FiveRivers













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Buildability Statement
Prepared for

ALTON
Town Council

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1. Envisaged Construction Sequence of Both Options

The detailed designs envisage the following potential construction sequence.

1.1. Setting-up of site

Access was assessed by representatives from FiveRivers. Access to the works area is via a junction off of Ashdell Road (NGR SU 72374 39436). As the access route is within a residential area, the maximum speed is 30 mph, as such although a Temporary Traffic Regulation Order (TTRO) wouldn't be required, mitigation measures to noise and air quality should be considered in relation to plant equipment and other machinery accessing the site via this route. South East water pipes do run beneath Ashdell road which connects the main roads to the primary access route; therefore a weight limit assessment may be required ahead of construction to determine the suitability of the access route for vehicles, plant and materials.

The main compound is assumed to then be established within the car park of King's Pond, Ashdell Road, Ashdell, Alton, Holybourne, East Hampshire, Hampshire, England, GU34 2TA, United Kingdom (NGR SU 72315 39404). Access to this area is possible via the main access route, following the track approximately ~ 26 m north and then turning right to the car park. Approximately 1 km of trackway and a 20 x 20 m compound will be required, upon which site welfare and parking will be available. Welfare Facilities which consist of a 10-person groundhog unit, which will provide adequate sanitary conveniences and washing facilities for all staff and visitors attending the site. Fencing will also be erected around the compound.

Site team to undertake pre-construction services check and all services on site to be marked out with all staff alerted to their presence. Where appropriate, the area is to be CAT®4 scanned prior to any breaking ground to ensure no remaining services are present within works area prior to starting. All ground penetration activities will be carried out in accordance with HSG47 'Avoiding danger from underground services' and a permit to dig completed by the Site Manager on site before work commences.

South East Water has one live distribution main asset and several fire hydrant assets within the surrounding area of site boundary. Within the site extent, one surface water outfall pipe connects the downstream end of the pond to the river which flows through a connecting culvert pipe system.

SGN has one medium pressure gas main utility running along the upstream section of King's Pond. One Openreach split coupling utility is located over the surface water outfall pipe utility at the downstream end of King's Pond.

1.2. Site Preparation

1.2.1. Public Access

Public access will be maintained to the through footpath on the west side of the pond but the rest of the site will be barriered. There are currently no Public Rights of Way (PRoW) located within the site extent, no PRoW currently give direct access to the site extent. Several PRoW are present within the vicinity of the site, to the north – east of the site a public footpath runs parallel to the site running alongside the opposite side of watercress railway line. To the south of the site a public footpath is present located on the opposite side of Ashdell Road. Another public footpath may be located at the junction of the Lamports ono Paper Mill Lane to the north of the site. Public access will therefore not be affected by temporary Heras fencing which will be erected adjacent to trackways and around the compound and material storage areas

Two cottages located in the north western corner of the site (SU 72202 39468) are accessed via a road extending along the northern perimeter of the King's Pond from Ashdell Road. Access to these properties will be maintained during the duration of and following completion of the works.

1.2.2. Ecological Constraints

Several walkover and field survey ecological studies were conducted by Dr June Chatfield between October 2024 and August 2025. These surveys concluded the major ecological pressures facing King's Pond, along with the history and present declining biodiversity and species assemblages of King's Pond's ecosystem. These reports also begin to outline potential management measures relating to sensitive ecological receptors found within the site.

The Ecology Partnership conducted a Preliminary Ecological Appraisal (PEA) of King's Pond in November 2025. Additional species-specific surveys were completed throughout 2025, including Wintering Birds in April, Great Crested Newts in May, and Bats, Breeding Birds, and Reptiles in November. The PEA concluded the mitigation and avoidance actions relating to sensitive ecological receptors such as habitats and species which are associated with the works area as follows:

1.2.2.1 Mammals;

Hazel Dormice (*Muscardinus avellanarius*):

The woodland on site did not contain the interconnectivity both within the understorey, and between the understorey and canopy, required by dormice to move easily between foraging areas and their arboreal or ground-based nests. A large proportion of the pond margin woody vegetation did not contain the required structure needed for Dormice to use, additionally there are significant gaps in the woody vegetation structure limiting dormice abundance. Along the north-eastern pond margin, there is a dense and interconnected area of hazel scrub, with potential to provide optimal dormice food sources. However, the isolated nature of this area caused by the lack of adequate surrounding vegetation, may limit Dormice suitability. Dormouse hibernation along the ground is highly disturbed within the site by visitors to King's Pond including dog walkers. Another key factor is the abundant population of wildfowl and Brown Rats (*Rattus norvegicus*).

There is a limited record of dormice within 2 km of site with the closest being found almost 1 km from site, suggesting a local population. However, with small isolated woodland blocks or areas of semi-natural or ancient woodland on site, as well as the isolated nature of the site in the centre of Alton, the continuation of a remnant population is unlikely. Therefore, it is considered highly unlikely that Dormice are present at King's Pond.

Precautionary measures should be implemented to avoid disturbance to any Dormice potentially present on site, and a pre-works check should be undertaken by an appropriately qualified ecologist. Further surveys include searches for nests and gnawed nuts (if Hazel is present) in suitable on-site habitats, during the active season April – November. A general Hazel Dormouse survey should also be conducted in accordance with the guidance provided by the Dormouse Conservation Handbook. This involves using a minimum fifty nest tubes implemented across suitable site habitat, ideally at 20 m intervals. All surveys and walkovers to be conducted in conjunction with a licenced ecologist.

If a Dormouse is observed within or near the working area once works have commenced, all activity should cease immediately, and an ecologist should be contacted for further advice. Night-time working and lighting should be avoided.

Water Voles (*Arvicola amphibius*):

No water voles were observed on site, and there were no definitive indications of their presence. A search was conducted for holes tracks, droppings or indicatively grazed vegetation during the January visit. The only possible sign of potential species presence was a hole on the southern banks of the channel which flows into King's Pond. Following further inspection, this hole was found to be shallow. Multiple Brown Rats (*Rattus norvegicus)* were seen during the site visit close to the bank edge, this is likely foraging around the site, particularly in relation to the abundant bird feed readily sown to the wildfowl present on the lake. Brown Rats often burrow into embankments, although they are typically higher above the water line than a water vole burrow. The banks of King's Pond and the small section of river channel provided opportunities for water voles to create nest burrows. Although opportunities for water vole foraging is limited, there is evidence enough to suggest potential Water Voles. There were small areas of pendulous sedge around the site, however much of the bordering grassland was already heavily grazed by waterfowl and so failed to offer the lush grassland that required for water voles foraging.

Precautionary measures should be implemented to avoid disturbance to Water Voles, and a pre-works check should be undertaken by an appropriately qualified ecologist. If any active burrows are identified, a minimum 5 m buffer should be established around these features, and works should be avoided in these areas. If a Water Vole is observed within or near the working area once works have commenced, all activity should cease immediately, and an ecologist should be contacted for further advice. Night-time working and lighting should be avoided.

Eurasian Otter (*Lutra lutra*):

No signs of Otter activity such as spraints, tracks, or signs of foraging behaviour, or holt entrances were identified either on or directly adjacent to site. The connecting River Wey and King's Pond would likely provide foraging opportunities for Otters; however the fish assemblage of King's Pond and resultant species yields within the pond remain unclear. The wider surrounding landscape of King's Pond would provide uninhibited access to Otters. In 2019, one dead Otter was recorded on the adjacent road, providing uncertain evidence of species presence at King's Pond. Although the surrounding area of King's Pond is urbanised, this is likely low density enough for Otters to migrate in and around the terrestrial landscape and may still enter the waterbody along the existing river channel at either end of the waterbody as long as they are able to navigate culverts.

Due to the potential presence of Otters in the site, night-time works should be avoided where possible.

