

# M25 junction 10/A3 Wisley interchange

## Requirement 9 Cockcrow Green Bridge



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## Document control

The Project Manager is responsible for production of this document, based on the contributions made by his/her team existing at each Stage

## Revision History

Revision	Suitability	Purpose / Description	Originated	Checked	Reviewed	Authorised	Date
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## Table of contents

<b>1.</b>	<b>Introduction</b>	<b>4</b>
1.1	Purpose and objectives	4
1.2	Background	4
1.3	Consultation	6
<b>2.</b>	<b>Detailed Design and Specifications</b>	<b>8</b>
2.1	Introduction	8
2.2	Bridge Structure	8
2.3	Parapet Design	11
2.4	Soft Landscaping	12
2.5	Fencing and Signage	15
2.6	Road surfacing	17
2.7	Specifications	17
2.8	Maintenance, Monitoring, Evaluation and Establishment	30
<b>3.</b>	<b>Engineering / Design Drawings</b>	<b>33</b>
3.2	Visualisations	33
<b>4.</b>	<b>References</b>	<b>35</b>
<b>Appendix A.</b>	<b>Approval in principle drawing</b>	<b>37</b>
<b>Appendix B.</b>	<b>Landscape drawings</b>	<b>39</b>
<b>Appendix C.</b>	<b>Heathland Connection across Green bridge</b>	<b>45</b>
<b>Appendix D.</b>	<b>Visualisations</b>	<b>47</b>

## Figures

Figure 1-1 - Location of Cockcrow green bridge	5
Figure 1-2 - Images of existing Cockcrow overbridge and the adjacent commons	5

## Tables

Table 2-1 – Considerations for heather translocation	14
Table 2-2 – Outline specification	18
Table 2-3 – Outline Specification for planting types and protective measures	21
Table 2-4 – Outline Specification for Fencing, Gates and hard landscape elements	24
Table 2-5 – Monitoring targets/measures of success	31

# 1. Introduction

## 1.1 Purpose and objectives

1.1.1 Requirement 9 in Schedule 2 of the draft Development Consent Order deals with Cockcrow green bridge. This document has been prepared to provide the details of the bridge design. This is to enable the consultation with parties specified in the Requirement to take place and for the Secretary of State to approve the measures, after consideration of the consultation feedback, in due course.

1.1.2 The full text of the Requirement is set out below:

*9.—(1) No part of the authorised development comprising the construction of the replacement Footpath 17 Cockcrow Bridge (Work No.35(b)) is to commence until details of the bridge design features, substantially in accordance with the preliminary design shown on the Engineering Drawings and Sections certified under article 46 (certification of documents, etc.) of this Order have been approved in writing by the Secretary of State, following consultation with the relevant planning authority, Natural England and the local highway authority.*

*(2) Work No.35(b) must be constructed in accordance with the details approved under subparagraph (1) unless otherwise agreed by the Secretary of State.*

*(3) Notwithstanding sub-paragraph (1) and (2), the Secretary of State may approve under this requirement a bridge design excluding any soft verge wildlife crossing.*

## 1.2 Background

1.2.1 Funding was granted from Highways England's Designated Funds programme (Environment and Wellbeing Fund) to change the design of the replacement non-motorised user (NMU) and accommodation bridge over the A3 (required as part of the M25 Junction 10 / A3 Wisley interchange improvement scheme and referred to as 'Cockcrow Bridge') to incorporate an additional width of 25m of heathland landscaping on the bridge deck.

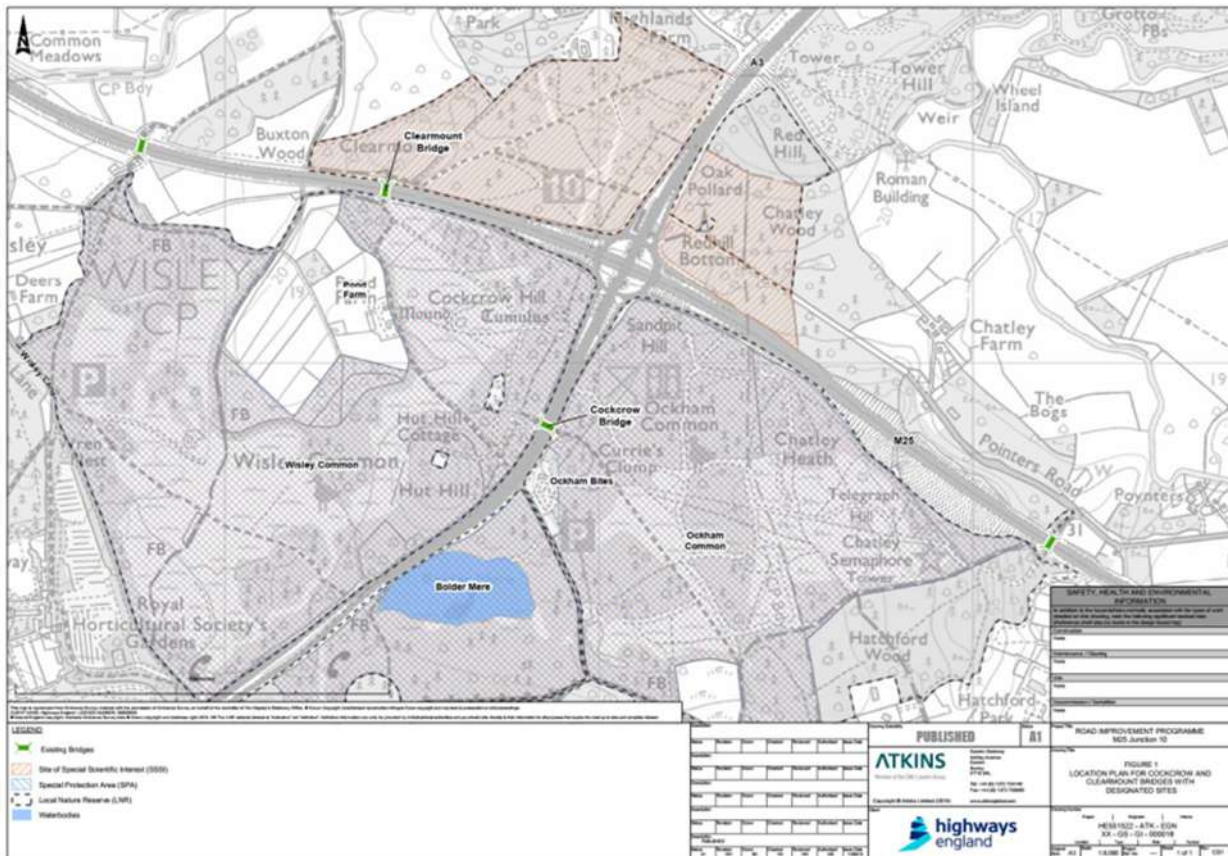
1.2.2 The additional landscaping will address negative impacts associated with historic development of the strategic road network (SRN) and will redress the physical and psychological barrier to movement of people and the physical barrier to wildlife created by the existing A3 Portsmouth Road as it crosses Wisley and Ockham Commons, severing the landscape of the Commons.

