Strensall
Public Drop-in Event

October 2019

Environment Agency

Event layout

Why we're here	History of Flooding	Assessment of flood risk	Options we have considered	Options we have considered
Our 5 Year Plan		Flood risk maps	Options we have considered	Our proposal
How it works	Location	Environment	Safety Standards	Next steps
Design and construction		Environment Map		

The River Foss
Why we're here

In September last year, we shared our proposals to better protect 490 properties along the River Foss from flooding by constructing a flood storage area north east of Strensall.

Since then, we have been developing designs for the scheme and working towards submitting our plans to City of York Council and Ryedale District Council for planning approval. As part of this process, we would like to share these plans with the community so that they have the opportunity to ask questions and raise any issues they may have.

Visitors to the Strensall drop-in event at Strensall Church Hall in September 2019

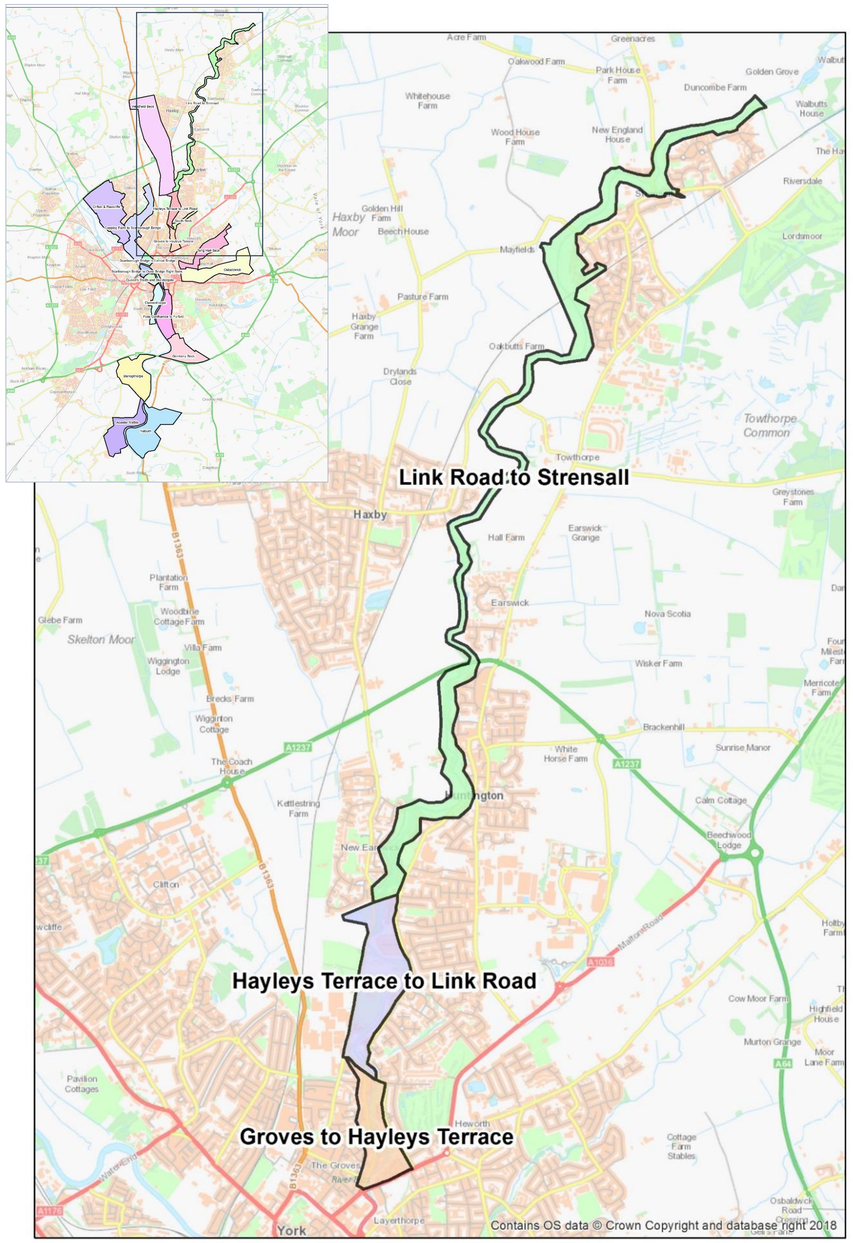
The River Foss
Our 5 Year Plan

After the floods in December 2015, the Government committed £45 million to better protect 2,000 homes in York. Theses floods of 2015 were the worst for a generation.

This section of the River Foss is divided into three separate ‘flood cells’:

- Link Road to Strensall
- Hayleys Terrace to Link Road
- Groves to Hayleys Terrace

Although there are other flood cells along the Foss, these three cells are being considered together because they are outside the area of benefit achieved through recent improvements to the Foss Barrier. All three cells will benefit from the proposed flood storage area.



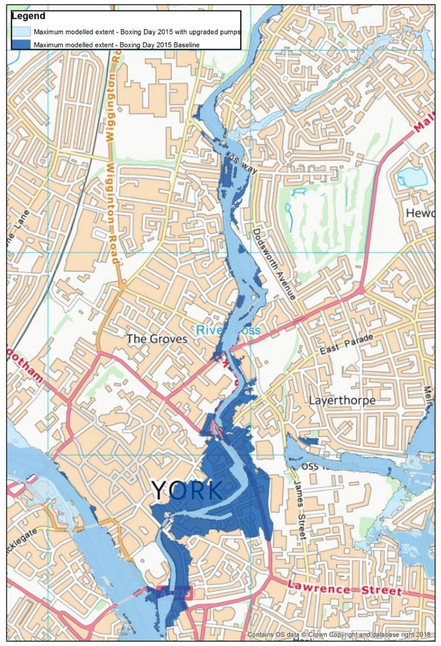
The Foss flood cells covering the area from the Groves to Strensall

The River Foss
History of flooding

There are around 500 properties at risk of flooding in the area between the Groves and Strensall.

The River Foss has a small catchment that responds quickly to rainfall. Flooding occurs where the channel capacity is reduced or where the bank height is low. This is evident from the fairly regular flooding of Huntington Road, caused by low bank height, causing disruption to a main thoroughfare into the city.

Historically many of the flood events on the River Foss have been caused by flood water in the River Ouse flowing back up this much smaller tributary. The Foss Barrier was constructed in 1987 to prevent this from happening. When the River Ouse reaches a specified level (7.8 metres above ordinance datum) the Foss Barrier is closed. The flow from the River Foss into the Ouse is then pumped around the barrier to avoid it backing up in the Foss.

