



County Offices  
Newland  
Lincoln  
LN1 1YL

13 May 2022

**Flood and Water Management Scrutiny Committee**

A meeting of the Flood and Water Management Scrutiny Committee will be held on **Monday, 23 May 2022 at 10.00 am in the Council Chamber, County Offices, Newland, Lincoln LN1 1YL** for the transaction of the business set out on the attached Agenda.

Yours sincerely

A handwritten signature in cursive script that reads 'Debbie Barnes'.

Debbie Barnes OBE  
Chief Executive

**Membership of the Flood and Water Management Scrutiny Committee**  
**(11 Members of the Council and 7 Other Voting Members)**

Councillors P A Skinner (Chairman), R P H Reid (Vice-Chairman), P Ashleigh-Morris, T R Ashton, A J Baxter, M Brookes, S Bunney, K J Clarke, A G Hagues, H Spratt and G J Taylor

**Other Voting Members**

District Councillors R Austin BEM (Boston Borough Council), P Vaughan (City of Lincoln Council), Mrs F M Martin MBE (East Lindsey District Council), Mrs L Hagues (North Kesteven District Council), M D Seymour (South Holland District Council), H Crawford (South Kesteven District Council) and I G Fleetwood (West Lindsey District Council)



**FLOOD AND WATER MANAGEMENT SCRUTINY COMMITTEE AGENDA  
MONDAY, 23 MAY 2022**

<b>Item</b>	<b>Title</b>	<b>Pages</b>
<b>1</b>	<b>Apologies for Absence/Replacement Members</b>	
<b>2</b>	<b>Declarations of Members' Interests</b>	
<b>3</b>	<b>Minutes of the previous meeting held on 21 February 2022</b>	5 - 12
<b>4</b>	<b>Announcements by the Chairman, Executive Councillors and Lead Officers</b>	
<b>5</b>	<b>Flood Risk Team Update (including Section 19 investigations)</b> <i>(To receive a report by Matthew Harrison, Flood and Water Manager, which provides an update to the Committee on the recent work of the Flood Risk team including information of the status of all current flood investigations being undertaken in the County)</i>	13 - 18
<b>6</b>	<b>Environment Agency Update</b> <i>(To receive a verbal report by Morgan Wray, Area Flood and Coastal Risk Manager, which updates the Committee on Environment Agency activities in Lincolnshire including progress on key capital schemes)</i>	Verbal Report
<b>7</b>	<b>Anglian Water Update</b> <i>(To receive a verbal update from Jonathan Glerum on Anglian Water's activities in Lincolnshire)</i>	Verbal Report
<b>8</b>	<b>Flood and Water Management Scrutiny Committee Work Programme</b> <i>(To receive a report by Kiara Chatziioannou, Scrutiny Officer, which enables the Committee to comment on the content of its work programme for the coming year)</i>	19 - 22

**ITEMS FOR INFORMATION ONLY**

<b>9</b>	<b>Flood and Coastal Resilience and Innovation Programme - submission of outline business case</b> <i>(To be noted by the Committee for information only)</i>	23 - 98
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**Please note:** for more information about any of the following please contact the Democratic Services Officer responsible for servicing this meeting

- Business of the meeting
- Any special arrangements
- Copies of reports

Contact details set out above.

Please note: This meeting will be broadcast live on the internet and access can be sought by accessing [Agenda for Flood and Water Management Scrutiny Committee on Monday, 23rd May, 2022, 10.00 am \(moderngov.co.uk\)](#)

All papers for council meetings are available on:  
<https://www.lincolnshire.gov.uk/council-business/search-committee-records>



**FLOOD AND WATER MANAGEMENT  
SCRUTINY COMMITTEE  
21 FEBRUARY 2022**

**PRESENT: COUNCILLOR P A SKINNER (CHAIRMAN)**

Councillors P Ashleigh-Morris, T R Ashton, A J Baxter, M Brookes, S Bunney, K J Clarke, A G Hagues and G J Taylor

District Councillors R Austin BEM (Boston Borough Council), P Vaughan (City of Lincoln Council), Mrs F M Martin MBE (East Lindsey District Council), Mrs L Hagues (North Kesteven District Council), H Crawford (South Kesteven District Council) and I G Fleetwood (West Lindsey District Council)

Councillors C Davie and R Reid attended the meeting as observers via Microsoft Teams

External Agencies:- Morgan Wray (Environment Agency) and Andrew McGill (Lindsey Marsh Drainage Board).

Officers in attendance:- Matthew Harrison (Flood Risk Manager), Ryan Davies (Assistant Flood Risk Office), David Hickman (Head of Environment), Kiara Chatziioannou (Scrutiny Officer) and Thomas Crofts (Democratic Services Officer)

External Agencies in attendance via Microsoft Teams:- Jonathan Glerum (Anglian Water

Officers in attendance via Microsoft Teams:- Darrell Redford (Network Resilience Manager) and Graeme Hemsall (Local Resilience Forum – Emergency Planning & Business Continuity)

**24 APOLOGIES FOR ABSENCE/REPLACEMENT MEMBERS**

Apologies for absence were received from Councillors M Seymore (South Holland District Council), R Reid and T Dyer.

**25 DECLARATIONS OF MEMBERS' INTERESTS**

There were no declarations of interest.

**26 MINUTES OF THE PREVIOUS MEETING HELD ON 29 NOVEMBER 2021**

The minutes of the meeting held on 29 November 2021 were approved as a correct record subject to the following amendments:

- Councillor Dyer's title to be corrected.
- The Anglian Water Update to be added.

**27 ANNOUNCEMENTS BY THE CHAIRMAN, EXECUTIVE COUNCILLORS AND LEAD OFFICERS**

Councillor Davie (Executive Councillor for Economic Development, Environment and Planning) announced that Council had recently approved a budget of £1.5 million allocated to flood and drainage works and that the effects of the recent storms were currently being reviewed.

**28 DEVELOPMENT FUND - DRAINAGE INVESTIGATIONS & FLOOD REPAIRS - PROGRESS ON PROGRAMME DELIVERY**

Consideration was given to a report by Matthew Harrison, Flood Risk Manager on the progress with the Development Fund for Drainage Investigations and Flood Repairs. The following was reported:

- The flood repairs budget had successfully delivered programmed schemes.
- A long-term scheme had been programmed to address issues concerning surface water flooding in Kirton. A meeting had been scheduled with the Parish Council and work was scheduled to begin in April 2022.
- Investigations into flooding in Scothern had concluded and works were due to commence.
- In addition to programmed works, £750,000 had been dedicated for flood additional works over the next two years to resolve smaller longstanding drainage issues.

Members considered the report, and the following comments were raised:

- Near misses concerning residential flooding were recorded but were not categorised as Section 19 incidents.
- Flood works at Bardney were under the remit of the Highways budget and did come under the Development Fund.
- Flood works at Cherry Willingham had been delayed as a need for a detailed modelling survey had been identified in order to properly understand the issues before works could commence.
- Flood monitors had been installed in Langworth.

Members discussed that flood works may not be prioritised if they existed under the remit of the Highways budget, and that incidental reporting of residential flooding could be made more robust, as in Section 19 reporting.

Members felt that a breakdown of responsibilities in the event of flooding could be reported to the committee to help all Members better communicate processes to constituents.

RESOLVED:

That the report and comments made be noted.

29 LINCOLNSHIRE HOMEOWNER PROPERTY FLOOD RESILIENCE ASSISTANCE SCHEME  
UPDATE

Consideration was given to a report by Matthew Harrison, Flood Risk Manager on the development and promotion of the Council's pilot approach to enhancing the resilience of properties. The following was reported:

- The trial was based on a similar carried out by Essex County Council and adapted to LCC processes for Lincolnshire. This included a case management system that minimised administrative burdens and aligned processes with the National Property Flood Resilience Code of Practice.
- The new process for property flood resilience was trialled last year – with 10 properties volunteered for the trial.
- Moving forward, it was the Council's ambition to take 35 properties out of the high flood risk category every year by implementing this scheme.
- Take up was currently low with seven properties having signed up. Further methods to promote the scheme were being explored.

During consideration of the report, some of the following comments were raised:

- Common flood prevention controls had been used throughout the trial and had been found to be both effective at lowering the risk of flooding as well as cost effective for these small-scale schemes.
- Wider publicity of the scheme was needed. Officers welcomed Member led promotion in support to their efforts.
- An identified barrier to the scheme's wider uptake was thought to be owners were hesitant to formally identifying their house as being at risk of flooding due to impacts on insurance costs and resale value, especially as flood knowledge did not always change hands when properties were bought and sold.
- Sustainable drainage was ensured in the approval of new schemes and planning developments.
- Assurance was given that applications for solar panel farms in Lincolnshire were being processed through the national infrastructure project and assessed by the strategic planning team.

Members discussed that the provision of a briefing note for all Members would be useful to promote the scheme, and that new developments must prioritise sustainability in terms of current and future flood risk with greater oversight by the Council.

RESOLVED:

That the report and comments made be noted.

**FLOOD AND WATER MANAGEMENT SCRUTINY COMMITTEE  
21 FEBRUARY 2022**

30 LINCOLNSHIRE RIPARIAN PROJECT UPDATE

Consideration was given to a report by Ryan Davies, Assistant Flood Risk Officer on the development of the Council's approach to the network of riparian watercourses. The following was reported:

- The project emerged following widespread flooding experienced in 2019 and explored how existing ways of working could be improved to develop a more robust, coordinated and sustainable approach to managing the risk from riparian assets and watercourses.
- A questionnaire was undertaken with Parish and Town Councils, the responses to which were analysed in the light of national, regional and local experiences. The data informed the development of a joint action plan with a focus on raising awareness of rights and responsibilities and ensuring a consistent approach regarding the management of watercourses.
- Enforcement had been consistently maintained.
- Many of the issues raised concerned watercourse ditches being filled in.
- The draft action plan on watercourse works was to be presented to the Committee later in the year.

During consideration of the report, some of the following comments were raised:

- Greater engagement and education regarding riparian rights and responsibilities were needed to help stop ditches being filled in, as functionality and value of watercourses were not widely understood.
- Greater oversight of developments that replaced dikes and ditches with pipes was needed, as many pipes were not suitable for current and increasing volumes.
- There were substantial limitations in funding to make enforcement more robust. There was an opportunity for the Council to lead on the issue of the importance of riparian and watercourse enforcement and present a plan to central government, as it was a large rural authority with Internal Drainage Boards that had expert knowledge on the matter.
- Section 25 enforcement was only actioned as a last resort – working with people to solve issues proved more efficient in terms of resources.
- Members discussed that the inclusion of enforcement updates in the report would be useful for Members to consider, and that Riparian rights could be included in County News.

RESOLVED:

That the report and comments made be noted.

31 FLOOD RISK TEAM UPDATE (INCLUDING SECTION 19 INVESTIGATIONS)



**FLOOD AND WATER MANAGEMENT SCRUTINY COMMITTEE  
21 FEBRUARY 2022**

Consideration was given to a report by Matthew Harrison, Flood Risk Manager on the recent work of the Flood Risk Team. The following was reported:

- The recent storms had resulted in some light surface water flooding and the reporting of near misses; however, the situation was still developing.
- Newly identified efficiencies were set to sustainably reduce the backlog of works from 2019/20.
- A Section 19 reported in Market Rasen was determined as a near miss upon further inspection.
- The Council continued to work in close partnership with Anglian Water in dealing with flood risk.

Members discussed the report and noted the following comments:

- The Riparian watercourse on Altham Terrace, Lincoln had been blocked and works scheduled to resolve the issue had not yet been completed.
- Reports of near misses were made public, with the exception of some being exempt where personal information was being disclosed. Exempt reports could be redacted so as to be reported publicly.
- Over 200 investigations into reports of near misses emerged from adverse weather in 2019-20. It was noted that this needed to be factored into the pressures put on resources going forward.
- A Section 19 investigation into Waddingham Bank was currently underway.
- A Section 19 investigation into Long Bennington was currently delayed due to complexities concerning ownership.
- Members suggested that a detailed report on near misses would be useful in understanding wider flood risks across the county.

RESOLVED:

That the report and comments made be noted.

32      LOCAL FLOOD INCIDENT MANAGEMENT - DRAFT MEMORANDUM OF UNDERSTANDING BETWEEN LCC AND DISTRICT COUNCILS

Consideration was given to a report by David Hickman, Head of Environment on the draft Memorandum of Understanding (MoU) between local authorities for localised emergency events. The following was reported:

- The MoU was designed to help bolster, describe and clarify the roles of various authorities in an emergency flooding incident.
- The draft MoU had been shared with all relevant partners for comment.

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Members discussed the report and welcomed the MoU giving greater clarity concerning emergency responses and financial responsibility. Members identified some typographical errors and wished to see clarity on responsibilities communicated to the public.

RESOLVED:

That the report and comments made be noted.

33 ENVIRONMENT AGENCY UPDATE

Consideration was given to a report by Morgan Wray, Area Flood and Coastal Risk Manager - Environment Agency (EA) on the EA's recent activities. The following was reported:

- High Spring tides had not caused much disruption; nevertheless, flood alerts had been issued.
- Remaining flood alerts were anticipated to be resolved imminently.
- The Gibraltar Point beach management scheme had proven successful, and completion was anticipated by the end of the financial year.
- Lincolnshire Wildlife Trust's draft Holistic Strategy had been completed and was due to be finalised in the coming year.
- The Wainfleet Action Plan capital programme was being finalised and was to be fully funded.
- The partnership between Lincolnshire County Council, East Lindsey District Council and Lindsey Marsh had successfully rolled out the dredging scheme on the removal of silt on the East Coast with Phase 2 having been finalised and Phase 3 being developed. The scheme sought to enhance water quality and naturally suppress weed growth to improve amenity value and flood protection.
- Boston's flood gates, dock entrance and defences were being improved to reduce flood risk to properties.
- A modelling survey was underway by the Lower Witham Resilience Project to inform a flood resilience action plan.
- Gibraltar Point's flooding strategic outline had been finalised and a business plan was being developed to cost necessary works.
- Aging amenity assets in Sleaford were due refurbishment and replace over the coming years.
- £6.5 million had been established for works to protect approximately 2,000 properties in Lincoln over several sites.

The Chairman extended thanks on behalf of the Committee to the Environment Agency representative for their presentation.

During consideration of the report, some of the following comments were raised:

- The pace of flood defence maintenance needed to be increased to meet the pressures brought about by climate change.

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- Works were needed to repair the slipping footpath along Altham Terrace, Lincoln and Dixon Street.
- The Lower Witham Project was crucial to mitigating flood risk in Lincoln.
- Maintenance of rivers needed attention, especially considering mud and weed build-up in places such as Chapel Hill.
- Members welcomed the opening up of rivers for amenity leisure use, and that the Slea and Witham showed great potential.
- Members also sought clarity on funding for the Lower Witham Project to evaluate whether sufficient resources were allocated.

RESOLVED:

That the report and comments made be noted.

34      ANGLIAN WATER UPDATE

A verbal update was presented by Jonathan Glerum, Regional Flood Risk Manager, Anglian Water (AW) on AW's recent activities. In addition to the discussion of cases/projects under previous items, it was noted that works at Altham Terrace, Lincoln had been delayed by approximately one month due to complexities concerning conditions. The contractors were to continue with cutting down roots and relining the pipe in the coming weeks.

Members considered the report and asked no further questions.

The Chairman extended thanks on behalf of the Committee to the Anglian Water representative for their update.

RESOLVED:

That the report be noted.

35      FLOOD AND WATER MANAGEMENT SCRUTINY COMMITTEE WORK PROGRAMME

Consideration was given to a report from Kiara Chatziioannou, Scrutiny Officer, which invited the Committee to consider and comment on the content of its Work Programme.

During consideration of the report, some of the following comments were raised:

- Members requested a future update on the progress of relevant partner Working Groups.
- It was requested that a breakdown of responsibilities in the event of a flood emergency was provided to Members.
- Members requested a report on flooding near misses across the county in the future.
- Information was sought in relation to funding for the Lower Witham Project.

**8**

**FLOOD AND WATER MANAGEMENT SCRUTINY COMMITTEE  
21 FEBRUARY 2022**

The Scrutiny Officer provided assurance that these topics would be taken under consideration for adding on to the Work Programme for 2022-2023.

RESOLVED:

That the Work Programme be approved, subject to the inclusion of future agenda items highlighted above.

The meeting closed at 12.31 pm

**Open Report on behalf of Andy Gutherson, Executive Director – Place**

Report to:	<b>Flood &amp; Water Management Scrutiny Committee</b>
Date:	<b>23 May 2022</b>
Subject:	<b>Flood Risk Team update (including Section 19 investigations)</b>

**Summary:**

To provide an update to Committee on the recent work of the Flood Risk team including informing the Committee of the status of all current flood investigations being undertaken in the County.

**Actions Required:**

Members are asked:

1. To view the current list of completed and active flood investigations online at <https://www.lincolnshire.gov.uk/flood-risk-management/flood-investigations>
2. Inform Democratic Services in advance if they wish to raise any particular sites at the forthcoming Committee meeting.
3. To note and comment as required on updates provided on the work of the Flood Risk Team.

## **1. Background**

A standing item to inform the Committee on the position of all current Section 19 investigations in the County has been in place for some time. Whilst this report will still highlight the status of such investigations in the county, the opportunity is also being taken to update the committee on recent work and initiatives for which the Flood Risk Team are involved. This will hopefully provide members of the Committee with a much broader understanding on some of the recent work that has been undertaken in the County.

## Investigations under Section 19 of the Flood and Water Management Act 2010

The Committee will be aware that all such investigations are published on the County Council's website by means of an interactive map, whether the investigation is completed, actively under investigation or awaiting works to mitigate future flooding.

It is a duty under Section 19, Flood & Water Management Act 2010 (F&WMA) for the Lead Local Flood Authority (LLFA) to carry out investigations to identify which Risk Management Authorities (RMAs) have a flood risk management function in connection with the flood and whether they have exercised, or intend to exercise, that function in response to the flood. To assist with this, Lincolnshire County Council as the LLFA makes recommendations for proportionate works to manage future flood risk, to be delivered by individual RMAs or in partnership as considered appropriate or expedient. Such recommendations are also published although this is over and above the requirements of the F&WMA; all recommendations for mitigation works and the RMA leading those works are available to view on the interactive mapping. If Members have any site-specific questions, they are requested to contact the Flood and Water Manager in advance of the meeting.

As previously reported to members of this committee, the workload generated by significant and widespread flooding in 2019 and 2020 has proved challenging. It is pleasing to report however that the review of the Section 19 process has now been implemented resulting in a more streamlined approach. This has resulted in a quicker turnaround of not only the current incomplete investigations as part of the existing backlog but also new investigations which have emerged, whilst still maintaining the high quality of investigation and report content. This will process will be kept under constant review.

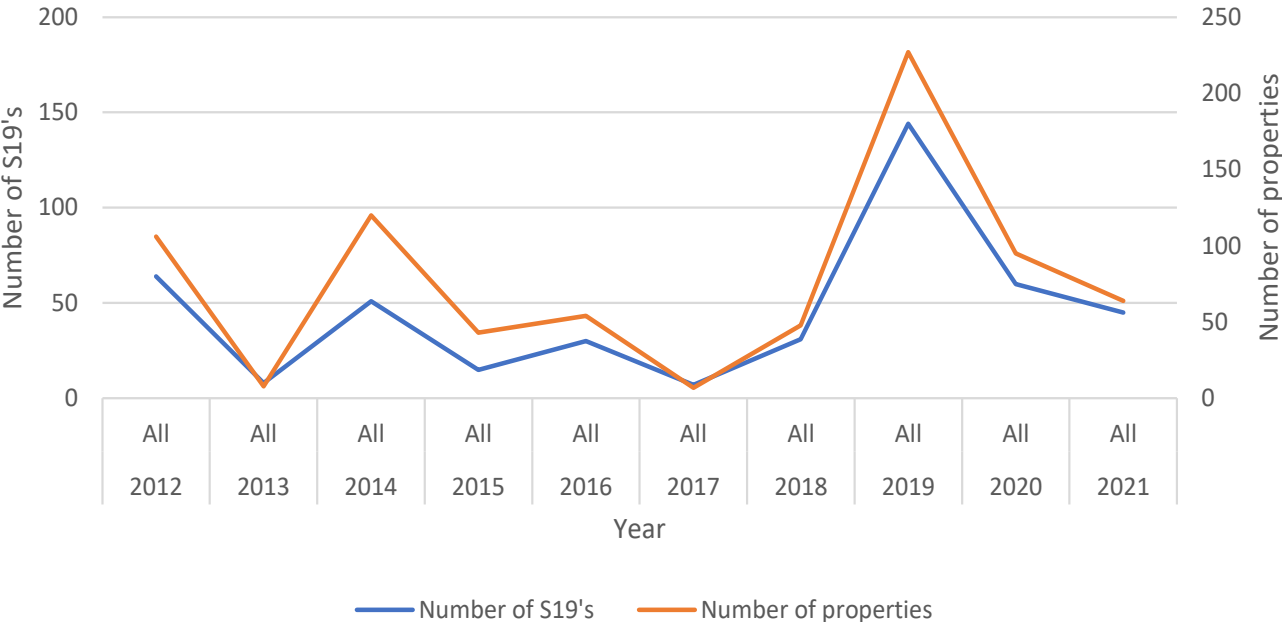
With regards to new flood investigations started in Quarter 4 of 2021/22 (January to March), there were 3 S.19 investigations started affecting 2 residential and 8 commercial properties. This compares with 2 investigation reports during the same period last year.

