Preliminary Environmental Information Report

Volume 2

Chapter 2: Project Description

2 Project Description

2.1 The Proposed Development

2.1.1 Overview

2.1.1.1 The River Thames Scheme (RTS) ('the project') is a significant new piece of green and blue infrastructure that will comprise a range of new features working together to deliver its goals. This will include the following project components (also summarised on Figure 2.1):

- A new flood channel in two sections, through the boroughs of Runnymede and Spelthorne in Surrey. Permanent flood channel associated features include flow and water level control structures, flood embankments, erosion prevention, bridges and permanent site compounds for maintenance of the flood channel. The channel will include planting for wildlife;
- Capacity improvements to the River Thames through bed lowering for approximately one kilometre downstream of Desborough Cut (in the boroughs of Spelthorne and Elmbridge) and upgrades to Sunbury Weir (in the borough of Elmbridge), Molesey Weir (on the boundary between the boroughs of Elmbridge and the London Borough of Richmond upon Thames (LBRUT)) and Teddington Weir (within the LBRUT);
- New green (land based) and blue (water based) open spaces are being considered associated with the flood channel, with access for local communities and facilities such as sports fields, accessible pathway networks, nature play spaces and raised landforms that are both sculptural as well as functional;
- Priority areas for habitat creation, enhancement or mitigation, which link with existing and new wildlife corridors, improve fish passage and build upon the network of existing wildlife sites;
- New or improved active travel provision and places for recreational access, which may be along and across the flood channel corridor and new open spaces, with connections to the existing network and two new pedestrian and cycle bridges across the River Thames at Chertsey and Desborough Island;
- Utilities and highways alterations and diversions; and

- Temporary construction features such as site compounds and materials processing and storage sites.

2.1.2 Design Parameters and Assumptions

2.1.2.1 We are still developing the design, which continues to be informed by consultation and ongoing technical surveys and assessments. As such, an understanding of the potential environmental impacts of the RTS is still being developed and the information provided within this Preliminary Environmental Information Report (PEIR) is preliminary. It may be subject to change prior to the production of the Environmental Statement (ES), as the design and assessment work develops.

2.1.2.2 In order to ensure a robust assessment on the current project design, we are following the Environmental Impact Assessment (EIA) guidance contained in Planning Inspectorate (PINS) Advice Note Nine: 'Rochdale Envelope' (PINS, 2019a), regarding the degree of flexibility that will be considered appropriate in order to address uncertainties within an application for development consent under the Planning Act 2008 (PA2008) process. The guidance states that the assessment of likely significant effects should establish relevant parameters (i.e. assumptions) for the purposes of the assessment "likely to result in the maximum adverse effect (the worst-case scenario) and be undertaken accordingly to determine significance".

2.1.2.3 The environmental baseline and assessments we present in this PEIR are based on design parameters for the construction and operation of the RTS that we set in March 2023, particularly in terms of the maximum or minimum dimensions of structures and ranges of potential uses and locations. The use of design parameters is required at this stage of the project to enable environmental assessments, consultation responses and technical considerations of the emerging design to further inform the proposals. The design parameters are described in the following sections of Chapter 2 and shown on Figure 2.1 of this PEIR. The design parameters for our EIA PEIR build on those we set for our EIA Scoping Report in 2022; we have identified in Section 2.4 which of these were updated.

2.1.2.4 The design of the project has progressed since March 2023, with the Design for Statutory Consultation being confirmed in October 2023. The

maximum parameters of the Design for Statutory Consultation presented in the Statutory Consultation brochure are almost entirely the same as those previously set for the PEIR, with two matters of deviation, being a reduction in the number of new green open spaces (NGOS) considered and some small additions to the project boundary; we have reviewed these differences and have verified that they do not change the assessment of likely significant effects reported in this PEIR.

2.1.2.5 Appendix 2.1 of this PEIR sets out an analysis of these changes and their impact to the PEIR assessments and conclusions, concluding that the PEIR still remains robust with those changes taken into account.

2.1.2.6 As the EIA process continues, we will continue to refine the design parameters as we progress the design and assessments to inform the DCO application.

2.1.3 Flood Channel

2.1.3.1 The project provides a new flood channel in two sections. The Runnymede Channel will be approximately 4.8 kilometres in length, and the Spelthorne Channel will be approximately 3.2 kilometres in length. The proposed route of the flood channel and the features it intersects are shown on Figure 2.1 of this PEIR. Plate 2-1 is an image of the Jubilee River, a flood channel from the River Thames between Maidenhead and Eton, which provides an impression of how the flood channel will look.

Plate 2-1: An image of the Jubilee River, which provides an impression of how the flood channel will look

2.1.3.2 The Runnymede Channel will start at Egham Hythe and end at Chertsey. The intake to the flood channel will be on the right bank of the River Thames (i.e. the right-hand side when facing downstream). It will pass under the A320 Chertsey Lane, then through agricultural fields before heading south under Green Lane and joining the existing course of the Mead Lake Ditch. From then, it passes through five existing lakes (lake south of Green Lane, lake south of Norlands Lane 1, Fleet Lake and Abbey Lake (the latter two being part of the Thorpe Park Resort). It will then pass under Staines Road (also part of the A320) through Abbey 2 lake towards Abbey Meads, and through the existing Burway Ditch M3 flood culverts, returning to the River Thames just south of the M3 motorway and downstream of Chertsey Weir.

2.1.3.3 The Spelthorne Channel will leave the left bank (i.e. the left-hand side when facing downstream) of the River Thames at Laleham, approximately 0.4 kilometres upstream of the outlet of the Runnymede Channel and Chertsey Weir, and north of the M3 motorway. The flood channel will follow an easterly route through three existing lakes (Littleton North, Littleton East and Sheepwalk 2) and pass under two local roads (Thames Side and Littleton Lane) before turning south underneath the M3 motorway. The flood channel route continues through open land at

Sheepwalk and Manor Farm and will pass under a further three local roads (Sheep Walk, Renfree Way and Ferry Lane) and through Ferry Lane Lake (also known as Ferris Meadow Lake) before re-joining the River Thames (refer also to Chapter 3: Consideration of Alternatives). The outlet to the River Thames is opposite D'Oyly Carte Island, just upstream of Desborough Island, and downstream of Shepperton Weir.

2.1.3.4 The channels will be created by linking together existing lakes formed by historical gravel workings. The new connecting channel sections will generally be 20 metres to 50 metres wide, depending on engineering and environmental constraints (and up to 94 metres wide at the fixed weir water level control structures). During flood conditions, the water level will be between three and four metres deep and will transfer up to 150m^3/s of water.

2.1.3.5 In non-flood conditions the gates in the flow control structures located at the inlet of each channel section intake will be closed. However, the new channels will not be "dry", as the water level in the channels will be maintained by the control structures. The intention will be for water levels to match the existing typical groundwater levels, with an average depth of water of two to three metres. Furthermore, there will be a small, continuous flow into the flood channels that will be limited to 1m^3/s (known as the 'augmented flow'). In-channel water level control structures will, alongside the augmented flow, maintain the water levels within the flood channel and provide for fish passage through the channel. This is a legal requirement to prevent stranding of fish that end up in the flood channel e.g. after a flood event.

2.1.3.6 The flood channels will comprise new sections of engineered channels connecting existing lakes, passing through the following ground conditions:

- Natural ground;
- Reworked natural ground and made ground with some man-made material (e.g. bricks and rubble); and
- Existing or historic landfill sites.

2.1.3.7 The shape of the flood channel will vary according to the ground conditions or lake that it passes through. The width of the channel will be minimised where possible given engineering and environmental

constraints to avoid excess excavation and the processing of material. The new channel will include in-channel and riparian habitat and a wider and softer landscape channel edge where ground and other constraints allow.

Channels through natural ground and made ground

2.1.3.8 Where the channel passes through natural ground or made ground it will be excavated to create ‘natural’ looking trapezoidal cross-sections; this is possible in several locations across approximately 0.5 kilometres of the Runnymede Channel and 0.2 kilometres of the Spelthorne Channel. Locations of the channel through natural ground and made ground can be seen in Figure 2.1.

2.1.3.9 The trapezoidal sections through natural ground and made ground will be approximately 45 metres wide, three to four metres deep (depending on the location) with an average water depth (in a non-flood scenario) of two to three metres. The trapezoidal channel sections will typically be unlined and have been identified as the areas with the most potential to include in-channel and riparian habitats and/ or softer landscaping of the flood channel.

2.1.3.10 The majority of channel in these areas will be excavated through topsoil and sub-soil into the underlying (Shepperton) gravels. These gravels will form the bed of the flood channel, lying anywhere between one and two metres below existing groundwater levels.

2.1.3.11 Plate 2-2 below shows an indicative cross-section through natural ground or made ground for both the Runnymede and Spelthorne Channels. In Plate 2-2, the left bank of the channel is gently sloping with marginal herbaceous vegetation extending from the water, and a tree is shown on the higher ground. The right bank is steeper, but also with herbaceous vegetation extending from the water. There are opportunities for improved active travel alongside the channel edge. Approximately 20 metres from the channel is a band of taller shrubby vegetation; this is approximately 30 metres wide. To the right of this is a three metre wide maintenance access track, flanked by a line of trees to its right.

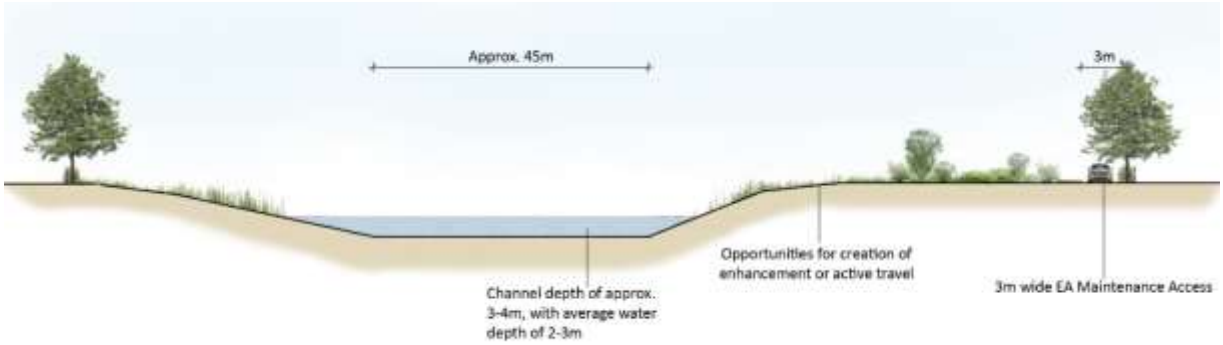


Plate 2-2: Cross-section example of a typical section of the 'natural' looking trapezoidal channel showing softer slopes with river edge habitat.

