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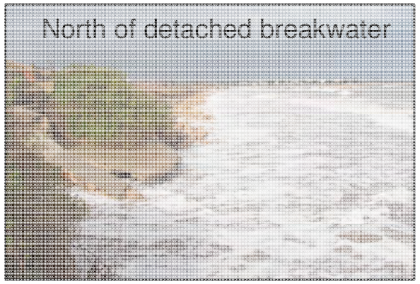
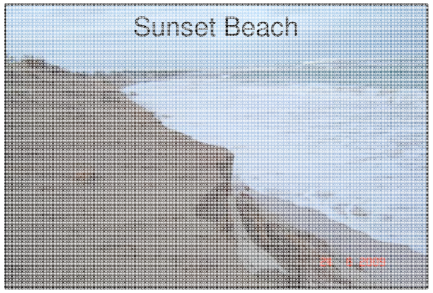
Agenda Recap

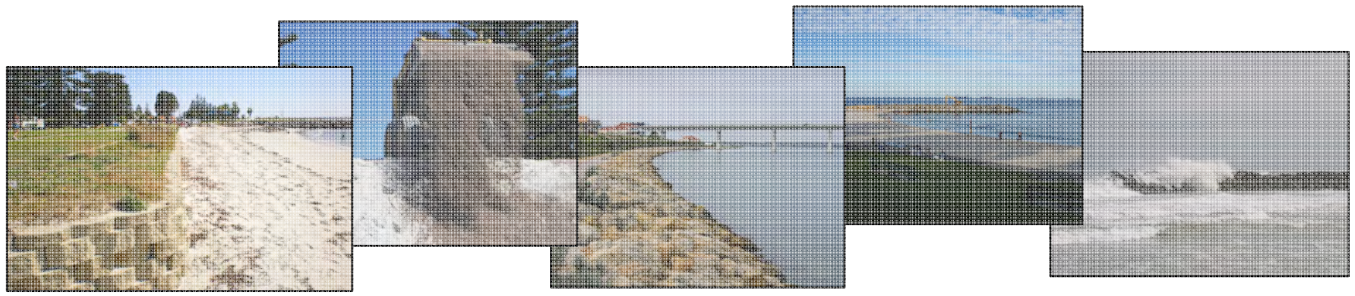
Session 2

- Coastal Vulnerability Assessment





- Coastal Protection Options



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Coastal Vulnerability

Required coastal setback for the next 20 years

Based on:

- Erosion during storm event (S1)
- Long term erosion trend (S2)
- Sea level rise erosion (S3)

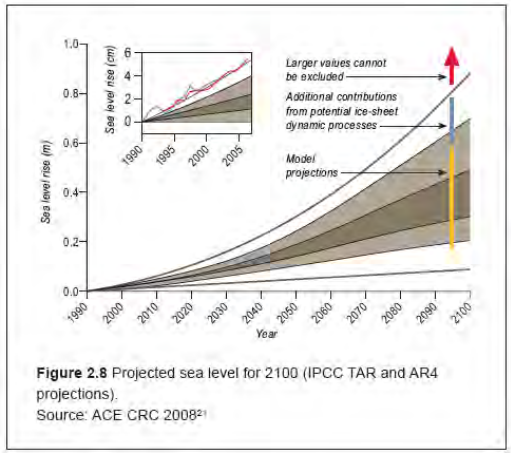
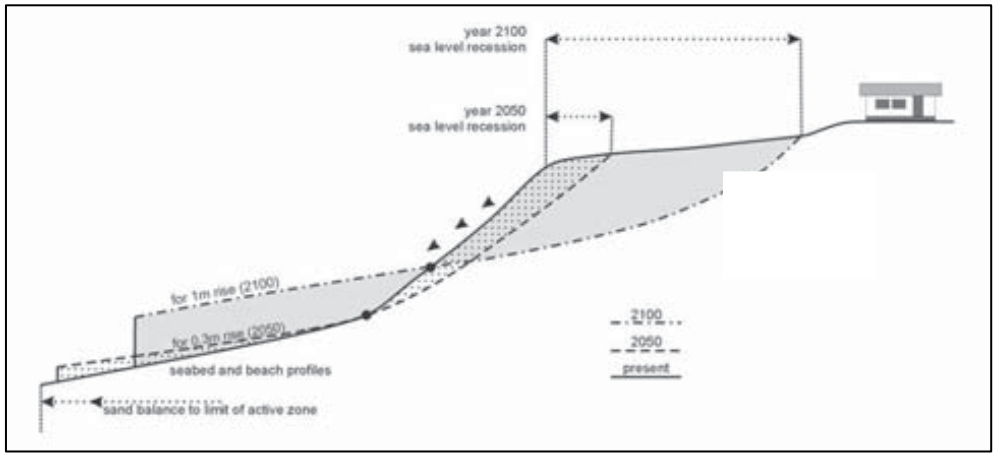


Figure 2.8 Projected sea level for 2100 (IPCC TAR and AR4 projections).
Source: ACE CRC 2008[21]



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Coastal Vulnerability

Assessment of Coastal Setback Distances for the next 20 years

Coastal section		Setback distance to Infrastructures (m)	
		Recommended	Actual
East Grey's Beach		70	80 to 120
West Grey's Beach		85	0 to 70 first habitations at 100m
Point Moore		70	90 to 15 Light house at 100m and first habitations at 140m
Point Moore (Car Park)		70	40 to 50
Explosive Beach		70	140 to 220
West Pages Beach		50	10 to 40
East Pages Beach		70	0 to 135
Town Beach		10	0
SN1		40	30 to 60
SN2		55	20 to 50
SN3	Bluff Point beach	55	45 to 90 Except boat ramp access area
	Near Fuller st	10	0
	Frederick st	55	15 to 25
SS1 (Sunset Beach)		55	20 to 90
SS2 (North Sunset Beach)		50	100 to 120
SS3 (Glenfield Beach)		70	>170

