



European Union
European Regional
Development Fund

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

2024



CONTENTS

1. Foreword by Richard Knight, Area Director & Scheme Sponsor	2	6. Environmental Benefits	28
		<ul style="list-style-type: none">• Landscape and planting• Biodiversity and habitat creation	
2. Project Background	3	7. Economic Benefits	33
<ul style="list-style-type: none">• The flood risk management journey• Taking a catchment-based approach		<ul style="list-style-type: none">• Keeping it local	
3. Natural Flood Management	6	8. Scheme Construction	34
<ul style="list-style-type: none">• Natural Flood Management (NFM) in the Kent catchment• Improved natural river environment in the Kent catchment		<ul style="list-style-type: none">• Phasing of work• Preparing for construction• Working arrangements• Carbon & sustainability	
4. Delivering a Flood Risk Management Scheme for Kendal	9	9. Getting Involved	39
<ul style="list-style-type: none">• Scheme key facts• Wall finishes and landscaping• Key design features• Integration of flood defences• Other projects		10. Keeping you Informed	40
5. Community Benefits	18		
<ul style="list-style-type: none">• New nature areas• Linking-in with Kendal's past• Preserving Kendal's heritage• Access for all• Art integration			

FOREWORD — Richard Knight, Flood & Coastal Risk Manager and Project Sponsor

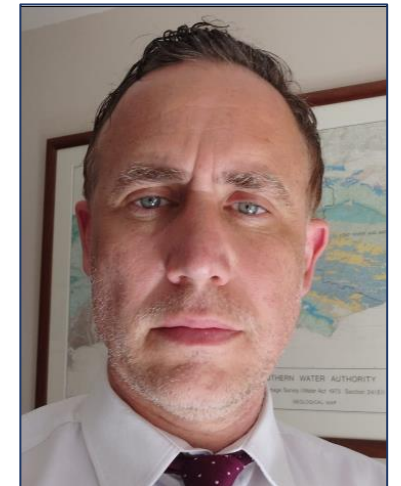
Communities across Cumbria continue to experience the devastating effects that flooding has on lives and livelihoods, and it is a priority for us as the Environment Agency, to ensure we continue to invest in our communities to reduce future flood risk as our climate changes.

The Kendal and Upper Kent catchment Flood Risk Management Scheme will invest multi million pounds across the catchment, delivering a diverse range of flood risk and environmental measures. Whilst our aim is to reduce flooding to those homes and businesses most at risk, we have made a commitment to enhance the river corridor for people and wildlife, improving amenity and habitat value.

The Flood Risk Management Scheme which once complete will improve the resilience of Kendal, Burneside, Staveley, and Ings, better protecting over 1,920 homes from flooding and over 2,250 businesses directly and indirectly from flooding. The investment we are making also increases the resilience of transport routes and communication infrastructure, providing increased resilience to the wider community. We have committed to planting over 15,000 new trees within the catchment, creating 55 hectares of habitat, and improving 3km of riverside footpaths for local communities.

Looking to the future, collectively we will need to do more across the Kent catchment that allows us to adapt to our changing climate. The Environment Agency cannot do this alone and will continue to work with others to understand our future risk, needs and opportunities to enhance all of our abilities to react to, and recover from future weather extremes. This scheme is the first key milestone in reducing one of the largest known risks for the catchment, and one which I and my team are proud to be leading.

Richard



BACKGROUND



Multi-million

Investment in the Kent catchment



Over 1920

Homes better protected



Over 2250

Businesses better protected



15000

New trees planted within the catchment



55

Hectares of habitat & two recreational spaces improved

This document provides an overview of the Kendal phase of the Kendal and Upper Kent Catchment Flood Risk Management Scheme. It will provide an overview of how the scheme is being delivered, key features of the scheme, and what the community can expect during construction.

The Environment Agency started construction in Kendal in February 2021, the first phase of the Kendal and Upper Kent Catchment Flood Risk Management Scheme which, when complete, will provide increased flood protection to homes and business.

Further elements of the scheme will deliver a combination of linear defences and environmental improvements in targeted locations within Burneside, Staveley and Ings, as well as flood storage suitably located in the upper catchment. Natural Flood Management will be a complementary measure, slowing the flow and improving habitat in key locations.

The investment we are currently making in Kendal will not only reduce the risk of flooding, but will create a lasting benefit for the community and environment. Our planned investment for the whole scheme will result in an overall catchment improvement for people, wildlife and visitors to the area.



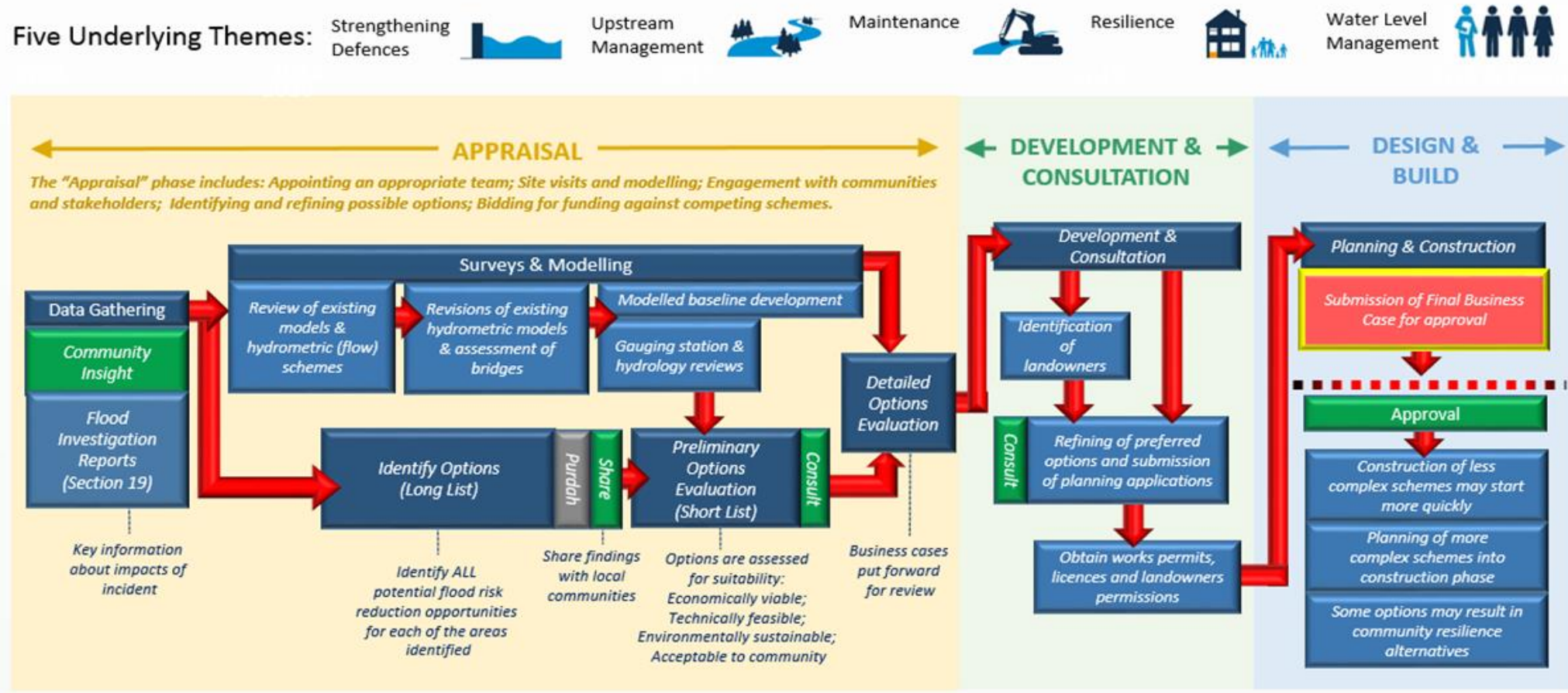
BACKGROUND - The Flood Risk Management Journey – Appraisal to Construction

Through a process of public consultation which started in early 2016 through to planning submission in 2018, engineering analysis, environmental assessment and economic appraisal of over 60 design options were tested against four criteria leaving a preferred set of options to take forward for delivery. Whilst we are in construction in Kendal, we continue to appraise a number of options for Burneside, Staveley, Ings and upstream storage.

