

# Accelerating partnerships to deliver natural solutions



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## 2. Glossary of terms

Term	Reference	Explanation
<b>AMP</b>	Asset Management Plan (or Period)	An AMP is a water company's detailed description of its investment plans for its underground assets. AMP is often used as a shorthand name for the companies' business plans. See also Business Plan.
<b>AMP7</b>	Asset Management Plan 7	Refers to the planning period between 2020 and 2025.
<b>AMP8</b>	Asset Management Plan 8	Refers to the planning period between 2025 and 2030.
<b>AONB</b>	Area of Outstanding Natural Beauty	Landscape designation applied to land protected by the Countryside and Rights of Way Act 2000
<b>CaST</b>	Catchment Systems Thinking	Approach to assessing the whole catchment systems when identifying challenges and solutions
<b>Defra</b>	Department for Environment, Food and Rural Affairs	Government department
<b>DWMP</b>	Drainage and Wastewater Management Plan	Water company plan assessing drainage and wastewater needs and options for solutions through to 2050
<b>ELMS</b>	Environmental Land Management Scheme	Agricultural payments scheme to replace basic payments and incentives delivering public goods on land
<b>GMCA</b>	Greater Manchester Combined Authority	Combined authority for Greater Manchester comprising of 10 local authority areas
<b>LENS</b>	Landscape Enterprise Networks	Approach to identify and aligning business demand for the services a landscape can provide and aligning these to the land manager that can provide these services
<b>MHCLG</b>	Ministry of Housing, Communities and Local Government	Government department
<b>MSC</b>	Manchester Ship Canal	Manmade water body in the North West connecting Manchester to the Irish Sea and into which several major rivers drain
<b>NFM</b>	Natural Flood Management	Interventions that mimic natural processes to reduce and slow the flow of water
<b>PR24</b>	Price Review 24	Refers to the planning process to develop the AMP 8 plan
<b>SCaMP</b>	Sustainable Catchment Management Programme	Programme of upland catchment management to drive raw water quality improvement and other benefits
<b>SuDS</b>	Sustainable Drainage Systems	Drainage solutions that mimic nature to intercept, infiltrate and attenuate surface water
<b>WFD</b>	Water Framework Directive	Directive that established need to deliver rivers as close to their natural state as possible and sets specific criteria to meet to achieve this
<b>WISER</b>	Water Industry Strategic Environmental Requirements	Environment Agency and Natural England document that sets out strategic requirements that the water industry has a requirement to deliver

## 3. Introduction

### 3.1. Executive Summary

- 3.1.1. As a water and sewerage undertaker the resilience of our services is intrinsically linked to the resilience of the ecosystems we depend upon. As a result of this we have a Catchment Systems Thinking (CaST) approach which seeks to ensure the health and efficiency of our services is optimised within the context of the resilience of the catchments in which they operate.
- 3.1.2. This Green Recovery proposal focuses on delivering innovative nature-based solutions in three distinct geographic areas of the North West of England. Each one tackles issues that relate directly to our service and also offer the potential to deliver wider benefits to society and therefore offer up partnership potential. We are proposing to bring forward AMP 8 investment to deliver interventions identified as required through AMP7 investigations and also deliver innovative new ideas to tackle problems in these catchments. The learning we gain from delivering within these three areas will be applied to the rest of the North West as we plan for PR24 and shared with other companies to enable take up elsewhere. The three distinct areas which feature in our proposal are:
- (a) **The River Eden catchment, Cumbria** – A largely rural catchment with extensive livestock farming other than for the city of Carlisle in the lower reaches. The catchment is also home to extensive stretches of river designated as Special Areas of Conservation.
  - (b) **The Fylde coast, Lancashire** – A heavily urbanised coast featuring resorts such as Blackpool with agricultural land further inland.
  - (c) **The River Irwell and wider Greater Manchester area** – The Irwell drains the northern half of Greater Manchester before it flows through Manchester city centre and eventually joins the Manchester Ship Canal. Other than moorland in the upper reaches it is a highly urbanised river system.
- 3.1.3. We are proposing to invest £15.4m on behalf of customers to deliver the following interventions which will enhance the health of ecosystems to deliver the following benefits to customers and wider society. We will also be targeting c£10m of partnership contributions to allow us to deliver greater benefit to customers without increasing costs. The costs shown below aligned to specific interventions are based on the outturn costs but the overall roll up at programme level is shown at 2017/18 values.

Table 1 - Benefits from Green Recovery proposals

Proposal	Description	Benefits
<b>Catchment phosphorus</b>	Up to £1.2m investment in scaling up nutrient markets in the Upper Eden catchment to get a head start on improving protected habitats. Up to £2m investment in piloting approaches to addressing the challenge of agricultural and urban diffuse phosphorus in the Irwell	<ul style="list-style-type: none"> <li>• 1,000kg/year of agricultural phosphorus load removed from each of the Irwell and Eden catchments</li> <li>• 65kg/year of urban pollution load removed from the Irwell catchment</li> <li>• Creation of green infrastructure</li> <li>• Removal of additional agricultural pollutants</li> <li>• Tackling the challenge of urban pollution and the additional pollutants this brings</li> <li>• Supporting local agricultural economies through challenging times</li> </ul>
<b>Sustainable drainage systems and natural flood management</b>	Up to £10m investment in sustainable drainage and natural flood risk management schemes within the target areas of Eden, Fylde coast and Greater Manchester to reduce flood risk and mitigate the impact of climate change on storm overflow operation	<ul style="list-style-type: none"> <li>• Flood risk reduced from properties in affected areas</li> <li>• Delivery of green infrastructure</li> <li>• Creation of amenity value and recreational spaces</li> </ul>
<b>Peatland restoration</b>	Up to £2.5m investment in restoration of upland peat in Haweswater, Goyt Valley, Winter Hill, Longdendale, Barnacre and Grizedale catchments	<ul style="list-style-type: none"> <li>• Restore 2,500Ha of peatland</li> <li>• Reduced dissolved organic carbon and colour in raw water supplies</li> <li>• Reduced carbon loss and eventually increased sequestration</li> <li>• Reduced wildfire risk</li> <li>• Improved biodiversity</li> <li>• Reduced water flow from uplands reducing downstream flood risk</li> </ul>
<b>Catchment water quality management</b>	Up to £0.8m investment in catchment interventions to improve raw water quality from the Rivers Lune and Wyre which serve the Fylde coast	<ul style="list-style-type: none"> <li>• 300 farms engaged with</li> <li>• 100 farms engaged with on-site in 121 visits</li> <li>• 40 farm plans and interventions delivered</li> <li>• Reduced agricultural pollution to water sources in E.coli, pesticides etc.</li> </ul>
<b>Invasive non-native species</b>	£0.5m investment into a partnership approach to management of invasive non-native species in the River Irwell catchment	<ul style="list-style-type: none"> <li>• Removal of invasive species from 20km of river catchment</li> <li>• Removal of invasive species from 60,500m<sup>2</sup> of UU land</li> <li>• Better recreation and amenity</li> <li>• Improved biodiversity</li> <li>• Reduced health and safety risk</li> </ul>

3.1.4. In developing these proposals we have worked with partners to identify the catchment requirements and the interventions that could be delivered to achieve these. As part of this we have identified in excess of 30 partners that we would seek to work with to align activities, leverage funding and increase delivery. Through these partners we are targeting realising c£10m of external funding and have already confirmed c£1m with c£33m of additional funding opportunities identified. This partnership activity will be key in delivering on our objectives to reduce annual phosphorus load by 1000kg in the Eden and Irwell, to restore 2500Ha of peatland and clear invasive species from 20km of

river habitat in the most efficient way and this will all help in avoiding or deferring c£75m of future investment.

- 3.1.5. We have already got partnership funding and resources confirmed and we believe we can secure further funding once we are able to confirm that our Green Recovery submission has been successful. We have confidence in securing partnership funding having operated in this way for multiple AMPs where we have demonstrated leveraged funding which has risen from a ratio of United Utilities to partnership funding of 1:2.5 in 2014/15 to 1:6.9 in 2019/20. Our proposal also sets out how we will manage any uncertainty to ensure the customers get good value for money and only pay for work that we actually deliver. By setting stretching delivery targets and unit costs for delivery, assessing solutions against conventional delivery to demonstrate that they deliver greater benefit and ensuring that for partnership projects we don't release our funding until we are satisfied that the partners can access the required additional funds to meet our objectives we will ensure that customers only pay for the projects delivered and get value for money.

## 3.2. Purpose of this document

- 3.2.1. The resilience and health of catchments in the North West is critical to the delivery of water and wastewater services for the 7 million people in the region. From cleaning the raw water we abstract, to receiving the treated effluent and biosolids that we generate, efficient well-functioning catchments are crucial in delivering our service. However catchments also offer much more in services to society; they hold water and slow the flow to reduce flooding, provide land for access and recreation as well as benefits to human health, they intercept pollutants in the air, land and water environments, they are a significant carbon sink and they provide vital habitat for biodiversity. As a result we have a Catchment Systems Thinking (CaST) approach which looks at the whole catchment system and aligns interests across United Utilities service and beyond to identify interventions in the catchments, both urban and rural, that can be aligned to meet the needs of all stakeholders.
- 3.2.2. We are amplifying our Catchment Systems Thinking approach through the Green Recovery to build on the innovative work we have delivered through recent AMPs by bringing forward new investment that would otherwise be delivered in AMP8. This will strengthen partnerships, drive innovation and deliver the environmental improvements needed in key catchments.
- 3.2.3. The North West faces significant challenges in the coming years. United Utilities has ambitious carbon targets, in line with national goals to be net zero but going faster than the government ambition and seeking to achieve this by 2030 together with the rest of the water industry. Local regions have also set targets which are more ambitious than the UK's goal, such as Greater Manchester's target to be carbon neutral by 2038. This action on carbon will, however, not be quick enough to mitigate the impacts of climate change completely, and changing weather patterns will drive more extreme weather which will put strain on the infrastructure customers rely on, both ours and that of others in the region. We also have predictions of a water deficit across the UK making the preservation of water sources a key concern and an opportunity to move towards water trading. There is a national biodiversity crisis which has led to the drive to deliver nature recovery networks. As part of this Defra has established a Local Nature Recovery Strategy which will be piloting in 5 areas nationally, Greater Manchester is one of the trial areas for this and we are supporting and aligning our activities to this project.
- 3.2.4. We propose to accelerate our Catchment Systems Thinking approach in 3 strategic catchments where there is significant opportunity to align interests with stakeholders and facilitate a partnership approach to deliver greater environmental outcomes at an efficient cost for customers.

# Accelerating partnerships to deliver natural solutions

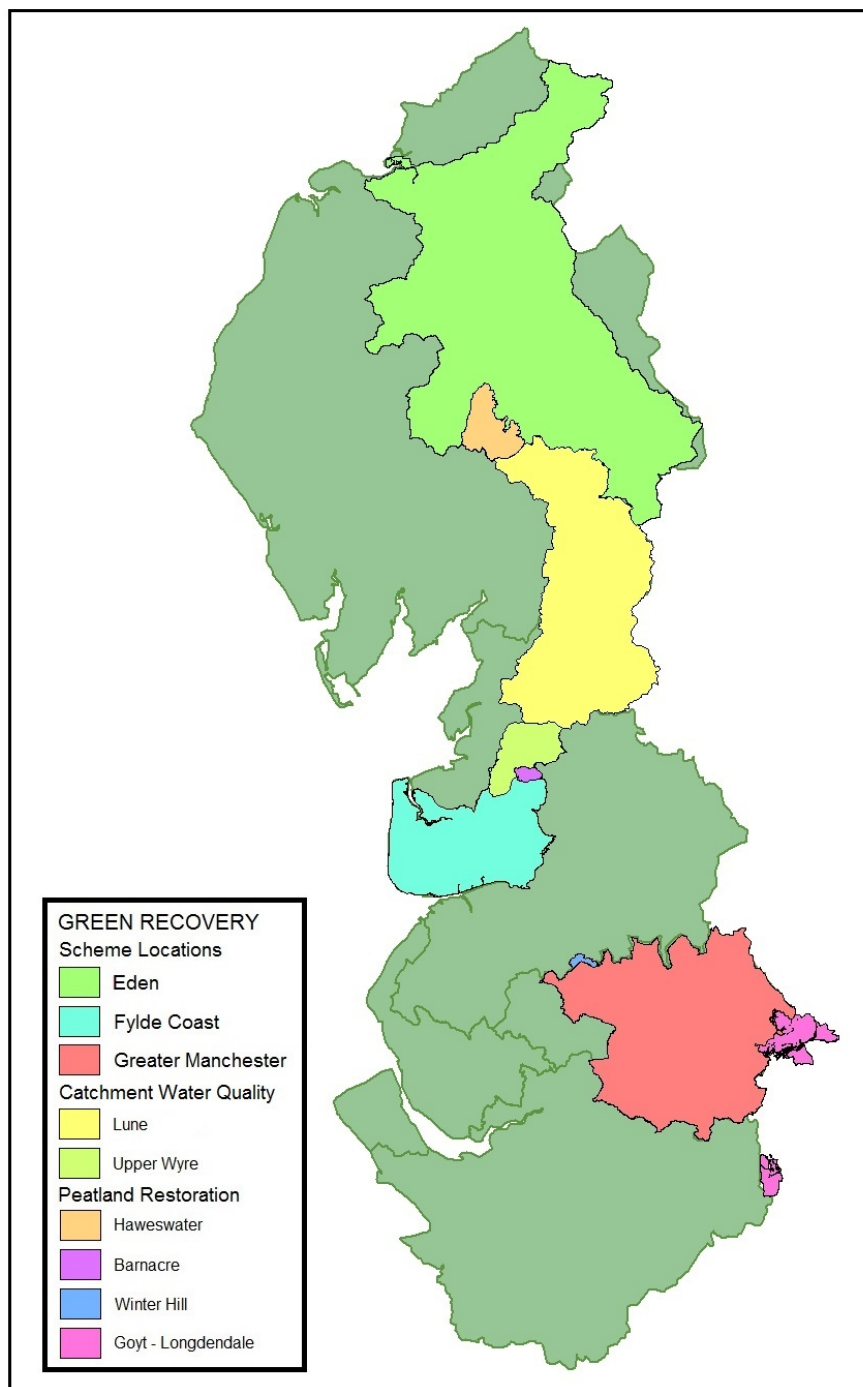
- 3.2.5. These catchments are; the River Eden in Cumbria, the Fylde coast in Lancashire, the River Irwell in Greater Manchester along with additional opportunities to manage upland peat habitats where there is significant benefit to customers. The challenges faced in each catchment vary but they are all areas where a focus on delivering ecosystem resilience will deliver benefits for customers, communities and the natural environment. The areas we will be working in and the issues we will be addressing through our Green Recovery proposals are shown in the maps below:



## Strategic Catchments

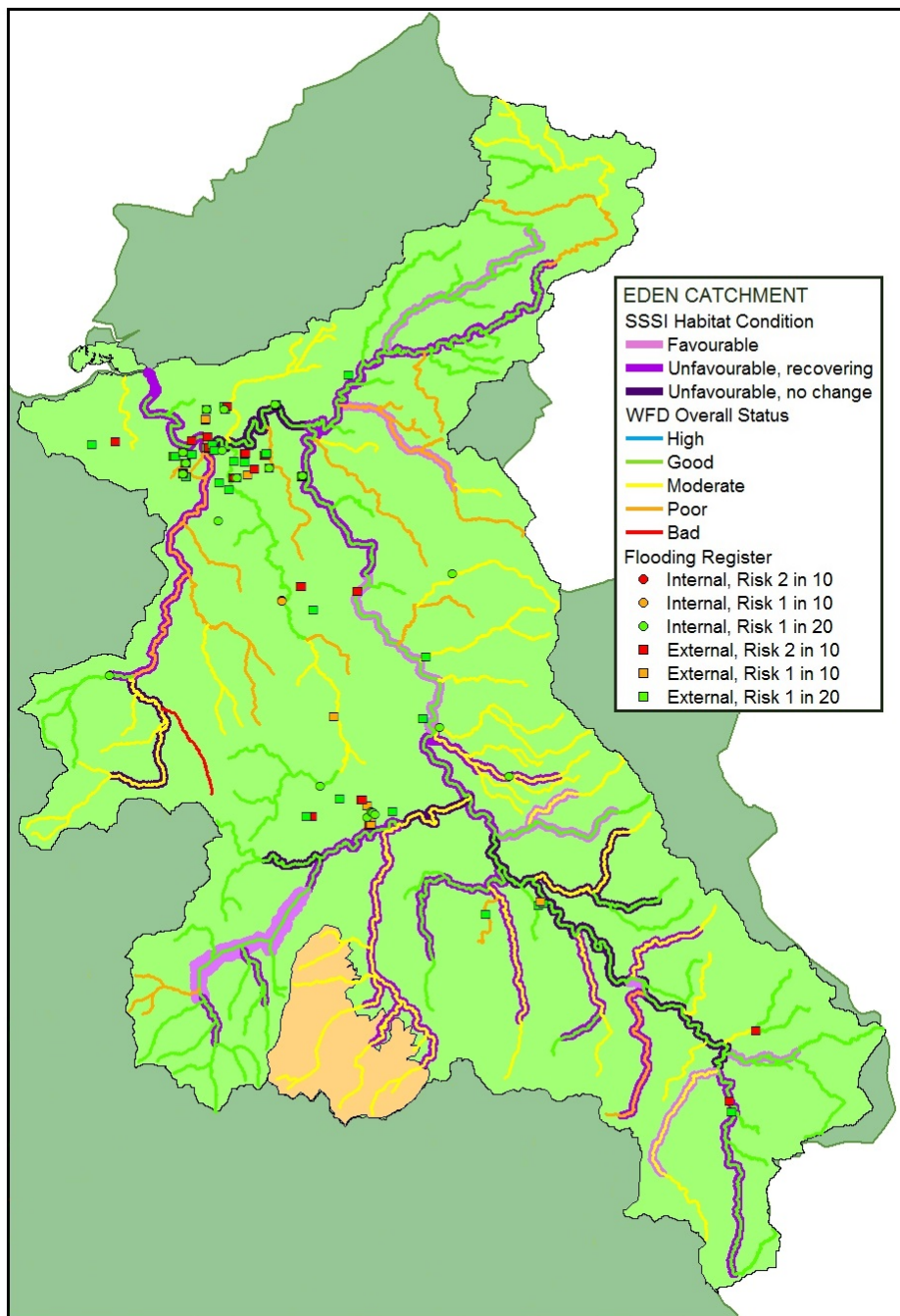
The locations of the work we will be delivering in the North West are shown on the map below:

- The River Eden in Cumbria
- The Fylde Coast in Lancashire
- The River Irwell in Greater Manchester
- Peatland restoration – Haweswater, Barnacre, Winter Hill, Longdendale Valley, Goyt Valley



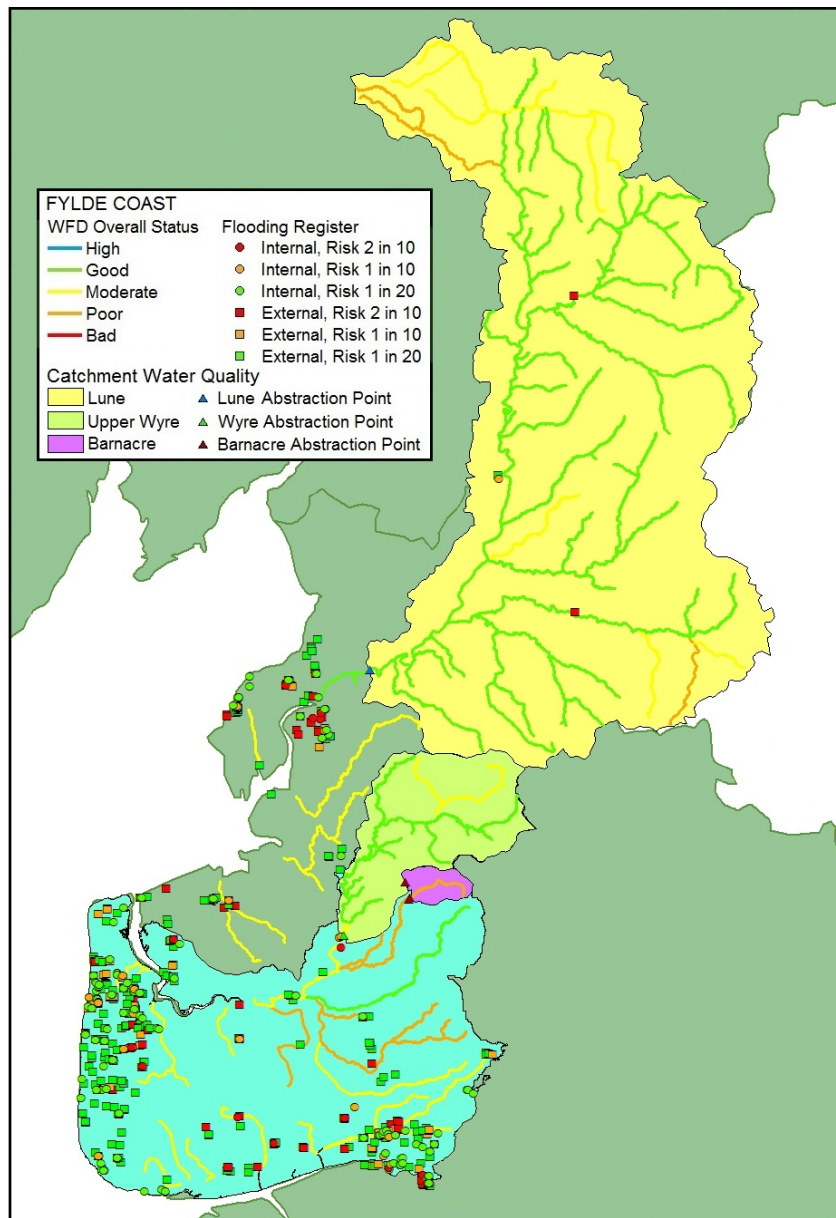
## The River Eden in Cumbria (including the local authorities of Eden and Carlisle)

- Water quality – Excess phosphorus build up in watercourses is impacting designated habitats and biodiversity indicated by the purple shading on rivers showing current condition is largely unfavourable.
- Flooding – Historic changes in land use and river courses combined with increasing severe rainfall is causing frequent flooding challenges to communities as well as our assets. Climate change and predicted growth will increase this challenge, these are shown by the squares and triangles on the map
- Raw water – Long term restoration of upland peat is needed to address raw water quality decline and to sequester more carbon



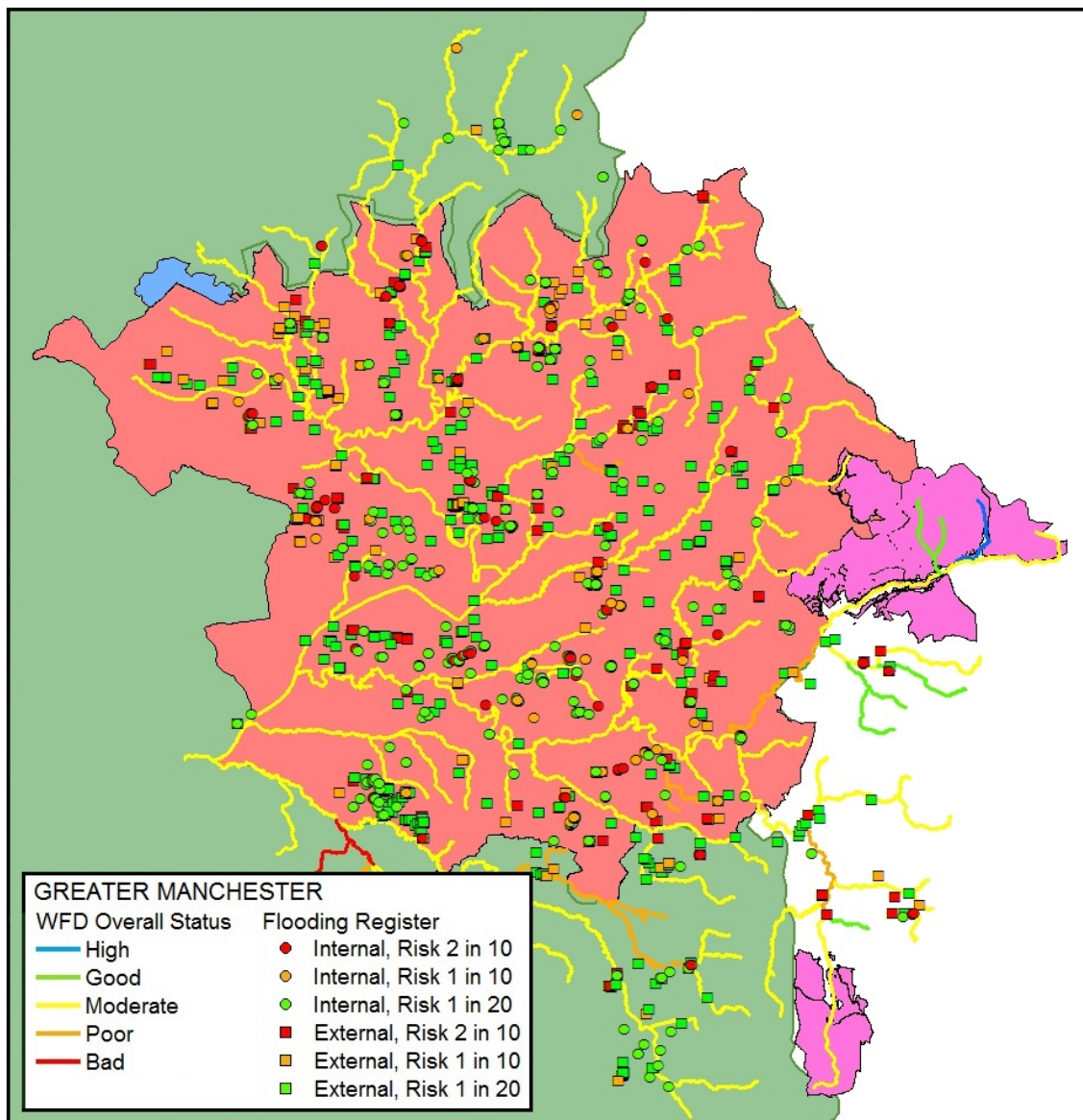
## The Fylde Coast in Lancashire (Including the local authorities of Fylde, Blackpool and Wyre)

- Flooding – Water management has been poor for 100's of years, societies' past decisions on land management and drainage have put an increasing strain on infrastructure and combined with climate change will lead to increased flood risk to communities as well as our assets as shown by the squares and triangles on the map
- Bathing water quality – climate change is also predicted to increase spill frequency in the catchment which has the potential to impact on bathing water quality
- Raw water – Long term restoration of upland peat is needed to address raw water quality decline and to sequester more carbon in the areas identified as Barnacre on the map
- Raw water – Agricultural land management processes are resulting in pesticides and other pollutants in raw water sources requiring additional investment in treatment technologies to manage this indicated by the Lune and upper Wyre areas on the map



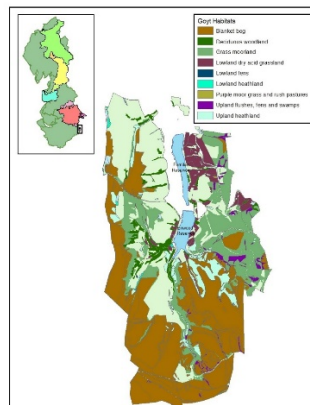
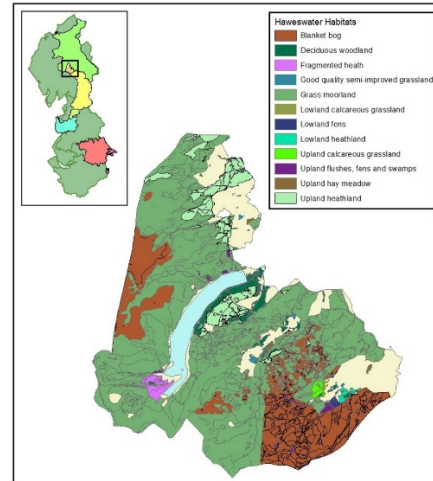
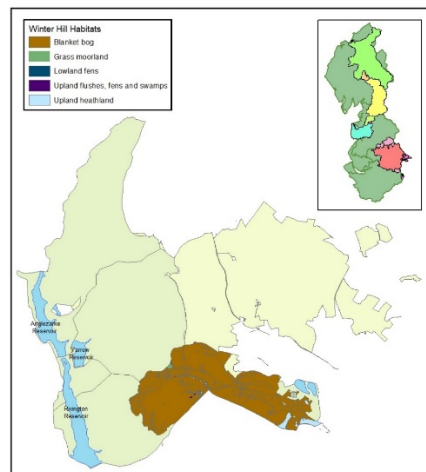
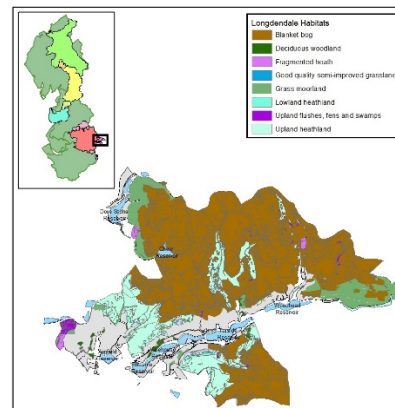
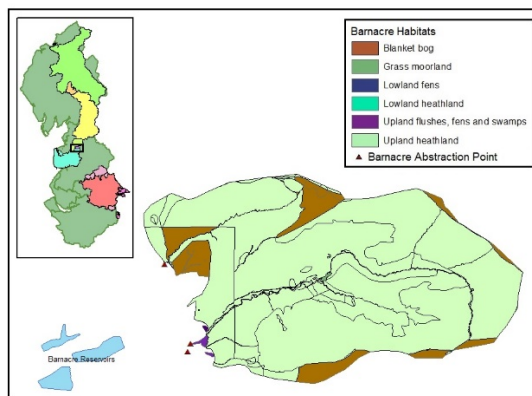
## The River Irwell in Greater Manchester (including the local authority areas of Bolton, Bury, Rochdale, Oldham, Manchester, Tameside, Salford, Trafford and Stockport)

- Flooding – Climate change is putting additional strain on infrastructure in one of the fastest growing cities in Europe. With increased run off increasing flood risk to communities as well as our assets as shown by the squares and triangles marked on the map
- Water Quality – Increasing population and greater urban runoff are causing deterioration in water quality in the river with high levels of phosphorus as well as other priority substances demonstrated by the lines showing watercourses WFD status is predominantly moderate or worse
- Recreation and biodiversity – There is a significant presence of invasive species in the Irwell which are spreading rapidly and threatening native biodiversity, water quality and customers' ability to access the environment



## Peatland restoration – Locations at Barnacre, Longdendale, Winter Hill, Haweswater and Goyt Valley

- Locations – Targeting additional locations for peatland restoration
- Raw water – Agricultural land management processes are resulting in (a) pesticides and other pollutants in raw water sources, requiring additional investment in treatment and (b) increasing the risk of wildfires which cause significant air pollution, prevent access to the environment and endanger the lives of those tasked with controlling them
- Maps show the habitat types and the potential for peatland restoration to both improve the condition of land currently classed as blanket bog and also return other habitat types to blanket bog as it would have originally been



- 3.2.6. The North West has been particularly badly hit by the Covid-19 pandemic with the region being the worst affected based on figures per 100,000 population<sup>1</sup>. The Green Recovery offers an opportunity to bring forward investment into the North West to achieve greater catchment resilience and establish long term partnerships in catchments. It will allow us to bring forward new investment that would otherwise be delivered in AMP8 to build on the strong foundations we have developed in catchments and continue to develop strategic partnerships and demonstrate the benefits that can be delivered using a Catchment Systems Thinking approach. This will bring benefit to customers and the environment sooner and support economic recovery post the Covid-19 pandemic, as well as improving understanding of the catchments to help inform efficient and effective planning. This aligns well to the country's broader goals around tackling climate change and driving to leave the environment in a better state than we found it as outlined in Defra's 25 Year Environment Plan.
- 3.2.7. This document will set out the challenges faced in the strategic catchments, the proposed solutions, how they will be delivered in the most efficient way using partnerships and the outcomes that will be achieved.

## 3.3. Structure of this document

- 3.3.1. We have taken a place-based approach to building our proposal so that we can clearly understand the challenges and opportunities that exist in a catchment, identify the right partners to work with and the right interventions to deliver to maximise benefit and deliver efficiently for customers. However following the identification of catchment needs, some of the solutions identified are consistent across several catchments. When demonstrating that these are efficient solutions that will meet the needs of the catchment, support economic recovery and deliver good value to customers we will do this based on the solution types to avoid repetition through each catchment.
- 3.3.2. As a result of this approach the evidence of need section of this document will be place based and laid out in the strategic catchments that we have assessed and go through the reasons why we need to deliver the identified interventions. The following sections will then be structured along the different solutions that have been identified as the evidence base for these is consistent across catchments. To help align these two sections Table 2 below shows the catchments considered, what interventions have been identified as being required in each and the proposed spend under the Green Recovery to deliver these. The costs shown allocated to individual projects and locations are based on expected outturn costs but when rolled up to the overall programme cost for natural solutions this equates to the £15.4m cost at 2017/18 prices.

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<sup>1</sup> (based on government data on 7th January 2021, <https://coronavirus.data.gov.uk/details/cases#card-cases-by-area-whole-pandemic>)

Table 2 - Matrix showing the interventions to be delivered in each strategic catchment, as well as the additional areas of peatland restoration

Catchment	Catchment Interventions for raw water quality (£m in outturn prices)	Catchment phosphorus management (£m in outturn prices)	Invasive non-native species management (£m in outturn prices)	Peatland Restoration (£m in outturn prices)	SuDS / NFM (£m in outturn prices)
Eden		1.20		0.50	10.00
Fylde Coast	0.80			0.50	
Irwell		2.00	0.50		
Goyt Valley, Longdendale Valley and Winter Hill				1.50	

## 3.4. Assurance of this submission

- 3.4.1. In developing this submission we have worked with key environmental regulators; the Environment Agency and Natural England, as well as key local authority partners in Greater Manchester Combined Authority, Lancashire County Council, Cumbria County Council and the local authorities that form part of these as well as environmental NGO's to validate that these proposals will deliver environmental benefit and are in line with the long term objectives for these catchments. We have worked with local planning and delivery organisations on the ground and have enclosed letters that demonstrate their support for this submission<sup>2</sup>. This demonstrates that the plans proposed are aligned to local interests and will assist and accelerate delivery of key catchment needs and promote opportunities to work in partnership.
- 3.4.2. We have applied an overarching assurance framework to the Green Recovery programme. This framework was managed by a dedicated assurance work stream which defined and oversaw the implementation of the governance and assurance activity. The framework identified the key deliverable components of the business case and assigned accountable owners using a RACI matrix. Each key deliverable of the business case was risk assessed against the likelihood and consequence of potential errors. This informed the minimum level of assurance that was required for each deliverable. The assurance process assessed the narrative and evidence provided for each component area against the requirements of the Green Recovery programme. Component parts identified as low have been assured by project teams, medium by the economic regulation and corporate audit teams and medium-high and high have received independent specialist external assurance<sup>3</sup>.

