



Report Reference:	Biodiversity Management Plan and Public Open Space and Strategy Westwood Mills , Linthwaite
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The information which we have prepared and provided is true and has been prepared and provided in accordance with the CIEEM's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions. This report does not constitute legal advice.

Introduction

Brooks

Ecological

Grounded advice

This Biodiversity Management Plan and Public Open Space Strategy (The Plan) is produced to show how biodiversity is a central consideration at this site and to show how biodiversity and public accessibility and human wellbeing are intimately linked.

The Plan is produced with reference to Chapter 11 of British Standard 42020.

To provide information on the Site's ecological value, the following studies have been carried out; with the relevant reports produced being:

Preliminary Ecological Appraisal Report: R-2506-01—Brooks Ecological, 2016

Updating Ecological Appraisal: P-3976-01— Brooks Ecological, 2019

Riparian Mammal Survey: R-3976-01—Brooks Ecological, 2019

Bat Emergence Survey: R-3976-02A- Brooks Ecological, 2020

Bat Activity Survey: R-3976-03A- Brooks Ecological, 2020

Floating Water – Plantain Survey: R-3976-o6-Brooks Ecological, 2020

Breeding Bird Report: R-3976-07— Brooks Ecological, 2020

Ecological Impact Assessment: R-3976-05B - Brooks Ecological, 2020

Aims of the Plan

To create a robust semi-natural landscape that will support high volumes of invertebrates and small mammals, which will attract predatory birds, larger mammals and amphibians. To bring ponds back into early successional stages which can support more aquatic wildlife. To protect riparian corridors. The landscape is to be semi-freely accessible to site users and to encourage interaction between children in particular and the natural world to help engender 'ownership' of the open spaces while retaining areas of protected habitats for wildlife.

Scope of Plan

This plan relates to the sites open spaces as illustrated right.

Delivering the Plan

The Developer is responsible for the creation and establishment works for a five-year period.

The Developer will appoint either a Specialist Ecological Management Company (SEMC) or a company working under the direction of an Ecological Clerk of Works (ECoW) to oversee the delivery of this plan prior to any work commencing on site.

The ECoW would be a qualified Ecologist and member of the Chartered Institute of Ecology and Environmental Management, or be otherwise approved by the LPA.

After year five, this plan will be the responsibility of a Site Management Company.



Plan Boundary

0 50 100 m

Themes

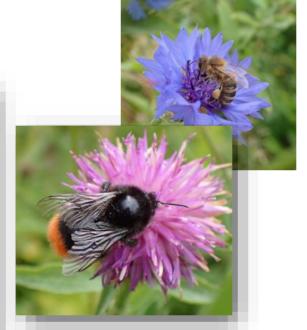
This site presents a great opportunity to inspire people to engage with the natural world, creating new accessible greenspaces linked to existing footpaths.

The main themes for biodiversity enhancements are focussed on creating new aquatic habitats and encouraging increases in invertebrate and small mammal populations.



Food for pollinators

Maximising the range and flowering period of pollen and nectar bearing plants increases potential invertebrate biomass and diversity.





Ponds

Introducing ponds into a site is a big win for biodiversity as they are rapidly colonised by aquatic invertebrates, amphibians and fish.

Natural play, natural locally



Birds

Enhancing habits for birds, encouraging growth of plants with berries. Creating new nesting opportunities.



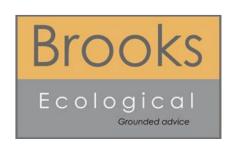


Deadwood for fungi and invertebrates

Accumulated deadwood and chippings spread on woodland floors are slowly broken down by fungi, whilst wood piles make homes for invertebrates, amphibians and small mammals. They also slow the release of carbon into the atmosphere.







Constraints

impacts.

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Grounded advice

This is a sensitive site with a number of key constraints which were identified in the Ecological Impact Assessment and supporting survey reports and which are further explored here. These constraints need to be carefully considered when delivering the development and place the measures proposed in this document are specifically designed to support the ecological value of the site and mitigate any development

1. The site contains a Local Wildlife Site and this LWS has records of the protected plant species floating water plantain. Although there is no current evidence of it

on site any more it will still be maintained as a suitable habitat for future re-occupation.

- 2. The site will support many birds during the nesting season.
- 3. The site lies in the Kirklees Wildlife Habitat Network so the ability for the site to allow wildlife to pass through freely needs to be retained.
- 4. Sensitive aquatic habitats enclose the site; the River Colne and the Huddersfield Narrow Canal. These are at pollution risk.
- The site supports Invasive Non-Native Plant species and development could lead to their spread on or off site.



