Hindley Integrated Water Management Plan

Strategic Report

Client: United Utilities

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Prepared on behalf of;

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Document Control Sheet

Hindley IWMP

Strategic Report – Prepared by Jacobs UK Limited

This report provides a strategic indication of the measures which should be considered by the Greater Manchester Integrated Water Management Trilateral Partnership to support the reduction in flood risk and improvements in water quality in the areas of Bickershaw Lane (including Keats Way) and Platt Bridge.

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Glossary

List of Acronyms

Acronym	
AEP	Annual Exceedance Probability
BCR	Benefit Cost Ratio
CSF	Critical Success Factors
EA	Environment Agency
FDGiA	Flood Defence Grant in Aid
FRMS	Flood Risk Management Scheme
GiA	Grant in Aid
GMCA	Greater Manchester Combined Authority
IWMP	Integrated Water Management Plan
JBA	JBA Consulting
NbS	Nature based Solution
NFM	Natural Flood Management
NRV	Non-Return Valve
OB	Optimism Bias
P	Phosphorus
RMA	Risk Management Authority
SuDs	Sustainable urban Drainage Systems
UU	United Utilities
WFD	Water Framework Directive

List of Definitions

Term	Definition
Annual Exceedance Probability	Hydrological assessment of the probability of an event occurring each year
Benefit Cost Ratio	The **Benefit-Cost Ratio (BCR)** is a financial metric used to evaluate the **economic feasibility** of a project or investment. It compares the benefits of a project relative to its costs, helping decision-makers determine whether the project is worthwhile. In economic terms, a Benefit-Cost Ratio (BCR) of less than 1 means that the costs of a project or investment outweigh the benefits. Many organisations use a BCR of 1 as a minimum threshold for project financial viability and only invest in those that show a BCR greater than 1.
Critical Success Factor	Attributes that any successful proposal must have, if it is to achieve successful delivery of its objectives
Flood Defence Grant in Aid	Central government fund for managing flood risk in England
Flood Risk Management Scheme	A coordinated set of measures designed to reduce the risk and impact of flooding in a specific area. These schemes are typically developed by government agencies, local authorities or water companies, often in collaboration with communities and other stakeholders.
Fluvial	Referring to anything related to rivers and the processes associated to them
Grant in Aid	A form of public funding provided by a government department to support the activities of another organization, typically for public benefit
Greater Manchester Combined Authority	A collaborative body formed by ten councils of Greater Manchester and the Mayor of Greater Manchester
Integrated Water Management Plan	A collaborative approach to the way all elements of the water cycle are planned for and managed within Greater Manchester
JBA Consulting	A part of the JBA Group, formation of environmental, engineering and risk management companies
Measure	Throughout the Hindley IWMP project, and throughout this report, a '*measure*' is determined as a component part of an option. For example, SuDs would be accounted as a measure.
Nature Based Solutions	Protecting, sustainably managing and restoring natural and modified ecosystems
Natural Flood Management	Working with nature to reduce the risk of flooding for communities
Non-Return Valve	Allowing water to flow in one direction, where in pressurised conditions may cause reversed flow.

Term	Definition
Optimism Bias	Refers to the tendency to underestimate costs, risks and timelines, and overestimate benefits when planning projects, especially in infrastructure, flood risk management and environmental schemes. Optimism Bias has been used in the Hindley IWMP to account for the uncertainties of the project.
Option	Throughout the Hindley IWMP project, and throughout this report, an *'option'* is determined as a collection of *'measures'* to reduce and mitigate the risk.
Risk Management Authorities	Organisations which play a major role in managing flood and coastal erosion risks
Separation	Hindley IWMP have categorised the separation measures as both disconnections from the combined sewer system along with nature based and natural flood management techniques which support in reducing flood risk and improving water quality.
Storage	Hindley IWMP have categorised storage measures which present grey storage solutions to reduce flood risk.
Sustainable urban Drainage Systems	Designed to manage surface water run-off environmentally friendly manner, by mimicking natural water systems
Total Phosphorus	Impacts water quality, as it acts as a nutrient which fuels growth of algae and aquatic plants, which can severely degrade aquatic ecosystems. Reducing levels helps to improve the ecological health of rivers, lakes and estuaries, aligning with the UK's 25-year Environment Plan and the Environment Act 2021.
Water Framework Directive	EU legislation aimed at protecting and improving water quality

1. Executive Summary

Jacobs UK Limited, were commissioned by United Utilities on behalf of the Greater Manchester Integrated Water Management Plan Team, to assist in delivering the Hindley Integrated Water Management Plan following the New Years Day floods.

Water Stewardship sits at the heart of Integrated Catchment Management, for organisations and Risk Management Authorities to come together to create a system-scale, place-based solutions for water, environment and / or social benefits.

In September 2021, a Memorandum of Understanding was signed by the Greater Manchester Combined Authority, Environment Agency & United Utilities, creating the first Partnership looking to manage water differently across the city region. In September 2022, it was agreed that GMCA, United Utilities and the Environment Agency should produce an Integrated Water Management Plan to bring together a collective vision, objectives and actions, while also identifying accountability and capacity for delivery.

The Greater Manchester Integrated Water Management Plan (GM IWMP) sets out the vision, ambitions and objectives which it will achieve by 2050. At the core of this initiative is the need to achieve continuous advancement through sustainable water management, enhancement of the natural environment and the development of resilient infrastructure to withstand flooding and the effects of climate change.

The IWMP team with Wigan Council have collaborated to support a place-based programme for the area of Hindley and Platt Bridge. This project team aims to develop and implement a comprehensive strategy addressing both flooding and water quality, through a multi-agency approach. By creating this strategy, true integrated water management can be deployed in the area, fostering a safer, healthier and more resilient and sustainable environment.

In Platt Bridge, two main rivers, Brookside Brook (flowing from the East) and Borsdane Brook (flowing from the North) converge to continue as Hey Brook, which flows Westward through Platt Bridge.

On New Years Day 2025, significant flooding occurred at Bickershaw Lane and Platt Bridge. This was the third time that these communities had flooded in a year. Modelling has indicated that 131 properties are at '*very significant risk'* (1 in 5 chance per year) of flooding in Hindley and Platt Bridge from Hey Brook. Additionally, there are over 400 homes and 51 businesses facing a 1 in 100 chance of flooding. The frequency of surface water flooding is a significant problem, with an estimated 1 in 2 chance per year.

The catchment area is predominantly served by a combined sewer system, with several surface water connections such as Hindley Cemetery. Surface water outfall locking occurs during a 1 in 2-year event (50% AEP) and is further hindered as water levels in Borsdane and Hey Brook rise, overwhelming critical infrastructure. Fluvial flood risk is driven by channel capacity and infrastructure constrictions leading to flooding in areas such as Templeton Road during a 1 in 2-year (50% AEP) event. Additionally overland flow paths from fluvial flooding enter the drainage network recirculating the water through the system.

It requires to be noted that the Hindley IWMP project was delivered over a 12-week period between February and May 2025, which required accelerated working methods, limiting the analysis and the detail achieved. Key Limitations can be found in Appendix A in section 11.1 of this report. These limitations should be considered when advancing the project.

Over the course of the 12-week period, the project activities focussed on developing and testing the effectiveness of place-based high-level options using hydraulic modelling. This included exploring opportunities for traditional grey solutions, sustainable surface water management and nature-based solutions, whilst incorporating the proposed fluvial flood risk management project.

The options for reducing surface water flooding are categorised into those that separate urban and rural run-off from the river and drainage network, and those which add additional storage capacity to the drainage system, thereby reducing the surface water flood risk. These options are also tested with and without the Flood Risk Management Scheme (FRMS) which seeks to reduce the frequency of flooding from the main rivers.

When assessing the benefits to the catchment, the combination of measures that separate rural and urban run-off from the river and drainage systems ranks highest in terms of both damages avoided and the broader benefits as represented by the Value Framework. Integrating these measures with the FRMS, not only offers the best value approach for the catchment but also supports a reduction in linear defences. This reduction is also observed when storage measures are combined with the FRMS scheme. This is particularly important

given the current funding rules for flood risk management schemes. Hindley FRMS faces a significant funding shortfall, which poses a barrier to its progress without additional Partnership Funding.

Notwithstanding the challenges of funding, this study recommends the most advantageous long-term approach to the management of flood and water quality issues in the study area, which is **to prioritise the implementation of a Flood Risk Management Scheme (FRMS) combined with measures to Separate run-off from the drainage network.** In upstream parts of the catchment, this means measures to slow and store water on greenfield spaces utilising Nature Based Solutions (NbS) and enhancing existing storage areas, while in the urban areas, rainwater management and Sustainable Urban Drainage (SuDs). Such measures could help to reduce flood risk, and the frequency and volume of network discharges leading to water quality benefits.

The Wigan Greenheart scheme (led by Lancashire Wildlife Trust) proposals for Victoria Fields by Hindley Prison have been integrated into the place-based options as both online and offline NbS measures, offering approximately 40,000m^3 of potential storage. The proximity to the key flood risk sites coupled with the comparatively low cost per m^3 of storage, makes this measure highly ranked. Therefore, collaboration with the Wigan Greenheart project is encouraged throughout the discovery phase of the Landscape Recovery Programme. Identifying funding to ensure the delivery of these measures is crucial, as they complement the FRMS scheme, and offer additional biodiversity & water quality benefits.

Under the current funding frameworks, none of the place-based options, whether they included the Flood Risk Management Scheme (FRMS), were found to be economically cost beneficial. The Flood Risk Management Scheme (FRMS) will be developed to meet cost beneficial criteria required for Grant in Aid (GiA) funding, aiming to enhance protection against fluvial and other sources of flood risk. However, the broader measures within the place-based options will require further exploration to determine their economic feasibility for delivery.

The project has identified a range complementary measures which could be delivered alongside the FRMS, adding further value to both the community and the local area. These additional benefits have the potential to unlock Partnership Funding opportunities, provided they are supported by expertise in Green Finance. It is therefore recommended that further modelling and detailed analysis be undertaken to strengthen the case (through quantifying the benefits) for flood risk mitigation in the area, while continuing to progress the FRMS.

It is recommended to adopt a new approach when assessing the viability of a solution for the benefit of the community and environment, recognising and valuing a blend of economic, financial, environmental and societal benefits.

This project seeks to inform the GM IWMP partnership on the merits of the various Options and provides three different pathways forward to consider. This provides flexibility to adapt to funding and delivery scenarios, some of which are within the direct control of the Greater Manchester IWMP partners and others from external sources. Complementing these options are a suite of recommendations relating to influencing development, community preparedness, resilience and emergency planning, all of which should be progressed in an integrated way.

When determining whether any option should be implemented into the area, further assessment must consider technical effectiveness, economic benefit and value added to the catchment. This approach offers flexibility in progressing options based on various factors such financial, governance and process constraints which would influence the level of protection and measures implemented.