1.2.3 Cockcrow green bridge is not necessary mitigation for the M25 Junction 10 / A3 Wisley interchange improvement scheme, however the green bridge was included (subject to its separate funding being approved) in the Environmental Impact Assessment and Habitat Regulations Assessment for the scheme.



- 1.2.4 A location map is provided below (Figure 1-1). Site photographs in Figure 1-2 show the existing NMU crossing point (which will be removed as part of the M25 Junction 10 scheme) and images from Ockham and Wisley common situated either side of the proposed green bridge.

**Figure 1-1 - Location of Cockcrow green bridge**



**Figure 1-2 - Images of existing Cockcrow overbridge and the adjacent commons**

**Existing Cockcrow overbridge**



**View of the A3 from existing cockcrow NMU bridge**



**View of Ockham Common with heather or 'Ling' (*Calluna vulgaris*)**



**Common Gorse (*Ulex europaeus*) in bloom**



## 1.3 Consultation

- 1.3.1 Surrey County Council, Surrey Wildlife Trust and Natural England have been key consultees throughout the development of the green bridge designated funds proposal.
- 1.3.2 Initially funding was granted from Highways England's Designated Fund (Environmental) programme for a feasibility study into providing one or more green bridges in association with the M25 junction 10 / A3 Wisley interchange RIP scheme (M25 Junction 10 Green Bridges Feasibility Study, Highways England, January 2019, updated September 2019). The study identified a 25m green element at Cockcrow Bridge (the location of a new proposed Non-Motorised User (NMU) / vehicle access bridge over the A3) as the best option and confirmed that it was deliverable. Funding was subsequently granted (again from Highways England's Designated Fund (Environmental) programme under the Landscape theme) in April 2020 to carry out detailed design for this option.
- 1.3.3 Early consultation during detailed design with Highways England's Regional Environmental Advisors (REAs) and Technical specialists for landscape identified the need to re-visit certain elements of the preliminary design for the bridge, particularly regarding the needs and experience of the users of the bridge (cyclists, pedestrians, equestrians and vehicles).
- 1.3.4 Work was carried out to refine the alignment of the access road across the bridge to incorporate this feedback. These designs were then taken to wider consultees (Natural England, Surrey County Council and Surrey Wildlife Trust) who were supportive of the changes and the improvements made for users of the bridge. These changes included a curved alignment of the access track and new landscaping areas along the southern parapet to give the user a feeling of 'still being in the commons' when they cross the bridge. This is a valuable improvement on the outline designs created in the feasibility study in terms of enhancement of the user experience. This has required splitting the 'Green element' (which was originally proposed to be only on the north side of the bridge) into two sections. Further work was done to ensure that this did not



diminish the ecological value of the bridge. For example, the widest part of the 'northern green element' is positioned towards the centre of the bridge (circa 21m) where wildlife, especially smaller species such as reptiles, may be most vulnerable to predation. In addition, the curved alignment gives the opportunity to provide more planting along the southern parapet which reflects the vegetation on the commons. This smaller green element will still also act as a corridor for wildlife which is less sensitive to disturbance. The proposed bridge still delivers a 25m wide green element but now provides an enhanced user experience whilst maintaining the original ecological benefits. All these decisions were made in consultation and agreement with Natural England, Surrey County Council's ecologist and Surrey Wildlife Trust.

## 2. Detailed Design and Specifications

### 2.1 Introduction

- 2.1.1 This section contains the detailed design and specifications and is supported by the Figures in Appendix A and B. The design comprises the following elements:
- Bridge Structure;
  - Parapet Design;
  - Soft landscaping;
  - Fencing and Signage;
  - Road surfacing;
  - Specification; and
  - Maintenance, Monitoring, Evaluation and Establishment.

### 2.2 Bridge Structure

- 2.2.1 The existing Cockcrow bridge is a PRow carrying a designated footpath (Route number 17 – Ockham) over the A3. The existing bridge needs to be demolished due to its north abutment clashing with the scheme's widened carriageway approaching Junction 10 on the A3 northbound carriageway.
- 2.2.2 Cockcrow green bridge will replace the existing Cockcrow bridge to become a restricted byway PRow, which will function as the designated footpath (Route number 17) crossing the A3. The proposed bridge will also replace the existing direct access from the A3 northbound off-slip at Junction 10, used by Surrey Wildlife Trust staff, local residents and others, as this access needs to be removed as part of the scheme. To accommodate both motorists and unsegregated non-motorised users, i.e. pedestrians, cyclists and equestrians of the PRow, the proposed Cockcrow green bridge will provide a 4.1m wide two-way 'shared use' single carriageway.
- 2.2.3 The bridge will form part of the proposed Cockcrow Local Access Road (LAR), which will commence by the entrance to the existing Ockham Bites café at Old Lane on the south of the A3, then crosses the A3 over the bridge, and connects with the existing access track that leads to Pond Farm and Birchmere Campsite. The entrance from Old Lane will be barrier restricted for vehicles, so that the road can only be used by vehicles of Surrey Wildlife Trust staff, users of the scout camp and local residents.
- 2.2.4 Cockcrow green bridge is located on the south side of M25 Junction 10, approximately 25m south of the existing Cockcrow bridge. The location for Cockcrow green bridge was constrained by the alignment of the A3, existing local features and, primarily, the local topography. Vertical alignment for the bridge is critical, dictating the bridges position on the A3. The local topography falls away from the A3 and maximum approach embankment gradients of 5° need to be used for non-motorised users' requirements. This means any increase in vertical alignment level would result in significant increases in length



of approach embankments and hence in the extent of the DCO boundary and land take from the SPA. Even at the proposed bridge's location, the horizontal alignment requires tight turns once off the bridge so that it can connect to the existing access roads.

