



European Union
European Regional
Development Fund

Delivering improved flood protection, environmental
enhancements and improved community amenities in Kendal

2021



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FOREWORD – Keith Ashcroft, Area Director

Communities across Cumbria have repeatedly experienced the devastating effects flooding has on lives and livelihoods and I have seen first-hand the immediate and longer term impacts that flooding has for communities such as Kendal. Our changing climate is already giving us wetter winters and the risk of flooding is set to increase over time. We need to act now and plan for a future that makes the communities in the Kent catchment better protected and more resilient to climate change.

The Flood Risk Management Scheme will reduce the risk of flooding and improve the resilience of Kendal, Burneside, Staveley, and Ings. In developing the £76m scheme which will better protect 1,480 homes and 1,150 businesses from flooding, we considered over 60 design options. The investment in the Kent catchment will not only bring an improved level of flood protection but will see improvements to community spaces, key infrastructure and the environment. We will also plant more than 4000 trees, create 55 hectares of habitat, and improve 3km of riverside footpath for local communities.

Looking to the future, collectively we will need to do more across the Kent catchment that allows us to adapt further to our changing climate. This includes better catchment planning, protecting lives and livelihoods from flooding and enhancing the ability to recover quickly.

The Environment Agency cannot do this alone and we want to work with communities and a wide range of partners to deliver a better place and future for people in the Kendal and wider Cumbria area.

Keith



BACKGROUND

December 2019



Funding approved to deliver all three phases

This document provides an overview of the Phase One proposals for the Kendal Flood Risk Management Scheme, how they will be delivered, and what the community can expect during this time.

The Environment Agency started construction on the three phase Flood Risk Management Scheme which, when complete, will provide better flood protection to homes and business.

Kendal is the first phase of the scheme to be delivered with construction starting in 2021.

January 2020



Begun discharging Phase 1 planning conditions

Further phases of the scheme will deliver linear defences in Burneside, Staveley and Ings with additional flood storage and flow diversion in the upper River Kent catchment. These are also complemented by a series of Natural Flood Management (NFM) measures.

The construction of flood defences through Kendal will not only reduce the risk of flooding, but will create a lasting benefit for the community and environment.

Summer annually



Gravel management

Our plans for the whole scheme will result in an overall improved environment for wildlife, the local community, and visitors to the town.

Early 2021 - 2023



Phase 1 Construction



BACKGROUND - The Flood Risk Management Journey

Through a process of public consultation, engineering analysis, environmental assessment and economic appraisal, over 60 design options were tested against four criteria leaving a preferred set of options to take forward for phase one of the Kendal Flood Risk Management Scheme.

Over 60 options were scored on their feasibility.

Options included;

- Flood storage (22 sites)
- Linear defences
- Increase conveyance
- Removal of weirs
- Pumping
- Improved culverts
- Replacement of bridges
- Flow routing
- Increased gravel removal
- Property level protection
- Natural Flood Management

Each option was tested for;

- Technical suitability
- Environmental impact
- Economic viability
- Social acceptability

Five Underlying Themes:

Strengthening Defences



Upstream Management



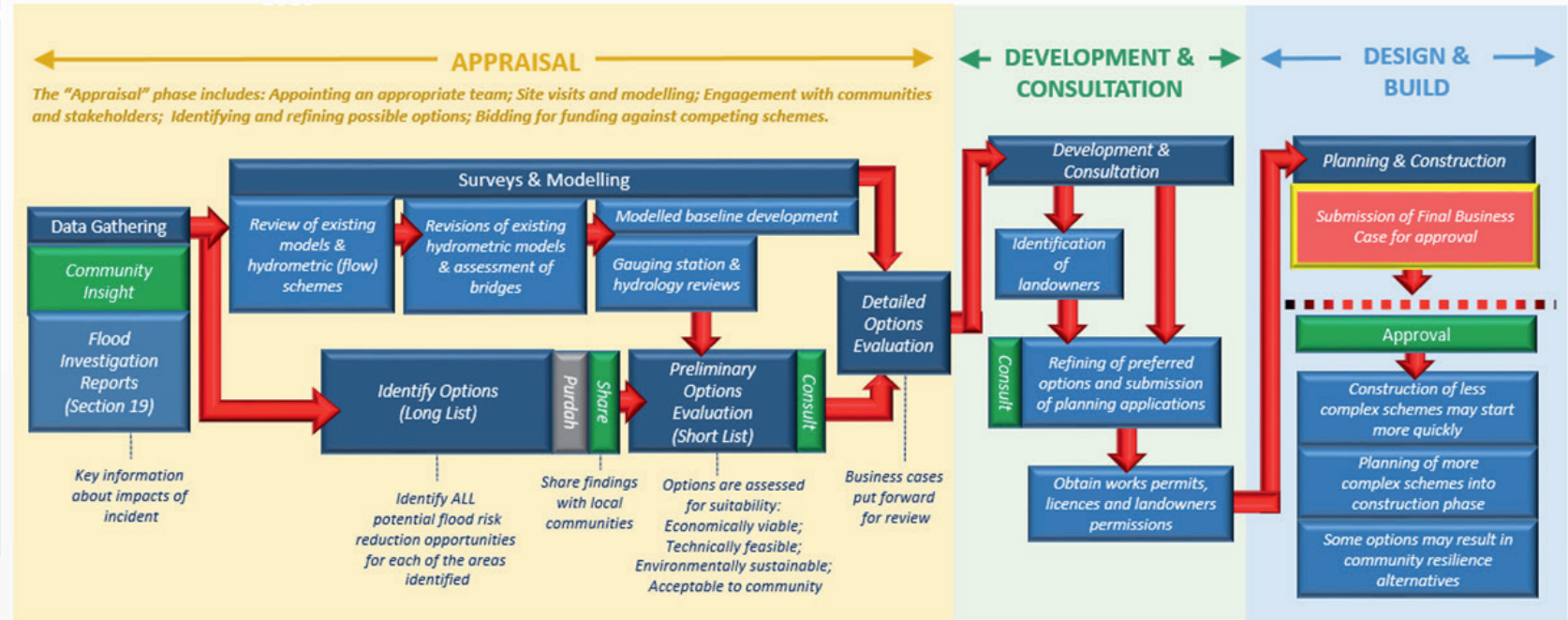
Maintenance



Resilience



Water Level Management



The Short list of options included; Flood storage, linear defences, a combination of linear defences & flood storage, pumping, flow routing, with complimentary property level protection and Natural Flood Management.

Short list options appraised in further detail using the four tests. A preferred option was then selected.

For Burneside, Staveley, Ings, and upstream storage measures we are currently at the 'Development & Consultation' stage.

BACKGROUND – Taking a catchment based approach

The Kendal Flood Risk Management Scheme will deliver improved flood risk management for the River Kent Catchment and is a combination of the following measures;

Kendal: Flood walls, earth embankments and pumping station.

Burneside, Staveley, and Ings: Flood walls, earth embankments and local flow routing.

Upper Catchment: Flood storage at Kentrigg and Kentmere Tarn, and a flow routing channel on Stock Beck.

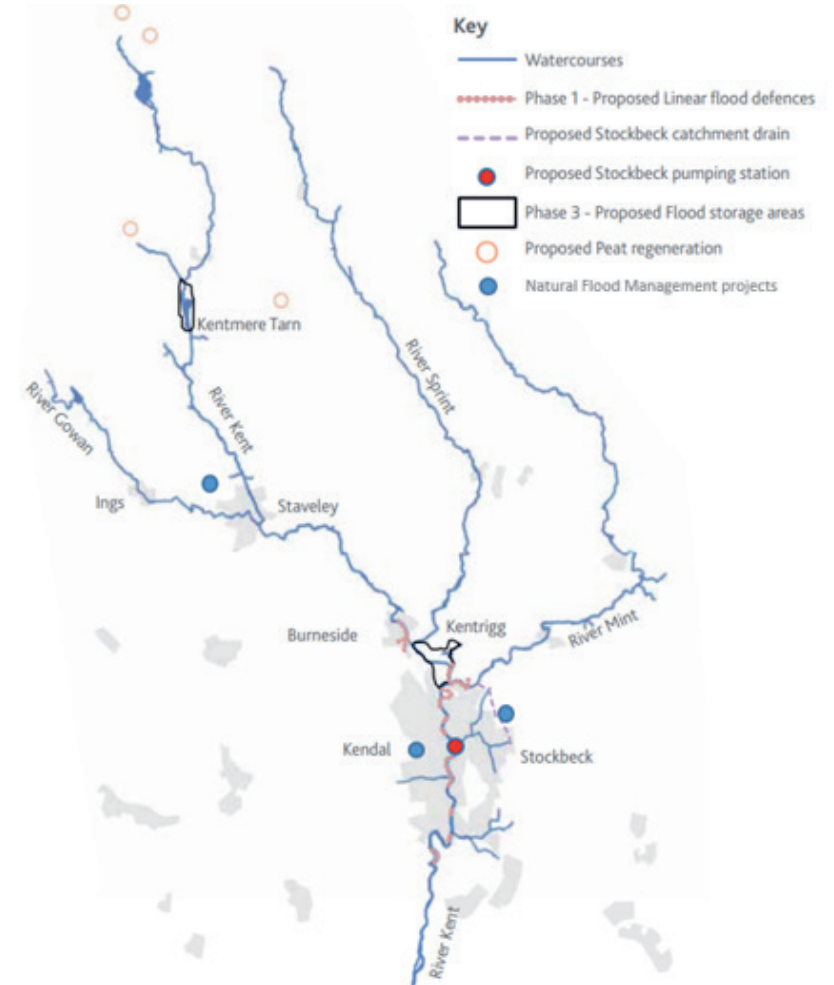
Working with others: Working with United Utilities, Cumbria County Council, and South Lakeland District Council to discuss sewer and surface water drainage risks, and to co-ordinate improvement works.

Complimentary measures: Natural Flood Management and Peatland restoration in the upper catchment.

Flood walls and embankments within communities will provide a localised level of protection that will provide homes and businesses with greater reassurances.

Upstream storage will provide the capacity required to temporarily hold water in extreme flood conditions. This will limit the river flows downstream creating greater capacity within the river system, and provide additional benefits to the surface water drainage system.

The 'whole catchment approach' will provide a 1 in 100 year standard of protection (reduce flood risk to a 1% chance in any given year)



NATURAL FLOOD MANAGEMENT (NFM) - Introduction

NFM forms part of our proposals for reducing flood risk and is complimentary to traditional engineered flood defences measures.

