Environment Agency

how we're reducing the risk of flooding for York

Our 5-year plan

November 2016

What's the purpose of this 5 year plan?

Following the floods of December 2015, the government allocated an additional £45 million to the Environment Agency to better protect 2,000 properties in York.

In the past, both the Environment Agency and our partners have invested substantially in York, which has significantly reduced the risk of flooding for thousands of residents and businesses. However the recent floods and the increase in frequency of high river levels on the River Ouse have demonstrated that the flood defences in York are no longer providing the standard of protection that they were designed for. Our work over the next five years will improve the standard of protection to York and take into account climate change.

Since receiving the additional funding we have assessed what changes could be made to the existing flood defences within the city and what new defences could be built. The results of this have been summarised within this plan. We will use this plan to guide our work in the city over the next 5 years.

The options we are presenting in this plan are based on our ambition to achieve a consistent standard of flood protection across the city.

In some places across York, raising or installing new defences to this level is unlikely to be acceptable or feasible and we may need to look at other options. We will agree the most suitable option by liaising with City of York Council and the relevant communities.

Foreword

York is a beautiful city with a unique history going back over 2,000 years. This is why we choose to live and work here, and why visitors from across the globe flock to experience the rich mosaic of the historic and the modern.

The rivers Ouse and Foss flowing through York have been instrumental in the city's success, providing first a defensive role for the Roman settlers, then an artery for trade and industrial growth as the city expanded. Our relationship with the rivers has not been without problems. Throughout history the city has regularly flooded, though none as fresh in the mind, nor as painful as the events of December 2015. The city's flood defences have protected residents on many occasions, and the people who live here have shown remarkable resilience.

We must remember that we cannot prevent all flooding. What we can do, and what we must do, is manage water better. Building new and improved defences throughout the city, and look upstream at the catchment as a whole for new ways to slow the flow, store water, and reduce the impact of flooding on York. The £45 million investment provided to York by the government is the first step towards that.

Over the next 5 years, working with City of York Council, we will carry out a major programme of upgrading flood defences within the city. This plan outlines our options and where we think the greatest improvements can be made.

Beyond this, the direction we take together will be guided by you. Early next year, we will begin consulting on a long term plan to reduce the risk of flooding in York over the next 100 years. This is an opportunity for you to shape the way that floods are managed into the future. I hope you will join me on this journey.

Mark Scott,
Yorkshire Area Manager, Environment Agency

As Chief Executive of City of York Council, I welcome the publication of this plan and look forward to working with the Environment Agency to deliver options for reducing the impact of flooding to the city over the coming years.

As organisations, we will work together to consider where changes are needed to our emergency plans; where we can involve others in helping keep communities safe and how we can best utilise our resources to tackle and manage the flood risk to the residents and businesses of York.

Mary Weastell,
Chief Executive, City of York Council

What we're investing in York

We are currently working with City of York Council and other partners to ensure we invest the additional funding that has been allocated to York, to improve the level of protection against flooding across the city.

In recent years, notable investments include:

- Almost **£200,000** a year spent on maintaining the River Foss and the Foss Barrier over the past 5 years.
- **£4.2 million** from the government in the Water End flood alleviation scheme. City of York Council has contributed an additional **£1 million**.
- Developed models for the rivers Ouse and Foss to inform the design of the proposed work and inform future catchment-wide actions.

From the additional funding from the government in 2016, we will:

- Invest up to **£17 million** to upgrade and improve the Foss Barrier.
- Invest the **£45 million** over the next 5 years to better protect at least 2,000 properties from flooding within York's administrative boundary.

Our partners, City of York Council have already allocated (as of November 2016) over **£500,000** in Property Level Resilience Grants to help residents to better protect their homes.

Improving the Foss Barrier

Following the flooding in December 2015, the government allocated £17 million of funding to improve and upgrade the Foss Barrier.

The barrier was built as part of an extensive flood management programme in response to the floods of 1982 and was completed in 1987.

It forms part of York's city-wide flood defences and has protected the city on many occasions, notably during the floods of 2000 and 2012. The Foss Barrier - which is operated on average 5 times per year - prevents water from the River Ouse increasing river levels on the River Foss, which would cause flooding along the Foss Basin.

During the December 2015 floods, water from the River Foss entered the pumping station causing serious damage to the electrics. The barrier was back in operation in just over 2 days and has been used on a number of occasions since.

In April 2016, we started to repair and upgrade the barrier to make it more resilient to future floods, whilst making sure it fits into its surrounding environment.

As part of the improvement work, we've installed new pumps which have a higher pumping capacity that would be able to deal with the amount of water that came down the River Foss on Boxing Day 2015. During the next phase of work, we will raise the height of the building and further improve the pumping capacity. The substantial part of the upgrade will be completed by December 2017 and the barrier will continue to be fully operational throughout the work.

Artist's impression of the completed Foss Barrier

What we've done since the floods

Foss Barrier has been operated 4 times since the flooding

£45 million from the government for York's flood defences

8 **new pumps installed at the Foss Barrier**

Flooding has devastating effects on lives and livelihoods. Storms Eva and Frank in December 2015 caused record rainfall across Yorkshire.

The 627 households and businesses in York that were flooded on Boxing Day have spent most of this year dealing with its effects. Since then, we, City of York Council and our partners have taken action to reduce the risk of flooding.

January

Allocated £10 million from the government for an upgrade to the Foss Barrier.

Started inspecting our flood defences and carried out emergency repairs.

Attended and presented at 8 MP led meetings where councillors and constituents were present.

February

Started flood defence repairs.

Held 5 public drop-in sessions across the city.

Established a team to deal specifically with flood recovery.

March

The government announced an extra £45 million for York's flood defences.

A further £7 million from the government for Foss Barrier.

April

Announced City of York Council independent review panel.

Started improvements to the Foss Barrier.

Reviewed and updated the flood warning areas for York based on public feedback.

May

Published the Foss Barrier investigation report.

Held a 2-day public exhibition in the city.

June

Began scheme feasibility studies and assessments.

Published report on the feedback received from the public exhibition.

July

Carried out improvements to river level monitoring.

August

Continued repairs to flood defences.

September

Started installing 8 new Foss Barrier pumps.

October

Completed the York detailed model reports and results.

November

Second exhibition highlighting our 5 year plan for York's flood defences.

Completed installing 8 new Foss Barrier pumps.