- 2.2.5 Cockcrow bridge is a two span fully integral bridge with a total length of 66m. At the preliminary design stage of the scheme, this arrangement was compared against alternatives and determined to be the preferred. Other span arrangements were discounted for the following reasons:
- A conventional single span option would require a steel composite deck with a span to depth ratio of greater than 30. The required construction depth is greater than that available with the vertical alignment of the LAR and the minimum headroom requirements.
  - A feature bridge single span option, such as a cable stayed bridge or thrust arch with hangers, could require less construction depth below the level of the carriageway and fit the geometric constraints, but would add significant cost and complexity to the construction.
  - Three span and four span arrangements were discounted as the cost and complexity of constructing additional piers and foundations outweighs the savings from a slightly shallower deck and lighter abutments when compared with other span arrangements. Additionally, the horizontal alignment of the proposed LAR has tight turns once off the bridge, so that it can connect to the existing access roads. This alignment would require end spans to be short and would potentially require special bearings to resist uplift at the abutments.
- 2.2.6 The fully integral bridge arrangement was preferred as this removes the need for expansion joints and bearings which significantly reduces the maintenance activities required for the structure. Instead, the connections between the bridge deck and bridge substructure, i.e. abutments and intermediate support, are cast in concrete making fixed continuous joints.
- 2.2.7 The superstructure consists of pretensioned precast concrete beams with a cast in situ reinforced concrete deck slab. This superstructure was preferred as it required the least future maintenance, minimised future road user disruption from maintenance activities, required the least temporary work site area to construct, minimised working at height during construction and was estimated to be the lowest costing option for the scheme. Other superstructure options were discounted for the following reasons:
- In situ reinforced concrete – For this form of construction the deck would have to be supported by a temporary falsework system during construction, which would require significant day time road closures that would not be permitted for the A3.
  - Post-tensioned prestressed beam – There are risks associated with the post-tensioning that are eliminated by selection of an alternative option that is equally appropriate for the span lengths required.
  - Steel composite I girders – This form of construction requires bearings to be used on the intermediate pier, increasing required maintenance activities for the bridge. This form would also be different to that used for the existing retained A3 bridges within and adjacent to the scheme.

- Steel composite box girders – This form of structure would be less economic than the ‘I girder’ alternatives. Furthermore, the inside of the box would be classified as a confined space and would create undesirable health and safety risks for the maintenance of the deck.
- Steel truss – This form of structure would be less economic than the steel composite alternative for this span length.

2.2.8 The superstructure is supported on abutments in the verges and an intermediate support in the central reserve of the A3. At abutments the superstructure end diaphragms are supported on reinforced concrete sleeved columns that are hidden behind reinforced soil walls. This abutment arrangement reduces the design earth pressures on the structure, reducing the reinforcement quantities and sections sizes required. The reinforced soil walls in front of the abutments hide the structure’s columns behind and provide feature facing panels giving a variety of aesthetic options. The intermediate support is a reinforced concrete leaf pier. A reinforced concrete leaf pier was preferred due to their resistance to vehicle impact in the event of an accident. Leaf piers are typically used when providing intermediate supports in the central reserve for this reason.

2.2.9 Following the granting of funds to carry out detailed design of the green bridge, it was identified through engagement with stakeholders that the external appearance of the bridge should be developed from the preliminary design proposal, to contrast the other bridges on the scheme and give identity to the green bridge. The detailed design stage of a project is too late to significantly change the appearance of the bridge, as the form of construction and span arrangement have by this time been integrated into the overall scheme and agreed in principle with the Highways England Safety, Engineering and Standards (SES) Structures Advisor for the scheme. It was considered that the best way of enhancing the appearance at this stage was to explore different options for vehicle parapet, as this makes up a significant proportion of the elevation of the deck and the most common form, a galvanised steel post and rail system, was to be used on other bridges on the scheme.

2.2.10 Concrete parapets have been previously used as an alternative to metal parapets where high containment is required, such as over railways. Concrete parapets give the opportunity to cast bespoke feature finishes into them. Concrete parapets with feature finishes are currently proposed on many of the road bridges required for the High Speed 2 project. Following engagement with stakeholders, it was preferred to explore metallic appearance options rather than concrete due to concerns over the extent of colour contrast with the environment either end of bridge.

2.2.11 Concrete parapets with metal panel cladding were explored. These are not typically used on bridges over highways and following discussions with Highways England SES and industry parapet suppliers, it was confirmed that this type of bespoke parapet would require testing for safety compliance. The scheme contractor confirmed that the construction programme would not be able to accommodate this testing or sustain the risk that the bespoke parapet system would be unsuccessful in the testing. Instead, the use of metal clad metal parapets was explored, which are already tested and compliant.

- 2.2.12 Further engagement with industry parapet suppliers identified that metal parapets could be clad in steel or aluminium panels, internally and externally, without affecting their existing compliance and requiring retesting. The use of weathering steel and other metals such as zinc or copper for cladding panels were explored but these would have required re-testing. The steel/aluminium panels can be laser cut with project specific patterns to give increased identify. Any hole's laser cut in the panels need to be sufficiently small to prevent these being used as footholds for potentially climbing over the parapet. The metal parapets would need to be either painted steel or anodised aluminium to provide colour options. Anodised aluminium is currently proposed as it gives the wider selection of colours and a better finish compared to painted steel. The solution will be developed to provide the cladding panels with equivalent appearance of weathered metal, such as a bronze colour. The parapet architectural design is discussed further in 2.3.
- 2.2.13 Inclusion of colour into the concrete parapet upstands that support the metal parapets will be explored further during the remaining detailed design.

## 2.3 Parapet Design

- 2.3.1 The bridge proposed will span between Wisley Common and Oakham common. Despite being joined across the A3 both spaces have their own unique character.
- 2.3.2 Wisley Common is in very close proximity to the formal gardens of RHS Wisley and is often included within people's walks around the gardens. Ockham Common is dominated by historic heathland known as 'Chatley Heath'.
- 2.3.3 The aspiration for the look and feel of the bridge is to have a distinctive design that complements the idiosyncrasy of the proposal: A singular green bridge that connects two areas of unique character through a continuous heathland habitat. As such, the bridge's balustrade was identified by the project team as the most visible component internally and externally. The proposed design of the parapets needed to achieve three main aims:
- Not being visually invasive to the landscape proposal over the bridge but blending in with it.
  - Creating contrast and richness in comparison with other ordinary bridges normally found in highways.
  - Not invalidating tested balustrade products, so the overall project programme is not affected by requiring approval for a non-standard approach or risking public safety through an unsafe balustrade design.
- 2.3.4 Different models were analysed considering geometry, finishes and compliance from a technical point of view. The project team were interested in exploring the idea of patterns applied to the balustrade which could tell a story about the uniqueness of the bridge proposal. This is how the project team developed the idea of bronze anodised aluminium panels to clad a proprietary steel balustrade with laser-cut details to display an abstracted pattern of heather which reflects the local vegetation.



- 2.3.5 Earlier ideas of using a weathering metal panel like Corten steel, bronze or copper were explored to look at “organic-like” finishes; however, as described above, these were not possible to implement without further testing which would impact the overall programme. Therefore, bronze anodised aluminium has been selected as the preferred cladding options due to its visual and performance properties. From a visual point of view, it has a closer look and feel to typical weathering metal panels due to its iridescent colour. From a technical point of view, pressed aluminium panels are very durable material, lightweight and low maintenance. They may be supported by steel or aluminium frames to create a certified parapet assembly with a design life of over 30-years.
- 2.3.6 The project team believe that the balustrade proposal will not only complement the landscape design but it will create an attractive and distinctive landmark as seen from the highway, allowing the road user below to know that they are arriving at junction 10 and are passing through a distinctive and attractive landscape.

