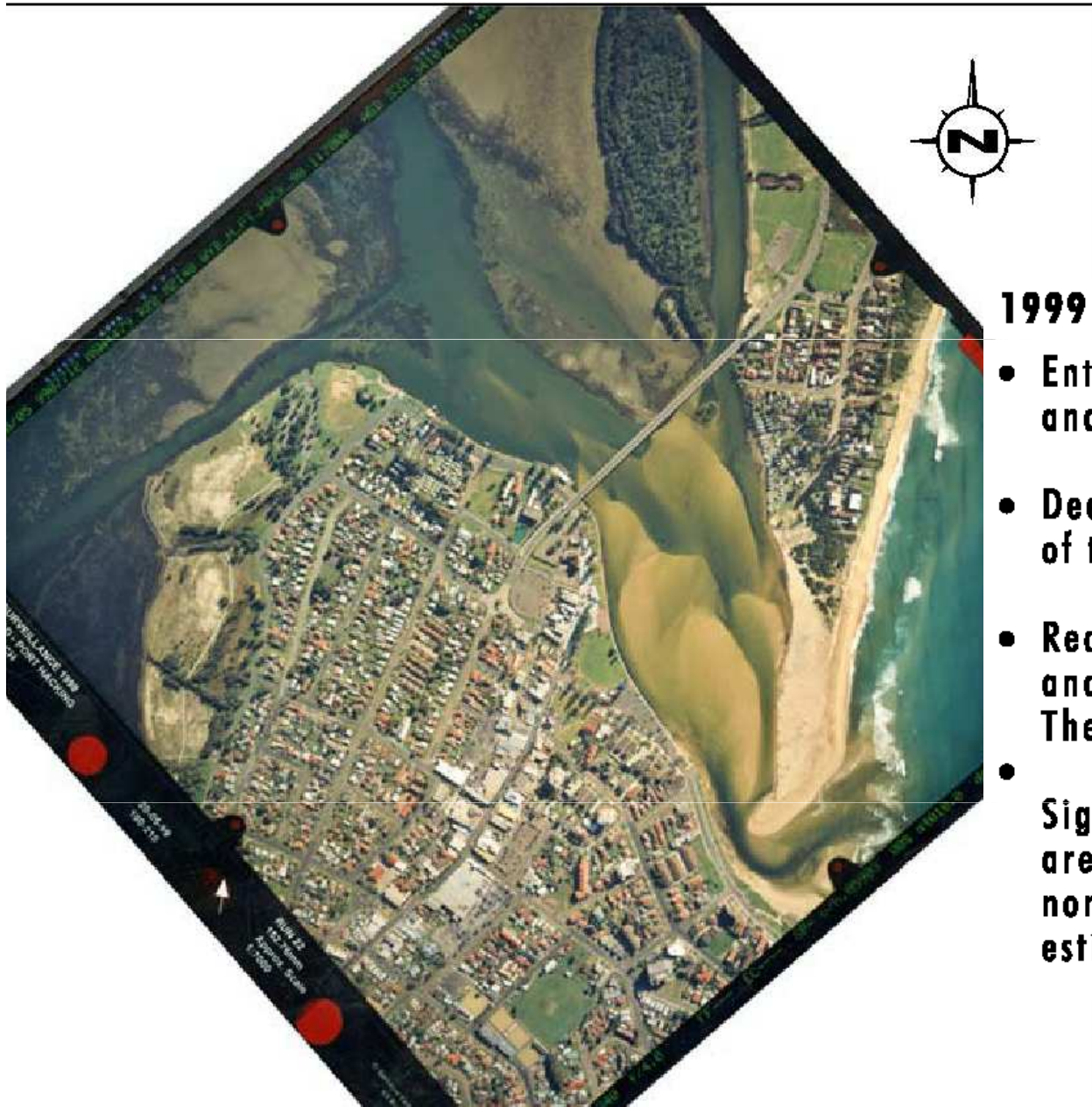
- **Entrance channel broken through on northern side of spit, isolating the southern entrance shore and The Entrance Beach from the main beach**
- **Reclamation and further dredging on western shore, inside the bridge reclamation**



**1996**

- Straightening and reclamation of lake foreshore and channel dredging to north of bridge, in outer entrance area, and along the western foreshore inside the bridge
- Recurve on spit shows sand moving south and into the entrance. Wide curved entrance channel separates an accreted Entrance Beach from North Entrance

