Welcome to the public consultation event for the Tarbert Coastal Flood Study. The purpose of the event is to inform you of the work we have done so far and to gather your feedback on the provisional short list of sustainable flood options.

Why are we here?

Tarbert, and the surrounding area, has been identified as a Potentially Vulnerable Area (PVA) by the Scottish Environment Protection Agency (SEPA). PVAs are defined as catchments identified to be significantly impacted by flooding either now, or in the future, as a result of climate change. In the case of Tarbert, the PVA assessment has found the primary risk of flooding is from the sea.

AECOM have been commissioned by Argyll and Bute Council to investigate the extent of coastal flood risk and develop sustainable options to reduce this risk.

What have we done so far?

The Tarbert Flood Study commenced in May 2018 and we undertook our first public canvassing event in July to gather local flood knowledge. Since then, we have been working to fully understand the coastal flood risk in Tarbert and how these risks could be minimised. We have done this by:

- Assessing the historic flood data and flood accounts
- Undertaking detailed coastal computer modelling, using various data sets and current climate change predictions.
- Mapping the flood contours within Tarbert
- Developing a long list of viable flood options for Tarbert
- Selecting a short list of preferred options based on key criteria

At this point we want to consult with you on the provisional short-listed options. Your views will help us identify an appropriate way to manage coastal flooding in Tarbert now, and into the future.
02 Defining the coastal flood risk

Flood risk can be defined in terms of Annual Exceedance Probability (AEP) or Return Period. Both refer to the probability of tidal conditions of the same magnitude occurring each year. For example, a 1 in 200 year Return Period sea level will have a 1 in 200, or 0.5% AEP chance of happening in any given year.

In order to assess coastal flooding in Tarbert, we have undertaken computer modelling of the harbour as well as the wider Loch Fyne area. The modelling utilised numerous topographic datasets and includes tidal conditions such as waves and tidal surge. This modelling has allowed us to establish extreme sea levels at Tarbert for a range of AEP events both now and in the future based on current climate change predictions.

The extreme sea levels established in the coastal modelling were then applied to mapping to produce a set of flood contour maps for all AEP events. The 0.5% AEP event flood contours, both current day and with climate change, are shown on this poster. A range of other AEP event flood contours can be viewed by speaking to one of the project team.

An indicative cross section through Barmore Road can also be seen on this poster. This aims to aid the visualisation of flood depths for a range of AEP events as well as highlighting the predicted impact of climate change on sea levels.

Flood risk in numbers for a 0.5% AEP event, with and without climate change:
- 69 properties within the 0.5% AEP event present day flood extents in Tarbert
- 84 properties within the 0.5% AEP event + climate change flood extents in Tarbert
- Flood risk to a number of roads including the Barmore Road and Harbour Street

What about my property?

By all means look up your property on the flood maps shown here. You should remember, however, that the computer modelling was carried out on a large scale that is not specific to any one property. No detailed account is taken of localised features such as kerbs and garden walls etc. which in reality may affect localised flow paths.
03 What coastal options have we considered?

Once we confirmed the existing coastal flood risk using the latest modelling techniques and data, we looked at potential ways to reduce this risk by creating a long list of options.

**Raise coastal wall at existing defence line**
To prevent overtopping along the existing harbour extent, the coastal defence wall could be raised to create a barrier to wave carry over and inundation from high sea levels. This would increase the standard of flood protection for all receptors, but it would incur significant cost as well as being highly disruptive due to the likely need to substantially re-build the existing defences. Furthermore, this could reduce Tarbert’s connection with the sea and result in impacts on various environmental and social receptors.

**Setback coastal defence line**
It was assessed that a flood wall could be installed on the landward side of the promenade to protect Tarbert from tidal inundation whilst still maintaining a recreational walkway overlooking the sea.

Installing a wall would incur significant cost as well as being highly disruptive due to the proximity of the main road. Furthermore, this could reduce Tarbert’s connection with the sea, although arguably less so than a wall along the existing defence line, and result in impacts on various environmental and social receptors.

**Property Level Protection (PLP)**
PLP can be employed to protect individual properties from flooding through pathways such as doors and windows, brickwork and sewage systems. This option would not address the source of flooding but could act as a resilience measure to protect individual properties against flooding up to 0.6m in flood depth. This upper limit on flood depth is predicted to be exceeded which limits the scope of protecting all properties. The success of PLP is also heavily dependent on the correct choice of PLP and its installation, operation and maintenance. Issues would arise with retrofitting these measures on listed buildings.

**Breakwater**
Installation of a hard-engineered structure, set out from the harbour, could be used to dissipate wave energy offshore to reduce onshore wave heights.

