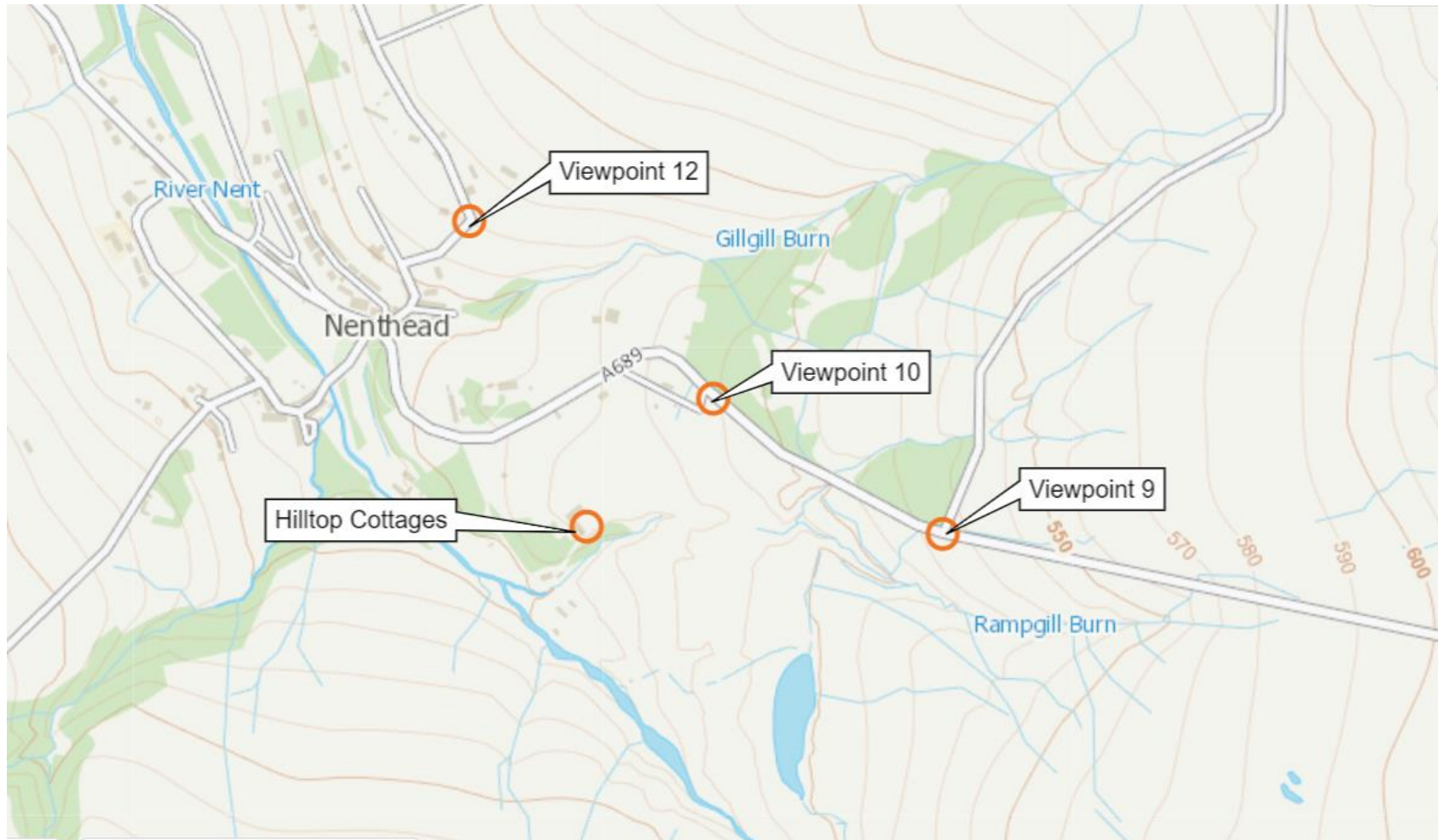


# Visualisation Viewpoints

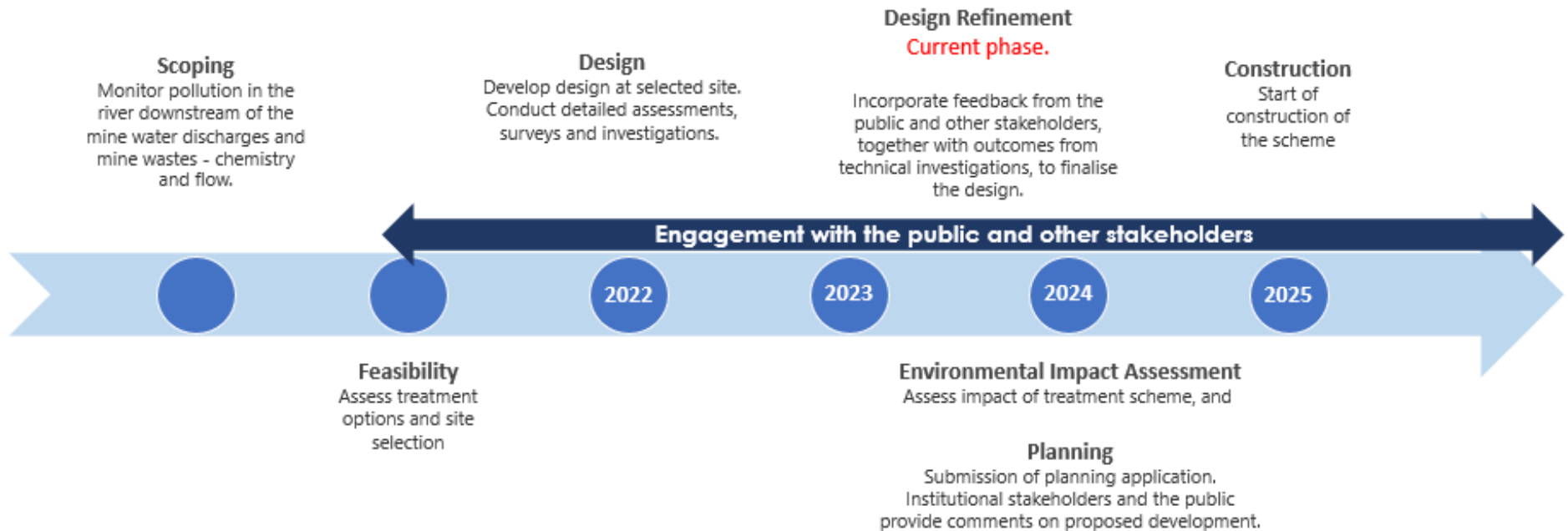
## Location Map



# Indicative Project Timeline

subject to budget and permissions

We have now made the decision to delay applying for planning permission for a scheme until 2024. This will allow us more time to gather all the data and necessary surveys to support the delivery of a mine water treatment scheme in Nenthead as we enter the final stages of designing the project.



# Nenthead Mine Site

## Ecology, plants, animals and habitats

The proposed site is within the North Pennines National Landscape but lies mainly outside the Scheduled Monument and Site of Specific Scientific Interest. We recognise this is a special environment and want to minimise the impact of our proposed treatment scheme.

### Mitigating the impacts of the proposed treatment scheme

Based on current information, our ecological experts do not believe the proposed scheme will have significant impacts on the existing wildlife and plants near the site. We will set this out in an Environmental Impact Assessment that will be submitted with the application for planning permission.

### Ecology Surveys in 2023 and 2024

Earlier in 2023, we carried out a detailed peat survey across the Nenthead mine site. We did a follow-up survey in November 2023.

