					Te	echnical	Ec	onomic	Enviro	nment	So	cial	P	litical	Leg	al	Total	Summary of long list
						4		Maintenance E		NFM and	Landscape and		Stratogic		Waste management	Regulatory t consenting and		
		Star	ndard of Prote	ection	performance and adaptability	Buildability	Capital cost	and monitoring	Ecology and environment	RBMP	Heritage	Tourism	Strategic alignment	views	and contamination	approvals		
		Short-term	Mid-term	Long-term		Aims: Safe to	Aims: Low	Aims: Minimal	Aims: No	Aims: Works	Aims: Works	Aims: Maintains	Aims: Aligns	Aims: Supported	Aims: Minimal waste			
Ontion	Description	Present day		Present day	desired standard of protection		capital cost.	ongoing maintenance	environmental	with nature to	with the existing	access to	with local	by stakeholders	disposal requirements	framework would	Chart list antions	
Option	Description	to 2030	to 2070	to 2118	throughout the			and/or monitoring	impact on local habitats, geology and	provide natural I protection and does not	landscape and is sensitive to listed buildings	beaches, considers local	strategies.	and the local community.	or contamination risks.	be readily achievable.	Short list options in green	Key reason for shortlisting / discounting
					design life of the							views and						
					scheme or is easily adaptable to allow	ground conditions and would not conflict with		requirements and costs.	ecology, including local	downgrade the existing	and heritage designations.	provides connectivity						
					for modifications	existing services,		costs.	designations.	classifications.	acsignations.	along the						
					for climate change	primarily the sewer						frontage.						
1	Replace sea wall				4	3	2	4	3	3	3	4	5	2	3	4	40	
İ	A new wall could be built of concrete, steel piles or masonry. This option would seek to replace the existing defence or be built seaward of the existing wall. To				+ High standard of protection and long	working within tidal		manganocene for	take so no	+ If the replacement wall	of existing	sea views - need	+ Provides HTL	- includes increasing	- Waste from demolition	- Marine licence		Option bought forward to shortlist as it provides flood protection in the long- term by raising the height of the defence. This option also includes extending
İ	adapt to climate change, the wall would need to be taller than the current				design lifePotential	windows, greater risk in low areas with smaller	-High capital costs	concrete works and Potential scour and	impacts on geology and	has the same	defence would increase amenity	to raise promenade	policy with increased SoP	promenade levels	of concrete and excavation around wall	required		the existing walls as in SFA option D. Note - Replacing wall does not
2	Raise existing sea wall				2	5	4	1	3	3	3	2	3	1	5	5	37	necessarily require demolition of existing encasement or similar nossible
i	Raising the existing wall would increase the flood protection performance of the defence in the short to mid-term. However, as this option relies on the existing				+ increased performance - Poor			+ High maintained	footprint of	+ Raising the	existing and new	could only be	+ Provides HTL					
İ	structure it can only practically be raised so far without a complete re-build. In	n n			design life as relies	+ works predominantly	+low / medium	costs for existing structures	defence. Potential impacts	existing wall would not	materials would require	raised so far before views	in short-		+ Limited demolition required, utilises	+ limited consenting		Option discounted as does not address extreme sea levels at southern end of the 'Central' benefit zone. Maintenance of existing defence and beach also
i	addition, without raising the promenade, sea views could be affected and therefore the wall could only be raised so far. In areas where the existing				on the existing wall - Potential for	land-based.	capital costs.	beach forms	on geology of	increase the area	consideration.	become restricted	medium term only		existing structures	required		required adding to costs.