<sup>2</sup> See GR0002c through GR0002t for associated letters of support.

<sup>3</sup> Further details of our assurance framework can be found at the following url:

<https://www.unitedutilities.com/corporate/about-us/performance/Assuring-our-performance-2020-25/>

## 4. The case for acceleration

- 4.1.1. A high quality environment is essential to enabling a healthy and happy population. It provides essential services to allow us to thrive such as provision of water and food, regulation of temperature and air quality and space for recreation and exercise. The dynamics of this relationship are changing; climate change is causing more prolonged dry spells as well as periods of more intense rainfall, the population is growing and therefore putting increasing demands on these services and the expectations that customers place on the environment are ever increasing. Our plan is to work with partner organisations to ensure resilient catchments can deliver the services customers require now and into the future and in order to deliver this in the most sustainable way we need to act quickly.
- 4.1.2. Since we started our Sustainable Catchment Management Programme (SCaMP) in 2005 we have been driving our catchment approach to deliver natural solutions to the challenges we face. We have now evolved this approach to Catchment Systems Thinking (CaST), in order to reflect the importance of considering not just our land holding but the full system when working in a catchment and aligning the interests across United Utilities service as well as those of other catchment stakeholders to facilitate efficient delivery through partnership.
- 4.1.3. Catchment Systems Thinking is underpinned by a focus on the resilience of ecosystems as we described in our PR19 business plan<sup>4</sup>. This led to the inclusion of ambitious schemes in our PR19 plan such as the one to improve the resilience of the Thirlmere catchment. Alongside this we are also following through with a greater focus on ecosystem resilience in our Drainage and Wastewater Management Plan and Water Resources Management Plan for PR24 and beyond. In the meantime we have identified some priority catchments where we will more deeply embed our approach and the Green Recovery offers a great opportunity to get a head start.
- 4.1.4. One of the key focuses we identified in our Catchment Systems Thinking approach was the importance of maturing partnerships. By developing long term partnerships in these catchments to facilitate efficient and aligned planning and delivery we can maximise the environmental gain that can be achieved at an affordable and efficient cost. We have been working in these catchments for many years and have already established strong partnerships such as Moors for the Future and our work with the Rivers Trust to deliver catchment interventions in the Petteril. Our long-term strategy is to strengthen these partnerships further to facilitate fully joined-up strategies at a catchment scale and the implementation of this through long-term, co-created catchment

Figure 1- Graphic showing our Catchment Systems Thinking approach and key considerations



<sup>4</sup> S4004 – Ecosystem resilience approach



management plans. The Green Recovery presents a significant opportunity to further develop this long-term relationship and progress key opportunities to drive resilient catchments that will provide the services customers need into the future.

- 4.1.5. Our work in catchments was recognised by our regulators through the pilots that we have delivered in AMP6 and in Ofwat’s initial assessment of PR19 business plans. Specifically in the Petteril we have looked to create catchment markets where we have aligned the interests of other organisations to deliver joint priorities. This has allowed us to outperform on the environmental targets we were working towards and leverage funding from other partners to achieve even greater results. We want to expand this work in the Eden but also look for opportunities to take similar approaches elsewhere, to deliver environmental benefits more quickly for customers, provide long-term resilience in the face of a changing climate and establish a valuable planning and delivery route which will help in developing an efficient and beneficial plan for AMP8.

*“The company use of markets, catchment management and partnership working for delivery services related to water network-plus is ambitious and innovative.”*

Ofwat initial assessment of PR19 Business plans

- 4.1.6. The Green Recovery process provides an opportunity to accelerate investment that would be needed in AMP8, and enable us to deliver better improvements for customers sooner such as in the case of the Eden catchment phosphorus management, our peatland restoration programme and catchment water quality work in the Lune and Wyre. It also allows us to promote new and innovative ideas to tackle the future challenges society faces and deliver against issues that are arising and will present problems to customers in the future such as tackling urban pollution in the Irwell and managing invasive non-native species. The SuDS section of the document bridges these areas in that the problems they will address will need to be addressed in future AMPs and this SuDS approach offers an innovative way of managing these in at a sustainable cost for customers.

## 5. Evidence of need

### 5.1. Introduction

- 5.1.1. For many years our society has exploited the natural environment. The services that it provides us with have been drawn down without sufficient consideration for the long term sustainability of that service. To continue to ensure that the natural world provides the services that we require, we must secure the long term resilience of the water environment at a catchment scale and deliver improvements through coordinated action.
- 5.1.2. The challenges currently faced include
- (a) The government's latest surface water status data for England shows rivers in the country to be deteriorating with 25% reaching good or high status in 2009 decreasing to 16% in 2018<sup>5</sup>
  - (b) The Environment Agency's 'Challenges and Choices' consultation stated that at current pace it will take over 200 years to achieve the goals of 75% of rivers meeting Water Framework Directive (WFD) good status
  - (c) Delivery is often fragmented with different organisations looking at different aspects of the catchment which prevents an aligned approach that could increase net benefit and efficiency
  - (d) Population growth figures assessed as part of the Drainage and Wastewater Management Plan (DWMP) show Greater Manchester is expecting 13% growth to 2050, the Fylde Coast is expecting 8% growth and the Eden is expecting 24% growth
  - (e) DWMP data suggests a 41% increase in annualised flood risk to 2050 and a 23% increase in overflow spill volume, this is on top of the challenges we already face as evidenced by the impacts of storms Desmond and Eva in 2015
  - (f) The Farm Accounts in England Results from the Farm Business Survey 2018/19<sup>6</sup> shows that for less favoured area grazing, such as upland catchment, average farms run at a loss from agriculture and only become profitable based on subsidies and diversification
  - (g) 74% of district, county and unitary and metropolitan councils in Great Britain have declared climate emergencies<sup>7</sup> and there is a growing call for similar emergencies to be called for biodiversity
  - (h) Quality of water available for abstraction is impacted by pollutants and agricultural practices
  - (i) UK Parliament POSTnote 538 on Green Space and Health shows up to a 50% reduction in health inequalities in deprived areas with good access to green space compared to those without<sup>8</sup>
  - (j) Blackpool and Manchester are ranked as the two worst areas for deprivation based on rank of lower super output areas and Blackpool itself has 8 of the 10 most deprived areas according to

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<sup>5</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/925442/21\\_Surface\\_water\\_status\\_2020\\_accessible.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925442/21_Surface_water_status_2020_accessible.pdf)

<sup>6</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/851845/fbs-farmaccountsengland-13dec19.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/851845/fbs-farmaccountsengland-13dec19.pdf)

<sup>7</sup> <https://www.climateemergency.uk/blog/list-of-councils/>

<sup>8</sup> <https://post.parliament.uk/research-briefings/post-pn-0538/>

The Ministry of Housing, Communities and Local Government (MHCLG) report on the English indices of deprivation 2019<sup>9</sup>. This emphasises the importance of delivering natural solutions to help the physical and mental wellbeing of customers

- (k) Invasive species are uncontrolled and threatening biodiversity, health and safety and reducing the amenity value of our natural environment.
- (l) Deterioration of peatland and the increasing risk of wildfire is reducing the resilience of our catchments and the quality of water we can continually abstract from them

5.1.3. The specific challenges faced in our strategic catchments are outlined in Table 3 below. (Maps showing the location of these challenges are included earlier, in section 3)

*Table 3- Catchment challenges and proposed solutions*

Catchment	Challenge	Solution
Eden	Phosphorus pollution impacting river water quality and breaching the requirements under the Habitats Regulations	Catchment measures to reduce rural diffuse pollution and remove phosphorus at source
	Climate change and growth are reducing the resilience of the catchment and increasing the likelihood of flooding	Sustainable drainage solutions and natural flood management to manage the water quantity better and reduce flood impacts on customers
	Degraded peatland is releasing colour and dissolved organic carbon into raw water sources which requires additional treatment to remove	Restore the peatland and slow the flow of water to reduce loss of carbon and colour into water supplies
Fylde Coast	Climate change and growth are reducing the resilience of the catchment and increasing the likelihood of flooding	Sustainable drainage solutions and natural flood management to manage the water quantity better and reduce flood impacts on customers
	Agricultural practices in the catchment are introducing contaminants such as pesticides into the raw water reducing quality and requiring additional treatment	Working with agriculture to reduce chemical usage and change management practices to protect raw water sources
	Degraded peatland is releasing colour and dissolved organic carbon into raw water sources which requires additional treatment to remove	Restore the peatland and slow the flow of water to reduce loss of carbon and colour into water supplies
Irwell	Phosphorus pollution impacting river water quality and preventing watercourses from reaching good ecological status. Urban runoff is causing phosphorus and other pollutants to enter watercourses	Catchment measures to reduce rural diffuse pollution and remove phosphorus at source combined with target approach to managing urban runoff to reduce urban phosphorus and other pollutants
	Climate change and growth are reducing the resilience of the catchment and increasing the likelihood of flooding	Sustainable drainage solutions and natural flood management to manage the water quantity better and reduce flood impacts on customers
	Invasive non-native species are spreading rapidly in the catchment and preventing safe access to the environment	Catchment wide approach to eradicate invasive species rather than just managing them.

<sup>9</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/835115/loD2019\\_Statistical\\_Release.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835115/loD2019_Statistical_Release.pdf)

Catchment	Challenge	Solution
<b>Peatland Restoration</b>	Degraded peatland is releasing colour and dissolved organic carbon into raw water sources which requires additional treatment to remove. Wildfire risk is increasing due to drier catchments	Restore the peatland and slow the flow of water to reduce loss of carbon and colour into water supplies and create a wetter environment more resilient to wild fire

5.1.4. As laid out above the challenges we face in these catchments are significant but they are not ones that affect us alone and effective and efficient delivery requires that we reach out to other partners with a shared interest. Sometimes the outcomes we seek to achieve will be similar or in other cases they may be very different but we have the opportunity to invest collaboratively in the same locations within a catchment to achieve these varied outcomes. Realising this opportunity requires a holistic approach to catchments and delivery through sustainable, long term partnerships. The Green Recovery represents a great chance to build on the strong foundations we have already established as the challenge is growing quickly so the sooner we can meet it the easier it will be to tackle.

5.1.5. The activities that we are proposing are in line with the expectation set out in the Water Industry Strategic Environmental Requirements (WISER) as demonstrated in Table 4 below.

# Accelerating partnerships to deliver natural solutions

Table 4 - Matrix demonstrating proposed activities and their link to the WISER

Catchment	Intervention	WISER section 2.1 Water Body Status WFD	WISER section 2.4 Biodiversity and Ecosystems	WISER section 2.6 Invasive Non Native Species	WISER section 3.0 Improving Resilience	WISER section 3.1 Flood Risk Management	WISER section Appendix 1 Environmental Obligations	WISER section Appendix 3 Phosphorus Stewardship
Eden	Catchment phosphorus Management	X	X				X	X
	SuDS and NFM				X	X	X	
	Peatland Restoration		X				X	
Fylde Coast	SuDS and NFM				X	X	X	
	Peatland Restoration		X				X	
	Catchment water quality management				X		X	
Greater Manchester	Catchment phosphorus Management	X	X				X	X
	SuDS and NFM				X	X	X	
	Invasive Species Management			X			X	
Peatland	Peatland Restoration		X				X	

## 5.2. Structure of this section

- 5.2.1. In order to drive long term catchment resilience which delivers on the needs of all stakeholders and serves the communities that utilise them it is important to assess catchments holistically as this offers the best opportunity to align objectives, work in partnership and deliver the greatest benefit at the lowest cost. As a result of this we have assessed the needs of 3 strategic catchments using a place based approach and in this section we will set out these needs on a catchment by catchment basis. There are also some areas where there are single specific opportunities to drive improvements outside our strategic catchments but where there are established partnerships offering a clear and efficient delivery route. These are primarily in peatland restoration to protect and improve raw water for abstraction so we have also included a section on some key areas of need for this activity.
- 5.2.2. A summary of the activity that we are proposing to undertake in these catchments is included in Table 5 below:

*Table 5 - Summary of activities to be delivered*

Catchment	Intervention	Key output
Eden	Catchment phosphorus Management	<ul style="list-style-type: none"> <li>1,000kg/year of phosphorus removed from the catchment</li> </ul>
	SuDS and NFM	<ul style="list-style-type: none"> <li>Delivery of up to £2m of investment (this will deliver the best value projects as a £10m programme across all areas but the expected split into specific locations is shown in this table) to improve drainage and reduce flooding in line with our methodology and cost benefit analysis</li> </ul>
	Peatland Restoration	<ul style="list-style-type: none"> <li>500 Ha of peatland restored</li> </ul>
Fylde Coast	SuDS and NFM	<ul style="list-style-type: none"> <li>Delivery of up to £4m SuDS and NFM (this will deliver the best value projects as a £10m programme across all areas but the expected split into specific locations is shown in this table) to improve drainage and reduce flooding in line with our methodology and cost benefit analysis</li> </ul>
	Peatland Restoration	<ul style="list-style-type: none"> <li>500 Ha of peatland restored</li> </ul>
	Catchment water quality management	<ul style="list-style-type: none"> <li>Engage broadly with 300 farmers</li> <li>Engage 1:1 with 100 farmers</li> <li>Deliver 40 farm plans and interventions</li> </ul>
Greater Manchester	Catchment phosphorus Management	<ul style="list-style-type: none"> <li>1,000kg/year of agricultural phosphorus removed from the catchment</li> <li>65kg/year of urban phosphorus removed from the catchment</li> </ul>
	SuDS and NFM	<ul style="list-style-type: none"> <li>Delivery of up to £4m of investment (this will deliver the best value projects as a £10m programme across all areas but the expected split into specific locations is shown in this table) to improve drainage and reduce flooding in line with our methodology and cost benefit analysis</li> </ul>
	Invasive Species Management	<ul style="list-style-type: none"> <li>20km of river cleared of invasive species</li> <li>60,500m<sup>2</sup> of UU land cleared of invasive species</li> </ul>
Peatland	Peatland Restoration	<ul style="list-style-type: none"> <li>1500 Ha of peatland restored</li> </ul>

## 5.3. Eden

- 5.3.1. The challenges facing the catchment of the river Eden are significant and diverse. There is a history of flooding throughout the catchment and this is expected to increase with the impacts of climate change, as well as the significant additional development that is expected. There are also environmental challenges associated with the phosphorus levels in watercourses and the impact this is having on the ecology of the river, which is designated as a Special Area of Conservation (SAC). In this section we will outline these challenges in more detail and how these will be addressed collaboratively.
- 5.3.2. Through our work in AMPs 6 and 7 we have developed and delivered improvements in the river Petteril, a tributary of the Eden, through a combination of asset based interventions and catchment interventions, delivered in partnership, to reduce phosphorus levels in the water bodies in line with the WFD objectives. This was achieved through collaboration with key stakeholders to identify and deliver the most efficient agricultural interventions to deliver customer benefit affordably. This has gone a long way to driving improvements in part of the Eden however the Habitats Regulations establishes a requirement to go further. In order to understand the need here we have been working on catchment investigations through the initial part of AMP7 and these have established a significant need for further investment in AMP8 to reduce the phosphorus load in the catchment including from United Utilities assets.
- 5.3.3. We are currently undertaking a significant sampling regime to improve our understanding of the catchment and what is needed to meet the requirements of the regulations. However, the Covid-19 restrictions across the country have meant that the investigations so far completed through the summer season are not yet fully representative of the catchment. Nevertheless we have gathered enough data to be confident that there is a need for intervention to protect habitats, improve the quality of the river environment and comply with the requirements of the Habitats Regulations as set out in the WISER section 2.4 and appendix 1.
- 5.3.4. We have undertaken catchment modelling using these sample results to predict what we would expect the required permits would be in the catchment. We have then followed a consistent methodology to that used in the AMP6 Petteril study to identify where we believe there is sufficient phosphorus load in the catchment, after fair share reductions have been delivered, to offset the phosphorus reduction requirements from our treatment works. We have then done engineering assessments on these sites to understand where we believe catchment interventions will make a material difference to the permit that would be required. This has led us to a required catchment phosphorus load reduction of 1,000kg/year. This is based on the sites where we have a high confidence that intervention will be needed. The efficiency of offsetting as opposed to onsite delivery will be discussed in section 6 “Evidence of Optimised Option” and section 7 “Evidence of Efficient Delivery”.
- 5.3.5. Table 6 below represents the sites which, based on our sampling, require tighter or new phosphorus permits to meet the requirements of the Habitats Regulations. These sites would therefore be required to be included in our AMP8 business plan. We have assessed confidence in the figures and ruled out any sites where we believe there could be a significant change to the expected permit levels as more data becomes available. Following this we have then assessed the catchment for the available phosphorus load, after fair share reductions and applied an assumption that we could potentially remove 10% of this. This assumption is in line with guidance from Natural England’s Catchment Sensitive Farming approach and also is aligned to the assumptions made when assessing past opportunities for catchment delivery in the Petteril. Where we believe there is sufficient catchment

phosphorus load to impact on our solution on-site we have completed more detailed engineering assessment. This has resulted in the 3 sections of the table showing the different confidence levels that catchment interventions will be viable.

Table 6 - WwTW with expected permit limit changes in the Eden if offsetting is delivered. This demonstrates the modelled need to deliver interventions in this catchment

Sub-catchment	WwTW	Existing Permit Limit (mg/l)	Expected Permit Limit (mg/l)	Expected Permit limit with offsetting (mg/l)	Diffuse load to be removed (kg/year)
<b>Sites where following engineering assessment we have high confidence that a catchment solutions will be deliverable and best value</b>					
Upper Eden	South Stanmore WwTW		1.5	Not required	20.40
Upper Eden	Kaber WwTW		1.0	1.5	3.11
Lyvennet	Kings Meaburn WwTW		1.0	2.0	19.76
Trout Beck	Long Marton East WwTW		1.0	1.5	10.58
Irthing	Brampton (Carlisle) WwTW	4.0	1.0	1.5	321.03
Caldew	Dalston WwTW	4.0	0.9	2.0	547.16
<b>Sites where following engineering assessment we believe a catchment solutions is deliverable and may offer best value which require further investigation</b>					
Upper Eden	Outhgill WwTW		4.5	Not required	37.45
Upper Eden	Kirkby Stephen WwTW	1.5	0.3	0.4	29.03
Upper Eden	Ravenstonedale WwTW		0.25	0.4	6.29
Upper Eden	Brackenber WwTW		3.0	4.5	9.42
Upper Eden	Appleby WwTW	2.0	0.5	0.7	103.57
Hoff Beck	Great Asby WwTW		0.6	0.9	8.35
Hoff Beck	Drybeck WwTW		0.3	3.5	14.48
Upper Eden	Kirkby Thore WwTW		1.5	4.5	253.10
Crowdundle Beck	Temple Sowerby WwTW		2.0	2.5	19.53
Eamont	Penrith WwTW	0.8	0.4	0.5	423.98
Caldew	Greengill WwTW		3.5	Not required	56.21
Caldew	Caldbeck WwTW		0.8	1.0	35.08
<b>Sites where initial assessment suggests there is insufficient catchment phosphorus load to make a catchment solution viable</b>					
Upper Eden	Brough WwTW		1.0	1.0	
Upper Eden	Soulby WwTW		4.0	4.0	
Upper Eden	Warcop WwTW		2.0	2.0	
Trout Beck	Murton WwTW		1.0	1.0	
Trout Beck	Brampton (Eden) WwTW		2.5	3.0	



Sub-catchment	WwTW	Existing Permit Limit (mg/l)	Expected Permit Limit (mg/l)	Expected Permit limit with offsetting (mg/l)	Diffuse load to be removed (kg/year)
Trout Beck	Dufton WwTW		0.9	0.9	
Trout Beck	Long Marton West WwTW		2.5	3.0	
Lyvennet	Shap WwTW	1.0	0.1	0.1	
Lyvennet	Morland WwTW		1.0	1.0	
Crowdundle Beck	Milburn WwTW		1.0	1.0	
Briggle Beck	Blencarn WwTW		1.0	1.0	
Lower Eden	Carlisle WwTW	2.5	1.0	1.0	

5.3.6. This activity demonstrates a clear environmental need to deliver phosphorus reductions in the Eden and through the activity we have already undertaken in AMP7 we have established the market mechanisms to allow us to deliver these catchment offsets. This will also allow us to work with partners in the same way we have done in the Petteril to align delivery and progress the activity on the sites in the catchment.

5.3.7. This work through the Petteril markets activity has also established a clear interest from other stakeholders in the catchment for natural flood management and sustainable drainage. The challenges for water management in Cumbria are significant and the past history of flooding of Carlisle at the downstream end of the Eden is well evidenced by the events of Storm Desmond but also looking back further by frequent significant flooding events. The predicted future flooding and spill volumes for Carlisle through the DWMP also demonstrate that this challenge will be getting worse with both internal and external flooding events in 2050 being rated as having significant risk with an increase in property flooding of 69% from 2020 levels as shown in Table 7 below. The significant new development planned for the city will exacerbate this, with the local plan targeting 11,460 new dwellings<sup>10</sup> the challenges in managing water quantity will be significant. This is a challenge that faces the full catchment and there is an opportunity to target delivery of sustainable drainage solutions in partnership with other organisations now to address this situation, delivering benefits for our customers today as well as ensuring the resilience of the city into the future.

Table 7 - Drainage and Wastewater Management Planning (DWMP) Baseline Risk and Vulnerability Assessment (BRAVA) results showing modelled risk of hydraulic sewer flooding in 2020 and 2050.

Green Recovery Area	Population	Population growth (%)	Internal Sewer flooding risk		External Sewer flooding risk		Open spaces (connected prop)		Risk of hydraulic sewer flooding in a 1 in 50 year storm (No of properties)		
			2020	2050	2020	2050	2020	2050	2020	2050	% Increase
The Fylde	365,578	8%	2	2	1	2	0	1	16,312	20,473	26%
Irwell and GMCA	3,362,394	13%	1	2	1	2	0	1	114,424	213,513	87%
The Eden	167,174	24%	1	2	1	2	1	2	15,228	25,734	69%

<sup>10</sup> [https://www.carlisle.gov.uk/Portals/24/Documents/Local\\_Plan/Carlisle%20District%20Local%20Plan%202015-2030/Carlisle%20District%20Local%20Plan%202015-2030.pdf?timestamp=1607959428483](https://www.carlisle.gov.uk/Portals/24/Documents/Local_Plan/Carlisle%20District%20Local%20Plan%202015-2030/Carlisle%20District%20Local%20Plan%202015-2030.pdf?timestamp=1607959428483)

- 5.3.8. Our need to evolve our ambitions through partnership working and the installation of sustainable drainage systems is supported by the recently completed Defra report 'Surface water and drainage: review of responsibilities'. This report highlights the overlapping responsibilities for surface water management and how collaborative cross sector investment needs to be encouraged<sup>11</sup>. It is also supported by Defra, through the Surface Water Management Action Plan. They reference that *'those responsible for surface water (local authorities, water and sewerage companies, highways authorities and others) need to work together if they are to tackle the risks effectively'*<sup>12</sup>.
- 5.3.9. Our work in the Petteril has established several other partners that are interested in Natural Flood Management (NFM) and SuDS and the potential to co fund these activities so there is an emerging opportunity to align our interests to deliver better results for customers in a more affordable way. Looking to address issues beyond sewer flooding but also helping to tackle surface water flooding, river flooding and provide other benefits around recreational space and improvements to biodiversity to benefit customers.
- 5.3.10. In the Eden catchment there are significant needs to deliver. Water quality improvements are required in the form of catchment phosphorus management and improvements to the management of storm water through SuDS and NFM to combat the growing pressure of climate change and population growth. There is also overlap in the catchment interventions that will deliver these outcomes so great potential to align our delivery through the Green Recovery with that of other stakeholders in the catchment. This will ensure we meet our objectives to drive a resilient catchment that can continue to deliver the broad benefits that customer's value.

## 5.4. Fylde

- 5.4.1. The Fylde coast, covering Fylde, Blackpool and Wyre council areas, represents an area with several challenges around the quantity and quality of water. The surface water abstractions in the catchment have quality risks associated to the upstream land use and agricultural pollution which results in greater reliance on groundwater sources which would be better reserved to manage the impact of dry weather events than for routine supply. The water environment has been actively managed here for many centuries, with extensive drainage and redirection of watercourses to enable agricultural development. This has led to very significant water quantity challenges facing the catchment with extensive flooding occurring frequently through a number of mechanisms and impacting on customers. In this section we will evidence the scale of these challenges and the action needed to address this through partnership.
- 5.4.2. A catchment approach offers a way to align some of these interests and build on work that has already been undertaken in the catchments through projects such as our Wyre NFM project in conjunction with the Rivers Trust, EA and insurance industry to deliver more sustainable investment to reduce flooding.
- 5.4.3. To drive a more resilient catchment we will promote activity to protect water sources for Franklaw Water Treatment Works, which are shown in the schematic in Figure 2 below. The treatment works provides drinking water to approximately 525,000 customers in the Fylde area. There are limited

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<sup>11</sup> Defra (a), 2020

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/911812/surface-water-drainage-review.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/911812/surface-water-drainage-review.pdf)

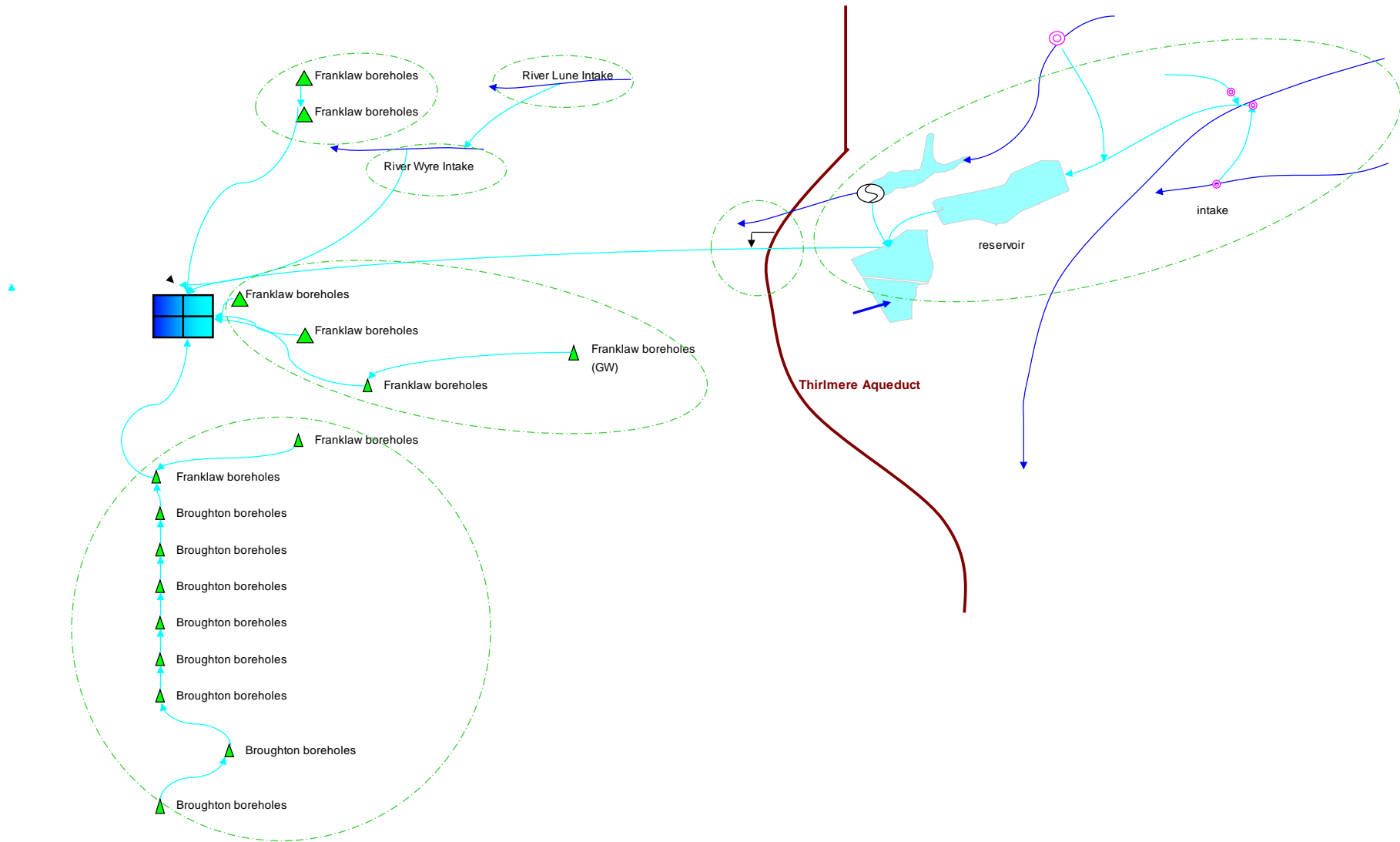
<sup>12</sup> Defra (b), 2020

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/911812/surface-water-drainage-review.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/911812/surface-water-drainage-review.pdf)

alternative options to supply these customers and we recognise the importance of improving water quality at source to reduce the risk of deteriorating raw water quality. To do this we intend to take two approaches; to restore the peatland in the Barnacre and Grizedale catchments which will be discussed further in section 5.6 below and to invest in activity to improve the water quality of the river intakes.

- 5.4.4. This will improve the resilience of these sources and provide a more diverse source selection. We have already been working with partners in the River Wyre catchment and we are keen to take this work further, delivering more in the Wyre and expanding the approach to work with partners in the River Lune catchment as well. There is an established challenge in the Wyre with pesticide use which is being addressed through a targeted programme of monitoring and advice in partnership with the Wyre Rivers Trust, Environment Agency and Natural England's Catchment Sensitive Farming initiative.
- 5.4.5. Figure 2 below shows a schematic of the Franklaw supply system.

Figure 2- Schematic of the Franklaw supply system



- 5.4.6. Existing monitoring currently in place identifies deteriorating water quality with regard to pesticides, E.coli, coliforms and ammonia; all of which can be linked to human and agricultural activity. Further monitoring is required to identify the sources of the deterioration and inform a programme of advice delivered in partnership with the Lune Rivers Trust via the employment of a farm advisor role.
- 5.4.7. In line with the challenges of climate change there is also an underlying need to secure reliable and sustainable water sources to ensure the water supply remains resilient as rainfall patterns change and we go through more periods of prolonged dry weather. Having multiple sources of high quality water will mitigate this risk. The challenge also goes beyond the Fylde Coast as the national water position identifies a need for water trading and reliable sources in the Fylde will help to secure supplies in the North West and increase the supplies available for trading.
- 5.4.8. The water challenge in the Fylde also extends to significant flooding events and how these pose challenges to customers and communities which suffer flooding from sewers, surface water and rivers. The analysis from developing our DWMP identifies how this challenge is expected to grow in the future with the Fylde rated as significant risk from internal and external flooding out to 2050 with an increase in properties modelled to experience hydraulic sewer flooding increasing by 26% from 2020 levels as shown in Table 7.
- 5.4.9. We have started looking at this challenge through the work done in the Wyre to develop alternative funding routes to deliver NFM interventions in partnership with FloodRe, the Rivers Trust, insurers and the Environment Agency. This work was targeted in the Wyre because of the long history of flooding in this area. There are significant Environment Agency flood basins here but, even with this in place, information provided to the Wyre project by the EA flood team showed areas in this catchment that have seen significant flooding on 4 occasions in the last 20 years. There are several mechanisms that are causing this flooding including river, surface water and sewer flooding so this can't be addressed in isolation. What is clear, however, is the significant impact this has on customer's lives, and the disruption it causes to local communities as can be seen in the video produced by the Churchtown Flood Action Group<sup>13</sup>.
- 5.4.10. To try and address this issue we have worked with other key stakeholders as above and are looking at delivering upland land management interventions to reduce and slow water flows into the lower catchment. The interventions required have been modelled using innovative new catchment assessment techniques to ensure they are located in the best places to achieve the greatest results. Due to the multiple flooding mechanisms however no individual organisation can resolve these issues so we have worked to develop a new funding model where a special purpose vehicle will deliver the interventions and organisations pay for the outcomes delivered on a payments by results basis. This manages the risk associated with the delivery through natural flood management and spreads the cost burden across multiple beneficiaries protecting customers both financially and from the impacts of flooding.
- 5.4.11. This approach demonstrates the need for better water management in the Fylde and shows how we have been innovative in how we have approached this in other parts of the catchment. The problem goes beyond Churchtown however so further investment is needed to deliver sustainable drainage in the Fylde. The maps included in section 3 Introduction demonstrated the current numbers of properties experiencing flooding in Blackpool and the DWMP data included in Table 7 shows how the risk of flooding will increase as we move towards 2050. As a result of this we have already been working in partnership with Blackpool Council to identify SuDS opportunities to deliver further and

<sup>13</sup> <https://www.youtube.com/watch?v=il84G9XIS94>

align our flooding requirements and those of Blackpool so we can deliver jointly in line with the expectations of the WISER as outlined in sections 3.0 and 3.1.

