

Bath and North East Somerset Flood Risk Management Strategy – Appendix G

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Appendix G - Proposed & Discounted Options			
Option No	Location	Description	Comments
Strategic Options			
1	Upstream Storage (u/s of the A4 Bath Road upstream storage)	Creation of an in-line flood detention area extending from the south side of the Bath Road A4 road bridge at Bathford for some 1.5km southwards. Includes construction of flow control structure/weir some 100m south of A4 road bridge; may require site specific defence raising through city river corridor.	Proposed option
2	Bypass Tunnel & Pumping Station - 4km Tunnel Under Bath	Bore a tunnel beneath Bath some 4km in length, from just upstream of the A36 Bathwick Street Bridge to just downstream of Brassmill Lane Industrial Estate to convey a range of peak flood flows around the city, thereby minimising defence raising or avoiding them altogether. The tunnel would be around 4m in diameter and sunk to such a depth beneath the City, and along such a route, as to not conflict with services, tunnels or the springs serving the spas. An intake at the upstream end will take river water into a series of pump sets with a variable phase power supply thereby providing an efficient and reliable variable speed pump system, catering for a range of flows in the most efficient manner possible. A variable phase supply will enable more cheap and reliable single speed motors to run pumps at a range of flow rates whilst using electricity in the most efficient manner possible. Given the size and importance of Bath's economy, this solution appears to be strongly viable. Further geotechnical and environmental investigation would be required to fully validate this solution.	Proposed option
3	Raised defences and compensatory storage	Raise hard river defences along whole river corridor and provide compensatory flood storage downstream at Newton St Loe and Holm Mead.	Proposed option
4	Cumulative Development Site Site-Specific Flood Storage Areas	Provision of compensatory flood storage within the river corridor in the City of Bath by the construction of the site specific flood storage areas at development sites: B1a, B3b, B4a, B5, B6a, B7, B8, B16, B17i, B18; Also includes the non development sites: Victoria park (next to B2c), Green Park (next to B6c), Locksbrook Island (remove section of island next to B13d&e)	Proposed option
5	Channel Widening & Deepening Through City of Bath	Widen channel through City of Bath by up to 50% and lower bed by 1m to 2m between Pulteny Weir and Sluice at Locksbrook Island. This option has a capital cost estimate of some £150M, as it requires replacement of road bridges, shoring up of foundations to riverside structures and alterations to weirs.	Proposed option
6	Twerton sluice improvements and compensatory flood storage downstream at Newton St Loe	Construct new sluice to improve flood alleviation, this would still require site specific defence raising options. Compensatory storage will be required.	Proposed option - Compensatory storage at Holm Mead in Keynsham was discounted from this option due to two existing wiers along the route and the increased flood risk for Salford Town
7	Upstream storage at Kensington Meadows and the proposed Mill Lane park and ride	Provision of flood detention upstream storage by adapting land surface profile of the Kensington Meadows and Mill Lane park & ride site; would still require site specific defence raising options.	Proposed option - Below ground storage options at both sites were discounted on high cost grounds
8	Riverside upstream storage	Channel widening / terracing to provide flood storage.	Proposed option
9	River Wellow Storage & Council Land to the North of	Provision of flood storage areas	Proposed option
10	West Hill Gardens Flood Storage & Fox Hills Flood Storage	Provision of flood storage areas	Proposed option
11	Overdredging of Channel through Bath	Removal of accumulated silt to improve conveyance capacity	Discounted - Due to high cost of dredging, environmental and cost issues associated with silt removal and work would need redoing every 2 years (>£5m each time), all for a limited impact on SoP.
12	Mill Lane Park & Ride - Buried Storage Tank	Excavation for and construction of a buried storage tank with associated flow control structures and pump sets.	Discounted - Due to very Large construction cost (>£2M) problems with disposal of large quantity of soil (environmental and cost) for a comparatively small impact on SoP, particularly compared to the cheaper cost of the above ground options.
13	Cricket Ground Buried Storage Tank	Excavation for and construction of a buried storage tank with associated flow control structures and pump sets.	Discounted - Due to very Large construction cost (>£2M) problems with disposal of large quantity of soil (environmental and cost) for a comparatively small impact on SoP, particularly compared to the cheaper cost of the above ground options.
14	Generic: Accumulation of a series of small flood storage areas along the river corridor; each strategic option being 1 number (FSA) less than the previous option.	Cumulative compensatory storage FD benefit obtained by constructing a series of small FSAs along the river corridor.	Discounted - Only one option included under strategic options as successive removal of FSAs from the scope reduced an already questionable improvement in SoP.
15	Clandown Flood Storage RK2-RK8	FSA to provide attenuation of flood flows	Discounted - FSA not considered to have sufficient capacity to provide benefit.