The current status of S.19 reports is shown in Table 1 below:

Number of Reports On-going	180 (22.42% reduction since last reported in February 2022)
Number of Completed Investigations with Outstanding Works	79 (79.54% increase since last reported in February 2022 due to the significant number of reports that have recently been signed off).
Number of Reports commissioned in April 2022	1
Number of Reports Commissioned in Q4 (2021 /2022)	3 (at the time of writing)
Number of Reports Commissioned in Q4 (2020 / 2021)	2
Number of Reports Circulated to RMAs for Endorsement	11
Reports Awaiting Sign-off	10

Table 1: Current status of S.19 investigations (as at 6/5/2022)

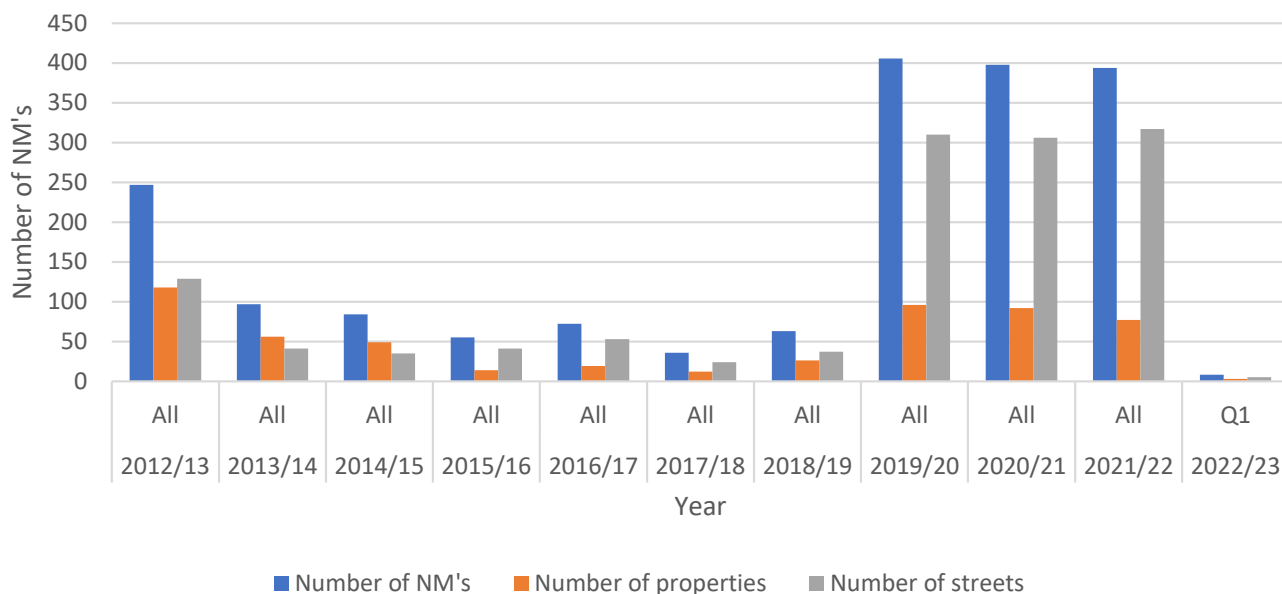
The total annual number of S.19 investigations and properties affected between 2012 and 2021 can be seen in table 2 below.



**Table 2: Annual totals of Number of S.19 Investigations and properties affected**

In addition to the above data, a piece of work has recently been completed by the floods team to collate data for the number of near miss reports received. A near miss report can be identified in a number of ways such as via a S.19 investigation where it is determined that internal flooding did not occur, but outbuildings or gardens were affected, or where instances of flooding are reported directly to the County Council to either the Flood Risk Team or Highways colleagues via members of the public, elected members or partner organisations. The collation of the near miss data can help inform decision making for future programmes of works by taking a proactive, rather than reactive approach to addressing flood risk and drainage issues.

A summary of the number of near miss data collated to date is summarised in table 3 below.



**Table 3: Summary of near miss data collated between 2012 and 2021**

### Water Situation Report update

The water situation report update for March 2022 (most recent data) in the Lincolnshire & Northamptonshire catchments showed that total rainfall, soil moisture deficit, river flows and groundwater levels were all noted at normal levels. Rainfall varied between 72-85% of the long-term average for the time of year (92-98% over the last 12 months) with the whole area receiving 39mm of rainfall during March, with 50% of this rainfall falling on one day – 16th March. Most days in March recorded 0mm of rainfall. Following the normal levels of rainfall recorded in March, river flows remained stable, with most sites being at similar levels to what they were in February 2022.

### An update on the Greater Lincolnshire Riparian Project

As previously reported to this committee the Joint Lincolnshire Flood Risk and Water Management Partnership has been exploring how existing ways of working can be improved, to implement a more robust, co-ordinated, and sustainable approach to reducing the risk of flooding from riparian assets and watercourses.

Following support for the continued development and implementation of the Joint Action Plan the Lincolnshire Riparian Working Group has commenced implementation on a number of measures, the following of which are on-going:

- Awareness-raising of rights and responsibilities among riparian landowners – in conjunction with national communication campaigns
- Developing a more consistent and visible approach for consenting and enforcement activities on watercourses across Greater Lincolnshire
- The strengthening of the existing first point of contact principle, and its extension across Greater Lincolnshire



- Strengthening the partnership across Greater Lincolnshire by actively developing and upskilling staff, reviewing existing arrangements and promoting the good work undertaken by the partnership
- Establishing a register of organisations able to undertake rapid, small-scale maintenance work
- The establishing of principles for the reasonable inspection of partner assets during site visits
- Consider the creation of byelaws in specific locations where proportionate and appropriate
- The identification and digitisation of localised riparian assets within high consequence flood risk areas

In addition, the measure identified to refine and expand on responses to conveyancing enquiries has now been implemented following agreed wording to be incorporated as part of standing advice to question 21 of conveyancing enquiries.

Unfortunately, the refresh of the Environment Agency's 'Living on the Edge' document has been delayed; nevertheless, measures have been implemented to ensure that the activities outlined within the communications and engagement log can progress.

### **An update on the Greater Lincolnshire Groundwater Project**

As previously reported to this committee this project is being taken forward following a successful bid into the national Flood and Coastal Resilience Innovation (FCRI) programme whereby confirmation has been received that capital funding to the value of £7,551,000 will be available over the six-year period of the project timeframe (1 April 2021 to 31 March 2027).

The FCRI Programme provides the opportunity to develop understanding of a broad range of groundwater risks and opportunities across multiple LLFA areas, leading to a range of practical actions delivered in partnership over the next six years. It is intended that these actions should incorporate multiple benefits, such that environmental and social resilience is built into the approaches developed.

All projects have to complete an Outline Business Case (OBC) for assurance and approval by the Environment Agency's national project assurance groups. Led by officers at Lincolnshire County Council, and supported by other partners and stakeholders, the OBC for this project has been developed over recent months to meet the submission deadline of end of April 2022. It is pleasing to report that the OBC and supporting appendices were submitted to the national team for review on 28<sup>th</sup> April and therefore marking a significant milestone in the early stages of this project.

Subject to assessment and approval this will allow drawdown of the remaining allocated funds to support the continued development and delivery of the Greater Lincolnshire Groundwater Project for which the partnership will then be committed to delivering on the objectives set out for this project.

## **2. Conclusion**

Despite the continued pressure on resources as a result of the above-average number of flood investigations being initiated, good progress continues to be made in managing the backlog of investigations while maintaining quality. This process will remain under constant review to ensure maximum efficiency when producing an appropriate, reasonable, and proportionate report. The Flood Risk Team will continue to build on the excellent working relationships it has with other Lincolnshire Risk Management Authorities to deliver partnership projects for the benefit of residents and communities across the county. Further updates will be presented to future meetings of this committee.

## **3. Consultation**

### **a) Risks and Impact Analysis**

N/A

## **4. Background Papers**

No background papers within Section 100D of the Local Government Act 1972 were used in the preparation of this report.

This report was written by Matthew Harrison, Flood and Water Manager, who can be contacted on 07771 837565 or [matthew.harrison@lincolnshire.gov.uk](mailto:matthew.harrison@lincolnshire.gov.uk).

**Open Report on behalf of Andrew Crookham, Executive Director - Resources**

Report to:	<b>Flood and Water Management Scrutiny Committee</b>
Date:	<b>23 May 2022</b>
Subject:	<b>Flood and Water Management Scrutiny Committee Work Programme</b>

**Summary:**

This item enables the Committee to consider and comment on the content of its work programme to ensure that scrutiny activity is focused where it can be of greatest benefit. Members are encouraged to highlight items that could be included for consideration in the work programme.

The work programme will be reviewed at each meeting of the Committee to ensure that its contents are still relevant and will add value to the work of the Council and its partners.

**Actions Required:**

The Committee is invited to: -

- (1) review, consider and comment on the work programme; and,
- (2) highlight for discussion any additional scrutiny activity which could be included for consideration in the work programme; and note the terms of reference of the Flood and Water Management Scrutiny Committee, as agreed by the County Council.

**1. Background**

Overview and Scrutiny should be positive, constructive, independent, fair, and open. The scrutiny process should be challenging, as its aim is to identify areas for improvement. Scrutiny activity should be targeted, focused and timely and include issues of corporate and local importance, where scrutiny activity can influence and add value.

Overview and scrutiny committees should not, as a rule, involve themselves in relatively minor matters or individual cases, particularly where there are other processes, which can handle these issues more effectively.

All members of overview and scrutiny committees are encouraged to bring forward important items of community interest to the committee whilst recognising that not all items will be taken up depending on available resource.

## 2. Work Programme

23 MAY 2022	
Item	Contributor
1. Floods Team Update (inc. S19 Investigations)	Matthew Harrison, Flood Risk Manager
2. Environment Agency Update	Morgan Wray, Area Flood and Coastal Risk Manager, Environment Agency
3. Anglian Water Update	Jonathan Glerum, Anglian Water
INFORMATION ONLY ITEM	
4. <i>Flood and Coastal Resilience and Innovation Programme - submission of outline business case</i>	<i>David Hickman, Head of Environment Matthew Harrison, Flood Risk Manager</i>

19 SEPTEMBER 2022	
Item	Contributor
1. Floods Team Update (inc. S19 Investigations)	Matthew Harrison, Flood Risk Manager
2. Environment Agency Update	Morgan Wray, Area Flood and Coastal Risk Manager, Environment Agency
3. Anglian Water Update	Jonathan Glerum, Anglian Water

21 NOVEMBER 2022	
Item	Contributor
4. Floods Team Update (inc. S19 Investigations)	Matthew Harrison, Flood Risk Manager
5. Environment Agency Update	Morgan Wray, Area Flood and Coastal Risk Manager, Environment Agency
6. Anglian Water Update	Jonathan Glerum, Anglian Water

## 3. Items to be Considered/Programmed

- Natural Flood Management
- South Lincolnshire Waste Partnership Progress Update - Water Resources East

- Digby Flood Alleviation Scheme – Report on outcomes from the completion of the scheme
- Coastal Adaptation Strategy

#### **4. Conclusion**

Members of the Committee are invited to review, consider and comment on the work programme and highlight for discussion any additional scrutiny activity which could be included for consideration in the work programme.

Consideration should be given to the items included in the work programme as well as any 'items to be programmed' that may be listed.

#### **5. Consultation**

##### **a) Risks and Impact Analysis**

Not Applicable

#### **6. Background Papers**

No background papers within Section 100D of the Local Government Act 1972 were used in the preparation of this report.

This report was written by Kiara Chatziioannou, Scrutiny Officer, who can be contacted on 07500 571868 or by e-mail at [kiara.chatziioannou@lincolnshire.gov.uk](mailto:kiara.chatziioannou@lincolnshire.gov.uk).

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## **Outline Business Case Template for the Flood and Coastal Resilience Innovation Programme**



This document provides a template for Outline Business Case submissions for the flood and coastal resilience innovation programme. Authors and Assurers should read this document in conjunction with the “Flood and coastal resilience innovation programme - Outline Business Case Guidance (May 2021)”.

The structure and content of this document are intended to support the application process, alignment of submission with the objectives of the programme, and to set individual projects-up for success during the investment period 2021-2027, and beyond.

### **The flood and coastal resilience innovation programme objectives are:**

- To encourage and enable local authorities, businesses and communities to test and demonstrate innovative practical actions within their areas.
- To improve the resilience of 25 areas to flooding and coastal change, reducing the costs of future damage and disruption from flooding and coastal erosion.
- To improve evidence on the costs and benefits of the innovative actions and demonstrating how different actions work together across geographical areas, and

### **To build, through practical experience and implementation, new evidence and learning developed to inform future approaches to, and investments in, flood and coastal erosion risk management (post 2027).**

### **Submissions are required to meet the following Five Principles:**

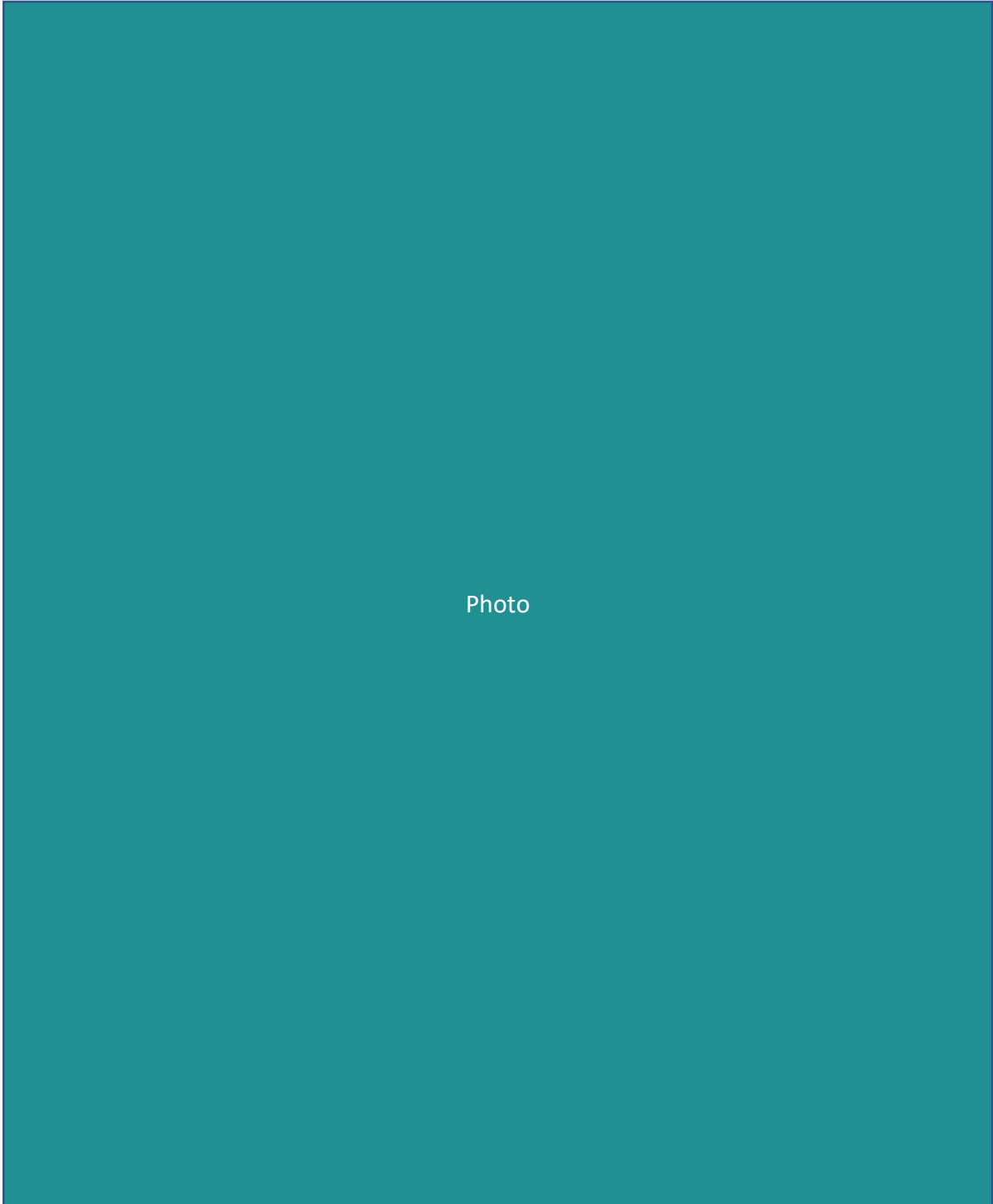
1. Deliver practical changes which increase the resilience within the project area by reducing the likelihood or consequences of flooding or coastal erosion.
2. Deliver benefits to people and their communities
3. Be consistent with existing flood and coastal erosion plans (in particular, local flood risk management strategies, flood risk management plans, catchment flood management plans and shoreline management plans).
4. Demonstrate added value by complementing and going beyond other local resilience work programmes and other funding mechanisms (for example, the Environmental Land Management scheme, flood recovery schemes, Nature for Climate Fund, the DfE’s Flood Resilient Schools work).
5. Demonstrate innovation (in particular by trialing new combinations of resilience actions, filling evidence gaps on costs and benefits, broadening the range of resilience actions, and through innovative approaches to increase the uptake and delivery of resilience actions).

Greater Lincolnshire groundwater Project

## Outline Business Case

Lincolnshire County Council

[date]



Photo



## Issue and revision record

Revision	Date of Issue	Originator	Checker	Approver	Description

## Comment sheet

Changes from EoI Submission to OBC

## Summary of Submission

Project name: **Greater Lincolnshire Groundwater Project**

Project short name: GLGP

Project reference: LIN011

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Total Project Value: **£8,001,000**

OBC Submission Value for Approval: **£7,551,000**

Public Contributions (£): **£0**

Private Contributions (£): **£450,000**

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Primary Source of Risk: **Groundwater Flooding**

Secondary Sources of Risk:

---

Milestone Full Business Case Approval **[Insert date]**

Milestone – Readiness for service **[Insert date]**

Project completion **31/03/2027**

---

Across the Greater Lincolnshire area there is a record of groundwater causing flooding of property, assets, impacts on the highway network and 'near misses' requiring remedial works on an ad hoc basis.

The Greater Lincolnshire Groundwater Project (GLGP) is an Innovative Partnership approach to better understanding and managing groundwater flood risk and resources. The project will initially focus on 3 trial sites across the region with the intention that the delivery of the project outcomes could be implemented on a wider scale. The emphasis of the project is on integrating with wider issues around environmental land management; health and wellbeing; water as a resource; the creation of new biodiverse environments; creating resilient people and places; and sustainable water level management.

Lincolnshire County Council is leading the delivery of outcomes for this project and is supported by a consortium of partner stakeholders.

Short description of the benefits

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The GLGP aims to achieve the following benefits:

- A wider awareness of the resilience measures available to risk management authorities
- Improved knowledge and understanding of current and future groundwater flooding and resource across Greater Lincolnshire

- In coordination with RMAs, ensure communities have the knowledge to increase their resilience to groundwater flooding
- Reduce flood damage within the identified trial sites
- Identified opportunities across Greater Lincolnshire to sustainably manage flood risk from groundwater
- Provide evidence base on impact and effectiveness of measures

The lessons learnt, and successful practices implemented in the place-based delivery of the project will help inform future approaches and develop a potential pipeline of future groundwater related projects.

---

Lead Authority

**Lincolnshire County Council**

Delivery Partners

**Anglian Water, Blow Wells Working Group, East Lindsey District Council, North Kesteven District Council, Environment Agency, East Lincolnshire Countryside Wolds Service, Humber Local Resilience Forum, Lincolnshire Chalk Streams Project, Lincolnshire Chalk Streams Trust, Lincolnshire County Council, Lincolnshire Local Resilience Forum, Lincolnshire Rivers Trust, Lincolnshire Wildlife Trust, Lincolnshire Wolds Countryside Service, National Flood Forum, Natural England – Catchment Sensitive Farming, Humber Nature Partnership, Greater Lincolnshire Nature Partnership, Lincolnshire Environmental Record Centre, North East Lincolnshire Council, North Lincolnshire Council, University of Lincoln, Water Resources East, Witham 3rd Internal Drainage Board, Lindsey Marsh Drainage Board**

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Project Risk (£)<sup>1</sup>

[Insert (£)]

[Insert (%)]

Optimism Bias value (£)

[Insert (£)]

[Insert (%)]

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<sup>1</sup> These risks relate to the scope of work being funded by the flood and coastal resilience programme if this is different to the whole project.

**Expenditure Profile:**

Costs per year (£k)	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	Total (£k)
Flood and Coastal Resilience Innovation Programme Funding	370	1238	1266	2010	2025	641	7551
Contributions	23	135	113	90	68	23	450
Total Project Expenditure	393	1373	1378	2100	2093	664	8001

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Project Manager:

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*(interim while recruitment for a fulltime Project Manager takes place)*  
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## Required appendices

2A	Communications and engagement plan
2B	Environment report
2C	Detailed description of the investment proposals and sub-projects
3A	Description of investment optimisation
3B	Details of costs and benefits
3C	Investment and innovation risk register
4A	Procurement strategy
5A	Detailed expenditure profile
5B	Contributions
6A	Partnership agreements and governance structure
6B	Project management and Quality Plan (include SHEW plan)
6C	Routemap and programme
6D	Innovation and learning: Detailed plans for monitoring, evaluation and dissemination

## 1 Executive Summary

### 1.1 Strategic Case

Summarise the Strategic Case for change, the alignment with the Resilience Innovation Programme and the objectives of the investment.

Across Greater Lincolnshire there is a record of groundwater causing flooding of property, assets, impacts on the highway network and 'near misses' requiring remedial work on an ad hoc basis. Nationally it is the least well understood source of flooding and LLFAs throughout England do not have the capacity to fully evaluate and understand the extent of the risks, to prioritise them in relation to fluvial or surface water flood risk, or to undertake works to manage them.

There is a need to gain a greater understanding of how widespread the groundwater issues are. Numerous homes in Grimsby alone are known to be at significant risk of flooding and there is a recent history of groundwater-related flooding across parts of Lincolnshire, but the true extent and inter-dependencies need to be better understood.

The Innovation Programme provides the opportunity to develop a greater understanding of a broad range of groundwater risks and opportunities across multiple Lead Local Flood Authorities, across Greater Lincolnshire, leading to a range of practical actions delivered through the project at trial sites. It is intended that these actions should incorporate multiple benefits, such that environmental and social resilience is a key factor to be built into the approaches developed.

The project will build on our current knowledge to understand how the predicted impacts of climate change on temperature, rainfall and sea level will have an impact on the groundwater levels of the Lincolnshire Northern Chalk and Lincolnshire Limestone catchments.

