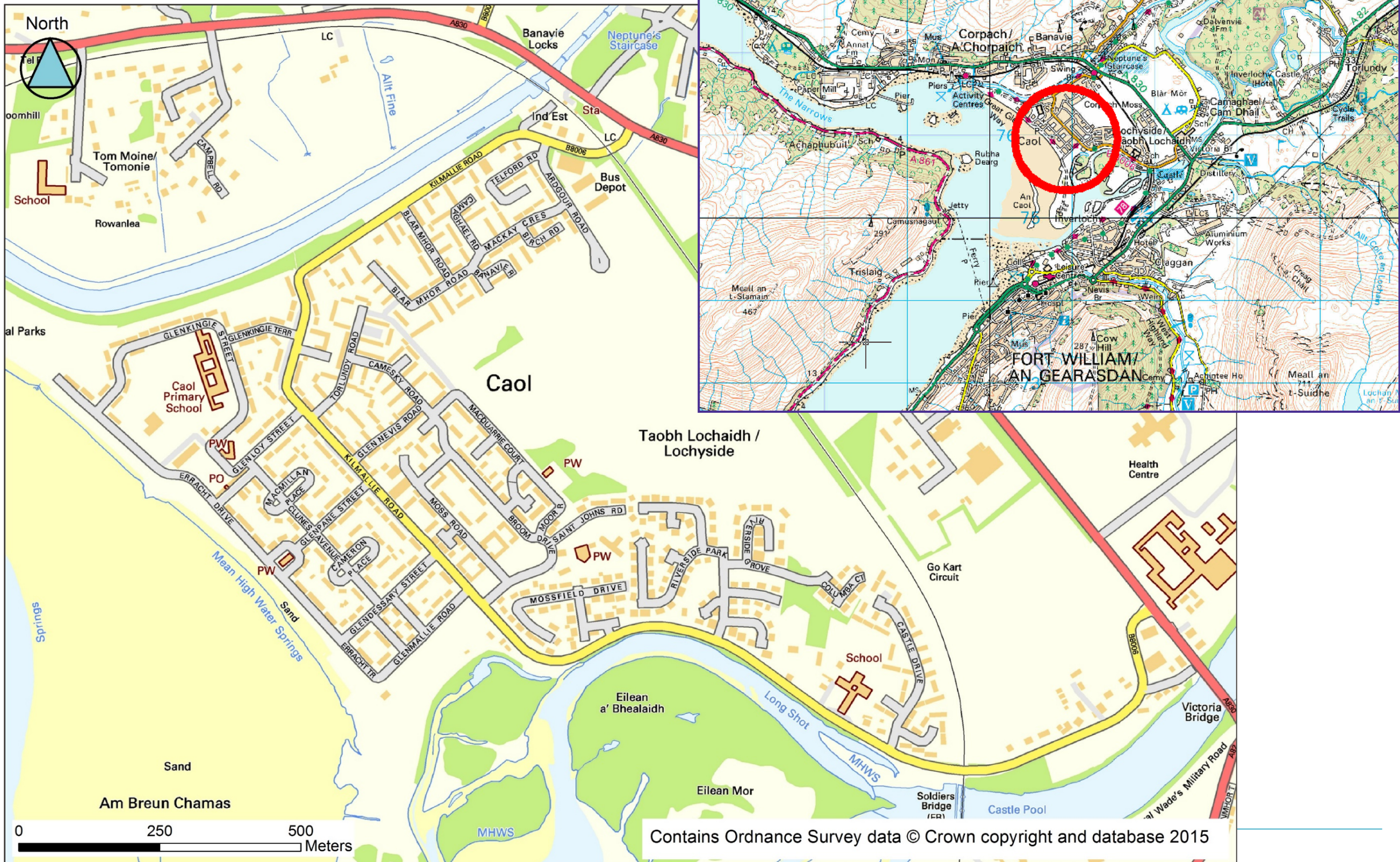


1 - Welcome to the exhibition

Put a dot on your house

Visitors from outside the area shown please put your dot here



2 - River Lochy / Caol Flood Protection

We are here to help you help us.

We have been collecting information and assessing new data to determine what we think is the best solution to manage flood risk in Caol.

It is vital that the local community and businesses of Caol have their say on the developing plans.

We would like to tell you how we have come to the preferred Flood Protection Scheme. In return we would value your opinion and local knowledge

How will we use this information?

Public participation is an essential and necessary element in developing the scheme. It is required at all stages from inception to construction.

We will use the information you provide to further develop the design of the Caol Flood Protection Scheme and get the necessary agreements to move on to the next stage of the process.



Coast towns face growing threat from higher tides

SCOTLAND'S coastal communities could be at risk from devastating floods caused by global warming, official statistics have revealed.

A report by the Scottish Environmental Protection Agency (SEPA) has shown that sea levels around the country have sometimes risen by eight feet above previous averages.

In one case, SEPA recorded a huge 15 feet tidal surge during winter storms at Corpach, near Fort William, Inverness-shire, in January 2005.

Last night, experts outlined the various ways global warming operates to create such dangerous tidal surges.

Rising temperatures increase the amount of water from melted snow reaching rivers. This, together with higher rainfall, means much more water is flowing into the sea.

Global warming also sparks ferocious storms and when these develop in mid-ocean, huge volumes of sea water can be pushed towards land.

Last night Chris Spray, SEPA's director of environmental science, said: 'We believe these climatic effects will intensify in future years.'

'For example, the volume of rainwater and melted snow being carried down our rivers in winter last year was more than 90 per cent higher than previously.'

'If it is proof, if proof were needed, that

By Vic Rodrick

climate change is already affecting Scotland in a major way and reinforces the need for us to take action to combat it.'

Environment expert David Basset, of Edinburgh-based JBA Consulting, which helped compile a new flood risk map for SEPA, said: 'A tidal surge is slightly different from a tsunami wave.'

'A surge elevates the whole water level, usually by about two feet, and the waves will then be on top of that.'

Alex Johnstone MSP, environment spokesman for the Scottish Tories, described the threat as 'worrying'.

He said: 'Tsunamis come once in a lifetime. While tidal surges are less significant one-off events, tsunami-like damage could still be caused.'

'If you get a storm surge from the sea at the same time as a high tide and a lot of water coming down rivers, the rivers back up and cause flooding.'

Fergus Ewing, Nationalist MSP for Inverness, Nairn and Lochaber, said: 'Rather than hearing talk of mini tsunamis and record sea levels, the good people of Corpach would be more impressed with SEPA if it took measures to protect them from future floods.'

A spokesman for SEPA said that although the agency handled flood alerts, flood prevention measures were the responsibility of local authorities.