## 5.5. Irwell

- 5.5.1. The environmental problems in the Manchester Ship Canal (MSC) and Irwell catchments are complex, with major problems associated with growth, nutrients, pollution and invasive non-native species. In this section we are going to expand on the specific challenges faced in this catchment and how these can be met through our approach to accelerating action and delivering improvements with stakeholders and partners.
- 5.5.2. Manchester is one of the fastest growing cities in the UK with significant development recently and further activity planned in the future as explained in the Greater Manchester Spatial Framework<sup>14</sup>. Significant elements of the development is associated with the river systems in Greater Manchester so the quality of these systems is a key element to driving the continued economic growth of the region. This growth comes at a cost however with increased pollutant loads being created through run off and collected through the sewerage network so a catchment approach to minimising the impact of this that manages all pollution routes is needed.
- 5.5.3. Climate change is also predicted to change weather patterns, increasing significant rainfall events and causing greater numbers of spills and flooding in the future as shown in Table 7 with Greater Manchester rated as at significant risk for both internal and external flooding and the number of properties modelled to experience hydraulic sewer flooding in a 1 in 50 year storm increasing by 87%. In order to meet this challenge from a water management perspective but also align with other parties to deliver the broader benefits that customer need in terms of quality of place, clean air, biodiversity and access to nature we need to develop new options to tackle all of these challenges in an aligned way that will increase the benefits we can deliver to customers whilst maintaining affordability.
- 5.5.4. The need for sustainable drainage and blue green infrastructure is highlighted in the Environment Agency Flood and Coastal Erosion Strategy, the Greater Manchester Infrastructure Plan 2040 and recommended by reports published by the National Infrastructure Commission. Additionally, the WISER document sets out the companies should consider the use of sustainable drainage systems wherever possible. Evidence supplied by the Greater Manchester Tree and Woodland Strategy indicates how trees help prevent surface water entering the network and so sewer flooding by intercepting 1.6 million cubic meters of storm water runoff per year.
- 5.5.5. This approach also supports the work we are doing in the Manchester Ship Canal as explained in detail in the 'environmental improvements across the Manchester Ship Canal catchment' document. The work we have done so far in this location has developed only the second catchment permit to be issued in England. The work done in this catchment with the EA identifies the significant challenges that the ship canal faces in terms of phosphorus load and dissolved oxygen but recognises the impact that the upstream catchments have on this. It allows us to balance the performance of our treatment works across the catchment pushing harder where it is efficient to do so to prevent further costs at locations that are more challenging. This drives a more efficient way of operating assets and takes in the performance of the overall catchment. The next step to take this further is understanding the contributions from the wider catchment and the impact these have on the Ship Canal. The evidence in graphs 5.1 – 5.7 below shows the impact the catchment is also having on the environmental

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<sup>14</sup> <https://www.greatermanchester-ca.gov.uk/media/3663/221020-agma-issue-opt.pdf>

performance of the river through phosphorus pollution but there are also significant other pollutants that are present in sources such as urban runoff, to progress this approach further and tackle all of these issues we need to work differently through partnership.

Figure 3 - Photo from Bury WwTW showing a van that had been washed down the river during storm Eva



5.5.6. The challenges that the catchment faces however go beyond water quality. Climate change, increases in predicted future rainfall and the impact of increased development is predicted to drive increased flooding and spills in future. The work underway through the Drainage and Wastewater Management Plan shows the significant increases in flooding and spill risk from our network as we progress to 2050 as shown in Table 7. In order to address this in an affordable way and support the broader benefits that customers value, in line with the expectations raised in the WISER sections 3.0 and 3.1, we propose to work with lead local flood authorities to align our interests and deliver Sustainable Drainage Solutions (SuDS) and natural flood management to remove surface water from our network and manage it in a sustainable way. Through partnership we can identify joint objectives and deliver SuDS. This more natural approach to water management also creates opportunities for urban green infrastructure and biodiversity and supports the strategic activity we are partnering in Greater Manchester through the IGNITION Project<sup>15</sup> and the local nature recovery strategy pilot<sup>16</sup>.

5.5.7. Storm Eva in Greater Manchester resulted in significant flooding of 2,250 homes and 500 businesses causing damage of £11.5m according to a GMCA report<sup>17</sup>. This demonstrates the resilience challenge faced in Greater Manchester and the need to develop ways of managing water quantity more effectively and the need to tackle this collaboratively. We have been working with partners in Greater Manchester as part of the Rockefeller 100 Resilient Cities

## United Utilities and Innovative financing aNd delivery of naTural climate sOLutioNs in Greater Manchester (IGNITION) Project



*How are UU working in partnership to help drive funding innovations that protect customers from increased bills?*

Developing innovative financing solutions for investment in Greater Manchester's natural environment to increase the city's ability to adapt to the impacts of climate change.

- Improve ability to adapt to the increasingly extreme impacts of climate change
- Key focuses are **urban heat and flood risk reduction**
- Wider benefits to water security, air quality, biodiversity and human health and wellbeing

**Develop the first financial model to enable major investment into large scale environmental projects**

**Enable a 10% increase in Greater Manchester's urban green infrastructure by 2038.**

<sup>15</sup> <https://www.greatermanchester-ca.gov.uk/what-we-do/environment/natural-environment/ignition/>

<sup>16</sup> <https://www.gov.uk/government/news/five-local-authorities-announced-to-trailblaze-englands-nature-recovery-pilots>

<sup>17</sup> <https://www.greatermanchester-ca.gov.uk/news/boxing-day-floods-report-released/>

programme so partnerships in this area are well established. The Green Recovery will drive forward investment through partnerships in solutions that reduces flooding for customer from sewers as well as surface and river water preventing the devastating impacts that flooding has on people's lives.

- 5.5.8. An increasing concern in the Irwell catchment is the significant spread in invasive species over the past few years. The specific challenge in the Irwell is associated with Giant Hogweed, Japanese Knotweed and Himalayan Balsam. These plants cause significant environmental, economic and health challenges but have spread due to the absence of a strategic approach to tackling them. The effectiveness with which these plants can spread prevents native vegetation from establishing, damaging our native biodiversity in itself but equally the size of these plants causes excessive shading of watercourses preventing macrophyte (aquatic plants) establishment which damages the aquatic environment reducing fish populations. These have a material impact on the Water Framework Directive (WFD) status of water bodies with direct impact on the biological and physical parameters and as stated in the Water Industry Strategic Environmental Requirements (WISER) we have a duty to manage or eradicate these species on our land where they pose a risk of deterioration in WFD status.

*Figure 4 - Photos from wildflowerfinder.org.uk showing Giant hogweed in the Irwell*



- 5.5.9. When these invasive plants die back during winter the lack of native vegetation below leaves significant bare patches which can cause erosion, washing sediment and nutrient loads into watercourses and contributing to channel changes which can have an impact on flooding as well as putting bankside assets at risk. In the case of Giant Hogweed there is also a significant health and safety issue with the sap of the plant causing severe burns which are photosensitive and can last for many years. The prevalence of these species along the river Irwell therefore creates a physical barrier to customers accessing the watercourse and significantly reduces the natural capital value of the river and diminishes the enjoyment and recreation that people can take from this.



Figure 5 - Photo showing Giant Hogweed burns caused by plants in the Irwell<sup>18</sup>



- 5.5.10. There have been limited studies of the increasing prevalence of invasive species in the Irwell. We have worked with the catchment partnership to understand this issue in more detail and they have confirmed a growing challenge. It is easy to see how this spread is occurring as in the case of Giant Hogweed a single plant can produce 20 – 50,000 viable seeds per year and whilst transmission through the air is fairly limited, watercourses can transmit these seeds for many kilometres. The seeds themselves are also extremely hardy with most seeds remaining viable in the soil for 2 years and some lasting as long as 7 (Tiley et al., 1996) which demonstrates why a long term approach is needed for eradication of these plants.
- 5.5.11. This approach has been hampered in recent years with changing weather patterns leading to wetter winters which spread seed further and drier summers which expose areas of river bank that would previously be submerged and therefore allowing species to establish themselves in new areas. This also reduces the channel width when flows increase contributing to further flooding challenges. 2020 has also been a particularly challenging year for these species as Covid-19 has prevented a lot of the normal control that would have taken place meaning far greater spread has occurred this year.
- 5.5.12. The experience of the catchment partnership is also borne out by United Utilities experience on our own assets, where we have seen the amount of these plants growing in past years increase significantly with our onsite teams reporting a tenfold increase in spend to control these from 2019 to 2020 and our water catchment teams predicting costs could double into next year. The prevalence of these species in the upstream catchment and the effectiveness with which these plants spread means that even with on-site management we are only containing the species but new seeds propagate each year meaning we are constantly having to treat and remove regrowth.

<sup>18</sup> <https://www.manchestereveningnews.co.uk/news/greater-manchester-news/hogweed-salford-bolton-plant-toxic-9620900>

- 5.5.13. As a result of this we believe the most effective way to manage these species is the complete removal from the catchment but in order to do this we cannot work alone. Currently we manage the spread on our own land but suffer from spread coming in from others land with seeds being transmitted by the river. This places a consistent burden on customers to managing these species. Based on figures from 2010 as referenced in the WISER the water industry alone is estimated to spend £5million per year but the cost to the economy overall was estimated to be £1.7billion .
- 5.5.14. At the current time it is also important to think about the social context in which this investment would be taking place. Covid-19 has placed significant challenges on people across the country but Greater Manchester has been one of the worst affected with some areas under national or local restrictions for most of 2020. Six of the nine local authorities we are proposing to work in in Greater Manchester are in the 35 worst hit lower tier local authority areas based on government data taken on 7<sup>th</sup> January 2021<sup>19</sup> with Covid-19 rates all above 6,000 per 100,000 people. The impacts of this have caused significant economic damage, as well as having a big impact on people’s lives and their health both physical and mental.
- 5.5.15. There has been significant research into the effect access to green space can have on people’s physical and mental health as discussed in the UK Government POST Note 538. Some studies have shown as much as a 50% reduction in health inequalities in the most deprived areas with good access to green space compared to those without. Invasive species represent a barrier to people accessing and using green/blue space in their local area and as large elements of the Irwell that will be targeted are in a urban setting this limited green space is a vital resource for communities. It is therefore a significant benefit to start tackling this issue now and to focus on the whole catchment to restore these spaces as recreation locations for the public.
- 5.5.16. Through working with the catchment partnership we have developed plans to tackle these species and provide long term resilience from their re-emergence. Through our support the partnership can leverage additional funding and work with other land owners that we would struggle to influence to tackle these species at a catchment level.
- 5.5.17. Studies have suggested that a collaborative approach to these species is the only way to achieve sustained reduction<sup>20</sup>. This is required to manage these efficiently and provide far broader benefits to customers in terms of improving access to the natural environment, restoring biodiversity, reducing the continual burden on the economy and reducing the risk that they pose to customers in terms of increasing flood risk. The WISER also indicates working in partnership as being key to the control of this issue.
- 5.5.18. As referenced earlier in this section one of the key challenges facing the catchment is population growth and the increasing strain this puts on the natural environment through things like urban runoff and the contribution this has to phosphorus levels as well as other priority substances. In line with the expectations in the WISER Section 2.1 we need to work to meet WFD requirements and prevent deterioration in the water bodies and catchment approaches are identified as best practice to achieve this. Therefore in order to drive the catchment approach we have modelled the catchment and

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<sup>19</sup> [https://coronavirus.data.gov.uk/details/cases#card-cases\\_by\\_area\\_whole\\_pandemic](https://coronavirus.data.gov.uk/details/cases#card-cases_by_area_whole_pandemic)

<sup>20</sup> Sutcliffe, C., Quinn, C.H., Shannon, C. et al. Exploring the attitudes to and uptake of biosecurity practices for invasive non-native species: views amongst stakeholder organisations working in UK natural environments *Biol Invasions* **20**, 399–411 (2018) <https://doi.org/10.1007/s10530-017-1541-y>

identified areas where there are contributions from both agricultural and urban run off as demonstrated in Figure 8 below.

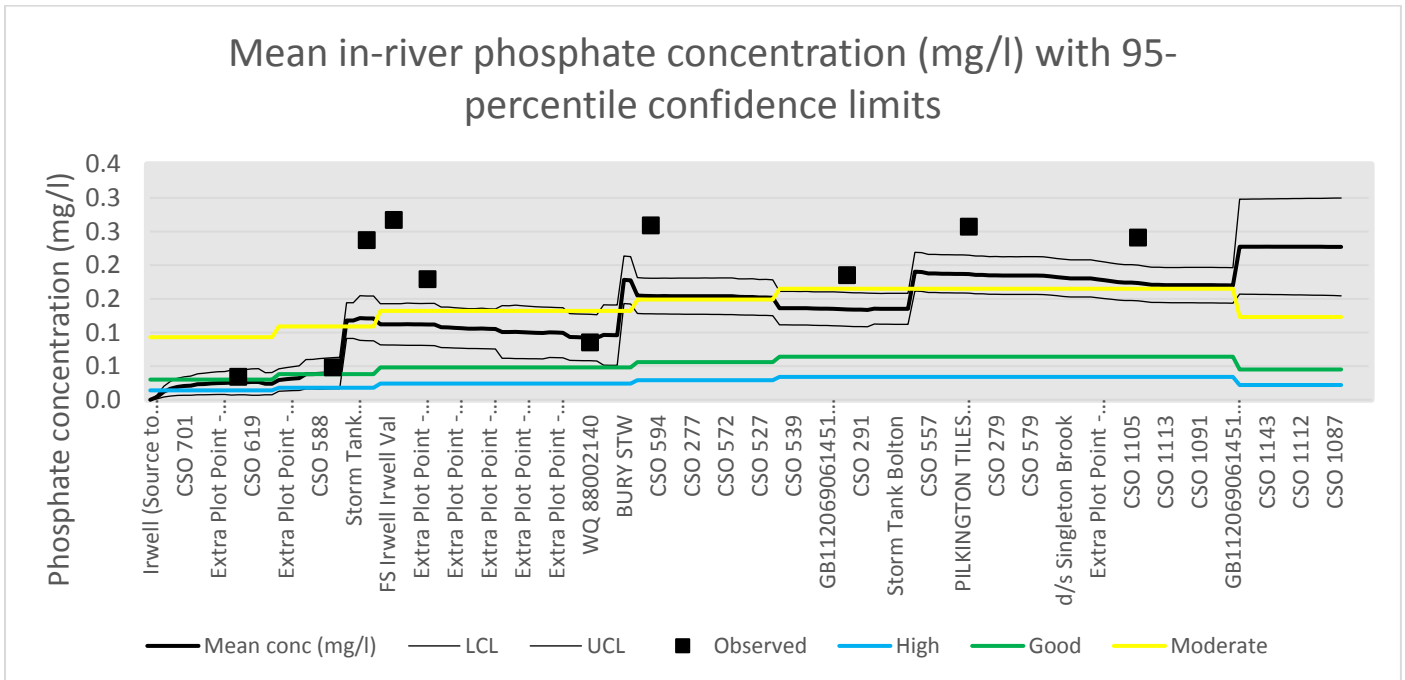
- 5.5.19. Through our partnership with Natural Course<sup>21</sup>, a European Union funded collaboration between United Utilities, the Rivers Trust, the Environment Agency, Natural England and Greater Manchester Combined Authority to identify how we can achieve better compliance with the Water Framework Directive, work has been completed across all the water bodies in the Irwell to identify challenges and opportunities to improve the river. As shown in the evidence and measures report completed by APEM for natural course<sup>22</sup>, opportunities exist to manage phosphorus in the catchment across significant numbers of waterbodies and we have been working with the catchment partnership to develop what could be delivered in these areas. This will provide opportunities to not only reduce urban sources of phosphorus but also tackle the other pollutants that are present in this urban runoff.
- 5.5.20. There is an established challenge with phosphorus in the Greater Manchester area as evidenced by the investigations and analysis completed by United Utilities through our Manchester Ship Canal work and by the evidence and measures study completed by Natural Course. The further growth in the area will put increasing strain on the natural environment as evidenced through the DWMP analysis shown in Table 7. The analysis we have completed demonstrates that there are significant parts of the Irwell which are moderate or worse for ecological status so there is a clear need to deliver improvements. To demonstrate this Figure 6 below shows a section of the main river Irwell and clearly shows the phosphorus concentration above the threshold for good consistently and also above the threshold for moderate at times. Whilst the impact of treatment works here is significant there are also other major sources of phosphorus in the Irwell as evidenced in Figure 7 below.
- 5.5.21. By adopting a catchment approach now we can engage partners to understand and manage phosphorus at a catchment level, deliver improvement in the current water quality to support the move to good ecological status and mitigate against future deterioration as well as delivering some of the additional benefits that we have been able to achieve in the Eden catchment as referenced in section 6 “Evidence of Optimised Option”. By developing a strong catchment partnership to tackle some of the catchment challenges we can mitigate some of these impacts and reduce the future requirements. This will be a key way to develop more sustainable management techniques to allow us to develop better informed plans in future and share this knowledge with the wider industry.
- 5.5.22. Figure 6 below plots the path of the river as you move downstream (x axis) against the concentration of phosphorus (y axis). The points on the x axis represent monitoring locations associated with outfalls or monitoring points. The required concentration to meet good ecological status is shown by the green line and as you move along the river there are significant phosphorus sources resulting in concentrations above this point, and often above the required level for moderate status (yellow line). The shows the scale of the challenge faced to meet the phosphorus levels required in the WFD

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<sup>21</sup> a collaboration between United Utilities, the Environment Agency, Greater Manchester Combined Authority, Natural England and The Rivers Trust (<https://naturalcourse.co.uk/>)

<sup>22</sup> GR0002a Irwell Catchment Evidence and Measures Study\_Water Body Outputs Maps.

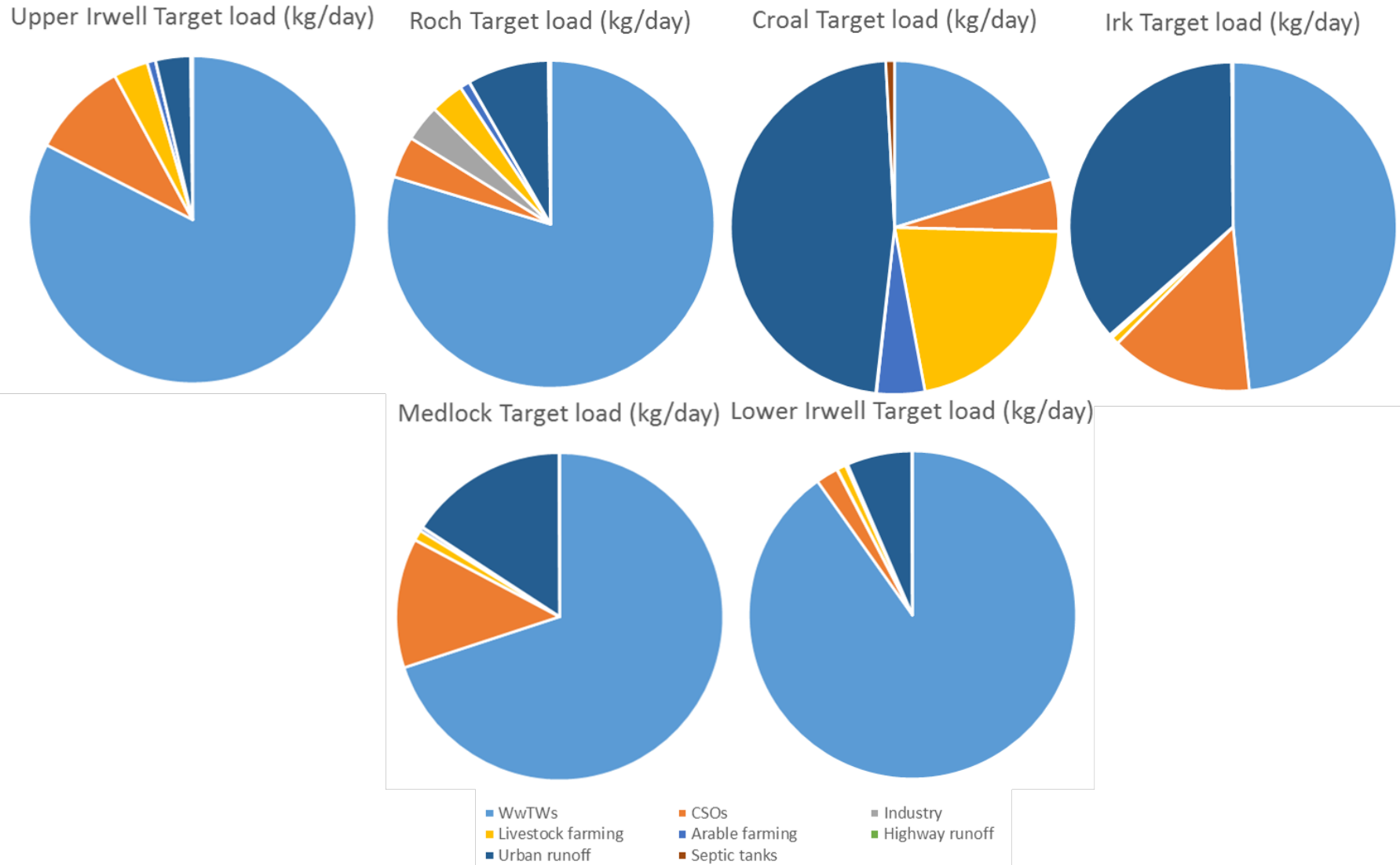
Figure 6 - Chain plot of the in river phosphorus concentrations on the main river Irwell



5.5.23. Figure 7 below shows the source apportionment for phosphorus pollution in the Irwell split into the 6 sub catchments. This demonstrates that whilst there is significant pollution attributed to the water industry there are also significant other sources of pollution that are contributing to the status of the river. In order to meet the aspiration of good ecological status and a resilient catchment action needs to be taken to address other catchment challenges. Working in partnership to tackle issues such as urban runoff is required as these are long standing constraints that prevent all stakeholders in the catchment from achieving their desired outcomes.

# Accelerating partnerships to deliver natural solutions

Figure 7 - Showing the source apportionment modelled for the sub-catchments in the Irwell



## 5.6. Peatland restoration

- 5.6.1. According to the International Union for Conservation of Nature IUCN, 70% of drinking water supplied in the UK originates from peatland sources (see Figure 9). This value is particularly the case for UU customers, with the majority of England's peat in the North West as shown in Figure 8. Peatland is a hugely important carbon sink holding 550 gigatonnes of carbon globally, more than twice the mass stored in all forests. Restored peat is therefore a significant delivery route for carbon net zero, not just for UU but for the industry and country as a whole. UU owns a significant estate (56,000 hectares) of which the majority is situated around the upland reservoir catchments. This provides a unique opportunity for us as a landowner and water utility to maximise restoration effort through partnership working to deliver benefits for society. Figure 9 below shows the benefits of peatlands as identified by the International Union for the Conservation of Nature, which demonstrates the additional value that can be achieved through peatland restoration.

*Figure 8 - UK soil observatory Peat coverage in North West England*

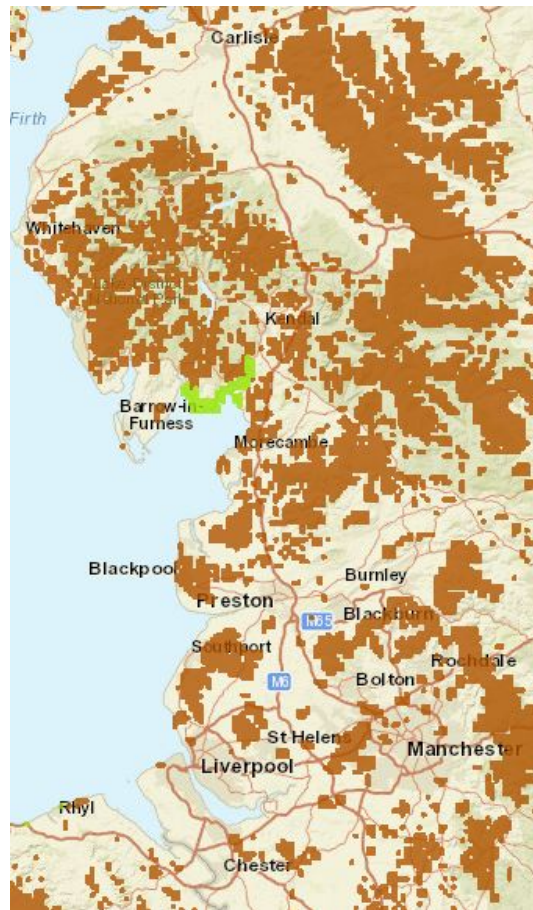


Figure 9 - International Union for Conservation of Nature IUCN: Ecosystem services provided by peatlands



- 5.6.2. The work planned through Green Recovery will build on the successful work that UU began in AMP4 as the first company to invest in catchment management to deliver benefits for water and wildlife. Over subsequent AMPs we have continued to support partners delivering peatland restoration. However, we recognise that the impact of climate change and the effects of damaging wildfires in recent years means that this is not enough. An increase in pace is required to bring about landscape-scale increases in resilience to protect the water and wildlife from future shocks and changes.
- 5.6.3. Key emerging challenges are: the frequency of drying and wetting cycles driven by changing weather patterns due to climate change, industrial legacy impacts – historic deposition of air pollutants from nearby towns and cities, the impact of evolving agricultural policies that once encouraged peat cutting, drainage, burning and grazing, and the impact of a growing population who access these areas for recreation causing path erosion and wildfires.
- 5.6.4. These challenges impact on the quality of water available for customers and if un-managed result in the requirement for expensive treatment processes downstream.
- 5.6.5. As Figure 10 shows below, the carbon in peat is dissolving into watercourses at an increasing rate as a result of reducing acid rain, coupled with a changing climate. We observe this trend in all of our upland sources, for example Figure 11 below shows data from Watchgate Water Treatment Works which is supplied by the Haweswater catchment. Dissolved organic carbon in water materialises as ‘colour’ and it is measured using units of hazen. Hazen is a measure of the concentration of dissolved and particulate material. A value of zero represents distilled water, values increase up the scale using gradient values of yellowness. Extremely coloured water from a flush of dissolved organic carbon would appear similar to a strong caffeinated drink.

Figure 10 - Drivers of changes to dissolved organic carbon versus water treatment thresholds

## Drivers of deterioration

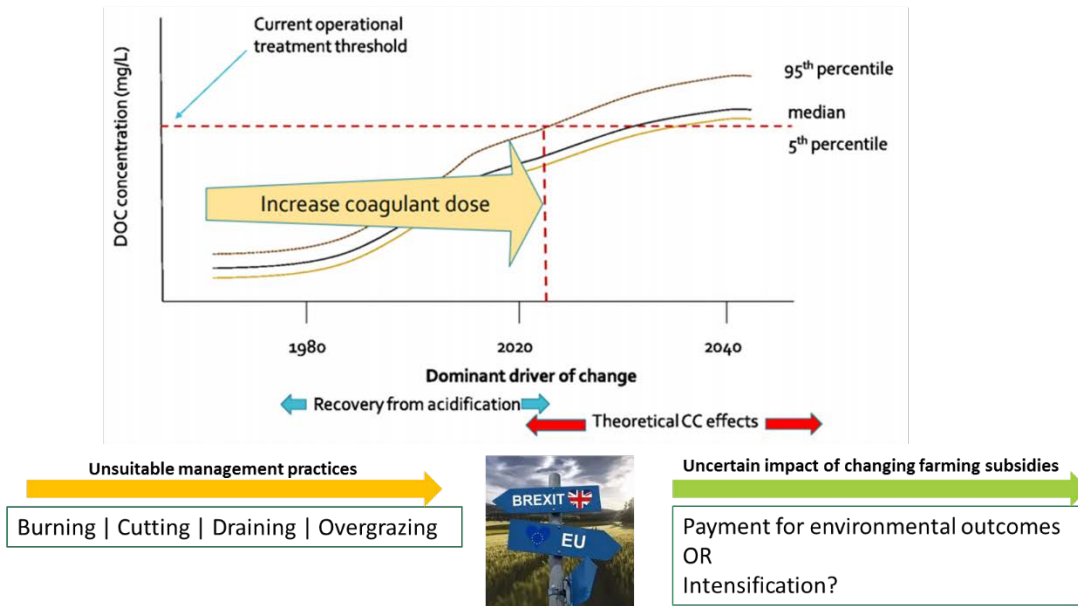
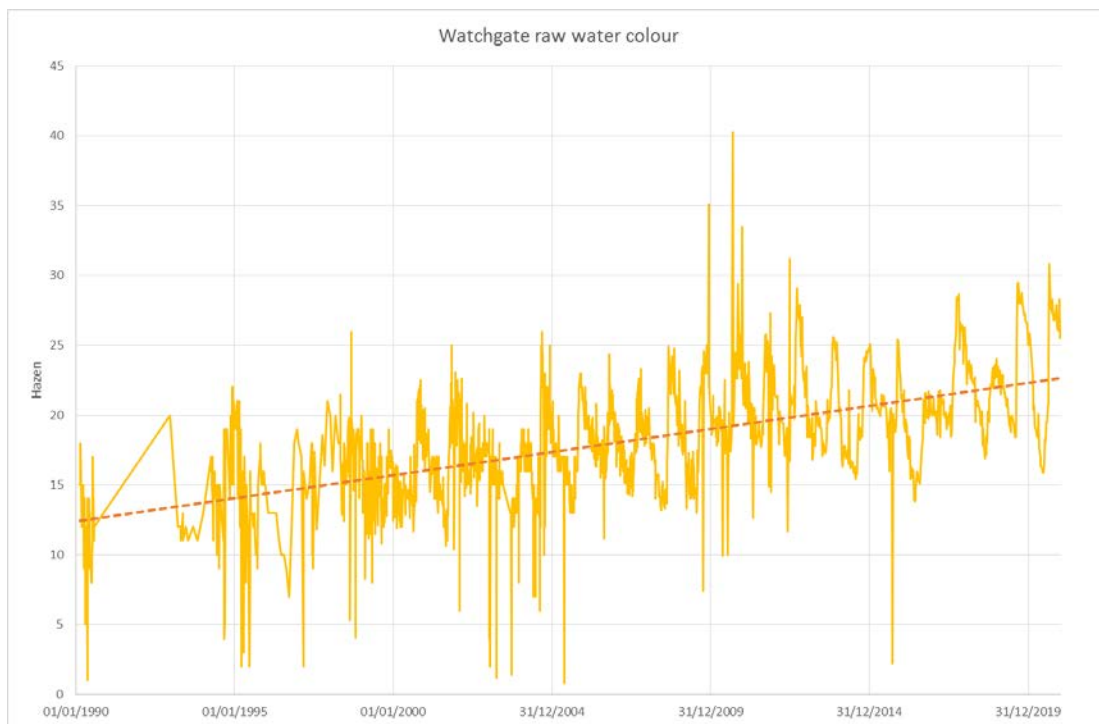


Figure 11 - Colour (hazen) measured at the inlet to Watchgate water treatment works 1990 - 2020



- 5.6.6. Peatland restoration is also important for mitigating the impacts of climate change where the cycle of wetting and drying of the peat soil causes carbon to be lost to the water and air, to the detriment of people and wildlife. Peatland restoration is also important for driving a more sustainable use of the land as a carbon sink rather than as marginally productive (or often loss-making) agricultural grazing.
- 5.6.7. Restored peat provides resilience against fires, which typically occur when the vegetation is dry and the soil water content is low.



- 5.6.8. The peatland carbon code acknowledges the benefit of peatland restoration for carbon sequestration and schemes can be accredited to provide carbon credits. Although carbon credits are cheaper to buy on the global market, if we do not take action to restore the peat in these locations customers will not get the other benefits in terms of improved water quality and biodiversity.
- 5.6.9. There is currently an uncertain future for upland farming which is heavily dependent on the existing farming subsidy regime. This is due for significant change when the Environmental Land Management Scheme transitions subsidies to payments for delivering public goods. It is noted that much of the uplands can deliver more in terms of public goods (clean air, water, nature, carbon storage) than they currently do for food and wool. We will be working with our tenant farmers and partners such as the RSPB to support the plans for a more resilient upland farm economy along with a focus on activities to increase resilience by restoring natural processes. This would build on the investment made through SCaMP in AMPs 4 and 5, water safeguard zones in AMP6 and WINEP schemes in AMP7 to accelerate the pace of positive environmental change.
- 5.6.10. Our work in partnership with RSPB at Haweswater is already recognised as an exemplar of how an upland farm can operate without subsidies<sup>23</sup>. Our current project in the Thirlmere catchment<sup>24</sup> is also a leading example of delivering increased resilience through improved land management practices. Through the proposed peatland work we will apply the learning from these areas to act as a positive demonstration to other upland farms in the Cumbria/Pennines/Peak District areas where the future economic climate is uncertain.
- 5.6.11. There has been a change in circumstance since the development of the AMP7 WINEP programme and the wildfires experienced at Winter Hill, the Goyt Valley and Longdendale in 2018 and 2020 have pushed the starting point back for the planned level of restoration in the WINEP schemes. Therefore, additional investment is needed to increase the resilience of the catchment, beyond that originally planned. As the custodians of these important landscapes we seek to minimise the risk of deterioration in land condition. Wildfires are extremely detrimental to the land condition; the wildlife it supports and the quality of the water that runs off into the reservoirs used to supply drinking water. Therefore customers support the management of these areas through investment in peatland restoration to minimise the impact of wildfire. Quite simply, a restored peatland is too wet to burn. Restoration is accompanied by a sustained campaign of public education and awareness raising, which is delivered through partner organisations such as Moors for the Future. We work with local councils to address wildfire caused by antisocial behaviour and ASBOs have been put in place by various councils during high-risk periods of prolonged dry weather.

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<sup>23</sup> [https://ww2.rspb.org.uk/Images/Farming\\_at\\_Haweswater-an\\_economic\\_report\\_2013-2016\\_tcm9-451498.pdf](https://ww2.rspb.org.uk/Images/Farming_at_Haweswater-an_economic_report_2013-2016_tcm9-451498.pdf)

<sup>24</sup> <https://www.johnmuirtrust.org/latest/news/2045-new-friends-in-the-lakes>

- 5.6.12. Table 8 below outlines the activities planned through Green Recovery funding. There is a recognition that sites such as Dovestones and Winter Hill are at an increased risk from wildfire due to their proximity to urban areas and the present state of ecological degradation due to the legacy of industrial pollution, and land management practices such as land drainage, burning and grazing. Research undertaken by Moors for the Future<sup>25</sup> has shown that the incidents of wildfires in recent years are around the moorland edge and along access tracks, whereas previously they were in more isolated locations. As more people take up the opportunity to gain health and wellbeing benefits from being in these places we recognise the need to educate visitors on the need to respect the warning signs (e.g. no barbecues) and roll out wider communication material developed as part of the MoorLIFE2020 campaign. Research into the air quality impact of wildfires has been undertaken in relation to the release of carbon<sup>26</sup> however further research is ongoing under a programme of funding by the Natural Environment Research Council<sup>27</sup>. The release of air pollutants from moorland fires is a public health issue, evidenced by the evacuation of homes in the Stalybridge area during the 2018 fire.
- 5.6.13. As part of these proposals there is currently a significant opportunity to work with partners to increase the delivery in The Great North Bog<sup>28</sup> this is an ambitious, grand-scale peatland restoration initiative being developed by the North Pennines AONB Partnership, the Yorkshire Peat Partnership and the Moors for the Future Partnership. It is a landscape approach to restoration across nearly 7000 square kilometres of upland peat in the Protected Landscapes of northern England, which currently store 400 million tonnes of carbon. Damaged peat in the Great North Bog releases 3.7 million tonnes of carbon annually. The programme aims to develop a working partnership to deliver a 20-year funding, restoration and conservation plan to make a significant contribution to the UK's climate and carbon sequestration targets.
- 5.6.14. United Utilities is a key partner in the Great North Bog, through which we aim to drive a long term, strategic approach to peatland restoration by resourcing successful partners to deliver across the region. This ambition is fully supported by the Environment Agency and Natural England, who have recognised in their letters of support that UU's Green Recovery work is well aligned to the ambition of the Great North Bog.
- 5.6.15. Figure 13 below demonstrated the 6 states of peatland restoration and demonstrates the change that we will be delivering over the long term. Through the delivery of SCaMP in AMPs 4 and 5 we brought about a shift in peatland state across our upland estate from state 2 (bare peat) to state 3 (dwarf shrub) as a result of investment to revegetate and stabilise areas of bare and eroding peat soil.

