Survey Results

Nutgrove and Longbeach Coastal Adaptation Pathway Project

City of Hobart

June 2015

Contents

PART ONE - BACKGROUND

Survey overview

- The survey forms part of the community consultation to the City of Hobart and Tasmanian Government– Nutgrove and Long Beach Adaptation Pathway Project 2015 (the Project). It targets community outside of the project area. See Attachment 1 for a copy of the survey questions.
- The project is a collaborative initiative between the City of Hobart and the Tasmanian Government to engage with the local and broader community on local values and possible responses to local coastal climate hazards and vulnerabilities by exploring three adaptation pathways (see Attachment 2: Coastal Adaptation Pathway Fact Sheets):
    - Pathway 1: Let nature takes its course (i.e. do nothing)
    - Pathway 2: Protect existing development as long as practical while protecting community values (i.e. soft engineering such as groynes, revegetation and beach nourishment)
    - Pathway 3: Protect existing development and permit future development to the maximum extent for as long as possible (i.e. hard engineering such as sea walls).
- The survey design and content was based on and consistent with a workshop, delivered by the project consultants SGS, to residents, businesses and community groups within the project area on 28 February 2015 that was attended by 22 people.
- A total of 79 responses were received for the survey. The survey responses in full Form Part 2 of this report.
- The survey was available on the City of Hobart's website from 22 April through to May 25.
- The survey was promoted through an advertisement in the Mercury on the 23rd April 2015 and in the Hobart Observer May 2015 edition. It was posted on the Councils website's 'Latest News' for two weeks and then included in the related page 'More News.' It was also on the CBC home page latest news and emails were sent out through professional networks. The project timing did not coincide with Capital City News timeframes.
- Two media releases were provided on the 22 April and 21 May, however there was no take up in print or electronic media.
- An article was published in the Mercury newspaper on 31 May however this was after the survey closed.
- The following section – Survey Results should be read in conjunction with the consultant's SGS Econimics and Planning, Final report section 8 Community Consultation which is included as Attachment 3 of this report.
- The survey results indicate that the Pathway 2 was the preferred pathway and considered the most plausible to occur. This pathway differs from the consultant's workshop report that identified Pathway 3 as the preferred and most plausible coastal adaptation pathway by the community within the project area.

Survey results:

Background and methodology:

The survey was designed to be consistent with the Nutgrove and Long Beach Coastal Adaptation Pathways (N&LB CAP) workshop that was delivered to residents on Saturday 28th February, at the Law Faculty, University of Tasmania, Sandy Bay Campus. The N&LB CAP is part of the Tasmanian Coastal Adaptation Pathways program that is being delivered by local and Tasmanian government partnerships to communities in identified vulnerable coastal areas across Tasmania. Given the considerable private and public assets and population within the area the N&LB CAP was designed to engage directly with the community within the project area through an information session and workshop and with the broader community through an online survey.

The online survey was based on and designed around the content of the community workshop and the three Pathway fact sheets that were available on the same City's N&LB CAP webpage as the survey. The survey's pathway questions were based on the three key questions, under the heading 'Things to think about and

explore' in the fact sheets (see Attachment 2). The survey included both quantitative and qualitative questions, along with an opportunity for open ended comment.

The survey consisted of three sections:

- Sections 1 Community Values :
  Demographics (Q 1 – 3), frequency of use (Q4 – 5), values (Q 6) and changes (Q 7 – 9)
- Section 2 Coastal Adaptation Pathways
  Adaptation pathways – Pathway 1 (Q10 – 12), Pathway 2 (Q 13 – 15) and Pathway 3 (Q 16 – 18)
- Sections 3 – Additional comments
  Other comments (Q 19)

Survey overview

The majority of the survey respondents were aged between 40 – 49 years 24% and 50 – 59 years 22% and 60 – 69 years 18%. A total of 76% of respondents were from outside the study area whilst 24% identified as being from within the study area. The majority, 60%, of respondents were from Sandy Bay (33%), Battery Point (14%) and Hobart (13%) with the balance of respondents spread across the southern region.

Consistent with the consultant's Final report, the survey found that area was used and valued for its beach and local recreational values. Similarly the parkland, beach and views were identified as preferring protection as the areas changed over time due to climate impacts.

In terms of changes noticed within the project area half respondents had noticed change whilst half had not. Interestingly this question attracted the most number of comments (34 responses were recorded) most noting that erosion had been observed in the beach area particularly around Sandy Point. The recently developed Tasmanian Government coastal inundation maps were for the most part known to the community indicating some level of awareness with 30% of respondents indicating they were familiar with them and a further 45% were aware but not viewed them and only 20% of respondents not being aware.

Conversely, to the Final report, Pathway 2 was the preferred pathway as respondents saw the recreational values, for as long as possible, as of greater importance. Pathway 1 was least preferred and Pathway 3

A limitation of the survey was that the respondents did not have the benefit of a briefing/workshop and the opportunity therefore to clarify assumptions about pathways, develop deeper understanding of the project and associated pathways or obtain further information that provide greater details and nuances of the pathways.

It is important to note that the survey provides an indication of the pathway preferred by the community and given the small sample size should not be considered as a representative sample of community opinion.

Pathway 1: considered least plausible - 35% yes and 65% no

This pathway allows maximum freedom for natural coastal processes to unfold with a minimum of intervention or resistance from existing or new development or erosion and flood protection works. This pathway means that:

- If structures such as buildings, fences, walls, pathways and/or roads are affected or damaged by erosion then these would be removed.
- Only limited development would be allowed in areas that are likely to experience erosion. Intensification of existing areas (e.g. further subdividing existing residential blocks) would not be permitted.
- Property owners may be permitted to take action that extends the life of their existing structures by making it resistant to erosion (underpin foundations), but only within their own property boundary and as long as it has no impact on adjacent areas.
- Filling and raising land would generally not be permitted, nor would the hardening (construction of sea walls, placement of rocks or concrete) of shorelines or beach nourishment.

Typically respondents agreed more rather than disagreed with the positives of Pathway 1. The options of 'lowered outlay of costs' and 'reduction in community expectation' were rated most highly. These were followed by allowing 'natural processes to occur' and the 'creation of open space' and the 'retreat of vegetation.'

Similarly in terms of the negatives respondents agreed rather than disagreed. The negatives theses were considered relate the public assets – 'loss of open space', 'impact on sewage and stormwater' and 'use of the area.' These were closely followed by 'loss of vegetation' and 'private property' respectively.

A wide range of comments were received about Pathway 1 and its plausibility. These included comments on the:

- pressure and potential influence to protect 'valuable/expensive' private assets/property (15 out of 33 comments 45%)
- access to and protection of public open space recreational asset for longer (5 out of 33 comments 15%)
- politics, processes and costs involved in the decision making associated with this pathway (10 out of 33 comments 30%)
- inevitability of climate change and futility of action through to (3 out of 33 comments 10 %)

In summary Pathway 1 was considered the least likely to occur with comments indicating that vested interests would influence the 'protection' of this area. The positives of this pathway related reduced costs and reduced expectation for protection whereas the loss of public assets such as open space were seen as negative.

Pathway 2: considered most plausible – 92% yes and 8 % no

This pathway balances the protection of natural and shared community assets, and private property. This pathway means that:

- This pathway protects property for as long as possible. Only protection with minimal impact on community values and assets
- Development may be permitted in areas that are likely to experience erosion, provided that the development and/or required protection measures did not have any negative impact on natural or community values.
- Actions for protection would only be permitted if they increased the attractiveness and amenity of the area. For example, sea walls that may cause beaches to disappear would not be permitted.

Once the measures under this pathway are no longer effective to manage risks, a process of managed retreat would need to be initiated.

The majority of respondents agreed that Pathway 2 would allow the area's recreational and beach use for as long as possible, however the costs and creation of expectation for ongoing use with identified as negatives. The majority of responses to property values were neutral whilst the capacity for this pathway to limit further development was reasonably spread.

Overwhelmingly 92% respondents considered Pathway 2 as being plausible.

A total of 26 comments were recorded and of these 46% [12] considered this to be a compromise pathway with comments ranging from it being politically acceptable and path of least resistance through to it allowed additional time to plan future responses and placating property owners. The balance of comments were diverse and ranged from vested interests influencing outcomes (20%), costly and issues or equity and who pays, ineffective in the long term and a positive interim outcome , allowance of further development and halting further development and the need to carefully and transparently plan suitable responses.

Pathway 3: no to being plausible 40% yes and 60%

This pathway protects key assets and property using any available options, such as engineered modifications like sea walls and levees. This pathway means that:

- Development is encouraged as it provides more financial contributors to coastal protection work.
- Development should consider community values for the area.
- Engineered modifications to natural areas may allow these areas to adapt in their own way and may be accepted by the community. For example, sea walls may provide habitat for coastal species and revegetation opportunities for coastal vegetation, as well as providing pathways and promenades for recreation.

Most respondents positively agreed that in the long term Pathway 3 protected private and public assets however this pathway was also negatively most strongly seen as being costly. It was also agreed that it would increase the use and enjoyment of the area and to a lesser extent increase local economic activity and property values. In addition to the costs respondents strongly agreed that this pathway would result in loss of beach, foreshore areas and natural amenity.

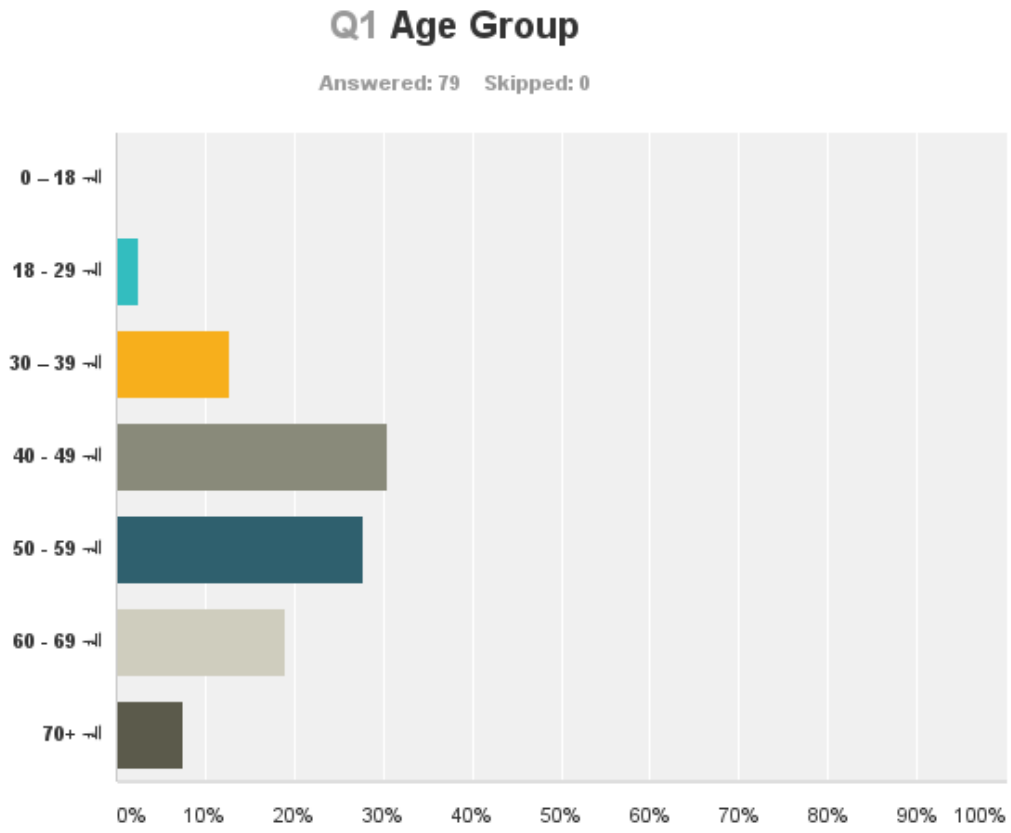
Almost 60% of respondents did not think that Pathway 3 was likely to happen, which is similar to the response to the likelihood of pathway 1 and contracts with Pathway 2 in which 92% thought that it was likely. This also contrasts with the consultant's report on the outcome from the community workshop (for those within the project area) that identified Pathway 3 was the preferred long term option.

