April 2020

Steeping Catchment Action Plan 2020 +

…from the Wolds to the sea

Environment Agency

Lindsey Marsh Drainage Board
Water Management Consortium

East Lindsey
DISTRICT COUNCIL

WITHAM FOURTH DISTRICT
INTERNAL DRAINAGE BOARD

Lincolnshire
COUNTY COUNCIL
Working for a better future

NFU
EAST MIDLANDS

Foreword

Photo courtesy of Cathryn Smithson Whitehead

"This action plan has been developed in reaction to the devastating events of the 12 of June 2019, a date that many of you will never forget. Many of your homes and businesses were flooded and I know you want reassurance that everything possible is being done to prevent this happening again.

The steering group and sub groups were formed by the Lincolnshire Flood Risk and Water Management Partnership Strategy Group to bring forward an action plan to reduce the risk of a recurrence of this flooding.

The Environment Agency, Lindsey Marsh Drainage Board, Witham Fourth District Internal Drainage Board, Lincolnshire County Council, East Lindsey District Council and the National Farmers' Union committed to work together, and I pay tribute to all those who gave time to developing this plan.

The actions we are strongly recommending in this plan are based on the evidence from modelling of the river, updated from the June 2019 flooding.

Photo courtesy of Richard Hardesty

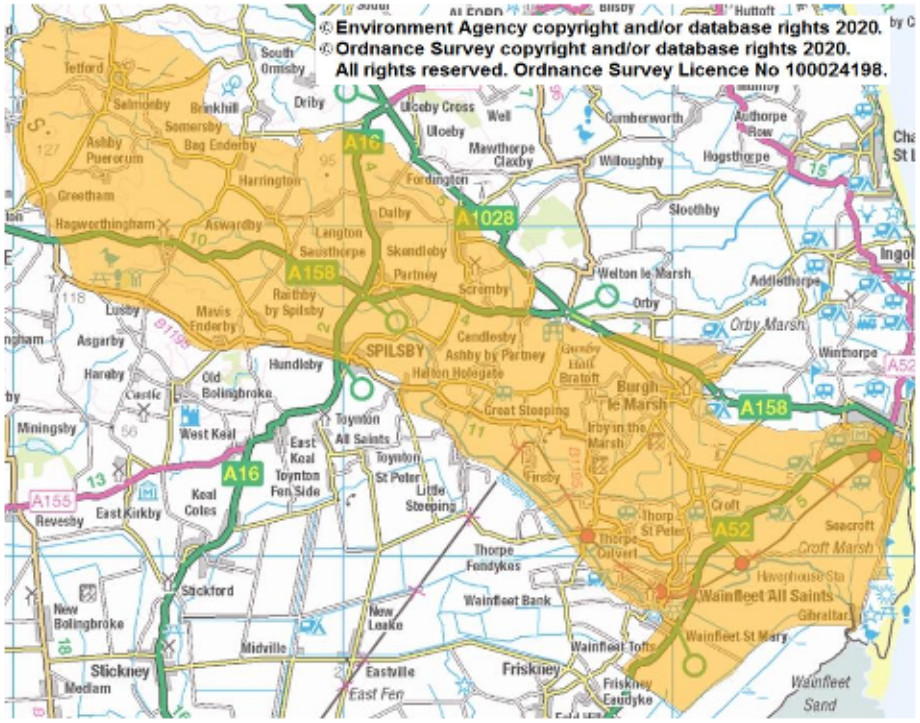
The changes we are proposing have the most benefit in reducing the risk of flooding across the entire catchment. The speed in which these actions are delivered will depend on availability of funding, but work can commence on actions that have the most benefit.

This action plan will be seen as a national blueprint for other lowland rivers in the UK, to develop their own plans. And as an example of the whole catchment approach to flood risk management.

I hope the whole community will endorse this plan and support the Authorities to deliver this as soon as possible."

Robert Caudwell, Chair of the Steeping River Catchment Steering Group

Introduction



More than two and a half times the monthly average rainfall fell in three days in the Steeping Catchment - shown to the right here. This led to overtopping in some areas and ultimately a breach on the Wainfleet Relief Channel on 12 June 2019. As a direct result 75 homes and businesses were flooded and in addition more than 2,000 acres of agricultural land were also flooded, at a time when many crops were about to be harvested.

The existing Lincolnshire Flood Risk and Water Management Partnership (LFR&WMP) set up a Steeping River Catchment Steering Group the following month to look at how flood risk is managed, explore any additional funding potential and ensure communication takes place with the community. This continues, and expands on, work that has already developed between partners over a number of years using a collaborative approach to manage flood risk through an agreed maintenance programme.

In January 2020, the Lincolnshire Joint Flood Risk and Water Management Strategy 2019-2050 was approved and adopted on behalf of Lincolnshire County Council in its capacity as the Lead Local Flood Authority. The strong partnership approach in Lincolnshire has meant that we have been able to put together the strategy as a joint venture between all the organisations with a role in flood risk management. The purpose of the strategy is to manage the impact of flood risk to people, businesses, infrastructure and the environment across the county, however the LFR&WMP has increasingly recognised that flood risk management is integral to a wider issue of managing water as a resource, which is essential to economic growth nationally and, particularly, in the east of England. The strategy aims to work with communities to develop long term resilience to the impacts of climate change and sea level rise. It also seeks to develop new and innovative ways of funding the work that will need to be delivered to achieve this. These challenges are identified in four key areas it believes Lincolnshire faces in terms of water; coastal Lincolnshire, agri-food sector, urban areas and the catchment based approach.