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



The Short list of options included; Flood storage, linear defences, a combination of linear defences & flood storage, improved pumping, flow routing, property flood resilience measures and complementary 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 'Appraisal' stage.

BACKGROUND – Taking a catchment based approach

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

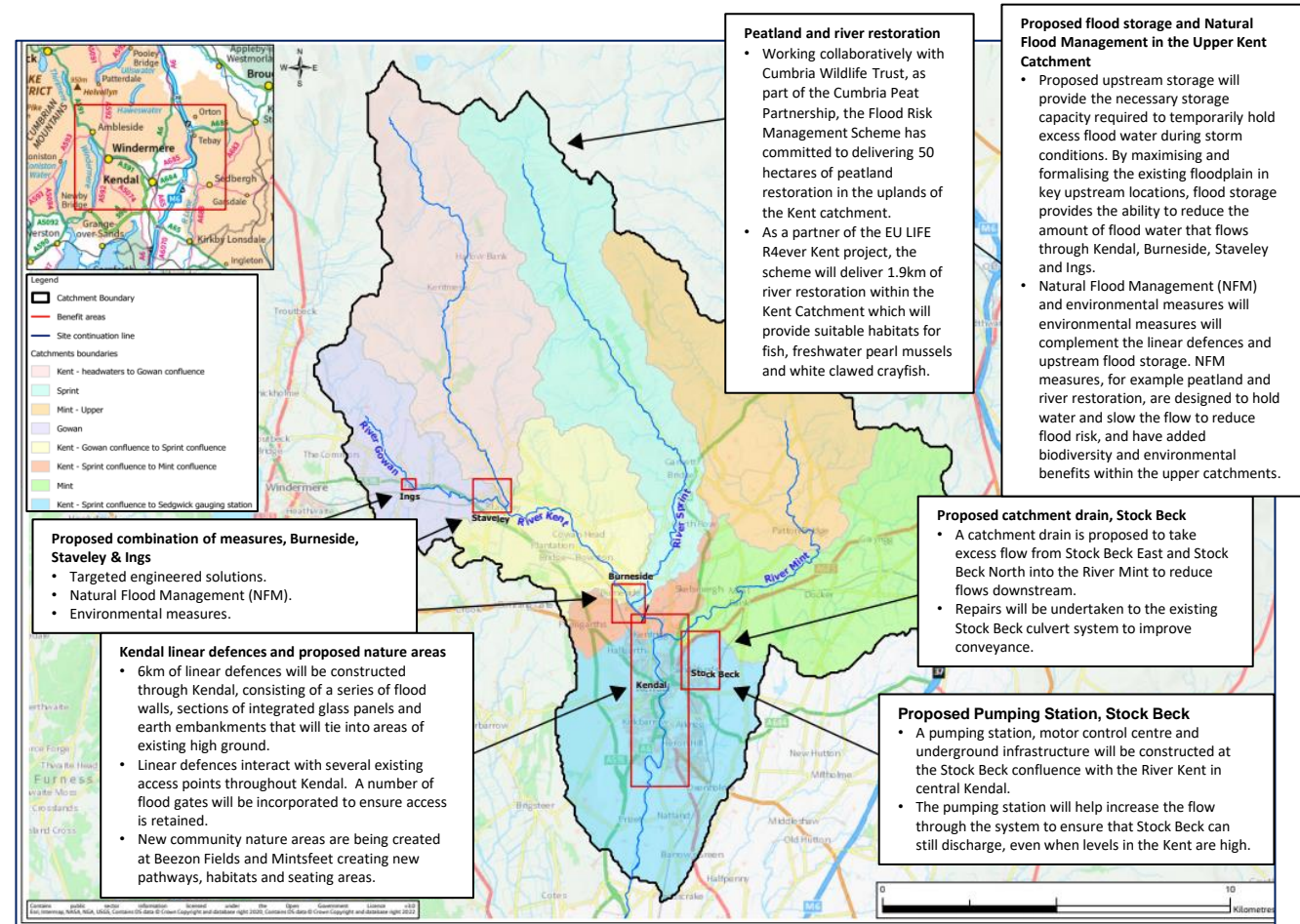
Kendal: Flood walls, earth embankments, improved conveyance and pumping station.

Burneside, Staveley, and Ings: A combination of Flood walls, earth embankments, local flow routing and environmental improvements in targeted locations.

Upper Catchment: Flood storage and a flow routing channel on Stock Beck.

Working with others: Working with United Utilities and Westmorland & Furness Council strategies will be developed to identify and address sewer and surface water drainage risks, and to co-ordinate future improvement works.

Complementary measures: Natural Flood Management, River restoration and Peatland restoration in the upper catchment.



Upstream storage is a fundamental element of the scheme which 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 aim to provide a 1 in 100 year standard of protection (reduce flood risk to a 1% chance in any given year). Once complete, the scheme within communities will provide a localised level of protection that will provide homes and businesses with greater flood resilience and reassurance.

NATURAL FLOOD MANAGEMENT (NFM) in the Kent Catchment

We continue to support NFM projects across the catchment by working with other organisations and landowners. We continue to identify new opportunities to deliver more in the future to address and adapt to our changing climate. A number of projects have so far been completed that provide a combination of improvements to the local environment by slowing the flow, creating enhanced habitat for wildlife and reducing flood risk.

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 deliver at least 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 the project lead South Cumbria Rivers Trust, this 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, this project has delivered 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 planting a wide variety of trees, this project also greatly improves the range of habitat on the land creating multiple benefits for the environment.

Together with the farming community, several options have been identified and delivered 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 land has received 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 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 over 7,500 trees consisting 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.



Bowston Weir removal, Bowston

South Cumbria Rivers Trust in collaboration with the Environment Agency and Natural England has successfully delivered a weir removal on the River Kent at Bowston, a location near Burneside in South Cumbria.

The weir removal forms part of a highly acclaimed Cumbria River Restoration programme, which aims to restore and improve our rivers for the benefit of people, river users and wildlife.

The Bowston weir removal was significant due to its size and scale and was the largest weir removal project in the country during 2022. Since the removal, the river has already shown improvements in form and function and will continue to improve as a designated Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC).

The programme of works has been funded by the European Agricultural Fund for Rural Development.

LifeR4everKent Project

Funded through the European Union's LIFE Programme, The Life R4ever Kent is a £4.5 million project that aims to Restore and Revitalise the River Kent to ensure the river environment can support its species to be more resilient to climate change. Set to run over five years from October 2021 to January 2027, partner organisations include Natural England, the Environment Agency, Freshwater Biological Association and South Cumbria Rivers Trust.