In a 1 in 100-year flood (1% chance of occurring in any one year), the volumes of flood water within the River Kent catchment are significant. Therefore Natural Flood Management options will not provide the level of flood protection needed without working together with more traditional flood defences.

The diagram demonstrates why our proposed £76m scheme (shown in blue) is our preferred option and some of the limitations of delivering only NFM as a stand-alone solution.

Number and type of interventions required to achieve the 3 million m ³ storage required or the 6 million m ³ storage required in place of storage and linear defences.						
Cost £millions	£13.3 - £14.6m	£76m	£45m	£90m	£90 - £112m	£180 - £225m
Investment required to achieve 1 in 100yr standard of protection or the equivalent of a 1% chance of flooding in any given year						
Flood storage capacity (million m ³)	6	Kendal 6km linear defences Stock Beck 2km catchment drain.				
	5	Stock Beck Pumping Station.				
	4	Burnside, Staveley & Ings 1km of linear defences.		Minimum 24,000 small dams required with each having the capacity to store maximum 250m ³ flood water.		48 million broadleaves planted 300km ² (30,000 hectares) land required.
	3	Kentmere Tarn storage volume = 1.2million m ³ , covering 0.5 km ² or 50 hectares of land Controls 10% of the catchment.		Build costs approx £12m plus replacement costs every 10 - 20 yrs = £90m.	24 million Broadleaves planted 150km ² (15,000 hectares) land required.	OR 54 million conifers planted 240 km ² (24,000 hectares) land required.
	2		Minimum of 12,000 small dams required with each having the capacity to store maximum 250m ³ flood water.		OR 27 million Conifers planted 120km ² (12,000 hectares) land required.	River Kent catchment upstream of Kendal = 184km ²
	1	Kentmere Reservoir controls only 5% of catchment and would require significant rebuild costs.	Kentrigg storage volume = 1.7million m ³ , covering 0.67 km ² or 67.6 hectares of land Controls 65% of the catchment.	Build costs approx £6m plus replacement costs every 10 - 20 yrs = £45m.	River Kent catchment upstream of Kendal = 184km ²	
	0.125	1 million trees planted after 10 yrs.				
Kentmere Reservoir & tree planting		Kent three phase Flood Risk Management Scheme	Small dams instead of upstream storage	small dams instead of upstream storage and linear defences	Tree planting instead of upstream storage	Tree planting instead of upstream storage and linear defences

← Intervention options →

* The costs of the NFM measures identified doesn't include land purchase, landowner negotiation costs or maintenance of the structures.

NATURAL FLOOD MANAGEMENT (NFM) in the Kent Catchment

We are supporting several NFM projects across the catchment and are working with other organisations and landowners to identify any new opportunities for more in the future. There are currently four projects underway to improve the local environment while holding water and slow the flow of the River Kent.

Peatland Restoration in the Upper Kent

Working with Cumbria Wildlife Trust as part of the Cumbria Peat Partnership, the Kendal Flood Risk Management Scheme has committed to delivering 50 hectares of Peatland restoration in the uplands of the Kent catchment. Peatlands are formed from bog moss called Sphagnum. Functioning bogs provide several benefits including;

- Storing carbon - The peat restored in this scheme could store 164 tons of carbon dioxide each year.
- Providing habitat for specialist species.
- Protection against flooding by slowing the flow.



Most of the blanket bog in the Lake District has been damaged. Restoring these peatlands by re-vegetating bare peat, blocking drainage channels and increasing the amount of Sphagnum in the uplands can have real flood alleviation benefits as sphagnum can hold up to 26 times its own weight in water.



Reston Scar, Staveley

Working with project lead South Cumbria Rivers Trust, a project has been delivered to 'test and trial' new techniques to reduce flood risk for rural communities whilst maintaining traditional farming practices. The project included the construction of:

- Several leaky timber structures
- Drainage works to store, divert and slow flows during storm events



NATURAL FLOOD MANAGEMENT (NFM) in the Kent Catchment

Town View Fields, Kendal

Working with project lead South Cumbria Rivers Trust, and the landowners South Lakeland District Council, this project will deliver an urban NFM project in the heart of Kendal.

The Town View Fields project site is being used to test how effective and viable NFM techniques are in urban areas to reduce peak flows during storms events. Some aspects of the project include:

- 90 meters of de-culverted watercourse
- A meandering stream running into two bunded wetland areas
- Creation of leaky dams and bunds using natural materials
- Planting of native tree species and wetland species

De-culverted watercourse



Kerplunk attenuation feature



Birds Park / Stock Beck

Working with project leads Cumbria Wildlife Trust, along with United Utilities and local landowners, this project aims to reduce the risk of flooding to the community of Kendal using more natural solutions. By creating a wetter environment and by planting a wide variety of trees, this project will also greatly improve the range of habitat on the land creating multiple benefits for the environment.

Together with the farming community, several options were identified to reduce the flow of water in the area including sub-soiling which improves water infiltration and soil quality, and re-routing flows away from known pressure areas.

The project on United Utilities owned land has their full support with much of the work being undertaken by Kendal Conservation Volunteers (KCV). This project has delivered the:

- Construction of large wood and earth bunds that slow down water in large storm events as well as the testing of other methods that can temporarily store water such as rebuilding drystone walls.
- Creation of swales that divert water to slow it before reaching the community downstream.
- Planting of 7,100 trees at Stock Beck, with over 500 more to be planted. The planting consists of a range of tree species but mainly of Sessile Oak and Hazel, along with many Rowan, Aspen, Hawthorn and Cherry. Crab Apple, Bird Cherry, Blackthorn and Goat Willow trees have been planted in the upper part of the reservoir.

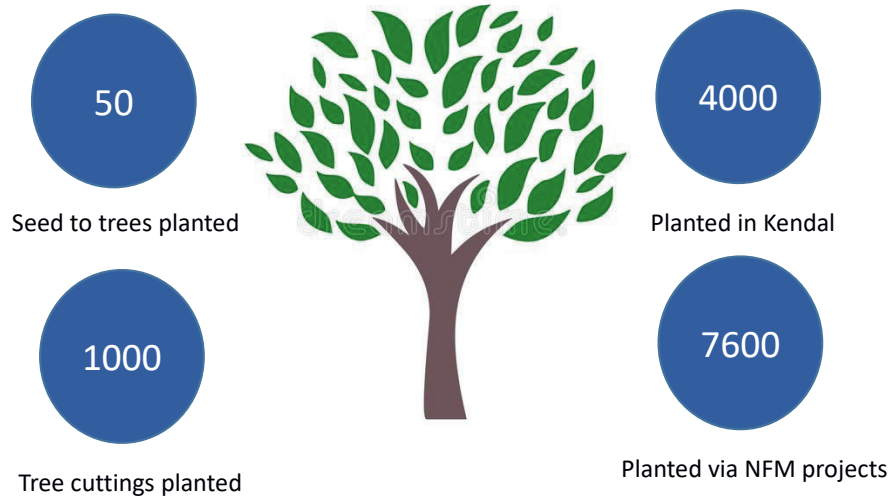


KEY FACTS - Delivering a Flood Risk Management Scheme for Kendal

When complete, the Kendal Flood Risk Management Scheme will deliver a series of catchment-wide flood risk, community, environment and economic benefits.

In Kendal we are creating better public access, enhancing the environment through landscaping and planting habitat rich species, preserving and replicating areas of local heritage importance. We will also integrate art, seating, sculptures and educational play in key areas throughout the town.

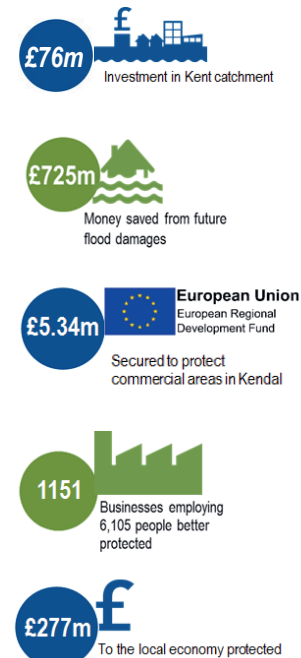
Catchment-wide tree planting target 15,000



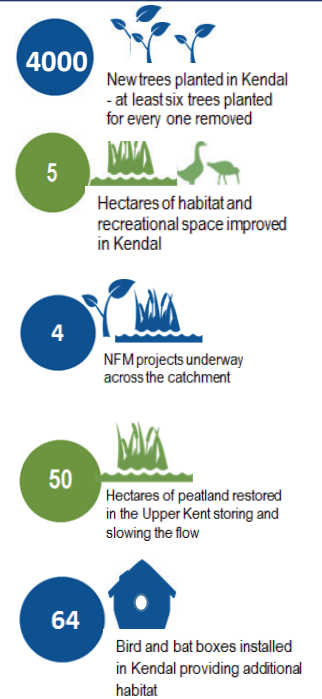
Providing flood protection and better community amenities



Providing economic stability and growth



Protecting and enhancing the local environment



WALL FINISHES - Kendal Flood Risk Management Scheme

The historic market town of Kendal has a blend of old and new buildings featuring a variety of styles and finishes. The design of the Flood Risk Management Scheme will be sympathetic to this history, and the Environment Agency is working hard to ensure that all flood walls are built and finished in a way that blends into the existing, varied, landscape.

There will be a number of finishes to the flood defence walls which have had planning permission granted.

Walls in the centre of Kendal will be made predominantly from re-using existing stone or natural stone cladding, sourced from a local quarry. However, in some of the outer areas of the town, imprinted concrete will be used which replicates natural stone, and in industrial areas where the walls will be much less visible, they will be finished in smooth concrete.

Around 6km of flood defences throughout Kendal will be built, with over half of these being set back from the riverside. Defences are set back from the river where possible as this helps to make more space for water, improves the river corridor environment and retains riverside access.

Natural Stone

The flood walls through the centre of Kendal will be natural stone clad, with over half of the flood defences being set back from the riverside to retain existing riverside access and views.



WALL FINISHES - Kendal Flood Risk Management Scheme



The flood defences will not be one continuous wall. They are designed to blend naturally into higher ground through the town and will be a combination of walls, embankments and sections of glass panels.

The glass panels are important in order to retain views of the river and key areas of interest. Glass panels will be installed at Gooseholme, Waterside, and Aynam Road.

Floodgates will be another key feature of the scheme as they enable the Environment Agency access to maintain the riversides. During high river levels, the floodgates will be closed so there is a continuous line of flood protection.

Railings and Handrails

Are a common feature throughout the town that defines the extent of public access and maintains public safety along the river's edge. Railings will be replaced in a number of locations and plan to use a single style that will provide consistency.