Appendix G - BANES STRATEGIC OPTIONS

Option No	Site Name /Option
1	Upstream Storage (u/s of the A4 Bath Road upstream storage)
	Creation of an in-line flood detention area extending from the south side of the Bath Road A4 road bridge at Bathford for some 1.5km southwards. Includes construction of flow control structure/weir some 100m south of A4 road bridge; may require site specific defence raising through city river corridor.
2	Bypass Tunnel & Pumping Station - 4km Tunnel Under Bath
City of Bath from Bathampton to Brassmill Lane Industrial Estate	Bore a tunnel beneath Bath some 4km in length, from just upstream of the A36 Bathwick Street Bridge to just downstream of Brassmill Lane Industrial Estate to convey a range of peak flood flows around the city, thereby minimising defence raising or avoiding them altogether. The tunnel would be around 4m in diameter and sunk to such a depth beneath the City, and along such a route, as to not conflict with services, tunnels or the springs serving the spas. An intake at the upstream end will take river water into a series of pump sets with a variable phase power supply thereby providing an efficient and reliable variable speed pump system, catering for a range of flows in the most efficient manner possible. A variable phase supply will enable more cheap and reliable single speed motors to run pumps at a range of flow rates whilst using electricity in the most efficient manner possible. Given the size and importance of Bath's economy, this solution appears to be strongly viable. Further geotechnical and environmental investigation would be required to fully validate this solution.
3	Raised defences and compensatory storage
	Raise hard river defences along whole river corridor and provide compensatory flood storage downstream at Newton St Loe and Holm Mead.
4	Cumulative Development Site Site-Specific Flood Storage Areas
	Provision of compensatory flood storage within the river corridor in the City of Bath by the construction of the site specific flood storage areas at development sites: B1a, B3b, B4a, B5, B6a, B7, B8, B16, B17i, B18; Also includes the non development sites: Victoria park (next to B2c), Green Park (next to B6c), Locksbrook Island (remove section of island next to B13d&e)
5	Channel Widening & Deepening Through City of Bath
	Widen channel through City of Bath by up to 50% and lower bed by 1m to 2m between Pulteny Weir and Sluice at Locksbrook Island. This option has a capital cost estimate of some £150M, as it requires replacement of road bridges, shoring up of foundations to riverside structures and alterations to weirs.
6	Twerton sluice improvements and compensatory flood storage downstream
	Construct new sluice to improve flood alleviation, this would still require site specific defence raising options.
7	Upstream storage at Kensington Meadows and the proposed Mill Lane park and ride
	Provision of flood detention upstream storage by adapting land surface profile of the Kensington Meadows and Mill Lane park & ride site; would still require site specific defence raising options.
8	Riverside upstream storage
	Channel widening / terracing to provide flood storage.
9	River Wellow Storage & Council Land to the North of Somervale Road
	Provision of flood storage areas
10	West Hill Gardens Flood Storage & Fox Hills Flood Storage
	Provision of flood storage areas

