# Carrochan Burn Feasibility Study

Public Consultation on Flood Alleviation Options

Tuesday 24th March 2026

# Overview

- Overview of Levenhowe flood risk and works to date (WDC)
- Carrochan Burn Feasibility Study - Background and Project Brief
- Current Status
  - Overview of work completed to date
  - Review of possible flood alleviation options
    - Culvert removal
    - Upstream Storage
    - Flow diversion
    - Culvert removal and hard defences
- Next steps
  - Receipt and consideration of feedback from Public Consultation
  - Confirmation of a preferred option
  - Internal Governance Procedures/Approvals (WDC)
- Questions and Answers

# Levenhowe Flood Risk

- Increased flood risk in recent years as a result of climate change
- The most recent major event was in October 2023.
- Damage to multiple residences and local businesses with high levels of costs to property owners
- Increase insurance costs

# Flood Risk Management

- River Leven Study undertaken in 2019 as part of our cycle 2 actions. Decision on any funding from Scottish Government has been delayed indefinitely.
- River Leven Study split into a number of cells with proposed mitigation for this area included in Flood Cell 8 to undertake improvements in the Ballagan and Carrochan Burns.
- £500k assigned for this element however completion of this in isolation would have resulted in increased flood risk further down stream and was unable to be progressed.

# Works to date

Funding was instead used to progress other mitigations including:-

- Property Level Protection (WDC  100%) contribution
- Vegetation Clearance
- Reinstatement of Culvert Overflow
- Undertake Surface Water Management Plan for Alexandria.
- Through discussions with local residents, we have been working to identify a potential solution. Engaged consultant to undertake a feasibility and options report to identify any potential mitigation measures.

# Background

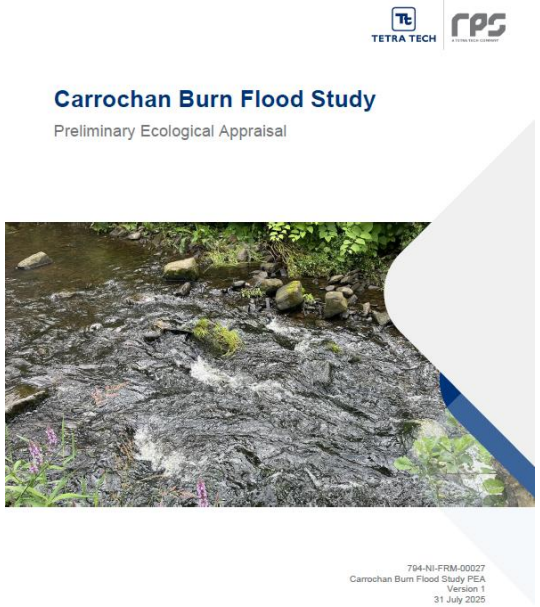
- Flood event occurred in Levenhowe Road area on 7th October 2023
- WDC appointed Tetra Tech RPS to identify a preferred option.