The Environment Agency has made a commitment to undertake approximately 2km of river improvements within the Kent catchment. Through this collaboration, river restoration will be delivered to protect and create suitable habitats for fish, freshwater pearl mussels and white clawed crayfish which are some of our most protected species.



BOWSTON WEIR BEFORE REMOVAL



BOWSTON WEIR AFTER REMOVAL LOOKING DOWNSTREAM



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 improved public spaces, 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 features in key areas throughout the town.

Catchment wide tree planting target 15,000

50

Seed to trees planted

2000

Tree cuttings planted



4500

Trees planted in Kendal exceeding our 4000 target

7600

Planted via NFM projects

Providing flood protection and better community amenities

1921



Homes better protected

82



Community facilities better protected



Community art project bringing Kendal's past and future to life

3km



Of Kendal's riverside footpaths improved

14



New gates maintaining access to the riverside

Providing economic stability and growth

Multi-million



Investment in Kent catchment

Over £1.2bn



Money saved from future flood damages

£5.34m



Secured to protect commercial areas in Kendal

2257



Businesses better protected including transport and communication infrastructure

£277m



To the local economy protected

Protecting and enhancing the local environment

4500



New trees planted in Kendal – at least 9 new trees planted for every one removed

8



Hectares of habitat and recreational space improved in Kendal

5



NFM projects within the catchment

50



Hectares of peatland restored in the upper Kent storing and slowing the flow

67



Bird and bat boxes installed providing additional habitat

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 is sympathetic to this, and the Environment Agency has worked hard to ensure that all flood walls are built and finished in a way that blends into the existing, varied landscape.

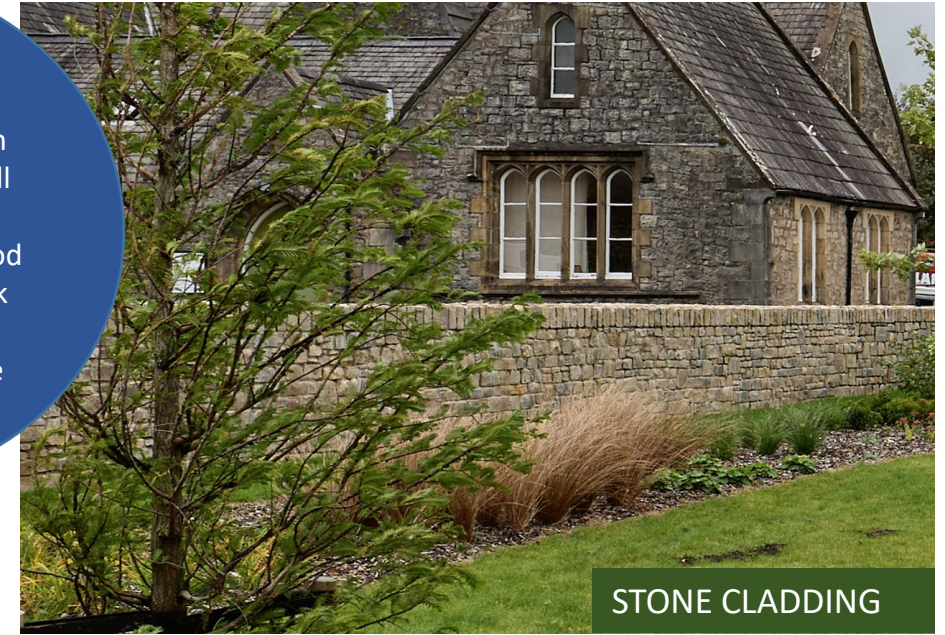
All the flood wall finishes that feature within Kendal have received planning permission.

Walls in the centre of Kendal are 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 are being built, with over half of these being set back from the riverside. Defences have been designed to be 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



IMPRINTED STONE WITH ARTWORK

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 integrated glass panels.

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



IMPRINTED CONCRETE: BRICK EFFECT

Flood gates are another key feature of the scheme as they maintain public riverside connectivity and enable the Environment Agency access to maintain the riversides. Once the scheme is complete, during high river levels the flood gates will be closed providing a consistent level of flood protection through the town.



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 are being placed in a number of locations using a single style to provide consistency.



BEFORE CONSTRUCTION OF THE NEW FLOOD WALL



AFTER CONSTRUCTION OF THE NEW FLOOD WALL AND RAILINGS

WALL FINISHES AND LANDSCAPING – Parish Church, Kirkland



BEFORE FLOOD WALL CONSTRUCTION



AFTER FLOOD WALL CONSTRUCTION AND LANDSCAPING

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 continues to integrate a number of key features into the scheme that enables important elements of the local heritage to be celebrated, installation of educational and art features in amenity locations, and landscaping and planting to improve biodiversity along the river corridor.

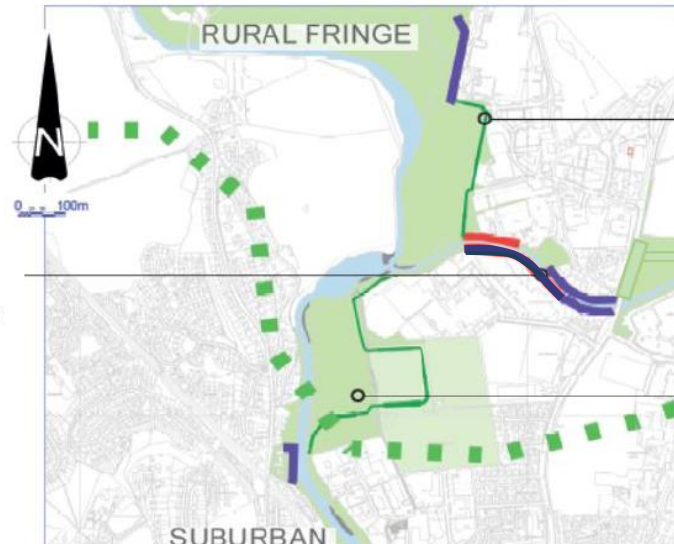
An extensive programme of engagement with local groups, schools, and local artists has supported the development of artworks, with commissioned sculptures being placed at Mintsfeet footpath, Mintsfeet Nature Area, Beezon Fields and Parish Church.

New riverside walking trails improve connectivity to the riverside and information boards showcase local biodiversity improvements, heritage information and signposting to local areas of interest.

- Natural stone cladding
- Imprinted concrete
- Smooth finish concrete
- Glass panel
- Natural stone cladding & Imprinted concrete
- Earth embankments

Mint Bridge footpath

Imprinted concrete walls to rear of residential properties and to boundaries of industrial land.



Lakeland Plastic

Combination of imprinted concrete wall and earth embankments to boundary of site.



Mintsfeet

Earth embankments set back from watercourse and landscaped providing an enhanced area for the community and wildlife.



INSET CARVED ARTWORK

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 have been subject to extra planning controls meaning property alterations, demolition and the felling or pruning of trees have required and subsequently received additional permissions.



Antiques Centre
Use of existing wall as flood defence



Beezon Fields
Lowering of existing riverbank within open land to create a new improved environmentally enhanced area for community and wildlife.