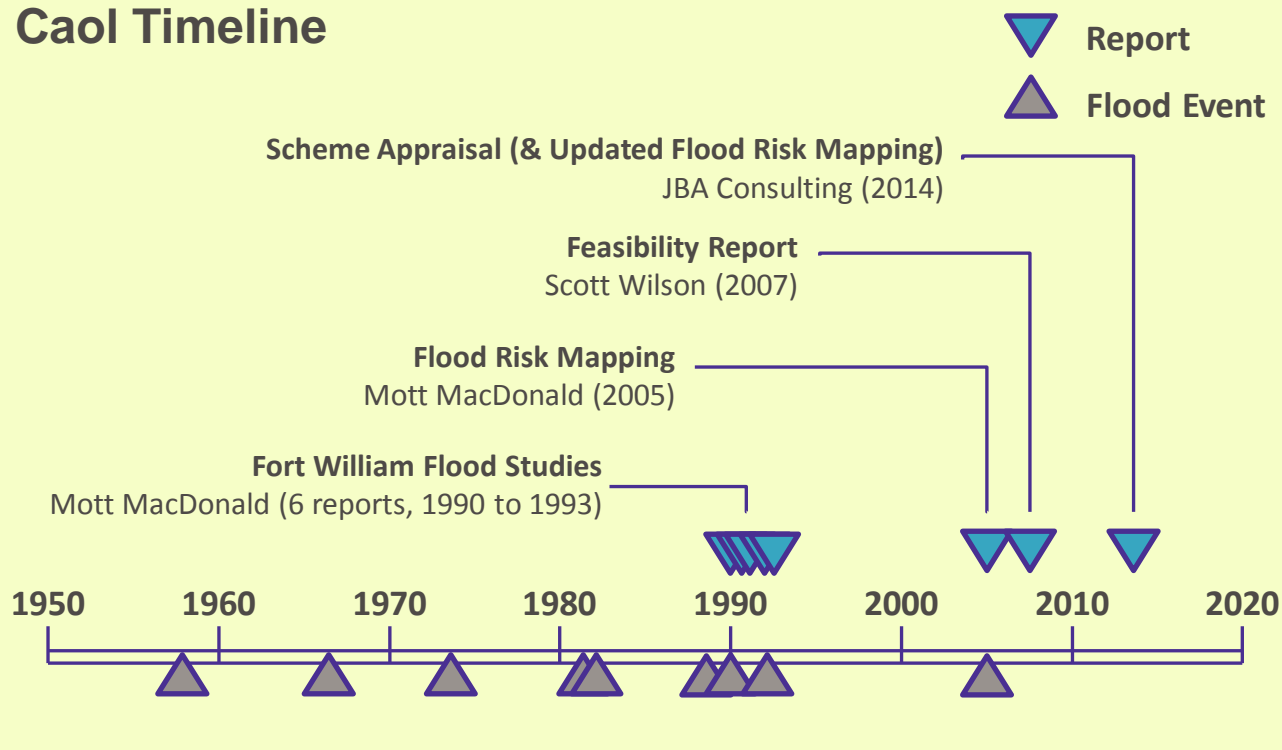


3 - What are the flood risks to Caol?

Caol has a long flood history and flooded most recently in 2005.

Studies have been carried out by professionals that agree there is a clear risk of river and coastal flooding in Caol.

Caol Timeline



The more information we have on previous flood events, the better we will be at finding an appropriate solution.

Questions

Do you have any information or photographs of previous flood events?

Caol is in an area of flood risk from the River Lochy and Loch Linnhe.

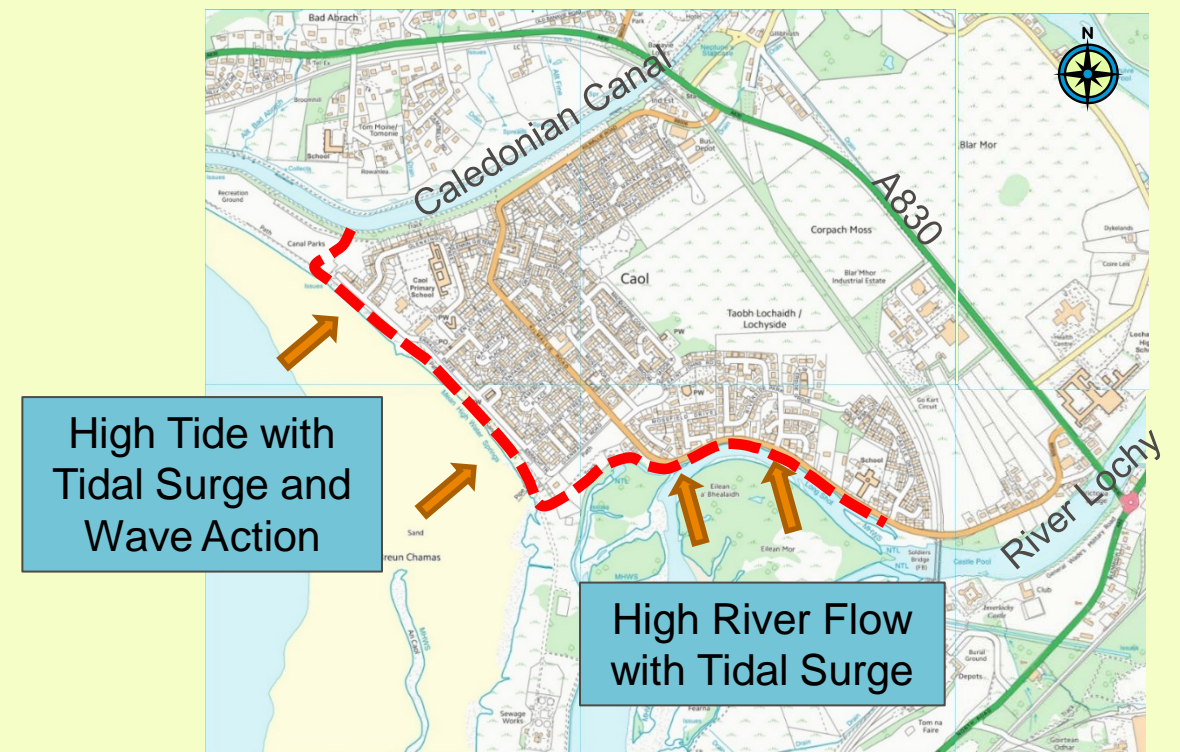
Flooding within Caol can occur due to four processes;

- from extreme sea-levels surging into the Loch,
- from wind-generated waves breaking over the foreshore,
- from river flows exceeding the bank level of the River Lochy and inundating the surrounding floodplain and
- from surface water.

Each process may occur in isolation or, during some cases, occur simultaneously to produce extreme flooding.

This is likely to get worse as the effects of climate change have an impact on sea levels and rainfall runs off the land into the River Lochy.

Caol Flood Risks



4 - Coastal processes impacting Caol

What is tidal surge?

A tidal or storm surge is a change in sea level that is caused by a storm, predominantly caused by high winds pushing the sea water towards the coast, causing it to pile up there. The strong winds in the storm generate large waves on top of the surge which can cause damage to sea defences, or spill over the top adding to the flood risk. The height of a storm surge depends on many factors such as the size and strength of the storm, the direction it approaches the coast, and the shape of the coastline and seabed. In areas with large tides, such as the UK, the timing of a storm surge is particularly important and just a couple of hours' difference may mean the difference between an area being flooded or staying safe.

