HS2 Phase 2a Consultation on the Environmental Impact Assessment of the route from the West Midlands to Crewe

Response from the Inland Waterways Association

To be returned to:

HS2Phase2aBillES@ipsos.com

Consultation closes at 23:45 on 30th September 2017

I do not wish my response to be treated as confidential, although IWA's address should be used if publishing an office for formal communications.

My Contact Details are as follows:

Mr Gren Messham
Broncroft
3 Chapel Lane
Whixall
Whitchurch
SY13 2QG
gren.messham@waterways.org.uk

I am responding on behalf of:

The Inland Waterways Association
Island House, Moor Road,
Chesham, HP5 1WA
Phone: 01494 783453
E-mail: iwa@waterways.org.uk

I am currently a trustee of IWA, and chair of its Navigation Committee and its High Speed 2 Campaign and Communications Group.

IWA has acted to influence HS2 since its public appearance in 2010. IWA communicates with its membership through expert groups and through its 8 regions and 33 branches, each of which has a regional chair and branch chair. On HS2, IWA consults with branch planning officers on specific issues, and more generally on consultation documents and responses via its website, a dedicated email list of individuals interested in HS2 specifically, its Waterways magazine published 4 times each year, and its officers Bulletin communicated electronically monthly. IWA's Navigation Committee and Board of Trustees oversee its responses in terms of policy and tactical alignment with charitable aims and objectives.

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Introduction

The Inland Waterways Association (IWA) is a registered charity, founded in 1946, which advocates the conservation, use, maintenance, restoration and development of the inland waterways for public benefit.

IWA members' interests include boating, towpath walking, industrial archaeology, nature conservation and many other activities associated with the inland waterways.

IWA works closely with navigation authorities, other waterway bodies, and a wide range of national and local authorities, voluntary, private and public sector organisations.

IWA accepts that the overall economic and social case for the proposed High Speed Rail network is for Government to make and for Parliament to decide.

If it proceeds it will have major adverse impacts on the local environment and quality of life of many people on its route, both during construction and operation, including impacts on the inland waterways infrastructure and users. The waterways affected include both existing navigations and canals under restoration for which equal consideration and provision should be made.

IWA considers that the project needs to be designed and implemented so as to minimise its impacts, to mitigate those impacts that cannot be avoided, and to fully compensate all those disadvantaged by its construction and operation.

The Phase 2A Western Leg (West Midlands to Crewe)

Consultation Question 1: Comments on the Non-technical Summary (NTS)

The NTS does a good job of putting the wealth of documentation in context, and explaining the interrelationship of the different volumes. Volume 5 has however become so large that it remains very hard to understand, and overview as a whole. Also the terms 'Environmental Impact Assessment' and 'Environmental Statement' seem to be used inconsistently throughout, which makes the relationship between both more difficult to comprehend. It is IWA understands that 'EIA' is the more recent and overarching requirement for this project, although the UK regulations have maintained the use of 'ES'.

Section 1.1 discusses the impact of the proposed scheme. The majority of those affected will expect that HS2 Ltd take all reasonable steps to avoid or mitigate these impacts, and certainly to reduce them below levels impacting individuals' health and safety. It is not clear that the proposed EMRs do in fact ensure this.

Section 1.2 covers engagement and consultation. IWA has made responses to all consultations and design refinements, and welcomes the level of transparency this has brought to the process whilst not necessarily agreeing with the outcomes.

Section 3 describes the overall project included in Phase 2a. This includes generic examples of earthworks and structures. However, Fig 9 Noise Fence Barrier shows a barrier around 5m high. This is unrepresentative, as there are very few noise fence barriers this high in the entire ES and one 2-3m high would be more appropriate. The section does confirm that the project 'will incorporate noise barriers to avoid or reduce significant noise Effects'. IWA is of the view that this should provide noise reduction to below SOAEL, to ensure the project's impact is below the level known to cause impact on individual's health (in this case hearing).

3.3 is a useful update on changes resulting from the various Design Refinement decisions and other changes, as suggested in IWA's comments on the Working Draft. Further comments on specific issues are made later in this Consultation Response.