Invasive nonnative plants present



Nesting birds will be present throughout







100 m

Opportunities

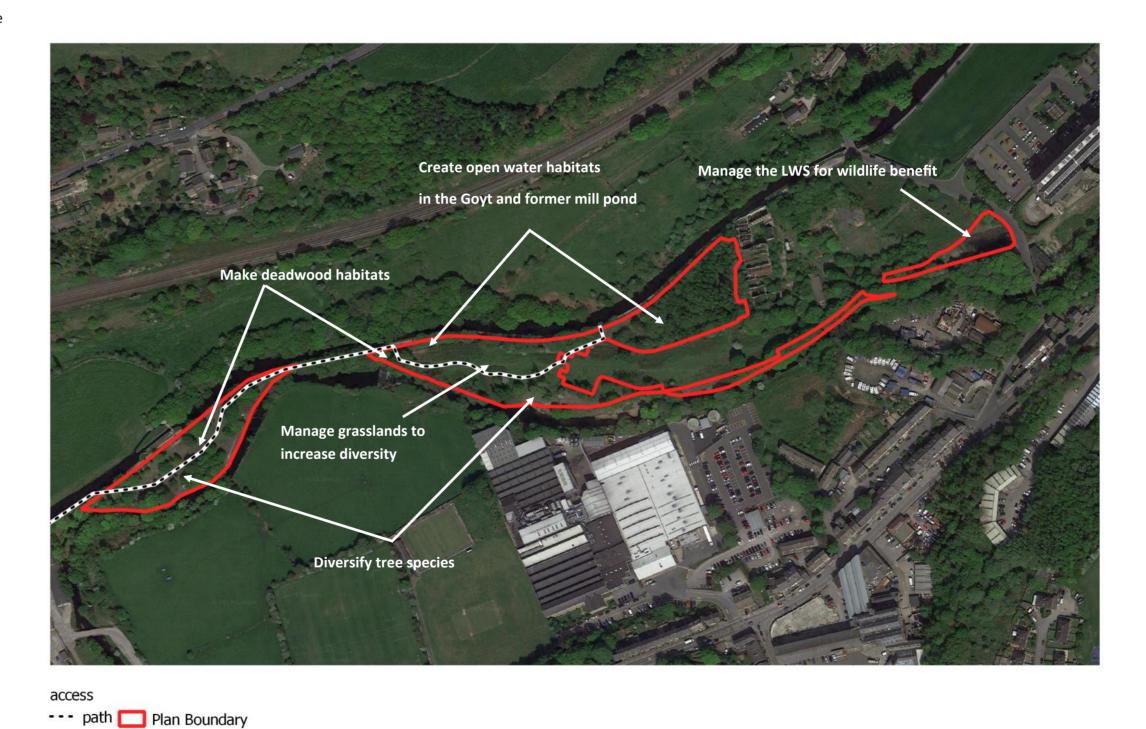
Brooks

Ecological

Grounded advice

The development will be an important driver to increasing public access, be a good educational resource and will bring some neglected habitats back to life and into active management.

- 1. There is the potential to secure the future of the protected floating water-plantain and aquatic habitats by preventing pond infilling with reedmace.
- New aquatic habitats will be restored from drained former mill pond and goyt through dredging and reprofiling.
- 3. Control of invasive plants allows native species to colonise or be reseeded (to be detailed in a CEMP: biodiversity).
- 4. Loss of wildflower grasslands to lower-value scrub can be halted.
- Tree species diversity can be increased and linear habitats reinforced by planting.
- 6. There is great scope to increase the accumulations of dead wood habitat on site.
- 7. Significant potential to introduce a programme of engagement and education encouraging volunteer involvement to deliver habitat restoration and installation works, increasing local understanding of the ecological issues and opportunities offered on the site.
- Publicly accessible enabling members of the public to enjoy a wide variety of grassland through to woodland and wetland habitats. This site represents a unique development solution in terms of the proportion of retained and visually and/or physically accessible open space to be enjoyed by the public which, inclusive of grasslands, woodlands, wetland areas, formal and informal open green space provision, currently stands at approximately 55% accessible open space which we endeavour to increase by 50%.



Ecological

Interaction with the landscape - Informal Play

Rationale

To inspire children to use the resources around them imaginatively for the purposes of self-led play and creative thinking. Helping children to value the natural world is

pivotal to preserving biodiversity.



- 1. Use natural materials such as wood, rope, willow.
- 2. Re-use materials found on site.
- 3. Encourage use of the landscape for informal creative play by providing materials, starting examples of woodland dens for children to take over and modify, creating seminatural tracks through the landscape leading to areas suitable for play.
- 4. Enable children to interact with the elements around them by enabling natural water play, providing materials which can be used to make sound if it is windy or if the materials are hit, explore opportunities to play with light and reflection.
- Install child friendly information on wildlife they could look for in each area enabling children to learn about the local ecology.

Specification

Use natural materials where possible to fix / secure structures or simply provide materials from within the site and allow the children to create their own structures.

If nails/screws/bolts are required, ensure there are no sharp edges or loose fittings that could cause potential damage to users. Avoid the use of these elements as far as possible.

Safety measures to be provided near water.