Figure 12- The Bogtastic Van, part of the MoorLIFE 2020 communications campaign to bring the moors to life for the public



<sup>25</sup> [https://www.moorsforthefuture.org.uk/\\_\\_data/assets/pdf\\_file/0018/97002/2019-Wildfire-Ignition-Risk-Mapping-Summary.pdf](https://www.moorsforthefuture.org.uk/__data/assets/pdf_file/0018/97002/2019-Wildfire-Ignition-Risk-Mapping-Summary.pdf)

<sup>26</sup> [https://www.moorsforthefuture.org.uk/\\_\\_data/assets/pdf\\_file/0026/265823/MoorLIFE-2020-A-case-study-estimating-the-amount-of-carbon-released-from-The-Roaches-wildfire-in-2018.pdf](https://www.moorsforthefuture.org.uk/__data/assets/pdf_file/0026/265823/MoorLIFE-2020-A-case-study-estimating-the-amount-of-carbon-released-from-The-Roaches-wildfire-in-2018.pdf)

<sup>27</sup> <https://nerc.ukri.org/planetearth/stories/1899/>

<sup>28</sup> [https://www.moorsforthefuture.org.uk/\\_\\_data/assets/pdf\\_file/0022/345451/The-GNB-summary-vision.pdf](https://www.moorsforthefuture.org.uk/__data/assets/pdf_file/0022/345451/The-GNB-summary-vision.pdf)

Through the work proposed as Green Recovery the sites will be advanced from state 3 to states 4 (grass dominated) and 5 (modified) by increasing the diversity of the vegetation and restoring the hydrological integrity by addressing drainage features (grips and gully's).

Figure 13 – Upland Management Group: Six states of peatland restoration

## 6 states of peatland restoration [Uplands Management Group guidance](#)



# Accelerating partnerships to deliver natural solutions

Table 8 - Water Industry National Environment Programme drivers for peatland restoration AMP4-AMP7 showing additionality of UU investment and Green Recovery work

Catchment	SCaMP (AMP4+5)	AMP6	AMP7	Green Recovery
<b>Haweswater</b>	Restoration work on Mosedale and Shap Fell  Restoration work on Naddle and Swindale	Drinking water protected area driver  UU funded mapping of peat soils support Defra funded peatland restoration	Site of special scientific interest (SSSI) driver  UU matched funding to develop a tree nursery for resilient upland plants	UU expanding catchment resilience approach  Peatland restoration 500 hectares on Shap Fell and Arnboth sub catchments  Green Recovery Challenge Fund supporting 4 peatland officers with Cumbria Peat Partnership to deliver restoration
<b>Barnacre Grizedale</b>	No driver	No driver	No driver	Resources to facilitate engagement through Bowland Area of Outstanding Natural Beauty  Environmental Land Management landscape recovery scheme trial or extension of existing stewardship scheme (timing dependent)  Peatland restoration scheme here and in the wider Wyre catchment. Linked to existing NFM work.
<b>Winter Hill</b>	De-stock grazing, gully blocking.	Wildfire in 2018 - Restore firebreak damage.  Recovery group for the restoration of Winter Hill established.	SSSI driver West Pennine Moors  Survey vegetation condition and opportunities for restoration  Sphagnum planting	Deliver restoration on sites identified in AMP7 survey.  Approx. 350 hectares of deep peat  Reduce wildfire risk by reducing dominance of molinia by innovative conservation grazing, and cutting.  Block remaining gully's.  Partnership working to address visitor issues e.g. erosion  Plant more sphagnum and other plant species.  Tree planting on moorland fringe.  Public education and policing around wildfire.
<b>Longdendale</b>	Reducing/excluding stock	Drinking water protected area driver (colour)	SSSI driver South Pennines	Dovestone partnership with RSPB to deliver accelerated habitat restoration in priority areas already identified

# Accelerating partnerships to deliver natural solutions

Catchment	SCaMP (AMP4+5)	AMP6	AMP7	Green Recovery
	<p>Stopped burning on deep peat</p> <p>Cutting used for firebreaks</p> <p>Bare peat restoration</p> <p>Stone gully blocking</p> <p>Moorlife on non-owned catchment</p>	<p>Reduced stocking</p> <p>Bare peat revegetated</p> <p>Sphagnum planting</p> <p>Gully blocking</p> <p>Cutting used for firebreak management</p>	<p>Extended area of Sphagnum planting</p> <p>Gully blocking using peat and stone dams</p> <p>Trial pipe blocking</p> <p>Cutting used for firebreaks</p> <p>Reduced stocking continued everywhere</p>	<p>Peaknaze/Pikenaze partnership with Moors for the Future to deliver accelerated habitat restoration in priority areas already identified</p> <p>Bare peat revegetation</p> <p>Reprofiling peat edge and revegetate</p> <p>Gully blocking</p> <p>Cutting and grazing molinia</p> <p>Planting sphagnum and other moorland plants</p>
<b>Goyt Valley</b>	<p>Agri-environment agreements</p> <p>Stock reductions</p> <p>Stopped burning on deep peat</p> <p>Cutting used for firebreaks</p> <p>Grip blocking</p>	<p>Low stocking levels</p> <p>Cutting used for firebreaks</p>	<p>Investigation driver (colour)</p> <p>Installing sub-catchment monitors</p> <p>New Countryside Stewardship scheme delivering peatland restoration</p>	<p>Extend the area currently being restored as part of the CS grant through match funding</p> <p>Trial new techniques for gullies to include more areas</p> <p>Trial new Sphagnum planting methods</p> <p>Cut more firebreaks to reduce the risk of wildfire and accelerate resilience</p> <p>Tree planting on moorland fringe</p>
<b>Lune</b>	No driver	No driver	No driver	Resource in the Lune Rivers Trust to investigate, monitor and engage with farmers to address water quality issues
<b>Wyre</b>	No driver	<p>Monitoring (pesticides) by Wyre Rivers Trust</p> <p>Engagement work with farmers and landowners</p>	<p>Continued monitoring and advice programme</p> <p>Now secured access for 2021 on the Abbeystead estate</p>	<p>Resource a dedicated farm advisor with Wyre Rivers Trust to engage with wider number of farmers</p> <p>Match fund interventions on farms as part of a combined green finance package drawing other funding for NFM, ELMS, tree planting, etc.</p>

## 6. Evidence of optimised option

### 6.1. Introduction

6.1.1. United Utilities has a long history of investing in catchments through our SCaMP approach and we have demonstrated through successive price controls that this represents good value for money for customers as evidenced in Table 9 below. In recent years we have evolved this to our Catchment Systems Thinking approach and through projects such as the Petteril, which as part of our catchment approach was highlighted as a strong example of innovation following PR19 in Ofwat’s Initial Assessment of Plans, we have explored how we can use this catchment approach to meet the challenges our wastewater business faces in the most efficient way. This approach has allowed us to work with local partnerships to create catchment markets where the interventions in catchments that deliver the benefits customer’s value can be traded in a competitive market and we can therefore drive the efficiency that this competition creates.

6.1.2. When working in catchments we look to identify partners who share similar objectives to ourselves and can therefore help to deliver our goals in a sustainable and efficient way. An example of this is the work we have done with Nestlé at the start of AMP7 to identify joint objectives in the Petteril sub catchment and align the investment that we are each making to deliver greater benefits for the catchment without additional expenditure. Nestlé were interested in driving resilient farming to secure their supply chain through investing in soil improvement and we were interested in preventing phosphate leaching to watercourses and despite different objectives we were able to align our interests to invest in the same natural assets and deliver multiple benefits. Therefore for the same investment customers experienced greater environmental gains.



#### Partnership in the Petteril

We have worked with partners to combine spend and deliver greater results. [✂]



6.1.3. This partnership approach provides significant opportunity to leverage funding from other sources and our history of peatland restoration work demonstrates that a little investment from United Utilities can allow partners to leverage significant additional funding which drives efficiency in our delivery, making customers money go further. Some examples of this leverage are included in Table 9 below:

Table 9 - Past funding leveraged by our peatland restoration work

Project	External funding	UU funding
<b>MoorLIFE2020 2015-2020</b>	£15 million EU LIFE programme	£1 million as part of AMP6 enhancement programme, addressing deteriorating raw water colour in the Longdendale catchment
<b>Pennine PeatLIFE 2017-2021</b>	£1 million EU LIFE programme	£400k as part of AMP6 enhancement programme, addressing deteriorating raw water colour in the Fishmoor catchment
<b>SCaMP 2005-2015</b>	£4 million Environmental Stewardship scheme payments to tenant farmers	£20 million investment in UU tenant farm infrastructure and peatland restoration
<b>Bampton Common peatland restoration</b>	£200k Defra peatland fund	Support in kind to assist with access to sites for restoration

- 6.1.4. Our Catchment Systems Thinking approach is about the right intervention in the right place. We do not target using nature based or catchment solutions specifically but we believe they are an important consideration and, where the right conditions exist, the potential additional benefits that they provide offer great opportunities to promote partnerships and drive greater benefits for customers. Often the catchment solutions that we can drive will be the lowest cost options to meet our needs but by considering the broader value that can be delivered through a catchment approach, particularly through the natural and social benefits that can be accrued, even a slightly more expensive approach can yield significantly greater benefit and therefore still be better value for money as long as it is supported by customers.

## 6.2. Structure of this section

- 6.2.1. In this section we will set out why we believe the interventions that we wish to deliver are the right interventions for the locations assessed, where we believe a partnership approach will allow us to deliver greater results and the additional benefits that we can realise through delivering in this way. Due to the overlap in the type of interventions across our strategic catchments this section will be structured along intervention types, as a lot of the evidence base for different types of activity is consistent across geography's and so a place based approach would result in significant repetition.
- 6.2.2. We call out the locations where interventions are proposed to be delivered through the document but for ease of reference the matrix in the Introduction section Table 2 shows the different types of interventions we are proposing and the locations that they are required and this is replicated in table 10 below. The costs show for each location in this tale are based on outturn values which when rolled up to programme level costs equate to the £15.4m overall cost which is expressed in 2017/18 prices.

Table 10 - Matrix showing the interventions to be delivered in each strategic catchment, as well as the additional areas of peatland restoration

Catchment	Catchment Interventions for raw water quality (£m in outturn prices)	Catchment phosphorus management (£m in outturn prices)	Invasive non-native species management (£m in outturn prices)	Peatland Restoration (£m in outturn prices)	SuDS / NFM (£m in outturn prices)
Eden		1.20		0.50	10.00
Fylde Coast	0.80			0.50	
Irwell		2.00	0.50		
Goyt Valley, Longdendale Valley and Winter Hill				1.50	

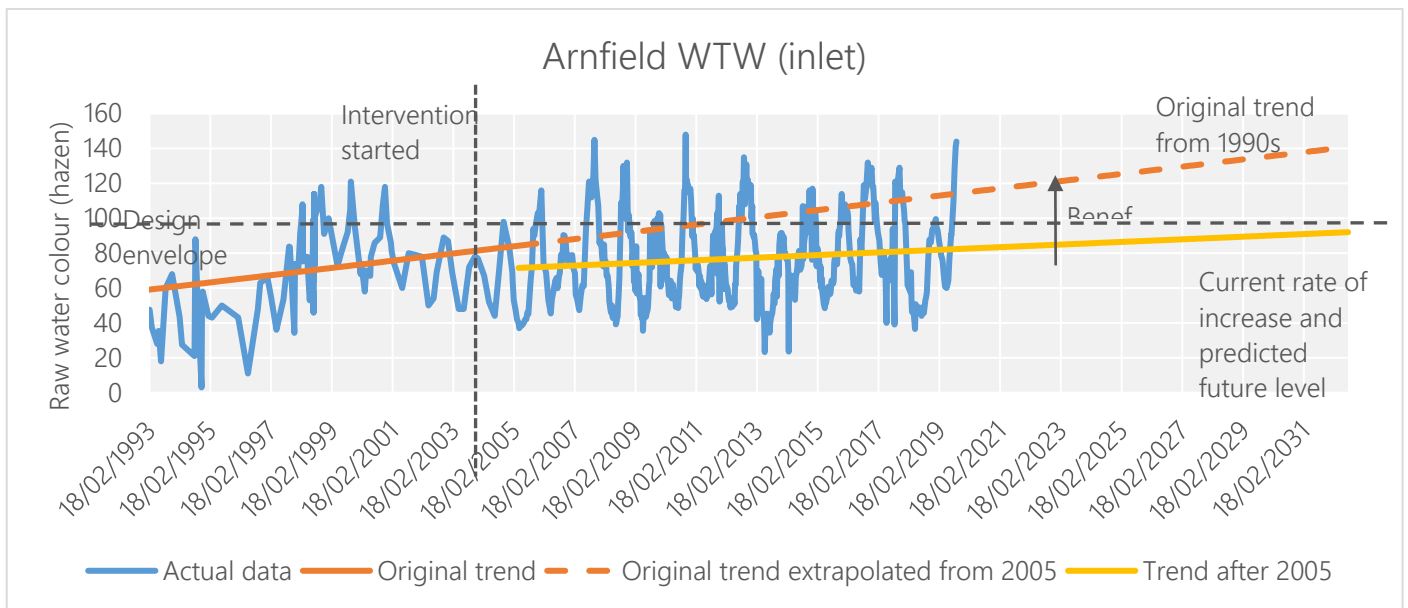
## 6.3. Peatland restoration – Eden, Fylde Coast and Specific site around Greater Manchester

- 6.3.1. Peatland restoration involves interventions on the ground to improve the hydrological integrity of peat soil by blocking artificial drainage features, stabilising erosion and planting a diverse range of vegetation including bog-forming mosses. Restored peatland delivers multiple benefits including: reduced carbon emissions from degraded peatland and maximise carbon storage from restored peat soil, reduced risk of wildfire and improved resilience to drought due to wetter soils, improved raw water quality due to less erosion, increased natural flood management due to water retention and enhanced biodiversity due to the number of plant and animal species supported by a flourishing peatland habitat. These ecosystem services will enhance the natural capital of the North West because they provide valuable services to society such as climate regulation, water storage and water purification. Some of these benefits could be delivered individually through traditional engineered solutions however this would not deliver the full range of ecosystem services compared to peatland restoration.
- 6.3.2. The alternative to peatland restoration in terms of reducing the impact of eroded peat soil (dissolved organic carbon) on drinking water quality is to upgrade the water treatment works' clarification and sludge treatment processes. The increasing levels of dissolved organic carbon are shown in section 5 Evidence of Need. Without an upgrade the water treatment works may have to operate on a reduced throughput to remove the increase in dissolved organic carbon load. This has an impact on the volume of the output of the water treatment works which may have a knock on impact on local and regional supply and demand.
- 6.3.3. To mitigate the impact of the drivers of deterioration shown in Section 5 "Evidence of Need" we have invested in improving catchment land through SCaMP since 2005, expanding to working in partnership on non-UU land in 2015. There is still a lot more to do however, and fully functioning peatland hydrology can take several decades to form so the earlier and quicker we can work with natural processes the sooner the benefits can be realised.
- 6.3.4. Peatland restoration helps to mitigate the impact of climate change and slow the rate of deterioration. An example is shown in Figure 14 - Colour (hazen) measured at the inlet to Arnfield water treatment works and predicted future trend below from Arnfield water treatment works, which is supplied by Longdendale. The rate of change has reduced since peatland restoration began in 2005, however the trend is still increasing. Extremes in weather such as long dry periods followed by intense



storms has the effect of flushing the dry peat into the downstream reservoirs and we experience peaks in concentrations above the design envelope of the works. In this situation the throughput has to be reduced, which has an impact on the supply-demand balance of the local area and integrated resource zone. Increasing intensity of spikes as well as the overall increase does not demonstrate a resilient system and therefore we have co-created a package of peatland restoration works for the Longendale area with our partners at RSPB and Moors for the Future.

Figure 14 - Colour (hazen) measured at the inlet to Arnfield water treatment works and predicted future trend



- 6.3.5. Post-SCaMP monitoring demonstrates the success these interventions can have at slowing the rate of deterioration in raw water quality and with further investment this deterioration will be able to be slowed and reversed. It is also key however as it contributes to the wider research base to inform our understanding of peatland chemistry so that we can act now to mitigate the impacts e.g. Centre for Ecology and Hydrology FREEDOM project.
- 6.3.6. Working in this way has significant additional benefits to customers and the communities they are a part of as it helps to drive resilient agriculture and a resilient rural economy which is particularly important following our exit from the European Union. The farm business income survey 2018/19<sup>29</sup> demonstrates that grazing farms typically operate at a loss without subsidies and these are typical of the farms located in upland areas. The work we have done with RSPB at Haweswater is an exemplar site for how farming can be done sustainably both environmentally and economically and through delivering further peatland restoration and working with local partners we will deliver more key demonstration sites that can influence land management more broadly.

## 6.4. Catchment water quality management – Fylde Coast

- 6.4.1. The alternative approach to working in partnership to address diffuse pollution in the Wyre and Lune is to increase the level of treatment at Franklaw Water Treatment works with more frequent regeneration of Granular Activated Carbon and/or Powdered Activated Carbon to treat pesticides. There is a potential impact on WTW output due to a reduced flow required to pass through the process leading to a potential impact on local and regional supply demand. Should a deficit in supply

<sup>29</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/851845/fbs-farmaccountsengland-13dec19.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/851845/fbs-farmaccountsengland-13dec19.pdf)

have to be made up with new sources the estimated cost is £55 million. There are also wider benefits to improving water quality in the river catchments. Working in partnership to raise awareness of diffuse pollution and support farmers to improve their practices will also help to improve biodiversity, reduce the rate of run-off and increase carbon sequestration. A reduction in the use of chemicals (pesticides) and an increased focus on working with natural processes to create buffer strips will support wildlife. Improving livestock management will reduce erosion and increase the retention capacity of the soil, which helps to slow the rate of runoff and increase carbon storage in the soil.

- 6.4.2. Where we have worked with partner organisations to address diffuse pollution in river catchments, particularly pesticides (e.g. River Dee AMP6 project, ongoing Wayoh project), the work is very effective providing that the level of effort is sustained for long enough (greater than an AMP) to bring about behaviour change. This is unless there is a change in legislation and a substance becomes banned e.g. metaldehyde, which is unlikely for the broad leaf herbicides we tend to see at Franklaw.

## 6.5. Catchment phosphorus management – Eden and Irwell

- 6.5.1. During AMP6 and the early part of AMP7 we have been working in the Petteril catchment in Cumbria to deliver catchment interventions as part of the first catchment flexible permit in the country. This has demonstrated that catchment interventions not only deliver a more affordable solution for customers they also achieve greater environmental outcomes showing they are the optimal options.
- 6.5.2. Table 11 below shows the modelled benefits delivered above our phosphorus requirements by the work we have completed in Calthwaite Beck and what is expected in the 2nd phase of the work taking in the full Petteril catchment. This additional benefit is on top of the estimated capital savings where original estimated costs of c£20m have been reduced to c£13m. This also has the effect of helping to improve farm infrastructure, and driving investment into the farming economy at a time where there is great uncertainty around Brexit and the introduction of new farm payment schemes.

*Table 11 - Additional reductions achieved by the interventions delivered at High Oaks Farm or being delivered in the whole Petteril. This is beyond the required Phosphorus targets of 13kg/year at High Oaks Farm and 135kg/year in the Petteril. All values modelled*

Pollutant	High Oaks Farm interventions	Proposed Petteril interventions	Total reduction delivered
Nitrate (kg/year)	174	1,700	<b>1,874</b>
Sediment (kg/year)	5,868	1,141	<b>7,009</b>
Nitrous Oxide (kg/year)	9	536	<b>545</b>
Faecal Indicator Organisms (10 <sup>9</sup> cfu)	3,445	9,855	<b>13,300</b>
Ammonia (Kg/year)	442	(-415)	<b>27</b>

- 6.5.3. In order to drive further benefits we have also looked to align the delivery that we have achieved with complimentary actions being delivered by our partners. Specifically in this catchment we have worked with Nestlé to align our investments to deliver mutual benefits. This has allowed us to influence spend that Nestlé were making in the catchment to also target water quality interventions which has resulted in water quality becoming one of the key drivers of their [£] annual investment in the Eden catchment. This has resulted in greater phosphorus reductions for no additional cost to water customers, giving them a better quality environment to enjoy and mitigating the risk of further investment being needed in the future. Table 12 below shows the additional revenue that have been leveraged through our work in the Petteril.

Table 12 - Nestlé funds influenced by work in the Petteril

Determinant	Nestlé spend in on catchment activity in the Eden (£)	Forecast UU spend on catchment interventions in the Eden (£)
Funding influenced by working in partnership	[✂]	£150k expected spend in Petteril catchment initiatives in AMP7
Potential future spend in the Eden	Continued ongoing annual spend which we have the potential to influence as we continue to work with them	£1.1m proposed through GR

- 6.5.4. To ensure these benefits are achieved for the most efficient price through our work in the Eden we have established a catchment market. This has worked with supply aggregators who have better links into the agricultural sector than we do and can therefore secure access to farm interventions and generate competition. Through the Green Recovery we would seek to expand this approach to the full Eden catchment and work with partner organisations to establish a long term market for catchment services which customers would benefit from through increased delivery at reduced cost.
- 6.5.5. As discussed in section 5 “Evidence of Need”, we have undertaken significant investigations into the activity required on the Eden catchment and demonstrated a clear need for investment in AMP8. We have also established where we believe catchment interventions could be delivered and make a material difference to the solution that would be needed on the treatment works. Based on the evidence put forward in this section around the funding that can be leveraged and the additional environmental benefits catchment interventions can achieve, the optimised solution to meet the established need must include catchment delivery. The markets that have already been developed to facilitate this will continue to drive further value for customers.
- 6.5.6. The catchment investigation in the Eden has not yet been completed as spring/summer sampling was impacted by the Covid-19 lockdown which means we have not been able to collect all of the information needed to completely establish the required interventions. In order to manage this we have assessed the information currently available and risk assessed this for potential change when the summer season sampling is completed. The Eden catchment is less affected by summer visitors than other areas of Cumbria as it is outside the National Park but we have still assessed which treatment works could expect significant variations due to catchments that include holiday accommodation or leisure sites. Any such sites have not been included in the proposals developed.
- 6.5.7. As further mitigation for this risk we are not proposing to complete all of the required activity in the Eden through the Green Recovery and there will still be further activity needed in AMP8 to fully meet the requirements of the Habitats Directive. This will give us an opportunity to get moving sooner, establish long term delivery partnerships and have a far better understanding of the catchment picture to support AMP8 planning and ensure an optimised long term approach can be taken.
- 6.5.8. This catchment approach has been very successful in the Eden through AMP6 and 7 and we have also started to work in this way in Greater Manchester and are keen to continue to drive this approach forward. Through our work so far on the Manchester Ship Canal as discussed in the “Environmental Improvements across the Manchester Ship Canal Catchment” document, we have worked extensively with the EA and other stakeholders to understand the challenges in this catchment and this has led to the country’s second catchment permit being implemented. As part of this we have also formed a catchment group chaired by the Mersey Rivers Trust to understand the phosphorus challenges in the catchment and the opportunities to tackle some of these.

- 6.5.9. As is evidenced through the work discussed in section 5 “Evidence of Need”, the scope to make a material difference to the permits at United Utilities sites is limited based on the size of the sites we operate in the catchment. In order to drive the environmental improvements that are required in the catchment and deliver these benefits to customer we do however need to think differently about how we can address the diffuse pollution challenge. The Green Recovery offers an opportunity to demonstrate how working in partnership across catchments in urban areas can meet the challenge of phosphorus but also deliver additional benefits as we did in the Petteril. This will be particularly valuable in an urban setting as urban runoff contains significant pollutants and priority substances which are notoriously hard to tackle.
- 6.5.10. The Irwell catchment does still have significant agricultural nutrient load which we are proposing to tackle to improve the phosphorus performance of the catchment and protect against future deterioration and we propose to take an approach utilising our learning from the Eden to ensure this is an efficient and optimised approach. Through AMP7 we have been working to develop a Landscape Enterprise Network (LENs) approach in the Irwell similar to the one we have taken in the Eden, this seeks to align the interest of multiple organisations that have interests in landscapes to promote joint investment, reducing costs and increasing delivery. We will use this to deliver in this area and achieve the same additional value as has been done in the Eden.
- 6.5.11. The agricultural pollution in the Irwell though is only part of the challenge and it is important to also tackle the challenge of urban and highway runoff. There has been little work done on tackling this urban diffuse pollution but it is becoming an increasing area of focus as without effective measures to tackle this as a society it is unlikely that we will be able to achieve the outcomes we seek. This is demonstrated by urban diffuse pollution being a key area of focus of the Environmental Audit Committee inquiry into river water quality. As a result of this we want to lead the industry and the country in looking at how urban pollution can be tackled by targeting interventions to reduce the phosphorus in urban runoff but also measuring the impacts we can have on other pollutants such as heavy metals and polycyclic aromatic hydrocarbons (PAH). Through the Green Recovery we will be able to show how a catchment approach can help to tackle these issues and share this lesson to help develop national approaches to how these challenges can be addressed.
- 6.5.12. Through this activity we will be able to address some of the issues with phosphorus in the catchment. We will be able to develop partnerships to tackle urban and rural sources of phosphorus pollution and achieve the additional benefits that catchment interventions can deliver as evidenced in the Petteril work and Table 11 and Table 12. This will also provide valuable knowledge about how this way of working can deliver in an urban environment and the additional pollutants that can be reduced. This will help prevent deterioration in the watercourse associated with the expected growth in the catchment and the run off that is associated with it. It will also demonstrate how catchment working can be incorporated into future plans across the industry to deliver in both urban and rural environments and build evidence of the costs and benefits that can be delivered.

## 6.6. SuDS and NFM – Eden, Fylde Coast and Irwell

- 6.6.1. The North West is statistically the wettest area of the UK. Paired with the highest percentage of combined sewers, this means that significant interventions are required to address the impact of climate change along with growth. We want to build back better, and greener, with sustainable drainage solutions delivered in partnership at the heart of this. Delivering sustainable drainage interventions through the Green Recovery will mitigate against current and future flood risk and environmental damage but also enable us to develop our experience of delivering in partnership, refine our systems, tools and processes to embed into PR24. This aligns with Environment Agency

direction which states that “we need a broader range of actions for achieving climate resilient places. This includes ... using nature based solutions to slow the flow of or store flood waters.”

6.6.2. Our Green Recovery proposal creates a mechanism to progress sustainable drainage projects that are cost beneficial based upon the natural capital value they deliver to the environment and their communities. We will seek to complete projects in locations that align with high levels of risk of flooding, and that are under pressure from climate change and development, evidenced by our DWMP modelling data.

6.6.3. A sustainable drainage system could include the following types of assets, which deliver natural and social capital benefits above and beyond that of conventional solutions:

- Green roofs
- Infiltration systems
- Filter drains
- Swales
- Bioretention systems
- Trees
- Permeable pavements
- Attenuation storage
- Detention basins
- Ponds and wetlands

6.6.4. To understand where SuDS and NFM solutions deliver maximum impact, the benefits of each scheme must be understood and prioritised. We will assess the benefits of the proposed options in terms of improved network performance using the same methods as identified in the AMP7 ODIs and will assess the broader natural capital benefit to customers using the BEST tool and the methodology developed for our “Enhancing natural capital for customers” ODI. The cost benefit assessment used to prioritise schemes is included in Figure 15 below. We will use our extensive suite of hydraulic network models to support this process. These models are run for the current, medium and long term outputs and help visualise pressures on the network. Through our DWMP work, we are able to view hydraulic capacity of sewers from a 1 in 1 storm return period to a 1 in 100 using a 2020, 2030 or 2050 scenario. Performance data includes the flow path of predicted flooding, which builds our capability in understanding the best possible opportunities.

Figure 15 - Calculation used to determine the cost benefit of potential SuDS schemes. This will prioritise schemes and also act as a cut off with any scoring less than one not being progressed further. Detail on this is provided in section 11 “Customer protection”

$$\text{Cost Benefit Ratio} = \frac{\text{Benefit of value to UU (£) + Natural Capital Benefit (£)}}{\text{Engineered Level 1 Cost Of Scheme } \pm 30\% \text{ (£)}}$$

6.6.5. To identify suitable projects to be assessed using this approach we have completed an opportunity identification exercise to build a pipeline of projects that can be ranked based upon their impact on the environment and communities. To build our pipeline, a wide range of studies and methods have been used with multiple partners to derive how we identify areas of highest confidence. We will continue to work through these workstreams to develop a pipeline of projects that involve multiple partners and stakeholders for the greatest diversity of options. These options are summarised in Table 13 below.

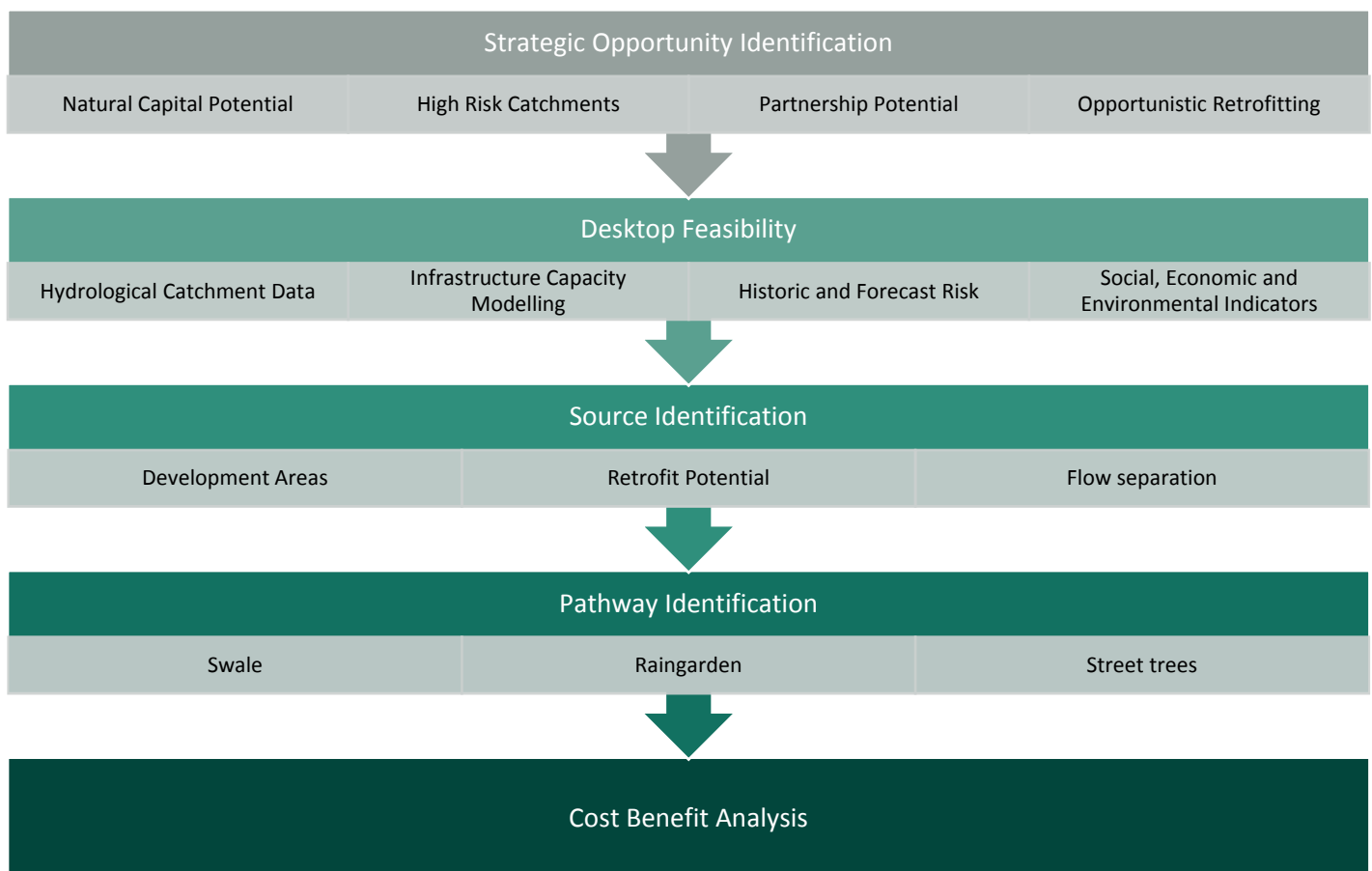
# Accelerating partnerships to deliver natural solutions

Table 13 - Opportunity identification. This table lists the work we are already doing to identify suitable sites for the SuDS, utilising many different data sources internally and harnessing external expertise to build and validate opportunities

Opportunity Workstream	Output	Data Repository for evidencing the optimised option	Partners Involved
<b>Regional SuDS Methodology</b>	Possible SuDS interventions at; Melbourne Park, Carlisle, Church Wharf, Bolton and Bury / Rochdale Northern Gateway	Catchment characteristics & risk Sewer infrastructure & risk Development areas Environmental constraints	Atkins Environment Agency (once site identification complete) Lead Local Flood Authorities (once site identification complete)
<b>United Utilities Operational Identification</b>	A number of opportunities that have multiple benefits, including rain gardens in Bury and enhanced surface water separation in Rochdale.	Operational expertise Dynamic Network Management (DNM) Integrated Drainage Area Management (IDAM) Partnership projects	Lead Local Flood Authorities Rivers Trust Highways Authorities
<b>NHS , School and other Local Authority Sites</b>	Prioritised list of sites across Greater Manchester	Operational performance data in flooding and pollution BEST tool	IGNITION (Innovative financing and delivery of natural climate solutions in Greater Manchester) Project Greater Manchester Local Authorities Department for Education National Health Service (NHS)
<b>Golf Sector Water Sustainability Project</b>	Innovative project investigating making sites more sustainable, by managing water holistically, reducing demand on water supplies, and managing surface water to improve drought and flood resilience	Wastewater infrastructure and modelling data Abstraction license data	Sports Turf Research Institute (STRI) Environmental Planning Group (EPG)
<b>Environment Agency Innovative Resilience Bid</b>	Strategic location identification	Collaborative workshop planning	Greater Manchester Combined Authority Lead Local Flood Authorities (Cumbria, Blackpool, Lancashire, Manchester, Salford, Stockport, Bolton, Rochdale)
<b>Natural Flood Management</b>	Catchment opportunity mapping	Collaborative workshop planning	The Rivers Trust as well as Wyre and Eden local trusts Lancashire, Blackpool and Cumbria Lead Local Flood Authorities

- 6.6.6. We will work in partnership with stakeholders to jointly identify sites of importance and relevance to run the methodology against. These study areas will have the cost benefit assessment above applied to them to determine beneficial co-investment projects with projects scoring a cost benefit value greater than 1 being progressed.
- 6.6.7. We have commissioned Atkins to develop a Regional SuDS Methodology. This provides a process that will follow the block diagram shown in the Figure 16. It will take an area of focus and subsequently apply a set of rules to establish the sources and sinks of surface water and from that where interventions could be made in the catchment. These options will then be presented to partnerships to develop funding packages together and assessed using our cost benefit assessment in Figure 15. All projects will also be assessed against the cost benefit of a conventional solution (non sustainable drainage solution).