Where we are looking at doing work

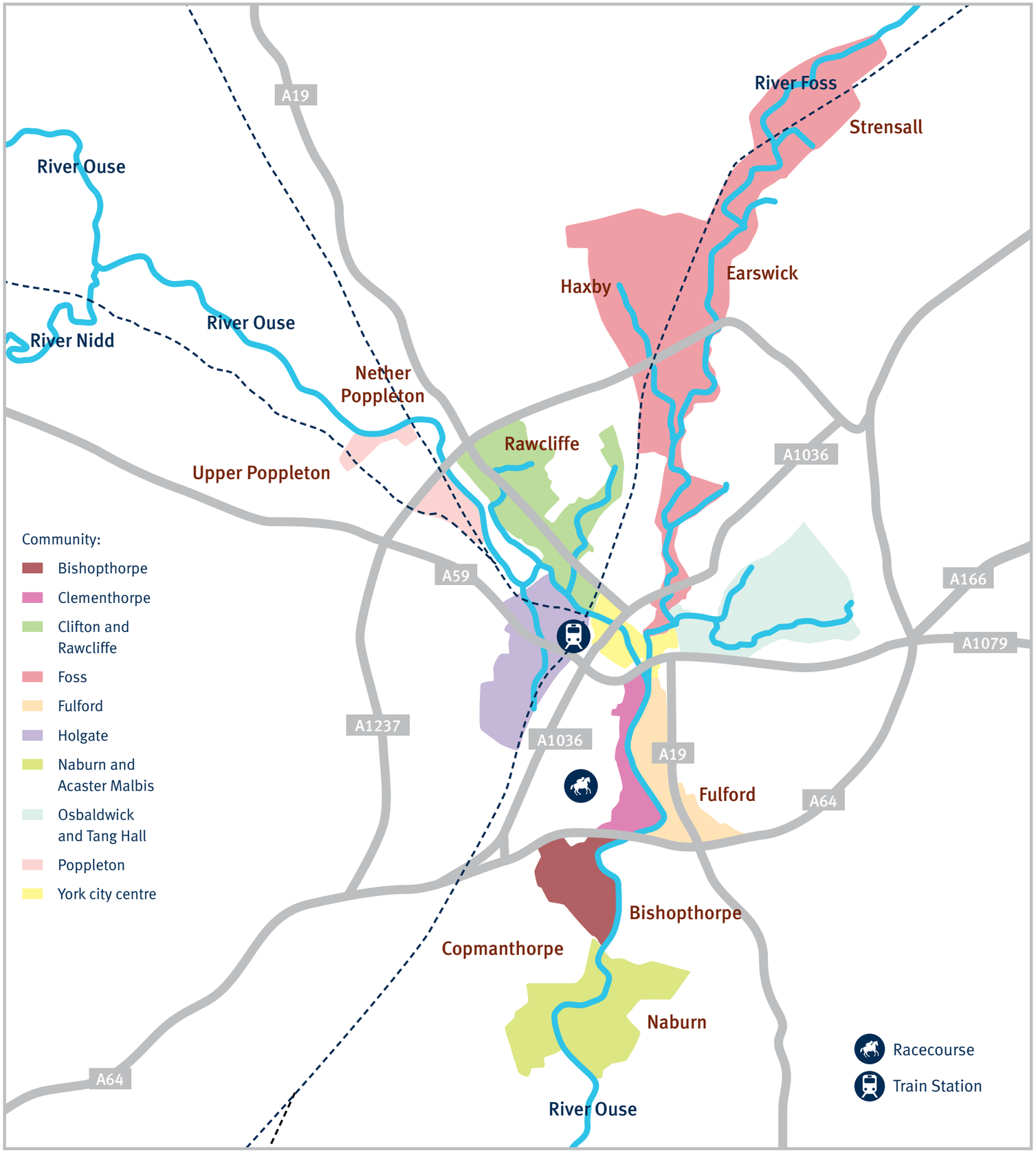
Our work over the next 5 years will focus on 10 ‘communities’.

These ‘communities’ are areas within York‘s administrative boundary, alongside the River Ouse, the River Foss and their tributaries, where there is a risk of flooding.

We have used historical flooding information and knowledge of the current flood defences to identify these. They are divided naturally by land features such as roads, rivers and high ground.

The next few pages outline a range of possibilities we are considering for each community to achieve a better standard of protection from flooding across York.

The following list of possible work has been created using historical information, an independent review and from suggestions by members of the public. This work shows what we would need to do to provide York with improved flood protection, but will require further analysis around their feasibility, cost and appropriateness for the community/area concerned.



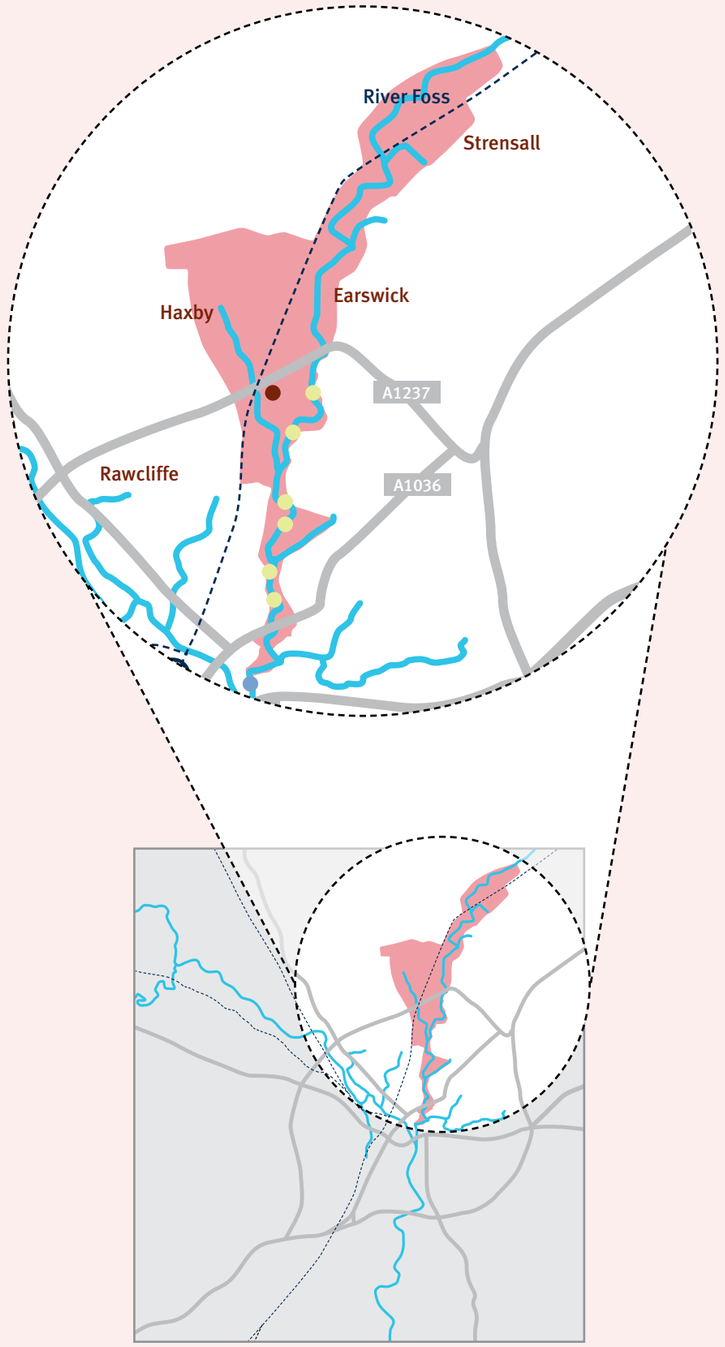
Foss community

Work we are doing:

- **Foss Barrier and pumping station**
  We are upgrading the Foss Barrier and pumping station which will significantly reduce the risk of flooding to the Foss Basin.

