



Appendix G

Adaptations Option Workshop Summary

Baird.

G.1 Summary Slides Presented in the Workshop

Baird.

Shire of Murray CHRMAP

- Examines the processes of erosion and inundation within the study area to understand coastal hazard risk affecting the shoreline areas today and the forecast impacts over the next 100 years (to 2120) associated with projected climate change and sea level rise.
- Developed in consultation with SoM, the local community, and a range of stakeholders in accordance with local and national guidelines. Delivered through a multi-discipline approach incorporating science, engineering, community engagement, land use planning and economic expertise.
- Aims to improve the understanding of coastal hazard risk for the community and stakeholders and to develop coastal adaptation approaches and pathways which can mitigate risk over the short to medium term (next 10-20 years) and provide management and adaptation strategies to mitigate hazard in future planning periods (next 100 years).

Workshop Overview

- A number of options identified to deal with several key issues
 - Erosion / Inundation of Nature Reserves
 - Inundation of Island Properties
 - Erosion of Islands/ River Banks
 - Septic Tanks
- Seeking input from key stakeholders
- The outcomes of this workshop will then provide input to further evaluation and assessment by the team for the preparation of the CHRMAP

Agenda

- Introductions
- Overview of MCA process
- Erosion – Nature Reserves
- Inundation – Island Properties
- Erosion – Islands and Riverbanks
- Septic Tanks
- Workshop Wrap-up

Multi-Criteria Assessment (MCA)

- An MCA is a tool to compare various alternatives or options
 - Provides a structured way to compare and contrast options
 - Uses a number of criteria, and scoring of those criteria, to compare options
 - Criteria are assigned a “score” based on the expected performance against those criteria
- Three key categories adopted for Shire of Murray
 - Technical
 - Social
 - Environmental
- These are then compared against the cost score for the option

MCA Categories and Criteria

- **Technical**

- **Feasibility** – the feasibility of designing and implementing the option
- **Effectiveness** – how effective the option is at achieving the outcome
- **Climate Change Adaptation** – how adaptable the option is to meet the likely changes due to climate change
- **Construction and Maintenance** – ease of construction and associated maintenance

- **Social**

- **Community** – impacts on the community
- **Public Amenity** – impacts on the recreational use of areas, access to areas etc

- **Environmental**

- **Natural Environment** – impacts on the natural environment
- **Visual Amenity** – visual impacts associated with the option

MCA Scoring

Score	Technical	Social and Environmental
-2	Very Poor Performance	High negative impact
-1	Poor Performance	Medium Negative Impact
0		Low to no impact
1	Good Performance	Medium positive impact
2	Very Good Performance	High positive impact