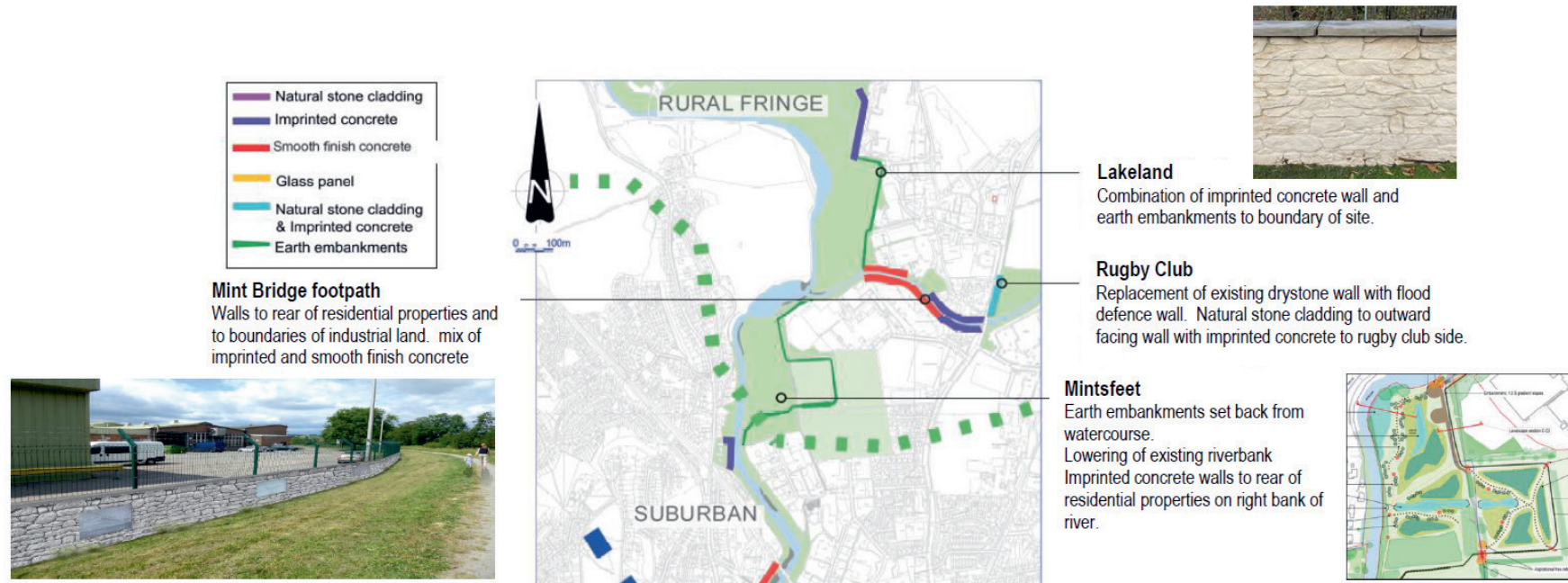
KEY DESIGN FEATURES – integrated into the northern fringe of the town

As part of the scheme, investment is being made into providing greater biodiversity benefits along the river corridor as well as improvements that the community and visitors to the area can enjoy.

The Environment Agency is integrating a number of key features into the scheme that enables important elements of the local heritage and the improved biodiversity along the river corridor.

Through engagement with local groups, schools, and local artists will support the development of artworks to be included into the final scheme design.

New walking trails and information boards will be installed to share local biodiversity improvements, heritage information and signposting to local areas of interest.

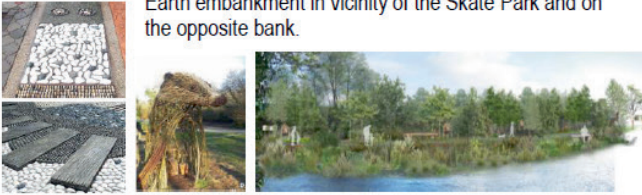


KEY DESIGN FEATURES – to be integrated into the town centre

The town centre is a conservation area. Conservation areas are designated for their special architectural or historic interest which are subject to extra planning controls meaning property alterations, demolition and the felling or pruning of trees may require additional permissions.

Beezon Fields

Lowering of existing riverbank within open land. Earth embankment in vicinity of the Skate Park and on the opposite bank.



New Road Common Land

Stone faced flood defence wall to tie into new footbridge access ramp. Floodgates to maintain public access through open space.



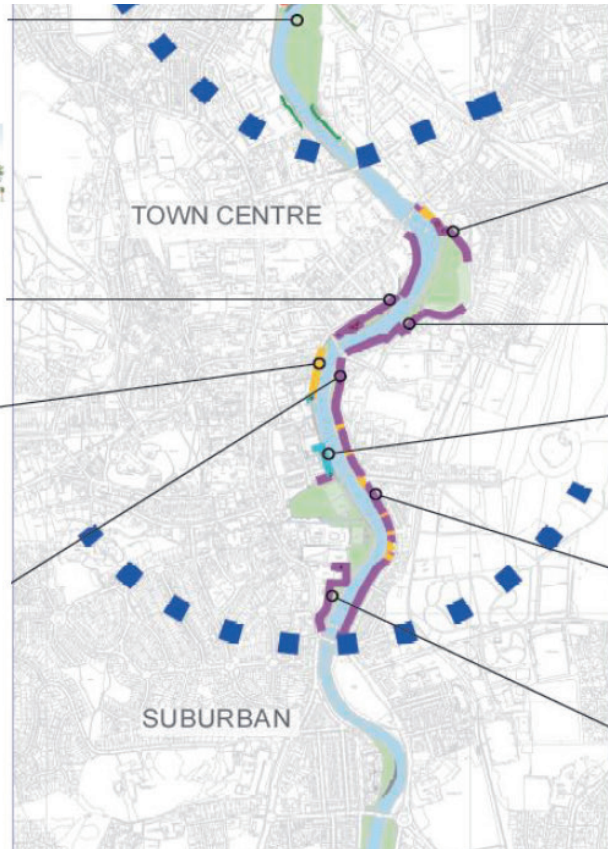
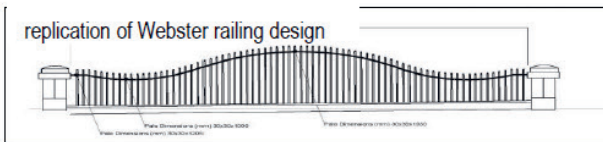
Waterside

Glass panels on low concrete upstand wall replacing riverside railings with floodgate at downstream end to maintain public access along riverside promenade.



Miller Field

Stone faced wall with floodgate access at downstream end.



Gooseholme Park

Stone faced flood defence wall with low sections topped by railing. Section of glass panel within Chantry Gardens. Floodgates providing access into public area.



Little Aynam Road

Stone faced flood defence wall to tie into new footbridge works.



Waterside Flats

Flood defence wall in vicinity of residential flats. Natural stone cladding to outward facing wall with imprinted concrete to residential side. Floodgates maintaining pedestrian access to riverside promenade.

Aynam Road and Jennings Yard Fountain

Stone faced wall with low sections topped by railing. Glass panels at viewing terraces and key sections along the road.

Floodgate access to footbridge. Re-location of Jennings Yard Fountain of heritage importance.



Parish Church frontage

Stone clad wall with low sections topped by railing. Access steps over flood defence linking to Kirkgate.



KEY DESIGN FEATURES – to be integrated into the southern rural fringes of the town

In the southern-most reaches of the Kendal Flood Risk Management Scheme are the communities of Helsington Mills and Watercrock.

These sit within a landscape which is of heritage importance that includes Laithes Mill Race and Leat which are considered part of the grade II listed structure.

A buried Roman Fort and settlement, of national importance, can also be found here which is protected as a Scheduled Monument. The scheme has been designed to avoid any impacts to this monument and limited work will be undertaken in the area. An archaeologist will monitor all works in this location during construction.

Ford Park

Imprinted concrete wall with closed floodgate providing vehicular access and access to steps to maintain public access at downstream end.



Helsington Mills

Raising and extension to existing earth embankments.

RURAL FRINGE

Design Strategy

The proposed scheme and finishes to the design components responds directly to their location within each of the identified character areas.

Clarks

Smooth finish concrete wall with low sections topped by railing.



INTEGRATION OF FLOOD DEFENCES

Glass Walls

Glass panel walls will be installed along Waterside, Aynam Road and Gooseholme to retain existing riverside views and community connectivity with the River Kent.

The self cleaning glass panels will be between 0.8m to 1m in height, and sit within stainless steel frames.



**WATERSIDE CAFE
FLOOD DEFENCES**
*The proposed flood
defences have been
designed to complement
the historic setting of
the conservation area
whilst retaining a visual
connection with the river
where possible.*

INTEGRATION OF FLOOD DEFENCES – OTHER PROJECTS

Using visualisations, we can indicate how the completed scheme will integrate into the local townscape. We are working closely with other organisations to ensure our scheme ties into other projects around Kendal.

New Road, Kendal

Is a relatively newly created, well used local green space located on the edge of the River Kent.

The new flood defence walls will run along the road side boundary tying into the existing river wall which will remain as it is now.

The defences have been designed to ensure that there is still visual connection with the River Kent.

Natural stone cladding will be used to ensure the new walls compliment the local townscape.

Access to the bridge will be ramped to ensure there is footpath, cycling and disabled access between open green space at New Road and Gooseholme.

The new footbridge at Gooseholme is being delivered by Cumbria County Council. This single span bridge provides greater capacity within the river channel, reducing the chance of blockages and improves the flow.

We have designed our flood walls to neatly tie into the new access points of the bridge.

Floodgates will retain public access to this area. The floodgates will remain open and only closed should flooding be imminent

Access to the river will be maintained for maintenance access or for river users.



