

# Summary Project Appraisal Report

Authority Scheme Reference

Promoting Authority

Scheme Name



Date

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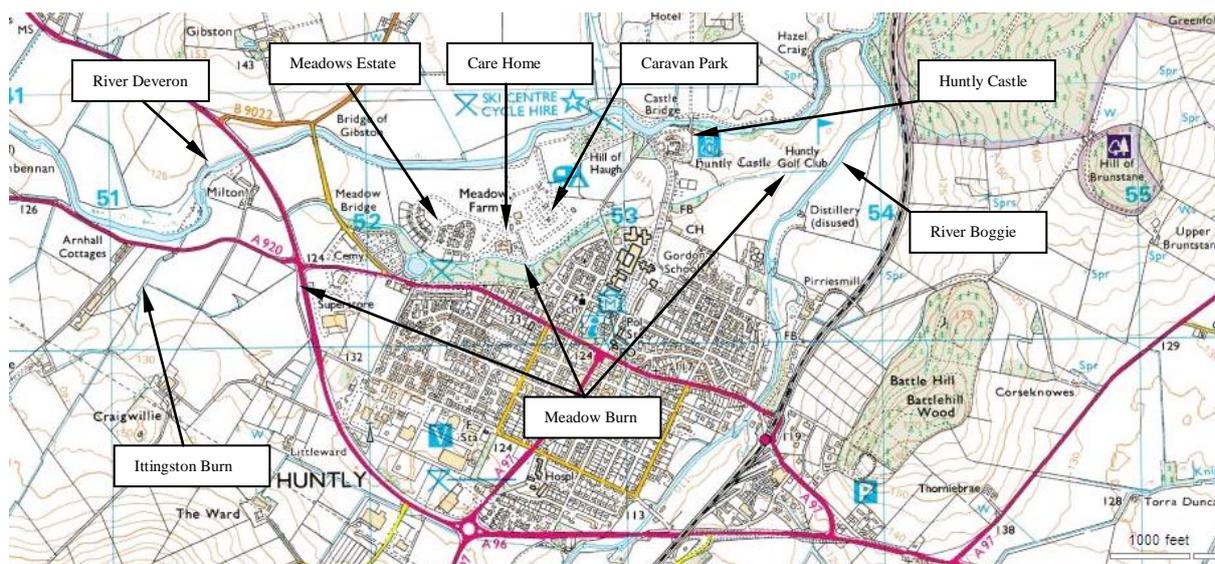
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## 1. Introduction and Background

- 1.1. The town of Huntly is situated approximately 65 kilometres north-west of Aberdeen on the main A96 Aberdeen to Inverness Trunk Road.
- 1.2. The origins of the town date back to a settlement serving Huntly castle. The Castle is located to the north of the town centre on the banks of the River Deveron. The River Deveron flows west-east, forming the northern boundary of the town.
- 1.3. The majority of the town is located on high ground to the south of the Castle. However between the town centre and the River Deveron there is a flat low-lying area called “The Meadows”. In the more recent past this area has been developed for housing and leisure purposes, (Meadows Housing estate, a care home, a Caravan Park and the Nordic Ski centre). There are also two special needs housing units located within the estate.
- 1.4. A location plan is indicated on Figure 1.



