KEMNAY FLOOD PROTECTION STUDY – NON-TECHNICAL SUMMARY

Date: 15/01/26

1. Introduction

RSK / Binnies were commissioned by Aberdeenshire Council to carry out a flood protection study in Kemnay. This non-technical summary provides a general overview of the Kemnay Flood Protection Study outputs, issued in January 2026, including its background, objectives, methodology, key findings, and recommendations. For full technical details, please refer to the Kemnay Flood Protection Study report, Option Appraisal and Hydrology & Hydraulics Modelling reports.

2. Background and objectives

Kemnay, located in Aberdeenshire, has experienced significant flooding in recent years, notably 2016, 2020 and 2022. These events affected homes, businesses, transport links and community infrastructure. The severity of these events combined with SEPA's climate change future projections, highlighted the need for a detailed assessment and flood mitigation solutions.

Under the Flood Risk Management (Scotland) Act 2009, Kemnay was designated as a Potentially Vulnerable Area (PVA 02/06/16) within the North East Local Plan District (LPD6) due to river and surface water flooding. The North East Flood Risk Management Strategy set out actions to manage flood risk, including a specific requirement to carry out a flood protection study.

The main objectives of the study were the following:

- Assess the current flood risk from rivers, surface water, and other sources within Kemnay.
- Evaluate potential flood risk management measures and recommend effective, sustainable and affordable options.
- Prepare for climate change, which is predicted to produce more intense and frequent flood events in the future.
- Engage with stakeholders including SEPA, Scottish Water, and the local community to incorporate their knowledge and concerns in the study.

Flooding in Kemnay typically results from high flows in the River Don, when the water levels exceed the river banks during periods of heavy and prolonged rainfall. Surface water flooding is also common generally during episodes of intense rainfall, when the generated runoff exceeds the capacity of the local drainage network. In addition, interactions between both the fluvial and drainage networks can aggravate flooding: high water levels in the River Don reduce the capacity of the drainage network to discharge, leading to potential backing up and flooding. These flooding mechanisms are particularly evident in the Kembhill Park and Milton Meadows areas.

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3. Methodology

The study followed the established industry and government standards and good practices for flood risk management planning. The key stages covered in the Flood Protection Study included:

1. Collection and review of data such as historical flood records, topographic data, geological and geotechnical constraints, environmental aspects, and river flow and rainfall data. These were gathered from Aberdeenshire Council, national datasets, previous studies, and local observations via questionnaire. To ensure accuracy, topographic surveys were carried out to update information on areas of interest, including river cross sections, so watercourses and their surroundings could be accurately represented in the hydraulic model. In addition, property threshold level survey was conducted to help estimate flood damages across Kemnay.
2. A mathematical model built to understand the current and future flood risk in Kemnay. This integrated catchment model, represented the River Don, local watercourses, the drainage network, and the ground surface, enabling the simulation of flows through these systems and their interactions. A hydrology assessment was carried out to estimate representative inflows into the watercourses. The model was calibrated and validated using recorded flow data from the River Don and historical flood event information. The verified hydraulic model was used to predict flooding for a wide range of rainfall events. Flood maps were generated for return periods ranging from 1 in 2-year to 1 in 1,000-year, both for present-day and climate change scenarios. These maps show the extent and depth of flooding, highlighting which areas are most at risk.
3. The available information and the hydraulic model were used to identify flooding issues within the catchment. These findings served as a baseline for evaluating options to manage flood risk. A long list of measures was developed, including actions that could be taken to reduce or manage the flood risk, such as direct defences (flood walls and embankments), natural flood management (NFM), wetland creation, floodplain recovery, sustainable drainage systems (SuDS), and non-structural measures. This long list was screened to remove actions that were clearly unfeasible, leaving an initial short list of potential actions. The screened options were evaluated using a multi-criteria assessment (MCA) to determine their suitability, covering technical, environmental, social and economic aspects. This scoring allows the elimination of measures that were not practical or viable for the situation. The final short-listed options were appraised in detail, using the hydraulic model to evaluate their performance under different scenarios. Implementation requirements, compatibility with other policies and plans are also considered at this stage. Based on the benefits associated with the flood reduction provided by the short-listed viable options, and the cost of implementing, operating and maintaining them through their life cycle, the benefit-cost ratio (BCR) is calculated. Options with a BCR greater than 1 are considered to provide a cost-effective flood mitigation. The combination of MCA results and BCR estimation informed the final options recommended for implementation.
4. A public consultation event was held to present and explain the Flood Protection Study outcomes and recommended options for implementation and engage with the community and stakeholders. The event provided an opportunity to gather feedback, incorporate local knowledge into the process.