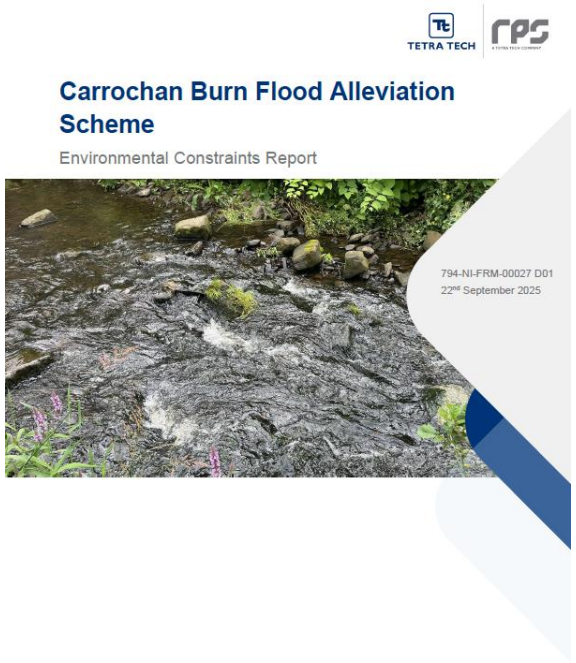
# Project Brief

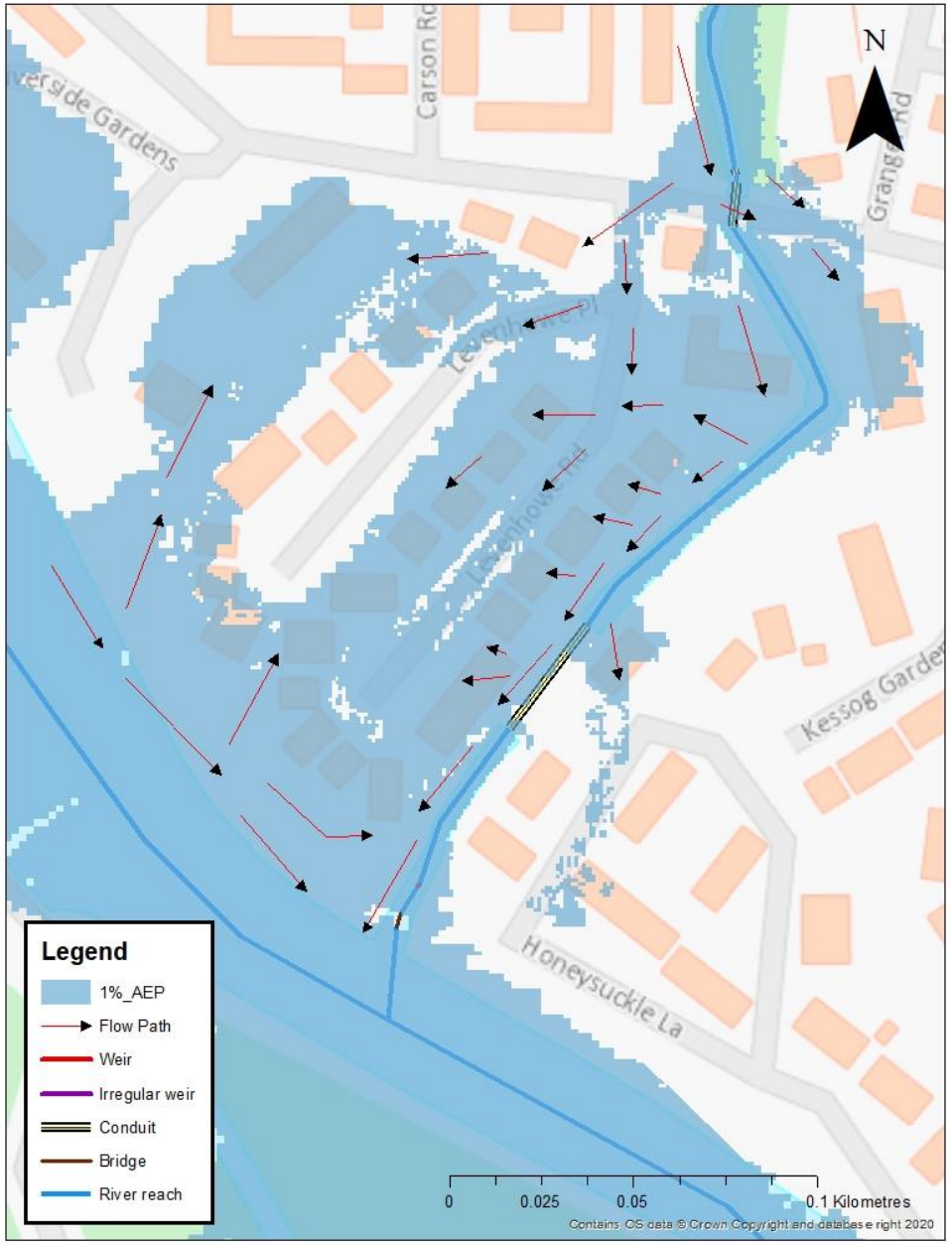
- **Stage 1 – Define the Baseline**
  - Hydrological Analysis
  - Hydraulic Analysis
  - Environmental Baseline Surveys
  - Consultation
- **Stage 2 – Identify the Preferred Option**
  - Compare and select the most sustainable option
  - Consultation
  - Reporting

# Current Status – Overview of work completed to date

- **Stage 1 – Define the Baseline**
  - Hydrological Analysis ✓
  - Hydraulic Analysis (incl. survey) ✓
  - Environmental Baseline Surveys
    - Draft Preliminary Ecological Appraisal (PEA) Report ✓
    - Draft Environmental Constraints Report ✓
  - Consultation – Draft Flood Maps (2nd October 2025) ✓