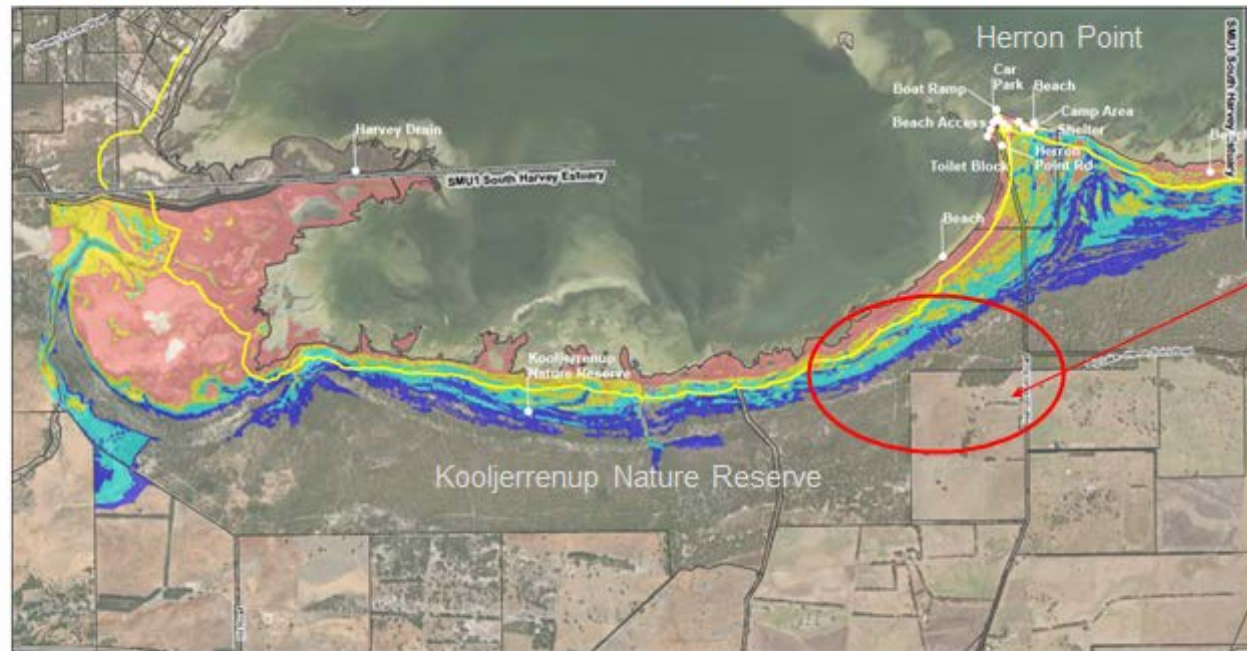
Score	Cost
1	Most Expensive
2	
3	
4	
5	Least Expensive

costs to
include
private costs
as well

Structure of Discussion

- Overview of the issue
- Options identified to mitigate the issue
- Scoring of the options
 - Discussion amongst the group

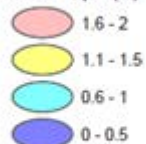
Erosion / Inundation Nature Reserve



- Loss of width
- Potential for retreat into the landside area in future ?

Inundation—2120, ARI500yr

Water Depth (m)