COMMUNITY BENEFITS – Proposed New Nature Areas

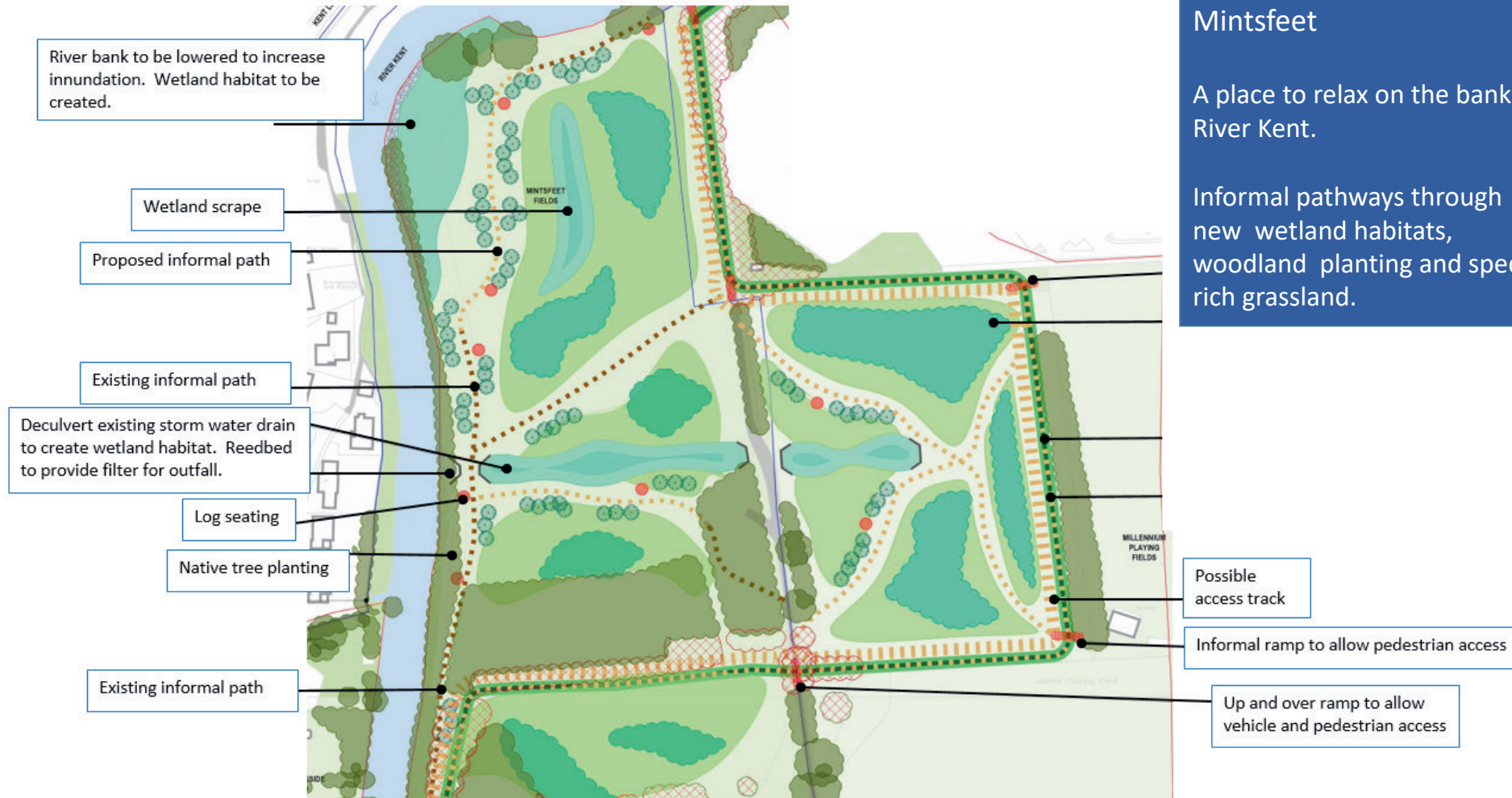
Beezon Fields

A new community nature area in the centre of Kendal with features including:

- Woodland planting
- Species rich grasslands
- Wetland scrapes
- Wildflower areas
- Insect habitats/hotels
- Sensory pathway with willow sculptures, printed tiles
- Reclaimed timber seating.



COMMUNITY BENEFITS– Proposed New Nature Areas



Mintsfeet

A place to relax on the banks of the River Kent.

Informal pathways through new wetland habitats, woodland planting and species rich grassland.

COMMUNITY BENEFITS – Linking-in with Kendal's Past

Archaeology and History

Kendal has been an important settlement from the medieval period and perhaps earlier; before this a Roman fort and civilian settlement was present at Watercrock Farm in the 2nd and 3rd century AD. Kendal developed as an important market and industrial town during the medieval period and maintained this importance throughout much of the post-medieval period.

Kendal's story is closely connected to the River Kent and as such, our scheme represents the latest part in this story. Our scheme has been influenced by this understanding and appreciation of the town, but also by its developing needs in the 21st century.



Historic Environmental Assessment

A Historic Environment Assessment has been undertaken which draws together the understanding of the historic development and significance of Kendal. This can be viewed online www.thefloodhub.co.uk/kendal. This assessment has highlighted gaps and areas of opportunity for more of Kendal's history to be told. Working with the Archaeologists at Cumbria County Council an archaeological strategy for investigations both prior to and during construction has been developed.

COMMUNITY BENEFITS – Preserving Kendal's Heritage

Avoidance of Heritage Assets

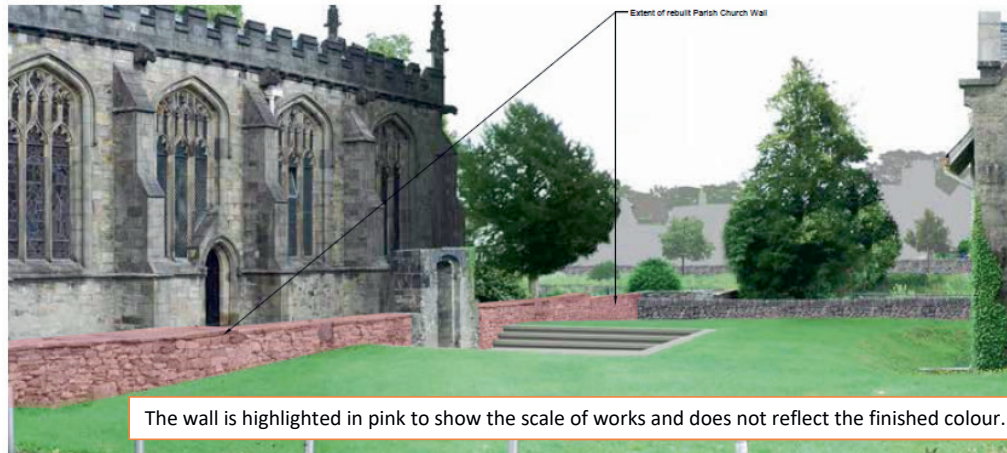
Wherever possible designs will seek to avoid, protect, and retain Kendal's heritage assets.

Designs to avoid impacts to Abbot Hall park historic boundary wall have been altered.

To minimise impacts on Kendal's bridges, the flood defence walls will be constructed up against them, rather than cutting into the stone.



Existing Parish Church wall



The wall is highlighted in pink to show the scale of works and does not reflect the finished colour.

Preservation of Structures

At Holy Trinity Church, the historic gateway in the boundary wall will be incorporated into the design, leaving it open with landscaping of the area to meet flood defence levels.

The Washing Steps at Waterside will be dismantled during the works. Archaeologists will prepare a detailed record, with individual elements being numbered and securely stored for accurate reconstruction.

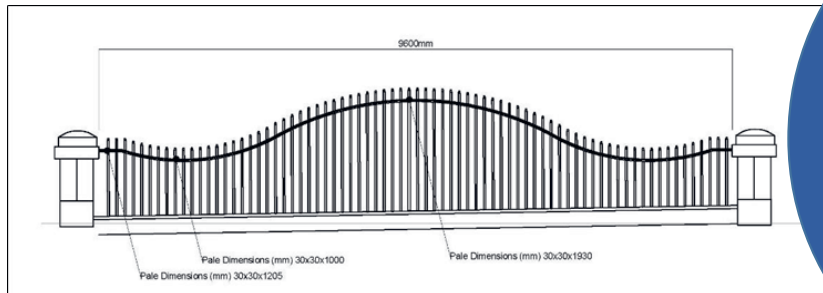
Supervision of Work

Where work is required on or near to historic structures, an archaeological and heritage specialists will monitor the work taking place, record finds, and ensure any items temporarily removed, are accurately restored.

COMMUNITY BENEFITS – Preserving Kendal's Heritage

Webster railings

There is an exception to the railing design where a section of 'Webster' design railings (shown in draft below) will be installed. A section of these will be reproduced on the left bank and this design will influence the railing design throughout the wider scheme.



Jennings Yard fountain

The historic fountain currently located at Jennings Yard will need to be relocated as it is positioned on the line of the new flood defence. New locations are being assessed.



Webster Railings

The historic 19th century, wrought iron, vertical bar railings designed by Francis Webster, are located on both banks downstream of Miller Bridge.

These are historically significant and were designed to complement the Scheduled Monument of Miller Bridge opened in 1818.

COMMUNITY BENEFITS – Access for all

It is important that the Kendal Flood Risk Management scheme is inclusive, and that the principles of inclusive design are considered throughout the scheme design process, during construction, and during operation.

The design teams have worked carefully to ensure that the needs of people are considered and that the principles of The Equalities Act 2010 are followed.

Examples include:

- Providing more opportunities for pedestrians to access public open green spaces with formalised footpaths.
- Providing new tree, grass, wetland, wildflower, perennial, and shrub planting to promote mental health and wellbeing.
- Providing seating, including benches with backrests and armrests in key locations.
- Creating interesting features to promote the use of new footpaths such as artwork, sensory play equipment, and sculptures.
- Avoiding stepped access where possible and creating new "up and over" ramped access.
- Avoiding awkward level changes that may cause trip hazards, and ensuring visual contrast is designed into any necessary level changes.
- Ensuring that during construction, pedestrian diversions are well communicated, sign posted, and safe to use.

Together with Cumbria County Council and South Lakeland District Council, we are identifying locations where we can create, Improve, or connect into footpaths and cycle ways as part of the scheme.



COMMUNITY BENEFITS – Art Integration

Integration of recreational features, signage, seating and artworks forms a key part of the Kendal Flood Risk Management Scheme.

The proposals are contained within the Kendal FRMS Public Art and Interpretation (Design) Strategy, also termed PAI(D)S. The document provides the rationale for the detailed proposals relating to public art, design of walls and railings, landscaping, floodgates and integration with the historic environment.