Diagram of shore frontage showing key flood levels and land/property levels

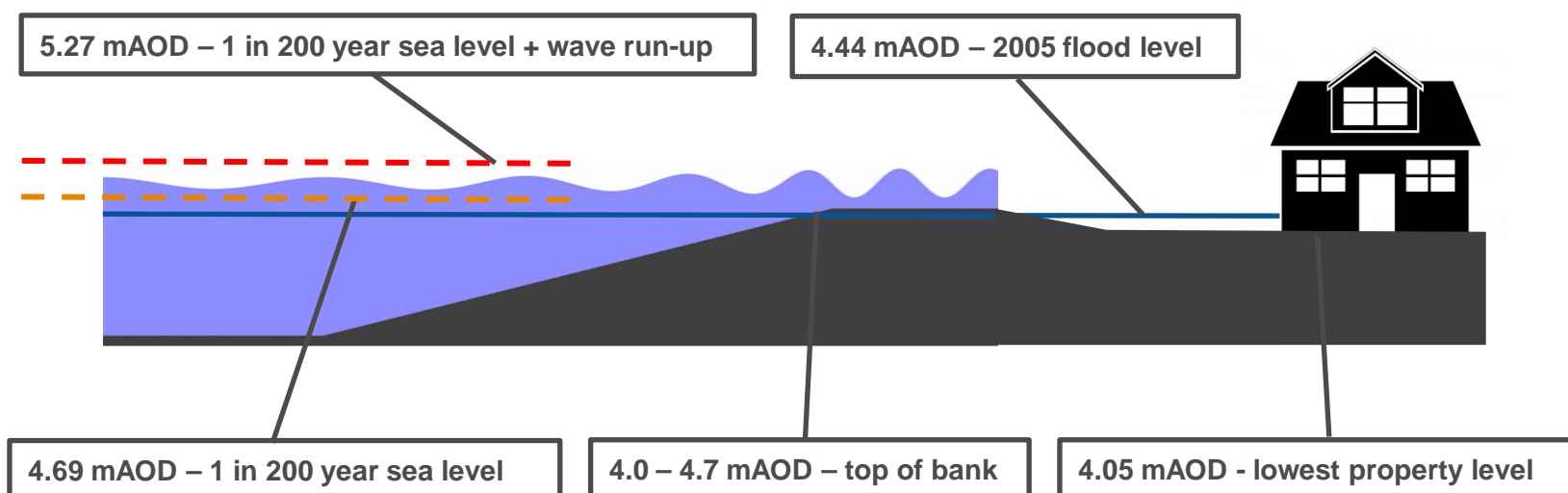
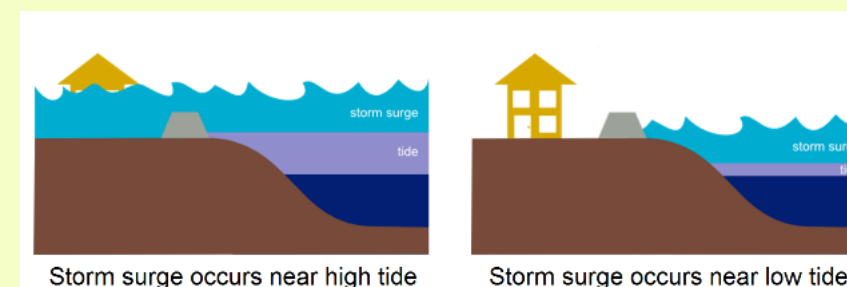


Illustration of storm surge and impact of timing of tide

Image: courtesy of the Met Office



Flood Warning:

Call Floodline on 0345 988 1188 or visit:

<http://floodline.sepa.org.uk/floodupdates>

Wave processes considered:

Wave modelling also undertaken to propagate waves and surge through Loch Linnhe

- Funnel shape of Loch acts to converge storm surges and waves
- Long straight, SW Loch acts to 'push' water up Loch
- Both factors result to increased elevations at head of Loch

How high does the defence need to be?

Based on the analysis undertaken to protect against both high tides and waves, the defence would need to be the following elevation:

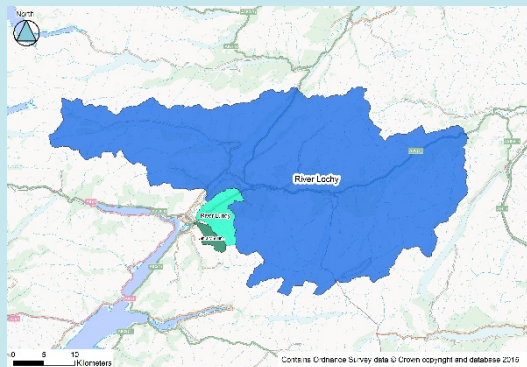
- 1:200yr sea level **4.69 mAOD**
- 1:200yr sea level + wave run-up **5.27 mAOD**
- 1:200 sea level +wave run-up + climate change **5.94 mAOD**

It is typical that an additional height is added to the designed level to take into account uncertainties. This is referred to as 'freeboard'. Therefore the design height is **6.54 mAOD**.

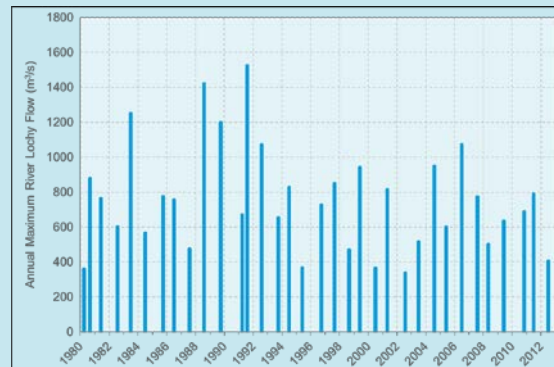
5 - River Lochy flood process & analysis

Flood flow estimates are used to determine defence heights

Important inputs into flood flow estimates are the analysis of historic floods. The maximum recorded flow on the River Lochy since 1980 is 1,524 m³/s. A 34 year record of River Lochy flows was used to estimate peak flows. These flood flows are used to estimate flood levels, flood extents and required flood defence heights.



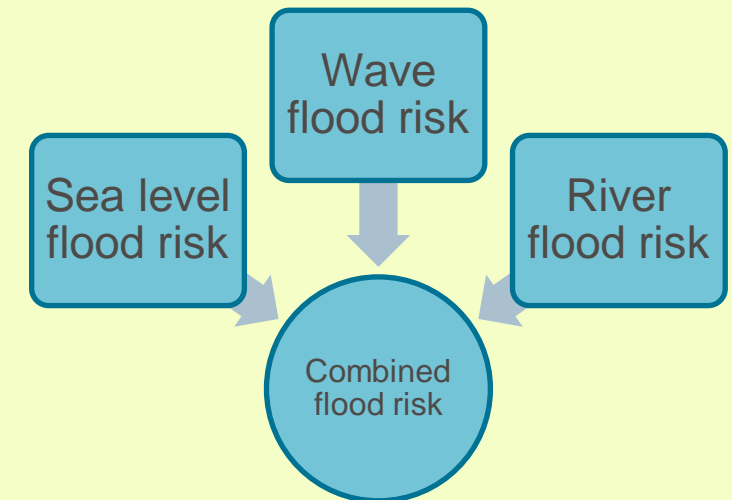
Catchment area of River Lochy



Annual maximum recorded flows in River Lochy

Modelling undertaken

Analysis of sea levels, wave impacts and flood flows on the River Lochy have been undertaken to assess risk from each source.



A joint probability analysis has been conducted to determine the most appropriate flood risk scenarios and defence levels.