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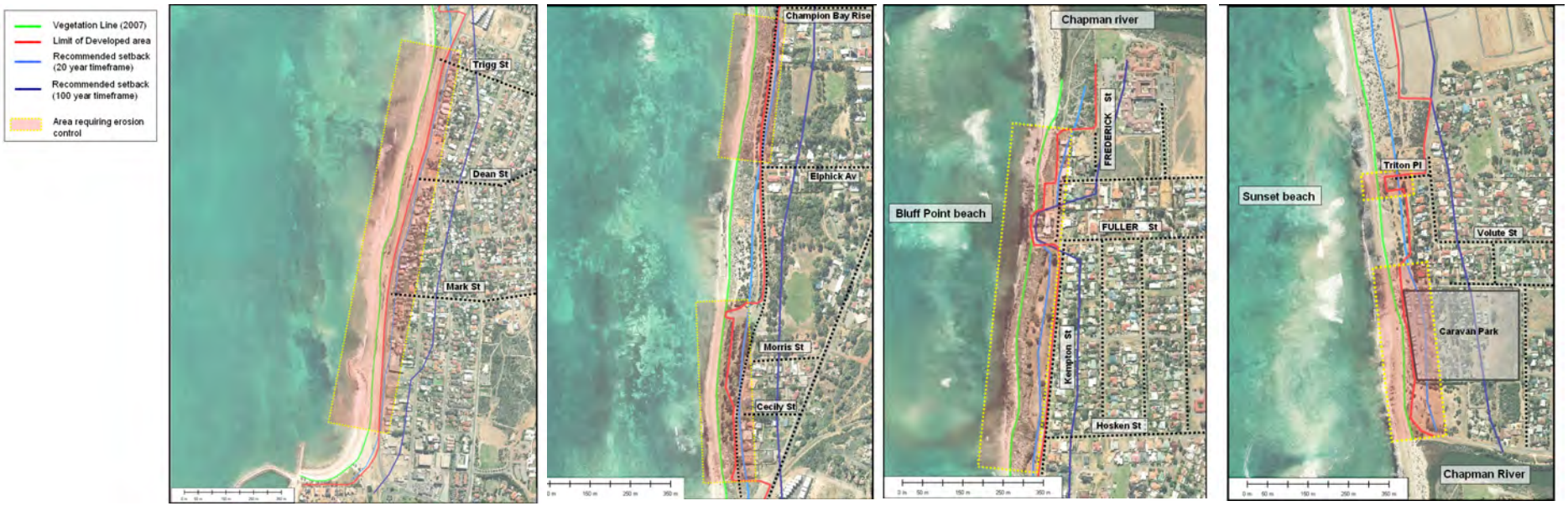
Coastal Vulnerability

Assessment of Coastal Setback Distances for the next 20 years



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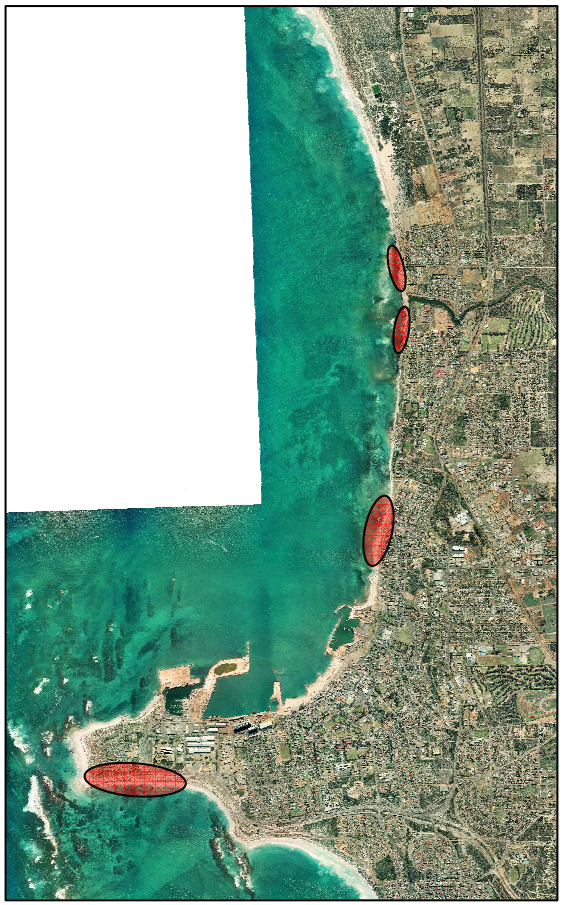
Coastal Vulnerability

Problem Areas :



- Section North of Detached Breakwater
- Sunset Beach
- South of Chapman River (Fredrick Street)
- Grey's Beach

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Coastal Protection Options

- Do Nothing / Managed Recession
- Dune Management
- Beach Nourishment
- Buried Seawall
- Groynes
- Detached Breakwater
- Artificial Reef
- Beach Drainage





