

# Lochgilphead Flood Study

Public Consultation— 22<sup>nd</sup> October 2019



# Public Consultation - Structure

- Background and why we are here today
- Summary of work to date?
- What options were considered?
- How did we appraise and prioritise the options?
- What are our preferred solutions?
- What are the next steps?
- Questions

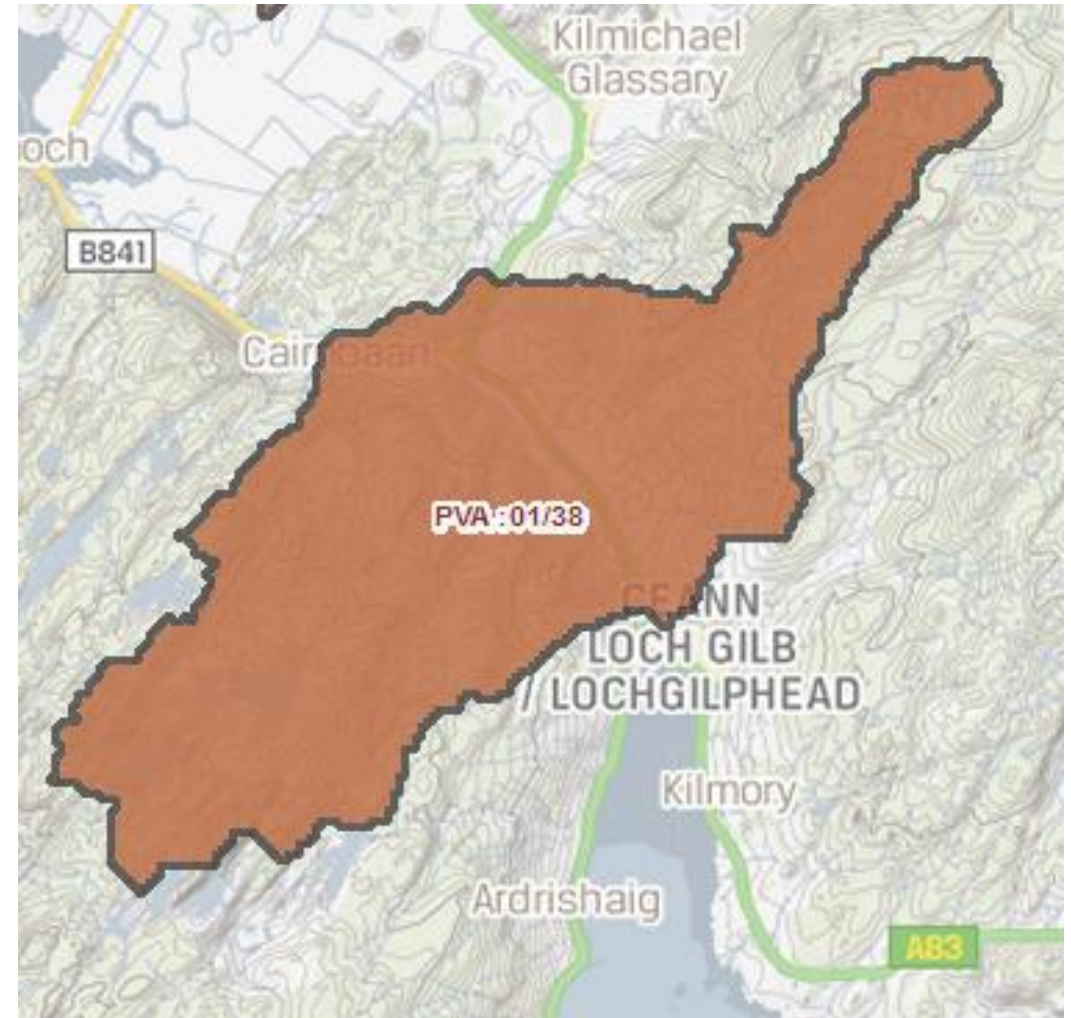


# Project Background

- Village included in a PVA, that focusses around Lochgilphead,
- Surface water, river and coastal flooding all affect the village,
- Coastal flooding likely to become significant due to climate change