**Figure 1 Location Plan**

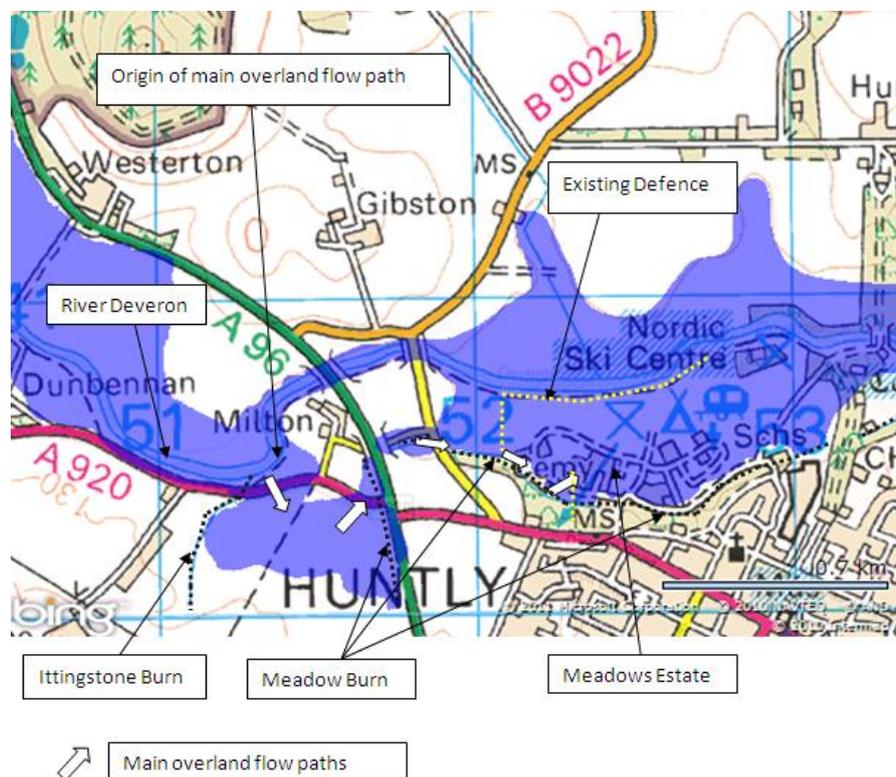
- 1.5. A number of main rivers and burns are confluent in the vicinity of the town. As well as the River Deveron these include the River Boggie, the Ittingston Burn and the Meadow Burn.
- 1.6. The Ittingston Burn joins the River Deveron in the Milton area to the west of the town. The River Boggie has its confluence with the River Deveron about 1km downstream of Huntly Castle and the Meadow Burn flows through ‘the Meadows’ to a confluence with the River Boggie to the north east of the town.
- 1.7. The Meadows has experienced several significant flood events within living memory, and damage has been caused to many residential and commercial properties. The area was flooded in September 1995, April 2000, October and November 2002, and most recently September and November 2009.

- 1.8. The A96(T) and the A920 are also affected by flooding causing significant disruption to transportation links in the area.
- 1.9. Following the 1995 event, a raised flood defence was built to the north and west of the Meadows Estate. This affords protection against direct inundation from the Deveron. However the flooding mechanisms in the area are complex, with overland flow from the Deveron and from the Ittingstone Burn still posing a significant risk to the Meadows Estate.
- 1.10. The largest event to affect the area was in Nov 2009. Despite the defences to the north and west of the estate, a total of 45 properties, including the care home, the special needs units and the caravan park were severely affected by flooding. This event is estimated to have an annual probability of occurrence of 4% (1 in 25).
- 1.11. Aberdeenshire Council propose to raise the current defence standard from a 20% (1 in 5) annual chance event to a 0.5% (1 in 200) annual chance event.
- 1.12. The scheme will be implemented under the powers granted by the Flood Risk Management (Scotland) Act 2009.

## 2. The Problem

- 2.1. Despite the construction of raised defences to the north and west of the Meadow Estate, the area is still at risk from overland flow paths which develop from the west. See Figure 2.

Figure 2 SEPA Indicative Flood Risk Map for Huntly



- 2.2. Flood waters from the River Deveron overtop the banks in the area of Milton Farm. Overland flow paths develop over the A920 and enter the catchment of the Meadow Burn.