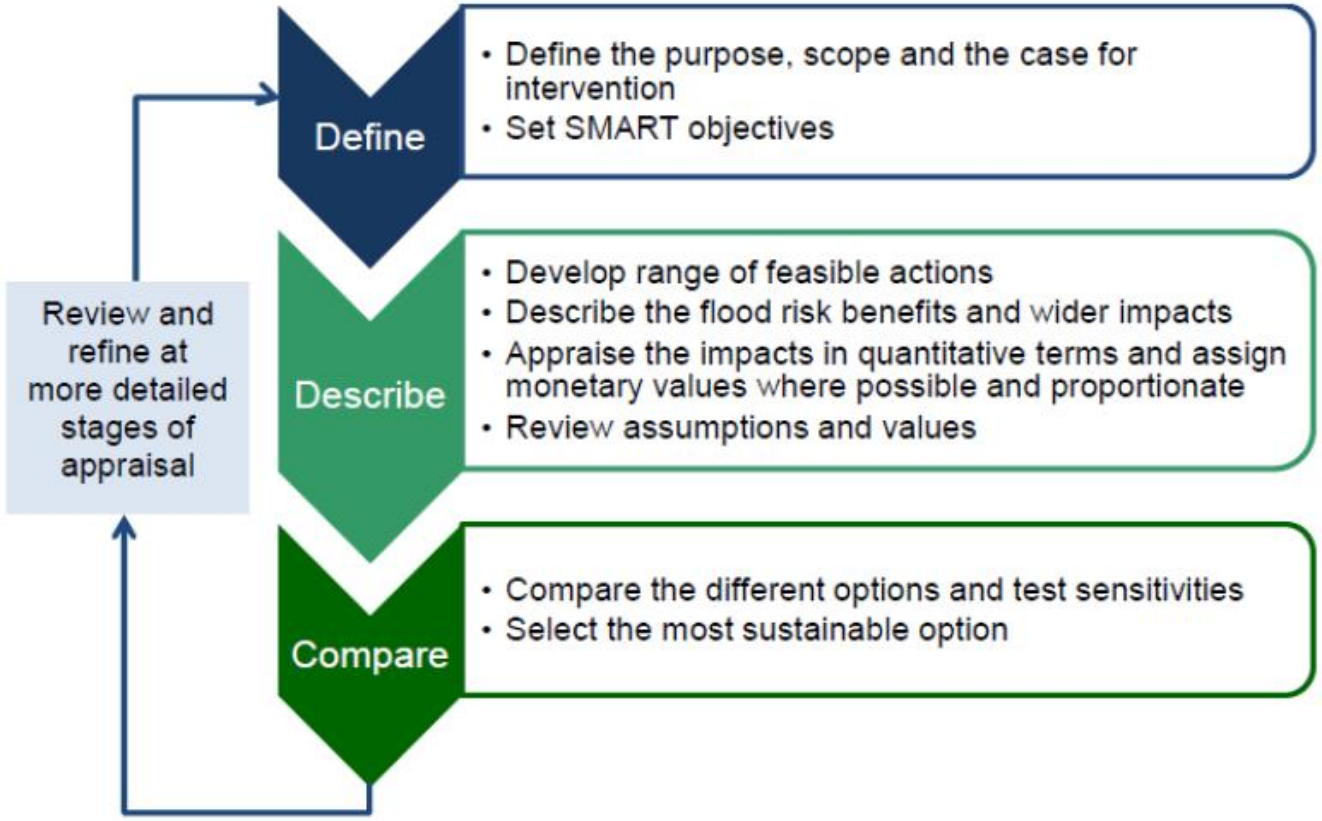


# Current Status – Review of Possible Flood Alleviation Options

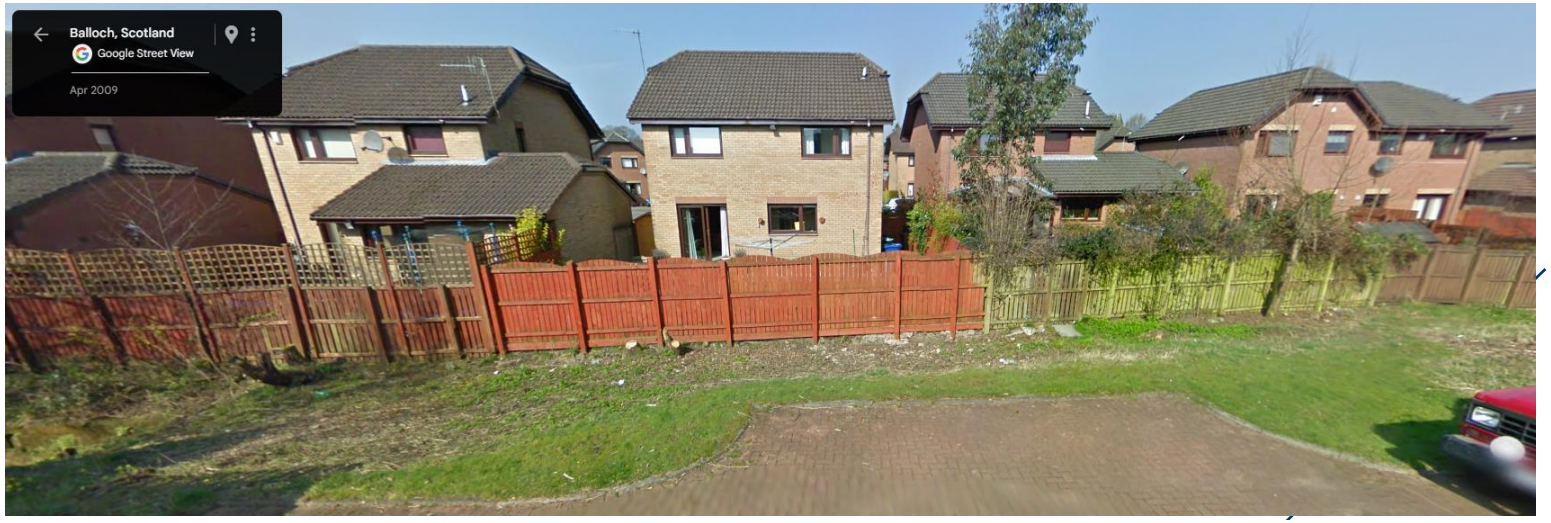
- **Stage 2 – Identify the Preferred Option**
  - Compare and select the most sustainable option ✓

