Appendix 1 - Canal & River Trust's response to the Phase One Environmental Statement Consultation.

Canal & River Trust
Keeping people, nature & history connected

Response to the Phase One Environmental Statement Consultation

Below are the relevant issues for the Canal & River Trust (the Trust) which are applicable for routewide and site-specific matters. If there are no site-specific comments, it should be assumed that the routewide comments apply.

Routewide Issues

Issue	Comments
Impact on our assets	Permanent Works on the Trust Property No permanent works are to be located on the Trust property (other than over sailing our property). Advance Maintenance Mitigation Works The waterway wall and towpath within the footprint of the HS2 structure needs to be repaired to ensure that no major maintenance will be required for the foreseeable future. Typically this will comprise waterway wall repair/reconstruction and towpath surfacing. It will extend for a distance either side of the HS2 structure, the distance to be specified by the Trust. This is required to ensure that the Trust does not inherit a maintenance liability due to the HS2 structure. Dredging of the waterway channel also needs to be included in this category. Mitigation works should have the same design life as HS2 structures. Ownership All crossing points to have clear signage confirming ownership, who to call to report defects, graffiti, etc. The Trust Bridge Numbers All bridges will need to have the Trust Bridge numbers - a simple bridge plaque on both elevations is acceptable. The Trust Ownership Boundary HS2 drawings should to show the Trust land ownership boundary. We have issued our GIS information on our land ownership to HS2 Ltd.

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	The Trust Code of Practice During the operation phase of HS2 any work adjacent to the canals needs to be managed in accordance with the Trust's "Code of Practice for Works Affecting the Canal & River Trust". Maintenance and Inspection We need to agree how HS2 structures are to be inspected and maintained. Water Levels and Headroom The Trust will supply relevant information regarding normal water levels, controlling weir levels etc to be used by HS2 in determining structure clearances over the Trust's property. Drainage All crossings over The Trust property need to be designed to ensure that water does not drip onto the canal or towpath. Air draft All crossings over non-commercial waterways are to provide a minimum air draft of 3.00m and a minimum towpath clearance of 2.75m. Specific requirements for each crossing point shall be provided by the Trust. Access for the Trust to maintain our navigation The Trust will require uninterrupted access to its assets to ensure that inspection and maintenance activities are not adversely affected. This is applicable during the construction and operational phases of HS2. Asset Resilience The Trust's network is 'working heritage' of up to 250 years old and is subject to very occasional breaches/failures which under certain circumstances could adversely affect HS2. The Trust will expect HS2 to inspect/assess its network in the vicinity of any crossing point to ensure that the construction work does not affect stability/resilience of the Trust's network. In addition, HS2 will need to ensure that the risk of a breach/failure affecting HS2 during its operational phase is mitigated to an acceptable level. The Trust will expect any mitigation work to be funded by HS2, with the Trust being indemnified against any potential claim against it by HS2 or the future operators of the railway.
Waterway Operation and Customer Use/Access	Keeping the waterways open during the construction phase HS2 to maintain navigation and towpath access at all times throughout construction and operation; no limitations on headroom / width etc. beyond those already in force from existing structures. Some of the Trust's towpaths are public rights of way. HS2 should consider opportunities for improvements to public access to our waterways that could arise from construction and operational accesses.

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	Graffiti/Vandalism New structures are at significant risk from graffiti and should be designed accordingly - e.g. anti-graffiti measures, maintenance regimes etc. This is a major challenge for the Trust. We need to agree with HS2 what is to be done with regard to offensive/non offensive graffiti on their structures. The Trust will expect that any offensive graffiti shall be removed from structures crossing its property within 24hrs of it being reported. Bird Proofing - Crossings to be "bird proofed" over the full width of canal and towpath to prevent infestation with feral pigeons. This does not preclude positive roost/nest features for songbirds or bats. Recreational Users The waterway corridors are used by a variety of recreational users and the impact on these users should be considered. Boating. Use of the waterway corridors for boating supports a number of businesses, including those providing moorings (either on or off the mainline of the waterway), boat building and repair together with boat sales, holiday and day hire and those engaged in passenger carrying. Appropriate mitigation should be employed to address issues resulting from HS2 which would affect these uses and businesses which are an important part of waterways. Moorings are used in a number of ways. Long –term moorings (i.e. the parking space for the boat) may be used for leisure purposes or could be someone's primary residence i.e. a residential mooring. Even use for leisure purposes can mean that boaters spend a significant period of time at the mooring location. There are also designated visitor mooring areas i.e. an area used by boaters for mooring whilst on a cruise, including 'continuous cruisers' for whom their boat is their primary residence. In addition to these moorings, the relevant waterway legislation permits casual mooring for up to 14 days at a time by any licensed boat along any length of towpath. The exceptions to this are where the towpath is designated for use by long term permit holders, the moorings are visitor moorings where the duration of stay has a specific time limit or the towpath is designated as a 'no mooring' stretch. Casual and visitor mooring can be undertaken by any boat regardless of how it is being used, whether it is a boater on holiday or someone for whom their boat is their primary residence. The impact of HS2 on all forms of mooring needs to be considered and addressed. Please also see our comments under noise. Also, when assessing the usage of the Trust's network, HS2 Ltd should refer to the latest Lockage Report as published on the Canal & River Trust's Website. The 2013 report can be found at http://canalrivertrust.org.uk/media/library/323.pdf. Fishing Car parking and access for those using the waterways for fishing is important and should be safeguarded or improved. Introduction of HS2 structures within the waterway corridor is likely to increase the area of water where fishing will need to be

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	restricted. Opportunities to underground existing overhead line crossings of the waterways may however allow some existing restricted areas to be used for fishing.
Utilities	Services on or under the Trust's land The Trust's land includes a significant amount of utility company apparatus. This will in some instances require relocation at the cost of HS2. It includes gas, water, electricity and telecoms apparatus and private pipelines including nationally significant oil pipelines. In addition, the canal provides drainage to a large number of properties and developments. Upon detailed assessment, some of this apparatus may require relocation during the construction of HS2. Pipe Bridges Pipe Bridges will need to be appropriately relocated. Overhead Lines Overhead lines will need to be appropriately relocated and undergrounded wherever possible.
Heritage	The Trust's historic network of waterways should be considered of high heritage value throughout. The heritage value should not be limited to the individual assets which are designated. At the strategic level, Conservation Areas, Listed Buildings and other heritage designations should lead to the early identification of those assets which are of greatest importance however, the historic interest of the waterways comprise many other non-designated structures of high heritage interest. The CFA reports generally describe the canals as being of moderate heritage value. However, HS2 will have a significant impact on the setting of a number of waterways and specific assets (both visual impact and noise disturbance) and this should be acknowledged in a consistent manner across the whole route. It is the Trust's policy to treat all heritage assets with the same level of care and protection as those legally designated. HS2 will have a significant impact on the setting of a number of waterways and specific assets (both through visual impact and noise disturbance) and this should be acknowledged and appropriately mitigated.
Biodiversity:	Protected Species The Trust expects to see generic mitigation / improvements for key waterway corridor species that will be affected such as bats, water voles and otters. Invasive Species The Code of Construction Practice needs to include requirements for pre-construction surveys and standard control measures for the most likely invasive species.

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	Vegetation Management The scale of vegetation management is likely to be extensive. This means that creation of compensation areas in advance to address construction and operational impacts will be important. The timing of clearance work will be essential (for instance to avoid impacts on nesting birds). The Trust would be concerned if compensation and landscaping were to be confined to the construction footprint, which will make advance mitigation almost impossible. The Trust would welcome the opportunity to discuss the use of residual and/or redundant parcels of HS2 or third party land adjacent to the canals for advance mitigation. Habitat Loss Any habitat compensation within the water on the non-towpath side of the waterway should consider appropriate habitats for fish.
Environmental Enhancement	Routewide Consideration of Enhancements At a corridor scale, HS2 will create opportunities for new wildlife connections. This needs to be more explicit in the Environment Statement. For instance, examples of landscaping and reinstatement of construction areas that could connect neighbouring habitats. The Trust can provide opportunities for compensatory habitat and connections to offset any unavoidable losses from construction (as we are doing with Crossrail). Creation of an "isolated fringe" where land take is offset from the Canal The Trust would be prepared to take on the ownership / management of an offside fringe where it is cut off by HS2 landscaping (e.g. Wormleighton). We would also be interested in discussions on the future management and use of the landscaping areas adjoining our waterways where there may be opportunities for recreational use or positive management by the Trust.
Water Quality and Resource	Pollution Control during construction and from operational drainage It is noted that HS2 Ltd are aware of the issue and are undertaking to control it at construction stage. The Trust will monitor discharge points (both constructed and intercepted existing watercourses). We expect Environment Agency involvement to set site specific control levels and actions to ensure that pollution of our waterways does not occur but we will also require specific protective measures with oil and silt traps as standard along with other measures such as filtering reed beds and/or pollution control valves. Please also see comments under contaminated land. Impacts on Water Flows in our canals There should be no interruption of supply during construction or operation. Any interruption of supply would need to be reviewed to protect wildlife, customers and abstractors. Surface water discharges (SWDs) Where SWDs come into the canal directly or via balancing ponds, these need to be assessed by the Trust to determine whether they would be acceptable. In order to confirm whether your proposed discharges will be acceptable, we will need a definitive list of