Possible work could include:

- **Create storage area**
  We will seek opportunities to temporarily store water upstream of the city which could slow the flow of the River Foss, reducing the need to construct further defences within the Foss Basin.
- **Improving the flow**
  In key locations we may carry out work in the channel to improve the flow of water along the Foss, particularly through the city centre.

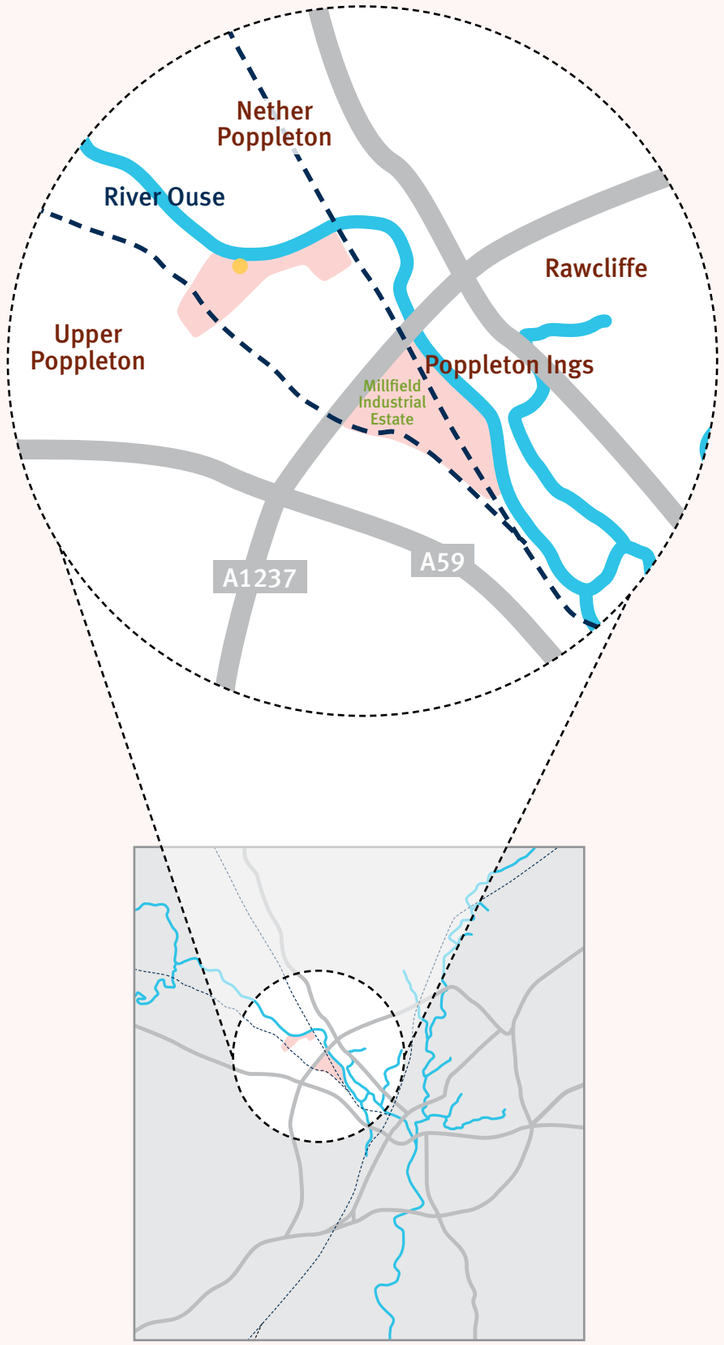


Poppleton community

Possible work could include:

- **Construct new flood walls**
  Build a wall of up to 2.5 metres in height to join the high ground north of Main Street to the high ground of the gardens of Ferrymans Walk.

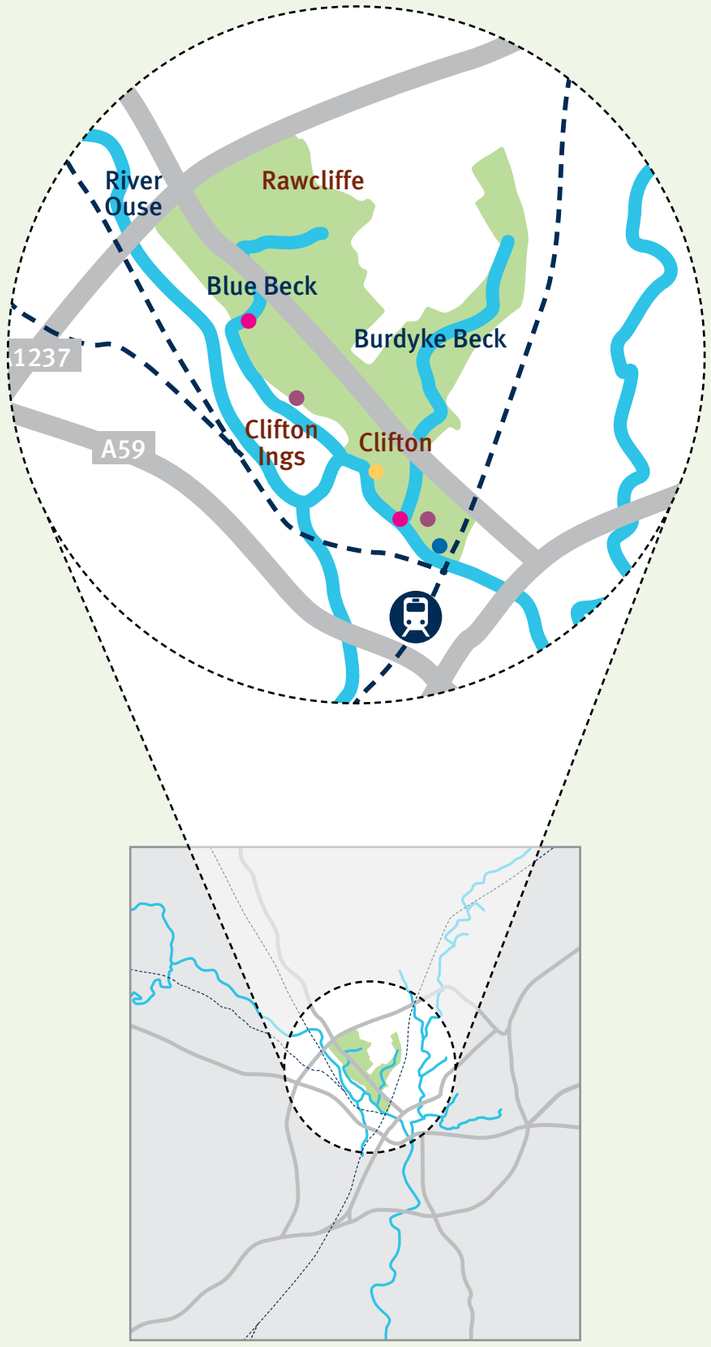
  We would also include flood gates for access. A new pumping station would also be needed in conjunction with the flood wall.