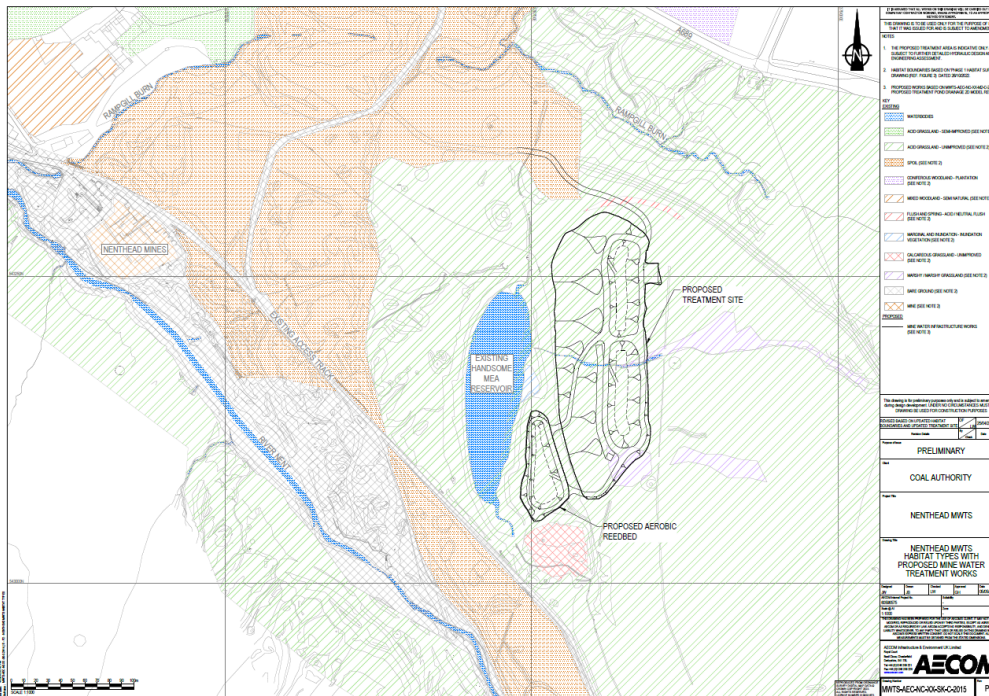
In September 2023, we undertook surveys of plants growing in the River Nent and have also been measuring water temperatures in the river.

In March 2024 we completed a black grouse survey.

### Wildlife and plants

Several different types of plant habitat are present in and around the proposed treatment site including calaminarian (metal-tolerant) plants, rushes and acid grassland.

We know that animal species live on or close to the proposed mine water scheme including red squirrels, bats, curlews, sandpipers, bats and newts, whilst brown trout have been found in the Handsome Mea reservoir.



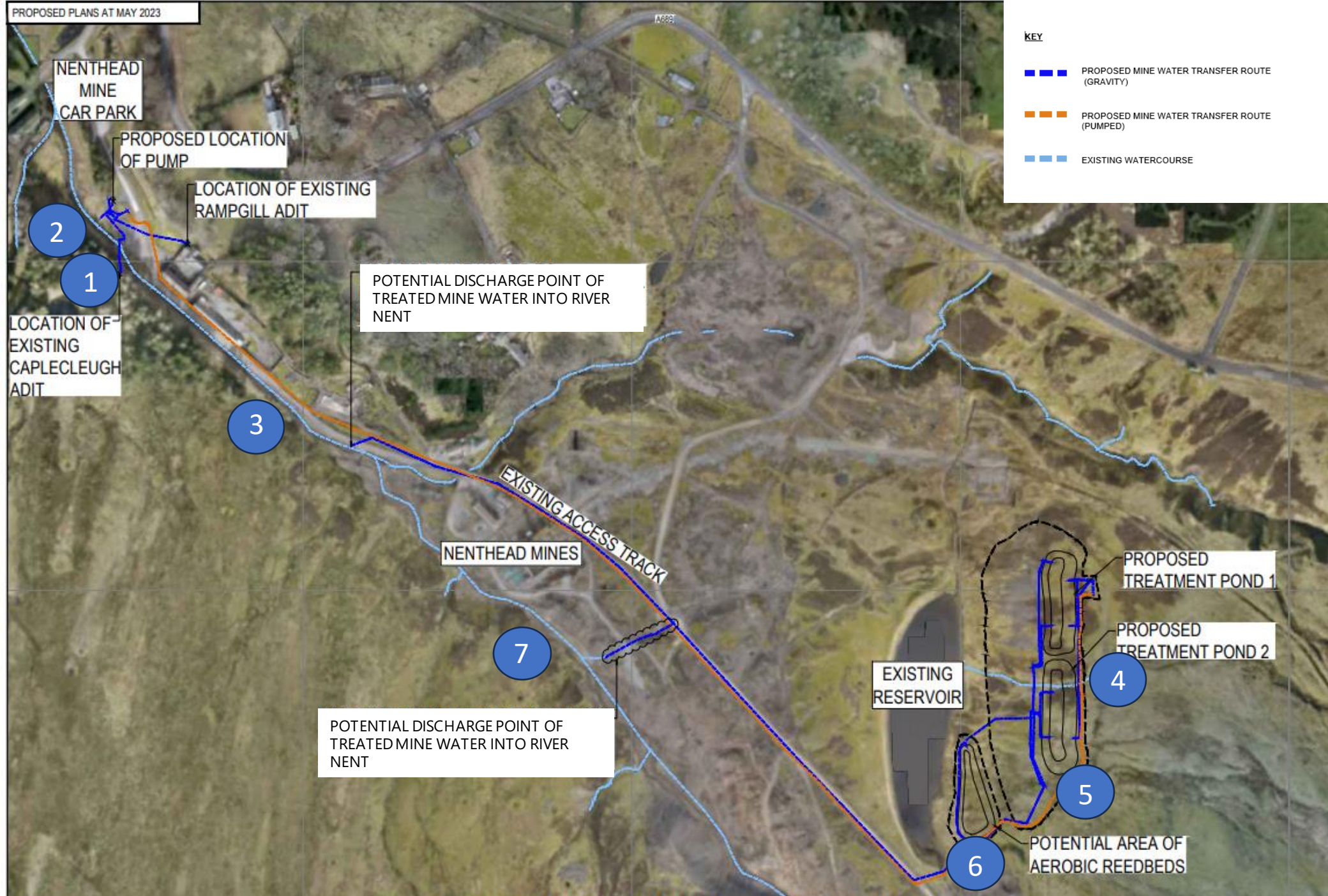
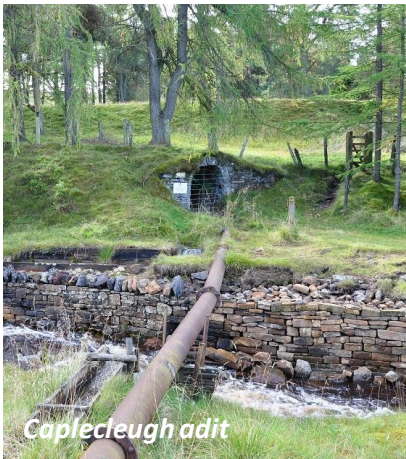


FIGURE 4 - SITE WIDE LOCATION PLAN (DRONE SURVEY)

## 1

# Mine Water Capture

## Mine water will be captured from the Caplecleugh and Rampgill adits



- We will collect the mine water before it reaches the River Nent. Up to 20 litres per second will be sent to the treatment ponds. Any flow over 20l/s will be released to the river without treatment.
- Mine water from Caplecleugh adit will need to be taken across the River Nent. We are proposing to put a new pipe inside the existing old metal pipe.

## 2 Pumping Station

**Mine water will be taken to a pumping station from where it will be pumped up to the treatment ponds**



*Visualisation of pumping station (option 5 is our preferred location) at the Nenthead car park*

- The pumping station will need to be constructed near to the adits.
- The exact pumps to be installed remains under review but they will sit in underground sound proofed chambers, designed so there will be no noise or vibration impacts.
- We reviewed five potential locations, and are proposing to use option 5.

# 3

## Mine Water Transfer Route

**Mine water will be pumped through a buried pipe up to the treatment ponds**



The disused metal pipe runs beneath this access track from the carpark up through the mine site to Handsome Mea reservoir.

- We are investigating whether we can put a new pipe inside the existing disused metal pipe that runs up the track from the carpark to near the Handsome Mea reservoir.
- If not, we will have to dig out this disused pipe and replace it with a new pipeline.

## 4

# Treatment Ponds

**Zinc and cadmium will be removed from the mine water in nature-based treatment ponds containing a layer of straw, wood bark and limestone, where naturally occurring bacteria help to capture the metals.**

- The mine water takes about 15 hours to pass through the treatment layer to give enough time for the metals to be captured by natural reactions.