In 4. Construction and Operation of the Proposed Scheme, there is reference to the operating speeds envisaged on commissioning of the services, however it also refers to the design of the route being to allow 400kph speeds in future. IWA is of the view that some of the route designs do not meet HS2 Ltd's environmental policy, perhaps as a result of this aspiration, and believes a better balance of impact and operating speed should be sought in some places. Further comments will be made below.

Section 5 purports to cover the EMRs mentioned above, but does not. IWA had expected to see detailed measures on issues such as noise and visual impact, of particular relevance to

impacts on inland waterways. However this NTS does not contain the information, which is contained elsewhere.

Section 7 describes the process HS2 Ltd has followed to firstly avoid or prevent environmental impact, secondly to mitigate that impact and finally to propose restoration and compensation measures. The NTS then refers to HS2 Ltd's published Environmental Policy (11 April 2017), which sets out how HS2 Ltd intends to deliver on environmental impact. IWA applauds the publication of this policy, as achieving a balance will be difficult. IWA's concerns relate particularly to the policy statement on noise nuisance:

'effectively manage and control noise and vibration to avoid significant adverse impacts on health and quality of life;'

IWA has raised this issue through the consultation process and petitioning process in both Houses. Evidence from experts in Local Authorities have made submissions on noise and how it degrades people's enjoyment of their local environment, and this is further informed by this project's Health Assessment sections. IWA believes that HS2 Ltd should aspire to avoid or mitigate noise nuisance to below SOAEL for all areas impacted by the project. This will deliver maximum benefit for all affected, whether intensely or more diffusely, as set out in government policy in documents such as the DCLG National Planning Policy Framework for Noise (2012) which says development should have:

'an environmental role – contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, ...'

'contribute to conserving and enhancing the natural environment and reducing pollution.'

- Or the Defra 'Noise Policy Statement for England' (NPSE) published on 15 March 2010, where government was looking for a noise impact from development:

'…where the effect lies somewhere between LOAEL and SOAEL. The aim is that "all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects[1] cannot occur."

[1]In this context, the 'adverse effects' are those arising from noise between LOAEL and SOAEL.

IWA considers that HS2 needs to go further to meet government aims. Specific comments will be raised below on HS2's proposed mitigation on noise and visual impact in individual CA reports.

The section goes on to confirm the impact of HS2 Phase 2A on the Trent and Mersey Canal Conservation Area, with reference to the junction of this scheme with Phase 1 at Fradley Junction, which IWA comments on in the relevant CA report.

This section also refers to general mitigation for Landscape and Visual Impact. It states 'The provision of new planting and landscape earthworks will help to integrate the Proposed Scheme into the local topography, landscape character and landscape pattern. This will provide visual screening for residents and other sensitive receptors (such as users of recreational sites and public rights of way).' It should, in IWA's view, also include canal towpaths and mooring sites in these 'recreational sites'.

In the section on Sound Noise and Vibration, the NTS refers to mitigation by design, putting the route 'low within the landscape where reasonably practical'. It later refers to the types of sites the S, N&V mitigation has covered, but still does not include tranquil areas, such as canal moorings and towpaths. These are usually within 300m of the route. IWA will comment on these in individual CA reports. Protecting such valuable amenity resource is a straightforward way to demonstrate an ability and intent to mitigate impact of the route which is claimed, but not yet apparent.

Section 8 summarises impacts on each Community Area. IWA's comments will be expanded in those sections of Volume 2, however some specific comments are as follows:

8.2 The impact of this scheme adds to that of Phase 1, combining adversely on the Trent and Mersey Canal Conservation Area. IWA believes more can be done to mitigate this combined impact.

The upgrades to Pyford Brook are referred to as designed in consultation with EA. In view of the impact on the Trent and Mersey Canal which Pyford Brook goes under, IWA suggests any design consultation should also include Canal and River Trust.

8.3 The impact on the business of Great Haywood Marina may be very significant, if noise generated by construction drives boaters elsewhere and the continuing noise from operation prevents them coming back.