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	SWDs so we can organise the process to assess and implement impacts. We understand that HS2 Ltd cannot provide this information until construction phase. We therefore feel that this issue has not been adequately assessed at this point and HS2 Ltd cannot say the environmental impact is being properly managed. We would expect any powers under the Act to contain a protective provision requiring our consent. The process for this consent is contained in our current Code of Practice for Works affecting the Canal & River Trust. Please note that we will not use EA "Greenfield Attenuation" levels. Instead, we will make our own assessment of the impact of new or increased discharges to our system. In addition, the Trust would need to be satisfied that the capacity and effect on any Trust structure affected by a SWD not connected to the canal was properly assessed. Compensatory measures may be required.
Waste, Hazardous Materials Use and Storage	<u>Control of Hazardous Substances and Waste</u> Code of Construction Practice requirements appear to address this issue, but will need close monitoring/advance liaison with individual contractors in the construction phase.
Contaminated Land	<u>Previous Trust Experience</u> Our greatest concern is about mobilising or pumping of contaminated water into surface water course / the canal. The Construction Code of Practice (CoCP) puts the onus on each of the bidding contractors to undertake risk assessments to manage this risk and that the Trust will be consulted where there is a risk to our waterways. Based on our experience elsewhere (Olympics / Crossrail) we require a clearer statement in the CoCP that the contractors will carry out adequate testing on all groundwater or surface water at risk of contamination before pumping it or allowing it off their site. The Trust's position is that the CoCP must state that no excavations, groundwater or surface water may be discharged without analysis demonstrating it is not contaminated. Where groundwater is contaminated, any proposed remediation prior to discharge should be agreed with the Trust.
Nuisance	<u>Noise</u> *Noise generated by construction operations* The Trust is very concerned about noise disruption in quiet rural areas blighting sections of the waterway. As a minimum during the construction phase - all parts of the waterway network should be protected as "Quiet" areas as per Section 13 of the Code of Construction Practice. *General comments on Noise* Noise protection on viaducts is not as effective as earth structures at reducing the noise contours, so there is a disproportionate impact on waterways at crossing points. Noise protection should be provided to reduce the impact on the waterway corridors (please also see our comments below on casual mooring) not only during the construction phase but also in the operational phase. Noise disruption will be frequent and continues for large parts of the day which will be intolerable for mooring sites, including

	casual moorings. The Trust will require the waterways to be treated as residential areas but allowing for the lower sound insulation provided by the shell of a boat compared to a house. Mitigation for boats off the Trust's waterspace should be discussed with the operators/owners of the mooring sites. Moorings are used in a number of ways. Long –term moorings (i.e. the parking space for the boat) may be used for leisure purposes or could be someone's primary residence i.e. a residential mooring. Even use for leisure purposes can mean that boaters spend a significant period of time at the mooring location. There are also designated visitor mooring areas i.e. an area used by boaters for mooring whilst on a cruise. In addition to these moorings the relevant waterway legislation permits casual mooring for up to 14 days at a time by any licensed boat along any length of towpath. The exceptions to this are where the towpath is designated for use by long term permit holders, the moorings are visitor moorings where the duration of stay has a specific time limit or the towpath is designated as a 'no mooring' stretch. Casual and visitor mooring can be undertaken by any boat regardless of how it is being used, whether it is a boater on holiday or someone for whom their boat is their primary residence. The impact of HS2 on all forms of mooring needs to be considered and addressed. The Trust is extremely concerned that HS2 Ltd has failed to understand the fundamental purpose, function and appeal of canals as quiet and peaceful corridors for exploring and enjoying, whether by boat, by bike or on foot. The Trust is disappointed that HS2 Ltd has determined that in Volume 5 Technical Appendix (Sound, noise and vibration) - Appendix SV-001-000: Annex G page 7 that canals do not merit protection as 'noise sensitive receptors' and will only enjoy noise mitigation measures where this is proposed for residential and non-residential receptors in the vicinity. HS2 Ltd has focussed on assessing noise impacts on the canals in relation to permanent residential and leisure moorings only. It has failed to address the impact on casual and visitor moorings used as primary residences for 'continuous cruisers'. It has also not addressed the noise impact on the other 90% of users of the canal corridor, e.g. walkers, cyclists, anglers, etc, that will be discouraged from using the canals in the vicinity of interface points undermining the Trust's ability to continue to deliver significant public benefits. In respect of moorings, Annex G states that "temporary and static moorings have, by their nature, transitory use with users staying only for short periods of time (e.g. a few hours at a time)". This is not correct. Users have the right to moor along the entire length of the canal network for up to 14 days unless restrictions indicate otherwise. Annex G adds that "People generally use such moorings when starting on journeys to other locations along the waterways network or whilst en-route between locations". The Trust would like to understand the basis for this conclusion. The Trust agrees with Annex G in that "Increases in noise due to construction and operation of the Proposed Scheme may adversely affect the acoustic character of the area around such facilities". However, the Trust strongly disagrees with the conclusion that "users will not be exposed to any increased noise for long periods" and "any adverse noise effects on users are not considered significant". Users may be exposed to such noise pollution for extended periods of time causing significant adverse noise effects. The fundamental point is that the Trust's customers have until now enjoyed peaceful and quiet visits to the canal at the interfaces

	with the Proposed Scheme and would continue to be able to do so if the Proposed Scheme had not proposed to cross the canals at the interfaces. It is therefore not unreasonable for the Trust to expect the impact on the canals to be minimised in line with Government policy on noise pollution and for canals and offline facilities to be afforded the same protection as other noise sensitive receptors such as residential properties. <u>Lighting</u> It is likely that there will be little lighting associated with the development. Lighting will however be required at some canal crossings, especially where significant "underpasses" are being created either by HS2 alone or in combination with existing structures. In these circumstances there will need to be sensitive lighting design to provide safety and improve the public space while not affecting wildlife which may be deterred by bright lights or adversely affecting customers. <u>Vibration</u> There is potential for the effects of vibration to impact on our network and customers. There is limited information in the ES on how vibration during construction and operation has been assessed and mitigated. The Trust is particularly concerned about the adverse effects of vibration on its c 250 year old network. In the absence of further information, the Trust requests that its infrastructure is categorised as "Potentially Vulnerable Buildings" as per Volume 5: Technical Appendices. <u>Odour/Smoke/Dust</u> Construction impacts are considered to be adequately addressed in the CoCP.
Bridge design/ Landscape	<u>Bridge crossing designs – permanent crossings</u> Bridges over waterways have a strong impact on the character of a waterway corridor, forming landmarks and often defining waterway character lengths. It is therefore critical that any new major bridging structure makes a positive contribution to the waterway corridor, and also the wider associated waterway landscape. The pace of travel along waterways either by boat or on foot is slow and, as a consequence, the approach to structures is also slow and carefully observed, possibly more so than in other transport corridors. As a result, any proposed structures set within the landscape, and the quality of any proposed structure when seen from below, is subject to significant scrutiny, and all elements and faces of the structure's design and finish subsequently need to be of an appropriately high quality. For the majority of canal crossings, the current "indicative designs" are shown as very simple concrete decks, on concrete piers. The Trust does not consider this to be an adequate or appropriate response to canal crossings. The bridge holes created by the proposed HS2 bridges (the space below the span) need to be positive spaces rather than difficult, dead spaces which, experience has shown, can become vandal havens, attracting graffiti and anti-social behaviour, and deterring the positive public use of the historic waterway network. These impacts upon the public amenity of the canal network also create a management and

	maintenance liability for the Trust. The Trust considers that the design and construction of the HS2 bridge structures should showcase the best in contemporary 21st Century architecture and engineering, creating structures that contribute positively to the multiple layers of transport history that are evident along the canal corridor. The design and quality of HS2 crossings of canal therefore need to be to the highest standards in terms of detailing and finishes, comparable to high profile City Centre design standards. We would therefore expect that each crossing will be subject to careful individual assessment and consideration to establish the subtlety of the design response to the individual crossing points. The Trust believes that creative, elegant use of the elevations, piers, soffits, decks, towing paths and other surfacing, lighting etc. can create crossings appropriate for their setting. Care will also need to be taken to ensure the proportions of the structures are considered in the context of the waterway corridor, therefore consideration needs to be given to the aesthetics derived from the relationship of span, deck depth, pier size, etc. We also anticipate that art can be successfully employed to help provide interest, and to tell the story of the waterways and would expect a "percent for art" contribution to be adopted by HS2. The Trust have produced a Design Principles Document (which will be provided to HS2 Ltd) to establish appropriate design approaches to HS2 Canal crossings. The Design Principles have been established within the design language of HS2, and to reflect the character of each waterway area and the story of each canal, and to meet our expectations for high quality structures and spaces. We also propose to commission an architect to generate individual bridge designs within the design language of HS2 to reflect the character of each waterway area and the story of each canal, and to meet our expectations for high quality structures and spaces. With regard to the visual impact of the crossing points, the Trust strongly believes that further soft landscaping measures should also be employed to reconcile the new crossing structures into the waterway corridor, and the wider landscape, and mitigate the visual impact of any new structures. The implementation of structure planting carefully designed and positioned to provide an oblique, framing buffer to the bridge crossings, could be employed to further exploit the linear nature of views within the waterway corridor. This could be a useful device in narrowing the visual field and therefore reducing the impact of adjacent or approaching railway infrastructure. This structural planting could also assist in blending the new crossings into the existing landscape, by responding to local field patterns and local hedge and woodland species mixes. Site by site assessments, and subsequent proposals, are once again required to ensure local appropriateness, with early planting works undertaken to establish a robust landscape structure, ideally to help screen construction and certainly to form a screen upon completion of HS2 major works. The Trust would welcome the opportunity to work with the HS2 design teams on the Canal & River Interfaces as follows: a) A Trust representative on the Design Review Panel; and b) The Trust will give approval for the canal and river crossings providing that it can be demonstrated that the following issues

	have been addressed by the HS2 design team and incorporated in the design where reasonably practicable. These design principles will establish an appropriate site specific crossing design for each HS2 canal interface, in accordance with the principles set out in the Knight Architects' Canal & River Trust HS2 Design Principles Document addressing: • Supporting Structures - Pier position and design; • Supporting Structures - Abutment position and design; • Extent of adjacent viaduct; • Parapets; • Soffit; • Quality standards for exposed finishes (concrete, steel etc); • Embankments; • Towing paths and other surfacing; • Maintenance access to HS2; • Associated and relocated access roads; • Lighting (where appropriate); • Drainage; • HS2 services integration (cabling , ducts etc); • HS2 offline –infrastructure (service boxes etc); • Associated fencing and other furniture details; • Associated soft landscaping measures to reconcile the new crossing structures into the waterway corridor, and the wider landscape, and mitigate the visual impact of any new structures. Site by site assessments, and subsequent proposals, to be undertaken to ensure local appropriateness, with early planting works undertaken to establish a robust landscape structure to help screen construction and certainly for completion; and • Art to help provide interest, and to tell the story of the waterways. <u>Bridge crossing designs – temporary crossings</u> There are at least 9 no. proposed temporary crossings of Trust owned waterways. These crossings will be in use for up to nine years and will, in effect, come to be considered as permanent features in the canalscape. The Trust will require all temporary crossings to be of high design quality and designed subject to the following minimum requirements: - no construction on Trust owned land; - minimum air draft of 3.00m for leisure waterways; and - minimum towpath headroom of 2.75m.