CENTRAL KENDAL PROPOSED ARTWORK Between Romney Gardens and Stramongate Bridge

- Metal sculpture (sheep/wool washing) at New Road.
- Sculpture (wild geese) at Gooseholme.
- Timber sculpture at Jennings Yard and Parish Church.
- Reclaimed timber seating at Miller Fields, Romney Gardens, Parish Church and Gooseholme
- Salvaged stone seating at Gooseholme and Little Aynam
- Site information boards
- Floodgate artwork



Timber sculpture



Floodgate artwork



Metal wild geese sculpture



Metal sheep sculpture

COMMUNITY BENEFITS – Art Integration

NORTH KENDAL PROPOSED ARTWORK Between Stramongate Bridge & Mint Bridge

- Willow sculptures at Beezon Fields
- Willow tunnels and arches at Beezon Fields and Mintsfeet
- Timber sculptures at Mintsfeet
- Sensory pathway and mosaic tiles at Beezon Fields.
- Reclaimed timber seating at Beezon Fields and Mintsfeet.
- Salvaged stone seating at Beezon Fields and Mint Bridge footpath
- Tiles depicting local flora & fauna in floodwall along Mint Bridge footpath
- Site information boards
- Floodgate artwork



Information boards



Floodgate artwork



Tiles inlaid into wall Mint Bridge Footpath

Willow sculptures & tunnels



Salvaged stone seating

ENVIRONMENTAL BENEFITS – Landscape and Planting

5 hectares
Habitat and
recreational
space improved
in Kendal



The landscape plans for each area of the town are tailored to the character and conditions of the site with moisture-loving plants in the wetter areas, native species used where possible, but with some more formal planting and ornamental species in the town centre.

Habitats will be improved outside of the town, with 50 hectares of peatlands restoration planned in the upper catchment. This will not only provide ecological benefits, but will help improve water quality, store carbon, and help the catchment become more resilient to our changing climate. In key locations within Kendal, such as Mintsfeet and Beezon Fields, new diverse woodland planting will provide additional cover for otters, and foraging opportunities for birds and bats.

A range of different native woodland types will be planted to provide a range of habitats, from open woodland consisting of mainly taller tree species like oak, birch and alder, to more dense woodland which includes understory shrubs and smaller trees like holly and blackthorn. Our planting and landscaping plans have been designed to improve the environment for some of our most threatened and well-loved species, such as declining native trees species like Aspen.

Specific nest boxes for starlings and swifts will help encourage them back into the area.

New wetland habitats with a diverse range of native marginal planting and seeding will increase biodiversity of both plants and animal species in the area. Native wildflowers will also provide a boost to our pollinators. Insect hotels will assist with providing richer habitat opportunities for our insects and invertebrates.

ENVIRONMENTAL BENEFITS – Landscape and Planting

Tree Planting

4000 new trees will be planted to create a habitat rich river corridor. Unfortunately, some trees will need to be removed to allow works to take place and the number of trees currently identified for removal is around 500.

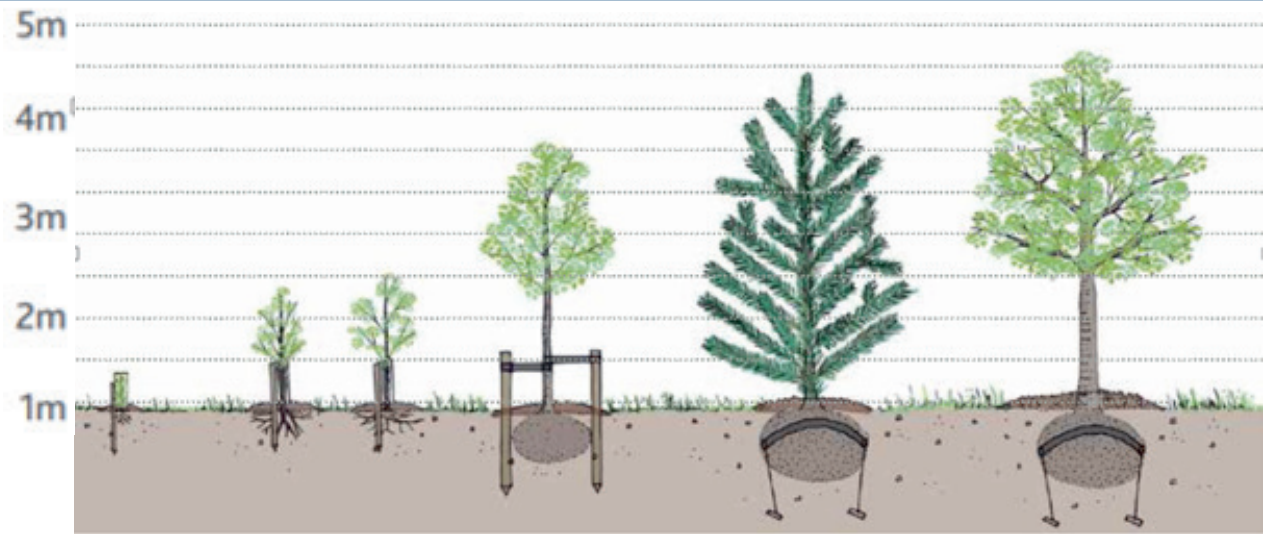
Different size trees will be planted in order to serve different functions and to best suit certain locations.

For example, native species will be plated in more rural locations where habitat creation is important, and in the town centre locations, ornamental trees that are suitable for urban planting, have been selected to suit the character of the town.

To help the trees establish, they will be planted during the dormant season (November to March)

This table shows how many of each of the various different size of trees will be planted.

- “Transplants” are a name for young trees that get “transplanted” from the seed bed.
- “Feathered trees” have multiple branches from the base of the tree, as opposed to “standard” trees, which have a clear stem up to a specific height.
- “Extra Heavy” and “Semi Mature” refer to the size of the trees – these are more established trees giving more immediate impact in the landscape and often used in the town centre locations.



Technical name of tree size/form	Transplants and Feathered	Feathered and Extra heavy standard	Semi Matured and Semi Mature standard
Total Number	At least 3317	At least 279	At least 70
Location Use	Woodland	Town centre/alongside footpaths	Key locations e town centre parks
Planted Heights	Transplants: 40-60com Feathered: 1.5m-1.75m	Feathered: 1:75 – 2m Extra Heavy Standards: 3.5m-4m	Semi Mature: 4.5-7m

ENVIRONMENTAL BENEFITS – Biodiversity and habitat creation in the rural fringes of Kendal

Below are some of the Native trees and seed mixes that will be planted in more rural locations on the edges of Kendal e.g Mintsfeet, Beezon Fields and Helsington Mills.

These species will compliment the natural setting and provide food and shelter for wildlife.

Native tree species



English Oak



Sessile Oak



Silver Birch



Alder



Aspen



Black Poplar



Wild Cherry



Goat Willow



Scots Pine



Grey Willow



Elder



Rowan



Bird Cherry



Blackthorn



Hawthorn

Native seed mixes



Agrimony



Field Scabious



Ox-eye Daisy



Selfheal



Yarrow



Yellow Flag Iris



Tufted Hair Grass



Marsh Marigold



Common Bent



Meadowsweet



Purple Loosestrife



Water Avens



Tufted Vetch



Cowslip



Yellow Rattle

ENVIRONMENTAL BENEFITS – Biodiversity and habitat creation in the town centre area of Kendal

Below are some of the ornamental and native trees, shrubs, grasses, perennial and bulb species that will be planted in town centre locations, including streets, parks and open spaces e.g Abbott Hall, Gooseholme Park and Aynam Road.

Species will be selected that are appropriate in size and will provide seasonal interest and wildlife value, such as supporting pollinating insects and birds.

Ornamental and native tree species



Great White Cherry



Scarlet Oak



Sargent's Cherry



Ornamental Pear



Swedish Whitebeam



Norway Maple



Honey Locust



Crimean Lime



Pin Oak



Dawn Redwood



Small Leaved Lime



Cut-Leaved Rowan



Sweet Gum



Hornbeam



Resistant Elm

Shrubs, grasses and perennial bulb species



Siberian Iris



Silver Grass



Russian Sage



Giant Oat Grass



Verbena



Allium



Turkish Sage



Tawhiwhi 'Tom Thumb'



Coral Bells



Christmas Rose



Sneezeweed



Californian Lilac



Dogwood



Avens 'Lady Stratheden'



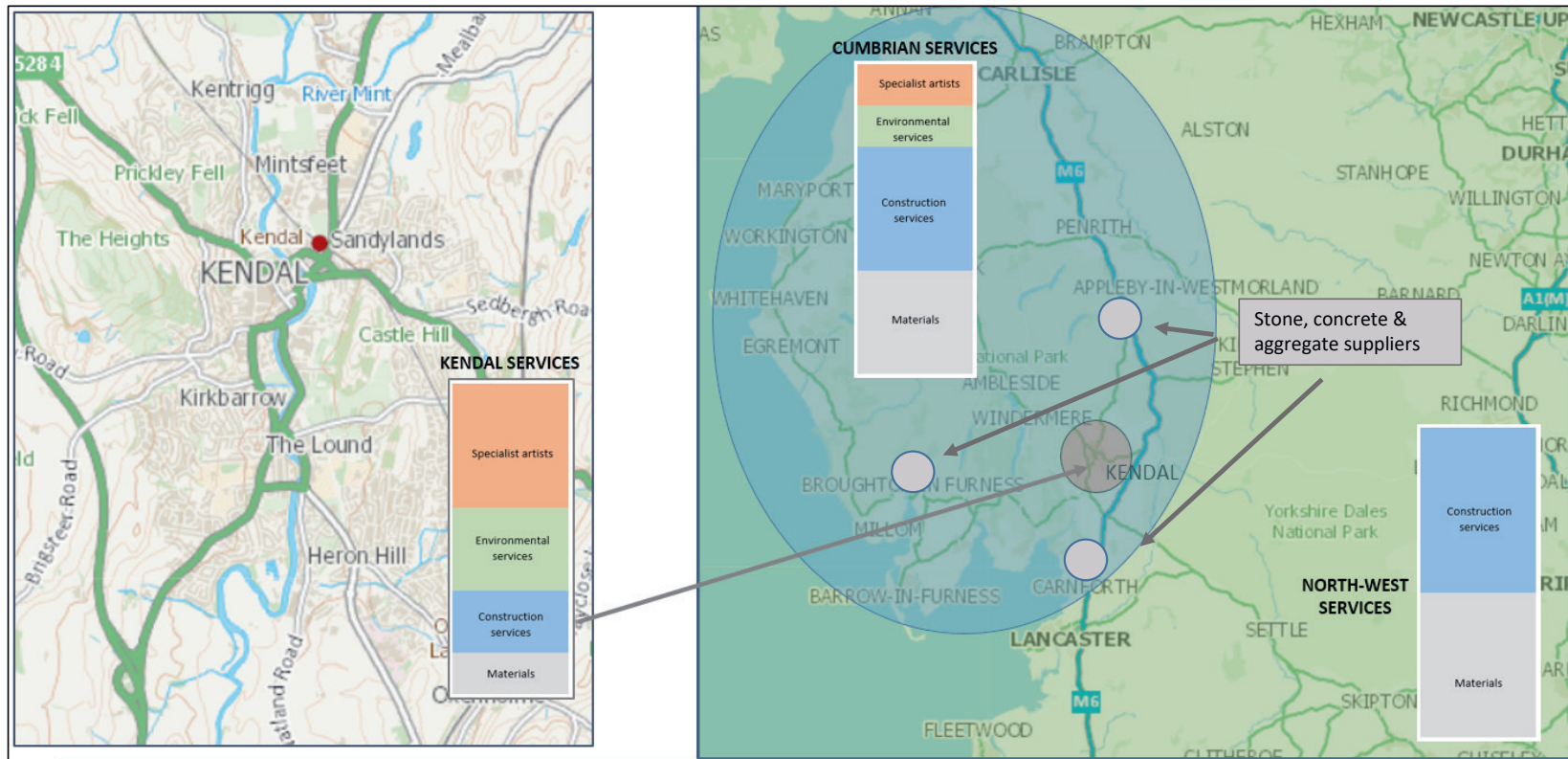
Snowdrop 'Viridapice'