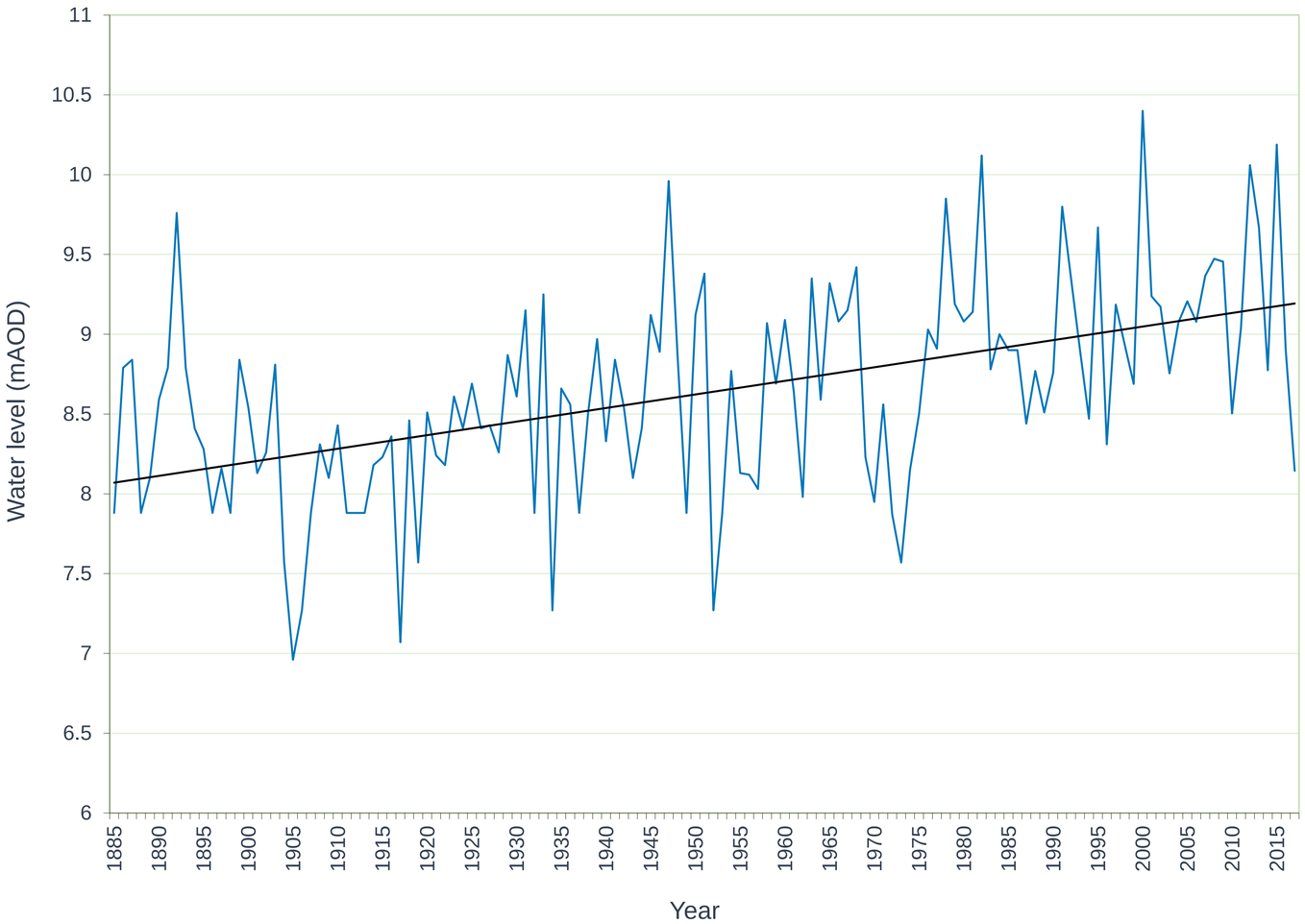


Left: the area in dark blue represents the area which is protected by the Foss Barrier.

Below: Huntington Road on Boxing Day 2015

The Foss Barrier

The River Foss
Assessment of flood risk



The steady increase in the annual maximum levels at the 'Viking' river level recorder in central York. Historic data has been taken from a historic document about flooding in York and recorded at the Guildhall (opposite the Viking recorder).

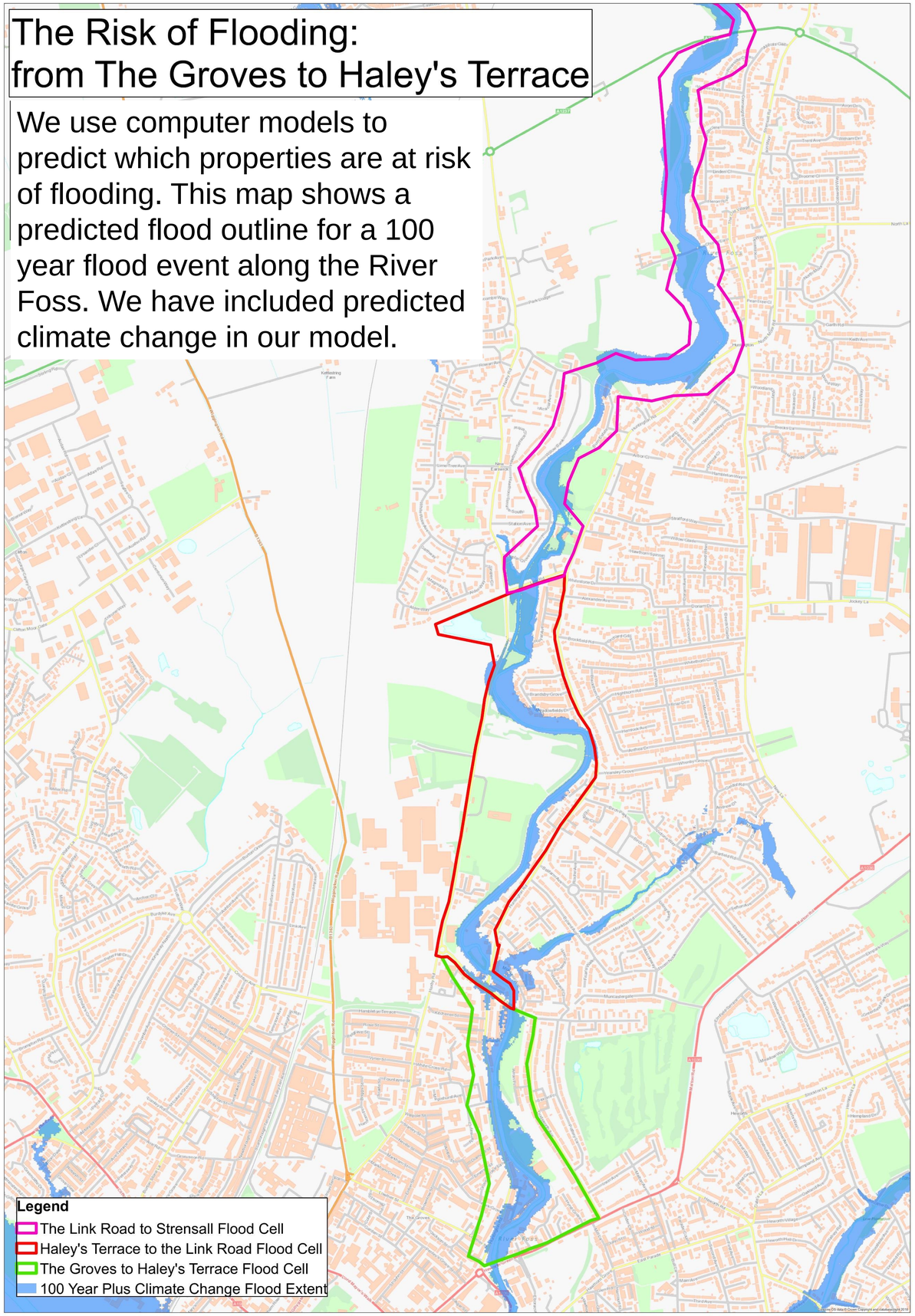
We use sophisticated modelling to assess the level of flood risk to people and properties along the River Foss. We look at a range of different flood events, their frequency and their extremity.