2. The Strategic Case

2.1 Introduction

Climate change predictions suggest an increase in the frequency and severity of storm events, heightening flood risk to people, properties and infrastructure. With forecasts indicating a 27% rise in peak river flows and a 20% increase in rainfall by the 2050's, it is becoming increasingly challenging to justify the expenditure required to mitigate present and future flood risk to acceptable levels under current economic funding rules.

The drainage infrastructure and watercourses in Hindley and Platt Bridge are intricately connected, as evidenced by the area's extensive flood history, including the most recent flooding on New Years Day 2025.

The *'Section 19 Flood Investigation Report'*, published by JBA Consulting in May 2025, identified that 35 residential and 11 commercial properties were affected by internal flooding in Platt Bridge. In response to the devastation caused by Storm Eowyn and previous flood events, the Risk Management Authorities within the Greater Manchester IWMP have initiated the Hindley Integrated Water Management Plan.

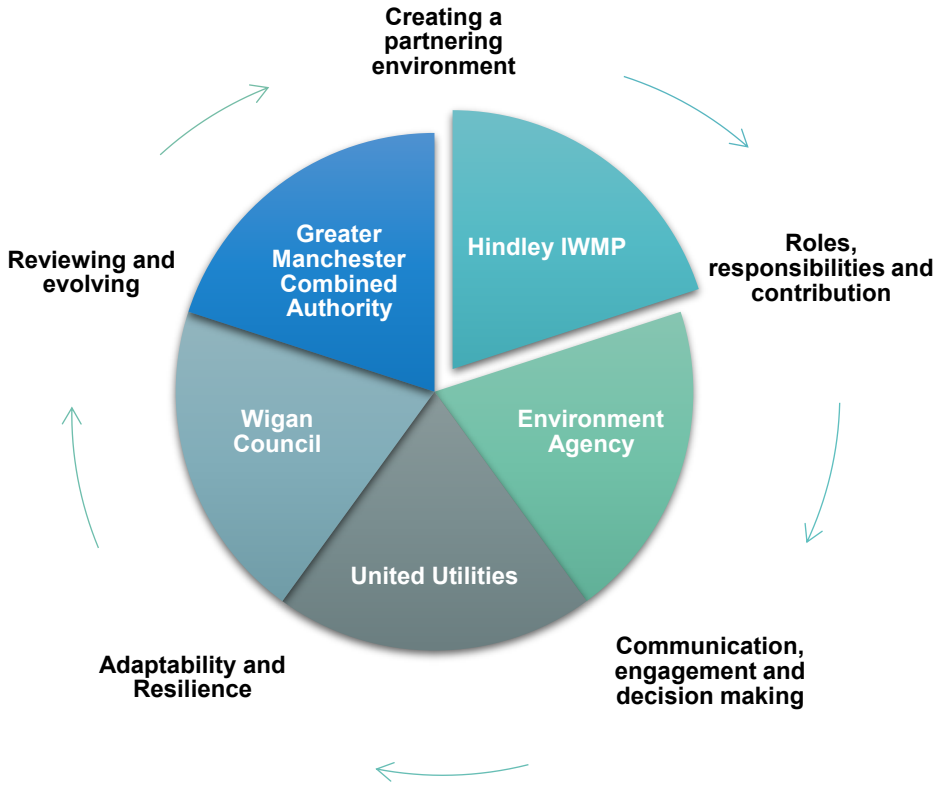


Figure 1; Hindley IWMP

The Hindley Integrated Water Management Plan, aims to unite partners in sharing their knowledge of water related issues, focussing on the interconnections between the flood and water quality concerns from the river and the drainage network.

By adopting this collaborative approach, partners can apply the principles of the Greater Manchester IWMP, to create an adaptive place-based IWMP for Hindley to enhance and maintain water management practices for the community's benefit.

As part of the Hindley IWMP, the project has developed and analysed numerous potential options, each comprising individual measures, to significantly reduce flood risk and improve water quality, benefiting both the community and environment.

Together, with the formation of the Hindley IWMP and the project, marks the beginning of collaborative efforts in Hindley, and the reports produced should enable partners to work together more effectively to advance and implement the IWMP's ambitions, thereby supporting the Greater Manchester IWMP 2050 plan.

2.2 Roles and Responsibilities of Water Environment Partners

Figure 2; Management of flood risk

Whilst water in any catchment functions as a single system, the accountability of that system is shared amongst several organisations and individuals. The Flood and Water Management Act 2010 places a duty on Risk Management Authorities (RMA's) to cooperate with each other in sharing information and act consistently in line with national and local strategies.

More recently, Sir John Cunliffe has noted that *'there is a need for strategic coordination across sectors impacting or interacting with water'.*

However, the Risk Management Authorities have different budget constraints and drivers and use different methods for making investment decisions and this can lead to ineffective siloed working. The GM IWMP seeks to overcome this, and it is apparent through this project that some institutional barriers remain.

In addition to the statutory responsibilities held by Risk Management Authorities, concerning flood risk, communities, landowners and individuals also play an active role in reducing flood risk and improving water quality in catchments:

- Catchment Partnerships Groups, while not holding any statutory duties, are increasingly delivering a more integrated and inclusive approach to managing the water environment at a catchment scale. This is achieved through working with charities, NGO's, public and private sector organisations that contribute to the objectives of the River Basin Management Plan.
- Public and private landowners, along with infrastructure providers, play a crucial role in enabling areas for nature-based solutions. Landowners are responsible for maintaining the assets on their land, though they are not duty bound to do so.
- Homeowners, individuals, and businesses must adhere to relevant planning permissions and building regulations for their properties. They are also responsible for obtaining the necessary permissions when modifying their properties, such as building an extension or extending driveways.

3. Problem Definition

Frequent flooding from the combined and surface water drainage networks and the watercourses in the area cause disruption and damage, contributing to water quality issues across the catchment.

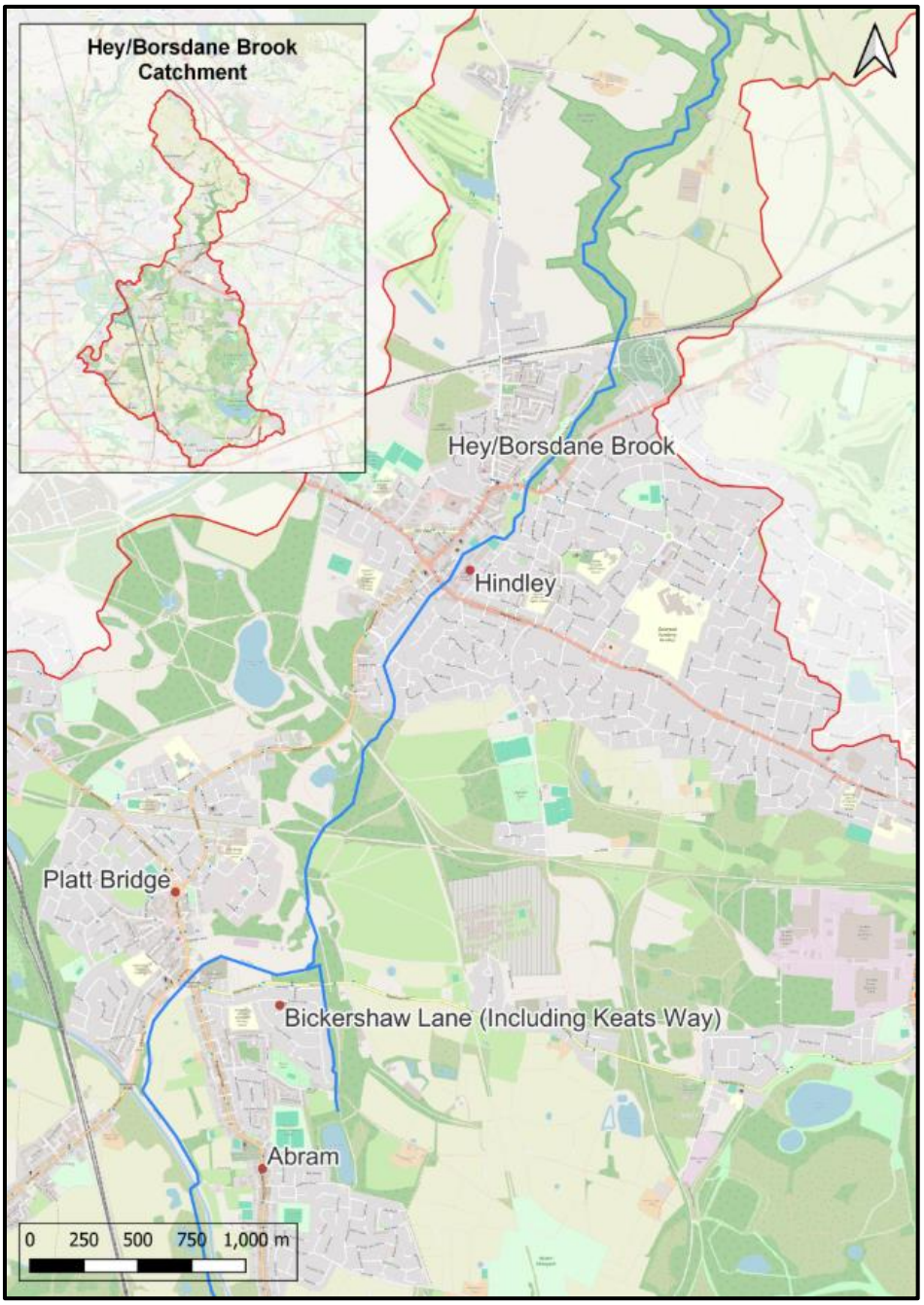


Figure 3; Map of Hey/Borsdane Brook Catchment as provided by United Utilities

3.1 Flood History

A JBA Consulting 'Hindley Fluvial Modelling Report' references flooding events from 1850 to 2024, stating that some events were localised and were amplified by operational issues, such as blockages (1944 & 2002). However, when not giving focus to those events, the report indicates that significant fluvial flooding occurs at and above a 1 in 25-year event.

The Environment Agency are currently using a computer river model to understand current and future flood risk due to climate change. Modelling has indicated that 131 properties are at 'very significant risk' (1 in 5 chance per year) of flooding in Hindey and Platt Bridge from Hey Brook. Additionally, there are over 400 homes and 51 businesses facing a 1 in 100 chance of flooding.

United Utilities have documented incidents from their infrastructure since around 1999, however following the implementation of a detention tank aimed at reducing sewer flood risk, hydraulic incidents significantly decreased. However, since 2019, there have been reports of external and internal property flooding in the

area, due to *'flooding other causes'* such as blockages. Since 2023, there have been eight properties affected by flooding due to hydraulic incapacity of the United Utilities infrastructure, six of these properties are related directly to Storm Eowyn.