Bats (*Chiroptera spp.*):

On-site habitat diversity provides suitable opportunities for Bats to hunt invertebrate prey species. The woodland and pond (including marginal vegetation) are considered likely to support an abundant assemblage of invertebrate prey. The pond itself may provide an adequate source of drinking water, as well as the wider foraging potential of lentic invertebrate prey species. As a result of the habitat diversity of King's Pond, within the relatively urbanised habitat context, it is considered that the site has the potential to be a significant local foraging resource. The site was moderately well connected to the surrounding environment. The railway embankment which borders the site provides the optimal linear connectivity to other suitable habitat within the wider landscape. Moderate levels of street lighting within the local area are reported, with the areas along Ashdell Road to the eastern boundary of site highlighted in particular. This could potentially reduce site accessibility for more light sensitive species. However, the western edge of the site was found to be darker and therefore would still provide suitable access opportunities for light sensitive Bat species.

All mature/veteran Oak pedunculate Oak trees are to be retained as part of designs with a minimum 15 m root protection zone forming an exclusion zone. Works within vicinity of the mature/veteran pedunculate Oak trees should be avoided during sensitive times to Bats, ideally to occur in the months of either March or early November.

Badger (*Meles meles*):

No signs of Badger activity were reported on site or in the adjacent surrounding area, this would include snuffle holes, latrines, sett entrances, tracks, or hairs. The site offers suitable foraging opportunities for badgers, in particular to the eastern portion of the site, in the open grassland areas. The lack of boundary enclosure around the majority of the site would also mean that any badger populations using or living within the site extent would easily enter, traverse, and exit the site from the surrounding area. Although the local area is relatively urbanised, it could not be described as high density. Although no Badgers were recorded as part of this survey, badger populations could potentially exist in the wider local landscape either along the railway, within local parks or gardens, or small areas of woodland/scrub in the local landscape.

Pre-works checks for Badgers should be carried out, no more than three weeks before works commence.

Other Species:

The terrestrial areas of King's Pond provide suitable Hedgehog (*Erinaceus europaeus*) habitat, in relation to foraging and refuge. Due to the open site boundaries and low-density urban context of King's Pond, the presence of Hedgehogs on site and within the immediate surroundings is deemed likely.

1.2.2.2 Great Crested Newt (*Triturus cristatus*):

King's Pond is the only suitable waterbody present within the red line boundary of the site, with no further ponds identified within 250 m. The water was relatively turbid, although the bottom could be seen in areas where water depth was less than *c*. 6 - 8 inches. Water was clearer towards the inflow point of the River Wey. The pond had a high density of Waterfowl using it, with *c*. 100 individuals noted at the time of the survey. Plant coverage was extremely low, to the point of almost non-existence at any point during the survey visits. It is considered that both native and potentially ornamental fish are likely to be in the pond and carp have been sighted, given the connection to the River Wey, and the urbanised setting of the pond. Great Crested Newt Habitat Suitability Index was assessed and was found to score Poor in King's Pond.

Greater Crested Newt terrestrial habitat was largely good across the site extent. The woodland to the south of the site as well as scrub areas surrounding the pond provide extensive invertebrate foraging opportunities and potential refuge amongst the leaf litter and tree root systems. Similarly, to the west the off-site railway embankment offers additional refuge and foraging opportunities within the ballast and leaf litter. This also provides a potential commuting corridor for Greater Crested Newt between potential local resources and on site habitats. However, the grassland areas are less suitable for the species. The open area provides limited commuting opportunities and lacks suitable vegetation or structural variation to encourage refuge or foraging to take place. Additionally, there was an extensive footpath network around the site which provides inadequate habitat. Following negative survey results for Great Crested Newts in 2025, alongside an assessment of limited habitat suitability, the species is deemed likely absent from the site. Accordingly, no further recommendations are made, and the proposed pond works may proceed without GCN-related constraints.

1.2.2.3 Reptiles

The marginal pond areas, especially on the western and southern sides, provide variable habitat suitable for refuge and sheltered basking. The woodland and pond also provide potential foraging habitats, particularly for species such as Grass Snakes (*Natrix helvetica*). Grass Snake are a semi-aquatic species. The lack of vegetation which would provide shelter to amphibian prey, so limiting Grass Snake foraging potential at King's Pond. The grassland on the eastern side of site lacked any significant habitat complexity and was likely of negligible value to reptiles. The pond margin experiences a high degree of disturbance from both local residents and visitors, as well as from Waterfowl. While no reptiles were recorded during the specific reptile survey, a single adult slow worm was encountered during a separate site visit on 25 June 2025.

1.2.2.4 Invertebrates

The abundance of Waterfowl at King's Pond appears to have a significantly detrimental effect upon the invertebrate assemblage of the pond. The only recent on-site record of invertebrates was a Leaf Beetle (*Chrysomelidae spp*.) not directly associated with the river channel. Within the last 10 years there have no records of species directly associated with river communities locally. However, older records of invertebrate species associated with river communities and

wetlands were recorded, this included Mayfly (*Baetis fuscatus*), two-tone Reed Beetle (*Donacia bicolorata*), Caddisfly (*Limnephilus binotatus*), Water Boatman (*Sigara striata*), and Common Darter (*Sympetrum striolatum*).

The dearth of contemporary records may potentially relate to the lack of survey effort locally for aquatic invertebrates; however, it is also noted that site water quality is likely sub-optimal for supporting significant sensitive aquatic invertebrate assemblages. Notable amongst local invertebrate records was the presence of the Stag Beetle (*Lucanus cervus*), the closest of these was *c*. 120m north of site in 2019. There was suitable habitat for Stag Beetles on site, amongst the mature trees in the woodland areas and spread as individuals across site. Also, the presence of deadwood in the woodlands provides further habitat and food material for the species larval stage. The remainder of site, particularly the open grassland and pond/river were not found to provide valuable habitat for Stag Beetles.

1.2.2.5 Birds

The vegetation structure of King's Pond provides a complex assemblage of canopy, scrub and marginal vegetation – providing diverse habitat for a variety of nesting bird species. Species identified included Mallard (*Anas platyrhynchos*), Tufted Duck (*Aythya fuligula*), Little Grebe (*Tachybaptus ruficollis*), Canada Goose (*Branta canadensis*), Cormorant (*Phalacrocorax carbo*), Grey Heron (*Ardea cinerea*), various Gull species (*Larus spp.*), Mute Swan (*Cygnus olor*), Eurasian Coot (*Fulica atra*) and Moorhen (*Gallinula chloropus*). A heronry was identified in a mature tree on the existing island in the middle of King's Pond, this island was also deemed ideal for Waterfowl to create undisturbed ground nests as well. Evidence of ground nesting from water birds, including a likely Swan nest, and un-hatched Goose eggs was also recorded in later site visits.

Significant assemblages of invasive non-native Canada Geese (*Branta canadensis*) are present on the site and have had negative effects upon the wider ecosystem structure.

To minimise the effect to bird species present within the site extent, all site work should be conducted outside of the bird nesting season, March to August – inclusive. Prior to works taking place, pre-works check should be undertaken by an appropriately qualified ecologist

1.2.2.6 Fish

There are several recent records of Brown Trout (*Salmo trutta*) and Bullhead (*Cottus gobio*) locally, the nearest to the site being Bullhead approximately 105 m north, along the River Wey. Siltation of the bed and general turbidity would impede salmonid life processes, the lack of flow and oxygenation caused by the lentic nature of the pond would also reduce fish population viability and likely further reduce the potential for salmonid migration beyond the pond to the upper reaches of the River Wey. This issue is emphasised by the chalk stream nature of the River Wey and therefore the importance of these river systems to salmonid spawning and subsequent life stages. Although the weir at the northern end of King's Pond inhibits fish passage upstream into King's Pond, potential Bullhead have been observed at the upstream inflow end of the waterbody. Invasive Common Carp (*Cyprinus carpio*), which will be removed prior to the works, have been observed in the main body of the pond.