A total of 26 comments were received about Pathway 3 of these 52% indicated that this adaptation pathway was too costly, comments mentioning issues of equity, who pays and ongoing/future maintenance costs. Two comments related to the inability to 'stop' sea level rise whilst others ranged from influence of developers, whether the landowners or community would be ultimate beneficiaries and that it was essentially fool hardy. A couple of comments however stated that it would provide ongoing amenity and recreation values.

Additional Comments

Respondents were able to provide comment on the project through the survey and a total of 13 comments were received. A number (6 out of 13) of these thanked and/or congratulated the Council for its efforts. One comment critiqued the survey suggesting the questions were leading towards an predetermined outcome, another felt the N&LB CAP project locked the Council into the Pathways presented, another felt that climate change impacts would be bigger than those faced in the project area, another suggested short use of groynes to mitigate erosion and another highlighted the need to undertake remedial action to preserve the area and its heritage.

PART TWO – Survey data

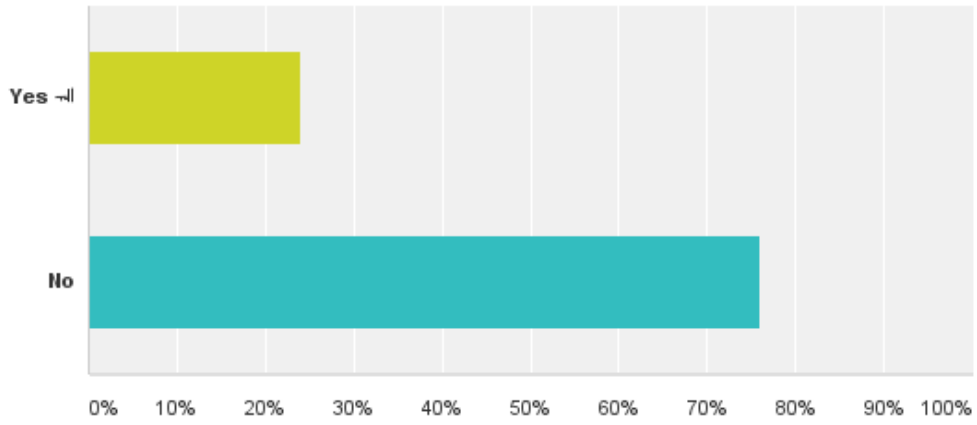


Question 2 Post code?

Area:	Postcode:	# of responses:	% of responses
Sandy Bay	7005	26	33
Battery Point	7004	11	14
Hobart	7000	10	13
New Town	7008	4	5
Kingston	7050	4	5
Howden	7054	4	5
Lutana	7009	3	4
Lindisfarne	7015	3	4
Rosny	7018	3	4
Taroona	7053	3	4
Mount Nelson	7007	2	3
Austins Ferry	7011	2	3
Colinsvale	7112	1	1
Bushy Park	7140	1	1
Kettering	7155	1	1
Scamander	7215	1	1

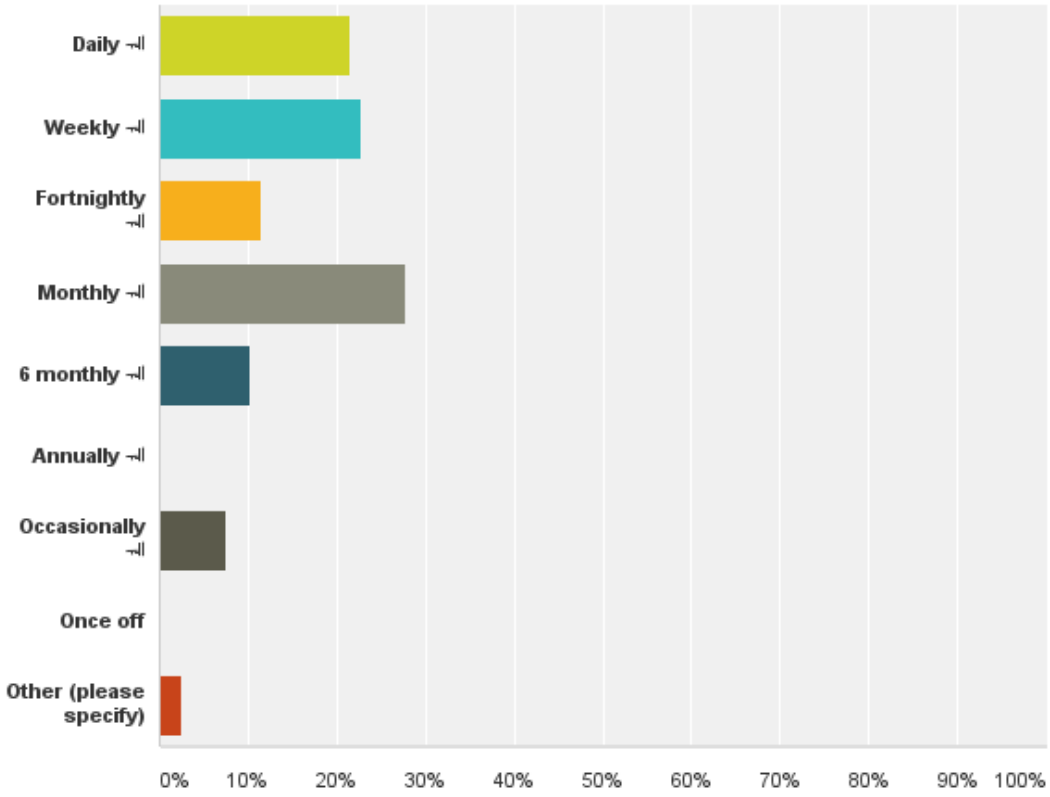
Q3 Are you a resident of the study area?

Answered: 79 Skipped: 0



Q4 How often do you visit the study area?

Answered: 79 Skipped: 0



Responses to other:

4.1. We have lived in Beach Road for 35 years and it is a stunning area. We hope to stay here!

4.2. Fishing

4.3. Photography

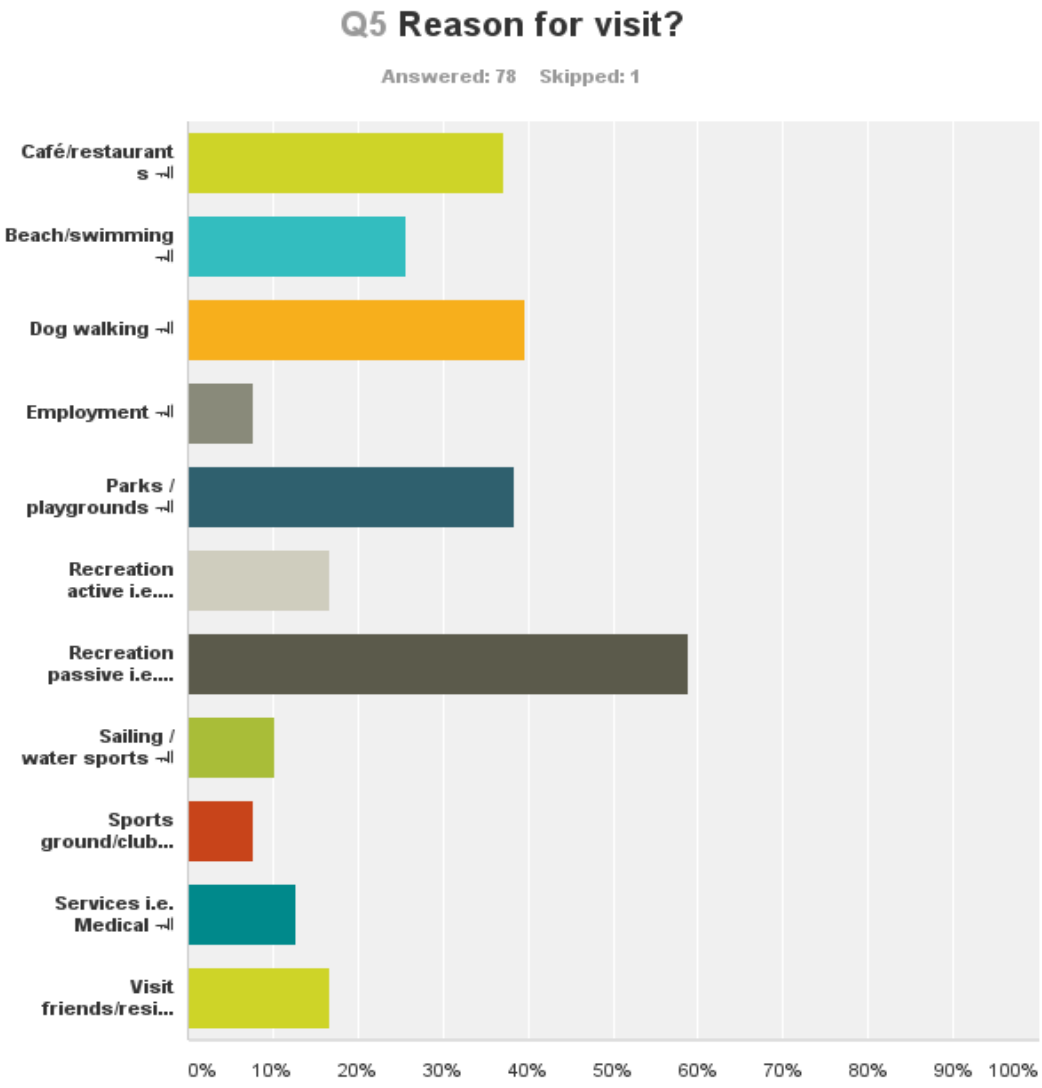
4.4. BBQ /recreational

4.5. Twilight market

4.6. Monthly Friday Market

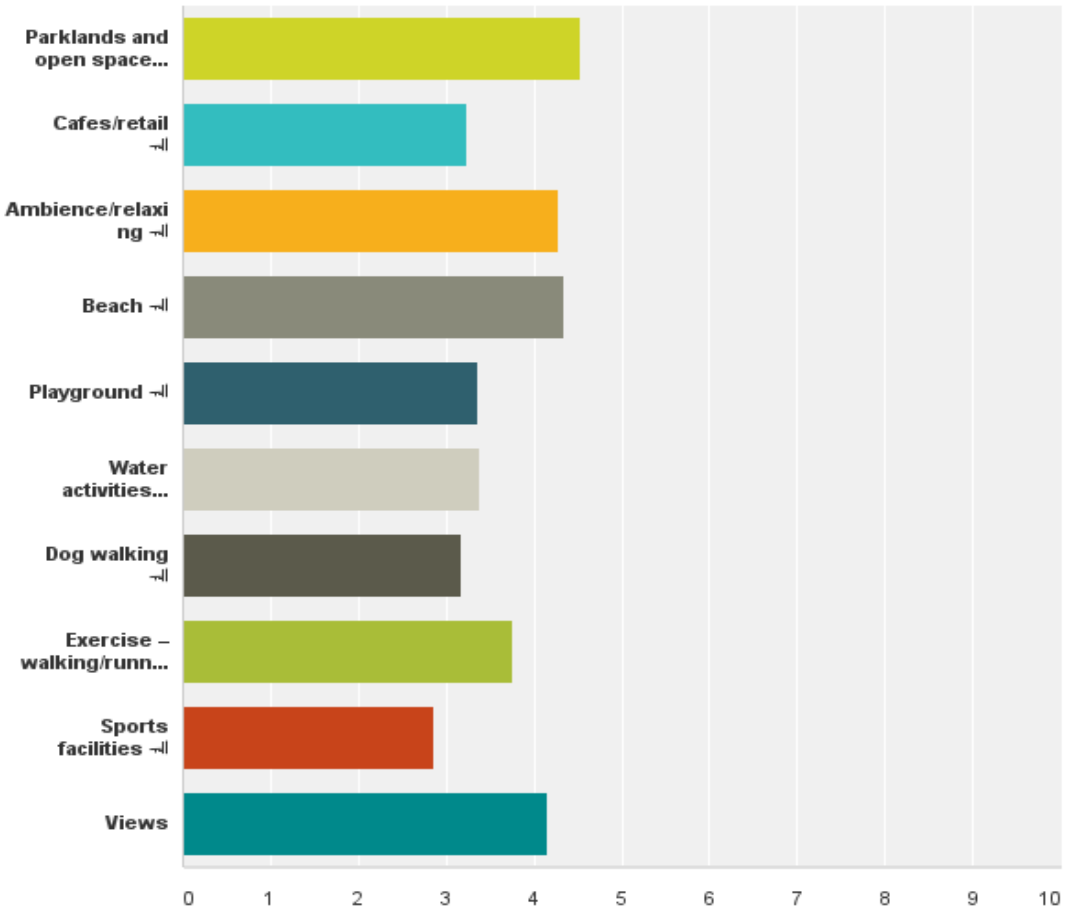
4.7. Barbecue facilities, trees and bird life

4.8. Marieville espl is in the same category, but our houses are closer, only 0.5 m above mean high tide



Q6 What do you value about the Nutgrove/Long Beach area? Please tick relevant boxes

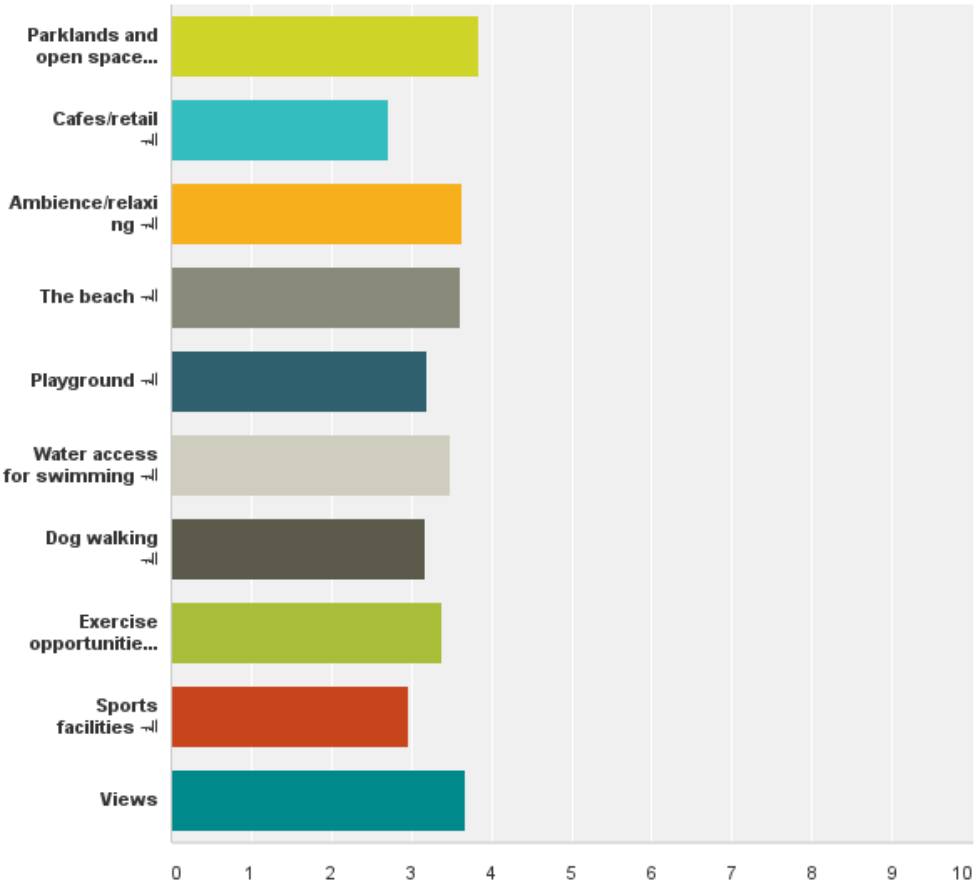
Answered: 79 Skipped: 0



Answer Options	Not at all		Value		Value highly	Rating Average	Response Count
Parklands and open space areas	2	0	10	9	58	4.53	79
Cafes/retail	4	14	29	17	11	3.23	75
Ambience/relaxing	1	0	13	27	37	4.27	78
Beach	1	1	9	27	41	4.34	79
Playground	9	12	15	20	19	3.37	75
Water activities swimming/sailing	10	8	19	24	17	3.38	78
Dog walking	22	7	11	8	28	3.17	76
Exercise – walking/running	5	5	22	14	29	3.76	75
Sports facilities	13	17	21	12	10	2.85	73
Views	4	3	9	22	39	4.16	77
Other (please specify)							8
						answered question	79
						skipped question	0

Q7 Sea level rise and climate impacts means that the area will change over time. What would you like to see protected? Please rate from 'Don't protect' to 'Protect at all costs'

Answered: 79 Skipped: 0



Answer Options	Don't protect		Protect as long as practicable		Protect at all costs	Rating Average	Response Count
Parklands and open space areas	5	0	27	14	30	3.84	76
Cafes/retail	17	12	32	5	10	2.72	76
Ambience/relaxing	6	4	27	13	26	3.64	76
The beach	5	3	34	13	24	3.61	79
Playground	9	8	36	11	15	3.19	79
Water access for swimming	4	7	32	16	18	3.48	77
Dog walking	14	6	29	11	18	3.17	78
Exercise opportunities	6	13	20	18	18	3.39	75
Sports facilities	7	18	33	9	10	2.96	77
Views	7	3	23	18	25	3.67	76
Other (please specify)							8
						answered question	79
						skipped question	0

Responses to other:

7.1. Heritage

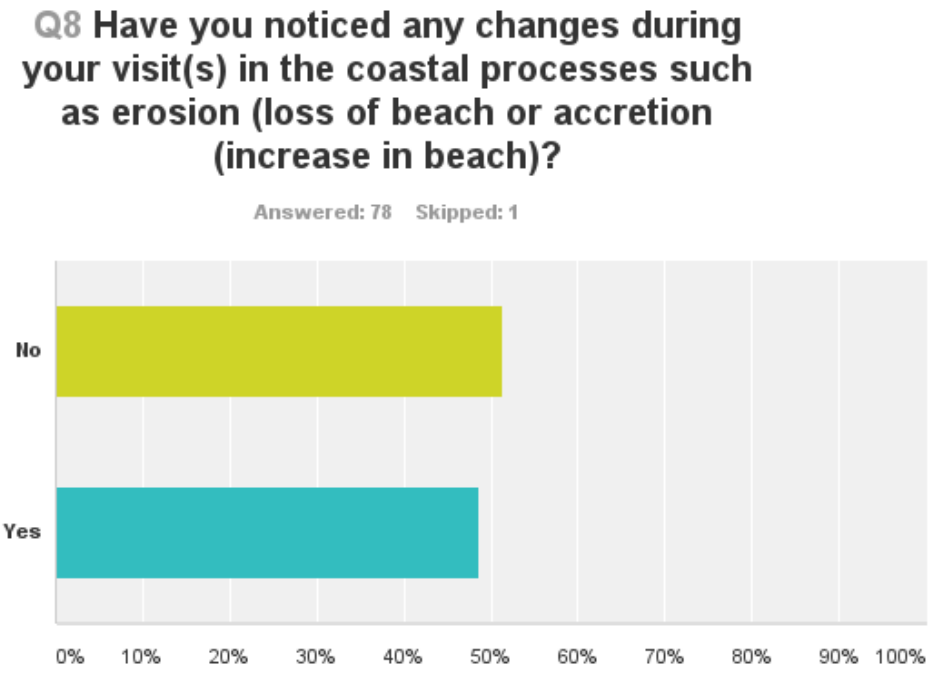
7.2. Most importantly the Council should reinstate the large volumes of sand which it was responsible for removing from the sand bar near Prosser's this has had a very significant impact on the natural movement of sand between Nutgrove and Long Beach. This is a naturally occurring process which allows for sand drift either direction depending on time of year and natural events. I have it on reasonable authority that the volumes removed was in the order of 25,000 to 30,000 tonnes The installation of hard form sea wall has in more recent time compounded the effect.

7.3. I scored these based on the fact that some amenities can be replaced in other areas and do not need the coastal area to function. I do like cafes though :)

7.4. Have to be practical - can't stop sea level rise from impacting on man-made and natural features in such areas.

7.5. Birdlife and trees

7.6. Define all costs - who pays?



Responses to other:

8.1. “Beach erosion - however it fluctuates

8.2. Erosion of foredune areas

8.3. dune erosion

8.4. Actually No. I do not trust memory, and attributing to climate change some of the erosion when it could well be more about human activities like walking through the dunes, rabbits etc etc. I would be keen to preserve the amenity of the place.

8.5. Beach seems to be narrower than when I was a child in the 1950's and there was no sea wall

8.6. Changes in the beach and sand movement

8.7. See above comment - but the impacts are not necessarily attributable to just natural forces. There is a fundamental difference between eroding landscapes and the deliberate removal of sand which occurred first

8.8. erosion and quality of beach ie., Sand and cleanliness

8.9. Hard to be specific because of the amount of work that has been done over the years.

8.10. movement of sand

8.11. erosion over decades and failed previous maintenance since overcome with sea wall reconstruction

8.12. The loss of sand accretion over the past 40 years has been very dramatic due mainly to the extension of Blinking Billy point by some 50 metres. Sand migrating northward is no longer allowed to deposit on the Long Point spit to then be drawn back along Long Beach by the circular currents within the bay. The recently erected wall prevents the natural accretion of beach sand by creating a backwashing reflected wave.

8.13. It varies from season to season

8.14. Beach erosion

8.15. Fore dune undercutting, sedimentation in some lee areas, exposure of coastal plants, limited recruitment of foredune stabilising plants in some areas, patches of hyper-salinity in hind dunes due to ground water and inundation.

8.16. Beach erosion at Marieville, just look how the tide mark has moved in the past 3 years.

8.17. Limited erosion around Sandy Bay Point

8.18. Some loss of beach...

8.19. Just from high tides and strong waves washing the sand away/over the concrete retaining walls at Long Beach - I rarely walk around to Nutgrove.

8.20. both erosion and accretion depending on the season and weather events

8.21. Depends on weather events - so subjective

8.22. Over a number of years I have noticed a change to the small beach around Blinky Billy point - the sand is being washed away and leaving pebbles - very noticeable over the last 5-10 yrs

8.23. The beach has come and gone over the years due to weather and sea wall configuration.

8.24. The beach changes all the time. I'm not sure if there is overall loss, or even if this is something we should be able to control.