The key sequential elements to the project will be:

1. The Conducting of academic research into the risk of salinisation of groundwater flooding in the Lincolnshire Fens and undertaking of a gap analysis and subsequent revision, including output validation, of the Lincolnshire Chalk and Spilsby Sandstone and Lincolnshire Limestone groundwater models. During this process initial community engagement will be undertaken within the potential trial sites of Barton and Barrow-upon-Humber, Grimsby and Scopwick, which have been preliminary selected based on observed flooding across Greater Lincolnshire.
2. Based on the outputs of the revised models, 3 trial sites (and potential future sites) will be confirmed.
3. The development and assessment of proportionate place-based measures within the confirmed trial sites. Throughout this process local communities shall be empowered and actively encouraged to take part in the development of measures, whilst simultaneously having regard to model outputs.
4. The implementation and delivery of packages of work in collaboration with stakeholders, including local communities, within the trial sites as identified through the assessment work, specifically suited to managing groundwater both in terms of flood risk and as a resource.

5. Throughout the development and implementation of the project, progress will be monitored, lessons shall be identified, shared and implemented and performance evaluated all of which shall contribute to, in addition to the above, the development of potential pipeline groundwater related projects.

## 1.2 Economic case

Summarise the Economic Case and the Critical Success Factors.

The GLGP provides the opportunity to develop an understanding of a broad range of groundwater risks and opportunities, leading to a range of practical actions delivered by the Partnership. 3 trial sites will be identified following a review of current groundwater models and gap analysis, but could include Scopwick in Lincolnshire, Grimsby in North East Lincolnshire and Barton and Barrow Upon Humber in North Lincolnshire, selected based on observed records and experiences of groundwater flooding. Business as Usual, regarding groundwater flooding across these sites is limited to remedial works taking place on an ad hoc basis. All three sites have a history of groundwater flooding and have initially been selected due to observed records and experiences of groundwater flooding.

GLGP will deliver against the following Critical Success Factors:

- Ensure learning and feedback is embedded during every aspect of the project
- Understanding current and future groundwater flooding and resource across Greater Lincolnshire
- Improved community resilience to groundwater flood risk withing identified trial sites
- Identify flood risk management techniques that are sustainable, transferable, and affordable

The GLGP requires £7551k from the Flood & Coastal Resilience Innovation Programme.

## 1.3 Commercial case

Summarise the Commercial Case including approach to procurement.

A system of procurement (based on LCCS contract and procurement procedure rules, and in agreement with our project partners) has been established, providing a consistent approach across delivery partners. The method for tendering and scoring for outsourced work will enable value for money and improve cost estimates for similar work as the project progresses.

Existing frameworks will be used where applicable and new contracts will use a Lincolnshire Council Standard Contract. Direct awards will typically only be used when a service or product is provided by a unique supplier with no competitors and the value is below £25k. However, value for money will be demonstrated through the financial benefit of having a supplier in place faster.



It is anticipated all tendering/quotation exercises will be assessed against both price and quality factors, with the importance of each factor determined on a project-by-project basis to help achieve the best commercial outcomes. The balance of quality and price will always aim to drive value for money, ensure quality and achieve innovation and improvement where possible which will be achieved via a bespoke/tailored approach to each project within the programme.

#### 1.4 Financial case

Summarise the Financial Case including funding sources/key contributions.

The project requires £7,551K cash through the Flood and Coastal Resilience Innovation Programme. Without FCRIP funding no additional works could take place and BAU in the 3 trial sites and wider Greater Lincolnshire area would remain.

In-kind contributions amount to £450K through partners time and resource. To date partners have provided officer time and specialist advice to develop the Expression of Interest and Outline Business Case and it is expected that this will continue to some degree throughout the project. Furthermore, volunteers will be sought to take part in certain activities, such as 'citizen scientists' assisting with the monitoring of actions on the ground. It is expected that all delivery aspects of the project will be undertaken through paid contracts with suppliers.

The assessment of costs is drawn from recent experience of project partners gained through the implementation of strands of similar work related to flood risk and environmental management projects across Greater Lincolnshire. The table below shows the yearly cost breakdown.

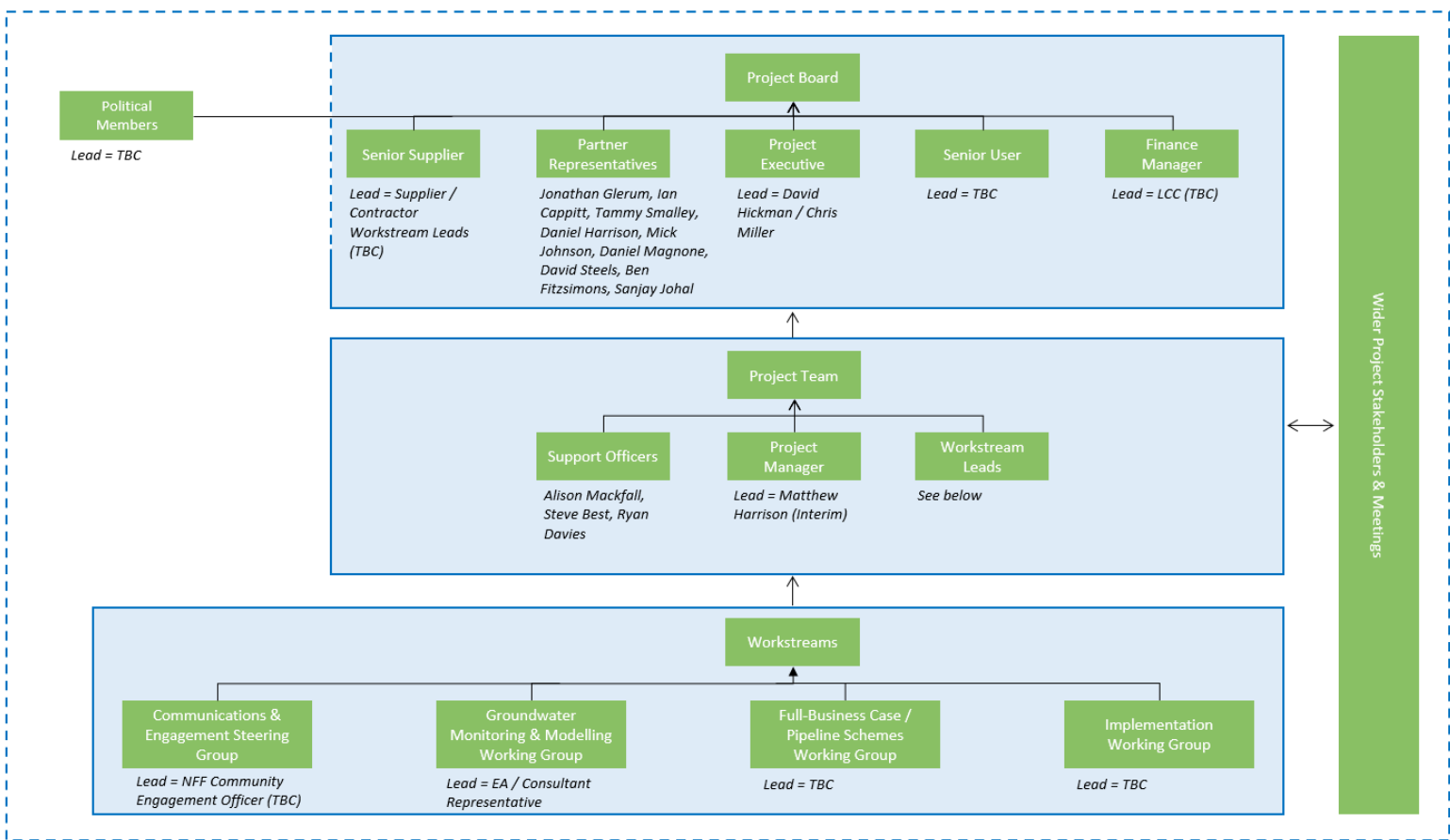
Costs per year (£K)	Year 1 (£K)	Year 2 (£K)	Year 3 (£K)	Year 4 (£K)	Year 5 (£K)	Year 6 (£K)	TOTAL (£K)
FBC development costs	61						
Construction, supervision and delivery costs	0						
Monitoring, learning, evaluation and dissemination	0						
Risk contingency							
<b>TOTAL</b>							

### 1.5 Management case

Summarise the Management Case including governance arrangements.

As the lead organisation, Lincolnshire County Council (LCC) has extensive experience of delivering projects of a similar scope and scale. Together they demonstrate a successful history of schemes that have been delivered on time, to budget and substantially align with the objectives of the GLGP.

The GLGP partners provide further experience, expertise and capacity in supporting and developing the project. The delivery of work packages will be undertaken by suppliers via contract agreements. The governance structure and terms of reference have been agreed by all partners.



The Project Board will be made up of relevant political members from Lincolnshire, North East Lincolnshire and North Lincolnshire, representatives from key partners, the project executive, the senior user, the senior supplier and an LCC Strategic Finance Manager. Over and above core membership, specialist or expert advisors can be brought into meetings as and when required. The Project Board provide strategic and policy direction to the Project Team and are responsible for scrutinising delivery of the project.

At an operational level, the Project Manager and Project Team are responsible for the on the ground delivery of the project and report to the Project Board. The Project Team will be made up of workstream leads, the Project Manager and project support officers.

Anticipated risks have been identified by the Partnership, along with mitigations based on expertise and experience from previous project learning. The risk register will be reviewed as standard in Project Board meetings. The main risks identified by the partnership include:

- Capacity and resources of partners and contractors throughout the 6 years.
- Slippage in programme due to constraints on partner and supplier resources or the exploratory nature of delivery takes longer than anticipated
- Lack of willingness or interest of stakeholders and communities to engage in the project

Learnings on costs and benefits will be gathered through monitoring by workstream leads. The Project Team will oversee the lessons learnt and change log and learnings will be reported back to the EA and to the wider programme.

Dissemination of monitoring and evaluation during and post project will be by way of:

- Social media/website
- Webinars/conferences/briefings
- Reports
- Newsletters/ published articles
- Events
- Case Studies
- LLFA political processes and relevant scrutiny committees

## 1.6 Recommendations

A clear statement of the recommendation(s) for approval.

We recommend that endorsement be provided for the continued development of the GLGP up to Full-Business Case, which shall identify preferred options to enhance the resiliency of proposed trial sites to groundwater, including the £7,551k from the Flood & Coastal Resilience Innovation Programme.

(Letters of approval from key partners, submitted with the Expression of Interest, remain unchanged, and all GLGP partners and LCC Executive have signed off the OBC prior to submission).

## 2 Strategic Case

### 2.1 Strategic context

Describe the strategic case in relation to the flood and coastal resilience innovation programme, and the regional and local context for the investment.

- How does this investment align with the national ambitions of the Programme and associated policies and plans?
- How does this investment align with regional and local plans and ambitions?

*(See Guidance Document Aspect 1)*

The new government policy statement on flooding and coastal erosion, published on 14 July 2020, sets out the government's long-term ambition to create a nation more resilient to future flood and coastal erosion risk. The press release included information about the £200m flood and coastal resilience innovation programme. Alongside the policy statement, the Environment Agency published its new National Flood and Coastal Erosion Risk Management Strategy for England, which is also focussed on improving overall resilience and provides a framework to guide the activities of those involved in flood and coastal erosion risk management.

This new flood and coastal resilience innovation programme will make a significant contribution to the implementation of this wider resilience approach.

The risks from flooding and coastal change are recognised in the UK Climate Change Risk Assessment and the National Risk Register. This flood and coastal resilience innovation programme will contribute towards delivery of the Government's 25 Year Environment Plan and Single Departmental Plan outcome 3) for floods and water: reduced risk of flooding.

Groundwater has played an important part in the physical and social shaping of Greater Lincolnshire. For centuries, it has emerged from springs, provided baseflow for chalk steams and blow wells, and been a source of drinking water, it is also a source of flooding, with the duty to manage the risk resting with the LLFA.

Across Greater Lincolnshire there is a record of groundwater causing flooding of property (S.19 investigations), assets (Water & Sewer Company sewer flooding and operational records), impacts on the highway network and 'near misses' requiring remedial works.

Currently, actions that improve the resilience to flood risk from groundwater that are eligible for Flood Defence Grant in Aid (FDGiA) or Local Levy a strategic approach is taken but focussed on each individual project.

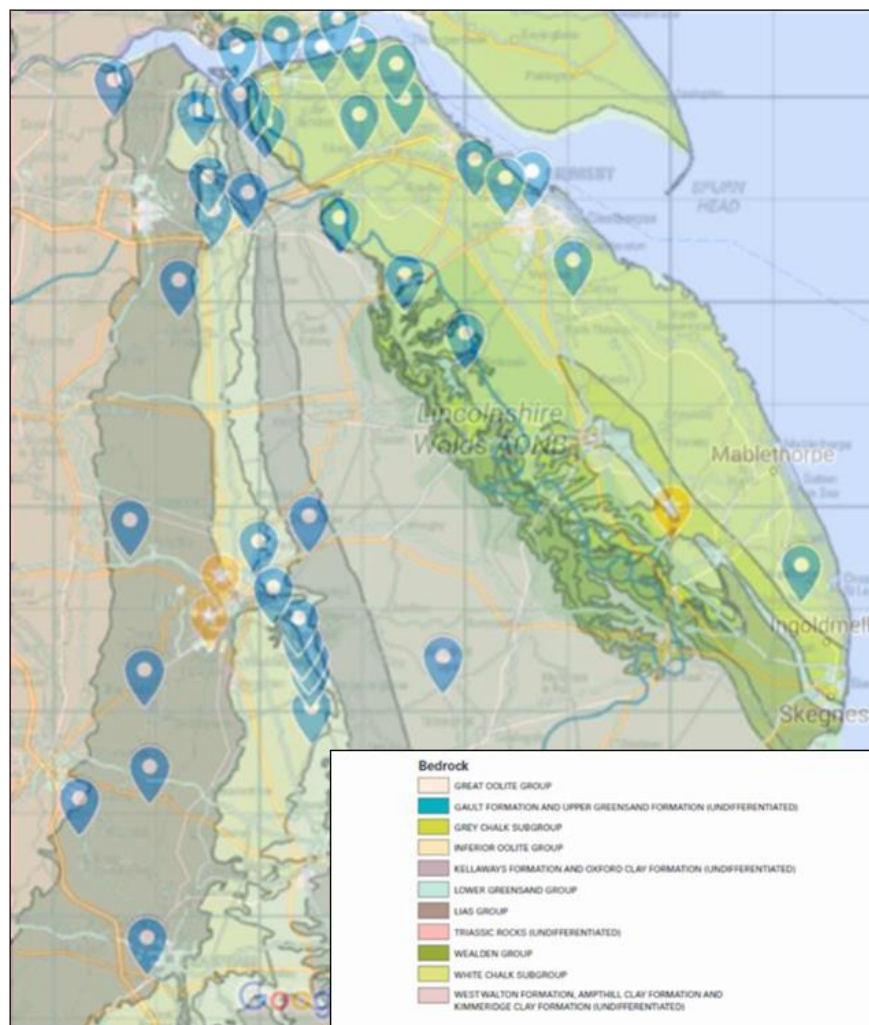
The GLGP will investigate groundwater and what management practices are required not just in flood risk management terms, but also water resources to mitigate against droughts, improve the environment and create communities resilient to multiple risks. The various practical actions, aggregated and singly, will deliver towards the goals within HM Government's 25 Year Environment Plan (2018) and the National Flood and Coastal Erosion Risk Management Strategy.

By identifying and delivering packages of work at trial sites across Greater Lincolnshire, its learning outcomes will provide the evidence base for future capital schemes to mitigate groundwater flood risk. The project will build on the foundations of other initiatives including the EA's Priority Catchment Pilots and the Catchment Based Approach (CaBA).

GLGP may well address the FCRIIP key policy challenges, particularly challenge 1 and 3 as the project progresses and packages of work are established. At this stage it would be too early to confirm further details.

Across the county, local planning authorities are at varying stages of production of their local plans, and some have come together to produce joint local development frameworks, for example Central Lincolnshire and South-East Lincolnshire.

The programme will also help fulfil the National Strategy ambitions across Greater Lincolnshire to create climate resilient places, that today's growth and infrastructure is resilient in tomorrow's climate and that this is a region ready to respond and adapt to flooding.



Locations of high groundwater levels across Greater Lincolnshire during the winters of 2019/20 and 2020/21 overlaying a BGS geology map showing the chalk/limestone features of Greater Lincolnshire

## 2.2 Environment and other considerations

Define any place specific environmental legal obligations, issues and opportunities.

- What is the regional/local environmental context for this investment?
- What key environmental requirements will this investment need to meet?
- What are the key environmental opportunities related to this investment?

The project area is the Lincolnshire Chalk and Spilsby Sandstone and Lincolnshire Limestone in the 3 Lead Local Flood Authority areas show below. Numerous national and locally designated sites may lie at risk of groundwater flooding, for instance, the Lincolnshire Fens is likely susceptible to salinisation from groundwater flooding. In addition to this a Local Planning Authority conservation area exists within Scopwick.

A very important habitat we have in Lincolnshire is the unique blow wells. They are a type of groundwater artesian spring found only in the coastal margins of Lincolnshire which have the designation status of Local Geological Site'. Between Louth and Barton upon Humber, there are around 37 known blow wells, including Tetney Blow Wells, which has been designated as a site of Special Scientific Interest.

We currently have very little information on the full impacts on blow well habitats from abstraction activities. Demand for water in the 1960's reduced groundwater pressure in the chalk aquifer resulting in low or no flow from blow wells. Even though demand for groundwater abstraction has lessened in recent years it is still a key factor impacting on the health of blow wells and chalk steams. The importance of blow wells in the social/cultural, historical and ecological development of Lincolnshire should not be underestimated.

The project will align with / have due regard to the following environmental requirements and strategies:

The Environment Act 2021

The Local Planning Authority conservation area within Scopwick

**The Greater Lincolnshire LEP's Water for Growth - Water Management Plan (2015-2040)** considers the effective management of flood risk and water resources to be a critical factor in enabling future economic growth across the area. The GLGP will align with the LEP's Plan, which seeks to develop Greater Lincolnshire as a national exemplar for water management, in both flood reduction and water supply, and to act as an incentive for investors in the LEP's priority sectors. Water for Growth recognises the significant challenges facing the area from both the risk of flooding and the future availability of water for residential, commercial and natural uses.

The Lincolnshire Wolds Area of Outstanding Natural Beauty (AONB) Management Plan - 2018-23, recognises the importance of the water resource to this nationally protected landscape, and highlights the need to protect and enhance the function and natural environment of the river and stream catchments, their landscape character and wetland habitats. Policies RSP1 - RSP7 provides the AONB Partnership's (the Lincolnshire Wolds Joint

Advisory Committee – JAC) strategic commitment to this area of work, with specific actions RSPA1 - 18 in the Management Plan aligning with elements of the GLGP.

Anglian Water's Strategic Direction Statement sets out a vision for the future, looking ahead to 2045. Outlined within this document are the long-term challenges faced across the east of England, and the outcomes agreed for customers and the environment. This includes four long term ambitions:

1. Making the east of England resilient to the risks of drought and flooding
2. Enabling sustainable growth
3. Becoming carbon neutral by 2030
4. Working with others to achieve significant improvement in ecological quality

Heritage assets within areas at risk of groundwater flooding.

The Environment Agency aims to become a net zero carbon organisation by 2030, with net zero targets also made by the RMAs. Lincolnshire County Council are working together with other public sector partners, including; Lincolnshire Waste Partnership, Greater Lincolnshire Nature Partnership, Central Lincolnshire Planning Group, Greater Lincolnshire Local Enterprise Partnership and Flood Risk and Water Management Partnership to deliver the ambitions set out in the County Council's Green Master Plan. The GLGP will work with and through existing initiatives to achieve mutual benefits.

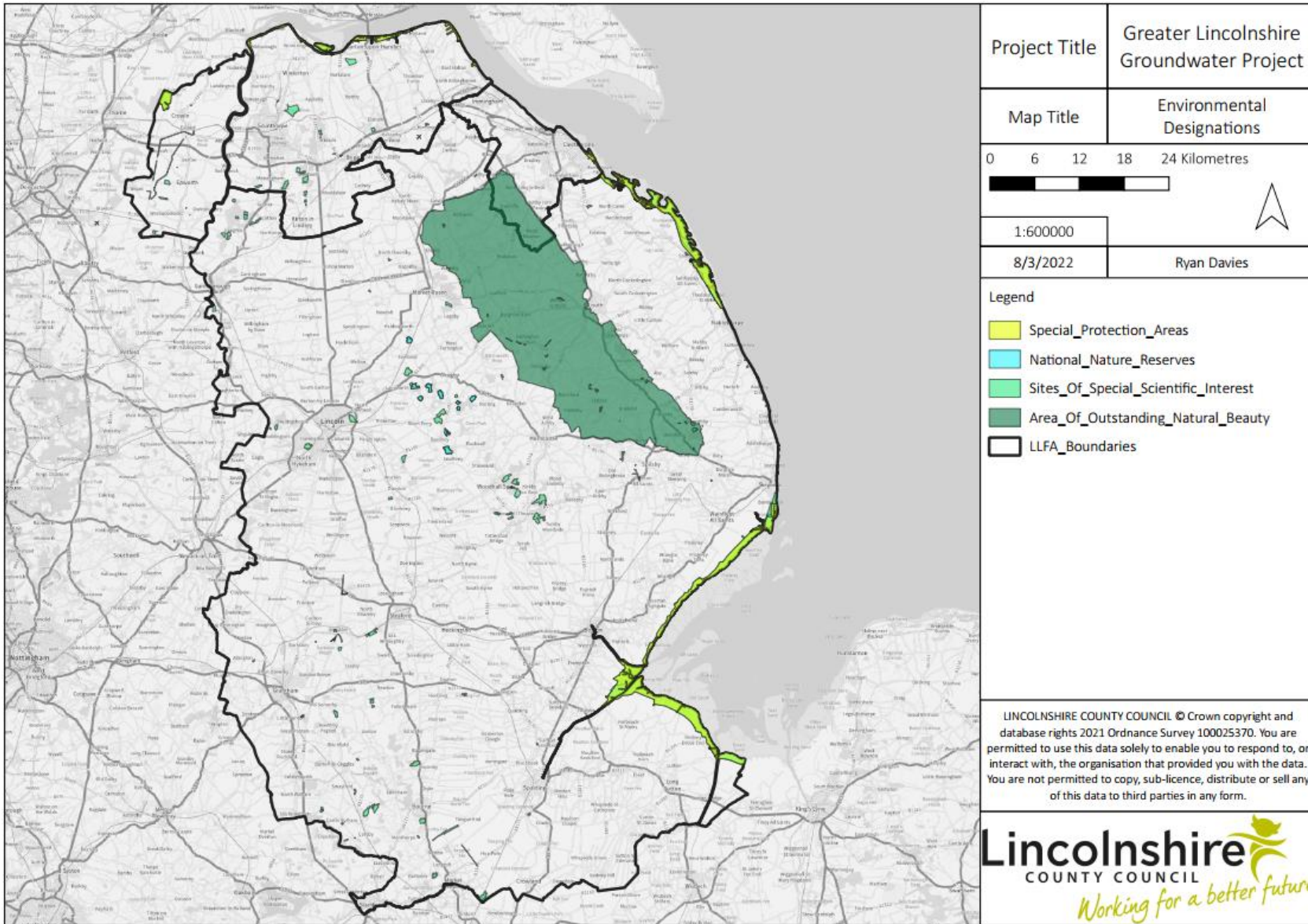
Key environmental opportunities related to the GLGP are outlined below. Further information regarding environmental opportunities is outlined in Section 3.6.3.