- 2.3. Flows in the Meadow Burn are dramatically increased. It has been estimated that during the Nov 2009 event, the flow in the burn was 24 cumecs. Without a contribution from the River Deveron we would normally expect a 0.5% (1 in 200) annual chance event in the burn to be in the order of 3 cumecs.
- 2.4. The conveyance available within the channel and existing culverts systems on the Meadow Burn are not even capable of containing the flows generated from within its own catchment.
- 2.5. Flood waters spill from the burn inundating properties within the Meadows Estate, the care home, the special needs units and the caravan Park.
- 2.6. Based on detailed modelling studies carried out by our consultants we have concluded that the flood risks to the community are as follows.
  - Overtopping of the banks of the River Deveron in the area of Milton Farm commences at a 20% (1 in 5) annual chance event.
  - The A920 and the A96(T) are affected by flood events greater than the 20% (1 in 5) annual chance event.
  - Property flooding within the Meadows estate commences at the 10% (1 in 10) annual chance event
  - The care home and caravan park start to be effected at the 10% (1 in 10) annual chance event.
  - A total of 50 properties are affected during a 0.5% (1 in 200) annual flood event
- 2.7. When consideration is given to the demographics of the area, the depths and velocity of flood waters pose a risk to life for the people who live in the care home and the special needs housing units within the Meadows Estate.

### **3. Options**

#### **3.1. Managed retreat**

We do not consider managed retreat to be a viable option due to the large costs, associated with replacement of properties and facilities elsewhere within the locality. The costs are in excess of the potential benefits that would be accrued from re-location of the community.

#### **3.2. Upstream storage**

There is little scope to create large flood retention areas within the upstream catchment. The topography of the area is characterised by relatively steep river channels and incised valleys. It has been estimated that in order to prevent flooding from the River Deveron in the area of Milton Farm during a 0.5% (1 in 200) annual chance event, it will be necessary to store over 25 million m<sup>3</sup> of water within the upstream catchment. Attenuation storage is not considered to be a viable solution and has not been taken forward for detailed appraisal.

#### **3.3. Demountable defences**

We do not consider this a feasible option. There is an unacceptable risk that the rapid rise of flood levels would not allow sufficient time for residents to erect the demountable defences before the onset of flooding.

### **3.4. Raised defences**

Consideration has been given to the construction of raised defences to provide flood risk management improvements for the at-risk community. These include raised defences on the:

- right bank of the River Deveron at Milton Farm
- right bank of the River Deveron from the Bridge of Gibston to the Hill of Haugh
- right bank of the River Deveron from the Hill of Haugh to Huntly Castle
- left bank of the Meadow Burn through the Meadows estate.
- right bank of the Ittingston Burn to the south of the A920

### **3.5. Increase Culvert Capacity**

Consideration has been given to whether there would be any benefits in increasing the sizes of any of the existing culverts on the Meadow Burn and the Ittingston Burn. These could reduce the heights to which flood defences would need to be raised.

### **3.6. Local Storage**

The creation of local storage areas within the Meadow Burn catchment could assist in reducing the impacts of a lack of capacity in the culvert systems through the Meadows Estate.

## **4. Preferred Option**

**4.1.** All the options taken forward for detailed appraisal have been subject to detailed modelling using a calibrated and verified one-dimensional numerical hydraulic model of the River Deveron, the Ittingston Burn and the Meadow Burn. The model was constructed using Infoworks RS software.

**4.2.** The model boundary conditions, i.e. the flows in the watercourses, have been agreed with SEPA.

**4.3.** The detailed modelling has shown that a combination of raised defences on the River Deveron, increasing the conveyance on selected culverts on the Ittingston and Meadow Burns and the provision of storage on the Meadow Burn are the most effective methods of providing flood risk management improvements for the community of Huntly.

**4.4.** The proposed works will raise the standard of protection of property flooding from the 10% (1 in 10) annual chance event to the 0.5% (1 in 200) annual chance event.