Climate change models suggest that river levels will rise in the future as a result of climate change. We use these models to design our flood defences. Our target is to increase flood protection and maintain the same high level of protection in the future.

Our proposals for the River Foss would provide flood protection for around 490 properties, from Strensall to The Groves.

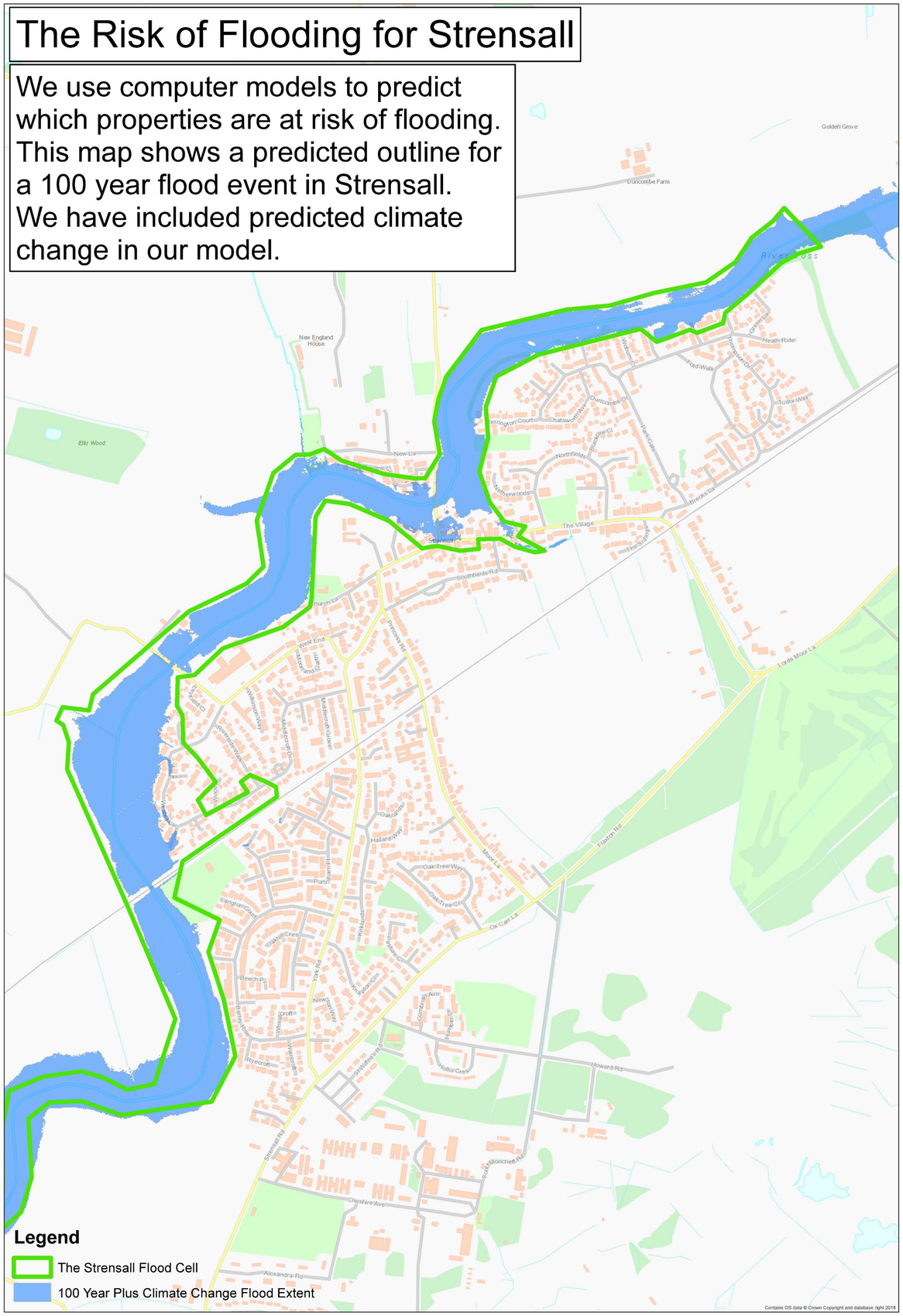
The Risk of Flooding: from The Groves to Haley's Terrace

We use computer models to predict which properties are at risk of flooding. This map shows a predicted flood outline for a 100 year flood event along the River Foss. We have included predicted climate change in our model.



The Risk of Flooding for Strensall

We use computer models to predict which properties are at risk of flooding. This map shows a predicted outline for a 100 year flood event in Strensall. We have included predicted climate change in our model.



The River Foss
Options and Constraints

We have considered several different options to reduce the risk of flooding for communities living alongside the Foss. Some of the options that were shortlisted were:

- Over four kilometres of linear defences (primarily walls) throughout the three flood cells
- A River Foss flood storage area near Strensall at Walbutts Farm
- Property Flood Resilience (PFR) or temporary defences

Building a wall along the Foss would require access to the gardens of multiple properties.