**Sand stored in large bars off North Entrance Beach**



**1999**

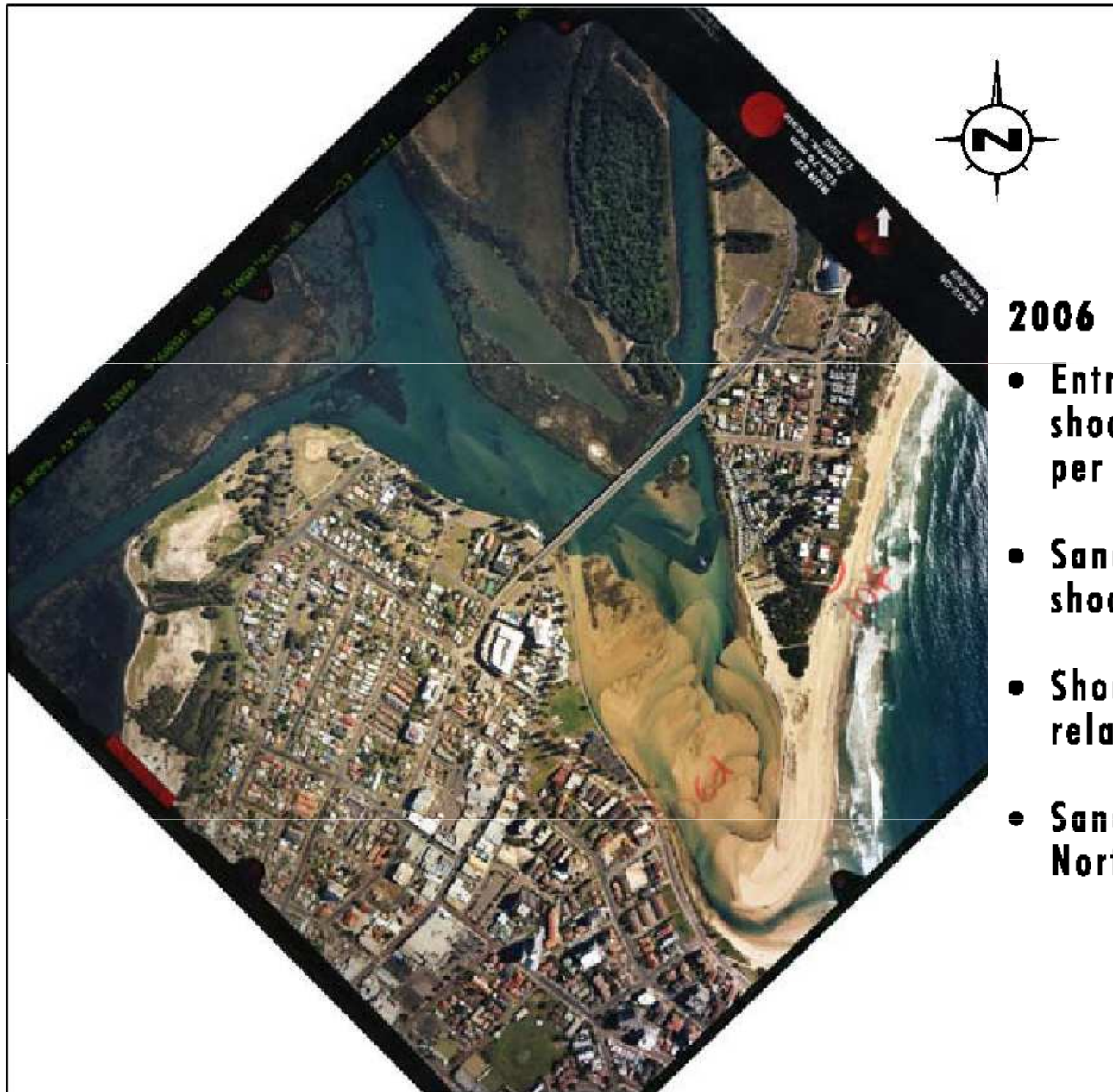
- Entrance almost closed, with straight spit and widespread shoaling in the outer entrance
- Deep channels (dredged) control flows upstream of the bridge
- Reduced sand volumes on The Entrance Beach and North Entrance Bench sand has moved into The Entrance
- Significant volume of sand from the tidal delta are locked into the reclaimed foreshores to the north east and west of the entrance (minimum estimate  $\sim 200,000\text{m}^3$ )