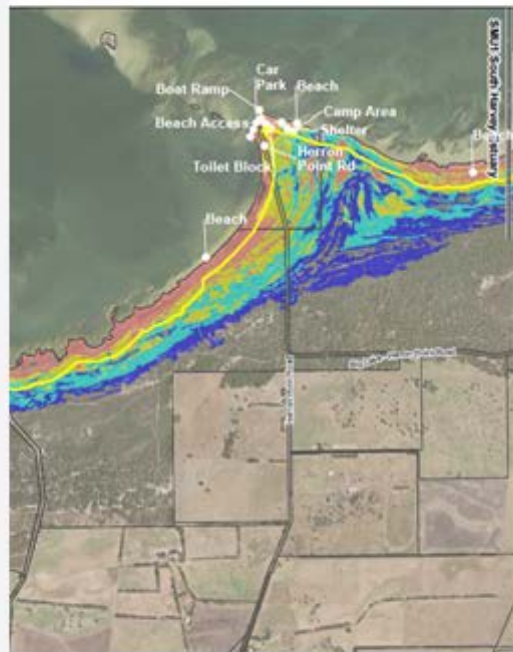


2120 Coastal Processes Line



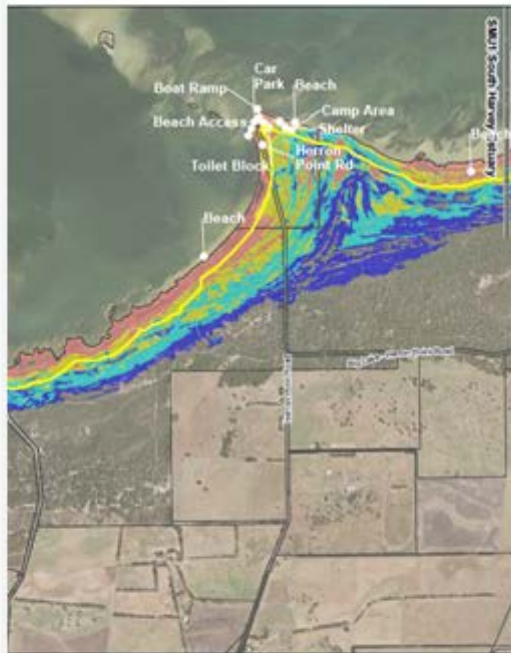
Erosion / Inundation Nature Reserve

- Overview of the issue
 - Erosion potential. Future coastal processes allowance of 150m - 200m inland
 - With sea level rise and extreme events the inundation area extends ~500m inland
 - Loss of Habitat for water birds / shore birds
 - Modification of coastal saltmarsh area
- Options identified to mitigate the issue
 1. Do nothing (annual monitoring)
 2. Managed Retreat
 3. Protect

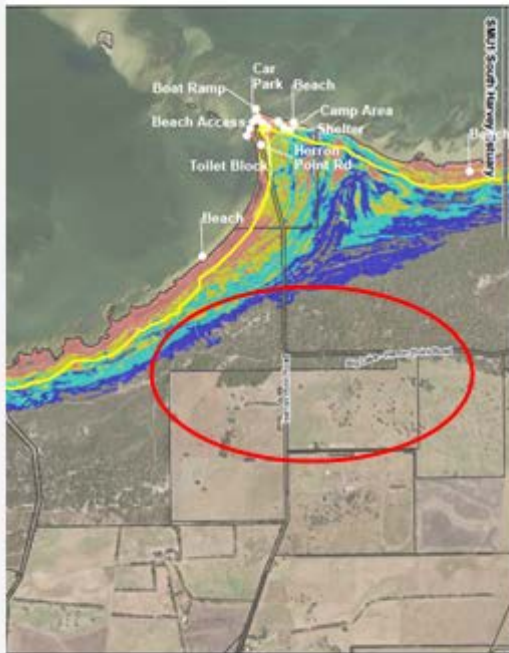


Erosion / Inundation Nature Reserve

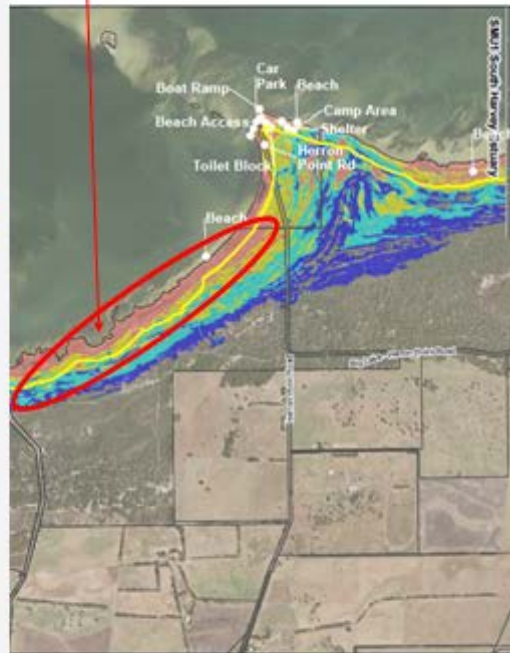
Nature Based Solutions
to protect shoreline areas



Do Nothing / Monitor



Managed Retreat



Protect

MCA Scoring

challenges
in
acquisition
of land

establishment
of vegetation -
challenges
over the
timeframes

nature based -
oyster reefs/
submerged
reefs etc

	Technical				
Option	Feasibility	Effectiveness	Climate Change Adaptation	Construction & Maintenance	Technical Score
1. Managed Retreat - do nothing	2	-2	2	2	4
2. Managed Retreat - purchase Farm Areas Landward for future expansion	0	1	1	-1	1
3. Protection - nature based approaches	-1	2	1	-1	1