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	The design, appearance, installation/dismantling method, maintenance and inspection regime of the temporary bridge crossings shall be agreed with the Trust. <u>Mitigation Areas</u> Further details are required for mitigation / landscaping areas. The Trust would like to see some screen planting at the edges of construction areas first with fast growing hedgerow plants at the boundary to help screen the construction phase and the operational phase from day one. This will also help to channel wildlife away from the construction areas to crossing points such as the canals. Planting should be kept a minimum of 5m from the water's edge and further from any structures (locks/waterway walls, etc.) - 10m would be more appropriate. Appropriate native species mix should based on existing local woodland character. Also, HS2 Ltd should explore opportunities for other priority habitats like heathland and grass meadows to be part of the mitigation areas on construction subsoil such as embankments and spoil areas. The Trust is also concerned at the potential impact of embankments and viaducts on wet meadows and other sensitive canalside landscape types. These landscape character types are visually important to the waterway corridor but equally important as habitat areas, supporting rare and endangered species. Retaining adequate parcels of accessible land between the canal and the HS2 route will enable traditional farming practices to continue to maintain these sensitive landscapes.
Socio-Economics and Restoration	<u>Impact of HS2 development on waterway socio-economic context.</u> The inland waterways of England and Wales provide many benefits; social (including health), economic and environmental. The provision of socio-economic benefits varies from waterway to waterway, ranging from minor to highly significant. It is the Trust's aim to ensure that the wider uses for and dividends from the waterways are understood so that their potential to add value and help deliver objectives at the national, regional and local level is realised. In particular, the promotion of public health and wellbeing is becoming an ever more important aspect of policy across local and national government. It is acknowledged that fostering a physically and mentally healthy population leads to higher levels of both labour force participation and productivity, whilst also reducing health service and social security costs. Whilst there are many aspects of health promotion, the availability of high quality green/blue spaces such as those provided by waterway corridors has assumed increasing importance in recent years. They can act as an easily accessible multi-functional health asset encouraging people to take more exercise, feel more confident about their community and provide a peaceful environment that can offer a real alternative to undertaking journeys by car or bus. The Trust therefore considers that inland waterways make a valuable contribution to socioeconomic outcomes including measurable benefits to people's quality of life. They provide recreation, transport and land drainage. They act as a focus for the regeneration of waterside areas. They provide an important environmental, landscape and heritage resource. Such quality of life benefits can be expressed and analysed in terms of ecosystems services delivered. Unlike the expenditure by visitors and the

	resultant employment generated, these ecosystems services represent real increases in people's welfare, rather than a spatial redistribution of benefits. The generation of a wide range of socio-economic benefits - and latent benefits in the restoration of canals – has been demonstrated by research conducted on the existing network and previously completed restorations. Our conclusion is that the work to be done on the Community Form Areas in relation to the socio-economic impact of HS2 should more properly consider the existing navigable waterway network and also prospective canal restoration projects that are impacted by the project. By doing this, we believe that the EIA process will more adequately assess any impact on existing benefits and those to be provided by restored canal lengths that are impacted by HS2.

Site Specific Comments

CFA	Location	Canal	HS2 Chainage Approx.	Issue/Comment	Action	Significance
1	Euston			No direct effect on the Trust's network - see Routewide comments.	No.	Minor
2	Camden Town	Regent's	1.700	**ENGINEERING INFRASTRUCTURE** **REGENT'S CANAL ADJACENT TO HAWLEY LOCK:** An area of Trust owned land including the towpath and lockside is shown as taken by HS2 during construction. The Trust objects to the parcel of land ref: 1017 on Plan Sheet 1-39 (also shown on CFA 3Mapbook CT-05-004b H7) being included in the Limits of Land to be Acquired or Used (LLAU). If taken, this would render the towpath impassable and the lock	The Trust will require HS2 not to take this land as it will render the lock inoperable.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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				inoperable. The Trust cannot see a good reason why this land should be needed. It is also noted that this parcel of land is not subject to the safeguarding direction.		
				Effect of construction traffic on the Trust bridges - we are concerned about the adverse effect of construction traffic on two Trust owned bridges - Bridge 26A, Camden St Bridge and Bridge 27, Camden Road North Bridge. These are shown as "Construction traffic routes" on drawing CT-005-003. These bridges are in fair condition and are likely to deteriorate due to HS2 construction traffic loadings. We would like construction traffic diverted away from these bridges (preferred) or other measures adopted by HS2 such as repairs/strengthening in advance of construction to our satisfaction.	We would like construction traffic diverted away from these bridges (preferred) or other measures adopted by HS2 such as repairs/strengthening to our satisfaction in advance of construction.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
3		Regent's	1.850	**ENGINEERING INFRASTRUCTURE** **REGENT'S CANAL CROSSING NEAR EUSTON:** Effect of tunnel construction - Settlement of canal towpath above HS2 tunnels to be assessed and mitigation measures implemented as required. The Trust expects HS2 to use best practice approach to this assessment. Tunnel invert is approx. 29m below ground level and in excess of 20mm of	The Trust will require measures to mitigate the additional flood risk that this will cause. This may include the raising of towpaths and waterway walls in the area in advance of construction.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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				settlement is predicted at canal level.		
				The canal is described as the "Grand Union Canal". This is incorrect as it is the "Regent's Canal".	Amend drawings and text accordingly.	Minor issue, no accommodation required by the Trust or canal users.
4	Kilburn to Old Oak	Paddington Arm	8.300	**ENGINEERING INFRASTRUCTURE** **SCRUBS LANE TO OLD OAK COMMON:** Existing Network Rail (NWR) Infrastructure – the Trust is concerned about effects of construction on the NWR owned retaining wall separating the canal from the railway CFA Report 4 implies that this wall is the Trust owned (Ref 13.1.7, 13.3.27 and 13.4.26). It is owned by NWR. Effect of tunnel construction - Settlement of canal towpath above HS2 tunnels to be assessed and mitigation measures implemented as required. The Trust expects HS2 to use best practice approach to this assessment. CFA 4 Report Cl 13.4.12 states effect of tunnel construction on Retaining Wall is negligible. The Trust needs to review the relevant report before commenting further.	The Trust expects HS2 to use best practice approach to this assessment. The Trust will require measures to mitigate the additional flood risk that this will cause. This may include the raising of towpaths and waterway walls in the area in advance of construction.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				Construction boundary as shown on drawing CT-05-007 includes approx. 500m of canal.	Construction/ LLAU boundary should be revised to keep it clear	Major issue with possibility of

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				This is not acceptable to the Trust as we need to retain full control and operation of our network during the project. Approx. 450m of the canal and towpath immediately West of the railway bridge beside Scrubs Lane is shown within the LLAU limit (see Plans Volume 1, Sheet 1-15 and CFA 4 Mapbook CT-05-008 B6, C6 and D6). This is not acceptable to the Trust as the canal and mooring site are required for the operation of the canal network. Approx. 100m of towpath shown within LLAU on Plans Volume 1 Sheet 1-46 - not acceptable to the Trust.	of Trust property.	unacceptable impacts on infrastructure / environment / heritage / users.
				Construction compounds - Two conveyor crossings and one road bridge will span the canal for c10 years at the Atlas Rd Construction site. Due to the length of time they will be in place, the Trust will expect them to be of high design quality. The design requirements for these structures will be the same as the Trust has specified for permanent crossings. The compounds at Atlas Rd and Willesden Euro terminal will be either side of or adjacent to the canal. The Trust expects HS2 to ensure that the hoarding / fencing to these sites does not create a tunnel effect which could promote anti-social behaviour. The Trust would like to talk to HS2 Ltd about improving towpath condition and connectivity to these sites so that the towpath could be promoted as a route to	See above	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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				work for personnel working on the project. The Hybrid Bill/Final Environmental Statement (ES) have also identified the following four crossings over the canal over a c300m length as follows: 1. Work No 1/47, Plans Volume 1 Sheet 1-46. Sections Sheet 4-65. Temp Conveyor Bridge up to 24m wide. Conveyor level approx. 11.2m above towpath level; 2. Work No. 1/48, Plans Volume 1 Sheet 1-46, Sections Sheet 4-65. Temporary Bridge up to 24m wide. Bridge soffit 5.00m above canal water level; 3. Work No. 1/51, Plans Volume 1 Sheet 1-46, Sections Sheet 4-67.Temp Conveyor bridge up to 50m wide when combined with Work No. 1/46. Conveyor level 12.83m above canal bed level; 4. Work No. 1/46, Plans Volume 1 Sheet 1-46, Sections Sheet 4-67.Temporary Conveyor Bridge up to 50m wide when combined with Work No. 1.51. Conveyor level 13.00m above canal water level. The Trust is concerned about the adverse effect of these especially when combined with the site hoardings that will be used around the construction sites. The Trust would also welcome clarification regarding the potential impact of the Victoria Road crossover box compound on the canal.		

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				A c650m length of towpath in the Atlas Road area is shown within the Land Potentially Required During Construction (LPRDC) - ref CFA4 Mapbook CT-05-009b-R1, G10, F9, F8, F7, E7 & E6. The Trust objects to this being taken by HS2 Ltd as there is no reason why it is required. CFA 4 Report Cl 5.4.19 confirms no permanent or temporary re-routeing of PROWs affecting the canal. Bridge 9D GP-015-011 (Not owned by the Trust) crossing the canal shown within LLAU on Plans Volume 1 Sheet 1-46 – the Trust need to be sure that the navigation and towpath are not restricted by these works. See also CFA 4 Mapbook CT-05-009b E6.		
				<u>WASTE AND HAZARDOUS MATERIAL USE</u> **Spoil Transport** - We need to know more about arrangement for spoil and use of Car Giant site. There will obviously be interaction between the Car Giant site and the tunnelling with the canal running between them.	HS2 to supply information.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
5	Northolt	Paddington Arm	17.100	**<u>ENGINEERING INFRASTRUCTURE</u>** **Effect of tunnel construction** - Settlement of canal towpath above HS2 tunnels to be assessed and mitigation measures implemented as required.	The Trust expects HS2 to use best practice approach to this assessment. The Trust will require measures to mitigate the additional flood risk that this will cause. This may include the raising of towpaths and waterway walls in the area in	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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					advance of construction.	
				Effect of Waxlow Road Construction Traffic on the Brent Feeder. The Trust is concerned that the construction traffic using Waxlow Road (Ref CFA 5 Mapbook, Plan CT-05-010b-R1) to access the F Sidings Satellite Compound during the nine year construction period (Ref CFA 5 Report, Table 11) may damage the culverted Brent Feeder running under the road. The feeder is a strategic asset supplying water from Brent Reservoir to the Canal.	HS2 to assess the effect of construction traffic on the feeder culvert and undertake repairs/strengthening as necessary.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				Land on the offside of the canal either side of the existing railway bridge crossing the canal is part of the LLAU (Land Parcel 867 on Hybrid Bill Plan 1-26). The Trust is concerned about the planned use of this land and the possible adverse effect on the canal. CFA 5 Mapbook Plan LV-04-017 shows proposed tree planting.	HS2 to clarify planned use of land and mitigation measures proposed	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
7	Colne Valley	Grand Union	26.900	**ENGINEERING INFRASTRUCTURE** **COLNE VALLEY VIADUCT:** **Pier Foundations** - The pier foundations adjacent to the canal may adversely affect the canal and towpath - these piers should be moved away from the canal or suitable measures incorporated by HS2 Ltd to ensure the stability of the canal is unaffected by pier construction (as part of the standard "no construction on the Trust property" position). **Pier construction** - no details of the form of the piers has been provided. The Trust needs to see this detail to be able to comment fully on	Design / mitigation measures required by HS2.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