Channels through landfill sites

2.1.3.12 Sections of the flood channel that pass through existing and historic landfill sites will be extensively engineered with vertical sheet piled sides. The sections of channel in landfill sites will be approximately 0.9 kilometres in length in the Runnymede Channel and 1.2 kilometres in length in the Spelthorne Channel. Locations of the channel through known and expected landfill sites can be seen in Figure 2.1.

2.1.3.13 The channel will be approximately 20 metres wide and four metres deep in these sections of channel. The water depth in these sections of channel will be approximately two to three metres in non-flood conditions. The sheet piled sides of the channel will be driven into the ground from the existing ground level, and an impermeable bed will be in place to isolate the channel from landfill. Where possible, planted edges would be formed to give the channel a more 'natural' appearance (such as in Plate 2-2).

2.1.3.14 Plate 2-3 shows an indicative cross-section through landfill sites for both the Runnymede and Spelthorne Channels. In Plate 2-3, the top of the sheet pile is shown with a raised capping beam flood defence wall on the left bank (but not the right bank). The section shows that there is no vegetation within the channel. On the left bank there is a band of trees and shrubby vegetation, approximately 15 metres wide, and grassy vegetation right up to the channel edge. On the right bank there is longer meadow grass, but no woody vegetation shown. A footpath is indicated adjacent the channel on the right bank, varying in width from five metres

to 13 metres, providing opportunities for enhancement or creation of active travel.

Plate 2-3: Cross-section example of the engineered channel.

Channels through existing lakes

2.1.3.15 Using the network of existing lakes as a flood flow route is an integral part of the project. This means hard engineering can be kept to a minimum. The flood channel will enter each lake; flow will move through the lake and exit the other side. It is not intended to deepen any lakes, however there may be a requirement to reshape the smaller lakes that the channel passes through to ensure flow passes efficiently (e.g. Lake South of Green Lane). Existing silt layers will remain in place, though operation of the flood channel may be expected to add to and redistribute the silt.

2.1.3.16 It is proposed to shallow some of the existing lake banks and use the material generated from reducing their gradients to create shallow margins and wetted habitat around the edges to the lakes for the benefit of wading birds and other species.

Abbey Meads Floodway

2.1.3.17 In flood conditions, water will flow through the Abbey Meads floodway and into the River Thames via existing flood culverts under the M3 and also

via a short reinforced spillway just upstream of the M3 bridge. In non-flood conditions, most of the flood channel will have an augmented flow and always contain water due to the presence of water level control structures (described in Section 2.1.3.5). The Abbey Meads floodway is the exception to this, as the augmented flow will be passed down the Abbey River via a flow control structure on the right bank of the Runnymede Channel (i.e. the right hand side when facing downstream), rather than flowing onward and into the Abbey Meads area. The Abbey Meads area will be partially excavated to form a predominantly dry floodway, varying between 140 metres to 300 metres wide, with the existing ground levels lowered by approximately one metre and profiled to provide a damp to wet summer grazing area (Plate 2-4 and Plate 2-5). This area will typically be partially flooded during wetter winter months and largely dry in the summer with rough grazing pasture. In this area, groundwater levels will continue to be controlled through Affinity Water's pumping of its water supply wells. In non-flood conditions, the partial flooding will be mainly caused by water backing up from the River Thames into the area of lowered ground (via culverts under the M3) rather than from groundwater or flow control structures on the flood channel.

2.1.3.18 Sections of the existing Burway Ditch, which runs through the northern half of the site, will be realigned where required to relocate it within the central section of the Abbey Meads floodway. The existing trees and Affinity Water monitoring boreholes will be retained on slightly raised 'islands'. A permanent backwater of the River Thames will be established north of the M3 culverts, creating a greater range of habitats.

2.1.3.19 Plate 2-4 shows the arrangement of the Abbey Meads floodway, including the levels dropping down to it from the M3 which lies to the south, and from the flood bank to the north, and the raised 'islands' of vegetation.

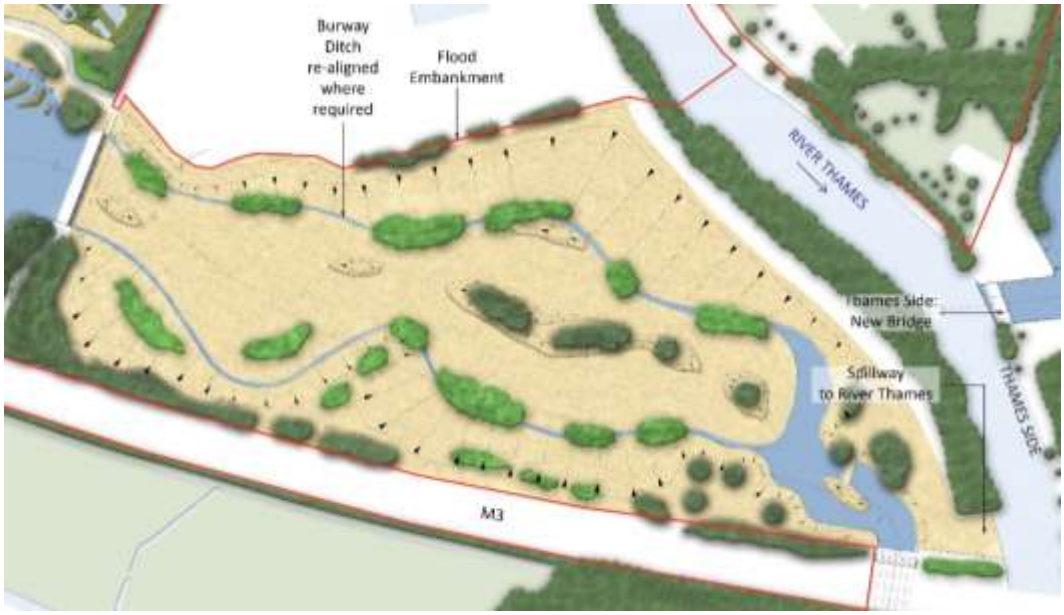


Plate 2-4: Flood channel alignment at Abbey Meads Floodway.

2.1.3.20 The cross section at Plate 2-5 below is cut through the Abbey Meads floodway site running from the north to the south. It shows the area is mostly flat and open, except for the higher ground of the M3 motorway to the south, the flood embankment to the north, and a raised island of vegetation in the centre. The realigned Burway Ditch in the northern half of the site and an unnamed ditch in the southern half are both labelled. Both are flanked with small trees either side.

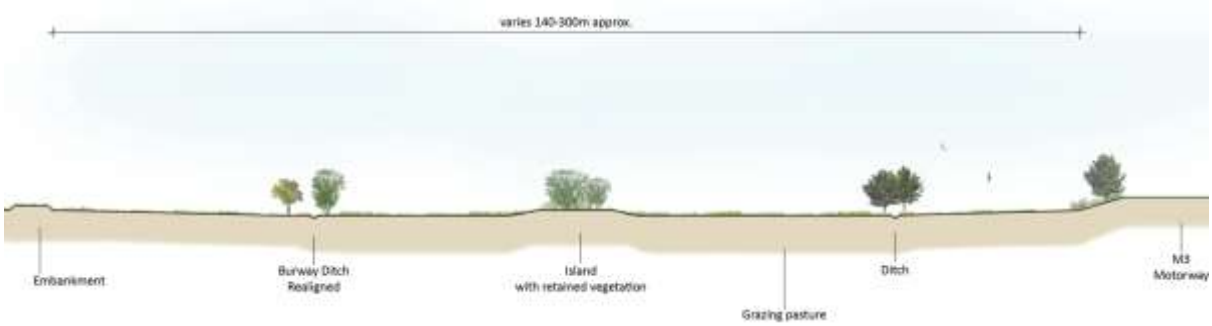


Plate 2-5: Indicative cross-section of Abbey Meads Floodway.

2.1.4 Flood Channel Associated Features

Flow control structures

2.1.4.1 Gated flow control structures (an example image is provided in Plate 2-6) are required on each channel section and at the crossing of Staines Road (A320), downstream of the Thorpe Park Lakes on the Runnymede Channel. These will be required to control the amount of water entering each flood channel. The gated flow control structures on the flood channel will be automated, so the gates move in response to remote signals. This will require warning sounds and lights. For the purposes of our PEIR, it is assumed that strobe lamps will provide the visual warning alongside the warning sounds. It is assumed that initially the gates will be operated on average once a year, although this frequency may increase throughout the lifetime of the project in response to climate change to maintain operation of the channel at the required level of flood risk reduction. The warning sound would typically run for two minute periods, up to 18 times whilst the gate opens and over the same durations while it closes.

2.1.4.2 Fixed water level control structures (an example image is provided in Plate 2-7) are required along both of the flood channel sections. Their function will be to control water levels during non-flood conditions, to ensure that the flood channel does not act as a drain leading to the surrounding groundwater levels being drawn down by the flood channel during normal conditions.