In addition, the Environment Agency consulted on a draft National Flood Risk Management Strategy in May 2019, having worked closely with partners to develop a shared strategic direction to 2100. This sets out the long term plan for tackling, preparing for and adapting to the additional risks that climate change will bring. It moves from the concept of protection towards being more resilient to flood risk and the changing climate. This will still mean building and maintaining defences, where funding is available, and also helping to ensure communities and those involved with infrastructure know how to adapt to the risk, are prepared and can recover more quickly. A key recommendation is that communities should have access to a range of tools which give them control of how they prepare for and respond to flooding and coastal change. The strategy is expected to get approval from Parliament imminently.

The Steeping River Catchment Steering Group is independently chaired by Robert Caudwell from the Association of Drainage Authorities. The following organisations are members: Environment Agency, Lindsey Marsh Drainage Board, Witham Fourth District Internal Drainage Board, Lincolnshire County Council, East Lindsey District Council, National Farmers' Union. The Steering Group set up three groups to achieve its aims. Elected councillors and community representatives are also involved.

This Catchment Action Plan has been created by the Steering Group, in alignment with the draft National Flood Risk Management Strategy, to show what action could be taken in the short, medium and long term to manage the risk of flooding within the catchment. Interested members from the community have had a key role to help shape this document.

There is no single solution anywhere that can eliminate flood risk. However, this risk can be reduced using a combination of actions to make the biggest difference.

Funding

There are different sources of funding which can be spent on flood risk management. The main source is the Flood and Coastal Erosion Risk Management Grant in Aid (FCERMGiA) which comes from central government. This funding is allocated using the Partnership Funding Approach and is also dependent on the benefits that a flood risk management scheme will provide. Where there are fewer beneficiaries of a scheme it may only attract some of the funding needed and so additional funding has to be found from other sources.

The Funding and Benefits Group is continuing to explore different funding avenues in more detail based on the actions within this Catchment Action Plan.

It is noted in the Budget on 11 March 2020, the Chancellor announced plans to invest £5.2 billion funding in flood defences in England over 6 years from April 2021. It is too soon to say what this means for Lincolnshire and where the money will go. The Steering Group remains committed to actively seek funding from every source that may become available, including commitments of £200,000 from Lindsey Marsh Drainage Board, £150,000 from Lincolnshire County Council and £50,000 from East Lindsey District Council. The Regional Flood and Coastal Committee has also awarded £60,000 to go towards delivery of the actions in this plan which is in addition to existing maintenance funding.

Action that has already been taken

- Set up multi-organisation Steering Group
- Breach permanently repaired
- Grass cut defences to help bind and protect
- Producing newsletters for the community
- Funding bid submitted
- Survey of silt levels
- Improved Flood Warning Areas
- Exploring numerous options to manage flood risk
- Flushing out and surveying IDB culverts
- Inspected banks
- Weed cut the river and IDB drains to improve the flow
- Starting emergency planning with parish/town councils
- Investigating water level management ahead of forecast rain
- Identified and repaired badger damage

Catchment Action Plan Themes

The Catchment Action Plan has produced a range of options under four themes:

1. Improving flow through the system

2. A resilient community and infrastructure

3. Strengthening and maintaining defences

4. Flood water storage

Within each theme, there is a table that explains what action is being taken and the model run reference (if applicable). This Model Run Summary can be viewed in the Appendix, along with a map showing key locations. Each theme has also considered additional evidence supplied, will show where and when action is happening, and which partner/s are involved. The table will indicate the cost involved and potential source of funding. Finally the table will show the next steps. There are other actions that have been put forward by partners and the community – see page 18. These have been investigated and the evidence shows that they would either not lead to a significant further reduction in flood risk or are cost prohibitive and are therefore less likely to attract funding under current government funding rules. Most will be kept under review and may be reconsidered if there is a change to these, or if further investigations prove they have greater value.

An investigation into the flooding under section 19 of the Flood and Water Management Act has been carried out by Norfolk County Council, on behalf of Lincolnshire County Council, in its role as Lead Local Flood Authority. Local residents and groups contributed greatly to this investigation, sharing experiences, opinions and local knowledge. Its recommendations are reflected within the Catchment Action Plan.

The Catchment Action Plan also incorporates findings from a survey of silt levels of the Steeping River and Relief Channels from Great Steeping to Burgh Sluice. This was commissioned in July 2019 and completed in October 2019. The results were reviewed by the Environment Agency and Lindsey Marsh Drainage Board. It revealed that the overall amount of silt in the system has reduced by almost 20% since the last survey in 2014. However, it also showed there are places where the silt has accumulated and consequently the depth of water has reduced such that the growth of flow restricting vegetation e.g. reeds is more likely.

The partners have therefore concluded that dredging will form part of the answer and therefore it does feature within this Catchment Action Plan and continues to be investigated. Dredging would take place in targeted locations where it can contribute to flood risk reduction.