Artist's impression of the treatment ponds at Nenthead

- The two treatment ponds proposed at Nenthead will have a total 'open water' area of about 3,400m<sup>2</sup> (each pond is about 1,700m<sup>2</sup>).
- For comparison, the Handsome Mea reservoir has an open water area of up to around 8,000m<sup>2</sup>.



## 5

# Odour control system

**The treated mine water will pass through an odour control system to remove any substances that may cause an odour nuisance**



*The two hydrogen peroxide storage tanks at the Nent Hags mine water treatment site.*

The treatment process converts some of the sulphate found naturally in the mine water into sulphide. Most of this sulphide binds to the metals and is stored in the treatment layer. Low concentrations of sulphide may remain dissolved in the treated mine water, and if not controlled, have the potential to cause odours if released to air as hydrogen sulphide (the rotten egg smell associated with decaying plants in ponds).

We will be adding hydrogen peroxide ( $H_2O_2$ ) to the treated mine water before any hydrogen sulphide can be released to air. This quickly transforms any hydrogen sulphide back into sulphate and so prevents an odour nuisance. This approach is used by industries across the world.

The odour control system will operate automatically with sensors monitoring how much hydrogen peroxide needs to be added to remove all the hydrogen sulphide. Performance of the system will be continuously monitored, and automatically reported to the site operator via the internet.

## 6

# Aerobic Reed Bed

**The final part of the process involves passing the treated mine water through an aerobic reed bed as a final polishing step**

- We expect to plant Common Reed (*Phragmites Australis*) which the Coal Authority uses at many mine water treatment schemes across the UK.



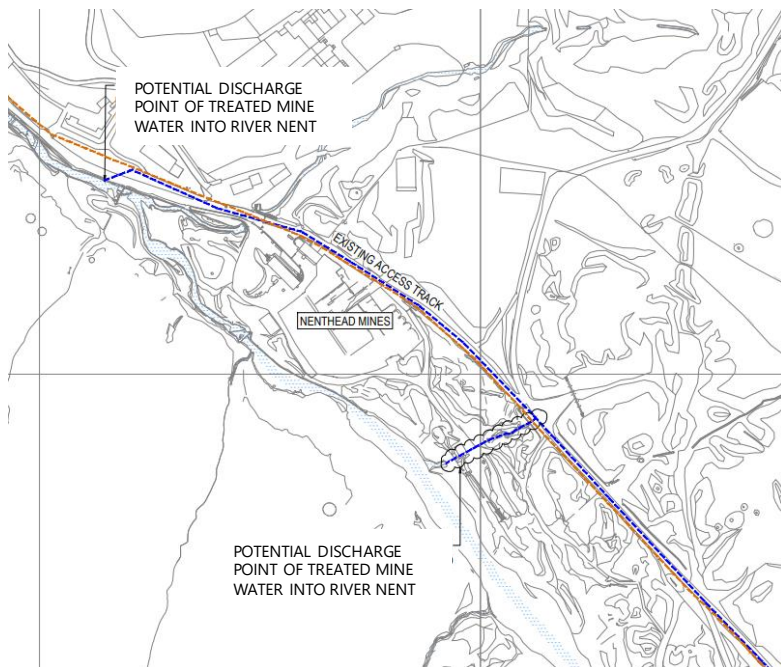
Reed beds at the Nent Hags  
mine water treatment scheme

- Common Reed is known to be tolerant of a wide variety of conditions including altitude and cold.
- Reed beds increase biodiversity and capture carbon dioxide.
- Every few years, we would need to cut back the reeds using an amphibious vehicle.

## 7

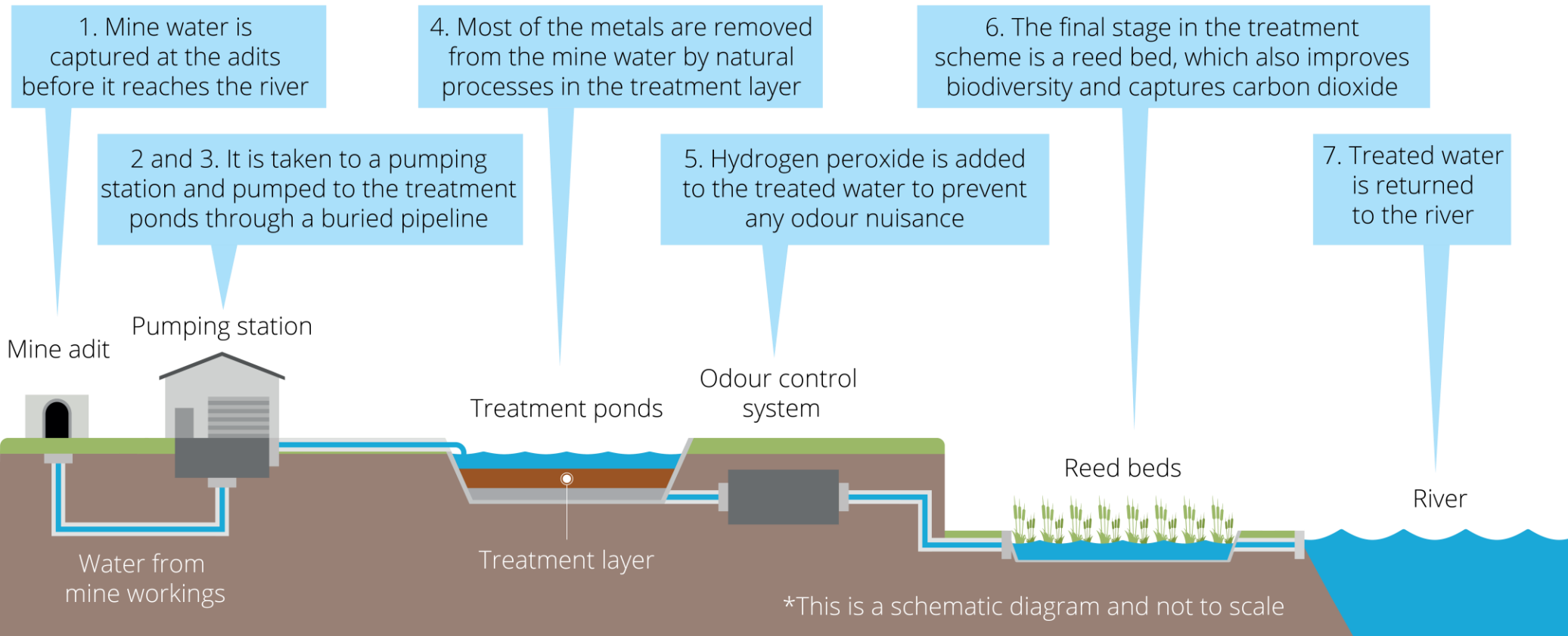
# Return of treated water to river

**Treated water will be returned to the River Nent upstream of the adits using a gravity pipeline**



- We will return the treated water to the River Nent upstream of the adits to minimise changes to the natural river flows in this area.
- We are investigating a number of locations to discharge the treated water to the river.
- Removing most of the zinc and cadmium from the mine water will improve the health and resilience of fish, river-flies and other wildlife in 60km of the Nent and South Tyne rivers.

# How this mine water treatment scheme works



Label numbers refer to annotated aerial photo board called "Figure 4 – Site wide location plan (drone survey)"

# Let's talk facts

## Odour from the scheme will not cascade down the valley.

The risk of odour being produced by the treatment scheme is minimal.

The scheme is designed so that any substances produced during the treatment process will be controlled so they do not cause an odour nuisance.

## We will not dig up the A689 to install pipeline.

The main pipeline for the scheme is expected to be installed along the Nenthead mines access track.

There are no options which involve digging up the A689. We may need to install temporary traffic lights during construction to allow materials to be brought on to the site safely.

## The scheme will not prevent access to the mine site for recreation.

Once the scheme is operating, we will restrict access to the treatment ponds themselves to avoid people and animals walking into the ponds. This has worked very well at the Force Crag site in the Lake District.