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Coastal Protection Options

Do Nothing / Managed Recession

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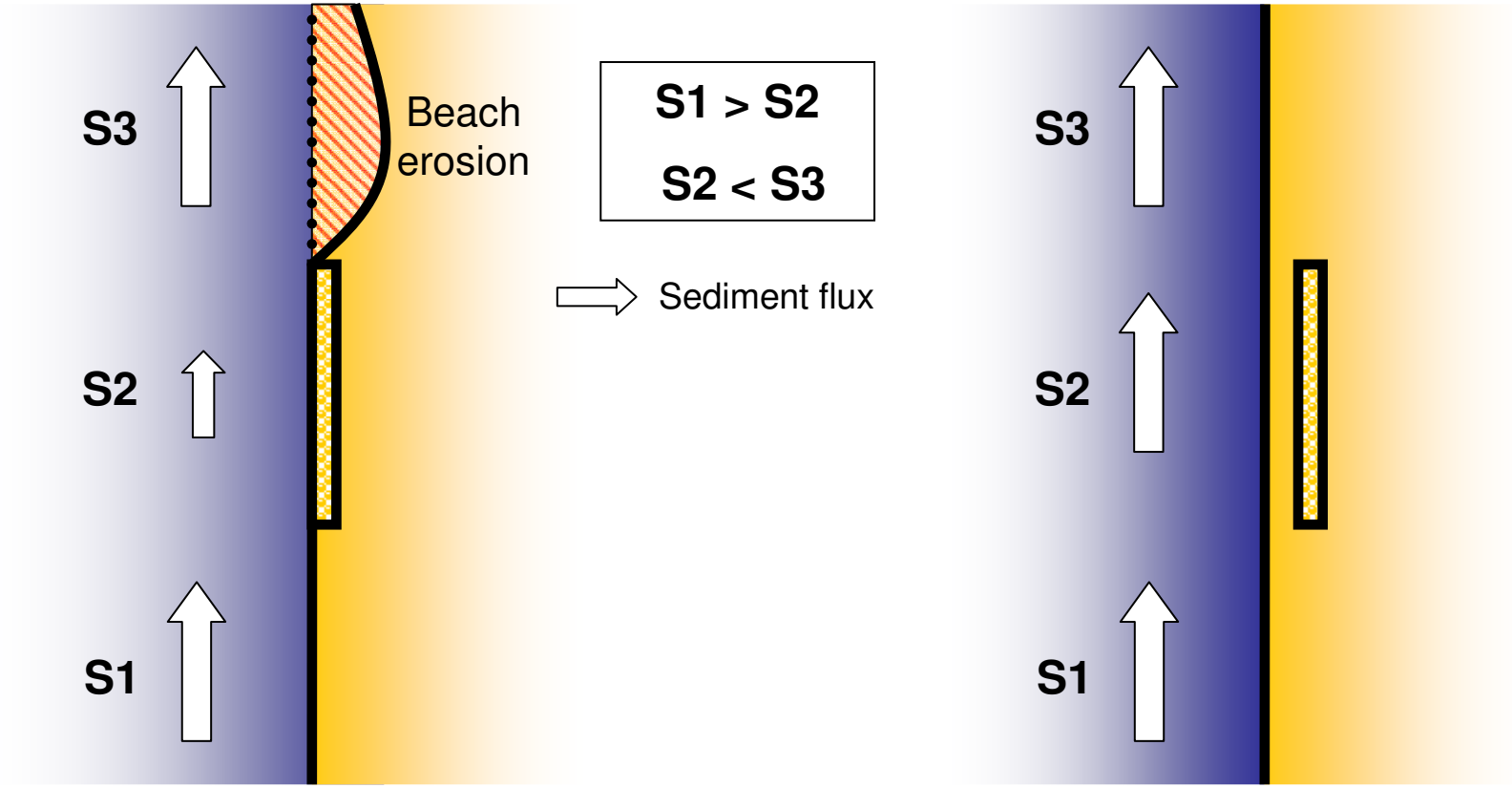
Coastal Protection Options

Seawall

Buried Seawall

Unless it is eroded, no impact on S1, S2 and S3.



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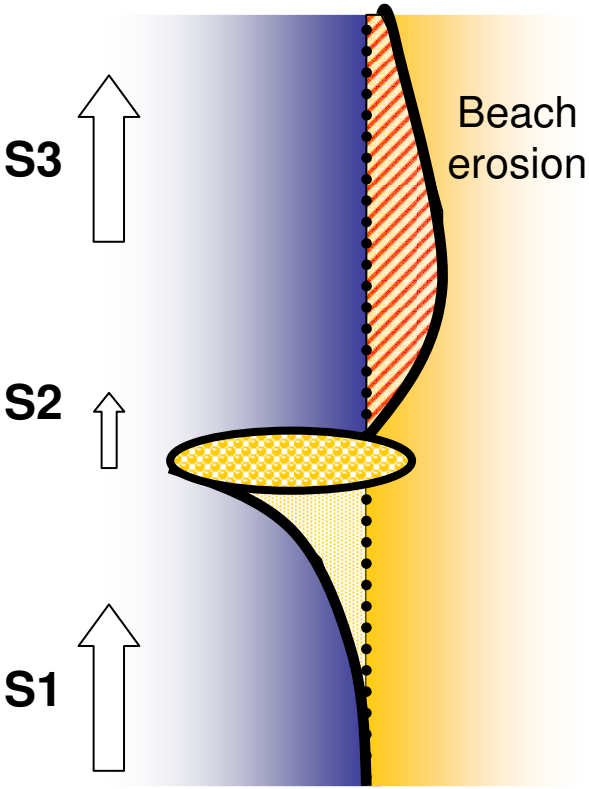
Coastal Protection Options