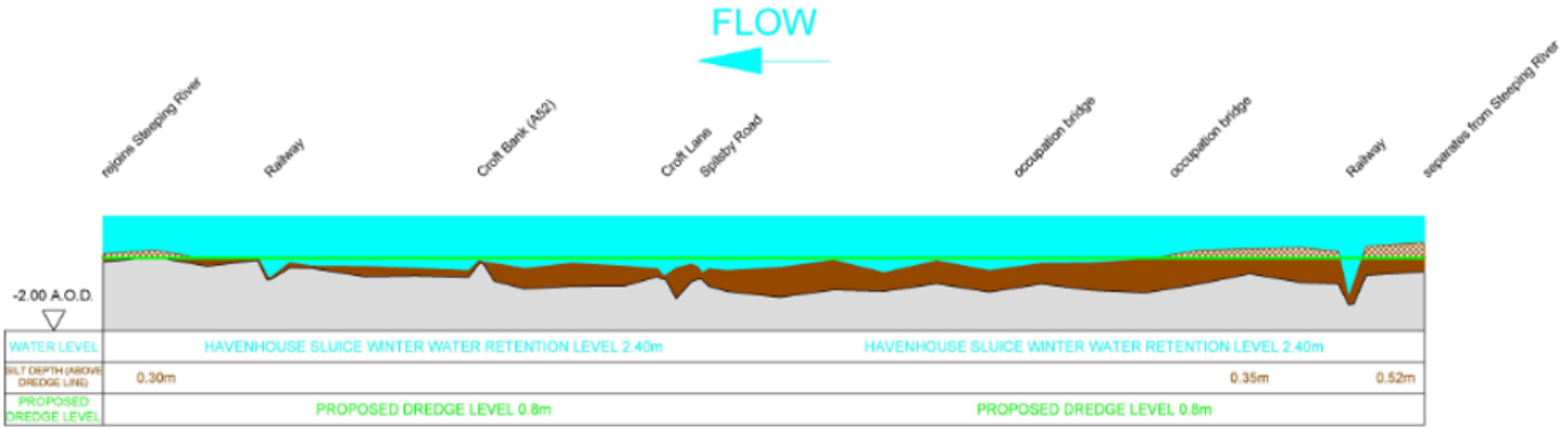
The images on the following two pages show silt levels from the survey in the Wainfleet Relief Channel and River Steeping between Haven House Sluice and Thorpe Culvert. The diagrams show a proposed dredge profile line at a level of 0.8m ODN. This is the level that is required to ensure a year round water depth of 1.5m. A retained water depth of 1.5m is important to aid flow conveyance as new growth or regrowth of reeds and bottom weed is deterred in waters of 1.5m depth.

This Catchment Action Plan is designed to be a 'live document' to reflect all the steps being taken by partners and the community working together. It will be regularly monitored and reviewed by the Flood Risk and Water Management Partnership to make sure actions are delivered and new information and ideas are incorporated. All members remain committed to its delivery and continuing to embed an integrated approach to flood risk and water level management.

The Catchment Action Plan can be seen online here: www.e-lindsey.gov.uk/flood2019 The community event due to take place at Batemans Brewery to launch this plan has been postponed during the coronavirus pandemic in line with government guidance. Therefore, if you have any comments or questions about the Catchment Action Plan, or would like to request a hard copy to be posted when this is possible, please contact the Steering Group partners. You can do this via the Environment Agency by:

- Email - LNenquiries@environment-agency.gov.uk
- Post – using the form on the back page

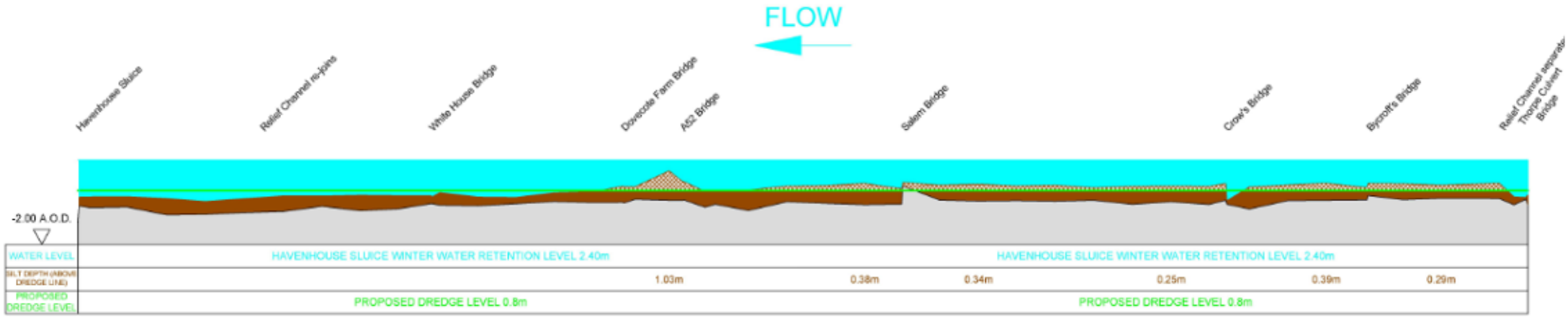
Please note questions emailed or posted will be held centrally and replied to when resources allow following the coronavirus pandemic.



Wainfleet Relief Channel

Key

- Required Dredge Level
- Silt To Be Removed
- Silt Not Requiring Removal



River Steeping - Havenhouse Sluice to Thorpe Culvert

Key

- Required Dredge Level
- Silt To Be Removed
- Silt Not Requiring Removal

1. Improving flow through the system

Actions in this theme of work look at how the flow of water could be better managed from the top of the catchment at Tetford out to the sea at Gibraltar Point. It includes looking at how sluices are used, and the maintenance of river channels with options such as weed cutting, clearing vegetation and dredging where it is shown to contribute to flood risk reduction and funding can be secured.