Framework for river flood risk analysis:

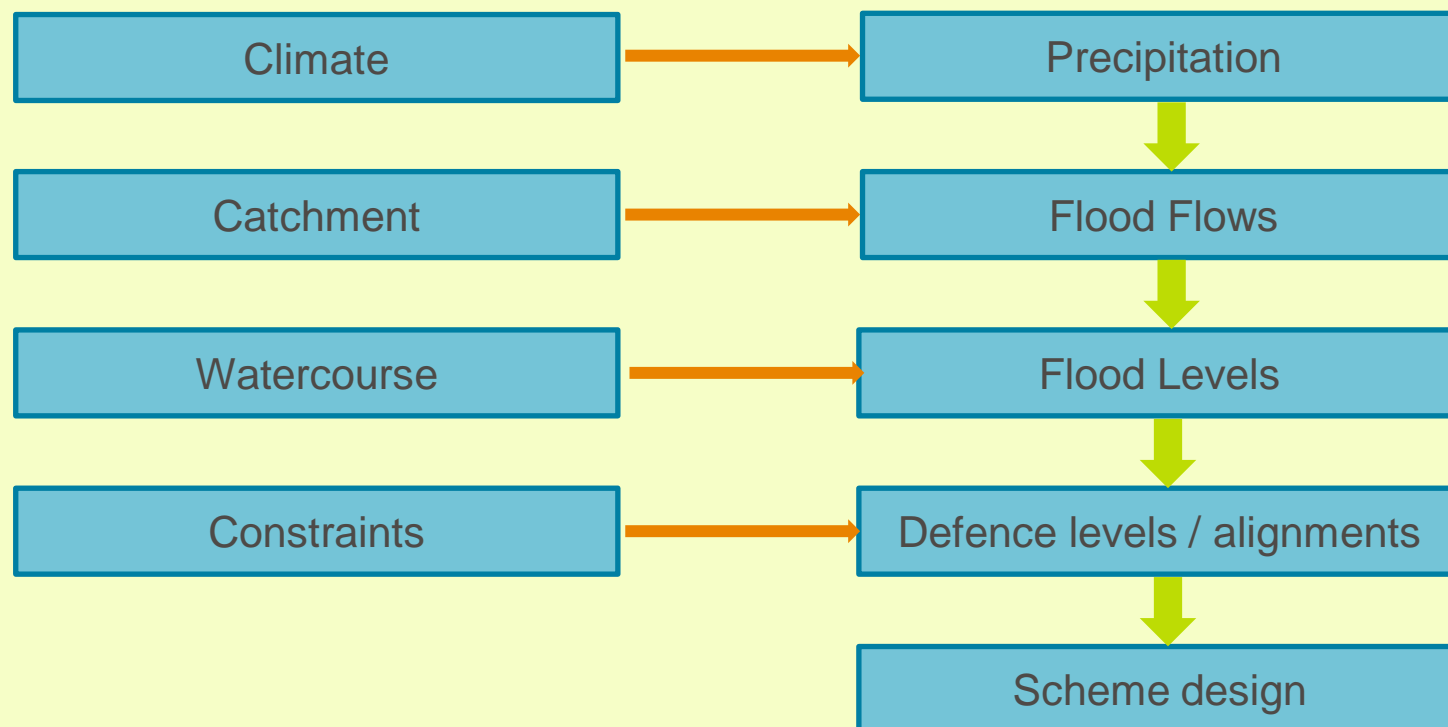


Illustration of combined risk from high tides and waves

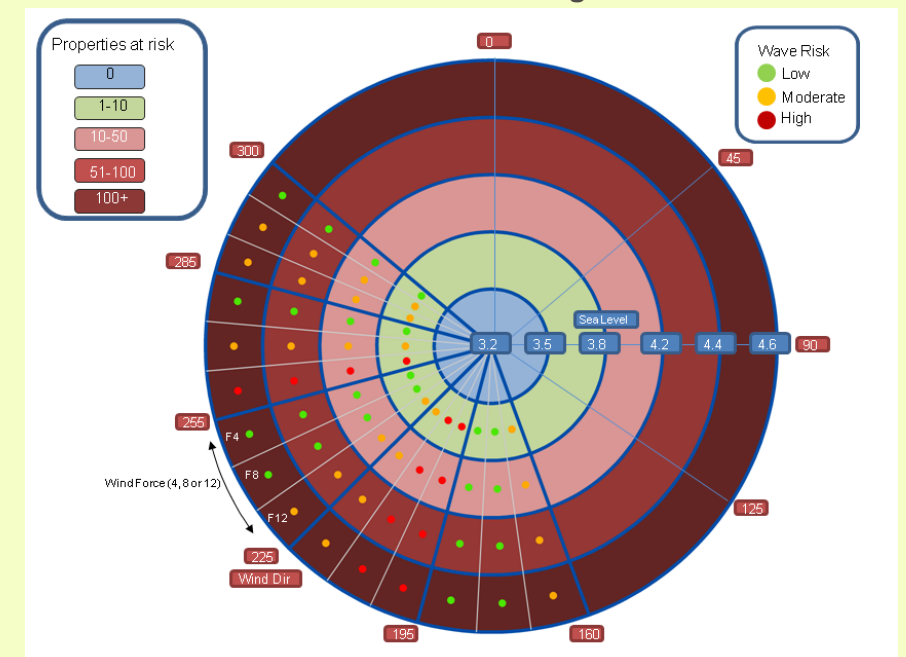


Image: courtesy of SEPA Flood Warning

6 - What is the extent of the problem?

Properties at risk:

There are estimated to be approximately 300 properties at risk at the 1 in 200 year flood (the design flood). Of these 300 properties, 23 are commercial or public buildings which includes the current Caol Primary School, Kilmallie Free Church and the police station.