Wigan Council have circa ninety-one reports of property flooding in the Hindley IWMP area, which includes, Aspull, Abram, Bickershaw, Platt Bridge, Hindley and Hindley Green. These reports span from 2019 to 1st January 2025, involving a mix of surface water (highway) and fluvial flooding incidents affecting both roads and properties. The flooding mechanisms are attributed to operational issues (blockages) and hydraulic incapacity.

On New Years Day 2025, there was significant flooding at Bickershaw Lane and Platt Bridge, Bickershaw Lane, suffering property flooding for the 3rd time in 12 months.

As the Lead Local Flood Authority, Wigan Council have commissioned a Section 19 Report, under their duty outline in the Flood & Water Management Act 2010 and was published on the 16th June 2025. Additionally, a Section 19 Report *('Greater Manchester December 2015'*) is available for Storm Eva in December 2015, which reportedly affected twenty-one properties in Platt Bridge and Hindley.

All Section 19 Reports are available on the Wigan Council website. To access them, navigate *'Resident'* section, then go to *'Crime and Emergencies'* > *'Flooding and Draining'* > '*Flood Investigations'*

Bickershaw Lane | North of Bickershaw Lane, scrap yard and United Utilities Hindley Pumping Station | Evacuations Templeton Road | Templeton Road, Platt Bridge

Figure 4; Flooding in Platt Bridge on New Years Day

3.2 Infrastructure connectivity and risk

Within the catchment area, United Utilities infrastructure primarily consists of a combined sewer system, which also receives inputs from surface water & highway drainage connections - most notably being located at Hindley Cemetery.

Surface water is a primary cause of flooding across the Hindley IWMP study area, predominantly due to the drainage networks inability to discharge due to high water levels in Borsdane, Hey and Dog Pool Brook, between a 1 in 2-year (50% AEP) and 1 in 5-year (25% AEP) event. Local topographic depressions are a contributing key factor to the problem.

Additionally, the surface water connections worsen the surcharge of the combined system during storm events, resulting in increased flood volume and higher combined sewer overflow discharges. During flooding events, these flows will circulate through the system.

Fluvial flood risk is primarily driven by the channel capacity of main and ordinary watercourses, causing tributaries to back up. Infrastructure constrictions, such as bridges, and utility pipes, increase the risk of blockages and further restrict channel capacity. Fluvial flooding begins at a 1 in 2-year (50% AEP) event in areas like Templeton Road, First Avenue and Platt Lane. Property inundation starts at a 1 in 5-year (25% AEP) event at First Avenue and Platt Lane, with additional properties, businesses, key infrastructure and roads being affected as the storm event intensifies.

Overland flow paths from fluvial flooding enter the drainage network, recirculating the flood water through both, contributing to spills to the watercourse and flooding.

Figure 5; Flooding in Platt New Years Day 2025, credit to NEW YEAR FLOODS PART 2 - 2025 - Platt Bridge , Wigan Lancashire , drone footage #djidrone #flood - YouTube

3.3 Waterbody Quality

In conjunction with flood risk for catchment, there are long standing water quality issues predominantly in Hey & Borsdane Brook, which are currently classified as *'heavily modified'* with a WFD *'moderate'* ecological status in both 2019 & 2022. There are numerous sources contributing to the water body not achieving *'good'* status such as physical modifications, diffuse pollution from abandoned mines, urbanisation and point source pollution from intermittent sewage discharges.

According to the *'Pennington Flash Water Investigations Quality Investigations Study',* United Utilities assets contribute approximately 17% of the Total Phosphorous (P) load over a typical year to Pennington Flash, with Hindley Pumping Station representing 12%.

A source apportionment exercise found that United Utilities assets were not the main contributor to Pennington Flash, as the detritus phosphorus associated with the decay of vegetation and other mechanisms, were identified as the most significant contributor (≈49% annually) of Total P to the lake.

4. Objectives and Critical Success Factors

4.1 Objectives

The strategic ambitions and goals of the partners align at an organisational level.

Each partner's strategy emphasises the creation, protection and enhancement of the natural environment to support the local economy, ensure a sustainable future and a nation resilient to climate change.

Collaborative efforts are crucial to address the challenges which these strategies aim to overcome, delivering multiple layers of benefit and value.

The Hindley IWMP is aimed to incorporate guidance from various strategies, aspirations and existing programmes of work. This will establish agreed and shared ambitions, objectives and requirements for a successful partnership and delivery of place-based solutions.

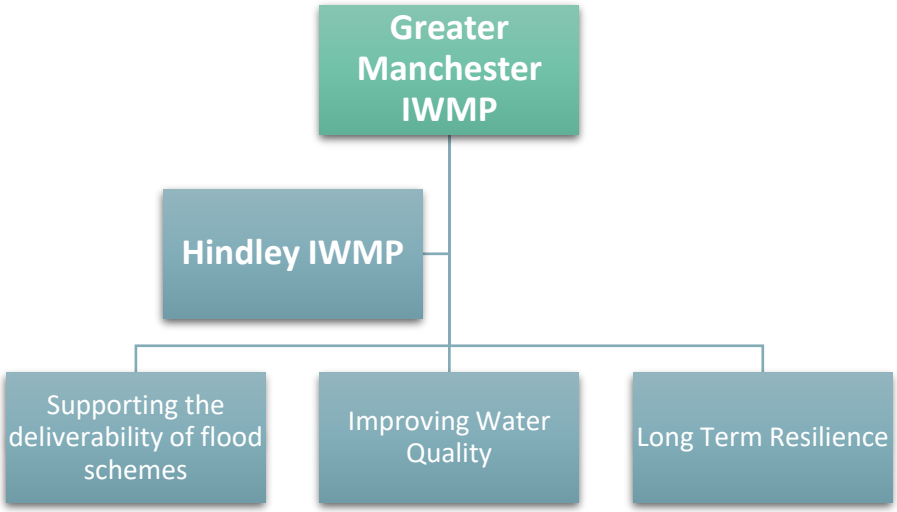


Figure 6; Ambitions of Hindley IWMP

Underpinning the three ambitions, are objectives to provide focus on the risks which require resolving to reduce flooding and improve water quality.

Ambition	Objectives
Supporting the deliverability of flood schemes	Reduction in fluvial flood risk in Hindley, Platt Bridge & Bickershaw Lane
	Reduction in surface water flooding due to hydraulic incapacity and third-party influence
	Improvement in level of service for the sewer infrastructure
Improving Water Quality	Achieving the requirements of the Water Framework Directive
	Reduction of phosphate loading onto the watercourses
	Enhancement of the drainage infrastructure to reduce storm overflow discharges
Long Term Resilience	Collaborate to address policies that strengthen the partnership
	Enhance the local environment and community
	Ensuring the long-term resilience of the drainage network through protection measures

Table 1; Objectives of the Hindley IWMP

This framework was utilised to filter and refine the *'unconstrained long list'* helping to identify measures delivering multiple benefits across the catchment.

4.2 Critical Success Factors

Critical Success Factors (CSF) are a useful way to appraise the deliverability and alignment of an implementation strategy against pre-agreed criteria.

For the Environment Agency and Local Government partners, the HM Government Treasury Green Book methodology utilises 'multi-criteria decision analysis' to appraise options and support the rational decisions between alternative options, when there is a requirement to achieve multiple specific objectives. Critical Success Factors provide performance criteria which each of the solutions should be compared against. Whilst this approach is relevant and familiar to some of the IWMP partners, it is less so for others and can be seen as a constraining factor in decision making. This becomes relevant when discussing the alternative pathways in section 8 of this document.

Key critical success factors	Relationship to Hindley IWMP
Strategic fit and business needs	- Fluvial flood scheme options must be consistent with National FCERM Strategy - Ensures comprehensive alignment and integration with Risk Management strategies, policies and programmes - Must support in meeting the regulatory Water Framework Directive (WFD) drivers for the Glaze River Catchment
Potential value for money	- Enhances social and environmental value by integrating green spaces - Whole life benefit of the identified solutions should exceed costs and provide good value when compared to alternate options to alleviate flood risk / improve water quality
Supplier capacity and capability	- Potential consultants / suppliers must have the capacity and expertise within their workforce to carry out the option
Potential affordability	- The option must be funded in accordance with the funding policies and governance of the individual partners of the Hindley IWMP as well as any other contributing partners
Potential achievability	- Partners must be able to adapt to the change in which this option will bring to the organisations, from both financial and resource perspective - All necessary approvals and consents must be obtained, construction must be physically possible to complete - Responsible partners must be identified as asset owners to take accountability of providing the necessary operational budgets and resources to safely complete, required maintenance over the lifetime of any new asset

Table 2; Critical Success Factors

For Hindley IWMP the critical success factors must acknowledge the complexities of a multi-agency approach in developing a comprehensive strategy, and delivering multi layered solutions which will naturally be underpinned by several national and local strategies for reducing flood risk and improving water quality.

- **Strategic Fit & business needs:** This is an integrated complex project, aimed at enhancing water management practices through collaboration. Achieving successful outcomes requires aligning and understanding the strategic business needs of each partner, which can be challenging when defining the benefits of the preferred solution. While each partner shares a common strategic ambition, their individual requirements to achieve this ambition may introduce complexities and obstacles in developing

the preferred solution. It will be important therefore that the GM IWMP act to facilitate and harmonise any organisational misalignment.

- **Potential value for money:** Ensuring that the benefits outweigh the costs, when undertaking actions to address statutory and policy requirements. One of the strategic objectives for the Hindley IWMP is to *'Improve Water Quality'* which includes statutory requirements for United Utilities to deliver as part of their Water Industry National Environment Programme. United Utilities is required to demonstrate that investment provides good value for customer money. The Pennington Flash scheme will improve water quality in Pennington Flash and Hey Brook by 2030.

- **Potential affordability:** Flood risk in Hindley and Platt Bridge is primarily driven by fluvial and pluvial sources. The main funding route for addressing both types of flood risk is the FCRM Grant in Aid. However, it's important to note that pluvial schemes often face challenges in demonstrating sufficient benefits under the current FDGiA Partnership Calculator, when compared with other schemes eligible. A revision of the calculator is anticipated in 2026, which is expected to improve the viability of pluvial options identified with the Hindley IWMP.

  Currently, there is a shortfall for the fluvial scheme. With the proposed changes to the Partnership Funding Calculator, the level of external contributions required is likely to decrease significantly. This situation is not unique to Hindley and Platt Bridge, many schemes across the country face similar challenges. Therefore, the key remains in the effectively demonstrating the benefits within the business case to secure funding.

  The Hindley IWMP aims to develop integrated water management solutions, making partnership-based funding a crucial challenge to address. This endeavour will face additional hurdles due to the misalignment of partners' investment periods. As business plans are developed and funding requirements are assigned throughout the previous investment cycle, new and emerging needs may challenge the affordability for each partner.