Groyne

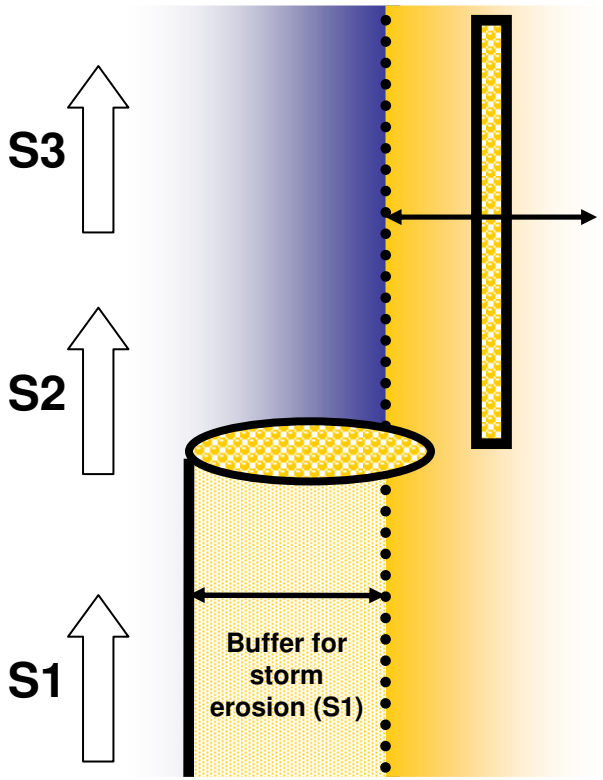


S1 > S2
S2 < S3

Sediment flux

Groyne and Replenishment

Provide sufficient buffer for erosion during storm event



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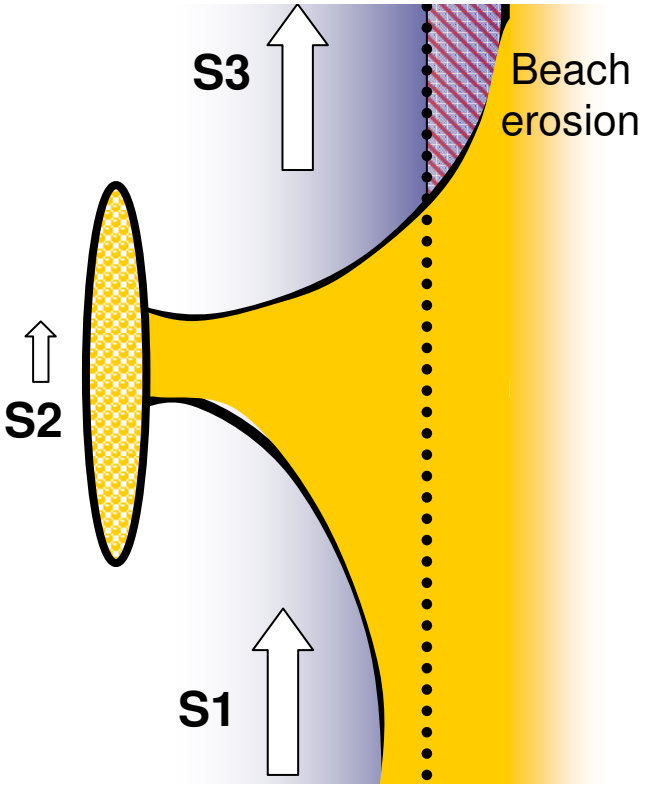
Coastal Protection Options

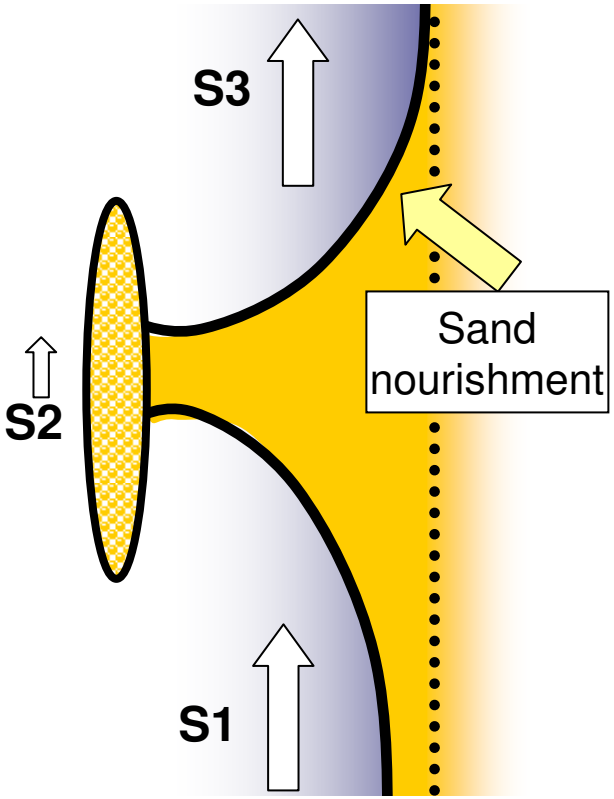
Breakwater



S1 > S2 **S2 < S3**

Sediment flux

Replenishment and Breakwater



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Coastal Protection Options

	Effectiveness	Aesthetics	Public Safety
Nourishment and Dune Management	**Most effective in areas of low alongshore sediment transport, unless used in conjunction with control measures Sustainable issues related to source**	**Positive aesthetic impacts, as long as similar colour and grain size is used.**	**No negative impacts to public safety unless courser grain size is used (can lead to stronger plunging waves)**
Buried Seawall	**Effective as a last line of defence against storm erosion can result in erosion downward of the littoral drift if not associated with regular nourishment**	**No intrusion on beach aesthetics if associated with beach nourishment and dune management Immediate intrusion on beach aesthetics and natural character after a storm event if sand cover is lost. Can be re-instated quickly without damage.**	**No negative impacts to public safety unless Not associated with beach nourishment: strong currents and increase wave agitation adjacent in the vicinity of the structure**
Groynes and replenishment	**Most effective when there is a predominant alongshore transport Allow sand bypassing and beach sand retention Can exacerbate downstream erosion**	**Intrusion on beach aesthetics and natural character and can block alongshore beach access. if rock is used instead of geotextile.**	**Public access to the structure if not associated with beach nourishment, can creates strong offshore directed wave driven circulation currents adjacent to the groyne**
Detached Breakwaters and replenishment	**Most effective in areas with low alongshore sediment transport. Can exacerbate downstream erosion**	**Exposed crest reduces the natural character of the coast feeling of being enclosed**	**If existence of a tombolo, can create strong offshore directed wave driven circulation currents Potential safety problems on the structure, since emerged part**
Submerged Reefs and replenishment	**Theoretically effective in areas where erosion is driven by waves May need to be improved**	**Very low aesthetic impacts, since always covered by water.**	**Increased public safety: lower waves and currents at the beach. Can cause navigation problems**

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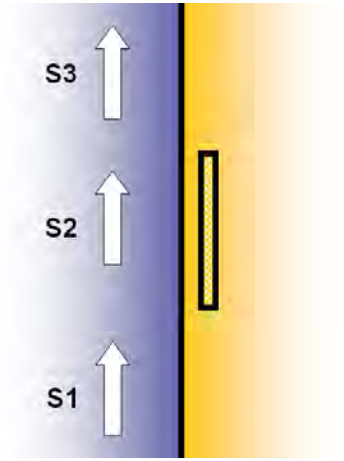
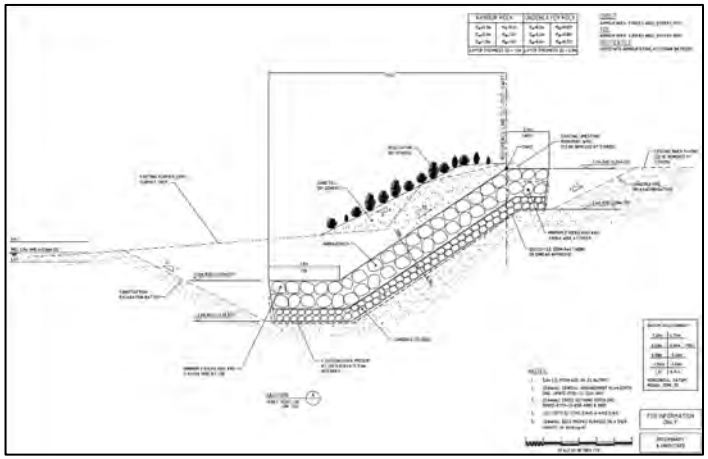
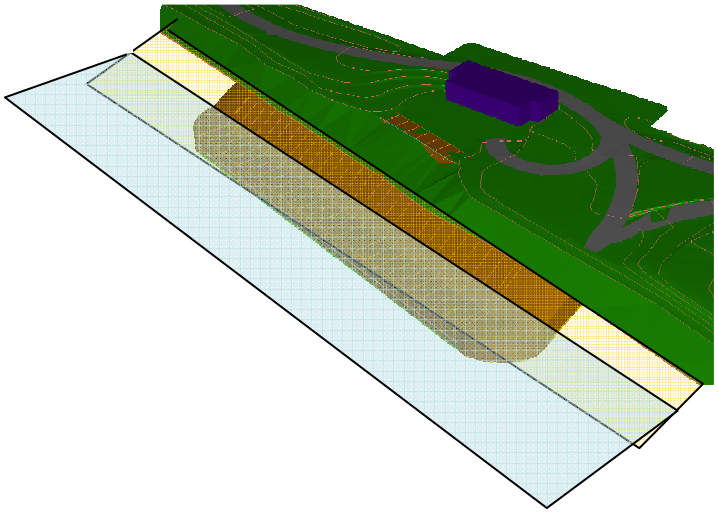
Coastal Protection Options