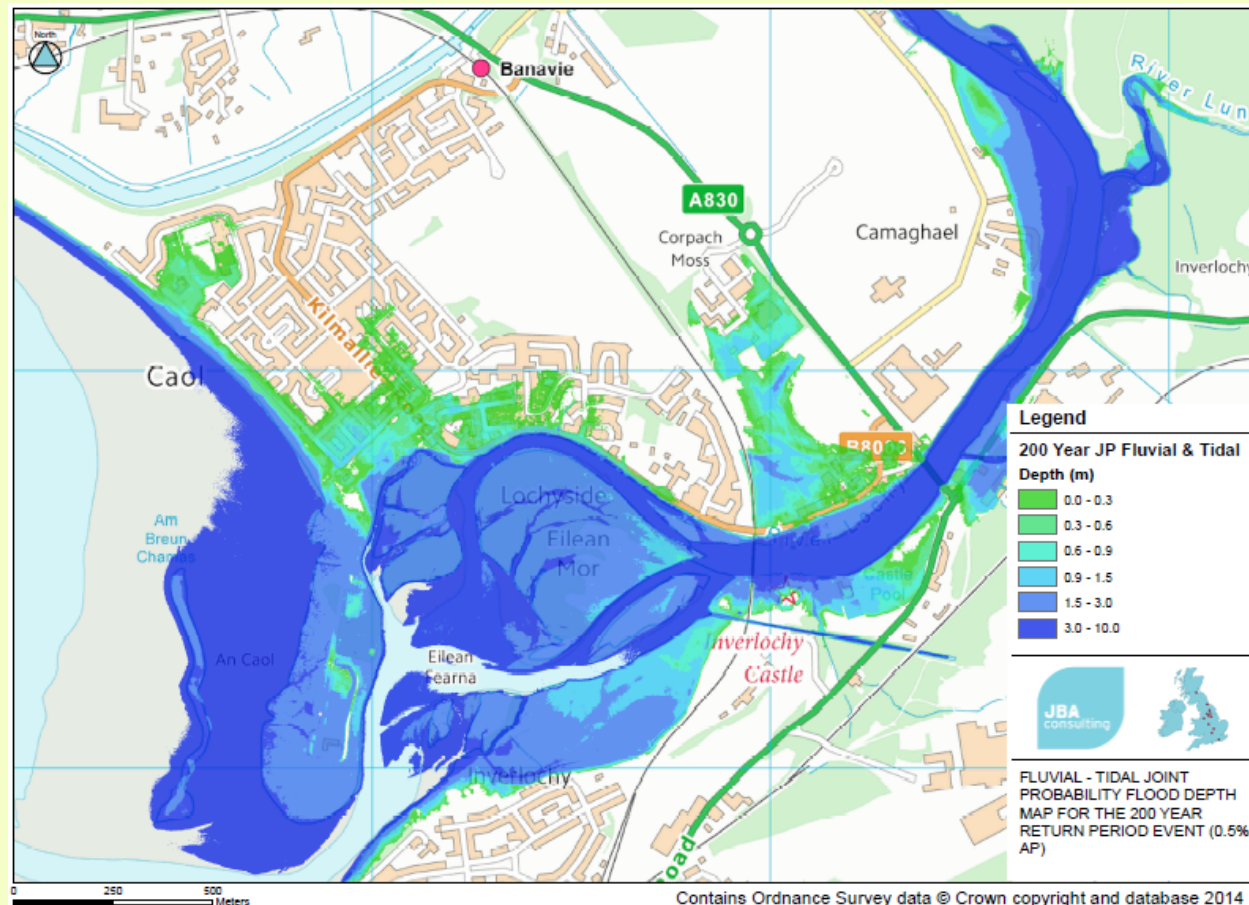
Total properties at risk

2 year	5 year	10 year	20 year	50 year	100 year	200 year
0	7	30	50	93	171	296

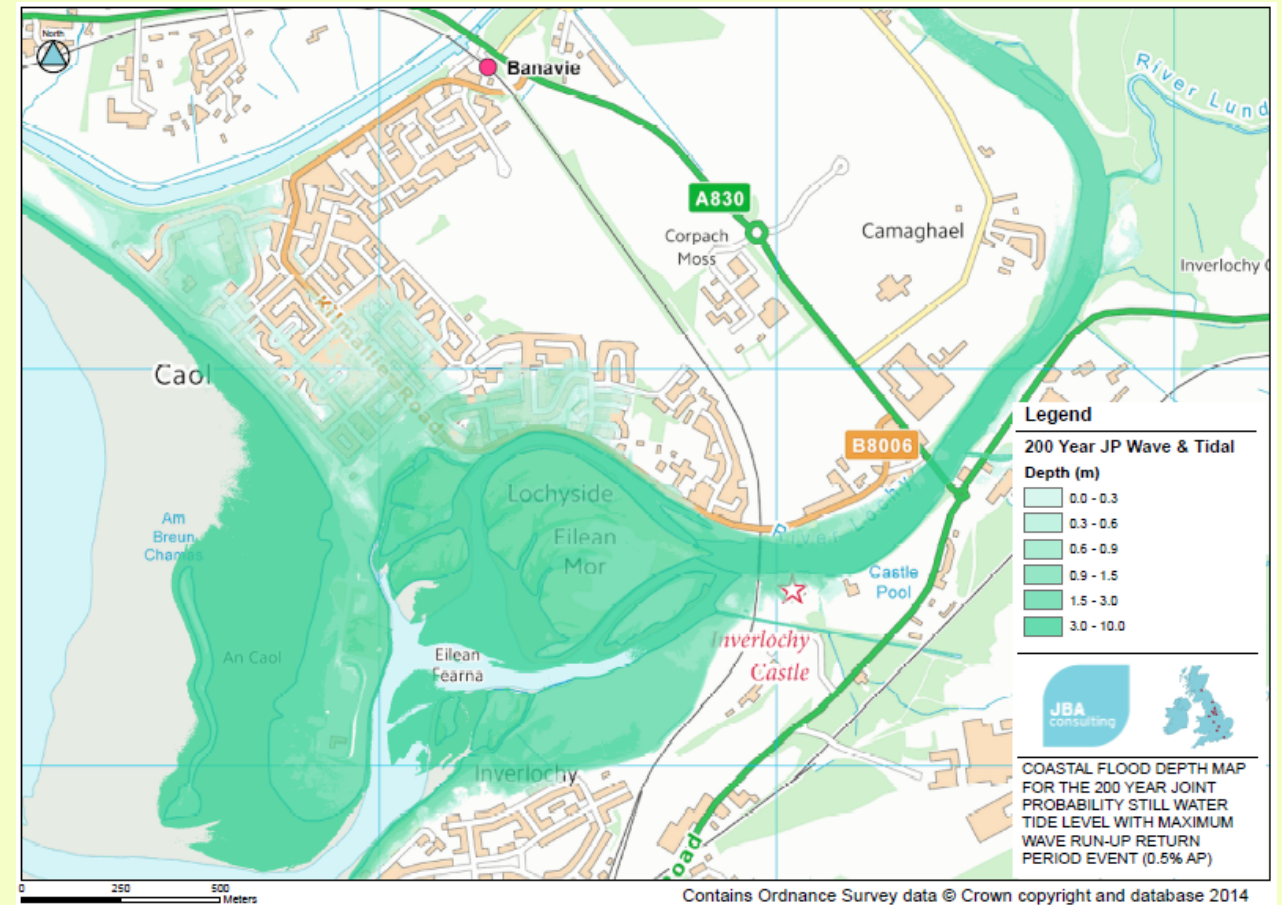
Key findings from these studies show that:

- The flood that occurred in 2005 had a level of 4.4mAOD and is likely to occur on average once every 20 years.
- Climate change is likely to increase sea levels by 0.66m by 2080.
- There are 300 properties at risk from the 1 in 200 year flood

