



Pathway 2: Protect existing development while protecting community values

This pathway protects property as long as practical and only where that protection has minimal impact on the values of the area important to the community, such as the beach, recreation areas and the dunes. There is a balance between protecting natural and shared community assets, and private property. In general, intensification of development in hazard areas would be discouraged unless it, and the required protection measures, clearly did not have any negative impact on natural and community values or potentially have a positive effect.

Some modifications to the environment may be permitted. However, protection and adaptation options that result in changes to the character of the area that reduce its attractiveness would not be pursued (e.g generally sea walls that threaten beaches).

In the long term, once the measures under this pathway are no longer sufficient to manage risks, a process of managed retreat would be initiated.

How might things proceed with this pathway?

Beach nourishment and shingle recharging would be two key measures to protect Nutgrove Beach and Blinking Billy Point in the short and medium term (at least up to 2050). The introduction of sediment management structures, such as groynes or offshore reefs, may be necessary to retain sediment and reduce recurrent recharge costs along Nutgrove Beach. Such structures may not be suitable for Blinking Billy Point as there appears to be little impact of longshore drift¹, for which these structures are especially effective.

The frequency of recharging or renourishment depends on the effectiveness of the structures and the storm conditions experienced. Groynes would be more visually intrusive than underwater offshore reefs. An underwater offshore reef may have the effect of building a bar between the current shoreline and the reef, either permanent or transient, and may affect swimming and other beach activities.

If nourishment were to use sand and shingle from outside the coastal system (that is, well offshore or land based sources), the added sediment may reduce the rate and extent of erosion. The ability to do this will depend on the availability, suitability, cost and environmental impact of taking sand and shingle from the sources.

Beach nourishment is expected to generate additional value to the community as well. With beach nourishment, a recreation beach could be maintained in front of the Long Beach sea wall and promenade.

Eventually, recharging and sediment management structures may become impractical due to cost and frequency, inadequate supplies of material, environmental or other impacts of supplying sand and shingle or the cost of maintaining or renewing the structures. At this point there would be some further progressive erosion and a shift toward managed retreat. However, some level of protection short of a sea wall may still be practical to limit 'catastrophic' damage. The beach and dunes would be retained as they migrate landwards.

Properties within the hazard zones may require protective works to reinforce the structures to reduce their susceptibility to erosion and ensure the buildings can be used until the end of their economic life.

The existing seawall and hardened foreshore along Long Beach and Sandy Bay Point would be maintained and repaired periodically to ensure the structures remain effective for as long as possible. This would ensure the area behind the wall can be used to at least 2100 and possibly longer. The narrow beach in front of the sea wall would gradually disappear over time, before 2100. Along Nutgrove Beach, the beach would likely come and go as sediment is redistributed by wave action, but would eventually be like the Point or the section of Sandy Bay Road from Maning Avenue to Wrest Point with no to little beach left. During extreme events, the seawall may be overtopped

¹ Before a wave breaks, it picks up sand and other sediment from the ocean floor. When the wave breaks on the shore, the underwater sediment is washed up onto the beach diagonally, at the angle in which the wave is moving. As the wave washes back out to the ocean, gravity draws it straight down the beach perpendicular to the shoreline, carrying the sediment with it. This means that ocean water, and the sediment it carries, moves down the beach in a repetitive zig-zag pattern. Over and over, sand and sediment is picked up in one location and deposited downstream on the beach.

by water and over time the structure could become unstable. It would be likely that the wall would need to be heightened past 2100.

New development and redevelopments/major extensions would be required to be built in a way to withstand the risk of erosion over the lifetime of the asset. Because this would occur at the time of development, the costs associated are modest.

This approach would likely permit most of the existing areas to continue to be occupied and used at least to 2050 and up to 2100.

The options most likely applied in this scenario are: vegetation management, beach nourishment, construction of sediment management structures, maintenance and upgrading of existing coastal protection works, the protection of individual assets, and ultimately retreat in areas along Nutgrove Beach and Blinking Billy Point.

Likely options for this pathway

The options most likely applied in this scenario are: vegetation management, beach nourishment, construction of sediment management structures, maintenance and upgrading of existing coastal protection works, the protection of individual assets, and ultimately retreat in areas along Nutgrove Beach and Blinking Billy Point.