8.25. Dunes near the sailing club ramp are receding

8.26. Less beach

8.27. Over a number of years/decades, much less sand at Long Beach.

8.28. The work already completed at Long Beach seems to have improved the beach there

8.29. The work already completed at Long Beach seems to have improved the beach there

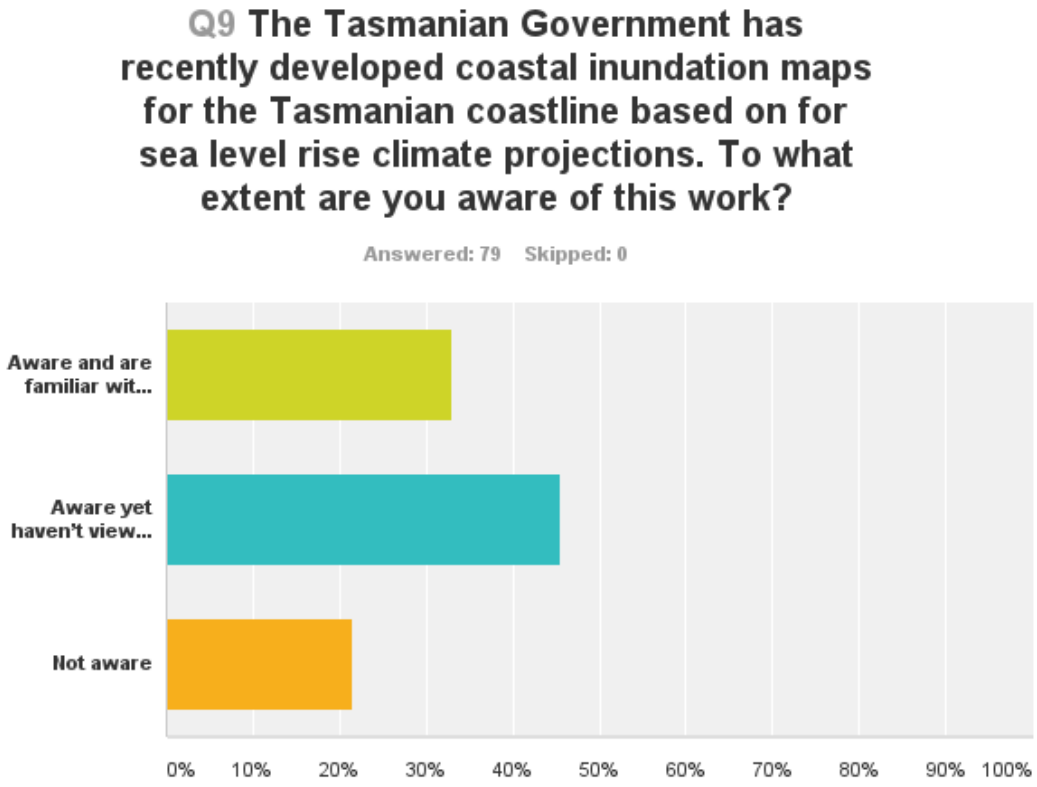
8.30. Long beach accretion after works completed

8.31. Accretion of north beach

8.32. Loss of beach

8.33. Movement of sand between sections of the beach and continued erosion

8.34. More stones apparent on Long Beach. Beach at Blinking Billy being dug out at entrance end. Damage to dunes on Nutgrove."



Responses to other:

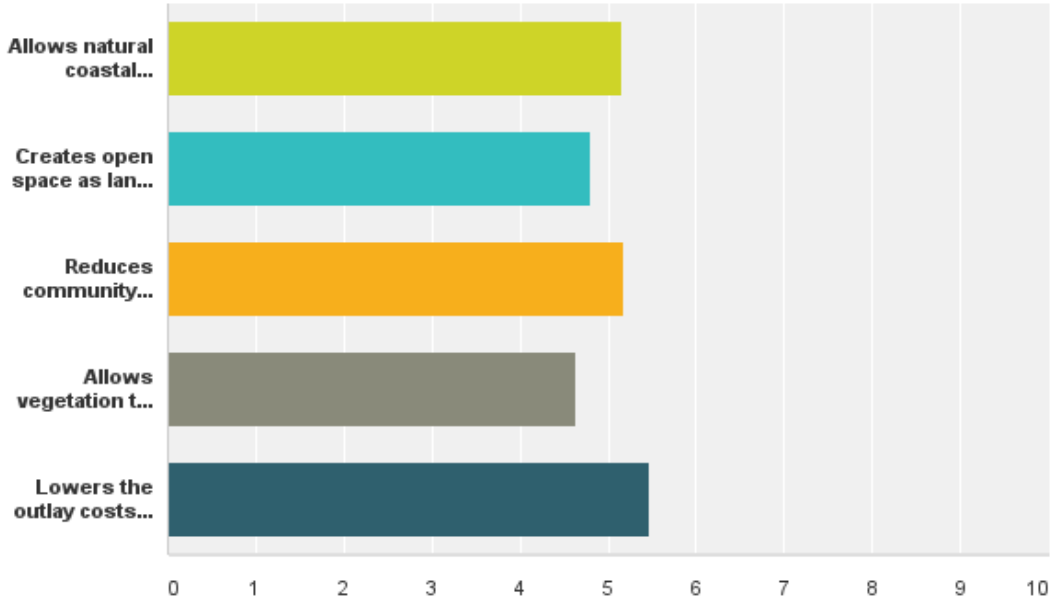
9.1. Sadly we were away for the information session earlier this year

9.2. Have viewed maps for Lauderdale, Kingston and this area, but may not have viewed all in Greater Hobart area

9.3. The maps are out of date - wrong sea level rise data. There is more to climate impacts that sea level rise that will affect the site.

Q10 What do you consider may be the positives of Pathway 1?

Answered: 59 Skipped: 20



Answer Options	Disagree			Neutral			Agree	Rating Average	Response Count
Allows natural coastal processes to occur	4	3	2	13	8	7	22	5.15	59
Creates open space as land use changes	4	2	3	19	10	7	14	4.80	59
Reduces community expectation for protection	5	3	2	10	8	9	22	5.17	59
Allows vegetation to move (retreat) landward	7	2	4	13	11	11	11	4.63	59
Lowers the outlay costs for adaptation response	5	0	0	9	14	5	26	5.47	59
Other (please specify)									6
							answered question		59
							skipped question		20

Responses to other:

10.1. Replace the removed volume of sand and then see what natural process can be restored.

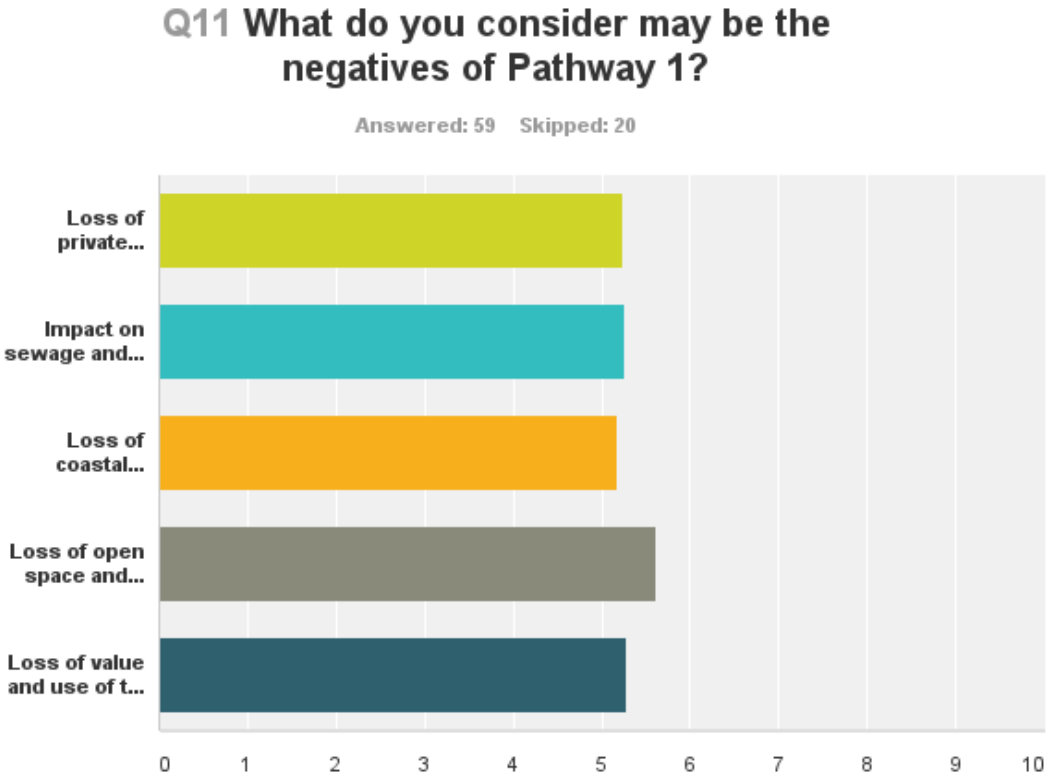
10.2. Promotes the acceptance of climate change and the concept that this planet is not here just for here humans to take what we want at the expense of all else.

10.3. Can you really cause it "natural coastal processes" when the more extreme events are caused by us (by increasing CO2 etc)?

10.4. As I understand it, the do nothing option does not leave the Council open to being sued by residents loosing valuable homes. If my understanding of the legal issues is correct then this is a huge benefit. If the law is changed so the Council has no financial risk if it takes action then this benefit no longer exists.

10.5. Silly and very expensive to try to beat sea level rise at Sandy Bay. Good reminder of our folly.

10.6. vegetation won't retreat landward as the area will still be used, unless its closed off. It may lower outlay costs, but if you look at total cost over a longer period these will not necessarily be lower. There is a highway and several properties which will be lost, this will cost somewhere.



What do you consider may be the negatives of Pathway 1?

Answer Options	Disagree			Neutral			Agree	Rating Average	Response Count
Loss of private property	3	2	1	17	6	8	22	5.25	59
Impact on sewage and stormwater system	3	2	2	11	11	11	19	5.27	59
Loss of coastal vegetation	4	3	2	12	7	11	20	5.17	59
Loss of open space and parklands	2	2	1	7	13	9	25	5.61	59

Loss of value and use of the area	3	3	2	11	10	6	23	5.28	58
Other (please specify)									1
								answered question	59
								skipped question	20

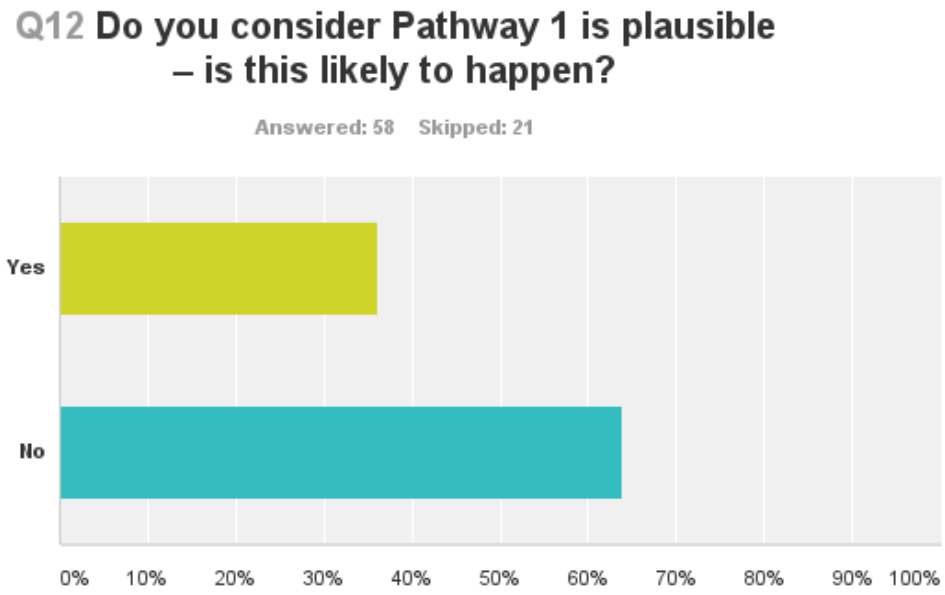
Responses to other:

11.1. Yes these are all negative impacts but once the decision is made to follow this pathway then I think the benefits will outweigh the negatives. we will never be able to beat natural processes in Long Beach. The Council assets that would be lost as a result of following this pathway would release the burden of having to replace those assets. Millions of dollars at Long Beach...