The wider mine site will still be accessible for recreation. During construction, there will be some temporary restrictions on access.

## We are looking at pollution from the mine wastes as well as the mine waters.

The worst river pollution by zinc and cadmium is caused by contaminated groundwater flowing out of tunnels dug by the miners – like the Caplecleugh and Rampgill adits. These mine waters provide the majority of the water in the river in drier weather.

Most of the lead in the river comes from rainfall washing metals out of the mine wastes. This is harmful but is not as damaging as the mine waters because the metals are diluted by rainfall

We are investigating the best way to tackle metals being washed out of the mine wastes whilst also protecting the industrial archaeology and special plants.

## The ponds will be designed and constructed to strict engineering standards.

We will need to build up embankments before we can install the lined treatment ponds. We will follow strict construction standards to ensure these are built to last.

We investigated the ground conditions, including the shallow mine workings, and our geotechnical experts are confident the treatment ponds can be built at this location.

## The treatment process uses natural methods.

The treatment layer will be a mixture of wood bark, straw and limestone gravel.

We have an example of what the treatment material will be on show today.

# Let's talk facts

## The scheme will cope with extreme weather conditions experienced in Nenthead.

The scheme will be carefully designed to withstand extreme weather such as the cold, rain, snow and wind experienced in Nenthead.

Since August 2022, we have been monitoring weather conditions from a new temporary weather station at the proposed treatment pond location. So far, this confirms that data from the Warcop weather station are suitable for assessing the potential impacts from the treatment scheme.

## Water in the treatment ponds.

The water in the ponds is the same groundwater that currently goes into the river without treatment. It is high in metals and so is damaging to fish and river-flies that live in water.

The treatment ponds will be fenced off to prevent inadvertent access but the water itself is not expected to be harmful to wildlife such as birds that might land on the ponds.

## Hydrogen peroxide use is safe, and it will be well managed.

Hydrogen peroxide is often used to manage hydrogen sulphide odour from all types of industries. We expect to use no more than 40 litres of hydrogen peroxide each day and would store up to 4000 litres on site.

Delivery of the hydrogen peroxide will depend on dosing rate, but we anticipate deliveries 3 or 4 times per year.

## The treatment scheme will require minimal maintenance

The treatment layer in the ponds will need to be replaced every 20-25 years.

The reed beds will need to be maintained every few years using an amphibious vehicle that cuts back the reeds.

Sensors at the site will send information to the operator so that the site can be monitored without needing to visit. Staff will visit regularly to take water quality samples and check that the site is performing as expected.

## The treatment process at the Nenthead site is nature-based.

The metals are removed from the mine waters by natural processes.

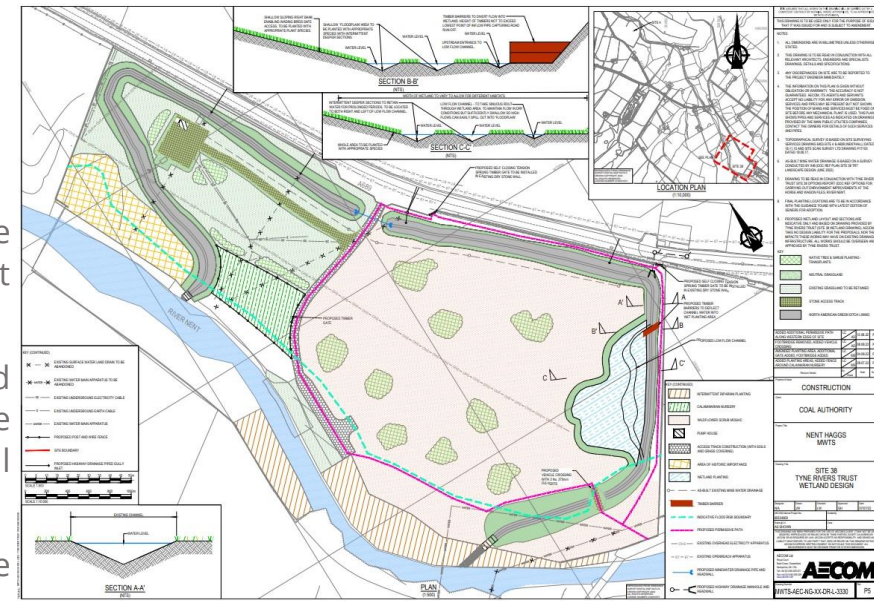
We are investigating if we can generate renewable energy to off-set some of the unavoidable costs of pumping mine water up to the treatment ponds.

# Nent Hagg: The Horse and Wagon field project

At Site 38 (also known as the Horse and Wagon field) which contains the mine water pumping station, we have been working with Tyne Rivers Trust to improve and enhance the field for wildlife and local residents.

Work began in August 2022, funded by the WAMM programme and Northumbrian Water's South Tyne Holistic Water Management Project. We discussed the proposals with local residents, the North Pennines National Landscape team and Westmorland and Furness Council.

Groundworks and planting, including of meadow grasses and trees, were completed in 2023. The wall next to the A689 has been replaced.



We created a wetland in the swale that takes surface water from the A689 to the river. Some calamarian (metal-tolerant) plants are already growing in the new 'nursery' area – we will observe how these self-seeded plants grow before doing any 'active' gardening.

## The site is now starting to bloom

The wetland plug plants have taken



The grass is coming through



99% of the trees are showing signs of budding



Mountain pansy



Pyrenean scurvy-grass



Tyne Rivers Trust and their volunteer network will be looking after the site for the WAMM Programme.

# Nent Hagsgs Mine Water Scheme

Progress Update, March 2024

## Transferring mine water from the Hagsgs adit to the treatment ponds



The Nent Hagsgs mine water is one of the main reasons why 60km of river is polluted by metals, as it releases about 3 tonnes of zinc and cadmium each year.

The mine water treatment scheme, which will remove at least 70% of the metals from the mine water, is due to start operating in 2024.



Mine water flows by gravity in a buried pipeline from the Hagsgs adit in Nentsberry to the pumping station on the Horse and Wagon field (site 38).

It is then pumped to the treatment ponds (site 4) by Foreshield Bridge.

We have installed approximately 2.5km of pipe to take the mine water to the treatment ponds.

## The treatment ponds and reed beds (site 4)



The treatment ponds have been lined, and all of the pipelines, chambers and drainage systems installed. The reeds were planted in the reed beds in May 2023 and grew well over the summer. Trees, bushes and grass have been planted in accordance with the planning permission and will help the site gradually blend into the local landscape.

The mechanical and electrical equipment, including water quality and gas sensors, was installed during autumn 2023. Since December, the mine water has been pumped up to the treatment ponds as part of the "wet testing" of the system. There is no risk of odours because no treatment is taking place.

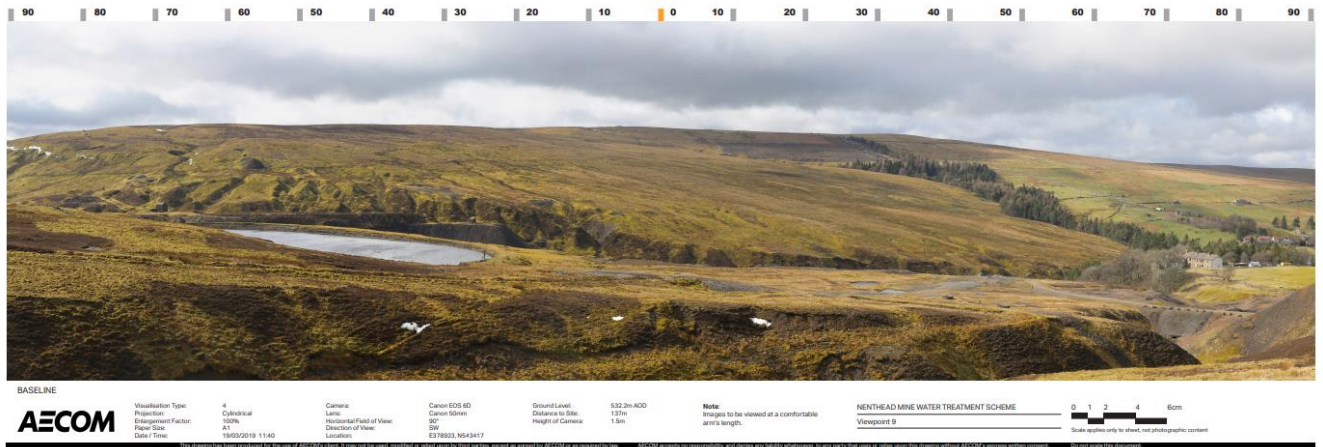
In the spring, we will place the treatment layer – a mixture of limestone gravel, wood bark and straw – in one of the ponds and start treating about one third of the mine water. After about 3 months (when we have shown that the scheme does not cause nuisance odours), we will start using the second and third ponds so that we can treat all of the mine water, and help to improve water quality in up to 60km of rivers.