1.2.2.7 Invasive Species

Prior to the commencement of the project activities, areas affected by invasive species will be identified and marked within the working area to prevent its spread during construction. Removal of invasive species will be undertaken as part of the site clearance and environmental works procedure, using an appropriate method based on the extent and location of infestation. This may include manual removal and/or herbicide treatment where suitable and permitted. Any treatment or removal works will be conducted by trained and competent personnel, and where herbicides are used this will be undertaken by an appropriately qualified operative, in accordance with the manufacturer's instructions and relevant environmental controls.

All invasive species will be removed carefully to minimise disturbance to the surrounding vegetation, soils, water, and wider ecosystem, as well as to prevent seed spread or the accidental movement of contaminated plant material around the site. Any removed material will be handled, stored, and disposed of in accordance with the agreed invasive species control measures and site environmental requirements. Material will not be re-used elsewhere on site unless confirmed as appropriate under the management strategy.

Biosecurity measures will be implemented throughout the works to prevent the spread of invasive species on and off.

site. This will include cleaning down plant, tools, PPE and footwear to remove mud, seeds and plant fragments before leaving the affected area or site. The treated or cleared areas will be monitored as required during the works, and any. regrowth or previously unidentified areas of Himalayan balsam (*Impatiens glandulifera*) will be subject to further treatment as necessary.

1.2.2.8 Bamboo (*Bambusoideae spp*.)

There were two patches of Bamboo were identified within the site extent. The first is located within the strip of 'other broadleaved woodland' on the eastern side of site, clearly introduced from the adjacent off-site garden. Whilst the exact species of bamboo was unknown it is non-native and highly likely to be invasive. The second was on the north-western edge of King's Pond, between the ponds edge forb vegetation and the area of mixed scrub.

1.2.2.9 Japanese Knotweed (*Reynoutria japonica*)

A remnant stand of Japanese knotweed was identified adjacent to the footpath in the southern area of woodland, on the western side between the footpath and the waterbody bank. A second stand of Japanese knotweed was identified, on the north-western border of site, within the more open canopy woodland adjacent to the railway embankment.

1.2.2.10 Buddleia (*Buddleja davidii*)

Buddleia was identified throughout the pond's edge forb vegetation on the western side of site.

1.2.2.11 Ground Elder (*Aegopodium podagraria*)

Two patches of ground elder were identified along the north-western edge of King's Pond.

1.2.2.12 Common Carp (*Cyprinus carpio*)

Several sightings of common Carp have been reported in King's Pond. Carp will be removed from King's Pond prior to the commencement of works.

1.2.3. Utility Protection

The Principal Contractor should acquire utility searches prior to work commencement, and communication with the utility provider should be established to ascertain the necessary utility protection measures required on site. The asset owner will determine type of protection required.

Protection measures will need to be planned and actioned to cross the live utilities, notably the sewage outfall which connects to the downstream mouth of the pond, and the medium pressure mains located beneath the upstream extent of the source of the pond. The gas pressure mains will be protected by track matting and will be located along designated points within the site area, as determined by the principal contractor and asset owner. In relation to the outfall pipe assets, a two tonne weight limit will be in place above the pipes, with 150 mm bog matting to be implemented in order to enable crossing of the track located above the pipes.

2. Dredging Option (2A)

2.1 Design Assumptions

Outline designs have been developed for the 2A dredging option at King's Pond, Ashdell Rd, Alton GU34 2SZ (U/S Extent: SU 72124 39263, D/S Extent: SU 72353 39518).

Option 2A consists of dredging the pond, reprofiling the banks, constructing silt traps along the upstream source and downstream mouth of the pond, as well as the construction of berm features along some of the banks. This option will increase the silt trapping potential of the pond which will reduce future maintenance dredging costs, whilst improving pond biodiversity and ecosystem resilience by reducing invasive species habitat and their associated necessary pond conditions.

The scope of this work primarily concerns improvements to the pond regarding blockages and water level fluctuations, reinstating and strengthening the banks of the existing islands, silt capture, and ecological improvements to the pond ecosystem. The designs are displayed in the following drawings:

- 5R-5080D_101_Kings-Pond_Dredging_Overview_V4
- 5R-5080D_102_Kings-Pond_Dredging_CS1_V4
- 5R-5080D_103_Kings-Pond_Dredging_CS2_V4
- 5R-5080D_104_Kings-Pond_Dredging_CS3_V4
- 5R-5080D_105_Kings-Pond_Dredging_CS4_V4
- 5R-5080D_106_Kings-Pond_Dredging_Silt-Trap_V4
- 5R-5080D_160_Kings-Pond_Dregding - Planting plan V2
- 5R_5080D - Planting Specification V2
-

Project Activities Include:

- Tree works
- Excavation of bed material (dredging)
- Bank reprofiling
- Re-use of excavated spoil (on-site)
- Channel infilling
- Large wood installation
- Island creation
- Marginal ledge creation
- Willow spilling installation
- Dead hedge installation
- Wet woodland creation
- In-channel sediment trap installation
- Reedbed planting
- Hibernacula creation
- Bat box installation
- Native Marginal planting
- Bench installation
- Hardstanding area installation

The designs have been developed based on the following key assumptions:

- Design assumes appropriate access rights will be granted by the local authority, including where the controlled crossing of public footpaths is required.
- Design assumes that the acquired utilities service search data is accurate, and that further higher accuracy wastewater asset surveys will not show assets impeding on the specified locations for interventions.

- Design assumes access paths above the outfall pipes can be safely crossed with 1.5 tonne equipment but cannot be crossed by plant equipment.
- Design assumes there are no hidden hard structures within the banks.
- Design assumes site won spoil from excavation is suitable for use in channel and for bed raising and that no contamination testing is required.
- Design assumes site compound may be constructed within the car park located on site (NGR SU 72413 39477)
- Design assumes excavated spoil materials from dredging activities may be stored on site on the True Right Hand Bank (TRHB) of the pond (NGR SU 72315 39404).
- Design assumes there are no protected species currently located on site.
- Design assumes there is no negative impact on flood risk.
- Design assumes that the Defra LiDAR data is accurate and fit for purpose.

2.2 Proposed Build

2.2.1 Tree Works

Throughout the site there may be a requirement for tree works to be undertaken by a trained and qualified professional. Selected ornamental and non-native trees near channel re-meandering and backwater are to be removed and processed into deflectors. Any tree with bat roost potential should be retained. Diseased trees such as those with ash dieback, or trees which easily coppice, should be preferentially selected for felling. Large, established specimens of any native species should be retained where possible. Tree works locations to be considerate of feature locations and corresponding machinery access to reduce the need of excessive tree works where it is required already for access.

2.2.2 Excavation of Bed material (Dredging)

Prior to excavation of sediment from the pond, there is a requirement to prepare the storage area for newly dredge material on the eastern bank of the pond. The Eastern bank of the pond has historically been used to dry and store dredge materials. Previously placed materials can be excavated and disposed of as non-hazardous waste if needed to create capacity for newly dredged materials. Testing of placed materials will be required prior to muckaway. The storage areas also require a bund to be constructed to retain the dredged the materials.

A 15T amphibious excavator to access King's Pond at designated access/egress point, ensuring utilities are only tracked over at the temporary crossing points. Excavator to dredge sediment from the bed of the pond, as much as is required for the proposed features. The excavator will remove silt from the pond bed and place it into barges; silt will then be transported to the storage point on the eastern bank of the pond by the barge and removed from the barge by a long-reach digger sat on the bank top. Spoil generated from the dredging of the pond is to be stockpiled in the east of the site area (NGR SU 72311 39392), which is still within close proximity to the western extent of the pond area, which will be infilled following bank reprofiling.

Upon completion of the site preparation, the pond area (excluding the area of pond running along the western portion of the site between the island and pond edge, NGR SU 72181 39350) will be dredged leaving 200-250 mm of silt in most areas to retain habitat for invertebrates, as well as suitable areas for planting. This is being done to increase storage capacity, reduce potential eutrophication and algal blooms, and maintain the pond feature. Additional benefits of the dredging may potentially include; increase habitat diversity, increase climate resilience, and management of pollutants deposited in the silt layer.