- **Potential achievability:** Ground conditions in the area may not be suitable for surface water management options and would potentially restrict the opportunities in the catchment. New infrastructure in the catchment may present an additional pressure on resource and capability on the partners internal business, this constraint being underpinned with ownership of new infrastructure.

5. Development of Options

An abbreviated framework based on the HM treasury business model was used to frame the project starting with the problem definition, setting of assessment criteria, development and assessment of options and assessment of the relative benefits. This approach facilitated the 'unconstrained' thinking and allowed comparison of options against the framework outlined in Section 4.

To develop a truly integrated water management plan, it is essential to acknowledge and consider the projects of partners. This integration enables the achievement of optimal catchment benefit and smarter delivery of interventions.

5.1 Projects of partners

5.1.1 Flood Risk Management Scheme led by the Environment Agency

The Flood Risk Management Scheme (FRMS) is led by the Environment Agency and covers the key flood risk areas of Hindley and Platt Bridge, while also looking at contributing to the catchment area for options on how best to manage that risk now and in the future.

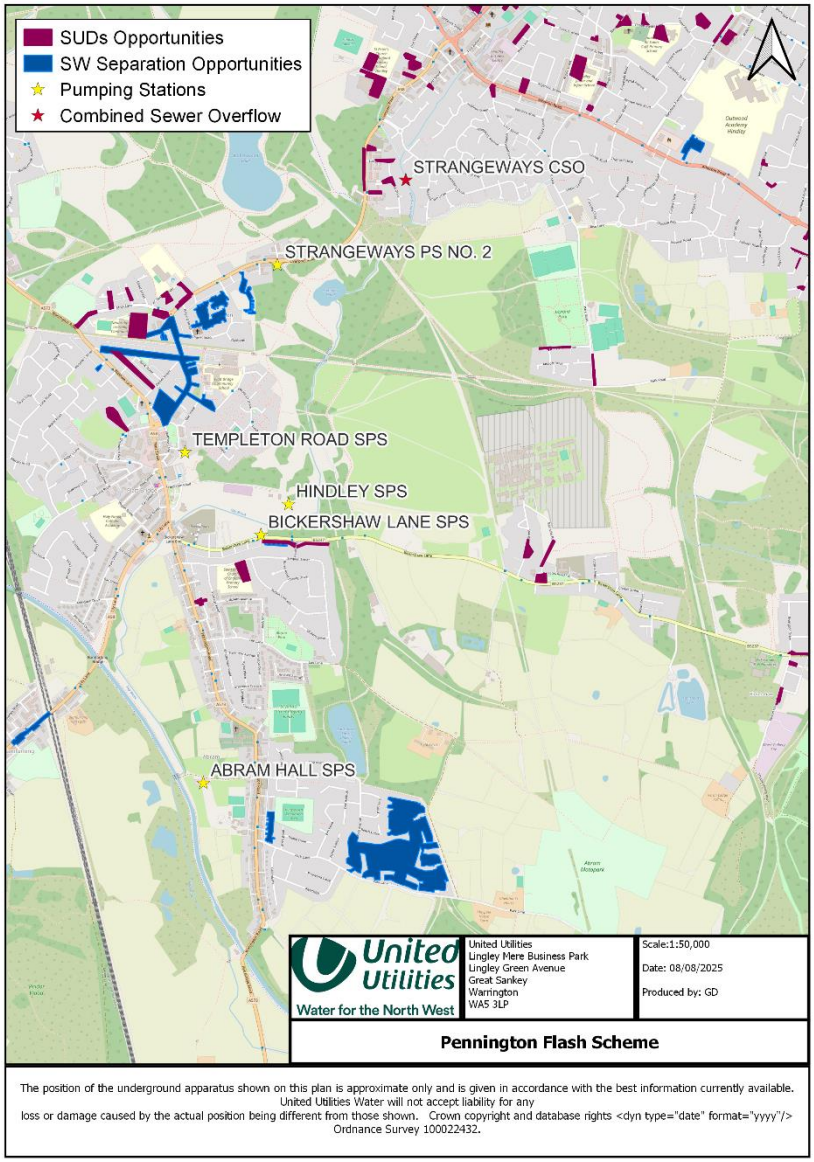
The fluvial scheme is considering a range of potential flood risk management options including:

- Providing linear defences structures
- Providing flood storage capacity
- Undertaking channel improvements to remove throttles
- Reducing flood frequency and volumes through run off management

The Environment Agency continue to develop the business case for the FRMS and anticipate deciding upon the preferred option towards the back end of 2025, with a subsequent Outline Business Case submission planned for Spring 2026. Until such time as the preferred option development has concluded and the business case is finalised, there will remain some uncertainty over the viability and funding for the scheme.

5.1.2 Pennington Flash Programme led by United Utilities

Requirements have been set for United Utilities to deliver improvements at six overflows to support water quality, which must be fulfilled by 31st March 2030.



The named assets are the locations included in the Pennington Flash scheme.

United Utilities have completed high level desktop investigations into understanding surface water separation and rainwater management opportunities. These are also highlighted on the map.

Figure 7; Assets in the Pennington Flash Programme

5.2 Long list to short list process

A long list of potential measures was collaboratively produced, with each measure assessed against the ambitions. Those demonstrating beneficial alignment where shortlisted and then collated into a suite of measures known as place-based options.

Ambitions

1. Reducing flood risk
2. Improving water quality
3. Long term resilience

Seventy-one measures formed the long list, and during the longlist workshop, fifty-one measures were identified to be taken forward and twenty measures were discounted due to duplication or technical ineffectiveness.

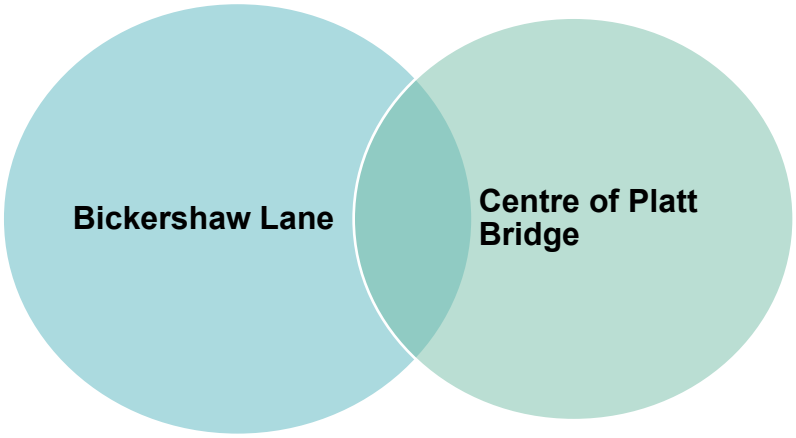


Figure 8; Priority areas for the study

After establishing priority areas from the long listing, the project activity focused on *'Bickershaw Lane'* (including Keats Way*)* and the *'Centre of Platt Bridge'* during the option development phase. Both the modelling and integrated engineering teams concentrated on these areas due to their complexity and the risks they pose to the community and environment.

Strategic initiatives and source control were identified as crucial elements as part of the long list to support driving forward the Hindley IWMP and implementing change.

The focus was placed on identifying Natural Flood Management (NFM) and Nature Based Solutions (NBS) in the upland catchment through hydrological analysis

Several of the short-listed strategic initiatives, focusing on planning policy are currently being addressed at a national level, led locally by the Greater Manchester IWMP.

Figure 9; Strategic Initiatives themes

5.2.1 Short list of options development process

When adopting the methodology to develop measures into place-based options an established framework was used. This framework allowed measures to be grouped on their function in managing water. The FRMS is integrated as part of the place-based options development as scenario tests.

Pennington Flash scheme is a regulatory requirement for United Utilities. The programme which they are following is fixed and has limited flexibility, the outputs of the IWMP will aid in the development of these solutions.

By identifying nature-based solutions in the upland catchment, and surface water management measures in the urban areas, the volume of flow entering the public sewer network will be reduced. This approach can potentially lower the overall cost of the various partner programmes if integrated.

One measure (though contentious) could be to relocate residents out of the flood-prone area and repurpose the land for uses more aligned to resilience goals.

5.2.2 Linking the FRMS with the Integrated Water Management Plan

The uncertainty surrounding the development of the FRMS poses a challenge for Hindley IWMP, as there will continue to be ambiguity regarding the types of FRM solutions that will receive support and funding.

The preferred option for the Environment Agency will be determined in spring 2026, followed shortly afterwards by a final decision on the schemes composition at the next Outline Business Case Gateway (G2) in 2027.

The Hindley IWMP has therefore represented the outcomes of the FRMS as 'Environment Agency Scheme Scenarios' within the evaluation model. These scenarios are shown below in Table 3.

FRMS Scenario	Description	Impact	How the scenario is represented in the hydraulic model testing
Do Minimum	The river system and associated flood risk is not changed from the current situation.	Flooding of urban and green spaces continue at present day frequency	Present day peak water levels and flow volumes
Defence Walls	The river system is contained at the urban flood risk areas. Green spaces continue to flood potentially at on more frequent basis	Increases peak water levels in locations where defences are provided, but all fluvial flooding is prevented	Represented as full containment (glass wall) of river flows in flood prone urban areas with an increase in predicted peak water levels used as boundary conditions for the analysis of the surface water system
Attenuation	Water is stored through a combination of man-made or nature-based measures	Peak river levels are reduced as flood water is stored in the upper parts of the catchment and in green spaces	2% Annual Exceedance Probability (AEP) (1 in 50yr) peak river levels used as boundary conditions in the analysis of the surface system

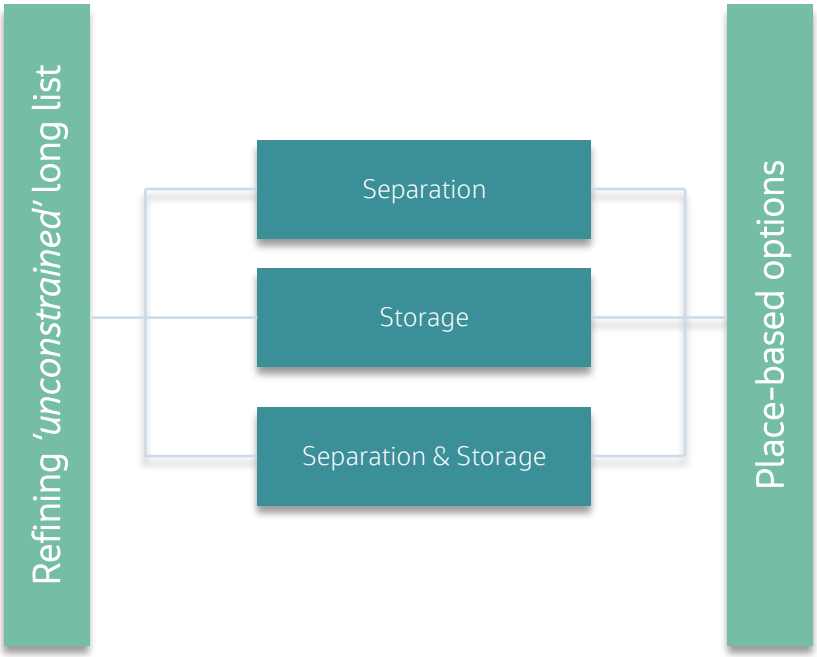
Table 3; Environment Agency FRMS scenarios

5.3 Methodology

The study commenced with a problem definition stage and utilised the models from both United Utilities and the Environment Agency to identify the interconnectivity of issues. This led to the development of a long list of potential measures, which were refined using Critical Success Factors to form a short list of measures to be tested.