- Potential for biodiversity net gain and carbon sequestration, thereby enhancing the resilience of the natural environment to changes such as climate change, urbanisation etc.
- Potential improvements of the biological, chemical and ecological status of waterbodies across Greater Lincolnshire

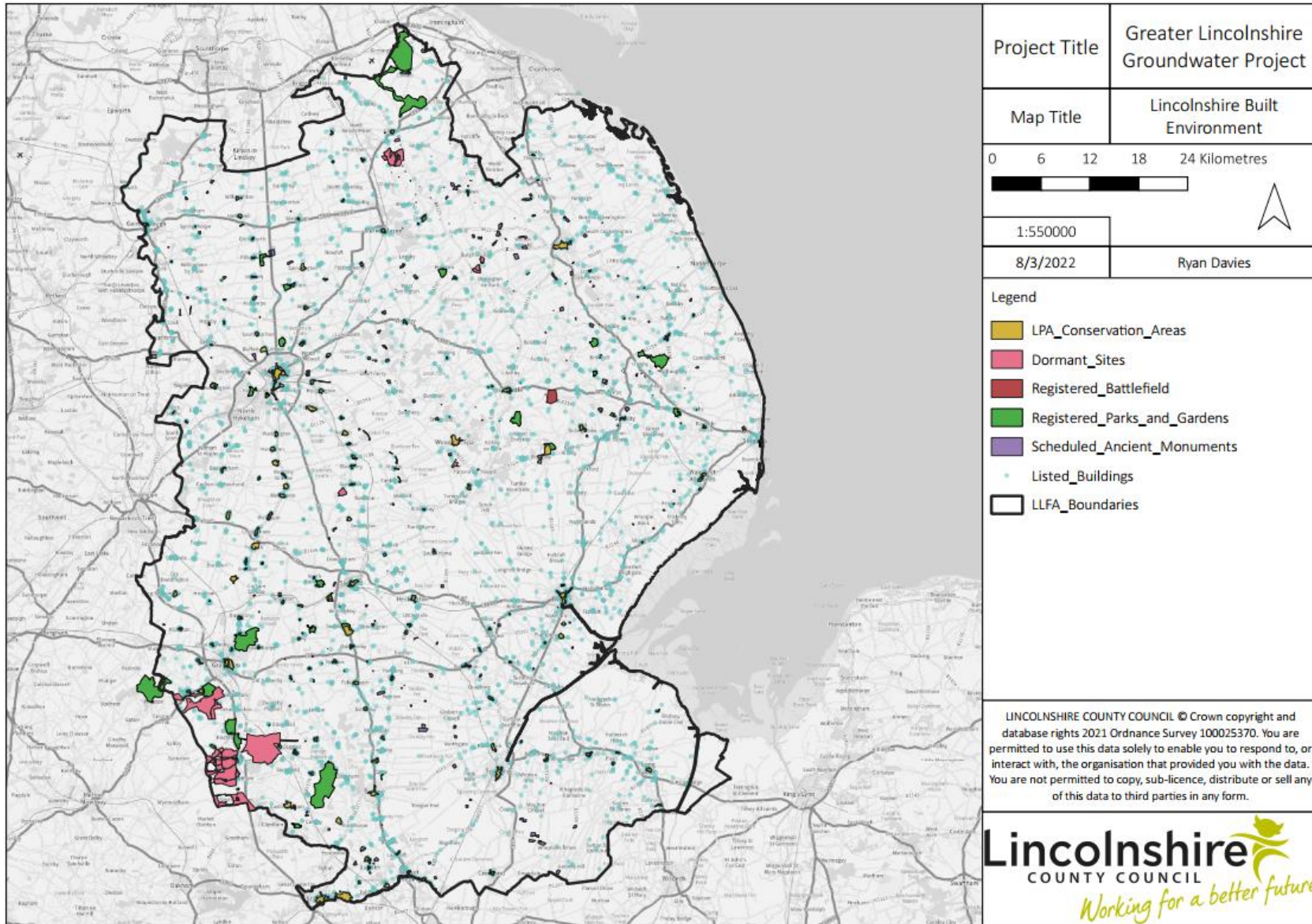
At a strategic level, Defra's 25-year Environment Plan calls for a greater use of flood risk management approaches that work with natural systems. GLGP will develop nature-based solutions to manage groundwater in a sustainable way that manages flood risk whilst protecting the environment, enhances watercourses/blow wells, provides amenity benefits and delivers water resources. In doing so, deliver a significant step change in how we manage this precious resource across Greater Lincolnshire.

GLGP will work closely with Water Resources East, the agri-food sector and environmental organisations to identify and appraise opportunities to manage groundwater effectively through a range of measures that reduce flood risk, deliver water quality and water resource benefits, including keeping chalk streams at health levels.

There are many heritage assets also within areas at risk of groundwater flooding. Listed buildings can suffer major damage from long duration flooding and there is often a reluctance to fit typical Property Flood Resilience (PFR) products to heritage assets and/or they are not effective because of the porosity of the buildings' construction.







## 2.3 Objectives (programme and project)

Linked to the strategic context and environmental considerations, describe the project objectives.

- What are the objectives of the investment?
- Are the objectives SMART (specific, measurable, achievable, realistic and time bound)?

The aims of the flood and coastal resilience innovation programme are to:

- Encourage local authorities, businesses and communities to test and demonstrate innovative practical resilience actions in their areas
- Improve the resilience of 25 local areas, reducing the costs of future damage and disruption from flooding and coastal erosion
- Improve evidence on the costs and benefits of the innovative resilience actions and demonstrate how different actions work together across geographical areas
- Use the evidence and learning developed to inform future approaches to, and investments in, flood and coastal erosion risk management

The project objectives, as submitted in the Expression of Interest document, have now been reviewed and expanded and are set out below:

**Objective 1.** Within the first two years, we will build on existing academic research and undertake a gap analysis of the Lincolnshire Limestone and Lincolnshire Chalk and Spilsby Sandstone models, including model validation, to gain a greater understanding of groundwater as both a risk and a resource across Greater Lincolnshire.

**Objective 2.** By 2027 we will identify and implement packages of work within the three confirmed trial sites which will enhance the resilience of local communities whilst simultaneously protecting and enhancing the environment, providing amenity benefits and delivering water resources.

**Objective 3.** To maximise the learning for the duration of the project we will continuously review all packages of work. We will adapt the programme to reflect the learning from this review and promote and roll out successful practices to reduce risk and improve resilience.

**Objective 4.** Between 2024 and project end in March 2027, we will, having regard to our newfound understanding of groundwater as both a risk and resource across Greater Lincolnshire, review lessons learnt to help inform and develop a potential pipeline of future groundwater related projects. We will, not only continue to develop understanding in this field but also sustain and further strengthen the partnership developed as part of the Flood & Coastal Resilience Innovation Programme.

## 2.4 Summary project description and mix of actions

Describe the project, the mix of actions and how they relate to the ambitions and objectives.

- How do the mix of actions work together to maximise resilience?
- What new evidence will be established to support a broader range of future FCERM actions?
- How will the project support an increasing uptake and delivery of future FCERM actions?

*(See Guidance Document Aspect 1)*

To date actions that improve the resilience to flood risk from groundwater are currently being considered or taken at a purely local level and on an opportunistic basis. This project offers the opportunity to develop plans and actions that provide broad and sustainable water management at both a strategic and operational levels, tailored to a range of geographical areas. GLGP, through desk based research and gap analysis of existing groundwater models will identify initially 3 trial sites in Greater Lincolnshire, potentially, Scopwick, Grimsby and Barton and Barrow Upon Humber and implement a package of works which, following an evaluation of lessons learnt and successes, could be implemented in other areas.

The proposed activities will improve our ability to understand and plan for groundwater flooding, whilst increasing our ability to protect communities, recover from and respond to high groundwater levels across Lincolnshire. By delivering this mix of actions we will move away from individual actions taken at a very local level to address impacts of elevated groundwater levels, for example on an individual property scale, and move to a more community or regional scale. The project outcomes will provide the evidence base for future capital schemes to mitigate groundwater flood risk.

The following proposed activities, through partnership work, new monitoring and datasets, evolving model systems and innovative thinking and delivery; will improve our ability to understand and plan for groundwater flooding:

*Review existing research and undertake a gap analysis of groundwater issues across the Greater Lincolnshire area:*

- **Strategic Groundwater review** into all groundwater issues across the Greater Lincolnshire area. At the same time, refine the Greater Lincolnshire catchment groundwater models to help identify opportunities for options that deliver multiple benefits from the management of groundwater.
- **Catchment Assessment** to identify and assess opportunities to sustainably manage flood risk from groundwater across Greater Lincolnshire on completion of the modelling work, whilst maximising additional benefits for water quality and water resources.

*This research will help to identify 3 trial sites (and potential future sites) and to undertake an options appraisal to deliver practical solutions for managing groundwater:*

- **Options appraisal** by working with Water Resources East, the agri-food sector and environmental organisations to identify and appraise opportunities to manage groundwater effectively through a range of measures that reduce flood risk, deliver water quality and water resource benefits e.g. keeping the chalk streams at healthy levels, agricultural land making appropriate use of groundwater.

*Implement and deliver packages of work in the test locations as identified through the assessment work, specifically suited to managing groundwater flooding. This could include:*

- **Managing groundwater risk** by delivering practical solutions that manage the risk of groundwater flooding in test locations, which could include Scopwick, Grimsby and Barton.
- **Sustainable operations delivery** to develop and deliver sustainable operations for IDBs, AW and farmers, enabling the management of groundwater through innovative techniques and transferring excess water to areas of need. This may possibly include wellfield operations, sustainable pumping regimes, water transfer and on-farm storage opportunities.
- **Harnessing natural processes** by working with natural processes to identify and deliver natural flood management options in both rural and urban setting, particularly on or near the chalk streams and limestone catchments across Greater Lincolnshire.
- **Implementation of an on-the-ground monitoring program** e.g. smarter monitoring of groundwater levels, measuring watercourse flows to monitor test sites and enhance the groundwater models, create a new network of boreholes with telemetry which can help inform groundwater flood warnings to be issued to increase community resilience.

*Partners will work with stakeholders, including communities in the identified trial sites to deliver resilience measures and raise awareness of groundwater issues:*

- **Community Engagement** by working with local communities in the 3 trial sites to deliver resilience measures and raise awareness of groundwater flooding issues, including flood stores, riverCare (or similar) groups, citizen science monitoring programs.

The project will have identified cost-beneficial actions; actions that increase resilience; synergies and antagonisms; combinations; and actions that are less successful. Moreover, the project will have identified opportunities across Greater Lincolnshire to sustainably manage flood risk from groundwater.

## 2.5 Key innovation learning and main benefits

Summary description of the key innovation learning and investment benefits.

- What are the expected learning outcomes: costs and benefits, management and governance, skills and capacities?
- What are the expected main benefits of the investment?

Until now we have not had the opportunity or resource to bring together active partners across Greater Lincolnshire to tackle the issue of flooding from groundwater. This project, in recent months, presented the circumstance whereby a multitude of partner organisations have come together to discuss how we need to work together across Greater Lincolnshire to deliver the Greater Lincolnshire Groundwater Project.

This innovative large scale collaborative approach to delivering the range of intervention activities the group outlined in Appendix 2C will not only have cost savings but also benefits from the sharing of data, resources, expertise, knowledge, support, links to the farming community and community groups and much more.

Learning outcomes, delivered through the place-based activities as detailed in Appendix 2C, include:

- Insights into a wider partnership approach to groundwater flood risk
- Sustaining engagement with stakeholders for the project duration
- Approaches to engagement and collaboration with communities to implement, monitor and evaluate resilient measures
- Further understanding of how to work collaboratively with other RMAs on groundwater projects
- Greater understanding /database of groundwater in Lincolnshire for use across RMAs in the future
- Greater understanding of existing models that can be utilised and adapted to gain a greater understanding of groundwater flood risk
- Enhance understanding of how groundwater resource can be managed
- Insight into how groundwater as a resource can be managed by specific sectors such as agriculture, water and environmental
- A greater understanding of place-based initiatives and their suitability to be implemented at other locations
- Development of an evidence base of what measures enhance resiliency to groundwater flooding (in certain circumstances) including what measures do not work

The main anticipated benefits of the GLGP are summarised below, further detail regarding these benefits are outlined in Section 3.6.

- Improve partners knowledge and understanding of, and identify opportunities (including cost certainty) for the sustainable management of groundwater as a resource across Greater Lincolnshire, including the identification of potential future pipeline schemes
- Enhance stakeholder awareness of groundwater (both as a risk and resource), whilst simultaneously empowering local communities and policy makers to plan and adapt

to flood risk and climate change by actively involving all those concerned within the design, implementation and maintenance of measures.

- Support an increased uptake and delivery of future FCERM actions in combination with actions from other sectors by increasing the acceptance both locally and nationally of investment regarding the integrated management of groundwater.
- Strengthen and build upon existing ways of working across both political and organisational boundaries
- Learning on how to measure resilience to groundwater
- Understanding and improving the emergency response capacity and capability to groundwater flooding amongst partners and communities
- Learning on approaches to monitoring of success of groundwater flood risk solutions

## 2.6 Strategic risks and learning from past projects

Describe the strategic risks and the learning captured from past projects with similarities to the main strategic risks.

- What are the key risks during Full Business Case development and delivery (up to 2027)?
- What are the key risks beyond 2027?

Based on the Readiness Assessment and project's risk register the following table summarises strategic risks to the project through the six-year programme and how learnings from past projects will help us manage them.

Key Risks	Mitigation /Past learning	To FBC	Up To 2027	Post 2027
<b>Capacity and resources of partners /contractors throughout the 6 years</b>	LCC and partners have delivered projects of similar scale. ToR are all in place to demonstrate levels of commitment by the Partnership through regular project board meetings. Contracted suppliers will undertake most of required works, managed by a full time Project Manager and supported with a proposed 2x project officer.  Utilisation of a diverse supply chain network in accordance with LCC Procurement rules / regulations.	•	•	
<b>Slippage in programme /scope creep/delays in delivery of actions</b>	Regular tracking and review of resource by PM and early indications raised by partners. Forward planning and understanding of risks for each phase so that any delays are more likely to be mitigated	•	•	
<b>Lack of access to data / data granularity for the identified trial sites, subsequently hindering refinement of groundwater models</b>	Maximise partnership networks and engagement opportunities to obtain access to data/land	•		

<b>Lack of willingness or interest of communities to engage in the project</b>	Utilise engagement specialists and pre-existing communication channels	•	•	•
<b>Increased costs associated with supplier resource</b>	Quantify and plan project around maybe a most likely, best case and worse case spend profiles.	•	•	•
<b>Ability to sustain implemented Measures / Works</b>	Identification of innovative funding sources for maintenance The designing of measures / works to be proportionate / sustainable, having due regard to future funding / maintenance requirements			•
<b>Maintaining the engagement of partners throughout the 6-year project</b>	Provision of regular project updates, actively involving partners in the development of the project and ensuring partners are brought in as and when appropriate times	•	•	
<b>Ability to Obtain Funding for Future Potential Pipeline Schemes</b>	Development of proportionate and feasible business cases, which identify and draw upon a broad range of funding sources			•
<b>Realisation of severe weather events</b>	Established Local Resilience Forum procedures already in place.	•	•	•
<b>Potential Withdrawal of Project Funding</b>	N/A	•	•	
<b>Gap analysis reveals that the groundwater models may not be fit for purpose. The work necessary to revise the models may be greater than expected. The worst-case scenario would be that an entirely new catchment model would need to be produced.</b>	Correspondence with relevant stakeholders has revealed that the Lincolnshire Limestone model is not calibrated for groundwater flood risk assessment, instead low flows, hence revisions of the model will be necessary.	•		

## 2.7 Constraints and dependencies

Describe the key delivery constraints and dependencies?

- What are the project constraints such as statutory requirements and conditions relate to funding contributions?
- What external project dependencies exist such as links to other projects?

The overarching project dependencies/ constraints are:

- Timescales
- Data access and availability
- Availability of resources (partnership/consultants/volunteers)

The table below identifies further constraints/dependencies for the key proposed project activities:

Activity	Constraint/Dependency
Partnership Management	<ul style="list-style-type: none"> <li>• Recruitment of project manager</li> <li>• Procurement of suitable Consultants</li> </ul>

	<ul style="list-style-type: none"> <li>• Capacity of partner members to invest time and resources</li> <li>• Ongoing partner, political and community support for the project</li> <li>• Robust risk management process</li> </ul>
Strategic Groundwater review and catchment assessment	<ul style="list-style-type: none"> <li>• Obtaining groundwater extraction licences</li> <li>• Ability to suitably expand upon existing models</li> <li>• Resolution of existing data / availability of observed data</li> <li>• Supply chain dependencies</li> <li>• Installation of additional boreholes / groundwater monitoring systems</li> </ul>
Options appraisal	<ul style="list-style-type: none"> <li>• Landowner take up and buy in</li> <li>• Model outputs that clearly project current and future groundwater resources under a range of scenarios</li> <li>• Site characteristics / ecological survey requirements</li> <li>• Levels of community engagement</li> <li>• Funding restrictions / limitations</li> <li>• Desired level of annual protection</li> </ul>
Operations Delivery	<ul style="list-style-type: none"> <li>• Dependency on landowners/farmers access to land</li> <li>• Planning permission</li> <li>• Landowner buy in</li> <li>• Further lockdown restrictions</li> <li>• Grant funding restrictions (particularly for property flood resilience measures)</li> <li>• Raising cost of materials and inflation</li> </ul>
Harnessing natural processes	<ul style="list-style-type: none"> <li>• Constrained by costs as these could be significant</li> <li>• Site feasibility</li> <li>• Clearly defined maintenance arrangements and funding for this maintenance</li> <li>• Land availability</li> </ul>
Community Engagement	<ul style="list-style-type: none"> <li>• Lack of community engagement/support at trial sites (including community buy-in)</li> <li>• Recruitment of Community Engagement Officer</li> <li>• Further lockdown restrictions</li> </ul>
Implementation of on-the-ground monitoring program	<ul style="list-style-type: none"> <li>• Landowner permission re installing monitoring equipment</li> <li>• Consistency in survey methods</li> <li>• Availability of resources</li> </ul>

## 2.8 Stakeholder Engagement

Describe the stakeholder engagement completed to inform the Business Case, and the proposed involvement of stakeholders in development of the Full-Business Case.

- How has stakeholder participation and engagement influenced and shaped the investment proposals?

*(See Guidance Document Aspect 2)*

The GLGP was established in November 2020 with the support of members from both the Lincolnshire Joint Flood Risk & Water Management Partnership and external stakeholders. This new partnership (a number of our partners are therefore also our stakeholders) cuts across many sectors – public, private, non-governmental, communities and the three political boundaries being Lincolnshire, North East Lincolnshire and North Lincolnshire (the full list of partners is detailed in Appendix 6A).

Consultation in relation to the project has been considered from an early stage in its development. As part of the development of the Expression of Interest and Business Case,



partner workshops were undertaken so as to capture information, develop a fuller understanding of partners issues and to consider the range of proposals that could address these.

In completing the business case, a readiness assessment was undertaken, and a specific steering group established with partners invited to join to assist, inform and make recommendations for its submission. Partners with specific expertise that could inform the business case were identified and consulted with, and the wider project group were asked to make recommendations before its final submission (currently in progress to coincide with the OBC health check submission). Two consultants have been commissioned to carry out the gap analysis work as detailed in the EOI, and whilst this work is ongoing these initial findings will set the scene for much of the planned works.

Moving forward, partners will continue to be part of the project development and play an active part of the delivery of practical actions on the ground. The engagement of stakeholders and partners is key, with each bringing expertise, experience and resource to the project that will ensure its success. Regular partner meetings will continue to inform and update the project and additional subgroups created where required. The project team has worked with Icarus in developing the readiness assessment and hosting partner engagement sessions.

Wider stakeholder engagement will take place in developing the full business case through proactive communication with local communities to support the project.

Community engagement work is currently being carried out in one of the potential trial sites at Scopwick with the involvement of the Scopwick Parish Council in a multi-agency working group looking at groundwater flood risk in the village.

In confirming the trial sites, a stakeholder mapping exercise for each location will be undertaken to ensure we have identified all relevant parties. At this stage further community engagement will take place to help shape and deliver the proposed packages of work, as per the Communication and Engagement Plan (Appendix 2A) . Community engagement may include, but is not limited to:

- Let's Talk Lincolnshire (LCC' public consultation website)
- Newsletters, published articles (LCC County News, Parish/town council news)
- Dedicated website on LCC's and (potentially) partners
- Social media – using LCC's established channels to circulate updates
- Email – a dedicated mailbox has been established for all enquiries
- Meetings: discussion events / workshops/ briefings/ drop in events
- Community Champions and case studies

This will complement the work of the Community Engagement Officer, recruited by GLGP partner National Flood Forum engagement.

## 2.9 Monitoring and evaluation framework, and dissemination

Describe the monitoring and evaluation framework for learning, building new evidence and dissemination of project outputs to achieve maximum impact.