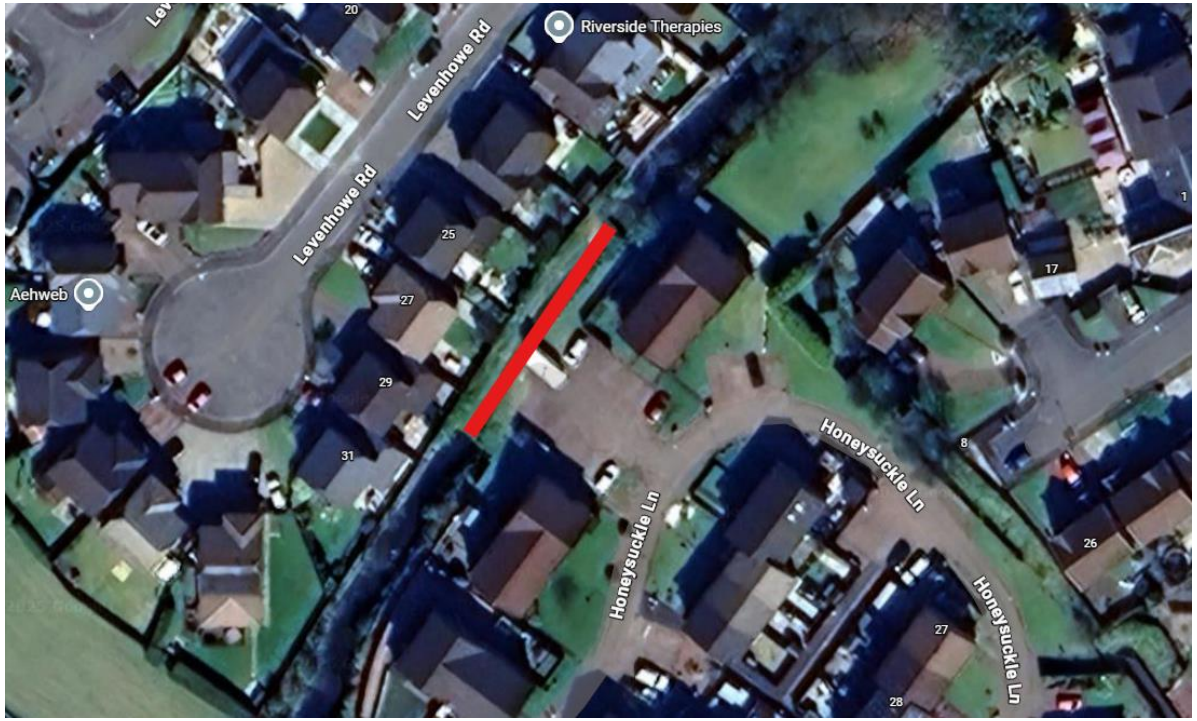


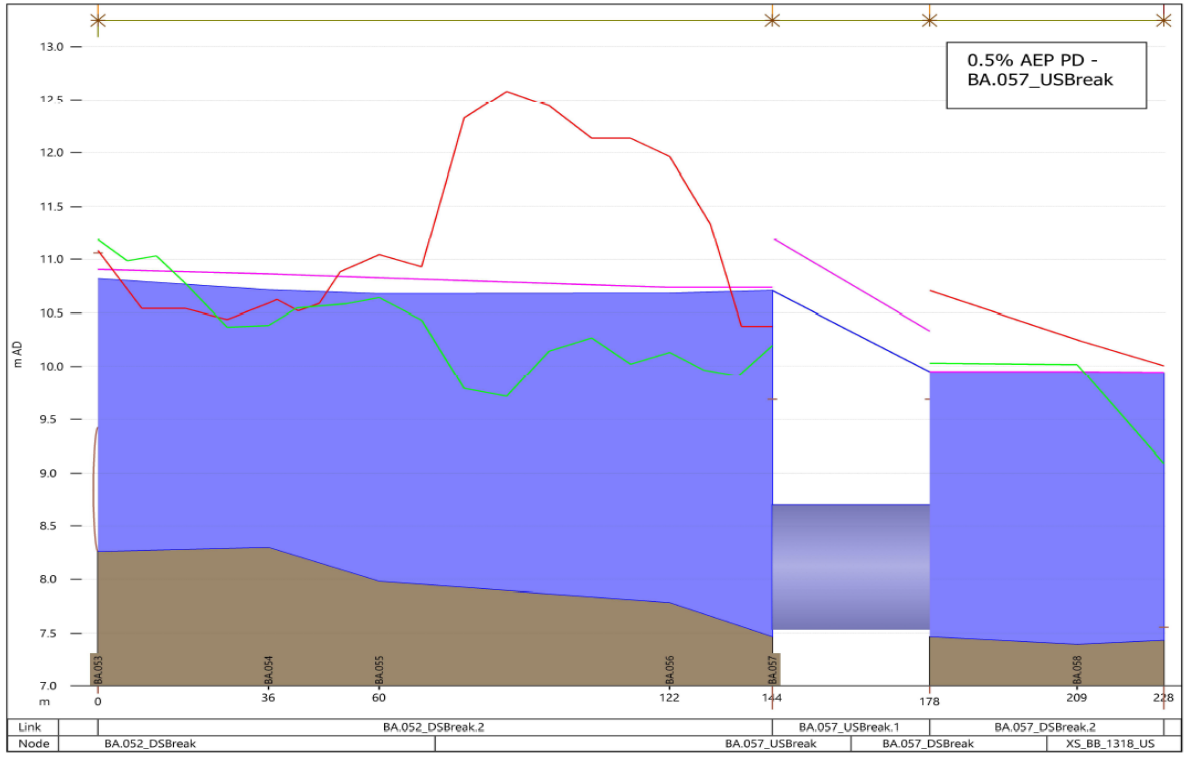

- Consultation
- Reporting

# Current Status – Review of Possible Flood Alleviation Options

- **Option 1 – Culvert Removal**



# Current Status – Review of Possible Flood Alleviation Options

- **Option 1 – Culvert Removal** (1% Annual Exceedance Probability (AEP))

| Option Summary | | | | |
|---|---|---|---|---|
| **Description** | | | | **£241,180** |
| | | Culvert Removal | £241,180 | |
| Preliminary Costs | 18% | of BCC | £42,706 | |
| Ground Investigation | 5% | of BCC | £12,059 | |
| **Overall construction cost (OCC)** | | | | **£295,944** |
| | | | | |
| Design & Environmental Fees | 20% | of OCC | £59,189 | |
| Site Supervision Fees | 8% | of OCC | £23,676 | |
| | | Total Fees | £82,864 | |
| | | | | |
| Archaeology & Environmental Mitigation | 5% | of OCC | £14,797 | |
| PV Operation and Maintenance Costs (50yrs) | | | £3,458 | |
| | | Total | £18,255 | |
| **Sub-total** | | | | **£397,063** |
| Optimism Bias (upper bound 60%) | 51.6% | of Sub-total | £204,885 | |
| **Total Cost** | | | | **£601,948** |