				the viaduct. **Elevations -** no elevation details for the spans over the canal have been provided. The Trust needs to see this detail to be able to comment fully on the viaduct in accordance with the principles established in the Knight Architects' Canal & River Trust HS2 Design Principles Document. **Freight potential -** there is the potential to use waterway for freight. The Trust would like to discuss this in more detail with HS2 Ltd in due course. 'Sections' Sheet 5-01 shows the rail level 16.02m above the canal bed level, plus piers positioned either side of the waterway. This is acceptable to the Trust and we'll require a minimum air draft of 10.00m. The viaduct over the canal will be constructed by the insitu (CFA Report 7 Cl 3.2.23) method and we are concerned about the effect of the temporary falsework on the canal, its operation, environment and customers. The Trust welcomes the confirmation that there will be no piers situated in the canal - CFA 7 Report, 7.4.1.		
				Construction boundaries (assumed to be dented by the red dashed lines on drawings CT-05-019 & CT-05-019-003) show significant lengths of the canal taken by HS2 Ltd during construction. This is not acceptable to the Trust as we need to retain full control and	HS2 Ltd to revise construction boundaries.	Major issue with possibility of unacceptable impacts on infrastructure / environment /

				operation of our network during the project The following packages of land are shown as part of the LLAU: a) towpath south of viaduct site - Sheet 2-01; b) towpath and canal north of existing railway viaduct - sheet 2-01. This is to facilitate Work Item 2/3 - temporary bridge over the canal; c) towpath and canal south of existing railway viaduct - sheet 2-02. This is to facilitate Work Item 2/4 - temporary bridge over the canal; and d) towpath south of Moorhall Road – approx. 10m length - sheet 2-06 In total over 1km of the canal falls within the LLAU - this is unacceptable to the Trust. **Mapbook 7 CT-05-20** – the Trust needs to understand why there is what appears to be an access route as part of the LPRDC intersecting the canal in H5. **Mapbook 7 CT-05-19b-L1** – the Trust needs to understand use of land to the east of the canal that is within the LPRDC as there could be adverse effects on the low embankments retaining the canal. **Mapbook 7 CT-05-020** - Access route shown in E1, F2 & F3 - the Trust needs to understand use of land to the west of the canal that is within the LPRDC as there could be adverse effects on the low embankments retaining the canal.		heritage / users.

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				General - the LLAU and LPRDC boundaries differ in this area. HS2 to clarify this.		
				Construction of Utility Diversions **Three pylons** are due to be demolished adjacent to the canal (Ref CFA 7 Report 2.3.40). Demolition works to be approved by the Trust to ensure our assets, staff and customers are protected. **Temporary Bridges Ref Work 2/3 and 2/4** – the Trust objects to these bridges on the grounds that they do not provide satisfactory clearance to permit craft and pedestrians to pass underneath. Work 2/3 on Plan 5-73 gives no information on the bridge to canal clearance. Work 2/4 on Plan 5-73 shows the bridge being installed at towpath level. This will block the canal. See Routewide Comments on the Trust's **design standards for temporary crossings**. **Mapbook 7 - CT-05-19b-L1 - New pylon** shown to be constructed adjacent to the canal (D6). HS2 must demonstrate to the Trust's satisfaction that there will be no adverse effect on the structural integrity of the canal during construction and operation. **Mapbook 7 - CT-06-019b-L1** – the Trust to specify minimum clearances for overhead cable crossings.	HS2 to revise construction boundaries.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.

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				BUILT HERITAGE See Routewide comment on general impact of HS2 on the heritage value of the waterways through visual intrusion and noise. In the 1950's, up to 50 boats were sunk in 'Hawtrey's Pit' part of Harefield Moor, to the East of the Grand Union Canal and south of Moorhall Rd in South Harefield (Denham area) (Grid references are TQ 05217 88596 and 505217/188596). Some of these boats are of a unique type and are now extinct and are therefore of historic importance and should be recorded and interpreted. English Heritage has received an application to add the site to the Schedule of Monuments. English Heritage is currently carrying out an assessment as to whether the site is of national importance before making a recommendation to the Secretary of State as to whether the site should be added to the Schedule of Monuments.	HS2 Ltd to investigate further.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				BIODIVERSITY Will removal of trees be required under the viaduct? **Mapbook 7, CT-06-019b –** the Trust to specify planting shown adjacent to the canal (A5 and A6) **Mapbook 7, CT-06-020 –** the Trust to specify planting shown adjacent to the canal (I5 and I6).	Timing / scale of clearance needs to be addressed in construction phase. Mitigation planting / habitat creation required.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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				NUISANCE Noise from viaduct will adversely affect two mooring sites - Harefield Marina (>65 dB) and Horse & Barge visitor moorings (50-55 dB). In addition, approx. 100m of the canal will be subject to >65dB (day) and >55dB (night). The Trust objects to this on the grounds that the canal is a residential area used by continuous cruisers as their principal residence. The Trust requests clarification of the noise mitigation shown to the south elevation of the Colne Valley Viaduct (CFA 7 Mapbook, SV-05-010) to the west of the canal.	Mitigation measures will be required to treat these sites as if they were residential properties.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				BRIDGE DESIGN/LANDSCAPE The key is to focus on making the pier/span as pleasing as possible. The effect on the local environment is very significant indeed. See Routewide comments - views and shading will be affected by construction and planting.	HS2 Ltd to take account of these comments in the design. The crossing to be designed and approved by the Trust in accordance with the principles set out in Routewide comments and in the "Knight Architects' Canal & River Trust HS2 Design Principles Document". The closed nature of the canal corridor here suggests that the crossing supports can be pulled back from the canal corridor and obscured by the tree line. A simple framed bridge crossing can	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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					then be formed. This arrangement will minimise the visual intervention in the landscape, to simply the bridge span. Mitigating woodland planting to supplement the exiting corridor and replace woodland lost through construction works will be critical.	
10	Dunsmore	Wendover Arm	54.000	**ENGINEERING INFRASTRUCTURE** No direct impact during construction or operation.	None.	Minor issue, no accommodation required by the Trust or canal users.
				BIODIVERSITY, WATER RESOURCE & QUALITY Potential impact on a tributary feeding Weston Turville Reservoir SSSI.	HS2 to confirm that water resource will be balanced to protect the SSSI.	
15	Greatworth	Boddington Feeder	114.800	**ENGINEERING INFRASTRUCTURE** **BODDINGTON FEEDER -** **General** – the Trust has been supplied with drawings showing the proposed feeder construction in this area - C222-ATK-CV-DGA-020-215700 P02 & C222-ATK-CV-DPL-020-000014 P05 and cannot comment in detail until we receive General Arrangement drawings, etc. The Trust needs to review the cross-section to understand how the walkway fits in. Note that the walkway may need a handrail. **Dimensions** - RC culvert 3.5m high - must have pedestrian access through the culvert to	See notes above.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

				facilitate inspection of the feeder. **Alignment** - Culvert is 155m long – note that alignment needs to be straight. The Trust would support the possibility of "cutting the corner" to create a shorter culvert. **Security** - Culvert will need to be secure at each end. A trash screen at the inlet end plus security grille at outlet end will probably be required. **Third Parties affected** - Thames Water (TW) need to be on list of consultees as TW discharge into the feeder upstream of this site. **Operational needs during construction** - Feeder will need to be operational during construction of culvert. The Trust will confirm flows to be accommodated. **Temporary and Permanent Land Take** - drawing CT-05-078 shows a significant length of the canal feeder taken by HS2 Ltd during construction. The Trust will need access to this feeder at all times for maintenance and inspection purposes during construction. **Operational Phase** – The Trust will expect HS2 Ltd to maintain the feeder within the HS2 boundary to a standard agreed by the Trust and HS2 Ltd. The Trust will require maintenance access to the feeder either side of HS2. The requirements for this are as follows - an access track of minimum with 4m, secured		

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				at points of entry from the public highway. The track should be suitable of accommodating a 13 tonne tracked excavator or an 18 tonne wheeled vehicle. To the north of HS2, the track should extend from Boddington Road to the feeder culvert entrance. South of HS2, the track should run from the feeder culvert to the point where the feeder passes under an unclassified road near Claydon Hill Farm.		
				Boddington Feeder - **CFA 15 Mapbook** **CT-05-077** - shows the edge of the LPRDC running along the bank of the feeder. The feeder channel needs to be protected from the possible adverse effects of construction activities within the LPRDC; **CT-06-077** - three balancing ponds are shown discharging into the feeder - see our Routewide comments on balancing ponds; **CT-05-078** - LPRDC includes c200m of the feeder (Ref F4 & G4). The Trust objects to this land being within the LPRDC as there does not seem to be any need for it to be used by HS2. Any works undertaken to the bridge over the feeder carrying the existing access to Cedars Farm will need the consent of the Trust. The LPRDC contains c600m of the feeder in the vicinity of the existing nursery (Ref F5, E6, E7 and F7). The feeder is an operational asset and its function must be preserved during the construction phase. The Trust will provide a	HS2 Ltd to address the Trust's concerns regarding land take and feeder operation & maintenance.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.

				performance specification for this feeder on request. Temporary material stockpiles are shown in the vicinity of the feeder (Ref E7, F7 and F9). The feeder must be protected from the risk of contamination / siltation from run off from these stockpiles. A new crossing of the feeder is forming part of the proposed access road to Cedars Farm (Ref F9). This new crossing along with the maintenance and inspection requirements will require the approval of the Trust. **CT-06-078** - two balancing ponds are shown discharging into the feeder - see our Routewide comments on balancing ponds. **Hybrid Bill Comments** Plans sheet 2-87 - land parcel refs 29 and 39: the Trust objects to these being within the LLAU as there is no need for HS2 Ltd to take these parcels to construct the railway. Plans sheet 2-88 - land parcel ref 53a: the Trust objects to this being within the LLAU as there is no need for HS2 to take this parcel to construct the railway.		
				WATERWAY OPERATION AND CUSTOMER USE / ACCESS Maintenance - Culvert will silt up if put in to existing levels.	Need to agree a maintenance plan with HS2 to avoid culvert silting up.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.