### **2001**

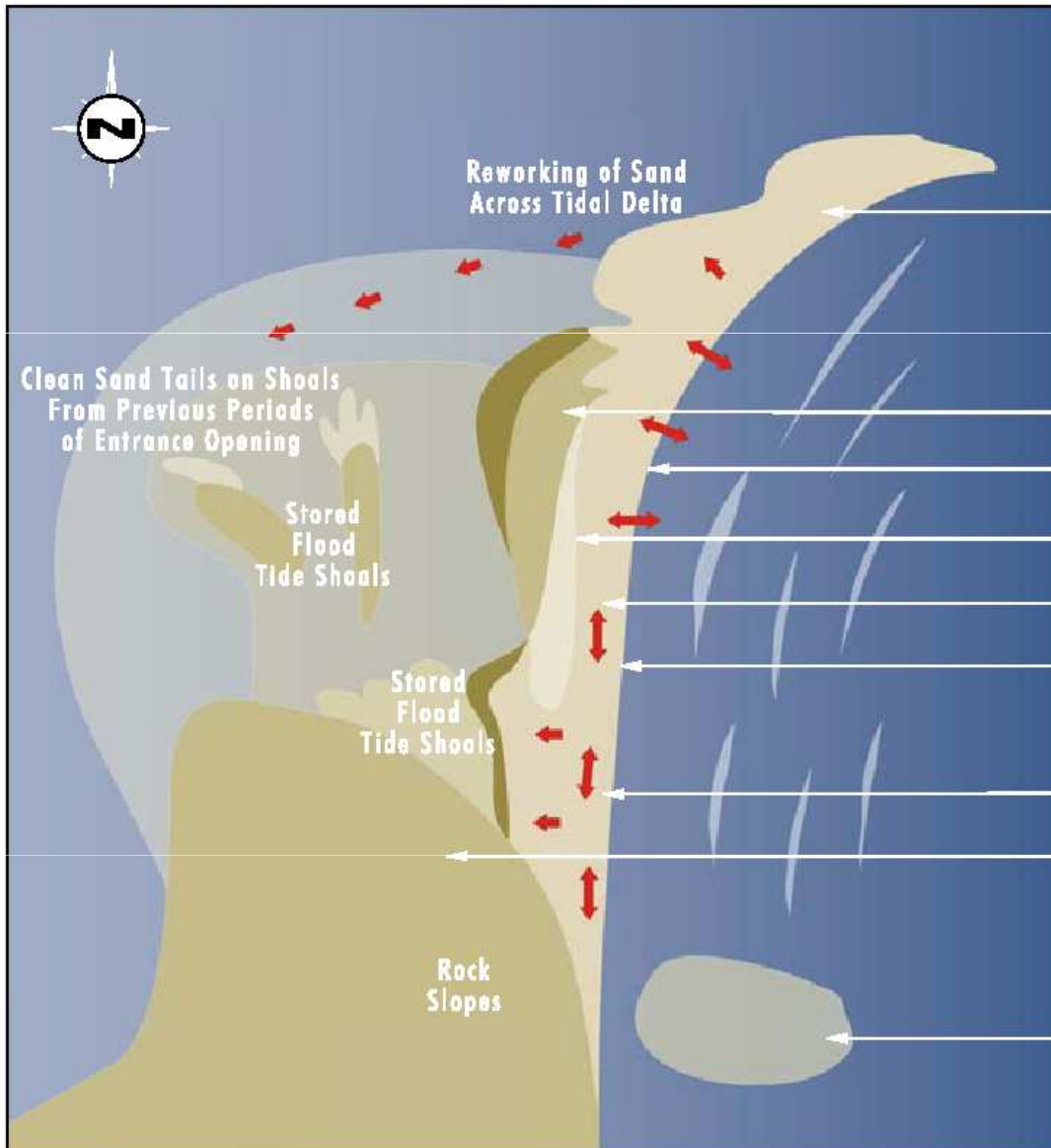
- Dredged channels in outer entrance area have reduced shoaling. North Entrance Beach accreted
- Reclaimed areas and dredged channels control flows and sediment movement inside the bridge





**2006**

- Entrance almost closed and channels heavily shoaled. North Entrance Beach is narrow (as per 1999)
- Sand volume stored in the spit and entrance shoals
- Shoal areas inside bridge vegetated and relatively stable
- Sand also accumulating in nearshore area of North Entrance Beach