**4.5.** The works consist of:

- Raised defences on the right bank of the River Deveron from Arnhall Cottages to Milton Farm (either next to the river or set back against the A920)
- Increasing the size of the culvert on the Ittingston Burn below the A920 and constructing raised defences adjacent to the road and on the right bank of the burn.
- Raising and strengthening the existing defences on the river Deveron between the Bridge of Gibston and the Hill of Haugh
- Constructing raised defences to the east and south of the caravan park

- Replacing one undersize culvert on the Meadow Burn with a timber footbridge.
  - Creating local storage to the west of the Meadows estate by constricting the flow in the meadow Burn to a figure that can be accommodated by the downstream channel and culvert systems.
- 4.6.** The works to the Ittingston Burn will reduce the frequency at which flood water will spill onto the A920 and the A96(T). Two options are shown on the general arrangement drawings. These provide protection to either the 3.33% (1 in 30) or the 1.33% (1 in 75) annual chance event. The preferred option is the scheme to offer protection against the 1.33% (1 in 75) annual chance event.
- 4.7.** At flood events greater than the 1.33% (1 in 75) annual chance event water will spill into the catchment of the Meadow Burn. This will not compromise the standard of protection to the Meadows estate due to the constriction and local storage that will be provided within the Meadow Burn catchment.
- 4.8.** The general arrangement drawings for the preferred option are indicated on drawing numbers 5097730-RC-01, 02, 03 and 04. These drawings are appended to this report.
- 4.9.** Drawing numbers 01 and 04 show the two alternative options for the defences between Arnhall Cottages and Milton Farm. The option shown on drawing number 01 is to construct raised defences adjacent to the River Deveron. This will protect the fields from flooding and retain the alignment of the river in its current location. This option is expected to be favoured by the landowner. However this option could introduce geomorphological instability and increase the risk of bank erosion and regression in adjacent reaches.
- 4.10.** The set-back option (drawing number 04) offers the preferred solution from a geomorphological perspective. It reduces the risk of negative impacts on the stability of the river system. It also offers a range of wider Water Framework Directive (WFD) related benefits. This option is favoured by SEPA. However it is likely to be opposed by the land owner.
- 4.11.** The preferred option is to adopt the set back defences (drawing number 04). It is some £200k cheaper than the option to construct raised defences adjacent to the River Deveron. It will not compromise the hydromorphological status of the River Deveron or compromise its ability to reach its WFD objective of achieving a Good status by 2027.
- 4.12.** We propose the following ecological and landscape enhancements:
- Use of shallow sloping defences to reduce the visual impacts and return the land to agriculture;
  - Visual coherence to the riverside landscape;
  - Additional planting to screen defences; and
  - Provision of bat and bird boxes/nesting tubes
- 4.13.** Aberdeenshire Council will seek to co-ordinate the proposed enhancements with local initiatives being undertaken to maximise the impact of the investment in improved flood defences.

## 5. Economic case and priority score

- 5.1. Present value costs and benefits together with benefit cost ratio are shown in Table 1

**Table 1 – Present Value Costs and Benefits**

Present Value benefits	£3.40m (PVb)
Present Value costs	£3.04m (PVC)
Net Present value	£0.36m (NPV)
Benefit cost ratio	1.1

- 5.2. The levels of benefits provided by the scheme are greater than the present value of costs. The scheme has a Benefit to Cost ratio of 1.1.
- 5.3. We have used a variable discount rate over the 100 year appraisal period (years 0 to 30 - 3.5%, years 31 to 75 – 3% and years 76 to 100 – 2.5%).
- 5.4. The whole life cost of the works with maintenance costs in cash terms, but without inflation is £3.42m
- 5.5. The estimated capital cost of the preferred option is £3.13m

## 6. Environmental considerations

- 6.1. A desk based environmental appraisal has been undertaken to inform the overall appraisal of the flood alleviation options from an environmental and planning perspective. An Environmental Constraints plan has been prepared and is appended to this report.
- 6.2. A planning policy review data has been undertaken and key land use / spatial policies and development allocations have been identified. This has provided a baseline policy context for the site and identified any policies specific to each of the options considered appropriate for flood risk management improvements.
- 6.3. The appraisal has been undertaken to ensure that potentially significant adverse environmental impacts are avoided, offset or reduced through the development of mitigation measures and through recommendations for further survey and assessment work. Other environmental impacts will be further offset or reduced through the development of mitigation measures during the detailed design.
- 6.4. A site walkover has identified the potential for protected species, habitats and established ecology that are likely to require further consideration during the design and construction stages of the project, (e.g. detailed protected species surveys; fisheries interests e.g. avoidance of impact on salmon spawning and migration through detailed culvert design measures). Detailed protected species surveys will be undertaken during the detailed design period to establish the current status of the river corridor and channel for otter, water vole, badger, nesting birds).
- 6.5. Where potentially significant environmental constraints were identified, regular communication between the environmental and design teams has ensured that the potential for significant adverse impacts has been avoided.