Action	Model run (if applicable)	Action	Where	When	Who is Involved	Cost	Funding Source	Next steps
1	12c	Continue effective weed management throughout the catchment	Steeping catchment	As per yearly programme	EA, LMDB	TBC	EA maintenance	Programme TBC in April 2020
2	12c	Investigate dredging to achieve a minimum water depth of 1.5m all year round to reduce weed growth. See silt distribution diagrams on page 9 and page 10	Steeping River: Dovecote Farm Bridge to Thorpe Culvert, Wainfleet Relief Channel: Lenton's Bridge to Thorpe Culvert and downstream of the railway culvert east of Wainfleet	TBC	EA, LMDB	Approx. £550k	TBC EA maintenance + partnership funding	Programme TBC in April 2020
3	5c	Investigate ways of reducing the use of Wainfleet Relief Channel until it is needed. In normal conditions, more flow in the Steeping River may help to reduce silt	Mouth of Wainfleet Relief Channel	TBC	EA	Further investigations required	TBC	Consider within the longer term strategy

4	3c	Explore the opening of Haven House and Burgh Sluices to lower river levels ahead of potential higher river levels	Haven House, Burgh Sluice	By summer 2020	EA	Minimal	EA	Work with EA internal teams to see if this can be achieved
5	10	Investigate reducing pumping from Thorpe Culvert Pumping Station during times of increased flow – either by short term storage in the lowland system or by emergency discharge to Bell Water Drain	Thorpe Culvert Pumping Station, Bell Water Drain	Started	EA, LMDB, W4DIDB	Up to £350k	LMDB revenue + grant if available	IDBs to investigate further
6	n/a	Continue refining the operation and effectiveness of Burgh Sluice, Wainfleet Clough Outfalls and Haven House Sluice (including door opening mechanisms)	Burgh Sluice, Wainfleet Clough	By summer 2020	EA	Minimal	EA	Work with EA internal teams to see if this can be achieved

2. A resilient community and infrastructure

Actions in this theme consider a broad range of activities to improve community and infrastructure resilience. Flood resilience can be described as the capacity of people and places to plan for, better protect, respond to, and recover from flooding and coastal change. The risk of flooding can never be removed entirely, and climate change means the threat will increase significantly. The Lincolnshire Resilience Forum, set up to co-ordinate emergency planning arrangements following the introduction of the Civil Contingencies Act in 2004, brings together emergency responders and other organisations to support communities and those involved with infrastructure to become more resilient e.g. with the creation and testing of Emergency Plans. This means they have the tools to be prepared, know the action they can take and will be able to recover more quickly as a result. Awareness is raised about signing up to the EA's Flood Warning Service and community/property flood mitigation measures will be explored.

Action	Model (if applicable)	Action	Where	When	Who is involved	Cost	Funding source	Next steps
1	n/a	Work with town and parish councils to help them understand their local flood risk now and in the future by supporting them with the creation, and testing, of Community Emergency Plans that cover all locally identified emergencies. This to include exploring community flood mitigation measures such as fixed/demountable barriers.	Across the Steeping Catchment	Started	LCC, EA ELDC, LMDB, W4DIDB, AW, NFU, Town and Parish Councils	Minimal		Wainfleet Town Council, Wainfleet St Mary Parish Council, Thorpe St Peter Parish Council and Croft Parish Council are working together on a joint Community Emergency Plan for the area after meeting with LCC

2	n/a	Work with residents to help them understand their flood risk now, and in the future, so they can be prepared. This means they will know how to reduce the impact of any flooding and recover more quickly.	Across the Steeping Catchment	Started	LCC, EA ELDC, LMDB, W4DIDB, AW, NFU, Community	Minimal		Continue raising awareness of EA Flood Warning Service, personal flood plans, checking insurance cover. To include property flood mitigation measures to reduce impact e.g. air brick covers, door/window barriers, ditch clearance, permeable paving, gravel.
3	n/a	Work with businesses, the agricultural sector and infrastructure owners to help them understand their flood risk and how they can be prepared to reduce the impact of any future flooding and recover more quickly	Across the Steeping Catchment	2020/21	NFU, EA, LCC, ELDC, LMDB, W4DIDB, AW, Businesses	Minimal		Continue raising awareness of EA Flood Warning Service, business flood plans, checking insurance cover. To include property flood mitigation measures to reduce impact e.g. air brick covers, door/window barriers, ditch clearance, permeable paving, gravel.
4	n/a	Develop an understanding of how the community, businesses, agricultural sector and infrastructure owners can adapt to a changing climate	Across the Steeping Catchment	2020/21	LCC, EA ELDC, LMDB, W4DIDB, AW, NFU,	Minimal		Ensure alignment with EA National Flood Risk Management Strategy Action Plan in due course once approved by Parliament and published online

5	n/a	Continue improving the EA Flood Warning Service by updating the catchment and flood forecasting models. This will improve the timeliness and accuracy of flooding warnings and enable work towards a community based flood warning service.	Across the Steeping Catchment	2020/21	EA	£150k ring-fenced from National Modelling And Forecasting Budget	EA National Modelling And Forecasting Budget	Update the catchment and flood forecasting models for the Steeping River system to provide the detailed information required to make the improvements

3. Strengthening and maintaining defences

This theme relates to flood defences such as embankments and walls. The theme looks to undertake affordable improvements in flood defences and resilience to reduce flood risk. The actions identify investment need and optimise available funding across the catchment. They review and continue activities to the existing flood defences, such as inspection, regular maintenance, asset repairs and a planned programme of engineering maintenance so they remain operational. Longer term, the effect of climate change is to be planned for and adapted to.