Figure 16 - A block diagram showing how the outputs of the opportunity identification stage will be assessed through validating the need against multiple data sources.



6.6.8. All potential schemes will be considered in comparison to conventional grey solutions where appropriate (using company standard storage cost curves) before they are progressed so we consider whether there are opportunities to;

- monitor the risk and respond where necessary using dynamic network management capabilities.
- undertake operational interventions such as desilting sewers
- optimise the existing network capacity and operation through small interventions

6.6.9. By making this comparison between the use of blue green infrastructure and conventional, we will be able to ensure that the best value is delivered for customers and solutions are only progressed if they deliver the best overall cost benefit return. To support this we have developed 3 rules as outlined below:

- The overall cost benefit ratio should be equal or greater than 1.0
- With test 1 satisfied, the solution should only be delivered if the cost benefit ratio of the SuDS solution is greater than the conventional solution
- Where test 1 and 2 are satisfied and the SuDS solution will impact upon ODIs, only the additional cost over and above that of the conventional solution will be funded through Green Recovery thereby ensuring there is no overlap with existing ODIs

6.6.10. These rules will then be applied using the decision tree in Figure 17 below to identify if projects are suitable to be delivered through the Green Recovery. This will provide a clear line between where we are already funded to do work through our baseline expenditure, and where the additional benefits that customers will receive make projects viable that would not ordinarily be completed. The yellow boxes are the sweet spots for Green Recovery funding. Box A demonstrates where a cost benefit analysis shows the conventional solution would be beneficial on its own but the SuDS solution would deliver greater cost benefit when considering the additional benefit for customers using the BEST tool. In this case the cost of the conventional solution would be covered as base expenditure but the additional cost to achieve the greater benefit of a SuDS solutions would be funded through the Green Recovery. Box B is where the conventional solution would not be cost beneficial but a SuDS would be beneficial when considering the broader natural capital benefit, these solutions would be funded through the Green Recovery. In both cases partnership funding would be sought to minimise the impact on customers and increase the benefits that could be delivered.

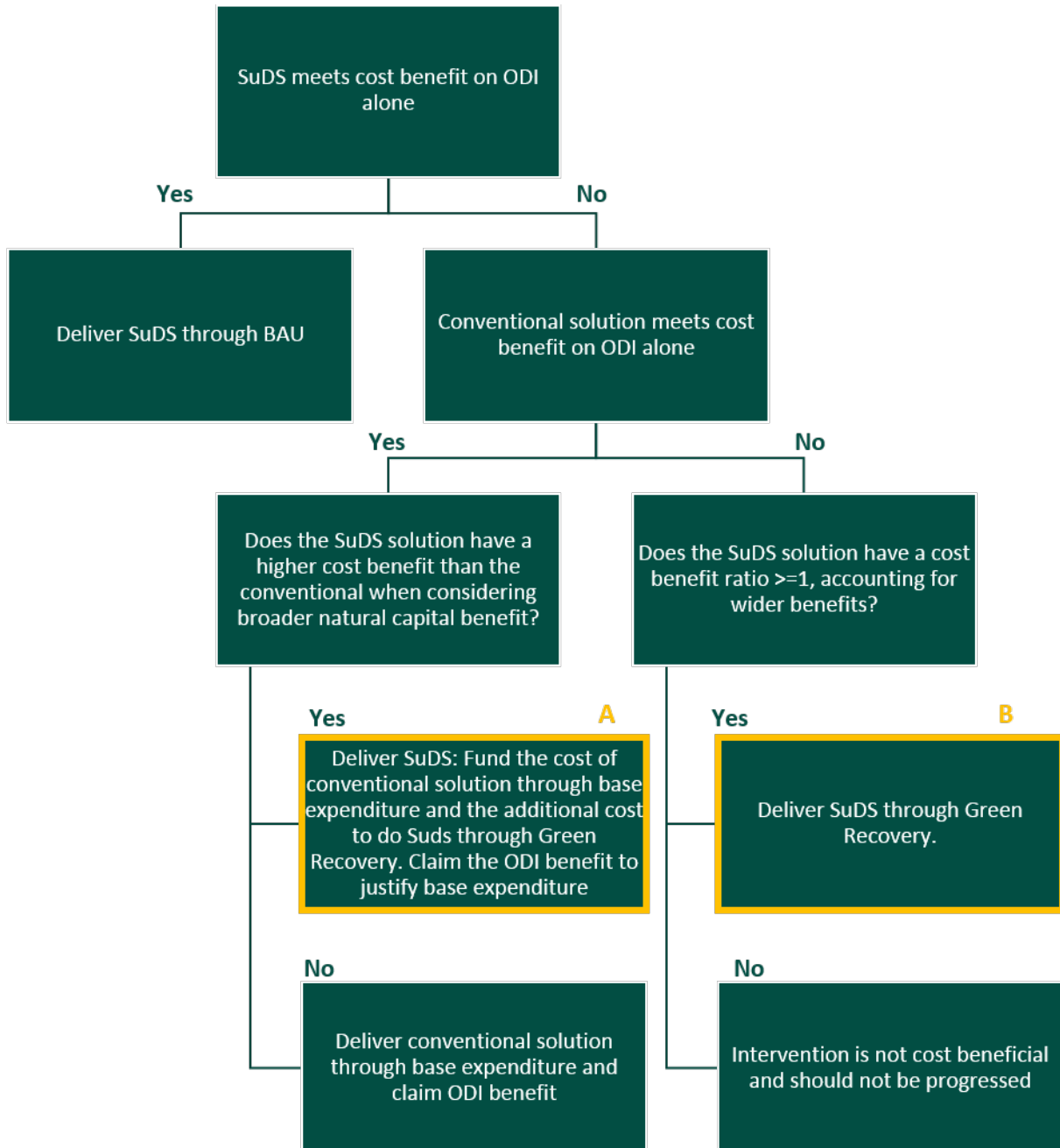
## Dynamic Network Management

Current telemetry alarm points as well as new monitoring on our network will enable monitoring and visualisation of high-risk assets and production line performance within a drainage area. This monitoring will be used to identify network performance trends and operational parameters for incidents.

We now have rain gauge analysis carried out across the catchments of the North West with monitoring positioned across our network where we have higher risk (inferred from our historical analysis of incidents on the sewer network). This gives us a predicted view of a rainfall band coming in across the North West and allows us to gain a real time view of current powered and non-powered asset performance. The DNM platform is able to review current pump performance in terms of Pass Forward Flow and on certain critical sites the Motor Control Centre's have been updated with signals that enable us to reverse the pump impellor remotely to look to remove blockages. Our vision is to gain a view of asset deterioration and an asset failure or blockage, enabling us to react with our sewer maintenance teams, prior to any negative effect to customers or the environment.



Figure 17 - SuDS decision process to identify if solutions are beneficial and how they should be funded



6.6.11. To increase the delivery we can achieve and deliver greater benefit to customers, working in partnership will be crucial, aligning our interests with other key stakeholders to drive down costs and increase benefits. This proposal actively seeks to break down the barriers to delivering in partnership. We are already reaching out to a range of partners to secure expertise, in kind and financial contributions. These will be required in order to ensure that the opportunities can be delivered and the maximum benefit for customers achieved. Some of the partners we are working with include:

- Lead Local Flood Authorities specifically aligning to bids being prepared by Lancashire County Council and Blackpool Unitary Authority (combined application), Cumbria County Council and the local authorities in Greater Manchester (combined application) to the Environment Agency's Innovative Resilience Fund
- Greater Manchester Combined Authority

- Environment Agency
- IGNITION project
- Business in the Community
- Groundwork
- City of Trees
- The Rivers Trust (both the national body and local trusts such as Wyre, Mersey and Eden)

## 6.7. Invasive non-native species - Irwell

- 6.7.1. As discussed in section 5 “Evidence of Need”, invasive species are spreading rapidly in the Irwell and cause a significant issue for customers. Despite our efforts to manage these on our own land this is not having an impact on the problem in the wider catchment and so they are still spreading and causing greater challenges to customers, other landowners and ourselves in managing this issue. The challenge of invasive species is one which goes across all land owners in the catchment and in order to tackle this a collaborative approach is needed. As a result of this we have worked with the catchment partnership to look at how a catchment wide approach to tackling invasive non-native species could be delivered.
- 6.7.2. Our experience in the Irwell in recent years is that continued management of invasive species is taking more and more resources each year to prevent their spread and the WISER states we should look to eradicate them where their presence in the catchment is providing a barrier to good ecological status under the WFD, this however is impossible in isolation. More time and resources are being spent on management each year across all stakeholders in the catchment as evidenced by figures from our own grounds maintenance teams that have seen costs increase tenfold from 2019 to 2020. We therefore believe that the most efficient way to tackle this problem is eradication from the catchment which will improve the biodiversity of the river, reduce the impact they have on WFD compliance, provide better access for customers to use and enjoy the rivers as well as reduce our and others ongoing expenditure. All of these benefits are valuable but can’t be delivered in isolation and we need to work with partners to achieve these.
- 6.7.3. Through work with partners and our internal grounds maintenance team we have looked at how we can drive the most efficiency in removal of invasive species. Based on experience we believe the only viable option is a coordinated approach across the catchment using herbicide and physical removal. This approach would not work without the coordinated efforts of partners across the catchment as the nature of how these species spread would result in significant regrowth through seeds being transmitted from other land holdings.
- 6.7.4. Our proposal is to drive a coordinated approach to eradication of these species across the catchment by providing financial support to the catchment partnership as well as operational resource that can work on United Utilities’ sites and land owned by others, where it will prevent future spread to United Utilities’ land. The funding to the partnership will help to develop a consistent plan and manage the ongoing delivery of activities across the catchment to help target delivery resources from both United Utilities and the partnership.
- 6.7.5. Partnerships can access 3rd party land owners in a way that UU cannot, so working in this way is crucial to allow us to truly tackle the challenge in the wider catchment. We do not have established relationships with all land owners but catchment partnerships have worked with them over many years to identify and support improvements that can be delivered and how these could be funded

through grant applications. This establishes trust with these landowners that we have not yet established, we can however benefit from this by working with these partners and further develop our own reputation for catchment delivery which will build this trust for the future.

- 6.7.6. The details of the funding the partnership believe will be necessary and how UU will contribute to this are included in section 7 “Evidence of Efficient Delivery”.

## 7. Evidence of efficient delivery

### 7.1. Introduction

- 7.1.1. Our Catchment Systems Thinking approach is about delivering the right intervention in the right place with the right partners to deliver the best value to customers. Sometimes this may cost a little more in the short term but the additional benefits achieved make this a worthwhile investment in line with customers expressed preferences for the services they are prepared to pay for.
- 7.1.2. An example of this work is the Petteril catchment in Cumbria where we had drivers to invest in our treatment works for phosphorus management. By taking a catchment approach however we were able to reduce the spend required on our treatment works, meet the environmental obligations we had in terms of phosphorus but also deliver interventions that reduced sediment loss and nitrates as well. This option also allowed us to align interventions with partners to leverage benefits from their investments and therefore make our funding go even further in terms of the benefits delivered to the environment which customers enjoy. Table 11 in section 6 “Evidenced of Optimised Option” includes details of the additional environmental benefits from our activities in Calthwaite Beck and the expected additional benefits in our work in the rest of the Petteril. This is on top of the core objective of reducing phosphate and other benefits such as biodiversity which are harder to quantify. As this approach has developed we continue to look to refine it and develop our use of markets to drive greater efficiencies in delivery.
- 7.1.3. The activities in the Petteril are only one example of utilising catchment activities to deliver more for less. We have also demonstrated through years of investment in peatland restoration that we can leverage additional funding from partners to make United Utilities’ investments go further. For example, as a result of our Sustainable Catchment Management Programme in AMPs 4 and 5 we leveraged £4 million in grant income for our tenant farmers in order to support the reduction in grazing required to restore the peatland. In AMP6 we secured £15 million of EU funding for peatland restoration through the Moors for the Future Partnership. We are also currently developing work in the Wyre catchment, with flood risk insurers, the EA, local authorities and the Rivers Trust to look at how investment mechanisms can be developed to fund interventions with beneficiaries paying based on the outcomes delivered. All of this delivers the benefits customer’s value but reduces the cost impact to them.
- 7.1.4. The work we are setting out in this document has been developed with partners in the catchment and will look to realise the cost benefits that a catchment based approach can deliver through cost efficiencies and aligning priorities to secure additional partnership funding to reduce our costs and deliver additional benefits.

### 7.2. Structure of this section

- 7.2.1. In this section we will set out the evidence that the interventions we will deliver represent good value for customer’s money, where we believe a partnership approach will allow us to leverage additional funding and the additional benefits that we can realise through delivering in this way. Due to the overlap in the type of interventions across our strategic catchments this section will be structured along intervention types, as a lot of the evidence base for different types of activity is consistent across geographies and so a place based approach would result in significant repetition.
- 7.2.2. We will highlight the locations where interventions are proposed to be delivered through the document but for ease of reference the matrix in the Introduction section Table 2 shows the different

types of interventions we are proposing and associated costs. This has been included in Table 14 below for ease of reference. The costs shown below split out to the specific locations and projects are shown as outturn values which when collated to the full programme value for 2 natural solutions equate to the £15.4m which is expressed as 2017/18 values.

Table 14 - Costs of interventions in each catchment

Catchment	Catchment Interventions for raw water quality (£m in outturn prices)	Catchment phosphorus management (£m in outturn prices)	Invasive non-native species management (£m in outturn prices)	Peatland Restoration (£m in outturn prices)	SuDS / NFM (£m in outturn prices)
Eden		1.20		0.50	10.00
Fylde Coast	0.80			0.50	
Irwell		2.00	0.50		
Goyt Valley, Longdendale Valley and Winter Hill				1.50	

## 7.3. United Utilities' contribution to delivery

### Peatland restoration

- 7.3.1. We propose to work with partners to restore 2,500 hectares of peatland across the North West region. This will be delivered across five areas, each restoring 500ha of peatland; Haweswater, Barnacre and Grisedale, Winter Hill, Longdendale and Goyt Valley.
- 7.3.2. Table 15 below provides information on types of activities to be undertaken and partnership activities as well as the deferral of expenditure we estimate this approach will deliver compared to conventional asset investment. The expected cost of peatland restoration is compared against the potential cost of upgrading the water treatment works' clarification and sludge treatment assets as a conventional means of addressing the water quality issues caused by degraded peat soils. The expected cost of the peatland restoration is expressed as the one-off investment made over the period to 2025 whereas the potential totex deferral of the conventional investment is expressed as a net present value of the investment over the life of the assets (40 years). The costs for the conventional investment includes those parts of the future upgrades that are negated if there is no deterioration in dissolved organic carbon. The estimates do not account for investment at the water treatment works associated with a wider set of requirements (future quality and maintenance needs) which will not be negated in full by peatland restoration.
- 7.3.3. Where the treatment assets are not expected to exceed their capacity for dissolved organic carbon in the planning horizon, the driver for restoration is closely linked to the need for increased resilience to wildfire and the avoided costs of wildfire events. In the case of Winter Hill and the Goyt Valley, consecutive years of wildfires have incurred expenditure on average of £500,000 per event. This cost includes expenditure on helicopters for firefighting, additional staff resources to facilitate the fire and rescue service, immediate repairs to land and catch pits to collect the material washed away that would otherwise enter the treatment works. We have calculated the net present value of the avoided cost of a wildfire incident occurring every other year over the 40 year horizon. The expected benefit will be realised providing that other measures (mainly associated with public access and the use of

disposable barbecues) can be put in place immediately following restoration to ensure that the risk of wildfire is minimised prior to the establishment of the restoration benefits.

- 7.3.4. In the below table the deferred investment benefit for Haweswater is not included as there is a risk that asset investment will be required in AMP 8. In line with the DWI's guidance on delivering twin catchment and asset based solutions we also need to deliver peatland restoration to improve the catchment irrespective of whether the investment in treatment infrastructure is required. As peatland restoration takes time to mature and realise its full benefit we have proposed bringing this investment forward to give the peatland time to mature. This also realises the considerable additional environmental benefits sooner and will inform our planning in PR24 as we will have an improved understanding of the catchment performance to allow us to optimise the solution developed for the site.

Table 15 - Information of activities being undertaken in peatland restoration and expected savings

Catchment	Activities	Potential Totex deferral compared to conventional	Expected cost of catchment measures (in outturn prices)
<b>Haweswater</b>	<ul style="list-style-type: none"> <li>UU developing a combined solution of asset investment (in future AMP) and expanding catchment resilience approach to Haweswater in line with DWI requirements for twin solutions</li> <li>Peatland restoration 500 hectares on Shap Fell and Arnboth sub catchments</li> <li>Aligning to the Government's Green Recovery Challenge Fund supporting 4 peatland officers with Cumbria Peat Partnership</li> </ul>	Solutions to reduce operational costs and support additional asset investment in AMP 8	£500,000
<b>Barnacre and Grizedale including Lune and Wyre catchment work</b>	<ul style="list-style-type: none"> <li>Resources to facilitate engagement through Bowland Area of Outstanding Natural Beauty</li> <li>Environmental Land Management landscape recovery scheme trial or extension of existing stewardship scheme</li> <li>Peatland restoration scheme here and in the wider Wyre catchment (linked to the NFM pilot project)</li> </ul>	c.£55,000,000	£1,300,000
<b>Winter Hill</b>	<ul style="list-style-type: none"> <li>Deliver restoration on sites identified in AMP7 survey</li> <li>Approx. 350 hectares of deep peat restored</li> <li>Reduce wildfire risk by reducing dominance by molinia (moor grass) by innovative conservation grazing, and cutting. Opportunity for tenant farmers to deliver this as payment for outcomes</li> <li>Block any remaining gully's</li> <li>Partnership working to address visitor issues</li> <li>Plant more sphagnum and other plant species</li> <li>Tree planting on moorland fringe</li> </ul>	c.£3,500,000	£500,000
<b>Longdendale</b>	<p>Dovestone partnership with RSPB to deliver accelerated habitat restoration:</p> <ul style="list-style-type: none"> <li>Construct 1500 peat dams</li> <li>Willow pinning for gully stabilisation</li> <li>Fire break creation, cutting 200 hectares of heather</li> </ul>	c.£6,000,000	£500,000

Catchment	Activities	Potential Totex deferral compared to conventional	Expected cost of catchment measures (in outturn prices)
Goyt Valley	<ul style="list-style-type: none"> <li>Plant 300 hectares of sphagnum</li> <li>Establish a joint-funded apprenticeship</li> </ul> Peaknaze/Pikenaze partnership with Moors for the Future to deliver accelerated habitat restoration: <ul style="list-style-type: none"> <li>Bare peat revegetation 0.8 hectares</li> <li>Reprofile 2.75 km peat edge and revegetate</li> <li>Block 70 gullies</li> <li>Cut 5.5 hectares of molinia</li> <li>Plant 42 hectares of sphagnum and 13 hectares of moorland plants</li> <li>Fencing 1.2 km to allow grazing of molinia</li> <li>Heather cutting 15 hectares</li> </ul>		
	<ul style="list-style-type: none"> <li>Extend the area currently being restored as part of the Countryside Stewardship grant by funding additional requirements</li> <li>Trial new techniques for gully blocking across new areas</li> <li>Trial new sphagnum planting methods</li> <li>Cut more firebreaks to accelerate resilience</li> <li>Tree planting on moorland fringe</li> </ul>	c.£3,500,000	£500,000

## Catchment water quality:

7.3.5. In order to achieve the full benefits identified in Table 15 in the Barnacre, Grizedale, Lune and Wyre row we would also need to deliver work on the river catchments of the Lune and Wyre to reduce the impact of agriculture on river water abstractions. This causes challenges such as E.coli and pesticides which without upland management would need to be removed at the treatment works. The costs for these activities are also included in the stated cost in Table 15. To provide these benefits we propose to work with catchment partners to deliver an extensive engagement campaign, working with farmers, developing plans to reduce their impact on the watercourse and implementing some of the activities identified in these plans. As is demonstrated by Table 15 this cost will help to achieve significant benefit in the overall catchment as well as supporting the local agricultural economy, helping farming to become more sustainable both environmentally and economically and providing broader natural capital benefits such as biodiversity.

7.3.6. Information on types of activities to be undertaken is included in Table 16 below:

*Table 16 - Activities undertaken to improve raw water quality*

Catchment	Activities
River Wyre	<ul style="list-style-type: none"> <li>Resource a dedicated farm advisor with Wyre Rivers Trust to engage with 150 farmers. Of these, we will engage broadly with 150, engage 1:1 with 50 and carry out detailed plans and interventions with 20.</li> <li>Match fund interventions on farms as part of a combined green finance package drawing other funding for natural flood management, Environmental Land Management and nature for climate</li> </ul>
River Lune	<ul style="list-style-type: none"> <li>Resource a dedicated catchment officer in the Lune Rivers Trust to investigate, monitor and engage with farmers on water quality issues (coliform, pesticides)</li> </ul>

Catchment	Activities
	<ul style="list-style-type: none"> <li>• Due to large catchment area, initial focus will be on areas upstream of the intake.</li> <li>• We will engage with 150 farmers. Of these, we will engage broadly with 150, engage 1:1 with 50 and carry out detailed plans and interventions with 20.</li> </ul>

## Catchment Phosphorus:

- 7.3.7. As established in section 5 “Evidence of Need” and section 6 “Evidence of Optimised Option” there is a need to tackle phosphorus pollution across the Eden and the Irwell and in doing so through catchment interventions we can establish partnerships, leverage funding and deliver better outcomes for customers. Our experience of delivering phosphorus reduction in catchments also demonstrates that we can achieve the objectives we seek more efficiently through catchment interventions than on-site delivery.
- 7.3.8. The work we have done so far in the Petteril has delivered the benefits as described in section 6 “Evidence of Optimised Option”. This has achieved the regulatory objectives in the WINEP of reducing phosphorus load in the river but will also delivered Nitrous Oxide reductions 3 times greater than the phosphorus reduction we targeted, nitrate reductions 12 times greater and sediment reductions 47 times greater, none of these additional benefits could have been delivered through on-site investment alone. These additional environmental benefits must also be viewed in the light of the project meeting our core objectives in a more efficient way. The estimated costs of delivery through on-site interventions to meet the requirements in the Petteril were c£20million but delivery of these requirements, and all of the additional benefits discussed is currently anticipated to cost c£13million. Delivering through natural solutions has delivered significant additional benefit, at reduced cost and has also supported the local agricultural economy.
- 7.3.9. For the work we are proposing in the Eden to ensure delivery is efficient we have used the modelling work done to identify sites where catchment interventions are possible and assessed the potential totex savings associated with relaxation of those permits. Based on our experience of dealing with catchment interventions we have calculated a unit cost of phosphorus removal of £1,100/kg which we have used to estimate the cost of delivering the catchment offsets. We have then taken forward the opportunities where the catchment interventions will be delivered for a lower cost than the on-site options would as is evidenced in Table 17 below.

*Table 17- Estimated engineering savings from catchment interventions and estimated cost of catchment measures*

Site	Expected cost of traditional solution	Expected cost of solutions following catchment offsetting	Potential Totex saving	Expected cost of catchment measures (in outturn prices)
Catchment interventions across the Eden at sites identified in Table 6	£22.12m	£15.66m	£6.46m	£1.2m

- 7.3.10. To arrive at the cost of £1,100/kg we have assessed the work undertaken so far in the Petteril and the costs predicted by our delivery partner First Milk who were selected through our market approach. For the 135kg of Phosphorus we need to deliver the anticipated cost of delivery to United Utilities is £148,500. We have then benchmarked this figure with the Catchment Leadership Network to confirm that this is in line with their experience across the country. The Catchment Leadership Network is a group led by the Cambridge Institute of Sustainability Leadership which includes several water



companies, the Environment Agency, Natural England, Defra and representatives from leading businesses. This group has been working to understand the benefits and costs of catchment delivery and how this can be encouraged where appropriate. As part of this they have captured information from water companies on average costs of phosphorus removal through the catchment which we have benchmarked against.

- 7.3.11. In order to achieve these reductions though we need to drive a competitive market to ensure the most efficient price is achievable. Based on our experience in AMP7 we have worked with supply aggregators who have better connections into the agricultural sector than we do and they can engage farmers more effectively to work with us. We need to fund the support of this aggregator with initial upfront cost of £100,000 but this will ensure we generate the interest and competition needed in the catchment and ensure we can deliver interventions for the most efficient price.
- 7.3.12. In the case of the Irwell as discussed in section 5 “Evidence of Need”, the scale of our assets in the catchment means that catchment measures will make little difference to our permit requirements. However the work done also demonstrates an issue in the catchment with diffuse pollution which is expected to grow as the development in Greater Manchester is delivered. As an industry we need to develop new ways of tackling this urban pollution challenge in partnership to protect customers from the potential of no deterioration drivers and increasing demands on water companies to mitigate other sectors that are harder to tackle.
- 7.3.13. We have therefore identified the opportunity to tackle farming diffuse sources where applicable in the Irwell using the same methodology and unit costs that have been discussed for the Eden. We have also been working with Stormwater Shepherds and the catchment partnership to understand what could be done on the urban diffuse pollution loads and from this have identified the potential to work with the highways authorities, both local and national, to address urban and road runoff.
- 7.3.14. Work done by Stormwater Shepherds indicates that targeting 65kg/year of phosphorus is achievable based on a unit cost of £11,523/kg (this value includes a unit rate for delivery of £23,048 but assumes we would attract partnership funding of at least 50% of the cost). This would go far beyond phosphorus however and would also address other pollutants of concern such as toxic metals including copper and zinc, and toxic organic compounds, such as benzo(a)pyrene. This is not something that has been done before but will provide valuable insight into how catchment activity can address urban pollution, remove diffuse sources and protect customers from future “no deterioration” drivers whilst delivering an improved environment now. The figures used here have been based on research completed by Stormwater Shepherds which represents efficient delivery, this is included in the report<sup>30</sup>.
- 7.3.15. As in the Eden we would also need to work with a supply aggregator to ensure efficient delivery and generate a competitive market so that all of these benefits can be delivered at an efficient price. We have therefore included £150k to fund this activity across the urban and rural elements of the Irwell.
- 7.3.16. In both of the cases discussed above we would expect to deliver additional benefits to customers as outlined in Section 6 “Evidence of Optimised Option” and in the case of urban runoff we will also deliver additional benefits to other pollutants. On top of these we are also expecting to deliver green infrastructure with its associated amenity value, recreational space, biodiversity and lower carbon solutions. This method of delivery will also support small local businesses during this difficult time and help to deliver infrastructure investments that will serve them into the future.

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<sup>30</sup> GR0002b Stormwater Shepherds Report on urban runoff

## Sustainable Drainage Solutions and Natural Flood Management

- 7.3.17. We are already taking a leading approach in the industry to influence planning policy and address ‘big questions’ set by UK Water Industry Research. As demonstrated by the proactive approach we are taking to developing the DWMP which is being funded by United Utilities directly rather than through customers. This is because of the value associated with developing this long term plan and the potential it provides us to proactively engage partners and develop more efficient solutions. The Green Recovery programme will supplement the work we are already doing, and work alongside our growing dynamic network management capabilities across the region.
- 7.3.18. Capital investment in sustainable drainage and NFM will enable us to combine the new modelling capabilities developed through our DMWP outputs (predictions) with the increased real time monitoring of wastewater infrastructure (actual events). We will be able to use these enhanced data sources and our expertise to work with partners in catchments and benefit from the experience and data sources they can provide to develop enhanced, modelled solutions and joint financing. Together this will build our ability to bring all types of sustainable drainage into the CaST philosophy.
- 7.3.19. United Utilities have looked to promote and increase the delivery of SuDS for a long time and have proactively led a detailed submission made on behalf of Water UK to the Ministry of Housing, Communities and Local Government (MHCLG) on their publication ‘Review of the Application and Effectiveness of Planning Policy for Sustainable Drainage systems’. Although not a consultation document our response highlighted specific concerns with national planning policy with respect to the effective delivery of sustainable surface water management. Promoting SuDS solutions through the Green Recovery would help to drive a more collaborative approach to delivering SuDS and inform how these solutions can be delivered benefiting the water industry but also other key drainage stakeholders.
- 7.3.20. We are working with North West Regional Flooding and Coastal Committee (NWR FCC) on two focus groups: North West SuDS Task and Finish Group and the SuDS Non-Statutory Technical Standards Group. Through these groups we are trying to influence Planning Authority’s and Lead Local Flood Authority officers looking at drainage plans for new housing development. Through these groups and this collaborative working we are looking to improve the standards, limiting flows from developments into downstream sewers with SuDS features. The more that we can influence in this area, will reduce incoming flows to sewer from new development across greenfield and brownfield sites.
- 7.3.21. Delivery of SuDS on new developments alone however will not be sufficient to drive significant change in the North West. United Utilities therefore also offers wholesale tariff incentives for Non-Household customers to implement SuDS on their premises to help drive greater uptake of SuDS and encourage retro fitting. These incentives can lead to a significant reduction in area applicable to their site area based surface water drainage charges.
- 7.3.22. In order to drive greater application of Sustainable Drainage Solutions to tackle multiple challenges facing stakeholders and promote a partnership approach to delivery we are looking to deliver solutions that are shown to be beneficial based on the methodology outlined in section 6 “Evidence of Optimised Option”. To identify opportunities we have already undertaken studies and some of this activity is detailed in Table 18 below.