- How will learning be monitored and evaluated?
- How will new evidence of costs and benefits be recorded and evaluated?
- How will dissemination be achieved during and post project?

*(See Guidance Document Aspect 11)*

Progress will be monitored by the Board in accordance with the monitoring mechanisms outlined in the developing governance structure (and through the EA’s reporting expectations); this includes but is not limited to regular Board meetings, political scrutiny and due financial diligence.

Monthly reporting will become part of the governance and project control mechanisms and aligned with LCCS reporting/accounting procedures until the end of the project and feed into the project board. Reports will describe progress against:

- Baseline
- Budget
- Expected benefits

Learnings from GLGP will be identified, captured and shared through the Board by means of summative project assessments for each work package, throughout the life of the programme and post-project. If deemed necessary by the Board, impartial assessments and peer review will be utilised to validate such learning. Sharing can be by many means, for example multi-agency meetings, publicity or professional literature.

While the objectives for the GLGP have been confirmed, not all activities to meet these objectives have been fully formed as these will be established once learning from the desk top research and gap analysis work progresses and trial sites have been identified.

The table below details the key areas for learning and how they will be monitored and evaluated:

Activity	Learning	How will learning be recorded/analysed/assessed
Desktop research and gap analysis	<ul style="list-style-type: none"> <li>• Understanding current groundwater flooding and resource</li> <li>• Reviewing the current groundwater models</li> <li>• ‘best practices’ re adapting groundwater models</li> <li>• Potential to develop new approaches to modelling groundwater</li> <li>• More granular outputs which will inform future decision making around groundwater actions</li> </ul>	<ul style="list-style-type: none"> <li>• Baseline data analysis</li> <li>• Review current groundwater models</li> <li>• Feedback and reports from consultants</li> <li>• Case studies of effective groundwater management</li> </ul>

<p><b>Identify trial sites, options to manage flood risk and wider opportunities</b></p>	<ul style="list-style-type: none"> <li>• Best course of actions in specific/differing locations</li> <li>• Identify proportionate place based measures / works to reduce risk of flooding within trial sites and how these measures can be implemented in other areas</li> <li>• Mix of actions</li> </ul>	<ul style="list-style-type: none"> <li>• Baseline data analysis of trial site</li> <li>• Continued monitoring of implemented workstreams</li> </ul>
<p><b>Community Engagement</b></p>	<ul style="list-style-type: none"> <li>• How effective have community measures been</li> <li>• What groundwater flood risk measures do communities want</li> <li>• Best practice for working with communities at risk of flood risk</li> </ul>	<ul style="list-style-type: none"> <li>• Surveys</li> <li>• Interviews</li> <li>• workshops</li> </ul>
<p><b>Packages of work at trial sites</b></p>	<ul style="list-style-type: none"> <li>• Effectiveness of the place-based packages of work</li> </ul>	<ul style="list-style-type: none"> <li>• Quantative and qualitative</li> </ul>

Once activities have been founded, defined measurement indicators for each of the different activities will be determined, in agreement with the programme strategic evaluation team, to monitor how well the project is performing.

Learnings on costs and benefits will be gathered through monitoring by workstream leads reporting to the Board in line with governance. Learnings will be reported back to the EA and to the wider programme, particularly identifying projects that are similar to GLGP – we have already engaged with other FCRIP groundwater projects.

Dissemination of monitoring and evaluation during and post project will be by way of:

- Shared learnings with other FCRIP relevant projects i.e. GRACE
- Social media/website
- Webinars/conferences/briefings
- Reports
- Newsletters/ published articles
- Events
- Case Studies
- LLFA political processes and relevant scrutiny committees

### 3 Economic Case and Benefits Framework

#### 3.1 Description of the Business as Usual baseline

Describe the Business as Usual baseline.

- What is the current practice including existing asset management, operation and maintenance?
- What are the current baseline costs (maintenance and operations)?
- What are the positive and negative impacts of current practice?

The Business as Usual (BaU) baseline is defined as: the continuation of current arrangements, as if the proposal under consideration were not to be implemented. BaU does not mean doing nothing, because continuing with current arrangements will have consequences and require action resulting in costs (based on HM Treasury Green Book).

Actions that improve the resilience to flood risk from groundwater are currently being considered or taken at a purely local level and on an opportunistic basis across Greater Lincolnshire. Where these actions are eligible for Flood Defence Grant in Aid (FDGiA) or Local Levy a strategic approach is taken but focussed on each individual project.

Business as Usual in the 3 potential trial sites is detailed below:

Trial Site	Standard works	Bespoke works	Costs (£k)
Grimsby	<p>Diversion of groundwater into the sewer network to mitigate against the worst of the impacts.</p> <p>Yearly maintenance is carried out within the allotments to manage silt and vegetation growth to ensure it is flowing as effectively as possible.</p> <p>Underpasses are pumped out at a near constant rate due to ground water filling the wetwell chambers.</p>	<p>At the Salting's allotments, a series of channels have been excavated to try and drain the waterlogged area into the combined sewer network. This has limited success due to the levels, but it helps to keep the water level outside of houses, although the sub-floor spaces are almost permanently waterlogged causing issues with damp and black mould.</p> <p>A footpath through Ainslie Street Park had to be raised by half a metre in order to open access back up to the park, as it had been submerged for over a year at the cost of approximately £75k.</p> <p>In other areas of the town, springs have been diverted into the sewer network to prevent properties from flooding.</p>	NELCC maintenance costs pa £15-20k
Scopwick	<p>Repairing / relining of the public sewer system</p> <p>Over pumping of the sewer system into Scopwick Beck</p>		Since 2011, Anglian Water costs relating to ground water have totalled to over £2M.

Barton and Barrow Upon Humber	TBC	TBC	TBC
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### 3.2 Summary description of the investment proposal

Briefly describe the investment proposal.

- What is the proposed investment (project and sub-projects)?

The table below summarises the planned activities up until submission of the Full Business Case. Additional activities and more long-term activities are yet to be confirmed and will be reviewed once initial learnings have taken place. Actual costs associated with each action are still TBC at this stage (overall expenditure costs are detailed further in Appendix 5A).

Activity	Description	Tasks (short term)
<b>Project Management</b>	Establish an effective partnership involving all stakeholders and beneficiaries, making use of inter-agency skills to deliver the agreed outcomes.	<ul style="list-style-type: none"> <li>• Recruitment of 1 x Project Manager, 1 x National Flood Forum Community Engagement Officer</li> <li>• Assess the need / desire to recruit 2 x project support officers</li> <li>• Subject to the above assessment, consider commencement of recruitment of 2 x project support officers</li> </ul>
<b>Strategic Groundwater review</b>	Undertake a strategic review of groundwater, as both a risk and resource, across Greater Lincolnshire, focusing particularly on the three trial sites of Barrow and Barton-upon-Humber, Grimsby and Scopwick.	<ul style="list-style-type: none"> <li>• Capability assessment of the existing Lincolnshire Limestone and Lincolnshire Chalk and Spilsby Sandstone groundwater models to understand how they can be adapted to meet the requirements of the proposed integrated catchment model. This work has been started by consultants Wood and Atkin to review what further input data would be needed and what further parameters can be incorporated into the modelling.</li> <li>• Gap analysis undertaken by consultants Wood and Atkins to produce a scope of works for what further data is needed, scoping for borehole installation sites and the integrated catchment modelling.</li> </ul> <p><b>Atkins Consultant</b></p> <ul style="list-style-type: none"> <li>• Identify areas of concern</li> <li>• Identify areas based on model results and “on the ground” knowledge (known areas of GW flooding)</li> <li>• Review model calibration for groundwater flooding events in those areas</li> <li>• Identify tasks to improve model calibration where needed</li> <li>• Plan sub model approach</li> <li>• Identify likely refinement to improve high GW level and high flow calibration</li> <li>• Consider need for refinement tasks such as higher resolution model grid, high resolution topography, detailed drainage and networks</li> </ul>

		<ul style="list-style-type: none"> <li>Consider approach to return period analysis, event modelling and need for linking with hydraulic models.</li> </ul> <p><b>Woods Consultant:</b></p> <ul style="list-style-type: none"> <li>Share and review previous recommendations for enhanced monitoring locations alongside incidents and Drift geology understanding</li> <li>Review UKCP18 rainfall, potential evaporation and sea level rise projections for climate change. Run multiple projections through the regional model to inform expansion and frequency of future wet spots</li> <li>Develop scope and costs of higher resolution shorter time step linked model incorporating Lidar-based drainage and better representation of shallow geological connections focussed on Grimsby</li> </ul>
<b>Catchment Assessment</b>	Having regard to the findings of the gap analysis, refine the existing groundwater models within Lincolnshire.	<ul style="list-style-type: none"> <li>Refinement of Lincolnshire Limestone and Lincolnshire Chalk and Spilsby Sandstone models</li> <li>The development of appropriate scenarios (1000+) to gain greater understanding of potential changes in groundwater. Scenarios will have regard to at least the following factors, reductions / increases in abstraction, climate change, input from a weather generator</li> <li>Running of model using the developed scenarios</li> <li>Validation of model outputs using observed data</li> </ul>
<b>Groundwater Research</b>	The undertaking of research to gain a greater understanding of the risk of salinisation from groundwater flooding in the Lincolnshire Fens	<ul style="list-style-type: none"> <li>Spatially quantify the salinity across the catchment</li> <li>Assess groundwater seasonal changes over 24 months</li> <li>Quantify the connectivity of the groundwater system to surface water, seawater and the rate of groundwater recharge</li> <li>Predict the risk of a drying climate, rising sea-levels and increased irrigation to the salinisation of soils from groundwater.</li> </ul>
<b>Pipeline Schemes</b>	Identification of future potential pipeline groundwater schemes	<ul style="list-style-type: none"> <li>Having regard to our newfound understanding of groundwater as both a risk and resource across Greater Lincolnshire, we will review lessons learnt to help inform and develop a potential pipeline of future groundwater related projects.</li> </ul>
<b>Catchment Assessment</b>	Identify and assess opportunities to sustainably manage flood risk from groundwater across Greater Lincolnshire on completion of the modelling work, whilst maximising additional benefits for water quality and water resources.	<ul style="list-style-type: none"> <li>Identify and confirm the 3 trial sites and further list of future pipeline sites</li> </ul>
<b>Managing groundwater flood risk</b>	Delivery of proportionate place-based solutions that manage the risk of groundwater flooding in test locations, including Barrow and Barton-upon-Humber, Grimsby and Scopwick.	<ul style="list-style-type: none"> <li>Work with Water Resources East, the agri-food sector and environmental organisations to identify and appraise opportunities to manage groundwater effectively through a range of measures that reduce flood risk, deliver water quality and water resource benefits e.g., keeping the chalk streams at healthy levels, agricultural land making appropriate use of groundwater.</li> </ul>

		<ul style="list-style-type: none"> <li>• Develop and deliver sustainable operations for IDBs, AW and farmers, enabling the management of groundwater through innovative techniques and transferring excess water to areas of need. This may possibly include wellfield operations, sustainable pumping regimes, water transfer and on-farm storage opportunities.</li> <li>• Work with natural processes to identify and deliver natural flood management options in both rural and urban setting, particularly on or near the chalk streams and limestone catchments across Greater Lincolnshire.</li> </ul>
<p><b>Options appraisal</b></p>	<p>Having regard to the outputs of the catchment assessment model outputs, the identification of proportionate place-based measures / works within trial sites of Barrow and Barton-upon-Humber, Grimsby and Scopwick.</p>	<ul style="list-style-type: none"> <li>• Confirm project trial sites</li> <li>• Optioneering and assessment of options. For example, we would like to explore the opportunity to convert abandoned allotments in Grimsby into wetland habitats – the assessment and gap analysis work will provide further information and potential benefits to implementing this.</li> <li>• Confirmation of options and production of Full Business Case</li> </ul>
<p><b>Community Engagement</b></p>	<p>To develop a community-led approach to flood resilience by proactively engaging and empowering individuals and groups to gain a greater understanding and ownership of groundwater flood risk and to develop and implement sustainable solutions through working in partnership, and where opportunities exist to integrate with wider issues around environmental land management; health and wellbeing; water as a resource; the creation of new biodiverse environments; creating resilient people and places; and sustainable water level management.</p>	<ul style="list-style-type: none"> <li>• Develop communications plan through the comms and engagement steering group. Share with the wider partnership.</li> <li>• Regular review of stakeholder groups</li> <li>• Establish a system of recording Stakeholder interaction</li> <li>• Once the trial sites have been confirmed, undertake stakeholder analysis for each site</li> <li>• Establish a community engagement plan for each trial site</li> <li>• Readiness Assessment to understand local concerns regarding flood risk</li> <li>• Work with local communities to gain a greater understanding of flood risk, focusing particularly on groundwater flooding</li> <li>• Raise awareness of groundwater, groundwater flood risk and the Greater Lincolnshire Groundwater Project within agreed trial sites</li> <li>• Act as a conduit for local communities, enabling them to voice their opinions, ideas, and / or concerns during the scoping, design, implementation and evaluation of potential measures / works</li> <li>• Empower local communities to take ownership of and implement sustainable solutions to groundwater flooding</li> </ul>
<p><b>Monitoring program</b></p>	<p>Implementation of telemetric groundwater monitoring sensors across Greater Lincolnshire, focusing particularly within the three sites of Barrow and Barton-upon-Humber, Grimsby and Scopwick.</p>	<ul style="list-style-type: none"> <li>• Engagement of suitable contractor and obtaining of all necessary approvals / consents</li> <li>• Installation of groundwater monitoring sensors</li> <li>• Monitoring of groundwater monitoring sensors and usage of data gathered to inform evaluation of model outputs</li> </ul>

Long term actions are still to be determined and will be reviewed following initial works and learnings.

### 3.3 Description of how the proposed solution was optimised

Briefly describe how the proposal presented in Section 3.2 has been optimised.

- What stakeholder and community engagement has been undertaken?
- How has the investment been optimised in terms of value, scale, location, timing, carbon, equality analysis etc?

*(See Guidance Document Aspect 3)*

GLGP investment optimisation to date, has been undertaken through engagement with the project Partners, a number of whom also represent Stakeholders. The Partnership is made up of different organisations, including, 3 Lead Local Flood Authorities, businesses, IDB's, 2 Local Resilience Forums and academic institutions. As such, the proposal incorporates the opinions, expertise and skills from a wealth of organisations and the combination of measures will reflect this. Engagement has occurred through meetings of the full partnership, partnership steering groups and technical works undertaken.

This partnership collaboration has led to a focus on 3 potential trial sites located in each of the three local authority boundaries that the partnership covers. Further pipeline sites will also be identified, through partnership collaboration that may be utilised as the project progresses.

To date, initial rapport building, and community engagement has been undertaken within the village of Scopwick by the National Flood Forum. This community engagement has built upon work previously initiated by the Scopwick Groundwater Task and Finish Group and has enabled the GLGP to gain a greater understanding of the communities concerns regarding groundwater / flood risk.

Further engagement and technical works (including but not limited to carbon assessments, calculation of cost-benefit ratios for proposed measures / works) are required to further optimise our approach for the Full Business Case and longer-term activities. For example, work is currently being carried out to review all groundwater issues across the Greater Lincolnshire area and how the current catchment groundwater models can be refined to improve the understanding and subsequently management of groundwater. This work will identify our trial sites and place based packages of work to be undertaken to ensure the realisation of the projects ambitions.

Due to the phasing and reliance of work packages optimisation cannot occur for later activities until earlier works have been completed.



### 3.4 Description of: Invest less and invest more

At a programme level there may be the opportunity/need to scale-up or down individual projects to best achieve the programme objectives and investment commitments. Please describe how the proposal in Section 3.2 could be scaled up or down in costs, and the impact these would have on potential benefits arising from the project. Indicatively a reduction or increase of expenditure of 20% should be considered.

*(See Guidance Document Aspect 3)*

#### 3.4.1 Invest less

The below table outlines the impact of scaling down the project:

Action	Impact
<b>Community engagement</b>	Project adopts a top-down communication approach rather than a collaborative approach.
<b>Reduced number of trial sites (2 not 3)</b>	The 3 trial sites have been selected due to their location and varying groundwater flood risks – reducing this to 2 would not seem sufficient in exploring a mix of resilient opportunities.
<b>Reduce the on the ground monitoring programme including reducing the number of new boreholes</b>	This would result in lower groundwater level monitoring certainty and potentially unnecessary flood warnings or missed opportunities to warn. Less data would be collected.
<b>Reduce the number of groundwater models reviewed (2 to 1)</b>	Reduces the learning opportunities for integrated water management, and for the delivery of practical solutions on the ground that enable benefits to flood risk management, water resources and the environment.
<b>Reduce the number of practical solutions that are delivered during the project</b>	Missed opportunity to put learnings into practice and monitor their benefits. Reduces the number of practical actions communities can put in place to build local resilience to groundwater flooding
<b>Reduce the no of stakeholders the project engages with</b>	Reduces the understanding and learning of the broad range of groundwater risks and opportunities.
<b>Reduce the scope to only look at management of flood risk (not water resources, environmental improvements)</b>	Project will not integrate with wider issues around environmental, health and wellbeing, water as a resource, sustainable water level management.

#### 3.4.2 Invest more

The below table highlights the impacts of investing more in specific activities proposed under GLGP:

Action	Impact
<b>Community Engagement</b>	Increased resource for community engagement will result in less 'top-down', more collaborative working and embedding of resilience.
<b>Increase number of trial sites (5 not 3)</b>	Increased community engagement, and investigation into varying groundwater issues. However, increasing the number of sites may not achieve any greater insights.
<b>Increase the on-the-ground monitoring programme including increasing the number of new boreholes</b>	More groundwater monitoring across more communities and increased amount of evidence collected.

<b>Increasing the number of practical solutions that are delivered during the project</b>	Additional communities will benefit from additional resilience measures.
<b>Increase the no of stakeholders the project engages with</b>	More collaborative working, increased awareness of issues and improved knowledge of local environment.

### 3.5 Investment costs

Briefly summarise the total present value (discounted) costs.

- What are the present value costs and the timeframe of the assessment?

Whole project costs are presented in the following table. These costs are in line with those estimated in the Expression of Interest and exclude Partner in-kind contributions and optimism bias. They are discounted using the standard 3.5% HM Treasury rate.

The below table shows the project costs.

Costs per year (£K)	Year 1 (£KPV)	Year 2 (£KPV)	Year 3 (£KPV)	Year 4 (£KPV)	Year 5 (£KPV)	Year 6 (£KPV)	TOTAL (£KPV)

As individual activities are developed there will be greater refinement and certainty of the costs based on feasibility, procurement and delivery options.

### 3.6 Investment benefits framework including learning and innovation

Describe the Benefits

- What are the learning benefits the project is expected to deliver?
- What are the benefits of the project in terms of 'value at risk'?
- What are the benefits of the project in terms of 'value potential'?

*(See Guidance Document Aspect 4)*

#### 3.6.1 Learning benefits

Table 1 Benefits Framework: Learning Benefits

Ref	Benefits Category	Description	Approach to capturing change
1.1	Learning on cost	<ul style="list-style-type: none"> <li>• Reduction of uncertainty and greater cost certainty of integrated water management solutions that will help protect local community infrastructure, including roads, drainage networks and communications infrastructure from groundwater flooding</li> <li>• Greater cost certainty for adapting existing groundwater models</li> </ul>	<p>Qualitative - Using available funding in the most cost-effective and proportionate manner</p> <p>Quantitative – Managing incomings, outgoing, invoices</p>

			<p>and making sure they align with FCERM 3 Form submissions. Cross-referencing the quotes with realised costs</p> <p>Economic justification for similar projects within the future.</p>
1.2	Learning on benefits	<ul style="list-style-type: none"> <li>• Greater understanding of groundwater as both a risk and resource across Greater Lincolnshire</li> <li>• Identification of potential pipeline schemes in Greater Lincolnshire</li> <li>• Effectiveness of solutions to managing groundwater and potential synergies of solutions</li> <li>• Appreciation of how-to better work with communities to manage groundwater</li> <li>• Better understanding of how groundwater interacts with the natural environment</li> <li>• Learning about how groundwater level data can be obtained and used via innovative means</li> </ul>	<p>Qualitative – Understanding what, when and where solutions to groundwater can be / should be implemented, ensuring the most appropriate use of available resources.</p> <p>Quantitative – Levels of community engagement. Properties protected. Increased groundwater data. Number of groundwater schemes / biodiversity net gain increase.</p>
1.3	Learning on management and governance (project level)	<ul style="list-style-type: none"> <li>• Learning on how to make effective decisions with changing stakeholders throughout the development / delivery of the project</li> <li>• Partnership collaboration and coordination in managing groundwater flood risk over the long-term programme (including across political boundaries)</li> <li>• How to collectively and effectively manage project risk over the next six years</li> <li>• Capacity and capability of project partners to deliver project objectives</li> </ul>	<p>Qualitative – Regular partnership updates on current and completed activities and learning</p> <p>Quantitative – Realisation of the state of project objectives. Release of funding associated with risks. Programme forecasting and reporting</p>

1.4	Learning on skills, tools (methods and mechanisms) and capacity needed to implement actions and combinations of actions	<ul style="list-style-type: none"> <li>• Understanding and improving the emergency response capacity and capability to groundwater flooding amongst partners and communities</li> <li>• Learn how to effectively engage with local communities to enhance preparedness to groundwater</li> <li>• Learning on approaches to monitoring of success of groundwater flood risk solutions</li> <li>• Learning on how to measure resilience to groundwater</li> <li>• Learning the resources required to deliver engagement / integrated water management solutions</li> </ul>	<p>Qualitative – Community feedback / surveys Training and exercising scenarios</p> <p>Quantitative – People, time, resources required to deliver actions</p>
1.5	Learning on management and governance (wider lessons learned)	<ul style="list-style-type: none"> <li>• Potential options that could be feasible for assisting in the understanding and mitigation of groundwater flooding</li> <li>• Transferable learning for similar communities and environments elsewhere on a local, regional and national scale.</li> <li>• Co-creation of practical solutions with local communities</li> </ul>	<p>Qualitative – Success in transferability of lessons learnt</p> <p>Quantitative – Number of times lessons are disseminated. Number of similar communities benefiting from the lessons identified.</p>

### 3.6.2 Value at Risk

Despite being a potential significant source of localised flood risk, particularly within the unconfined chalk aquifers of southern England, the assessment and mitigation of groundwater flood risk has only recently begun in earnest since the widespread groundwater flooding experienced across much of the chalk aquifers of southern England during the autumn of 2000/2001 and winter of 2003. These events resulted in prolonged and extensive damages and followed an unusual 30-year groundwater flood free period (Cobby et al. 2009; Environment Agency 2001; Marsh 2007).