Some of the constraints that we had to consider were:

- There are several Conservation Areas within the cells including *Heworth Green/East Parade* and *York Area of Archaeological Importance,* which is located within two of the cells
- Strensall Common Site of Special Scientific Interest and Special Area of Conservation is close to the proposed flood storage area
- The River Foss acts as a wildlife corridor for mammals, birds and fish
- A public footpath runs alongside the River Foss
- Many private properties border the banks of the Foss, making wall building challenging and potentially undesirable for these homeowners
- Any work close to the river would cause disruption to residents
- There are many underground services such as sewers running through the area.

The River Foss
Options we have considered

Environment Agency

Linear Defences (Flood Walls)

Flood walls are often perceived by the public as a reassuring solution to reduce the risk of flooding and some areas of the centre of York benefit from the protection they provide. However, many residents' gardens back onto the Foss, making wall construction technically challenging and disruptive. A flood wall may also disrupt views of the river.

Property Flood Resilience

Property Flood Resilience uses bespoke measures to reducing the impact of flooding, should water get inside a property. The aim is to minimize damage and enable residents to return to their homes as quickly as possible after a flood. This is the best option for areas where there are few properties that flood, as an alternative to building costly defences.

Flood Storage Area

A flood storage area (FSA) offers multiple benefits whilst still offering the same standard of protection as a flood wall. A FSA can be constructed away from built up areas, causing less disruption to local communities. The FSA proposed would reduce the risk of flooding for all properties downstream, including in the village of Strensall, which was originally not part of the York FAS.

The River Foss
Options we have considered

Flood Defence Options	Construction	Acceptability to Community & Visual / Access Impacts	Costs	Safety
Flood walls and earth embankments At around 12 locations, 4km total length	Large construction area – 4km Access and space to build walls very limited at most locations Sections of walls would need to be built in numerous private gardens and thus seen as intrusive X	Walls would need to be up to 1.8 m high in some locations. Large sections on private land/gardens Impacts on views and access restrictions at times of flood events X	Technical challenges of construction at many of the locations and over 4km in total length mean that the total cost would be very high X	Designs would meet all required safety standards ✓
Single Flood Storage Area (FSA) 2km NE of Strensall	Single site location Rural location Good site access ✓	FSA located in a rural setting, limited impact on wider community ✓	Single site location and simple design plus the opportunity to use on site materials mean that costs are lower than walls/embankment option ✓	Designs would meet all required safety standards Independent Reservoir Engineer is appointed to oversee design, construction and operation. ✓

A flood storage option has been assessed as the most appropriate solution for the Foss community

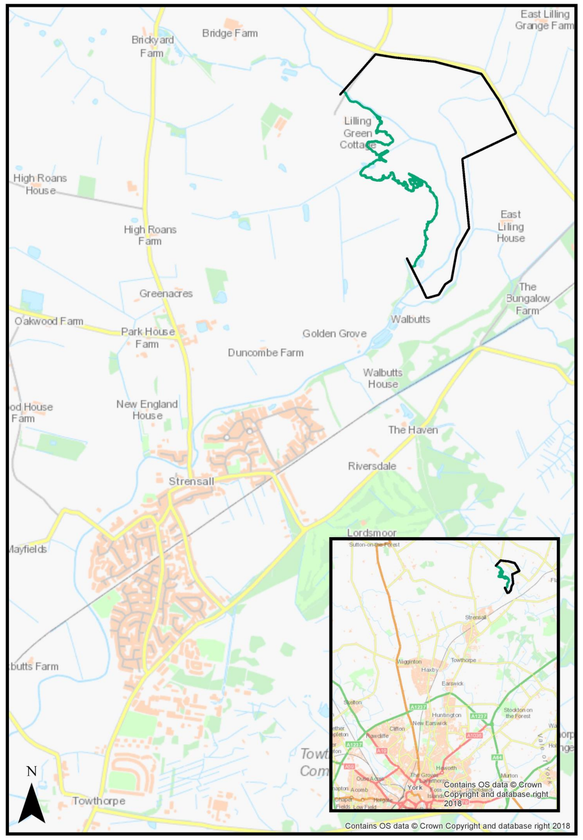
The River Foss
Our proposal

We are proposing to construct a flood storage area north-east of Strensall, between Walbutts Farm and East Lilling Grange Farm, to better protect 490 properties from flooding.

A flood storage area (FSA) is a piece of land which stores water during a flood, releasing water back into the river slowly after the flood has peaked. This reduces peak flows downstream, thus reducing flood risk.

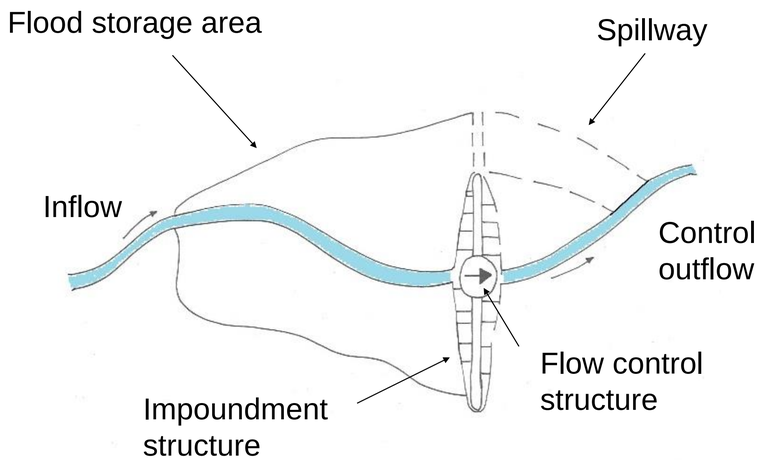
We are proposing to build an online storage area. This means that during normal flows, the River Foss will flow freely through the storage area and exit through a control structure (outlet). The storage area will remain dry the vast majority of the time and will only be full during an extreme flood event.

The storage capacity of the proposed storage area will be around 1 million cubic metres. Due to its size, we are required by the Reservoir Act 1975 to appoint an independent reservoir engineer specialist called a Panel Engineer to ensure design, construction and maintenance meet the our highest safety standards. This means it will have to be designed as if it permanently stores water, even though this won't be the case.