2.2.3 Bank Reprofiling

In specific locations in both reaches, the banks are to be regraded back to create a shallower gradient. The banks are. to be regraded to a 1:3 slope at the steepest, with a preference for 1:4 which will increase stability and prevent undercutting. An extended slope may also be implemented if this is deemed more appropriate in relation to the surrounding landform. The excess spoil created by regrading can be used throughout the reach in the proposed channel infilling, spoil re-use areas, and hibernacula.

Mark out the regrading extent on the top of bank, and then use an excavator, positioned safely away from the bank edge. Pull the bank face material back from 0.1 m above the existing bed to the marked new top of bank location. Regrading should have additional variation in the gradient on the bank face to imitate natural formations, these variations should not exceed a 1:3 slope to prevent slumping.

The regrading extent is also dictated by the location of tarmacked footpaths running along the top of pond banks and, although the footpath around the pond is not a PRoW, there is the aim to not see the path moved away from its current extent in order to maintain current site character and use of the footpaths by the public.

These works may result in the removal of trees currently growing along the bank to be regraded. Where appropriate, new native trees should be planted to replace those lost, ensuring this will not cause the channel to become overshaded in the future. Native tree species appropriate to the habitat should be selected for planting.

2.2.4 Re-use of Excavated Spoil (on-site)

A 370 m^2 area of spoil re-use will be constructed along the western bank of King's Pond. Berms are to be installed along the TLHB to create the perimeter of the spoil re-use area for which benches will be installed on top of. The berms should be brash, made ideally from site won material that allows for daylighting. The berms should primarily be infilled from site won spoil. This material has been classified as non-hazardous within the silt analysis report (Contamination Assessment Report), material reuse on site in line with the D1 permit guidance. The berms created for the spoil re-use area at King's Pond will provide benefits and create marginal habitat as well as stable banks to enable a public seating area to be created.

A row of posts at 0.5 m intervals should be secured into the bed by 0.5 - 1 m depth, with at least 0.35 m left above ground. The shape should follow a gentle arc as shown on the Planview drawings. The apex of any berm should not extend to more than 50 % of the channel, and should have a shallow leading edge angle, no greater than 20 degrees. A hazel bundle should then be pushed against the post at ground level; a second post should then be levered against the bundle and hammered into the bed to the same extent as the previous post. Any excess post above the hazel bundle should be sawn off. Rope or medium tensile wire should then be looped over the top of the posts in a figure of eight and then secured with fencing staples. The bank can then be re-graded by pushing the site won material into the channel to backfill the front. Berm fronting will be completed using coir rolls to encourage vegetation uptake and establishment.

2.2.5 Channel Infilling

A row of posts should be secured into the bed by 0.5 - 0.75 m leaving at least 0.35 m above the ground, the posts should outline the front edge of the intended infill area. A hazel bundle should then be pushed against the post at ground level; a second post should then be levered against the bundle and hammered into the bed to the same extent as the previous post. Any excess post above the hazel bundle should be sawn off. Rope or medium tensile wire should then be looped over the top of the posts in a figure of eight and then secured with fencing staples. This process should be repeated for each bundle, so they are secured by four posts total each.

Silt dredged from within the channel can then be used to backfill the new front. This can be lifted in using a long-reach digger sat on the left bank and/or the aquatic excavator, then transported across the pond by a barge. Additional material from regrading could be used alongside the silt to fill these marginal zones. The bank-side material should be used towards the back of the wetland shelf, reprofiling smoothly into the bank, with the silt closest to the middle of the channel.

2.2.6 Large Wood Installation

In locations where large wood is to be installed, site-won large woody debris (LWD) is to be secured using 1.8 m chestnut posts at 0.5 m intervals and jute rope. LWD to be 0.2 - 0.5 m diameter, and 1.2 - 2 m in length generated from tree works on site. the LWD used will sit a maximum of 150 mm above low-flow water level, and to be keyed into the bank by a minimum of 0.5 m to ensure stability and minimise it becoming dislodged. Movement of the timber to be undertaken by machine with timber grapple under lift plan procedures. Site won brash should be densely pinned in areas between LWD. The LWD is intended to front the channel infill area between the large existing island and the western bank of the pond.

2.2.7 Island Creation

Exact location of berm features to be determined on site in accordance with the volume of silt identified and in consultation with client during each phase of works. Berms to be marked out on 1st day of works with client in accordance with design. Operatives to position 6' chestnut posts (3 - 4" dia.) at 500 mm centres along proposed outer edge and loosely push into bed. Excavator to drive posts two thirds into bed or to point of refusal using a hydraulic post pounder attachment. When working around post pounder, the safe system of work is as follows – operatives to position post as required underneath the post pounder. Excavator operator to gently rest post pounder attached to top of post and give operative thumbs up so they can let go of the post and move away. Operative to move to safe distance from excavator (2 m) and give thumbs up to excavator driver who can then commencing post pounding. All operatives within 10 m of post pounding activities are to wear appropriate ear defenders. Geocoir/Verdamat 900 to be unrolled over berm footprint and stapled to chestnut posts with at least double the width of the berm overhanging the posts. High tensile

wire to be secured along the top of the posts using a fencing stapler and tensioned to create a straight edge. This is to be done on the larger berms that require greater capacity of silt to be held back. This will be determined onsite. (Berms over 3 m in width). Geocoir/Verdamat 400 to be unrolled on top of the Geocoir/Verdamat 900 and stapled to the chestnut posts in the same way with at least the width of the berm overhanging the posts.

Berm to be backfilled by the excavator using site won excavated silt up to bank top height with a gentle gradient down to water level – overfill by *approx*.200 mm to allow for further settlement. Silt to be installed in layers and compacted as practicably possible to ensure a consolidated structure. Both layers of Verdamat to be pulled back over berm (but remain secured in place by wire) to cover exposed surface and provide erosion protection whilst vegetation establishes. Finished profile of berms to undulate along their length to ensure the new structures look natural and provide variation for micro habitats. Posts to be cut off at desired height by suitability qualified chainsaw operative using petrol chainsaw. Berm to be plug planted with marginal plants on completion and hydroseeded in the Spring to encourage quick vegetation with strong root structure to provide long term stability.

2.2.8 Marginal Ledge Creation

Marginal ledges are to be created using site won spoil. Banks of the ledges should not exceed 1:3 gradients in order to maintain stability and avoid slumping. Ledges are to be topped with biodegradable matting, such as C125BN biodegradable erosion control blankets to prevent erosion. Matting should be pegged into place using 150 mm hardwood pegs in a 0.5 m grid. Plug planting is then to occur after matting.

2.2.9 Willow Spilling Installation

Live willow rods to be woven between hardwood chestnut posts, 1.8 m x 75 mm, installed at 0.5 m intervals. The chestnut posts shall be driven into the ground by approximately one third of length, or to the point of resistance where ground conditions prevent this, providing a stable framework. The willow shall be progressively woven to 30 cm height, with rod ends tucked into the structure or trimmed neatly as necessary. Jute rope shall be used to secure the willow to the chestnut posts where required, ensuring the woven structure remains stable during establishment.

2.2.10 Dead Hedge Installation

Brashy material generated from works around site to be used to create dead hedges. Brash material to be pinned by hardwood chestnut stakes, 1.8 m long x 75 mm diameter, installed at 0.5 m intervals. Woody material shall then be placed horizontally between the two rows of stakes, with larger and heavier branches forming the base and smaller branches and brash used to fill voids and build the hedge progressively to the required height and density. Where practicable, branches shall be interwoven around the stakes to improve stability and prevent excessive movement.

2.2.11 Wet Woodland Creation

Construction of the wet woodland will initially follow the channel infilling specification laid out in 2.2.5, then woodland planting would then be required. Tree planting has been proposed within the design to increase the shade along the watercourse, as its currently overly exposed likely subjecting the water to seasonal temperature influxes, reducing its climate resilience. Incorporating native tree planting will provide a future source of woody debris to the system, and additional habitat and nesting opportunities. The removal non-native and ornamental trees may provide brash material for berm features, whilst enabling a new native tree to be planted in its place, providing greater ecological resilience and functionality.