ECONOMIC BENEFITS - "Keeping it Local"

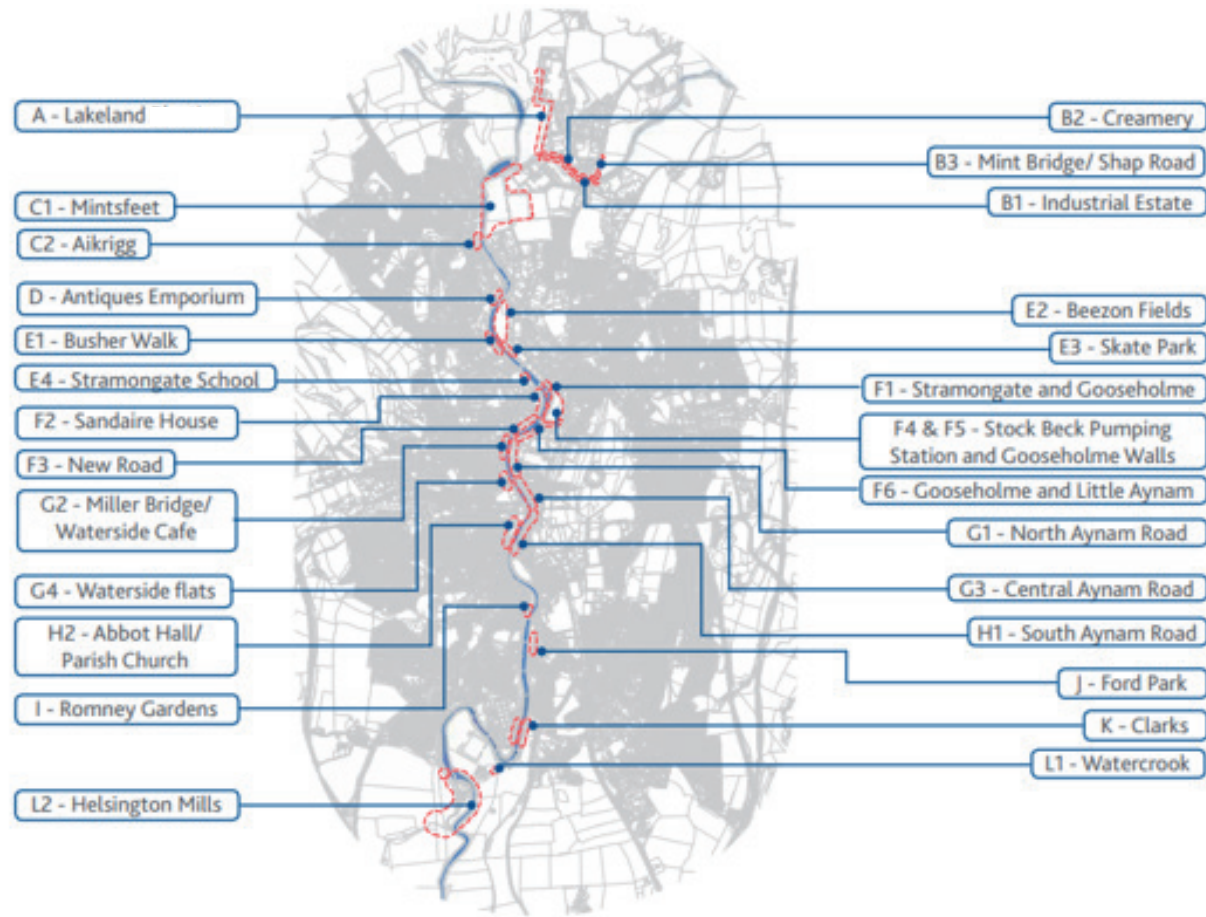
During construction local firms and specialists will be employed and materials will be source locally wherever possible.

So far during construction over 60% of our current construction outlay has been invested into the Kendal local economy.

Through managing flood risk in Kendal and reducing flood damage costs, the scheme will also help to provide security and stability to the local economy.



SCHEME CONSTRUCTION – Phasing of Work



We are delivering a flood risk management scheme that will run from Helsington Mills in the south of Kendal to Mintsfeet in the north.

The complex nature of delivering a long linear scheme through a busy town centre has led us to break down the scheme into a number of small sections we term as 'reaches'.

The order of work is influenced by minimising traffic and pedestrian movement within the town and ensuring we manage flood risk.

Due to the scale of the project within Kendal, the construction work will be phased over a three year period.

The map shows the locations of the different reach areas where works will be occurring.

SCHEME CONSTRUCTION – Programme

The complex nature of delivering a scheme through a busy town centre means that works on the scheme need to be broken down into a number of small sections we term as 'reaches'. The order of work is influenced by minimising disruption within the town and ensuring flood risk is managed.

Work will take place in a number of reaches at the same time and the ordering of these has been carefully considered.

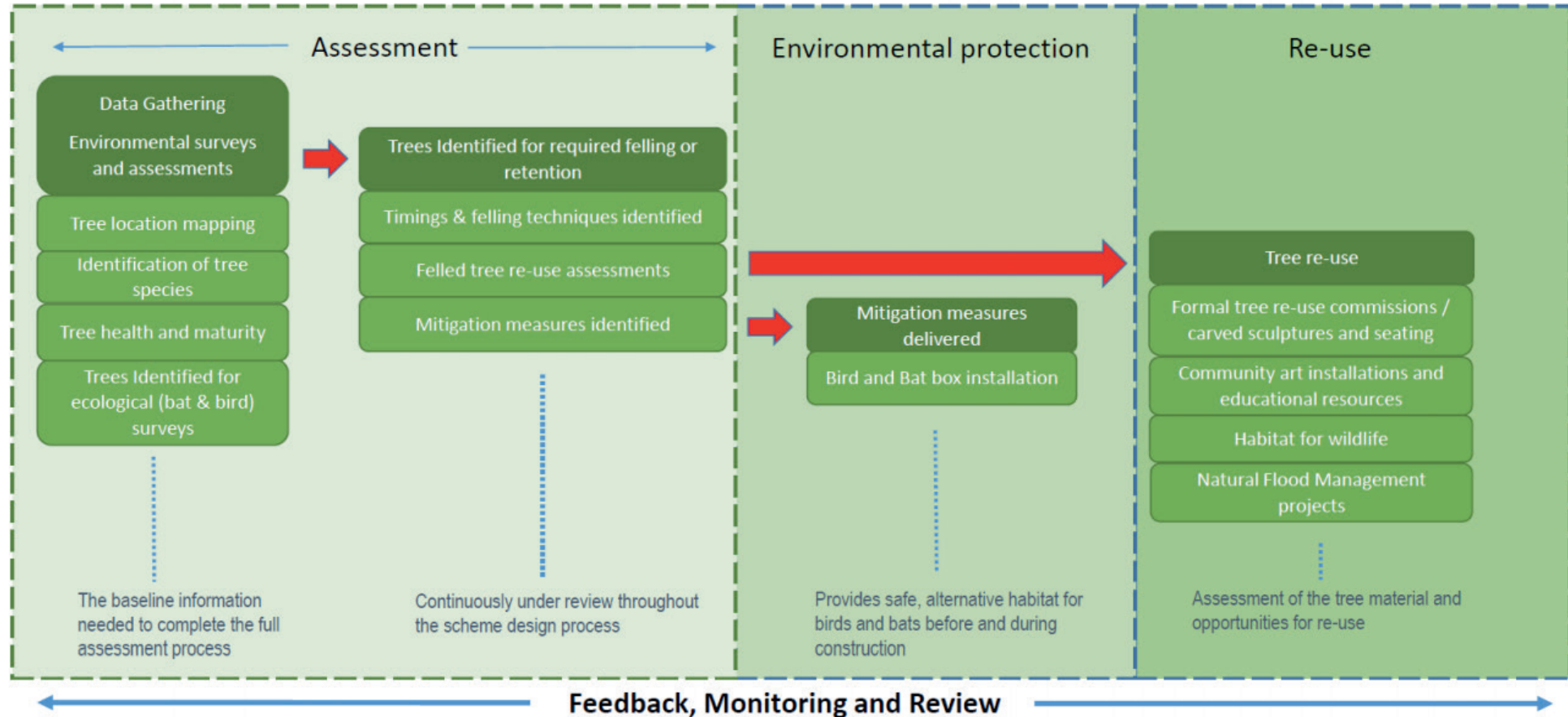
* this programme is accurate as of July 2021 but is subject to change

	2021	2022	2023				
Location							
Watercreek/Scroggs	Reach L1 - Watercreek/Scroggs						
Helsington Mills	Reach L2 - Helsington Mills						
Clarkes/Natland Rd	Reach K - Clarkes/Natland Rd						
Ford Park	Reach J - Ford Park						
Romney Gardens	Reach I - Romney Gardens						
Aynam Road		Reach H - Aynam Road					
Parish Church	Reach H2 - Parish Church						
Miller Bridge		Reach G1 - Miller Bridge					
Waterside café			Reach G2 - Waterside Cafe				
Jennings Bridge		Reach G3 - Jennings Bridge					
Waterside flats	Reach G4 - Waterside Flats						
Stramongate		Reach F1 - Stramongate					
Sand Aire House		Reach F2 - Sandaire House					
New Road			Reach F3 - New Road				
Gooseholme walls			Reach F4 - Gooseholme Walls				
Gooseholme PS			Reach F4 - Gooseholme Pumping Station				
Gooseholme		Reach F5 - Gooseholme					
u/s Miller Bridge		Reach F6 - u/s Miller Bridge					
Busher Walk	Busher Walk						
Skate park		Reach E3 - Skate Park					
Dockray Hall	Reach D - Dockray Hall						
Jubilee Fields		Reach C1 - Jubilee Fields					
Aikrigg		Reach C2 - Aikrigg					
Mint Bridge			Reach B1 - Mint Bridge				
Mint Bridge		Reach B2 - Mint Bridge					
Lakeland			Reach A - Lakeland				

SCHEME CONSTRUCTION– Preparing for Construction (tree removal and re-use)

Tree Assessment and Appraisal process

The tree assessment process is detailed and ongoing throughout the design and construction phases. As part of the assessment process mitigation measures are identified ahead of any construction works and also determine the re-use option of wood from all felled trees and branch removal.