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				BIODIVERSITY Diversion of part of Boddington Feeder will result in loss of some valuable open water habitat	This needs to be compensated for / reinstated in the new channel diversion or through enhancements of other parts of the Feeder. New culvert needs to ensure that it does not create a barrier to fish passage etc. that could be considered 'deterioration' under WFD.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				WATER QUALITY & RESOURCE Maintenance of water supply in Feeder throughout construction.	Diversion of the Feeder and new channel construction needs to guarantee maintenance of water supply at all times to current levels or better. Principles are acceptable at this stage, some further details to be resolved at a later stage.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
16	Ladbroke and Southam	Oxford	118.600	**ENGINEERING INFRASTRUCTURE** **WORMLEIGHTON** By the bend in the canal near Footpath SM116a Underbridge: The Trust is concerned about the proximity of HS2 structures. The Trust offers no right of support to HS2 structures and access roads which are in close proximity. Also, the Trust will require these waterway walls to be assessed and repaired/replaced as necessary. We suggest re-piling the offside wall with soft bank mitigation as the offside wall is potentially unstable and life expired. **Effect of HS2 structures** - HS2 embankment is c 8m high adjacent canal- the Trust will need	See notes above.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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				to see more detail of this area and the likely effect on the canal. **Land Take** - construction boundary in the vicinity of the Oxford Canal Underbridge and Footpath SM116a Underbridge show HS2 taking lengths of the canal. This is not acceptable to the Trust as we need to maintain operation of the canal during the construction phase. **Operational Access** - Vehicle access to offside required by the Trust. **Pier Foundations** - Pier foundations on the Trust's property and very close to edge of canal. Need to be relocated away from the Trust's property. **CFA 16 Report Fig 5** - please clarify what is meant by the "Oxford Canal Culvert" - this does not appear on any drawings in the CFA Mapbook. **CFA 16 Mapbook:** **CT-05-80** - Footpath SM116, bridleway and maintenance access - these are shown being reconstructed on either side of the Trust's Bridge 128. This bridge is in poor condition and subject to a 10 tonne weight restriction. The Trust will require the access route and bridleway to be reconstructed over the bridge, including any structural works necessary to the bridge. The Trust requests a right of access (pedestrians and vehicles) along the proposed		

				access route from Wormleighton Road (Ref I9) to the Oxford Canal Viaduct (Ref A4). The Trust is concerned about the potential adverse effect on the canal of construction traffic using the proposed Temporary Construction Access (Ref F1, F2). Measures to mitigate these effects are to be approved by the Trust and may include structural works to the canal, banks, waterway walls and lining to ensure it can continue to operate as normal during the construction phase. **CT-05-080-R1** - The Trust is concerned about the potential adverse effect on the canal of construction traffic using the proposed Temporary Construction Access (Ref F7,F8,F9 and F10). Measures to mitigate these effects are to be approved by the Trust and may include structural works to the canal, banks, waterway walls and lining to ensure it can continue to operate as normal during the construction phase. CT-06-080 - balancing pond shown discharging into the canal. See our routewide comments on balancing ponds. **Hybrid Bill** **Plans Sheet 2-90 - Work No 2/136** - Temporary Bridge over the Canal - The Trust is very concerned about the adverse effect of this structure on the canal and existing bridge at this location and objects to it. It is suggested that the existing Trust owned bridge is up-graded by HS2 to allow it to take construction traffic loadings and hence remove the need for		

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				the temporary bridge (plus see comments above). Should a temporary bridge be installed then it shall be constructed and maintained in accordance with the Trust's requirements for temporary crossings. **Sections Sheet 5-91** - no information given on the level of the underside of the temporary bridge relative to the canal. The Trust will require a minimum of 3m air draft and 2.75 towpath headroom at this location. **Plans Sheet 2-90** - Work No. 2/133 Railway, Sections Sheet 5-78 - shows rail level 6.97m above canal bed level plus a comment "Span 23.6m, Height 2.75m". This needs to be clarified with respect to the Trust's design requirements for permanent bridges.		
				Design of Oxford Canal Viaduct.	HS2 to design in accordance with the Trust's requirements set out in the "Knight Architects' Canal & River Trust HS2 Design Principles Document". See also detailed landscape/urban design comments below.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				UTILITIES - Discharges and other wayleaves New utilities crossings proposed.	There are two utility crossings of the canal near footpath SM116A Underbridge on drawing CT-05-080. We need more information on these - type, temporary / permanent / underground or overground, etc. and crossings will need to be controlled / approved	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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					by our Code of Practice and commercial agreements required.	
				BIODIVERSITY Wormleighton by bend - Mitigation area - What is planned for remaining strip of land between canal and new HS2 mitigation area? If left unmanaged, this could affect the canal. Wormleighton Bridge: Environmental - loss of soft bank habitat due to shading if not direct disturbance.	1) suggest extending this area to the canal edge. 2) Mitigation required to address loss of soft bank in vicinity of the structure.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				WATER QUALITY & RESOURCE Balancing pond shown discharging into to canal by Oxford Canal Underbridge, plus watercourse shown discharging into canal near Footpath SM116a Underbridge - see routewide comments on pollution control and resource.		Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				NUISANCE **Footpath SM 116a Underbridge** - adjacent to the embankment where it is closest to the Oxford Canal (the Wormleighton Loop) should have improved noise barriers fitted to the trackside parapets to minimise noise, or other engineering mitigation deployed, as the current proposals will expose the canal to the 60-65 dB contour.	HS2 to provide improved noise mitigation. Same comment relates to the Oxford Canal Underbridge where the current proposals will see the canal exposed to >70 dB. See also routewide comment.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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				BRIDGE DESIGN/LANDSCAPE This is a good example of where fringe planting in advance would screen the construction area and ensure good screening of the new structures from before operation begins.	HS2 to take account of this in the design.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				Oxford Canal Viaduct to be designed and approved by the Trust in accordance with the principles set out in the "Knight Architects' Canal & River Trust HS2 Design Principles Document". The open nature of the canal corridor here suggests that an open canal crossing approach is appropriate. This will require Canal Appropriate Piers to the north and south of the canal with two additional standard HS2 piers to the north of the canal to extend the viaduct in accordance with the Trust's Design Principles, to maintain openness. The hybrid bill proposals have added an access road to the north of the Canal. This road has the potential to adversely affect the quality of the waterside environment if not properly detailed and managed. The proposed road should pass behind (north of the) the previously described waterway specific pier and any associated road furniture must relate to the character and quality of the waterway corridor and relate to the "Knight Architects' Canal & River Trust HS2 Design Principles Document". The Trust will work with the HS2 design team to develop the detail of the appropriate crossing		

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				design. **Supplementary Landscape Works** The hedgerow along the towing path is critical to the local landscape and mediation of the visual impact of the HS2 crossing in the landscape from the towing path. The towing path hedgerow there requires short term management (laying) to ensure longevity. Hedgerow reinstatement to the undertaken to restore towing path hedge, further planting required to mediate the impact of the proposed HS2 works Supplementary planting to the hedgerow as appropriate. To the north of the canal additional woodland copse/block planting is required along the embankment to reduce the engineering impact of the structure in the landscape. Underpass accommodating footpath SM116a realignment adjacent to the elbow canal, in addition to presenting potential engineering concerns also presents aesthetic concerns and needs to be designed in accordance with the "Knight Architects' Canal & River Trust HS2 Design Principles Document" as appropriate, and to the approval of the Trust.		
17	Offchurch	Grand Union	129.600	**ENGINEERING INFRASTRUCTURE**	See notes above.	Significant issue

	and Cubbington			**Longhole Viaduct** **Mapbook CT-05-088b** - Shows temporary material stockpiles adjacent to canal (Ref I4, I5 and G7). The canal must be protected from the risk of contamination / siltation from run off from these stockpiles. Approx. 200m of canal and towpath shown within the LPRDC. This is not acceptable to the Trust as the canal and towpath are operational assets and must remain open throughout the construction phase. **CT-05-088b** - the Trust is concerned about the potential adverse effects on its Longhole Bridge which will be adjacent to the Longhole Viaduct / Ridgeway Lane construction site. The Trust will require HS2 Ltd to undertake any repairs necessary to the bridge to allow it to continue to function. **CT-06-088b** - Ridgeway Lane from Welsh Road to Longhole Bridge (Ref F4, F5, G5 and G6). The Trust currently has access for canal maintenance purposes along the lane and expects to have the same rights along it following reconstruction. The Trust will also require preservation of the existing maintenance access to the canal off Ridgeway Lane, adjacent to its Longhole Bridge. **CT-06-88b** - this shows a balancing pond discharging into the canal. See our routewide notes on balancing ponds.		with impact on waterway uses or infrastructure / environment / heritage.

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				Hybrid Bill **Plans Sheet 2-102 - Work 2/146, Section Sheet 5-82** - shows rail level 11.68m above canal bed with the comment "Span 31.75m Height 4.95m". This needs to be clarified with reference to the Trust's design requirements for crossings.		
				WATERWAY OPERATION AND CUSTOMER USE / ACCESS Maintenance Access.	The Trust would like to discuss possibility of shared use of access tracks to Balancing Ponds. Issue is now loss of access because lane to Longhole Bridge being severed.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				UTILITIES - Discharges and other wayleaves Buried Services - Fibre optic cables buried below the towpath - depth unknown but could be shallow.	The fibre optic cables must be protected.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				BIODIVERSITY The Trust is concerned about the loss of the existing hedges and possible loss of soft bank habitat on offside due to shading, if not direct disturbance.	Hedges and soft bank to be retained. If loss due to shading or other indirect impact, mitigation works required in vicinity of the crossing.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				WATER QUALITY & RESOURCE Balancing Ponds – two balancing ponds to be assessed – see routewide comments. Also toe drain diverted direct into the Canal will be subject to same consents and controls – why does this not have a balancing pond?	HS2 Ltd to address concerns.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.

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				NUISANCE See Routewide comments - Canal here falls into the 65-70 dB sound contours - not acceptable to the Trust. Further mitigation measures required.	HS2 Ltd to provide improved noise mitigation.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				<u>BRIDGE DESIGN/LANDSCAPE</u> **Longhole Viaduct** The crossing should be designed and approved by the Trust in accordance with the principles set out in the "Knight Architects' Canal & River Trust HS2 Design Principles Document". The canal corridor here in enclosed to the south of the canal with proposed supplementary planting as part of the HS2 works to the north of the canal. This suggests that a close canal crossing approach would be appropriate (See the "Knight Architects' Canal & River Trust HS2 Design Principles Document") this would require the formation of a separate underpass for the realigned Ridgeway Lane. If, however, as a result of the realignment of Ridgeway Lane to the North, it is impossible to form a "close" canal crossing here with separate highway underpass, then the Trust may consider a revised arrangement of Canal Appropriate Piers to be set back from the visual corridor of the canal, to the north and south of the canal, so that only the bridge deck is visible upon approach along the canal.		

				This arrangement would require a waterway specific pier and two additional HS2 Piers on both sides of the canal in accordance with the principles for an "open" crossing as described in "Knight Architects' Canal & River Trust HS2 Design Principles Document". **Supplementary Landscape Works** The Canal & River Trust will work with the HS2 design team to develop the detail of the appropriate crossing design. In order to maintain the enclosed visual corridor approaching the crossing at Longhole, on-going woodland management and planting is required to maintain this woodland edge. Any loss of woodland during construction will need to be replaced with a locally appropriate woodland mix, to be agreed with Canal & River Trust's Ecologists. The hedgerow along the towing path is critical to the local landscape and mediation of the visual impact of the HS2 crossing in the landscape from the towing path. The towing path hedgerow requires short term management (laying) to ensure longevity. Supplementary hedgerow planting is required to screen the realigned Ridgeway Lane, to be specified in agreement with the Trust's Ecologists to ensure maximum benefit to the biodiversity of the wider canal corridor.		