As the characteristic feature of groundwater flooding events is its relatively long duration when compared with other sources of flooding and when considering the above and the fact that the impacts of groundwater can occur before water levels reach the ground surface, for instance the flooding of basements or critical infrastructure, the accurate calculation of value at risk for groundwater flooding is more complex, under researched and underfunded in comparison to other local sources of flood risk.

As outlined in other sections of the Outline Business Case, a key component of the GLGP is the reviewing and subsequent revision of the Lincolnshire Chalk and Spilsby Sandstone and Lincolnshire Limestone groundwater models. This work will enable the GLGP to ascertain, amongst other aspects, the number of properties at risk of flooding from groundwater across Greater Lincolnshire, potentially focusing on the 3 proposed trial sites of Barton and Barrow-upon-Humber, Grimsby and Scopwick. As such a detailed economic analysis, including options appraisal, has therefore not been undertaken at this moment in time.

However, this is not to say that indicative value at risk benefits / Estimated Annual Damages (EAD) cannot be provided. For instance, in 2010 a preliminary assessment of flood mitigation options for

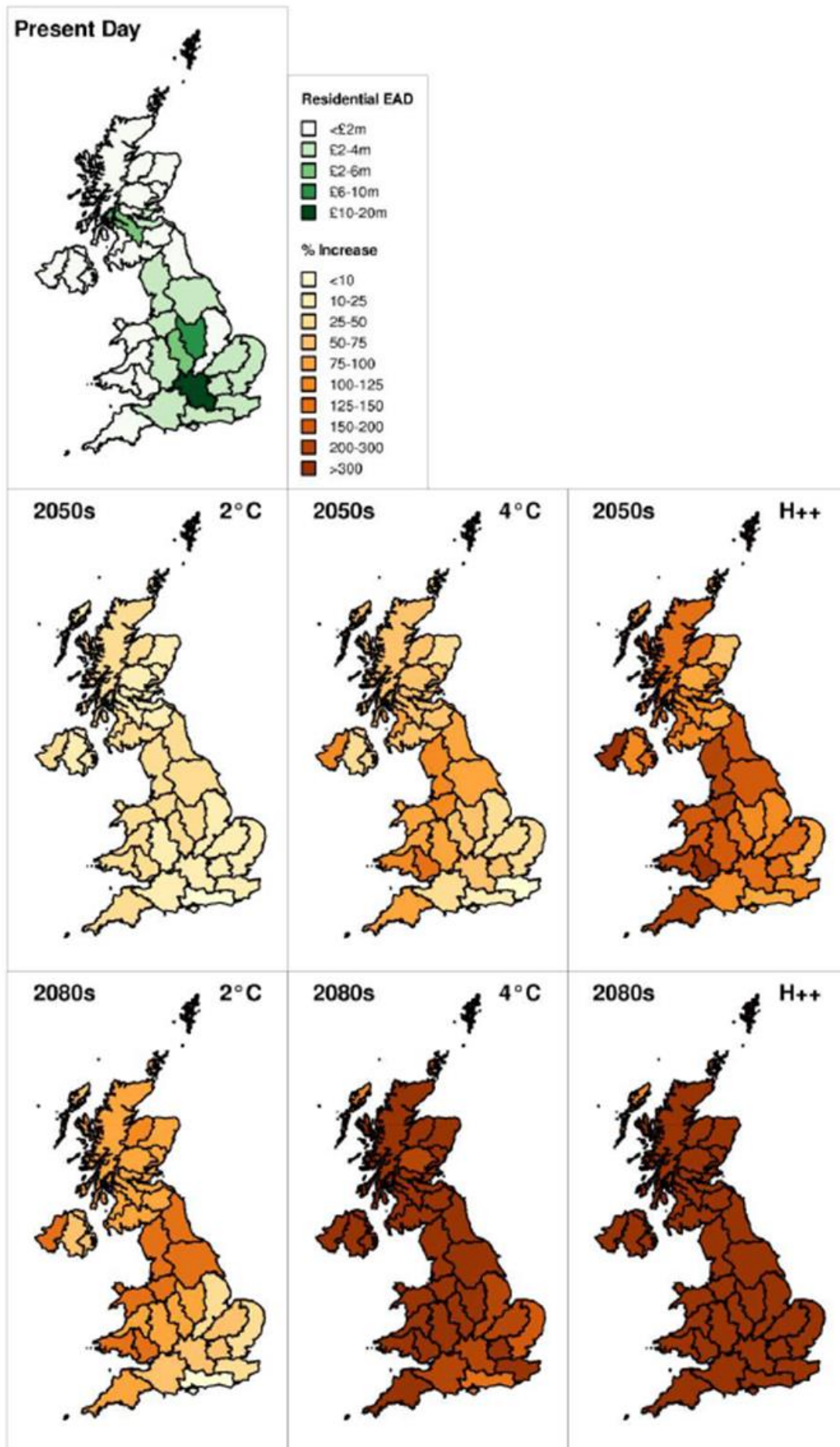
Westoby Lane and areas adjacent to Midby Drain in Barrow-upon-Humber, North Lincolnshire was commissioned. A hydrological groundwater model was constructed and identified 56 properties as being at risk of a 1% annual exceedance groundwater flood event. 12 flood alleviation options were proposed with 6 being taken forward for further economic analysis using a timescale of 100 years. Damages were discounted over this timescale in line with Treasury Green Book Guidance.

A summary of the economic analysis is provided below:

- Direct damages ranged from 0.19 to 92 (£k)
- Indirect damages ranged from 0.17 to 50 (£k)
- Present value damages ranged from 77 to 5,421 (£k)
- Present value benefits ranged from 2,539 to 5,683 (£k)
- Benefit cost ratios ranged from 16.87 to 3.82

In addition to the above, the Third UK Climate Change Risk Assessment published in July 2021 provides EAD for three types of groundwater flooding: Clearwater flooding (from chalk and limestone aquifers); Clearwater flooding (from other aquifers); and flooding from Permeable Superficial Deposits (PSD). Analysis for the whole of England suggests that up to approximately 360,000 residential and 170,000 non-residential properties could be at risk of groundwater flooding. Regarding EAD, the analysis indicates that groundwater flooding is a small proportion ranging from £54m to £95m. For a more localised scale, the outputs of the Second UK Climate Change Risk Assessment are provided below, which estimates that:

- The 'present day' EAD for residential properties across Greater Lincolnshire is <£2m
- The EAD for residential properties across Greater Lincolnshire in 2080, under a 4°C temperature rise, may increase by 150-200%



Although the above values cannot directly provide economic justification for undertaking resilience activities within all the proposed trial sites (please note that the proposed trial sites may change following validation of the revised groundwater model outputs), they do nonetheless support observed impacts of groundwater flooding across Greater Lincolnshire, and hence strengthen the rationale for continued development of the GLGP. It should be noted however, that these values relate solely to residential / non-residential properties and do not consider all the costs associated with groundwater flooding, for instance flooding of agricultural land, disruption of transport infrastructure etc, and thus are likely an underestimation of value at risk.

To support the economic justification of the OBC, work is currently on-going to undertake an outline economic case based on existing model outputs, various assumptions, and current Multi-Coloured Handbook approaches, although it should be noted that any outputs derived from this analysis will be subject to significant uncertainties as currently the Lincolnshire Chalk and Spilsby Sandstone and Lincolnshire Limestone models are calibrated for low flows and not indicating groundwater flood risk.

Unfortunately, due to delays in obtaining model licences and contractor availability, it is not possible to provide outputs of this economic analysis as part of OBC submission. What follows is a summary of the approach that shall be taken, including assumptions that shall be made.

- The analysis will quantify the expected annual damage and 50-year present value damage to residential and non-residential buildings and agricultural land within the 3 proposed trial sites of Barton and Barrow-upon-Humber, Grimsby and Scopwick.
- The following sources of information will be utilised as part of the analysis:
  - The National Receptor Dataset (2014) which has been cleaned to remove upper floor properties and those not representing habitable dwellings and commercial buildings, excluding critical infrastructure. On site verification has not been conducted as part of this outline assessment
  - Ordnance Survey MasterMap to identify parcels of land classified as agricultural land
  - Crop Map of England 2020 has been used in conjunction with Ordnance Survey MasterMap to identify areas of crop that may be damaged by groundwater flooding, for instance cereal crops are more likely to be impacted by groundwater flooding than land used for grazing
  - Outputs from the Lincolnshire Chalk and Spilsby Sandstone and Lincolnshire Limestone models
- The Multi-Coloured Handbook simplified benefit:cost appraisal tool shall be utilised to gain an initial understanding of scheme feasibility.
- Assumptions include:
  - o Existing model outputs provide information regarding return periods. If return periods do not form part of model outputs, then the assumption is that, based on expert groundwater modelling judgement, indicative return periods can be inferred.
  - o The quantification of indirect damages for groundwater flooding is uncertain. FCDPAG3 guidance states that a partial measure of disruption resulting from flooding can be given by the cost of renting an equivalent home to that which was flooded together with the cost of accelerating the drying out process. Multi-Coloured Handbook values for the likelihood and duration of seeking alternative accommodation and the duration of humidifier use shall be utilised having regard to costs associated with the use of dehumidifiers and the average rental price for Lincolnshire, North East Lincolnshire and North Lincolnshire, values of which shall be derived from the Residential Rental Price Index
  - o Advice regarding the intangible benefits of flooding such as increased stress, loss of memorabilia etc., is outlined in DEFRA research project FD2005 “The Appraisal of Human-Related Intangible Impacts of Flooding” which stated that the willingness to pay

to avoid the health impacts associated with flooding were about £150 - £200 per household per year. More recent research has suggested that the intangible costs of flooding may be of the same magnitude of direct costs or approximately 40% of direct costs (Lantz et al. 2012; Alfieri, Feyen and Di Baldassarre 2016). Here intangible damages shall be calculated as 40% of direct damages.

- o The estimate of benefits of GLGP shall assume that: (a) agricultural land more susceptible to impacts of groundwater flooding shall be protected up to groundwater flood events with a 4% annual chance; (b) agricultural land less susceptible to impacts of groundwater flooding may not receive any benefits; and (c) residential and non-residential properties shall be protected up to groundwater flood events of between a 1% and 2% annual chance.
- o A value of 0.10m shall be utilised to account for thresholds of residential properties and 0.00m for commercial properties. These values were chosen following guidance provided by the GRACE project

Once greater clarity has been obtained regarding groundwater flood risk and all trial sites confirmed, an detailed economic assessment, including option appraisal and calculation of cost-benefit ratios will be made as part of the Full Business Case. This will likely require innovation in of itself, as traditional Multi-Coloured Handbook approaches to estimating benefits do not provide an appropriate valuation of resilience-focused benefits, and likely do not adequately reflect the specifics of groundwater flooding outlined above. To resolve this challenge, the GLGP may, subject to resource availability, develop and trial an alternative approach to calculating value at risk and resilience benefits by working with experts in the field of groundwater and economics.

As part of the GLGP, the University of Lincoln will be conducting research to determine the risk of salinisation from groundwater flooding within the Lincolnshire Fens. This research will help the GLGP understand the broad range of issues associated with groundwater flooding, thereby enabling a more comprehensive integrated water management solution to be developed. Subject to resource availability and timescales, an economic assessment of this risk may be undertaken.

Notwithstanding the above, the GLGP has, based on flooding realised within the proposed trial sites, been able to identify value at risk benefits (Table 2), although it should be noted that the full extent of these risks is currently uncertain. The standard of protection that will be delivered by the GLGP has yet to be determined, but will nevertheless be place specific, having regard to the principles of strategic investment pathways.

Table 2 Benefits Framework: Value at Risk Benefits

Ref	FCERM_AG AST Category	Sub-category	Description	Approach to capturing change
Value at Risk				
2.1.1	Economic	Residential property	Reduction in damage from internal / external flooding. (Loss, repair, asset replacement)	Number of properties, location, value, depth, duration, frequency
2.1.2		Non-residential property	Reduction in damage from internal / external flooding. (Loss, repair, asset replacement) Business profit loss	Number of properties, location, value, depth, duration, frequency
		Emergency costs	Emergency services costs avoided	Number of callouts related to groundwater



			Local authority emergency response costs reduced	flooding and associated costs
		Infrastructure	Reduction in loss of critical infrastructure functionality. Damages avoided due to reductions in repair or replacement of assets. Disruption avoided / minimised to operations, services and revenues	Retained functionality to critical infrastructure. Previous whole lifecycle asset costs.
		Transport	Reduction in road / rail closures and material damage Reduced disruptions to services, operations and revenues Damages avoided in terms of repair or replacement of assets	Highway's authority data. Retained functionality of transport infrastructure. Previous whole lifecycle asset costs.
		Agriculture	Damages avoided to flooding of land / crops – costs to business	Engagement and ongoing liaison with farmers
		Land use	Damages avoided to public green spaces Reduction of waterlogged land	Number of complaints regarding waterlogged public space / land.
		Indirect effects on businesses	Reduced disruption due to flooding of businesses – impacts on local supply chain Reduction in staff absences due to groundwater flooding / high groundwater related health or property complications.	Reduction in enforced closure to business / staff absenteeism
2.2.1	Environmental	Regulating services	Reduction in economic, environmental and political impacts of soil erosion Reduction in risk of salinisation of groundwater resources	Increase / decrease of health status of watercourses in line with Water Framework Directive
2.2.2		Biodiversity	Reduction in potential impacts on species including protected species	Increase / decrease of health status of watercourses in line with Water Framework Directive Changes within land use
		Change in status under WFD	Deterioration of waterbodies avoided through reduced sewer	Reduction in reported combined sewer overflows

			overflows into watercourses Reductions of surface water flows / agricultural land runoff	Increase / decrease of health status of watercourses in line with Water Framework Directive
		Historic environment	Damages avoided to repair historic sites and assets. Disruption minimised to operations, revenues and service provided. Reduced risk of repeated wetting and drying of buried archaeology	Number of reported flood events / concerns raised regarding waterlogged land
		Hazard	Reduction in the likelihood of secondary hazards e.g., landslips contaminated water supply	Number of recorded landslips.
2.3.1	Social (individual and family)	Way of life	Negative impacts of long duration flooding avoided where use of toilets, showers etc are restricted	Uplift to direct damage, numbers of people and feedback on benefit
		Health and well-being	Reduced contact with contaminated flood water Reduced disruption to health and wellbeing caused by flooding and possible future flooding	Uplift to direct damage, numbers of people and feedback on benefit
		Fears and aspirations	Reduced feeling of isolation, helplessness Reduced disruption to health and wellbeing caused by flooding and possible future flooding	Uplift to direct damage, numbers of people and feedback on benefit
2.4.1	Social (Community)	Community	Negative impacts avoided for services and facilities	Community engagement and feedback
		Political systems	Reduction in required investigations and resource expenditure	Reduction of complaints / concerns raised
		Fears and aspirations	Negative impacts avoided. Reduction in the disruption to health and wellbeing communities are facing due to groundwater flooding	Community engagement and feedback

*[Note: Insert sub-categories and additional rows as necessary] Refer to the OBC Guidance Document for example sub-categories.*

## 3.6.3 Value Potential

Table 3 Benefits Framework: Value Potential

Ref	FCERM_AG AST Category	Sub-category	Description	Approach to capturing change
<b>Value Potential</b>				
3.1.1	Economic	Residential and non-residential property	Increased attractiveness as a place to live with benefits for property values. Potentially creating a more desirable work location.	Community survey. Correspondence with elected members / Parish / Town Councils
3.1.2		Emergency costs	Enhanced preparedness of local communities, businesses, Category 1 / 2 responders due to greater understanding of groundwater flooding and associated responses	Community surveys. Correspondence with elected members / Parish / Town Councils. Discussions with Category 1 / 2 responders and after-action reports
		Infrastructure and Transport	Reliability of infrastructure improved	Highway's, Water & Sewerage providers, telecoms, gas, electric, rail reported issues / operational responses
		Agriculture	Increased confidence in sustainability of business Improvements to variations of land usage (e.g., more diverse crop types / rotations)	Surveys with beneficiaries via National Farmers Union, National Flood Forum
		Land use	Improvements to variations of future land uses	Changes in land use classification
		Indirect effects on businesses	Potential benefits from enabling economy growth and resilience to future perturbations	Economic reports / updates via the Greater Lincolnshire

			Potential increases in desire to invest	Local Enterprise Partnership
3.2.1	Environmental	Biodiversity	Potential for biodiversity net gain	Environmental surveys and increased environmentally minded visitations
		Change in status under WFD	Healthier waterbodies	Environmental surveys. Standard water quality checks
		Regulating services	Improved soil health Biodiversity net gain Potential carbon capture and storage via wetlands Increases in usable green spaces	Environmental surveys Community surveys
3.2.2		Landscape	Improved condition of habitat Increased amount of natural habitat Increases in usable green spaces	Changes in health status of watercourses in line with Water Framework Directive Changes within land use Community surveys
3.3.1	Social (individual and family)	Way of life	Increased sense of place	Community surveys
3.3.2		Skills and competencies	Greater understanding of groundwater and its importance for the natural environment Increased confidence / capabilities of local communities to engage and lead on projects relating to groundwater / flooding	Community surveys
		Recreation	Greater enjoyment of the natural environment / outdoor space	Reports of improved health and wellbeing Community surveys
		Political systems/inclusion/engagement	Increased confidence / capabilities of local communities to engage	Community surveys

			and lead on projects relating to groundwater / flooding	
		Health and well-being	Increase in mental well-being of those previously at risk Potential increases in physical wellbeing	Community survey
		Fears and aspirations	More positive mental health from greater community and environmental connection Households are better able to plan for uncertainties associated with groundwater / groundwater flooding, taking control of decisions and how they react.	Community survey
3.4.1	Social (Community)	Community	Public realm enhancements improving sense of place Communities taking ownership and help to shape their own resilience to groundwater flooding	Community survey
		Political systems/inclusion/engagement	Increased ability / engagement / willingness to engage in other aspects / policy concerns	Community surveys
		Fears and aspirations	Communities are better able to plan for uncertainties associated with groundwater / groundwater flooding, taking control of decisions and how they react.	Community surveys
3.5.1	Knowledge and Skills	Technology	More optimism about innovative solutions for other flood-related issues	Community survey
3.5.2		Holistic flood risk management	Confidence to deliver holistic flood risk	Community survey

			management in high groundwater areas	
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[Note: Insert sub-categories and additional rows as necessary] Refer to the OBC Guidance Document for example sub-categories.

### 3.7 Comparison of costs and benefits

Describe the economic justification for the investment.

- What are the costs and the benefits (quantitative)?
- What is the benefit cost ratio?
- What are the additional qualitative benefits?
- How sensitive is the justification?

(See Guidance Document Aspect 4)

Table 4: Economic appraisal (quantitative)

Options	PVc £k	PVb £k	BCR
Proposed Solution	Total project costs £8001	Direct building and agricultural damages and indirect/intangible damages avoided in 3 trial sites XXX	

The comparison of costs and benefits in Table 4 above suggests that all project costs (£7.5M PV) can be attributed to delivering avoided damages in the 3 trial sites (£XXX PV). Although this suggests a benefit:cost ratio of., this is not an appropriate comparison for the following reasons:

- Costs for many activities will lead to benefits that are transferable to improve resilience in other locations both within Greater Lincolnshire and beyond.
- Because of the innovative nature of the project, some costs may not lead to useful outcomes and so cannot be attributed to avoiding damage. These could be termed innovation costs.

In both these cases, it is not possible at this stage to estimate the costs or benefits required to give a more accurate economic appraisal in Table 4.

### 3.8 Sensitivity of the benefits to the level of investment

Describe the 'do less' and 'do more' options and the impact on the benefits arising from the project. The purpose of this is to understand the sensitivity of the benefits to the level of investment and the optimal selection of the combination of actions. Indicatively the sensitivity should consider +/- 20% change the level of investment. Describe the economic justification for the investment.

(See Guidance Document Aspect 3)

Table 5: Do Less

Options	PVc £k
Do Less	
Description of the reduction in benefits	
<ul style="list-style-type: none"> <li>• Less exploration of the variation in social, environmental and economic contexts for groundwater resilience</li> <li>• Fewer houses protected</li> <li>• Fewer communities get improved resilience</li> </ul>	

Table 6: Do More

Options	PVc £k
Do More	
Description of the increase in benefits	
<ul style="list-style-type: none"> <li>• Less 'top-down' communication and more innovative delivery and embedding of resilience</li> <li>• More exploration of the variation in social, environmental and economic contexts for groundwater resilience</li> <li>• Better groundwater monitoring and investigation into innovative groundwater monitoring technologies</li> <li>• More approaches or refinement of approaches to modelling and mapping</li> <li>• More houses protected</li> <li>• More communities get improved resilience</li> <li>• Improved evaluation of groundwater resilience</li> <li>• Greater collaboration with the other Resilience Innovation projects which are also refining aspects of evaluating resilience.</li> </ul>	

### 3.9 Critical Success Factors

Critical Success Factors (CSFs) are outcomes that are crucial (not desirable) to the successful delivery of the investment. Describe the critical success factors for the project.

- What outcomes of the investment are crucial to meeting the objectives of the flood and coastal resilience innovation programme?
- What outcomes of the investment are crucial at project and local level?

Table 7 Critical Success Factor

Ref	Critical Success Factor	Measurement criteria
1	Ensure learning and feedback is embedded during every aspect of the project	<ul style="list-style-type: none"> <li>• Learning log, reporting on change, success/challenges</li> <li>• Feedback – stakeholders and communities, National EA team / other FCRIP projects</li> </ul>
2	Understanding current and future groundwater flooding and resource across Greater Lincolnshire.	<ul style="list-style-type: none"> <li>• Identification of pipeline sites</li> <li>• Review /revise current groundwater models</li> </ul>
3	Improved community resilience to groundwater flood risk within identified trial sites	<ul style="list-style-type: none"> <li>• Reduction in flood damage in communities involved with the project</li> <li>• Better response infrastructure</li> <li>• Community feedback and evaluation</li> </ul>

4	Identify flood risk management techniques that are sustainable, transferable and affordable.	<ul style="list-style-type: none"><li>• Quantative (future costs/cost benefit ratio) and qualitative</li><li>• No of homes with reduced risk (reduce risk banding)</li><li>• Environmental net gain/ positive carbon impact</li><li>• Outcomes worth promoting, report/studies</li></ul>
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## 4 Commercial Case

### 4.1 Summary of procurement strategy and timescales

Describe the procurement strategy and timescales.