2.1.4.3 Flow control structures are shown in Figure 2.1 and include:

- A gated control structure with nine gates at the inlet of the Runnymede Channel (structure reference IS2). This structure will include a fish pass;
- An uncontrolled inlet (scour protected) at the Drain in Thorpe Hay Meadow (structure reference TCS9);
- A piped inlet with flap valve at Mead Lake Ditch (structure reference FCS6);
- A broad crested weir with submerged orifice (with flap gate) and tilting gate at Abbey Lake outlet to St Ann's Lake (structure reference FCS7);
- Lowering of 20 metres of river bank on the Chertsey Bourne at St Ann's Lake inlet (structure reference FCS8);

- A small structure on the outlet from St Ann's lake into the Twynersh Lakes will be rebuilt to adjust water levels in St Ann's lake whilst also limiting outflows into the Chertsey Bourne River. This will be a small channel with a closed sluice gate or adjustable stop logs, limiting outflows into the Twynersh lakes and from there into the Chertsey Bourne River (structure reference FCS9);
- A gated control structure (nine gates) at the Thorpe Park Lakes outlet (structure reference FCS10). This structure will include a fish pass;
- An uncontrolled inlet (scour protected) on the Abbey River (structure reference TCS10);
- A stop logged channel outlet structure on the Abbey River (structure reference TCS11);
- Sections of the Burway Ditch that are not realigned will be blocked off (structure reference TCS12);
- A fixed level control structure (concrete, 82 metres long) at Ferry Lane (structure reference FCS12);
- A gated control structure (nine gates) on the Spelthorne Channel between Littleton North Lake and Littleton East Lake (structure reference IS3). This structure will include a fish pass;
- A fixed level control structure (concrete, 94 metres long) at Manor Farm (structure reference FCS18). This structure will include a fish pass;
- Flow restriction at the outlet weir from Sheepwalk West 1 lake to the Pool End Ditch;
- An overflow at Drain to Ferry Lane (structure reference TCS13);
- A blanking wall to existing flood culverts beneath the M3 motorway between Sheepwalk East Lake and Manor Farm (structure reference HA4M);
- A blanking wall to existing flood culverts beneath the M3 motorway between Littleton North and Littleton South lakes (structure reference HA5M); and
- A fixed level control structure (concrete, 75 metres long) at Ferry Lane Lake (structure reference FCS19). This structure will include a fish pass.

2.1.4.4 The flow control structure example shown in Plate 2-6 below comprises a series of metal gates spanning the channel, separated by concrete walls,

with an elevated steel walkway and railings running along the top of the whole structure.

Plate 2-6: An example of a typical flow control structure.

Plate 2-7: An example of a typical water level control structure.

Flood embankments and erosion prevention

2.1.4.5 Where the flood channel is in proximity to housing, commercial developments and important utilities at risk of flooding, and where there is

a risk of water bypassing flow control structures, flood embankments will be constructed to address these risks. They will be between approximately 0.3 metres and two metres high, and are shown in Figure 2.1 (referenced as FW5A, FW5B, FW6 and FW8). Embankments will have a cut-off and have minimum top widths of three metres. In addition, an approximately 285 metre long section of flood wall, up to 0.6 metres in height is required and is shown in Figure 2.1 (FW10).

2.1.4.6 Some riverbank protection works will be required, to prevent erosion of the River Thames around the outlet of the Runnymede channel. Some areas will also require some embankment raising (see Figure 2.1). The protection works are likely to include sheet piling, rock armour or concrete revetments.

Structures for intersected features

2.1.4.7 The following existing features will be intersected by the flood channel, requiring a wide range of structures:

- Major and minor roads; this will require road bridges for the channel to pass underneath (whilst mindful of the Environment Agency's overarching policy to minimise the use of culverts where possible) (Plate 2-8 provides an example of a typical road bridge for the channel to pass underneath);
- Natural drainage lines and other ordinary watercourses; this will require drainage structures;
- Public Rights of Way; this will require bridges over the channel; and
- Services including gas, water, electricity etc.; these will require re-location.

Plate 2-8: An example of a typical road bridge for the flood channel to pass underneath.

Bridges

2.1.4.8 Road bridges will be required on minor and major roads and existing property accesses that the channel sections intersect. Some of these bridges will be designed to hydraulically "drown out" during channel operation (i.e. operate safely and efficiently with the soffit of the bridge submerged). Bridges for public rights of way will also be required. The following bridges have been identified as required, and the construction of these may require full or partial road closures;

- Road bridge at Chertsey Lane (structure reference HA1);
- Service bridge upstream of Thorpe Hay Meadow (structure reference FBR5);
- Accommodation bridge at Green Lane (structure reference C2);
- Road bridge at Norlands Lane (structure reference LA6);
- Accommodation bridges at Thorpe Park to provide access (structure references C3 and T5);
- Road bridge at Staines Road (structure reference HA2);
- Accommodation bridge at Monks Walk Access (structure reference T4);
- Accommodation bridge at Ferry Lane Access (structure reference T3);
- M3 motorway crossing using the existing Burway Ditch Culverts (structure reference HA3M);
- Road bridge at Thames Side (structure reference LA7);

- Road bridge at Littleton Lane (structure reference LA9);
- Accommodation bridge at Littleton Sailing Club Access (structure reference T6);
- Public right of way bridge at Littleton East lake (structure reference FBR6);
- M3 motorway crossing at Underbridge (structure reference HA7M);
- Road bridge at Renfree Way (structure reference LA11);
- Road bridge at Ferry Lane (structure reference LA12);
- Public right of way bridge for users of Ferry Lane Lake (structure reference FBR8); and
- Public right of way bridge at the outfall of the Spelthorne Channel (structure reference FBR7).

2.1.4.9 In addition, we propose two new pedestrian and cycle bridges to cross the River Thames in order to accommodate the project's active travel proposals (refer also to Section 2.1.8). One bridge will cross from Abbey Meads to Littleton North lake, approximately 100 metres south of the intake to the Spelthorne Channel. The other bridge will cross from Ferry Lane Lake to Desborough Island. The bridges will be cable stayed and therefore will be a maximum of 50 metres high above ground level at their highest point, with aviation lighting if required. They will include an approximately five to six metre clearance above the maintained water level for the main navigational arch. The bridges will include landing points on each bank, and intermediate pier(s) within the River Thames, positioned approximately one third in from the banks. The bridges will also incorporate walkways with 1:22 gradients to allow access for all, and will likely be constructed from steel or concrete.

Permanent maintenance structures and access

2.1.4.10 Permanent operational compounds will be required at the three gated flow control structures on the flood channels; these will include buildings to house the operational equipment. Anticipated locations of permanent operational compounds are shown in Figure 2.1 and listed below:

- A320 Chertsey Lane, at the intake to the Runnymede Channel;
- A320 Staines Road, downstream of the Thorpe Park Lakes (Runnymede Channel); and
- Littleton Lane, Shepperton on the Spelthorne Channel.

2.1.4.11 In addition to the permanent operational compounds above, we will create further operational and maintenance compounds at Royal Hythe and Sheepwalk. These compounds will contain offices and equipment storage space for those operating the channel and other aspects of the design such as the NGOS and priority areas for habitat creation, enhancement or mitigation. We are currently considering the exact locations of where these compounds will be positioned. The anticipated locations of these permanent operational and maintenance compounds are shown in Figure 2.1.

2.1.4.12 We will consider and incorporate integrated renewable energy opportunities into the project proposals where practicable, in line with the RTS Vision (see Section 1.3 of Chapter 1: Introduction). This may include, for example, solar panels on new buildings and structures that are required as part of the project, such as those described in Section 2.1.4.10.

2.1.4.13 Access tracks along the flood channel will facilitate access for our maintenance purposes together with slipways at appropriate locations. Where appropriate (locations to be confirmed), these access tracks may also be used by the public for walking and cycling.

2.1.5 Capacity Improvements

2.1.5.1 There are four locations in which capacity improvement works to existing River Thames features and assets are required as part of the project to ensure no detriment in flood conditions downstream of the flood channel. All are located downstream of the proposed flood channels and are described below.

Bed lowering downstream of Desborough Cut

2.1.5.2 Bed lowering of a stretch of the River Thames, approximately one kilometre in length, downstream of Desborough Cut will be undertaken through excavation of the river bed to improve channel capacity in this area. Bed lowering is proposed from the confluence of the Desborough Cut with the River Thames to just downstream of Walton Marina.

2.1.5.3 We anticipate that only the central third of the River Thames channel (approximately 20 metres width) will be excavated. No impacts upon the banks of the River Thames are therefore anticipated as a result of this

work. The average total depth of bed lowering will be 0.7 metres, including built-in resilience against siltation. This is shown in the cross section below in Plate 2-9.

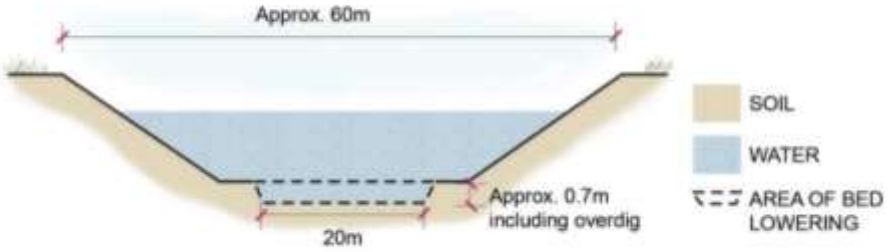


Plate 2-9: Cross-section of proposed bed lowering in the River Thames downstream of Desborough Cut (not to scale).

Upgrades to Sunbury Weir

2.1.5.4 The capacity improvements at Sunbury Weir will be achieved by constructing a new weir complex with three dipping radial weir gates through Sunbury Lock Ait (location shown on Figure 2.1). A channel, approximately 12 metres wide, 75 metres long and five metres deep, will be cut through the island, at a diagonal angle, leaving the existing lock cut just upstream of the footbridge and entering the River Thames (on the other side of Sunbury Lock Ait) downstream of weirs A and B. The proposals have been designed to avoid boat moorings at Sunbury Lock Ait Marina. A typical example of a weir complex with dipping radial weir gates is shown in Plate 2-10.

Plate 2-10: An example of an existing River Thames radial gate weir at Molesey.

Upgrades to Molesey Weir

2.1.5.5 Molesey Weir is on the boundary between the Borough of Elmbridge, in Surrey and the LBRUT (location shown on Figure 2.1). The proposed works are in the LBRUT section of Molesey Weir. The capacity improvements at this weir will be achieved by replacing the existing overfall weir and salmonid fish pass on weir C (Plate 2-11 shows an image of this) with two dipping radial weir gates and a multi species fish pass (with a combined width of approximately 13 metres).

Plate 2-11: Photograph of the existing overfall weir (far left) on weir C at Molesey.