Action	Model run (if applicable)	What action is being taken	Where	When	Who is involved	Cost	Funding source	Next steps
1	n/a	Undertake annual visual inspection of flood defences as part of a routine inspection programme to identify defects	Steeping catchment downstream of Great Steeping	Annual	EA	Minimal	EA	Programmed for September 2020
2	n/a	Prioritise repairs for the identified defects to flood defences	Steeping catchment	Works started on programme for 2020-21+	EA	TBC	EA + partnership funding	Await budget confirmation (expected April 2020). Plan and deliver work.
3	n/a	Review, plan and carry out routine maintenance to flood defences e.g. grass cutting, vermin control etc.	Steeping catchment	Grass cutting started March 2020	EA		EA maintenance + partnership funding	Continue to deliver maintenance throughout 2020

4	n/a	Plan and deliver a phased programme of toe protection (Steeping River – Warth's Bridge to Salem Bridge and downstream of A52; Wainfleet Relief Channel)	Wainfleet Relief Channel & Steeping River	Assessed as being required 2021 onwards	EA	TBC	EA + Partnership funding	Bid for money June 2020. Plan and deliver subject to confirmation.
5	n/a	Plan and deliver a phased programme of bank top levelling (Burgh Sluice Relief Channel, Wainfleet Relief Channel)	Wainfleet Relief Channel & Burgh Sluice Relief Channel	2023	EA	TBC	EA + Partnership funding	Develop programme. Bid for money. Plan and deliver subject to confirmation.
6	n/a	Plan and deliver works to increase the resilience of the embankments of the Wainfleet Relief Channel to overtopping and the effects of climate change	Wainfleet Relief Channel	Funding bid submitted	EA + partners	£3m +	FDGiA + other funding that may include ESIF and recovery funding	Awaiting ESIF funding bid timetable. Detailed technical appraisal needed.
7	n/a	Investigate how banks of the Steeping River can be made more resilient to overtopping and effects of climate change	Steeping River	Ongoing	EA + partners	£5m +	FCERMGiA + partnership funding	Detailed technical appraisal needed
8	n/a	Investigate, plan and deliver a project to reduce the risk of flooding from Lady Wath's Beck (upstream of the B1195 bridge)	Lady Wath's Beck	Started	EA + partners	TBC	FCERMGiA + partnership funding	Develop a scheme and apply for funding
9	n/a	Liaise with adjacent landowners/occupiers to improve access to defences for inspection and maintenance. Discuss activities which could impact on defences such as land management, Environmental Permitting regulations etc.	Steeping catchment	Started. Ongoing as a longer term action	EA	Minimal	EA staff time	Identify priority locations and land owners

4. Flood water storage

Actions in this theme relate to consideration around the advantages of constructing formal flood water storage areas in the catchment that could also support agri-food and environmental benefits. Water could be diverted here from the river and stored until the flow had fallen and the water surplus to other requirements can be returned to the river. It also includes - with appropriate funding - consideration of how natural flood management techniques and working with natural processes, such as targeted woodland planting, sediment capture and management, and holding water temporarily on land upstream, could slow the flow and help reduce water entering the lowland system in the Wainfleet, Firsby, Great Steeping and Thorpe St Peter areas.

Action	Model run (if Applicable)	Action	Where	When	Who is involved	Cost	Funding source	Next steps
1	11	Investigate methods and locations in the upper catchment for natural flood management	Steeping catchment	2020/21 +	EA, NFU + partners	Initial £60k	RFCC Local Levy	EA to finalise project scope
2	11	Work with landowners to investigate changes to land management practices across the catchment to reduce silt coming into the system						
3	11	Investigate provision of multi-use formal flood water storage area/s within the catchment and appropriate payment	Steeping catchment	2025 +	EA, NFU + partners	TBC	Potential through agri-environment FDGiA and partnership funding	Consider within the longer term strategy

Additional actions not taken forward at present

There are other actions that have been put forward by partners and the community. These have been investigated and the evidence shows that they would either not lead to a significant further reduction in flood risk or are cost prohibitive and are therefore less likely to attract funding under current government funding rules. Most will be kept under review and may be reconsidered if there is a change to these, or if further investigations prove they have greater value.

The table below explains what these actions are and which model run relates to this – see Model Run Summary and map showing key locations in the Appendix:

Action	Model run (if applicable)	What	Why	Cost
1	9b	Re-profiling of tidal outfall up to Wainfleet Clough and reinstatement of Wainfleet Clough gravity outfall (all at 0.26m ODN)	Provides only small reduction in flood risk and would require regular repeated dredging to overcome tidal siltation	> £0.5m
2	9b	Dredging of full channel system to achieve a bed level of 0.26m ODN (circa 125,000m^3 to Thorpe Culvert)	Has some flood risk benefits when combined with Action 1. High cost.	£1.5m
3	n/a	Reform bed and cleanse Steeping River from Thorpe Culvert to Mill Lane road bridge at Great Steeping	Needs further investigation	Not costed
4	4a to 4i	Removal or rebuilding of major structures on Steeping River or Wainfleet Relief Channel	No evidence that they contribute significantly to increased flood risk. Likely high cost.	Not fully costed as minimal flood risk benefit
5	7 and 2d	Building a connection to Burgh Sluice pumping station (circa 2.0 and 4.0 m^3). Refurbish and increase capacity of Burgh Sluice pumping station accordingly.	Modelling indicates these measures would not contribute to lowering flood risk beyond Haven House Sluices	Not costed
6	2d	Building a new main river pumping station at Burgh Sluice	Modelling indicates these measures would not contribute to lowering flood risk beyond Haven House Sluices	Not costed