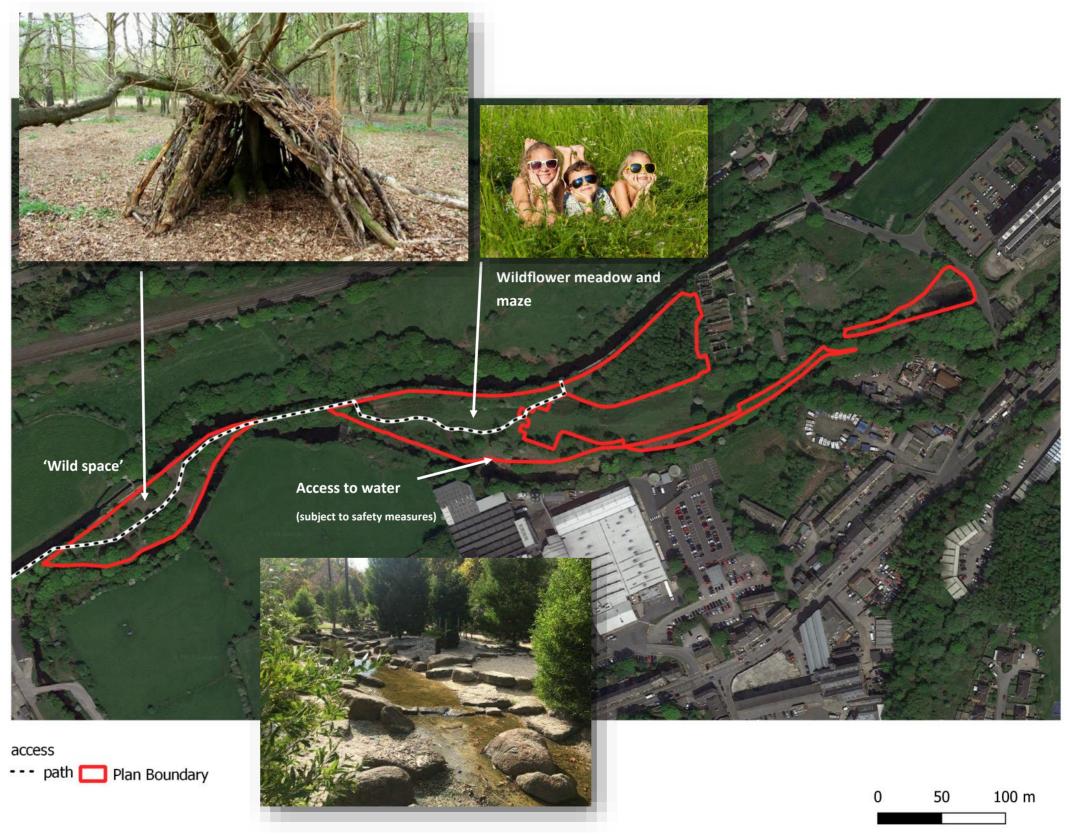
Management

Year 1

Consider temporary signage to indicate that play is permitted, to be removed after the first year.

Year 2 onwards

Ensure continuous replenishment of materials year on year. Mow grasslands to create mazes of paths through tall wildflower grassland.



Interaction with the landscape - Formal Play

Rationale

To inspire children to use the resources around them imaginatively while still providing a safe play environment for younger children, using natural materials in natural colours and finishes.



Objectives

- 1. Use natural materials such as wood, rope, willow, woodchip
- 2. Re-use materials found on site where possible
- 3. Create play opportunities which develop motor skills, problem solving, creative imaginary play, emotional learning
- 4. Features do not have to be restricted to the designated play area, opportunities for play and interaction with the environment should be provided along the access routes as well as within the wider grassland and woodland areas.
- 5. Include seating opportunities particularly in the formal play area for the use of supervising parents

Specification

Use natural materials where possible to fix / secure structures.

Where nails/screws/bolts are required, ensure there are no sharp edges or loose fittings that could cause potential damage to users.

Surround play features with natural floor material such as grassland or wood chip.

Management

Year 1

Low level maintenance, damage checks.

Year 2 onwards

Ensure play features are in sound condition, perform repairs or replacements as necessary, allow for the form of features to change and evolve year on year to retain interest.



LWS Management

Rationale

This water body is filling in with reedmace and will dry out without intervention. Maintaining the pond as a healthy balance of open water to marginal vegetation will maximise the ecological value of the habitat and increase its ecological longevity. Open water helps support the rare and protected plant Luronium natans which, while not currently present, has been recorded here in the past.

Objectives

- 1. Floating water plantain if present increases by year 5.
- 2. Trees and shrubs rooted not allowed to grow in the mill ponds walls.
- 3. Open water makes up 75% of area at year 1.
- 4. Emergent vegetation never attains more than 50% cover.
- 5. A continuous and diverse belt of emergent and marginal herbaceous plants is maintained.

Specification

Survey for floating water plantain (Luronium natans) and securing any license that may be needed and acting under the agreed method statement and CEMP (Biodiversity).

Woody vegetation removed under ECoW direction. Dredging carried out under ECoW supervision to leave shallow edges that can re-vegetate. Diversify marginal species through plug planting from schedule (overleaf).

Management

Year 1 – 2 weed management.

Year 3 onwards periodic pond clearance to prevent infilling.

Monitoring

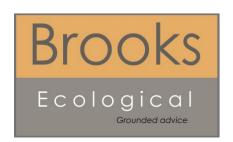
Year 3 and 5 Ecologist to record according to objective 1-4.

<u>Output</u>

ECoW report.

Remedial actions

Pond reprofiling and reseeding. Weed management. Re-dredge if it fills in too quickly.









0 50 100 m

Pond and Goyt Restoration

Rationale

Neither mill pond or goyt hold water and they are infilled with birch and invasive scrub. These will be made structurally sound and made to hold water again which will have significant benefits for wildlife not least providing valuable foraging opportunities to support the pipistrelle bat population found on site.

Objectives

- 1. Both features hold water permanently. Open water makes up a minimum of 85% of area at year 5.
- 2. Low light levels are maintained to support bat activity.
- 3. Vegetation never attains more than 75% cover from year 4 onwards.
- 4. A continuous and diverse belt of emergent and marginal herbaceous plants in all ponds.
- 5. Installation of information panels explaining the site's history and ecology for educational purposes.

Specification

Woody vegetation removed under ECoW direction acting under a Construction Environment Management Plan- <u>CEMP</u> (<u>Biodiversity</u>). Dredging carried out under ECoW supervision to leave shallow edges that can re-vegetate.

Seed exposed muddy margins with Emorsgate seeds EP1.

Plant marginal and emergent plug plants as schedules at 5 plants per linear m (shore and bank length). Planting to be directed by ECoW.

Management

Year 1 - 2 weed management.

Year 3 onwards periodic clearance to prevent infilling.