Benson Green and Busher Walk
Combination of stone faced flood walls and earth embankments

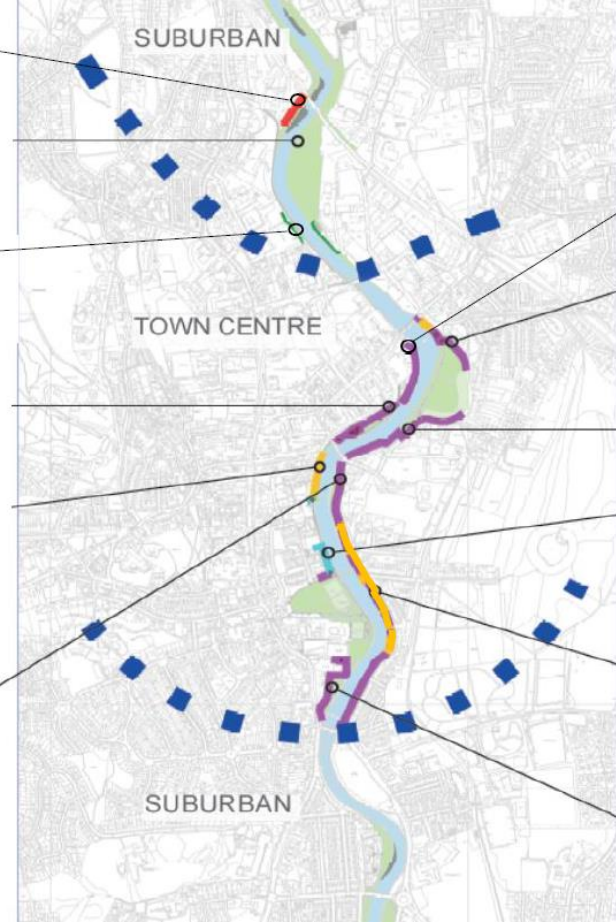
New Road Common Land
Stone faced flood defence wall to tie into new footbridge access ramp. Floodgates to maintain public access through open space.



Waterside
Glass panels on stone faced wall replacing existing riverside railings with floodgate at downstream end to maintain public access along the riverside.



Miller Field
Stone faced wall featuring Webster railing design and new riverside footpath.



Sand Aire House & Lambrigg Terrace
Stone faced flood defence wall



Gooseholme Park
Stone faced flood defence wall with low sections topped by railing. Section of glass panel riverside between Stramongate Bridge and Gooseholme Park. Floodgates providing access into public area.



Little Aynam Road
Stone faced flood defence wall to tie into new Gooseholme footbridge.

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.

Aynam Road and Jennings Yard Fountain
Combination of stone faced wall with low sections topped by railing, and 411m of continuous glass panels along Aynam 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 ramp over flood defence linking to Kirkland.



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 and delivered in a way to avoid any impact to this monument with an archaeologist presence throughout construction to monitor all works in this location.

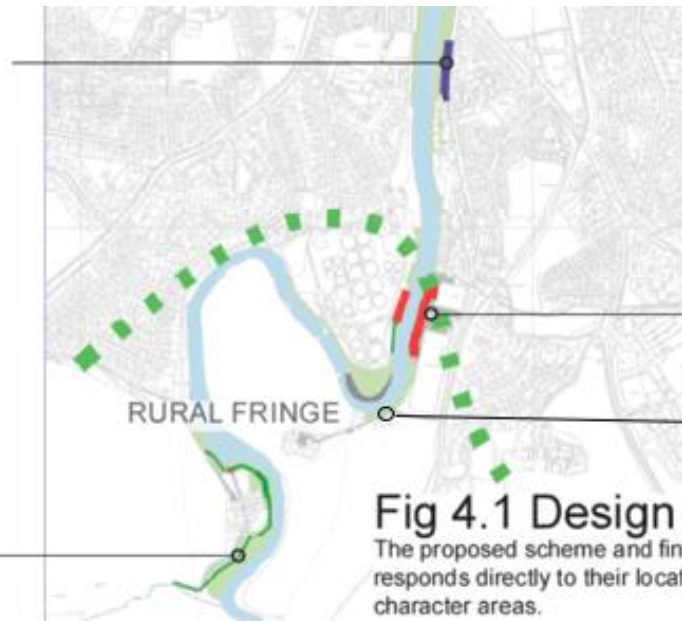
Natland Road / Ford Park

Imprinted concrete wall with extensive landscaping.



Helsington Mills

Raising and extension to existing earth embankments and road raising and lowering.



Clarks

Smooth finish concrete wall with low sections topped by railing.

Watercrock

Road lowering and flow routing.



Fig 4.1 Design Strategy

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

INTEGRATION OF FLOOD DEFENCES – Glass panels

Glass Walls

Glass panel flood walls are being installed in three central locations of Kendal. These feature at 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 slimline stainless steel frames.

577m of glass panels will be integrated across the scheme



INTEGRATION OF FLOOD DEFENCES – Other projects

We are working closely with other organisations to ensure our scheme accommodates other projects along the river corridor in Kendal. Gooseholme Bridge is a recently completed project which was designed and delivered collaboratively to ensure the design and aesthetics were consistent with the flood scheme. We are working with Westmorland and Furness Council, Kendal Town Council and others on projects that interact with our scheme and where we can, we are designing the scheme to accommodate others as they continue to improve public amenity and accessibility through the town.

New Gooseholme bridge with a ramped access to provide access for all connecting two open spaces of New Road Common and Gooseholme Common.

Flood gates integrated into the flood walls will retain public access to this area.



Gooseholme bridge was designed as a single span bridge, providing greater capacity within the river channel, reducing the chance of blockages and improving the flow.

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

Working collaboratively with LCWIP and Green River Corridor projects

Wherever possible, the flood scheme has been designed to accommodate future investment in walking and cycling infrastructure improvements