MCA Scoring

issues with
landowners

	Social		
Option	Community	Public Amenity	Social Score
1. Managed Retreat - do nothing	-2	-1	-4
2. Managed Retreat - purchase Farm	1	1	4
3. Protection - nature based approaches	2	1	6

MCA Scoring

	Environment		
Option	Natural Environment	Visual Amenity	Environmental Score
1. Managed Retreat - do nothing	-2	-1	-6
2. Managed Retreat - purchase Farm Areas Landward for future expansion	1	1	4
3. Protection - nature based approaches	2	1	6

MCA Scoring

Option	Cost Score
1. Managed Retreat - do nothing	5
2. Managed Retreat - purchase Farm Areas Landward for future expansion	2
3. Protection - nature based approaches	3

only buying
enough to
provide
buffer

Option	Technical	Social	Environment	Total Performance Score	Cost Score
Weighting	50%	25%	25%		
1. Managed Retreat - do nothing	4	-6	-6	-1	5
2. Managed Retreat - purchase Farm Areas Landward for future expansion	1	4	4	2.5	2
3. Protection - nature based approaches	1	6	6	3.5	3

Option	Technical	Social	Environment	Total Performance Score	Cost Score
Weighting	33%	33%	33%		
1. Managed Retreat - do nothing	4	-6	-6	-2.64	5
2. Managed Retreat - purchase Farm Areas Landward for future expansion	1	4	4	2.97	2
3. Protection - nature based approaches	1	6	6	4.29	3

legal - built into feasibility and constructability

Inundation of Properties

- Overview of the issue
 - Under projected sea level rise there is increased risk of inundation for properties in low lying areas
 - Areas of Interest - Murray Delta Islands, North / South Yunderup, Furnissdale
 - 2000 properties are within the 2120 coastal inundation hazard extent under a projected sea level rise of 0.9m in 100 years

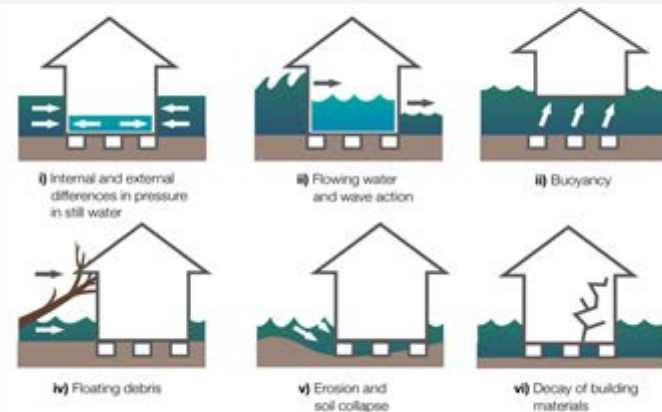
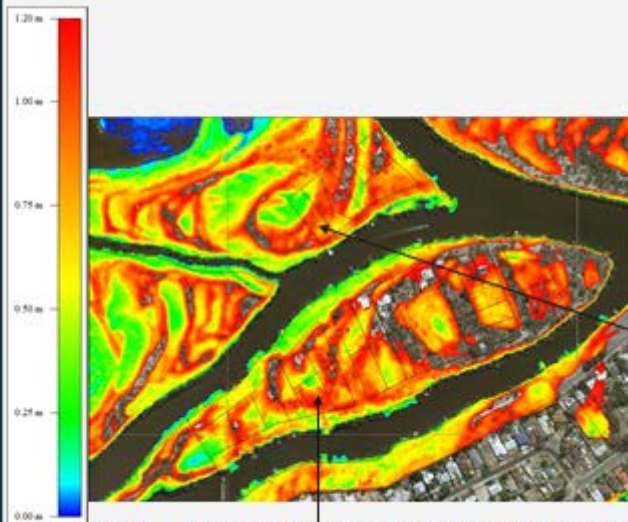


Figure 1 Floods can result in structural damage of buildings in one of several ways.