11.2. The issue of Council liability is again critical. If a sea wall is built that fails to protect a block of flats will the Council have to pay compensation? I hope not.

11.3. But for how long? Sea levels rise will rise - and might rise quickly. What would be the point?

11.4. Delaying a decision is never an advantage. It merely makes the procrastination level rise.



Responses to other:

12.1. Unpredictable impacts of rising sea levels when rate of rise is unknown

12.2. too many high value properties /bad politic

12.3. Vested interests and human centric approach prevalent

12.4. These are societal decisions, and so they are plausible pathways. We would need only to decide to allow it to happen this way. The challenge will be if this is the most sensible approach to managing this high value space in Hobart area.

12.5. It's a disaster! Climate change cannot be ignored.

12.6. Impact on private property owners

12.7. Extensive engineering of the area has already happened, there is no longer a "natural" course of action. To do nothing is to abandon responsibility.

12.8. The ocean is a powerful force, it would cost a lot to hold it back

12.9. I expect that community / political pressure would result in attempts to hold off the inevitable tide for as long as possible. Especially if other municipalities are investing in climate change adaptation infrastructure.

12.10. so many areas we need to protect with limited resources, not sure we can afford to just protect this area, in many ways there is a greater buffer for protection here than in other areas in southern Tasmania for example would prefer to see greater protection of Hobart waterfront where there is more effect on an area of greater value

12.11. Will depend on how much funding and resource is allocated and by whom. Expect it will be patchy.

12.12. I wish it were the pathway chosen, as is the case in other countries. But our government and Council has not shown the strength to take this pathway, instead they pander to the wealthy greedy people who live in beautiful coastal areas.

12.13. maybe over generations

12.14. Nature will never be allowed to take its course whilst the seawall remains and the groyne created by the fill on Blinking Billy remains in place

12.15. It's a very passive and ad hoc response and local amenities deserve more support.

12.16. Community expectation and values. People will want this area maintained to a certain extent.

12.17. People will always resist, at least for a while.

12.18. Vested interests/landowners will have enough political influence to ensure our money is used (directly or indirectly) to protect their interests.

12.19. Engineering of erosion controls along shorelines has been proven to be difficult to achieve. To choose to undertake these works (i.e. and not go down pathway 1) would be folly.

12.20. There will be a good deal of resistance from residents both nearby and farther afield but this can be met with a full assessment of the cost to ratepayers/taxpayers of complete protection over the long term and what it will mean to the area (e.g. loss of view because of sea wall)

12.21. The area is home to a significant number of very rich and influential people

12.22. land owner and public pressure to do something

12.23. There area is significant in terms of community values and is probably worth some investment to protect. As the coastal area is constrained by private ownership there will be pressure to protect to foreshore position.

12.24. Politically intolerable. Considerable valuable public infrastructure and recreational space will be lost. Public access and use of the area will cease

12.25. Local residents have a lot of capital tied up in their properties and in the enjoyment of their current ambience.

12.26. I doubt community and property owners would consider this reasonable

12.27. Pressure to protect private properties and assets

12.28. Loss of private land.

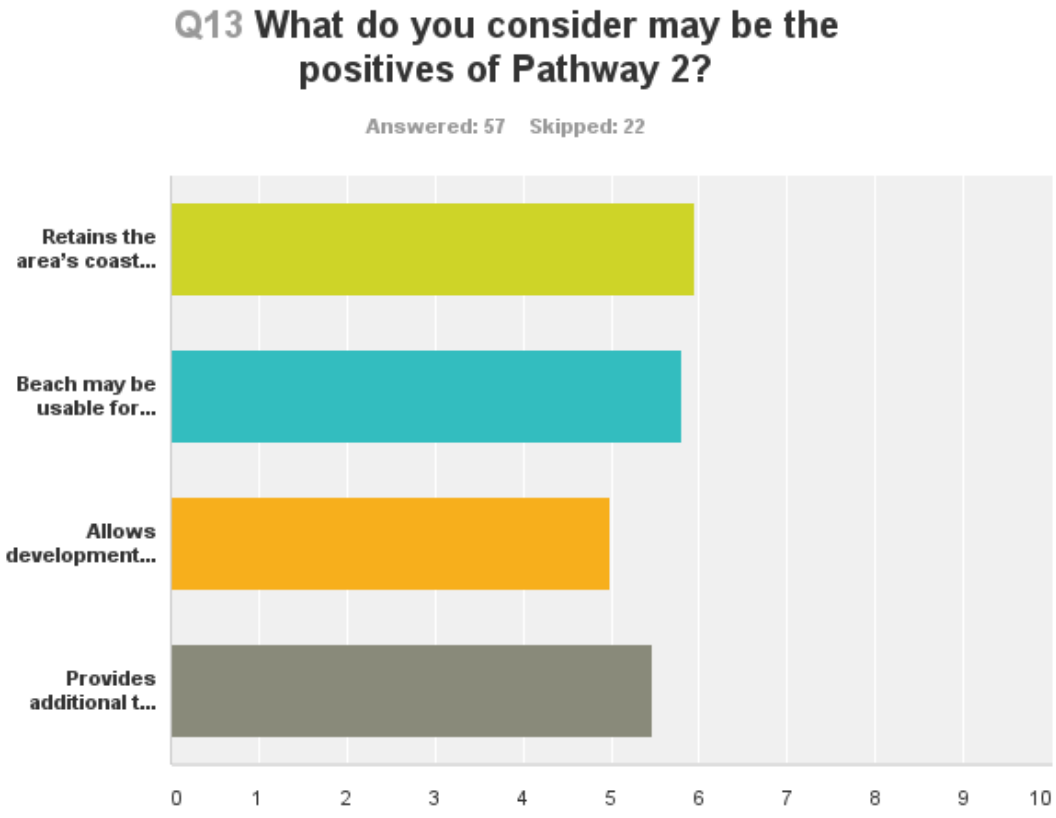
12.29. Residents are likely to want to protect the area more actively.

12.30. It is the only realistic option. Once you start on a protection strategy it will become an open ended never ending demand on resources when there will be much more important uses of public money.

12.31. People with high value properties have the means to protect their properties

12.32. This is high value land with an awesome sporting facilities. Losing these facilities should not be done lightly.

12.33. residential land is to valuable.



Answer Options	Disagree			Neutral			Agree	Rating Average	Response Count
Retains the area's coastal	1	1	1	7	6	12	29	5.95	57

amenity and recreation values for as long as possible									
Beach may be usable for longer into the future	1	1	2	8	7	11	27	5.81	57
Allows development that balances protection and community values	3	4	6	9	3	13	16	5.00	54
Provides additional time to consider other pathways	1	1	1	14	7	14	18	5.48	56
Other (please specify)									6
								answered question	57
								skipped question	22

Responses to other:

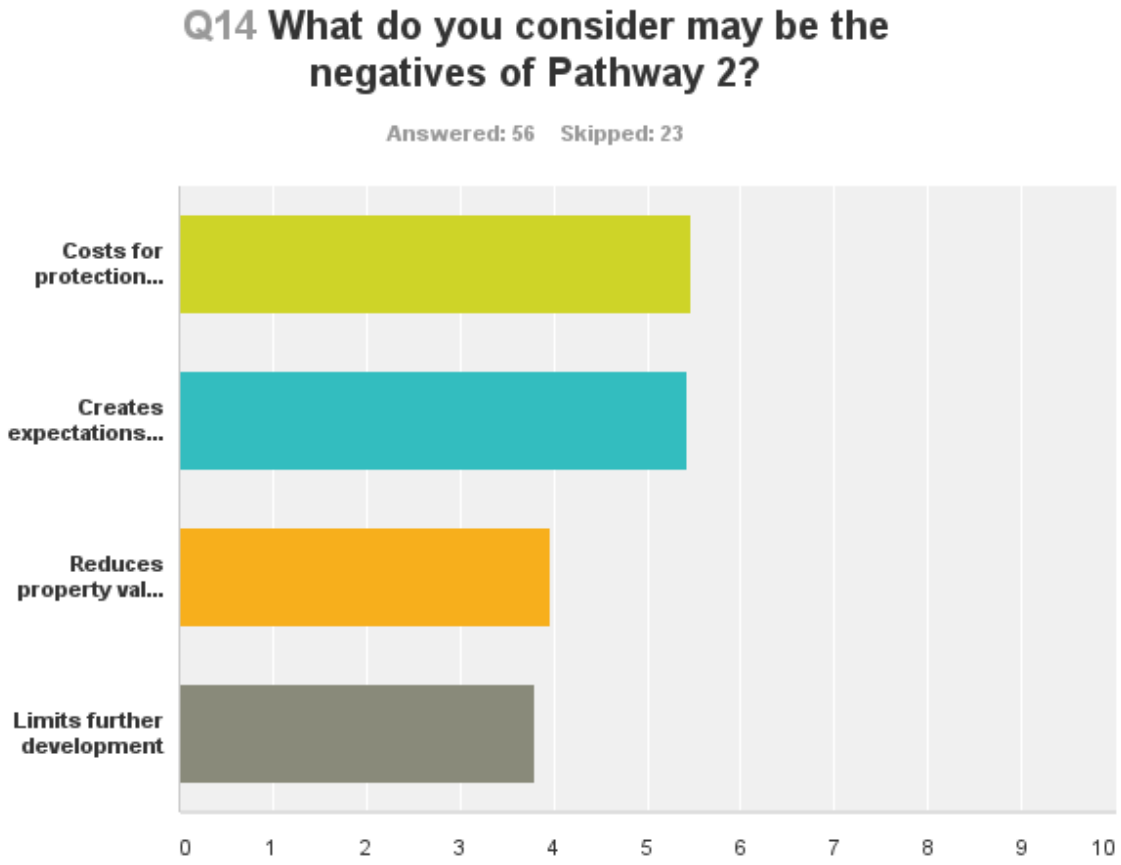
13.1. We shouldn't need a lot more time to work out what to do. Surely we have enough info and enough experts to lead the way

13.2. People will try to subvert any expenditure to protect private interests

13.3. The issue of Council liability is again critical. If a sea wall is built that fails to protect a block of flats will the Council have to pay compensation? I hope not