# Visualisation Viewpoint 9

## From junction between A689 and Carrshield road

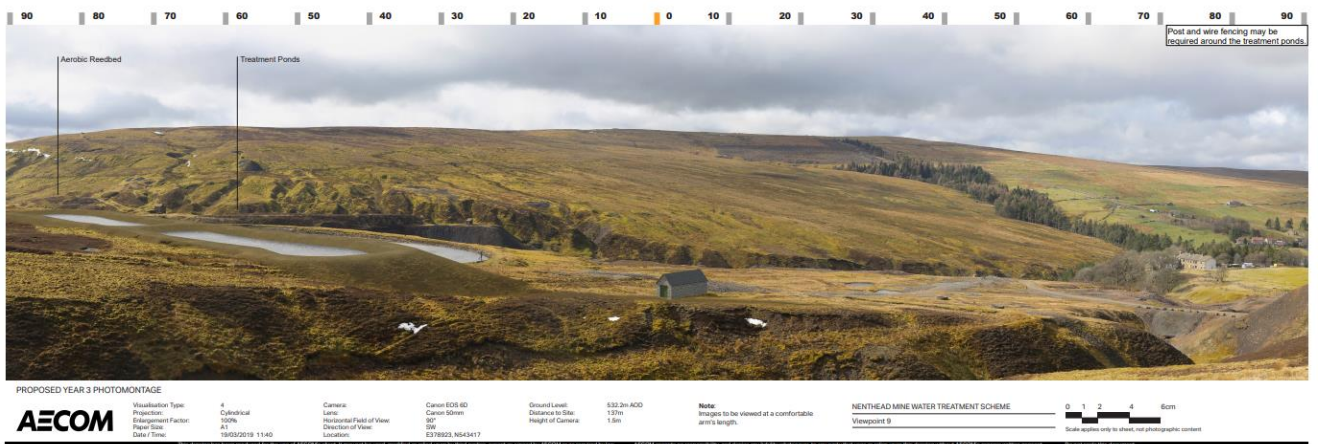
### Now



### 1 year after construction is complete



### 3 years after construction is complete



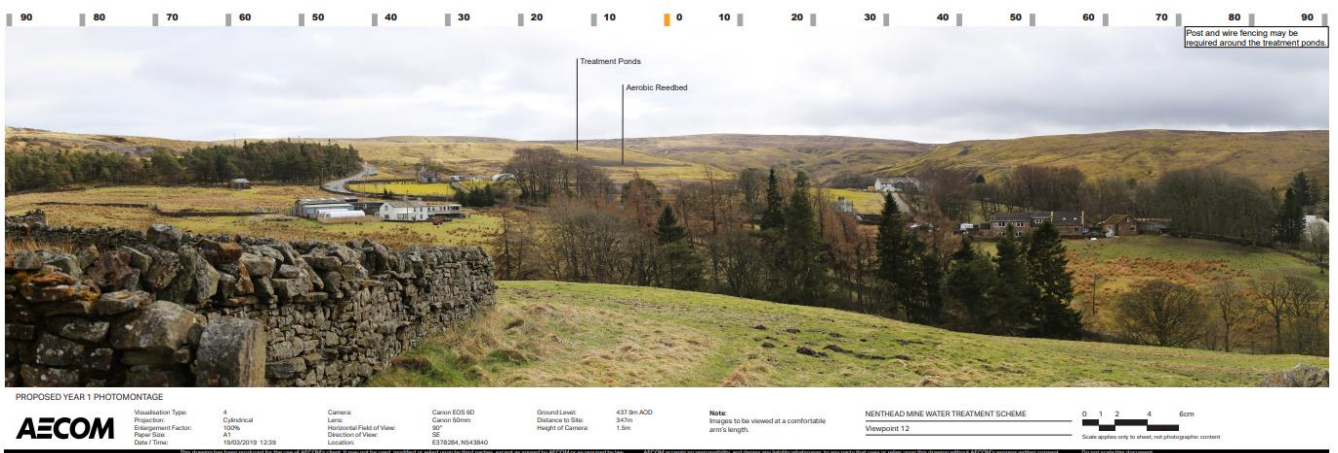
# Visualisation Viewpoint 12

## From above Nenthead

### Now



### 1 year after construction is complete



### 3 years after construction is complete



# Visualisation Viewpoint 10

## From quarry track at A689

Now



**BASELINE**

<b>AECOM</b>	Visualisation Type: 4	Camera: Canon EOS 80D	Ground Level: 503.3m AOD	<b>Note:</b> Images to be viewed at a comfortable arm's length.	NENTHEAD MINE WATER TREATMENT SCHEME Viewpoint 10
	Projection: Cylindrical	Lens: Canon 50mm	Distance to Site: 317m		
	Engagement Factor: 100%	Horizontal Field of View: 90°	Height of Camera: 1.5m		
	Paper Size: A1	Direction of View: S	Location: E378635_N643589		
Date/Time: 19/03/2019 11:54					0 1 2 4 6cm Scale applies only to sheet, not photographic content

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## 1 year after construction is complete



**PROPOSED YEAR 1 PHOTOMONTAGE**

<b>AECOM</b>	Visualisation Type: 4	Camera: Canon EOS 80D	Ground Level: 503.3m AOD	<b>Note:</b> Images to be viewed at a comfortable arm's length.	NENTHEAD MINE WATER TREATMENT SCHEME Viewpoint 10
	Projection: Cylindrical	Lens: Canon 50mm	Distance to Site: 317m		
	Engagement Factor: 100%	Horizontal Field of View: 90°	Height of Camera: 1.5m		
	Paper Size: A1	Direction of View: S	Location: E378635_N643589		
Date/Time: 19/03/2019 11:54					0 1 2 4 6cm Scale applies only to sheet, not photographic content

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## 3 years after construction is complete



**PROPOSED YEAR 3 PHOTOMONTAGE**

<b>AECOM</b>	Visualisation Type: 4	Camera: Canon EOS 80D	Ground Level: 503.3m AOD	<b>Note:</b> Images to be viewed at a comfortable arm's length.	NENTHEAD MINE WATER TREATMENT SCHEME Viewpoint 10
	Projection: Cylindrical	Lens: Canon 50mm	Distance to Site: 317m		
	Engagement Factor: 100%	Horizontal Field of View: 90°	Height of Camera: 1.5m		
	Paper Size: A1	Direction of View: S	Location: E378635_N643589		
Date/Time: 19/03/2019 11:54					0 1 2 4 6cm Scale applies only to sheet, not photographic content

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# Visualisation Viewpoint

## From Hilltop Cottages

### Now



### 1 year after construction is complete



### 3 years after construction is complete



# Keeping In Touch

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We are keen to hear your thoughts about the proposals and help you stay up to date with the project.

You can do this by:



Signing up to our [email newsletters](#) by leaving your email details with a member of the project team here today.



Checking out our [website](#) at - <https://consult.environment-agency.gov.uk/north-east/nenthead-mwts/> or by scanning the adjacent QR code



Asking [any questions](#) via [nent@coal.gov.uk](mailto:nent@coal.gov.uk) or calling 0345 762 6848.

We will also continue to post details of key updates relating to the proposed scheme to properties in Nenthead.

# The WAMM Programme

Britain has a long industrial history of mining for minerals. Despite most mines closing towards the end of the 19<sup>th</sup> Century, about 1500km of rivers are still polluted by metals such as cadmium, lead and zinc.