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

COMMUNITY BENEFITS – New Nature Area at Beeson Fields

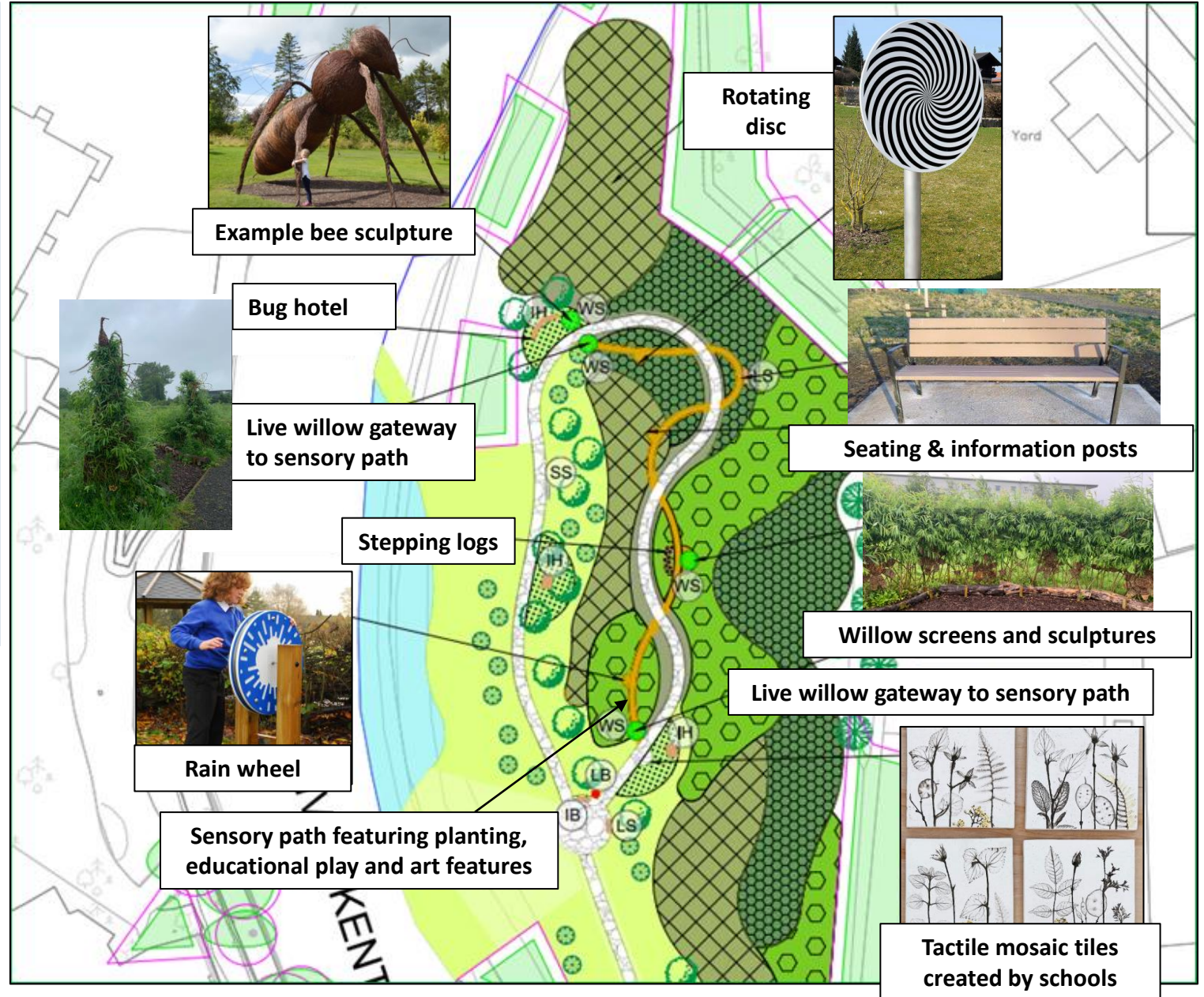
Beeson Fields

Following consultation with Primary and Nursery schools, a concept of a 'Sensory Path' was explored and has subsequently since been delivered. This sensory experience includes features that 'awaken your senses' to nature. Other elements of this amenity area include:

- Woodland planting
- Species rich grasslands
- Wetland scrapes
- Wildflower areas
- Insect habitats/hotels
- Sensory pathway with willow sculptures, mosaic tiles and educational play features
- Reclaimed carved stone seating.
- Seating
- Bee Sculpture









Carved reclaimed stone seat










COMMUNITY BENEFITS – New nature area at Mintsfeet

KEY TREES

-  Native Feathered Tree
-  Native Extra Heavy Standard Tree
-  Native Woodland & Bulb Planting Area
-  Native Security Shrub Planting Area
-  Tree Survey with root protection zones: Retained trees to be protected through the duration of the project
-  Existing trees to be retained if possible

LANDSCAPE SURFACE TREATMENT

-  Wet Wildflower Meadow
-  Wet Grassland Meadow
-  General Wildflower Meadow
-  Cornflower Annual Meadow
-  Orchard Understory Meadow
-  Amenity Grassland
-  Managed Meadow
-  Crushed Rock Access Track
-  Slate Chipping Footpath
-  Mowed Grass Footpath
-  Informal Path



Mintsfeet

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

New flood embankments around the boundary of the site provide increased flood protection to homes and businesses in the Mintsfeet and North Kendal area.

New pathways improve access to new wetland habitats, woodland and species rich grassland areas.

Educational and art installations feature within the area providing opportunities for educational discovery and play.

For those who love to forage, opportunities will be present in the native woodland area.

Archaeology and History

Kendal has been an important settlement from the medieval period and perhaps earlier; before this a Roman fort and civilian settlement were 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 previously Cumbria County Council and now at Westmorland and Furness Council, an archaeological strategy for investigations both prior to and during construction has been developed.

Importance of Archaeology

In the vicinity of the Parish Church, recognised as one of the oldest parts of Kendal, during excavation, a number of human remains were found underneath the church boundary wall. These human remains were carefully recovered, documented and analysed which has subsequently told us a great deal about their lives as once inhabitants of Kendal.

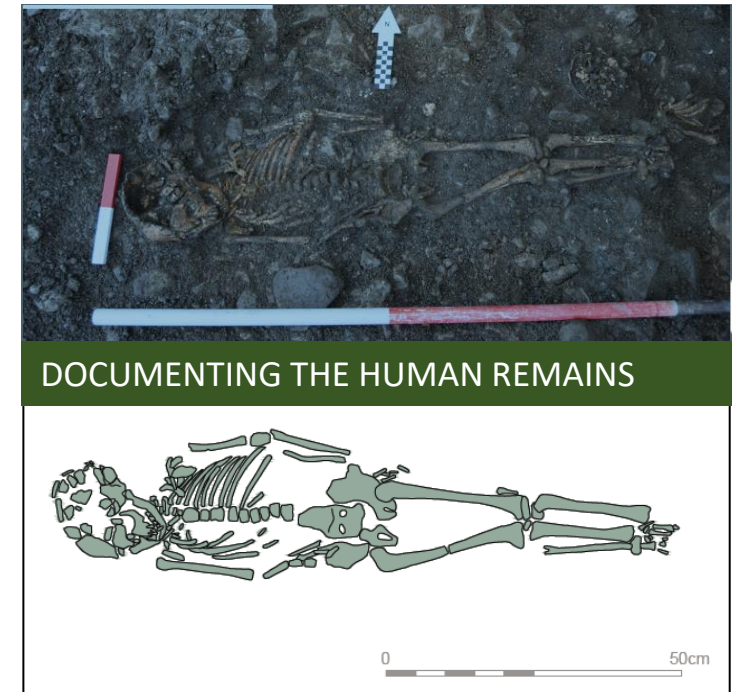
The Parish Church was first recorded in 1232AD however, historians have argued that an earlier church may have been present on this site before the Norman conquest (1066). The human remains found have subsequently been dated to the 11th century AD proving the argument that a church or religious settlement was present on this site prior to the building of the Parish Church.

At least 66 individuals were identified in the vicinity of the church boundary wall, which through detailed analysis has suggested that they were probably poor laypeople. The injuries and diseases noted during analysis indicated they led hard lives, and lives of toil. The radiocarbon dating of these human remains as medieval is certainly significant as it reveals earlier burial practices being undertaken at the church.

Ancient DNA results are forthcoming as part of a significant national mapping genome project. These human remains will form an important part of this research as data from the northwest, especially Cumbria, is fairly sparse.

A number of significant archaeological features have been exposed and recorded as a result of the Kendal Flood Risk Management Scheme. These archaeological results have led to a much better understanding of:

- The origins of the church
- Diet and death in medieval Kendal
- The fast-paced industrial development of the riverside
- The type of cottage industries utilising the River Kent.



COMMUNITY BENEFITS – Preserving Kendal's Heritage

Avoidance of Heritage Assets

Wherever possible designs have sought to avoid, protect, and retain Kendal's heritage assets.