Buried Seawall

- No impact on longs shore sediment transport
- Effective as a last line of defence against storm erosion
- No intrusion on beach aesthetics



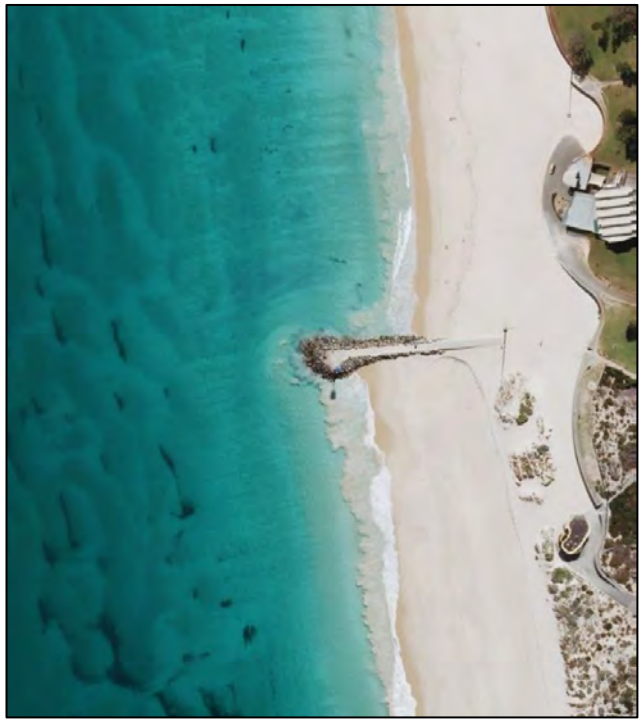


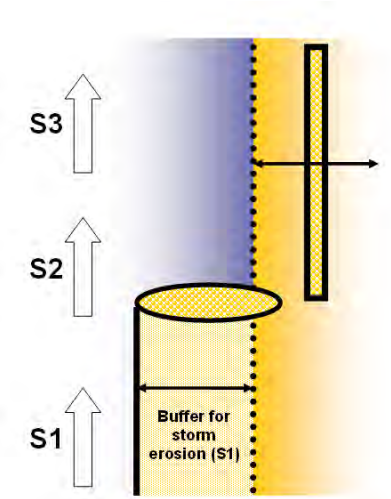


Coastal Protection Options

Groyne and sand replenishment

- limited impact on longshore sediment transport
- Creation of a sand buffer to absorb storm erosion
- Creation of a recreational beach area





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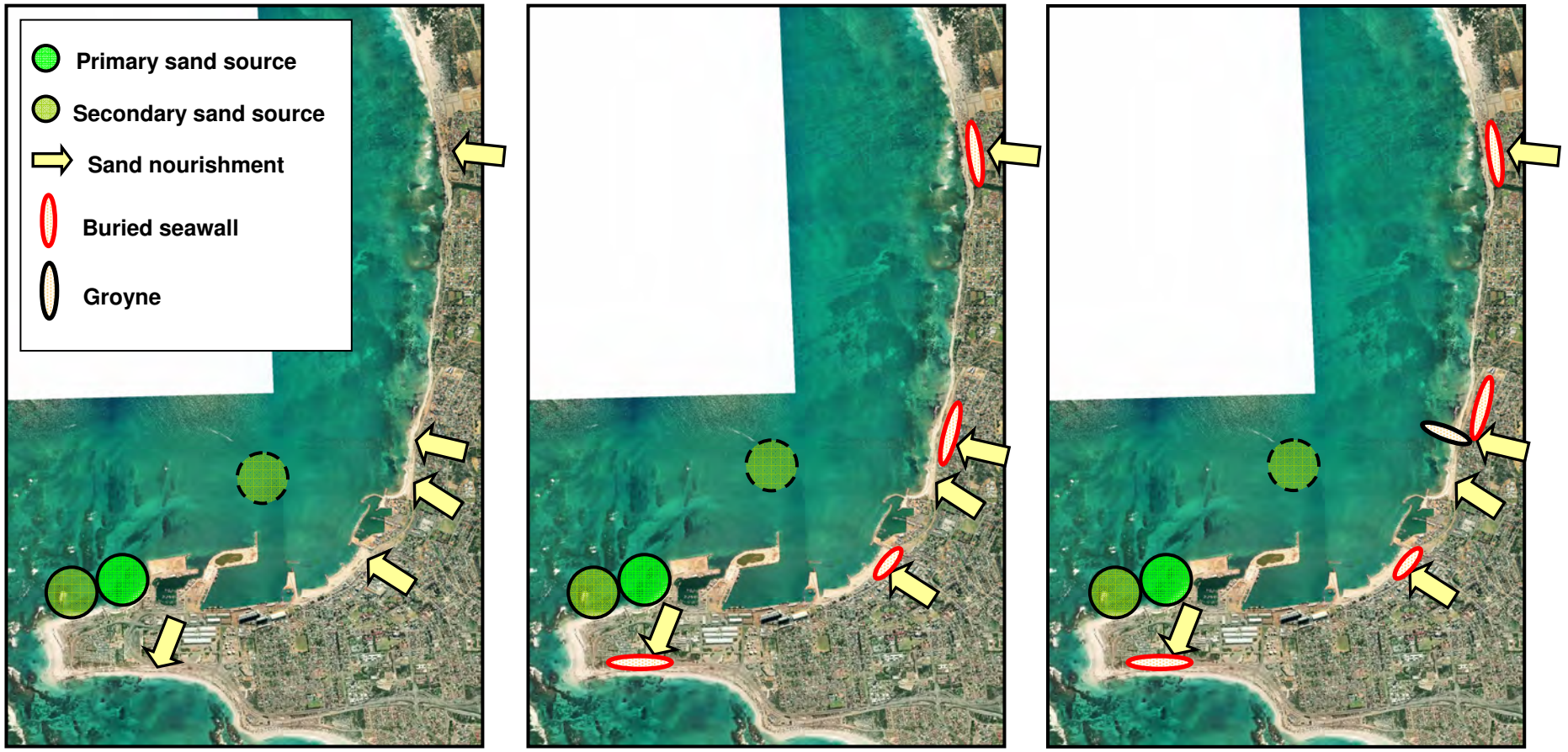
Coastal Protection Options