	structures are currently in poor condition a concrete 'shroud' would be used to	,			increased scour			primary defence	SSSI and non-	of coastline	Within	- may need to	only	-				
4	Setback walls with flood gates				4	3	4	1	on terrestrial	+ No additional	existing and new	4 Potential loss of	2	3	3	4	38	
Í	defences, these would run parallel to the roads and private property boundaries. In some instances, it is envisioned that private properties may require integrating				+ Mid to long term performance - relies			+ High maintained	habitat.	coastal land take	materials would	amenity space on	- Allows same		- Excavation on land for			Option discounted as it is understood that during previous events the
Í	into the defence line to ensure flood wall continuity; this would require				on existing defences	+ land based	-Medium	costs for existing	Reduced geological and	which works toward the RBMP	require consideration.	landward side. Access to beach	or higher level		wall foundations -	+ Land-based		momentum of water as well as deris carried with is unlikely to be stopped by
Í	waterproofing or shrouding of vulnerable areas. This option would help prevent flooding to the town through a secondary defence line; while it does not help		1		for long term performance - does	construction	capital costs	structures beach forms	ecological	objectives Not	Within	only effected	of overtopping of existing		Possible demolition of existing walls and	construction		setback walls. Also limited space on where these could be located in some areas.
İ	reduce wave overtopping, it would prevent flood water from inundating				not mitigate scour			primary defence	impacts. Potential to	full realignment and therefore still	conservation area with numerous	during flood event.	defences		surfaces			dreas.
5	Offshore breakwater				4	1	2	2	2	4	3	5	4	5	3	2	37	
	An offshore breakwater would seek to reduce the flood risk by dissipating wave						- High capital		significant	+ May increase	structure would	works required	+ Allows for				3,	
İ	energy within Stonehaven Bay. The size of the structure (height and width) would determine how much wave energy is dissipated. For this reason, a				+ long term performance - relies	- Difficult to construct,	costs for volume of	+high maintenance	alteration to	the area of sandy foreshore which	have no impacts	along the	HTL to be implemented		- Possible dredging	- Marine licence		
İ	breakwater could be designed to be submerged such that it is not visible, creating				on condition of	water based activities	material	costs for existing structures	coastal processes and downdrift	would have NFM	on landscape or seascape.	frontage, thus keeping wall	more effectively		activities	required - offshore work		Discounted as extreme sea levels will still cause flooding in the long term.
İ	a reef-like structure to break the largest waves offshore. As this option does not increase the height of the existing defences it may only offer limited protection in				existing defences		required and construction	Structures	erosion issues,	benefits by	Potential impacts	heights down.	through reducing direct			WOIK		
7	New stepped or sloping revetment				5	3	1	4	2	2	2	2	5	2	3	4	35	
i	The existing defences could be replaced by a new stepped revetment (as currently seen along the Cowie promenade), or by a similar modular blockwork				+High standard of				existing defences	+ Replacement of	defences already	already present						
İ	structure or rock armour structure. All solutions could be designed such that their				performance + does	- complex construction	- large capital	- medium	may not increase the footprint.	existing defences may not increase	present within the bay, although	(buried beneath shingle).	+ Provides HTL policy with		 Waste from demolition of concrete and 	- Marine licence		Option discounted due to the high capital cost and limited difference to sea
İ	wave overtopping performance is suitable into the long-term scenario. Given the present-day overtopping risk, a higher crest level than existing will be required.				not rely on existing structures	on beach	costs	maintenance	Potential impacts	the defence	defences in	Need to be higher			excavation around wall	required		wall.
	To adapt to climate change, the wall would need to be raised further, which may				Structures			_	on geology of	footprint thus	central section	than current		_	_	_		
8	Beach recharge + control structures The beach within Stonehaven could be recharged increasing the beach crest width				3 Detection to be at	3	3	- potential for high	Rectalli Hatarai	4 + This is an NFM	Larger beach	Increase in beach	+ Allows for	5	- offshore dredging for	2	41	
İ	and height. To prevent the beach mobilising and moving around within the bay				 Potential short design life + high 	+ simple construction -	- Medium /	maintenance costs	foreshore and potential for	option which	would add amenity value	amenity space. Control structures	HTL to be		beach sediment -	- large change to		Option bought forward to short list as larger beach can provide flood
İ	beach control structures would also likely be required. With a large enough beach in both height and width this option could be a solution in the long-term, however				standard of	added complexity with	large capital	depending on beach loss -	ecological benefits	would require limited 'hard-	and is likely to	could detract	implemented - but maybe not		requirement for recharge with suitable	coast and foreshore,		protection and increases amenity values. Option is the same as SFA option B; same as option C as beach control structures are not defined at this stage
9	it would also require replenishment over time if it is shown that material is lost				protection - relies on existing structures	beach control structures	costs	maintenance of	if sound practice of beach	defence'	enhance landscape and	from beach, but also provide	on it's own		sediment - excavation	licences required		(could be timber or rock groynes).