Table 18 - Information on the studies which are ongoing and the potential opportunities these are assessing

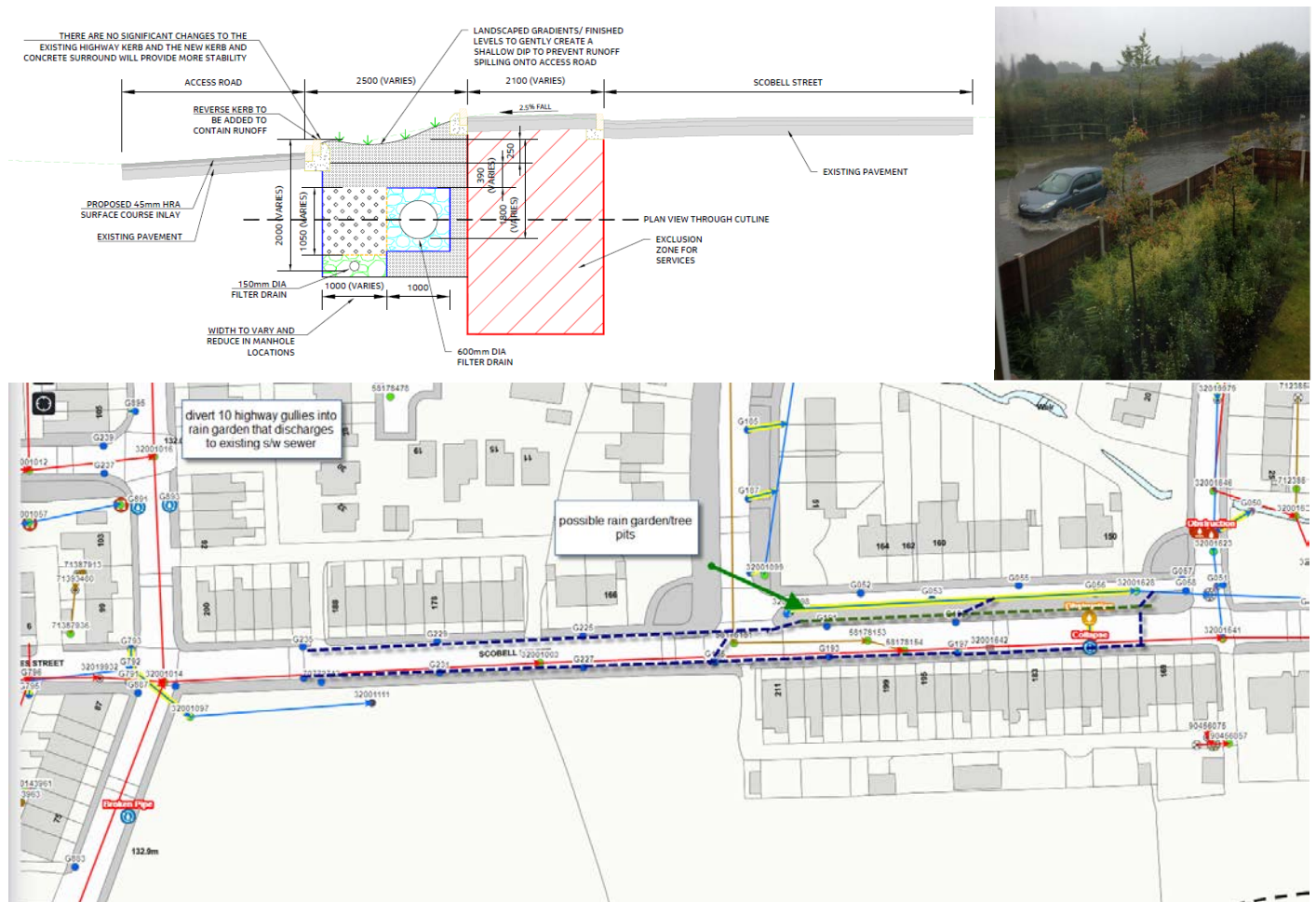
Catchment	Activities
<b>Eden and Carlisle</b>	<ul style="list-style-type: none"> <li>• Pilot study has been commissioned looking at the potential benefits of installing SuDS within the area of Melbourne Park, Carlisle to reduce flood risk. This aligns to the Environment Agency flood risk management project that is currently in progress there to provide additional flood alleviation benefits to the wider catchment.</li> <li>• We are working alongside the Lead Local Flood Authority, Cumbria County Council, to identify opportunities for targeted sustainable drainage system installations and natural flood management opportunities in the catchment aligned to their Innovative Resilience proposals.</li> </ul>
<b>Fylde Coast</b>	<ul style="list-style-type: none"> <li>• We are working alongside the Lead Local Flood Authorities in Blackpool and Lancashire and the Wyre Rivers Trust to identify opportunities for targeted sustainable drainage system installations and natural flood management opportunities in the catchment aligned to their Innovative Resilience proposals.</li> <li>• There is a study that is looking at drainage in Blackpool holistically, which includes for a potential solution on the removal of a main river from the combined sewer at Bispham Dyke Blackpool. With results due in April, we will apply our methodologies to those outputs to deliver beneficial solutions in partnership.</li> </ul>
<b>Irwell &amp; GMCA</b>	<ul style="list-style-type: none"> <li>• Pilot study has been commissioned looking at the potential benefits of installing SuDS within a number of areas in GMCA. We will run our methodology for the following sites as a trial to test our methodology.</li> <li>• Bury / Rochdale Northern Gateway is part of the Greater Manchester Spatial Framework, with a targeted development on greenfield land of around 1,200,000sqm of industrial and warehousing space (with around 700,000sqm being delivered within the plan period), 1,200 new homes and a new primary school and supporting ancillary services and facilities.</li> <li>• Church Wharf, Bolton is a £150m brownfield regeneration project where SuDS installation will be a lot more challenging due to the spatial limitations that are available on site. Nine buildings with 352 dwellings, a hotel, parking, 7,500sqm of business floor space, 660sqm or retail floor space, 1,500sqm of professional service floor space and 750sqm of community facility floor space is planned.</li> <li>• Scobell Street, Bury – This is an area where significant investment has already taken place in separating existing highways drainage from the combined sewer in order to provide capacity within the system. We have identified an opportunity to install a 96m long raingarden in the area, and will look to deliver this £200k project as the first shovel ready scheme.</li> <li>• We have worked with IGNITION to prioritise over 2,000 sites in GMCA which will be assessed to identify any cost beneficial options</li> </ul>

### Case Study – Scobell Street Raingarden

- 7.3.23. The area suffers from severe hydraulic flooding, 36 incidents have been recorded in the area, with Scobell Street being flooded 8 times in 2019. The Integrated Drainage Area Studies identified an opportunity to separate surface water. A solution was developed that was 95% surface water removal and 5% SuDS. The 5% of SuDS was not thought cost beneficial to deliver in this case as the wider benefits of a SuDS solution were not valued, but the surface water separation was completed. Since completion in 2019, flooding has reduced dramatically but still occurs during significant events. The installation of a 96m long raingarden will improve this residual flood risk and boost amenity by greening up an area of unsightly tarmac in the Bury area of the Irwell.

7.3.24. This investment will allow us to test delivering SuDS as part of street landscaping to allow disconnection of highway drainage from the public combined sewer, in a way that can deliver more holistic benefits, and align to local authority climate change objectives. This will provide us with the opportunity to test and quantify the benefit of such an intervention, and will also support growth in the area for a site allocation within Greater Manchester Spatial Framework. This provides an opportunity for UU to develop our partnership/ bi-lateral agreement with Greater Manchester Combined Authority and understand the benefits of upscaling such interventions in partnership for multi-beneficiaries.

Figure 18 - Top left – A schematic of the proposed raingarden. Top right – flooding in Scobell Street in 2019. Bottom – sewer layout in the area.



7.3.25. By considering the natural capital benefit that customers will experience, the benefit of doing the residual work has been placed at a value of c£1.35m. This value has been calculated using the BEST tool in line with the methodology developed and assured for the “Enhancing natural capital for customers” ODI. This value is made up of amenity benefits (c£280k), recreation benefits (c£650k) and health benefits (c£430k) for the wider community and this additional benefit to customers justifies the additional spend based on our methodology as it gives a cost benefit ratio well above 1 as demonstrated below.

$$\frac{\text{United Utilities Benefit (c£5k)} + \text{Natural Capital Benefit (c£1.35m)}}{\text{Cost of Scheme (c£200k)}} = \text{Cost Benefit Ratio (6.8)}$$

- 7.3.26. The solution will not only help to reduce flood risk, but also decrease the frequency of consented pollutions through spills at the downstream combined sewer overflow and greatly increase the amenity of a location that has been impacted heavily by coronavirus. Further research will be able to quantify other multiple benefits of the scheme, using climate regulation and other recreational impacts.
- 7.3.27. We will also consider the wider catchment and potential opportunities. This will involve expanding on our work ongoing in the catchment, evidenced already by a “SuDS for Schools” project at the local primary school.
- 7.3.28. Without considering the broader benefits that this solution can deliver it would not be cost beneficial. It is a case study which proves that when accounting for wider benefits, the green solution can be more cost effective than a traditional solution which results in better value being delivered to customers. This also demonstrates the value of Green Recovery in making these projects happen and realising these benefits for customers.

## Invasive Non-native species:

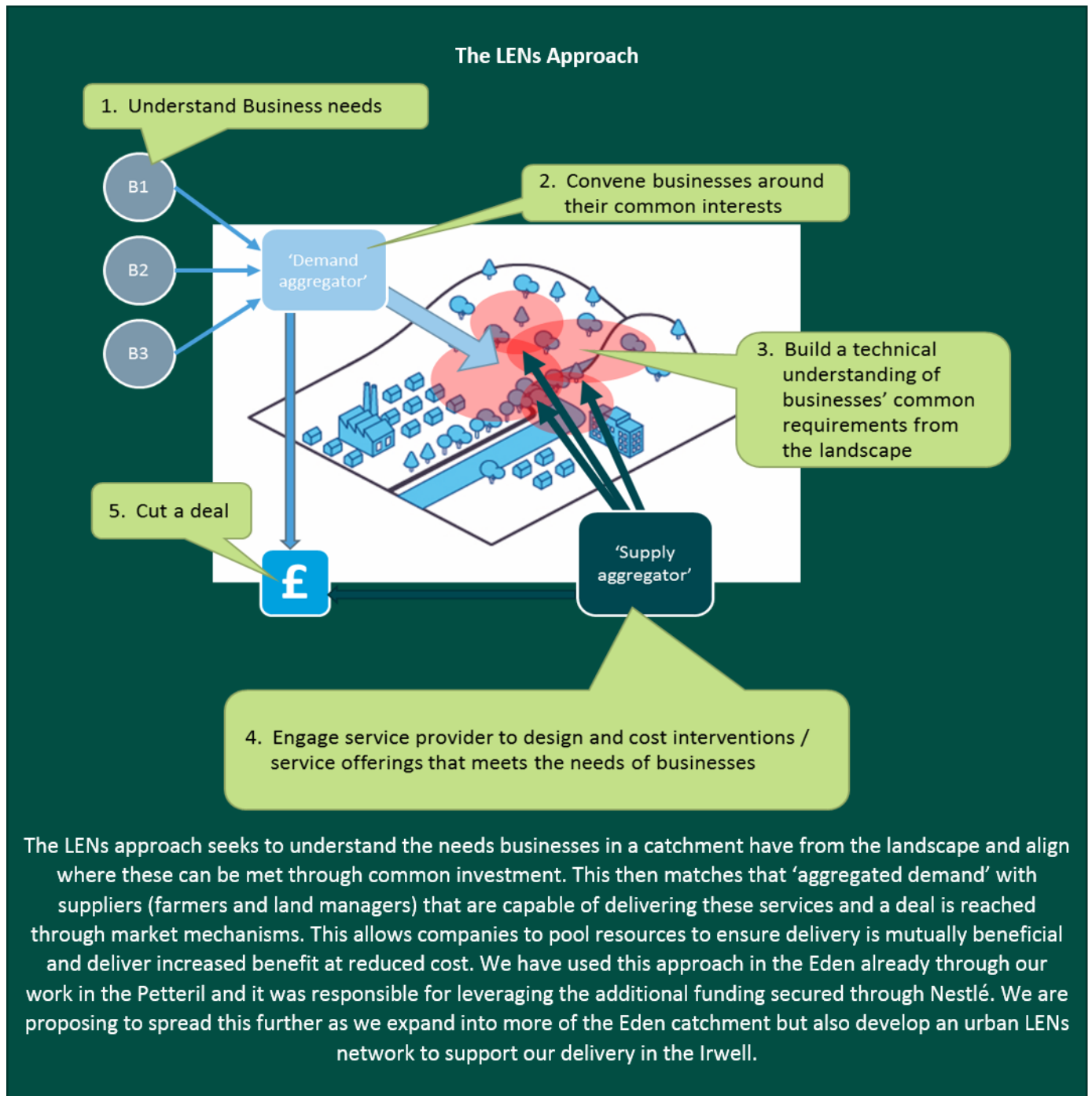
- 7.3.29. As demonstrated in Section 5 “Evidence of Need” there is a growing problem with invasive species in the Irwell and working collaboratively is required in order to meet this challenge. Currently United Utilities and some other land owners are managing these issues in isolation which whilst controlling the issue on our land is not reducing the prevalence of these species. In the wider catchment the species are still able to spread widely due to an inconsistent approach and some land owners not managing these species at all.
- 7.3.30. In order to meet this challenge we are proposing to work with the catchment partnership to deliver activity in an aligned way through partnership. Our base management of invasive species requires us to manage their presence on our land and not allow them to spread to others. This activity is covered under our base expenditure as part of the annual maintenance spend. As part of this approach however we are looking to increase this spend using customer funding of £500k to support the catchment partnership to tackle invasive species through the full catchment and provide a dedicated team which will work with the partnership as well as eradicate invasive species on our land. This work will be completed with the aim of meeting the catchment partnerships ambition of 75% clearance of all invasive species within 10m of the water’s edge. This will involve clearing in excess of 20km of river bank from invasive species and over 60,500m<sup>2</sup> of UU land which will prevent the spread of these further in the catchment and reduce the ongoing maintenance spend.
- 7.3.31. United Utilities continuing to act on our own would not resolve the issue long term as the significant amounts of invasive species upstream in the catchment would allow this area to be readily repropagated. As a result the support for the catchment partnership both financially and in terms of resources will be critical to ensuring the aims of this work are achieved and the lengths of river are cleared of invasive species. This partnership will greatly increase the results that can be achieved by United Utilities alone as the partnership will be able to access land in 3rd party ownership more effectively than UU, encourage financial contributions from land owners to help funding go further and utilise volunteers to understand the issue in more detail and help deliver the reduction plans.
- 7.3.32. This activity will eradicate invasive species from a large section of the Irwell which will allow customers to access this valuable natural resource again, prevent further spread of these species, allow native biodiversity to re-establish itself and reduce ongoing maintenance costs. It will also improve the data held on these species in the Irwell and inform how this approach can deliver efficiently which will help build ongoing proposals to drive further removal in future across all catchments.

## 7.4. Contributions from external sources

- 7.4.1. Specific details of the funding we anticipate being able to leverage from partners is included in section 10 “Sources of Funding” within tables 10.2 and 10.3.
- 7.4.2. Through working in partnership in phosphorus management in the Petteril we have been able to align our activity with that of Nestlé to deliver additional benefit to our customers without any additional funding. As evidenced in section 6 “Evidence of Optimised Option”, Table 12 we have been able to influence [X] Nestlé spend by delivering in the catchment ourselves and aligning our interventions with theirs. This spend is anticipated to continue so by continued working in the catchment there is the potential to leverage this additional finance on an ongoing basis to further benefit customers. This is an example of the work that a partnership approach can deliver and we will be seeking out further opportunities and partners to work with to take this further.
- 7.4.3. Through our work in the Eden we have developed a Landscape Enterprise Network<sup>31</sup> that has helped us to leverage this funding and they have confirmed that with additional demand in these catchments they will be applying to the EA investment readiness fund for £100k support to establish this network on a permanent basis in the Eden and look extend this into the Irwell. These networks which would be delivered by third party funding would help us to align interest in these areas and secure partners to deliver greater customer benefit at less cost and working with these groups now will help to sustain them for the long term so they can continue to support efficient catchment delivery and provide greater long term benefits for customers and accesses to sources of funding we could not otherwise access.

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<sup>31</sup> <https://landscapeenterprisenetworks.com/>



7.4.4. In the case of invasive species a partnership approach is key and the catchment partnership, led by Groundwork and including several environmental NGOs such as Mersey Rivers Trust and City of Trees along with the Environment Agency, local authorities and Natural England, have an established and costed plan for how they would like to tackle invasive species. We don't believe it would be appropriate for United Utilities to fund all of this activity, as invasive species are a challenge that affects everyone in the catchment, however we do believe there is significant benefit to water customers in taking a catchment approach to this challenge so we are keen to fund the partnership to facilitate the delivery of these activities and help them to leverage funding from external sources. The partnership is proposing to undertake activities as outlined in Table 19 over the next 4 years to achieve a significant reduction in non-native species in the catchment.

Table 19 - Catchment partnership plan of activities required to deliver sustainable removal in the catchment

Activity	Cost
Training Citizen Scientists on monitoring for invasive species	£239k
Develop data acquisition app	
Complete survey activity across the catchment and mapping of locations	
Develop strategy with partners and key stakeholders	
Health data survey	
Managing data collation and ongoing updates through the catchment plan	
Engagement activities with key stakeholders to deliver plan	
Train 10 staff in the removal of invasive species	
Staff and equipment costs to tackle 20km of river catchment	
Education programme to reduce spread / reintroduction	
Development of innovation to reach difficult access locations for mapping and control (drones, rope access, boat access, etc.)	

7.4.5. Through the Green Recovery we propose to use customer funding to put £100k toward the partnership costs to get this process started and allow them to access other funding sources as well as aligning the activity of our resources to the work of the partnership to deliver greater overall results. The additional revenue the partnership requires will be targeted from sources as outlined in Table 20 below and will allow us to deliver greater results than we could do alone.

Table 20 - External funding sources to support partnership delivery

Alternative funding source	Targeted amount	Actual / Potential
<b>Confirmed Funding</b>		
Local authority funding through MRT	£40k	Actual
Funding from Forestry England through MRT	£20k	Actual
Funding from Salford / Bury INNS programme through MRT	£20k	Actual
EA annual maintenance spend (£60k per annum)	£240k	Actual
<b>Potential Funding</b>		
Water environment improvement fund (WEIF)	£20k	Potential
Green Recovery Challenge Fund	£50k	Potential
Kickstarter fund	£19.5k	Potential
Heritage lottery fund (HLF)		Potential
Esmee Fairbairn Foundation		Potential
Greater Manchester Environment Fund		Potential
Flood resilience innovation fund		Potential



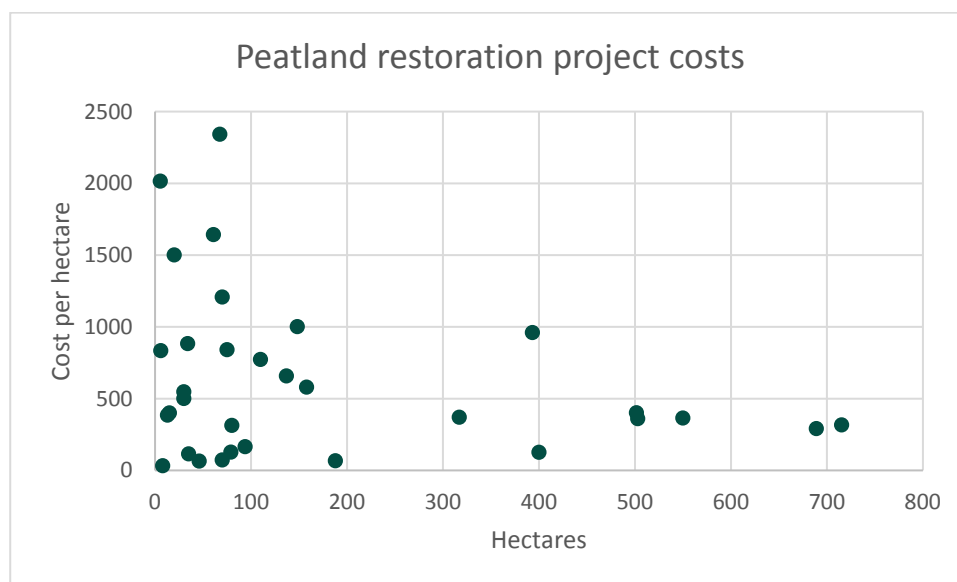
Alternative funding source	Targeted amount	Actual / Potential
Land owner payment	Targeted on direct engagement when delivering	Potential
ELMS	Potential future opportunity	Potential
Biodiversity Net Gain	Potential future opportunity	Potential

7.4.6. Whilst in some of these cases funding is already approved or bids are well underway and would be aligned to this activity there are other sources of funding where the UU investment would be key in providing match funding which opens up new avenues to approach HLF or WEIF. In this way we would be able to deliver far greater results in partnership than we could do alone and would deliver significant additional benefit for our customers. Our support to the partnership would be conditional on sufficient external funding being secured to deliver all of the objectives outlined in Table 19.

## Peatland restoration

7.4.7. Peatland restoration costs can vary according to the particular site. For example, a remote site requiring helicopter access has a higher unit cost than one where machinery and labour can access easily from a road or track. There are also economies of scale which means that working over a larger area is more efficient as shown in Figure 19 below. These costs have been provided by organisations that are recognised as experts in peatland restoration including Cumbria Wildlife Trust, Moors for the Future and RSPB. They represent actual costs of work delivered over the last 10 years.

Figure 19 - Efficiency of peatland restoration



7.4.8. We have asked these organisation to assure the costs and assumptions made in this business case and provide testimony for the work planned.

7.4.1. The costs of peatland restoration are efficient because they have been refined by decades of experience of delivering projects at various scales.

7.4.2. By working with partners to deliver restoration they can often secure funding from multiple sources such as Defra grants which means that UU’s contribution is efficient because customers do not bear

the full cost of the intervention and we would anticipate that this would be the case with the activities proposed under the Green Recovery.

- 7.4.3. In comparison to the cost of treating the effects of degraded peatlands through conventional water treatment and sludge disposal, the catchment measures offer extremely good value for money as shown in Table 18. However, this only represents the private cost to UU and not the full cost to society which results from a reduction in ecosystem services from the degraded peatland.
- 7.4.4. The only way to fundamentally address the issue of degraded peatlands is to address the issue at source and resource long term investment in restoration to take each site from eroded to vegetated to wet and fully functioning blanket bog, as described in section 5 “Evidence of Need”. Fully intact, hydrologically functioning peatlands are the most efficient means to provide clean water for drinking and other ecosystem services.

## Catchment water quality management

- 7.4.5. We have evidenced through section 6 “Evidence of Optimised Option” that delivering in the catchment offers greater value than delivering through traditional asset solutions. To ensure that the costs for delivering these catchment activities is efficient we have developed the cost estimates for this delivery based on our extensive experience through AMPs 6 and 7 and by working with partners to drive efficient delivery.

## Catchment Phosphorus

- 7.4.6. United Utilities are at the forefront of catchment delivery. We have been using our SCaMP approach since 2005 and have evolved this to take in broader environmental challenges which have significant impact on customers through our Catchment Systems Thinking approach. This experience has put us in a strong position to understand and identify how catchments and markets can deliver the phosphorus reductions that we require in an efficient way. Specifically the work we have done in the Petteril has driven a market approach to rural catchment phosphorus management and this market has set the efficient cost for removal of phosphorus as outlined earlier in section 6 “Evidence of Optimised Option”. The market nature of our delivery here has led to competition which drives an efficient cost and in order to be confident that this is comparable to others experience we have benchmarked this with the Catchment Leadership Network<sup>32</sup>.
- 7.4.7. Based on the success we have had using this approach in a rural environment we are keen to expand this and demonstrate what can be achieved in an urban environment. As this is an extremely innovative approach in an urban setting however, there is less evidence to demonstrate an efficient cost. As such we have worked with partners such as the LENS network and Stormwater Shepherds to understand what an efficient unit cost for phosphorus may be in an urban environment as outlined earlier in this section. Our work with LENS has also identified other industries and beneficiaries that may be interested in co investment in aligned catchment interventions for other reasons and we believe that an urban environment can offer greater opportunity to leverage additional funding due to the higher number of people and companies that can benefit from these activities. This work will also have the benefit of delivering natural solutions close to customers so the additional benefits around amenity and recreation will be far greater.

## Sustainable Drainage Solutions and Natural Flood Management

- 7.4.8. To support our submission, it is critical that contributions, both financial and in-kind are gained from stakeholders and partners. This is because drainage systems are complex, crossing political

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<sup>32</sup> GR0002v Catchment Leadership Network Confirmation of P costs

boundaries, having multiple types of ownership and responsibilities with these owners. We are committed to working together with partners to understand how sewerage infrastructure interacts with watercourses and local topography to identify how Sustainable Drainage Solutions (SuDS) can be targeted to improve holistic pluvial flood risk and amenity in catchments that that will deliver the greatest cost benefit to customers. The partners that we are proposing to work with to develop and fund solutions include the Environment Agency, Regional Flood and Coastal Committee (RFCC) and the Lead Local Flood Authorities that make up the NW RFCC are able to invest in socio-economic and environmental benefits for their own areas.

- 7.4.9. Working in this way with partners such as the Rivers Trust, who have huge experience and success in implementing natural flood management solutions. We can be confident that the best options will be identified and the right partners engaged. This will ensure the potential benefits are maximised and the cost to customer minimised to deliver the greatest possible cost benefit.
- 7.4.10. Through our work with the IGNITION project, partners have undertaken significant research into the broader benefits of SuDS. This is summarised in Table 21 below. We will utilise this research to help identify co-beneficiaries for projects that are proposed so we can seek to drive down the cost to customers and increase delivery. This promotes new ways of working in exploring what new and innovative financing solutions can be utilised and the learning achieve through this will be beneficial in developing future plans across all stakeholders. Through these projects we will also seek to validate research completed and improve the available evidence base, filling in some of the gaps that currently exist around multiple benefits.
- 7.4.11. This approach will also allow us to build new relationships with the housing, retail and business sectors which will help us influence how they approach additional development. This will help to address the concerns around the impact of this development on communities. We will work alongside planning authorities and developers alike to ensure that opportunities for interventions are maximised.

# Accelerating partnerships to deliver natural solutions

Table 21 - Academic summary of the use of sustainable drainage and the multiple benefits it can deliver<sup>33</sup>

Benefit	Studies Included	Physical flow	Storage facilities	Filter strips and swales	Infiltration	Unit	Comments
<b>Air quality</b>	0	Pollution removal	No data				There is no data for this at present, although data could potentially be taken from green spaces database where appropriate.
<b>Carbon</b>	15	Annual carbon sequestered	0.183 [Rng. 0.09-0.31]	0.27 [Rng. 0.034 - 0.62]	No data	Avg. kg C m <sup>2</sup> yr.	Only strong data on SuDS carbon storage focusses on detention ponds, it would not be appropriate to generalise this across SuDS due to the difference in hydrology influence. Outlying data reporting 17kg m <sup>2</sup> yr. sequestration was not included.
		Carbon storage	1.57 - 2.28	3.05 - 5.04	No data	Avg. kg C m <sup>2</sup>	
<b>Water Quantity</b>	26	Peak flow reduction	70% [Rng. 36-99%]	57% [Rng. 52-61%]	40%* [Rng. 40-85%]	Avg. % reduction	An abundance of research is available for this benefit, covering many measurable units, the three included here were found to be most common. Less data on infiltration SUDS.
		Peak flow delay	16mins	33-34mins [mid point 33.5mins]	No data	Minutes	
		Runoff reduction	72% [Rng. 35-100%]	69% [Rng. 50-88%]	60%*	Avg. % runoff retained	
<b>Water Quality</b>	26	Total nitrate removal	51% [Rng. 30-79%]	19-70% [mid point 44.5%]	65%*	% Nitrate removal	All but one study report nitrate removal. (One reports increased oxidisable nitrate in effluent in an infiltration SuD)
		Total suspended solids removal	68%*	79% [Rng. 56-95%]	43% [Rng. 36-50%]	% Total suspended solids removal	All studies found reported removal
		Total phosphate removal	55% [Rng. 50-60%]	62% [Rng. 40-85%]	48% [Rng. 45-51%]	% Phosphate removal	All but one study reports phosphate removal. (One reports increase in phosphate in filter strip & swale SuDS)
<b>Temperature</b>	4	Reduction in air temperature	Sparse data, 3 studies reported blue space has the potential to increase air temperature, 1 study reports lower temperature above blue space in city in daytime.				Qualitative data with differing units requiring interpretation. Definitive studies need to be found.
<b>Energy Use</b>	0	Energy consumption for cooling	No data				There are potential energy reductions from decreased requirements to treat waste water.
		Total energy consumption					

<sup>33</sup> Ignition 2020; <https://www.greatermanchester-ca.gov.uk/what-we-do/environment/natural-environment/ignition/>

# Accelerating partnerships to deliver natural solutions

<b>Health and Wellbeing</b>	0	Energy consumption for warming			There is no data for this at present, although data could potentially be taken from green spaces database where appropriate
		Thermal resistance			
		Attention	No data		
<b>Noise</b>	0	Memory and recall			There is no data at present and unsure if this would show any positive benefit
		Reduction in noise levels	No data		
<b>Land and Property</b>	4	% house price premium	0.9%*	Avg. % house price premium with a small blue space within 200m of a property	Data listed in summary based on 3 studies that make reference to generic "blue space", other data in database on varying measurable aspects exists. 1 study concludes that in the absence of green and blue spaces, property prices in Great Britain would be £4,813 lower and this reflects the value of services provided by green and blue spaces.
		% property premium close to water	3.6%*	Avg. % house price premium with a large blue space close to the property	
<b>Amenity</b>	2	No consistent physical flow data	One UK willingness to pay study shows a positive value, one South African study shows a negative value due to badly designed and maintained SuDS		Summary figure based on 2 studies, other studies available in database with differing measuring units.
<b>Biodiversity</b>	12	No consistent physical flow data	Strong qualitative data on increase in biodiversity in storage facilities, with many studies in the UK. One UK study reports that SuDS ponds have 60-80% species richness as a natural pond		Multiple qualitative data entries, mostly UK based.
<b>Local economic growth</b>	0	Staff turnover	No data		
		Sick leave			
		Productivity			

# Accelerating partnerships to deliver natural solutions

## Invasive non-native species

- 7.4.12. We have been investing in invasive species management in line with the requirements on us as a landowner for many years and have driven efficiency in how we undertake this activity through insourcing our grounds maintenance work. In order to drive this efficiency further we need to take action to eradicate invasive species not just control them as this will deliver significant benefit to customers in reduced health and safety risk, better access to watercourses, improved biodiversity and better resilience to flooding and land erosion. This will also reducing our ongoing spend in management and drive efficiency.
- 7.4.13. As is evidenced in Section 5 “Evidence of Need” this challenge is ever growing and can’t be addressed by United Utilities alone. We have therefore worked with the catchment partnership to identify a joint action plan for how we can tackle this issue at a catchment scale and how additional funding could be leveraged through the partnership to support UU resources and make customers money go further.
- 7.4.14. This approach will allow us to start to tackle the problem of invasive species and deliver a reduction across the catchment rather than ongoing management with little overall impact. Alignment of other stakeholders is vital to achieve this so the support of the catchment partnership is key.

## 8. Evidence of customer support

### 8.1. Introduction

- 8.1.1. We have carried out a broad range of research with customers, through both PR19 and for the Green Recovery specifically, related to the environment and environmental outcomes. We have summarised our PR19 research in Table 22 below and the specific research completed for Green Recovery is included in GR0010 Green Recovery Customer Research Report.
- 8.1.2. Through the Green Recovery research we found 79% of customers supported the delivery of the natural solutions proposed through the Green Recovery programme. This support for delivery remained strong, 63%, when considering the proposals in line with the expected customer bill impact of £1.30<sup>34</sup>.
- 8.1.3. In addition to our specific engagement with customers, the environment is consistently ranked by the public as one of the most pressing issues facing the nation and is presently rated as the most important issue behind health, the economy and the UK leaving the European Union. Environmental issues have also been of notable concern for younger generations. Having carried out our own discussions with ‘Gen Z’ (14-24 year olds), we found that this generation are most concerned by climate change, and 78% of people we spoke with identified that they were concerned about impacts on wildlife and 70% were concerned about extreme weather. Evidently, concern and awareness of green issues is not limited to the present, it is a growing issue for future generations.
- 8.1.4. As outlined in section 5 “Evidence of Need”, we also recognise the clear challenges and expectations being set by regulators regarding environmental improvements. Defra’s 25 Year Environment Plan aspires to be the first generation to leave the environment in a better state than we found it; and “Time to Act Together” Ofwat’s strategy references the environment and that companies will need to improve the environment as a core part of their business to deliver sustainable, resilient water supplies. We have listened to these expectations and believe that our proposals will enable us to deliver a more resilient service, provide true value for customers but will fundamentally support the environment and contribute to enhancing it and improving it both now and for future generations.
- 8.1.5. The importance and value of good quality green space has become even more prevalent during the Covid-19 pandemic. During the national lockdown, more individual’s accessed green spaces, and it is widely accepted, including by Public Health England and the World Economic Forum, that green spaces have significant value for communities through improving health and wellbeing, enhancing social cohesion and contributing to mitigating the effects of climate change.
- 8.1.6. It is apparent that access to good quality green spaces, and a healthy environment to mitigate climate change, are not restricted to localised preferences but are also of national concern. Our proposals to invest in strategic catchment partnerships, management of invasive species and peatland restoration have been outlined extensively in previous sections. However we recognise that through investing in these areas we are preserving green spaces and supporting to improve the overall quality of the environment which hold significant importance in addressing wider interests.
- 8.1.7. Collectively, as outlined in section 6 “Evidence of Optimised Option” and section 7 “Evidence of Efficient Delivery”, proposals across catchment water quality and phosphorous management,

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<sup>34</sup> GR0010 Green Recovery Customer Research Report.

peatland restoration, invasive non-native species and SuDS are able to deliver wide ranging environmental benefits such as; increased biodiversity, added natural capital and enhanced ecosystem resilience. Due to the reliance on natural processes to deliver these environmental outcomes, the full benefits realisation of these interventions may not be seen in their entirety for some time however once delivered, there will be beneficial effects on the surrounding environments that will be evident in AMP7. These include; improved recreational spaces with removal of non-native invasive species, added biodiversity within our strategic catchments through adoption of nature based solutions and flood-risk alleviation through use of SuDS. We will also see additional associated benefits to water quality through removal of pollutants at source.

- 8.1.8. An additional factor of consideration is that the alternative to some of these proposals, notably catchment management interventions, would be conventional chemical or 'grey' treatments. These solutions, although providing some specific environmental benefits, often do not deliver the multiple additional benefits gained from green infrastructure alternatives and are typically less cost-effective than nature based counterparts, as seen in the Petteril Catchment example in section 6 "Evidence of Optimised Option".
- 8.1.9. More still, through the application of a CaST approach, we are able to identify partners within the catchment who have comparable environmental interests and leverage external funding to co-deliver interventions such as with Nestlé where we have been able to influence [£] annual spend in the Eden. As such our proposals are able to offer true value for customers whilst also protecting and enhancing the natural environment in the North West.
- 8.1.10. Additionally, with a number of prevalent storm events affecting the North West in recent years, preventing homes from being affected by sewer flooding is an emerging priority for customers. This was identified by customers during our 'Customer Priorities' research as being one of the four most important areas for United Utilities to prioritise, to ensure continued delivery of service. This was closely followed by preventing accidental pollution from our activities. Collectively, this suggests that customers support flood reduction but are also mindful of environmental impacts, and as outlined in more detail below customers are largely in favour of utilising sustainable drainage solutions to help mitigate some of these impacts



# Accelerating partnerships to deliver natural solutions

Table 22 - Summary of PR19 customer research demonstrating customer support for proposals.