Sand replenishment

Seawall and sand replenishment

Buried Sewall and Groynes and replenishment



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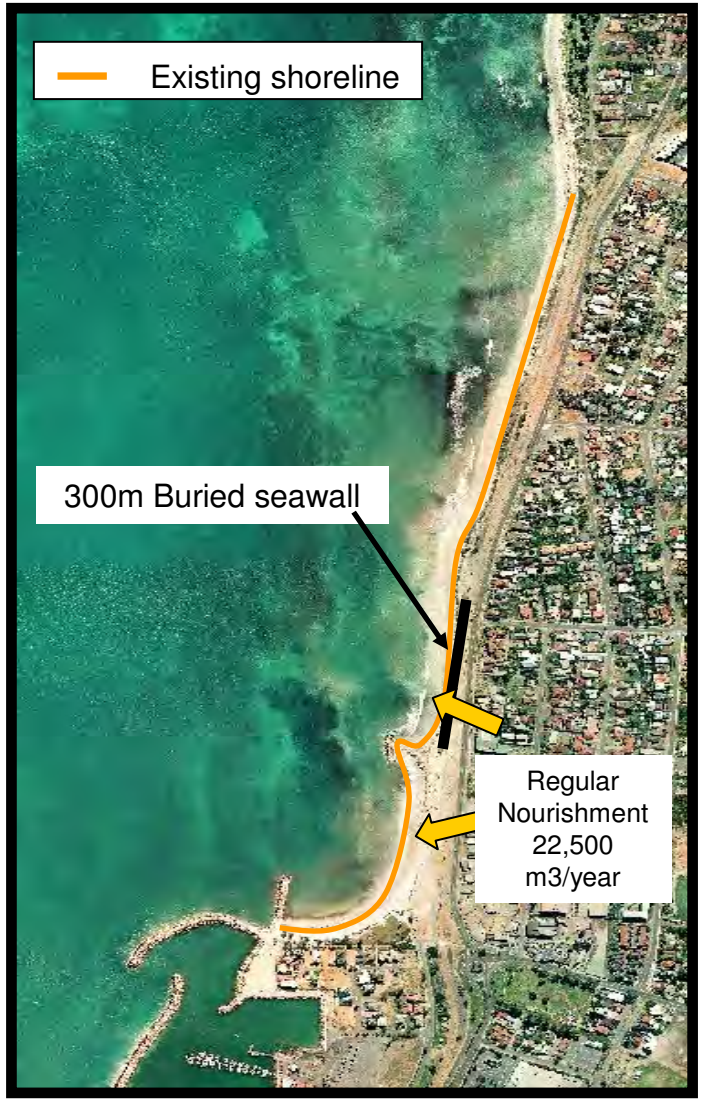
Coastal Protection Options

Northern Beaches



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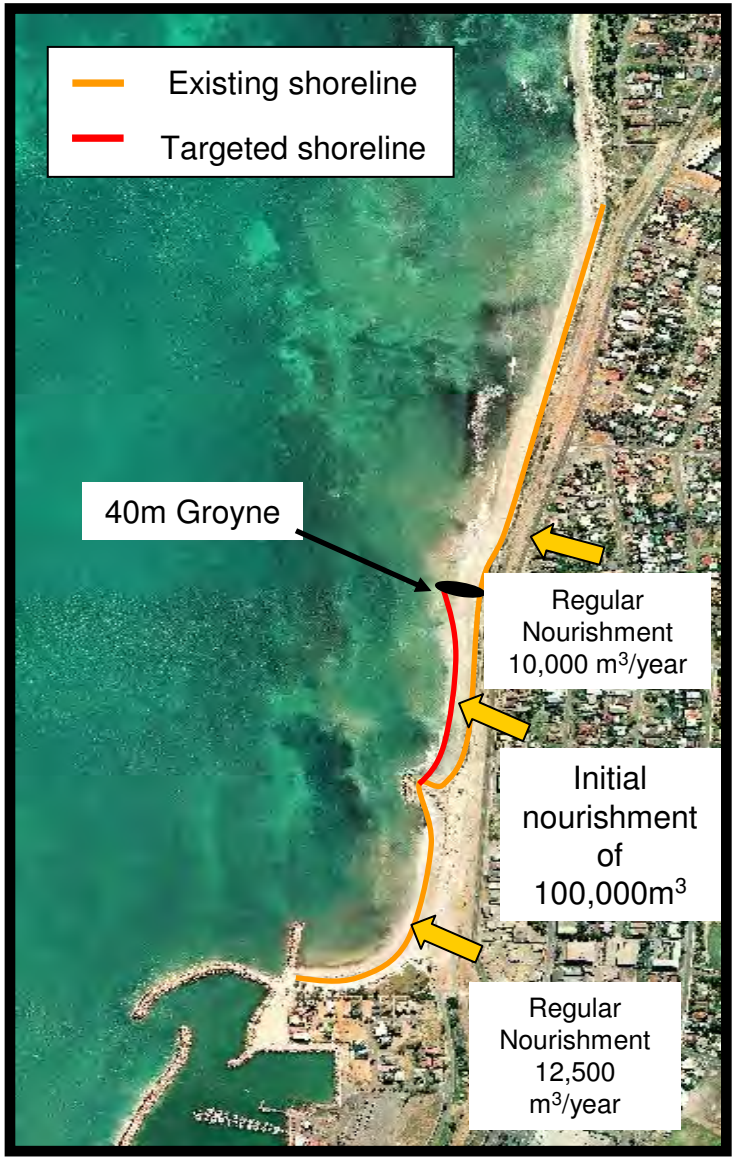
Coastal Protection Options