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



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.

Preservation of Structures

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

The Washing Steps at Waterside have been carefully dismantled. Archaeologists have prepared a detailed record, with individual elements being numbered and securely stored for accurate reconstruction.



Archaeological finds

A number of archaeological finds have been made in the vicinity of Waterside. These finds have given us a glimpse into Kendal's industrial past where wool, cloth and the dyeing industry were plentiful along the riverside.



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

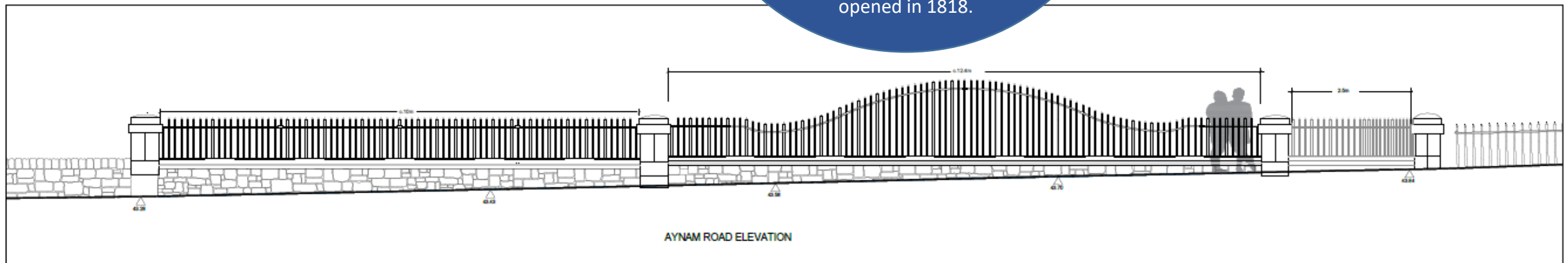
The historic fountain currently located at Jennings Yard adjacent to Jennings Footbridge will be relocated to an alternative riverside location.



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.



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 in areas at Bezon Fields and Mintsfeet Nature Area.
- Avoiding stepped access where possible and creating new "up and over" ramped access at Kirkland leading to the riverside.
- 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 Westmorland and Furness Council, we are identifying locations where we can create, improve or connect into footpaths and cycleways 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.

Artworks commissioned

- Carved slate tiles designed from workshops centered around a soundscape of stories of old from local people of Kendal. These tiles will be inset into the flood wall along Mint Bridge footpath.
- Willow Tunnels and arches promoting educational discovery and play at Mintsfeet Nature Area and Beezon Fields
- Sensory path designed to ‘awaken the senses’ at Beezon Fields
- Handmade mosaic tiles, designed and made by local school children will feature at Beezon Fields along the sensory path.
- Bee Sculpture at Beezon Fields promoting the protection of our pollinators
- Timber sculptures at Mintsfeet and Parish Church
- Salvaged stone seating at Beezon Fields and Mintsfeet
- Site information boards
- Flood gate artwork promoting local places of interest





Timber Sculpture

Using reclaimed Oak, this timber sculpture was carved by hand using traditional tools and techniques and sits within Parish Church ground.

Replicating John Speed's map dated 1611-12 it captures early features of the town and celebrates the early wool and textile industry upon which Kendal was built.



COMMUNITY BENEFITS – Remembering Kendal's past and securing Kendal's future



Art and Education

Using art to inspire and educate our younger generation has been central to the design and integration of a number of features across the scheme.

Capturing stories of old and encouraging the connection to the riverine environment has enabled us to celebrate the past, and work towards securing a sustainable future for people and wildlife.



Community Tapestry

A community tapestry created by Kendal school children and local craft volunteers replicates John Speed's map of Kendal dated 1611-12

The tapestry was gifted by the Kendal Flood Risk Management Scheme to the Parish Church where it resides.

ENVIRONMENTAL BENEFITS – Landscape and Planting

5 hectares
Habitat and
recreational
space improved
in Kendal



Rain gardens will
feature adjacent to
Gooseholme Common
on Castle Street.
Planted spaces
designed to collect
and drain excess
surface water

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 peatland 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 Beeson Fields, new diverse woodland planting provides additional cover for otters, and foraging opportunities for birds and bats.

A range of different native woodland types have been 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 planted along the riverside provide a boost to our pollinators. Insect and bug hotels will assist with providing richer habitat opportunities for our insects and invertebrates.

ENVIRONMENTAL BENEFITS – Landscape and Planting

Tree Planting

At least 4500 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 below 500.

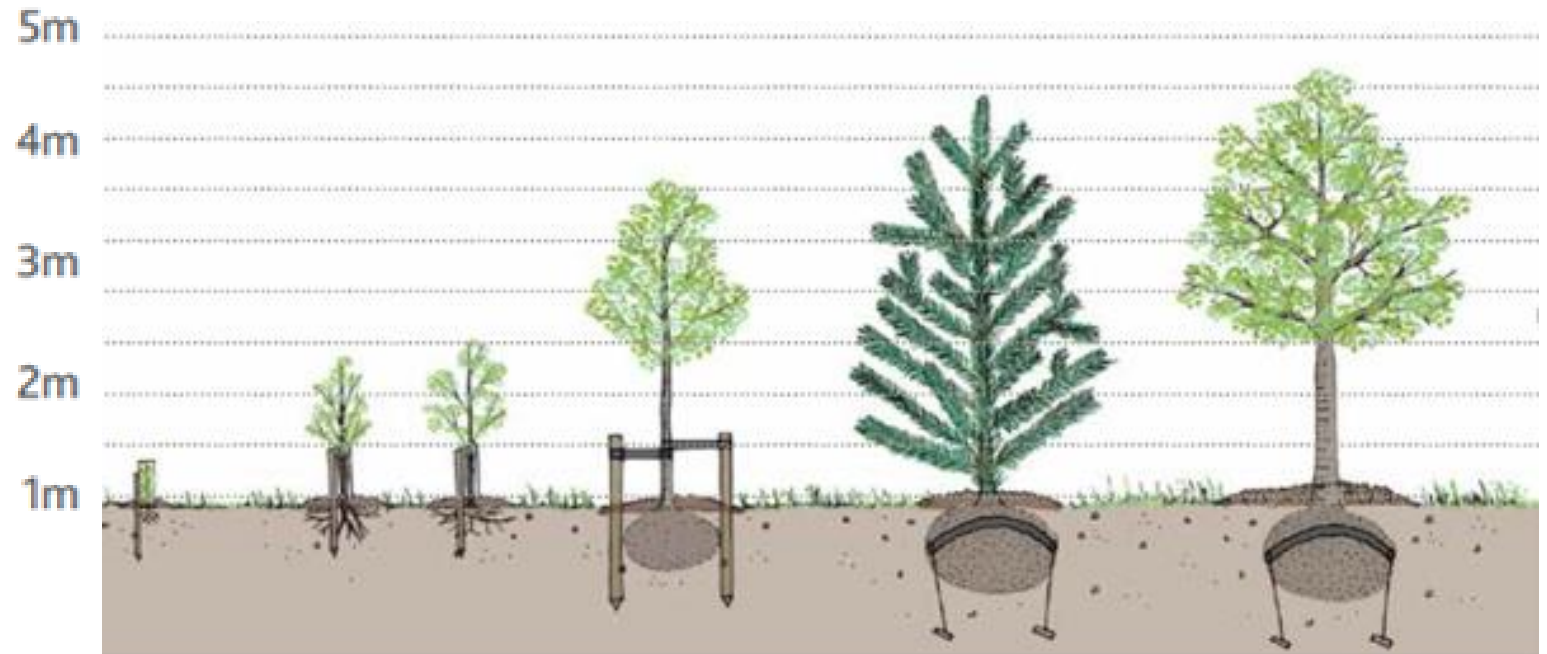
Different size trees have been planted in order to serve different functions and to best suit certain locations.