Upgrades to Teddington Weir

2.1.5.6 The Teddington Weir complex is on the official tidal limit of the River Thames. The capacity improvements at this weir will be achieved by constructing a new weir complex with five dipping radial gates through Teddington Lock Island, which also lies on the boundary of the tidal limit (location shown on Figure 2.1). A channel, approximately 20 metres wide, 20 metres long and five metres deep, will be cut through the island, approximately 10 metres upstream of the existing boat rollers and 70 metres downstream of the footbridge.

2.1.6 Landscape and Green Infrastructure Design

2.1.6.1 The project will deliver a wide range of benefits through the development of new landscape and green infrastructure provision in and around the corridor of the proposed flood channel as a part of the integrated design. This will result in several NGOS, possibly new blue open spaces, areas of habitat creation, enhancement or mitigation, and new provision for pedestrians and cyclists.

2.1.6.2 As noted in Section 2.1.2, our design work is ongoing, nevertheless the description here sets out the design parameters for the landscape and green infrastructure aspects of the design that have informed our PEIR. Chapter 3 describes our landscape and green infrastructure design optioneering and how the design has evolved since these parameters

were set. Further optioneering and feasibility assessment, consultation and design work is required before a preferred landscape and green infrastructure design can be presented. The ES will provide information on the optioneering process and its outcomes.

2.1.7 New Green and Blue Open Spaces

2.1.7.1 Within our PEIR, we assume that the project design will likely include the provision of NGOS (land-based), at any or all of the following locations (see Figure 2.1):

- Royal Hythe;
- Penton Park;
- Manor Farm;
- Sheepwalk (this is currently assumed to involve the potential demolition of the buildings within this area of the project boundary); and
- Land South of Chertsey Road.

2.1.7.2 Within our PEIR, we assume that any of the following facilities could be provided within NGOS at any of the above locations:

- Sporting fields;
- Adventure golf;
- Viewing platforms;
- Boardwalks;
- Maze;
- Sculptures and artwork;
- Visitor facilities (for example, end of trip facilities and bicycle storage);
- Amphitheatre;
- Field centres;
- Trim trail;
- Entertainment space;
- BMX pump track;
- Outdoor gym;
- Land art;
- Sculptural landforms;
- Wetlands;
- New woodland planting;

- Accessible pathway networks;
- Enhancing habitats and creating opportunities for interaction;
- Active travel (cycle and pedestrian);
- Educational signage;
- Lighting;
- Playgrounds and nature play spaces;
- Car parking;
- Maintenance facilities (no public access); and
- Re-creation and/or interpretation of historic landscapes.

2.1.7.3 We will be considering these facilities as part of the wider optioneering process for the landscape and green infrastructure opportunities with Plate 2-12, Plate 2-13 and Plate 2-14 giving representative examples.

Plate 2-12: An example of an accessible pathway over a wetland

Plate 2-13: An example of nature play spaces

Plate 2-14: An example of improved active travel provision

2.1.7.4 For the purpose of our PEIR, some height parameters have been applied to the potential features listed above which will be further developed for the ES stage. Raised landforms could be up to a maximum height of eight metres above existing ground levels, whereas items such as lighting, shade structures, signage, artwork and boardwalks could be up to a maximum height of seven metres above proposed ground levels. Stadium style lighting associated with sporting fields could be up to a maximum of 12 metres in height. Buildings (education centres, visitor facilities, field centres or maintenance facilities) could be up to 10 metres in height. We will incorporate integrated renewable energy opportunities, such as solar panels, on the new buildings wherever possible.

2.1.7.5 Use of excavated arisings onsite for construction such as for landscaping (such as raised landforms) will be undertaken where material is geotechnically and geochemically suitable for use and subject to the permitting process. All excavated arisings that are chemically and physically suitable for transfer between the project sites for use will be done so in accordance with the RTS materials management plans. Further information on materials management is included in Section 2.2.6.

2.1.7.6 For the purposes of our PEIR, we consider that the project design may include the provision of new blue (water-based) open spaces, at any or all of the following locations (see Figure 2.1):

- Abbey 1 lake (within Penton Park new green open space);

- Littleton North lake; and
- Sections of the flood channel adjacent to NGOS under consideration.

2.1.7.7 We are considering any of the following for delivery within the new blue open spaces at the above locations:

- Use by recreational non-motorised (e.g. canoes) navigation;
- Visitor facilities;
- Boardwalks;
- Enhancing habitats and creating opportunities for interaction; and
- Jetties and slipways to enable access and egress.

2.1.7.8 Whilst we are investigating possibilities, access to sections of the flood channel (including in lakes) beyond those identified above is unlikely to be possible given flood control structures, bridge soffits, existing uses and access restrictions that will inhibit free passage.

2.1.7.9 We will continue to explore if there are any further sites in the vicinity that would be suitable for the provision of new green and blue open spaces. If further sites are found to be suitable they will be assessed within the ES.

2.1.8 Active Travel

2.1.8.1 New or improved active travel provision is proposed along and across the flood channel corridor and NGOS with connections to the existing network. New or improved active travel measures are being considered for the purposes of the PEIR within the ‘areas of enhanced public connection’, shown in Figure 2.1. This will include new provision for pedestrians and cyclists. We are also considering potential for use by equestrians within the project. This is yet to be confirmed and design and appraisal work is still in development; additional equestrian provision is therefore not assessed within this PEIR. We will continue to explore opportunities for new or improved active travel provision and any additional opportunities that are identified or confirmed, such as equestrian use, will be assessed within the ES.

2.1.8.2 Opportunities to create or improve active travel provision being considered include:

- Creating or improving access paths, Public Rights of Way (PRoW) or roads (including the Thames Path National Trail) (see Appendix 2.2 for details of PRoW which may be improved by the project);
- Incorporating opportunities for active travel route(s) within and between new green and blue open spaces associated with the flood channel, potentially as a raised walkway up to eight metres in height in places;
- Wayfinding devices;
- Improved drainage through sustainable drainage;
- Urban tree planting;
- Lighting;
- Accessible pathway networks;
- Links to existing transportation networks; and
- Pedestrian and cycle bridges (refer also to Section 2.1.4.9).

2.1.9 Priority Areas for Habitat Creation, Ecological Enhancement or Mitigation

2.1.9.1 The RTS aims to achieve a range of biodiversity improvements within the project boundary. The locations and designs of these biodiversity improvements are currently being developed alongside the detailed landscape design. They will be informed by the project goals, in particular that to create a network of high-quality habitat and achieve Biodiversity Net Gain (BNG), as well as the need for carbon sequestration and mitigation for effects on certain habitats and species that may be required from the Ecological Impact Assessment (EcIA), Water Framework Directive (WFD) compliance assessment and Habitats Regulations Assessment (HRA) being undertaken for the project.

2.1.9.2 Types of biodiversity improvements are likely to include:

- Naturalised shallow margins in certain sections of the flood channel and around the edges of some existing lakes and watercourses to improve bankside vegetation growth;
- Sinking of trees removed during construction, along the flood channel and in some other waterbodies to provide alternative habitats;
- Targeted tree planting adjacent to the flood channel and some existing waterbodies plus macrophyte planting and the creation of islands in waterbodies;

- Enhancing the condition of existing terrestrial habitats, such as meadows and grassland, and river habitats;
- Improving connectivity of the River Thames floodplain, between the River Thames and other waterbodies;
- Creating new habitats such as woodland and wetland (an example image is provided in Plate 2-15);
- Creating hedgerows and enhancing existing through infilling of a diverse mix of species; and
- Species specific measures to enhance habitat conditions.

Plate 2-15: An example of a woodland habitat creation

Priority Areas

2.1.9.3 Specifically, to deliver BNG and to supplement the improvement measures above, we are considering a series of potential priority areas for habitat creation, enhancement or mitigation (Figure 2.1).

2.1.9.4 We are looking to achieve BNG firstly through the delivery of habitat creation and enhancement within the flood channel and landscape design footprint. Where possible this will integrate with other desired landscape and green infrastructure outcomes through the provision of recreation and amenity benefits, active travel routes and reconnection to historic landscapes. Potential priority areas for habitat creation, enhancement or mitigation where such multi-functional opportunities are currently being explored include:

- Norlands Lane;

- Former Laleham Golf Course;
- Abbey Meads;
- Littleton Lane;
- Land South of Chertsey Road;
- Sheepwalk;
- Manor Farm; and
- Desborough Island.

2.1.9.5 In addition to these multi-functional sites, it may be necessary to include sites which would be more focussed on habitat creation, enhancement or mitigation. These opportunities are being explored at (this is not an exhaustive list):

- Land South of Wraysbury Reservoir;
- Laleham Reach;
- Abbey River;
- Sheepwalk Lakes;
- Land Between Desborough Cut and Engine River;
- Drinkwater Pit; and
- Grove Farm.

2.1.9.6 All of the potential priority areas for habitat creation, enhancement or mitigation will be the subject of optioneering and design but will typically favour enhancement of the existing habitats where appropriate. This may include, for example, enhancement of neutral grassland, mixed scrub, broadleaved and other woodlands, ponds, wet woodland, and open mosaic habitat. The design of the potential priority areas for habitat creation, enhancement or mitigation will also seek to create high quality habitats including reedbeds, wetlands, ditches, hedgerows and lowland meadows. For the purpose of our PEIR assessments, we assume that works will be undertaken at all potential priority areas for habitat creation, enhancement or mitigation.

2.1.9.7 We are committed to an approach for the delivery of BNG that balances the rules and principles associated with the Department for Environment, Food and Rural Affairs (Defra) Metric version 3.1 by ensuring that sound ecological judgement is used to deliver high quality habitats (i.e. the delivery of BNG will not solely be driven by Defra Metric outputs), whilst balancing the other goals of the project. The ongoing design of habitat

creation, enhancement and mitigation is discussed further in Section 3.3.3 of Chapter 3: Consideration of Alternatives.

2.1.9.8 We will continue to explore if there are any further sites in the vicinity that would be suitable for the provision of habitat creation, enhancement or mitigation. If further sites are found to be suitable they will be assessed within the ES.