Monitoring

Year 3 and 5 Ecologist to record according to objective 1-4.

<u>Output</u>

ECoW report.

Remedial actions

Reseeding and replanting if required.



Marginal plants

Scientific **English** Hemp agrimony Eupatorum canabium Filipendula ulmaria Meadowsweet Angelica sylvestris Angelica Sanguisorba officinalis Great burnet Scrophularia nodosa Figwort Valeriana officinalis Valerian Pulicaria dysenterica Fleabane

Marginal Plants

Scientific
Iris pesudacorus
Lythrum salicaria
Caltha palustris
Mentha aquatica

English
Yellow flag
Purple loosestrife
Marsh marigold
Water mint



0 50 100 m

Birch clearance and dredging

Surface water runoff management—swales

Rationale

The site is designed to manage surface water runoff using natural landscape features rather than engineered solutions, within a context of significant on site water bodies. Swales help to temporarily capture runoff, releasing it slowly into the surrounding water table thereby preventing flooding issues.

Objectives

- 1. Temporarily hold water during periods of heavy rainfall.
- 2. Use planting to treat the water and cleanse it before it is released.
- 3. Contribute additional wildlife habitat and foraging opportunities.
- 4. Year round species rich planting strip which can tolerate dry conditions as well as waterlogged conditions during heavy rainfall.
- 5. Ensure ground level within the swale never increases beyond that originally specified in relation to surrounding ground level.

Specification

Create a below ground level running trench with sloping sides to capture runoff in times of heavy rainfall as shown opposite, in accordance with the SUDs report.

Seed exposed muddy margins with Emorsgate seeds EP1.

Management

Year 1 - 2 weed management.

Year 3 onwards ensure continuation of function by maintaining as built ground levels.

Monitoring

Year 3 and 5 Ecologist to record according to objective 1-5.

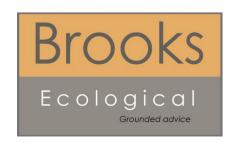
<u>Output</u>

ECoW report.

Remedial actions

Weeding, reseeding and replanting if required.

Removal of infill material to retain function if required.

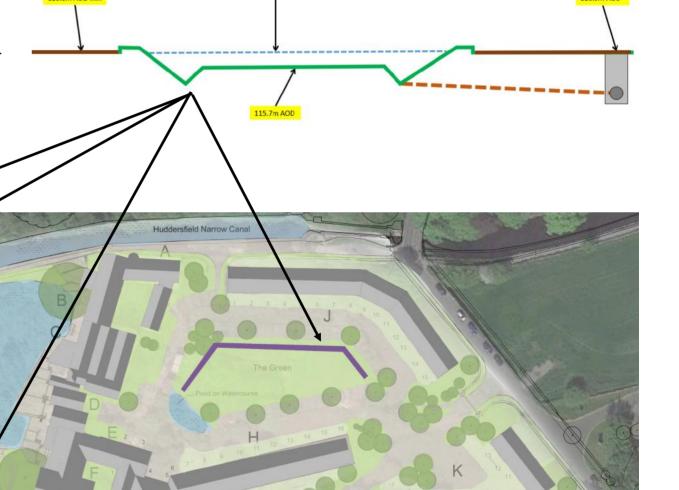


Marginal plants

Scientific **English** Hemp agrimony Eupatorum canabium Filipendula ulmaria Meadowsweet Angelica sylvestris Angelica Sanguisorba officinalis Great burnet Scrophularia nodosa Figwort Valeriana officinalis Valerian Pulicaria dysenterica Fleabane

Marginal Plants

Scientific	English
Iris pesudacorus	Yellow flag
Lythrum salicaria	Purple loosestrife
Caltha palustris	Marsh marigold
Mentha aquatica	Water mint



Flood management—'two-stage channel'

Rationale

This two-stage drop in the topography of the river bank provides a water containment area in times of increased river flow, increasing the capacity of the channel. Vegetating the created channel reduces the velocity of the water which protects the structure of the bank and reduces the potential for erosion.

Objectives

- 1. Temporarily contain floodwaters during periods of heavy rainfall.
- 2. Use planting to reduce velocity of floodwaters minimising damage.
- 3. Contribute additional wildlife habitat opportunities.
- 4. Year round species rich planting strip which can tolerate dry conditions as well as waterlogged conditions during heavy rainfall.
- 5. Ensure ground levels within the designed channel feature never increase beyond that originally specified in relation to the adjacent road level.

Specification

Create a stepped and vegetated bank between the river and the new access road and parking provision.

Seed exposed muddy margins with Emorsgate seeds EP1.

Interplant with shrubs increasing in density on level 2.

Management

Year 1 - 2 weed management.

Year 3 onwards ensure continuation of function by maintaining as built ground levels.

Monitoring

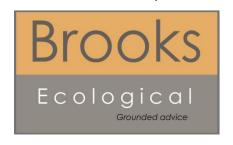
Year 3 and 5 Ecologist to record according to objective 1-5.

<u>Output</u>

ECoW report.

Remedial actions

Weeding, reseeding and replanting if required. Removal of infill material to retain function if required.