	offshore or the heach migrates shoreward through "roll-over" This ontion may Foreshore recharge				2	2	2	existing structures	2	5	4	5	without being 4	5	for control structures 3	1	36	
	Similar to beach replenishment, this would look to have large quantities of beach				- Potential short			- potential for high	natural processes	+ Creation of new	foreshore area -	amenity space.	- More similar		- offshore dredging for			
İ	material dumped near the centre of Stonehaven Bay, effectively making a very large beach / sand bar. Over time this material would move around within the				design life + high standard of	+ simple construction -	- Medium /	maintenance costs depending on	sand is transported to	foreshore habitats Impact	add amenity value and likely to	Access to beach maintained.	to ATL given		beach sediment - requirement for	 large change to coast and foreshore. 		Option discounted due to the environmental impact on the rocky foreshore and
İ	bay, replenishing the existing beaches. This option would reduce the water				protection - relies on	uncertainty around placement	large capital costs	beach loss -	where it would	of coastal water	enhance	No detrimental	the magnitude of nourishment		recharge with suitable	licences required		the high capital and maintenance costs.
	depths within the bay and thus create a large area in which wave action would be dissipated across. This option would be suitable up until the long-term scenario.				existing structures			maintenance of	accumulate	quality and	landscape and	effects on views.	required		sediment			
10	Beach and river realignment Within the central section, the heach could be moved seaward with a view to				4	3	2	2	2	2	3	3	4	2	2	2	31	
	redirect the Cowie Water south towards the Carron, as it flowed historically. As	5			+Good standard of			 high maintenance costs associated 	 need to consider habitats that 	+ Redirecting the Cowie may	through re- alignment.	format of beach, but potential to	- More similar					
İ	the beach is moved seaward, it would effectively act as type of breakwater to the hard coastal defences, however this realignment would likely require nourishment				protection + limited	 difficult construction - risk of destabilising 	- high costs	with unearthing	would be lost.	enhance sediment	Change in	create new	to ATL given the magnitude		 Excavation of beach and river mouth, 	 Change to coast and foreshore, 		Option discounted due to buildability concerns, maintenance costs and
	along with control structures to make sure the system is stable in extreme events				design life of existing structures	existing defences		existing defences and managing the	Impacts on ecological and	transport from the fluvial	character of frontage,	amenity space with bridges to	of nourishment		potential contaminants	licences required		stakeholder views.
	and not breached. This option would be suitable into the mid-term scenario, but							beach	RBMP status of	environment to	although also	link promenade to	required					
14	River Cowie training wall / groyne extension				4	3	2	3	2	2	3	2	4	2	2	3	32	
Í	The existing concrete structure could be extended further out and southward to shelter the river mouth from waves. The structure could be an extension of the	é			+ would shelter	complex construction	- high / medium cost	me di	and is outwith	+ Sheltering the river mouth may	potential impacts	Potential impact	- Not an option alone + but	I CEA additional	- Excavation beach and	- Change to coast		Discounted as stakeholder concerns on imports of disarting flow
Í	concrete structure or be formed of rock armour. As this defence does not increase the height of the existing river banks, it is only effective to the mid-term	t	1		cowie +High standard of	 complex construction - impact on cowie mouth 	based upon	- medium maintenance	SSSI boundary. Construction and	prevent excess	on views. Within	on views. No change on	aides	+ SFA additional option A	river mouth, potential	and foreshore,		Discounted as stakeholder concerns on impacts of diverting flow southwards on sediment infront of coastal defences.