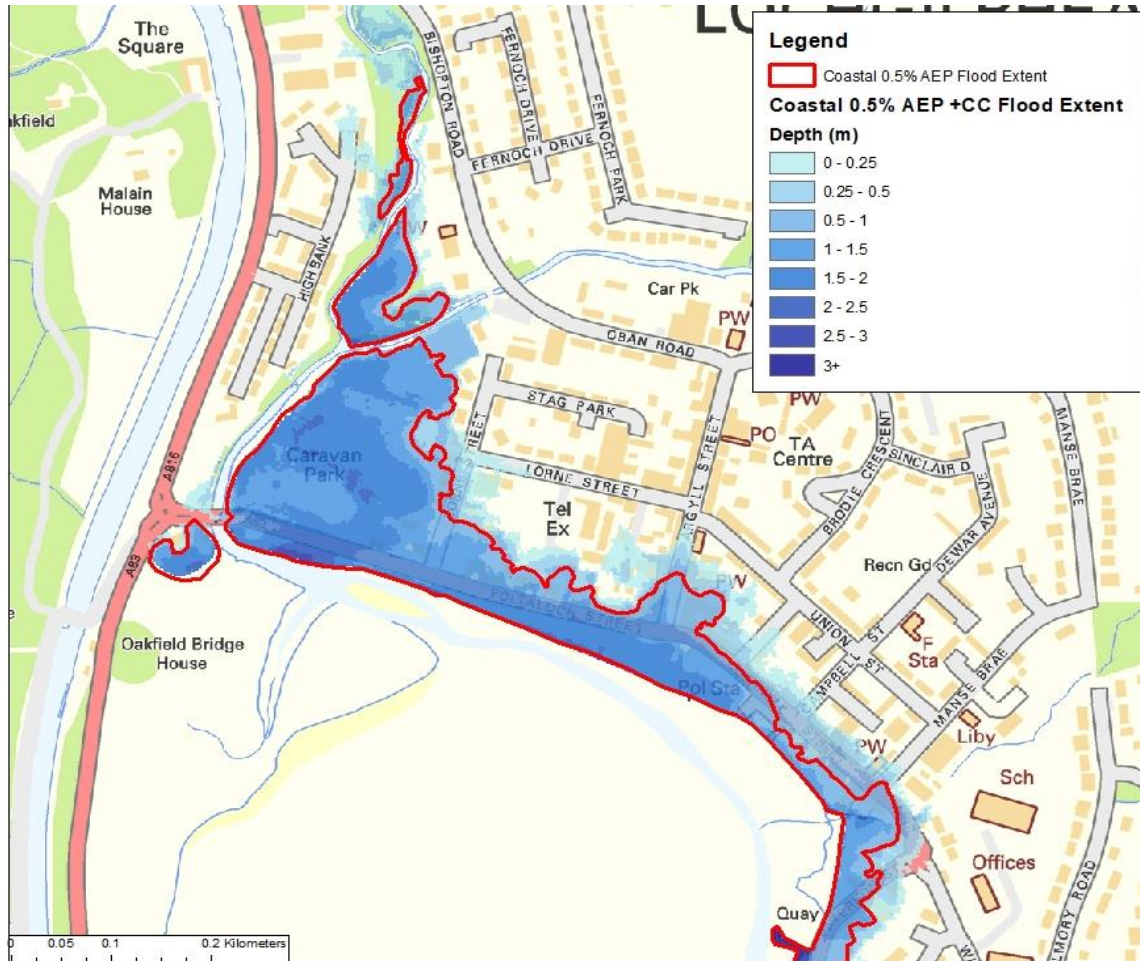
## Summary of work to date

- Assessing the historic flood data and flood accounts
- Undertaking detailed river and coastal computer modelling
- Mapping the flood risk within Lochgilphead
- Developing a long list of viable flood options for Lochgilphead
- Selecting a short list of preferred options based on key criteria and in consultation with key stakeholders and the public
- Developing preferred solutions from the shortlist through economic, social and environmental appraisal.