For example, native species have been planted 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)

A range of various size trees will be planted throughout Kendal. The table below shows the type, location and planted heights

- “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
Location Use	Woodland	Town centre/alongside footpaths	Key locations e town centre parks
Planted Heights	Transplants: 40-60cm 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 have been planted in more rural locations on the edges of Kendal e.g Mintsfeet, Beeson Fields and Helsington Mills.

These species have complemented 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'

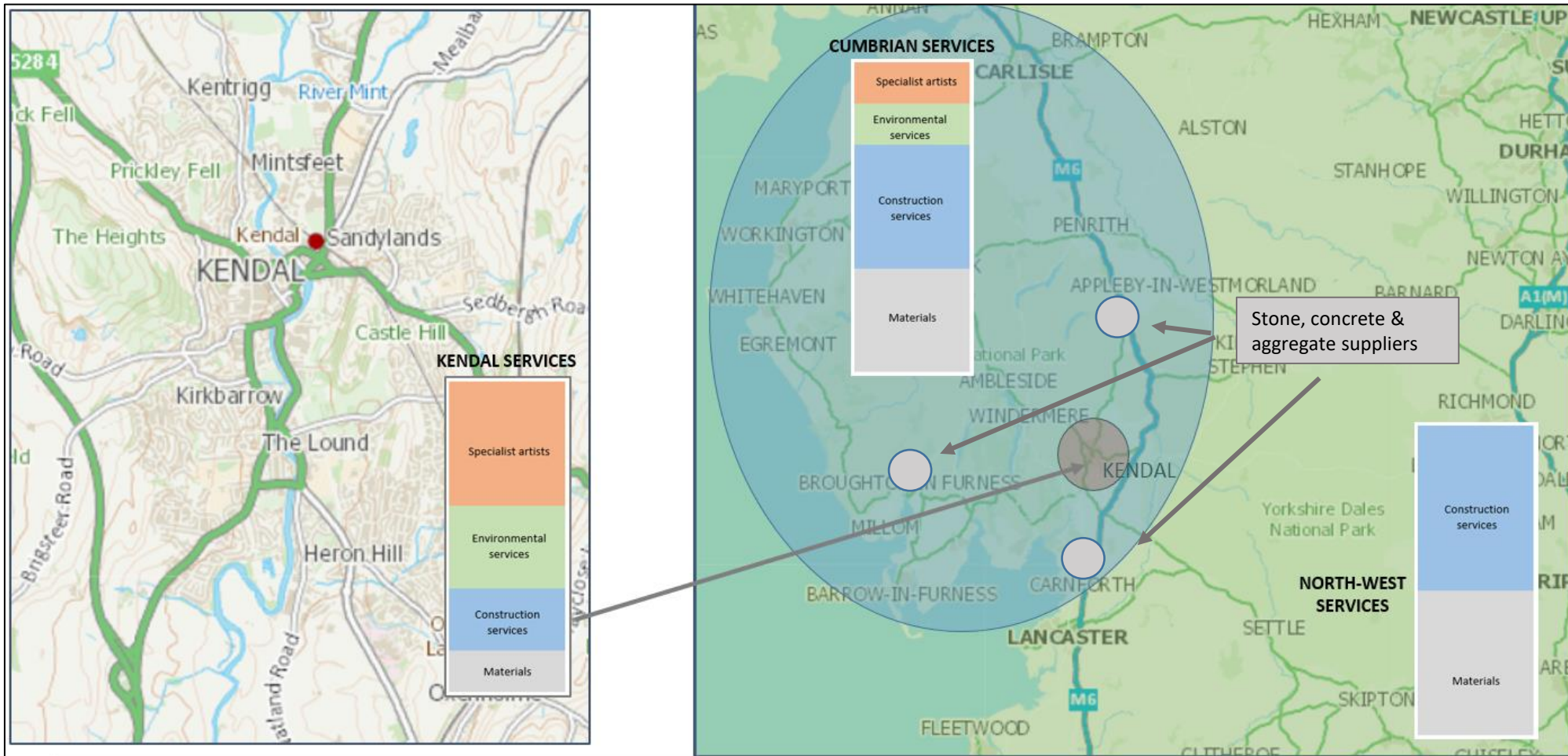


ECONOMIC BENEFITS - "Keeping it Local"

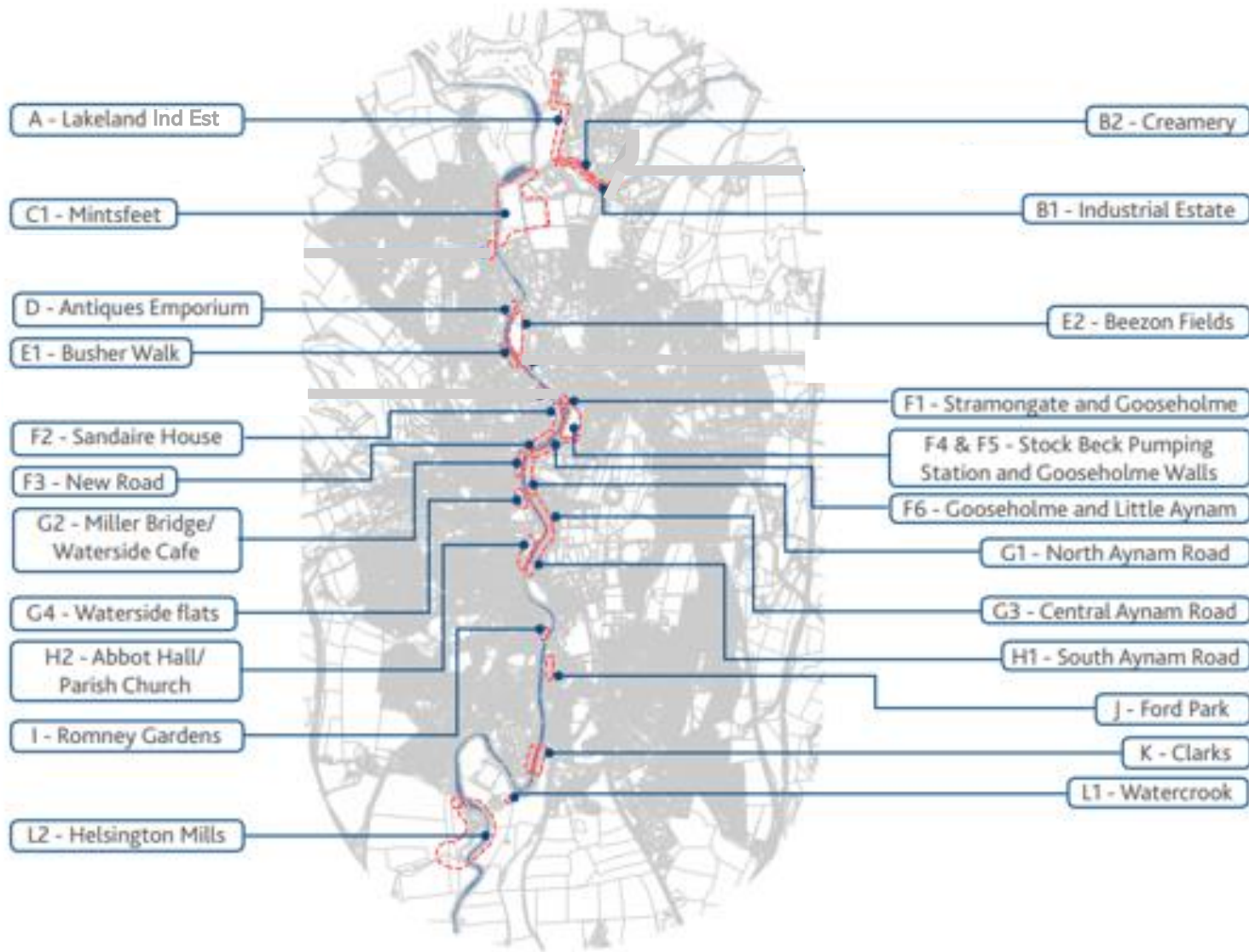
During construction local firms and specialists have been employed and materials have been sourced locally wherever possible. The stone facing used throughout Kendal is supplied by Orton Quarry, Slate is supplied by Burlington Quarry and the path surfacing is supplied by Kendal Quarry.