	scenario however counled with existing defence improvements would make it a				protection		size of structure		operation could	sediment	conservation area	access to beach.	implementation of HTI		contaminants	licences required		
20	Property relocation Properties at immediate flood risk behind the current coastal defences could be				3	2	2	2	2 Potential bat	3	2 Impacts on	3	1	1	1	3	25	
Í	relocated, reducing potential flood damages while also providing additional space				+ Reduces properties at risk - relies on		- high costs for	- maintanence	habitats in		character of	1	- Against HTL		- Demolition of buildings	- Significant change to land + no		
Í	for flood protection improvement schemes behind the existing defences. While		1		condition of existing	- difficult to relocate	relocation	costs for existing defences	existing buildings. Distruption to		frontage. Within	No impact on sea	policy		- land based excavation	maritime licences		Discounted as not in stakeholder interest or practical.
	this option does not seek to reduce wave overtopping it could be coupled with other mid to long-term strategies to reduce flood risk damages.				defences			derences	terrestiral	No impact.	conservation area	views or access.				required		
. 24	Property Flood Resilience and Resistance (PFR)			+	2	5	5	low maintener	3	3	3	5	4 Partially	3	5	5		
21	A snort-term option to address flooding in less severe storm events, PFK		1	1	- low standard of	I Family sand	I law eart	 low maintanence costs - maintanece 					+ Partially supports HTL -		+ limited waste and	I limited sense the		Teles through as build wint instead of short life and a
21	measures could be a valuable option to incorporate into those properties at risk of		1			+ Easy to consturct	+ low cost	costs for existing		1	No impact.	l	but only in		disturbance	+ limited consenting		Taken through as 'quick win' instead of short list option.
21					protection	,			Marian	No import								
	measures could be a valuable option to incorporate into those properties at risk of flooding. For more severe storms and with increasing sea levels, the level of resilience will be limited and is therefore not considered to be a mid-term option,				protection	, t	-	defences	No impacts.	No impact.	NO IIIIpact.	No impact.	short-term	1	3		33	Discounted as not inline with HTL policy
22 23	measures could be a valuable option to incorporate into those properties at risk of flooding. For more severe storms and with increasing sea levels, the level of				protection 1 1	5 5	5		No impacts.	No impact.	2	No impact.	short-term 1 3	1 1	2	5	33 35	Discounted as not inline with HTL policy Discounted due as it does not address flood risk issues.
22 23 SFAG Option A	measures could be a valuable option to incorporate into those properties at risk of flooding. For more severe storms and with increasing sea levels, the level of resilience will be limited and is therefore not considered to be a mid-term option, Do Nothing Do minimum Cowie southern training wall				protection 1 1	5	5		No impacts.	No impact. 3 3	2 3	No impact.	1	1	3	5 3		
22 23 SFAG Option A SFAG Option B	measures could be a valuable option to incorporate into those properties at risk of flooding. For more severe storms and with increasing sea levels, the level of resilience will be limited and is therefore not considered to be a mid-term option, Do Nothing Do minimum Cowie southern training wall Central area groynes				protection	5	5		No impacts. 2 3	No impact. 3 3	2 3	No impact.	1	1	2 3	3		Discounted due as it does not address flood risk issues. Will be considered as part of control structures within option 8. Will be considered as part of control structures within option 8.
22 23 SFAG Option A	measures could be a valuable option to incorporate into those properties at risk of flooding. For more severe storms and with increasing sea levels, the level of resilience will be limited and is therefore not considered to be a mid-term option, Do Nothing Do minimum Cowie southern training wall				protection 1 1	5 5	5		No impacts. 2 3	No impact. 3 3	2 3	No impact.	1	1	2 3	3		Discounted due as it does not address flood risk issues. Will be considered as part of control structures within option 8. Will be considered as part of control structures within option 8. Rock armour will be considered as a control structure within option 8.
22 23 SFAG Option A SFAG Option B	measures could be a valuable option to incorporate into those properties at risk of flooding. For more severe storms and with increasing sea levels, the level of resilience will be limited and is therefore not considered to be a mid-term option, Do Nothing Do minimum Cowie southern training wall Central area groynes				protection 1 1	5	5 5		No impacts. 2 3	No impact. 3 3	2 3	No impact.	1	1	3	5 3		Discounted due as it does not address flood risk issues. Will be considered as part of control structures within option 8. Will be considered as part of control structures within option 8.