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Morpeth Flood Alleviation Scheme Options Consultation

April 2009

Morpeth Flood Alleviation Scheme

Environment Agency Proposed options

April 2009

Introduction

Since November 2007 the Environment Agency have been working to increase the existing protection against flooding in Morpeth.

As a result of investigations so far, we have already been able to discount a number of options. These options are not suitable for Morpeth, but have been summarised on page 2 for your information.

We have identified two broad options for a flood alleviation scheme that are technically, environmentally and economically viable. These are:

- to build flood defences where none presently exist, and refurbish or raise existing walls
- to build one or more floodwater storage areas upstream of Morpeth, together with new and refurbished flood walls in the town

By creating flood water storage areas upstream, it would mean the defences in the town would not need to be as high.

We have identified three possible sites upstream to store water during flood conditions. These are:

- Upstream of Mitford Hall on the Mitford Estate
- Upstream of Rivergreen Mill
- Upstream of Meldon Park

We are continuing our discussions with the landowners involved to understand their needs. It is possible that either one or two of the sites could be used to store floodwater.

Both of the options would be complemented by improvements to culverts in Morpeth. Increasing the culverts' capacity should reduce the risk of flooding from Cotting Burn, Church Burn and Postern Burn.

We are working closely with Northumbrian Water and Northumberland County Council to identify ways of reducing flood risk from surface water and to ensure any flood scheme does not increase the risk of flooding from other sources.

This document gives further details on the proposed options, and the potential impacts of each. The options are:

- Option 1 – Local defences in Morpeth
- Option 2a – Storage near Rivergreen Mill (Site B) and local defences in Morpeth
- Option 2b – Storage on the Mitford Hall Estate (Site D) and local defences in Morpeth
- Option 2c – Storage on the Mitford Hall Estate (Site D) and Meldon Park (Site A) and local defences in Morpeth
- Option 2d – Storage near Rivergreen Mill (Site B) and Meldon Park (Site A) and local defences in Morpeth

For more information please contact Project Manager Helen Tattersdale:
Address: Environment Agency, Phoenix House, Global Avenue, Leeds, LS11 8PG
Telephone: 0113 2134682
Email: helen.tattersdale@environment-agency.gov.uk

Options discounted before detailed appraisal

The following options were discounted before we started the detailed appraisal.

River dredging

Dredging the bed of the river Wansbeck is not a sustainable option. Making the channel bigger or lower will not make it big enough to contain the huge volumes of water which pass through the town during a flood. The channel also fills up again quickly, and so dredging would need to be done on a regular basis. This is very costly, and can have a negative impact on the biodiversity of a river. There is also the risk of significant pollution occurring to the river from dredging activities.

Removing weirs

Removing weirs at Oliver's Mill and East Mill would have little impact on flood levels. The removal of weirs can lead to a reduction in river bed levels. This could threaten the stability of riverside walls and existing flood defences.

Raising Oldgate Bridge

Raising or replacing the bridge would reduce flood water levels immediately upstream. However, this would require significant works to the road on Oldgate, and would not be cost effective.

Options discounted following detailed appraisal

The following options, included in the detailed appraisal sheets in Section 3, have been discounted and are therefore not included in the summary sheets in this section.

Storage without local defences

Building upstream storage areas without constructing new defence walls in the town has been discounted on technical grounds. The required storage volume is available in the river valley but the height of dam and size of control structure required to achieve it is not technically viable.

Storage at specific locations, with local defences in Morpeth

Upstream storage only at Meldon Park (Site A)

We have discounted upstream storage near Meldon Park (Site A) as a standalone option following hydraulic modelling. Because this storage area is upstream of the Hart Burn confluence, there would be a risk that a significant rainfall event in the Hart Burn catchment could cause flooding in Morpeth. We are considering this storage site in combination with other storage sites further downstream at Rivergreen Mill (Site B) and Mitford Hall (Site D).