Inundation of Properties

Overview – Water Level

- General Tide Range +0.3m AHD (0.9mCD)
- Winter Storms +0.8m AHD (1.4mCD)
- Largest Measured +1.0m AHD (1.6mCD)



LIDAR mAH Yunderup Island +1.2m AHD and above

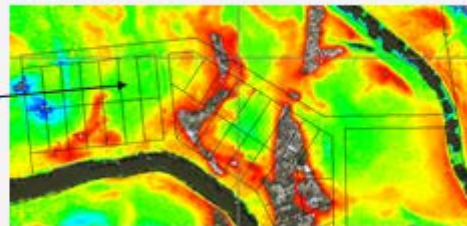


Land Elevation – Murray Delta Islands

Ballee Island +1.2m AHD

NW Cooleenup Island
+0.3m AHD

Mid /Lower Cooleenup Is
+1.2m AHD and above



Inundation Properties

- Options identified
 1. Housing Design - Raise Floor Level
 2. Housing Design - Use Fill to raise development pad
 3. Temporary Flood Barrier
 4. Permanent Flood Barrier
 5. Storm Surge Barrier at Dawesville Cut
 6. Voluntary Acquisition / Managed Retreat



Op1 Raise Floor Level



Op2 Fill Land

Inundation Properties



MCA Scoring

	Technical				
Option	Feasibility	Effectiveness	Climate Change Adaptation	Construction & Maintenance	Technical Score
1. Planning Based Approaches for Housing Design - Raise Floor Levels and improve foundation design to withstand flood conditions (as redev.)	2	1	1	2	6
2. Planning Based Approached for Housing Design. Fill Properties to Design Level (as redev.)	1	1	-1	1	2
3. Temporary Flood Barriers at the edge of the 3 Islands that can be erected to protect from inundation ahead of the event	-2	-1	1	-2	-4
4. Permanent Flood Barriers at the edge of the 3 Islands that can be built and maintained at a level above the design flood	1	1	1	-1	2
5. Build Flood Barrier at the Dawesville Cut	-2	2	1	-2	-1
6. Managed Retreat. Islands returned to Nature	-1	2	2	-1	2

consider not having slab on ground

could be for a property only

property level protection?

flood barrage needs to consider the wider area (not just shire)

MCA Scoring

with fill -
opportunity
to est.
vegetation

can have
natural
features in the
permanent
barrier

B.
—
19
81

barriers
can be at
property or
island edge

Option	Social		
	Community	Public Amenity	Social Score
1. Planning Based Approaches for Housing Design - Raise Floor Levels and improve foundation design to withstand flood conditions (as redev.)	2	0	4
2. Planning Based Approached for Housing Design . Fill Properties to Design Level (as redev.)	2	1	6
3. Temporary Flood Barriers at the edge of the 3 Islands that can be erected to protect from inundation ahead of the event	1	0	2
4. Permanent Flood Barriers at the edge of the 3 Islands that can be built and maintained at a level above the design flood	1	-1	0
5. Build Flood Barrier at the Dawesville Cut	2	0	4
6. Managed Retreat. Islands returned to Nature	-2	1	-2

MCA Scoring

Option	Environment		
	Natural Environment	Visual Amenity	Environmental Score
1. Planning Based Approaches for Housing Design - Raise Floor Levels and improve foundation design to withstand flood conditions (as redev.)	0	0	0
2. Planning Based Approached for Housing Design . Fill Properties to Design Level (as redev.)	-1	-1	-4
3. Temporary Flood Barriers at the edge of the 3 Islands that can be erected to protect from inundation ahead of the event	0	0	0
4. Permanent Flood Barriers at the edge of the 3 Islands that can be built and maintained at a level above the design flood	-1	0	-2
5. Build Flood Barrier at the Dawesville Cut	0	-1	-2
6. Managed Retreat. Islands returned to Nature	2	1	6