Separation and storage methods were prioritised during the optioneering phase, measures providing maximum benefit were then integrated into combined place-based options.

1. **Separation (S);** Includes catchment-wide Nature-based Solutions, Sustainable urban Drainage Systems and measures that separate the river and surface water networks, aiming to manage surface water by reducing run-off from urban and rural areas entering the combined sewer system. This helps to lower the risk of drainage system surcharges, flooding and discharges to the watercourses.
2. **Storage (St);** The provision of additional capacity (through increasing pipe sizes, tanks etc.) reduces the frequency of surcharging which can lead to surface water flooding and triggering discharges into the watercourses
3. **Separation & Storage (SS);** Combining measures with the most benefit, and which are likely to work in combination in the priority areas.



These options vary in measure composition depending on whether they aim to target benefit at Bickershaw Lane or Platt Bridge, although many of the measures provide benefit to both, especially when they affect the volume and timing of peak flows in the river.

In total, eighteen place-based options where assessed, each having a unique identification label, that is comprised of the below:

Location Prefix	FRMS Scenario	Place-based Option combination
Bickershaw **(B)**	Do Minimum **(DM)**	Separation **(S)**
Platt Bridge **(PB)**	Defences **(D)**	Storage **(ST)**
	Attenuation **(A)**	Separation and Storage **(SS)**

Table 4; Unique identification label

Option ID	Location	FRMS Scenario	Place-Based Option Combination
B.DM.S	B. Bickershaw Lane	DM. Do Minimum (no fluvial scheme)	S. Separation
B.D.St	B. Bickershaw Lane	D. Fluvial defences option (raises fluvial levels)	St. Storage
B.A.SS	B. Bickershaw Lane	A. Fluvial attenuation option (reduces peak water levels)	SS. Separation and Storage

Table 5; Example of the place-based option identification

6. Assessment of Options

6.1 Methodology

Integrated hydraulic modelling has been utilising two existing models to support option testing:

- **Environment Agency Hindley Fluvial Model (JBA, 2025)**
- **United Utilities Wigan Drainage Network Model (UU, 2020)**

To evaluate the technical effectiveness of each of the options, the approach involved assessing the reduction in flood risk to properties after implementation. Additionally, an assessment of the avoidance of economic damages was conducted to inform the relative performance against the ambitions and critical success factors.

Estimated costs for the measures have been derived using a Cost Intelligence Database owned and maintained by a specialist Quantity Surveying firm employed specifically for this project. An Optimism Bias (OB) of 30% has been included in the place-based options costs to reflect the high-level nature of the design and risks. A 60% OB has been included for all Environment Agency FRMS cost scenarios. This is in line with HM Treasury Guidance for cost assessments at preliminary stages of development.

To understand the added value of the place-based options, the Value Framework (based on the six capitals framework) developed for the Greater Manchester IWMP in 2022, has been further refined to support the implementation of place-based options in various areas. Figure 10 shows the factors that have been included in the Value Framework assessment, with The factors in blue the blue circles being monetarised flood risk reduction benefits, and those in green being non-monetarised benefits.

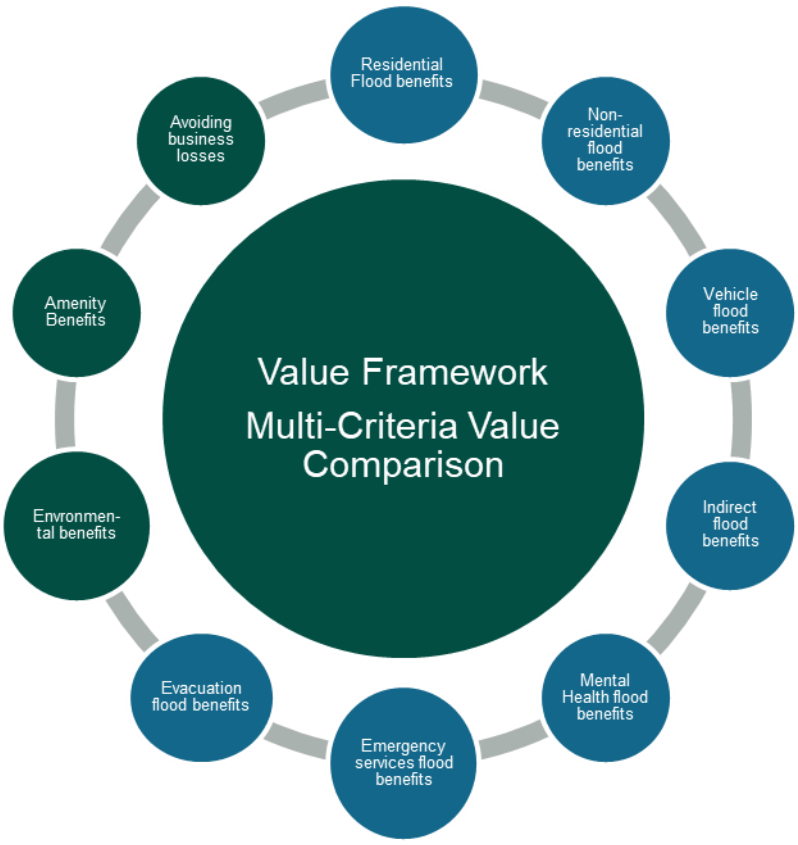


Figure 10; The Value Framework - Monetised and Non-monetised factors

The Value Framework was initially designed to demonstrate and qualitatively measure the effectiveness of collaborative working to better manage water. For the Hindley IWMP, the framework has been adapted to evaluate the benefits of implementing a solution, and to compare different place-based options. The refined framework enables the analysis of broader benefits, including infrastructure and property protection, and economic growth, biodiversity improvement, and stronger community engagement and trust.

To effectively compare the different options, a standardisation approach was employed that allowed for the inclusion and comparison of both monetised and quantified benefits. This method assigns each benefit a

value between 0 and 1, where 0 represents the lowest value for that benefit and 1 represents the highest value for that benefit. By standardising the benefits in this manner, the analysis provides a clearer understanding of the options' relative advantages. The present-day situation (Do Minimum) represents the least cost and least beneficial option and so this has been included in the method for comparing relative costs and benefits.

Several benefit factors used in the Value Framework for the project activity have been significantly constrained due to the time and data. Consequently, only a small number of benefit indicators beyond those related to flood risk reduction have been used, and none have been monetised. This is a key limitation of the approach. Each of the three non-monetised benefits have been given an equal weighting to the seven monetised flood risk benefits Whilst this provides some reflection of the integrated benefits, it does not adequately represent their value contribution. It is recommended that further work be done to extend the range of benefits considered in the framework and introduce a mutually agreed weighting system to reflect the relative importance of these benefit factors.

6.2 Options and Costs

This and the following sections (6.3 & 6.4) present the place-based *'Do Minimum'* (DM) options for Bickershaw Lane (including Keats Way) and Platt Bridge. The modelling exercise revealed that the measures in the catchment were not influenced by the FRMS, but rather the FRMS by the wider catchment measures. As a result, it was decided to focus solely on costing and presenting the *'Do Minimum'* place-based options.

Nature Based Solutions were identified as providing greater benefits in the upland catchment area, benefitting Hindley Town Centre, Platt Bridge and Bickershaw Lane (including Keats Way). Consequently, the NBS measures were included in both costed options.

The separation interventions indicate a reduction in the required height and extent of any FRMS flood defences and the required volume of storage, potentially leading to a reduction in FRMS. This has been represented in the economics by selecting a lower value within the range of the FRMS cost scenarios.

Option OP48 (Weir removal downstream of Platt Bridge) whilst not affecting flood risk, offers benefits under the Water Framework Directive (WFD) and has been retained as a measure in the options.

Option, OP57 (Controlling Urban Runoff: Installing green infrastructure such as rain gardens, permeable pavements, and green roofs can help absorb and filter stormwater before it reaches rivers). The specific measure of *'Permeable paving at Iceland carpark / container'* falls under this categorisation, and through engineering assessments it was found that it should not be considered until the FRMS has been implemented, as the area identified is within the fluvial flood zone and therefore will have little to no benefit for the catchment.

6.3 Bickershaw Lane (including Keats Way) *'Do Minimum'* Options and Costs

Table 6 below states the measures which were applied for the *'Do Minimum'* scenario for Bickershaw Lane (including Keats Way). The SuDS, disconnections and storage measures are within the Bickershaw lane area, while the nature-based solutions were applied to the upland catchment, thus benefitting multiple locations.

Bickershaw Lane Seperation (B.DM.S)				
Measures	**Capital Cost**		**Operations and Maintenance cost estimate**	
Amberswood / Low Hall Storage	£	24,600.00	£	74,700.00
SuDS Measures	£	5,921,600.00	£	87,400.00
Nature Based Solution Measures	£	6,245,100.00	£	433,000.00
Disconnections & NRVS	£	1,500,400.00	£	29,900.00
Wigan Greenheart	£	428,200.00	£	74,700.00
Total	**£**	**14,120,000.00**	**£**	**700,000.00**

Bickershaw Lane Storage (B.DM.St)				
Measures	**Capital Cost**		**Operations and Maintenance cost estimate**	
Storage Measures	£	5,247,000.00	£	107,000.00
Total	**£**	**5,247,000.00**	**£**	**107,000.00**

Bickershaw Lane Seperation & Storage (B.DM.SS)				
Measures	**Capital Cost**		**Operations and Maintenance cost estimate**	
ımberswood / Low Hall Storage	£	24,600.00	£	74,700.00
;uDS Measures	£	5,921,600.00	£	87,400.00
lature Based Solution Measures	£	6,245,100.00	£	433,000.00
ıstallation of NRVs	£	55,400.00	£	8,700.00
Vigan Greenheart	£	428,200.00	£	74,700.00
;torage Measures	£	4,763,300.00	£	32,400.00
Total	**£**	**17.438.200.00**	**£**	**711.000.00**

Table 6; Bickershaw Lane 'Do Minimum' Summary of measures & costings

6.4 Platt Bridge 'Do Minimum' Options and Costs

Tables 7 below states the measures which were applied for the *'Do Minimum'* scenario for Platt Bridge. The SuDS, disconnections and storage measures are within the Platt Bridge area, while the nature-based solutions were applied to the upland catchment, thus benefitting multiple locations.