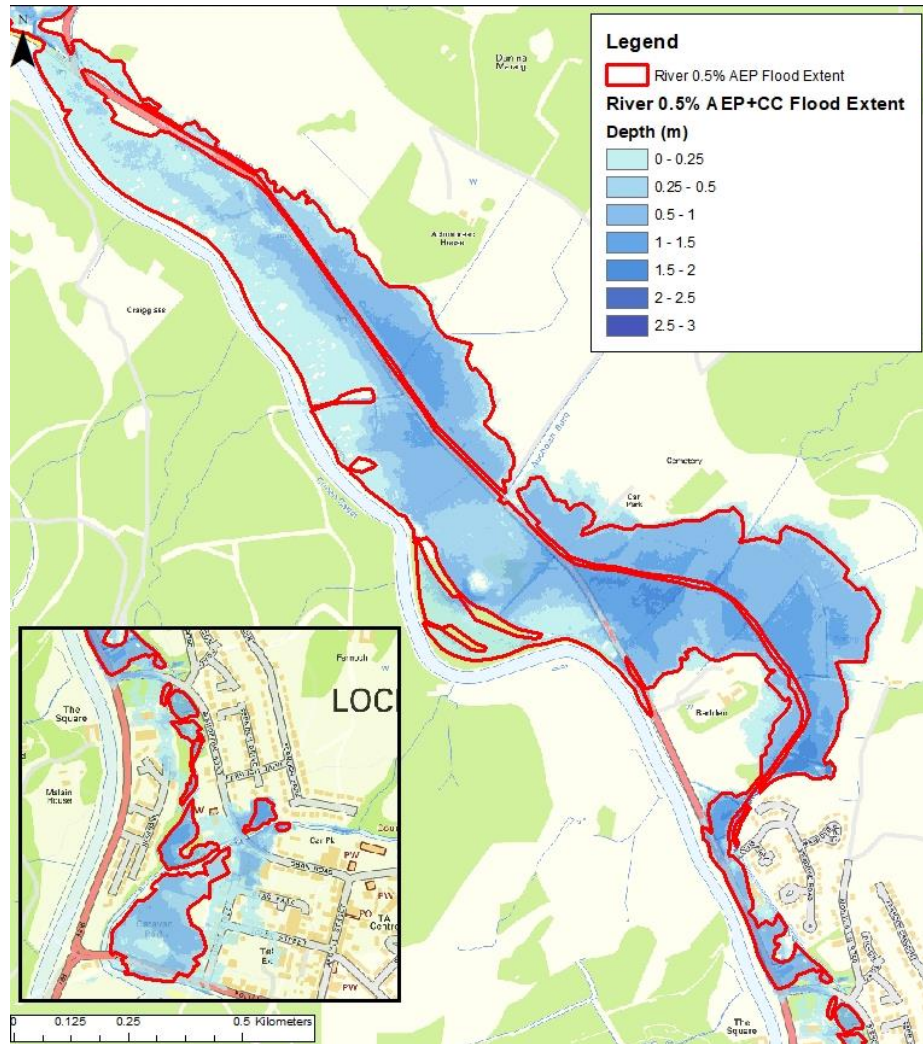


# Defining coastal flood risk



- Computer modelling of intertidal area and wider Loch Fyne area undertaken,
- The sea levels produced from the computer coastal modelling were applied to a computer model of the land around Lochgilphead,
- The 0.5% AEP coastal event flood maps, both present day and with climate change, are shown.
  - 83 properties are at risk of flooding at the 0.5% AEP present day,
  - 165 properties are at risk of flooding at the 0.5% AEP event + climate change.
- Current standard of protection – around 5% AEP event
- Standard of protection in 80 years (0.65m sea level rise – <50% AEP event

# Defining river flood risk



- Several watercourses were modelled; Badden Burn, Cuilarstich Burn and Crinan Canal (spill enters the Badden Burn),
  - Outflow from the Crinan Canal was established through a separate model,
  - Flows for the tributary watercourses were established for a range of AEP events,
  - All inflows were then applied to the computer model of the land that would be used to establish both coastal and river flooding in the study area,
- The 0.5% AEP river event flood maps, both present day and with climate change, are shown,
  - It is assessed that 36 properties are at risk of flooding in Lochgilphead at the 0.5% AEP present day event,
  - 85 properties lie within the 0.5% AEP event + climate change extent.