Fish Passage

2.1.9.9 The project proposes to improve fish passage along the River Thames and its tributaries, through the installation of multi-species fish passes at five locations on the river within the project boundary; these being (from upstream to downstream) at Chertsey Weir, Beasley's Ait, Sunbury Weir, Molesey Weir and Teddington Weir. As noted above, at Molesey Weir this will involve replacing the existing salmonid fish pass. Assessments are currently ongoing to understand the effects of the project on fish passage. The outcome of these assessments will be reported in the ES.

2.1.9.10 Several flow control structures will include fish passes; these are described in Section 2.1.4.3 and the locations of the proposed fish passes are shown on Figure 2.1. The project is also considering the installation of fish passage on the Abbey River alongside other enhancements in this area to improve the watercourse for fish and other water dependent species.

2.1.10 Primary Environmental Mitigation

2.1.10.1 Our approach to mitigation is described in section 4.5 in Chapter 4: Approach to the Environmental Assessment. This includes for example an explanation of the different categories of mitigation (as classified by IEMA, 2016), how these have been factored into our preliminary assessment of effects in this PEIR, and how we anticipate securing these measures.

2.1.10.2 We have included certain primary (embedded) environmental mitigation in the project design to date and this will be refined as part of the EIA process. This includes for example:

- The sequential approach to flood risk is being followed as part of the ongoing design of the project, for both the permanent and temporary

(e.g. materials processing sites) project components. These will be appropriately located in the areas of lowest flood risk where feasible, and the uses of these areas will adhere to what is appropriate in the different flood zones based on their National Planning Policy Framework (NPPF) vulnerability classification. The NPPF Sequential and Exception Tests will also be applied where appropriate to demonstrate that the project is NPPF compliant. Chapter 10: Flood Risk provides further information in relation to subsequent flood risk tests;

- Section 2.3.2 explains channel maintenance works that are proposed as part of the project. This will include ongoing silt monitoring and maintenance of the flood channel to maintain the design profile and therefore ensure it can continue to function effectively;
- An Outline Climate Adaptation Plan will be developed as a measure to mitigate against the effects of climate change on generic receptors. This will include monitoring and adaptive management measures such as water consumption being reduced by the specification of highly efficient water installations;
- Sustainable Drainage Systems (SuDs) are to be designed to manage flood risk through the construction and operation stages of the project to ensure no increase in surface water flooding (including an appropriate allowance for climate change) and to also address water quality;
- An integrated landscape design process is being pursued, which aims to sensitively integrate all project components within the existing landscape. This will include consideration of: material finishes to buildings and structures; sensitive landscape design and planting in relation to the setting of Scheduled Monuments; the form and contouring of raised landforms; public space and its use; incorporation of existing green infrastructure including trees and vegetation; new planting to achieve carbon mitigation, natural capital outcomes and in relevant locations, screen project components; and sensitively locating material stockpiles;
- The water level control structure between St Ann's Lake and Abbey Lake will isolate St Ann's Lake (part of the Southwest London Waterbodies Special Protection Area (SPA)) from the flood channel and limit nutrient inputs from the River Thames;

- The provision of five fish passes on flow control structures along the new flood channel (shown on Figure 2.1);
- The provision of an augmented flow of up to 1m^3/s along the flood channel (when not being operated with a larger flow during major flooding), which aims to avoid nutrient enrichment of existing lakes and allow for fish passage over water level control structures on the new flood channel;
- Flow devices will control ground and surface water within the flood channel to maintain a minimum water level and flow;
- Design of flood channel morphology and inclusion of control structures on existing water bodies and within the flood channel to improve hydromorphology and prevent contamination;
- The potential for management of the augmented flow during periods of low flow is currently being considered to limit potential impacts on water resources, water quality and biodiversity within the River Thames and new flood channel. This could include temporarily reducing flow to an appropriate level, ceasing or alternating flow between the flood channels;
- Within the Thorpe Park Lakes WFD waterbody, the existing connection between Manor Lake and Fleet Lake will be infilled to limit the nutrient inputs from the River Thames (via the flood channel) reaching Manor Lake;
- Avoidance of work within Thorpe Hay Meadow Site of Special Scientific Interest (SSSI);
- The mitigation hierarchy for habitats and species has been applied in project designs on information currently known. This has worked to initially avoid significant effects on biodiversity (e.g. avoidance of works in sensitive sites). Where this is not achievable, impacts will be minimised and/or mitigated;
- Habitat creation, mitigation or enhancement for other effects on habitats or species will also be incorporated into project designs;
- Enhancement of habitats immediately downstream of three weirs on the River Thames in the reach bypassed by the flood channel (at Penton Hook, Chertsey and Shepperton). Implementation of enhancements will be subject to the EIA confirming effects on these habitats from diverting water along the flood channel, but could include macrophyte planting;

- The carbon reduction hierarchy will be applied to project designs, with a focus on eliminating ‘at source’ carbon emissions. Where emissions cannot be entirely eliminated at source, the hierarchy works to reduce emissions (e.g. through more efficient processes and equipment), substitute (e.g. adoption of renewable technologies) and lastly compensate for unavoidable residual emissions (e.g. through carbon offsetting);
- Designs of temporary and permanent buildings will be climate resilient, using appropriate guidance from the Chartered Institute of Building Service Engineers (CIBSE) to mitigate against the predicted effects of climate change; and
- Off-site car parking for construction workers has been incorporated into the project to reduce the number of vehicles using local roads in proximity to the construction working areas. A total of six potential car park sites are currently being considered. The locations of the potential car park sites are shown in Figure 2.2.

2.1.10.3 Other primary and secondary (additional) environmental mitigation may be required as a result of the EIA, WFD compliance assessment and HRA, and will be developed as these assessments and the project design progress. It may be that some of the biodiversity improvements identified in Section 2.1.9 will be required as mitigation in some locations.

2.1.10.4 In addition, tertiary mitigation (standard practice, such as monitoring and use of construction management plans) will also be required for the project. The individual topic Chapters 6 to 18 set out topic relevant primary, secondary and tertiary mitigation that is being considered at this stage. Mitigation will be further developed as part of the ongoing EIA process.

2.2 Construction

2.2.1 Programme

2.2.1.1 Since the EIA Scoping stage, we have continued further work understand the detailed timelines for each phase of work. As such, no presumptions are made in our PEIR as to phasing, except that habitat creation works will take place as soon as reasonably practicable within the programme.

2.2.1.2 The project is scheduled to be constructed from winter 2026 to early 2032. Maintenance work is expected to commence from early 2032.

2.2.1.3 Construction work will include the following key activities:

- Enabling works - these will take place prior to each site being occupied for the main civil engineering works. They include activities such as surveys, vegetation clearance, demolition of buildings, services diversions, works to some existing structures, bank protection works, and construction of compound areas. These have been considered as construction phase works for the purposes of the PEIR;
- Weirs and bed lowering downstream of Desborough Cut;
- Excavation and construction of the flood relief channel. The channel will not be used for flood conveyance purposes until all capacity improvement works downstream of Desborough Cut are completed and are operational;
- Priority areas for habitat creation, enhancement or mitigation and NGOS – these would be commenced as early in the construction programme as feasible; and
- Landscaping (planting and establishment of soft landscaping) and Mitigation works, such as planting to screen construction features.

2.2.1.4 For the purposes of the technical assessment of effects in our PEIR it is assumed, as a worst case scenario, that all aspects of construction will take place throughout the full construction period. This will be further refined and assessed for the ES however, with the current expectation as follows:

- Construction will start after the detailed design phase is complete and the full business case is approved in Spring 2027. There may some enabling works in the detailed design phase associated with vegetation & tree clearance, intrusive surveys, diversions (utilities, footpaths etc) and environmental mitigation measures.
- The flood channel will be operational from 2030.

2.2.1.5 We anticipate that the majority of construction work will take place during normal working hours between 8am and 6pm, with potential for working seven days a week and across 24 hours on certain construction activities.

Those construction works with potential 24 hour working requirements would have associated lighting and are anticipated to include:

- Traffic management works;
- Road and motorway works;
- Earthworks and processing to take advantage of longer daylight hours during the summer when drier conditions are more favourable to undertake earthworks;
- Delivery of abnormal loads, large plant and materials – generally either side of the core hours for up to 1.5 hours;
- Placing and/or pouring of large concrete structures;
- Piling works for road bridges at existing highways;
- Utilities diversions;
- Water pumps and generators (likely to need to run for extended periods);
- Security; and
- Water treatment plants.

2.2.2 Flood Channel

2.2.2.1 Some sections of the flood channel will pass through existing built properties; this will likely require the demolition of four dwellings and one outbuilding at the northern end of the Runnymede Channel (relevant landowners have been notified). Construction of the Sheepwalk NGOS will also potentially require the demolition of the buildings within this site.

2.2.2.2 Through natural ground, the flood channel will typically be dug ‘wet’ (i.e. groundwater will not be excluded from the excavation). Through landfill, the sheet piles that form the edges of the flood channel will first be driven into the ground. The ground between the piles will either be excavated and drained before processing, resulting in a body of water remaining, or the ground will be dewatered then excavated and transported for processing, resulting in a largely dry excavation. In both approaches, the ground will be excavated to bed level. All effluent from dewatering this material will require treatment and discharge. It is unlikely that this effluent will be able to be discharged to the sewer network. Therefore, temporary works will be required to treat the effluent to ensure acceptable water quality before it is discharged into the River Thames.

2.2.3 Flood Channel Associated Features

Bridges

2.2.3.1 The flood channel crosses several public roads. Bridges are required to carry these public roads over the flood channel. These road bridges will be designed (but not exclusively) to typically adopt a 'top down' construction method. This method involves forming the bridge supports with bored concrete piles and then casting the bridge deck in formwork supported by the ground. The earth beneath the deck will be excavated out after the bridge deck has achieved full strength. This technique allows the bridges to be built in sections whilst managing traffic flows around the site with narrow lanes and traffic light controls. This construction method will reduce the need for full road closures during construction. The construction approach for road bridges will be finalised during the detailed design phase of the project. For the purposes of this PEIR, the construction approach outlined here is assumed to be followed.