Upstream storage at combination of Sites B and D

We have discounted a combination of storage at Rivergreen Mill (Site B) and Mitford Hall (Site D). The hydraulic modelling shows that there is no significant reduction in the height of storage embankment required at each site when compared to either Site B or Site D by itself. This is partly due to the existing storage which exists in the floodplain at these locations.

Upstream storage at combination of Sites A, B and D

We have discounted a combination of three storage areas at Meldon park (Site A), Rivergreen Mill (Site B) and Mitford Hall (Site D). Our preliminary environmental assessment has shown that the impact of three storage sites on the river is likely to be greater than for individual sites and for a combination of two. In addition, our hydraulic modelling has shown that there is little benefit obtained in combining three storage sites.

Option 1 –
Local defences in Morpeth

We could construct local flood defences where none exist at present, and refurbish or raise the existing defences to provide a common level of flood risk management for Morpeth. We would also install a tree screen upstream of Lowford Bridge to prevent large debris from reaching Morpeth. This could reduce the risk of flooding to between 2% (1 in 50 year standard of protection) and 0.3% (1 in 300y standard of protection) chance of occurring in any year.

At **Mitford Rd**, we would construct a new flood defence along the rear of the properties which back onto the river. Depending on the standard of protection, this could be between 1m and 3m high.

At **High Stanners**, we would construct a new flood defence between the properties and the river. Depending on the standard of protection, this could be between 1m and 3m high.

Between Oldgate Bridge and Elliot Bridge, we would construct a new flood defence beside the river on the east side. Depending on the standard of protection, this could be between 500mm and 2m high. At Oldgate Bridge we would provide a flood barrier or gate across both ends of the road.

Elsewhere, we would refurbish or replace the existing flood defences and retaining walls. Depending on the standard of protection, we may need to raise these by up to 1.5m above their current height.

We would increase the capacity of the **Cotting Burn, Church Burn and Postern Burn** culverts to ensure that the flood risk from these watercourses was no greater than from the Wansbeck. We would either replace the culverts with larger ones, or construct overflow culverts to take the excess water. As an alternative on the Cotting Burn, we could create a flood storage area upstream to limit flows through the existing culverts.



High Stanners



Oliver's Mill



St George's church



Bennett's Walk

Potential positive and negative impacts and issues – Option 1

	Positive	Negative
Human	<p>Reduced flood risk to residents and businesses in Morpeth.</p> <p>Business confidence would increase as current flood risk would be reduced, long-term investment in the local economy could be supported.</p>	<p>Reduced recreational opportunity at High Stanners public open space.</p>
Geomorphology	<p>Natural flow and sediment transport regime would continue as no upstream impoundment.</p>	<p>Bank profiles through Morpeth are heavily modified and would be further modified under this option.</p> <p>Disconnection from floodplain around High Stanners area.</p> <p>In-channel works would disturb bed sediments increasing turbidity and reducing water quality. At Morpeth, the surface bed material is typically fine gravels with some coarser deposits.</p>

	Positive	Negative
Landscape and Visual	<p>Opportunity to improve the visual appearance of some of the existing hard defences within the town.</p>	<p>Visual impact of walls on riverside residents and river corridor users.</p> <p>Increased separation of the townscape fabric and character from the river corridor.</p> <p>Reduction in quality of landscape character for which Morpeth is renowned within the region.</p> <p>Potential impact of high walls on character and quality of Conservation Area.</p> <p>Increased difficulty of establishing / maintaining river crossings and access to river.</p> <p>Increased Landscape and Visual impact on private residence gardens aligning Mitford Road.</p>
Historic Environment	<p>Major benefit in reduced impacts of flooding on cultural heritage sites downstream, including the listed buildings and parts of the Conservation Area (mentioned above) within Morpeth.</p>	<p>Potential adverse impacts to the setting of the Oldgate and Chantry areas of Morpeth town Conservation Area from the erection of higher flood walls/ embankments on the north side of River Wansbeck.</p>
Ecology	<p>No statutory sites (i.e. SAC, SSSI, SPA, Ramsar) would be affected by increased flooding.</p> <p>Limited opportunity for installing 'bat bricks' where defences are re-built or increased in height to provide new roosting habitat.</p> <p>Existing upstream connectivity of Wansbeck would be maintained.</p>	<p>No opportunity for habitat creation upstream.</p> <p>Wansbeck through Morpeth will be further modified with new defences at High Stanners for example.</p> <p>Loss of riverine habitat and increased disconnection of river from its floodplain through the town.</p> <p>In-channel works to rebuild/repair and construct defences through Morpeth could disturb otter, crayfish and fish movements (although would be subject to Land Drainage Consent).</p>