# Considered flood mitigation options

Once we confirmed the existing coastal and river flood risk, we looked at potential ways to reduce these risks by creating a long list of options

## Setback coastal embankment

- Installed within the Front Green to protect against high water levels
- Significant costs, and visually intrusive.
- Landscaped features could be built into embankment.



## Raising of existing defence

- Installed along existing defence to protect against high water levels
- Could incur significant costs, and be visually intrusive
- Demountable walls could reduce visual impact.



## Canal management

- Altering canal operations could reduce flooding on A816 and in town
- Non-engineered option = low cost and land take
- Could be investigated further in partnership with Scottish Canals.



## Natural Flood Management

- Small scale attenuation areas along Badden Burn could reduce flood risk
- Salt marshes/ beach recharge create a natural buffer which can reduce wave heights





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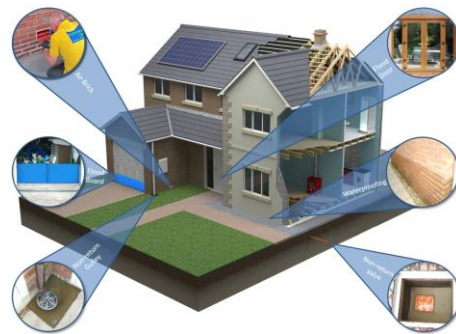
## Culvert/bridge upgrades

- May reduce out of bank flooding – although current capacity reasonable
- Upgrades would incur significant costs
- Significant road disruption



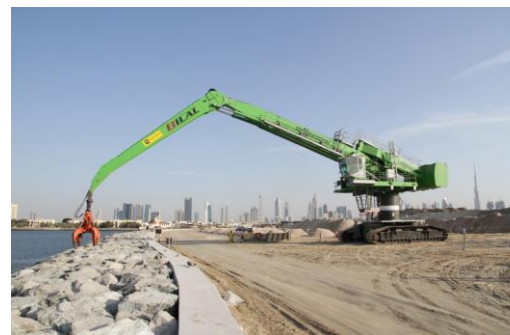
## Flood resilient properties and PFP

- Properties retrofitted with resilience measures or PFP
- Could include lifting electrical sockets and blocking flood pathways
- Flood risk still there.



## Land reclamation

- Infilling of area behind Lochnell Street to provide more space for defences
- Although more space for engineering works is created, impacts on environmental and social receptors remain.



## Tidal barrage

- Seek to stop high sea levels entering bay area
- Gated to allow access
- Extremely costly, and would significantly affect the character of area, the local environment and ecology.

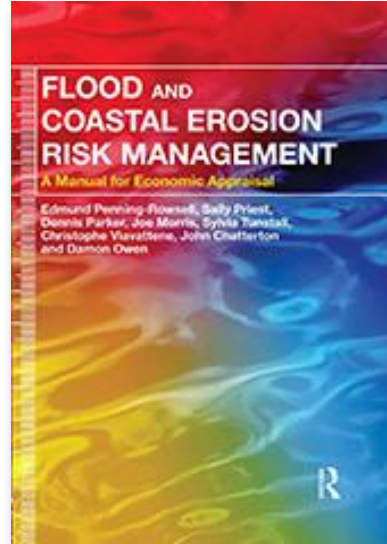


# How did we refine the options?

The long list of options was screened in terms of technical feasibility, legal constraints, financial constraints and environmental impacts to produce the short list of most viable options. These short list options were then appraised.