Clifton and Rawcliffe community

Possible work could include:

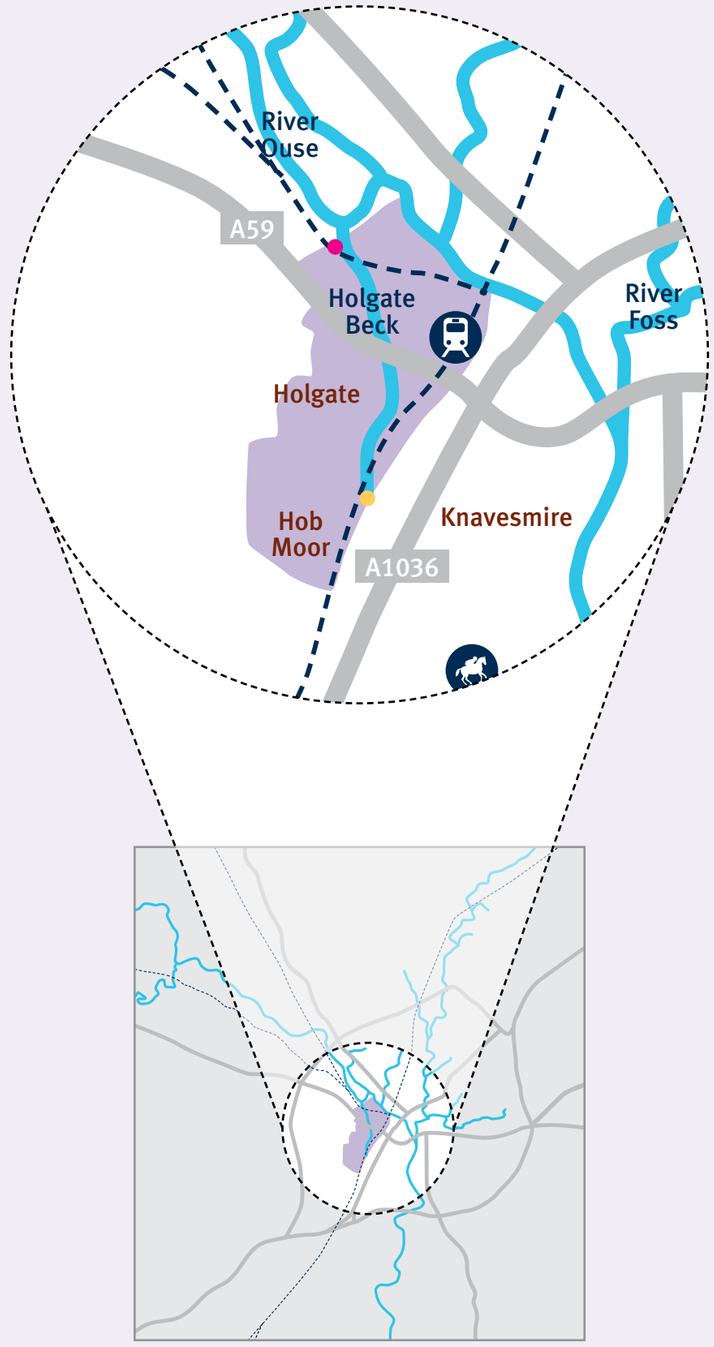
- **Increase pumping capacity**
  Construct a new fully automated pumping station where Blue Beck enters Clifton Ings. Increase the pumping capacity and resilience of the existing Burdyke Beck pumping station.
- **Raise embankments**
  Raise existing embankments by between 1.2 and 1.5 metres at Clifton Ings, Lower Bootham and St Olave's School.
- **Construct new embankments**
  Build a high earth embankment or flood wall to the rear of Government House Road.
- **Raise flood walls**
  Raise the height of the Almery Terrace flood wall by up to 1.1 metres using demountable defences.



Holgate community

Possible work could include:

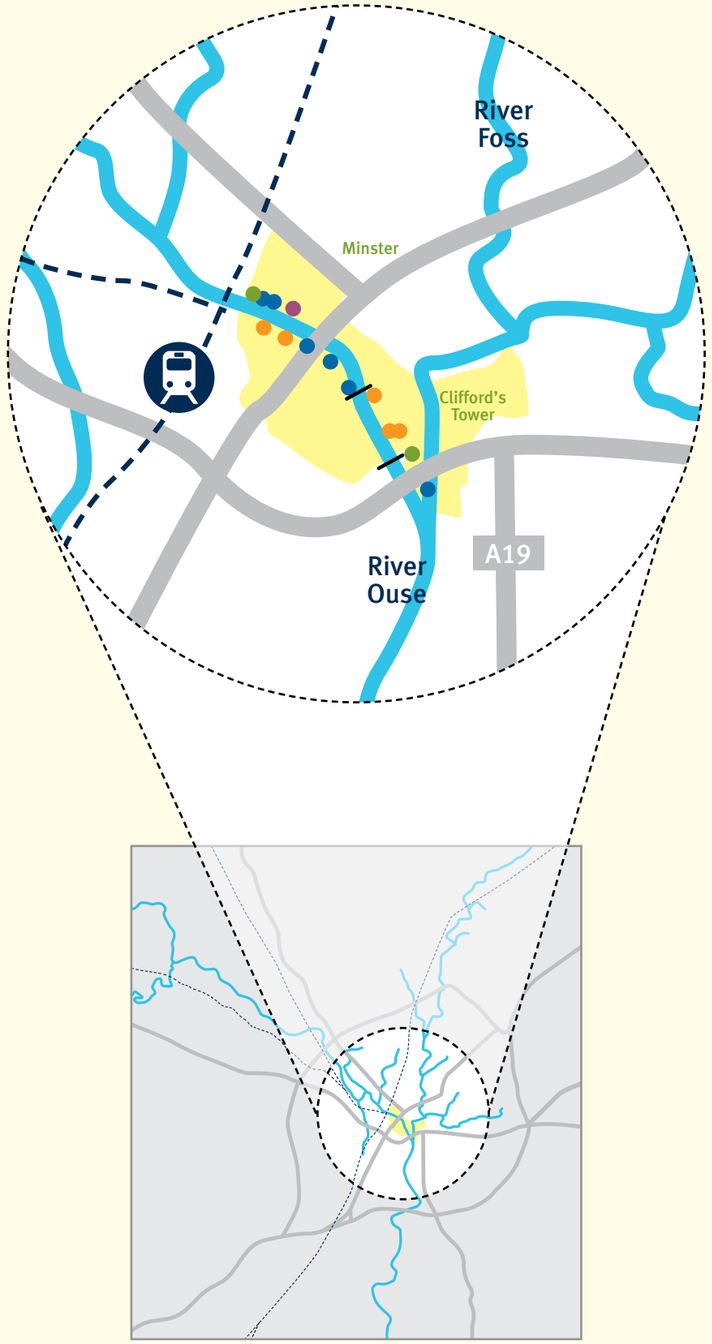
- **Construct new embankments**
  Build an embankment of up to 2.8 metres high along Gale Lane Drain to prevent water going over onto Hob Moor Drive.
- **Increase pumping resilience**
  Raise the height of the Holgate Beck pumping station and access road to improve its resilience to flooding.



