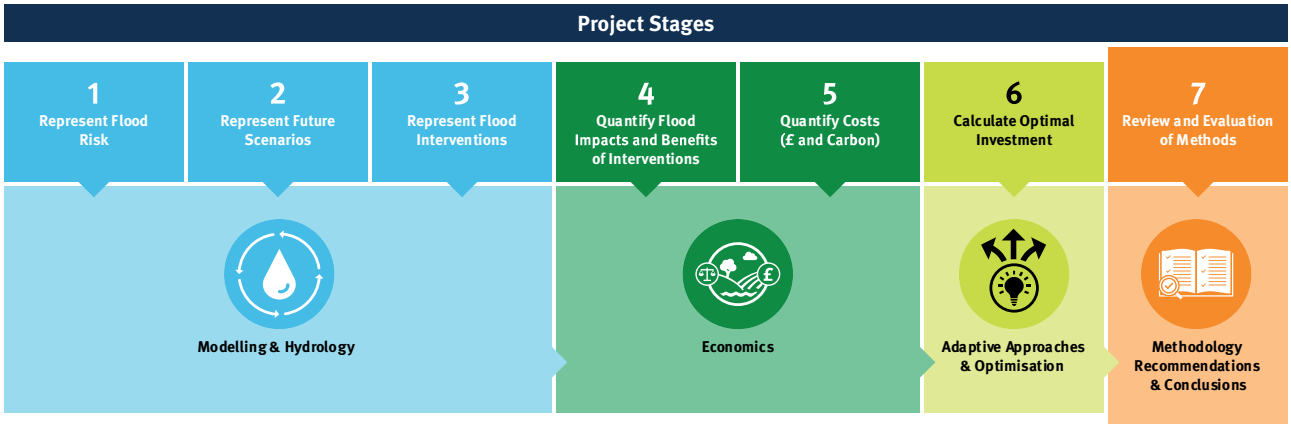
Flood Risk Investment Study

Methodology Recommendations & Conclusions



Project aims

This project had two distinct aims:

1. to identify the optimum level and timing of investment in flood protection across the Oxford to Cambridge Arc (OxCam Arc) and to use those findings to influence future investment.
2. to learn from a study of this complexity and share learnings with interested parties who are looking to apply adaptive planning to investment decisions. For example, was it technically feasible and what worked well or could be improved?

This paper focuses on responding to Aim 2.

Expected challenges

There were a number of known challenges that the OxCam Flood Risk Investment Study (FRIS) project sort to better understand through a test and trial approach. This included the:

- **Focus of the study**: The FRIS focuses on the *economic optimum spend* rather than flood risk reduction or maintaining flood risk levels which are usually the Environmental Agency's primary consideration
- **Geographical area**: The study area was chosen due to political geographical boundaries, and therefore covers large parts of, but not all of, three major river catchments. This is an unusual approach to a flood risk study which would usually consider full river catchments.
- **High levels of uncertainty: The** FRIS looks at multiple future growth scenarios (housing and commercial) in addition to future climate change scenarios.
- **Multiple risk sources**: The FRIS considers both fluvial flooding and surface water flooding. Tidal flooding is also considered towards the mouth of two of the major river catchments.

Key learnings and recommendations

Geographical Scale

Observation: the geographical boundary of the study area was determined by political, administrative, and economic reasons. However, the methodologies that needed to be applied to understand flood risk and reduction benefits needed to adhere to river catchments.

Recommendation: future projects should consider designing the study boundary to be in line with river catchments because the benefits and increased robustness outweigh the benefits of aligning with other boundaries. In some cases, the study boundary could align with Regional Flood and Coastal Committee (RFCC) boundaries especially where the RFCCs are users of the project outputs.

Observation: Undertaking modelling across three river catchments resulted in long processing times which significantly limit the speed at which work could be progressed. This would also be a major limiting factor if more detailed analysis of intervention options was required. Each catchment also needed to be calibrated individually which caused further time constraints.

Recommendation: complete separate projects for each river catchment but using the same computer modelling methodology to gain efficiency benefits.

Observation: due to the large geographical scale of the study area significant assumptions were made when assessing the viability of the flood risk interventions considered. Therefore, results are only robust at the overarching geographical scale and could lead to misleading results at a smaller scale, for example at a Local Council boundary scale.

Recommendation: invest more time in validating the feasibility of interventions at a local level so results are more relevant to local stakeholders.