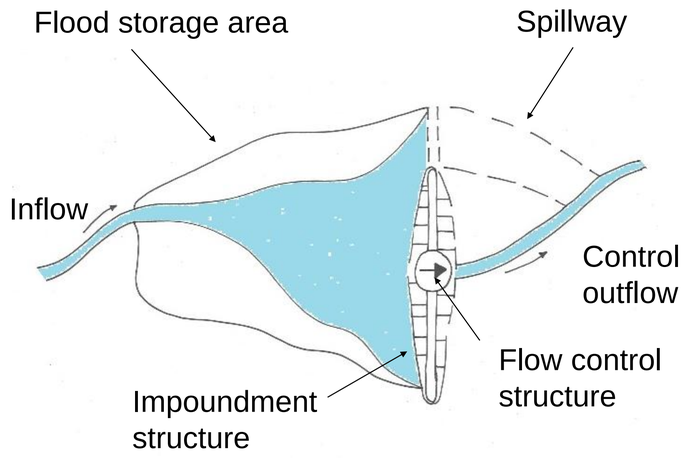


The location of the proposed flood storage area.

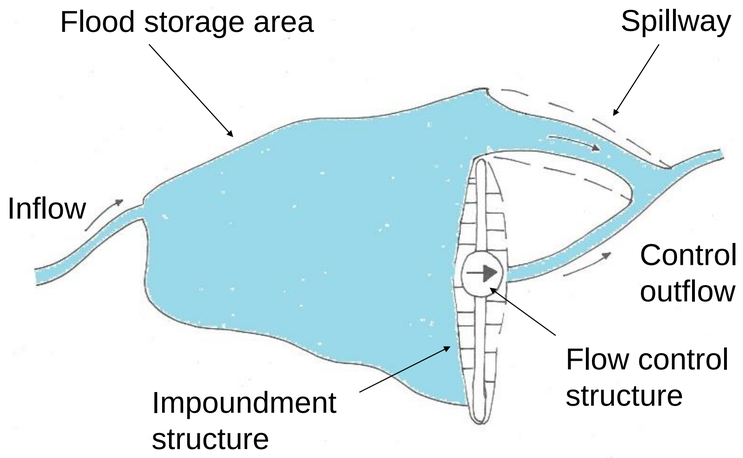
The River Foss
How it works



During normal flows, the River Foss will flow freely through the storage area and exit through a control structure (outlet). This means the storage area will remain dry the vast majority of the time.



When the flow increases, water will be restricted by the control structure and the storage area will start to fill.



Once river flows decrease, the storage area will continue to release water at a controlled rate. If the storage area becomes full, water will start to safely spill out of the storage area via a spillway. At this point the storage area will no longer provide a benefit downstream.

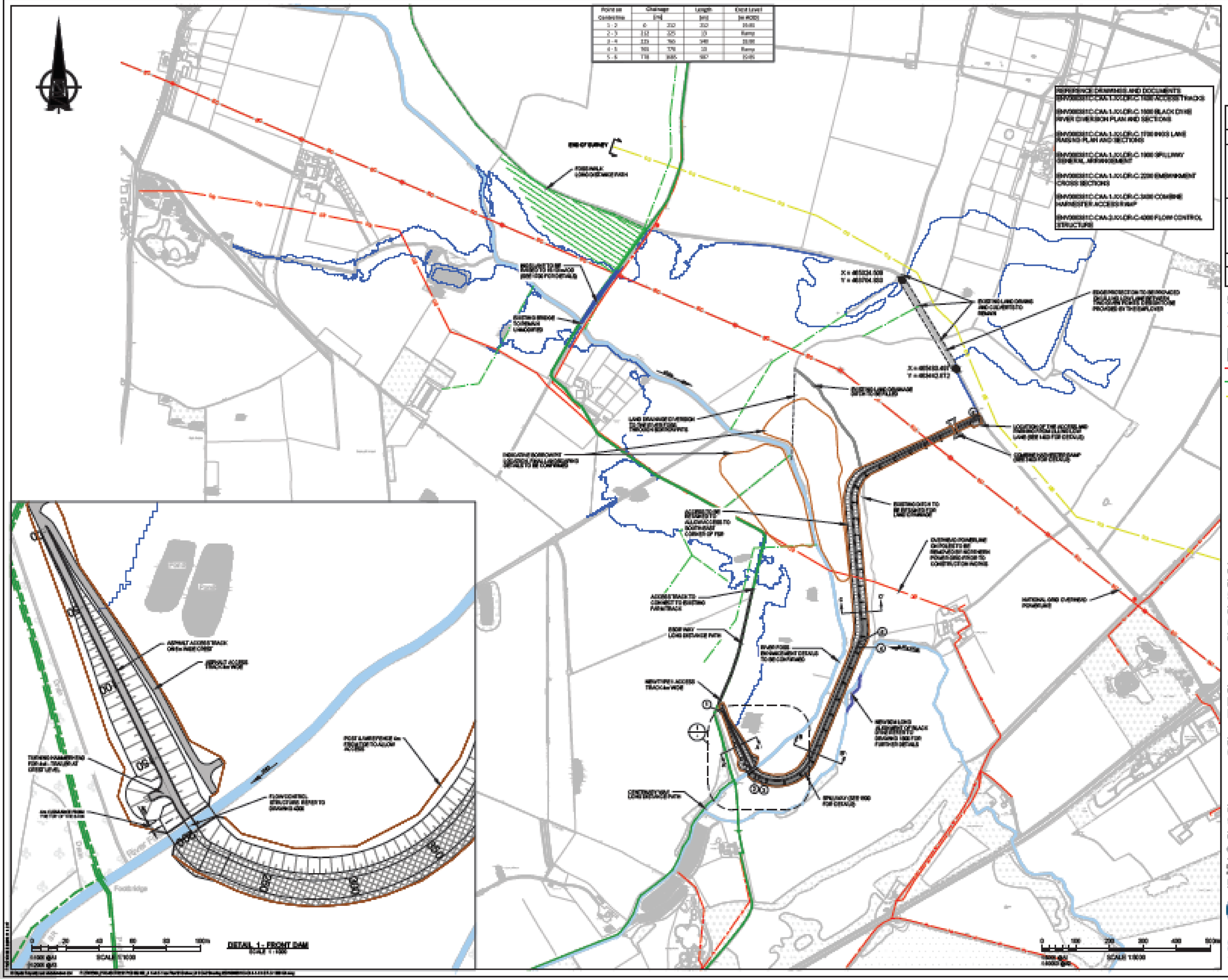
The proposed flood storage area is completely passive and not mechanically operated

The River Foss
Design and construction

The design of the Foss Storage Area consists of the following elements:

- A 1.7 kilometre long earth embankment up to 4.1 m in height which joins high ground adjacent to Lilling Low Lane
- A 610 metre long reinforced grass spillway. This is to allow water to flow in a controlled and safe manner in the unlikely instance that the water in the storage area exceeds its capacity.
- A passive structure which will control the flow of water through the storage area. The passive design removes the risk of moving parts failing during a flood.
- Two large excavations (known as ‘borrowpits’) will be dug to source the material to construct the embankment. By using local materials, we wont need to import tens of thousands of tonnes of clay and so avoid the huge disruption this would cause to local traffic. The borrowpits will also provide the opportunity to create wetland habitat and increase the range of flora and fauna within the area.
- Diversion of a large land drain into one of the borrowpits. This will capture a large amount of agricultural runoff, reducing sediment getting in to the River Foss and improving river water quality;
- Raising the height of Ings Lane between the Ings Lane Bridge over the River Foss and Lilling Low Lane by a maximum of 1.05 metres. This will maintain dry access during an extreme flood event.
- Realignment of a land drain tributary of the Black Dike to ensure that there is sufficient room for vehicle access and future channel maintenance.