York city centre community

Possible work could include:

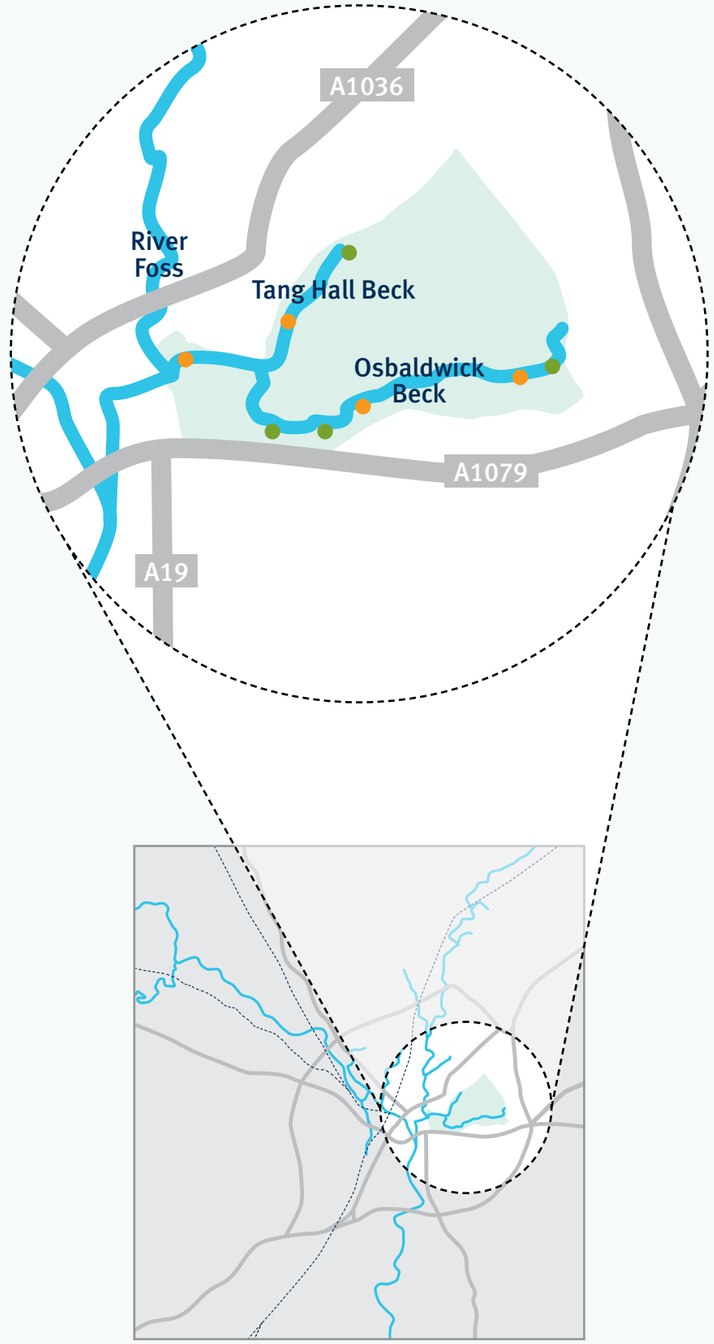
- **Raise land**
  Increase the height of the footpath between Scarborough Bridge footbridge and Earlsborough Terrace and the roundabout on Tower Street.
- **Construct new flood walls or gates**
  Build new flood gate and 1.3 metre high wall in the post office car park; build a 0.9 metre high wall and gates at Memorial Gardens; build demountable walls along Skeldergate, Queen Staithes and Kings Staithes; install new defences from Lower Friargate to South Esplanade and install flood gates; build a 0.8 metre high wall and flood gates along edge of Tower Gardens
- **Raise embankments**
  At Museum Gardens by up to 1 metre.
- **Raise existing flood walls/gates**
  Replace the existing gate at Marygate with one that has a height of up to 2.1 metres; replace 12 flood gates at Earlsborough Terrace; raise the wall at Earlsborough Terrace by up to 0.6 metres; increase the height of the flood gate at Lendal Bridge by 0.7 metres; raise the wall at Wellington Row and North Street and inside the car park at Park Inn by 0.55 metres; raise the wall at St George's Field car park and access ramp by up to 0.5 metres.



Osbaldwick and Tang Hall Beck community

Possible work could include:

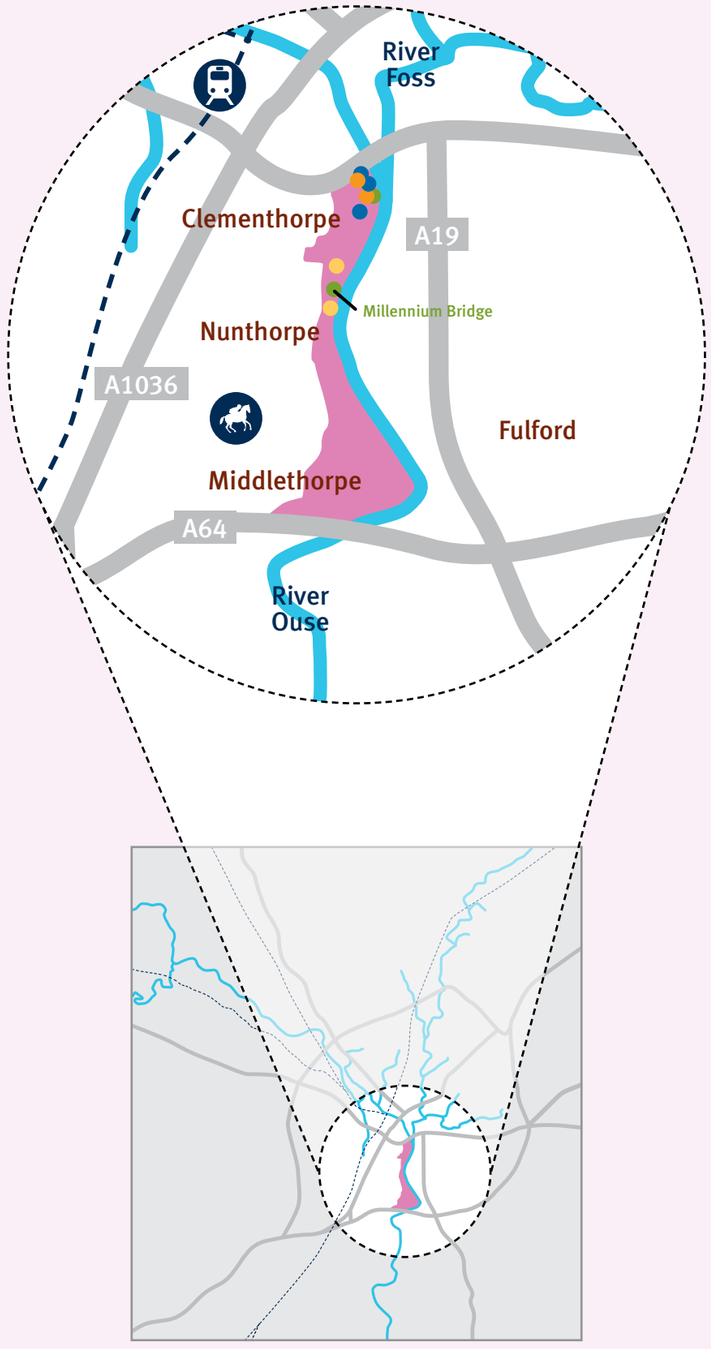
- **Raise land**
  Increase the height of both banks of Osbaldwick Beck at Melrosegate between 0.1 and 1.4 metres; on the left bank of Osbaldwick Beck at Burnholme Drive and Millfield Lane; on the right bank of Osbaldwick Beck at Outgang Lane commercial units.
- **Construct new flood walls or gates**
  With heights between 0.6 and 1.8 metres, we will look to install a gate at the entrance to James Street traveller site; build a wall along the right bank of Tang Hall Beck; build a new wall along Osbaldwick Beck at Tang Hall Lane crossing; build a wall along both banks of Osbaldwick Beck along Murton Way and Osbaldwick Village – this would also require approximately 22 flood gates to allow access to estates and properties.