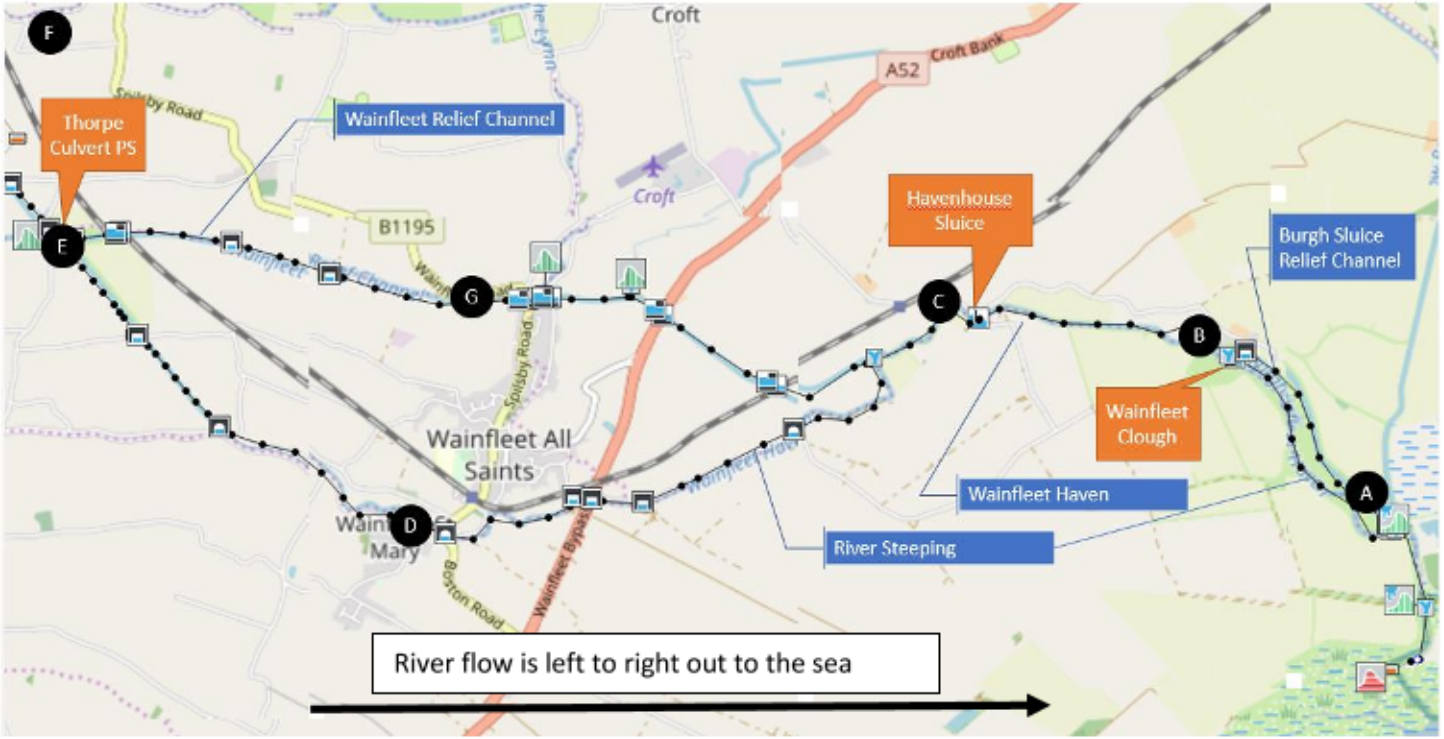
7	8a	Removal or rebuilding of B1195 road bridge on Lady Wath's Beck at Great Steeping	No evidence that the bridge contributes significantly to increased flood risk. Likely high cost.	Not fully costed as no flood risk benefit
8	n/a	Creation of Flood Cells to mitigate wider impacts of breaching and overtopping by sealing railway over bridge on Wainfleet Relief Channel	Would provide significant long term flood risk benefits but will require further investigation.	Under further investigation

5. Appendix

Key Locations

The letters on this map show some of the key locations:

Letter	Location
A	Burgh Sluice u/s
B	Wainfleet Clough u/s
C	Haven House Sluice u/s
D	Salem Bridge
E	Thorpe Culvert Pumping Station
F	Great Steeping
G	Wainfleet Relief Channel u/s of Spilsby Road Crossing



Model Run Summary

Modelling Summary	
Mod-01	Base model (n=0.05)
Modifications at Burgh Sluice and to System Outfalls	
Mod-2a	Enlarge Burgh Sluice gravity outfall
Mod-7	Removal of 2 m3/s of water from the Steeping system into the Burgh Sluice pump system
Mod-2d	Removal of 4 m3/s of water from the Steeping system into the Burgh Sluice pump system
Mod-2e	Reprofile all d/s of Wainfleet Clough to (-) 0.59 mAOD
Mod-2f	Reprofile all d/s of Wainfleet Clough to 0.26 mAOD
Mod-2g	Full closure of Wainfleet Clough
Operation of Havenhouse Sluice	
Mod-3a	Apply the winter retention level of 2.4mODN all year round. Existing Burgh Sluice level not to be altered.
Mod-3b	Apply the summer retention level of 2.7mODN all year-round at Haven House Sluice. Existing Burgh Sluice level not to be altered.
Mod-3c	Apply same water retention level as Burgh Sluice.
Identify flow restrictions	
Mod-4a	Steeping - Removal of Crow's Bridge
Mod-4b	Steeping - Removal of Salem Bridge
Mod-4c	Steeping - Removal of White House Farm Bridge
Mod-4d	Steeping - Removal of Haven House Sluice
Mod-4e	WRC - Removal of western railway culvert
Mod-4f	WRC - Removal of Spilsby Road culvert
Mod-4g	WRC - Removal of Croft Lane culvert
Mod-4h	WRC - Removal of A52 culvert
Mod-4i	WRC - Removal of eastern railway culvert