## 2.4 Soft Landscaping

- 2.4.1 The bridge is set within the heathland and woodland that form Wisley Common and Ockham Common and the landscape proposals are intended to provide a continuous landscaped link between these areas to reduce the severance effect of the A3. As part of the M25 Junction 10 scheme proposals, extensive heathland restoration is proposed to enhance the ecological value of the SPA. The soft landscape proposals are intended to complement these proposals so that a continuous heathland link is created across the bridge (refer to Appendix C for a plan showing the continuous heathland link created by the green bridge and the main scheme’s heathland restoration areas). At the same time, it is intended to maintain and enhance the existing woodland screen planting alongside the A3 where possible to block views of the moving traffic.
- 2.4.2 The access route up to the bridge from Old Lane will be planted with native tree and shrub planting which will link to separate proposals to enhance the car park here. A clump of trees situated on a natural knoll, known as Curries Clump to the east of the bridge will be retained as a feature in the landscape. At this point the access track and NMU route fork with one route crossing the bridge and the other carrying straight on via a T-junction. A gate was initially proposed at this T-junction but has since been removed, as a result of feedback from local stakeholders, to allow for free-flow of equestrians, cyclists and pedestrians.
- 2.4.3 As the track forks to cross the bridge an area of heather/common gorse turfing on the right-hand side links the newly created heathland to the east around Curries Clump with the habitat creation on the bridge. There will be areas of common gorse turfing either side of the NMU track to aid reptiles crossing the NMU route, providing them cover close to either side of the path.
- 2.4.4 Once on the bridge, the access track/NMU route has been designed to curve gently across the bridge, maintaining an expanse of heathland vegetation to the north side which will provide a visually attractive route for pedestrians and horse riders together with a buffer strip of heathland vegetation between them and the southern parapet.

- 2.4.5 The access track will have an asphalt surface with precoated chips (14mm stone size) to give a rural appearance whilst being suitable for the heavy vehicles that will be using it. It is set below the level of the planting by 450mm and the landscape grades up gently from the edge of the track to the surrounding planted areas. On the southern side of the track there is verge of fittleworth stone material (approximately 1m wide) which will be flush to the track (before the landscape grades up) which has a drainage function as well as additional space for NMUs to wait safely should vehicles need to pass them.
- 2.4.6 The depth of soil across the bridge is typically 600mm but lower and higher areas have been designed to create south facing slopes and sandy areas for basking reptiles and invertebrates. The bridge will be turfed with heather/common gorse turves which will have been lifted from adjacent heathland. Amongst the heather/common gorse turfs dwarf gorse (*Ulex minor*) and broom (*Cytisus scorparius*) will be seeded as there is insufficient examples of the dwarf gorse and broom on the adjacent heaths to allow translocation. Seed will be collected for these two species from Wisley and Ockham Common.
- 2.4.7 The soil for the bridge and the neighbouring embankments, which will also be turfed, will be lifted from areas of the SPA that will be lost during the creation of the embankments and other parts of the main M25 J10 scheme. These soils will be lifted and stored separately specifically for re-use on the areas of heather turfing.
- 2.4.8 A line of up-ended tree stumps will provide a safe route for reptiles moving across the bridge. The stumps will provide a refuge whilst the heathland is establishing and cover across the bridge is limited. The line of stumps link either side of the bridge extending to the areas of heathland creation in E1 and E2 which form part of the SPA compensation works for the main M25 J10 scheme. The placement of stumps in a meandering line also allows it to form a feature of visual interest in the heathland landscape across the bridge and down the embankments. Groups of small rocks/boulders will also be placed to provide refuges for small fauna using the green bridge to cross between the heathland on either side.
- 2.4.9 On the west side of the bridge the embankment down to the access track for the balancing pond and heathland creation areas here will be graded out to create a more natural landform and link to the common land to the west (Wisley Common). This graded out slope will also be turfed to extend the area of heathland from the bridge out into the landscape where the M25 junction 10 scheme proposes extensive areas of heathland restoration. Broadleaved woodland planting will screen views of the balancing pond, environmental barrier and traffic on the A3. The access track for the balancing pond will have a loose surface without kerbs to maintain connectivity between the area of heathland creation (E1) and the heathland creation on the green bridge and embankment slope.
- 2.4.10 South of the access track, along the tow of the embankment, there is a drainage ditch required to capture any surface water flow from the new western embankment. This is a natural open ditch with 1 in 1 sloped sides. Two 'crossing points' have been designed adjacent to the 'heathland corridor' created between the green bridge and the heathland restoration area referred to as E1. These

crossing points will provide suitable connection for any specialist dry heath species which may be less likely to cross the open ditch. They are both approximately 10 metres in length and comprise a section of filter drain with heathland turfs at the surface, tying into the heathland turfs on the bridge embankment. Common gorse turfs will be placed strategically in front of these crossing points to dissuade access onto the embankment by the public, but still allow movement of wildlife.

- 2.4.11 The embankments either side of the bridge will be planted with broadleaved woodland to screen views of the road and as far as possible retain the feeling of travelling between two landscapes of heathland and woodland mosaic. Environmental barriers included as part of the junction 10 scheme will run alongside the A3 from the north and terminate at the bridge abutments. These will serve as a visual and noise barrier to reduce as far as possible the impact of the A3 on users of the adjoining land.

### Translocation of planting stock

- 2.4.12 Turf translocation is an effective method of habitat creation as it ensures that the original seed bank and soil composition is retained. With heathland, the removal of the turfs can also benefit the existing donor heathland as, when turfs are removed, bare areas are created which allows early successional species to establish and promotes a mosaic habitat composition.
- 2.4.13 The provision of donor heather turfs from Wisley and Ockham Common offers an excellent means of creating heathland habitats on the proposed green bridge.
- 2.4.14 There are a number of considerations to be taken into account when establishing heathland. These are detailed in Table 2-1 below and are based on best practice guidance (Anderson, P. 2003. Habitat translocation: a best practice guide. CIRIA) and the experience of Atkins staff.

**Table 2-1 – Considerations for heather translocation**

Description	Best practice recommendations	Suggested approach during construction
Donor turf size/depth	2.4m x 1.2m donor turfs are recommended (Will Bond, Alaska Ecological Contracting Ltd, pers comm) with a soil depth typically between 120-140mm	A detailed translocation method statement will be produced (by a specialist contractor) and followed.
Subsoil requirements	Heathland soils are typically low in pH and low in nutrient levels. Deviating from this will cause problems (such as an increased risk of weed growth and failure of heather turfs) therefore subsoil (the mineral layer specifically) should be used from adjacent heathland.	Subsoil to be used from adjacent areas, this soil will be sourced during the construction of the M25 junction 10 / A3 Wisley Interchange scheme. A competent soils scientist will oversee the sourcing of the material and storage.