Section 9 summarises route wide effects, and confirms that despite planned mitigation, health effects may still occur. IWA will propose further mitigation to reduce these health effects, which it considers reasonable.

Section 10 refers to Off Route effects, which potentially includes work to modify the WCML existing railway north of Crewe too improve the flexibility of operation with HS2. IWA comments on these in Volume 4. The work is claimed to be limited to the existing rail corridor, however there is little detail. It is important that work is planned to avoid any impact on canal traffic, which continues throughout the year, at varying levels of usage.

Consultation Question 2: Comments on Volume 1: Introduction and Methodology

Section 1.5 sets out HS2's approach to sustainability, and how it fits within UK's Planning Framework. 1.5.4 quotes the 3 elements of development's contribution to sustainability. However HS2 is in many cases reducing environmental standards by degrading local environments, increasing noise and visual nuisance from the railway itself. To achieve a positive result within NPPF HS2 needs to take more steps to reduce HS2's environmental negatives for many people and situations, by for example at least reducing noise nuisance levels to at or below the SOAEL the project has established.

Section 2.3.3 quotes WCML levels of usage as 15-16 trains per hour in the peaks, without saying whether this is each way, or both ways.

Section 2.4.2 mentions the benefits from bringing Phase 2A forwards, by potentially improving connectivity for the increased number of current users. It seems rather odd that plans for the new Crewe station are still to be prepared, and that this project seems likely to disrupt current traffic to the station over a long period of time.

Section 2.6.1 mentions the inevitability of some disruption in constructing the line. This may well be true, however there is still time to improve the design and implementation, and this consultation can form part of that process. IWA certainly intends to raise what it sees as opportunities to improve sustainability and reduce impact, and no doubt others will in a similar way.

Section 4.2.19 covers changes to the proposals in this project. Where IWA has comments on these and the additional changes to the junction with Phase 1 these are covered in the Community Area reports.

4.3.12 identifies the possibility that in future trains may run on the proposed track at up to 400kph, provided no new or significantly different environmental impacts would result. Given the likely increased noise from pantograph aerodynamics at these higher speeds, investment in noise mitigation now should facilitate this future possibility.

Figure 16 shows a typical arrangement of a pedestrian underbridge. The drawing 'People' appear to be 2/3 height of OLE, so 6m high. The drawing would work better if less 'perspective' was involved. As it is, it is rather misleading even for an 'example'.

Section 5.9.2 states that viaduct height is governed by local topography and clearances needed over existing features. IWA is pleased to have this confirmation of the design drivers

for viaduct and presumably embankment height, since there are several examples where the route seems unnecessarily high. These will be raised in the CA report comments.

Section 5.1 discusses the height of noise fence barriers and landscape earthworks, suggesting that height may be governed by benefit from the barrier, its cost, and other impacts such as visual intrusion. For the majority of situations, the baseline is no viaduct or embankment, and no visual or noise nuisance. Construction of the viaduct and associated OLE makes an irreducible visual impact on the landscape, which at best may reduce in time as planting (if any) blends the structure in the landscape. However the impact on noise nuisance for fitting of higher noise barriers or fences will make a very small difference- if indeed any- in the visual impact of the structure but a significant reduction in the noise nuisance. People can in general become used to the visual nuisance, but will always benefit from the noise reduction across a wide area. Suggesting that the visual impact of noise fences outweighs the benefit from the reduction in noise nuisance is far from the case, especially for those suffering from the visual and noise nuisance. IWA has also commented above on the 5m fences chosen here, although there are few fences of this height within this project.

Section 5.12 and Figure 20 set out how restoration of some areas such as borrow- pits can be used to provide new or replacement habitat, including areas for recreation whilst at the same time screening the route from the landscape. This may be correct, however attention will need to be paid to noise mitigation, as otherwise encouraging people closer to the operating line will expose them to high levels of noise nuisance and adverse health outcomes.

The proposal to field Community Engagement personnel in 6.3.15 is an excellent idea, and should reduce the possibility of the community feeling isolated from the construction. The contacts made should also prevent any minor issues escalating unnecessarily.