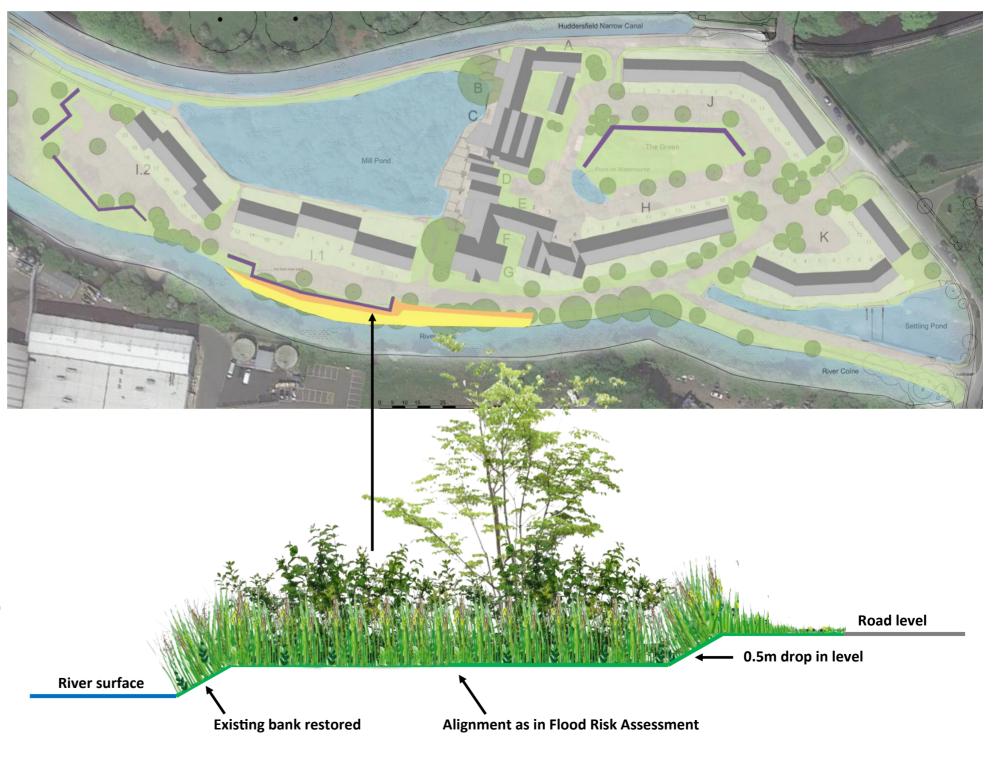


Marginal plants

Scientific **English** Eupatorum canabium Hemp agrimony Filipendula ulmaria Meadowsweet Angelica sylvestris Angelica Sanguisorba officinalis Great burnet Scrophularia nodosa Figwort Valeriana officinalis Valerian Pulicaria dysenterica Fleabane

Shrubs

Scientific	English
Cornus alba	Dogwood
Corylus avellana	Hazel
Sambucus nigra	Common elder
Frangula alnus	Alder buckthorn



100 m

Wildflower - Seeding, Plug Planting and Establishment

Brooks Ecological Grounded advice

Rationale

The figure below shows an estimation of the areas that may be disturbed or reprofiled through construction or dredging. In both cases, the rationale is to maximise the number of flowering plants to benefit invertebrates and in turn, larger fauna that will prey upon these. This will be achived through a combination of wildflower seeding, plug planting and wildflower management. The wildflower planting predominantly replaces existing neutral grassland and scrub providing a higher value habitat.

Objectives

- 1. Ensure that all seeding in the locations shown are subject to wildflower seeding and plug planting (grass only mixes not used).
- 2. Ensure that flowering plants attain, and remain at, no less than 50% of the sward.
- 3. Ensure that plants can flower (are not cut too often).

Specification

Emorsgate EM1 seed mix or similar.

Naturescape N₄ Summer Flowering plug plant mix or similar

Preparation

Topsoil removed or inverted (spread beneath subsoil) as per CEMP (Biodiversity). This will be loose tipped and spread with back actor to avoid compaction, and harrowed to a fine tilth ready for seeding.

Seeding

Seed or plant according to supplier's instructions. If soils have been spread before September, any weed growth that has established in the meantime will be sprayed off with glyphosate and a seedbed be re-prepared.

Seed will either be broadcast by hand or by approved lightweight machinery at c. 40Kg /Ha. Following seeding the area will be lightly rolled to incorporate the seed with the growing substrate.

Year 1 Management

Year 1

Use a weed wipe three times in year 1 to kill off weeds - Spear thistle, creeping thistle, broad-leaved dock, clustered dock, wood dock, curled dock, nettle, ragwort and others according to ECoW recommendations. Operative must be proven competent in identifying these in their early stages to prevent killing off sown wildflowers.

Monitoring

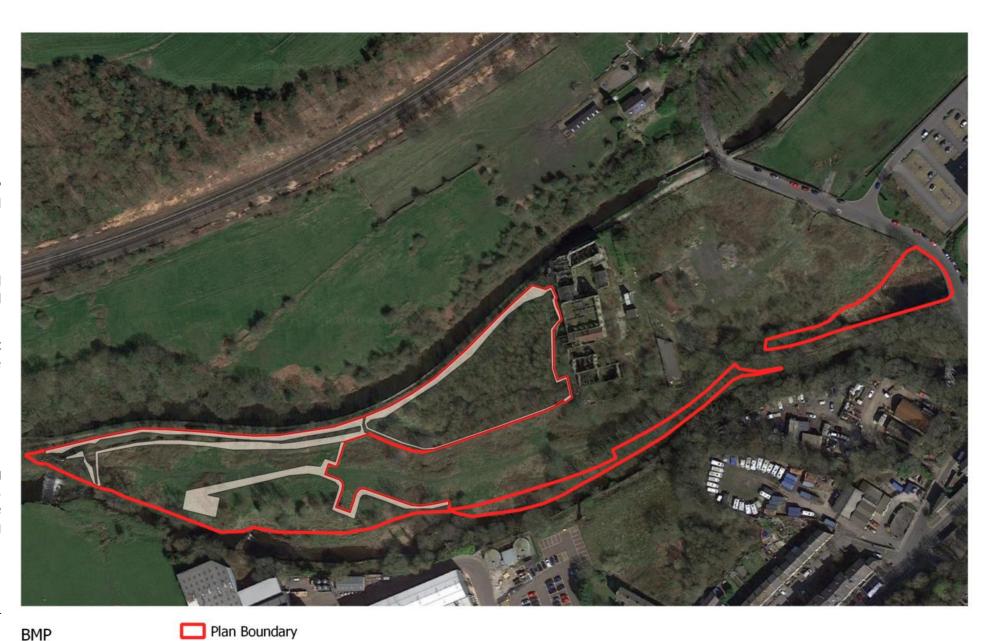
Year 2 Ecologist survey to record relative cover values according to objective 1 - 3