Plate 2-16: An example of an accommodation bridge

2.2.3.2 The flood channel crosses several existing access tracks and other roads. Plate 2-16 shows an example of an accommodation bridge; these will be required to carry the access tracks/roads over the flood channel. They are generally located on private land and will be used for operational access around the land by the landowner and Environment Agency Operations teams. The structures are likely to consist of either reinforced concrete slab type bridges or bridges with a composite reinforced concrete and steel deck. Some of the bridges will also be used to carry services across the flood channel. The services are likely to generally be laid in ducts within the structure. For the purposes of our PEIR, it is assumed that both types of bridge outlined here could be constructed.

2.2.3.3 The flood channel crosses several PRoWs. The bridges required to carry these PRoWs and active travel routes over the flood channel are likely to consist of lightweight composite deck bridge structures, but this will be considered further as design work continues.

2.2.4 Flow and Water Level Control Structures

2.2.4.1 Flow control structures and water level control structures in the flood channel will be constructed in cofferdams in a similar manner to the capacity improvements to the River Thames weirs (see also Section 2.2.5).

2.2.5 Capacity Improvements

2.2.5.1 Construction of the capacity improvement works at the River Thames weirs will typically take place within a cofferdam (Plate 2-17 below), likely requiring fender piles to prevent accidental damage from passing vessels. The cofferdam will act to exclude either groundwater or river water or both whilst construction of the new weir gates takes place inside the dam. Plate 2-17 below provides an example of a cofferdam, showing large sheet piles enclosing a working construction area, standing at least 4 metres high above the channel. Sheet piles are likely to be driven into the river bed using a crane and vibrating hammers. Plate 2-18 shows a crawler crane hook above a row of steel sheet piles that are to be hammered into the ground with approximately four metres left protruding; for the purposes of this PEIR, a piling method similar to this is assumed to be required.

Plate 2-17: An example of a cofferdam, used to construct new weir gates.

Plate 2-18: An example of a crawler crane, used to drive sheet piles (photo provided by BAM Nuttall Ltd)

2.2.5.2 We assume that access to some sections of the River Thames will be restricted during construction, but that a degree of navigation will be maintained throughout.

2.2.6 Materials Management

2.2.6.1 We will develop a Materials Management Strategy (MMS) which will apply the waste hierarchy and will be incorporated into the ES (see Chapter 13: Materials and Waste for further information). The project will re-use or recover the minimum amount of excavated material that is required by the design. Design work and associated appraisals are currently ongoing; current assumptions with regards to material volumes and types are described below. These are subject to confirmation following site investigations and further design development, and quantities reported are rounded to the nearest 1,000m^3 or 1 per cent.

2.2.6.2 The estimated amount of excavated material from construction of the flood channel is in the region of 975,000 m^3, which is split between natural ground material (e.g. gravel/ alluvium/ topsoil) and made ground/disturbed natural ground. The natural ground material is estimated to be 447,000 m^3 or 46 per cent of the total amount of excavated material, samples of which will be subject to lab testing. For PEIR purposes, we have assumed that approximately 360,000 m^3 (81 per cent) of the natural material will be reused for landscaping works while the remaining 87,000 m^3 (20 per cent) will be reused for flood embankment or channel improvement works, or exported to market. This will be tested further as the design progresses and the confirmed need for material re-use for the project is finalised.

2.2.6.3 Made ground (i.e. re-worked natural/outside of landfill) and waste (i.e. disposed of in former or existing landfill) is assumed to consist of 528,000 m^3 or 54 per cent of the total amount of excavated material. It is currently estimated that 134,000 m^3 (25 per cent) of this will be recovered for landscaping works; the final extent of this will be as required from the design. The remaining material (394,000 m^3 or 75 per cent) is expected to come from historic landfill sites and will be processed on site. Following this, it is assumed that approximately 119,000 m^3 (30 per cent from made ground/waste) is taken off site for recycling or for off-site disposal (a small percentage of this material is assumed to be hazardous waste). The remaining 275,000 m^3 (70 per cent) of processed material is assumed for PEIR purposes to be recovered for landscaping or other works. This will

be tested further as the design progresses and the confirmed need for material re-use for the project is finalised. All materials will be lab tested to confirm their suitability for these assumed uses.

2.2.6.4 Large, temporary, material processing and storage sites will be required within the project boundary during construction at any or all of the following locations under consideration:

- Royal Hythe;
- Sheepwalk;
- Manor Farm;
- Land south of Chertsey Road; and
- Northwest and south sides of Ferry Lane Lake, on the alignment of the Spelthorne Flood Channel.

2.2.6.5 The temporary material processing and storage sites would include processing lines to undertake the following tasks:

1. Dry excavated material
2. Stockpile the dried material for processing
3. Process the dried material into separate material types
4. Stockpile these different material types before they are either reused or removed from site.

2.2.6.6 It is assumed for the PEIR that material processing lines could cover an area of up to nine hectares each and will likely be in operation for the duration of the construction period, for approximately six days per week over a 12 hour duration. The height range of temporarily stockpiled material is assumed for the PEIR to be up to 12 metres above existing ground level.

2.2.6.7 In addition to the main processing and material storage sites, further temporary material storage is likely to be required within the project boundary for stockpiling of excavations and storage of construction materials (for example steel sheet piles). Heights of stored construction materials in these locations could be (and have been assumed in the PEIR to be) up to 12 metres above existing ground level. The locations currently under consideration are largely alongside proposed main and satellite compounds (discussed in Section 2.2.8), but standalone sites

may also be required for example, at Abbey Meads and Littleton North. Sites currently under consideration are marked on Figure 2.1.

2.2.6.8 Hazardous excavated waste will need to be removed to suitably permitted facilities via the public road network (or other means of transportation).

2.2.6.9 In addition, we have confirmed that there is sufficient capacity at licenced sites within 16 kilometres of the project boundary for placement of material not used on site (i.e. material that is not chemically and/or physically suitable for project purposes or is surplus to requirements). This will be confirmed by the results of ongoing geotechnical and geoenvironmental investigations with regards to waste characterisation. For the purposes of the PEIR therefore, assessments have considered the movement of all excavated materials (plus or minus 15 per cent) off site to the major and strategic road networks only. Transportation from the major road network and placement of material at its end destination is not assessed, as the assumption is that this is managed by the procedures of each licenced site.

2.2.7 Vehicle Movements

2.2.7.1 Plant associated with the earthworks and piling will be heavy and large and thus will require a dedicated haul road along the route of the flood channel as well as compounds sufficiently large to store the plant when it is not in use. By using haul roads along the flood channel route, some movement of construction and excavated materials can be managed without using the public roads in the local area. Some of the haul roads can also be reused following construction as access tracks for maintenance activities. However, there will be unavoidable use of the public road network (or other means of transportation) for delivery of materials and plant and movements of material (for example by Heavy Goods Vehicles (HGVs) and concrete wagons). Figure 17.1 shows the roads under consideration for the movement of HGVs transporting excavated material between construction areas and off-site for recycling or disposal.

2.2.7.2 There will also be movements of Light Goods Vehicles (LGVs) and worker/commuter traffic associated with operatives and construction staff attending site. Nevertheless, the use of off-site car parking (discussed in section 2.1.10) will reduce the construction staff traffic movements in

proximity to the construction working areas. Road access to site will be routed via main thoroughfares from the arterial roads i.e. routes through villages and towns will be avoided in favour of direct links to the motorways and 'A' roads.

2.2.7.3 The construction works will require a large number of construction vehicles, or Non-Road Mobile Machinery (NRMM) to be moving within and between the construction sites. NRMM will range in size and type; the vast majority will be diesel powered and all will have flashing lights as a safety requirement. It is expected that NRMM numbers will reduce through the winter months alongside a reduction in material excavation works. Typical NRMM is expected to include:

- Driven sheet piling rigs;
- Rotary piling rigs;
- 30 tonne and 40 tonne articulated dumpers;
- 36 tonne excavators;
- 21 tonne excavators;
- 20 tonne loading shovels;
- Bulldozers with D6 blades;
- Seven tonne towed rollers;
- Crawler cranes with masts of 65 to 70 metres;
- Tower lights powered by diesel or hybrid;
- Material processing plants, with screeners, washing and crushing stages, powered by electric;
- Water treatment plants; and
- Other standard NRMM e.g. telehandlers, trailers, tractors, fuel bowsers/lorries, and pumps.

2.2.7.4 There are limited options to use the River Thames for transportation given accessibility issues due to existing low bridges on the alignment of the new flood channel and the large volumes of materials that may need to be transported. Nevertheless, river transport of materials is being considered at the intake and outlet of the Runnymede Channel and at land South of Chertsey Road through the construction of temporary wharves on the River Thames (the approximate locations of these three wharves are marked on Figure 2.1). If used, the wharves would each include a pontoon, unloading areas, road access and turning circles. An example image of a temporary wharf is provided in Plate 2-19 below. For the

purposes of the PEIR, impacts of these potential wharves and associated barges used to transport materials are considered however, they are not defined as primary mitigation to reduce traffic from RTS construction on local roads, as there is not yet certainty in their use.

2.2.7.5 River transport is expected to be used for the capacity improvement works i.e. the River Thames bed lowering downstream of Desborough Cut and improvements at three River Thames weirs and fish passage improvements, with road transport required for transportation to the material's final destination. These works would potentially utilise an existing Environment Agency wharf at Sunbury depot.

2.2.7.6 The possibility of using rail for transport of construction materials has been investigated; this is considered unfeasible given the lack of local railheads and additional use of the road network in combination with the rail network in transporting materials from source to destination. The rail transportation option has therefore been discounted.

Plate 2-19: An example of a temporary wharf (photo provided by BAM Nuttall Ltd)

2.2.7.7 Traffic volumes have not been finalised and will be evaluated as part of design development, including in relation to movements to and from identified sites. For the purposes of the PEIR, approximate vehicle numbers associated with the transportation of excavated material between and off site, on the public highway (which is considered to form

the majority of traffic volumes), have been used to determine potential significant effects. These are provided in Appendix 17.2.