4. Outcomes and recommendations

The model showed that parts of Kemnay are already at risk from flooding during high-flow events in the River Don (the Kembhill Park area near the riverbanks is particularly exposed). Surface water flooding can also occur in heavy rainfall, especially where drainage capacity is limited (notably, the Milton Meadows area). Climate change scenarios reveal an increase in the severity of flood events, causing greater damages affecting more people and properties.

A total of 48 potential actions to mitigate flood risk were considered in the long list. Following screening, stakeholders' engagement consultations, and a multi-criteria assessment process, four options were shortlisted:

- **Option 1**: Flood embankment and flood wall at Kembhill Park.
- **Option 2**: Flood embankment at Milton Meadows, replacing the existing topographic bund at this location
- **Option 3**: Upstream storage area on the River Don, and the provision of a flood embankment to prevent flooding of the nearby access track.
- **Option 4**: Provision of wetlands immediately downstream Kembhill Park, with elevations set to capture additional storage at the flood peak.

Only one option passed the multi-criteria assessment in full, this was Option 1 (direct defences at Kembhill Park). However, in assessing option 2 (Bund at Milton Meadow), the integrated catchment model revealed a flood mechanism where surface water accumulates behind the existing topographic feature. Because of this finding a new option was developed as further mitigation against this secondary source of flood risk, comprising the construction of a local SuDS basin to capture overland flow and retain it until the River Don levels are low enough for it to discharge into the river. This revised Option 2b passed the multi-criteria assessment with a BCR of 1.4.

Table 4-1 – Method used for flow estimation

Option No.	Estimated Cost	Estimated Benefit	Benefit-Cost Ratio (BCR)
1	£974,453	£1,271,197	1.3
2	£1,494,993	£1,004,453	0.7
2b	£906,847	£1,273,738	1.4
3	£4,751,079	£532,115	0.1
4	£179,829	£29,583	0.2

(a) Option 1. Embankment and flood wall at Kembhill Park

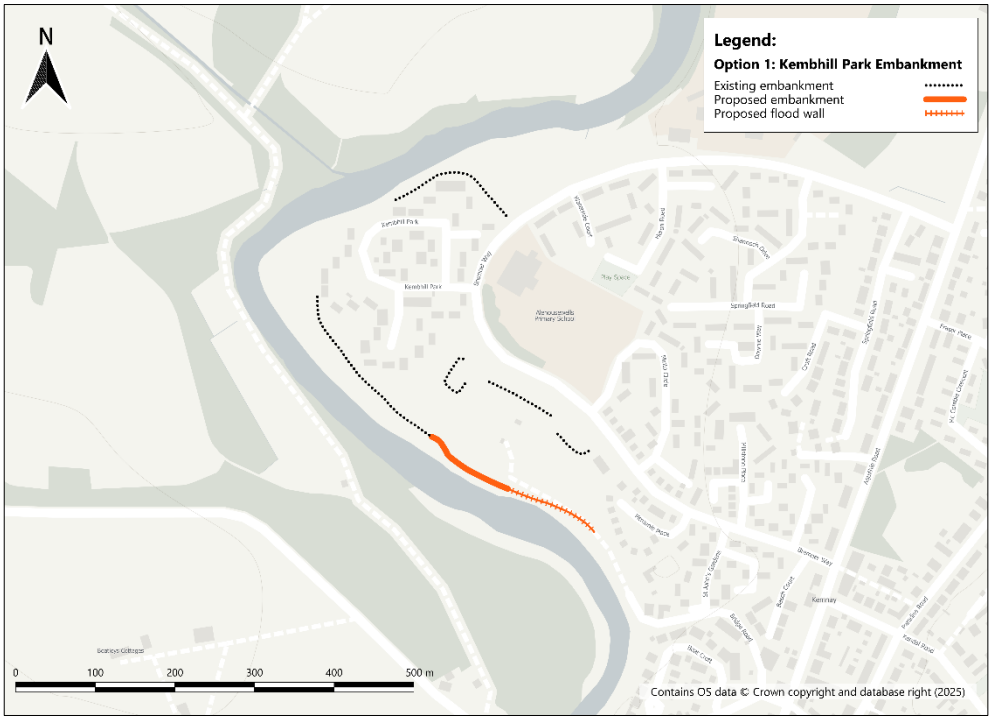

Figure 4-1 – Option 1 sketch

This preferred option at Kembhill Park includes building a flood embankment (bund) about 125 metres long continued by a 120 metres long flood wall reducing the flood risk from River Don for the residential properties and the wastewater treatment works. Together, the bund and the flood wall will connect to the existing natural high ground in the area. The embankment is expected to be approximately 11 metres wide, although this width might be reduced following ground investigations carried out during detailed design stage.