<u>Output</u>

ECoW report

Remedial actions

Localised weed control or over sowing with wildflower seed under the instructions of the ECoW.



seeding and planting

Native Tree Planting

Rationale

The retained trees and developing open woodland can be diversified to make them more ecologically resilient and provide food sources for wildlife. Additional woodland planting also compensates for any loss of existing on site woodland.

Objectives

- 1. 80% successful establishment.
- 2. Diversify tree species while using locally prevalent species .
- 3. Help create a well balanced stratified canopy.
- 4. Maintain a connected largely continuous canopy.

Specification

- Plant in non-grid, naturalistic patterns. Plant to schedule adjacent.
- Plant with UK provenance trees and shrubs from schedule 1 Set out in liaison with ECoW .
- Plant in staked tree shelters (rabbit gauge).

Management

Year 1-5

Standard landscape establishment maintenance

Remedial actions

Localised $\,$ weed control $\,$ or $\,$ replanting of failed material under the instructions of the ECoW $\,$

Monitoring

Year 3 and 5 Ecologist to record according to objective 1-4.

<u>Output</u>

ECoW report

Remedial actions

Replanting if required



Schedule 1 New trees

Scientific	English	Stock	Groupings
Quercus petrea	Sessile oak	1+1 BR	groups 1-3
Malus sylvestris	Crab apple	1+1 BR	groups 3-5
Prunus avium	Wild Cherry	1+1 BR	groups 1-5
Prunus padus	Bird Cherry	1+1 BR	groups 1-6
Sorbus aucuparia	Rowan	1+1 BR	groups 1-7
Betula penula	Silver birch	1+1 BR	groups 1-8
Alnus glutinosa	Alder	1+1 BR	groups 1-9



Dead wood habitat

Rationale

Woodlands make better habitats where deadwood can accumulate or chippings are spread, which are then slowly broken down by fungi. Wood piles make homes for invertebrates, amphibians and small mammals.

Objectives

- 1. 50% of cleared timber to be reused on site to assist with carbon accumulation.
- 2. Zero carbon emissions from taking wood off site to burn.
- 3. At least 10 species of wood rotting fungi found on site by year 10.
- 4. Significant dead wood resource still present at year 5.

Specification

Felled timber from site clearance to be retained on site and stacked in log piles in retained treed areas. Chip brash and spread under retained trees. Secure round wood piles with wire. Use chipped wood for footpaths.

Management

Non-intervention.

Monitoring

Ecological Clerk of Works year 2 and 5 monitoring visit to check wood is still on site and assess fungi baseline to objective 3.

<u>Output</u>

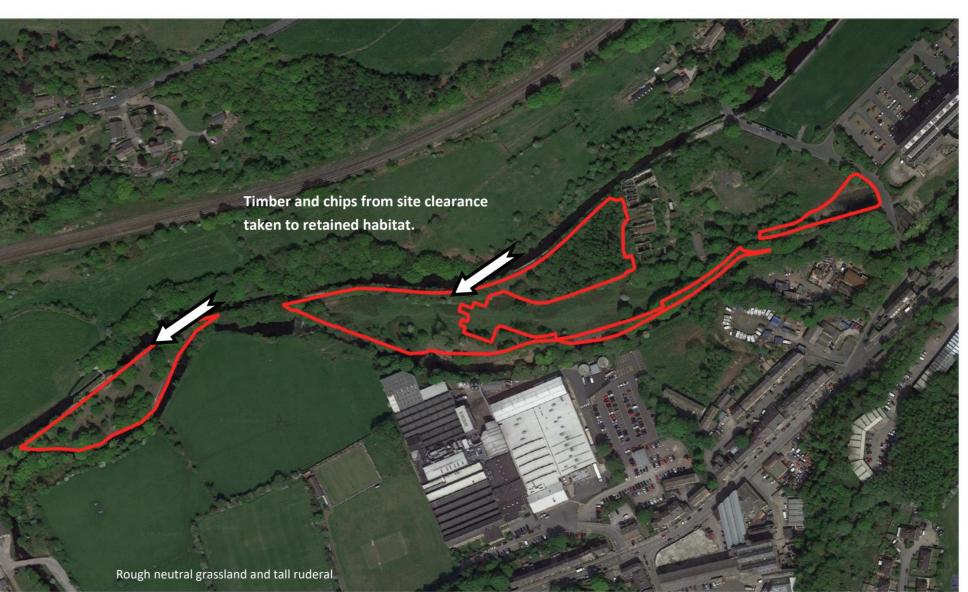
ECoW report year 3 and 5.

Remedial actions

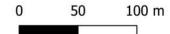
Re-stack and rewire as required.