However, based on the modelling, wave heights were seen to be relatively low, with the primary source of coastal flooding being still water levels. For this reason, a breakwater is unlikely to provide significant reductions in flooding to Tarbert.

**Natural Flood Management - Salt marshes/ beach recharge**
This option aims to reduce flood risk by creating a natural buffer for waves by dissipating wave energy and thus reducing wave heights before they reach the harbour. Natural Flood Management options are considered a sustainable approach to flood risk which could provide amenity value.

However, based on the modelling, wave heights were seen to be relatively low, with the primary source of coastal flooding being still water levels. For this reason, salt marshes or beach recharge are unlikely to provide significant reductions in flooding to Tarbert.

**Flood resilient properties**
Properties within the area designated as at risk of coastal flooding would be retrofitted with resilience measures. This option essentially accepts there is a flood risk and properties are adapted to better withstand flooding, with measures including lifting of electrical sockets and flood proof paint and flooring. There has been little uptake of this kind of solution in the UK; however, it is becoming more popular in areas where an engineered scheme is not appropriate or desired.

**Land reclamation**
Infilling of an area of the intertidal mudflats in front of the existing harbour wall to provide more space for coastal defence options such as a wall or embankment. The primary purpose of this land reclamation is for flood defence purposes; however, the additional land could also be used to create a multipurpose amenity area for the village.

Whilst this option provides better access and more space for the engineering works, and the potential to reduce the height of the defences, the connection to the sea and potential impacts on environmental and social receptors remain.

**Tidal Barrage**
A tidal barrage would seek to stop high sea levels entering the harbour area. This structure could run between the mainland and an island to reduce the overall length. The tidal barrage would remain open for the majority of the year, only closing when high sea levels were forecasted.

It is likely that a structure of this scale would be extremely costly and would significantly affect the character and appeal of the area. In addition, it would likely impact local environmental and ecological receptors and potentially affects commercial interests.
Tidal flooding often presents fewer potential flood options as the issues are largely related to water levels, rather than flow volume. Options are therefore largely focussed on blocking these high water levels from reaching properties.

**Direct defences**

Direct defences in some arrangement are likely to form part of the preferred option for Tarbert. The preferred location, either along the existing defence line or set back, will be chosen based on an assessment of the feasibility of each location and the feedback from this public consultation.

Regardless of location, there are ways that the visual impact of the defences could be minimised. These options could include using glass topped walls as seen in Kirkwall or utilising demountable or flip up defences.

Another approach would be to develop a combination of approaches in one overall scheme; selecting the most appropriate flood option for each location. Gates could be installed where access is frequently required, flip up or demountable walls may be preferable across visually sensitive sections of the harbour and traditional defences may be most appropriate at less sensitive locations.

**Land reclamation and direct defences**

Land reclamation would involve infilling a section of the intertidal area up to the existing road level to create more space for the installation of coastal defences. The extent of this land reclamation will depend on numerous factors such as the overall space requirement for coastal defences, the necessity to maintain commercial usage of the harbour and potentially the space requirement for amenity purposes.

Overall defence heights will remain relatively high, however there may be scope to reduce the overall appearance of a wall or embankment height through gently sloping the reclaimed land up to the defences.

**PLP and flood resilience**

As part of a wider scheme, and particularly in the short to medium term, PLP could play an important role in reducing coastal flood risk. Small scale property interventions, such as flood doors and windows, can protect properties from flood depths up to 0.6m and could be particularly useful in locations where only isolated properties are affected.

In tandem with PLP, flood resilience measures, such as raising sockets and using water resilient materials, could offer a means of further reducing flood damage to property.
05 What are the next steps?

Further development of the provisionally short-listed options will be undertaken utilising feedback from the stakeholder group and this public consultation as well as additional assessments of the technical, legal, economic and environmental considerations.

Once we have undertaken all of our assessments, we will be back for another public consultation to present the preferred flood solution for Tarbert later in the year.

A report containing details of the current and future flood risk and recommendations for the management of coastal flood risks in Tarbert will be produced. The results of this study will be compared to the results of other flood studies being undertaken across Scotland, and this will identify a priority list for flood protection works. This is a competitive process and prioritisation, and therefore flood scheme funding, is based on how economic the presented flood solutions are.

In the meantime, if you want to learn more about flood risk and how you can better prepare yourself, please ask the project team for information on written resources and flood related organisations.

How to provide your feedback?

The project team welcome your comments on the Tarbert Flood Study.

You can provide your feedback in various ways. A questionnaire is available for you to leave your comments today at the event. Alternatively, you can email morag.hutton@aecom.com with any queries or comments.