barrage potential benefits for SLR for enviro

MCA Scoring

Option	Cost Score
1. Planning Based Approaches for Housing Design - Raise Floor Levels and improve foundation design to withstand flood conditions (as redev.)	5
2. Planning Based Approached for Housing Design . Fill Properties to Design Level (as redev.)	5
3. Temporary Flood Barriers at the edge of the 3 Islands that can be erected to protect from inundation ahead of the event	3
4. Permanent Flood Barriers at the edge of the 3 Islands that can be built and maintained at a level above the design flood	2
5. Build Flood Barrier at the Dawesville Cut	1
6. Managed Retreat. Islands returned to Nature	2

private
based
costs






Option	Technical	Social	Environment	Total Performance	Cost Score
Weighting	33%	33%	33%		
1. Planning Based Approaches for Housing Design - Raise Floor Levels and improve foundation design to withstand flood conditions (as redev.)	6	4	0	3.3	5
2. Planning Based Approached for Housing Design . Fill Properties to Design Level (as redev.)	2	6	-4	1.32	5
3. Temporary Flood Barriers at the edge of the 3 Islands that can be erected to protect from inundation ahead of the event	-4	2	0	-0.66	3
4. Permanent Flood Barriers at the edge of the 3 Islands that can be built and maintained at a level above the design flood	2	0	-2	0	2
5. Build Flood Barrier at the Dawesville Cut	-1	4	-2	0.33	1
6. Managed Retreat. Islands returned to Nature	2	-2	6	1.98	2