Platt Bridge Seperation (PB.DM.S)				
Measures	**Capital Cost**		**Operations and Maintenance cost estimate**	
Amberswood / Low Hall Storage	£	24,600.00	£	74,700.00
SuDS Measures	£	6,544,400.00		
Nature Based Solution Measures	£	6,245,100.00	£	433,000.00
Disconnections & NRVS	£	1,232,200.00	£	17,500.00
New surface water discharge tanks (required for roof disconnections)	£	335,000.00		
Wigan Greenheart	£	428,200.00	£	74,700.00
Total	**£**	**14,810,000.00**	**£**	**600,000.00**

Platt Bridge Storage (PB.DM.St)				
Measures	**Capital Cost**		**Operations and Maintenance cost estimate**	
Storage Measures	£	9,992,500.00	£	131,100.00
Wigan Greenheart	£	428,200.00	£	74,700.00
Total	**£**	**10,421,000.00**	**£**	**206,000.00**

Platt Bridge Seperation & Storage (PB.DM.SS)				
Measures	**Capital Cost**		**Operations and Maintenance cost estimate**	
Amberswood / Low Hall Storage	£	24,600.00	£	74,700.00
SuDS Measures	£	6,544,400.00		
Nature Based Solution Measures	£	6,245,100.00	£	433,000.00
Disconnections & NRVS	£	1,232,200.00	£	32,400.00
Wigan Greenheart	£	428,200.00	£	74,700.00
Storage Measures	£	10,212,800.00	£	152,200.00
Total	**£**	**24,687,000.00**	**£**	**767,000.00**

Table 7; Platt Bridge 'Do Minimum' Summary of measures & costings

7. Options benefits compared

The Value Framework helps to balance the wide range of positive and negative impact of the options.

When considering the benefits of options, using flood damages avoided (also known as economic benefits) combines the frequency of flooding, number of properties affected, flood depth and whether flood water is likely to be contaminated with foul water from a combined drainage system. It is therefore a good representation of the overall reduction in flood risk. However, it should not be the only consideration.

This section provides the findings of the benefits assessment, starting with the economic benefits of the options and then the overall benefits when viewed through the Value Framework.

7.1 The cost and economic benefits of the options

Options 7 and 10 (Separation and Storage combined with a FRMS) deliver the greatest economic benefits but are the highest cost options as shown in Table 8 below.

	Baseline	Option Number								
EA FRM Cost	1	2	3	4	5	6	7	8	9	10
Scenario	DM	DM.S	DM.ST	DM.SS	D.S	D.ST	D.SS	A.S	A.ST	A.SS
EA FRM Min cost	£0.0	£30.0	£20.7	£47.2	£51.6	£42.3	£68.9	£54.8	£45.5	£72.1
EA FRM Max cost	£0.0	£30.0	£20.7	£47.2	£62.0	£52.7	£79.3	£70.0	£60.7	£87.3
Economic Benefits	£0.0	£11.7	£2.6	£13.8	£37.6	£34.4	£39.6	£36.7	£32.2	£38.7

Table 8; Economic benefits of the place-based options

	Baseline	Option Number								
EA FRM Cost	1	2	3	4	5	6	7	8	9	10
Scenario	DM	DM.S	DM.ST	DM.SS	D.S	D.ST	D.SS	A.S	A.ST	A.SS
EA FRM Min cost	£0.0	0.39	0.13	0.29	0.73	0.81	0.57	0.67	0.71	0.54

Table 9; Ratio of costs to economic benefit of the options

When assessing the whole life cost and benefit cost ratio (BCR) as shown above in Table 9, combining the Storage measures with the FRMS defences (D.ST) or attenuation (A.ST) provides the highest ranked options. However, even when adopting the minimum proposed cost of the Environment Agency FRMS, this and all other options are a benefit cost ratio of 1, indicating that the whole life costs exceed the economic benefit. This presents a significant challenge for the deliverability and funding of any option and further emphasises the need for innovative approaches to deliver and finance project in similarly challenged areas.

The government's approach to calculating flood risk damages focuses on the economic impact on the UK's economy, which differs from the financial calculations made by individual property owners. The primary reasons for this discrepancy are that the national economic approach excludes VAT (and other taxes) and considers the depreciated cost of damaged items. For instance, for a ten-year-old television, it uses the depreciated value rather than the cost of buying a new one. According to Jacobs' experience, this often results in financial losses being nearly double the national economic damages. Additionally, when assessing business losses due to operational disruptions during a flood, the national economic approach assumes that much of this loss is offset by gains to other businesses, so only a small portion counts as an economic loss.

This economic approach might therefore under-represent the financial benefits of the options and might therefore provide justification for progressing with options that have a current BCR below 1.

7.2 The cost and overall benefits of the options

To determine the most advantageous approach at delivering integrated benefits across the catchment, the place-based options are compared to the present-day situation (Do Minimum) and their benefits ranked relative to each other.

A standardisation approach is taken to compare the different options as there are both monetised and non-monetised benefits. This method assigns each benefit a value between 0 – 1, where 0 indicates least beneficial and 1 indicates the most beneficial.

Option	Code	Monetised Values							Qualitative Values					Average Benefit Rating
		Residential flood benefits	Non-residential flood benefits	Vehicle benefit	Indirect benefit (non-residential)	Mental health benefit	Emergency services costs benefit	Evacuation benefit	Reduced cost of CSO spills	Recreation	Reduced environmental damage	Amenity	Avoids business losses	
1	Do Min	*Baseline*												
2	DM.S	0.25	0.60	0.79	0.47	0.51	0.27	0.28			1.00	1.00	1.00	0.62
3	DM.ST	0.03	0.00	0.73	0.25	0.50	0.27	0.31			0.00	0.00	0.50	0.26
4	DM.SS	0.32	0.58	0.89	0.46	0.58	0.33	0.34			1.00	1.00	0.50	0.60
5	D.S	0.94	1.00	0.89	1.00	0.93	0.94	0.95			1.00	1.00	1.00	0.97
6	D.ST	0.95	0.54	0.87	0.85	0.78	0.91	0.92			0.00	0.00	0.50	0.63
7	D.SS	1.00	0.99	1.00	0.98	1.00	1.00	1.00			1.00	1.00	0.50	0.95
8	A.S	0.92	1.00	0.89	1.00	0.91	0.90	0.90			1.00	1.00	1.00	0.95
9	A.ST	0.91	0.46	0.87	0.73	0.72	0.81	0.84			0.00	0.00	0.50	0.58
10	A.SS	0.98	0.99	1.00	0.98	0.98	0.96	0.96			1.00	1.00	0.50	0.93

Table 10; Value Framework outputs for place-based options

Option	Option Reference	BCR	Average Benefit Ranking	Ranking
2	DM.S	0.39	0.62	7
3	DM.ST	0.13	0.26	9
4	DM.SS	0.29	0.60	8
5	D.S	0.73	0.97	1
6	D.ST	0.81	0.63	5
7	D.SS	0.57	0.95	3
8	A.S	0.67	0.95	2
9	A.ST	0.71	0.58	6
10	A.SS	0.54	0.93	4

When the relative costs of the options are considered, Options 5 and 8 are the leading choices.

This suggests that **Separation** measures are the most advantageous approach and offers the best integrated solution with both the fluvial protection and catchment interventions.

Table 11; Benefit ranking of place - based options

Whilst the separation measures consistently provide benefit across all options, the high investment cost makes it less favourable when assessing against the Benefit Cost Ratio (BCR). The storage option, combined with the Environment Agency's FRMS, becomes the most economically favourable. However, the storage option is not the best solution for achieving overall catchment benefit and sustainability.

The Value Framework includes all measurable benefits, which are aligned to the Hindley IWMP's ambitions and objectives. Due to the Hindley IWMP's pace (12-week programme), the assessment which the Value

Framework carried out made several assumptions, which may have favoured the separation place-based options, therefore further analysis of the Value Framework should be conducted following additional data becoming readily available in future phases of the programme.

It is strongly recommended that following this project, the Value Framework is further developed to provide a more robust evaluation of the wider benefits that options deliver and key to this will be a mutual agreement (between the participating parties) on a recognised evaluation methodology.

8. Adaptive Pathways

As the partnership moves beyond this stage of the IWMP, there are several pathways forward providing flexibility to adapt to funding and delivery scenarios, some within the direct control of the Greater Manchester IWMP partners and others from external sources.

When determining whether any option should be implemented into the area, the assessment must consider technical effectiveness, economic benefit and value added to the catchment. This approach offers flexibility in progressing options based on various factors such as financial, governance and process constraints which would influence the level of protection and measures implemented.

This section presents a variety of implementation options with alternative next steps. These options have different implementation challenges and offer different outcomes and these need to be balanced when considering what comes next.

The different pathway options considered are listed below and described in sections 8.1 to 8.3.

- An approach that delivers the highest standard of protection against flooding, unconstrained by funding
- An approach that delivers best value, unconstrained by funding
- An approach that delivers best value, but is constrained by existing future and procedural processes

8.1 An approach that delivers the highest standard of protection from flooding

This proposed pathway considers the place-based option which provides the greatest benefit to the catchment and community, **unconstrained** by cost.

Option 7, Separation and Storage Place Based Option in conjunction with the FRMS (defence) is the most effective for reducing flood risk in Platt Bridge and Bickershaw Lane.

This approach ensures a significant risk reduction for both areas, with fluvial defences providing a high standard of protection, offering a 1 in 50 year (2% AEP) for both locations. The surface water drainage network (as presented in United Utilities model), level of service for Platt Bridge and Bickershaw Lane is enhanced to protect up to a 1 in 30 year (3.33% AEP).

Reduction in flood risk to an acceptable standard of protection for the community whilst also promoting catchment wide benefits, such as improved water quality, without being limited by financial or governance constraints.

The measures, as part of the short list, were selected due to the level of risk presented, therefore they were implemented in specific locations, to tackle particular risk, which naturally then left residual risk to isolated areas of Platt Bridge. These areas are predicted to experience flooding prior to a 1 in 30-year rainfall event. It is important to note that the flooding depths are <=0.01m. Through the next phases of the programme and detailed option testing and modelling, it is recommended to expand the scope outside of the short-listed measures to support reducing risk in wider areas of the catchment.

In addition to the level of flood protection provided by this option, the natural flood management (NFM) and nature-based solutions (NBS) incorporated through the separation measures, delivers significant broader catchment benefits, such as improved water quality and amenity.

Option 7 provides the greatest overall economic benefit regarding flooding at both Bickershaw Lane and Platt Bridge. This approach would require a high level of investment between £68.9m and £79.3 million; against a benefit of £39.6 million.