Operation of Wainfleet Relief Channel	
Mod-5a	Removal of the Wainfleet Relief Channel from the model so it carries no flows of water.
Mod-5b	Weir at the upstream end of the Wainfleet Relief Channel set at 2.7mODN
Mod-5c	Weir at the upstream end of the Wainfleet Relief Channel set at 2.4mODN
Flooding of Lady Wath's Beck	
Mod-8a	Removal of the bridge structure for the B1195 from the model
Removal of Silt	
Mod-9a	Lower the bed level of the Steeping and WRC to 0.8mODN for all sections from Burgh Sluice up to Thorpe Culvert PS
Mod-9b	Lower the bed level of the Steeping and the WRC to 0.26mODN from Burgh Sluice to Thorp Culvert PS. Also lower the tidal sections downsteam of Burgh Sluice and Wainfleet Clough to 0.26mODN
Reduce / Restrict inflow from LMDB Thorpe Culvert Pumping Station	
Mod-10	Limit flows from Thorpe Culvert PS to 2.1 cumec
Natural Flood Risk Management in the upper catchment	
Mod-11	Reduction in peak flows downstream of Mill Bridge by 5%
Weed management	
Mod-12a	n = 0.04 (Clean Channel)
Mod-12c	n = 0.125 (Fully Vegetated Channel)

6. Glossary

Word	Meaning
AW	Anglian Water
Bed level	The boundary between the water and the material at the bottom of the channel. References to bed level in this action plan include any silt present.
Breach	Erosion of bank material, resulting in a gap in the defence, allowing the water to escape from the channel and cause flooding of the land.
Climate Change	The effects of climate change are already being seen through hotter, drier summers and warmer, wetter winters. It will lead to more frequent bouts of extreme weather, including heavy rainfall which causes flooding. The threat of flooding and rate of coastal change will increase significantly.
Community Emergency Plan	A document produced and owned by a community e.g. a parish or town council. Through an Emergency Planning Group of emergency volunteers, the plan will help them to identify the local emergencies they could face. It contains e.g. triggers for plan activation, contact details, existing skills and resources, places of safety and people who may need help. It means the community is better able to respond before the emergency services arrive and that they can liaise more effectively with them.
Community Resilience	Resilience can be described as the capacity of people and places to plan for, better protect, respond to, and recover from flooding and coastal change.
d/s	Downstream
Dredging	Removal of silt material from a watercourse. This can include excavations to re-shape or increase the size of the existing channel or, as the case for this action plan, removing material from the existing channel (sometimes also referred to as desilting).
EA	Environment Agency
ELDC	East Lindsey District Council
Embankment/Bank	A raised structure made of earth built for the purpose of containing water.
ESIF	European Structural Investment Funds
FCERMGiA	Flood and Coastal Erosion Risk Management Grant in Aid (formerly known as FDGiA) money from central government
Flood Cell	Areas of land where water can flood, the extents of which are usually defined by the level of the land or man-made structures such as roads and railways.

Flood Mitigation	Ways in which a community or a property can be made more resilient to reduce flood risk. Community measures include free standing barriers, demountable barriers, perimeter walls, ditch clearance, tree-planting. Permanent property measures include water resistant external doors and windows, sealing around these, sealing cracks and service inlets, waterproof rendering, re-pointing brickwork, permeable paving, gravel. Temporary property measures include barriers for doors/windows/garage, airbrick/pet flap covers, modern versions of sandbags, toilet seals/bungs, freestanding pumps.
Formal/Flood Storage Area	An area designed to be able to flood when needed.
Hard Defence/Engineering	Building artificial structures to contain and control the flow of water and manage the risk of flooding. This can include methods such as piling and placing stone to prevent erosion of defences.
IDB	Internal Drainage Board
Infrastructure	Facilities that help a community run, for example roads, power supplies, sewage treatment, water supplies, schools and communication lines
LCC	Lincolnshire County Council
Lead Local Flood Authority	Lincolnshire County Council is the Lead Local Flood Authority in the county, as designated by the Flood and Water Management Act 2010. The Lead Local Flood Authority role includes assessing the risk of surface water flooding across Lincolnshire as well as working with organisations with water management powers across the county. This allows people and resources to be brought together more effectively to help reduce the likelihood of flooding happening, and provide the best possible help when it does happen. To support this it is required to implement and monitor a Local Flood Risk Management Strategy which must be consistent with the national flood risk strategy, for which the Environment Agency is responsible, but responding to local needs and circumstances, and which develops local strategic priorities. One key role is the duty to investigate and publish reports on flooding incidents in its area (where appropriate or necessary) and to identify which authorities have relevant flood risk management functions and what they have done or intend to do in response to a flood. Where an investigation is carried out it must publish the results and notify the relevant risk management authorities.
LFR&WMP	Lincolnshire Flood Risk and Water Management Partnership