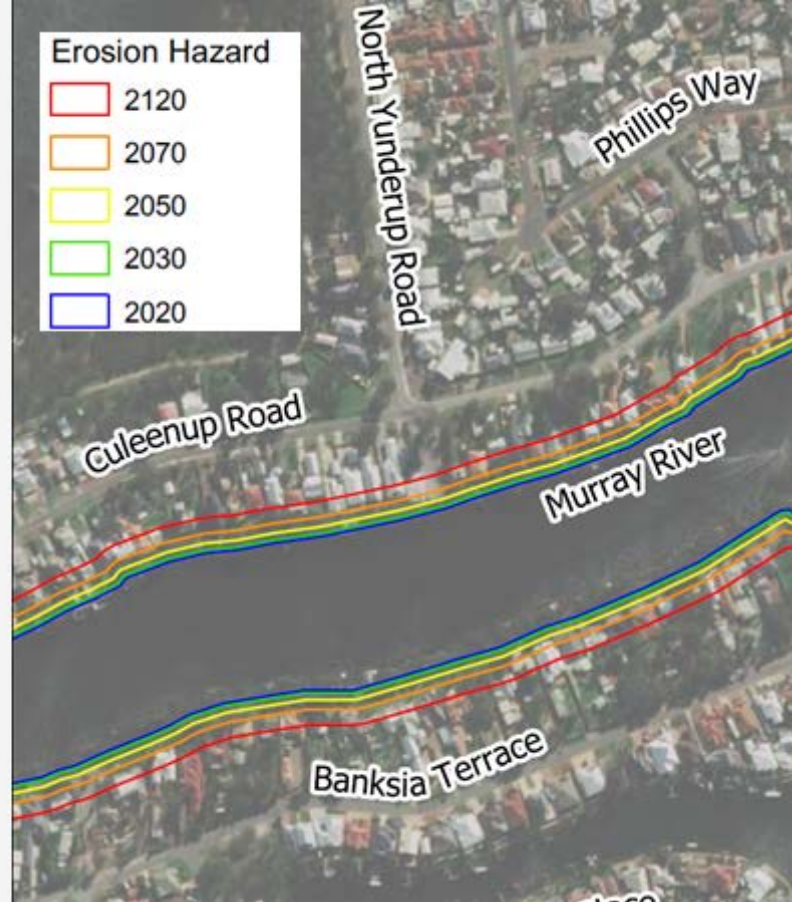
Erosion of Riverbanks

- Overview of the issue
 - Erosion of Murray and Serpentine Shorelines
 - Threat to property and assets landward
 - Affects North / South Yunderup, Murray Delta Islands, Furnissdale
- Options identified to mitigate issue
 1. Do nothing (annual monitoring)
 2. Managed Retreat
 3. Protection – Hard engineered walls
 4. Protection through Nature Based Solutions
 5. Reduce Vessel Speed (*** Implement)

vessel type
rather than
just speed

Erosion Hazard

	2120
	2070
	2050
	2030
	2020



MCA Scoring

	Technical				
Option	Feasibility	Effectiveness	Climate Change Adaptation	Construction & Maintenance	Technical Score
Do Nothing	2	-2	2	2	4
Hard Engineering Solutions	1	2	-1	-1	1
Soft Edge Treatments	1	1	1	1	4
Managed Retreat	-1	2	2	-1	4

MCA Scoring

	Social		
Option	Community	Public Amenity	Social Score
Do Nothing	-2	-2	-8
Hard Engineering Solutions	0	1	2
Soft Edge Treatments	1	2	6
Managed Retreat	-2	1	-2

potential for
properties with no
public land - hard
engineering may
be better

managed
retreat - empty
blocks over
time an issue
(visual etc)

MCA Scoring

	Environment		
Option	Natural Environment	Visual Amenity	Environmental Score
Do Nothing	-1	-1	-4
Hard Engineering Solutions	-1	-1	-4
Soft Edge Treatments	1	2	6
Managed Retreat	2	1	6

MCA Scoring

Option	Cost Score
Do Nothing	5
Hard Engineering Solutions	2
Soft Edge Treatments	3
Managed Retreat	1

hard engineering
could be more
expensive

Option	Technical	Social	Environment	Total Performance	Cost Score
Weighting	33%	33%	33%	Score	
Do Nothing	4	-8	-4	-2.64	5
Hard Engineering Solutions	1	2	-4	-0.33	2
Soft Edge Treatments	4	6	6	5.28	3
Managed Retreat	2	-2	6	1.98	1

Septic Systems

- Overview of the issue
 - The septic systems on Murray Delta Islands pose a risk to River Water Quality in Future under sea level rise scenarios
 - An extreme inundation event could flood the septic and release faecal material into the Murray
- Options identified to mitigate the issue
 1. Upgrade all systems on each island to one centralised unit (ATU) above hazard level
 2. Connect to mains (WaterCorp)
 3. Managed Retreat of all houses

note that there are other places as well



Could just be for a few houses

MCA Scoring

	Technical				
Option	Feasibility	Effectiveness	Climate Change Adaptation	Construction & Maintenance	Technical Score
1. Managed Retreat - all properties	-1	2	2	-1	2
2. Upgrade Island septic to be on one central system located and maintained above the flodd level	1	1	2	-1	3
3. Connect the Islands to Main Sewage (WaterCorp). This would require pipe network and pumps under the river onto the islands.	-1	2	1	-2	0

several sub-options could be possible

MCA Scoring

	Social		
Option	Community	Public Amenity	Social Score
1. Managed Retreat - all properties	-2	1	-2
2. Upgrade Island septic to be on one central system located and maintained above the flood level	2	1	6
3. Connect the Islands to Main Sewage (WaterCorp). This would require pipe network and pumps under the river onto the islands.	2	1	6

MCA Scoring

	Environment		
Option	Natural Environment	Visual Amenity	Environmental Score
1. Managed Retreat - all properties	2	2	8
2. Upgrade Island septic to be on one central system located and maintained above the flood level	1	1	4
3. Connect the Islands to Main Sewage (WaterCorp). This would require pipe network and pumps under the river onto the islands.	2	1	6