Option 2a –

Storage near Rivergreen Mill (Site B) and local defences in Morpeth

We could create a flood storage area upstream of Rivergreen Mill (Site B) to limit the flow in the river through Morpeth during periods of high flow. We would construct local flood defences in Morpeth where none exist at present, and refurbish the existing defences to provide a common level of flood risk management for Morpeth. We would also install a tree screen upstream of Lowford Bridge to prevent large debris from reaching Morpeth. This could reduce the risk of flooding to between 2% (1 in 50 year standard of protection) and 0.3% (1 in 300y standard of protection) chance of occurring in any year.

We would create the **storage area** by constructing a grassed earth embankment across the river. The embankment could be between 60m and 160m long, and between 8m and 17m high.

- During normal and low flows, the river would pass through the embankment in a culvert with a natural bed. Velocities and depths in this channel and culvert would allow movement of fish and crayfish. This culvert would be closed during high flows.
- During periods of high flow, a second 'high flow' culvert would limit the flow through the embankment, with the remainder of the water being impounded in the storage area. We may need to provide some form of flow control structure to the 'high flow' culvert such as a moving gate.

At **Mitford Rd**, we would construct a new flood defence along the rear of the properties which back onto the river. This could be between 1m and 1.5m high.

At **High Stanners**, we would construct a new flood defence between the properties and the river. This could be between 500mm and 1.3m high.

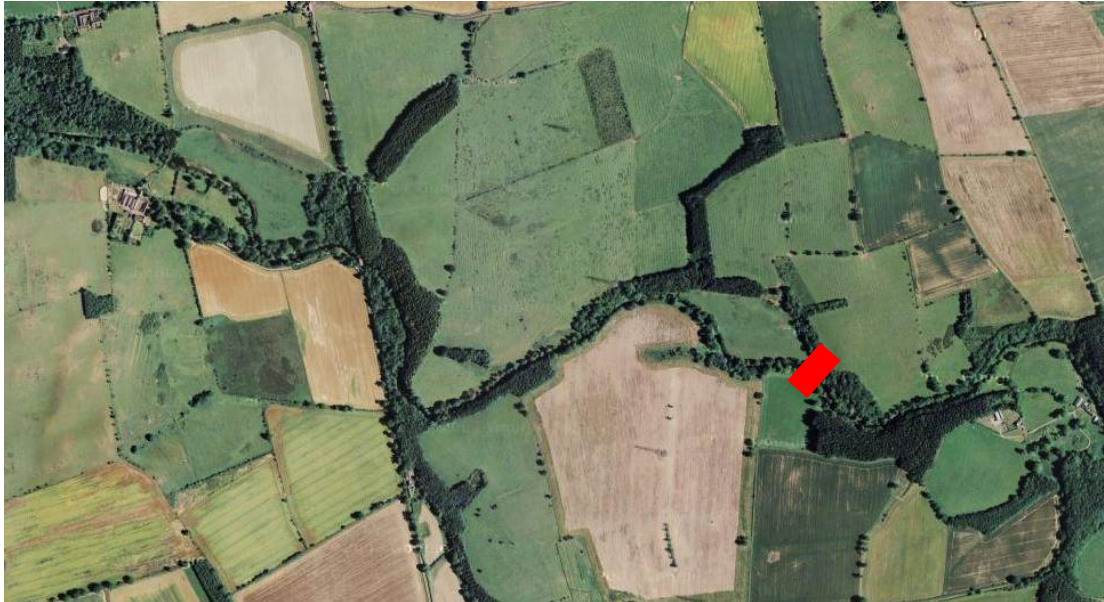
At **Oldgate Bridge** we would reprofile the road at either end of the bridge to raise the level of the road by 100mm.