SCHEME CONSTRUCTION – Preparing for Construction (tree removal and re-use)

A range of techniques will be used in order to manage the tree and vegetation removal on site ahead of any construction works.

Trees that will be retained - Tree protection barriers will be installed to minimise the risk of damage to tree root systems, branches and trunks from soil compaction, contamination, construction works, or vehicles.

Vegetation clearance and pruning - Ground covering vegetation will be removed to ensure the working area is clear. Some trees will require pruning to ensure there is safe clearance and space to work but will be protected from further impact. If trees are pruned they will be retained.

Coppicing – This is a process of cutting trees down to ground level and allowing the stumps to regenerate new growth over a number of years. This technique enables the tree to remain.

Soft Felling - This approach will be used on trees that have been identified through our assessment process to have bat roosting potential. Soft felling will be undertaken outside of the bat roosting season. This technique involves removing small sections of the tree, carefully lowering to the ground and leaving overnight to provide an opportunity for bats to vacate the tree.

Felling - For tree removal (other than those to be soft felled) a sensitive approach will be taken to ensure any limit all impacts. Any trees that need to be felled will be done outside of the bird nesting season and appropriate checks will be made on site for any active nests prior to removal works.

We continue to assess the removal of any trees as a consequence of the scheme and continue to work hard to reduce this number.

To date, through further assessments and refining the scheme design, the number of trees identified for removal has reduced from 779 to around 500.

Work continues to reduce this number further.

Potential Tree Re-Use Category	
Category	Potential Tree Re - Use
1	Insitu and relocated carved trunk and root mass sculptures
2	Play areas made from trees these are for low level climbing/exploration
3	NFM projects for various organisations
4	Seats/picnic benches this can be carved trunks or constructed planks
5	Timber for furniture such as planters, fences signs etc. – via local mill
6	Timber for rustic fences, board walks and signs (outside conservation area)
7	Stumpary – educational gardens, habitat creation and planting
8	Insect Habitats - multiple options for these from log piles to ones on pallets
9	Chippings from remaining sources used for soft pathways
10	Mulch for planting areas /allotments / farmers and landowners
11	Biomass
12	Logs - for firewood
13	Willow sculpture / tunnel

SCHEME CONSTRUCTION – Working Arrangements

Preparing for construction

Ahead of any construction there will be a number of preparation works to carry out. In some locations we are able to deliver the construction works more easily due to larger working areas, the works not being complex in their nature, or because there is little interference from underground services.

There are a number of locations however, particularly in the central areas, where a number of preparatory works are needed before construction can begin.

All the working areas need to be free from utility services, and street furniture such as seating, bins and street lighting. Where it is known where underground services are located, and street furniture and lighting needs to be removed, preparations are being made with the service providers to divert or undertake removal and relocation works. Some of the major relocation and service diversion works may require footpath closures / diversions and temporary lane closures on the highway.

Working hours

The approved working hours will be Monday to Saturday from 8am to 6pm however, our aim is to work from Monday to Friday only. We do not anticipate working outside of these hours but if required, additional permissions will be applied for.

Minimising construction noise & dust

Throughout the construction of the scheme, noise and dust levels will be monitored and managed to reduce any impact to homes, businesses, public areas, and the natural environment. Several monitoring techniques will be used and a range of measures to provide visual screening which will assist with reducing noise and dust levels.

To manage any debris on the roads created by construction traffic, a full clean of the carriageway will be undertaken by a road sweeper or similar at a frequency that is appropriate.

Construction traffic

There are dedicated routes for bringing in materials and plant to the site compound area and then distributing from the site compound to our various work areas. The construction traffic and delivery routes will access Kendal from Junctions 36 and 39 of the M6.

The Phase 1 compound area is located at Gilthwaiterigg Lane in the north of the town. The compound is also used to store materials and has office and site welfare facilities.

SCHEME CONSTRUCTION – Keeping Kendal Moving

The primary aim throughout the construction work is to ensure that Kendal is kept moving. This has been fundamental to how the works have been ordered through the town.

The working areas will be compact, balancing the need to keep the contractors, the community and visitors to the area safe, minimising any disruption. Some footpaths along the riverside will be temporarily closed whilst works take place in those areas, but alternative footpaths will be open.

The Traffic Management Plan has been developed in conjunction with Cumbria County Council Highways who have ensured any temporary road closures or lane closures are managed appropriately to minimise traffic disruption.

All road bridges will remain open for access at all times. There will be temporary lane closures on Aynam Road and on New Road whilst work takes place in these areas.

Only one road closure is required during our construction works at Waterside

Legend

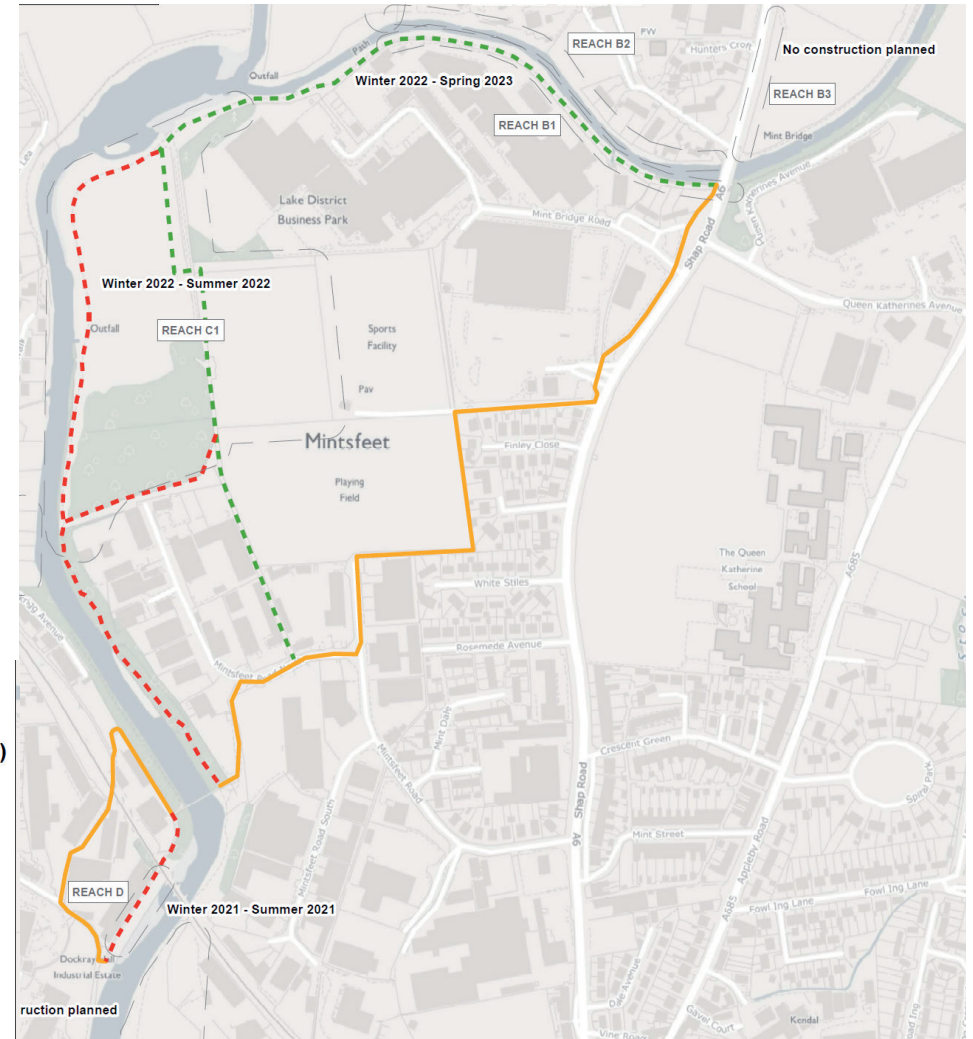
Construction Reaches

Footpath diversions (construction) Type

- Closed Public Rights of Way (PRoW)
- Closed footpath or footway
- Diverted PRoW, footpath or footway