Trees should be planted in small groups of 3 – 5, with spacing of approximately 1 – 3 m between. Each tree should be securely planted, staked, and fitted with a spiral guard to protect it from grazing mammals, such as rabbits and muntjac deer. Spiral guards should be removed after 5 years once the trees are established and large enough to withstand occasional grazing. Trees are to be planted at least 1.5 m away from the banks of the river in accordance with FRAP consenting.

2.2.12 In-channel Sediment Trap Installation

New gravel and Purbeck stone silt traps to be installed as per designs. Area to be CAT scanned and permit to dig issued before any excavations (including installing posts) take place. Area upstream of silt trap installation to be excavated as per design depth. This will become the area for silt deposition. 16 ton excavator to sit adjacent to the channel and excavate the material from the channel to form the desired depth and shape. Material arisings to be

deposited adjacent to machine on Right Hand Bank in designated silt deposit locations agreed with client. Purbeck stones to be transported to work area via telehandler from compound location following the correct lift plan with banksman. Gravel ton bags to also be transported from site compound to works area via telehandler following site lift plan with banksman. Purbeck stones of *approx*. 1000 mm x 500 mm to be installed in design locations with smaller Purbeck stones filling in any gaps, this will be completed using 16ton Excavator following lift plan methods of practise.

Excavator to sit on Right Hand Bank adjacent to silt trap structure, using the engcon grab the machine will pick up each. A temporary access ramp may be required to access the channel. Purbeck rock and place them in the specified location. Care taken to not have any personnel within unsafe working distance of the excavator. Exact dimensions of Purbeck rockery to be determined on site based on available sizing's of stones. A Steep gravel ramp will be installed downstream of Purbeck rockery edging to the proposed silt trap. Excavator will install gravel using a bucket or similar behind the Purbeck rockery as designed. This will increase flow speed to improve deposition of sediment that is not settled in the trap. Gravel extent to not impede the existing culvert or other structures present in the watercourse. Banks to be reinstated after install before moving onto the next area of works. Repeat all the above for the silt trap construction at the designated installation points.

2.2.13 Reedbed Planting

It is recommended the reedbeds are plug planted primarily with Common Reed (*Phragmites australis)*. This species will quickly colonise, establishing a thick habitat for riparian species. Reedbeds to be planted to a density of 4-5 plants per square metre. These will provide nutrient trapping along the outfall point.

2.2.14 Hibernacula Creation

Excess material generated from tree and ground works to create hibernacula. Hibernacula should be approximately 50 cm deep and 1.5 m across. Hibernacula soils should be stable and level with the ground, to avoid slumping and adding material to flood flows which may then block culverts and pipe networks downstream. areas where the soil is free draining or easily waterlogged should be avoided.

The hibernacula should be filled loosely, with site won rocks and woody material to create a spacious environment. Access routes should then be implemented to enable movement between the hibernacula and terrestrial environment; these are typically pipes but may also be hollow wood or aerated bricks. spaced Approximately 50 cm of soil should then be piled on top of the hibernacula.

2.2.15 Bat Box Installation

Bat boxes are most likely to be used in areas where bats are known to feed. Boxes should ideally be placed 4 m above the ground, sheltered from strong winds and artificial light sources, but exposed to sunlight for periods of the day – typically south, south-west, south-east facing. Surrounding foliage should be dense enough to provide good cover and shelter from predation; whilst being light enough to enable easy navigation to and from the boxes.

To be undertaken by trained personnel with climbing qualifications in order to place the bat boxes at the required heights.

During the operational phase of the bat boxes, opening of the boxes for survey and maintenance activities must be solely conducted by a licenced bat worker due to UK legal protection. Boxes should be secured using Aluminium or stainless steel screws which will not damage the trees. Bat box arrangement within the wooded area should aim to cluster 2 or 3 boxes closely together, on the same tree, which would allow bats to easily move between roosts depending on temperature changes.

2.2.16 Native Marginal Planting

Marginal planting shall be undertaken to increase plant diversity. All plants used shall be native water tolerant species in accordance with the planting specification. Plugs to be planted at a density of 8 per square metre, in diverse arrangements.

2.2.17 Bench Construction

Lastly, benches will be erected to the west of the site on top of the spoil re-use area. This will provide outdoor seating for the local community and a place to enjoy nature and outdoor space. Five benches will be built in this area using

sustainably sourced materials. The materials used for the benches should be as locally sourced as possible to reduce transport cost and associated emissions.

2.3 Demobilisation

Reinstate working site and access routes to suitable condition. Final site walkover to be conducted with project management and client/ stakeholders to determine completion of the works and if snagging or additional works are required. If all is good and completed, works can be signed off to initiate demobilisation of the works.

All on site machinery/equipment to have all soil/mud/materials scraped or dug out of tracks and off body as best as possible adhering to biosecurity procedures prior to pressure washing and Virkon decontamination spray. The site compound will then be removed and all plant and machinery off hired and collected from site.

Reinstate site compound area and demobilise from site.

Following the demobilisation a return visit may be required to undertake reinstatement of sediment drying area including cultivation and seeding.

2.4 Maintenance

The design has been created with the intention of requiring as little maintenance as possible. Whilst this is true, there will still be suggested maintenance that should be carried out to enable the best functioning of the restoration. Features installed into the watercourse should be checked within a year of installation or following storm events within this time to check for damage. The inspection for damage can be carried out via a site walkover and does not require action if there has been no damage.

Areas that have been planted should be inspected after a year to assess whether the planting has been successful in establishing. If there are excessive bare spots these should be re-planted at an appropriate time of year. Establishment, Maintenance, and aftercare of planted vegetation should be undertaken in accordance with the Planting Specification (5080D - Planting Specification_V1) including replacement of failures and general maintenance for the duration set out within the specification.

Where invasive species have been removed the area should be checked for re-growth in the following spring. If there is signs of regrowth then the new growths should be treated, removed, and disposed of responsibly.

Clearing of silt trap should be undertaken as required with either the use of a Vacuum excavator from the right hand bank or with use of an excavator accessing the channel from the left hand bank through the wet woodland. If accessing via the wet woodland silt clearance should be undertake during dry summer months.

3. River and Pond Option (3C)

3.1 Design Assumptions

Detailed designs have been developed for the 3C pond dredging and channel restoration option at King's Pond, Ashdell Rd, Alton GU34 2SZ (U/S Extent: SU 72124 39263, D/S Extent: SU 72353 39518).

Option 3C includes dredging of the pond and the restoration of the channel of the River Wey through the site extent, here the pond will be maintained in a smaller connected state with walkways provided across the site for public accessibility. Option 3C also details sediment traps located at the upstream end of the pond, as well as the downstream sewer outfall and culvert connecting the downstream extent of the River Wey. This option will significantly improve the sediment transport across the site and reduce the necessary maintenance of the pond long term. Due to the reduction in siltation along the bed, Option 3C will also serve to reduce invasive species presence, whilst improving habitat conditions for desired species such as Trout and Bullhead.

The designs are displayed in the following drawings:

- 5R-5080D_201_Kings-Pond_River_Overview_V4
- 5R-5080D_202_Kings-Pond_River_CS1-3_V4
- 5R-5080D_203_Kings-Pond_River_CS4_V4
- 5R-5080D_204_Kings-Pond_River_Q-Water_V4
- 5R-5080D_205_Kings-Pond_River_Silt-Trap_V4
- 5R-5080D_260_Kings-Pond_River - Planting plan V2

Project Activities Include:

- Tree works
- Tree planting
- Excavation of bed material (dredging)
- Main channel reinstatement
- Secondary channel creation
- Culvert construction
- Backwater creation
- Bank reprofiling
- Re-use of excavated spoil (on-site)
- Brash Berm construction
- Marginal Shelf Creation
- Willow Spilling Installation
- Wet Woodland Enhancement
- In-channel sediment trap installation
- Marginal Reedbed planting
- Hibernacula Creation
- Bat Box Installation
- Bird Box Installation
- Log pile construction
- Native Marginal Planting
- Bench construction
- Bridge Construction

The designs have been developed based on the following key assumptions:

- Design assumes appropriate access rights will be granted by the local authority, including where the controlled crossing of public footpaths is required.
- Design assumes that the acquired utilities service search data is accurate, and that further higher accuracy wastewater asset surveys will not show assets impeding on the specified locations for interventions.