Description	Best practice recommendations	Suggested approach during construction
Timing of translocation	The transfer of heather turfs will be carried out during the dormant season. The best period for translocation is autumn/early winter (October-December) under 'normal' weather conditions (Will Bond, Alaska Ecological Contracting Ltd, pers comm)	Translocation will be carried out October-November to avoid the reptile hibernation period. It can be extended into December if the risk to hibernating reptiles is mitigated.
Personnel	The condition of the turfs when they are cut, moved and placed is key to the success of the translocation. Skilled operatives are fundamental in achieving this, as is experienced supervision.	Only specialist contractors with specialist equipment will deliver this element of work. Supervision of works by experienced staff.

2.4.15 Once the turfs have been placed on the bridges there will be a key period of establishment during which careful management may be required to give the turfs the best chance of establishing. It is difficult to predict what may occur during this time but there may be some localised turf failure or damage and germination of undesirable weed species. Many of these scenarios can be dealt with (i.e. through spot treatment of weeds, replacement of failed turfs etc) although it should be acknowledged that this type of habitat creation is complex and there is a risk that the translocation of heather may not be successful. If this scenario were to occur additional heather/common gorse plants could be sourced locally and used as a contingency plan.

2.4.16 Further details on the establishment activities/responsibilities are provided in section 2.8.

## 2.5 Fencing and Signage

2.5.1 Details of the layout and types of fencing are also set out in Table 2.2, Outline Specification for fencing, gates and hard landscape elements.

2.5.2 Fencing will be provided to control the access of non-motorised users and animals to land on and around the green bridge. This is for the benefit and safety of users and to enable the continued success of the habitats on the bridge itself.

2.5.3 To the north of the bridge there are wooden environmental barriers on either side of the A3 adjacent to the verge. These are 2.5m high and will tie into the abutments of the bridge on either side of the A3 and as part of the noise mitigation proposals help to reduce the noise effects of the main scheme on the surrounding area. There is also highway boundary fencing running south from the bridge on the west side and running north from the bridge on the east side. This will be post and four rail wooden fencing which is positioned alongside the NMU route which approaches the bridge from the north and south. This will prevent access onto the land adjacent to the highway by livestock and users of the NMU route.

2.5.4 Surrey Wildlife Trust (SWT) use cattle to help manage vegetation on Wisley Common and the cows are free to roam over much of the common. They are not

used on Ockham Common on the east side of the A3 and there is a need to control access to this side of the A3. For this reason, stockproof fencing is provided to control movements of cows across the bridge. SWT are expecting cattle to access the green bridge as part of the management operations for the habitats being created on it so fencing is proposed alongside the NMU route on the north side and then across the eastern end of the bridge to control access. This fence will be a cleft chestnut post and three rail fence approximately 1.2m high with bays at 2.7m spacings. Sections of this fencing will have sheep netting attached to the lower sections to prevent access by dogs and limit disturbance to sensitive heathland animals using the bridge. Sections will be designed to allow deer to pass through unhindered, these sections will be located at strategic points in the fencing and will be free of mesh to allow for deer to pass through unhindered. The design of these deer passing points has followed advice provided by Surrey Wildlife Trust (Surrey Wildlife Trust, Stock Fencing & Deer advice note, June 2013).

- 2.5.5 There is also stockproof fencing proposed between the green element and the northern parapet to protect the parapet potential damage from cattle.
- 2.5.6 To prevent the free roaming cattle getting across the bridge on the NMU route a cattle grid is included at the western end.
- 2.5.7 A grid would also prevent equestrian access; therefore, a horse gate and horse margin is provided (with mounting blocks on either side of the gate) so that horse riders can get around the cattle grid. This is in line with the current provisions for horse riders in Wisley Common (i.e. a mounting block and gate at the western end of the existing Cockcrow pedestrian bridge).
- 2.5.8 The bridge will be used by different user groups and some signage will be required at the bridge to direct the different user groups that will be using the crossing and the NMU route which intersects with the bridge. Vehicular traffic will be accessing the bridge from Old Lane by the Ockham Bites car park (where an access control gate would be placed) and then crossing over to Hut Hill Cottage, Pond Farm and the Scout Camp.
- 2.5.9 The NMU route will also be used as a maintenance access track with the route being suitable for vehicular traffic. To prevent inadvertent access to the NMU route by non-maintenance vehicles signs will be provided where the route intersects with the vehicular route across the bridge on either side. Vehicle control barriers will also be provided at the access points to the NMU route to prevent access by other vehicles with maintenance teams being provided with access keys/codes. Signage for NMUs will also be provided to direct them along the NMU route to destinations north and south.
- 2.5.10 As the green bridge will have an ecological as well as a landscape benefit interpretation boards will be placed at strategic points either side of the bridge to explain the aims of the green element of the bridge and the types of species that could be seen on it.

## 2.6 Road surfacing

- 2.6.1 In design terms, the character of the route is intended to be rural and appropriate to the wider Common Land with soft verges and no kerbs. Vegetation will blend into the commons beyond.
- 2.6.2 The route across the bridge has been designed to accommodate passenger vehicles that need to access Hut Hill Cottage, Pond Farm and Birchmere Scout Camp on Wisley Common to the west of the A3. It also must be able to carry heavy goods vehicles making deliveries to these properties, refuse and fire trucks as well as SWT lorries carrying cattle and timber. The layout of the route across the bridge and the construction of it has been designed to accommodate all these vehicles types.
- 2.6.3 The road will have a 4.1m cross section with a 1 metre wide fittleworth stone 'verge' along the southern edge for drainage purposes and to enable equestrians to move off the hard-surfaced route when vehicles are approaching. Passing places would be provided at either side of the bridge so that vehicles can wait if another vehicle is already using the crossing. The road itself would not be kerbed to facilitate 'over the edge' drainage and give a less formal appearance. The wearing course would be asphalt with precoated chips which would be in keeping with the rural setting of the bridge. As noted in Section 2.4 above there would be a cattle grid on the western end of the bridge to prevent SWT cows crossing onto the Ockham Common side.

## 2.7 Specifications

- 2.7.1 The outline specifications are provided in this section in Table 2.2 (general measures), Table 2.3 (planting and protective measures) and Table 2.4 (fencing, gates and hard landscaping elements).
- 2.7.2 These will be developed into standard Highways England Series 3000 Specifications and issued to the contractor to follow and implement.