Plan Boundary



Dark zones

Rationale

To maintain the function of the Wildlife Habitat Network and ensure that the development does not deter nocturnal animals from continuing to use the site for commuting and foraging, controlled dark zones will be included.



Objectives

- 1. Dark and controlled light zones delivered per plan.
- 2. Protected dark zones remain fully dark.
- 3. Controlled light zones with low level lighting.

Specification

Lighting strategy to be produced.

Management

N/A

Monitoring

ECoW to check lighting compliance upon first occupation.

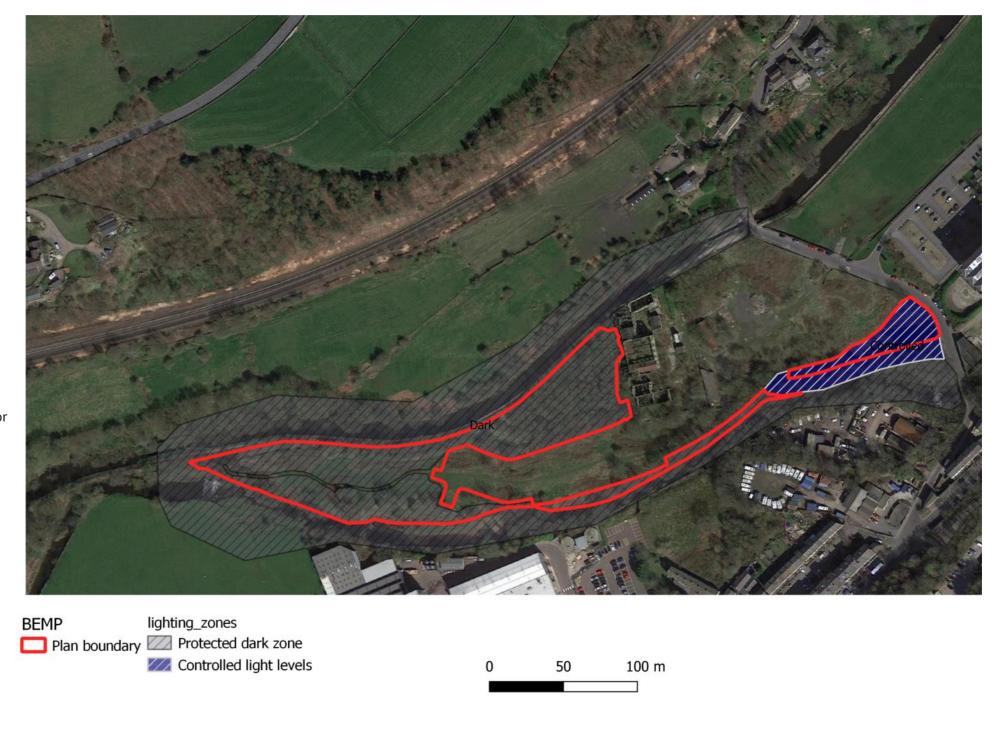
<u>Output</u>

ECoW report year 3 and 5.

Remedial actions

Modify light timings and/or replace/install mitigation fencing or planting.





Wildflower Grassland - Management - Regular cutting

Brooks Ecological Grounded advice

Rationale

Regularly cut areas are important to make Sites look cared for, these need not be 'green deserts' but should provide nectar and pollen food sources for creatures vital to ecosystem health. Flowers with low growth points that are resistant to regular cutting include Clovers (Trifolium spp), Bird's-foot trefoil (Lotus corniculatus), daisy (Bellis perennis) and autumn hawkbit (Leontodon autumnalis).

Objectives

- 1. Flowing plants (forbs) allowed to colonise/ remain in the sward.
- 2. Flowers can bee seen in bloom from April through to September.
- 3. Competitive weeds no more that 10% cover.

Specification

Area seeded with flowering lawn mix to suppliers instructions where soils have been disturbed during construction.

Management

Year 1

Establish to suppliers instructions.

Year 2 onwards

Regular cuts in growing season, drop arisings to rot in situ. Periodic relaxion of cutting (less frequent) in June-July is beneficial.

Monitoring

Year 2 Ecologist to record according to objective 1-3.

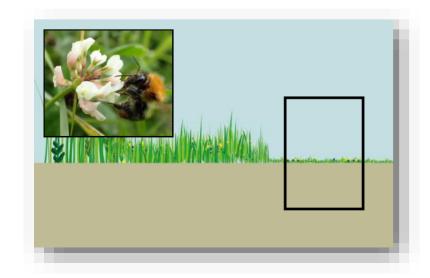
Year 5 Ecologist to record according to objective 1-3.

<u>Output</u>

ECoW report

Remedial actions

ECoW to liaise with contractor to amended cutting regime





Plan Boundary Management
Regular mowing

0 50 100 m

Wildflower Grassland - Management - Annual cutting

Brooks Ecological Grounded advice

Rationale

Grassland cut once or twice a year can make great habitats for invertebrates and amphibians and in summer make attractive flower –filled habitats for people to enjoy. Annual cut grasslands are commonly used as foraging and nesting areas for native birds. Once cut, these areas are good for people to enjoy and walk on so make good multi-use spaces. Managing for wildlife also means there is less need to use chemical fertilisers or pest treatments so make healthy sustainable environments.

Objectives

- 1. Flowing plants (forbs) make up no less than 40% of the sward.
- 2. Flowers in bloom from April through to September.
- 3. Competitive weeds and Scrub no more that 10% cover.
- 4. INNS absent at year 3.

Specification

N/A

Management

Year 2 onwards.