Lincolnshire Resilience Forum	Local resilience forums (LRFs) are multi-agency partnerships made up of representatives from local public services, including the emergency services, local authorities, the NHS, the Environment Agency and others. These agencies are known as Category 1 Responders, as defined by the Civil Contingencies Act. LRFs are supported by organisations, known as Category 2 responders, such as the Highways Agency and public utility companies. They have a responsibility to co-operate with Category 1 organisations and to share relevant information with the LRF. The geographical area the forums cover is based on police areas. LRFs also work with other partners in the military and voluntary sectors who provide a valuable contribution to LRF work in emergency preparedness. The LRFs aim to plan and prepare for localised incidents and catastrophic emergencies. They work to identify potential risks and produce emergency plans to either prevent or mitigate the impact of any incident on their local communities. For more information on the risks to Lincolnshire please visit https://www.lincolnshire.gov.uk/emergency-advice/prepare-emergency and read the Community Risk register that explains the risks to the county, what partners are doing to prepare for them and what you can do to prepare yourselves and your communities.
LMDB	Lindsey Marsh Drainage Board
Local Levy	Local Levy – money raised locally by the RFCC that can be used to fund local priority schemes that might otherwise find it difficult to attract FCERMGiA funding. It can also be used to supplement existing grant funding where it has not been possible to attract partnership funding from elsewhere.
Mannings	In hydraulic river modelling the Manning formula is used to estimate the average velocity of water flowing in an open channel. It uses a friction coefficient *n* along open channels to represent the impact on flows imposed by geometer, bed and bank materials and vegetation growth. In lowland rivers such as the River Steeping a value of n=0.04 would represent a recently cleaned channel with little or no vegetation whereas n=0.05 is taken as an average of baseline year-round condition. To assess the impact on flows in a fully vegetated channel such as would be expected in early summer each year a value of n=0.125 is often used.
Natural Flood Management	This can help catchments to function more naturally. It involves implementing measures which help to restore or emulate the natural functions of rivers, floodplains and catchments. By encouraging these natural functions, we can trap sediment, slow the speed of water and store it in the wider catchment to reduce the impact of flooding in areas or communities at risk, whilst also enhancing biodiversity and water quality. NFM can be used to complement traditional engineering solutions. NFM can be part of the solution to reduce the risk of flooding to people, property, businesses and infrastructure, and can also increase the resilience of both existing and new hard flood defences to projected climate change effects. It also generates multiple other benefits for the environment and people.
NFU	National Farmers' Union
ODN	Ordnance Datum Newlyn (UK standard reference point to measure levels from)
Outfall	Where the river discharges into the sea
Overtopping	Water going over the top of the flood banks/defences

Partnership Funding Approach	For flood alleviation schemes FCERMGiA funding (from the government) is allocated using a partnership funding approach based on the benefits the scheme provides. If a scheme does not provide enough benefits it may only receive partial funding from FCERMGiA. It therefore becomes necessary to seek additional funding through partners such as other risk management authorities or those in the area who would benefit and are able to make a contribution.
PS	Pumping Station
Re-profiling	Altering the gradient, shape or level of the channel bed. It can be used to refer to work undertaken to an embankment to change the shape and to create a level bank top.
Resilience (context of flood defences)	Resilient defences would be better able to resist damage from extreme water levels and overtopping.
RFCC	Regional Flood and Coastal Committee. The committee was established under the Flood and Water Management Act 2010. The RFCC approves the annual programme of flood risk management work for the region and sets the Local Levy that can be used to fund priority works in their area. Membership is made up of representatives from Lead Local Flood Authorities and independent experts appointed by the Environment Agency. The Steeping catchment is covered by the Anglian Northern RFCC.
Risk Management Authority	Under the Flood and Water Management Act 2010 all risk management authorities - the Environment Agency, internal drainage boards, Lead Local Flood Authority, district councils, highways authorities, water and sewage companies - have a duty to co-operate with each other and to share data. A key theme of the Pitt Review was for flood risk management authorities to work in partnership to deliver flood risk management better to the benefit of their communities.
Soft Engineering	Working with natural processes to manage the risk of flooding. For example using coir rolls or willow to prevent erosion of defences.
Structures	A physical structure that is put in place to help reduce flood risk e.g. sluice gates, weirs, relief channel.
TBC	To be confirmed
Toe Protection	Work undertaken to protect the bottom of the embankment from erosion where the embankment meets normal water level.
u/s	Upstream
W4DIDB	Witham Fourth District Internal Drainage Board
WRC	Wainfleet Relief Channel

Steeping Catchment Action Plan Enquiry/Comment Form

Please detach and complete the form and post to: Flood Resilience Team, Environment Agency, Ceres House, Searby Road, Lincoln, LN2 4DW. Alternatively, you can email LNenquiries@environment-agency.gov.uk. Please note questions emailed or posted will be held centrally and replied to when resources allow following the coronavirus pandemic.

Name: .....

Please tick to indicate whether this is:

a Comment (no response needed) ☐ **or an Enquiry (response needed – please provide your contact details below)** ☐

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Please use additional sheets if needed.

How would you like us to get back to you if this is an Enquiry?

Please provide your postal address or email address. See 'Data Protection', below, for how we deal with your personal data.

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We will respond when we can, but please be aware that the Environment Agency office is currently closed during the coronavirus pandemic in line with government guidance.

All Comments received will be logged (excluding personal details).

Data Protection

Providing your contact details is optional. The Environment Agency, or Steering Group partner, will only use the details provided to contact you about your enquiry. Once your enquiry has been responded to, all hard copy enquiry forms will be destroyed.

We will store your details securely and keep your contact details for three months after we have responded in case of any follow-up queries. If you no longer want us to contact you or you would like us to delete your contact details sooner, please let us know at any time by emailing LNenquiries@environment-agency.gov.uk or writing to **Flood Resilience Team, Environment Agency, Ceres House, Searby Road, Lincoln, LN2 4DW**

The Environment Agency is the data controller for the personal data you provide. For further information on how it deals with your personal data please see our Personal Information Charter on gov.uk (search 'Environment Agency personal information charter') or contact us using the details above.