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				To the north of the canal additional woodland copse/block planting is required immediately between the canal and viaduct.		
20	Curdworth	Birmingham & Fazeley Canal	167.700	**ENGINEERING INFRASTRUCTURE** **BIRMINGHAM AND FAZELEY CANAL VIADUCT AREA** **Marston Lane Bridge** - this is not suitable for any construction traffic and will not be available for use by HS2 or its contractors. **Culvert on Offside** - There is a culvert running parallel to the canal edge on the offside that may be affected by pier pile cap construction. **Construction of pile caps could adversely affect the cana**l - require HS2 to move all permanent works off the Trust's land- e.g. by relocating pile caps further away from the canal. Offside pier construction may compromise canal wall – suggest work is carried out during a canal stoppage to repair/strengthen offside wall. Excavation will be required at the toe of embankments that support the canal on the offside - needs to be planned/designed carefully. **Cross section** - We'd like to look at a cross-section through the bridge. **Maintenance Access** - How will bridge be accessed for maintenance and inspection? –	See notes above.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

				We suggest that a dedicated access road is provided. **Nearby Lock and Weir** - HS2 embankment construction - surcharges, vibration, etc, may adversely affect adjacent weir/lock **Mapbook** **CT-05-119** - shows c500m of canal and towpath within the LPRDC. This is unacceptable to the Trust as the canal is an operational asset and must remain open during the construction phase. There are two construction compounds (Ref A6 and C6) adjacent to the canal. The Trust is concerned about the possible adverse effect of these on the canal - pollution, noise, dust, etc and requests that they are moved further away from the canal. The fuel pipe diversion works (Ref C7, C8, C9 and D9) may affect the stability of the canal as the route passes under the canal by Lock 3 and finishes adjacent to the canal. This work will need to be approved by the Trust. The land take in C7, D8, D9, E9, E10 and F10 appears to be for a construction traffic route although this is not stated on the drawing. The Trust is concerned that traffic using this route may cause damage to the canal and towpath. The construction and operation of this route will need to be approved by the Trust for the elements that could affect the canal. **CT-05-113** - The west bank of the canal may		

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				need strengthening to accommodate loadings from the HS2 embankment; and **CT-06-113** - there is a balancing pond shown discharging into the canal. See our Routewide comments on balancing ponds. **Hybrid Bill** **Plans Sheet 3-43 - Fuel Pipeline diversions - Section Sheet 6-79** - shows the pipeline located 4.64m below towpath level. This is unacceptable to the Trust due to the shallow nature of the crossing. The Trust will specify the maximum level for this crossing. **Plans sheet 3-43 - Work No. 3/36 - Railway, Section Sheet 6-26** - shows the viaduct with span 65m and height 7.45m, 10.59m rail level to towpath level. This crossing is to be designed in accordance with the Trust's design standards for crossings.		
				WATERWAY OPERATION AND CUSTOMER USE / ACCESS Maintenance Access	The Trust will require uninterrupted access to Marston Lane Bridge and the adjacent buildings and storage areas.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				UTILITIES - Discharges and other wayleaves Proposed power line crossing - more details required.	New easements will need to be controlled / approved by our Code of Practice and subject to commercial agreements.	Major issue with possibility of unacceptable impacts on infrastructure /

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						environment / heritage / users.
				BIODIVERSITY Known Badger sett north of lock 3 Records of water voles in this area - could affect towpath/waterway wall upgrade works.	Presence of protected species to be taken into account in construction phase.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				WATER QUALITY & RESOURCE Balancing pond - Concerns from waterway team over contaminated water plus effect of additional water from HS2 on overflow from Kingsbury Water Park. Pond will discharge into a short pound meaning that works to upgrade the lock bypass weirs may be required. See Routewide comments.	HS2 Ltd to address concerns.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				NUISANCE Canal here falls into the 65-70 dB sound contour - not acceptable to the Trust. Further mitigation measures required. See Routewide comments.	HS2 to provide improved noise mitigation.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				<u>BRIDGE DESIGN/LANDSCAPE</u> The crossing to be designed and approved by the Trust in accordance with the principles set out in and in the "Knight Architects' Canal & River The Trust HS2 Design Principles document" The open nature of the canal corridor at Curdworth suggests that an open canal crossing approach is appropriate. This will require Canal Appropriate Piers to the north and south of the canal with two additional		

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				standard HS2 piers to the north and south of the canal to extend the viaduct in accordance with the Trust Design Principles, to maintain openness. The highly skewed nature of the crossing exacerbates those issues of concern identified by the Trust, therefore the quality of the detailing and design needs to mitigate this. The Trust will be seeking the depth of the Bridge Beam (5.3m+) to be reduced, this will include an assessment of the suitability of the structural support being provided above the rail deck (bowstring or similar), to reduce size of beam. The Trust will work with the HS2 design team to develop the detail of the appropriate crossing design. Given the scale of the span and the highly visible nature of the crossing, the Trust believes that the design of this crossing should be undertaken by the HS2 lead bridge architect as a special project.		
22	Whittington to Handsacre	Coventry/ Wyrley & Essington	183.400	**ENGINEERING INFRASTRUCTURE** **Cappers Lane and Streethay Area** **Mapbook CT-05-124** - shows c50m of the canal's north bank and towpath falling within the LPRDC. This is unacceptable to the Trust as the canal is an operational asset and must remain open during the construction phase. In addition, this area is used for moorings by the Lichfield Cruising Club.	None.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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				CT-05-125 - temporary bridge over the canal (Ref C4): this will need to be designed, in accordance with the Trust's design requirements for temporary crossings. Approx. 300m (over three locations) of the canal and towpath is shown within the LPRDC. This is unacceptable to the Trust as the canal is an operational asset and must remain open throughout the construction phase. Approx. 1.3km of the canal is bordered by a temporary material stockpile area to the West. The Trust is concerned about the potential adverse effects of this on the canal - noise, dust, contaminated run off, siltation, visual impact, etc. The Trust expects that the boundary of the stockpile area abutting the canal will be suitably treated to mitigate these effects. In addition, the Trust will expect additional mitigation works in the vicinity of Kings Orchard Marina. **Bridge 83 Plough Bridge** (aka Huddlesford Road Bridge) in square I1, although not shown as a construction traffic route, is likely to be used by such traffic. This bridge is in fair condition and has a vehicle weight limit of 7.5 tonnes. It is unsuitable for any construction traffic and we request that HS2 takes suitable measures to ensure that no construction traffic uses this bridge. **CT-05-125-R1** - this shows a construction traffic route passing over the Trust owned Brookhay Bridge. This bridge is in fair condition and carries a 13 tonne weight restriction. It is		

				unsuitable for use by construction traffic and the Trust objects to it forming part of a construction traffic route. One solution would be to upgrade the bridge to allow it to take construction traffic or provide a temporary bridge over the canal. **CT-05-125** - there are two utility crossings (Ref F4, G3). The Trust will require these to run under the canal. **CT-06-124** - there is one balancing pond and one new watercourse shown discharging into the canal. See our routewide comments on balancing ponds. **CT-06-125** - the flow from the proposed balancing pond in G6 will flow through a Trust owned culvert in G3. This culvert is in poor condition and cannot accommodate any additional flow. The Trust will require HS2 Ltd to repair this culvert to allow it to accommodate any changes in the current flow regime.		
		Trent & Mersey	188.000	**Fradley Junction Area** **General** - The Trust objects to the proposed HS2 alignment in this area due to its adverse effect on the canal. The Trust requests that the route is realigned to run south of the canal in accordance with "HS2 - Fradley Junction Area - Alternative Alignment Study" report commissioned jointly by the Trust and the Inland Waterways Association. The report is appended to this response.	HS2 to address the Trust's concerns.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.

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				Mapbook **CT-05-127** - c250m of canal and 850m of towpath shown within the LPRDC. This is unacceptable to the Trust as the canal is an operational asset and must remain open at all times during the construction phase. There are a number of material stockpiles located near the canal (Ref C6, D6, A6 and A7) and the Trust is concerned about the potential adverse effect of these on the canal. **CT-06-127** - There are no noise mitigation measures shown on the drawing. This is unacceptable to the Trust bearing in mind the increase in noise levels shown on SV-05-63 with over 250m of canal experiencing >55dB (night) and >65dB (day) due to HS2. The Trust will require suitable noise mitigation based on the assumption that the canal is a residential area. The Lyntus Autotransformer station should be repositioned further away from the canal and suitably screened to mitigate the adverse visual and noise effects of this building. **CT-05-128** - The Trent & Mersey Canal West Viaducts (Southwest) Satellite compound in I6 - the Trust requests that this is relocated further away from the canal and Woodend Lock to reduce the potential adverse effects of noise, dust, vibration and light pollution. **CT-06-128** - balancing pond shown discharging into the canal. See our Routewide comments		

				on balancing ponds. There is a mooring site in H5 that will be lost when the Trent & Mersey Canal West Viaducts are constructed. The Trust will expect HS2 to provide a suitable replacement site and secure the necessary permits and consents for the replacement site to contain residential mooring berths. **CT-05-129 - R1** - The LPRDC boundary for the utility works in H7 are shown encroaching onto the Trust's land and may affect the integrity of the canal and towpath. This is unacceptable to the Trust as the LPRDC boundary can be easily realigned to avoid the Trust's property while still allowing the utility works to be undertaken. **Hybrid Bill** **Plans Sheet 3-74.** This shows sections of the towpath within the LLAU. This is unacceptable to the Trust as the towpath is not required to allow HS2 to be built. **Work 3/38 - Railway, Work 3/94 and Work 3/93 - bridge crossings** to be designed in accordance with the Trust's design requirements for crossings. **Work 3/98 - temporary bridge** to be designed in accordance with the Trust's requirements for temporary crossings. **Plans Sheet 3-75** - c150m of canal shown within the LLAU. This is not acceptable to the Trust as the canal is an operational asset and		

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				is to remain open during the construction phase. **Work 3/99 - temporary bridge** - to be designed in accordance with the Trust's requirements for temporary crossings. **Plans Sheet 3/78** - LLAU encroaches onto the Trust's land near Kings Bromley Marina. This is unacceptable to the Trust as the LLAU boundary can be easily realigned to avoid the Trust property while still allowing the utility works to be undertaken.		
				WATERWAY OPERATION AND CUSTOMER USE / ACCESS **Cappers Lane Area** The balancing pond on South side feeds into brook that passes under the Coventry Canal at culvert 24 which may not be able to accommodate additional flow. In addition, the Trust owns part of the watercourse which currently silts up frequently. The Trust expects HS2 to purchase this culvert to mitigate the risk of the Trust attracting any long term maintenance liability resulting from the construction of HS2. See also "noise" and "waste" for some site specific commentary regarding impacts on marinas.	Flow assessments need to be carried out. The Trust needs to be indemnified against upstream flooding due to excess loading. Access for dredging to keep watercourse clear required.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				Fradley Junction Area Access for maintenance.	If there are permanent access tracks to HS2, the Trust would like to use these to access the canal.	Minor issue, no accommodation required by the