PR19 Research Summary																		
Theme	Research Title	Summary Findings	Associated Document															
Peatland Restoration	UU Customer Priorities	4th identified area that UU should focus on in the future is "taking good care of the land and reservoirs that they own and manage"	<a href="#">S1001 – Pages 12-15</a>															
	Sustainable Land and Waste Management	Customers prioritised the protection of natural habitats and environment for wildlife when managing non catchment land	<a href="#">S1001 – Pages 148-149</a>															
	Drinking water taste, smell and appearance	<ul style="list-style-type: none"> <li>Nearly all customers drink tap water, so any change to its perceived quality is an important issue.</li> <li>A change to the appearance of water – especially particles or discolouration – causes a stronger reaction than a change to the taste or smell, and as a result, is more likely to lead to contact</li> </ul>	<a href="#">S1001 – Pages 106-107</a>															
Catchment phosphorus management	PR19 Willingness to Pay Survey	<p>Households appear most willing to pay for service improvements in:</p> <ul style="list-style-type: none"> <li>safe clean drinking water;</li> <li><b>the cleanliness of rivers and lakes; and</b></li> <li>the cleanliness of seas and lakes for swimming.</li> </ul> <table border="1"> <tr> <td>Cleanliness of our rivers and lakes</td> <td>Per 1% of river meeting "good" standard</td> <td>-1</td> <td>-£8.81</td> <td>-£2,584,785</td> </tr> <tr> <td></td> <td></td> <td>+1</td> <td>£5.41</td> <td>£528,887</td> </tr> <tr> <td></td> <td></td> <td>+2</td> <td>£10.01</td> <td>£489,508</td> </tr> </table>	Cleanliness of our rivers and lakes	Per 1% of river meeting "good" standard	-1	-£8.81	-£2,584,785			+1	£5.41	£528,887			+2	£10.01	£489,508	<a href="#">S1001 – Pages 44-46</a>
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		+1	£5.41	£528,887														
		+2	£10.01	£489,508														
	River Petteril Customer and Stakeholder Research	<ul style="list-style-type: none"> <li>Stakeholders are quite strongly critical of chemical dosing</li> <li>Customers generally prefer Catchment Management Solutions (CMS) but are open to a hybrid approach, due to the reliability of chemical dosing</li> <li>CMS is perceived to be a more sustainable, long-term option</li> <li>Customers are concerned that the success depends on effective engagement with local farmers and land owners – but feel it would be possible with financial support</li> <li>Stakeholders believe a strategic approach must be adopted for selecting schemes, and that a funding mechanism should be put in place</li> </ul>	<a href="#">S1001- Pages 144-145</a>															

		<ul style="list-style-type: none"> <li>- They feel any mechanism should be easy to apply for and should operate on a long-term basis</li> <li>- There was enthusiasm for an independent party to manage the scheme</li> <li>- The majority of customers felt that any saving that is achieved by adopting CMS, rather than chemical dosing, should be invested in flood mitigation schemes</li> </ul>																			
	<p>Immersive Research - Technical Annex</p>	<p>We hosted a workshop with customers that 'immersed' them in the environment of the River Irwell. We used a range of creative materials to outline ecosystem services including: a healthy river to support wildlife, visual appearance of rivers, and safety of river for recreational use, biodiversity, and green spaces for recreation. Following the interactive experience, participants were asked if they would like to 'buy' ecosystem services that were most important to them.</p> <p>86% of participants opted to purchase at least one service improvement and the majority (55%) bought three or more service improvements.</p> <p>Mean willingness to pay across each ecosystem service is outlined below.</p> <p><b>Figure 6 Mean WtP for ecosystem services</b></p> <table border="1"> <thead> <tr> <th>Ecosystem service</th> <th>Mean WtP (per HH / yr)</th> <th>Implied improvement<sup>1</sup></th> </tr> </thead> <tbody> <tr> <td>Green spaces for recreation</td> <td>£0.17</td> <td>40 projects, including 13 big sites</td> </tr> <tr> <td>A healthy river to support wildlife</td> <td>£1.83</td> <td>buys 228 km of rivers more will support wildlife</td> </tr> <tr> <td>Visual appearance of rivers</td> <td>£1.20</td> <td>buys 200 km of rivers with better visual appearance</td> </tr> <tr> <td>Safety of river for recreational use</td> <td>£0.11</td> <td>provides 62 km of rivers safe for recreational use</td> </tr> <tr> <td>Biodiversity</td> <td>£0.12</td> <td>41 projects on UU Land &amp; 25 other projects</td> </tr> </tbody> </table>	Ecosystem service	Mean WtP (per HH / yr)	Implied improvement <sup>1</sup>	Green spaces for recreation	£0.17	40 projects, including 13 big sites	A healthy river to support wildlife	£1.83	buys 228 km of rivers more will support wildlife	Visual appearance of rivers	£1.20	buys 200 km of rivers with better visual appearance	Safety of river for recreational use	£0.11	provides 62 km of rivers safe for recreational use	Biodiversity	£0.12	41 projects on UU Land & 25 other projects	<p><a href="#">S1001- Pages 143</a></p>
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# Accelerating partnerships to deliver natural solutions

<b>Catchment Interventions for raw water quality</b>	Management of United Utilities' Catchment Land	<p><b>How do customers feel about sustainable ways of managing catchment land?</b></p> <p>Three-quarters think it's important that they have a say in how UU manages its land. Two-thirds would support more investment in sustainable land management if bills would not increase.</p> <p>The most important benefits of sustainable land management are securing water supplies – seen as a vital commodity – and reducing the chances of flooding.</p>	<a href="#">S1001- Pages 110</a>
	Water Abstraction	<p><b>What do customers expect of United Utilities when it comes to environmental initiatives, and why?</b></p> <p>Ensuring environmental protection is very important. Almost all think it is important for UU to invest in related initiatives, primarily to secure water supplies now and in the future.</p> <p>When collecting water, customers expect United Utilities to:</p> <ul style="list-style-type: none"> <li>- Protect the natural environment</li> <li>- Monitor and manage water supplies</li> <li>- Minimise negative environmental impact</li> </ul> <p>They would also welcome investment in broader, non-essential schemes such as ensuring all UU land is put to best use, and supporting customers to also act responsibly.</p>	<a href="#">S1001- Pages 129-130</a>
<b>SuDS / NFM</b>	River Petteril Customer and Stakeholder Research	<ul style="list-style-type: none"> <li>- The majority of customers felt that any saving that is achieved by adopting Catchment Management Solutions (CMS), rather than chemical dosing, should be invested in flood mitigation schemes</li> <li>- Customers were broadly supportive of greater use of SuDS</li> </ul>	<a href="#">S1001- Pages 144-145</a>
	Sustainable Drainage Solutions	<p>Customers respond positively to the idea of sustainable drainage solutions; they acknowledge that such solutions:</p> <ul style="list-style-type: none"> <li>- are environmentally friendly</li> <li>- provide green spaces and improved air quality, both of which contribute to well-being</li> <li>- are potentially less disruptive than traditional solutions.</li> </ul> <p>- Consequently, over two-thirds feel it is more important for United Utilities to invest in sustainable drainage solutions than traditional solutions.</p> <p>- However, traditional solutions are still valued for their reliability and efficacy – they are seen as better able to cope with severe / flash floods.</p> <p>- Therefore, in the absence of more information / reassurance, customers would like an option that incorporates both types of solution.</p>	<a href="#">S1001- Pages 152-153</a>

# Accelerating partnerships to deliver natural solutions

<b>Invasive non-native species management</b>	Water Trading Report	Impact on river life and wildlife is of high concern across all regions (regarding water transfers). Concerns raised by customers: - Disruption to natural habitats and landscapes - Spread of invasive species - more likely to be a concern where rivers are used in the process to transfer water rather than pipes	<a href="#">S1001- Pages 131-133</a>
	River Patteril Customer and Stakeholder Research	"A number of participants raise complaints about the condition of river banks, in particular complaints about litter and fly tipping, particularly in more built-up areas. Another concern raised was the presence of invasive plant species."	<a href="#">S1001- Pages 144-145</a>

## 8.2. Structure of this section

- 8.2.1. This section will outline the customer evidence for nature based solutions in general terms and also going into the specifics of solutions where the supporting evidence is available.

## 8.3. Customer support

- 8.3.1. Through our collective engagement and discussions with customers, we have identified key insights across a variety of environmental topics including land management, SuDS and use of catchment management solutions. We know that customers have an overarching expectation that we take good care of the land and reservoirs that we own and manage<sup>35</sup>. Additionally customer priorities identified that when managing non-catchment land we should focus on creating a protective environment for wildlife and natural habitats<sup>36</sup>.
- 8.3.2. To support delivering these aspirations, and as highlighted in section 6 “Evidence of Optimised Option” and section 7 “Evidence of Efficient Delivery”, we will grow partnerships and develop catchment markets, expanding our work in the Petteril Catchment in AMPs 6 and 7. Not only do we believe that utilising markets in our delivery offers efficiency in managing pollution at source, importantly the use of markets helps fund and support local small enterprises and drives competition in delivery to ensure a fair price for water customers.

### Invasive Species Management

- 8.3.3. As outlined in Table 22, now more than ever, access to nature is vital and of growing significance to the public. The presence of invasive species can prohibit this access, due to growth of these species along river banks and watercourses; but also diminish the overall quality of the area through the use of pesticides and herbicides that are frequently used to treat the species.
- 8.3.4. During immersive research with customers, we facilitated detailed, interactive workshops focused on the Irwell catchment in order to understand the value customers placed on certain ecosystem services. From this engagement, we identified that customers were most willing to support improvements in rivers to support wildlife, as well as improvements in the visual appearance of rivers. Mean willingness to pay (per household, per year) for these improvements was £1.83 and £1.20, respectively. We recognise that there is a desire from customers to have visually appealing rivers that also support wildlife – and a willingness to pay to see improvements in these areas. Addressing the issue of non-native invasive species will be a significant action in delivering this expectation.

### Catchment Phosphorus Management

- 8.3.5. We have carried out specific qualitative research in the River Petteril catchment, part of the Eden, we discussed extensively the use of catchment management solutions for phosphorous. The overall preferences from this discussion were that stakeholders were strongly critical of chemical dosing alternative to catchment interventions, customers generally prefer catchment management solutions but were open to a hybrid approach, due to the reliability of chemical dosing however catchment management solutions were perceived to be more sustainable and a good long-term option. In conjunction with findings from our immersive research identified in Table 22, regarding customer

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<sup>35</sup> United Utilities Customer priorities summarised in S1001 Page 12 [https://www.unitedutilities.com/globalassets/z\\_corporate-site/pr19/supplementary/s1001\\_customer\\_research\\_summaries.pdf](https://www.unitedutilities.com/globalassets/z_corporate-site/pr19/supplementary/s1001_customer_research_summaries.pdf)

<sup>36</sup> Sustainable land and Waste Management summarised in S1001 Page 148 [https://www.unitedutilities.com/globalassets/z\\_corporate-site/pr19/supplementary/s1001\\_customer\\_research\\_summaries.pdf](https://www.unitedutilities.com/globalassets/z_corporate-site/pr19/supplementary/s1001_customer_research_summaries.pdf)

support for improvements in rivers to support wildlife, customers clearly value healthy rivers and also value utilising more nature based approaches to support delivering these improvements. This is further supported by 'PR19 Willingness to Pay' research that found 'cleanliness of rivers and lakes' was one of the top three areas that customers were most willing to pay for service improvements in.

## Sustainable Drainage Solutions and Natural Flood Management

- 8.3.6. We have undertaken specific research with customers to gather insights into customer understanding of SuDS and their preferences around their use within business activities. From this engagement customers responded positively to the idea of sustainable drainage solutions; they acknowledge that such solutions are: environmentally friendly; provide green spaces and improved air quality - both of which contribute to wellbeing; are potentially less disruptive than traditional solutions; and consequently, over two-thirds (68%) of participants in our research felt it was important for us to invest in sustainable drainage solutions than were environmentally beneficial, with wetlands being the preferred solution for investment. The benefits of SuDS that most appealed to customers was reduced flooding of public spaces which was identified by 59% of participants. However customers also valued the environmental benefits of SuDS with 'a source of habitats to support wildlife' being identified as one of the top three benefits, outlining that customers recognise the range of benefits that SuDS can provide.

## Peatland Restoration & Catchment Interventions for raw water quality

- 8.3.7. Having spoken with customers about the taste, smell and appearance of drinking water, we understand that whilst all three components are important, a change to the appearance of water, especially particles or discolouration, causes a stronger reaction than a change to the taste or smell, and as a result, is more likely to lead to contact. Evidently the appearance of water is important to customers, we also know from research including: "Customer Priorities", "Sustainable Land and Waste Management" and "Management of United Utilities' Catchment Land" that customers have a strong preference for United Utilities to manage and protect the environment.
- 8.3.8. Notably in our "Management of United Utilities' Catchment Land" research, 65% of participants supported investment in sustainable land management, even if bills increased. These customers accepted a £0.27 annual bill increase, translating to 420,000 hectares managed sustainably, and 57% of participants would accept an annual bill increase of £0.57 equating to 540,000 hectares managed sustainably. Significantly, 74% of customers were willing to accept bill increases now in order to help protect the environment and water supplies for future generations. In addition we understand that this is an emerging concern for 'Gen Z' customers (14 – 24 year olds) who outlined that among their environment concerns were: the future of wildlife (78%), extreme weather (70%) and water supplies (64%) to name some.
- 8.3.9. Collectively this range of engagement demonstrates that customers have a strong desire for good quality water including taste, smell and notable appearance. There is also a desire for catchments to be managed sustainably both now and in the future. Through our proposals for peatland restoration and catchment interventions for raw water quality, we are able to contribute to meeting both of these expectations through supporting in reducing turbidity, improving raw water quality whilst also enhancing and improving the wider environment and catchments.

## 9. Additional benefit of acceleration

### 9.1. Introduction

- 9.1.1. The environmental challenges facing the strategic catchments are well established through earlier sections of this document and these challenges continue to grow. As a result of this the interventions required also continue to grow and the opportunity to invest early as afforded by the Green Recovery offers an opportunity to deliver in a more efficient way.
- 9.1.2. To deliver long term resilient catchments we need to change how we work and increase our usage of partnerships to align stakeholder's needs and deliver efficient interventions that meet multiple drivers. Delivery through partnership however is complicated and takes time to establish the relationships that are needed to be successful so the opportunity to start this process earlier and develop more sustained work flows to keep partnerships consistently active helps drive these more efficient delivery mechanisms.
- 9.1.3. Part of our activities to date have been focused on creating markets in catchments as demonstrated by our work in the Petteril catchment through AMPs 6 and 7. In addition to the efficiency benefits already discussed, working in this way also channels funding directly to small local businesses, investing in their infrastructure to help deliver environmental and financial resilience to these organisations. This is particularly important now in the light of the strain these organisations are under as a result of Covid-19, but also the uncertainty that Brexit has caused and the potential for significant change in how the rural economy operates.
- 9.1.4. Utilising natural solutions also allows for wider benefits to be realised, often at lower cost, but these solutions don't just switch on as with traditional hard engineered assets and time is needed for them to mature so that the full value of them can be realised. As a result early delivery offers the option of intervening in more sustainable and efficient ways now, to maximise multiple benefit and provide the time for these interventions to mature so customers can experience this benefit sooner.
- 9.1.5. A summary of the benefits of acceleration is included in Table 23 below and the additional jobs we would expect to generate is also included in Table 24.

# Accelerating partnerships to deliver natural solutions

Table 23 - Summary of the benefits of acceleration

Catchment	Intervention	Solutions can mature to provided environmental benefits and resilient catchment sooner	Learning will inform future planning and speed up AMP8 delivery	Jobs created or maintained as part of activity	Reduced costs by tackling this challenge sooner	Supporting local small businesses through asset investment at a time of need	Reduce wildfire risk sooner	Opportunity to better align to other partners work
Eden	Catchment phosphorus management	X	X	X		X		X
	SuDS and NFM	X	X	X				X
	Peatland restoration	X	X	X				X
Fylde Coast	SuDS and NFM	X	X	X				X
	Peatland restoration	X	X	X				X
	Catchment water quality management	X	X	X				X
Greater Manchester	Catchment phosphorus management	X	X	X		X		
	SuDS and NFM	X	X	X				X
	Invasive species management	X	X	X	X			X
Peatland	Peatland restoration	X	X	X			X	X



# Accelerating partnerships to deliver natural solutions

Table 24 - Additional jobs anticipated as a result of Green Recovery proposals

Catchment	Intervention	Jobs created within United Utilities	Jobs created in partner organisations as a result of United Utilities funding	Jobs created in partner organisations as a result of further funding that can be leveraged
Eden	Catchment phosphorus management	1 (resource to coordinate delivery and work with partnership)	1 (Catchment officer) 2 (Contractor jobs to deliver works on ground)	1 (Catchment officer)
	SuDS and NFM	2 (additional resource to help with opportunity identification and delivery across region)	20 roles regionally split as - 10 (Project teams / consultants working on consulting options regionally) - 10 (Contractor jobs to deliver works on ground)	5 (Project teams / consultants working on consulting options regionally)
	Peatland restoration	1 (one role across all peatland areas)	6 (Contractor jobs)	4 (peatland officer roles with Cumbria Wildlife Trust)
Fylde Coast	SuDS and NFM	2 (additional resource to help with opportunity identification and delivery across region)	20 roles regionally split as - 10 (Project teams / consultants working on consulting options regionally) - 10 (Contractor jobs to deliver works on ground)	5 (Project teams / consultants working on consulting options regionally)
	Peatland restoration	1 (one role across all peatland areas)	1 (project officer in the rivers trust) 2 (Contractor jobs)	4 (2 project delivery roles and 2 contractor roles)
	Catchment water quality management	1 (resource to coordinate delivery and work with partnership)	2 (one farm advisor in the Lune and Wyre Rivers Trusts)	2 (one additional advisor in the Lune and Wyre Rivers Trusts to link into multiple funding streams)
Greater Manchester	Catchment phosphorus management	1 (resource to coordinate delivery and work with partnership)	1 (Catchment officer) 4 (Contractor jobs to deliver works on ground)	1 (Catchment officer)

# Accelerating partnerships to deliver natural solutions

Catchment	Intervention	Jobs created within United Utilities	Jobs created in partner organisations as a result of United Utilities funding	Jobs created in partner organisations as a result of further funding that can be leveraged
	SuDS and NFM	2 (additional resource to help with opportunity identification and delivery across region)	20 roles regionally split as - 10 (Project teams / consultants working on consulting options regionally) - 10 (Contractors to deliver works on ground)	5 (Project teams / consultants working on consulting options regionally)
	Invasive species management	2 (additional resources to work with the catchment partnership and tackle invasive species)	3 (Roles in the partnership 1 to coordinate activity and 2 to work on invasive species removal)	2 (Additional roles in the partnership to work on invasive species removal)
Peatland	Peatland restoration	1 (one role across all peatland areas)	4 (1 project officer at Winter Hill, 2 at Longdendale and 1 at the Goyt Valley) 6 (Contractor jobs)	12 (4 project delivery roles created at Winter Hill, 6 at Longdendale and 2 at the Goyt Valley)

## 9.2. Structure of this section

- 9.2.1. The activity that we have identified as being required through the Green Recovery is all activity we anticipate would need to be delivered through AMP8 but presents an opportunity to deliver early to achieve greater efficiency, deliver benefits sooner, and give natural solutions a chance to mature or facilitate partnership approaches. In this section we will outline the additional benefits that can be delivered by accelerating the interventions for each of the activity types we have identified as being required.

## 9.3. Peatland restoration

- 9.3.1. Restoring the hydrological integrity of the peatland (raising the water table, slowing the flow) can be a catalyst to ecological restoration by creating the right conditions for peat-forming species to thrive. This can be done through interventions such as gully blocking, peat hag (erosion damage) reprofiling and creation of ponds.
- 9.3.2. Restoring the vegetation can be helped by interventions such as stabilising eroding peat using a layer of geojute, applying lime, seed and fertiliser to establish a nurse/grass crop to cover bare peat and planting sphagnum moss. To allow the vegetation to recover it is important to reduce or remove animal grazing for a minimum of 10-15 years. This shows the benefit of a longer term approach and we're proposing accelerating this delivery so these benefits can be experienced sooner.
- 9.3.3. The risk of wildfire is also very real with several significant fires in recent years, they pose a significant health risk with very poor air quality to surrounding populations and also the safety risk and cost involved to the people that have to fight these fires. In dry (heather or molinia dominated) areas where grazing is removed it is important to manually reduce the potential fuel load to avoid the hugely damaging impact of wildfire. Taking action now helps protect customers from the damaging impacts of wildfire today as well as helping to protect a long term resilient source of water for tomorrow.
- 9.3.4. Peatland restoration is a long term activity but most schemes are usually funded through short-term grants with Defra and the EU being the biggest funders historically. Examples of projects delivered are in Table 9. Having a long term view of the restoration we will complete is beneficial in targeting and securing these grants and in doing so reducing the cost burden on customers.
- 9.3.5. It is important to note that no UK peatlands have as yet been fully restored. It is a boundless process; restoring the impact of decades of erosion and mismanagement before ecological succession can take place and peat soils form. This emphasises the importance of accelerating this work. The process of forming peat is a long one but the benefits are well established and therefore the sooner this activity is progressed the sooner customers and society can start to reap the benefits of healthy well-functioning peatlands.
- 9.3.6. The benefits of peatland restoration are to wider society and not just UU customers through a reduced cost of water treatment. This aligns with the new Environmental Land Management Scheme (ELMS) and 'public money for public goods' approach. There will be a new tier of funding for projects delivering nature recovery at a landscape scale, working across multiple landowners. We are already starting to demonstrate this approach through the Endangered Landscapes project in Cumbria working with Lowther Estate. We plan to engage with neighbouring landowners at the sites identified for peatland restoration through Green Recovery, particularly in the Barnacre and Grisedale area where UU has no land ownership. We will resource the Forest of Bowland AONB to facilitate

partnership working and engage the land owners to deliver peatland restoration in areas of mutual interest.

- 9.3.7. The opportunity that things like ELMS and the Great North Bog, as discussed in section 5 “Evidence of Need”, represent means that taking this action now is particularly beneficial as we can align to these other delivery routes and use these to leverage additional funding to increase the efficiency of our delivery. This allows us to deliver the benefits sooner for customers at a more efficient cost.

## 9.4. Catchment water quality management

- 9.4.1. Taking action to work with partners and farmers in the River Lune and Wyre catchments is important to mitigate and begin to reverse the impact of land management practices that are at present causing deterioration of the water quality.
- 9.4.2. Over a sustained period, catchment management delivers resilience of the water sources to protect water supplies and ensure a sustainable cost of treatment and there are broader environmental challenges associated to the quality and quantity of raw water that are present now and getting worse so taking action now to address and reverse this deterioration is key.
- 9.4.3. We will take a partnership approach which allows for other organisations to collaborate to deliver multiple benefits and of wider improvements by funding these aspects in the catchment. This approach enables us to support local partnerships and small business through this challenging time, not only due to Covid-19 but the impact of Brexit on the agricultural sector, as well as the existential impacts of climate change.
- 9.4.4. There are wider benefits to improving water quality in the river catchments. Working in partnership to raise awareness of diffuse pollution and support farmers to improve their practices will also help to improve biodiversity, reduce the rate of run-off and increase carbon sequestration. A reduction in the use of chemicals (pesticides) and an increased focus on working with natural processes to create buffer strips will support wildlife. Improving livestock management will reduce erosion and increase the retention capacity of the soil, which helps to slow the rate of runoff and increase carbon storage in the soil.

## 9.5. Catchment phosphorous

- 9.5.1. Delivering in catchments can involve a range of solutions some of which are more asset based on farms and others are focused on nature based delivery. In the case of nature based solutions the benefits that can be delivered are far wider than just the phosphorus management but some of these benefits can take longer to be fully delivered as the solutions need to mature. Delivery early through the Green Recovery would assist in delivering interventions and therefore realising these benefits sooner for customer.
- 9.5.2. Aligning interventions with partners offers great efficiency gains but can be very difficult not only do the desired outcomes need to align but also the timeframes for delivery. Opportunities exist now to align our investments with those of partners such as Greater Manchester being one of the trial sites for a local nature recovery strategy, a project we are actively involved with, and there are opportunities now to align our activity with that of Greater Manchester. The Green Recovery will allow us to take advantage of these opportunities and drive partnerships to help target nature recovery as well as the other objectives we are working towards.
- 9.5.3. As discussed in previous sections the challenge we face in the Eden is not one we are attempting to fully resolve through our Green Recovery proposals. We are keen to deliver a multi AMP strategy that

will begin to deliver now, achieving multiple benefits for customer early and allow better information to be captured to feed into our next AMP planning, this will ensure that we are delivering in the most efficient way moving forward. This is also a benefit of delivery in the Irwell. As we have covered there is a significant challenge with urban diffuse pollution and identifying how we can tackle this using a catchment based approach will identify alternative options for delivery and help to establish costs and benefits to inform future planning for United Utilities and across the industry.

- 9.5.4. Delivering through catchment interventions is also particularly relevant at the current time when there has been a significant economic impact caused by Covid-19 and there is great uncertainty in the sustainability of farming due to our exit from the European Union and the change to how farm subsidies will work. At this time there is great value in investing in the rural economies to support farms to deliver infrastructure improvements to help their businesses become more sustainable both environmentally but also economically and funding added here will cascade down the supply chain helping to support the local businesses and drive an economic recovery.

## 9.6. Sustainable Drainage Solutions and Natural Flood Management

- 9.6.1. The climate is changing around us, with increasing levels of rainfall adding extra water into systems that are already squeezed and altered through development and land adaptation. By the 2050's, annual losses from flooding in England are expected to increase by between 25% and 80% depending on global warming increases of 2°C or 4°C as shown in Figure 20<sup>37</sup>. Buy-in to SuDS installation is often undermined by a lack of practical evidence and monitoring of implemented SuDS<sup>38</sup> so helping to build this evidence base now is key to increase delivery in the long term.
- 9.6.2. To be ready for the challenges that 2030 and even 2050 will present customers we need to take action now to provide an increased resilience to climate change and population growth. We need to increase our understanding of Sustainable Drainage Solutions so they can become a more mainstream solution nationally and we can establish effective working partnerships to ensure customers are protected from the full cost impact of meeting these challenges. This requires a proactive approach using the spectrum of stakeholders involved, from community groups to developers, who all help shape the catchment. These measures need to meet the blue green challenges set by bodies such as Greater Manchester Combined Authority in their 2040 Infrastructure Delivery Plan. This means learning how we can retrofit sustainable drainage, as opposed to reactively building large storage tanks, in partnership. Starting this action now is key to ensuring that resilience is delivered in time and customers are protected from the impacts of these challenges.
- 9.6.3. Figure 20 below shows how the changing climate will increase property flood risk across the UK. The increases in the frequency and intensity of rainfall will have a direct impact upon combined sewers which make up a high percentage of the North West's drainage network. This will inherently increase risk, reflected in our modelling studies done for our Drainage and Wastewater Management Plans (DWMP). Taking action early to mitigate climate change through things like carbon capture and peatland restoration will be key but will not fully address this situation. Adapting to this changing climate will also be key and SuDS offers a sustainable way to do this. We need to take action now however to ensure the environment is ready to meet these expected challenges.

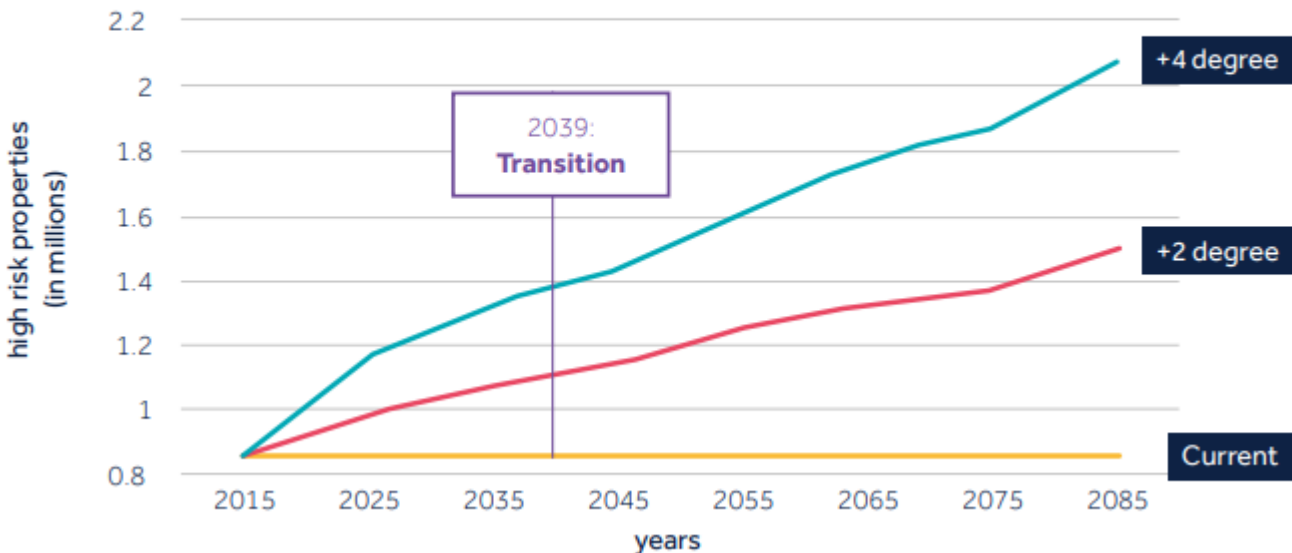
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<sup>37</sup> FloodRe, 2020; <https://www.floodre.co.uk/wp-content/uploads/Flood-Re-Annual-Report-2020-FINAL.pdf>

<sup>38</sup> Cotterill, Sarah and Bracken, Louise J. (2020) 'Assessing the effectiveness of Sustainable Drainage Systems (SuDS) : interventions, impacts and challenges.', *Water.*, 12 (11). p. 3160. <https://dro.dur.ac.uk/32161/1/32161.pdf>

Figure 20 - Projected properties at flood risk across England in response to a changing climate<sup>39</sup>

## Projected number of UK properties at high-risk of flooding (with a 1 in 75 or greater annual probability of flooding) by climate change scenario



- 9.6.4. We are aware that these changes in climate will occur, and by them occurring we will see adverse impacts on communities. The aim of this proposal is to allow a mechanism whereby we are able to provide resilient catchments sooner, evidenced through the multiple benefits of the natural capital of the intervention. Under current approaches, we have not previously assessed these benefits and as a result opportunities to deliver sustainable drainage solutions that would deliver flood risk reduction as well as broader natural capital benefit have been missed.
- 9.6.5. Testing our approaches and methods ahead of AMP8 will be vital in supporting and informing the development of these plans to ensure they are as efficient and effective as possible for customers. By then using our Dynamic Network Management capabilities and Integrated Drainage Areas Study outputs, we will use a combination of existing systems and monitors and data from the newly installed monitors across the network, to identify network performance trends and operational parameters for incidents, known as the network signature and an improved understanding of how SuDS can be used to address these challenges will be key.
- 9.6.6. We are already working with UK Water Industry Research on Big Question 6 “How do we achieve zero uncontrolled discharges from sewers by 2050”. This has a strong synergy with SuDS as their installation and their multiple benefits can help drive levels of understanding in how they can be implemented to meet these challenging targets<sup>40</sup>.
- 9.6.7. We are integrating our new understanding of rain gauge analysis, carried out across the catchments of the North West, with monitoring data from the network where we have higher risk. Using this predicted view of rainfall allows us to gain a real time view of current performance and build our ability to predict problems before they occur. This data will also be key in understanding the benefits of SuDS on wastewater network infrastructure.

<sup>39</sup> FloodRe, 2020; <https://www.floodre.co.uk/wp-content/uploads/Flood-Re-Annual-Report-2020-FINAL.pdf>

<sup>40</sup> UKWIR 2020; <https://ukwir.org/How-do-we-achieve-zero-uncontrolled-discharges-from-sewers-by-2050>

- 9.6.8. We are currently supporting Birmingham University with two PhD's focusing on water and future urban design and how to make cities resilient to the needs of today but also future proofed against the needs and challenges of tomorrow. SuDS will be a key tool in this and by developing case studies now, we will be able to use these in building our understanding to help shape planning guidance and lead in the challenge to effectively drain existing catchments better and accommodate the flow from new sources.
- 9.6.9. These projects will create and maintain jobs for businesses that deal with blue green infrastructure, as well as acting to maintain the existing contracts that United Utilities hold through its supply chain for standard items of work.
- 9.6.10. United Utilities also offers wholesale tariff incentives for Non-Household customers to implement SuDS on their premises to help drive greater uptake of SuDS and encourage retro fitting. These incentives can lead to a significant reduction in area applicable to their site area based surface water drainage charges.
- 9.6.11. By leveraging the opportunity the Green Recovery presents, it allows us to align closely with other Lead Local Flood Authorities in their submissions for Environment Agency Innovative Resilience bids. This provides a platform of shared understanding that has been developed collaboratively which enables each other to leverage partnership funding, and increase the robustness of the expression of interest. Further information can be found in section 7 "Evidence of Efficient Delivery".
- 9.6.12. In addition, acceleration will mean that the bid will be able to have interface with the Environment Agency's £5.2 billion Flood and Coastal Erosion Risk Management funding pot. This opportunity will mean that interventions can be made alongside existing bids made by the Environment Agency and local authorities for this funding to reduce flood risk.
- 9.6.13. The opportunity that this provides is for extra resilience to be delivered to customers now, providing multiple socio-economic benefits proactively. This will also provide valuable evidence and experience to support the delivery of an efficient and effective AMP8 plan to reduce flooding and increase water quality and neighbourhood amenity in partnership.

## 9.7. Invasive non-native species management

- 9.7.1. As outlined in earlier sections one of the key challenges with invasive species in the Irwell is the ease with which they can propagate. Looking at giant hogweed alone a single plant can produce 20-50,000 viable seeds each year, meaning over the course of the next 4 years 80-200,000 additional seeds will have been released per plant and this leads to an exponential rise in numbers. The location of these plants on the river also helps to spread this seed far further than air transport could manage alone and, as the seeds can remain viable in soil for up to 7 years, the longer this problem is not tackled the greater it becomes. Intervening early therefore represents an opportunity to start removing these plants from the river corridor and therefore remove their opportunity to spread further reducing the cost of removal and control in the future.
- 9.7.2. The current timing is also opportune as Greater Manchester is currently one of the trial locations for a local nature recovery strategy supported by Natural England. With a focus on connecting and restoring habitats, the work associated with this will be well aligned to invasive species removal. This will help in coordinating activity and securing partnership funding which may not be available at other times meaning we will be able to achieve greater results with the same customer funding.
- 9.7.3. The economic challenges posed by Covid-19 have also been significant in Greater Manchester, with it being under some of the strictest local restrictions for much of the pandemic. The opportunity to

deliver investment in this area would therefore provide a good boost and help support people to re-train in environmental management. The proposals we are putting forward would result in direct employment in UU or our partners of 3 full time equivalents but would also create training opportunities in invasive species monitoring for in excess of 40 citizen scientists as well as investing a significant amount in the training of 10 paid staff in the partnership to treat and remove the invasive species.

## 10. Sources of funding

### 10.1. Third party funding or other support

#### Introduction

- 10.1.1. When assessing the challenges that our strategic catchments face we have looked through not only a United Utilities lens but also tried to align the challenges that we face with those of other stakeholders in the catchment. This approach allows us to deliver in partnership and leverage additional funding from other sources.
- 10.1.2. We have a long history of investing in peatland restoration and catchment interventions for water quality and can evidence the significant partnership contributions that have been realised in the past and we would expect to be realised again. These ratio of partnership funding we have been able to achieve over the last 6 years is included in Table 25 below which shows a steady increase in partnership contributions. As part of this we have also recently delivered catchment phosphorus management interventions which allowed us to identify and deliver interventions in an aligned way with Nestlé which leveraged additional funding for water quality outcomes in the catchment resulting in greater delivery than we could have achieved alone.