### **Type 1: Entrance Closed, Active Aeolian Processes**

**Ongoing Aeolian Losses From Beach to Lake Shoreline**

**Back Barrier Flat**

**Rip Cell Circulation Along All of Beach**

**Narrow, Single Frontal Dune**

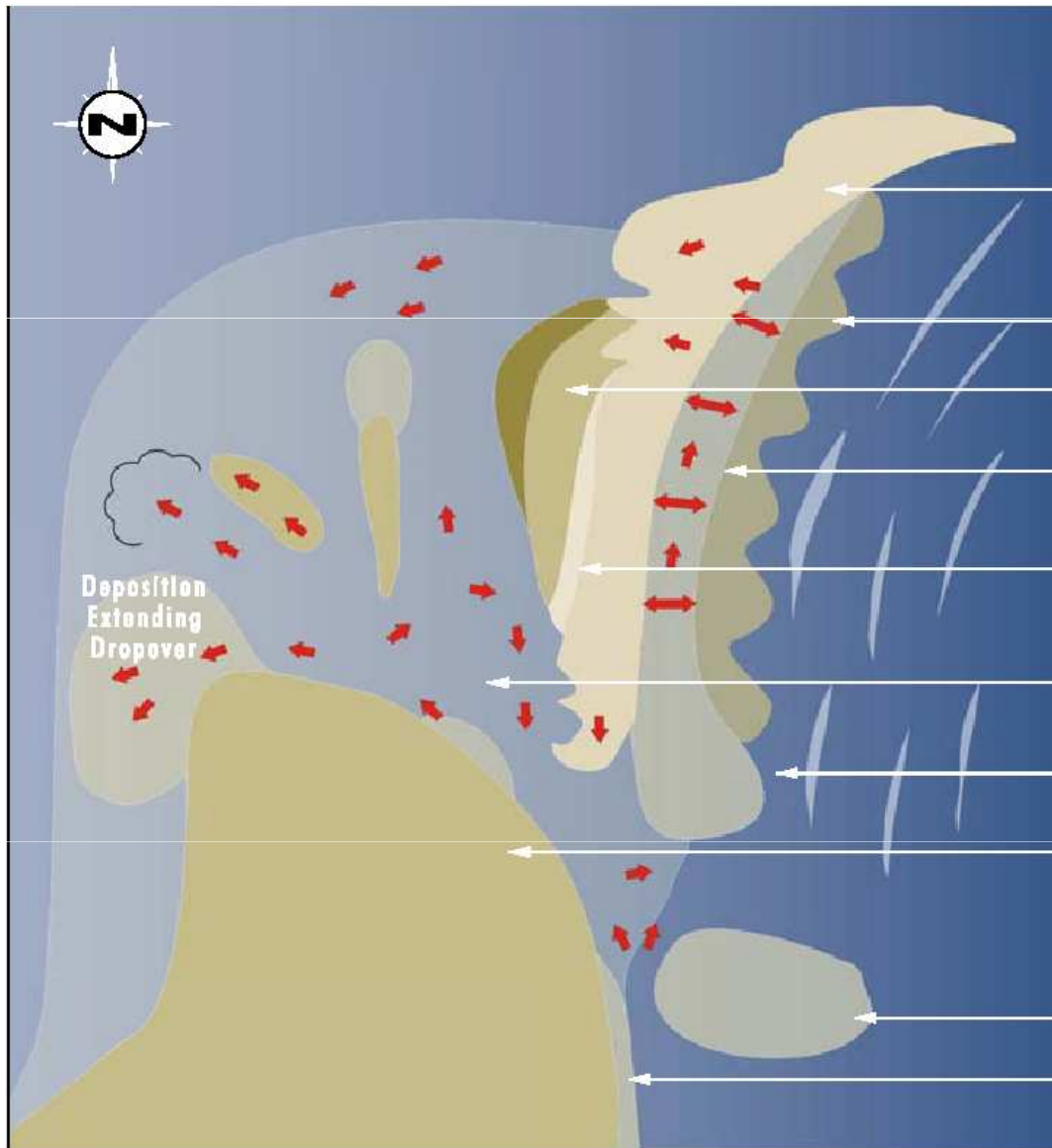
**Wide Beach**

**Shoal Tied to Beach**

**Closed Entrance:**  
**Potential for sand to move north/south across The Entrance.**  
**Also some minor windblown sand loss into The Closed Estuary**