13.4. But for how long? Sea levels rise will rise - and might rise quickly. What would be the point?

13.5. Delaying a decision is never an advantage. It merely makes the procrastination level rise.

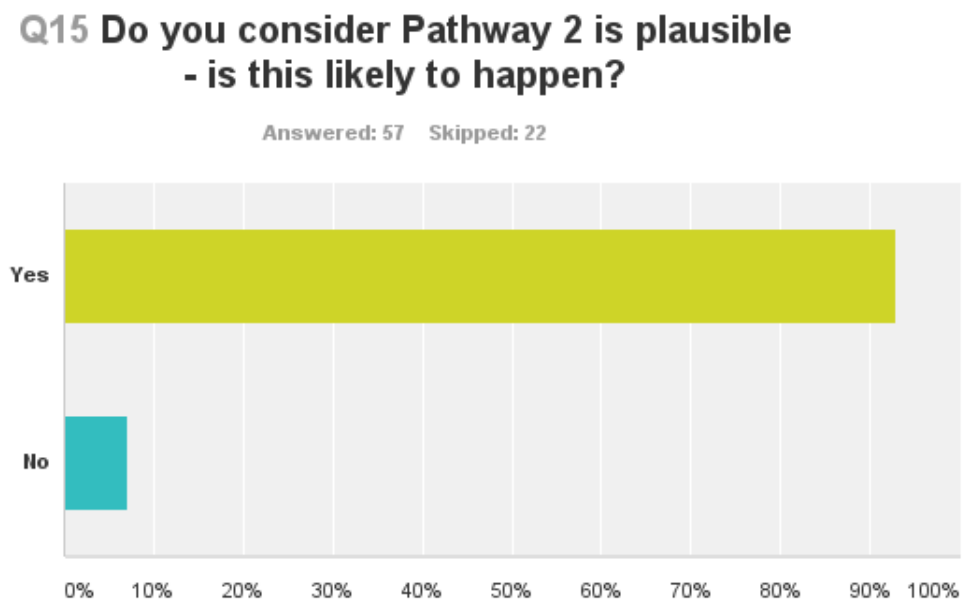


Answer Options	Disagree			Neutral			Agree	Rating Average	Response Count
Costs for protection works	0	2	3	11	10	11	19	5.46	56
Creates expectations of ongoing use	2	4	2	6	10	10	22	5.43	56
Reduces property values due to long term threat	7	5	2	22	11	4	4	3.96	55
Limits further development	10	7	6	13	8	6	6	3.79	56
Other (please specify)									3
								answered question	56
								skipped question	23

Responses to other:

14.1. Negatives, yes. But above all this is the reality of what we face

14.2. Further development should be limited and recognise that sea level rise is occurring.



Responses to other:

15.1. It is a compromise pathway

15.2. important to stop new development now

15.3. Power of economic drivers

15.4. This is sort of the balanced option, one that considers the cost of protection and the value of the beaches and local land behind. Much of the value of the region is its proximity to the water, the parks and the promontories. Nutgrove beach is not a natural environment, already highly altered by construction of beach wall, and presumably the "swampy" low lying regions behind.

15.5. Costly

15.6. Council could buy threatened private properties at reasonable rate as they go for sale to create new recreational land use and re-vegetate for storm surge, erosion protection.

15.7. Coastal problems exist everywhere and will continue to do so, We need to look to all other areas for ideas to protect beaches and bushland, and understand that we ned to be adaptable and open to new ideas, wait, watch and work out what can be done and how.

15.8. IMO the best strategy, if done with care and foresight

15.9. Depends if the true cause of current erosions is openly considered in the context of protective measures that will be put forward. To date restoring the sand volumes have not been suggested.

15.10. It will be politically more acceptable.

15.11. the people of lower sandy bay seem to have considerable political clout, it wouldn't surprise me if they were able to convince government(s) to invest in this area

15.12. it is the easy middle ground, and that is more likely the style of Council/Government based on past performance

15.13. it is only a halfway solution and eventually money wasted

15.14. As the threat can be considered relatively long term measures can be implemented in stages however pro active planning must be commenced now so that if and when inundation does occour preventative action is ready at short notice

15.15. Probably the "path of least resistance"

15.16. Probably the most sensible approach. Again, it will face opposition/modification attempts to favour wealthy landholders.

15.17. as it allows for further development, therefore will get large amount support from developers and current land owners. It is not the best option for the greater Hobart community.

15.18. It's plausible so long as ratepayers/taxpayers not from the affected area support it. A high level of support will attract accusation of favouring the big end of town. If such a policy were pursued it would have to be in conjunction with a similar policy for other areas affected by sea-level rise, storm surge etc.

15.19. The area is home to a significant number of very rich and influential people

15.20. Politically acceptable

15.21. It is a balanced approach to change. The challenges will be in: investing enough to make the protection worthwhile; and being prepared to stop protecting the area at some stage.

15.22. Sensible middle ground. Politically palatable. Balances cost with amenity. Public bear the cost but also benefit from continued use and access

15.23. It's a compromise position, will placate the local property owners.

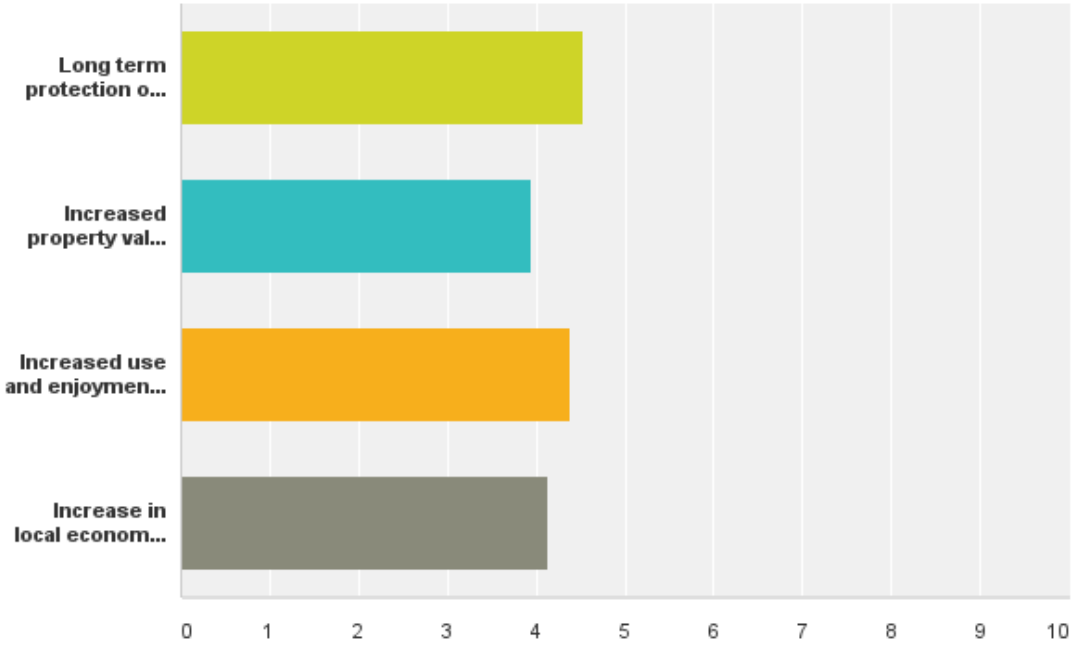
15.24. There will be strong and powerful vested interests expecting us to do something. Governments are not very good at sensible decision making in such situations.

15.25. More thought should be given to allowing further development here.

15.26. There is only so much that can be done to protect these areas and we should not protect residential properties when there is considerable knowledge about potential for threat against properties.

Q16 What do you consider may be the positives of Pathway 3?

Answered: 57 Skipped: 22



Answer Options	Disagree			Neutral			Agree	Rating Average	Response Count
Long term protection of assets (private and public)	11	4	2	13	1	5	21	4.54	57
Increased property values	12	5	5	13	5	5	11	3.95	56
Increased use and enjoyment of the area	9	2	4	16	6	7	12	4.38	56
Increase in local economic activity	7	4	9	15	5	10	7	4.14	57
Other (please specify)									5
								answered question	57
								skipped question	22

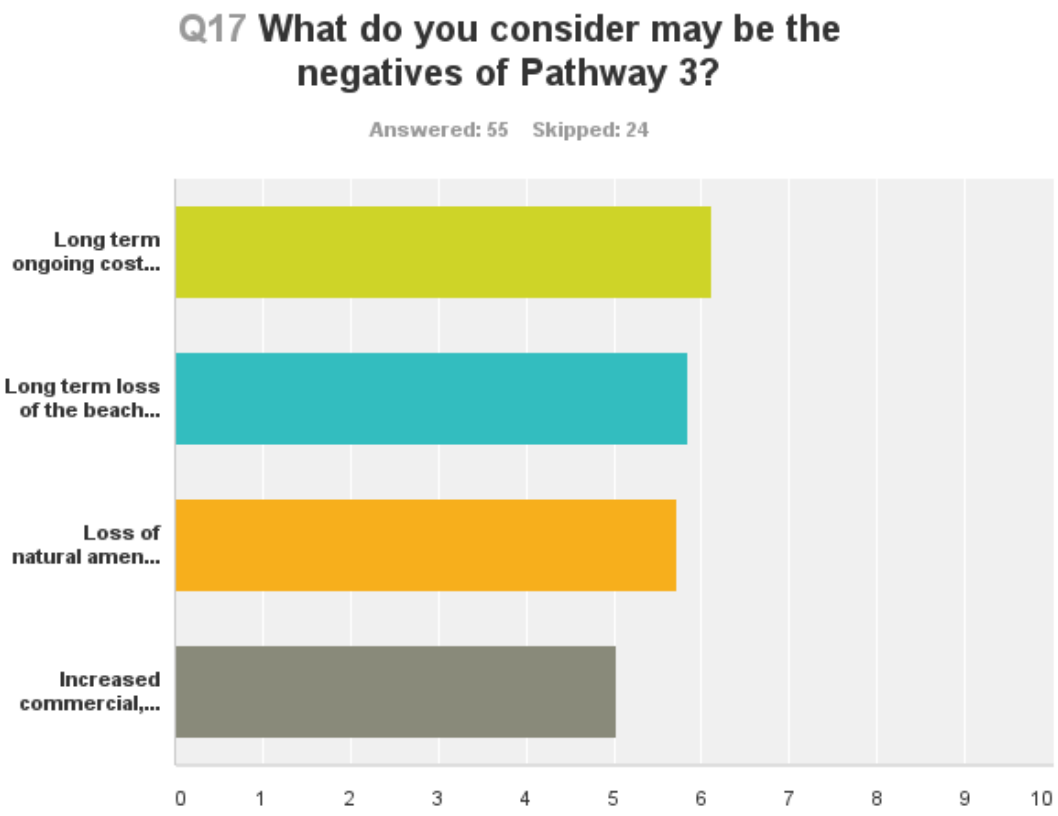
Responses to other:

16.1. Expending a heap of money may not prevail in the end as competing areas become affected. Maybe do an ecosystem services cost benefit analysis of the options which includes the coastal modelling? This is widespread in Europe for these issues.

16.2. The economic 'benefits' would be to the landholders more than the community as a whole. So, while I 'agree' that doesn't mean I support.

16.3. The state has to prosper for the area to prosper. Since the state is currently in decline there is no reason to suggest that local economic activity will increase significantly.

16.4. Building levees is a waste of time. I already pay the highest rates in the nation and be buggered if I'm going to see my rates go to protecting a few wealthy landowners.