2.2.8 Landscape and Green Infrastructure, Active Travel, and Priority Areas for Habitat Creation, Ecological Enhancement or Mitigation

2.2.8.1 Where possible, certain landscaping and land management works will be undertaken in advance of the main construction activities, such as aspects of the habitat creation and improvements to deliver enhancement or mitigation and parts of the NGOS to enable vegetation to become established. There is potential for the buildings within the project boundary at Sheepwalk to be demolished in advance of the new green open space landscaping works. In areas where early establishment is not possible, certain locations of NGOS and priority areas for habitat creation, enhancement or mitigation will be used for site compounds, material storage or processing of excavated materials during construction (see Sections 2.2.9 and 2.2.6 for more detail and locations), before works to develop their final proposed form can proceed. It is anticipated that some of the raised landforms will take much of the construction period to be physically created from excavated and processed materials, allowing for settling, with their completion and landscaping (such as seeding and planting) towards the end of the construction programme.

2.2.8.2 The two new pedestrian and cycle bridges crossing the River Thames to accommodate the project's active travel proposals are described in Section 2.1.4.9. It is assumed they will be constructed using the following process:

- Installation of piling platforms on both river banks for the installation of the bridge abutments;
- Installation of a temporary steel jetty and cofferdam within the river to accommodate the in-channel construction works;
- Construction of the in-channel intermediate pier(s) from the temporary jetty and within the cofferdam. The pier(s) will be supported on concrete rotary piles;
- The bridge deck will arrive at the site by either road or river, and will be lifted into place in sections. The sections will be lifted using either large land-based mobile crane or river-based lifting equipment;

- As the sections are progressively added across the river in both directions, the cable stays will be connected to support the weight; and
- Approach ramps both sides of the river will be constructed after the bridge deck construction.

2.2.8.3 Timeframes and the nature of active travel improvements (both in NGOS and outside of them) are yet to be confirmed, but it is anticipated that these will be completed within the overall construction period.

2.2.9 Site Compounds

2.2.9.1 There will be a series of temporary site compounds required through the construction period. They will be required to store plant and materials and provide office space, welfare facilities and limited parking. These temporary site compounds are distinct from the permanent compounds required. Detail on the permanent compounds is included in Sections 2.1.4.10 and 2.3.2.6.

2.2.9.2 Temporary site compounds will be provided, depending on their respective scale of construction works, in the form of either a main compound, a satellite compound or a mobile compound.

2.2.9.3 Main compounds may be combined with the temporary material processing and storage sites (as described in Section 2.2.6.4). They are anticipated to cover a large area compromising of approximately 2,500m^2 (or 0.25 hectares) for office and welfare facilities, also outdoor space to provide plant and materials storage, and car parking. Locations currently under consideration for main compounds include Royal Hythe, Sheepwalk and/or Manor Farm, as shown in Figure 2.1.

2.2.9.4 Satellite compounds will be smaller than main compounds and will be located across the construction working area. They will vary in size according to the scale of works they are supporting. For the purposes of the PEIR, it is assumed that the satellite compounds would consist of up to five containerised cabins, welfare facilities and storage containers. Satellite compounds may be combined with the temporary construction material storage sites under consideration. Sites of satellite compounds under consideration are shown in Figure 2.1.

2.2.9.5 Mobile compounds would be required for small scale works. The mobile compound would consist of welfare vans and/or single 10 metre cabins or a mobile pontoon for works within the River Thames. A mobile compound would be able to move alongside as works progress. Mobile compounds would be required for sections of piling works on the Runnymede Channel and on the Spelthorne Channel at Land South of Chertsey Road. A mobile compound may also support any works to improve active travel along the Thames Path (see Section 2.1.8).

2.2.9.6 Each priority area for habitat creation, and improvements work to deliver, enhancement or mitigation is expected to have its own temporary site compound; the type of compound will depend on the final design of each area but the satellite compound type is expected to be required at these sites.

2.2.9.7 A summary of compound and material processing and storage sites expected to be used across the duration of the project (construction and operation) is provided in Table 2-1 below.

Table 2-1: Summary of site compounds and material processing and storage sites to be used through construction and operation of the RTS

Compound type	Description of compound
Temporary site compound: Main compound	Located at: Royal Hythe, Sheepwalk and/or Manor Farm. Large area compromising of approximately 2,500m^2 (or 0.25 hectares) open place floor space for office and welfare facilities, also outdoor space to provide plant and materials storage, and car parking. May be combined with temporary material processing and storage sites.
Temporary site compound: Satellite compound	Smaller satellite compounds will be located across the working area and will vary in size according to the scale of works they are supporting. Assumed to include up to five containerised cabins, welfare facilities and storage containers. Satellite compounds may be combined with the temporary construction material storage sites under consideration.

Compound type	Description of compound
Temporary site compound: Mobile compound / pontoon and/or welfare van	Required for small scale works, the mobile compound would consist of welfare vans and/or single 10 metre cabins. A welfare van is able to move alongside as works progress. Mobile compounds would be required for sections of piling works on the Runnymede Channel and on the Spelthorne Channel at Land South of Chertsey Road. A welfare van pontoon may also support any works to improve active travel along the Thames Path.
Temporary material processing / storage sites	Large, temporary stockpiles of excavated materials for processing and reuse or removal from site. Sites currently under consideration are alongside or within main and satellite site compounds at Royal Hythe, Sheepwalk, Manor Farm, Land South of Chertsey Road and at Ferry Lane Lake. Stockpiles could be up to 12 metres in height; the sites could cover an area of up to 9 hectares.
Temporary construction material storage sites	In addition to stockpiles of excavated material, locations are also required for the temporary storage of construction materials before they are used e.g. sheet piles. The locations currently under consideration are largely alongside proposed main and satellite compounds but standalone sites may also be required for example, at Abbey Meads and Littleton North. Stockpiles could be up to 12 metres in height.
Temporary wharves	Required on the River Thames if river transport is used. These are currently being considered at the intake and outlet of the Runnymede Channel, and at Land South of Chertsey Road, within close proximity to potential materials processing / storage sites.
Permanent compounds	Permanent operational compounds will be required at the three gated flow control structures on the flood channels; these will include kiosks to house the operational equipment. Two are located on the Runnymede Channel, and one on the Spelthorne Channel, as described in Section 2.1.4.10. Two further permanent operational and maintenance compounds will likely be required within Royal Hythe and Sheepwalk. These compounds will contain office and equipment storage space for those operating the RTS, as described in Section 2.1.4.11.

2.2.10 Public Rights of Way (PRoW)

2.2.10.1 The network of PRoW within the project boundary for the EIA PEIR will be affected during construction through either temporary diversions and/or closures, and potentially permanent closures in some cases. Where temporary diversions and closures are used these will be in place for the shortest period of time possible with advanced notice of the diversion/closure and alternative route (if applicable) advertised in advance of works. Appendix 2.2 lists the PRoW numbers which will be potentially subject to diversions and/or closures, this should be read in conjunction with Figure 2.3 which shows where these PRoW are located.

2.3 Operation and Maintenance

2.3.1 Operation

2.3.1.1 The capacity improvements in the River Thames at each weir and downstream of Desborough Cut will be ready for use once construction has been completed at each site. We anticipate that the flood channel and associated flood management features will be in operation by the end of 2032.

2.3.1.2 The flood channel will only operate once flow in the River Thames exceeds a certain threshold flow value. This flow value on the River Thames is yet to be confirmed, but it is thought that it will be approximately 230m^3/s (i.e. the River Thames is at bank full condition). Once operational, the flow down the flood channel will be regulated by flow control structures at the intakes (one flow control structure for each section of the flood channel and one just east of the crossing of Staines Road (A320), downstream of the Thorpe Park Lakes). These gates will be opened incrementally so that more and more flow is conveyed by the flood channel (up to approximately 150m^3/s) whilst flow in the River Thames remains at approximately the threshold value (~230m^3/s). If flow down the River Thames is such that the capacity of the flood channel would be exceeded (for example, during a flood event greater than a 1 in 100 flood (one per cent chance of happening in any given year)), the flow control structures will throttle flow to ensure the channel does not overtop its banks. From this point, increased flows in the River Thames will cause flooding in a mechanism similar to the existing situation. Reduced flows at

the end of a flood will see the flow control structures gradually close in a reverse manner to how they were opened.

2.3.1.3 In non-flood conditions, the flood channel will always contain water due to the presence of water level control structures.

2.3.1.4 The Abbey Meads area is the exception, which will be a predominantly dry floodway with the existing levels lowered and profiled to provide a damp to wet summer grazing area.

2.3.1.5 For the most part, the water level control structures on the flood channel route will be fixed weirs (see Plate 2-11). The weirs are necessary to ensure that the existing lakes (which the flood channel flows through) and the adjacent land (where the groundwater is typically only one to two metres below ground level) are not drained below their existing levels. The augmented flow of up to 1 m^3/s will be allowed to pass down the flood channel in non-flood conditions (normal and low flows).

2.3.1.6 The permanent site compounds will primarily serve as an area to operate and maintain the gates of the flow control structures at the channel intakes. A similar compound with the same function as those next to the intake structures will also be located adjacent to the flow control structure on the Runnymede Channel just downstream of Thorpe Park lakes (FCS 10 on Figure 2.1). Further permanent operational and maintenance compounds will likely be required within Royal Hythe and at Sheepwalk to contain office and equipment storage space for those operating the RTS. Other small permanent compounds may be required along the flood channel; this will be confirmed for the ES but is not assessed within this PEIR.

2.3.1.7 The flood channel will also be used to manage flood flows in the Chertsey Bourne. A formalised overspill from the Chertsey Bourne will allow high flows to spill into St Ann's Lake (structure FCS8 as detailed in Section 2.1.4.3) (this formalises a situation that already occurs). The pressure of the rising water level in St Ann's Lake will open a new flap gate between St Ann's and Abbey Lakes (structure FCS7 as detailed in Section 2.1.4.3). Some flows will be diverted back from St Ann's Lake to the Chertsey Bourne (structure FCS9 as detailed in Section 2.1.4.3). In this way, some of the Chertsey Bourne flood flows will be directed towards, and conveyed through, the downstream end of the Runnymede Channel to the River Thames to alleviate flooding in Chertsey.