Clementhorpe community

Possible work could include:

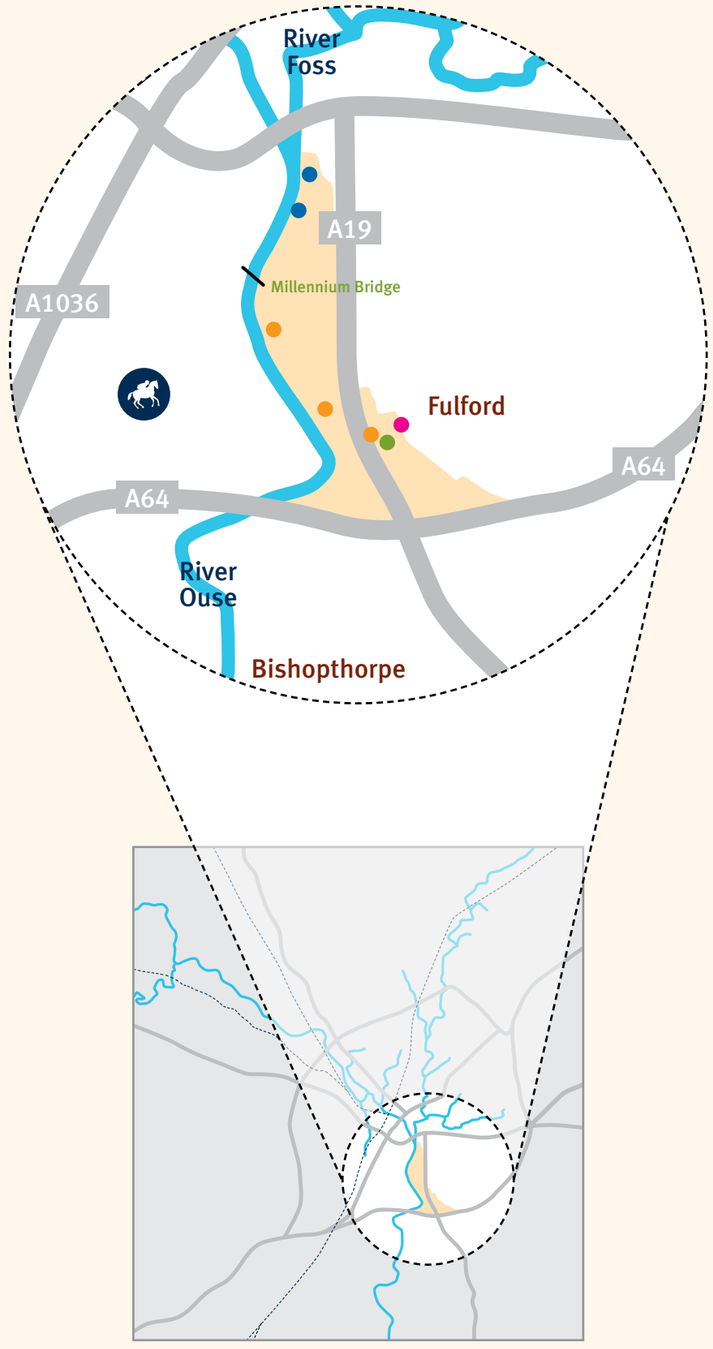
- **Raise land**
  Raise the access to the bridge across the floodplain and install an access ramp.
- **Construct new embankments**
  Build a 1.5 metre high embankment downstream of Rowntrees Park to reduce the risk of flooding to Butcher Terrace and Terry Street. Build a second embankment to reduce the risk to Reginald Grove.
- **Raise flood walls**
  Increase the height of existing walls at Terry Avenue and Postern Close by between 0.5 and 0.8 metres; the threshold of the steps at Dukes Wharfe, increase the south defence wall and the road way platform entrance; increase the existing defences at Lower Ebor St and extend the flood wall to near Bewlay Street. Raise the height of the flood defence by 0.5 metres along Waterfront House on Terry Avenue.
- **Construct new flood walls or gates**
  Build a new flood wall 0.6 metres high to the rear of Waterfront House; build a new demountable barrier around 2 metres high across Clementhorpe Street which could connect into the existing defences.