These metals cause harm to fish and other river wildlife. In most rivers impacted by abandoned metal mines, metals are the only reason why the rivers are polluted.

Before 2000, mine operators could abandon mines without having to take responsibility for dealing with ongoing pollution of rivers after mining ended.

If Government does not act, thousands of tonnes of metals will continue to pollute our rivers for hundreds more years.



The map above shows where rivers are polluted by abandoned metal mines in England.

## The Water and Abandoned Metal Mines (WAMM) Programme

The WAMM programme was set up in 2011 to begin to clean up the 1,500km of English rivers polluted by abandoned metal mines. It is a partnership between the Environment Agency, the Coal Authority and the Department for Environment, Food and Rural Affairs (Defra).

In January 2023, Parliament approved new legally-binding targets under the Environment Act. One target is to halve the length of rivers polluted by abandoned metal mines by 2038. This strengthens existing commitments made in the Government's 25 Year Environment Plan and the statutory River Basin Management Plans.

The WAMM Programme currently operates four mine water treatment schemes with a fifth (Nent Hags) opening in early 2024. The new Environment Act target means up to 40 new treatment schemes will be needed along with a similar number of diffuse interventions. The proposed scheme at Nenthead is one of these new schemes.

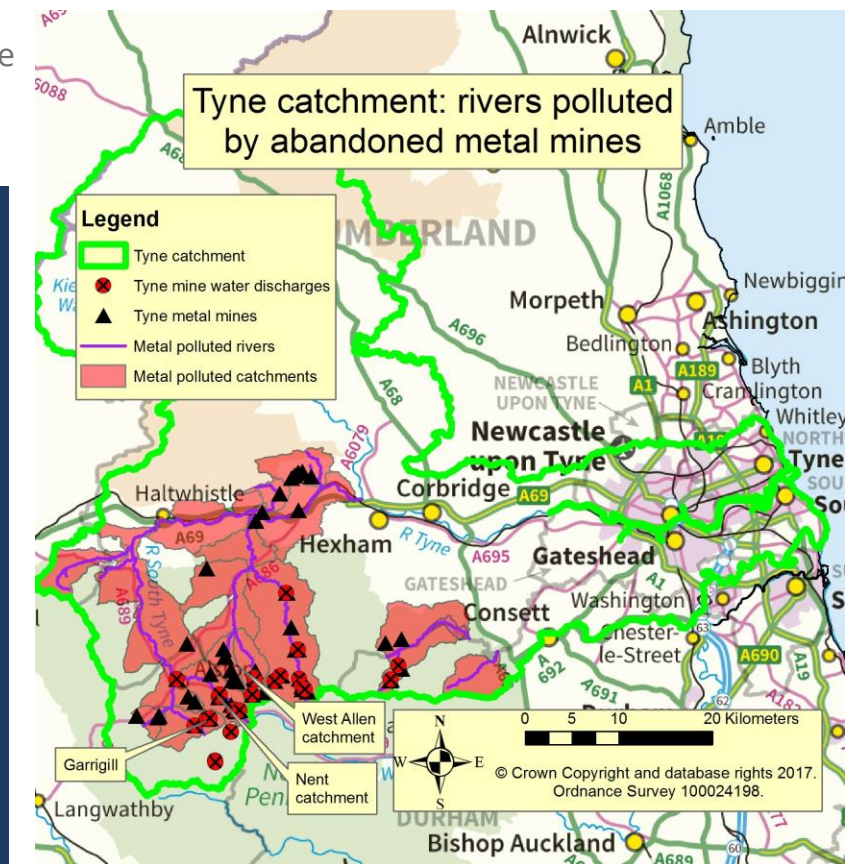
# Metal Pollution in the South Tyne catchment

Although most mining activity had stopped by the mid-20th century, more than 150km of rivers in the Tyne catchment are still being polluted by cadmium, lead and zinc. These metals harm fish and other river life, and will continue to do so for hundreds more years unless action is taken.

As well as polluting the river water, the metals collect in river sediments and ultimately accumulate in the Tyne estuary.

The River Nent is the second most metal polluted river in England, and the most polluted in northern England. This pollution by cadmium, lead and zinc comes from several different sources and the effects on water and sediment quality, and aquatic life can be seen for 60km along the River South Tyne and in the Tyne Estuary.

The map to the right shows the catchments in the River South Tyne that are polluted by abandoned metal mines.



## Water Quality in the River Nent

Clean water is fundamental for human health and wellbeing, for wildlife and for our economy. Pollution in our rivers has significantly reduced but more work is needed to ensure a healthy water environment.

The Northumbria River Basin Management Plan explains the current condition of rivers in the South Tyne catchment, where and why water bodies are polluted, and the statutory objective for water bodies to reach good status by 2027.

The River Nent is currently classed as poor for fish (so between moderate and bad) and moderate for invertebrates (river-flies) due to metals from abandoned mines.

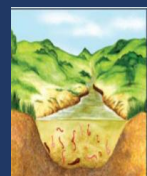
### Examples of river quality standards in watercourses



Good



Moderate



Bad

# The River Nent: fish surveys

## Environment Agency monitoring

Between 2017 and 2019, the Environment Agency monitored fish and invertebrate (river fly) populations along the River Nent to provide baseline data for the WAMM project.

Monitoring was undertaken at several locations along the River Nent, as well as from the Deepdale Beck, a tributary of the River Tees, which is similar to the Nent except that it isn't polluted by abandoned metal mines.

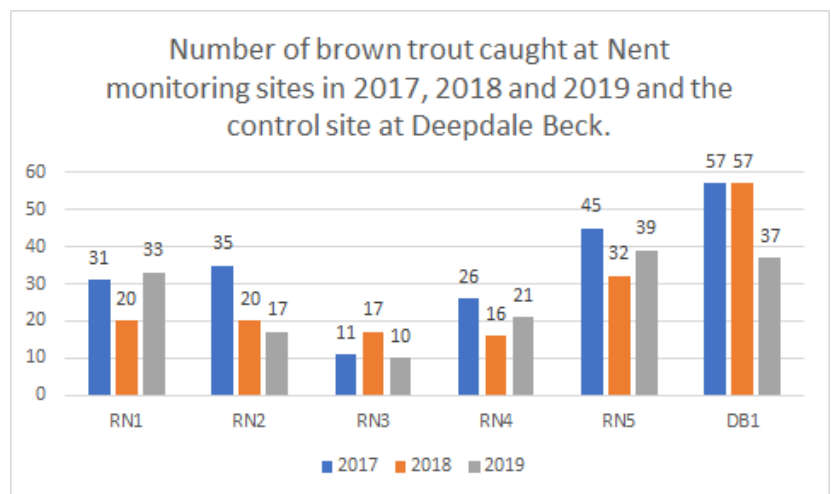
### Results

In Deepdale Beck, we found a diverse fish population with Brown Trout, Atlantic Salmon, Grayling, Bullhead, Stoneloach and Minnow recorded, as well as a healthy river-fly population.

Across the 3 years, the only fish found in the River Nent were Brown Trout (migratory fish like salmon are not expected because the Nent Force waterfall is a natural barrier). There were only about half as many trout in the Nent compared to the Deepdale Beck. We found no juvenile fish (less than a year old) in the main River Nent channel and we believe this is because the younger fish live in tributaries where the metal concentrations are lower.

This graph shows the number of fish recorded at the 5 sample sites along the River Nent, and the control site on the Deepdale Beck.

It is likely that these populations have developed some tolerance to the extremely high levels of zinc, cadmium and lead which would normally be acutely toxic to fish.



A similar story was found for river-flies with the surveys recording a lower number and less diverse population. Overall, these results illustrate that aquatic wildlife in the River Nent is heavily impacted by the high metal concentrations and is less resilient and abundant than in similar un-polluted rivers.



# You Said, We Listened – Mar 2024

## You said

You are concerned about the impacts of construction and operation of a scheme on the community.

## What we've done

We have developed a set of "Construction Principles" outlining how we propose to minimise impacts on the community if we were to build the scheme. We would like to hear comments from the community via [nent@coal.gov.uk](mailto:nent@coal.gov.uk) or at our regular drop-in events at the Hive.