- 8.2. Procurement of professional services and a contractor for the project shall follow normal Aberdeenshire Council procedures.
- 8.3. The risk pot included in the approval sum is £721k.
- 8.4. The period of whole life costs is 100 years.
- 8.5. A summary of the scheme's Capital costs over the 100 year appraisal period is shown in Table 3.

**Table 3 - Summary of Capital Costs (£k)**

	Cost for economic appraisal (PV)	Whole life cash cost	Aberdeenshire approval project cost
<b>Costs to PAR:</b>			
Aberdeenshire CC staff	Sunk Costs		
Site investigation & survey	Sunk Costs	26	
Consultant fees	Sunk Costs	80	
Early Contractor Involvement (ECI)	Sunk Costs		
Cost consultant fees	Sunk Costs		
<b>Sub-total</b>	Sunk Costs	106	
<b>PAR to Construction:</b>			
Aberdeenshire CC staff			-
Site investigation & Survey	40	40	40
Consultant fees	70	70	70
Early Contractor Involvement (ECI)	5	5	5
Cost consultant fees	-		-
Other costs	-		-
<b>Sub-total</b>	<b>115</b>	<b>115</b>	<b>115</b>
<b>Construction:</b>			
Construction costs	2,043	2,043	2,043
Inflation allowance for * months			
Environmental enhancement	16	16	16
Environmental mitigation	16	16	16
Aberdeenshire CC staff	-		-
Consultant fees	22	22	22
Site supervision	44	44	44
ECC PM	40	40	40
Compensation	108	108	108
Other costs	-		-
<b>Sub-total</b>	<b>2,289</b>	<b>2,289</b>	<b>2,289</b>
<b>Future Costs:</b>			
Maintenance	154	543	
Future construction			
<b>Risk Contingency:</b>			
30% Optimism Bias			721
20% Optimism Bias	481	481	
<b>Contributions</b>			
<b>TOTAL</b>	<b>3,039</b>	<b>3,428</b>	<b>3,126</b>

## **9. Contributions and Funding**

- 9.1.** The flood risk management improvement to be undertaken at Milton and on the Ittingston Burn will significantly reduce the flood risk for the A96 Trunk Road. An approach will be made to Transport Scotland for a financial contribution to the scheme costs. An approach will also be made to the Grampian Housing association, who own a number of houses within the Meadows estate.

## **10. Status**

- 10.1.** The preferred option for flood risk management improvements is a combination of raised defences on the River Deveron, increasing the conveyance on selected culverts on the Ittingston and Meadow Burns and the provision of storage on the Meadow Burn. The work will raise the standard of protection from 5% (1 in 5) to 0.5% (1 in 200), in line with Scottish Government/SEPA guidance.
- 10.2.** The approval sum for the preferred option is £3,126,000.
- 10.3.** The whole-life cash cost over the 100 year appraisal period is £3,428,000.
- 10.4.** The preferred option will protect 50 residential properties, a care home complex, two special needs housing units, a caravan park and will reduce flood risk to the A96(T) and the A920.

## **11. Recommendations**

- 11.1.** Aberdeenshire Council recommend that construction of flood risk management works to provide protection against a 0.5% (1 in 200) annual chance event are adopted as the preferred option for the Huntly Flood Alleviation Scheme. The capital cost of the scheme has been estimated at £3,126,000. This sum includes a risk contingency of £721,000.

# **APPENDIX A**

## **Scheme drawings**

**Appendix B**  
**Environmental Constraints Plan**