- Design assumes access paths above the outfall pipes can be safely crossed with 1.5 tonne equipment but cannot be crossed by plant equipment.
- Design assumes there are no hidden hard structures within the banks.
- Design assumes site won spoil from excavation is suitable for use in channel and for bed raising and that no contamination testing is required.
- Design assumes site compound may be constructed within the car park located on site (NGR SU 72413 39477)
- Design assumes excavated spoil materials from dredging activities may be stored on site on the True Right Hand Bank (TRHB) of the pond (NGR SU 72315 39404).
- Design assumes there are no protected species currently located on site.
- Design assumes there is no negative impact on flood risk.
- Design assumes that the Defra LiDAR data is accurate and fit for purpose.

3.2 Proposed Build

3.2.1 Tree Works

Throughout the site there may be a requirement for tree works to be undertaken by a trained and qualified professional. Selected ornamental and non-native trees near channel re-meandering and backwater are to be removed and processed into deflectors. Any tree with bat roost potential should be retained. Diseased trees such as those with ash dieback, or trees which easily coppice, should be preferentially selected for felling. Large, established specimens of any native species should be retained where possible. Tree works locations to be considerate of feature locations and corresponding machinery access to reduce the need of excessive tree works where it is required already for access.

3.2.2 Tree Planting

Individual trees are to be planted at points along the True Right Hand Bank of the Mill Tributary channel. Native species should be selected for planting, with the surrounding environment being considered key to determining the most appropriate species. Trees should be planted between November and March during their dormant period trees should be planted at least 2 metres away from existing and new trees on site to allow for the roots to develop unobstructed. Tree guards may be required if there is significant deer activity on site, tree guards should be removed approximately 5 years after the planting or when the tree is established.

3.2.3 Excavation of bed material (dredging)

Prior to excavation of sediment from the pond, there is a requirement to prepare the storage area for newly dredge material on the eastern bank of the pond. The Eastern bank of the pond has historically been used to dry and store dredge materials. Previously placed materials can be excavated and disposed of as non-hazardous waste if needed to create capacity for newly dredged materials. Testing of placed materials will be required prior to muckaway. The storage areas also require a bund to be constructed to retain the dredged the materials.

A 15T amphibious excavator to access King's Pond at designated access/egress point, ensuring utilities are only tracked over at the temporary crossing points. Excavator to dredge sediment from the bed of the pond, as much as is required for the proposed features. The excavator will remove silt from the pond bed and place it into barges; silt will then be transported to the storage point on the eastern bank of the pond by the barge and removed from the barge by a long-reach digger sat on the bank top. Spoil generated from the dredging of the pond is to be stockpiled in the east of the site area (NGR SU 72311 39392), which is still within close proximity to the western extent of the pond area, which will be infilled following bank reprofiling.

Upon completion of the site preparation, the pond area (excluding the area of pond running along the western portion of the site between the island and pond edge, NGR SU 72181 39350) will be dredged leaving 200-250 mm of silt in most areas to retain habitat for invertebrates, as well as suitable areas for planting. This is being done to increase storage capacity, reduce potential eutrophication and algal blooms, and maintain the pond feature. Additional benefits of the dredging may potentially include; increase habitat diversity, increase climate resilience, and management of pollutants deposited in the silt layer.

3.2.4 Main channel reinstatement and walkway installation

The River Wey currently flows into King's Pond via a culvert at the upstream extent of the pond before flowing out at the downstream end via another culvert. The River and Pond option involves reinstating the River Wey main channel through the centre of the pond area to alleviate siltation pressures and reduce future maintenance requirements. The depth of the reinstated main channel allows for a wide low flow channel designed to overtop into the second stage of main channel during high flow events. The pond extent will be reduced and will be limited to the northeastern area of the existing King's Pond, and will be connected via a culvert to the reinstated main channel.

The channel reinstatement procedure begins with temporary dewatering. Principal Contractor to produce Temporary Works Design for any temporary dams used. Before any physical work starts, a comprehensive fish rescue must be conducted to protect local aquatic life. The pond level should then be lowered by pumping water from the pond, ensuring

the pumping setup maintains a functional water level for construction while allowing safe downstream flow. Throughout this drainage phase, contractors must implement sediment control and pollution prevention measures to safeguard the surrounding environment.

The construction protocol pivots from channel reinstatement to an engineered trapezoidal boulder-packed pathway, which can only be constructed once all required weirs and overflow structures are fully built. First, field engineers must conduct a soil assessment; if the subsoils below the pond exhibit a good bearing capacity, the typical pathway construction framework can proceed. A ground investigation scope to be produced by and may require local dewatering if ground investigation can not be undertaken adjacent to the pond

Plastic sheet piling to be installed to retain the water level balance between the main channel and ponds. The contractor will begin by clearing the installation line of all debris and digging a shallow pilot trench along. Next, the contractor will position the first sheet vertically into the trench and drive it into the ground, using a mallet or backhoe bucket for soft soil, or a mechanical vibratory hammer and steel mandrel for harder ground to prevent the flexible plastic from buckling. The contractor will then slide the interlock of each subsequent sheet into the previous one, ensuring they face the correct direction, and drive them down evenly until they reach a uniform target depth. Once all panels are secured, the contractor will attach horizontal waling beams and tie rods to provide structural anchoring against soil pressure, and they will finish the top with a protective capping rail. Finally, the contractor will backfill the area behind the completed wall in gradual, controlled layers using free-draining granular material to avoid overloading the new structure..

Contractors will use clean, quarry-sourced boulders and rocks with a minimum size of ø300 mm, ensuring they are not extracted from sea-based areas to prevent chemical contamination of the pond water.

To achieve a 2-metre-wide walkway above the waterline, the initial base of the pathway must be set sufficiently wide, scaling appropriately with the local water depth. Workers will continuously place the rocks to build up the structure until it breaks the water surface line. To reach the targeted walkway width above the surface, the rocks must be built up with 45-degree sloping sides, creating a stable, trapezoidal cross-section.

Once the core rock structure rises above the waterline, the packed boulders must be mechanically compacted into the pond's base to firmly seat the foundation. If any localised areas sag or settle following this compaction phase, additional rocks must be integrated to level the surface. Following the successful seating of the core rocks, a mix of fines measuring a maximum of 10 mm will be placed and vibrated directly into the remaining structural voids. This filling process must be executed incrementally in 50 mm layers of fines at a time, using the same compaction method to eliminate gaps, with the entire sequence repeated sequentially for the full length of the walkway.

Once the area is sufficiently dry, infilling will begin on the right-hand side of the pond using 6F5, a coarse, crush-and-run granular aggregate graded from 75 mm or 80 mm down to dust, which will be sourced from quarried stone material for this project. This infill must strictly follow the engineering design and must not extend into the retained pond area. The 6F5 material will be transported along the true right-hand bank from the spoil re-use storage area to be placed and compacted in layers where required. Finally, a suitable layer of topsoil will be provided over the completed 6F5 fill to properly support the proposed surface finish and vegetation.