At **Elliot Bridge**, we would construct a new flood defence on the north side to reduce the flood risk to the leisure centre and Pretoria Avenue.

Between **St George's Church and the library**, we would raise the flood defence walls by between 150mm and 400mm. We may need to replace the existing walls to do this.

Elsewhere, we would refurbish or replace the existing flood defences and retaining walls at their existing height.

We would increase the capacity of the **Cotting Burn, Church Burn and Postern Burn** culverts to ensure that the flood risk from these watercourses was no greater than from the Wansbeck. We would either replace the culverts with larger ones, or construct overflow culverts to take the excess water. As an alternative on the Cotting Burn, we could create a flood storage area upstream to limit flows through the existing culverts.



Approximate location of flood storage embankment near Rivergreen Mill

Potential positive and negative impacts and issues – Option 2a

	Positive	Negative
Human	<p>Reduced flood risk to residents and businesses in Morpeth.</p> <p>Business confidence would increase as current flood risk would be reduced, long-term investment in the local economy could be supported.</p>	<p>Increase in frequency and area of Grade 3 agricultural land flooded affecting current agricultural practices.</p>
Geomorphology	<p>Increased sediment and nutrient movement onto a wider area of the floodplain upstream of the dam site in times of inundation.</p>	<p>Storage area could conflict with Water Framework Directive hydromorphology objectives. The River Wansbeck from Hartburn to Font is classed as good ecological status.</p> <p>The dam could cause the reduction of sediment supply to any floodplain areas downstream movement of nutrients from the floodplain into the river.</p> <p>River is more constrained so potential for channel migration is lower than at dam sites A or D.</p> <p>Banks downstream of dam are very steep with generally loose soils stabilised by trees so there is the potential for destabilisation.</p>

	Positive	Negative
Landscape and Visual	<p>Smallest construction footprint of all three Dam sites.</p> <p>Lowest potential visual impact of all three Dam sites.</p> <p>Considered smallest borrow area for construction of Dam.</p>	<p>Potential for impact on sensitive landscape features (e.g. ancient woodland)</p>
Historic Environment	<p>Major benefit in reduced impacts of flooding on cultural heritage sites downstream, including the listed buildings and parts of the Conservation Area (mentioned above) within Morpeth.</p>	<p>Unknown archaeological and palaeoenvironmental deposits may suffer adverse impacts within footprint and construction zone of dam.</p>
Ecology	<p>No statutory sites would be affected by increased flooding.</p> <p>An increase in the land area inundated by flood water could help contribute to Local Biodiversity Action Plan (BAP) targets and supports the outputs from the North East Wetland Feasibility Studies.</p>	<p>Increased strandings for fish and white-clawed crayfish as a consequence of inundation.</p> <p>Increased inundation of ancient woodland and Site of Nature Conservation Interest (parts of same site).</p> <p>Storage area could conflict with Water Framework Directive. The River Wansbeck from Hartburn to Font is classed as good ecological status.</p> <p>In-channel works to rebuild/repair and construct defences through Morpeth could disturb otter, crayfish and fish movements (although would be subject to Land Drainage Consent).</p>

Option 2b – Storage near Mitford Hall (Site D) and local defences in Morpeth

We could create a flood storage area upstream of Mitford Hall to limit the flow in the river through Morpeth during periods of high flow. We would construct local flood defences in Morpeth where none exist at present, and refurbish the existing defences to provide a common level of flood risk management for Morpeth. We would also install a tree screen upstream of Lowford Bridge to prevent large debris from reaching Morpeth. This could reduce the risk of flooding to between 2% (1 in 50 year standard of protection) and 0.3% (1 in 300y standard of protection) chance of occurring in any year.