Section 6.3.44 sets out HS2 Ltd's proposed noise and vibration strategy. This should include residential occupiers of boats on inland waterways, where boaters can moor at many places on the navigations themselves for up to 14 days, and in marinas or on long term moorings continuously. Boats have lower insulation properties than conventional housing, so better mitigation will be required.

Table 6 final entry mentions work on the existing WCML North of Crewe, to improve the lines' flexibility to allow passing of trains. The work does not mention any likely impact on users of the associated Trent and Mersey Canal. This waterway is regularly in use throughout the year, and any work will need to facilitate boat traffic passing in safety.

Section 8.5.5 refers to establishing baseline data on use of local community resources. For inland waterways, Canal and River Trust has annual data on usage of towpaths and the

waterspace, and this will be useful in setting baselines and understanding economic & environmental impacts of potential interruptions due to construction.

Section 8.13.10 confirms that HS2 Ltd is following government methodology in assessing noise and vibration and its potential impact. However at the present time IWA does not agree that the project is meeting government development guidelines on mitigating noise, as set out in the Defra NPSE 2010, and National Planning Policy Framework 2012. More work is needed, and IWA identifies locations in CA reports below.

Section 8.13.20 states that HS2 Ltd has assumed that the rolling stock will be quieter than the relevant EU current specifications. Why is this a reasonable assumption? As IWA states below, to ensure this outcome is achieved, IWA considers there needs to be an undertaking from The Promoter to bind those implementing this project and their successors, to ensure rolling stock and track are procured and maintained to deliver these quieter trains operating on quieter track and achieving noise mitigation at least as forecast.

Section 9.13.8 repeats the above statement about the as-yet unordered trains being quieter than current EU operating trains. As these trains will be of an old design and unlikely to run at the higher 360kph speeds, these claims are unlikely to be tested, and some independent backing of these claims is needed. Otherwise, current information indicates that at the higher speeds trains are likely to be noisier than current stock at current speeds, and will require more mitigation.

Section 9.13.15 sets out the response to those residents exposed to levels of noise above SOAEL. This needs to encompass boaters resident in their boats whilst navigating in the vicinity of the route, where unless noise levels can be reduced below this level by avoidance or mitigation, insulation specifically tailored to boats which otherwise have relatively poor sound insulation will need to be fitted.

Section 9.16.3 The relevant statutory authority for the majority of the inland waterways in this project is the Canal and River Trust.

Question 3: Comments on Community Area Reports

IWA has comments on the following Community Areas:

- CA 1 Fradley to Colton
- CA2 Colwich to Yarlet

CA1 Fradley to Colton

Section 2.1.34 details changes to the design since the Working draft EIA Report:

- The removal of Pipe Ridware Maintenance Loop is useful, allowing reductions in the overall alignment height.
- The central section of the Pyford North embankment is described as reducing in height by 6m, however Pyford N Embankment is still an average of 4.5m above existing ground- apparently unnecessary elevation leading to increased visual and noise nuisance.
- The height of the southern end of Kings Bromley viaduct is described as reducing by 0.9m, however Kings Bromley Viaduct remains an average of 12 m above existing ground- unnecessarily high leading to more material being needed, higher cost, and creating more noise and visual impact and nuisance
- The height at the northern end of the Kings Bromley viaduct and the southern end of the Bourne embankment have both increased by 2.5m. This also leaves Bourne Embankment on average 14.7m above existing ground leading to significantly increased requirement for fill material, and creating unnecessary cost, noise and visual nuisance.
- The height at the northern end of the River Trent viaduct and the southern end of the Pipe Ridware embankment has reduced by 8.2m, however this leaves the River Trent Viaduct and Pipe Ridware Embankment both still an average of 12.4m above existing ground level leading to unnecessary cost, noise and visual nuisance.