2.3.1.8 The bed lowering of the River Thames downstream of Desborough Cut will reduce flood levels through this section of the river and upstream to Shepperton weir. The additional gates on the three River Thames weirs downstream of the flood channel will add flow capacity by opening incrementally once all the existing weir gates have been opened fully, reducing flood levels back to the next weir upstream.

2.3.1.9 The capacity improvements ensure there is no increase in flood risk from the River Thames downstream of the RTS. In some flood conditions, the flood channel leads to a small increase in peak flows passing downstream. However, this is fully compensated by the additional capacity provided by the bed lowering downstream of the Desborough Cut and the additional weir gates at Sunbury, Molesey and Teddington. Therefore, the net effect will mean that there is no increase in flood levels in the River Thames at any location in any flood conditions.

2.3.1.10 We are also exploring opportunities with Thames Water to adjust the timing of their abstractions to existing storage reservoirs during large flood events so that the highest rate of abstraction coincides with the flood peak. This would be undertaken in accordance with an agreed protocol between the Environment Agency and Thames Water. There is potential for the abstraction regime to be altered at existing abstraction locations on the River Thames. This includes at Datchet (which primarily supplies the Queen Mother and Wraysbury Reservoirs), Laleham (which primarily supplies the Queen Mary Reservoir) and Walton (which primarily supplies the Queen Elizabeth II Reservoir). Changes to the abstraction regime would help to achieve additional benefit by reducing the peak flows and river water levels downstream of the abstraction points and downstream of the flood channel during large floods.

2.3.1.11 The need for the project is likely to increase over time and therefore it is unlikely that a point in time will be reached when the project is no longer required. Due to climate change it is highly likely that to maintain operation of the project beyond 100 years at the required level of flood risk reduction, changes to its capacity or operation (such as increased frequency of use) may be required.

2.3.1.12 In the unlikely event that the project is no longer required, we do not anticipate that the RTS would be decommissioned (i.e. removed). It is more likely that the flood channel and its associated features would be left

in-situ and its operational regime modified as needed. Similarly, there are no plans to decommission the landscape and green infrastructure opportunities, priority areas for habitat creation, enhancement or mitigation, or improved fish passage being incorporated to the project. Effects associated with decommissioning of the project are therefore scoped out of the EIA. They are not discussed further in this PEIR and will not be discussed in the ES.

2.3.2 Maintenance

General maintenance works

2.3.2.1 Maintenance requirements for the flood channel will consist of vegetation maintenance (trimming, replacement, coppicing trees etc.), removing debris, inspecting the channel banks and structures and maintenance of mechanical and electrical gate parts.

2.3.2.2 Maintenance of Sunbury, Molesey and Teddington Weirs and any other landscape design or green infrastructure aspects of the project (including NGOS, priority areas for habitat creation, enhancement or mitigation and active travel provision) will be maintained in accordance with operational requirements and other regimes agreed with project partners and developed as part of the DCO application (or subject to a DCO requirement to do so).

2.3.2.3 An approximate two-year establishment maintenance period will generally include:

- Watering;
- De-weeding;
- Removing rubbish;
- Pruning of trees to ensure clear trunk;
- Pruning of trees and shrubs as required to maintain visibility into NGOS and active travel routes;
- Deadwooding;
- Mowing;
- Removing graffiti;
- Topping up protective coatings of furniture and fixings;
- Upkeep/ replacing any furniture or fixtures to ensure they are up to standard and functional;

- Maintaining pavement surfaces to be hazard free;
- Re-mulching planting areas;
- Monitoring habitats to ensure the preferred habitat develops; and
- Replacing dead plants and removing undesirable plants.

2.3.2.4 Beyond the two-year establishment period, longer term maintenance will be required that will include the above establishment activities plus potentially the following:

- Grazing of grasslands/ wildflower meadows; and
- Mowing of select amenity grassland (such as around potential visitor centres and along active travel routes).

2.3.2.5 Access tracks along the flood channel will facilitate access to the various flow and water level control structures as well as the flood channel itself for maintenance purposes.

2.3.2.6 A Public Safety Risk Assessment (PSRA) will be developed during the detailed design of the channel and associated features and before construction, building on work being undertaken as the project progresses. The PSRA will be reviewed by the responsible party on completion of construction and after every five years, with safety inspections every year in between. The PSRA will give consideration, for example, to emergency egress points for anyone who might fall into the channel (e.g. a formalised exit point and/or grab chains) and access for emergency vehicles to deal with such situations. The PSRA will also consider the installation of handrails at maintenance sites and strategic provision of life buoys, throw lines and warning signage.

Channel maintenance to restore design profile

2.3.2.7 We anticipate that annual desilting will be required at the entrances to the intake structures on both sections of the new flood channel at Runnymede and Spelthorne in order to ensure the bed levels remain as designed and the channels can therefore function effectively.

2.3.2.8 We also anticipate that sediment could build up within the flood channel and connecting waterbodies following large flood events (greater than a one in ten annual exceedance probability) that would be desilted to retain the designed bed levels if required.

2.3.2.9 No further desilting activities are anticipated to be required as a result of the project. Bathymetric surveys will be undertaken periodically to detect any changes in siltation and erosion over time.

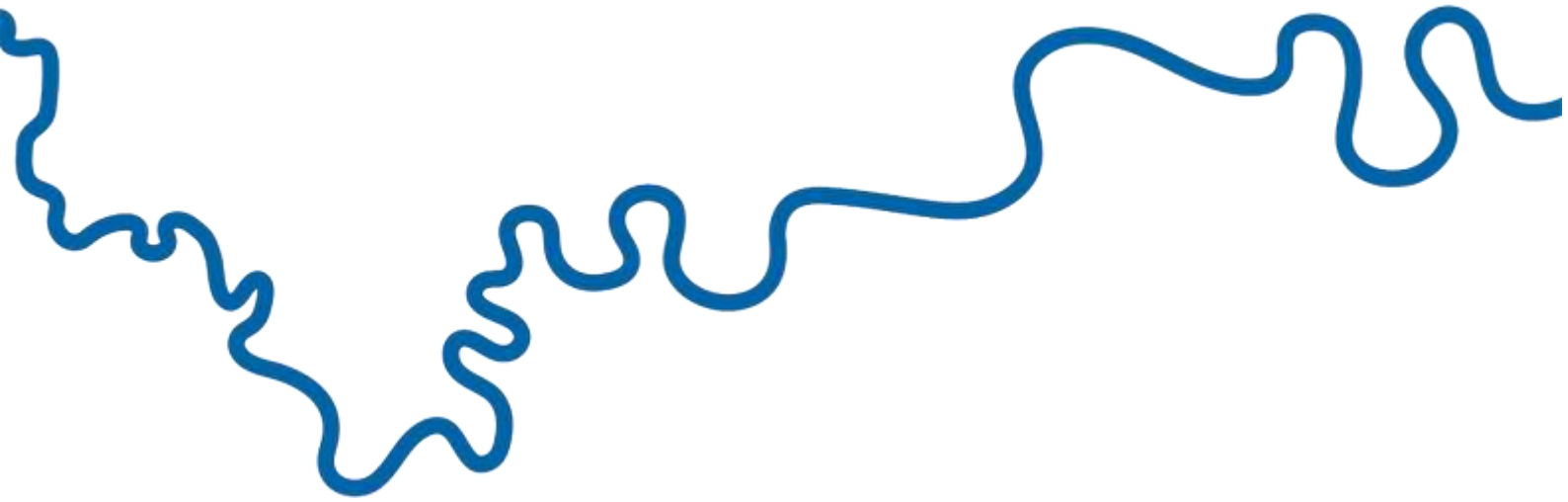
2.4 Updates Since EIA Scoping

2.4.1.1 We have updated the design parameters for this EIA PEIR since the EIA Scoping Report following subsequent stakeholder engagement, assessment and design development. We have done this in order to refine the assumptions and largely reduce the maximum reasonable extent of the following project components:

- Flood channel: the augmented flow has been reduced from 1.5m^3/s to 1m^3/s. This is described further in Section 3.3.5 of Chapter 3: Consideration of Alternatives;
- Flood channel: a short (approximately 600 metres long) section of the Spelthorne Channel is proposed to be realigned at Sheep Walk, where the channel extends south of the M3. This is described further in Section 3.3.2 of Chapter 3: Consideration of Alternatives;
- Landscape and Green Infrastructure Design: the assumption of heights for raised landforms has been adjusted from the maximum height of 22 metres considered in the Scoping Report, to a maximum of eight metres in height (as described in Section 2.1.7.4);
- Landscape and Green Infrastructure Design has identified the possibility of new blue open spaces to support the RTS project goal of creating new open spaces for recreation, Section 2.1.7 details the locations currently under consideration in this PEIR and Section 3.3.3 of Chapter 3: Consideration of Alternatives describes the development of the Landscape and Green Infrastructure Design;
- Landscape and Green Infrastructure Design Active Travel: the PEIR provides greater detail than the EIA Scoping Report on areas of enhanced public connection under consideration. In addition, the project boundary for the PEIR has been amended to accommodate active travel opportunities at Staines between Monk's Walk, the A320 Staines Road and Ferry Lane in Chertsey, plus opportunities at Littleton South, Sheepwalk and Cowey Sale, and the two pedestrian and cycle bridges across the River Thames;

- Materials management: routes, volumes of material and destinations for surplus materials have been identified since the EIA Scoping Report (details summarised in Section 2.2.5 and 2.2.6);
- Areas to the north of Norlands Lane, to the west of Royal Hythe and part of the area south of Wraysbury Reservoir have been removed from the project boundary as they were not required to deliver the project goals or for associated construction activities. Some land east of Laleham Reach has been added to the project boundary to incorporate opportunities for habitat creation, enhancement or mitigation;
- Locations of temporary material processing, storage and construction compounds under consideration;
- Likely locations of permanent operational and maintenance compounds; and
- Off-site car parking for construction workers. This is described further in Section 3.3.4 of Chapter 3: Consideration of Alternatives.

2.4.1.2 Design and assessment work is ongoing. As the EIA process continues, we will continue to refine the design parameters, and these will be described in the ES.



The River Thames Scheme represents a new landscape-based approach to creating healthier, more resilient and more sustainable communities by reducing the risk of flooding and creating high quality natural environments.

River Thames
Scheme