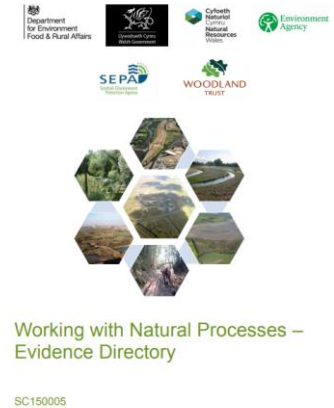
## Economic appraisals:

- As any successful scheme would receive government funding - economic benefits of an option should be greater than the costs. Benefit Cost Ratio greater than 1.
- Our assessment included:
  - Property damages
  - Clean-up costs
  - Emergency services
  - Option costs



## Social and environmental appraisals:

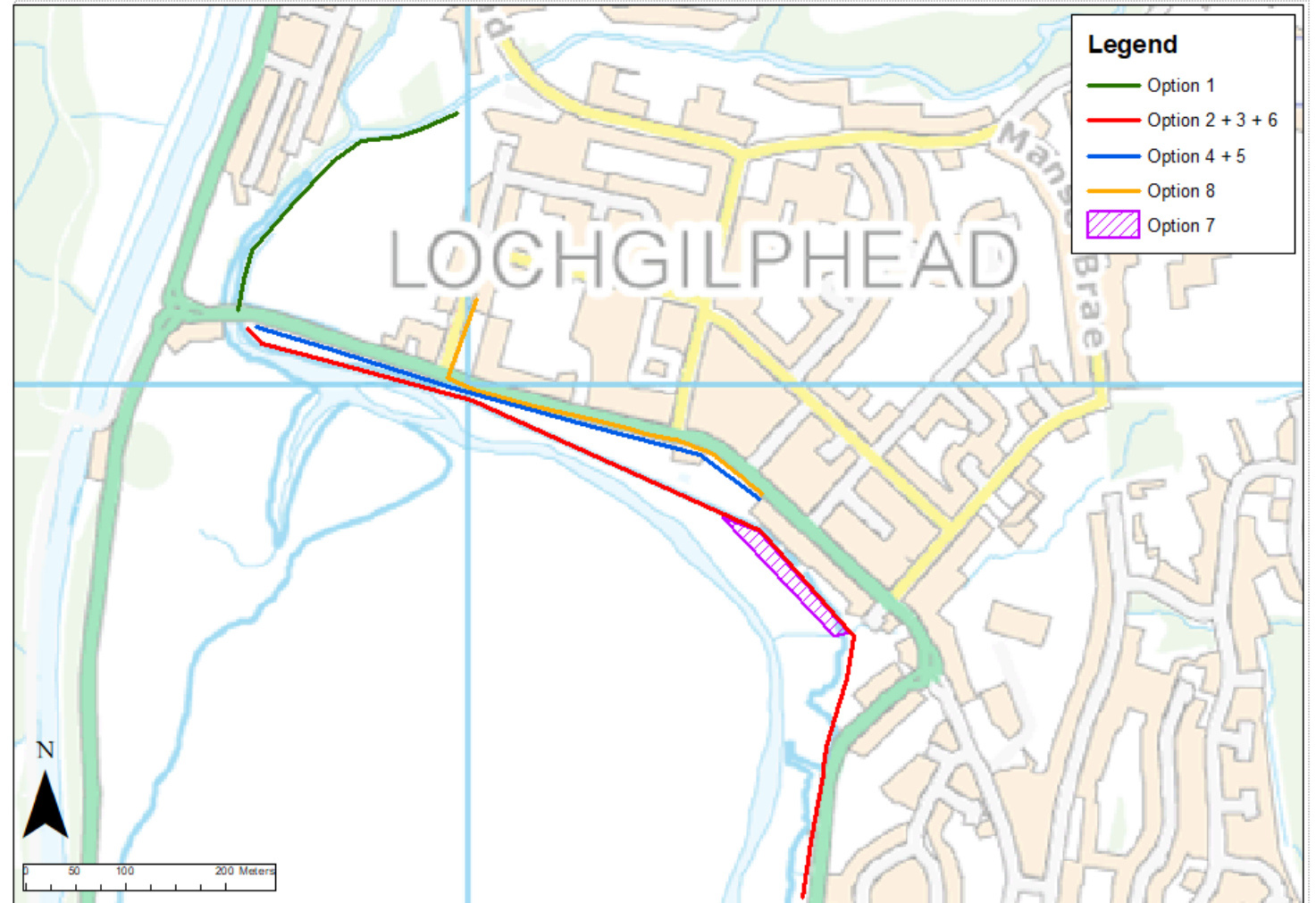
- Economically viable options should also show wider social and environmental benefits
- This may result in options being taken forward that do not show the best economics but are best when considering all factors or discounting options if very poor environmentally
- We looked at:
  - Health benefits, social vulnerability
  - Water, Ecological, heritage, etc.
  - Air, soil and climatic factors