Fulford and Germany Beck community

Possible work could include:

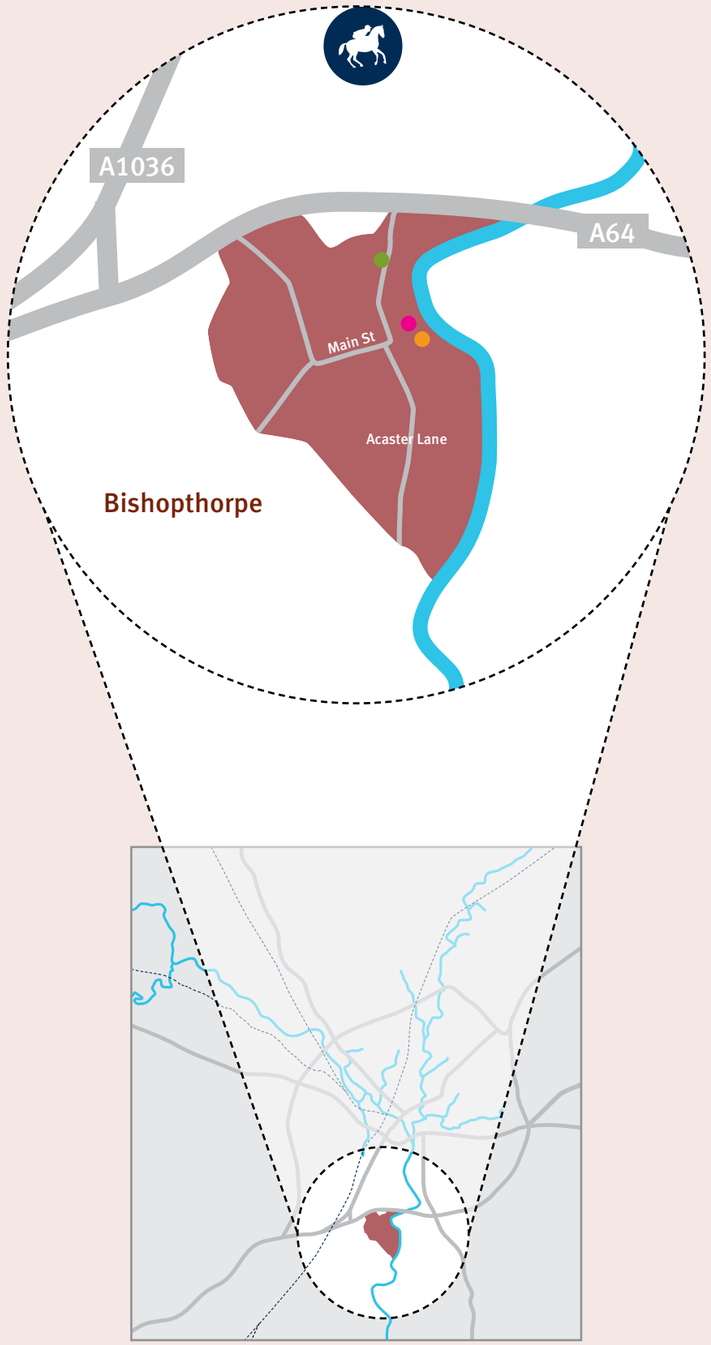
- **Increase pumping capacity**
  Improve the outfall of Tunnel Drain.
- **Raise land**
  Raise a section of Fordland Road where it crosses Germany Beck (also replacing the culvert structure and raising parapets) and join this into the new Germany Beck spine road to hold back water from the River Ouse.
- **Raise flood walls**
  Increase the height of the retaining walls by between 1 and 1.2 metres at Grange Garth and Alma Terrace running along New Walk and include 2 new flood gates.
- **Construct new flood walls**
  Build a new flood wall around 1.3 metres high with 2 floodgates on St Oswald's Road; extend the existing floodwall on both sides of Landing Lane and extend the existing flood wall on Fordlands Road.



Bishopthorpe community

Possible work could include:

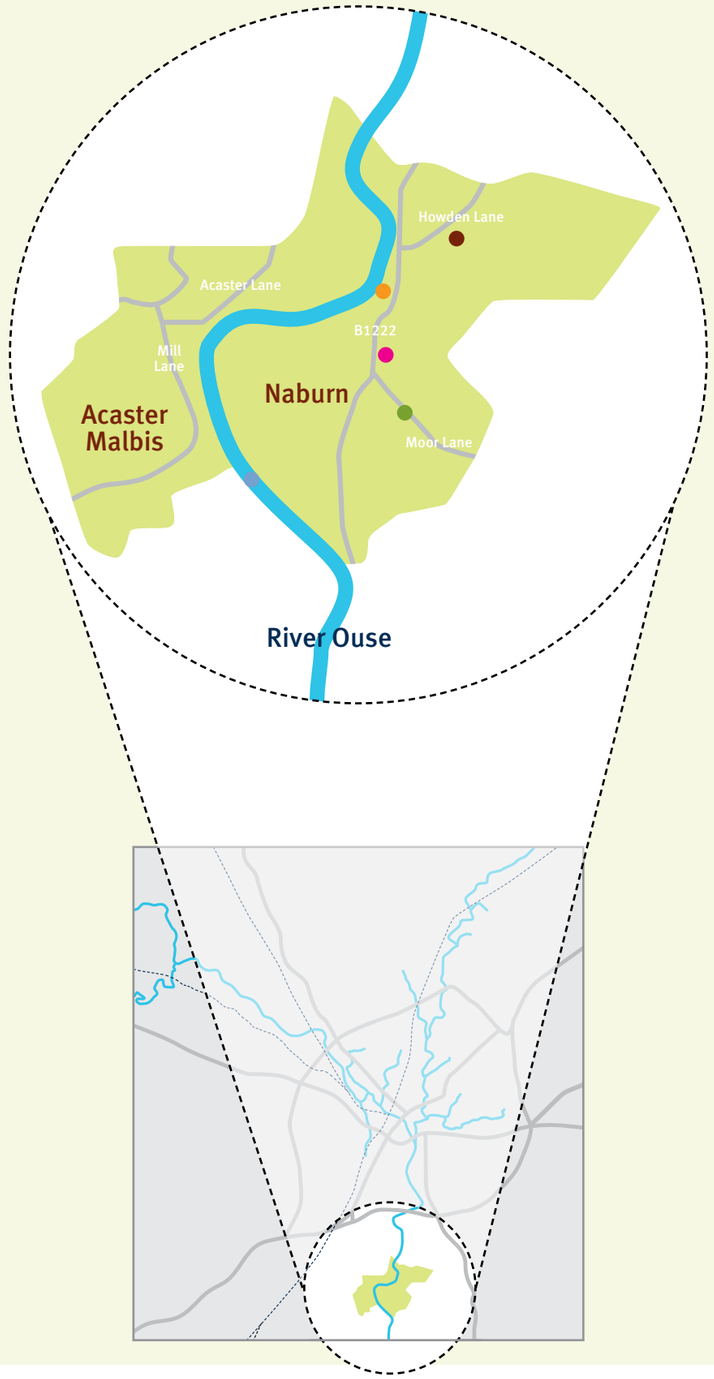
- **Raise land**
  Build up a section of Bishopthorpe Road to remove an existing depression where water gathers.
- **Construct new flood walls or gates**
  Build a new flood wall about 0.5 metres high around the Dell, joining the high ground at Bishopthorpe Palace and raising the bottom end of Chantry Lane; install a penstock to the Chantry Lane manhole.
- **Increase pumping capacity**
  install a small pumping station at the end of Chantry Lane to pump surface water over the new flood wall.