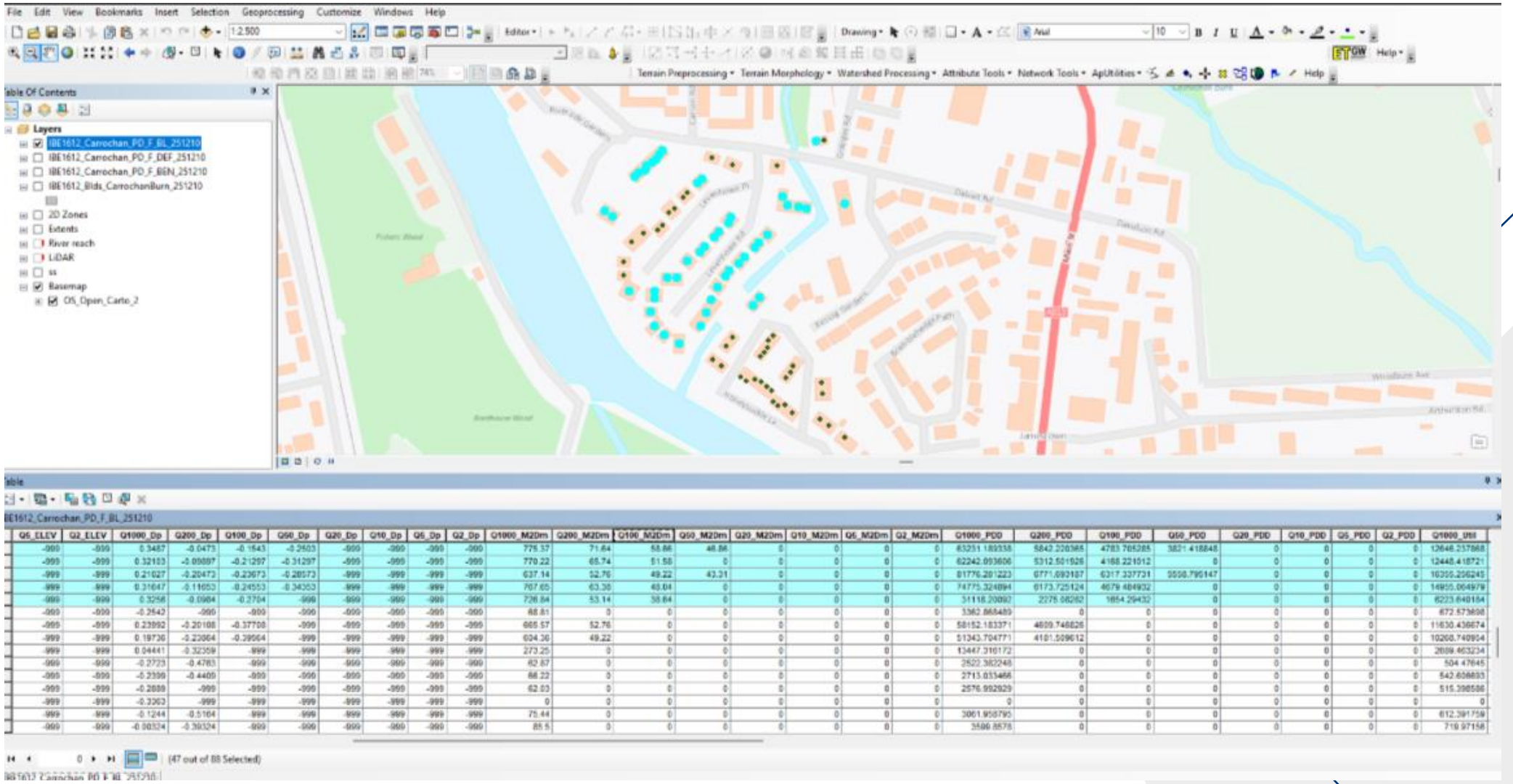
# Target Standard of Protection

- **Design Target Standard of Protection**
  - The standard guideline for grant funding purposes is typically protection against a 1 in 100-year event, though 1 in 200-year is common for major projects to account for climate change and future risk.
  - A 1 in 75-year standard is often considered the minimum to allow for affordable insurance, but new schemes aim for 1 in 100-year or higher.