These principles will be refined based on discussions with contractors and feedback from the community and other stakeholders.

## You said

You are disappointed that the sand martins have still not returned to the Nenthead riverbank.

## What we've done

In February 2024 we asked a local contractor and Tyne Rivers Trust to carry out an investigation of the existing artificial sand martin habitat.

As a result of this, we're looking to make some improvements to attract the sand martins back.

## You said

You would like to know where the contractor compound areas will be during construction.

## What we've done

We have now identified contractor compound areas and locations across the mine site that will be used, if we get permission to construct the scheme.

We have brought these plans to share with you today.

## You said

You are concerned about the impact of increased traffic through the village during construction of the scheme.

## What we've done

We have commissioned a traffic survey within the village which will provide us with a baseline understanding of traffic travelling through Nenthead. Areas surveyed will include the A689 and the road across to Overwater.

This will help us to determine what would be a reasonable addition to traffic and how we can best manage additional traffic during peak times.

## You said

You are concerned about the impact of construction on black grouse on the Nenthead mine site / in the area.

## What we've done

We will be completing a survey in the coming weeks to determine whether there are black grouse populations in the area, and where they are residing. The results of this survey will help us to reduce impacts on the birds in the area.

## You said

You are concerned about noise and vibrations from the operation of the scheme.

## What we've done

We will be completing an additional noise and vibration survey early in 2024.

We did a baseline noise survey in October 2022. This new survey will give us extra information to help design the pumping station in a way to avoid causing a noise nuisance.

# You Said, We Listened – May 2023

## You said

You are concerned about the impacts of construction and traffic disruption in the village.

## What we've done

We are aiming to minimise any traffic disruption by avoiding any work in the A689 and will share the draft construction and traffic management plan as soon as possible.

## You said

You would like us to share information about the project better.

## What we've done

We have held monthly informal drop-in sessions at the Hive since August. We hope this is helping people to hear more about the proposed scheme.

We will continue to hold community events at key stages to share the latest information with you.

We have created a website to share information about the project including the results of surveys and other report.

## You said

You are concerned about the noise from the pumping station.

## What we've done

We have carried out a baseline noise survey so that we can design the pumping station to avoid causing a noise nuisance.

Most of the background noise is from the River Nent. We will repeat the survey in summer 2023 when river flows are lower so it should be quieter.

## You said

You are concerned about odour from the treatment scheme.

## What we've done

We have moved the treatment ponds further away from houses and reversed the changed where treated water comes out of to decrease the risk of odour nuisance. , and also moved . This includes the location of the odour dosing control point being at the most southerly point on the plans.

Our modelling assessment shows that any emissions of hydrogen sulphide will be considerably below levels set by WHO to protect human health.

## You said

You are concerned about whether building the treatment scheme over old mine workings will be safe.

## What we've done

We completed a Shallow Mines Risk Assessment in July 2022 which assessed any risks to the stability of the proposed development from underlying mine workings hazards. It highlighted one area for concern where a void was identified. The risk assessed at that location was ranked as medium to high and further ground investigation was recommended.

In January 2023 we completed a more in depth assessment looking at mine plans and which included an underground visit. Our geotechnical engineering experts have concluded that the risks of building the ponds above the mine workings is very low.

# You Said, We Listened – Nov 2022

## You said

You are concerned about the impacts of construction and traffic disruption in the village.

## What we've done

We have committed to sharing with you a draft construction and traffic management plan as soon as possible.

## You said

You were concerned about the meteorological data we were using.

## What we've done

In August 2022 we installed a temporary weather station on the Nenthead Mine Site to gather site specific data.

## You said

You are not clear about how we selected the site to build the scheme on.

## What we've done

We have updated the summary of our site selection to make this clearer and provide more information about the process.

## You said

Ecology surveys should be done during different times of the year to reflect the higher altitude conditions in Nenthead.

## What we've done

Throughout 2022 we have updated our ecological surveys to reflect the climatic conditions in Nenthead. We have brought this information to share with you today.

## You said

You are concerned about the noise from the pumping station.

## What we've done

We have agreed to determine the detailed pump specification earlier than originally planned. We can then design the pumping station building so that we can explain why it will not cause a noise nuisance.

We have also carried out a baseline noise survey and will repeat it when river flows are lower and so it will be quieter (most of the background noise is from the River Nent).

## You said

You would like us to share information about the project better.

## What we've done

We have held monthly informal drop-in sessions at the Hive since August. We hope this is helping people to hear more about the proposed scheme.

We are committed to holding a formal community event on a weekend in spring 2023.

## You said

Could we install the required pipeline under the river.

## What we've done

We asked our engineering experts to investigate whether we could install the pipeline from the adits to the treatment ponds in the river channel rather than in the track.

They concluded that it would be so expensive and there are so many technical challenges that it is not viable.

## You said

You are concerned about odour from the treatment scheme.

## What we've done

We have moved the treatment ponds further away from houses.

Our modelling assessment shows that any emissions of hydrogen sulphide will be considerably below levels set by WHO to protect human health.

## You said

You want to see the Nent Hagsgs scheme operating before we build a scheme at Nenthead.

## What we've done

We have chosen to delay submission of a planning application so we can gather more information. This also means the Nent Hagsgs scheme will be operating before we submit the planning application for the Nenthead scheme.

## You said

You are concerned about the impact of construction on red squirrels.

## What we've done

We have been in contact with the local red squirrel group and have seen the red squirrels. We will explain how we intend to minimise impacts of construction activities earlier than we would normally do in a project. We will provide more information in the spring.

# Nenthead Diffuse Interventions

## Surface Water Management and Check Weir

We know that the movement of metal rich sediment across the local landscape also contributes to metal pollution of our rivers. As well as tackling point source pollution, we also need to tackle these diffuse sources of pollution. Diffuse pollution is where metal contaminated materials, such as from old spoil heaps, wash or erode into rivers.

We have already completed the installation of a series of interventions to protect our rivers from diffuse pollution in the area. We are continuing to explore options across the catchment for further interventions, including on the Nenthead Mine Site.

Below are some examples of the interventions we have installed over the past few years.

### Galligill Burn



The use of timber revetments and geo-coir matting to stabilise spoil prevent around 24kg lead and 43kg zinc from reaching the watercourse each year.

### Garrigill Burn



Log revetments stabilise contaminated spoil and small-scale check weirs slow the flow of water across the landscape preventing metals reaching the Burn.

### Nent Banks



Timber revetments installed along a 350m length of the River Nent prevent around 98kg zinc and 35kg lead from reaching the river each year.

### Sipton Terrace



Repaired stone walling (shown above) and timber revetments installed across the site prevent around 172kg zinc and 120kg lead from reaching the Sipton Burn and River East Allen each year.