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 extends 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 map shows the locations of the different reach areas where works have been and will be occurring.

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

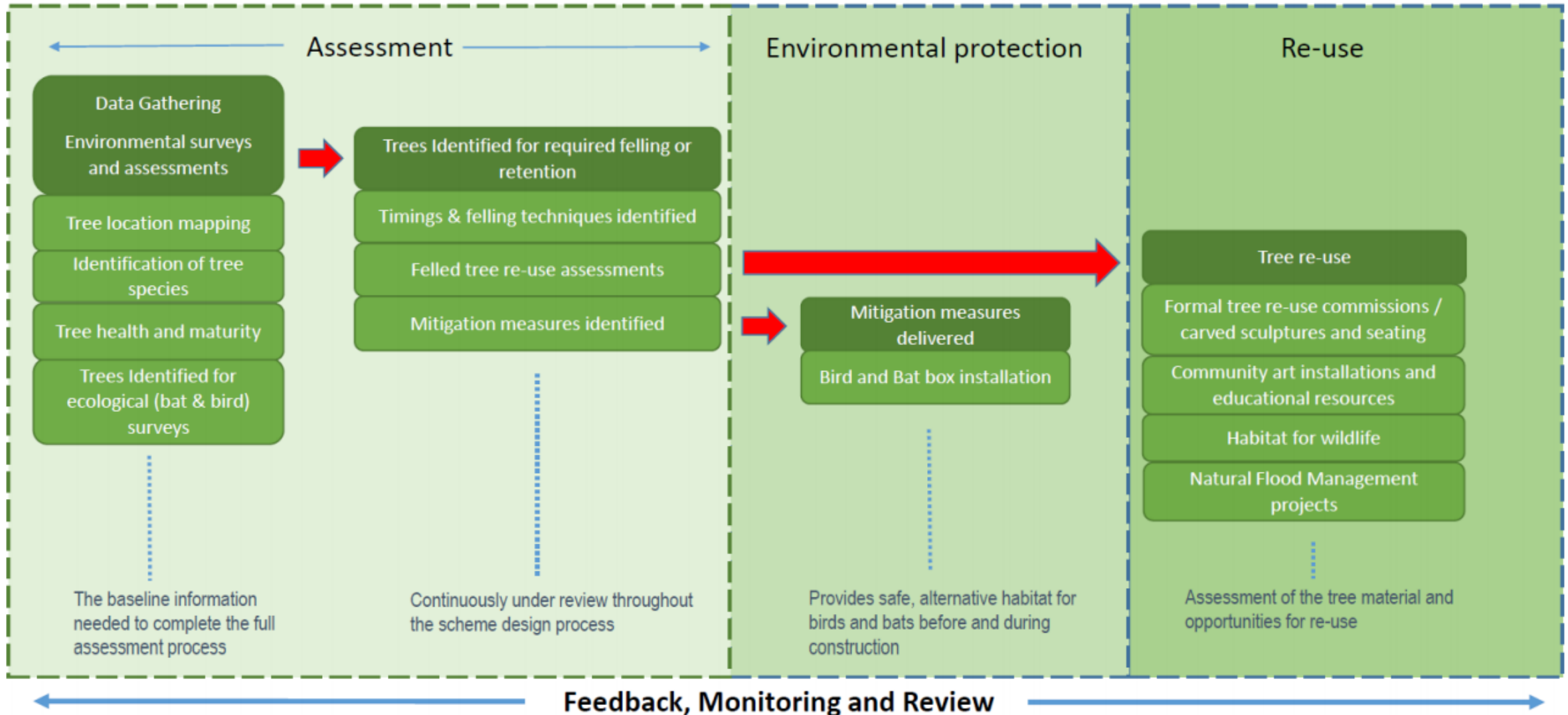
The working areas will be compact, balancing the need to keep the contractors, the community and visitors to the area safe. Some footpaths along the riverside will be temporarily closed whilst works take place in those areas, but alternative footpaths will be open in line with our Traffic Management Plan.

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

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 and wood re-use options are identified ahead of any construction works.



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

A range of techniques have been used in order to manage the tree and vegetation removal on site ahead of, as well as during, any construction works.

Trees that will be retained - Root protection zones will be in place to protect existing trees from damage by construction works or vehicles.

Vegetation clearance and pruning - Ground covering vegetation has and 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 has been and 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 has and will be taken to 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 less than 500.

Work continues to reduce this number further.

Potential Tree Re-Use Category	
Category	Potential Tree Re - Use
1	In situ 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

Preparing for construction

Ahead of any further 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 being less 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 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 are 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.

Piling activities

Piling is an activity which will take place in locations where we need to create a strong foundation from which the new flood walls will be constructed. Piling can cause noise and vibration impacting homes and businesses within the vicinity. Noise and vibration mitigation will be in place during these works and will be consistently monitored to ensure levels remain within agreed tolerances.

Construction traffic

There are dedicated routes for bringing in materials and plant to the site compound area located at Gilthwaiterigg Lane. Materials are then distributed 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.



Carbon Reduction

The Environment Agency has set a 45% carbon reduction target for its capital schemes by 2030.

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 use and reduction will be monitored throughout the scheme.

Carbon Offsetting

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

Sustainability Performance



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.

Seed to tree
planting days

Community art
workshops

Supporting
Kendal's
Foodbank

Creating a
better place

Tree cutting days

Delivering climate
resilience activities
in schools

Supporting local
care charities

Supporting
schools to obtain
their John Muir
Award

Community Events

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

www.thefloodhub.co.uk/kendal

Some of the 1,000 tree cuttings planted by St
Thomas' and Stramongate Schools



KEEPING YOU INFORMED

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

Follow us on  @EnvAgencyNW  @envagencynw

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

Come and see us at our Information Hub located on
Beezon Road, Kendal, LA9 6BW



European Union
European Regional
Development Fund



Jacobs



Flood Scheme Information Hub – Beezon Road