(b) Option 2b. SuDS basin at Milton Meadows

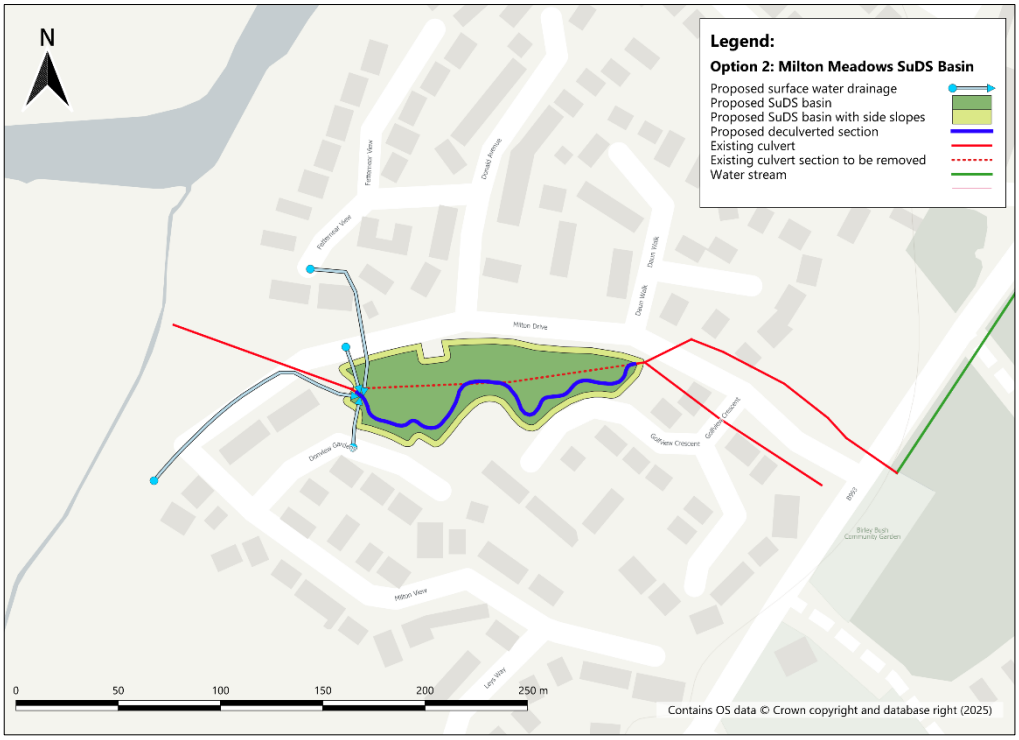

Figure 4-2 – Option 2b sketch

The preferred option at Milton Meadows involves creating a SuDS basin within the green space at Milton Drive, supported by surface water drainage to collect and convey overland flows from local low points into the basin. The design also includes deculverting the existing watercourse across the green area, restoring it to an open channel to provide environmental, aesthetic, and flood management benefits. A chamber with a non-return valve (NRV) will be installed at the basin outlet to prevent backflow from the River Don during extreme high-water events. There is scope to enhance the design through consultation with a Landscape Architect to add amenity value for residents.

Surface water flooding currently affects the Milton Meadows area, with hydraulic modelling showing ponding mainly at the western edge of the development. During intense rainfall, the drainage network and culvert capacity are exceeded, causing surcharge and overland flow. The proposed mitigation introduces a storage basin to manage excess flows in a controlled manner. This basin will temporarily store culvert discharges and runoff exceeding network capacity, reducing ponding at low points. If the basin reaches full capacity, residual floodwater will continue to accumulate in existing flood-prone areas.

4.2 Recommendation

Considering the multi-criteria assessment outcomes, the benefit-cost ratio values and the feedback received during the public engagement event, the following course of action is recommended:

Preferred Option at Kembhill Park

This option offers a strong level of protection, designed to withstand a flood event that has a 0.5% chance of occurring in any given year (called a 1 in 200-year event). It will also provide benefits during more severe floods, reducing the number of properties at risk by around 55 during this event.

The economic assessment shows this option is cost-effective, with a benefit-to-cost ratio of 1.3. Feedback from the public was largely positive. Based on these factors, it is recommended that this option be progressed as a formal flood protection scheme.

Preferred Option at Milton Meadows

The recommended solution for Milton Meadows involves creating a Sustainable Drainage System (SuDS) basin within the green space at Milton Drive. This basin will collect excess surface water during heavy rainfall and help manage flooding in the area. The design also includes restoring an existing culverted watercourse to an open channel, improving both drainage and the local environment.

This option is designed to protect against a flood event with a 1% annual chance (1 in 100-year event) and will also reduce risk during more extreme scenarios, lowering the number of properties affected by about 6 during a 1 in 100-year event. It has a benefit-to-cost ratio of 1.4, making it technically and economically viable.

However, public feedback on this option was mixed. While it is recommended from a technical perspective, further consideration by Elected Members and additional community engagement are advised before moving forward with this scheme.