We would create the **storage area** by constructing a grassed earth embankment across the river. The embankment could be between 220m and 360m long, and between 6m and 13m high.

- During normal and low flows, the river would pass through the embankment in a culvert with a natural bed. Velocities and depths in this channel and culvert would allow movement of fish and crayfish. This culvert would be closed during high flows.
- During periods of high flow, a second 'high flow' culvert would limit the flow through the embankment, with the remainder of the water being impounded in the storage area. We may need to provide some form of flow control structure to the 'high flow' culvert such as a moving gate.

At **Mitford Rd**, we would construct a new flood defence along the rear of the properties which back onto the river. This could be between 1m and 1.5m high.

At **High Stanners**, we would construct a new flood defence between the properties and the river. This could be between 500mm and 1.3m high.

At **Oldgate Bridge** we would reprofile the road at either end of the bridge to raise the level of the road by 100mm.

At **Elliot Bridge**, we would construct a new flood defence on the north side to reduce the flood risk to the leisure centre and Pretoria Avenue.

Between **St George's Church and the library**, we would raise the flood defence walls by between 150mm and 400mm. We may need to replace the existing walls to do this.

Elsewhere, we would refurbish or replace the existing flood defences and retaining walls at their existing height.

We would increase the capacity of the **Cotting Burn, Church Burn and Postern Burn** culverts to ensure that the flood risk from these watercourses was no greater than from the Wansbeck. We would either replace the culverts with larger ones, or construct overflow culverts to take the excess water. As an alternative on the Cotting Burn, we could create a flood storage area upstream to limit flows through the existing culverts.



Approximate location of embankment near Mitford Hall

Potential positive and negative impacts and issues – Option 2b

	Positive	Negative
Human	<p>Reduced flood risk to residents and businesses in Morpeth.</p> <p>Business confidence would increase as current flood risk would be reduced, long-term investment in the local economy could be supported.</p>	<p>Increase in frequency and area of Grade 3 agricultural land flooded affecting current agricultural practices.</p>
Geomorphology	<p>River occupies concave bowl shaped valley so would lend itself to water storage.</p> <p>Increased sediment and nutrient movement onto a wider area of the floodplain upstream of the dam site in times of inundation.</p> <p>Greater potential for impoundment of flow upstream of site D than at Site A, due to the narrowness of the floodplain.</p>	<p>Storage area could conflict with WFD hydromorphology objectives. Wansbeck from Hartburn to Font is classed as good ecological status.</p> <p>Geomorphological sensitivity assessment indicates that the Wansbeck has predominantly moderate sensitivity although some reaches are highly sensitive.</p> <p>The valley at this point is wider than at dam site B so potential for channel migration is lower than at dam site A, but is greater than at dam site B.</p>

	Positive	Negative
Landscape and Visual	Good potential for extension of the existing Public Rights of Way (PROW) network linking over the north and south banks of the river (subject to landowner agreement).	<p>Largest Site area creating the biggest construction footprint.</p> <p>Considered to have the highest degree of localised visual impact during construction due to proximity to road.</p> <p>Loss of large areas of woodland and trees.</p> <p>Highest degree of impact on higher quality landscape character found closer to Morpeth.</p>
Historic Environment	Major benefit in reduced impacts of flooding on cultural heritage sites downstream, including the listed buildings and parts of the Conservation Area (mentioned above) within Morpeth	<p>Unknown archaeological and palaeoenvironmental deposits may suffer adverse impacts within footprint and construction zone of dam.</p> <p>Non-designated archaeological monuments such as Holly Well may be subject to greater degrees of erosion during periods of inundation.</p> <p>Possible long-term erosion of historic field patterns and hedgerows within maximum flood zone.</p>
Ecology	<p>No statutory sites would be affected by increased flooding.</p> <p>An increase in the land area inundated could help contribute to Local BAP targets and supports the outputs from the North East Wetland Feasibility Studies.</p>	<p>Increased strandings for fish and white-clawed crayfish as a consequence of inundation.</p> <p>Increased inundation of ancient woodland and Site of Nature Conservation Interest (SNCI) (this includes parts of same site).</p> <p>Storage area could conflict with Water Framework Directive. The River Wansbeck from Hartburn to Font is classed as good ecological status.</p> <p>In-channel works to rebuild/repair and construct defences through Morpeth could disturb otter, crayfish and fish movements (although would be subject to Land Drainage Consent).</p>