Appendix G - SITE SPECIFIC OPTIONS

Option No	Site Ref	Site Name	Comments
101	B1b	Cornmarket to Podium	a) Integrated Building Defences & SUDS; e.g. hard defences, patios etc.
102	B2a	Empire undercroft	a) 2m high glazed flood barrier within undercroft concourse, enabling removal of steel railings
103	B2c	Grand Parade	a) Bunding to landward boundary to provide in-line flood detention & SUDS. Opportunity for creation of an amphitheatre should this be included in the strategic storage option.
104	B3a	The Rec & sports centre	a) Excavate underground flood storage tank to absorb some of the peak flows & SUDS. Playing field will be laid to roof of tank ensuring continual use of pitch. (part of combined strategic storage options)
105	B3b	Cricket Ground	a) Bunding and ramped access to outside perimeter of grounds will enable its use as a temporary flood detention area (part of combined strategic storage options) & SUDS.
106	B4a	Manvers Street	a) Integrated building defences and SUDS, including flood walls/perimeter flood defence (possibly running from upstream and downstream bridges). b) Bypass channel and pond to provide storage and amenity including SUDS.
107	B5	Former Menzies Hotel	a) Perimeter flood defence to hotel and mitred flood gate (to canal theme) on canal to Rossiter's Bridge will enable canal basin/marina to act as a small flood detention area. Lock keeper's cottage will need perimiter defence raising and footpath to cottage & SUDS.
108	B6a	Avon Street Car / Coach Park	a) Integrated Building Defences and SUDS (e.g. wetlands).
109	B6b	City of Bath College	a) Integrated Building Defences & SUDS
110	B6ci	Green Park House Topland	
111	B6cii	Green Park House other	
112	B6di	Kingsmead House	
113	B6diii	Rosewell Court	
114	B6e	1-3 James St West	
115	B6f	4 James St West	
116	B6g	The Forum	
117	B7	Green Park Station	a) Integrated building defences & SUDS (e.g. Architecturally designed hard defences to be in keeping with existing development, defence height optimised through construction of terraced inlet channel again), designed in correlation with remodelling of Green Park as small flood detention area (FDA) b) SUDS; Section of Green Park Road (along eastern edge of park) to also become terraced inlet = absorbs small peaks in flow. Increases river-side frontage for future development/open aspect. Could join the 2 inlet channels with culvert to form a bypass channel.
118	B8	BWR East	a) Re-profiling (e.g. Remodel green open space to north boundary and recreation ground on opposite bank to provide channel widening), combine with hard defences to perimeter bund car park. b) Create bypass channel within site to provide flood storage. c) Integrated Building Defences & SUDS
119	B9a	South Quay	a) Integrated Building Defences & SUDS
120	B9b	RBP to Travis Perkins	a) Integrated Building Defences & SUDS, raised hard defence to northern property edge.
121	B12	Bath Press	a) Integrated Building Defences & SUDS, raised hard defence to northern property edge.
122	B13a	Lower Bristol Road	a) Integrated Building Defences & SUDS, raised hard defence to northern property edge.
	B13b	Lower Bristol Road	
	B13c	Lower Bristol Road	
	B13d	Lower Bristol Road	
	B13e	Lower Bristol Road - Access to Locksbrook Island Depot	a) Integrated Building Defences & SUDS, raised hard defence to northern property edge.
123	B13f	Brassmill Lane Industrial Estate (Lower Bristol Road F)	a) Integrated Building Defences & SUDS, hard defences/berm to property perimeter, Berm cut into channel on right bank by up to 16m, b) Convert disused railway line by excavation into a wetland side-channel for minor flood storage/extend back to river with some culvert installation work to form a bypass channel.
124	B14	Locksbrook	a) Flood Storage: set back defence with berms; coach vehicle trailer parking area relocated to disused Maybey bridge and original parking area remodelled to provide in-line flood detention/Ground remodelling could incorporate a bay or a beach and provide additional storage. b) Integrated Building Defences & SUDS
125	B15	The Maltings	a) Integrated Building Defences & SUDS, raised hard defence along riverside property boundary.
126	B16	BWR Phase one	a) Create wetland as compensatory flood water features as part of development. Capping off of potentially contaminated land with spoil from Recreation Ground underground SUDS storage reservoir option (for B3a). b) Integrated Building Defences & SUDS, raised hard defence to property edge.
127	B17ii	BWR Phase Three (2&3)	a) Construct school buildings on raised ground with spoil imported from B3a (Recreation Ground) excavation work b) Integrated Building Defences & SUDS, raised hard defence to perimeter.
128	B18	Westmark	a) Integrated Building Defences & SUDS, raised hard defence to property edge
129	B19	Comfortable Place / TA Centre	a) Integrated Building Defences & SUDS
130	B20	Omega Centre	a) Integrated Building Defences & SUDS
131	B21	Hinton Garage	a) Remodel recreation ground lowering main area and pushing earth into bunds to the back of the grounds (Nelson Place West and Norfolk Crescent). b) Integrated Building Defences & SUDS
132	KM1	Somerdale / Cadburys	a) Flood Detention Area with control structures on Keynsham Hams, combined with raising of bunded defences to Cadbury's site as necessary b) Integrated Building Defences & SUDS, raised hard defence to property edge
133	KM3b	The Centre	a) Integrated Building Defences & SUDS, raised hard defence to property edges.
134	KM8	Riverside Park	a) Channel widening and high level overflow channels. b) SUDS and combined with new culverts beneath road and rail embankments, includes wetland creation.
135	KM9	Keynsham Paper Mill	a) SUDS (Detention basins, open channels and swales).
136	KM11	Broadmead Lane Waste Site	a) Flood Detention Area, IDB & SUDS.
137	MN3	Chesterfield House	
138	MN4	Streamside	a) Integrated Building Defences & SUDS, raised defences to property edge
139	MN8	Somer Centre	
140	MN9	Welton	a) Flood Detention Area & channel widening combined with raising of bunded defences. Raised hard defences b) Integrated Building Defences & SUDS c) Deculverting
141	MN12	High Street	a) Integrated Building Defences & SUDS, raised defences to property edge
142	MN13	Town Park	
143	MN14	Town Park Housing	
144	MN17	Old Mills Industrial Estate Extension	a) Flood Detention Area & channel widening combined with raising of bunded defences b) Integrated Building Defences & SUDS, raised defences to property edge
145	RK2	Rymans	a) Integrated Building Defences & SUDS, raised defences
146	RK3	Charltons	
147	RK4	Old Bakery	a) Integrated Building Defences & SUDS, raised defences
148	RK5	Post Office	
149	RK6	Library / Youth Centre	
150	RK7	Fortescue Road	
151	RK8	RadCo	a) Flood Detention Area & channel widening combined with raising of bunded defences b) Integrated Building Defences (flood walls/bunds) & SUDS
152	RK9	Combe End Road	a) Clandown FSA with repairs to existing masonry culvert b) Integrated Building Defences (flood walls/bunds) & SUDS