Table 25 - History of partnership and leveraged funding<sup>41</sup>

Business Commitment	Measure	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Invest in community partnerships for mutual benefit with particular focus on current social issues	Partnership Leverage (ratio of UU spend to Partnership funding leveraged)	1:2.5	1:4	1:4	1:4	1:5	1:6.9

- 10.1.3. Whilst it is hard to secure partnership funding without firm commitments of our contributions for the activities we are seeking to progress under the Green Recovery, we would look to utilise these same approaches and expect to be able to leverage 3rd party funding in the same way. Through the development of these proposals we have worked with over 30 partner organisations and already confirmed funding of c£1m is available and directly linked to our delivery. In addition to this we have also identified c£33m of potential funding opportunities that we believe we can target to leverage support delivery. In some cases, as in peatland restoration, this reduces the cost that we are passing to customers and our submission reflects the additional support we are expecting to achieve, and in other as in the work done with Nestlé this has allowed additional benefits to be delivered to customers at no extra cost. The funding we could deliver would be used by catchment partnerships as match funding allowing them to access pots that we would not be able to. They will also be able to

<sup>41</sup> <https://www.unitedutilities.com/corporate/responsibility/communities/community-performance/>



access other government sources such as countryside stewardship and have the relationships with land owners to support people to make proposals to these and align them with our delivery.

- 10.1.4. Whilst the specific demands in catchments are varied so the same commercial organisations will not have interests in different catchments necessarily, the LENs approach has been one we have used successfully in the Eden and we would look to repeat this and spread it further to see how we may be able to align our delivery with other commercial organisations and leverage further funding as we did in the Petteril.
- 10.1.5. There are also other funding streams which are currently available that partners are already bidding to access such as the EA Resilience fund. Local authorities in Greater Manchester, Lancashire and Cumbria are developing proposals for this and we have been working with them to align this activity to the work we are looking to do using SuDS and NFM to ensure additional resources can be realised and aligned. We have worked closely with other flood risk agencies in the past and there is great opportunity to do more of this through the Green Recovery.

## Structure of this section

- 10.1.6. Through this section we demonstrate the types of funding that we believe can be leveraged based on our history in delivering these types of interventions and our experience of what has been achieved in the past. Work has been undertaken to identify and secure partnership funding and this will be highlighted where it is already confirmed or bids have been submitted. We highlight where partnerships have targeted funding sources and what they believe will be realised through these routes. A lot of the routes the partnerships will apply through for funding require match to access additional money so United Utilities contribution will open up access to further funding that could not be realised without our involvement.
- 10.1.7. Through completing this activity and collecting the evidence of what partnership funding can deliver we will be able to improve our cost models for catchment interventions and develop a better understanding of what can be achieved both in terms of delivery and leveraged funding. This will allow us to better predict future spend and delivery and drive long-term efficiencies for customers. This will be particularly relevant for interventions that have not really been delivered in this way in the past such as invasive non-native species management.
- 10.1.8. Tables 26 and 27 below demonstrate where additional funds have been secured or identified sources that we would target with partners. Table 26 shows the proposals where partner contributions are required to meet the objectives we have set and where these funds are reducing the amount we are asking customers to fund. Table 27 shows the proposals where the objectives set out in this proposal can be met by customer funded investment alone but we will target leveraging additional partnership funding to increase delivery and achieve greater benefits for customers.

# Accelerating partnerships to deliver natural solutions

## Overview of potential funding sources

Table 26 - Potential Sources of Third Party funding reducing customer spend

Catchment	Intervention	Objective	Green Recovery funding proposed (£000 in outturn prices)	Partnership funding required (£000)	Potential partners (confirmed sources in bold)
Eden	Peatland restoration	500Ha of peatland restored	500	500	<b>£420k Cumbria Wildlife Trust (hosts of the Cumbria Peat Partnership)</b>
Fylde Coast	Peatland restoration	500Ha of peatland restored	500	500	Forest of Bowland AONB
	Catchment water quality management	Engage with 300 farms Develop 100 farm plans Deliver 40 interventions	800	800	Lune Rivers Trust Wyre Rivers Trust
Greater Manchester	Invasive species management	20km of river cleared of invasive species 60,500m2 of UU land cleared of invasive species	500	140 (minimum required but further funding is being sought to deliver additional outcomes)	<b>c£1.8m Green Recovery challenge fund (potential to leverage some funding across multiple drivers across Greater Manchester)</b> <b>£240k EA annual maintenance over 3 years</b> <b>£40k Local Authority Funding</b> <b>£20k Salford and Bury funding through MRT</b> <b>£20k Funding from Forestry England through MRT</b> £20k Water environment improvement fund £50k Green Recovery Challenge Fund £19.5k Kickstarter fund Heritage lottery fund Greater Manchester Environment Fund Land owner payment Biodiversity Net Gain
Peatland	Peatland restoration	1500Ha of peatland restored	1,500	1,500	<b>£1m Countryside stewardship funding for Goyt Valley</b> <b>£250k RSPB Green Recovery challenge funding for Dovestone</b> Moors for the Future

# Accelerating partnerships to deliver natural solutions

Table 27 - Potential to influence external funding to increase the benefits delivered

Catchment	Intervention	Objective	Green Recovery funding proposed (£000 in outturn prices)	Potential partners (confirmed sources in bold)
Eden	Catchment phosphorus management	1,000kg/year of phosphate removed from the catchment	1,200	<del>[X]</del> Nestlé £100k LENS (application to IRF joint with GM) Catchment partnerships (access to sources such as ELMs or countryside stewardship)
	SuDS and NFM	Deliver SuDS solutions in line with methodology	2,000	<b>£15k – Shap Beck Flood Alleviation Scheme – Levy Funded</b> <b>£50k – Quick Wins – Levy Funded</b> £6m - Cumbria County Council – Bid Total TBC Environment Agency The Rivers Trust
Fylde Coast	SuDS and NFM	Deliver SuDS solutions in line with methodology	4,000	<b>£50k – Quick Wins – Levy Funded</b> <b>£100k – Thornton Cleveleys SWMP – Levy Funded Study</b> £11m – Lancashire Strategic Partnership EA Innovative Resilience – Bid Total TBC (incl. Blackpool, Lancashire & Blackburn LLFA, Wyre / Ribble / Lune Rivers Trust) Environment Agency Lune, Wyre & Ribble Rivers Trust
Greater Manchester	Catchment phosphorus management	1,050kg/year of agricultural phosphorus removed from the catchment 65kg/year of urban phosphorus removed from the catchment	2,000	£100k - LENS (application to IRF joint with Eden) Other commercial interests (seek to identify other demand interests the LENS as with Nestle in the Eden) Catchment partnerships (access to sources such as ELMs or countryside stewardship) Highways England (partners can help access joint delivery)

# Accelerating partnerships to deliver natural solutions

	SuDS and NFM	Deliver SuDS solutions in line with methodology	4,000	<p><b>£50k – Quick Wins – Levy Funded</b>  <b>£500k - Dean Brook Culvert, Bolton – Levy Funded</b>  <b>£204k - River Irwell, Kearsley – Levy Funded</b> Greater                  £8m – GMCA &amp; Rochdale EA Innovative Resilience – Bid TBC                  The Rivers Trust                  Environment Agency                  IGNITION Project &amp; Finance Earth to leverage private funding.                  Groundwork – Community and catchment links.</p>
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## Catchment Phosphorus

- 10.1.9. As discussed in section 6 “Evidence of Optimised Option” and section 7 “Evidence of Efficient Delivery” our work in the Petteril has shown us what the potential is to engage other partners and deliver greater benefit. The costs we are predicting are based on the delivery requirements in the catchment to meet the Habitats Directive in an efficient way. There is also potential to deliver enhanced benefits to customers through partnership. As discussed earlier Nestlé have identified significant additional funding in this catchment as part of their environmental work and through our investments we will be in a position to influence this. We are keen to develop this concept further through partnerships in the Irwell as well. To help facilitate this we are working with LENSs to secure 3rd party funding to establish a permanent LENSs network which will continue to deliver value in the future.

## Peatland restoration

- 10.1.10. To deliver our aspirations in peatland restoration, partnership funding will be crucial to achieve the challenging targets we have set. As demonstrated in Table 26 we have a history of successfully leveraging partnership funding which gives us confidence we will be able to achieve similar ratios for the delivering of these activities. Potential sources of partnership funding are identified in Table 27 but we also have several partnership funds that are already confirmed.
- 10.1.11. Funding has been secured from the Green Recovery Challenge Fund for the Cumbria Peat Partnership (hosted by Cumbria Wildlife Trust) for 4 peatland officers to support the delivery of UU’s peatland restoration at Haweswater, amongst other projects including UU’s Thirlmere Resilience project. This helps to cover project management costs and overheads that would have otherwise been covered by customers.
- 10.1.12. Further Green Recovery Challenge Fund funding has been secured by the RSPB at Haweswater to develop and extend the tree nursery to grow hardy upland species suitable for planting on UU land. Through the AMP7 WINEP scheme UU are funding £130k which will complement the Green Recovery Challenge Fund funding of £250k.
- 10.1.13. Green Recovery Challenge Fund grants have also been secured in Longdendale by the RSPB at Dovestone as part of the wider Greater Manchester project which received £1,799,108 to deliver 537 hectares of habitat restoration that will benefit 2,758 hectares of connected landscapes, connecting more people to nature.
- 10.1.14. Defra’s Countryside Stewardship Scheme has also confirmed funding of £1 million for peatland restoration in the Goyt Valley which will address some of the challenges identified by a Natural England scoping survey.

## Sustainable Drainage Solutions and Natural Flood Management

- 10.1.15. To make SuDS an economically sustainable delivery solution we have demonstrated the need to consider the wider benefits that they provide to customers through section 6 “Evidence of Optimised Option”. These additional benefits attract other organisations to contribute to the delivery of these solutions and aligning the interests of all of these stakeholders is key to drive down the cost to customers and enhance the benefits they receive. In some situations the benefits will be so great United Utilities can complete this work on our own and it will still represent good customer value but in order to drive efficiency and maximise delivery for customers we will always be seeking to align investment made through the Green Recovery with other parties and funders.

10.1.16. As part of the development of this work we have aligned our activities with the relevant Lead Local Flood Authorities (LLFAs) proposals to the Environment Agency’s Innovative Resilience Fund<sup>42</sup> to ensure that our activity will be complementary, and all areas have significant potential overlap. Cumbria County Council, Lancashire County Council combined with Blackpool Unitary Authority and the Greater Manchester Local Authorities together through Greater Manchester Combined Authority have all confirmed that our proposals are aligned and there is good potential to deliver joint projects that will drive efficiency for customers from both sides.

10.1.17. The key principles that will guide projects to generate mutual benefit are that they should:

- Achieve practical changes which increase resilience within the project area by reducing the likelihood or consequences of flooding or coastal erosion.
- Provide public benefits.
- Be consistent with existing flood and coastal erosion plans
- Demonstrate added value – for example, they must:
  - go beyond other local resilience work programmes and other funding mechanisms
  - work with actions funded by other routes
  - See the list of potential project partners and other relevant funding.
- Demonstrate innovation

Table 28 - The key areas of synergy between EA Innovation Resilience bids and Green Recovery SuDS and NFM interventions.

LLFA	Project	Benefit	Collaboration
<b>GMCA (Manchester, Salford, Bolton, Rochdale, Oldham)</b>	Drainage catchment / neighbourhood Integrated Water Management Plans	A nature based/multi benefit focussed set of complementary integrated water management approaches to manage surface/drainage incapacity and wider residual risk in GM	£4m Stockport £1m Bolton
	Retrofitting Integrated Water Management pilots		£2m Manchester £2m Salford
	Residual risk management and people / property scale		£1m Rochdale
<b>Lancashire County Council and Blackpool Unitary Authority</b>	Lancashire wide resilience programme targeting nature based solutions delivering multiple benefits in the long term	Potential to target joint investment to increase community resilience to flooding and provide climate change adaptation with a stated focus on aligning to WFD and other environmental benefits and supporting agriculture	Overlap of target areas but specific opportunities are still being identified

<sup>42</sup> <https://www.gov.uk/guidance/flood-and-coastal-resilience-innovation-programme#programme-aims>

LLFA	Project	Benefit	Collaboration
Cumbria County Council	Cumbria wide resilience program with targeted schemes in the Eden catchment at Appleby and Stockdalewath	Potential to target joint investment to increase community resilience to flooding and provide climate change adaptation	Overlap of target areas but specific opportunities are still being identified

- 10.1.18. As shown in section 5 “Evidence of Need”, flooding is a major challenge for customers and one which is predicted to grow in future years with the impact of climate change. This is not a challenge that United Utilities faces in isolation though as there are numerous mechanisms that cause flooding for customers and whilst we are a key organisation in tackling these, other stakeholders have an important role to play as well. By working effectively with these organisations we can manage water more efficiently and jointly tackle multiple sources of flooding which will ensure customers get the outcomes they value but that the cost burden is shared between all stakeholders and not just water customers.
- 10.1.19. As part of their role to manage main rivers and fluvial flooding it was announced in July that the government had released £5.2billion to address flooding nationally over the next 6 year investment period running from 2021 to 2027. This is double what was allocated at the start of the last spending review in 2015 of £2.6 billion. The aim of this funding is for the Environment Agency and local authorities to bid for grants to reduce flood risk. We already have strong relationships with other flood risk authorities and will use these, where opportunities interventions are identified, to align interest through these bids. We will be able to map out where these schemes are and leverage funding to add efficiencies to projects.
- 10.1.20. In addition to these funding streams, there is also locally raised funding that is approved through the RFCC in the form of Local Levy funding. Other funding options such as Local Enterprise Partnerships, landowners and developers will also be explored on a case by case basis.

## Invasive Species Management

- 10.1.21. We have worked with the catchment partnership to develop a coordinated plan that will deliver the sustained improvement in the catchment that is required. This will achieve key objectives of significantly reducing invasive species from the upstream catchment for a major part of the Irwell. United Utilities is proposing to support the catchment partnership in delivery of its plan as well as eradicating invasive species from our land to a total value of £500k. The Partnership has identified other funding sources that they are approaching to bridge the gap and attempting to secure further funding to deliver more, these sources are included in Table 26. By delivering this work across the catchment we will eradicate invasive species from a large area and reduce the ongoing spread. This will contribute to the reduction in the annual spend we are currently incurring in the catchment but moreover will deliver significant catchment benefits, allowing customers to access the river, native biodiversity to re-establish itself and improve catchment resilience.
- 10.1.22. As this is a new way of delivering invasive species management and we have not worked in catchment scale partnerships before the secured alternative funding is not available straight away however based on experience working with other partnerships to achieve other goals we believe that the proposed funding required by the partnership to deliver the objectives laid out in section 7 “Evidence of Efficient Delivery” is achievable and the UU funding will help to secure some of this additional support.

- 10.1.23. The work that is proposed under the Green Recovery will achieve a significant reduction and give us far better understanding of what additional funding can be achieved through partnerships and the results that can be delivered. This will allow us to plan how we can expand and improve this approach for AMP8 to complete the work needed in the Irwell to remove invasive species and also look at how this can be expanded to deliver efficiently in other priority areas.

## 10.2. Customer funding and bill impact

### Introduction

- 10.2.1. The activity that we are proposing to deliver has been assessed to ensure there is an environmental need as discussed in section 5 “Evidence of Need” and we have identified how we can deliver this in the most efficient way through section 6 “Evidence of Optimised Option” and section 7 “Evidence of Efficient Delivery”. In order to minimise the impact to customers’ bills we have looked to identify partnerships that can help us deliver and other funding sources to leverage to help deliver the key objectives of this plan and also deliver beyond these to achieve greater benefits for customers. There will however still be an impact on customer bills as a result of this work and through section 8 “Evidence of Customer Support” we have demonstrated that the activity proposed and the way we are looking to deliver is supported by customers.
- 10.2.2. The activity we are looking to bring forward is activity that would need to be delivered in AMP8 but through the Green Recovery we can bring this forward to deliver greater benefit to customers sooner and support the recovery of local economies.

### Structure of this section

- 10.2.3. Through this section we will demonstrate the overall impact on customers’ bills of delivering our objectives through natural solutions.

### Customer bill impact

- 10.2.4. Based on customer research that has been completed<sup>43</sup> we have found that 79% of customers support the proposals put forward. The support from customers remained strong when bill impacts were also considered. Based on the costs identified to deliver the required objectives as outlined through this document we have identified a customer bill impact of £1.30 and 63% of customers asked found this bill increase to be acceptable to deliver all of the natural solutions proposed through the Green Recovery.

## 10.3. Company contribution

### Introduction

- 10.3.1. As we have evolved our SCaMP approach to CaST we have continually looked for new opportunities where it would deliver efficient costs and greater benefits to customers to take a catchment approach. This has led to us using catchments to offset wastewater treatment discharges and reduce the required capital expenditure. Through this work we have looked to identify opportunities to expand and deliver greater benefits to customers.
- 10.3.2. Approaches such as tackling invasive species on a catchment basis through partnership have not been done before and require a lot of work to establish partnerships which are capable of delivering these activities. This is work which United Utilities have been undertaking for a long time by investing our

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<sup>43</sup> GR0010 Green Recovery Customer Research Report.



time and resources into catchment partnerships. Work such as the Natural Course partnership (where we are one of 5 members) has gone a long way to establishing strong CaBA groups in our region and we are keen to push these relationships further. Delivering through partnership does carry some risk but by fully supporting the partnerships to flourish we believe this risk can be managed and unlock significant additional benefits for customers whilst managing the cost impact to them.

- 10.3.3. This has been evidenced by the work we have done in the Eden where we are a founding member of the LENs partnership and have been supporting the development of this to establish a self-sustaining LENs network. This is instrumental in the delivery of functioning markets so fundamentally we believe the risk associated with supporting this will ultimately help us to deliver the work we need to in a far more efficient way and also help others to invest more in natural assets, driving greater benefits in the catchment for customers. This is being borne out by the savings we are seeing in the Petteril work in AMP7, as shown in section 7 “Evidence of Efficient Delivery”, further developing these approaches will drive further customer benefit in future years.
- 10.3.4. Over the past few years we have also invested significantly in trialling and developing nature based and catchment solutions. We have delivered the first catchment flexible permit on Cathwaite Beck in the Petteril and are close to delivering our second, taking into account the full remaining catchment. We are also in the process of investing over £1m in a green asset laboratory to trial and develop nature based solutions to give us and our regulators greater confidence in delivery and help us to deliver the benefits that these solutions can achieve to customers.
- 10.3.5. We have taken the lead in the North West in driving a natural capital approach to fully value the work we are doing both in terms of the value it provides United Utilities but also the further value that investment in natural assets can deliver to customers. Through this work we have commissioned and completed the first North West natural capital baseline to help us understand the current state of the environment we operate in and show how our and our partners activities have a positive effect on this. Whilst we have led this activity we have ensured that stakeholders are fully engaged in it as we recognise it is a key tool to help deliver aligned interventions and a consistent method of measuring these. The value of this tool is far greater if it is shared and used by all partners.
- 10.3.6. All of these activities are key enablers that help to drive efficient and effective long term partnerships and deliver better results for our customer for years to come.

## 11. Customer protection

### 11.1. Introduction

- 11.1.1. As discussed throughout this document our CaST approach is about delivering the right interventions in the right place with the right partners to deliver the core elements of what United Utilities needs to achieve in the most efficient way whilst also delivering additional benefit to customers, catchments and society. All of our interventions have been assessed with this in mind to ensure they represent the best cost benefit when considering all of the environmental and social benefits that they can deliver.
- 11.1.2. The work we are proposing to do has been assessed based on the experience we have developed through our long history of delivery in catchments to ensure it is deliverable. There are however risks and challenges associated with catchment delivery and working in partnerships where interventions are not entirely in our control. Through this section we will demonstrate how we will protect customers against non-delivery or where costs escalate as the right partnerships are not available.
- 11.1.3. Table 29 outlines the different mechanism we are proposing to protect customers.

Table 29 - Proposed customer protection mechanisms

Catchment	Intervention	Green Recovery funding proposed (£000 in outturn prices)	Unit cost of measure (only charge customers for units delivered)	Customer Protection			
				Only seek cost recovery in line with the delivery at the unit cost	Only provide funding when at least 80% of other partnership funding is secured (other partnership funding targeted in brackets)	Only deliver solutions that have met cost benefit analysis	Only deliver solutions that deliver a greater cost benefit ratio than traditional solutions
Eden	Catchment phosphorus management	2,000	£1,100/kg	X			
	SuDS and NFM	1,200	N/A			X	X
	Peatland restoration	500	£1,000/Ha	X	X (£500k)		
Fylde Coast	SuDS and NFM	4,000	N/A			X	X
	Peatland restoration	500	£1,000/Ha	X	X (£500k)		
	Catchment water quality management	800	£1,800 per farm engaged	X	X (£800k)		
Greater Manchester	Catchment phosphorus management	2,000	£1,100/kg rural £11,523/kg urban	X			
	SuDS and NFM	4,000	N/A			X	X
	Invasive species management	500	Broader catchment - £5,000/km UU Land - £6.60/m <sup>2</sup>	X	X (£140k)		
Peatland	Peatland restoration	1,500	£1,000/Ha	X	X (£1,500k)		

## 11.2. Structure of this section

- 11.2.1. This section will identify how customers will be protected through all of the different activities we are looking to deliver. We will break this down across the different solution types and how this protection will work.

## 11.3. Detail of customer protection measures

### Catchment Phosphorus

- 11.3.1. As evidenced in section 7 “Evidence of Efficient Delivery” our experience working in rural catchments suggests that a unit cost of phosphorus of £1,100/kg is reasonable and efficient. Through working with partners we believe that the specific challenges in urban areas mean that a cost of £23,046/kg is efficient, however to protect customers further we have applied a 50% reduction to this with the rest being made up by partner contributions. This gives a United Utilities unit cost of £11,523/kg and whilst this is more than for rural management it is worth emphasising that this is due to the more complex nature of urban catchments and the high cost of interventions there but also that these interventions will remove additional urban pollutants that are causing environmental damage but currently not being tackled and are of a high priority nationally.
- 11.3.2. In order to protect customers we will cap interventions delivered at these costs so whilst we will endeavour to deliver to the targets set out if there are insufficient interventions at an efficient cost we will not deliver and customers will not pay. Funding would be returned at a rate equal to the efficient unit cost of phosphorus for each kg of our target not delivered. Any interventions delivered will be over and above the required level of existing AMP7 commitments included in the Irwell Catchment Permit (Irwell) or the Petteril Flexible Permit (Eden).

### Sustainable Drainage Solutions and Natural Flood Management

- 11.3.3. To allow us to maximise opportunities to work in partnership we are proposing that customers will be protected by putting a restriction on interventions that can be delivered. Firstly we will put an overall cap on investment of £10m to protect customers from excessive bill increases. Secondly we will only progress schemes that are cost beneficial. Whilst in this document we have identified the split we currently anticipate between the strategic catchments we will approach this as a regional programme so that we can ensure only the highest value solutions are delivered across all of our target areas.
- 11.3.4. We will calculate the benefit to UU in line with methodology developed for AMP7 ODIs as agreed through PR19. We will calculate the added natural capital benefit using CIRIA’s BEST tool in line with the methodology developed for the “Enhancing natural capital value for customers” ODI as assured by Vivid Economics<sup>44</sup>.
- 11.3.5. We will apply three tests to our investment opportunities to determine whether they are suitable and applicable for the Green Recovery measure.

#### *Test 1 – Delivering Added Value*

- 11.3.6. The overall cost benefit ratio should be equal or greater than 1.0. The value of 1.0 has been set to ensure that all the investments made deliver at least equivalent benefit for customers but we have set this at the minimum level that customers get equivalent benefit to ensure we can maximise the number of solutions we can deliver. This is to increase our understanding of these solutions, driving

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<sup>44</sup> GR0002u Natural Capital ODI detailed methodology

down future costs and supporting future planning. This will provide additional benefit to customers in the long run. The equation used to calculate the cost benefit ratio is below:

$$\text{Cost Benefit Ratio} = \frac{\text{Benefit of value to UU (£) + Natural Capital Benefit (£)}}{\text{Engineered Level 1 Cost Of Scheme } \pm 30\% \text{ (£)}}$$

## Test 2 - Efficient Spending

- 11.3.7. With test 1 satisfied, the solution should only be delivered if the cost benefit ratio of the SuDS solution is greater than the conventional solution.

## Test 3 - Avoiding Overlap

- 11.3.8. Where test 1 and 2 are satisfied and the SuDS solution will impact upon ODIs, only the additional cost over and above that of the conventional solution will be funded through Green Recovery thereby ensuring there is no overlap with existing ODIs. This process is explained in more detail in section 6 "Evidence of Optimised Option".
- 11.3.9. By taking a partnership approach across catchments, we will actively identify opportunities for partnership working to make this funding go further and deliver greater customer benefit. This will deliver direct investment in sustainable drainage to achieve the water outcomes that are needed but also improve the natural capital customers benefit from. The learning from this work will also develop our systems, tools and processes to inform future planning and provide additional benefits to customer in the long term.
- 11.3.10. There are three key considerations in our proposals to protect customers further which are identified below:
- (a) *Consideration 1* - SuDS for WINEP schemes are eligible for outperformance payments through the natural capital ODI and therefore we will not seek to fund these through the Green Recovery.
  - (b) *Consideration 2* - Customers will only pay for the actual cost of the scheme or the marginal cost difference between the conventional and sustainable solution.
  - (c) *Consideration 3* - Future flood risk may be used in B£ST benefit calculations and will be profiled from when the risk is forecast to materialise. This will ensure our assessment adequately reflects that that some of the benefits of the scheme will be deferred as the risk hasn't yet manifested itself.

## Invasive non-native species

- 11.3.11. For this intervention we have identified an efficient unit cost to eradicate invasive species in the catchment and on our own land and we would not deliver activity above this unit cost. Whilst we believe this level is efficient and achievable if we were unable to meet that cost we would not deliver solutions and there would be no cost incurred to customers. Funding would be returned at a rate equivalent to the unit cost for the interventions not delivered. As partnership funding is key to be able to achieve these objectives we would not fund any activities through the partnership unless at least 80% of the required partner contributions had already been secured. 80% has been set to ensure that we can achieve the targets established at an efficient cost to customers but to also maximise delivery. As we are seeking to achieve significant partner contributions we would not want to hold back delivery and miss potential customer benefit if the majority of this contribution is achieved.

## Peatland restoration

- 11.3.12. Our cost assumptions have been validated by comparison with historic costs as well as assurance provided by partner organisations using actual project costs and quotes from suppliers. This means that we can be confident that customers will be protected against non-delivery. The exercise has also shown that there is an opportunity to deliver more than expected with the same funding. At a programme level we expect the cost per hectare to be £1,000 which includes the cost of restoration and overheads. However, partners have indicated that this is based on a range of costs depending on the accessibility of the site, the extent of the peatland damage and the land owner negotiations involved to bring about a restoration scheme. Therefore, the minimum restoration we will deliver is 2,500 hectares up to a maximum of 5,000 hectares, based on a lower unit cost of £550 per hectare.
- 11.3.13. If we deliver less than the minimum commitment the funding will be returned to customers at a rate of £1,000 per hectare, which represents the average unit cost across the programme.
- 11.3.14. As partnership funding is key to be able to achieve these objectives we would also protect customers by not funding any activities through the partnership unless at least 80% of the partner contributions required to meet our targets had already been secured. 80% has been set to ensure that we can achieve the targets established at an efficient cost to customers but to also maximise delivery. As we are seeking to achieve significant partner contributions we would not want to hold back delivery and miss potential customer benefit if the majority of this contribution is achieved.

## Water quality management

- 11.3.15. Through the employment of a project officer in each catchment; the River Lune and River Wyre, we will engage at a high level with 150 farmers in each catchment. From this number we will undertake face-to-face engagement with 50 farmers in each catchment, and more in-detail work with 20 farmers.
- 11.3.16. Due to the large area covered by the river catchments (Upper Wyre 10,817 hectares; River Lune 98,528 hectares), even accounting for the uncertainty in farmer participation, it is unlikely that the commitment on engagement will not be met. However, should we deliver less than the 300 farms we have committed to engage with as a minimum the funding will be returned to customers at a rate of £2,660 per farm missed, which represents the average cost of engagement across the programme.

## 12. Third party assurance or views

### 12.1. Introduction

- 12.1.1. In order to demonstrate that this is an appropriate approach we have reviewed all the proposed activities with our key environmental regulators and aligned our responses to key guidance such as the WISER to ensure these proposals represent good environmental outcomes which are worth investing in.
- 12.1.2. We have a history of working closely with catchment partnerships and we have used these relationships to develop our understanding of need in the catchments and the possible solutions. As a result the partnerships are fully engaged in the activity we have undertaken and brought into the proposals as is evidenced by the letters of support we have received which are included as appendices to our green recovery proposals<sup>45</sup>. These partnerships also include environmental regulators so they have been involved in the development of these proposals from the outset.
- 12.1.3. Through the process there are certain interventions where we felt further external assurance would be beneficial. So where applicable we may also have used specific additional assurance such as organisations like the Catchment Leadership Network to provide further confidence that the proposals represent value for money from our customers.

### 12.2. Structure of this section

- 12.2.1. In this section we will set out the assurance that has been used across this submission and the support that we have received from 3<sup>rd</sup> party organisations. Where we have sought out specific assurance for interventions or approaches we will also reference that activity.

### 12.3. Peatland restoration

- 12.3.1. Defra recognise the importance of peatland restoration for nature recovery and carbon sequestration. The publication of the England Peat strategy is imminent, which will set out the Government's priorities and funding mechanism.
- 12.3.2. The Environment Agency and Natural England recognise the importance of working with partners to address diffuse pollution as is clear in the principles of the Water Framework Directive.
- 12.3.3. The Drinking Water Inspectorate have shown support for these types of interventions in the past such as through their support of our PR19 submission for Thirlmere Resilience.
- 12.3.4. Letters of support have been received from several key organisations within our catchments, as outlined below.
  - Cumbria and Lancashire Wildlife Trusts (GR0002e)
  - Forest of Bowland Area of Outstanding Natural Beauty (GR0002g)
  - Moors for the Future Partnership (GR0002m)
  - Natural England (GR0002o)
  - Pennine Prospects (GR0002q)

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<sup>45</sup> GR0002c – GR0002t Letters of support.

- Royal Society for the Protection of Birds (GR0002s)
- Wyre, Ribble and Lune Rivers Trusts (GR0002t)

## 12.4. Catchment phosphorus

- 12.4.1. The core activities associated with catchment phosphorus management are aligned to WISER requirements and associated with key environmental deliverables which are regulated by the Environment Agency. As part of the development of these ideas we have engaged with the EA through the catchment partnerships and received a letter of support from the catchment coordinator for the Irwell for this activity.
- 12.4.2. To assure the efficiency of our proposal we have also sought feedback from the Catchment Leadership Network and Stormwater Shepherds on our unit cost for phosphorus removal to confirm that these are in line with industry norms where available or international best practice where not<sup>46</sup>.
- 12.4.3. Letters of support have been received from several key organisations within our catchments, as outlined below.
- City of Trees (GR0002d)
  - Environment Agency (GR0002f)
  - Greater Manchester Combined Authority (GR0002h)
  - Groundwork (GR0002i)
  - Irwell Catchment Partnership (GR0002j)
  - Lancashire Wildlife Trust (GR0002l)
  - Mersey and Ribble Rivers Trusts (GR0002n)
  - Natural England (GR0002o)
  - Nestlé (GR0002p)


## 12.5. Sustainable Drainage Solutions and Natural Flood Management

- 12.5.1. The Environment Agency and Water UK are both strongly supportive of the delivery of surface water separation and SuDS to address capacity and climate change challenges. This is reflected as a resilience strategy to mitigate flood risk in the Environment Agency's "National Flood and Coastal Erosion Risk Management Strategy for England".
- 12.5.2. Figure 21 below includes some public statements from various organisations in support of Sustainable Drainage Solutions.

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<sup>46</sup> GR0002v Catchment leadership Network confirmation of P costs; and GR0002b Stormwater Shepherds Reports on urban runoff

Figure 21- Supporting statements to using sustainable drainage to tackle flood risk through the delivery of natural solutions.




**CHALLENGE 6 & 7:**


- Provision of infrastructure that maintains and/or reduces flood risk across Greater Manchester whilst accommodating developmental growth and climate change
- Maximising the eco-system services provided by green and blue infrastructure, whilst responding to spatial pressures on finite space and improving accessibility

**Resilience Actions**

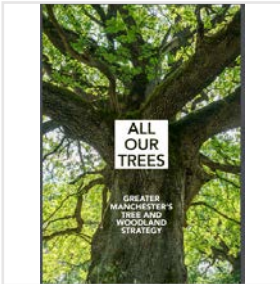
- Improve place making by designing places, buildings and infrastructure more effectively. Examples include retrofitting sustainable drainage systems in urban areas
- Green infrastructure and sustainable drainage systems can reduce surface water flooding while also helping biodiversity and access to green spaces for promoting wellbeing.



The National Infrastructure Commission has recommended that water companies and local authorities work together to build on their existing plans to take action on local flood risk including surface water, for example through investing further in sustainable drainage systems where this is possible.



Trees can help prevent surface water and sewer flooding, intercepting 1.6 million cubic metres of storm water runoff per year – this is equivalent to 35,000 road tankers.



12.5.3. Letters of support have been received from several key organisation in the catchment which are included below.

- Blackpool Council (GR00002c)
- City of Trees (GR0002d)
- Environment Agency (GR0002f)
- Nestlé (GR0002p)
- Greater Manchester Combined Authority (GR0002h)
- Groundwork (GR0002i)
- Irwell Catchment Partnership (GR0002j)



- Lancashire Wildlife Trust (GR0002l)
- Natural England (GR0002o)
- Mersey, Wyre and Ribble Rivers Trusts (GR0002t)

## 12.6. Invasive non-native species

- 12.6.1. We have developed these proposals in conjunction with the catchment partnership and which includes representation from the EA, local authorities and Natural England. We have engaged with these local resources to develop meaningful plans for the catchment that are aligned with wider stakeholders to allow for more efficient delivery.
- 12.6.2. These regulators have been supportive of the proposals put forward with the EA specifically commenting that it was pleased to see consideration for invasive species and the impact they can have on WFD status and also providing a letter of support from their catchment coordinator.
- 12.6.3. Letters of support have been received from several key organisation in the catchment which are included below.
  - City of Trees (GR0002d)
  - Environment Agency (GR0002f)
  - Greater Manchester Combined Authority (GR0002h)
  - Groundwork (GR0002i)
  - Irwell Catchment Partnership (GR0002j)
  - Lancashire Wildlife Trust (GR0002l)
  - Mersey and Ribble Rivers Trust (GR0002n)
  - Natural England (GR0002o)