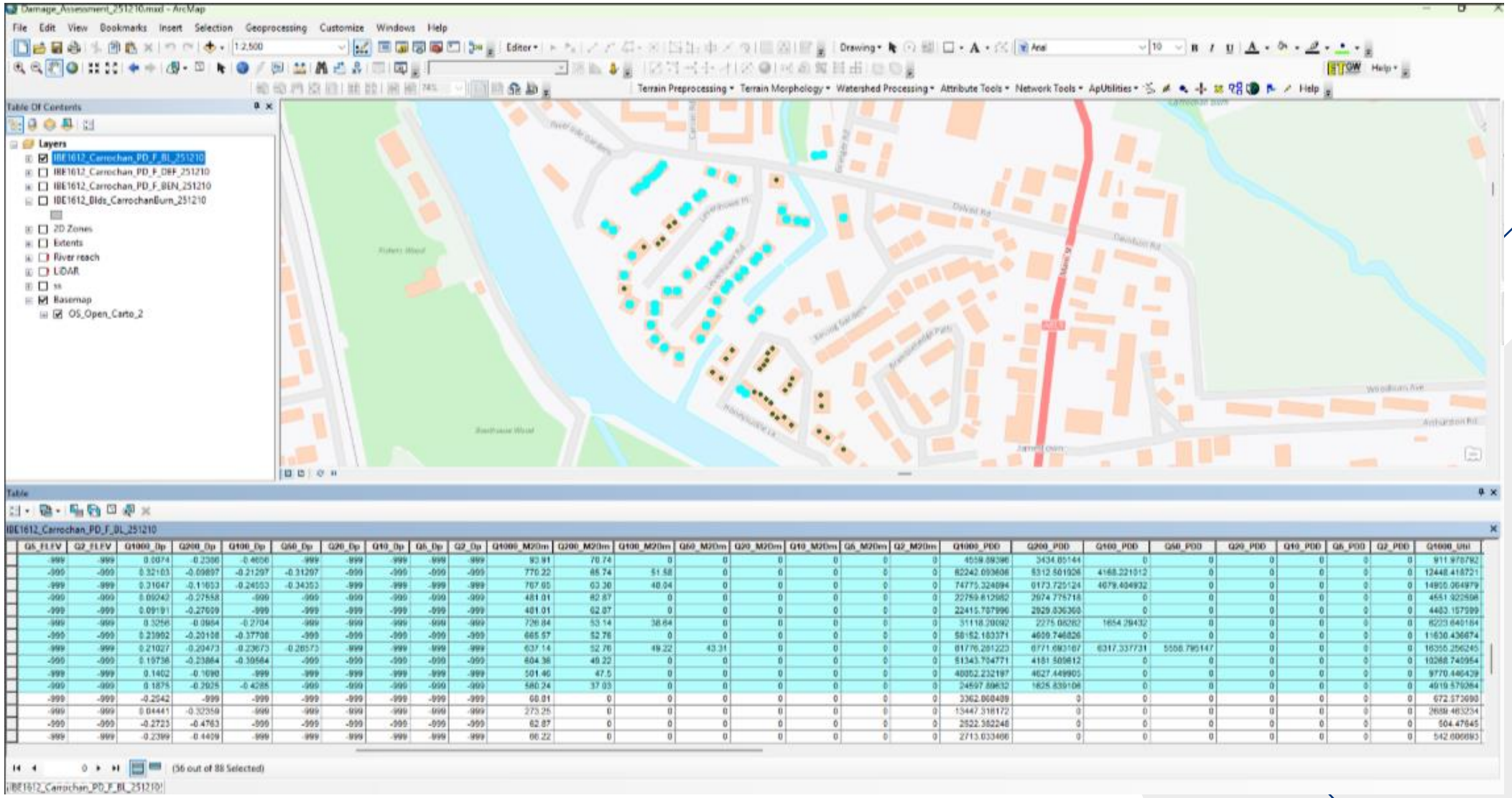
- **Explanation of Terminology**
  - *Return period*
    - The average length of time between events of a similar magnitude
    - 1 in 100 year return period does not necessarily mean it happens once every 100 years

  - **Annual Exceedance Probability (AEP)**
    - The probability of a specific magnitude event occurring or being exceeded in any given year.
    - For instance, a 1% AEP event has a 1 in 100 chance of being exceeded in any single year, while an AEP of 0.1% corresponds to a 1 in 1,000 year event.

# Properties benefitting from 1% AEP flood alleviation scheme (47 properties)



# Properties benefitting from 0.5% AEP flood alleviation scheme (56 properties)



# Current Status – Review of Possible Flood Alleviation Options

- **Option 2 – Culvert Removal and Hard Defences** (0.5% AEP)


- Culvert removal.
- Hard Defence: reinforced concrete walls set along the river banks to prevent out of bank flooding. Walls will replace bridge parapet.