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						Trust or canal users.
				UTILITIES - Discharges and other wayleaves **CAPPERS LANE:** land identified as replacement common land.	Para 5.5.11 of CFA Report 22 identifies Trust land to replace common land lost permanently at Broad Lane, Huddlesford. This is unacceptable to the Trust. The land is leased to the Lichfield Cruising Club, a long established tenant of the Trust and is used as amenity land by Members and is the site of the bi-annual Huddlesford Gathering.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				BUILT HERITAGE Both crossings need to have special treatment bearing in mind proximity to listed structures at Woodend Lock.		Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				BIODIVERSITY King Bromley Wharf to Fradley Junction, Coventry Canal SBI, is crossed by the Proposed Scheme, and comprises two lengths of canal supporting diverse marginal and emergent vegetation; Current assessment is that no loss will occur, but the Trust is concerned about shading impacts.	Mitigation measures or compensation required.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				ENVIRONMENT ENHANCEMENT Wider corridor linkages for mitigation planting.	The Lichfield Canal restoration is proposing a heathland corridor along the new canal line using	Minor issue, no accommodation required by the

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					sandbanks. This could be considered as either a land restoration part of this scheme or a potential use for sandy spoil.	Trust or canal users.
				Fradley Junction Area Opportunity here for the waterway to be a connecting corridor between the woodlands and new compensatory planting.	Consider alterations to details of mitigation / compensation planting to ensure good connections to the wider corridor.	Minor issue, no accommodation required by the Trust or canal users.
				WATER QUALITY & RESOURCE **Cappers Lane Area** The balancing pond on South side feeds into brook that passes under the Coventry Canal at culvert 24 which may not be able to accommodate additional flow. In addition, the Trust owns part of the watercourse which currently silts up frequently. Balancing pond feeds need to be of higher quality than existing canal. See routewide comments.		Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				Fradley Junction Area Both crossings appear to show balancing ponds and embankment toe drains discharging into the canal - to be reviewed. Balancing Ponds – must review effect of discharge from balancing ponds by Bourne Brook Viaduct on the capacity of Aqueduct 18. See routewide comments.	HS2 to address issues.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				NUISANCE **Cappers Lane Area** Site specific impacts on two marinas - Kings	HS2 to provide improved noise mitigation.	Significant issue with impact on waterway uses

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				Orchard and Streethay. Very significant impacts on Kings Orchard which is in close proximity. Streethay impacts are less severe, but in terms of noise the routewide standards requested should be applied.		or infrastructure / environment / heritage.
				Fradley Junction Area Noise Screening – should be provided on noise screening on approach to bridge as well as over it. No noise barriers currently shown on embankments between the bridges. Noise and disruption during construction may affect local businesses e.g. cafe, pub and chandlery. Operational noise may also have a long term negative effect on customers visiting these businesses.	HS2 to provide improved noise mitigation	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users
				BRIDGE DESIGN/LANDSCAPE **Cappers Lane Area** The Trust will work with the HS2 design team to develop the detail of the appropriate crossing design. The crossing should be designed and approved by the Trust in accordance with the principles set out in and in the "Knight Architects' Canal & River Trust HS2 Design Principles document". The open nature of the canal corridor at Cappers Lane suggests that an open canal crossing approach is appropriate. This will require Canal Appropriate Piers to the north and south of the canal with two additional standard HS2 piers to the north and south of the canal to extend the viaduct in accordance	The preferred mitigation here would be a further realignment of the HS2 line away from the canal, to reduce the visual impact on this sensitive canal corridor. In addition to any potential realignment, the Trust suggests that a robust and comprehensive structure planting scheme is required, that will be implemented as a priority to ensure a degree of mitigation to the construction phase, as well as the completed and operational HS2. The operational HS2 will very much change the feel and character of Woodend Lock and the landscape	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users

				with the Trust's Design Principles, to maintain openness. This will reduce the proximity of the embankment, and abutment to the canal The hedgerow along the towing path is critical to the local landscape and mediation of the visual impact of the HS2 crossing in the landscape from the towing path. The towing path hedgerow requires short term management (laying etc) to ensure longevity. Hedgerow reinstatement to the undertaken to restore towing path hedge and further planting required to mitigate the impact of HS2. Supplementary planting to the hedgerow as appropriate, mix to be agreed with the Trust's Ecologists. Advanced planting of the proposed screen landscape is critical to ensure mitigation is in place prior to the opening of HS2. **Fradley Junction Area** The Trust have serious concerns regarding the potential adverse impact that the proposed HS2 rail crossing will have upon listed Woodend Lock and Lock Cottage and the Trent and Mersey Canal Conservation Area on the Trent and Mersey Canal. The 3 no. crossings of the canal, and the proposed HS2 embankments and crossings in close proximity to Woodend Lock on the Trent and Mersey Canal will have a dramatically adverse impact upon a particularly tranquil and	strategy must therefore aim to promote a sense of enclosure of the canal, minimising views out and organising the visual interest around the immediate canalside. The structure planting should enhance and respond to the pattern of existing small copse woodlands around the canal, breaking up the impact of the rail line from the canal corridor. With regard to the visual impact of the 3 no. crossing points, the Trust strongly believes that further soft landscaping measures should also be employed to reconcile the new crossing structures into the waterway corridor, and the wider landscape, and mitigate the visual impact of the new structures. The implementation of structure planting carefully designed and positioned to provide an oblique, framing buffer to the bridge crossings, could be employed to further exploit the linear nature of views within the waterway corridor, and limit the impact of adjacent rail infrastructure in the landscape. Landscape improvements and enhancements should also be made to the immediate canalside environment to balance the negative effects of HS2 upon the	

				much loved length of a rural canal and, as such, it is a canal scene currently enjoyed by high numbers of visitors by boat, bike and on foot. The crossing to be designed and approved by the Trust in accordance with the principles set out in the "Knight Architects' Canal & River Trust HS2 Design Principles Document". The number of HS2 crossings of the canal in Fradley will have an impact upon the conservation area, it is therefore critical that the quality of these crossings needs to be high to mitigate this. The proposed HS2 crossings need to positively contribute to the canal conservation area, and therefore require an appropriate, site specific design solution within the context of the HS2 Network. The closed nature of the canal corridor at Fradley suggests that the crossing supports can be pulled back from the canal corridor and obscured by the tree line. A simple framed bridge crossing can then be formed. This arrangement will minimise the visual intervention in the landscape with only the bridge span prominent. The Trust will work with the HS2 design team to develop the detail of the appropriate crossing design. <u>Supplementary Landscape Works</u> In order to maintain the enclosed visual corridor	canal corridor.	

				approaching the crossings at Fradley, on-going woodland management, and planting is critical to maintain this woodland edge. Any loss of woodland during construction will need to be replaced with a locally appropriate woodland mix, to be agreed with the Trust's Ecologists. These woodland habitats are locally varied and create a landscape tapestry along the canal corridor; these subtle changes need to be recognised in the design. The hedgerow along the towing path is critical to the local landscape and mediation of the visual impact of the HS2 crossing in the landscape from the towing path. The towing path hedgerow requires short term management (laying etc) to ensure longevity. Hedgerow reinstatement to the undertaken to restore towing path hedge, further planting required mitigating the impact of HS2. Supplementary planting to the hedgerow as appropriate, mix to be agreed with the Trust's Ecologists. Advanced planting of the proposed screen landscape is critical to ensure mitigation is in place prior to the opening of HS2. In addition to the proposed bridge crossings of the canal, the associated viaducts and embankments will also impact upon the canal corridor.		

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				SOCIO-ECONOMICS AND RESTORATION **Cappers Lane Area** Restoration potential must be protected (as WCML and M6 Toll have already carried out works to protect the line). Restoration potential - Construction of bridge should not make restoration of disused canal more expensive. Existing road is aligned for navigation (subject to £6.5m of ERDF funding). Facilities on existing section could be affected - need to be moved to other side of canal or restore section through the bridge and put new facilities on there. HS2 could restore a short section of canal. Pier pile cap construction could affect currently disused canal and this much be avoided. Appendix CM-001-022 'Community impact assessment record sheet - construction' that the *"field leased by the Cruising Club adjacent to the junction of the Wyrley and Essington Canal and the Coventry Canal, will be designated as common land which will constrain access and use of the land and reduce the area available exclusively to the Cruising Club".* The Trust is the freeholder of the land and would resist any re-designation as common land.	HS2 to address in the design	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
26	West Midlands	Birmingham & Fazeley Canal (Digbeth Branch)	175.000	**ENGINEERING INFRASTRUCTURE** **CURZON STREET STATION AND APPROACH:** **Drawings CT-05-142 and CT-06-142**	HS2 to address the Trust's concerns.	Major issue with possibility of unacceptable impacts on infrastructure / environment /

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				Mapbook **CT-05-142** - Ref H5 - the station deck will be constructed over an operational lock (Lock 6). HS2 will be expected to provide the necessary facilities to ensure that the maintenance of this lock is not adversely affected by the construction of the station. These facilities will include the provision for installation of lock gates periodically. Approx. 150m of the canal is shown within the LPRDC. This is unacceptable to the Trust as the canal is an operational asset and must remain open during construction of the station. Curzon Street No. 3 Viaduct Satellite Compound (in square I5) plus its access road will be adjacent to the canal. The Trust is concerned that vibration and loading effects from plant using this compound may have an adverse effect on the waterway walls in this area. The Trust will require HS2 to mitigate any adverse effects in this location. **CT-06-142** - there is a large pond shown in I6 that does not appear to discharge anywhere. Should it require discharging into the canal, please seeing our routewide comments on balancing ponds.		heritage / users.
		Birmingham & Warwick Junction Canal	173.000	**SALTLEY VIADUCT AREA - Drawings CT-05-140 and CT-06-140** **Mapbook** **CT-05-140** - c 100m of canal shown within the LPRDC as part of the River Rea overflow channel works. This is unacceptable to the	HS2 to address the Trust's concerns.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.