# NENTHEAD DIFFUSE POLLUTION MEASURES: POTENTIAL OPTIONS

**INTERVENTION I -**  
ENGINEERING WORKS TO PREVENT SURFACE WATER FLOODING ALONG QUARRY ACCESS TRACK



**INTERVENTION T -**  
EXISTING CHECK WEIR. REPLACEMENT/REFURBISHMENT WORKS REQUIRED



**INTERVENTION R -**  
UNBLOCK CULVERT



**INTERVENTION O -**  
POTENTIAL REINSTATEMENT OF EXISTING PIPE



**INTERVENTION M -**  
LOCAL INCREASE TO LEAT CHANNEL SECTION



**INTERVENTION L -**  
INSTALLATION OF CALIBRATED WEIR ON RAMPGILL BURN



**INTERVENTION Q -**  
POTENTIAL TO DISCHARGE SURFACE WATER INTO RAMPGILL BURN



**INTERVENTION S -**  
CONSTRUCTION OF IMPERMEABLE SURFACING AND PROVISION OF DRAINAGE INFRASTRUCTURE



**INTERVENTION K -**  
PROVISION OF HIGH LEVEL CULVERT UNDER CARRS SHOP



**INTERVENTION N -**  
PROTECTION OF PROPOSED DRAINAGE INFRASTRUCTURE



**INTERVENTION H -**  
HYDRAULIC ASSESSMENT OF EXISTING LEAT CHANNEL



**KEY**

— LEAT CHANNEL  
--- WATERCOURSE

**INTERVENTION J -**  
STRUCTURAL REFURBISHMENT WORKS AND PROVISION OF DRAINAGE



**INTERVENTION E -**  
ENGINEERING WORKS ALONG RIVER NENT



**INTERVENTION A -**  
IMPROVEMENTS TO DOWGANG BURN LEAT



**INTERVENTION P -**  
REINSTATEMENT OF NATURAL SURFACE WATER CHANNEL



**INTERVENTION F -**  
MANAGEMENT OF SURFACE WATER FLOW INTO HANDSOME MEA RESERVOIR



**INTERVENTION D -**  
ASSESSMENT OF EXISTING LEAT FOR TREATMENT / REINSTATEMENT



**INTERVENTION C -**  
INSTALLATION OF CALIBRATED WEIR AT LONGLEUGH BURN



**INTERVENTION B -**  
INSTALLATION OF CALIBRATED WEIR AT OLD CARRS DRAIN



# NENTHEAD ECOLOGY SUMMARY

## FOR FURTHER INFORMATION REFER TO-

- MWTS-AEC-NC-XX-RP-Y-3110 P2 - Preliminary Ecological Appraisal
- MWTS-AEC-NC-XX-RP-Y-3111 P2 - Upland Breeding Bird Survey Report
- MWTS-AEC-NC-XX-RP-Y-3112 P2 - Otter and Water Vole Survey Report
- MWTS-AEC-NC-XX-RP-Y-3113 P2 - Reptile Survey Report
- MWTS-AEC-NC-XX-RP-Y-3120 P2 - Tree Survey report

## NOTES:

- All surveys were carried out by qualified ecologists in accordance with all relevant standards.
- Other surveys were undertaken but no other ecological species were found.

## LOCAL ECOLOGY



A fully mature Beech



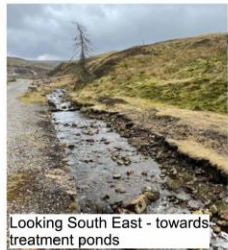
High quality group, consisting of mostly Sycamore



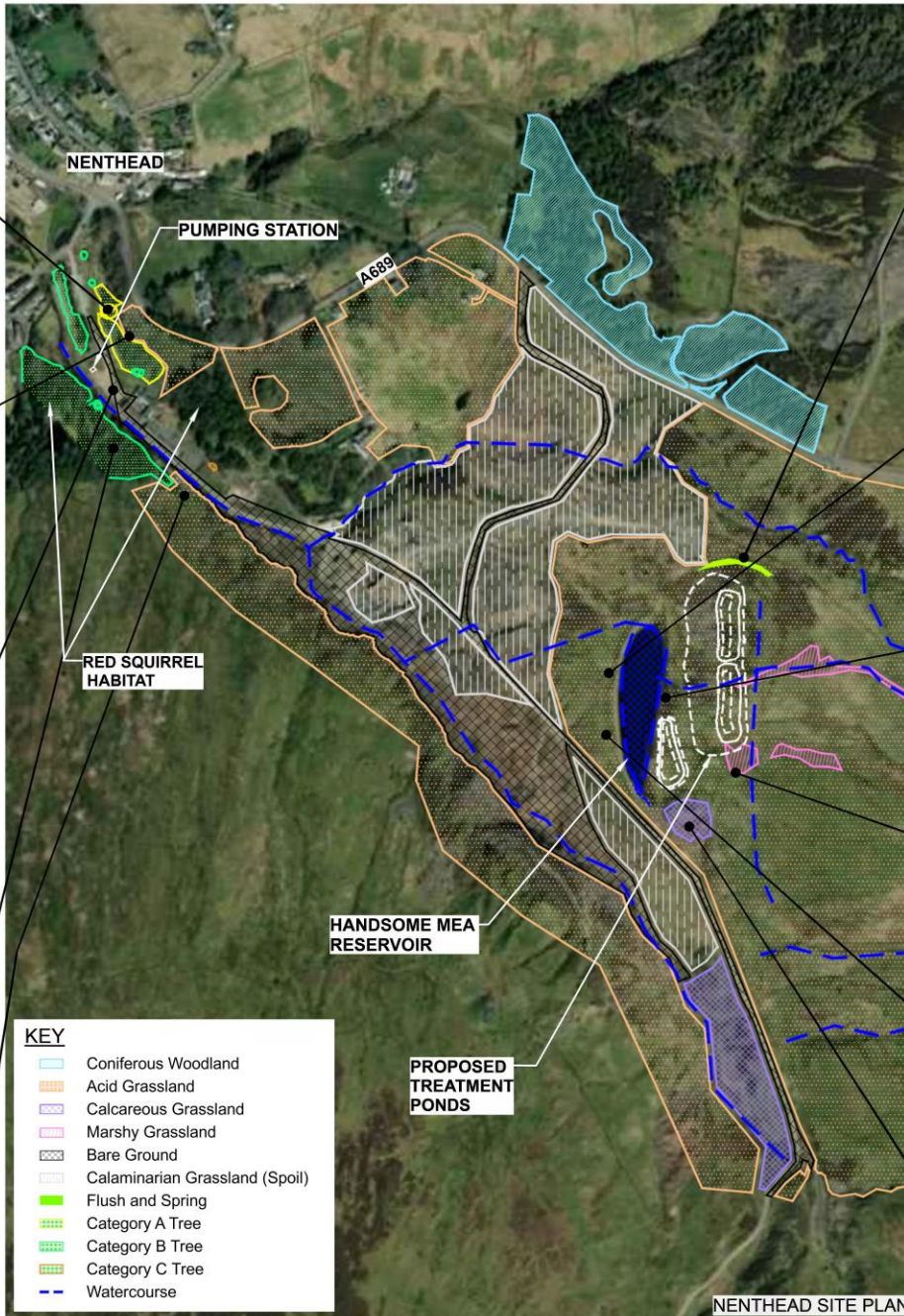
View up stream of River Nent from NMCS car park



Woodland group of mostly Larch and Pine



Looking South East - towards treatment ponds



Acid / Neutral Flush



Smooth / Palmate Newt



Handsome Mea Reservoir



Transition between Acid and Calcareous Grasslands



Calaminarian Grassland (Spoil)



Calcareous Grassland

## ECOLOGICAL FEATURES POTENTIALLY AFFECTED BY THE PROPOSED SCHEME -

- Calaminarian grassland, calcareous grassland, upland flushes, fens and swamps, River Nent.
- Great Crested Newt (none found but several ponds within Site boundary).
- Red squirrel (in woodland adjacent to the Site).
- Reptiles.
- Breeding birds.
- Bats (potential roosts in Capelcleugh and Rampgill adits).
- Otter (River Nent and associated tributaries).
- Water Vole (River Nent and associated tributaries).

## RECOMMENDATIONS FOR MITIGATION OR ADDITIONAL ASSESSMENT -

- Breeding birds** – avoidance of habitat clearance within the nesting season where possible (March to August inclusive). Where site clearance works are to be carried out in the bird nesting season, a check for nests should be undertaken by a suitably experienced ecologist and if a nest is found, then a buffer zone would be required around the nest site and works in that would not be able to proceed until the young have fledged.
- Reptiles** – staged approach to vegetation clearance during construction to minimise the risk of accidental killing/ injury to be set out in a Precautionary Working Method Statement (PWMS).
- Red squirrel** – retention of habitat connectivity during and post construction, retention of mature trees, checks for dreys in close proximity to construction activity and implementation of appropriate buffers where dreys are identified.
- Toolbox talk** – to be given to all contractors to identify above risks and ensure appropriate working practices to be adopted to minimise impacts on protected species.
- Protected species recording** – a record will be made of any protected species observed during the construction works in and around the Site, particularly red squirrel.
- Habitats** – further work is needed to identify mitigation or enhancement measures to minimise impacts on the sensitive acid / neutral flush, calaminarian and calcareous grassland communities.
- Bats** – it is recommended that once the scheme is further defined, bat surveys are undertaken in the mine adits should there be potential for impacts on bat roosting habitats.