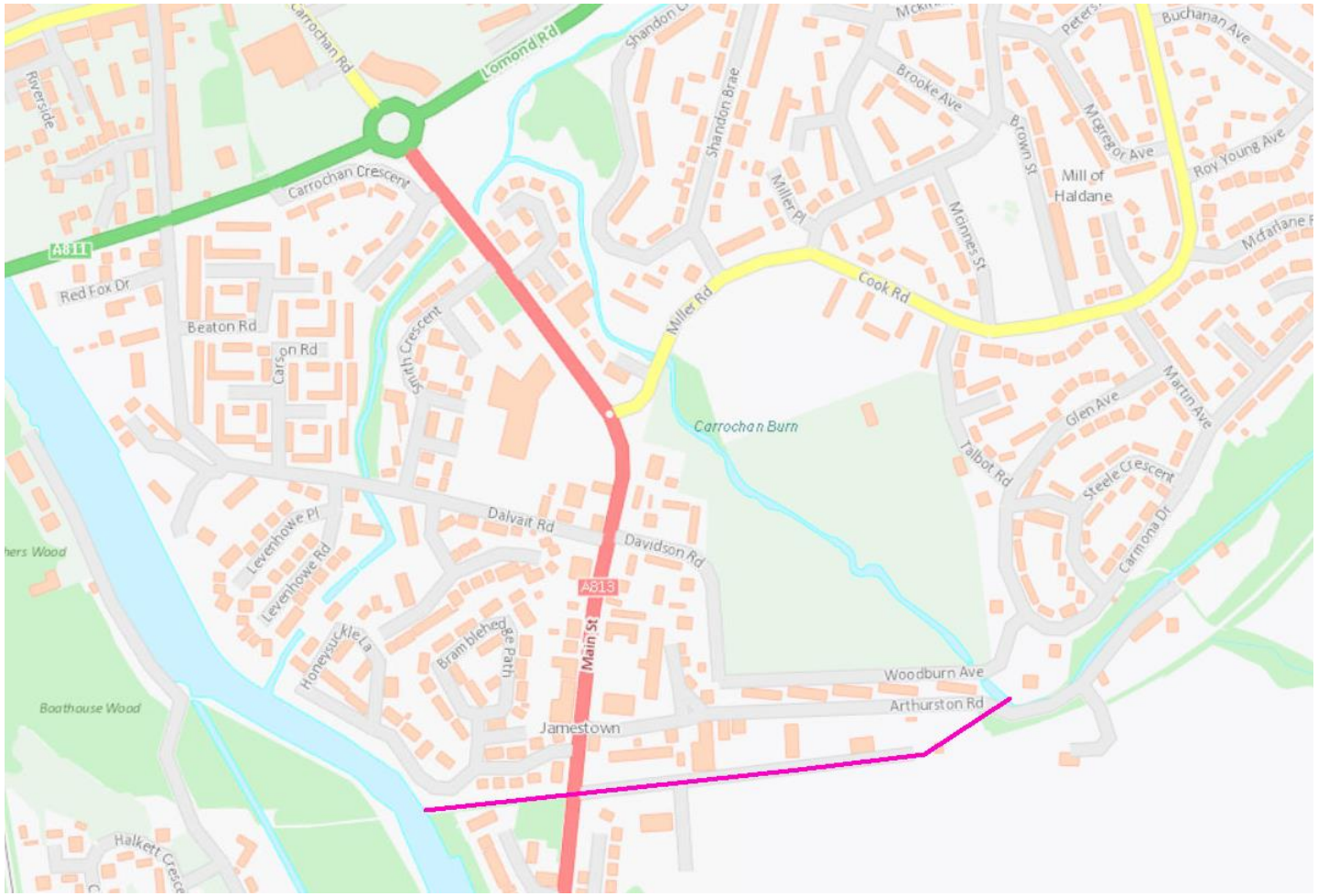
# Current Status – Review of Possible Flood Alleviation Options

- **Option 2 – Culvert Removal and Hard Defences**

| Option Summary | | | | |
|---|---|---|---|---|
| **Construction Costs** | | | | **£595,346** |
| | | Culvert Removal | £241,180 | |
| | | Flood Walls | £354,167 | |
| Preliminary Costs | 18% | of BCC | £105,418 | |
| Ground Investigation | 5% | of BCC | £29,767 | |
| **Overall construction cost (OCC)** | | | | **£730,532** |
| | | | | |
| Design & Environmental Fees | 5% | of OCC | £36,527 | |
| Site Supervision Fees | 8% | of OCC | £58,443 | |
| | | Total Fees | £94,969 | |
| | | | | |
| Archaeology & Environmental Mitigation | 10% | of OCC | £73,053 | |
| PV Operation and Maintenance Costs (50yrs) | | | £5,402 | |
| | | Total | £78,456 | |
| **Sub-total** | | | | **£903,956** |
| Optimism Bias | 58.2% | of Sub-total | £526,103 | |
| **Total Cost** | | | | **£1,430,059** |
| | | | | |

# Current Status – Review of Possible Flood Alleviation Options

- **Option 3 – Flow Diversion** (0.5% AEP)




- Assumed a 3m x 1m diversion culvert would sufficiently divert flow away from the risk area.
- Most direct route assumed under the single carriageway road and under the pedestrian path before discharging to the River Leven.

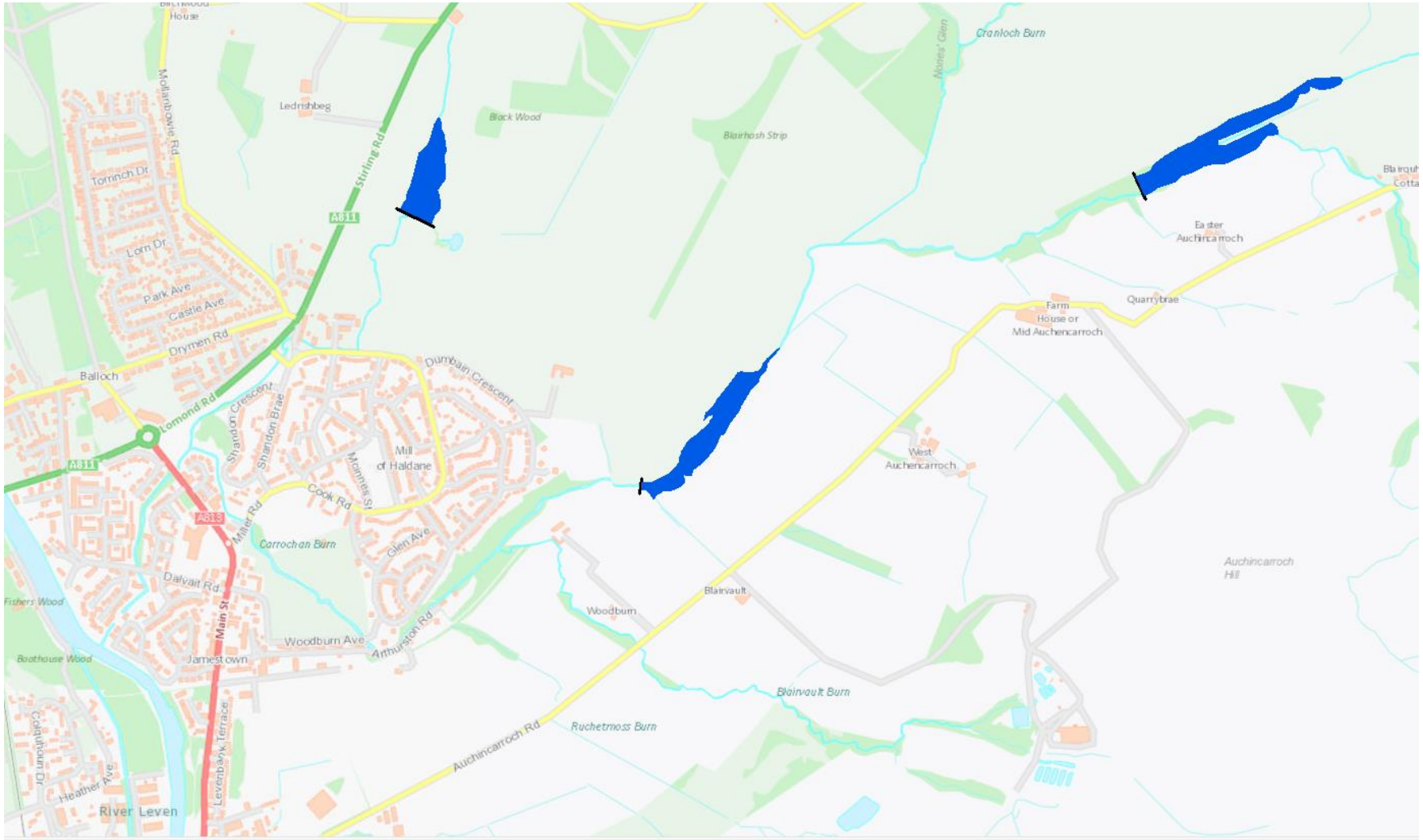
# Current Status – Review of Possible Flood Alleviation Options