A 5T excavator will be used to over-excavate the channel according to the specified design dimensions. The main channel is estimated to be 3.9 m wide at bank-full width and 1 m deep, which includes a 1.4 m wide low-flow channel within it that is 0.5 m wide at the base and designed to overtop into the main channel at Q50. To construct the banks, a row of posts will be installed at 0.5 m intervals, secured 0.5 to 1 m deep into the bed, and left with at least 0.35 m protruding above ground. The shape must follow a gentle arc as detailed in the Planview drawings, ensuring the apex of any berm does not extend across more than 50% of the channel and maintains a shallow leading-edge angle no greater than 20 degrees. A hazel bundle will then be pushed against the post at ground level, and a second post will be levered against the bundle and hammered into the bed to the same depth as the first. Any excess post height above the hazel bundle must be sawn off, and the posts must be wrapped in a figure-of-eight loop using rope or medium tensile wire and secured with fencing staples. Following this, the bank can be re-graded by pushing site-won material into the channel to backfill the front, and coir rolls will be installed for berm fronting to encourage vegetation uptake and establishment. Throughout this process, suitable excavated material should be reused to supplement the infilling where possible.

To form the new gravel bed, the required gravel must be placed and spread evenly at a depth of 200 mm into the newly excavated channel. Subject to final confirmation, downstream erosion control measures, such as a silt curtain, should be deployed to manage any potential erosion risks around the refilled areas.

Pumping operations will continue to lower the pond level sufficiently to allow work to begin on the left-hand side. The left-hand pond area will be infilled with 6F5 material and compacted in layers where required, utilizing a 2,400–5,700 kg non-vibrating roller for 4 passes. Once the fill is complete, a suitable topsoil layer will be applied over the 6F5. To optimize material efficiency and reduce the overall volume of imported 6F5 required, consideration should be given to whether specific areas, such as the backwater, should remain unfilled or be excavated.

To conclude the project, all required filling, topsoiling, and compaction must be fully finalized. Once the new works are deemed stable and complete, the temporary pumping equipment will be gradually stopped to allow the pond to return to its normal water level naturally. After the water levels stabilize, all temporary pumping equipment and their associated controls will be completely removed from the site.

3.2.5 Secondary channel creation

A secondary channel will be constructed off the reinstated main channel to flow around the western perimeter of the retained island feature in the southern section of the King's Pond (as seen in section 1 and 2). This channel will provide additional capacity during high flows events and will be constructed using the same method used to reinstate the main channel.

The backwater wetland will be constructed with secured silt and then topped with a 100 – 200 mm layer of new material. The wetland silt layers will not be compacted as permeability is to be maintained enabling infiltration through the soil and the therefore the cycling of nutrients in the silt.

3.2.6 Culvert construction

To maintain access across the site for maintenance works, culverts are needed between the channel and pond area maintaining flow between the two waterbodies. A 600 mm twin wall pipe seated on gravel along with pre-cast concrete headwall (Althon or similar) of flex MSE headwall. This will be backfilled with engineered granular fill and compacted to specified requirements as per pending design. The detailed design of the culverts are subject to engineer design specification.

3.2.7 Backwater Creation

Proposed backwater to be created along the western portion of the downstream section of the site extent. The backwater shall be approximately 1 m deep and formed with gently sloping banks at a gradient of 1:3. Material to be removed from area using wheeled/tracked dumper.

3.2.8 Bank Reprofiling

In specific locations in both reaches, the banks are to be regraded to create a shallower gradient. The banks are to be regraded to a 1:3 slope at the steepest, with a preference for 1:4 which will increase stability and prevent undercutting. The excess spoil created by regrading can be used throughout the reach in the proposed channel infilling, spoil re-use areas, and hibernacula.

Mark out the regrading extent on the top of bank, and then use an excavator, positioned safely away from the bank edge. Pull the bank face material back from 0.1 m above the existing bed to the marked new top of bank location. Regrading should have additional variation in the gradient on the bank face to imitate natural formations; these variations should not exceed a 1:3 slope to prevent slumping.

The regrading extent is also dictated by the location of footpaths running along the top of pond banks and, although the footpath around the pond is not a PRoW, there is the aim to not see the path moved away from its current extent in order to maintain current site character and use of the footpaths by the public. Ground protect will be required for footpaths.

These works may result in the removal of trees currently growing along the bank to be regraded. Where appropriate, new trees should be planted to replace those lost, ensuring this will not cause the channel to become overshaded in the future. Native tree species appropriate to the habitat should be selected for planting.

3.2.9 Re-use of Excavated Spoil (on-site)

A 370 m^2 area of spoil re-use will be constructed along the western bank of King's Pond. Berms are to be installed along the True Left Hand Bank to create the perimeter of the spoil re-use area for which benches will be installed on top of. The material has been classified as non-hazardous within the silt analysis report (Contamination Assessment Report), material reuse on site in line with the D1 permit guidance. The berms should be brash, made from site won material that allows for daylighting. The berms downstream of the pond should primarily be made from site won spoil, in order to lose the majority of material on site.

The berms created for the spoil re-use area at King's Pond will provide benefits and create marginal habitat as well as stable banks to enable a public seating area to be created.

A row of posts at 0.5 m intervals should be secured into the bed by 0.5 - 1 m depth, with at least 0.35 m left above ground. The shape should follow a gentle arc as shown on the Planview drawings. The apex of any berm should not extend to more than 50 % of the channel, and should have a shallow leading edge angle, no greater than 20 degrees. A hazel bundle should then be pushed against the post at ground level; a second post should then be levered against the bundle and hammered into the bed to the same extent as the previous post. Any excess post above the hazel bundle should be sawn off. Rope or medium tensile wire should then be looped over the top of the posts in a figure of eight and then secured with fencing staples. The bank can then be re-graded by pushing the site won material into the channel to backfill the front. Berm fronting will be completed using coir rolls to encourage vegetation uptake and establishment.

3.2.10 Brash Berm Construction

Where berms are to be installed the toe of the berm should be delineated with 0.3 m diameter brash bundles stacked two high, held in place by chestnut stakes and tied down with natural rope, before being backfilled with spoil from bank. regrading works and channel excavation. The shape should follow a gentle arc as shown on the Planview drawings. The apex of any berm should not extend to more than 1/3 of the channel width, and should have a shallow leading edge angle, no greater than 20 degrees. The chestnut stakes should be mechanically driven into the bed to a minimum depth of 0.5 – 0.75 m or to the point of resistance and the brash bundles secured to the stakes using jute rope (or similar).

Tops of posts to be cut off at berm top level. The area behind the brash bundles will be backfilled and compacted by re-grading the bank behind the berms to a slope no steeper than a 1:3 gradient. The bank should be reprofiled to rise gently to reach the existing ground height. 400 gsm coir geotextile should then be installed over the top of the berms and fixed in place with wooden pegs. These berms will be fronted with willow spilling.

3.2.11 Marginal Shelf Creation

Marginal ledges are to be created using site won spoil. Banks of the ledges should not exceed 1:3 gradients in order to maintain stability and avoid slumping. Ledges are to be topped with biodegradable matting, such as C125BN biodegradable erosion control blankets to prevent erosion. Matting should be pegged into place using 150 mm hardwood pegs in a 0.5 m grid. Plug planting is then to occur after matting.

3.2.12 Willow Spilling Installation

Live willow rods to be woven between hardwood chestnut posts, 1.8 m x 75 mm, installed at 0.5 m intervals. The chestnut posts shall be driven into the ground by approximately one third of length, or to the point of resistance where ground conditions prevent this, providing a stable framework. The willow shall be progressively woven to 30 cm height, with rod ends tucked into the structure or trimmed neatly as necessary. Jute rope shall be used to secure the willow to the chestnut posts where required, ensuring the woven structure remains stable during establishment.

3.2.13 Wet Woodland Enhancement

Tree planting has been proposed within the design to increase the shade along the watercourse, as its currently overly exposed likely subjecting the water to seasonal temperature influxes, reducing its climate resilience. Incorporating native tree planting will provide a future source of woody debris to the system, and additional habitat and nesting opportunities. The removal non-native and ornamental trees may provide brash material for berm features, whilst enabling a new native tree to be planted in its place, providing greater ecological resilience and functionality.

Trees should be planted in small groups of 3 – 5, with spacing of approximately 1 – 3 m between. Each tree should be securely planted, staked, and fitted with a spiral guard to protect it from grazing mammals, such as rabbits and muntjac deer. Spiral guards should be removed after 5 years once the trees are established and large enough to withstand occasional grazing. Trees are to be planted at least 1.5 m away from the banks of the river in accordance with FRAP consenting.