Point at Connection	Chainage (m)		Length (m)	Exist Level (m AOD)
1 - 2	0	212	212	10.00
2 - 3	212	225	13	Ramp
3 - 4	225	365	140	10.00
4 - 5	365	378	13	Ramp
5 - 6	378	845	467	10.00



REFERENCE DRAWINGS AND DOCUMENTS

ENV0003011-CIA-1-XX-DR-C-1000 ACCESS TRACKS

ENV0003011-CIA-1-XX-DR-C-1500 BLACK DYKE RIVER DIVERSION PLAN AND SECTIONS

ENV0003011-CIA-1-XX-DR-C-1700 RACE LANE RAISING PLAN AND SECTIONS

ENV0003011-CIA-1-XX-DR-C-1900 SPILLWAY GENERAL ARRANGEMENT

ENV0003011-CIA-1-XX-DR-C-2200 EMBANKMENT CROSS SECTIONS

ENV0003011-CIA-1-XX-DR-C-3400 COMBINE HARVESTER ACCESS RAMP

ENV0003011-CIA-1-XX-DR-C-4000 FLOW CONTROL STRUCTURE

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

CONSTRUCTION

MAINTENANCE / CLEARING

DECOMMISSIONING / DEMOLITION

LEGEND

- 1 IN 100 + CC FLOOD LEVEL (10.19 mAOD)
- BORROW PIT AREA
- NATIONAL GRID PYLONS
- WIDED CONCRETE PROTECTION
- BT SERVICES
- EXISTING BURIED DRAIN PIPES
- ETHYLENE PIPELINE
- "ROAD LIKELY TO FLOODING" ROAD SIGN

NOTES:

1. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

Rev	Description	Date

Purpose of Issue: 50% Design freeze

Classification: Commercial in Confidence

Client: Environment Agency

Project: RIVER FOSS FLOOD STORAGE AREA

Drawing: GENERAL ARRANGEMENT PLAN

Scale @ A1	Drawn	Checked	Approved
1:5000	MO	CL	DS

Project No.: C0003483

Date: 08/06/2015

Drawing Identifier: ENV0003011C-CIA-1-XX-DR-C-1003

Revision: P03

CAPITA

Real Estate and Infrastructure

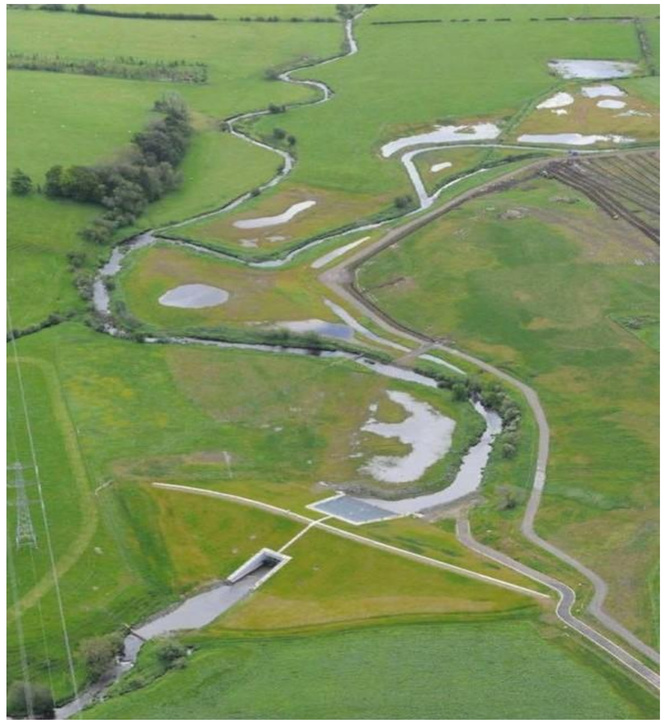
Capita Property and Infrastructure Ltd.

The River Foss
Location

The Foss Flood Storage Area will be located north-east of Strensall, between Walbutts House and East Liling Grange Farm. It will extend from north of the sewage treatment works to a point south-east of Bridge Farm. Whilst only a small portion of land will be used for embankment creation and borrow pits, during a flood event the storage area will be able to store 1.1 million m^3 of water over 111 hectares.

This location allows us to utilise natural higher ground to the west of the River Foss, using the embankment to create a ‘bowl’.
to store flood water.

We have conducted ground investigations to ensure that the land is suitable for constructing a flood storage area. We have talked to landowners, conservation groups and the Internal Drainage Board as part of the design process to gain a better understanding of the site.



An example of an online flood storage area located near Glasgow

The River Foss
Landscaping and the Environment

Environment Agency

We have carried out an Environmental Impact Assessment to assess how our proposals could affect the local environment and identify measures that will reduce any negative effects.