	Baseline	Option Number								
EA FRM Cost	1	2	3	4	5	6	7	8	9	10
Scenario	DM	DM.S	DM.ST	DM.SS	D.S	D.ST	D.SS	A.S	A.ST	A.SS
EA FRM Min cost	£0.0	£30.0	£20.7	£47.2	£51.6	£42.3	£68.9	£54.8	£45.5	£72.1
EA FRM Max cost	£0.0	£30.0	£20.7	£47.2	£62.0	£52.7	£79.3	£70.0	£60.7	£87.3
Economic Benefits	£0.0	£11.7	£2.6	£13.8	£37.6	£34.4	£39.6	£36.7	£32.2	£38.7

Table 12; Economic benefits of the place-based options

8.2 An approach that delivers best value, unconstrained by funding

This pathway considers the place-based option which provides the best value to the catchment and community, **unconstrained** by funding and processes.

Option 5 and 8 (Separation with FRMS Defences or Attenuation Scenarios) provide the greatest overall value due to additional wider benefits, including new greenspaces in proximity to residential properties, reduced pollution and a reduction in losses to businesses. In conjunction with the Flood Risk Management Scheme the separation measures (NFM & NbS) deliver a combined integrated approach, providing optimal value in the catchment.

Delivering best value when considering both costs and the Value Framework benefits without being limited by financial constraints or governance issues

In the upstream parts of the catchment, measures to slow and store water on greenfield spaces using Nature Based Solutions and enhancing existing storage areas are essential.

The Wigan Greenheart proposal at Victoria Fields by Hindley Prison and Amberswood Lake are prime examples of a local NBS and attenuation which should be prioritised. Integrating these measures with the Flood Risk Management Scheme can provide additional biodiversity and water quality benefits.

The resulting Standards of Protection are dependent on the Flood Risk Management Scheme options, but it is assumed that this would be a minimum of 1 in 50 year (2% AEP) for all locations. Bickershaw Lane and Keats Way East would benefit from an increase in Standard of Protection from the drainage network to a 1 in 30 year (3.33% AEP), however Platt Bridge would not see a marked improvement in the existing Standard of Protection other than benefitting from a reduction in network surcharging when river levels are high.

By implementing the separation measures, it is anticipated (as evidenced through the modelling undertaken), that the flood defence heights & lengths at both Bickershaw Lane & Platt Bridge will be reduced and that it will also reduce the frequency of surface water surcharging and related spills into the watercourse.

Option	Option Reference	BCR	Average Benefit Ranking	Ranking
2	DM.S	0.39	0.62	7
3	DM.ST	0.13	0.26	9
4	DM.SS	0.29	0.60	8
5	D.S	0.73	0.97	1
6	D.ST	0.81	0.63	5
7	D.SS	0.57	0.95	3
8	A.S	0.67	0.95	2
9	A.ST	0.71	0.58	6
10	A.SS	0.54	0.93	4

Table 13; Benefit ranking of place - based options

It is crucial to influence the design of the development site at the container depot, as this could reduce costs of the FRMS and decrease the volume of water entering the combined drainage network.

Dependent on the Flood Risk Management Scheme, the estimated cost range is between £51.6m and £62m, with economic benefits of between £37m and £38m respectively.

Delivery of this option could commence following additional optioneering work to progress to detailed design, is undertaken, landowner consents, and planning and procurement activities are finalised for the FRMS.

It is anticipated that the coordination and investment opportunities from all partners of the Hindley IWMP and broader green financing initiatives will be managed by the Greater Manchester IWMP partnership.

8.3 An approach that delivers best value but is constrained by existing funding and procedural processes

This pathway reflects the current delivery environment, delivering best value but constrained by existing funding rules and processes.

Options 5 and 8 (Separation with FRMS Defences or Attenuation Scenarios) provide the greatest overall value.

The Separation measures would be implemented independently and in advance of the FRMS acknowledging the funding shortfall faced by the FRMS and the possibility that this issue may not be resolved.

Delivering best value to the catchment when assessing both costs and Value Framework benefits but is constrained by existing funding and governance

The current method in which the government funds flood defence schemes, presents a shortfall in the proposed Hindley FRMS scheme which poses a challenge to deliverability. Changes to the Partnership Funding policy are under consultation, with a government announcement anticipated in March 2026. The outcome of this could change the pathway of this and other options

The outputs of the Value Framework indicate that the implementation of nature based, and natural flood management measures, coupled with the FRMS has the greater benefits to the community of Platt Bridge and Hindley, when compared with storage. When isolated from the FRMS, the Value Framework indicates that the Separation measures still provide both the greater value and economic benefit

This approach reduces the catchment risk through the implementation of natural flood management and nature-based solution measures.

For Bickershaw Lane, onset of fluvial flooding currently occurs at a 1 in 20-year (50% AEP), with the implementation of NFM and NbS measures, this onset of flooding is mitigated. With the further measures of the installation of an NRV on the outlet of the ordinary watercourse, attenuation, and a small defence wall (as illustrated in figure 11 below), further protects the community, with the onset of flooding occurring at a 1 in 50-year event (2% AEP). A surface water discharge tank is required to protect properties on Keats Way East.

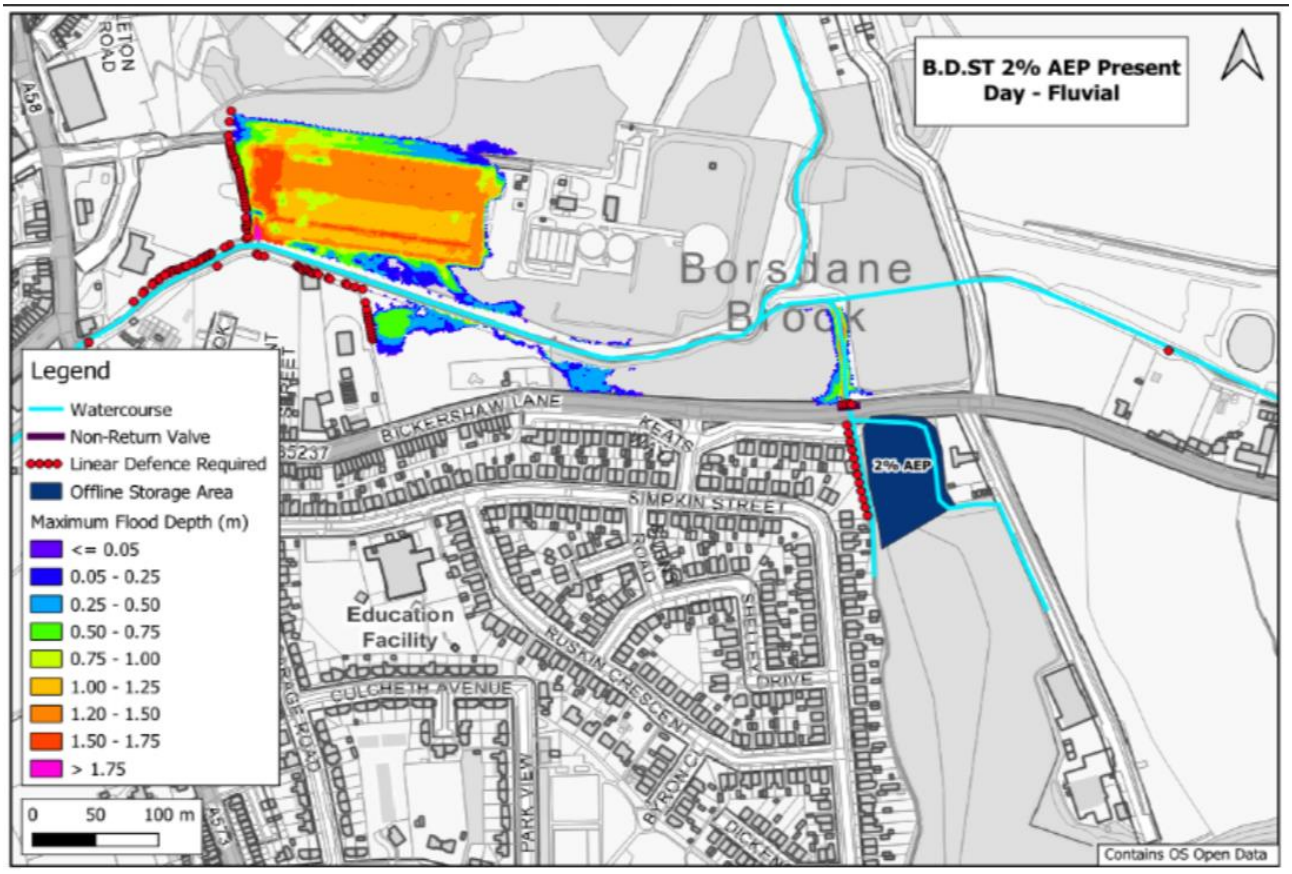


Figure 11; identifying linear defence and NRV required for protection of Bickershaw Lane

The level of fluvial flood protection in Platt Bridge improves from a 1 in 10-year (10% AEP) event to a 1 in 20-year (5% AEP) event. While Separation measures to reduce the volume and timing of surface water entering the drainage system will be beneficial, significant investment in network capacity is necessary to reduce the frequency of surface water flooding.

The estimated cost of the Separation measures is £30m, with an economic benefit of £11.7m. With the addition of the FRMS costs, the costs range from £52m to £70m, delivering approx. £37m of economic benefits.

Delivery of this option could commence following additional optioneering work to progress to detailed design, landowner consents, planning and procurement activities are finalised for the Separation measures and with the FRMS integrating the hydrological impacts into the design of the flood defence measures with a view to submitting the outline business case in Spring 2026.

9. Conclusions

The Greater Manchester IWMP was officially established in September 2021, to foster and grow a partnership between Greater Manchester Combined Authority, Environment Agency and United Utilities, for more effective water management. This new approach enabled the partnership to extend into place-based IWMP's.

The Hindley IWMP has adopted ambitions and objectives of the Greater Manchester IWMP and its partner organisations to develop shared goals and has translated these into specific ambitions. Aligned to these is the Value Framework through which the options have been compared.

As the partnership moves beyond this stage of the IWMP, there are several pathways forward and an ability to adapt the approach depending on funding and delivery scenarios, some within the direct control of the Greater Manchester IWMP partners and others from external sources.

Alternatives pathways that could lessen the frequency and severity of flooding, albeit to a lower standard of service might be viable. However, with predictions of increased river flows and rainfall intensity due to climate change, the communities might find the level of risk unsustainable for safe living. The community might welcome an opportunity to have assistance in relocating out of high-risk areas which could be more cost-effective solution than substantial investment in defences and infrastructure upgrades.

10. Recommendations

The development and funding of the FRMS and the implementation of the recommended actions will all require planning, coordination and funding, all of which will be a frustration to those living with the risk. The acute nature of the flood risk prescribes immediate action, so the following resilience measures are recommended:

Reference	Recommendation
	Flood Resilience
FR1	Implement a short-term temporary flood warning service based on upstream catchment gauges and forecasts whilst developing a longer-term plan for providing a formal flood warning service supported by new local river gauging in the Platt Bridge area **(OP25).**
FR2	Investigate options for providing emergency pumping provision at Keats Way, noting that this measure will not be effective when river levels are high.