- How will the selected procurement process demonstrate value for money?
- What supplier engagement – market testing - has taken place and how has this influenced and shaped the procurement strategy?
- What are the key tender evaluation criteria and how has innovation been addressed?
- Is this compliant with your organisations procurement procedures?
- What is the planned tender (and approval) timescale?

*(See Guidance Document Aspect 5)*

A system of procurement has been established and agreed by the partnership providing a consistent approach across delivery partners.

As partnership lead, Lincolnshire County Council will be responsible for leading on all procurement and adhere to its Contract and Procurement Procedure Rules that detail spending requirements of the Council and form part of the larger Council Constitution. For any spend in excess of the Find a Tender Service (FTS), (formerly OJEU) procurement thresholds, the requirements of the Public Contracts Regulations 2015 (PCRs) will be strictly adhered too

The method for tendering and scoring for outsourced work will enable value for money and improve cost estimates for similar work as the project progresses. Tenders and quotes are obtained through the Council's e-procurement system (ProContract) and therefore the processes are fully auditable. Suppliers invited to respond will be given an adequate period in which to prepare and submit a Tender, consistent with the urgency and complexity of the contract requirement. A minimum of at least four weeks will be allowed for straightforward and simple requirements. If more complex procurement are required, a longer period may be more appropriate. The PCRs lays down minimum specific time periods for submission of documents which will be followed.

Value for money is a prime consideration which will be balanced against the risks associated with driving innovation. It is anticipated all tendering/quotation exercises will be assessed against both price and quality factors, with the importance of each factor determined on a activity-by-activity basis to help achieve the best commercial outcomes. The balance of quality and price will always aim to drive value for money, ensure quality and achieve innovation and improvement where possible which will be achieved via a bespoke/tailored approach to each project within the programme.

To date procurement has taken place to establish contracts with Wood and Atkins to provide a capability assessment of the Lincolnshire Chalk and Spilsby Sandstone, and Lincolnshire Limestone Groundwater models.

## 4.2 Contractual terms and risk allocation

Describe the form of contract, or contracts, and how risks will be shared.

- What form of contractual arrangement is proposed?
- How will key risks be managed and shared during and post delivery?

Procurement for services will be undertaken by Lincolnshire County Council as the lead Partner, and on behalf of the Partners.

Contracts will be procured for the following:

- The supply of goods;
- Execution of works;
- The delivery of services;

Existing procurement frameworks will be used where applicable.

Contracts for GLGP will adhere to the Lincolnshire Council Standard Contract and Procurement Procedure Rules

Direct awards will typically only be used when a service or product is provided by a unique supplier with no competitors and the value is below £25k. However, one of its advantages is the reduced time taken to procure a service, allowing the project to commence on time. Value for money will be demonstrated through the financial benefit of having a supplier in place faster.

Where bespoke contracting arrangements are required (non-framework awards), contracts will be produced by Legal Lincs (the Council's legal department). As a public sector organisation, these contracts strive for a fair balance of risk and reward for all parties to the contract and offer protection to the public purse through suitable and proportionate performance management frameworks. A range of escalating sanctions will be in place to help all parties understand any consequences from a failure to deliver on their contractual obligations and contracts will also detail any monitoring and reporting requirements to help ensure performance remains on track.

Describe any commercial issues related to innovation and how these are addressed in the procurement strategy

- How are Intellectual property rights addressed in the contract to ensure public availability and use of the learning, evidence and project outputs?
- How are the innovation and performance risks addressed during delivery and post delivery?

## 4.3 Innovation and commercial issues

The following risks and issues related to innovation projects summarise our proposed mitigation:

- Not allowing sufficient time: Innovation typically requires time, and excessive pressure to deliver results can be counter-productive and lead to fewer innovative

outcomes. Sufficient time and budget is being integrated into sub-project programming to manage this risk.

- Experimenting too late: The project will need to test ideas in order to refine them. The project plan and route map will allow sufficient time for experimentation to incorporate findings in the early stages of development.
- Not meeting the requirements of the target audience: Stakeholder and community engagement will ensure innovation will match with stakeholder and community needs and preferences.

Project progress meetings led by Project Manager will monitor and assess risks. There will be a standard agenda item to review the risk register.

Intellectual Property Rights (IPR) clauses will be checked for their appropriateness. New contracts will use a Lincolnshire Council Standard Contract that specifically addresses IPR. IPR of technologies created or developed for GLGP will be owned by the party developing them. To enable transferring learning and benefits, third parties grant rights to Lincolnshire County Council to prepare reports containing high level evaluation and explanation of the technologies and the outcome of services, as agreed between the parties, and to share these reports with others.

## 5 Financial Case

### 5.1 Summary of Project Cost and Whole Life Cost

Summarise the Whole Life Cost of the project (and separately provide a more detailed cost breakdown in Appendix 5A including a breakdown of cost per resilience action).

Table 8: Project Cost

Cost heading	Cash Cost (k)
<b>Costs up to OBC</b>	
Costs up to OBC	£203,414
Sub-Total (A)	£203,414
<b>Full-Business Case Development Cost</b>	
Staff costs	£110,000
External consultant costs	£477,000
Environmental	£120,000
Other <sup>2</sup>	£0
Contingency/risk allowance 5%	£258,055
Sub-total (B)	£965,055
<b>Construction, supervision and delivery costs of resilience actions</b>	
Construction	£2,162,533
Supervision	£k
Land purchase and compensation	£k
Other	£k
Contingency/risk allowance	£2,260,956
Sub-total (C)	£4,423,489
<b>Monitoring, learning, evaluation and dissemination</b>	
Monitoring	£1,105,609
Evaluation, learning and dissemination	£k
Other	£k
Contingency/risk allowance	£1,130,478
Sub-total (D)	£2,211,745
<b>Inflation</b>	
Inflation allowance	£108,402
Sub-total (E)	£108,402
<b>Total Project Value</b>	
<b>Total Project Value for approval (A+B+C+D+E)</b>	<b>£8,001,000</b>

Table 9: Whole Life Cost

Cost heading	Cash Cost
<b>Total Project Value from table above (F)</b>	<b>£8001k</b>
<b>Post-project cost</b>	
Future operation, monitoring and maintenance costs	£k

<sup>2</sup> Add further rows as necessary for 'Other'.

Future capital replacement costs	£k
Optimism bias for future costs	£k
Sub-total (G)	£8001k
<b>Total Whole-Life Cost</b>	
<b>Total Whole-Life Cost (F+G)</b>	<b>£8001k</b>

## 5.2 Financial risks and optimism bias

Describe how the costs have been derived and how the risk contingencies and optimism bias estimated.

- How have the risk contingencies and optimism bias been derived?
- How have post-project costs and optimism bias been derived?

Project costs have been estimated by Partners and are based on experience of delivering similar work. Optimism bias has been kept at 60% for OBC due to uncertainty that still exists. Following the gap analysis and assessment of the groundwater models this uncertainty will reduce and by FBC there will be further clarity regarding whole life project costs.

Post project funding has not been included, as currently we are unable to identify what future requirements might be. These will be re-examined during the development of the FBC.

Funding options for maintaining the actions after the initial 6 year funding period include (but are not limited to) self-funding, partnership funding, grant funding (for example for capital replacement costs), commercial sources, community funding/volunteers, maintenance by a willing landowner.

## 5.3 Funding sources and contributions

Describe all funding sources and contributions.  
Appendix 5B Contributions

*(See Guidance Document Aspect 6)*

Table 10: Funding sources and contributions

Source of funding	£k	Comments
Resilience Innovation Fund	£7,551	This includes optimism bias at 40%
Contribution 1	£450 over 6 years from 25 Partners	Work in kind. Committed staff time from all Partners equivalent of £3k per annum.
<b>Total funding</b>	<b>£8,001</b>	

## 5.4 Expenditure and Funding Profile (2021-2027)

Complete the expenditure profile for the project (2021-2027)

Table 11: Expenditure Profile (2021-2027)

Costs per year (£k)	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	Total (£k)
Full-Business Case Development Cost							
Construction, supervision and delivery costs of resilience actions							
Monitoring, learning, evaluation and dissemination							
<b>Total</b>							<b>8001</b>

Table 12: Funding Profile (2021-2027)

Costs per year (£k)	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	Total (£k)
Funding Allocation (Defra)							7,551
Funding Allocation (Contributions)							450
<b>Total</b>							<b>8001</b>

## 5.5 Future funding and financing

Describe how future maintenance, operation, monitoring and asset costs will be secured.

- How will future costs be secured after the project implementation?

*(See Guidance Document Aspect 6)*

Funding options for maintaining the actions after the initial 6 year funding period include (but are not limited to) self-funding, partnership funding, grant funding (for example for capital replacement costs), commercial sources, community funding/volunteers, maintenance by a willing landowner.

Opportunities for financial contributions from partners – and commitment to those contributions – will be sought during the development phase(s) of the project, as will

opportunities for commercial funding, for example from beneficiaries of the practical actions. It is expected that in-kind contributions will be made by funding and non-funding partners alike. For example, to date partners have provided officer time and specialist advice to develop the Expression of Interest and OBC and it is expected that this will continue throughout the programme. Furthermore, volunteers will be sought to take part in certain activities, such as 'citizen scientists' assisting with the monitoring of actions on the ground.

In addition, some of the non-Governmental organisation partners are expert at fundraising by alternative means. These partners include the Lincolnshire Chalk Streams trust, Lincolnshire Rivers Trust, and the Lincolnshire Wildlife Trust.

## 6 Management Case

### 6.1 Governance and partnership arrangements

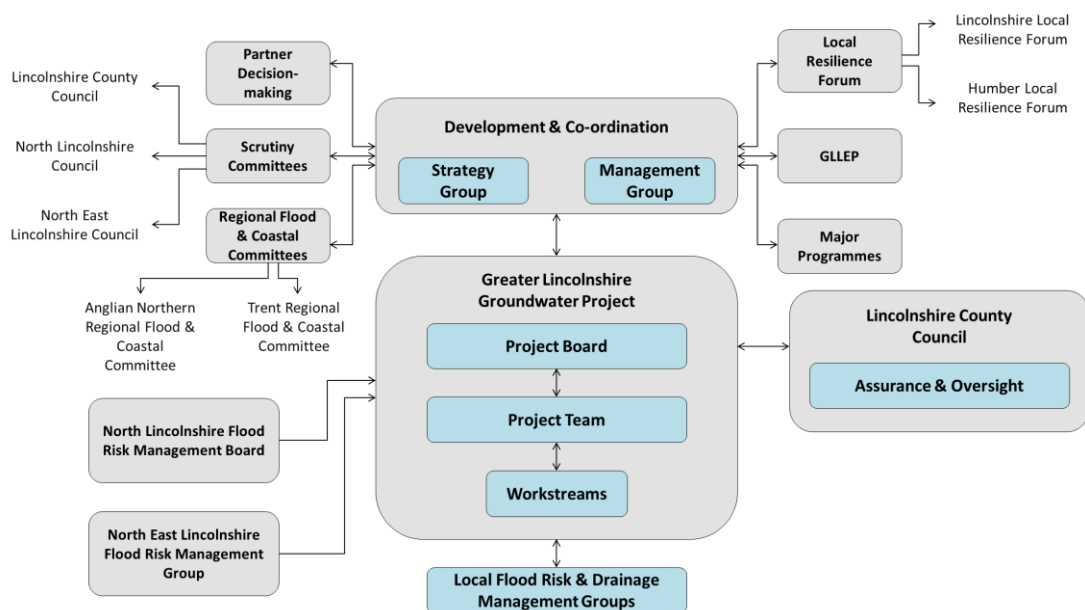
“Put simply, governance is concerned with the way in which decisions are taken and implemented, and decision-makers are held to account” (FRS17186, 2021)

Briefly describe the governance and partnership arrangements proposed for delivery.

- Who are the partners and contributors (financial, knowledge, technology)?
- What is the relationship with wider stakeholders and the local community?
- What are the management arrangements, and are these set-out in a Memorandum of Understanding (MoU), or Terms of Reference( ToR) or similar?
- What leadership commitments are in place to realise the investment ambitions?

(See Guidance Document Aspect 7)

The GLGP has established a partnership making use of stakeholder inter-agency skills and expertise to deliver the agreed outcomes of the project. The partners will form a Project Board, which will operate in accordance with the agreed governance structure. The partnership aligns with, and will work within a wider flood risk and water management structure across Greater Lincolnshire, as illustrated below:



The Project Board will be made up of relevant political members from Lincolnshire, North East Lincolnshire and North Lincolnshire County Councils, representatives from key partners, LCC’s project executive, senior users, senior suppliers and an LCC Strategic Finance Manager (see governance structure).

The terms of reference and governance structure (see appendix 6A) have been produced to facilitate collaborative, joined up working across all partners whilst ensuring clear mechanisms are implemented to report and monitor progress against delivering the agreed project objectives.



It is anticipated all delivery activities will be carried out by contracted suppliers, for example, GLGP partner NNF have been contracted to employ a Community Engagement Officer for the purpose of the project and Wood and Atkins have been contracted to review existing groundwater models and complete gap analysis work.

Project progress will be reported to the Board by the Project Manager in accordance with the monitoring mechanisms outlined in the governance structure; this includes but is not limited to regular Board meetings, political scrutiny and due financial diligence.

Evidence about the costs and benefits of the resilience actions will be gathered through monitoring by the project manager, and will form part of the regular reporting to the Board. Learnings will be discussed at monthly project progress meetings and collated and reported by the Project Manager including back to the EA.

Learning from the overall project will be identified, captured and shared through the Board by means of summative project assessments throughout the life of the programme. If deemed necessary by the Board, impartial assessments and peer review will be utilised to validate such learning. Sharing can be by many means, for example multi-agency meetings, publicity or professional literature.

## 6.2 Project management, roles and responsibilities

Briefly describe the project management arrangements for the investment.

- What of the project roles and responsibilities?
- What Quality Plan arrangements are in place to manage the investment and deliver innovation?
- What Safety, Health, Environment and Well-being (SHEW) arrangements are in place?

*(See Guidance Document Aspect 8)*

Roles and responsibilities for the project are outlined in the project terms of reference, including the project board, project team and workstreams.

Project management roles and responsibilities include:

- Project Board: responsible for the overall direction of the project
- Project Executive: overall control of the project,
- Project Manager: manages the project on a day-to-day basis on behalf of the project board, coordinating the activities of the Project Team and reporting progress of delivery, risks and issues, interdependences and budgets.

The Project Team will comprise of a full time Project Manager (recruitment for which is currently underway), 2 project support officers and workstream leads. They will be responsible for:

- Provide a key linkage between the Greater Lincolnshire Groundwater Project and the national Environment Agency (EA) team;
- Co-ordinating workstreams and ensuring that all undertaken work aligns with the strategic direction set by the Project Board (PB)

- Liaise with individual workstreams to manage and report upon project delivery, timescales, costs, quality, risks
- Monitoring progress and reporting to the Project Board
- Managing risks and issues and reporting them to the Project Board where required
- Managing lessons learnt and change controls
- Responsible for overseeing and distributing lessons reports;
- Oversee an integrated programme of delivery across Greater Lincolnshire;
- Work alongside the PB to determine the projects evaluation criteria. All criteria must be consistent with criteria developed by the EA.

### 6.3 Skills and capacity

Describe the technical knowledge, skills and expertise in place to drive and manage innovation; and the capabilities and resource commitments in place to deliver the proposed resilience measures.

- What knowledge, skills and expertise you have in place?
- What knowledge, skills and expertise remain to be acquired and how will this be done?

*(See Guidance Document Aspect 8)*

All project partners have extensive experience of leading and delivering complex asset management and community engagement projects. The partnership is made up of representatives from a number of different organisations, providing access to a wide range of varying skills, knowledge and expertise.

The majority of GLGP activities will be delivered by contractors. The Lead Local Flood Authorities will lead the bulk of the work, with support from Anglian Water and relevant Drainage Boards leading on any monitoring, instrumentation and technology to deliver smart catchment monitoring, and the Lincolnshire Chalk Steams project, Lincolnshire Wildlife Trust and Lincolnshire Rivers Trust leading on environmental baseline and monitoring work.

Further specialist skills will be accessed via contract agreements with suppliers, for example, the GLGP currently hold contracts with Wood and Atkins to provide the capability assessment and gap analysis work on the groundwater models. The large number of partners that make up the GLGP mean that where additional skills and capacity are identified the partnership can respond in sourcing specialist contractors.

### 6.4 Programme

Describe the overall route-map for delivery including a detailed programme to Full-Business Case, and the outline programme to 2027 for implementation and completion of the project.

- What are the key milestones?
- What is the critical path and what time allowances are included for risk?
- What are the key dependencies with stakeholders and the local community?
- When are the key evaluation and learning points?

*(See Guidance Document Aspect 9)*

The overall route-map for delivery including a detailed programme to Full-Business Case, and the outline programme to 2027 for implementation and completion of the project is outlined below and in Appendix 6C. It is currently anticipated that the Full-Business Case

shall be submitted for approval by end of April 2024, with the following being key milestones:

- May 2022 – Confirmation of evaluation questions for GLGP
- June 2022 – Recruitment of a suitable Project Manager to co-ordinate delivery of the GLGP
- July 2022 – Commencement of research by University of Lincoln regarding the risk of salinisation from groundwater flooding in the Lincolnshire Fens
- August 2022 – Completion of Phase 1 (Scoping) - Review of groundwater models
- November 2022 – Completion of Phase 2 (Pre-modelling) – Review of groundwater models
- December 2022 – Installation of additional groundwater monitoring sensors across Greater Lincolnshire
- January 2023 – Completion of initial rapport building and community engagement within the identified trial sites of Barton and Barrow-upon-Humber, Grimsby and Scopwick
- March 2023 – Completion of Phase 3 (Groundwater Modelling) - Review of groundwater models
- July 2023 – Commencing the identification of potential future groundwater schemes
- January 2024 – Partnership approval of Full-Business Case
- March 2024 – LCC Executive approval of Full-Business Case.

Notwithstanding the above, it is important to note that the timescales outlined are potentially overestimates as uncertainty, due to contractor availability, still exists regarding the work required to review, revise and validate the Lincolnshire Chalk and Spilsby Sandstone and Lincolnshire Limestone groundwater models. The GLGP is currently in the process of obtaining greater clarity regarding timescales. Once this has been obtained the programme will be reviewed with the aim of bringing forward the target date for Full-Business Case completion, if, upon guidance of groundwater modelling experts, such an ambition is appropriate.

Referencing the above comment regarding uncertainty, the GLGP has currently assigned risk allocations to the following activities:

Reference	Activity	Risk Allocation (Months)	Likelihood of Realisation
3	Recruitment of Project Manager	3	Medium
4	Approval of Outline Business Case	1	Medium
5	Indicator Data Collection & Confirmation of Evaluation Questions	1	Low
9	Recruitment of Project Officers (If Necessary)	3	Low
14	Procurement of Suitable Contractor for Groundwater Monitoring Sensor Installation	1	Low
15	Installation of Groundwater Monitoring Sensors	3	Low
19	Production of Full-Business Case	2	Medium

20	Community Involvement / Empowerment During Optioneering Process	2	Medium
26	Partnership Approval of Full-Business Case	1	Low
31	Assurance of Full Business Case	1	Low
32	Procurement of Suitable Contractor and Resources to Implement Measures / Work Identified	2	Medium
33	Implementation of Proportionate Place Based Measures	2	Uncertain

For ease of representation the critical path of the project has been displayed within a separate Gantt Chart (n = 60 months).

As outlined previously within the Outline Business Case, the key dependency of the project is the reviewing, revising and validation of the Lincolnshire Chalk and Spilsby Sandstone and Lincolnshire Limestone groundwater models. Without which the identification of proportionate, place-based measures will be severely compromised due to a relatively limited understanding of groundwater flood risk across Greater Lincolnshire. This is because existing groundwater models have been designed to predict / demonstrate low flows within groundwater and hence are not currently suited for assessing groundwater flood risk.

In addition to the above, another key dependency will be the engagement and empowerment of stakeholders and local communities, and as such engagement is programmed to commence in earnest during the revision of the groundwater models and will continue throughout the development of the Full-Business Case (including optioneering).

Evaluation of progress, and the identification, dissemination and integration of lessons identified will be undertaken by the Project Manager, with support from the Project Team, as often as deemed necessary. For the avoidance of doubt this process will align with FCRIP reporting requirements and the governance arrangements of the Joint Lincolnshire Flood Risk and Management Partnership alongside governance arrangements of North East Lincolnshire Council and North Lincolnshire Council. It is likely that key evaluation and learning points will be identified following the completion of the following activities:

- January 2023 – Completion of initial rapport building and community engagement within the identified trial sites of Barton and Barrow-upon-Humber, Grimsby and Scopwick
- March 2023 – Completion of Phase 3 (Groundwater Modelling) - Review of groundwater models
- April 2024 – Submission of Full Business Case
- February 2025 – Completion of research by University of Lincoln regarding the risk of salinisation from groundwater flooding in the Lincolnshire Fens
- July 2024 – October 2026 – During and following implementation and monitoring of proportionate place-based measures
- March 2027 – Identification of potential future groundwater schemes

## 6.5 Communications, stakeholder and community engagement

Describe the Communications and Engagement Plan going forward.

- How will communications be managed?
- How will stakeholders be engaged going forward?
- How will the community be engaged going forward?

*(See Guidance Document Aspect 2)*

A Communication steering group has been established which will develop best practice and hold and develop the communication and engagement plan. The Communication and Engagement Plan will be revisited and updated on a regular basis, and when new workstreams are established.