Beach nourishment



Groynes

Indicative costing of options under pathway 2

The table below outlines the indicative costs of the various options under this pathway. The most significant cost would be the loss of prime residential and other land as a result of retreat from 2050 onwards (in the area of \$14 million).

Beach nourishment along Long Beach has the potential to generate substantial recreation and amenity benefits to 2050. After that, when beach nourishment is not effective enough anymore and is ceased, the costs of retreat become significant.

Other options, for which the costs are uncertain, include vegetation management, maintenance and periodic repair of the seawall and the fact that infill development would no longer be allowed, which could result in an opportunity cost for some properties.

TABLE 1: INDICATIVE COSTING OF OPTIONS UNDER PATHWAY 2 (\$ MILLIONS)

Option	Cost or applicable				
	At present day	To 2050	To 2100	Past 2100	Present day to 2100
Beach creation / Artificial beach	\$0.03	\$1.00			\$1.03
Beach nourishment	-\$0.20	-\$0.50	-\$0.20		-\$0.90
Build/upgrade sea wall				√	
Maintain sea wall	√	√	√	√	
Minimal/No subdivision*	√	√	√	√	
Protection individual assets		-\$0.80	-\$1.40	√	-\$2.20
Redevelop less vulnerable		√	√	√	
Retreat			-\$13.80	√	-\$13.80
Sediment management structures	-\$0.35	-\$0.35			-\$0.70
Stormwater drainage				√	
Vegetation management	√	√	√		
TOTAL	-\$0.52	-\$0.70	-\$15.40		-\$16.60

* unless it can be demonstrated the subdivision/intensification generates significant net benefits to the community.

Source: SGS (2014)

Other implications and costs (in addition to the cost table)

- Flood/erosion direct and indirect damage expenses (private and public property) less than other scenarios but not zero
- Community value of some additional waterways
- Emergency services expenditure (limited if residents leave before major event (unlikely); higher if leave after major event, but depending on effectiveness of emergency planning)
- Some other infrastructure reconfiguration

Things to think about and explore

What are the positives? The negatives? What does the overall balance feel like? Is it 'desirable'?

Is it a plausible scenario? Can I imagine this actually happening? Is it likely to happen? If not, why not?

Could it be made to happen and if so, what would be required? Would that be desirable or acceptable?

How might things develop differently if:

- Sea levels don't rise? Rise faster? It becomes stormier and erosion increases? Erosion stops by

itself? (the experts just got it wrong!)

Property values fall independent of the course of action being chosen (ie in general or at least all coastal, not just locally eg sea becomes smelly from acidification; the economy crashes)?

Property values rise strongly? (coastal risks perceived as manageable, large population increase)

A major storm hits and takes out part of a main access road with no alternative in place.

Some major technology trend or innovation?

How would it happen:

- Who decides what works are done and when (eg. when beach nourishment is renewed, what standard?)
- Who pays for the required works (including beach nourishment, raising roads or upgrading services)?
- Should the community that most benefits contribute to developing roads as a protective sea wall?
- How is land filling assessed, approved and controlled? What sanctions should apply to unauthorised filling, especially if it contributes to flood damage to other properties?
- Should landowners on low lying land be forced to raise land? When should they be compelled to act? Who decides?
- How might this arrangement be established?
- How could this process fail? (eg disagreements, unwilling/unable to pay).
- What if decisions are delayed and (avoidable) damage occurs in a storm?
- For areas not raised and subject to repeated inundation, would people leave voluntarily or have to be forced out by a storm / flood event that makes their home uninhabitable?
- If sea levels rise rapidly and the strategy cannot keep up or is deemed not cost effective or worth it, how would retreat occur and what would it be like?
- Can an abandoned block subject to inundation later be 'reoccupied' by a floating dwelling if these become cost effective? When is the title for land underwater lost?
- What would happen to property values? What would happen to natural values?
- Are there winners and losers? Who are the winners and losers?
- If sea levels rise rapidly and the strategy cannot keep up or is deemed not cost effective or worth it, how would retreat occur and what would it be like?

After exploring this pathway, do you think this is a realistic option for Nutgrove- Long Beach?