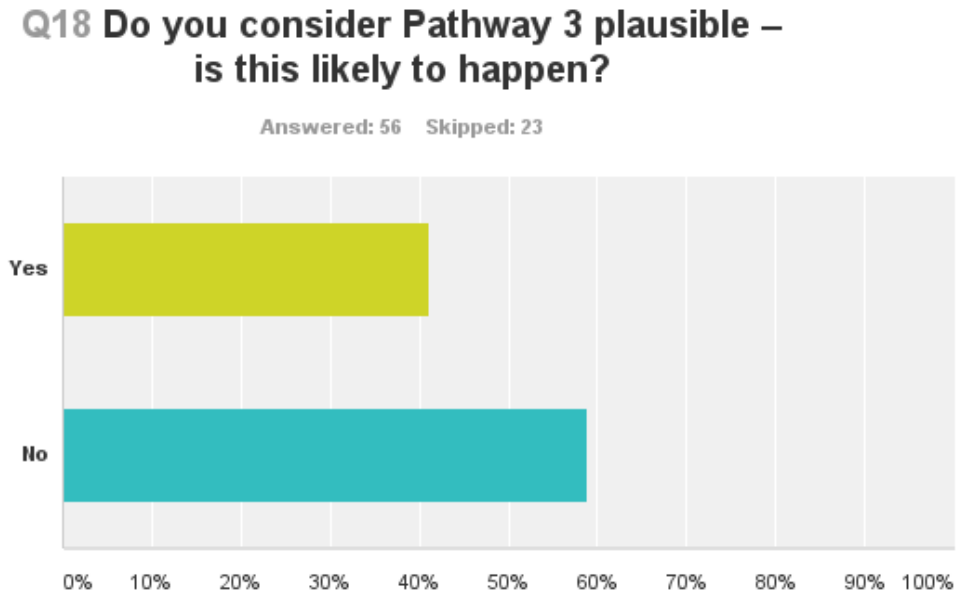
Answer Options	Disagree			Neutral			Agree	Average	Count
Long term ongoing costs for maintenance of protection works	2	1	1	3	8	3	37	6.11	55
Long term loss of the beach and foreshore areas	1	1	1	11	3	10	28	5.84	55
Loss of natural amenity of the area	2	0	3	9	5	9	27	5.73	55
Increased commercial, residential and recreation activity within the area	5	2	4	12	5	6	21	5.04	55
Other (please specify)									3
								answered question	55
								skipped question	24

Responses to other:

17.1. Other than the Sea Wall we haven't actually tried anything yet nor can comments be made on this when no detail as to the measures contemplated is being provided.

17.2. Affects to the environment up and down stream that may not be predictable or able to be modelled

17.3. The area could never be the same, it could only be a 5th rate copy and mainly private property



Responses to other:

18.1. Private sector unlikely to invest if risk is too high

18.2. Too expensive, unrealistic

18.3. Too expensive

18.4. Cost

18.5. This could easily happen if the constraints on development and use of the beach and land behind for commercial purpose. I would be disappointed if this pathway was taken, and would increase the liability of the council, government, with the underlying expectation for protection by the local residential housing and beachside properties.

18.6. Costs too much (infrastructure and long term maintenance, rebuilding when there is a breach / storm) and is only a temporary solution as the sea is going to damage this infrastructure at least periodically anyway, to huge community cost (take Brisbane floods for example, as an engineering solution to a infrequent natural event costing more than if the low-lying land had been retained as parkland instead of being developed. Old houses and those destroyed should have been bought up and made parkland anticipating future floods, rather than re-building and hoping it doesn't happen again

18.7. I am always nervous about developers and the way they operate. Developers always say they will consider community values, and generally this does not happen. I don't trust developers to be honourable in their intent

18.8. Likely too expensive

18.9. This area is highly valued by the community - and not just the people who live within the area. Therefore there may be a logic to concentrating resources here. And Long Beach already has a sea wall and other infrastructure that is not 'natural'. I think the Nutgrove area is different, however, being more of a natural system

18.10. Too expensive

18.11. Not realistic. People are smarter than that, this option is like applying a blindfold.

18.12. High cost.

18.13. If this pathway were chosen by the current leaders I would bet that the leaders in 20 years will have a massive burden to deal with in terms of financial cost and greater problems than anticipated, up and down stream of the Long Beach area.

18.14. despite the costings over time the results give a better chance of a controlled outcome to maintain existing values for what is essentially defining original recreation area of Hobart city for the last two centuries

18.15. Future development must be curtailed as too much damage has already been done. I do believe that sand is the most important element and its presence must be enhanced. These beaches have existed for a very long time built and protected by natural forces and these forces must be allowed to once again re build the beaches so that nature can be the protected we seek.

18.16. Maintains current investment and amenities

18.17. Not consistent with the current values of the area.

18.18. I fear it is as it will benefit local landholders over the community who will be paying.

18.19. You can't stop the tide.

18.20. Ultimately far too costly.

18.21. The area is home to a significant number of very rich and influential people - however the wider community is possibly not prepared to pay for their privileged treatment

18.22. Cost and adverse impact on amenity

18.23. Cannot afford such a response. Only creates unrealistic expectations

18.24. Costly. Favours individual property values over community values

18.25. Public cannot contribute a bottomless pit of money. If done by private sector, they will be expecting exclusive or privileged use of the area, reducing public access and amenity. Also long term risk that public funds will inevitably be used to support private sector and private commercial activity as private sector in Tas do nothing without a government subsidy.

18.26. The costs would be exorbitant and a major drain on the City's resources. It would represent a major subsidy to local residents, when it has been known since the 1980's that sea level rise is a likely consequence of global warming, and people should have been making sensible decisions not to buy and develop in areas likely to be affected.

18.27. I think there is unlikely to be sea level rise in the foreseeable future that will justify the significant cost of constructing the protective infrastructure

18.28. There will be an expectation from the community to develop the area into an urban setting (similar to South Bank and current sea wall and associated parklands) rather than retain the vestiges of the coast and associated processes

18.29. Not even our governments could be that silly

18.30. This option presumes growth. Although growth may be a good aim, the state, and the city is currently in decline. The key question is will the demand for growth in this area be sustainable if the population of Hobart, and Tasmania continues to drop. What happens if property in Sydney becomes more affordable. What happens if property values decline in Hobart?

18.31. The question "does the area warrant the cost" will raise questions of how much of the foreshore can be saved. it is likely that other areas will be prioritised.

18.32. sand and water will always move and the likelihood that pathway 3 will be needed is negligible. Residents that buy properties in these areas do so at their own risk.

Question 19: Comments

19.1. Said enough and thanks for the opportunity.

19.2. I would hate to think that the rich people who own land in this area would be considered above the needs of the greater community. Hobart has many other open spaces to offer

19.3. failure to undertake as full a remedial action as possible will only see funds directed to less important areas over time - one cannot imagine why such an important heritage locality of greater Hobart city should not be saved by any endeavour necessary from destruction for as long as possible as change occurs]

19.4. In the short term sand accretion on Long beach may be assisted through the use of groynes located on Long Point. These groynes need not be the intrusive wooden fence type as illustrated in the report it is quite feasible to use sand bags to create this barrier. Such an arrangement has existed at Maroochydore for many years very successfully controlling sand movement adjacent to the Maroochy River.

19.5. You should get a 3D laser scanning survey of the foreshore to map and monitor the risk points at a fine scale to understand the processes as aerials cannot show undercutting etc. Raby Bay development in Qld are just about to get a surveyor ([redacted]) to do this. I know because I am his sister and we have discussed risk-based options for coastal management and I mentioned Nutgrove Beach as a risk here (as well as Kingston Beach). Great to see this science presented to the community and combined so well with a survey. Really well done.

19.6. A long overdue piece of work, and the documentation supporting is well prepared

19.7. It is good that Council is looking at these issues

19.8. Thanks for asking for the input! Your planning efforts are much appreciated.

19.9. Residents must be aware that long term protection is unlikely to be practical/affordable. Owners can make their own judgement on how long the property might be viable. Many things affect property values - increased traffic, adjoining sub-division, loss/reduction of views, etc. In these cases property owners are not compensated by the Council. So the risk of reduced property values as the inevitability of property damage/loss due to climate change should not be given very high priority when deciding how much coastal protection, if any, to implement.

19.10. Having this limited number of pathways locks in the fact that these are the only decisions on the table. Who will pay - should I at south Hobart pay for expensive sea level rise protection at the expense on the need to increase bushfire resilience from climate change? What does the crown say it will do - how much of the land is theirs? Why only Nutgrove beach - you need a whole of council exploration with the costs and benefits openly tabled to all the ratepayers - not just the shiny properties.

19.11. By 2050 nobody is going to be worried about Sandy Bay/Nutgrove beach. There will be much bigger problems long before then that will be a much higher priority for action. Realistically there can be no long term protection, so any plans to try will be a huge waste of money.

19.12. Congratulations to the City and the Tasmanian Government for discussing these issues.

19.13. This survey is too long to get meaningful input from across the range of Tasmanians. It seems that this is directing people towards a set of answers. The questioning strategy is leading and therefore results obtained will probably support the middle road, which one suspects is the desired outcome. Did the survey designer consult an independent statistical expert before designing the survey?

Attachment 1 – Survey: Nutgrove – Long Beach Coastal Adaptation Pathways May 2015

Nutgrove Long Beach Coastal Adaptation Pathway Community Survey

Introduction

This survey is part of the community consultation for the Nutgrove and Long Beach Coastal Adaptation Pathways project. The project is collaboration between the City of Hobart and the Tasmanian Government that aims to inform the community of the potential coastal hazards and explore possible ways that the risks can be managed and impacts reduced.

The project area extends from the Nutgrove Beach in the north through to Sandy Bay Point, Long Beach and Blinking Billy in the south and includes the area landward of Sandy Bay Road. Please see map below.

Nutgrove and Long Beach Coastal Adaptation Pathways project area

Coastal hazard mapping by the Tasmanian government has identified the area as vulnerable to present day and future hazard of coastal erosion. This survey seeks to identify what the broader community values about the area and explores three possible pathways that may be considered to enable the area to respond to the climate related coastal hazards.

The Council will consider a report on the project in late June 2015 that includes the community survey results and output from a local residents workshop held in late February 2015.

More information on the Project can be found at www.hobartcity.com/NLBCAP/survey

Section 1 - Community Values

Nutgrove Long Beach Coastal Adaptation Pathway Community Survey

***1. Age Group**

- ◯ 0 – 18
- ◯ 18 - 29
- ◯ 30 – 39
- ◯ 40 - 49
- ◯ 50 - 59
- ◯ 60 - 69
- ◯ 70+

***2. Postcode**

Postal Code:

***3. Are you a resident of the study area?**

4. How often do you visit the study area?

- ☐ Daily
- ☐ Weekly
- ☐ Fortnightly
- ☐ Monthly
- ☐ 6 monthly
- ☐ Annually
- ☐ Occasionally
- ☐ Once off
- ☐ Other (please specify)

5. Reason for visit?

- [ ] Café/restaurants
- [ ] Beach/swimming
- [ ] Dog walking
- [ ] Employment
- [ ] Parks / playgrounds
- [ ] Recreation active i.e. jogging
- [ ] Recreation passive i.e. walking
- [ ] Sailing / water sports
- [ ] Sports ground/club
- [ ] Services i.e. Medical
- [ ] Visit friends/residents

Other (please specify)

6. What do you value about the Nutgrove/Long Beach area? Please tick relevant boxes

	Not at all		Value		Value highly
Parklands and open space areas	◯	◯	◯	◯	◯
Cafes/retail	◯	◯	◯	◯	◯
Ambience/relaxing	◯	◯	◯	◯	◯
Beach	◯	◯	◯	◯	◯
Playground	◯	◯	◯	◯	◯
Water activities swimming/sailing	◯	◯	◯	◯	◯
Dog walking	◯	◯	◯	◯	◯
Exercise – walking/running	◯	◯	◯	◯	◯
Sports facilities	◯	◯	◯	◯	◯
Views	◯	◯	◯	◯	◯

Other (please specify)

Nutgrove Long Beach Coastal Adaptation Pathway Community Survey

7. Sea level rise and climate impacts means that the area will change over time. What would you like to see protected? Please rate from 'Don't protect' to 'Protect at all costs'

	Don't protect		Protect as long as practicable		Protect at all costs
Parklands and open space areas	◯	◯	◯	◯	◯
Cafes/retail	◯	◯	◯	◯	◯
Ambience/relaxing	◯	◯	◯	◯	◯
The beach	◯	◯	◯	◯	◯
Playground	◯	◯	◯	◯	◯
Water access for swimming	◯	◯	◯	◯	◯
Dog walking	◯	◯	◯	◯	◯
Exercise opportunities	◯	◯	◯	◯	◯
Sports facilities	◯	◯	◯	◯	◯
Views	◯	◯	◯	◯	◯

Other (please specify)

8. Have you noticed any changes during your visit(s) in the coastal processes such as erosion (loss of beach or accretion (increase in beach)?