**Bedrock Controlled Shoreline**

**Rock Reef in Nearshore**



**Type 2: Entrance Open, Active Aeolian Processes, Predominantly Natural Shoreline Configuration**

Ongoing Aeolian Losses From Beach to Lake Shoreline

Extensive Nearshore Bars

Back Barrier Flat

Rip Cell Circulation Along All of Beach

Narrow, Single Frontal Dune

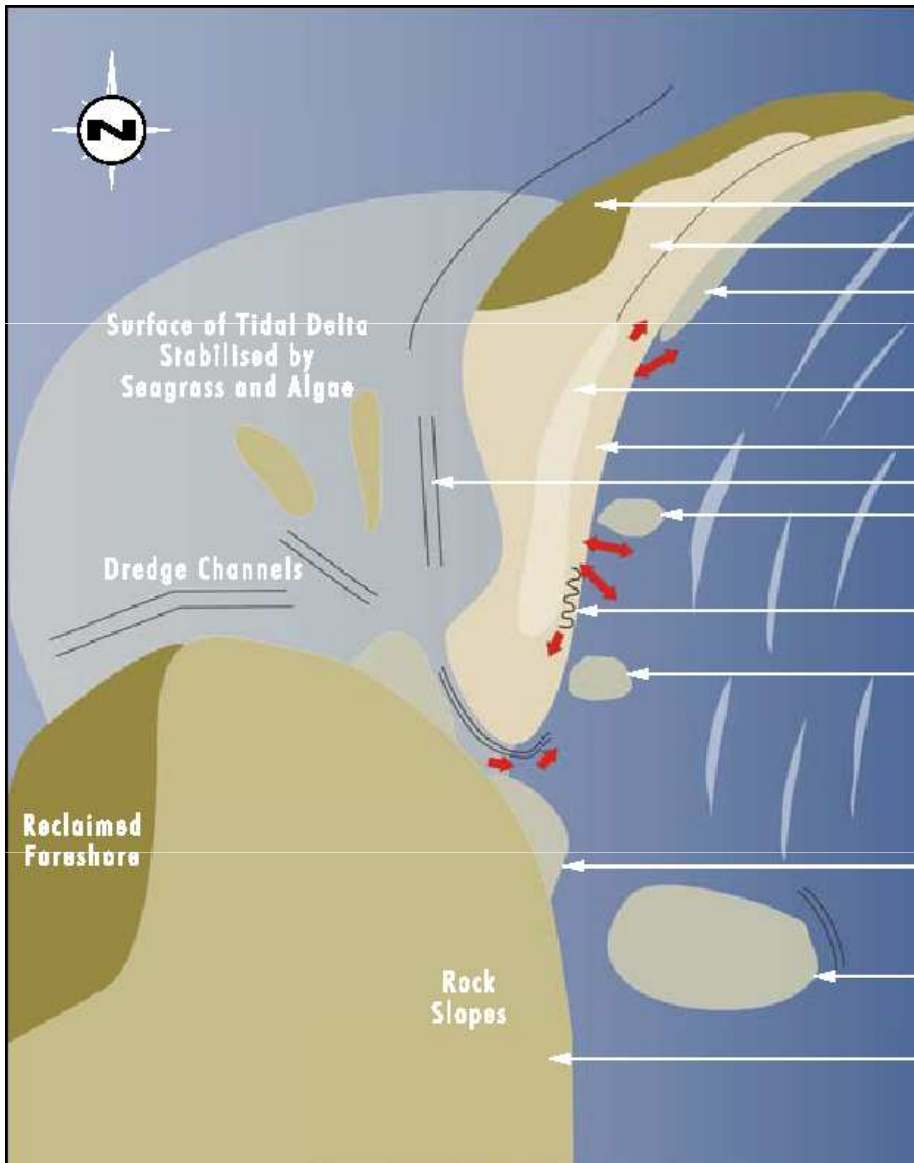
Flood Tide Shoals

Ebb Tide Shoal

Bedrock Controlled Shoreline

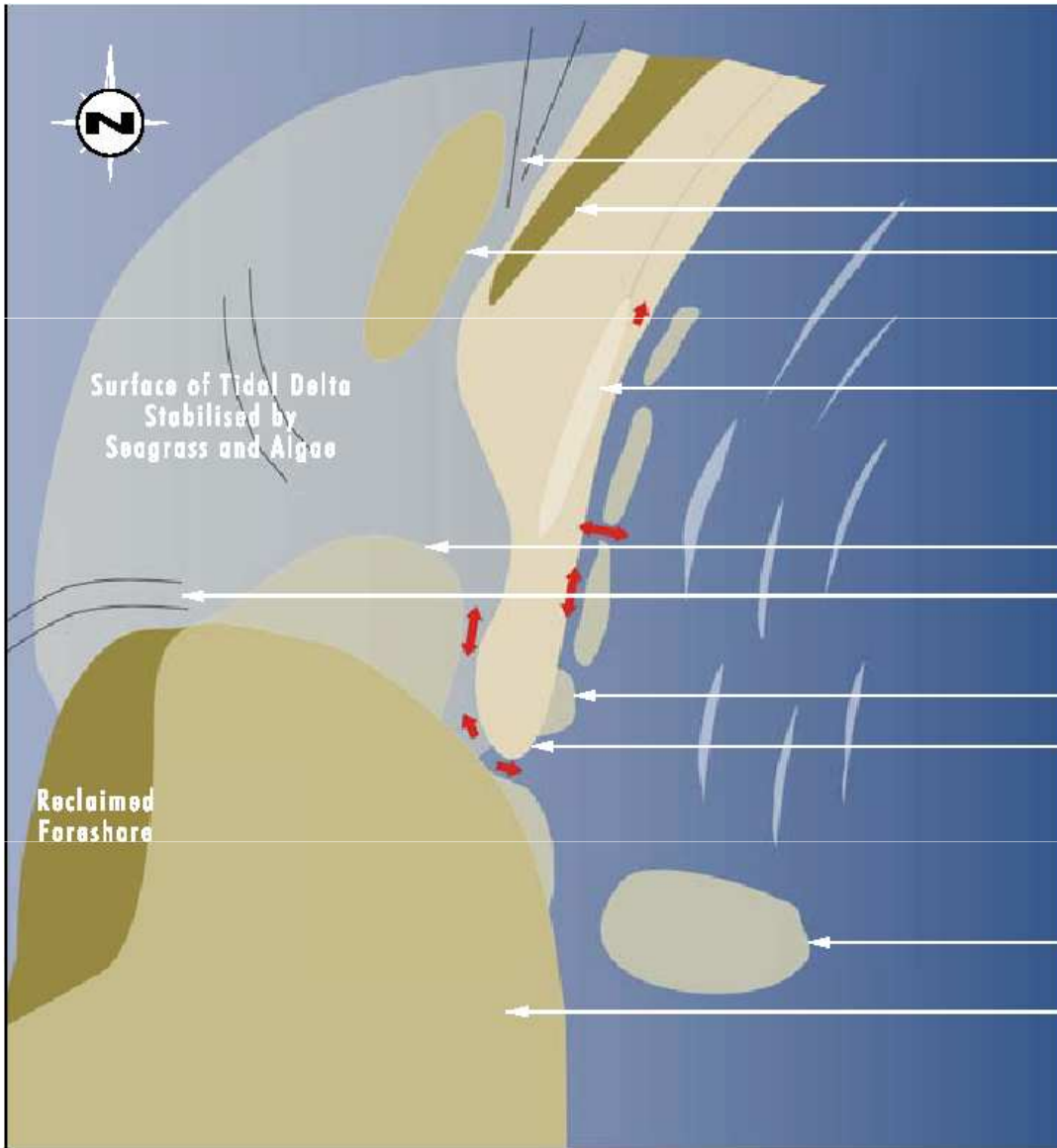
Rock Reef in Nearshore

Sand Stripped From The Entrance Beach



**Type 3: Entrance Open, Dredged and Scoured.  
Previous Mobile Sand Areas Now Locked Up**

- Reclaimed Foreshore
- Stabilised Transgressive Dune, Now Developed
- Shoal/bar
- Single Frontal Dune with Development
- Narrow Beach, Depleted Sand Volume
- Dredge Channel
- Shoal
- Cusps with Rips and Deeper Water Close to Shore
- Ebb Tidal Shoal
- Sand on The Entrance Beach
- Rock Reef in Nearshore
- Bedrock Controlled Shoreline



**Type 4: Entrance Closed, Very Restricted Tidal Currents. Narrow Depleted Beach and Bars**

Deep Dredge Channel

Reclaimed Foreshore  
Island

Narrow Depleted Beach, with Narrow Bars

Shoaled Entrance

Deep Dredged Channel

Small Ebb Delta

Entrance Closed (except for narrow channel  
along both sides of the spit)

Rock Reef in Nearshore

Bedrock Controlled Shoreline