Northern Beaches



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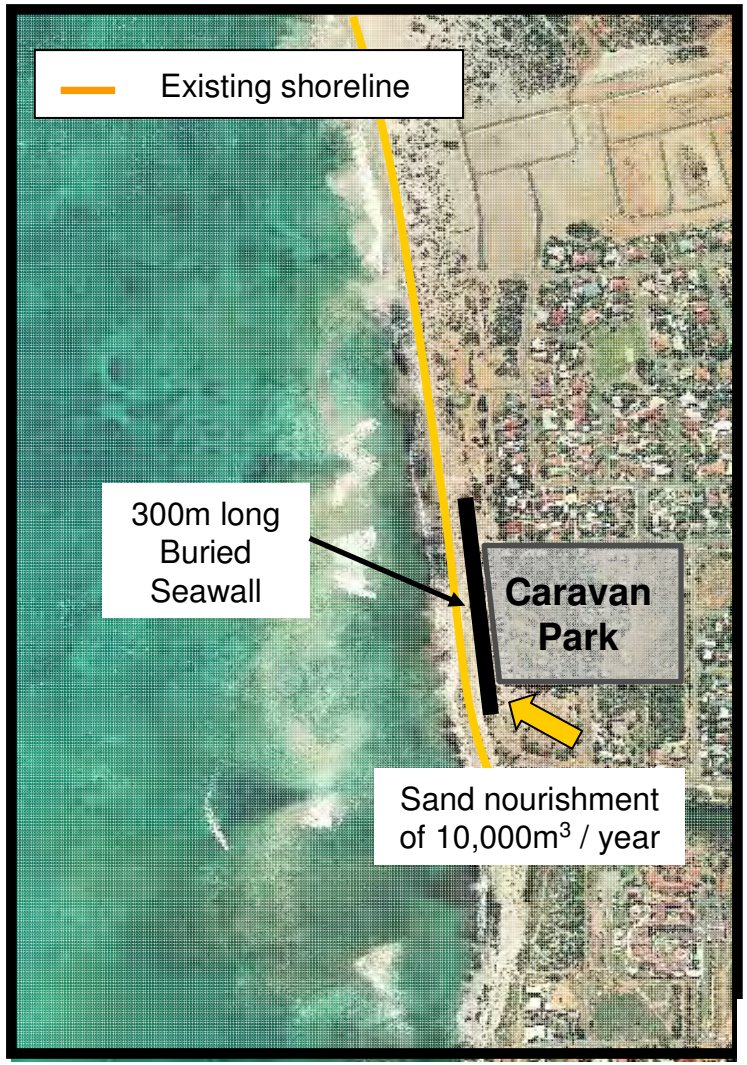
Coastal Protection Options

Sunset Beach



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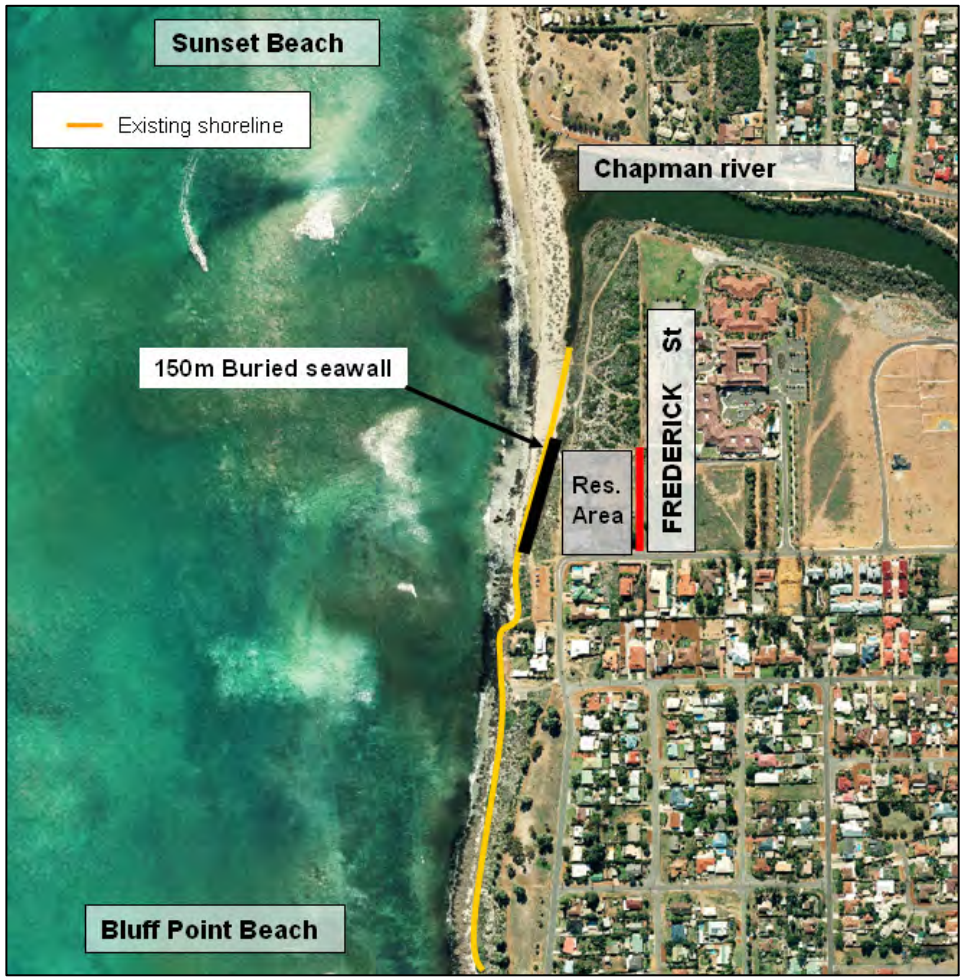
Coastal Protection Options