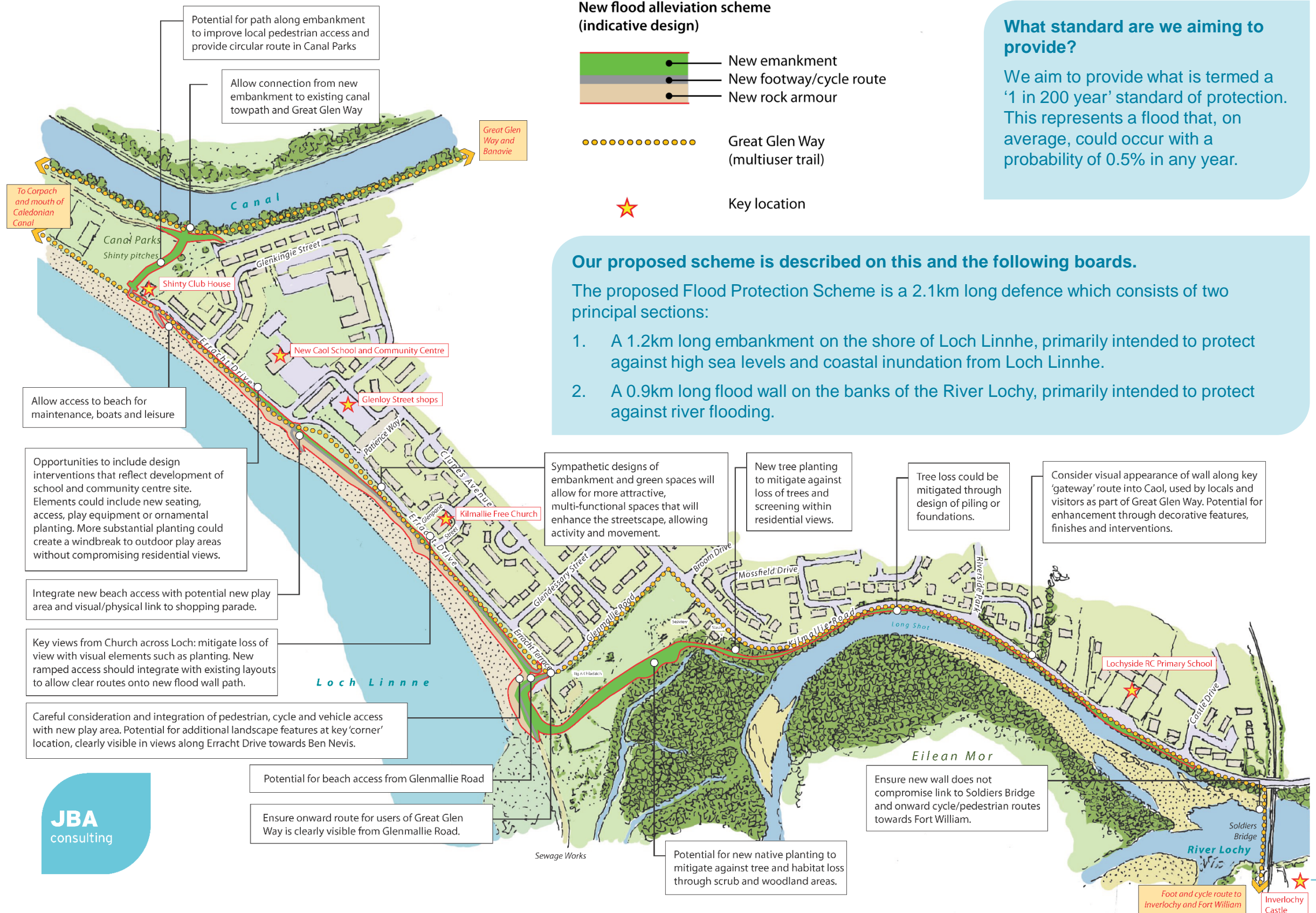
Predicted Flood Depths from the River Lochy








Predicted Flood Depths from Waves and Tidal Surge



7 - So what is the proposed scheme?



New flood alleviation scheme (indicative design)

-  New embankment
-  New footway/cycle route
-  New rock armour
-  Great Glen Way (multiuser trail)
-  Key location

What standard are we aiming to provide?

We aim to provide what is termed a '1 in 200 year' standard of protection. This represents a flood that, on average, could occur with a probability of 0.5% in any year.

Our proposed scheme is described on this and the following boards.

The proposed Flood Protection Scheme is a 2.1km long defence which consists of two principal sections:

1. A 1.2km long embankment on the shore of Loch Linnhe, primarily intended to protect against high sea levels and coastal inundation from Loch Linnhe.
2. A 0.9km long flood wall on the banks of the River Lochy, primarily intended to protect against river flooding.

Allow access to beach for maintenance, boats and leisure

Opportunities to include design interventions that reflect development of school and community centre site. Elements could include new seating, access, play equipment or ornamental planting. More substantial planting could create a windbreak to outdoor play areas without compromising residential views.

Integrate new beach access with potential new play area and visual/physical link to shopping parade.

Key views from Church across Loch: mitigate loss of view with visual elements such as planting. New ramped access should integrate with existing layouts to allow clear routes onto new flood wall path.

Careful consideration and integration of pedestrian, cycle and vehicle access with new play area. Potential for additional landscape features at key 'corner' location, clearly visible in views along Erracht Drive towards Ben Nevis.

Potential for beach access from Glenmallee Road

Ensure onward route for users of Great Glen Way is clearly visible from Glenmallee Road.

Sympathetic designs of embankment and green spaces will allow for more attractive, multi-functional spaces that will enhance the streetscape, allowing activity and movement.

New tree planting to mitigate against loss of trees and screening within residential views.

Tree loss could be mitigated through design of piling or foundations.

Consider visual appearance of wall along key 'gateway' route into Caol, used by locals and visitors as part of Great Glen Way. Potential for enhancement through decorative features, finishes and interventions.

Ensure new wall does not compromise link to Soldiers Bridge and onward cycle/pedestrian routes towards Fort William.

Potential for new native planting to mitigate against tree and habitat loss through scrub and woodland areas.

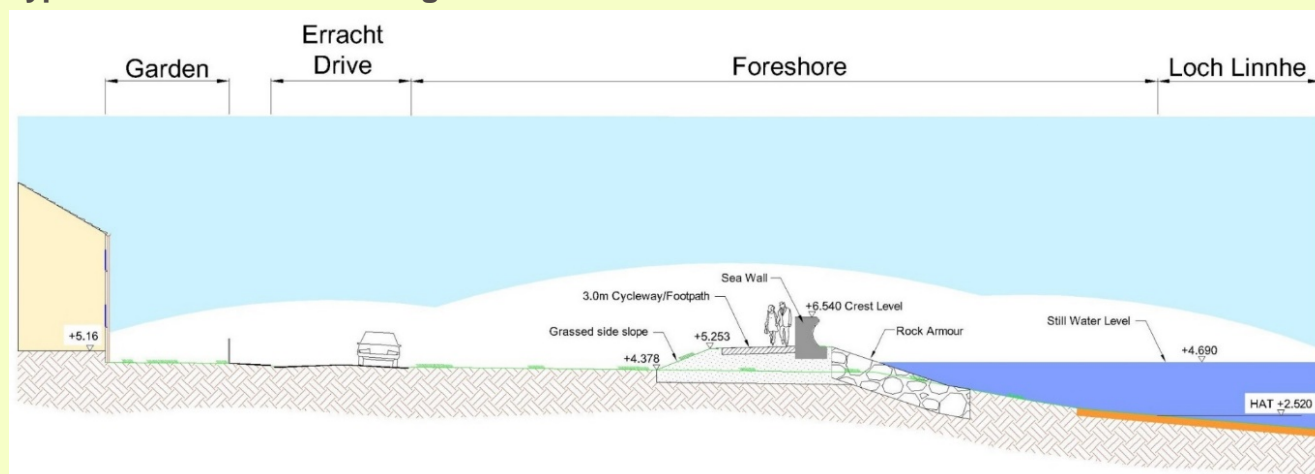
8 - Section through shoreline embankment

Flood bank along shore

At present our proposals are to raise a flood bank along the shore of Loch Linnhe. The design can be refined and in places a bank and wall or a bank and rock armour may be used. This allows variation in an otherwise linear structure. The shoreline area consists of an earthworks embankment with rock armour face. The section shows the still water level of a 1:200 year event. The crest level of the defence is based on the still water level plus an allowance for sea level rise due to climate change, wave action and freeboard. This level is between 2 and 2.5m above the existing shoreline.

The design allows for a shared cycleway / footpath to be provided along the seafront and a wall to prevent overtopping. It is anticipated that this wall will have access points to the foreshore. The access points will have flood gates fitted. These will generally be open unless a predicted flood warning is in place. SEPA's Firth of Lorne flood warning system gives sufficient time to allow planned closure of these accesses when required.