**Table 2-2 – Outline specification**

Introduction		
	The outline specification below is intended to set out the ways in which the design outcomes shall be achieved. This is will be subject to ongoing review and development at the project progresses.	
	<b>Planting General</b>	
	<p>"Materials, goods and workmanship shall be the best quality of their respective kinds, and those for which there is a British Standard or Code of Practice shall comply therewith. In regard to the timing of Horticultural Works, planting shall be carried out between November and March subject to suitable weather conditions. Suitable weather conditions shall mean when the ground is moist but not wet and workable. Planting shall be suspended during periods of drought, when soil is frost-bound or waterlogged, during persistent drying cold winds or during any other conditions unfavourable to successful establishment. BS 3936 - Part 1 for Feathered trees, Whips and Shrubs - All commercially grown plants shall comply with this specification and the relevant parts of BS 3936 and shall be to the height and/or spread as detailed. They shall be well grown, bushy, healthy and well-established nursery stock of good form, hardy, free from defects, furnished with a fibrous root system exactly true to name as specified.</p> <p>Note that there will be plant material derived from locally translocated sources within the adjacent common areas. These will be subject to the equivalent standards for commercial plant stock in terms of plant handling, planting and establishment.</p>	
	<b>Water Supply Restrictions</b>	
	"If the water supply is, or is likely to be restricted, advise Consultant and do not carry out planting or seeding until instructed. If planting or seeding has been carried out, obtain instructions on watering."	
	<b>Supply and Handling</b>	
	"Supply and handling of Trees and Plants; shall comply with the National Plant Specification and the Code of Practice for Plant Handling (CPSE) which is incorporated in the National Plant Specification (available free at <a href="http://www.gohelios.co.uk">www.gohelios.co.uk</a> ).	
	<b>Origin of Plants, Certification and Labelling</b>	
	<p>All plants shall have been obtained from a reputable nursery and grown within the British Isles for at least one growing season if stock of local provenance is not available. The contractor shall provide a Certificate of Local Provenance and confirmation that all plants supplied comply with the specification. Plant samples shall be approved on site by the Landscape Architect prior to planting. In all grass/perennial planting the collection will be tagged with waterproof durable labels as specified by the Landscape Architect.</p> <p>All heathland turfs shall be obtained from Wisley and Ockham Common (or potentially other local heathland sites, with permission) in agreement with Natural England (NE), Surrey Wildlife Trust (SWT) and Surrey County Council (SCC). Location of areas where turves shall be lifted from shall be agreed with SWT, SCC and the Ecologist prior to lifting and these areas will be prepared (mown) in advance to prepare them for turf lifting operations. Should insufficient turf be</p>	



	Introduction		
		available from local sources then alternative methods of heather establishment shall be considered, including distributing brash or collecting seed and seeding.	
		<b>Supply of Seed</b>	
		Collection of dwarf gorse and broom seed shall be from within the SPA. Grass seed mixes shall have been produced for the current growing season, be Blue Label certified and in accordance with EU purity and germination regulations. Native wildflower seeds to be of British Provenance. Mixes shall be bespoke and comprise the species identified in the outline specification below.	
		<b>Heather Turves</b>	
		Donor turves shall be 2.4m x 1.2m in size when lifted with a minimum depth of 100-120mm. A detailed method statement shall be produced by a specialist sub-contractor and agreed before lifting and translocating turves. The transfer of heather turfs shall be carried out during the dormant season during autumn/early winter, during suitable weather conditions free from frost or waterlogging (see General above). Translocation of heather turves shall be carried out by an experienced specialist contractor with experience in translocating heather turves.	
		<b>Ground Preparation</b>	
		<b>Vegetation Clearance</b>	
		All vegetation to be cleared with grass areas to be cut to 50mm and arisings removed from site. Vegetation to be removed in accordance with agreed plans. The tree works shall be undertaken in accordance industry standards, BS3998 is the British Standard for Tree Work. For tree removal trunks of 600-800mm diameter to be retained in 2-3 metre sections for re-use as part of the design.	
		<b>Soil</b>	
		Subsoil for areas of heathland turfing shall be sourced from the subsoil removed from the SPA to construct the main scheme and stored separately for re-use on the bridge. Maximum depth of subsoil shall be 600mm on the bridge deck and 200mm on the embankment slopes. A competent soil scientist shall oversee sourcing and storage of the subsoil. No imported topsoil or peat extracted compost or composted material. It is not envisaged as required as the scheme will rely on site won material from donor SPA areas.	
		<b>Weed Control</b>	
		Methods for weed control prior to planting shall be agreed in liaison with the landscape architect and ecologist for plant species which are agreed as undesirable or invasive/injurious weeds and not in accordance with the design objectives. Methods shall not lead to the pollution of ground water of the water supply. For all new hardstanding areas total weed control will be required.	
		<b>Planting Sundries</b>	

	Introduction		
		There should be an allowance for protection of planting, with stakes to whips, transplants and rabbit guards to be used for woodland planting until completely established. Maintenance activities are considered further in Section 2.8 of the report.	



**Table 2-3 – Outline Specification for planting types and protective measures**



2.7.3 The following sections outline the materials to be used for the scheme.

Item	Material	Size at planting	Eventual height	Unit	Comment	Image and product references where appropriate.
	Heather turves <i>Calluna vulgaris</i>	2.4m x 1.2m in size 120-140mm depth	300-500mm	Total Area to be 7723m <sup>2</sup>	<p>Turves to be laid to create mosaic.</p> <p>Will bring a variety of seed sources with it providing a source of associated heathland species to colonise the bridge.</p> <p>Will also bring seed source of pine and birch, saplings to be managed in the long term, see management section.</p> <p>The scheme has agreement to source these turves from local heathland areas. This is likely to be from Ockham and Wisley Commons but may be supplemented, should this be required, from other local heathlands such as Chobham Common</p> <p>Natural England and the SCC ecologist support this approach as it ensures local genetic stock is used.</p>	
	Common gorse turfs <i>Ulex europaeus</i>	2/3m x 1/2m2.4m x 1.2m in size 200mm 120-140mm depth	2-3m	538m <sup>2</sup>	<p>Turves to be laid to create mosaic.</p> <p>There are areas of 'strategically placed' common gorse turfs where turfs will be located to provide cover for reptiles/other species crossing the NMU route, or where public access dissuasion is required.</p>	
<b>Broadleaved Woodland Mix:</b>						