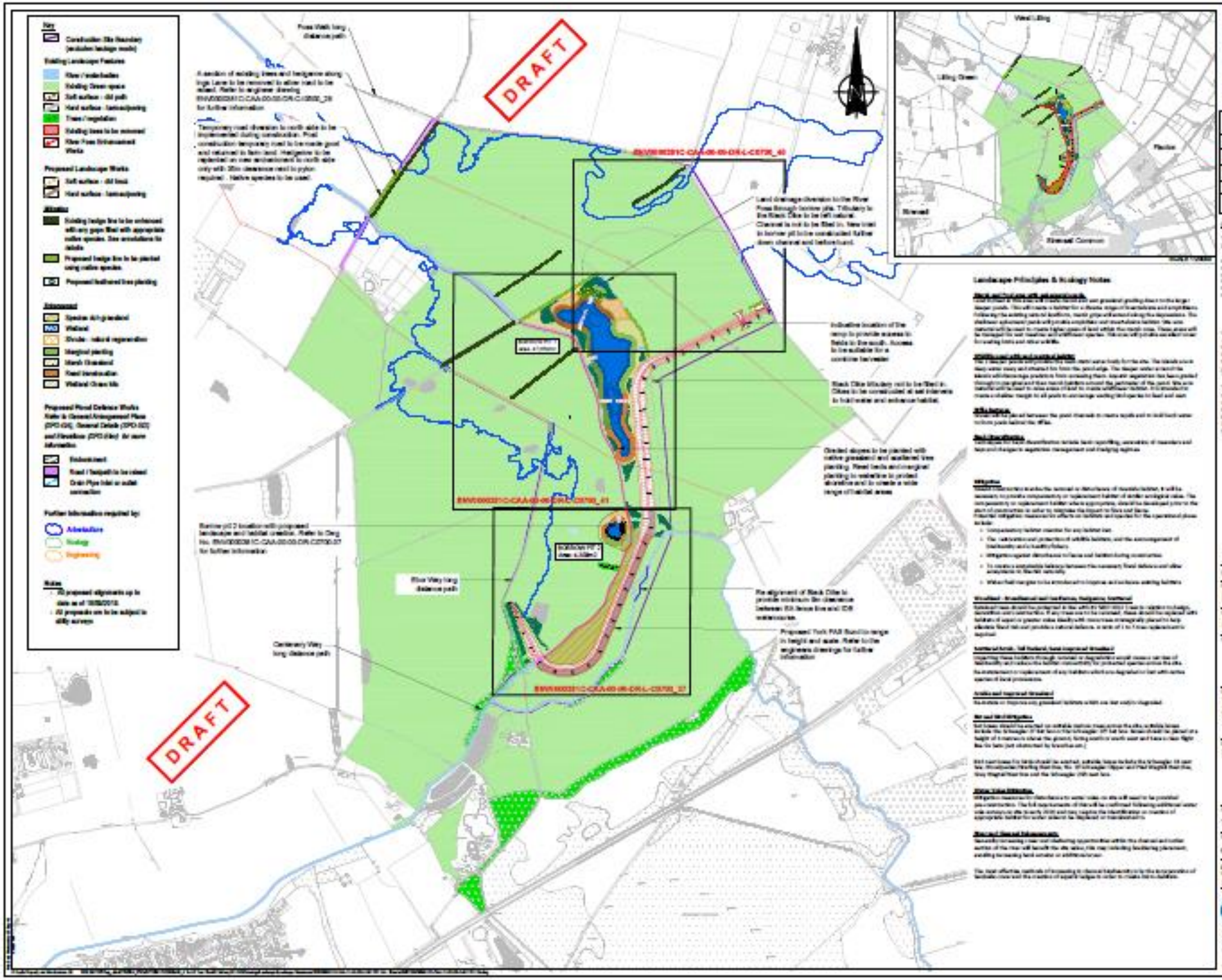
As a result of this, we are proposing to:

- Locate the embankment to minimise the loss of woodland and ponds
- Plant trees and replace lost hedgerows to enhance habitat connectivity on site
- Retain the tree with bat roosting potential on the proposed borrow pits
- Create an enhanced wetland habitat on the site of the proposed borrow pits, including reed beds and a network of small ponds
- Maintain the biodiversity-rich habitats and encourage water vole colonisation through management practices
- Carry out pre-construction checks for nesting birds and avoid active nests
- Relocate water vole, where necessary, to safe areas during construction
- Locate all construction works and site compounds at least 200 metres away from Strensall Common
- Use pollution prevention control measures to prevent spills
- Apply precautionary methods of working when working within 250 metres of offsite ponds