# Short list of options

- Option 1 – Caravan park embankment
- Option 2 - Coastal wall along existing defence line
- Option 3 – Coastal embankment along existing defence line
- Option 4 – Set back wall
- Option 5 – Set back embankment
- Option 6 – Combination of wall/ embankment
- Option 7 –Land reclamation and wall/ embankment
- Option 8 – Short set back wall
- Option 9 – Property Flood Protection



# Prioritisation of Options

Based on the economic appraisal, a Benefit Cost Ratio (BCR) for each option was calculated. This is the ratio of the total damages avoided as a result of the option vs. the cost. The short listed options were as follows:

- Option 1 – Caravan park embankment – BCR 0.1*
- Option 2 & 4 – Coastal defence wall – BCR 0.2 – 0.21*
- Option 3 & 5 – Coastal defence embankment – BCR 0.28*
- Option 6 – Combination of direct defences – BCR 0.23*
- Option 7 – Direct defences and land reclamation – BCR 0.27*
- Option 8 – Short set back wall – BCR 0.19*
- Option 9 – Property Flood Protection – BCR 2.9*



It was found that the formal scheme options, such as direct defences, were unable to achieve a reasonable BCR. Option 9 was the preferred option as it provides a high Standard of Protection (SoP), achieves a good BCR and has reduced visual intrusion.



# Preferred Option- Property Flood Protection (short –medium term)

## *Flood risk benefits*

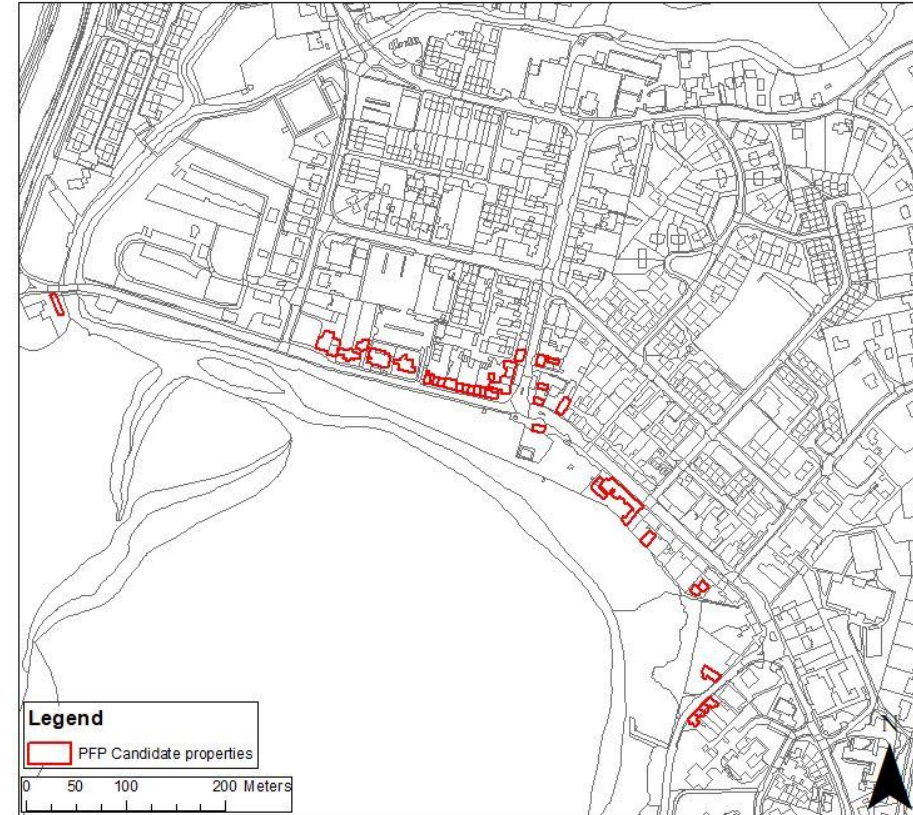
- Reduction in coastal flood risk to properties along the frontage of Lochgilphead up to the 1 in 200 year event.
- High Standard of Protection (SoP)
  - 30/33 at risk properties protected to 1 in 100 – 1 in 200 year standard
  - Remaining 3 properties receive slight lower SoP