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				Trust as the canal is an operational asset and must remain open throughout the construction Phase. The Trust is concerned about the possible adverse effect on the stability and integrity of the canal here during the River Rea overflow channel works. Any work in this area will require the Trust's approval. Approx. 350m of canal shown within the LPRDC to construct the Saltley Canal Underbridge and Saltley Viaduct. This is unacceptable to the Trust as the canal is an operational asset and must remain open throughout the Construction Phase. The construction of both new HS2 structures will potentially require the relocation of the Trust's Artillery Street Feeder - a major strategic water supply asset in the area. The Trust will require HS2 Ltd to relocate the feeder in this vicinity without affecting water supply to the Trust's waterway network in the area. **Hybrid Bill** **Plans sheet 3-114 - Work No 3/205 - Railway. Section Sheet 6-122** - rail level shown as 4.62m above water level at Saltley Canal Underbridge. Bridge height described as 2.46m. The Trust will not accept a bridge here that provides less headroom than that provided by the existing adjacent structures. **Work No 3/220 - Public Road**. Section Sheet 6-123 - rail level shown as 12.49m above water level but bridge height described as 3.00m,		

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				which is unacceptable to the Trust having regard to the level of the rails above the canal. Minimum headroom to be specified by the Trust. **Work No. 3/222 - Sewer**. Sections Sheet 6-124. Please confirm if this is the Trust's Artillery Street feeder.		
				WATERWAY OPERATION/ AND CUSTOMER USE/ACCESS **Curzon Street** Security risk - moored boats under HS2 station deck and high graffiti risk.	HS2 to address the Trust's concerns.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				Saltley Viaduct Artillery Street Feeder - concerned about access to inspect and maintain artillery street feeder.	Probably requires relocation of existing inlet shaft.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users
				BUILT HERITAGE **Curzon Street** Portal of existing Tunnel is listed.	Need for special consideration bearing in mind the listed status of the tunnel portal.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				BIODIVERSITY **Curzon Street** Curzon Street approach will have an adverse	Mitigate through enhancements of the adjoining spaces and protection of the canal as corridor	Significant issue with impact on waterway uses

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				effect on the ecology of the site due to the shading of open space.	(e.g. for bats and otters).	or infrastructure / environment / heritage.
				Saltley Viaduct Diversion / opening up of River Rea overflow channel / "Washwood Heath Brook" - could be positive but concerns over water quality / debris and erosion of canal embankment. Opportunity for Kingfisher banks on the overflow waterway and enhancements for them on the canal.	More information required on impacts of this part of the development on the Trust's property.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				WATER QUALITY & RESOURCE **Curzon Street** Balancing ponds shown but no discharges to the Canal. If discharge is intended, see Routewide comments.	HS2 Ltd to confirm discharge arrangements.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				Saltley Viaduct The Trust is very concerned about Artillery Street feeder which needs to be protected.	HS2 Ltd to relocate feeder as part of the detailed design.	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.
				Also protect waterway from demolition impacts - pollution control / prevent debris falling into the canal.	CoCP measures should be sufficient.	Significant issue with impact on waterway uses or infrastructure / environment / heritage.
				WASTE, HAZARDOUS MATERIALS USE	HS2 Ltd to review suggestion.	Significant issue

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				AND STORAGE **Saltley Viaduct** Demolition of existing viaduct – the Trust assumes that the existing viaduct will be demolished to ground level. Could bricks from this be salvaged and used on other crossings in the area to soften the impact e.g. brick cladding of abutment faces, etc. Demolition will have an effect on the canal which will need to be managed via the Trust's Code of Practice (or similar).		with impact on waterway uses or infrastructure / environment / heritage.
				BRIDGE DESIGN/LANDSCAPE **Curzon Street** The Trust has serious concerns regarding the potential adverse impact that the proposed rail crossing will have upon the Birmingham & Fazeley Canal (Digbeth Branch), and the consequential impact upon the Birmingham Canal Network. The proposed rail crossing will create a significant tunnel over the canal, which will dramatically alter the character of the canal, in very close proximity to the existing Grade II listed Curzon Street Tunnel (thereby creating a combined impact). If not properly treated, the space created by the proposed rail crossing will have a considerable adverse impact upon both the canal itself as well as canal corridor users, impacting not only locally, but also upon wider leisure, commuting and local route use of the canal network in Birmingham.	In order to address this issue, the Trust request that the design of this crossing structure is considered holistically; producing a comprehensive solution that addresses not only the canal corridor space created immediately below the rail deck, but also the role of the wider canal network in the City, the emerging plans for Eastside and Digbeth, the proposed HS2 Station, the University, and Millennium Point and Park. By doing so, the Trust believe that the impact of the viaduct upon the overall quality of this section of canal can be minimised. Following detailed design review with URBED and BCC, the Trust believes that the design of the viaduct arch over the Birmingham	Major issue with possibility of unacceptable impacts on infrastructure / environment / heritage / users.

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					and Fazeley Canal (Digbeth Branch) still requires further amendment to improve the relevance of the structure to the waterway corridor and to help address the issues of concern relating to the quality of waterside environment, and misuse of the canal corridor. Our design analysis of the other canal tunnels and bridges has established some simple principles of bridge design that should be followed: • The arch should be enclosed - there should be no views out from the canal from the canal to the adjacent areas under the tracks; • Critically there should be no space or very limited space on the western bank of the canal. The arch should appear to spring from the offside wash wall; • The bridge should include a minimum of two light wells between the tracks allowing light and rain in; • The sides of the space should be smooth, formed by the viaduct structure (not secondary barriers) - with no alcoves or hiding spaces; and • The structure should create no pigeon roosts.	

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					The imagery (LV-14-015Illustration of Curzon Street Viaduct: view from north) included within the Environmental Statement Mapbook for CFA 26 'Washwood Heath to Curzon Street' shows a landscape environment that we do not believe is sustainable. The Trust would wish to see a high quality holistic landscape proposal for the canalside space between the existing listed Curzon Street rail tunnel portal and Curzon Street. The blank wall shown in the rendered image (V-14-015 illustration of Curzon Street Viaduct: view from north) shows blank walls along the canal corridor, this is not acceptable as an edge to the waterway corridor. It is important that the proposed structure considers the potential development of the canalside land along Curzon Street and also below the HS2 viaduct to the east, to ensure optimum activity around the canal corridor, and also to optimise the potential of the canal to the City. Principal issues to consider in the	

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					further design development of the HS2 crossing: a) The quality of the canalside space created below; b) Activity generation – encouraging the positive use of the canal corridor; c) Connectivity - the potential role of the canal in the development of the station, as a green travel route and as a setting to the station, whilst ensuring that the canal remains a visible and valued part of Eastside; d) Connectivity – analysis of the role the canal can play in the City (in the context of the HS2 viaduct over the canal); e) Waterway network - boating, walking, jogging and cycling: assessing the current and potential future use, mitigating the potential impacts of proposed tunnel infrastructure on the existing and future use of the canal corridor; f) Opportunity to interface with new HS2 Station - making the most of the canalside land holdings; g) Consider opportunities for additional waterspace to create a positive environment; h) Improved treatment of the existing Curzon Street Tunnel to ensure the existing and proposed tunnel work together to form a	

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					positive waterway place; i) Ensuring the canal corridor through Eastside and Digbeth is legible and well signposted from key points as a green transport corridor; and j) Consider the view of the viaduct from the canal at the pace of a canal user, as well the view of the viaduct from the wider City. <u>Design Requirements</u> The crossing to be designed and approved by the Trust in accordance with the principles set out in the "Knight Architects' Canal & River Trust HS2 Design Principles Document", and the URBED Curzon Street Study. The Trust has been working closely with Birmingham City Council (BCC) to ensure that the proposed development of the HS2 Station at Curzon Street and associated infrastructure makes a positive contribution to the canal. The importance of the canal corridor has been recognised by BCC in their Birmingham Curzon Masterplan (Dec 2013), prepared to address the issues integrating the canal with the City in Eastside and Digbeth.	

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					The HS2 design of the viaduct crossing has established a wide, clear, arched span which goes some way to limit the adverse impact of the crossing on the immediate canal environment, and to recognise that presence of the canal. However, the space that is created remains a concern to the Trust and we believe that further works are required to ensure that the resulting canal corridor is a positive and attractive space that can sustain positive role on the waterway network and within the City. In accordance with both the Trust and BCC requirements, the HS2 crossing must therefore result in: 1. A sustainable and viable development parcels to the east and west of the canal, which will also provide landscaped public spaces to connect the canalside with the surrounding streets; 2. Edges and interfaces between the canal and the viaduct supports, to be designed to form continuous and elegant/appropriate boundary edge to the canal to form a positive waterway place; 3. No sub- station to the east of the canal;	

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					4. No service roads parallel to the canal, east or west of the crossing point; 5. Improved pedestrian access to the canal from Curzon Street to the Trust and BCC approval; 6. High quality landscape treatment of the canal corridor, between Curzon Street and the southern portal of the existing Curzon Street Rail Tunnel, to mitigate the adverse effect of the proposed crossing. This will included surfacing, lighting, boundary treatments etc, to extend quality of the surrounding streetscape standards to the canalside; 7. Provision of an art installation within the overall treatment of the space; 8. Vehicle access to the canalside for a crane; 9. Improvements to the lighting of the existing Curzon Street tunnel; and 10. Further revision to the viaduct design to create a physically and aesthetically appropriate structure within the waterway corridor.	
				Saltley Viaduct The Trust has serious concerns regarding the potential adverse impact that the proposed HS2 rail crossing will have upon the Grand Union	In order to address this issue, the Trust request that the design of this crossing structure is	

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				Canal (Birmingham & Warwick Junction Canal) and the consequential impact upon the wider Birmingham Canal and towing path Network. The proposed rail crossing will create a significant tunnel over the canal adjacent to existing crossings (thereby creating a combined impact). If not properly treated the space created by the proposed rail crossing will have a considerable adverse impact upon both the canal itself as well as canal corridor users, impacting not only locally, but also upon wider leisure, commuting and local route use of the canal network in Birmingham. The existing pedestrian access to the canal appears to be severed by the proposed Saltley Viaduct West Compound. This section of the canal is isolated by a lack of access points and it is therefore important to the sustainable positive use of the canal to replace or reroute the exiting access to provide a high quality, appealing pedestrian route to the canal. The overshadowing of the towing path and towing path verge will require a comprehensive hard landscaping treatment of the waterside space affected by the HS2 works. Care is also required to address any amendments to the abutment Saltley Viaduct.	considered holistically; producing a comprehensive solution that addresses not only the canal corridor space created immediately below the rail deck, but also the role of the wider canal network in the City. Our design analysis of the other canal tunnels and bridges in Urban Settings has established some simple principles of bridge design that should be followed: • The arch or tunnel should be enclosed - there should be no views out from the canal from the canal to the adjacent areas under the tracks; • Critically there should be no space or very limited space on off side of the canal. The arch should appear to spring from the offside wash wall; • The bridge should include light wells between the tracks allowing light and rain in; • The sides of the space should be smooth, formed by the viaduct structure (not secondary barriers) - with no alcoves or hiding spaces; and • The structure should create no pigeon roosts. • An appropriate lighting scheme.	

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					The crossing to be designed and approved by the Trust in accordance with the principles set out in the "Knight Architects' Canal & River Trust HS2 Design Principles Document", to make a positive contribution to the canal.	