◯ No

◯ Yes

9. The Tasmanian Government has recently developed coastal inundation maps for the Tasmanian coastline based on for sea level rise climate projections. To what extent are you aware of this work?

◯ Aware and are familiar with the maps £

◯ Aware yet haven't viewed the maps £

◯ Not aware

Other (please specify)

Nutgrove Long Beach Coastal Adaptation Pathway Community Survey

Section 2 - Coastal Adaptation Pathways

The Nutgrove and Long Beach Coastal Adaptation Pathways project explores three possible coastal adaptation pathways. The Pathways are not preferred options or recommendations. They are three ways of imagining different futures based on a range of choices about how to respond to coastal climate hazards. The three pathways are:

- Pathway 1 - Let nature takes its course
- Pathway 2 - Protect existing development as long as practical while protecting community values
- Pathway 3 - Protecting existing and permitting future development to the maximum extent for as long as possible

If you would like more detailed information on the three pathways please refer to the fact sheets that are located at www.hobartcity.com/NLBCAP/survey. It is not necessary to have read these to be able to complete the survey.

Pathway 1 - Let nature take its course

This pathway allows maximum freedom for natural coastal processes to unfold with a minimum of intervention or resistance from existing or new development or erosion and flood protection works. This pathway means that:

- If structures such as buildings, fences, walls, pathways and/or roads are effected or damaged by erosion then these would be removed.
- Only limited development would be allowed in areas that are likely to experience erosion. Intensification of existing areas (e.g. further subdividing existing residential blocks) would not be permitted.
- Property owners may be permitted to take action that extends the life of their existing structures by making it resistant to erosion (underpin foundations), but only within their own property boundary and as long as it has no impact on adjacent areas.
- Filling and raising land would generally not be permitted, nor would the hardening (construction of sea walls, placement of rocks or concrete) of shorelines or beach nourishment.

10. What do you consider may be the positives of Pathway 1?

	Disagree			Neutral			Agree
Allows natural coastal processes to occur	○	○	○	○	○	○	○
Creates open space as land use changes	○	○	○	○	○	○	○
Reduces community expectation for protection	○	○	○	○	○	○	○
Allows vegetation to move (retreat) landward	○	○	○	○	○	○	○
Lowers the outlay costs for adaptation response	○	○	○	○	○	○	○

Other (please specify)

11. What do you consider may be the negatives of Pathway 1?

	Disagree			Neutral			Agree
Loss of private property	○	○	○	○	○	○	○
Impact on sewage and stormwater system	○	○	○	○	○	○	○
Loss of coastal vegetation	○	○	○	○	○	○	○
Loss of open space and parklands	○	○	○	○	○	○	○
Loss of value and use of the area	○	○	○	○	○	○	○

Other (please specify)

12. Do you consider Pathway 1 is plausible – is this likely to happen?

◯ Yes

◯ No

Why/Why not?

Pathway 2 - Protect existing development as long as practical while protect...

This pathway balances the protection of natural and shared community assets, and private property.

This pathway means that:

- This pathway protects property for as long as possible. Only protection with minimal impact on community values and assets

- Development may be permitted in areas that are likely to experience erosion, provided that the development and/or required protection measures did not have any negative impact on natural or community values.

- Actions for protection would only be permitted if they increased the attractiveness and amenity of the area. For example, sea walls that may cause beaches to disappear would not be permitted.

Once the measures under this pathway are no longer effective to manage risks, a process of managed retreat would need to be initiated.

13. What do you consider may be the positives of Pathway 2?

	Disagree			Neutral			Agree
Retains the area's coastal amenity and recreation values for as long as possible	◯	◯	◯	◯	◯	◯	◯
Beach may be usable for longer into the future	◯	◯	◯	◯	◯	◯	◯
Allows development that balances protection and community values	◯	◯	◯	◯	◯	◯	◯
Provides additional time to consider other pathways	◯	◯	◯	◯	◯	◯	◯

Other (please specify)

14. What do you consider may be the negatives of Pathway 2?

	Disagree			Neutral			Agree
Costs for protection works	◯	◯	◯	◯	◯	◯	◯
Creates expectations of ongoing use	◯	◯	◯	◯	◯	◯	◯
Reduces property values due to long term threat	◯	◯	◯	◯	◯	◯	◯
Limits further development	◯	◯	◯	◯	◯	◯	◯

Other (please specify)

15. Do you consider Pathway 2 is plausible - is this likely to happen?

◯ Yes

◯ No

Why/Why not?

Pathway 3 - Protecting existing and permitting future development to the ma...

This pathway protects key assets and property using any available options, such as engineered modifications like sea walls and levees.

This pathway means that:

- Development is encouraged as it provides more financial contributors to coastal protection work.

- Development should consider community values for the area.

- Engineered modifications to natural areas may allow these areas to adapt in their own way and may be accepted by the community. For example, sea walls may provide habitat for coastal species and revegetation opportunities for coastal vegetation, as well as providing pathways and promenades for recreation.

16. What do you consider may be the positives of Pathway 3?

	Disagree			Neutral			Agree
Long term protection of assets (private and public)	◯	◯	◯	◯	◯	◯	◯
Increased property values	◯	◯	◯	◯	◯	◯	◯
Increased use and enjoyment of the area	◯	◯	◯	◯	◯	◯	◯
Increase in local economic activity	◯	◯	◯	◯	◯	◯	◯

Other (please specify)

17. What do you consider may be the negatives of Pathway 3?

	Disagree			Neutral			Agree
Long term ongoing costs for maintenance of protection works	◯	◯	◯	◯	◯	◯	◯
Long term loss of the beach and foreshore areas	◯	◯	◯	◯	◯	◯	◯
Loss of natural amenity of the area	◯	◯	◯	◯	◯	◯	◯
Increased commercial, residential and recreation activity within the area	◯	◯	◯	◯	◯	◯	◯

Other (please specify)

18. Do you consider Pathway 3 plausible – is this likely to happen?

◯ Yes

◯ No

Why/Why not?

Section 3 - Additional comments

19. Are there any additional comments that you would like to make about the Nutgrove and Long Beach Coastal Adaptation Pathways project or the three coastal adaptation pathways?

Attachment 2 – Fact Sheets

Pathway 1:
Sea level rises and retreat early

This pathway allows maximum freedom for natural coastal processes to unfold with a minimum of intervention or resistance from existing or new development or erosion and flood protection works. Where erosion threatens structures with failure in the short term, they would be removed if they cannot resist the hazard[1]. Little if any new (re)development would be allowed in hazard areas, and certainly no intensification of existing areas (eg further subdividing existing residential blocks).

Property owners would be allowed to take action that extends the life of their existing structures by making it resistant to erosion (underpin foundations), but only within their own property boundary and as long as it has no impact on adjacent areas. Filling and raising land would generally not be allowed, nor would hardening shorelines with rocks or concrete or even dune or beach nourishment.

1 Where property is regularly inundated, it would eventually not be worth repairing and the property would be abandoned. This is unlikely in the study area for sea level rise of up to 0.8m

How might things proceed with this pathway?

With this pathway, erosion is expected to become progressive, with some cycles of sediment/dune rebuilding but a long term recession of perhaps 23 to 49 metres from the current High Water Mark by 2050 and 50 to 83 metres by 2100. With property removed as erosion proceeds, the beach would be allowed to retain form further shoreward, maintaining amenity.

A total of 47 properties, including 38 dwellings, may be at risk of erosion at present day if an extreme event was to occur. These properties are worth $50 million. These properties are mostly along Nutgrove Beach and the foreshore around Blinking Billy Point. Most of the built structures on properties are away from the coastline and therefore probably not presently at risk but valued land would be lost. With active vegetation management, the susceptibility to erosion may be reduced and shoreline regression slowed down.

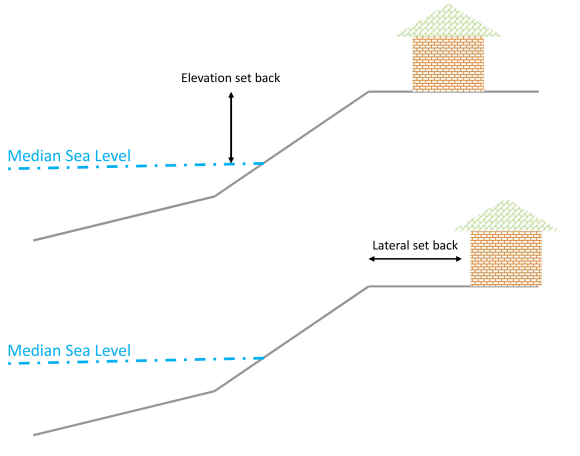
Nonetheless, those properties most at risk today may be required to start retreating before 2050. This is the case along Nutgrove Beach and Blinking Billy Point where most residential uses are located within the hazard bands. Long Beach and Sandy Bay Point will remain fairly protected due to existing foreshore protection, and these areas are not expected to actively retreat until the sea wall fails, probably well after 2100.

Inundation as a result of an extreme storm event would primarily be due to rainfall and stormwater drainage issues, and may result in some localised flooding with depths of below floor level and little if any damage. Flood risks increase little over the projected timeframe and mostly affect properties that would already have been affected by erosion.

With the sea level rising, low lying areas may increasingly experience issues of rising water tables and salinization, and stormwater drainage especially after extreme rainfall events. This may become an issue at the recreation grounds along Long Beach. Over time, vegetation may change due to the increased salinity levels in the soil combined with the effects of other climate factors.

Likely options for this pathway

Major works and modifications to the landscape would not be permitted under this scenario. Most work would be involved in vegetation management, selective retreat and reconfiguring infrastructure to remain serviceable.



Elevation set back (top) to cope with coastal flooding and lateral set back (bottom) to cope with coastal erosions

Retreat

Vegetation management

Indicative costing of options under pathway 1

The table below shows the indicative costs of the various options under this pathway. It shows how options and costs play out over time. The most significant cost would be the loss of prime residential and other land as a result of retreat (in the area of $25 million). 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 1 ($ MILLION)

Option	Cost or applicable At present day	To 2050	To 2100	Past 2100	Present day to 2100
Maintain sea wall	√	√	√	√	√
Minimal/No subdivision	√	√	√	√	√
Protection individual assets	-$0.80	-$1.40	-$1.40	√	-$3.60
Redevelop less vulnerable					
Retreat		-$13.90	-$11.20	√	-$25.10
Vegetation management	√	√			√
TOTAL	-$0.80	-$15.30	-$12.60		-$28.70

Source: SGS (2014)

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

- Flood/erosion direct and indirect damage expenses (private and public property). The amount depends upon level of reinvestment/maintenance of property in hazard areas, degree of investment in protection, effectiveness of warnings and community response
- Land value lost to current owners
- A gain in community value of some additional open space/wetlands, but this partly just replaces areas lost to open water
- 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
- Impact on population, commercial and social services available unless replaced with development on higher land
- Psychological impact of 'decline' of a coastal community

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!)
- Capital improved value 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)?
- Capital improved value 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 and who pays? Why those in particular?\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 happens if this process fails – how would things 'fall apart' and who suffers?

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

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.

SGS Economics & Planning | Independent insight.

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 drift[1], 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?

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.

SGS Economics & Planning | Independent insight.

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 draingage 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?