South of Chapman River



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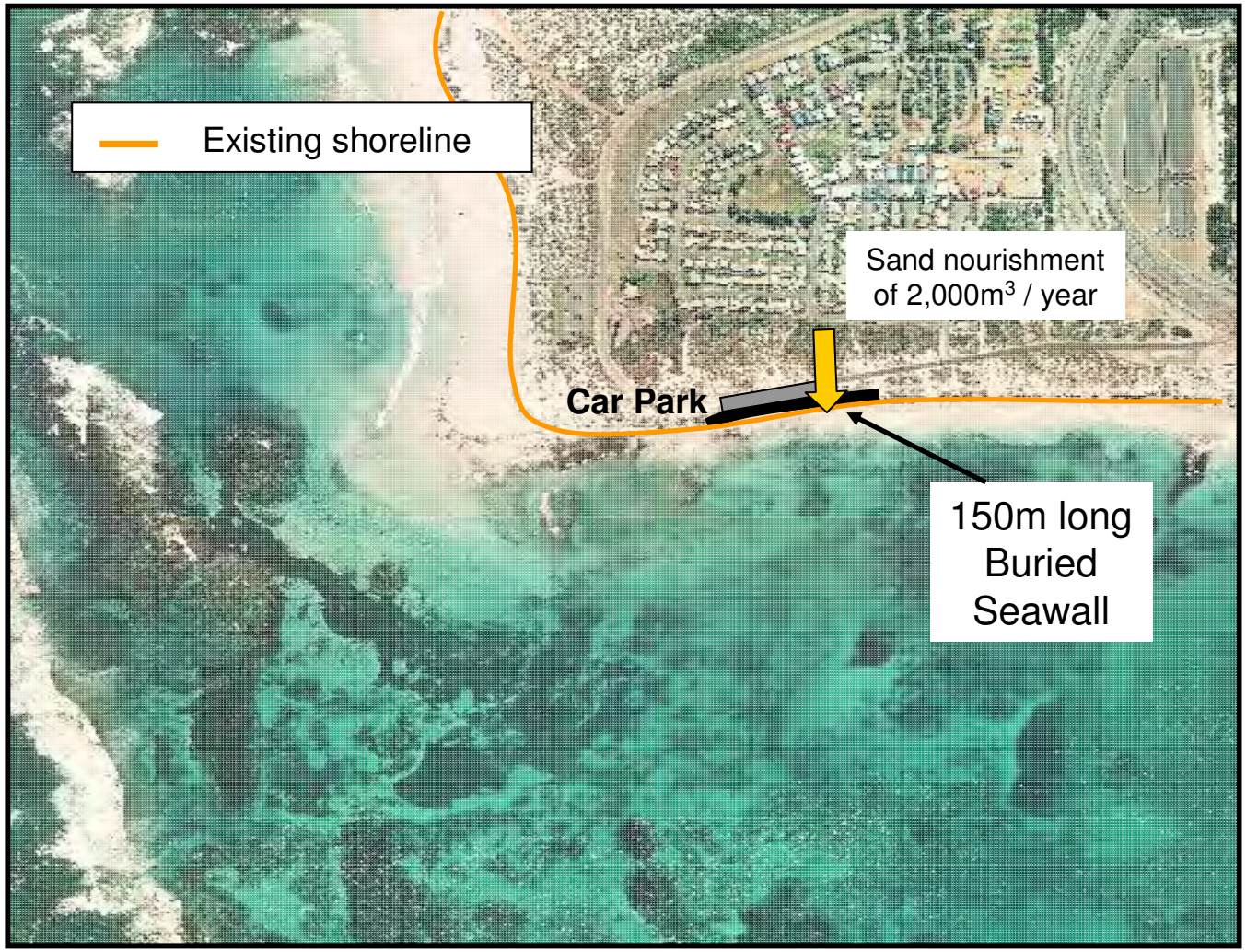
Coastal Protection Options

Grey's Beach



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Coastal Protection Options

Scenario	NPV ($million) at different discount rates		
	4%	7%	10%
Northern beaches			
Do Nothing	-56.4	-54.8	-53.3
Present Northern Beaches Stabilization Programme	-2.2	-1.7	-1.4
Increase of nourishment to 22,500 m^3/year	-3.1	-2.4	-1.9
Construction of 300m buried seawall+ 22,500 m^3/year renourishment	-4.3	-3.6	-3.1
Construction of groyne+ 150m buried seawall + initial nourishment+ 22,500 m^3/year renourishment	-4.2	-3.5	-3
Sunset Beach			
Managed Retreat	-2.2	-2.1	-2.1
Initial nourishment of 100,000 m3 and renourishment of 10,000m^3/year	-1.8	-1.4	-1.2
Construction of a buried seawall+ initial nourishment+ 22,500 m^3/year renourishment	-3.2	-2.8	-2.5
South of Chapman River			
Do Nothing	-2.0	-1.9	-1.8
150m buried seawall	-0.8	-0.7	-0.7
Grey's Beach			
Do Nothing	-0.3	-0.3	-0.3
Nourishment of 2,000 m^3/year	-0.4	-0.3	-0.2
Construction of a buried seawall + nourishment of 2,000 m^3/year	-1.2	-1	-1

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Coastal Protection Options

- Successful long-term coastal protection solutions should seek to directly address the technical issues and meet the amenity and other non technical objectives of the stakeholders.

- Beach renourishment alone or in combination with supplementary coastal structures are all plausible solutions

- In the evaluation of options for Geraldton, the use of buried seawall with ongoing nourishment and dune management meets most of the objectives of the working group by offering:
    - balanced solution
    - median NPV
    - high level of aesthetics
    - protection of coastal infrastructure

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Coastal Protection Options (cont'd)

• North of Batavia Coast marina, connectivity of the beaches is important

•Increasing the renourishment to southern end of northern beaches will influence areas further north such as sunset beach

•The resolution of stability at beaches directly north and adjacent to BCM will influence beaches up to Sunset beach

•The current approach of incremental implementation is therefore effective and suggests

- Stage 1: Incremental increase in renourishment to BCM area (SN1 & SN2)
- Stage 2: Review impact on Sunset Beach area
- Stage 3: Implement any supplementary preferred coastal structures including buried seawalls

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Thank You !

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