

# Appendix A. Aberdeen City Council Short list of Flood Risk Management Options

Objective	Action Category	Action	Initial Coastal Screening	Initial River Screening	06/15 Aberdeen Bridge of Don		06/16 Aberdeen City - Denmore		06/17 Westhill		06/18 Aberdeen City - Deeside		06/19 Peterculter			
					Coastal	River	Coastal	River	Coastal	River	Coastal	River	Coastal	River		
					No coastal objectives	Properties/ People/ Utilities/ Roads	No objectives	No objectives	Inland PVA	No Objectives	Residential/ NRP/ People/ roads/ rail	Residential/ NRP/ People/ community facilities/ utilities/ roads/ rail	Inland PVA	Residential/ People/ Utilities/ Roads		
					PVd = £6k	PVd = £37.5M					PVd = £1.7M	PVd = £345M	PVd = £0	PVd = £18M		
					Avoid	Flood Protection Schemes	Maintain existing defences	If a formal flood protection scheme, including coastal defences, is present in the PVA, then always retain this action for the short-list								Sea wall along the beach and to south of harbour
Relocation	Relocation of properties/infrastructure away from flood risk areas	If any properties at risk retain for short list														
National Planning Policies	Scottish Planning Policy (SPP)	Always retain for short list														
	Planning Advice Notes (PANs)															
Local Planning Policies	Specific policies/guidance in local development plans in addition to National Planning Policy															
	Use of Strategic Flood Risk Assessment to inform local development plans															
River/floodplain restoration	Runoff		Gully woodland planting	Retain if NFM Screening A identifies areas of moderate to high potential												
		Floodplain reconnection	Only section of existing embankment is in vicinity of waste water treatment works (this does flood)										Flood banks already overtop, floodplain utilised	Already connected to floodplain.		
		Floodplain woodland	No locations considered appropriate, too urban and too far down urban area										Maximum potential ~700ha (minimum cost of ~£3.4M for full area of potential). Within the 'green' corridor. Potential land use issues i.e. golf courses. A lot of floodplain is planted and combined tidal effect .	Although there is some potential within the PVA the majority is not located upstream of the main area of properties at risk. The amount available is ~30ha and therefore unlikely to achieve much benefit		
		Creation of riparian woodland	No locations considered appropriate too urban and too far down urban area													
		Placed large woody debris and boulders	No locations considered appropriate too urban and too far down urban area		Retain if NFM Screening B identifies areas of moderate to high potential								Due to size of river and presence of embankments unlikely to be effective	There are some existing hard dams on the Culter Burn historically to hold water but now tend to be constantly wet. Potential for improvement in these locations with this action and potential on Gormack		

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					Protect (NFM)	Reach restoration (e.g. re-meandering)	Automatically screen out for coastal	Meanders already present	Meanders already present	No evidence of straightened sections				
Creation of washlands (offline storage)	No significant space on floodplains within PVA but potentially upstream outside of PVA boundary. No existing embankments to alter and create action on tributaries	No existing embankments on the smaller tributaries to alter and create washlands	Some existing embankments on Gormack to potentially create washlands											
				Managing channel instabilities (sediment transport)		Retain if NFM Screening C identifies areas of high deposition	Not aware of issues	Risk not from Dee, therefore action here would not reduce risk although sediment issues around mouth of harbour which is dredged yearly. Deposition on tributaries not really located in areas of risk	At the bottom of the Culter burn there are issues					
Sediment Management	Sediment traps	As risk not from Dee, would not particularly reduce risk. No issues on smaller tributaries												
			Surge attenuation	Creation/restoration of intertidal area including mudflats and saltmarsh, and regulated tidal exchange	Mainland - Retain if NFM Screening D identifies areas of moderate to high potential. Islands - Screen based on local geography	Automatically screen out for river	As risk not from Dee, would not particularly reduce risk, although keep in as standard							

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					Storage	Flood storage online										On tributaries upstream and west of Stronsay (30,000m3) and similar elsewhere (west burn).												
Flood storage offline											On tributaries upstream. Potential locations identified by ACC			Would most likely require multiple storage areas to capture flows on all watercourses (Leuchar Burn/Culter Burn and Gormack Burn)														
Conveyance	Increased conveyance through channel modification - deepening/widening/two-stage channel														Always potential for it to be tide locked so would not help. Permission been granted for area at woodside									No potential on tributary as restricted by flow/levels in the River Dee				
	Relief/diversion channel/bypass tunnel/culvert															Water down the mill leat causes the flooding so do not want to use this (only area initially identified as potential)									Too steep a valley, not suitable topography			
	Realign channel															No space for realignment due to proximity of properties/infrastructure									Not correct topography			
	Culvert (addition or removal)		Automatically screen out for coastal	Retain if river objectives identified												Trying to open up a few culverts (Alan to send list).												
	Removal of hydraulic constrictions															No known issues										Heavily urbanised city centre, sewers may need to be upgraded		