3.2.14 In-channel Sediment Trap Installation

New gravel and Purbeck stone silt traps to be installed as per designs. Area to be CAT scanned and permit to dig issued before any excavations (including installing posts) take place. Area upstream of silt trap installation to be excavated as per design depth. This will become the area for silt deposition. 16 ton excavator to sit adjacent to the channel and excavate the material from the channel to form the desired depth and shape. Material arisings to be deposited adjacent to machine on Right Hand Bank in designated silt deposit locations agreed with client. Purbeck stones to be transported to work area via telehandler from compound location following the correct lift plan with banksman. Gravel ton bags to also be transported from site compound to works area via telehandler following site lift plan with banksman. Purbeck stones of approx. 1000 mm x 500 mm to be installed in design locations with smaller Purbeck stones filling in any gaps, this will be completed using 16ton Excavator following lift plan methods of practise.

Excavator to sit on Right Hand Bank adjacent to silt trap structure, using the engcon grab the machine will pick up each. A temporary access ramp may be required to access the channel. Purbeck rock and place them in the specified location. Care taken to not have any personnel within unsafe working distance of the excavator. Exact dimensions of Purbeck rockery to be determined on site based on available sizing's of stones. A Steep gravel ramp will be installed downstream of Purbeck rockery edging to the proposed silt trap. Excavator will install gravel using a bucket or similar behind the Purbeck rockery as designed. This will increase flow speed to improve deposition of sediment that is not settled in the trap. Gravel extent to not impede the existing culvert or other structures present in the watercourse. Banks to be reinstated after install before moving onto the next area of works. Repeat all the above for the silt trap construction at the designated installation points.

3.2.15 Marginal reedbed planting

It is recommended the reedbeds are plug planted primarily with Phragmites australis (Common Reed). This species will quickly colonise, establishing a thick habitat for riparian species. Reedbeds to be planted to a density of 4-5 plants per square metre. These will provide nutrient trapping along the outfall point.

3.2.16 Hibernacula Creation

Excess material generated from tree and ground works to create hibernacula. Hibernacula should be approximately 50 cm deep and 1.5 m across. Hibernacula soils should be stable and level with the ground, to avoid slumping and adding material to flood flows which may then block culverts and pipe networks downstream. areas where the soil is free draining or easily waterlogged should be avoided.

The hibernacula should be filled loosely, with site won rocks and woody material to create a spacious environment. Access routes should then be implemented to enable movement between the hibernacula and terrestrial environment; these are typically pipes but may also be hollow wood or aerated bricks. spaced Approximately 50 cm of soil should then be piled on top of the hibernacula.

3.2.17 Bat Box Installation

Bat boxes are most likely to be used in areas where bats are known to feed. Boxes should ideally be placed 4 m above the ground, sheltered from strong winds and artificial light sources, but exposed to sunlight for periods of the day – typically south, south-west, south-east facing. Surrounding foliage should be dense enough to provide good cover and shelter from predation; whilst being light enough to enable easy navigation to and from the boxes.

Bat boxes to be installed by trained and competent individuals with appropriate climbing tickets and equipment.

During the operational phase of the bat boxes, opening of the boxes for survey and maintenance activities must be solely conducted by a licenced bat worker due to UK legal protection. Boxes should be secured using Aluminium or stainless steel screws which will not damage the trees. Bat box arrangement within the wooded area should aim to

cluster 2 or 3 boxes closely together, on the same tree, which would allow bats to easily move between roosts depending on temperature changes.

3.2.18 Bird Box Installation

Bird boxes are most likely to be used in areas where bird species are already known to be present. Ecological surveys should be conducted and referenced in relation to the selection of the most appropriate bird boxes to install on site. Nest boxes should be placed approximately 2 – 5 metres high and be between north and east facing. Nest boxes should be cleaned annually, and should occur outside of the breeding season, September – January, this work should be conducted by a qualified individual. Old nest material, unhatched eggs, or deceased chicks should be removed by a qualified individual.

3.2.19 Log Pile Construction

Excess and dead logs generated from build activities can be used to create log piles within the site. The location of the log piles will be determined by identifying intended species, as different locations will encourage different species to occur.

3.2.20 Native Marginal Planting

Marginal planting shall be undertaken to increase plant diversity. All plants used shall be native water tolerant species in accordance with the planting specification. Plugs to be planted at a density of 8 per square metre, in diverse arrangements.

3.2.21 Bench Construction

Lastly, benches will be erected to the west of the site on top of the spoil re-use area. This will provide outdoor seating for the local community and a place to enjoy nature and outdoor space. Benches to be assembled as per design specification or manufacturer specification. Five benches will be built in this area using sustainably sourced materials. The materials used for the benches should be as locally sourced as possible to reduce transport cost and associated emissions.

3.2.22 Bridge Construction

Bridges or railed boardwalk is to be used to cross the new channels and so connect the footpath across the site. The bridges will be constructed out of wood, using a 100 mm x 200 m Type-1 concrete pad. The bannisters will be constructed with 2100 mm upright posts (75 mm x 125 mm), and 4000 mm handrails (38 mmx 100 mm). The bridge platform will be constructed out of wood using 100 mm x 1200 mm x 50 mm decking boards, and a 100 mm x 4000 mm cross-brace. Oak 75 mm x 125 mm upright posts sawn off to level with the decking will be secured into the ground to approximately 750 mm.

A competent contractor will be required to install the bridge. The supporting beams should be driven into the ground by 750 mm or to the point of resistance. The bearers should then be installed across the width of the bridge using appropriate length wood screws. Once the supporting structures are in place the remainder of the bridge can be built in a methodical manner, installing the footboards from one end to the other ensuring that it is built level.

Timber decking should have a shelf life of 15 – 30 years. Routine maintenance is key to achieving this. Yearly inspection for damage and cleaning of decking boards is advised. Inspections should pick up any structural damage such as splits in the timber or rot. Deformities should either be repaired or replaced depending on the severity. Routine cleaning of decking boards will increase the longevity of the structure and reduce the risk of slips, trips, and falls. Cleaning using a pressure washer is advised over chemicals due to nature of the site.

3.3 Demobilisation

Reinstate working site and access routes to suitable condition. Final site walkover to be conducted with project management and client/ stakeholders to determine completion of the works and if snagging or additional works are required. If all is good and completed, works can be signed off to initiate demobilisation of the works.

All onsite machinery/equipment to have all soil/mud/materials scraped or dug out of tracks and off body as best as possible adhering to biosecurity procedures prior to pressure washing and Virkon decontamination spray. The site compound will then be removed and all plant and machinery off hired and collected from site.

Reinstate site compound area and demobilise from site.

Following the demobilisation a return visit may be required to undertake reinstatement of sediment drying area including cultivation and seeding.

3.4 Maintenance

The design has been created with the intention of requiring as little maintenance as possible. Whilst this is true, there will still be suggested maintenance that should be carried out to enable the best functioning of the restoration. Features installed into the watercourse should be checked within a year of installation or following storm events within this time to check for damage. The inspection for damage can be carried out via a site walkover and does not require action if there has been no damage.

Areas that have been planted should be inspected after a year to assess whether the planting has been successful in establishing. If there are excessive bare spots these should be re-planted at an appropriate time of year. Establishment, Maintenance, and aftercare of planted vegetation should be undertaken in accordance with the Planting Specification (5080D - Planting Specification_V1) including replacement of failures and general maintenance for the duration set out within the specification.

Where invasive species have been removed the area should be checked for re-growth in the following spring. If there is signs of regrowth then the new growths should be treated, removed, and disposed of responsibly.

Clearing of silt trap should be undertaken as required with either the use of a Vacuum excavator from the right hand bank or with use of an excavator accessing the channel from the left hand bank through the wet woodland. If accessing via the wet woodland silt clearance should be undertake during dry summer months.