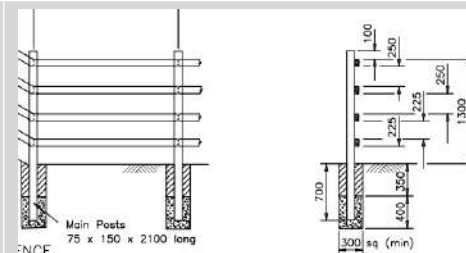


Item	Material	Size at planting	Eventual height	Unit	Comment	Image and product references where appropriate.
	<i>Acer campestre</i> <i>Quercus robur</i> <i>Carpinus betulus</i> <i>Sorbus aucuparia</i> <i>Sorbus torminalis</i> <i>Crataegus monogyna</i> <i>Corylus avellana</i>	400-600mm		15% 15% 15% 10% 10% 20% 15%	Standard sourcing but with local provenance stock. Embankment slopes facing the A3 (i.e. outside of the areas earmarked for connective heathland habitat). Will provide screening of A3.	
<b>Seeding:</b>						
	Gorse ( <i>Ulex minor</i> ) and broom ( <i>Cytisus scorpiarius</i> ) seeding	N/A	300-500mm as final plant size.	Method of collection by hand	Sewing of seed to be in naturalistic sweeps, with areas left bare for natural colonisation. Seed collected by hand from Ockham and Wisley Common.	 Broom
	Dead Wood Stumps	Sizes: Minimum diameter 600mm	Indicative height of elements 1200mm max.	Total 275m	To be placed on bridge deck and extending down embankment slopes Sourced from arisings created during site clearance for the main scheme in the adjacent commons. Habitat for reptiles.	



Item	Material	Size at planting	Eventual height	Unit	Comment	Image and product references where appropriate.
	Stakes	Length varies, minimum diameter 40mm for small plants up to 80mm.	Varies – 500mm to 800mm	tbc.	Softwood, peeled chestnut, larch or oak, straight, free from projections and large or edge knots and with pointed lower end. Preservative treatment: Pressure impregnated with timber preservative suitable for timber in ground and non-toxic to plants. Neutral colour.  Nails: to be galvanized, minimum 25 mm long and with 10 mm diameter heads.	
	<b>Rabbit guards</b> Tubex or similar			tbc	To be fixed with stakes. Colour to be natural buff	



**Table 2-4 – Outline Specification for Fencing, Gates and hard landscape elements**




Item	Material	Size	Finish	Unit	Comment	Image and Product references
	<b>3 Bar Post and cleft rail fencing</b>	1.2m high, 2.7m bays with 3 horizontal rails. Sizes of posts: 2100 x 100 x 125mm Sizes of rails: 120mm, variable appearance to be agreed. 2900 length to achieve 2700mm interlocking bays.	Chestnut, source from South East e.g. Sussex	413m	To be constructed of locally sourced Chestnut. Design to include sheep mesh to main lengths. Open sections to either end of bridge crossing to allow for deer as denoted on plan.	
	<b>Sheep mesh</b> to be attached to lower section to deter dogs and	Size of Mesh: 800mm height galvanised, 8 horizontal wires, 15cm between vertical stay wires. 2.5mm top and bottom wires, 2mm middle wires.		413m	Mesh to lower section to be dog proof and avoid mesh exceeding height of top rail.	Indicative illustration of Mesh 




Item	Material	Size	Finish	Unit	Comment	Image and Product references
	<b>4 bar highways fencing</b> Fencing to tie into the highway's fencing/boundaries on the south and western side of the proposed green bridge.	Height: 1300mm	Natural timber finish	tbc	Design to match existing and tie into the alignment on existing fencing.	
	<b>2 Way Horse Access Gate</b> Self-closing gate leaf with anti-vandal fittings.	Size: 1200mm	Galvanised finish	1 No.	Closing speed can be adjusted to the type of users.	 <a href="https://centrewire.com/products/worcester-2-way/">https://centrewire.com/products/worcester-2-way/</a>
	<b>Vehicle Gate to be located at Old Lane</b> Triangular Barrier gate manufactured from 100x50mm RHS but with the addition of a 'hinge less' opening system.	Size: 3600mm wide	Galvanised finish	1 No.	Concealed hinge	 <a href="https://centrewire.com/products/hingless-barrier/">https://centrewire.com/products/hingless-barrier/</a>

Item	Material	Size	Finish	Unit	Comment	Image and Product references
	<b>Field Gate</b>	Sizes: Height 1114mm Width 3600mm Hanging Stile 50mm x 50mm box section Slam Stile 50mm x 25mm box section Top and Bottom rails 44.5mm Steel Tube Intermediate Rails 35mm Steel Tube	Galvanised finish	1 No.	Gate provides access to the green element on the Ockham common side (where fencing is present across the width of the green element to prevent cows accessing Ockham Common.	 <a href="https://centrewire.com/products/corner-field-gate/">https://centrewire.com/products/corner-field-gate/</a>
	<b>Footpath/Vehicle Route Surface Asphalt with precoated chips (14mm stone size)</b>  In accordance with BS EN 13108, to be laid to create a uniform appearance capable of taking light vehicle loading for access and maintenance purposes.	In accordance with engineer's specification	Grey/black to match finishes used locally	Extent to be 2901m <sup>2</sup>		

Item	Material	Size	Finish	Unit	Comment	Image and Product references
	<b>Fittleworth stone 'strip'</b>	1m wide Aggregate sizes tbc	Fittleworth stone	225m <sup>2</sup>	Specification to be agreed with SCC	
	<b>Cattle Grid</b>	4000mm width Depth, 250- 450mm max	Galvanised finish	1 No.	Specification by engineers. Required on Wisley Common side of bridge only (cows are not used to graze Ockham Common). To be positioned slightly off the bridge deck to minimise interaction with integral bridge deck thermal movement.	

Item	Material	Size	Finish	Unit	Comment	Image and Product references
	<b>Boulders</b>	150-330kg, various sizes, partially buried, to be located on bridge deck.	Fittleworth stone	Approx. 50 in total	Boulders to be laid out in groups of 1,3 or 5  To be used as a basking resource (for reptiles).	  <p><a href="https://www.cedstone.co.uk/products/gabbro-boulders#2">https://www.cedstone.co.uk/products/gabbro-boulders#2</a></p>
	<b>Sandy Scrapes</b> Sand to be laid on an appropriate membrane to a minimum depth of 300-400mm. Material to be derived from donor SPA sites.	1m wide	Natural material derived from donor SPA site, there to match existing	Total Area 345m <sup>2</sup>	Habitat for reptiles and invertebrates associated with the heathland	 <p>Nick Moulton, Reptile Habitat Management Handbook, 2010</p>

Item	Material	Size	Finish	Unit	Comment	Image and Product references
	<b>Interpretative Boards</b>	Details to follow	Oak finish	4 No.	To follow SCC's signage specifications Artist involvement to provide visual interpretation content. SWT/SCC and NE to inform the design intent and material.	