Typical cross section through embankment



Sketch view of how the flood defence might look from the Erracht Drive



Sketch view of how the flood defence might look from the Erracht Drive



3D visualisation looking along the shore frontage (junction between Erracht Terrace and Glenmallie Road)

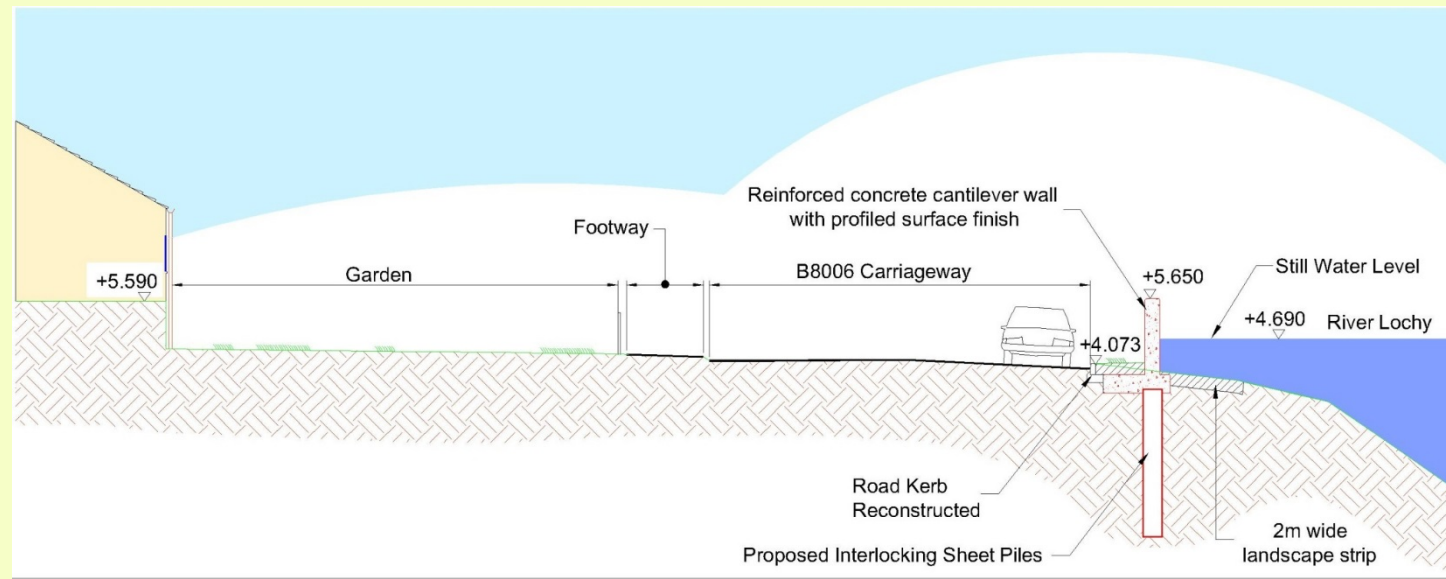


9 - Section through wall

Flood wall along Kilmallie Road

The flood wall along Kilmallie Road and associated works may provide opportunities to improve pedestrian and cycle access and connectivity to the Great Glen Way. By improving the path there may be opportunities to provide better links to the services in Caol.

Cross section through wall at Kilmallie Road showing defence height



Landscape architects sketch of how the wall might look



3D visualisation of how the wall might look



10 - Access arrangement proposals

Access arrangements

The aim of the scheme is to reduce flood risk, but the works will have wider benefits to the local community. The new flood bank along the shore will present an opportunity to provide a new footpath and seating.

This will improve access and tourism for the Great Glen Way. Evidence suggests that linked networks of good quality public space can result in positive economic, social and environmental benefits.

Questions

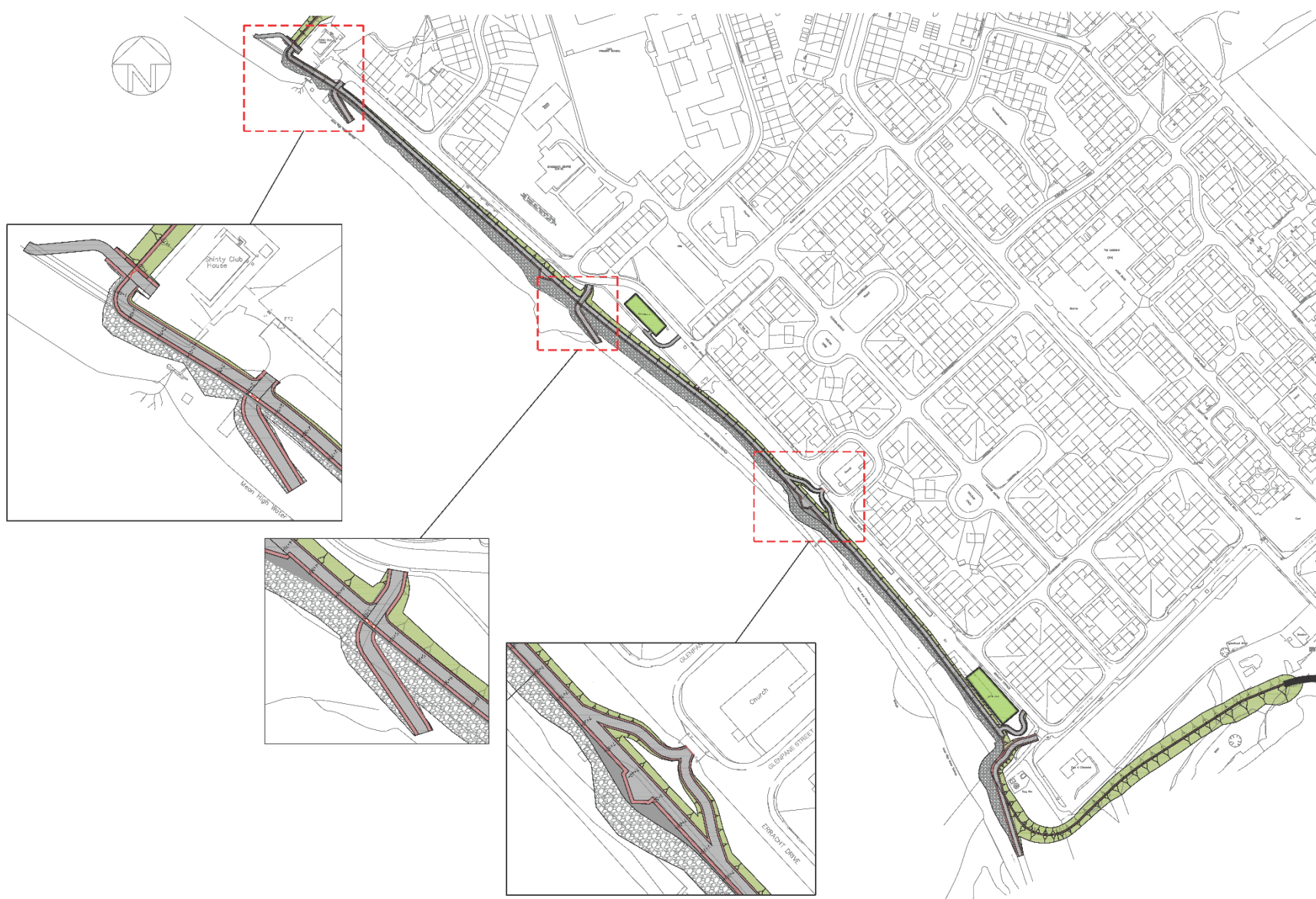
Does the proposal allow for:

- Sufficient access to the beach?
- Sufficient access to the embankment/path?