Option 2c –

Storage near Mitford Hall (Site D) and Meldon Park (Site A) and local defences in Morpeth

We could create two flood storage areas: one upstream of Mitford Hall, and one near Meldon Park, to limit the flow in the river through Morpeth during periods of high flow. We would construct local flood defences in Morpeth where none exist at present, and refurbish the existing defences to provide a common level of flood risk management for Morpeth. We would also install a tree screen upstream of Lowford Bridge to prevent large debris from reaching Morpeth. This could reduce the risk of flooding to between 2% (1 in 50 year standard of protection) and 0.3% (1 in 300y standard of protection) chance of occurring in any year.

We would create the **storage areas** by constructing grassed earth embankments across the river. Near Meldon Park, the embankment could be between 100m and 200m long, and between 5m and 9m high. At Mitford Hall, the embankment could be between 200m and 300m long, and between 5m and 10m high.

- During normal and low flows, the river would pass through the embankment in a culvert with a natural bed. Velocities and depths in this channel and culvert would allow movement of fish and crayfish. This culvert would be closed during high flows.
- During periods of high flow, a second ‘high flow’ culvert would limit the flow through the embankment, with the remainder of the water being impounded in the storage area. We may need to provide some form of flow control structure to the ‘high flow’ culvert such as a moving gate.

At **Mitford Rd**, we would construct a new flood defence along the rear of the properties which back onto the river. This could be between 1m and 1.5m high.

At **High Stanners**, we would construct a new flood defence between the properties and the river. This could be between 500mm and 1.3m high.

At **Oldgate Bridge** we would reprofile the road at either end of the bridge to raise the level of the road by 100mm.

At **Elliot Bridge**, we would construct a new flood defence on the north side to reduce the flood risk to the leisure centre and Pretoria Avenue.

Between **St George’s Church and the library**, we would raise the flood defence walls by between 150mm and 400mm. We may need to replace the existing walls to do this.

Elsewhere, we would refurbish or replace the existing flood defences and retaining walls at their existing height.

We would increase the capacity of the **Cotting Burn, Church Burn and Postern Burn** culverts to ensure that the flood risk from these watercourses was no greater than from the Wansbeck. We would either replace the culverts with larger ones, or construct overflow culverts to take the excess water. As an alternative on the Cotting Burn, we could create a flood storage area upstream to limit flows through the existing culverts.



Approximate location of embankment near Meldon Park.