To complement these resilience measures, the following strategic measures are recommended.

Please note that it is recognised that certain strategic initiatives have been developed to challenge change at a national level, under these key requests sit recommendations / requirements to ensure change. They have been pitched through the IWMP, which could be leveraged by politicians and officers, utilising this project as a lens to further advocate or influence.

	Strategic
S1	The establishment of a mutually recognised “Value Framework” which can be used to identify and evaluate co-benefits delivered in an integrated way should be formalised and adopted. Extend the Value Framework adopted for this study into a more comprehensive system which aligns to Partner Values. Align policies and support regulatory changes to drive better integration between RMAs.
S2	Map beneficiaries and co-ordinate to unlock additional funding streams that can bridge any deficit in scheme funding. Explore potential for additional funding sources with organisations specialising in green finance.
S3	Align policies and support regulatory innovation to allow better integration
S4	Pro-actively engage with the promoters and designers of the significant development sites within the catchment. By contributing to the Local Plan Consultation by June 2025, ensuring the Wigan Draft Local Plan strengthens its commitment to water management.
S5	Implement legislation that will support more co-ordinated water management
S6	Adopt nature based & natural flood management solutions to reduce catchment run-off delivering sustainable and resilient multi layered benefits to the catchment.

Coordinating with the GM IWMP group, progress with delivery strategies for the following interventions.

	Solution Development and Implementation
I1	In partnership with the other Risk Management Authorities, the Environment Agency should progress with the development of measures to reduce fluvial flood risk in the risk locations with preference given to options that align with the Integrated Water Management approach.
I2	Removal of watercourse at Hindley Cemetery from the United Utilities combined sewer system, thus reducing the frequency of surcharging and spills from the combined sewer system and reducing the volume of water passing through the treatment works. Further modelling is required to demonstrate if this will also provide benefit to the Pennington Flash programme, and combined network flood risk.
I3	Undertake a feasibility study with a view to increase the flood attenuation capacity at Amberswood Lake. This should include assessing the optimised benefits of different flood storage volumes, whilst balancing the costs and environmental impacts of such modifications. **(OP8).**
I4	Strengthen the alignment of planning and flood risk policies to ensure that water management is consistently and proactively embedded in development decisions, helping to reduce future flooding in the community. **(OP5).**

	Solution Development and Implementation
I5	Provide financial and delivery support to Wigan Green Heart Nature Recovery Scheme to progress with proposals to re-wet, slow the flow and create attenuation ponds at Victoria Fields (to the East of Platt Bridge). Coupled with delivering flood risk benefits downstream, this site would complement ambitions to deliver local biodiversity gains. **(OP2).**
I6	Low Hall Flash is a proposed scheme by Wigan Council, which is in the same location as the proposed Fluvial scheme. Due to the maturity of the Low Hall Flash scheme details were not provided and was not incorporated into this stage of the Project. It is therefore recommended that a Feasibility Study is undertaken to develop the proposal, while integrating with Environment Agencies Fluvial scheme **(OP41).**
I7	Implement SuDS at the locations identified in the Bickershaw Lane catchment **(OP10 / OP57).**
I8	Implement Surface water discharge tanks to store SW flood volumes whilst fluvial event recedes (or implementation of equivalent storm pumps during periods where fluvial water level is sufficiently in bank) **(OP10 / OP57).**
I9	Disconnect property roofs from the combined system (with appropriate mitigations in place to prevent increased flooding in SW **(OP71).**
I10	Trace and disconnect all surface water drainage from United Utilities combined sewer network upstream of Platt Bridge and Bickershaw Lane pumping stations **(OP71).**

It is recognised that as the project moves beyond this initial project stage, the trilateral partners will need to consider how and when these recommendations should be progressed. One of the limitations of the Hindley IWMP is that all the Nature-based Solutions contained within the Separation Option have been grouped and modelled together making it difficult to assess which elements deliver the best value. Should the partners choose to prioritise the further development of NbS, it is recommended that they refer to the place-based option templates “Surface Water Management” tab in which these NbS measures are compared.

11. Appendix

11.1 Appendix A; Limitations

This stage of the Hindley IWMP was delivered over a 12-week period between February and May 2025. This short duration has necessitated accelerated ways of working and has constrained the methods of analysis used and level of detail achieved. The methods adopted are not always sufficiently robust to align with governance standards for business case approvals and further development of key aspects such as the location and composition of the measures and options, the hydraulic modelling of the drainage and fluvial systems, the economic assessment, the benefits evaluation will be needed.

The following summarises the key assumptions and limitations associated with the hydraulic modelling completed for the purposes of the Hindley IWMP:

- The hydraulic modelling was developed in a very short space of time and is considered suitable to inform draft outline design. Additional detailed modelling is required on every measure (fluvial and sewer network) to develop hydraulic model outputs sufficient to inform detailed design of the options.
- The Hindley IWMP programme did not allow sufficient time for the development of a fully integrated fluvial, sewer network and surface water model. Although the best efforts have been made to associate boundary conditions and inputs/outputs between the two models, differences in inflow hydrology, available AEP events, storm duration and model format have meant that the models are dynamically not linked.
- The Hindley IWMP programme did not contain sufficient time to allow the development of surface water / direct rainfall model. There is therefore no explicit consideration of highway drainage flood risk (accumulation of direct rainfall and overland flow) within the hydraulic modelling outputs.
- The hydraulic modelling was developed using existing hydraulic models provided by the Environment Agency and United Utilities. All assumptions and limitations associated with the provided models should be considered as part of this analysis.
- The Environment Agency Fluvial 'Do Minimum' Hindley model was reviewed and accepted by the Environment Agency and provided to the Hindley IWMP as the best available fluvial model for use in this assessment. No additional review of the model has been completed as part of the Hindley IWMP to determine suitability for use.
- The United Utilities Wigan network model was provided to the Hindley IWMP, as the best available baseline model for use. No review was conducted as part of the Hindley IWMP to determine suitability for use. It is understood that United Utilities Wigan network model provided has not been recently verified or calibrated and that the United Utilities Pennington Flash CSO project is currently undertaking model improvements and verification works across the Wigan network. The United Utilities CSO model is therefore likely to supersede the model used for the Hindley IWMP analysis.
- The Environment Agency Fluvial defended scenario was tested using artificial *'glass walls'* based on the initial Hindley FRMS OBC defence alignment with some manual refinement based on the Environment Agency Fluvial baseline model results. No consideration has been made to the design crest elevation of the defences or any consideration of residual uncertainty analysis / freeboard.
- The Environment Agency fluvial attenuation scenario, incorporating Aspull FSR, was provided by JBA (on behalf of the Environment Agency) in draft state, it is understood that the location and arrangement of the Aspull FSR is likely to change during development of the Hindley FRMS OBC and therefore the modelled results during the attenuation scenarios are likely to change.
- The Nature Based Solution measures are located in rural catchments that are shown not to drain to the United Utilities drainage network as represented by the United Utilities network model used for this study. The influence of these NBS measures has therefore only been considered within the Environment Agency fluvial model.
- Conversely, the SuDS measures are located within the urban sub catchments that are considered to drain to both the United Utilities drainage network within the United Utilities network model and the fluvial system within the Environment Agency fluvial model. The SuDS measures have been accounted for within the United Utilities network model but have not been considered within the Environment Agency fluvial model due to the assumption that the reduction in hydrograph volumes is negligible compared to the full hydrograph volumes generated by each sub catchment.

Due to the time constraints, multiple measures have been grouped into single place-based options and have been assessed for technical effectiveness and benefits as a single option. It is not therefore possible to

attribute specific benefits to a single measure without further work. For the NbS and SuDs measures, it is possible to assess their relative storage capacity and draw conclusions from this, however proximity to the priority sites is also a factor which needs integrating. Relative cost and ease of implementation also need to be a factor when deciding which measures are to be prioritised.

The development of options has been high level concept design only. No ground information, topographic surveys, utility information or environmental screening data has been made available and as such, the design of any measures is indicative.

The Value Framework: The number of benefit factors used has been significantly constrained by the time and data available. Consequently, only a relatively small number of benefit indicators has been sued, beyond those associated with flood risk reduction and none of these have been monetised. This is a key limitation of the accelerated approach taken. Each of the three non-monetised benefits have been given an equal weighting to the seven monetised flood risk benefits and whilst this provides some reflection oof the integrated benefits, it does not adequately represent their value contribution. It is recommended that further work is done to extend the range of benefits considered in the framework and a mutually agreed weighting system introduced to reflect the relative importance of these benefit factors.

It is important for the reader to recognise and account for these limitations when developing the next stages of the project.

11.2 Appendix B; Flood Risk Management

Organisation	Policy / Strategic Lead	Flood Risk
Department for Environment, Food & Rural Affairs (Defra)	Flood and Coastal Erosion Risk Management in England Environment Agriculture & Nature	Defra has overall national responsibility for policy on flood and coastal erosion risk management (FCERM) in England Sponsor of the Environment Agency
Ministry of Housing, Communities and Local Government	National planning policy framework	Provides funding to the Lead Local Flood Authorities aimed at supporting flood risk management and infrastructure improvements
Local Authorities	Surface Water Management Plans Flood Risk Assessments Local Flood Risk Management Strategies	**Lead Local Flood Authority:** Develop and implement strategies to manage local flood risk, including surface water, ground water and ordinary watercourse as mandated by the Flood & Water Management Act 2010 **Planning & Development Control:** Implements planning policies to ensure new developments incorporate Sustainable Drainage Systems (SuDS) and management of surface water run-off rates to greenfield levels Assessment of flood risks for new developments, ensuring appropriate measures to manage risks **Emergency Planning & Response:** Prepare and implement emergency plans for flood events including co-ordination with other agencies and community groups **Highways Authority** Responsible for the installation, operation and maintenance of highway drainage infrastructure, ensuring that roads and footpaths are effectively drained. Have a duty to address flooding caused by inadequate highway drainage; they can act against landowners if their property contributes to highway flooding.

Organisation	Policy / Strategic Lead	Flood Risk
Environment Agency	National Flood and Coastal Erosion Risk Management Strategy River Basin Management Plans	Have strategic overview all sources of flooding Responsibility for 17 risk management activities on main rivers and reservoir safety. Responsible body for producing River Basin Management Plans Powers to build and maintain flood defence walls but is not duty bound to do so.
Water Companies	Drainage and Wastewater Management Plan Water Resources Management Plan Drought Plan Long Term Delivery Plan	Responsible for flooding from the foul/combined sewer systems, and surface water drainage systems that are owned by the company. Under the Water Industry Act 1991, water companies must ensure the area they serve is effectively drained, with responsibility for wastewater from within properties and water drained from property roofs.

Table 14; Government Bodies & Risk Management Authorities