Photo credit: Andrej Chudy

Photo credit: Stuart Warrington

Photo credit: Peter Trimming

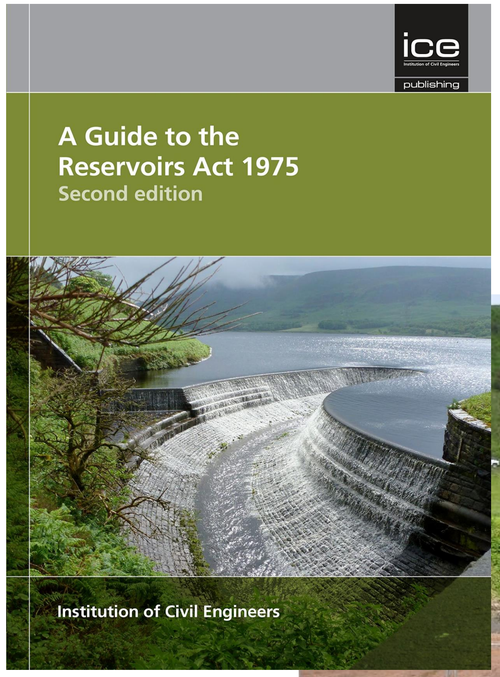

DRAFT
Key
Construction Site Boundary (excludes haulage routes)
Existing Landscape Features
River / watercourses
Existing Green space
Soft surface - old path
Hard surface - tarmac/paving
Trees / vegetation
Existing trees to be removed
River Foss Enhancement Works
Proposed Landscape Works
Soft surface - old track
Hard surface - tarmac/paving
Hedges
Existing hedge line to be enhanced with any gaps filled with appropriate native species. See annotations for details
Proposed hedge line to be planted using native species
Proposed feathered tree planting
Amenity
Species rich grassland
Wetland
Shrubs - natural regeneration
Marginal planting
Marsh Grassland
Reed bed/wetlands
Wetland Grass Mix
Proposed Flood Defence Works
Refer to General Arrangement Plans (DPD-GA), General Details (DPD-GD) and Elevations (DPD-Elev) for more information
Embankment
Road / footpath to be raised
Drain Pipe inlet or outlet connection
Further information required by:
Arboriculture
Ecology
Engineering
Notes
1. All proposed alignments up to date as of 18/06/2010.
2. All proposals are to be subject to utility surveys
Foss Walk long distance path
A section of existing trees and hedgerow along Ings Lane to be removed to allow road to be raised. Refer to engineer drawing BMW00003IC-CAA-00-00-DR-C-0002_20 for further information
Temporary road diversion to north side to be implemented during construction. Post construction temporary road to be made good and returned to farm land. Hedgerow to be replanted on new embankment to north side only with 20m clearance road to pylon required. Native species to be used.
BMW00003IC-CAA-00-00-DR-L-C0700_40
Land drainage diversion to the River Foss through borrow pits. Tributary to the Black Dike to be left natural. Channel is not to be filled in. New inlet in borrow pit to be constructed further down channel and before bund.
Indicative location of the ramp to provide access to fields to the south. Access to be suitable for a combine harvester
Black Dike tributary not to be filled in. Dikes to be constructed at set intervals to hold water and enhance habitat.
Graded slopes to be planted with native grassland and scattered tree planting. Reed beds and marginal planting in waterline to protect shoreline and to create a wide range of habitat areas
BMW00003IC-CAA-00-00-DR-L-C0700_41
Indicative PIC area: c.100m2
Review of 2 location with proposed landscape and habitat creation. Refer to Dwg No. BMW00003IC-CAA-00-00-DR-C0700-37 for further information
River Ouse long distance path
Re-alignment of Black Dike to provide minimum 5m clearance between EA fence line and IDB maintenance.
Proposed York PAS Bund to range in height and scale. Refer to the engineers drawings for further information
Centenary Way long distance path
BMW00003IC-CAA-00-00-DR-L-C0700_37
DRAFT
West Lilling
Lilling Green
Rawcliffe
Rawcliffe Common
Landscape Principles & Ecology Notes
SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
CONSTRUCTION
MAINTENANCE / CLEANING
DECOMMISSIONING / DEMOLITION
REFERENCE DRAWINGS AND DOCUMENTS
This drawing is to be read in conjunction with the following documents and drawings:
BMW00003IC-CAA-00-00-DR-L-C0700_37
BMW00003IC-CAA-00-00-DR-L-C0700_38
BMW00003IC-CAA-00-00-DR-L-C0700_41
BMW00003IC-CAA-00-00-DR-L-C0700_40
BMW00003IC-CAA-00-00-DR-L-C0700_39
BMW00003IC-CAA-00-00-DR-L-C0700_20
Landscape Environmental Management Plan
GENERAL NOTE
After engineering soils have been removed from the adjacent area of the River Foss the topsoil profile will be modified and shaped to improve and integrate better into the landscape. The final levels and profile of the borrow pits will depend on the amount of soil removed to create the bund. This will only be known when construction begins.
The depth of the water bodies will be determined by the final restoration design. The water levels should be linked to the surrounding groundwater levels and average water levels of the River Foss. Seasonal variations are likely to occur and this will also impact on the levels in the borrow pits from the River Foss. Well pipe flood level will be used as the maximum height of the inlet/outlet.
Rev Date Description
Draft
Commercial in Confidence
YORK FLOOD ALLEVIATION SCHEME
FLOOD CELL 11
LANDSCAPE MASTERPLAN
1:5000
PC
CAPITA
Real Estate and Infrastructure

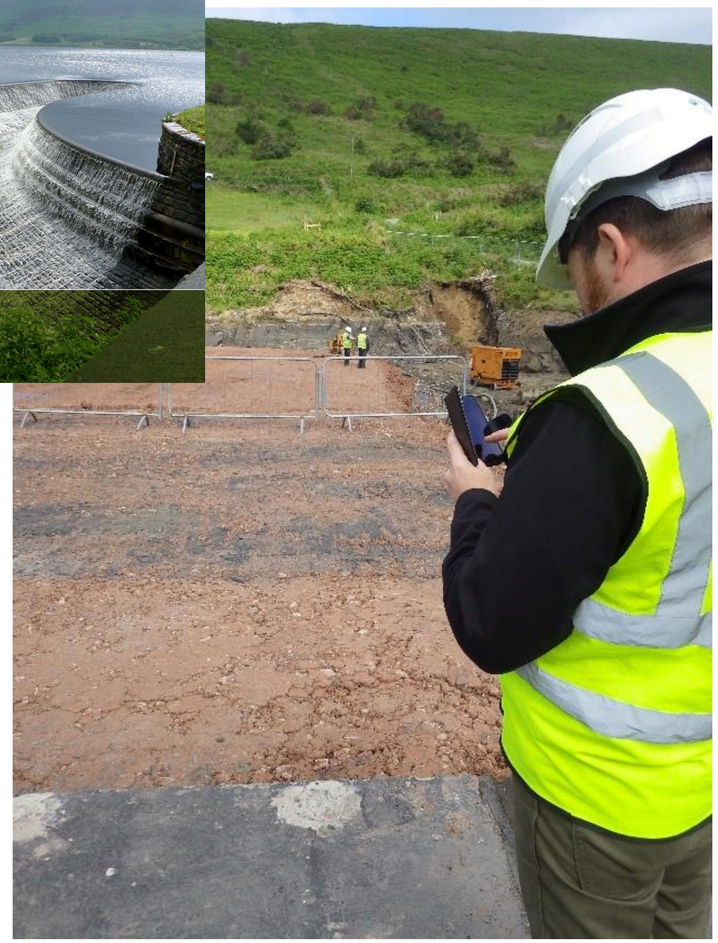
The River Foss
Safety Standards

Under English law, any structure which stores more than 25,000 m^3 of water is classified as a reservoir and so must comply with stringent conditions for their design, construction and operation, set out in the Reservoirs Act 1975. This means that the FSA at Strensall will be designed and built to the highest safety standards using modern construction methods.

Under the Reservoir Act 1975 we are required to appoint an independent specialist engineer called a Panel Engineer to ensure design and construction meet safety standards. Once built, a Supervising Engineer will be appointed to carry out annual inspections of the flood storage area to ensure it complies with all legal safety standards. If an inspection reveals anything that needs attention, they have the power to enforce action to be taken to rectify the issue.

For more information about our safety standards, please refer to the *'Flood Storage Areas and Reservoir Safety'* briefing.





The River Foss
Next steps

We will submit our planning application to City of York Council and Ryedale District Council by mid-October. The planning documents will be available to view and comment on both councils' planning portals.

Subject to landowner agreement and planning permission, we plan to start construction in Spring 2020.

This information and any updates can be found on our webpages at:
https://consult.environment-agency.gov.uk/yorkshire/riverfoss/#grovestostrensall

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yorkfloodplan@environment-agency.gov.uk

@EnvAgencyYNE

York Flood Alleviation Scheme, Environment Agency, Foss House,
1-2 Peasholme Green, King's Pool, York, YO1 7PX

The River Foss
FAQs

Is there anything you would like to comment on or would like to know more about?

Please use a post-it note to share your thoughts. Any comments or questions raised here will be included in our post-event report and used to create a ‘Frequently Asked Questions’ document which will be shared online and with those on our email mailing list. If you would like to receive copies of these documents, please provide us with your email address at the sign-in desk.