Proposals/opportunities

As part of this study we will be looking for opportunities for enhancements to access including:

- Provision of adequate number, type and location of crossing points through or over the defences.
- Utilisation of the embankment top as a walkway/cycleway and provision of adequate seating and viewing platforms.
- Investigation of opportunities to improve the experience of using the Great Glen Way along the B8006 Kilmallie Road.
- Recognition of the iconic views to the community and visitors using the Great Glen Way.



11 - Enhancing nature, leisure and amenity

Working to create designs that enhance the natural environment

Whilst the key function of the scheme is to reduce flood risk, our proposals aim to provide some innovative enhancements to public spaces that will benefit the local community. We aim to provide designs that, where possible, increase the amenity, aesthetic and recreational value of the shoreline and river side.

Good naturalistic design will offer richness, appeal and encourage scheme ownership and positive interaction with the scheme. Options for improvements considered include:

- New or upgraded play parks.
- Involvement of the community in aesthetics of the design.
- Linkages with green space, walking and cycle networks (increased recreational users).
- Removal of invasive species (e.g. Japanese Knotweed).
- Opportunities for appropriate local planting.
- Innovative techniques for the face of pre-cast walling.

This public meeting is the first step in ensuring that the community and stakeholders are engaged and informed throughout the process. We want to ensure that all opportunities for enhancing leisure and amenity values are taken into account.

Questions

Are there any amenity requirements needed that are not currently shown/offered on the drawings.

Ecology

Bats and otters live in and along the River Lochy.



Image: courtesy of the K. Sheehan

These are protected species and permits will be required before any work can begin.

Invasive species

A full site investigation and mapping of Japanese Knotweed has been undertaken.



Image: courtesy of the K. Sheehan

Treatment of Japanese Knotweed must be undertaken prior to the work being started.

Studies underway or planned:

In order to ensure that environmental sensitivities are fully considered a number of studies have either been undertaken or are planned. These include:

- Tree Survey (complete)
- Habitat Survey (complete)
- Invasive Species mapping (Japanese Knotweed) (complete)
- SEPA screening opinion (complete)
- Species surveys (e.g. bats/otters)

Design and amenity aspects

One of the proposed play park areas at the eastern end of the shore front.



12 - Costs, benefits and funding

What are the benefits of the scheme?

- There are 296 properties that would benefit from the scheme in Caol
- Annual damages avoided by the scheme are £400,000
- Total damages avoided in long term by scheme = £12.2 million

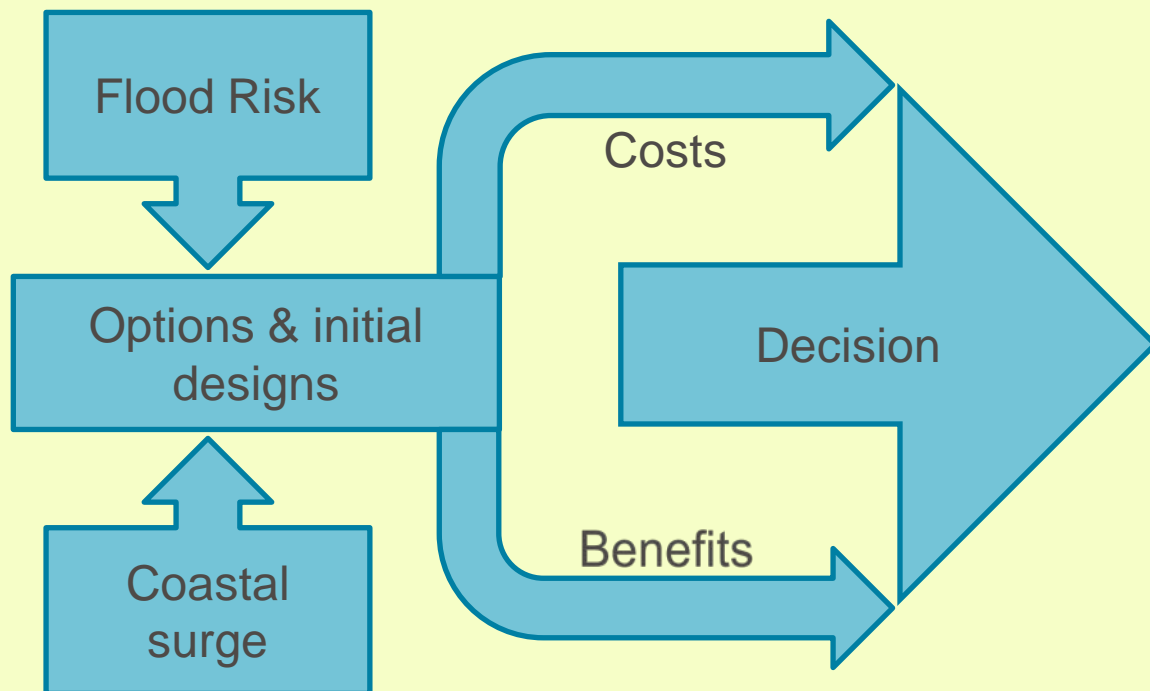
What are the costs of the scheme?

The costs of the scheme are estimated to be £6.2 million. This includes a range of items such as the design of the scheme, construction of the defences and longer term works to ensure that the wall and embankment remain in good condition and fit for purpose.

How is the viability of the scheme assessed?

Benefit cost analysis looks at a flood risk management strategy or practice and compares all the benefits that will be gained by its implementation to all the costs that will be incurred during the lifetime of the project.

Framework for scheme appraisal:



Benefits

Costs

Reduced property damage

Less clean up of flooding costs

Reduced health & wellbeing impacts

Less vehicle damage

Design

Construction

Operation & Maintenance

13 - What are the next steps?

What happens next?

We will analyse the responses we get from the public, community groups and stakeholders to ensure that the scheme taken forward is one that benefits the widest sections of your community. This will feed back into finalising the outline design of the scheme along with some additional surveys and investigations that will be completed over the next few months.

What approvals are required?

The scheme is being promoted by the Highland Council under the powers of the Flood Risk Management (Scotland) Act 2009 and, if confirmed, will benefit from deemed planning permission from Scottish Ministers.

This information will then be used to prepare the draft Flood Protection Scheme which The Highland Council will then consider. An FPS gives consent for the proposed works to progress.

As such, there is a set process for promotion of the scheme that needs to be undertaken in order to gain the official planning and scheme sign-off. Key steps in the analysis is shown in the figure to the right.

How will the scheme be funded?

Once the scheme has gained approval The Highland Council will submit a request to the Scottish Government for part funding of the capital works. It is anticipated that up to 80% of funding will be provided through grant application to the Scottish Government. The remainder will be provided through the Council's Capital Programme

When can we expect the scheme to be built?

A number of processes need to be completed before construction can begin notwithstanding the above legislative procedures. Our current plan for construction is Spring 2018. A number of activities will be undertaken during this period including the detailed design of the scheme and ongoing treatment of Japanese Knotweed (an invasive species).

Previous studies

Options appraisal and outline design

Today

Initial public consultation

June 2015

Planning, Development and Infrastructure (PDI) Committee

Agree standard of protection for Caol

Summer 2015

Design development including ground investigation, statutory undertakers, statutory consultations, stakeholders etc.

Autumn/Winter 2015

Further public consultation

PDI Committee consider draft FPS

Objections considered. Mitigation if required

Publish FPS

PDI Committee considers revised FPS

Objections

Reject proposed scheme

Confirm scheme

Funding application to Scottish Government

2016/17

Detailed design

Contract preparation

2018

Construction