August-September – annual cut and remove arisings.

Monitoring

Year 2 Ecologist to record according to objective 1-4.

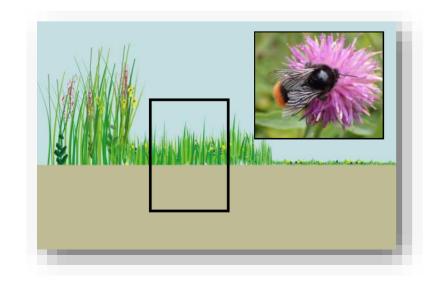
Year 5 Ecologist to record according to objective 1-4.

<u>Output</u>

ECoW report.

Remedial actions

ECoW to liaise with contractor to amended cutting regime.





Wildflower Grassland - Management - No cut areas

Brooks Ecological Grounded advice

Rationale

Strips and islands of grassland to be available to act as faunal refuges and habitat for small mammals, birds and invertebrates that depend on coarse vegetation with a thatch layer.

Objectives

- 1. 30% of the grasslands on site remain uncut in any one year.
- 2. Thatch present in uncut areas.
- 3. Evidence of voles found in retained grasslands by year 5.
- 4. No Invasive Non-Native weeds present from year 2-onwards.

Specification

N/A

Management

No grass cutting carried out, litter pick regularly, remove woody vegetation (if establishing) on a three year cycle. Enter into INNS management regime.

Monitoring

Year 2 Ecologist to record according to objective 1,- 4.

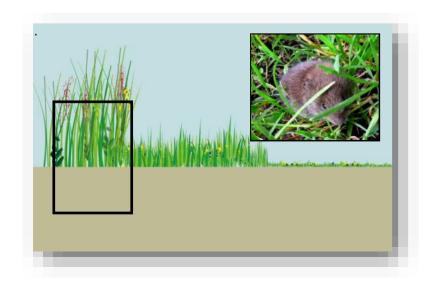
Year 5 Ecologist to record according to objective 1-4.

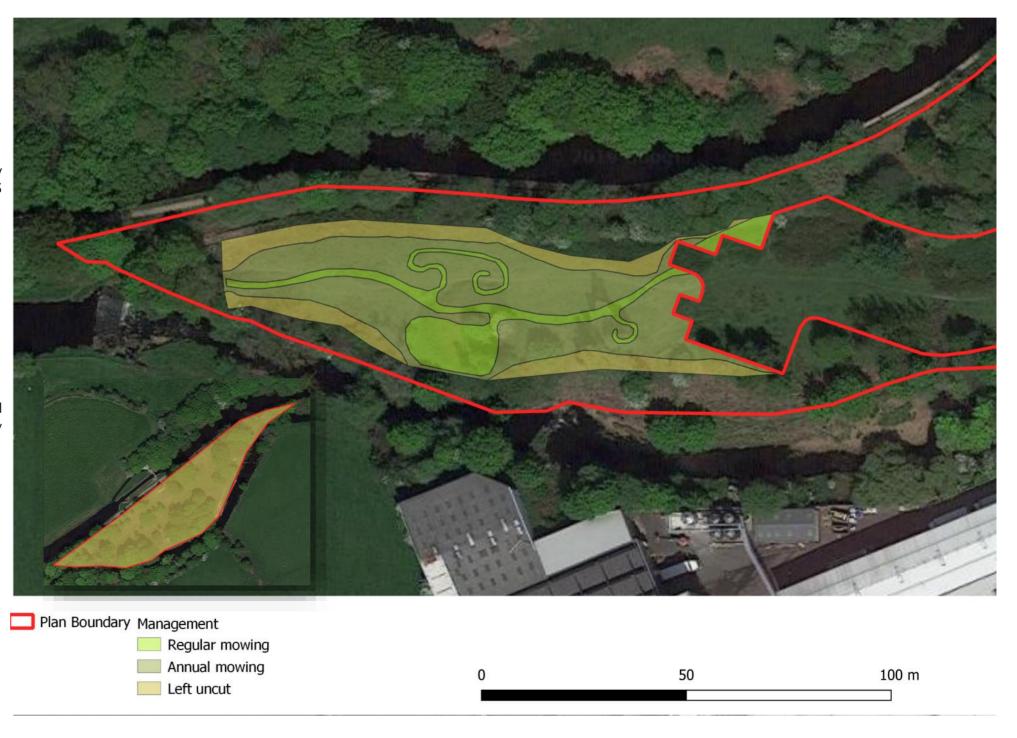
<u>Output</u>

ECoW report

Remedial actions

ECoW to liaise with contractor to amended cutting regime, additional efforts to manage INNS, especially Himalayan balsam which is most likely to spread on site.





Works Schedule



Pre-clearance

Task	ECoW to direct	ECoW to carry out
Produce CEMP (Biodiversity) based on completed survey work to include floating water plantain survey.		yes

During-clearance

Task	ECoW to direct	ECoW to carry out
Follow requirements for fencing, survey and methods in CEMP Biodiversity	yes	yes
Retain materials suitable for play use		

During development

Task	ECoW to direct	ECoW to carry out	Year 1	Year 2	Year 3	Year 4	Year 5	6+
Vegetation clearance and dredging and timber placement	yes		October-February	October-February				
Seed and plant wildflower habitats	yes		9	As needed according to ECoW instructions				
Establishment management of wildflowers Establishment of play features	yes			April-September				
Manage wildflower areas	yes			April-Sept	April-Sept	April-Sept	April-Sept	April-Sept
ECoW Monitoring		yes	yes		yes		yes	