Approximate location of embankment near Mitford Hall

Potential positive and negative impacts and issues – Option 2c

	Positive	Negative
Human	<p>Reduced flood risk to residents and businesses in Morpeth.</p> <p>Business confidence would increase as current flood risk would be reduced, long-term investment in the local economy could be supported.</p>	<p>Increase in frequency and area of Grade 3 agricultural land flooded affecting current agricultural practices.</p>
Geomorphology	<p>Two flood storage sites offers opportunity to create separate areas of wetland.</p>	<p>Two storage areas could conflict with WFD hydromorphology objectives. Wansbeck from Hartburn to Font is classed as good ecological status.</p> <p>Two culverts could disrupt sediment transport regime at two locations. Loss of natural flow and sediment transport regime at two places.</p> <p>Potential issues with release hydrographs and erosion at two locations.</p>
Landscape and Visual	<p>Landscape impacts are largely a combination of those identified for storage at A and D, although visual impacts may be reduced as a consequence of smaller dam structures.</p>	
<i>Site A</i>	<p>Protects the more sensitive landscape patterns downstream.</p>	<p>Largest zone of visual influence due to surrounding topographical conditions</p> <p>Highest degree of impact on surrounding landscape character of all Dam sites</p> <p>Highest impact on surrounding Public Rights of Way network of all Dam sites</p> <p>Highest degree of construction disturbance of all dam sites</p> <p>Highest requirement for stock refuges to be constructed throughout existing pasture land surrounding site.</p> <p>Highest loss of Grade 3 pasture quality land of all dam sites</p>

	Positive	Negative
<i>Site D</i>	Good potential for extension of the existing PROW network linking over the north and south banks of the river (subject to landowner agreement)	<p>Largest Site area creating the biggest construction footprint.</p> <p>Considered to have the highest degree of localised visual impact during construction due to proximity to road</p> <p>Loss of large areas of woodland and trees</p> <p>Highest degree of impact on higher quality landscape character found closer to Morpeth</p>
Historic Environment	Major benefit in reduced impacts of flooding on cultural heritage sites downstream, including the listed buildings and parts of the Conservation Area (mentioned previously) within Morpeth	Unknown archaeological and palaeoenvironmental deposits may suffer adverse impacts within footprint and construction zone of dam
Ecology	<p>No statutory sites would be affected by increased flooding.</p> <p>Two flood storage sites offer opportunity to create separate areas of wet grassland. An increase in the land area inundated could help contribute to Local BAP targets and supports the outputs from the North East Wetland Feasibility Studies.</p> <p>One of the best opportunities for habitat creation (at Site A).</p>	<p>Two culverts could obstruct up/downstream movement of fish and crayfish at two locations.</p> <p>Increase in ancient woodland within the flood outline.</p> <p>Increase in area of SNCI within the flood outline (Site D only).</p> <p>Storage areas could conflict with Water Framework Directive. The River Wansbeck from Hartburn to Font is classed as good ecological status.</p> <p>In-channel works to rebuild/repair and construct defences through Morpeth could disturb otter, crayfish and fish movements (although would be subject to Land Drainage Consent).</p>

Option 2d – Storage near Rivergreen Mill (Site B) and Meldon Park (Site A) and local defences in Morpeth

We could create two flood storage areas: one upstream of Rivergreen Mill, and one near Meldon Park, to limit the flow in the river through Morpeth during periods of high flow. We would construct local flood defences in Morpeth where none exist at present, and refurbish the existing defences to provide a common level of flood risk for Morpeth. We would also install a tree screen upstream of Lowford Bridge to prevent large debris from reaching Morpeth. This could reduce the risk of flooding to between 2% (1 in 50 year standard of protection) and 0.3% (1 in 300y standard of protection) in any year.

We would create the **storage areas** by constructing grassed earth embankments across the river. At Meldon Park, the embankment could be between 150m and 240m long, and between 7m and 10m high. At Rivergreen Mill, the embankment could be between 50m and 100m long, and between 6m and 11m high.

- During normal and low flows, the river would pass through the embankment in a culvert with a natural bed. Velocities and depths in this channel and culvert would allow movement of fish and crayfish. This culvert would be closed during high flows.
- During periods of high flow, a second 'high flow' culvert would limit the flow through the embankment, with the remainder of the water being impounded in the storage area. We may need to provide some form of flow control structure to the 'high flow' culvert such as a moving gate.

At **Mitford Rd**, we would construct a new flood defence along the rear of the properties which back onto the river. This could be between 1m and 1.5m high.

At **High Stanners**, we would construct a new flood defence between the properties and the river. This could be between 500mm and 1.3m high.