Naburn and Acaster Malbis community

Possible work could include:

- **Raise land**
  Increase the height of the land at Moor Lane by up to 1.2 metres.
- **Construct new flood walls**
  Build a new defence along the river bank adjacent to Front Street and Maypole Grove.
- **Increase pumping capacity**
  Install a new pumping station in the low spot on the B1222 road.
- **Create storage area**
  Build a new embankment in the field that's west of the railway line on Howden Dyke.
- **Naburn Weir**
  We will look to modify Naburn Weir if it is seen to reduce river levels.



How this could look

These are illustrations of the type of things we could do. We will agree the most suitable option for each location by working closely with City of York Council and the relevant communities.

Permanent walls and gates

These defences remain fully in place and are built into the natural surroundings. During a flood, little action is required other than closing gates.

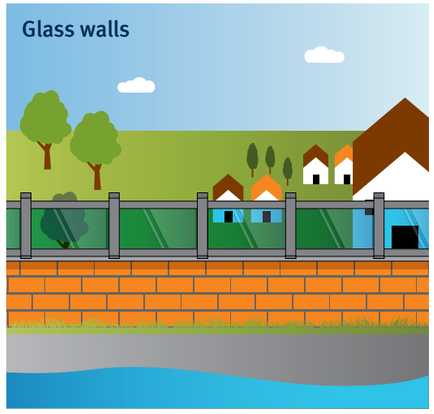
York has several areas protected by flood walls and gates such as Wellington Row, North Street and Lower Bootham.

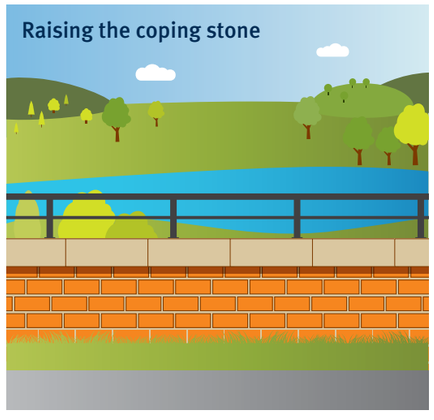
We can raise these walls by simply building them higher by raising the level of the coping stones or using glass panels or demountable elements on top of the fixed structure.

- **Raising with glass panes**
  Sometimes, it may be possible to increase the height of walls using glass panels to maintain the view.
- **Raising the height of the flood walls with coping stones**
  Many modern flood walls such as those used at Water End are constructed in a way that allows them to be easily raised in the future.

  This involves removing the coping stones at the top and adding additional rows of bricks.

  This requires strong foundations built to withstand the increased load from higher walls, so it is not always possible for older walls.



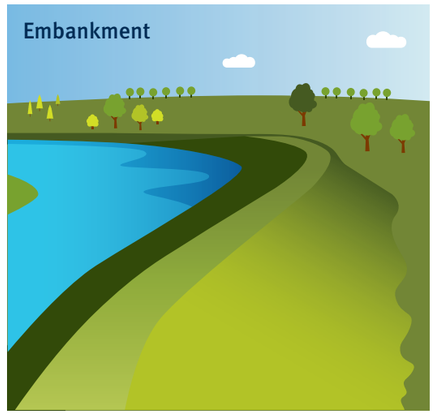


Embankments

This is a permanent raised bank of earth. They usually require more space, compared to a wall and therefore tend to be built in open spaces and rural areas.

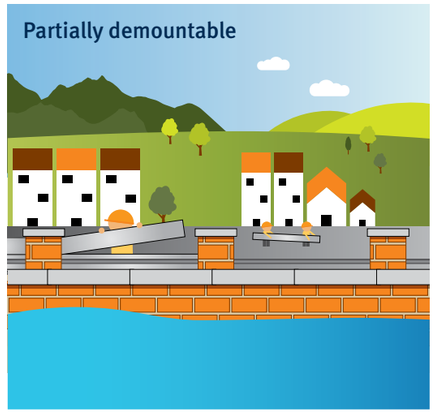
York is protected by earth embankments such as those at Clifton Ings and the banks around St Olave's School and in Museum Gardens.

Where there is space, we could raise these embankments with earth material and where there is not the space we could build a raised defence along the top.



Permanent part walls and demountables

Some permanent flood defences can be raised when a flood is expected by adding a demountable section that can be removed when not needed. It has pre-installed foundations and supports which require operation prior to a flood. We would look to use demountable defences where we need access or open space when there is no flooding.

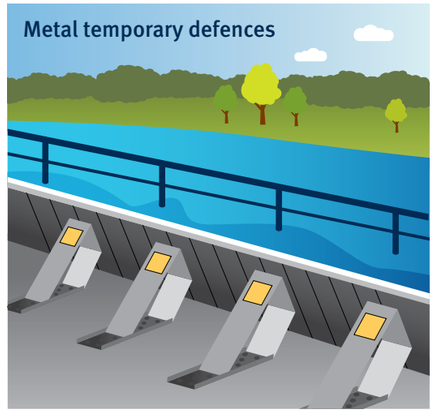


Temporary defences

These freestanding frames can be installed prior to a flood and removed when water levels have dropped.

The opportunities for using temporary barrier systems in York is limited and they are not the most effective solution.

If we can't justify the use of permanent defences on technical or economic grounds then we may consider using temporary defences.



Our long-term vision

The options in this document focus on improvements we can make in the next 5 years, but we also need a long-term plan to better prepare York for the risk of future flooding and to mitigate the effects of climate change. To achieve this, we need to look at the catchment as a whole and understand the risks of flooding beyond the city of York. We have therefore started to develop a plan of action, working with a wide range of partners across the city and the surrounding area to prepare York for the future.

The plan will focus on:

- Enhancing the way the development planning system can reduce the risk and impacts of flooding to new and existing developments.
- Improving flood forecasting tools and technology to provide more timely and targeted flood warnings.
- Upstream storage and natural flood management techniques that can slow the flow and help regulate the flow of water into the city.

These are just some of the options we are considering, and we will be seeking your views on what else we should include. This will begin in early 2017 and we will keep you updated as to when and how you can get involved.

What you can do next

This plan has been developed in response to the December 2015 flooding and sets out the main actions we have already taken and intend to take to reduce the risk of flooding in York over the next five years.

In the meantime, we are encouraging people living in York to be better prepared for the risk of flooding in the future.

Here are some important things you can do now:

- Find out if you're at risk of flooding and sign up for flood warnings – call Floodline on **0345 988 1188** or visit **www.gov.uk/flood**
- Familiarise yourself with our flood warnings system and what you should do when you receive a warning.

FLOOD ALERT
FLOODING IS POSSIBLE. BE PREPARED.

FLOOD WARNING
FLOODING IS EXPECTED. IMMEDIATE ACTION REQUIRED.

SEVERE FLOOD WARNING
SEVERE FLOODING. DANGER TO LIFE.

- Make your home more resilient to flooding – advice is available on **www.gov.uk/flood**
- Share your local knowledge, suggestions and ideas at **yorkfloodplan@environment-agency.gov.uk**

To find out more information visit **www.gov.uk/flood**

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