The overriding aim of our communication and engagement is to ensure that all relevant stakeholder's and communities play a key role in the design, implementation, maintenance and embedding of the project's outputs. A stakeholder mapping exercise was undertaken through the Theories of Change engagement to identify partners and stakeholders in the development of the project. Stakeholder mapping will be used again in identifying the 3 trial sites. Detailed Stakeholder and Community plans will then be developed for each trial site to encourage and enable involvement, provide consistency and help manage goals and expectations.

It is anticipated that GLGP will use the EA's web platform Engagement HQ to host digital communications with communities and stakeholders, and the wider public. This will provide consistency in messaging across our trial sites and allow partners/workstream leads access to digital tools for engagement activities. The Community and Engagement steering group will work with GLGP partners to ensure assurance sign off before information is uploaded to Engagement HQ. Partners will signpost enquiries to this website.

Communication plans will be adapted and evolve over time as the project processes. Plans will be evaluated and may change dependant on review on effective communication channels.

Future key areas for engagement with stakeholders and communities will include:

- Mapping of stakeholder and communities for individual trial sites and producing stakeholder and community engagement plans for each.
- Exploring different community engagement approaches to ensure inclusivity and maximise active involvement
- Regular review of stakeholder and community plans, objectives and success criteria
- Branding and engagement materials, key messaging and effective communication channels
- Coordinate engagement between the trial sites, any future pipeline sites and other flood resilience projects and activities.

The Project Manager, in liasion with the Communication and Engagement steering group will manage internal Partnership communications. The monthly partnership steering group meeting will provide project updates and allow partners the opportunity to discuss any

concerns, opportunities, and share lessons learnt. Further communication channels, including TEAMS channels, sharing of reports and learnings, a dedicated partner pages on the Engagement HQ website will provide the opportunity for partners to work collaboratively.

## 6.6 Risk and change management

Describe the approach to the assessment and management of risk and uncertainty.

- What are the key delivery risks (time, money, reputation) and how will these be managed?
- What are the key delivery uncertainties associated with the innovation and implementation?
- How will these uncertainties be managed?
- How will future changes be agreed and communicated?

*(See Guidance Document Aspect 10)*

Table 13 Key risks to fulfilling the investment objectives:

Ref	Key Risks	H/M/L	Owner	Counter Measures and approach
1	Capacity and resources of partners/ contractors throughout the 6 years	M	Lincolnshire County Council	Contracted suppliers will undertake most of required works, managed by a full time Project Manager and supported with a proposed 2x project officer.
2	Maintaining the engagement of partners throughout the 6-year project	M	Lincolnshire County Council	Provision of regular project updates, actively involving partners in the development of the project and ensuring partners are brought in as and when appropriate times
3	Slippage in programme /scope creep/delays in delivery of actions	M	Lincolnshire County Council	Regular tracking and review of the programme by PM and early indications raised by partners. Forward planning and understanding of risks for each phase so that any delays are more likely to be mitigated. Reporting by exception if required to the Project Board
4	Increased costs associated with supplier resource	M	Lincolnshire County Council	Quantify and plan project around maybe a most likely, best case and worse case spend profiles.
5	Ability to sustain implemented Measures / Works	L	Lincolnshire County Council	Identification of innovative funding sources for maintenance The designing of measures / works to be proportionate / sustainable, having due regard to future funding / maintenance requirements

## 6.7 Contract management

Describe the key contract management proposals.

- Who will be responsible for day-to-day contract management?
- How will interfaces and dependencies between individual contracts be managed?

GLGP partners all have experience of managing the delivery of operational contract and performance management for large programmes.

The Project Manager, with support from the Project Team will be responsible for day to-day contract management, scheduling in regular reviews of contract progression and outputs. This activity will be supported by the procurement team at LCC, in line with LCC's Standard Contract and Procurement Procedure Rules.

The Project Team will identify and assess any third-party dependencies, with input from the wider GLGP partners. Resources will be prioritised, responsibilities allocated, and strategies put in place to monitor progress. The route map will be developed following the initial desk-based research and gap analysis to take account of interfaces and communicated to the partners to pre-empt activities and solutions to minimise risk.

## 6.8 Assurance

Describe the assurance plan for the business case.

- What checks have and will be applied?
- Have partners approved the Business Case?

Useful references and existing industry guidance:

- "A Guide to Integrated Assurance", Association for Project Management, 2014

The outline business case has been produced by lead partner Lincolnshire County Council in collaboration with the GLGP partners, by way of feedback and review. It has been approved by the GLGP partners and signed off by the Project Executive prior to submission.

The business case has also been approved by the LCC's internal executive board. The draft OBC was submitted with papers to the Senior Management Team for review and approval and sign off was provided by the Service Director and lead member for flooding.

## 6.9 Innovation and learning: monitoring, evaluation and dissemination

Describe the proposals for monitoring, evaluation and dissemination of innovation and learning.

- What are the proposals and arrangement for sharing and exchange with the Programme?
- What are the proposed arrangements for monitoring the innovation and learning?
- How will the evidence be recorded and the evaluation be managed?
- What are the arrangements and plan for dissemination through the life of the project?

*(See Guidance Document Aspect 11)*

Proposals for monitoring, evaluation and dissemination are detailed in Section 2.9 and Appendix 6D.

## 6.10 Contingency plans

Describe the options available if the proposal is unaffordable, fails to win community support and/or other necessary approvals.

- Is a scaled down investment proposal possible?
- Can the phasing of the work be amended?
- Can the location of the proposals be adjusted?
- Are alternative and/or additional contributions (financial, knowledge, technology) available?

A scaled-down investment proposal was presented in Section 3.4.1, with suggested reduced benefits.

Phasing of GLGP is sequential:

1. The Conducting of academic research into the risk of salinisation of groundwater flooding in the Lincolnshire Fens and undertaking of a gap analysis and subsequent revision, including output validation, of the Lincolnshire Chalk and Spilsby Sandstone and Lincolnshire Limestone groundwater models. During this process initial community engagement will be undertaken within the potential trial sites of Barton and Barrow-upon-Humber, Grimsby and Scopwick, which have been preliminary selected based on observed flooding across Greater Lincolnshire.
2. Based on the outputs of the revised models, 3 trial sites (and potential future sites) will be confirmed.
3. The development and assessment of proportionate place-based measures within the confirmed trial sites. Throughout this process local communities shall be empowered and actively encouraged to take part in the development of measures, whilst simultaneously having regard to model outputs.
4. The implementation and delivery of packages of work in collaboration with stakeholders, including local communities, within the trial sites as identified through the assessment work, specifically suited to managing groundwater both in terms of flood risk and as a resource.
5. Throughout the development and implementation of the project, progress will be monitored, lessons shall be identified, shared and implemented and performance evaluated all of which shall contribute to, in addition to the above, the development of potential pipeline groundwater related projects.

If necessary, the 3 trial locations could be changed, although these were identified by the Partners and the desk-based analysis. Other pipeline sites will be identified during this phase.



**15 – 29 APRIL 2022**

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**FLOOD AND COASTAL RESILIENCE PROJECT - THE GREATER LINCOLNSHIRE GROUNDWATER PROJECT, SUBMISSION OF OUTLINE BUSINESS CASE**

**COMMENTS FROM THE ENVIRONMENT AND ECONOMY SCRUTINY COMMITTEE**

On 12 April 2022, the Environment and Economy Scrutiny Committee considered a report in relation to the Flood and Coastal Resilience Project - the Greater Lincolnshire Groundwater Project, submission of Outline Business Case and unanimously supported the Recommendations to the Executive Councillor for Economic Development, Environment and Planning.

The following points were highlighted:

- Members echoed that the report was very comprehensive, exceedingly well written and paved a great way forward and congratulated Officers for their efforts.
- Members recognised that a partnership approach was adopted for the whole of Greater Lincolnshire, however, asked for clarity around how it was ensured that in addition to large projects, funds would be used to tackle issues in small villages which had experienced significant flooding. Officers clarified that the proposed was not a project based to address specific issues in the county, rather aimed to develop learning and understanding of the effects of groundwater and what that meant as to use that when issues emerge in the county by enabling the roll out of works on the ground to mitigate issues emerging from groundwater. The areas initially identified were Scopwick, Grimsby and Barton and Barrow Upon Humber across three authority areas where groundwater issues have previously been identified. This would facilitate community engagement in terms of warning and informing to ensure preparedness against the effects of groundwater. Officers emphasised on funding allowing for greater exploration the potential opportunities to harness that groundwater either for environmental benefits or for increased water capacity.
- Members noted concerns related to potential for coastal inundation and the risks of flooding and other defences of water courses failing (reflecting on Wainfleet flood in 2019). Hydraulic pressure being a major force may infiltrate the foul water drains and overflow into properties; specific examples of areas similar in terms of geology and hydrology, to Scopwick were mentioned, with emphasis on the complexity of issues emerging from groundwater which required a great level of understanding before implementing any mitigations. Members were pleased to see that this project viewed groundwater as a resource to be managed rather than merely a problem to be mitigated.
- Further information in relation to the 25 local areas that had been successful in bidding for funds. Officers explained that these were spread across the country and mentioned two major projects focused on groundwater, the Groundwater Resilience and Community Engagement project, located in Buckinghamshire and the

Sunderland and East Durham Ground Water Stations in North East Durham. Links had been made with project leads in those areas for information to be shared and learning to be taken between those projects. Other projects looked at different types of flooding issues and water resource problems for example coastal problems. Further liaisons will be made to extract learning from these areas as well.

**Open Report on behalf of Andy Gutherson - Executive Director – Place**

Report to:	<b>Councillor C J Davie - Executive Councillor for Economic Development, Environment and Planning</b>
Date:	<b>15 - 29 April 2022</b>
Subject:	<b>Flood and Coastal Resilience Project - the Greater Lincolnshire Groundwater Project, submission of Outline Business Case</b>
Decision Reference:	<b>I022487</b>
Key decision?	<b>Yes</b>

**Summary:**

To provide an update on the Flood and Coastal Resilience Project and to seek approval to progress with the submission of the Outline Business Case for the Greater Lincolnshire Groundwater Project.

**Recommendation(s):**

That the Executive Councillor for Economic Development, Environment and Planning:

- 1) approves the submission of an Outline Business Case for the Greater Lincolnshire Groundwater Project generally in the form attached at Appendix A; and,
- 2) delegates to the Executive Director – Place, in consultation with the Executive Councillor for Economic Development, Environment and Planning, authority to make any final amendments to the Outline Business Case prior to submission.

**Alternatives Considered:**

- |    |  |
|----|--|
| 1. | That submission of the Outline Business Case is not approved. This would result in the Greater Lincolnshire Groundwater Project being unable to progress to Full Business Case and overall project delivery. |
|----|--|

**Reasons for Recommendation:**

Approval for Lincolnshire County Council to submit the Outline Business Case (OBC) on behalf of the Greater Lincolnshire Groundwater Partnership will, subject to approval of the OBC, allow the project to progress to developing a full business case, drawing down remaining funds and delivering against the actions to better understand groundwater issues across Greater Lincolnshire.

## **1. Background**

In the 2020 Budget, the government announced a £200 million fund for a flood and coastal resilience innovation programme to help deliver the government's policy statement on flooding and coastal erosion and the Environment Agency's National Flood and Coastal Erosion Risk Management Strategy for England.

The programme is allocating £150 million to 25 local areas, which could be a county, city, town or village, or also mean a river catchment, a tidal estuary or part of the coast.

Lincolnshire County Council is leading on the development of a collaborative approach founded on the flood and water management partnership and based on the Greater Lincolnshire geography. This includes North Lincolnshire Council, North East Lincolnshire Council, North Kesteven and East Lindsey District Councils, Internal Drainage Boards, the Environment Agency and Water Companies. Within the Council a range of internal services are engaged, including Highways, Emergency Planning & Business Continuity and Countryside Services. The overall emphasis is on the management of current and future groundwater flood risk as an area much less understood than coastal, fluvial and surface water risks. The partnership has recognised there is an identifiable impact of groundwater on residents and infrastructure across the Greater Lincolnshire area, and this little-understood subject offers opportunities for innovative approaches to be taken in making a strong bid.

Following the success of an Expression of Interest in January 2021, LCC were informed of the success of the application and acceptance on to the Flood and Coastal Resilience Innovation (FCRI) programme. It confirmed that capital funding to the value of £7,551,000 will be received over the six-year period of the project timeframe (1 April 2021 to 31 March 2027) to take forward the actions and interventions identified in the EOI. The £150 million FCRI programme was re-confirmed in the Government spending review and confirmation was received that following Ministerial approval, the Environment Agency can now allocate and pay-out this funding commencing during the financial year 2021/22.

A stipulation of the project is that this has to be led by a Lead Local Flood Authority. Lincolnshire County Council, having this role, will therefore be required to administer the funds for this project and co-ordinate project actions with partners and stakeholders to deliver against the objectives set. This project will be fully funded via drawdown of the capital allocation, with only officer time from both LCC and partners required to support project delivery.

### **Development of an Outline Business Case**

All projects have to complete an Outline Business Case (OBC) for assurance and approval by the Environment Agency's national project assurance groups. Initial allocations of funding for the supporting studies required to complete an OBC had to be claimed via submission of form FCERM7: Application for approval of studies. This was completed by members of the partnership and outlined key packages of work that will be required to lead to the development of the OBC and the associated indicative costs.

In producing an OBC this will support the development of a multi-functional Integrated Catchment Model. This model will involve using innovative methods to assess groundwater flood risk at a catchment level and will incorporate input data from partners across Greater Lincolnshire. The capability of the models will be adapted so that it is fit for purpose to be able to assess water resource opportunities and to also identify where groundwater flooding is likely to occur. Whilst the modelling work will be core to the development of the overall project other areas which will be explored include potential environmental benefits and resilience to climate change and a key focus on community engagement to better understand the risk of groundwater flooding. To support this, and in developing a robust OBC the key packages of work currently identified by the project team are as follows:

#### Project Team Resource

- To establish dedicated resource within the project team to manage the overall programme and undertake day to day tasks such as engagement, procurement, technical input and completion of the OBC. This dedicated resource is seen as fundamental to ensuring deliverables are produced to programme and meet the quality standards expected. This resource will entirely be externally funded for the duration of the project.
- Recruitment of a National Flood Forum Community Engagement Officer to establish effective community groups and facilitate a multi-agency approach to help the residents deliver outcomes.

#### Strategic Groundwater Assessment and Gap Analysis

The Strategic Groundwater Assessment has been identified as the first phase of work in assessing what data is available within the wider partnership, what methods can be used and enhanced for modelling and where there are gaps in resource, knowledge or data. The Strategic Groundwater Assessment will consist of the following tasks:

- Desktop review of the Rapid Evidence Assessment (REA) of Groundwater flooding;
- Review national mapping products for capability;
- Capability Assessment of the Greater Lincolnshire Limestone and Chalk models;
- Collection of localised data to assist with the Integrated Catchment Modelling; and
- Gap analysis – consisting of scope of works for Catchment Modelling and any other required tools

The project team are engaging with consultants who built the Greater Lincolnshire Limestone and Chalk models and will work with them moving forward to develop this further.

Confirmation has been received from the Environment Agency national team that this project has already been assessed against the criteria relating to project viability and deliverability and it is expected this next stage of project development will provide the

opportunity to further refine the scope of the project and reduce critical areas of risk and uncertainty.

### **Next steps**

Led by officers at LCC, and supported by other partners and stakeholders, the OBC for this project has been developed over recent months in anticipation of meeting the submission deadline of end of April 2022. The OBC in its current form can be found in **Appendix A** although please note that this is still in draft and is being continuously updated by the partnership. It is recognised there are sections where further detail is needed, however the context will not fundamentally change between now and submission deadline. Support is available through the Environment Agency to review the business case and, where necessary, will make recommendations which help the project get off to the best start possible to enable the partnership to achieve the planned benefits and outcomes for the project. The Greater Lincolnshire Groundwater Project has been submitted for an Outline Business Case Health check with the national Flood and Coastal Innovation Programme Team and opportunity has been taken to meet with the OBC assurance panel all ahead of the final OBC submission. Assurance will be a key step for the project with the aim to be passed through Environment Agency assurance with a recommendation to approve. This will then allow the project team to draw down additional funding, develop a full business case and begin to deliver on the actions identified.

## **2. Conclusion**

The Flood & Coastal Resilience Innovation Programme provides the opportunity to develop understanding of a broad range of groundwater risks and opportunities across multiple LLFA areas, leading to a range of practical actions delivered in partnership over the next six years. It is intended that these actions should incorporate multiple benefits, such that environmental and social resilience is built into the approaches developed.

The Expression of Interest form, developed in a relatively short period of time, required the rapid establishment of a partnership involving a broad range of partners from across the Greater Lincolnshire area. The successful establishment of this partnership and the active collaboration of its members indicates the recognition across the region of the climate change challenges faced by our residents, businesses and environment.

Final refinement of the Outline Business Case is ongoing in advance of the submission deadline of the end of April 2022. Subject to assessment and approval this will allow drawdown of the remaining allocated funds to support the continued development and delivery of the Greater Lincolnshire Groundwater Project for which the partnership will then be committed to delivering on the objectives set out for this project.

The Executive Councillor is recommended to approve the submission of the OBC in respect of the Greater Lincolnshire Groundwater Project generally as attached at Appendix A with a delegation to the Executive Director – Place to make final changes prior to the final submission date.

## 2. Legal Issues:

### Equality Act 2010

Under section 149 of the Equality Act 2010, the Council must, in the exercise of its functions, have due regard to the need to:

Eliminate discrimination, harassment, victimisation and any other conduct that is prohibited by or under the Act.

Advance equality of opportunity between persons who share a relevant protected characteristic and persons who do not share it.

Foster good relations between persons who share a relevant protected characteristic and persons who do not share it.

The relevant protected characteristics are age; disability; gender reassignment; pregnancy and maternity; race; religion or belief; sex; and sexual orientation.

Having due regard to the need to advance equality of opportunity involves having due regard, in particular, to the need to:

- Remove or minimise disadvantages suffered by persons who share a relevant protected characteristic that are connected to that characteristic.
- Take steps to meet the needs of persons who share a relevant protected characteristic that are different from the needs of persons who do not share it.
- Encourage persons who share a relevant protected characteristic to participate in public life or in any other activity in which participation by such persons is disproportionately low.

The steps involved in meeting the needs of disabled persons that are different from the needs of persons who are not disabled include, in particular, steps to take account of disabled persons' disabilities.

Having due regard to the need to foster good relations between persons who share a relevant protected characteristic and persons who do not share it involves having due regard, in particular, to the need to tackle prejudice, and promote understanding.

Compliance with the duties in section 149 may involve treating some persons more favourably than others.

The duty cannot be delegated and must be discharged by the decision-maker. To discharge the statutory duty the decision-maker must analyse all the relevant material with the specific statutory obligations in mind. If a risk of adverse impact is identified consideration must be given to measures to avoid that impact as part of the decision-making process.

Addressing issues regarding groundwater flooding is intended to support those communities most impacted by this form of risk. A Readiness Assessment undertaken by an external agency included assessment of impacts upon vulnerable groups within society, and the development of community engagement elements of the programme through the national Flood Forum is specifically designed to explore differential impacts on those with protected characteristics and to develop solutions accordingly.

#### Joint Strategic Needs Analysis (JSNA) and the Joint Health and Wellbeing Strategy (JHWS)

The Council must have regard to the Joint Strategic Needs Assessment (JSNA) and the Joint Health & Wellbeing Strategy (JHWS) in coming to a decision.

The Greater Lincolnshire Groundwater Project has most direct application with regard to the housing elements of the JSNA and the mental health (adults) priority within the Health and Wellbeing Strategy. It is intended that direct community engagement work will support appropriate intervention in this regard during the implementation of the project, and close links have been developed with public health services in the development of the Outline Business Case.

#### Crime and Disorder

Under section 17 of the Crime and Disorder Act 1998, the Council must exercise its various functions with due regard to the likely effect of the exercise of those functions on, and the need to do all that it reasonably can to prevent crime and disorder in its area (including anti-social and other behaviour adversely affecting the local environment), the misuse of drugs, alcohol and other substances in its area and re-offending in its area.

Limited direct impacts in terms of anti-social behaviour and other aspects of crime and disorder were identified during the completion of the readiness assessment, however there is potential for substantial contribution to improving community resilience in the longer term and for reducing adverse community impacts that can contribute to localised lack of inclusion or diminished sense of community belonging.

### **3. Conclusion**

The conclusion of this decision report is that it is appropriate for Lincolnshire County Council, as Lead Local Flood Authority, to submit an Outline Business Case to the Environment Agency regarding the Greater Lincolnshire Groundwater Project and approval is sought from the Executive Councillor to do so.



#### **4. Legal Comments:**

The Council has the power to submit the Outline Business Case as recommended.

The decision is consistent with the Policy Framework and within the remit of the Executive Councillor

#### **5. Resource Comments:**

Submission of an Outline Business Case as recommended, is necessary to progress securing the full £7.551m funding for the Flood and Coastal Resilience Innovation programme. Development of the OBC has to date been funded by Defra with existing staff time contributed by the partners.

Continuing development of the project to Full Business Case and ultimately delivery, is also expected to be funded by Defra and is not forecast to require any contribution from the Council's own resources beyond Officer time which is already budgeted for in the approved revenue budget.

#### **6. Consultation**

##### **a) Has Local Member Been Consulted?**

N/A

##### **b) Has Executive Councillor Been Consulted?**

Yes

##### **c) Scrutiny Comments**

This report will be considered by the Environment & Economy Scrutiny Committee on 12 April 2022 and the comments of the Committee will be reported to the Executive Councillor.

##### **d) Risks and Impact Analysis**

An external Readiness Assessment has been carried out during the preparation of the Outline Business Case which identifies key impacts across the programme as a whole. This is available from the author of the present report. In addition, each constituent project within the programme will undertake a detailed impact assessment as part of its delivery, which will be managed through the project delivery team.

#### **7. Appendices**

These are listed below and attached at the back of the report

Appendix A	Greater Lincolnshire Groundwater Project - Outline Business Case
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## 8. Background Papers

The following background papers within Section 100D of the Local Government Act 1972 were used in the preparation of this report.

Background Paper	Where it can be viewed
Readiness Assessment Report	<a href="#">LIN011 Readiness Assessment Report Final 26102021.pdf</a> .

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