## 2.8 Maintenance, Monitoring, Evaluation and Establishment

- 2.8.1 The approach to initial maintenance of soft landscaping and the long-term maintenance and management of the green bridge have been discussed at length with Surrey County Council and Surrey Wildlife Trust as part of the DCO examination particularly during the development of the Statement of Common Ground with Surrey County Council.
- 2.8.2 Full details of the long-term management and monitoring for the green bridge are provided in the SCC Environmental Management Plan.

### Initial Maintenance Period for Soft Landscaping

- 2.8.3 Three years of maintenance are funded as part of the construction funding awarded to BBA for the green bridge (from Highways England's Designated Funds scheme) and a further two years of maintenance will be delivered by BBA as part of their aftercare period for the main scheme.
- 2.8.4 During this time the contractor will be responsible for inspecting all soft landscaping on the bridge for any signs of defects (this will include any failure of turfs) and replacing failures, or discussing suitable alternative solutions with consultees (Surrey County Council, Natural England and Surrey Wildlife Trust).
- 2.8.5 Short term measures would be expected (but not limited to) the following as part of the establishment period:

#### Heather/Gorse/Broom

- Control of problem species; birch, pine, ragwort, thistles, nettle, bramble and bracken.
- Replacement of failed turf.

#### Broadleaf Woodland

- Watering as necessary to prevent plants wilting.
- Loose plants: Re-firm surrounding soil, without compacting.
- Weed control of invasive or injurious weed; remove weeds prior to flowering.
- Mechanical, chemical or mulching methods of vegetation control to be agreed.
- Keep ditches and drains clear.
- Check all stakes and rabbit guards to ensure upright
- Replacement planting to be provided at earliest opportunity in following planting season.
- Pruning of plants as required.

#### Hard Landscape Elements

- Wash down and keep clean surfaces and equipment, noting touch points in the Covid-19 context.

- Inspect all mechanical parts for signs of damage/replacement to ensure safe operation.
- Surfaces to be kept clean and free of debris during the agreed maintenance period.
- Litter picking and fly-tipping to be managed.

## Long-term Maintenance/Management

- 2.8.6 This scheme will be delivered in partnership with Surrey County Council and Surrey Wildlife Trust. Its location within an actively managed and internationally designated site provides longevity and legacy. Surrey Wildlife Trust will maintain the green bridge on behalf of Highways England via funding arrangements made in the M25 Junction 10 scheme side agreements.

## Monitoring

- 2.8.7 Long term monitoring would focus on pedestrian numbers and experience. A pre-construction pedestrian count and interview survey has already been undertaken at Cockcrow bridge. Monitoring surveys are planned in years 1 and 5. Additional long-term monitoring (minimum of 10 years) will include fixed-point photography to record how the visual amenity of the green bridge evolves, and selected species surveys for wildlife in collaboration with Surrey Wildlife Trust. This will be delivered as part of the long-term monitoring required for the main M25 Junction 10 scheme.
- 2.8.8 Full details of monitoring are provided in the SCC Environmental Management Plan which is currently being drafted for the main scheme.

## Evaluation

- 2.8.9 The following objectives have been set for the proposed green bridge:
- Objective 1: Provide a user experience across the bridge that is safe and visually appealing for all users.
  - Objective 2: Establish and maintain soft landscaping on and adjacent to Cockcrow green bridge, providing a wildlife corridor across the new structure which is linked to areas of new heathland creation.
- 2.8.10 The following monitoring targets have been devised to measure the success of the objectives.

**Table 2-5 – Monitoring targets/measures of success**

Objective	Year 5
1) Provide a user experience across the bridge which is safe and visually appealing for all users	Visitor surveys indicating an improved experience/sense of enjoyment from users of the green bridge.
2) Establish and maintain soft landscaping on and adjacent to Cockcrow green bridge, providing a wildlife corridor across the new structure which is linked to areas of new heathland creation.	All failures removed and replaced. 95% success rate for turfs/transplants by Year 5. Evidence of wildlife using the green bridge to move between Ockham and Wisley Common.



### 3. Engineering / Design Drawings

- 3.1.1 This detailed design technical report is supported by a number of engineering / design drawings contained within the following appendices:
- Appendix A – Approval in Principle drawing
  - Appendix B – Landscape drawings
  - Appendix C – Heathland Connection at Green bridge
- 3.1.2 The Approval in Principle drawing given in Appendix A is submitted with the Approval in Principle document as part of the Highways England technical approval process for the bridge. The structural option for the bridge has been already been agreed with the Highways England Structures Advisor for the scheme with the earlier submission of the Structure Options Report. The purpose of the Approval in Principle document and associate drawing is to define and seek agreement on, from the Highways England Structures Advisor for the scheme, the principles of the structural design so that they can be used in the detailed structural design of the bridge. No planting details are provided on the Approval in Principle drawing as these are independent of the principles of the structural design of the bridge, although key elements affecting loading such as the use of boulders and the grazing of cows on the bridge are considered and included in the Approval in Principle document.

### 3.2 Visualisations

- 3.2.1 The A3 corridor in the location of the green bridge will undergo substantial transformation as a result of the green bridge proposals and the construction of the M25 Junction 10 scheme (including the large heathland restoration proposals which are being delivered as part of the compensation package for the loss of SPA land). In order to help visualise the changes at this location the project team have created visualisations of the proposed green bridge, and its immediate surroundings. The visualisations are provided in Appendix D and a brief explanation of the views is provided below. These visualisations are indicative at this stage and use imagery, which is currently available to the Atkins visualisation team, therefore exact species cannot be replicated, neither can exact specification of elements such as fencing. For details on these landscaping features please refer to section 2 (detailed design). The parapets selected for the green bridge are bespoke and therefore images used in the visualisations are those that closely resemble the selected parapets only.
- Internal view of green bridge – the view is looking west to east with Ockham Common in the distance and the southern parapet with landscaping on the right side of the picture.
  - External view of the green bridge – the view is of travelling south along the A3 from Junction 10.

- Aerial view of the green bridge – the view is looking west to east with Ockham Common in the distance.
- Aerial view of the green bridge – the view is looking east to west with Wisley Common in the distance.



## 4. References

- 4.1.1 M25 Junction 10 Green Bridges Feasibility Study, Highways England, January 2019, updated September 2019
- 4.1.2 Edgar, P., Foster, J. and Baker, J. (2010). Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth
- 4.1.3 Anderson, P. 2003. Habitat translocation: a best practice guide. CIRIA
- 4.1.4 Surrey Wildlife Trust, Stock Fencing & Deer advice note, June 2013

# Appendices

# Appendix A. Approval in principle drawing

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## Appendix B. Landscape drawings



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# **Appendix C. Heathland Connection across Green bridge**



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# Appendix D. Visualisations



Figure D-1 – Internal View



Figure D-2 – External View





Figure D-3 – Aerial view looking towards Ockham Common





Figure D-4 – Aerial view looking towards Wisley Common



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