- **Option 3 – Flow Diversion**

| Option Summary | | | | |
|---|---|---|---|---|
| **Construction Costs** | | | | **£3,640,093** |
| | | Diversion Culvert | £3,640,093 | |
| Preliminary Costs | 14% | of BCC | £502,560 | |
| Ground Investigation | 5% | of BCC | £182,005 | |
| **Overall construction cost (OCC)** | | | | **£4,324,657** |
| | | | | |
| Design & Environmental Fees | 5% | of OCC | £216,233 | |
| Site Supervision Fees | 8% | of OCC | £345,973 | |
| | | Total Fees | £562,205 | |
| | | | | |
| Archaeology & Environmental Mitigation | 10% | of OCC | £432,466 | |
| PV Operation and Maintenance Costs (50yrs) | | | £197,873 | |
| | | Total | £630,339 | |
| **Sub-total** | | | | **£5,517,201** |
| Optimism Bias | 58.2% | of Sub-total | £3,211,011 | |
| **Total Cost** | | | | **£8,728,212** |

# Current Status – Review of Possible Flood Alleviation Options

- **Option 4 – Upstream Storage** (0.5% AEP)




- Three storage locations identified.
- Assume 4m high embankments with up to 3m deep water impounded behind during flood events.

# Current Status – Review of Possible Flood Alleviation Options

- **Option 4 – Upstream Storage**

| Option Summary | | | | |
|---|---|---|---|---|
| **Construction Costs** | | | | **£1,323,989** |
| | Upstream Storage Embankments | | £1,323,989 | |
| Preliminary Costs | 17% | of BCC | £228,842 | |
| Ground Investigation | 5% | of BCC | £66,199 | |
| **Overall construction cost (OCC)** | | | | **£1,619,030** |
| | | | | |
| Design & Environmental Fees | 5% | of OCC | £80,951 | |
| Site Supervision Fees | 8% | of OCC | £129,522 | |
| | | Total Fees | £210,474 | |
| | | | | |
| Archaeology & Environmental Mitigation | 10% | of OCC | £161,903 | |
| PV Operation and Maintenance Costs (50yrs) | | | £1,144,425 | |
| | | Total | £1,306,328 | |
| **Sub-total** | | | | **£3,135,831** |
| Optimism Bias | 58.2% | of Sub-total | £1,825,054 | |
| **Total Cost** | | | | **£4,960,885** |

# Current Status – Review of Possible Flood Alleviation Options

- **Summary of Options**

| Option Name | Standard of Protection (AEP) | Total Cost |
|---|---|---|
| **Option 1 – Culvert Removal** | 1% AEP | £0.60m |
| **Option 2 – Culvert Removal and Hard Defences** | 0.5% AEP | £1.43m |
| **Option 3 – Flow Diversion** | 0.5% AEP | £8.73m |
| **Option 4 – Upstream Storage** | 0.5% AEP | £4.96m |

# Next Steps

- Receipt and consideration of feedback from Public Consultation
- Confirmation of a preferred option
- Internal Governance Procedures/Approvals (WDC)

# Next Steps

| Action | Anticipated Completion Date |
|---|---|
| Finalise Feasibility Report and Options Appraisal | April 2026 |
| Submit Report to Senior Asset Management Group (SAMG) to request funding to progress Design | May 2026 |
| Committee Paper to confirm funding to IRED/Council | May/June 2026 |
| Procurement of Detailed Design Consultant | September 2026 |
| Undertake Detailed Design and confirm Construction Costs | Spring 2027 |
| Develop Tender Documents and undertake Procurement of Construction Contractor | Spring /Summer 2027 |
| Construction of Proposed Option | Summer 2027 |

# Questions and Answers