At **Oldgate Bridge** we would reprofile the road at either end of the bridge to raise the level of the road by 100mm.

At **Elliot Bridge**, we would construct a new flood defence on the north side to reduce the flood risk to the leisure centre and Pretoria Avenue.

Between **St George's Church and the library**, we would raise the flood defence walls by between 150mm and 400mm. We may need to replace the existing walls to do this.

Elsewhere, we would refurbish or replace the existing flood defences and retaining walls at their existing height.

We would increase the capacity of the **Cotting Burn, Church Burn and Postern Burn** culverts to ensure that the flood risk from these watercourses was no greater than from the Wansbeck. We would either replace the culverts with larger ones, or construct overflow culverts to take the excess water. As an alternative on the Cotting Burn, we could create a flood storage area upstream to limit flows through the existing culverts.



Approximate location of embankment near Meldon Park



Approximate location of embankment near Rivergreen Mill

Potential positive and negative impacts and issues – Option 2d

	Positive	Negative
Human	<p>Reduced flood risk to residents and businesses in Morpeth.</p> <p>Business confidence would increase as current flood risk would be reduced, long-term investment in the local economy could be supported.</p>	<p>Increase in frequency and area of Grade 3 agricultural land flooded affecting current agricultural practices.</p>
Geomorphology	<p>Two flood storage sites offer opportunity to create separate areas of wetland.</p>	<p>Two storage areas could conflict with WFD hydromorphology objectives. Wansbeck from Hartburn to Font is classed as good ecological status in draft Northumbria River Basin Management Plan.</p> <p>Two culverts could disrupt sediment transport regime at two locations.</p> <p>Loss of natural flow and sediment transport regime at two places along the Wansbeck. Potential issues with release hydrographs and erosion at two locations.</p> <p>Increased loss of unmodified bank and channel bed.</p>
Landscape and Visual	<p>Landscape impacts largely a combination of those identified for storage at A and B, although visual impacts may be reduced as a consequence of a smaller dam structure.</p>	
<i>Site A</i>	<p>Protects the more sensitive landscape patterns downstream.</p>	<p>Largest zone of visual influence due to surrounding topographical conditions</p> <p>Highest degree of impact on surrounding landscape character of all Dam sites</p> <p>Highest impact on surrounding Public Rights of Way network of all Dam sites</p> <p>Highest degree of construction disturbance of all Dam sites</p> <p>Highest requirement for stock refuges to be constructed throughout existing pasture land surrounding sites</p> <p>Highest loss of Grade 3 pasture quality of all Dam sites</p>

	Positive	Negative
<i>Site B</i>	<p>Smallest construction footprint of all three Dam sites.</p> <p>Lowest potential visual impact of all three Dam sites.</p> <p>Considered smallest borrow area for construction of Dam.</p>	<p>Potential for impact on sensitive landscape features (e.g. ancient woodland)</p>
Historic Environment	<p>Major benefit in reduced impacts of flooding on cultural heritage sites downstream, including the listed buildings and parts of the Conservation Area (mentioned above) within Morpeth</p>	<p>Unknown archaeological and palaeoenvironmental deposits may suffer adverse impacts within footprint and construction zone of dam</p>
Ecology	<p>No statutory sites would be affected by increased flooding.</p> <p>An increase in the land area inundated at two locations from could help contribute to Local BAP targets and supports the outputs from the North East Wetland Feasibility Studies.</p> <p>One of the best opportunities for habitat creation (at Site A).</p>	<p>Increased strandings for fish and white-clawed crayfish as a consequence of inundation.</p> <p>Two culverts could obstruct up/downstream movement of fish and crayfish at two locations.</p> <p>Storage areas could conflict with Water Framework Directive. The River Wansbeck from Hartburn to Font is classed as good ecological status.</p> <p>In-channel works to rebuild/repair and construct defences through Morpeth could disturb otter, crayfish and fish movements (although would be subject to Land Drainage Consent).</p>