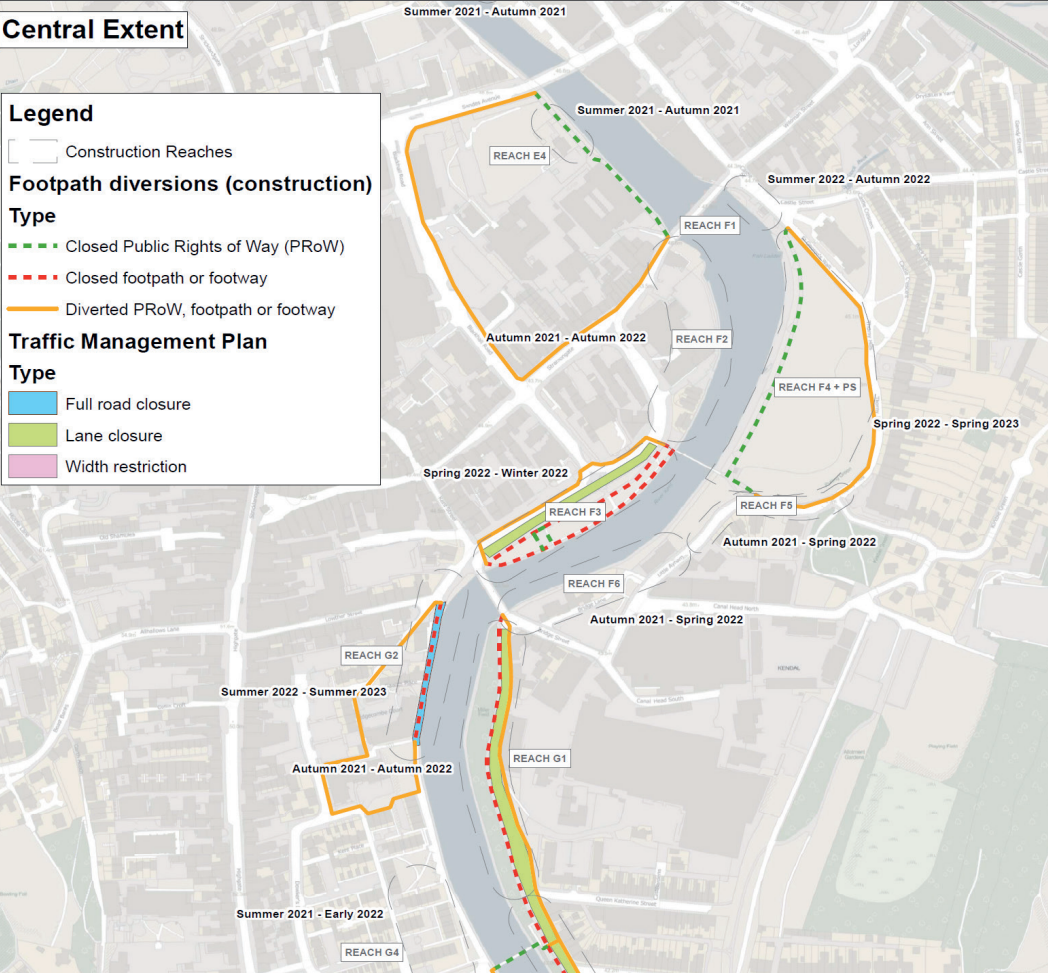
Traffic Management Plan Type

- Full road closure
- Lane closure
- Width restriction



SCHEME CONSTRUCTION– Keeping Kendal moving through central areas

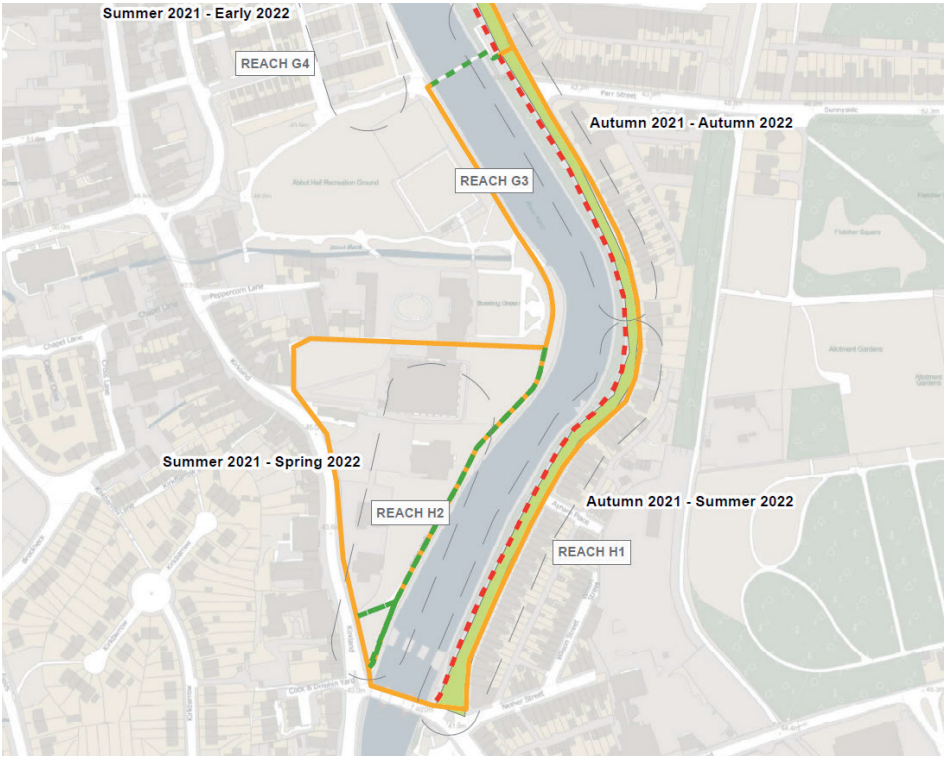
Central area including northern end of Aynam Road



A temporary lane closure will be required along Aynam Road and New Road in preparation for, and during, our construction works.

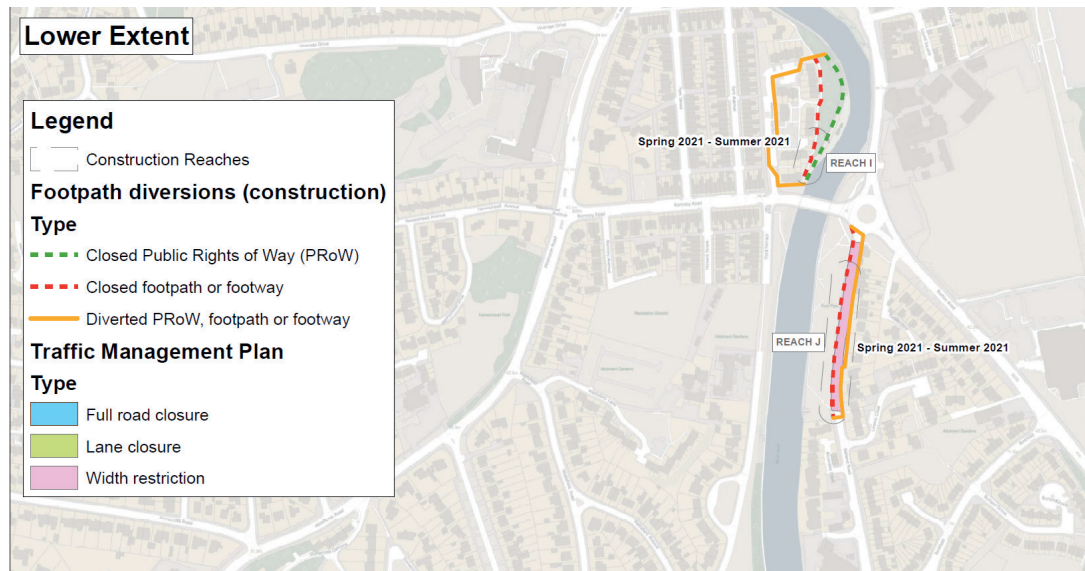
The riverside footpath will also be closed but alternative footpath routes will be provided.

Southern end of Aynam Road and Parish Church

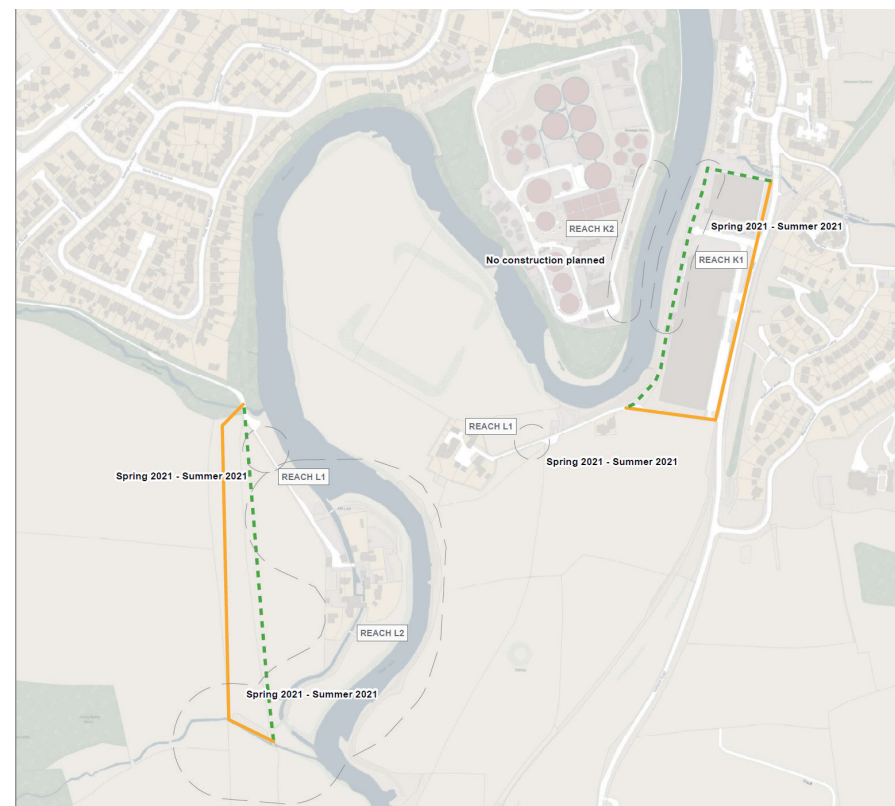


SCHEME CONSTRUCTION – Keeping Kendal moving through southern areas

Southern area including Romney Gardens and Natland Road



Southern area including Clarks and Helsington Mills



SCHEME CONSTRUCTION – Carbon & Sustainability

Carbon Reduction

The Environment Agency has a 40% carbon reduction target for its capital schemes between initial business case and construction completion.

Our initial estimate of scheme carbon emissions was identified within our business case. This is termed the "carbon baseline".

We are working to reduce our carbon emissions through:

- Use of electric vehicles & solar powered site cabins
- Low carbon materials in our construction
- Material re-use where possible

Carbon decisions will be monitored and they will be re-calculating the schemes carbon emissions at regular intervals.

Carbon Offsetting

Carbon offsetting is additional to our 40% efficiency target and will help us to the Environment Agency's "net zero by 2030" objective.

Additional carbon will be offset through the creation of new environmental areas, upland peat restoration and NFM schemes including tree planting.



CEEQUAL

CEEQUAL is the leading international evidence-based sustainability assessment and awards scheme for civil engineering, infrastructure, landscaping and works in public spaces.

The assessment is an ongoing process throughout all aspects of the scheme from business case stage to construction completion.

The Environment Agency minimum CEEQUAL sustainability target is 60% ("very good").

We will be aiming to reach a higher score of 75% ("excellent").



Getting involved

There are a number of opportunities to get involved in the scheme and we will be delivering some of these directly with local schools, community groups and charities. Keep an eye on the flood hub website for events that will be happening near you.



Community Events

Keep up-to-date with community events go to:


www.thefloodhub.co.uk/kendal

Some of the 1000 tree cuttings planted by St Thomas' and Stramongate Schools



KEEPING YOU INFORMED

Visit our online information hub at www.thefloodhub.co.uk/kendal

Follow us on Twitter @EnvAgencyNW 

Get in touch by emailing KendalFRMS@environment-agency.gov.uk

Come and see us at our Information Hub Little Aynam House, Little Aynam, Kendal opening in July 2021
(subject to covid guidelines)



European Union
European Regional
Development Fund



Jacobs
CAPITA



Flood Scheme Information Hub – Little Aynam