Use as an influencing tool

Observation: there is high confidence in using the results of this study to influence at a national level and moderate confidence at a river catchment and local level.

Recommendation: this methodology should only be used to influence at a regional and national level.

Observation: there is low confidence in using the results to influence at a Local Council level. This is due to the methodology deployed, for example, the costs of flood storage are attributed to the upper reaches of rivers and the benefits are attributed to the lower reaches. As individual local authorities might only cover one of these, then the results they will see assigned to them would be skewed one way or the other.

Recommendation: If using this methodology and level of detail, the benefits of interventions are therefore much more likely to be realised if Risk Management Authorities link up to take a catchment-based approach.

Recommendation: If individual Local Council's are an intended audience, then a more detailed assessment is needed which can attribute benefits and costs in different geographical locations. To achieve this with any level of certainty, specific (or at least more specific) locations for the interventions would need to be identified.

Use of forecasted development scenarios

Observation: development scenarios used were not based on local information such as known strategic housing locations or Local Plan allocations. The development scenarios also favoured locations outside of flood risk areas in line with the objectives of the current planning policy sequential approach and not at business-as-usual levels. As such the results did not show development scenarios to have a major impact on the investment needed which may not reflect reality.

Recommendation: at project inception ensure the implications of modelling choices and the impacts on results are understood

'Real options appraisal' / optimisation	Observation: the use of this methodology allowed an assessment and conclusion of a robust investment pathway across multiple (27) future scenarios. Without this coded model/methodology it would not have been possible to assess, draw conclusions or present the results of such a high number of potential future scenarios Recommendation: the methodology is fit for purpose in understanding the 'no regrets' pathway. (No regrets pathway: identified level and timing of investment deemed to always be cost beneficial despite the uncertain future)
Economic assessment	Observation: The methodology used for this study goes 'above and beyond' the standard appraisal by including indirect benefits such as gross value added (GVA). Since one ambition within the OxCam Arc is to increase the economic output of the region, it was important to assess impacts on future economic growth to see how investments in flood risk management and wider climate adaptation and resilience measures could help protect future economic growth. Recommendation: Numerous Local Council's and cities in the UK, such as Manchester and Bristol, are seeking to leverage future economic growth to fund their climate resilience and green ambitions. The methodology is fit for purpose and can be replicated elsewhere for this purpose.
Selection of Intervention for investment	Observation: specific interventions and their suitability in each location was not assessed due to budget and timing constraints and a lack of local knowledge within the project team. This means interventions considered for specific locations cannot be shared or the percentage breakdown of different interventions within catchments despite our stakeholders being interested in this information. This project was designed to provide monetary values and therefore it is the costs and values of the interventions that are reported on, rather than the specific intervention types and their locations. Recommendation: Identify the target stakeholders and end users early in the project. Ensure that the project's focus and limitations are clearly communicated throughout project lifecycles.

Conclusion

Was it possible to identify a robust investment pathway?

Yes.

Innovative methodologies were needed due to the high number of variables considered (climate change and forecasted built development increases).

The methodology is robust through an economic lens when viewed as intended at a regional scale. However, the hydrological/intervention selection methodology is not considered robust at a more local scale. As such the outputs from the study are not robust enough to use to make individual investment decisions.

Could the outputs be used in the intended way to influence investment?

Partially.

The results can be used to evidence that early investment in flood protection in the region provides the greatest return on investment and how this level of investment changes based on changes in the climate and growth. It also provides a no/low regrets investment pathway.

However due to the OxCam Arc not receiving direction via a government led Spatial Framework, there is no central or strategic place to target future influencing. Local Councils across the region have expressed commitment to work together, however, it is thought that these local stakeholders would be keen to breakdown the results to smaller geographical areas, which is not possible based on the methodology used.

The outputs of this project could be used, in some parts of the OxCam Arc, specifically where combined authorities or County Councils operate at a more strategic scale and may have the remit and skills to manage investment under the new levelling up agenda. RFCCs could also potentially play an active role in using the output, because they can provided a strategic overview of flood risk management investment.

The results could be used to influence HM Treasury/national organisations, however, because the OxCam Arc only represents 8% of England's land a case study approach may be most suitable.

A key lesson for undertaking a similar project in the future would be to ensure that end users for the results are identified who are fully engage from project inception and who are committed to acting on the results. Results from the OxCam Arc FRIS could be used as an example to help with these early conversations.