



Pathway 3: Protect development and support intensification for as long as possible

This pathway concentrates on protecting the existing and future community and property. It assumes that the rate and extent of change will be manageable using any necessary protection and adaptation option. Intensification of development enables more parties to contribute to the costs of protection works. While natural areas may be affected, they will adapt in their own way or become modified in ways that the community accepts.

How might things proceed with this pathway?

Sediment management structures (eg groynes, artificial reefs) combined with beach and shingle nourishment could manage erosion risks along Nutgrove Beach and Blinking Billy Point at least until 2050.

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

Renourishment and sediment management may eventually become impractical due to frequency and cost, inadequate supplies of sand and shingle, environmental impacts or the cost of maintaining or renewing the structures. At this point, likely between 2050 and 2100, the shoreline would be hardened to prevent ongoing erosion, with a sea wall or revetments. Due to the high amenity and recreation values of Nutgrove Beach, a seawall with promenade would be a likely option, while a revetment wall would be effective to prevent undermining of the cliffs at Blinking Billy Point.

Some level of renourishment may continue to be practical to maintain a beach for a while, but in the long run, hardening an eroding coast with rising seas would lead to the loss of the beach and dunes entirely.

Hardening of the shore would protect the community from shoreline erosion and recession for a long time (but not indefinitely). It prevents the need for individual properties to address erosion hazards. Some residents may value security with a promenade and a view as highly, or more highly, than a beach. The costs of a sea wall, to be borne by those who benefit from it, are substantial. Significant intensification of development would be a means to reduce the burden of costs per property owner.

Before the foreshore is being hardened (at least to 2050), new development and redevelopment/major extensions would be required to be built in a way to withstand erosion risks for the lifetime of the asset.

In the longer term (well beyond 2100), if sea levels rise by two, three or more metres, the protection works along Long Beach may need to become larger and more sophisticated. The land behind the Long Beach seawall would likely need to be filled and/or improved drainage infrastructure would be required once the seawall needs to be raised to withstand longer term storm and inundation risks. Pathways and road sections would be raised each time they were being rebuilt (ie at the end of their normal service and renewal cycle), in line with a progressive drainage plan. The plan would need to be quite prescriptive about filling and development to ensure that it would be effective.

The costs of this pathway are likely to increase significantly from 2050 onwards, requiring a seawall with promenade and a hardened foreshore to be developed along Nutgrove Beach and Blinking Billy Point.

Likely options within this pathway

The main options with this pathway are: vegetation management, beach nourishment, sea walls and hardening of foreshores.



Dyke with coastal road, Holland with amenity values (Sandy Bay)



Sea wall



Fill to raise land levels while allowing for stormwater drainage channels

The table below outlines the indicative costs of the various options under this pathway. The most significant cost would be the loss of beaches along Nutgrove and Blinking Billy Point (beyond 2050 or 2100). This could be as high as \$22 million (from 2050 to 2100). Much of the value of the foreshores could likely be retained by developing an artificial foreshore with high amenity values, such as is currently the case at Long Beach. However, given the different setting, with mostly private back yards behind the promenade, the level of amenity would not likely achieve the same benefit as for Long Beach. Such a promenade may also impact on the privacy of residents, adversely affecting private property values.

Another significant cost item is the construction of a sea wall and hardened foreshore along Nutgrove Beach and Blinking Billy Point (in the area of \$10 million). These costs are not expected before 2050 and possibly close to 2100. Other options, for which the costs are uncertain, include vegetation management, maintenance and periodic repair of the seawall.

The costs of raising the sea wall and of improved stormwater drainage at Long Beach may be significant. However, these costs are not expected to be required until after 2100, which is beyond the assessment timeframe of this study.

TABLE 1: INDICATIVE COSTING OF OPTIONS UNDER PATHWAY 3 (\$ 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			-\$0.70
Build/upgrade sea wall			-\$9.20	√	-\$9.20
Hardening foreshore			-\$0.80	√	-\$0.80
Loss of beach			-\$22.20		-\$22.20
Maintain sea wall	√	√	√	√	√
Sediment management structures	-\$0.35	-\$0.35			-\$0.70
Stormwater drainage				√	√
Vegetation management	√	√			√
TOTAL with loss of beach values	-\$0.52	\$0.15	-\$32.20		-\$32.60
TOTAL without loss of beach values	-\$0.52	\$0.15	-\$10		-\$10.40

* unless it can be demonstrated the subdivision/intensification generates significant net benefits to the community
 Source: SGS (2014)

As is clear from the above table, most of the costs of this pathway will not occur until after 2050 and close to 2100.

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

- Reduced flood/erosion direct and indirect damage expenses (private and public property)
- Much less property lost or abandoned
- Reduced emergency expenditure
- Community value of some potential additional waterways
- 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 sea wall, raising roads or upgrading services)?
- 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 critical is it that these particular organisations/ individuals decide and or pay?
- 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?
- What if the sea wall fails or becomes ineffective or has expensive maintenance sooner than expected?
- What if levels set for development and roads are not set high enough for the full service life (ie sea rises faster than expected) leading to unexpected damage?
- 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?