## *Economics*

- Positive Benefit Cost Ratio of 2.9

## *Social and environmental impacts*

- Reduced stress due to flooding,
- Less visual impact compared with a formal scheme,
- Reduced pollution associated with flooding.

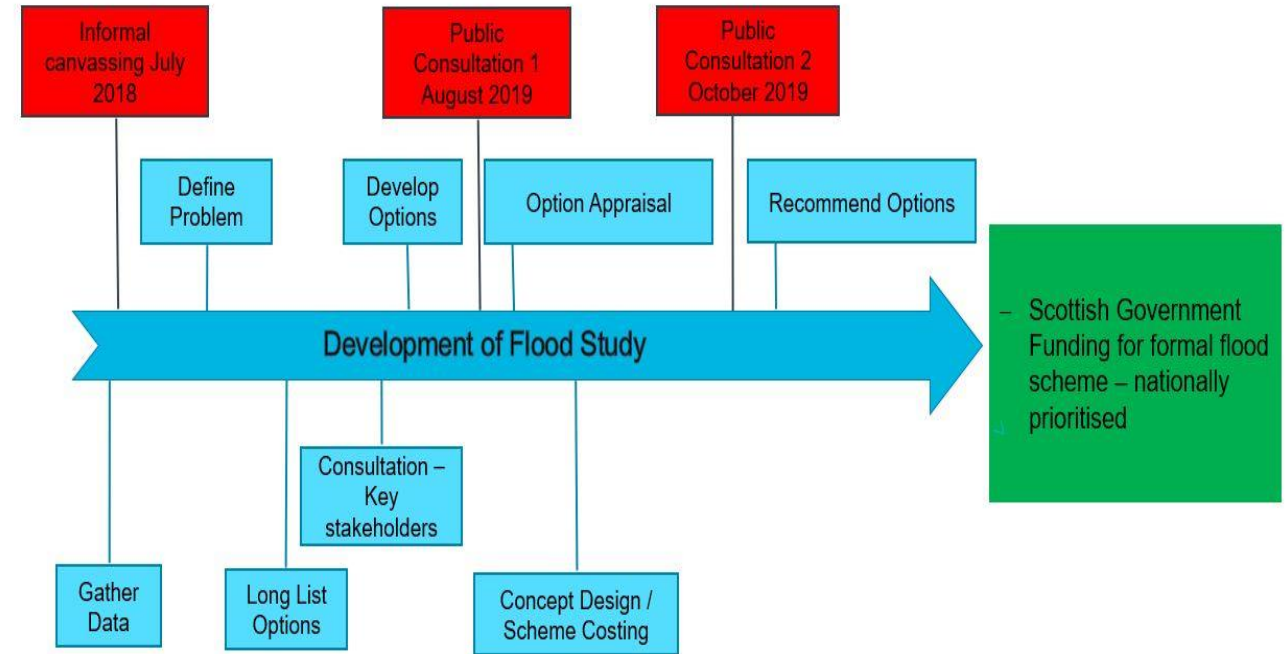


## **Longer term solution**

Formal Scheme likely to be viable following on from PFP in around 30 years time due to increase event frequency.

# Next Steps

- We will be available for further discussion here today until 8pm
- A comment card is available for you to leave your feedback at the back of the room.
- You can also feed back to: [morag.hutton@aecom.com](mailto:morag.hutton@aecom.com)
- Report will feed into SEPA National Prioritisation







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