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					Protect (engineering)	Control structures	Bridges (raising, removal or repositioning)		No known issues					
Sluice gate/penstock/flap valve (addition or removal)		Potential for controlling flows through Persley Den. Change/stop flows down Mill leat								Properties on Dee flood (from local knowledge not flood maps), not on smaller watercourses so not relevant				
Weir (addition or removal)		Not considered to be a problem. One west of flood area stops tide affecting river. This is the most significant and important, therefore maintain								No weirs known to causes issues				
Trash screens (addition or removal)		Hakes (trash screens) are on culverts, operation programme in place.								Continue to maintain and clear				
Pumping stations									Size of river makes cost prohibitive and risk from culverted watercourses is not expected to be as high as mapping (due to modelling methodology)					
Revetments										Flooding associated with interaction with the River Dee. Some revetment already in place				
	Groynes									Flooding associated with interaction with the River Dee. Groynes already in place at foot of Dee				
	Breakwaters									Don't affect still water level therefore will not impact on interaction with River Dee				

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					Coastal	Artificial reefs and detached breakwaters	Retain if coastal objectives identified	Automatically screen out for river						
Gates and tidal barriers										Affordability may be an issue but consider further for area west of harbour. Would not reduce risk at foot of the Dee. Potential conflict with harbour use. Would impact on outflow from River Dee which is the larger flood source				
Direct defences	Embankment	Retain if coastal objectives identified	Retain if river objectives identified		Improve existing potentially					No space due to existing land use	Embankment at reservoir maintained by Scottish water but not sufficient to protect reservoir. Agricultural embankments overtop regularly. May be potential for new where there is space. Location to be defined in ICS.			
	Wall										Location to be defined in ICS.			
	Adaptable wall (can be added to)									In combination with measures to address river flood risk (so would deal with both sources of flooding). Concrete wave wall already in place at foot of Dee			Type of defence will depend on height and space available for footprint, most likely to be walls rather than embankment (embankment in Millside area)	
	Demountable/temporary defence										On River Dee potentially		No space, too many properties backing onto watercourse	
Sustainable Urban Drainage	SUDs measures	Automatically screen out - surface water measures												
Watercourse maintenance	Routine inspection and maintenance of watercourses	Automatically screen out for coastal	Always retain for short list											
	Event triggered watercourse maintenance													
Property level protection	Property level protection	If any properties at risk retain for short list												
	Resilient property design (retrofit)													

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Prepare	Flood forecasting & warning	Flood forecasting and alerts	Liaise with SEPA regarding assessment of Flood Warning appraisal for inclusion	SEPA to advise	SEPA to advise	SEPA to advise	SEPA to advise		SEPA to advise	SEPA to advise	SEPA to advise		SEPA to advise	
		Flood warning schemes		SEPA to advise	SEPA to advise	SEPA to advise	SEPA to advise		SEPA to advise	SEPA to advise	SEPA to advise		SEPA to advise	
	Self Help	Business continuity planning	If any non-residential properties at risk retain for short list											
		Flood insurance	If any properties at risk retain for short list											
		Community Flood Action Groups (including resilient community plans)												
		Awareness raising												
	Emergency Plans	Emergency response plans	Always retain for short list											
Site Protection Plans	Site protection plans	If trunk roads, railways, airports, cultural heritage sites, designated environmental sites, utilities present then include on short-list		utilities, rail, roads				Roads	roads, rail, cultural heritage	utilities, roads, rail, cultural heritage		utilities, roads		
Improved Understanding	Modelling and other assessments to improve knowledge of flood hazards and impacts	Always retain for short list												

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Aberdeen City Council Comments/Thoughts for above sites

						New Aberdeen exhibition centre at carrying a diversion on Greenburn, although for new development rather than to reduce risk from baseline						Increased flooding compared to flood maps expected around north side of harbour (union sq. and train station) Wave overtopping experienced at entrance to harbour	Gilcomston Burn - 100yr defences	Roads in Millside (south of Peterculter)
						Green Burn, Scatterburn - chk references/names						Wave overtopping, foot of the Dee village - existing wave wall which overtops currently (wave wall integrated into bk of houses) - small fisherman's village - probably listed buildings (40 approx.)	Culverted watercourses are modelled as open	Majority of flooding from Cutler burn
						Far Burn Near Dyce							Westburn have flood problems u/s before it goes into the culvert (u/s of A90)	Also North Burn
						Grandholm Village in centre of PVA at risk from Don. Flood bank and mill leat still exist							Some flooding where tributary comes out of culvert for a short distance	
						Flood bank at Grandholm village may provide some protection - model update will include flood bank and new bridge)							Flood scheme considered - 30,000m3 upstream of Hill of Rubislaw to help d/s	
						Bucksburn outside PVA							Watercourses south of Westburn flow into Dee but all culverted. ACC to provide details	
						Glashie Burn not been modelled - this has defences							Risk at Riverside Drive (west of suspension bridge)	
													Prepare' considered appropriate	