The first part of this section is still in general elevated- a total average increase in height over ground levels by embankment or viaduct of around 11m. This is unnecessary, and apparently, on inspection of the route maps, undertaken to 'smooth' the descent and rise from the Trent & Mersey Canal crossing to the Pipe Ridware section as the route crosses the Bourne and Trent floodplains- perhaps to allow the route to meet criteria for the suggested 400kph aspiration. This major engineering will be unnecessarily costly, and create excessive visual and noise intrusion in the landscape as can be seen from the subsequent landscape assessments. It also contradicts the statement in the NTS in the section on Sound Noise and Vibration, which refers to 'mitigation by design', by putting the route 'low within the landscape where reasonably practical'.

IWA considers the rail route should be dropped significantly to a <u>minimum</u> needed to avoid the various road crossings and flood plain risk of the Bourne Brook and River Trent. Surplus spoil could then be used as highlighted in Vol 1 mitigation, using 'shoulder' embankments to further mitigate noise and visual appearance over a wide area.

The second half of the section has gradients and balance of cut and fill which more closely follows the land form, although without taking the opportunity to keep the rail route low in the landscape to minimise noise and visual intrusion.

The retention of Shaw Lane is to be welcomed, subject to the above suggestions on viaduct and embankment height. The realigned Shaw Lane appears to be some 10-15m below the currently proposed route, so there is plenty of scope to reduce the height of Kings Bromley Viaduct whilst allowing Shaw Lane through.

Section 2.1.35 says that noise barriers, landscape earthworks and compensatory environmental planting have been considered as well as the location and configuration of construction compounds, stockpiles and site haul roads. By further reducing the height of the route at the beginning of the section, major improvements can be realised by avoiding some of the visual and noise nuisance otherwise created. Retaining the planned landscape and noise mitigation works will help mitigate the remaining effect somewhat.

Section 2.2.11 advises of additional noise mitigation measures to be installed as part of this project on the connection to be built in Phase 1. Sound and Vibration Plans SV-05-101 and 102 show a 'Likely significant effect' from the route, indicated by OSV#-N# Level of 50-65 dB (Daytime LpAeq,T (T=07:00 to 23:00)), 40-55dB night time, over the whole of the Trent & Mersey Conservation Area from the car park by The Swan at Fradley Junction to beyond Ravenshaw Cottage, itself a significantly affected residential property. These lengths of canal are currently 'tranquil', and include several popular mooring areas. Operational noise will affect people's daytime recreation and night time sleep. IWA notes that the barriers on the viaduct over the canal are shown as 'up to 2m'. IWA suggests that some higher noise barriers are needed to further reduce noise nuisance, to get all areas accessed by the public including canal towpath and navigation users well below project SOAEL levels. The noise barriers proposed on the main line crossing of the Trent and Mersey Canal should also be tied acoustically into the Pyford Embankment and the opposite south end abutment. Likewise reducing the height of the embanked and viaduct sections suggested above would also help. This integrated work would also help reduce impact on residential properties in the affected area.

The section Fradley Wood to Ashby Sitch (2.2.12-14) includes the following viaducts and embankments:

- Pyford South Embankment 305m long and up to 9m high, after the crossing of the Trent and Mersey Canal
- Pyford Brook Viaduct 180m in length and up to 10m in height
- Pyford North Embankment 1km in length

Some further reductions in height of these structures as described above will reduce noise and visual impact, to the benefit of canal users and local residents.

The section Ashby Sitch to Bourne Embankment includes noise fence barriers on both north and south sides of the Kings Bromley Viaduct, to reduce noise nuisance to residential dwellings. The reductions in height of the structures IWA has suggested above will further reduce noise nuisance, providing the opportunity to reduce the impact on these properties, and to canal users and Kings Bromley Marina at the same time.

The section Bourne Embankment to Pipe Lane includes the embankment, 505m long and up to 16m in height. Bourne Embankment is still on average 14.7m above existing ground leading to apparently unnecessary noise and visual nuisance. Reducing the height will reduce the impact of noise and visuals, and so improve the experience of residents of Kings Bromley. The proposed 2m noise fence barrier will, when added to a reduced embankment height, reduce the impact on residents further.

Likewise, the further reduction in height IWA has suggested for the River Trent Viaduct and the southern end of the Pipe Ridware embankment, still 12.4m above existing ground levels will reduce the unnecessary cost, noise and visual nuisance. It will also improve the effectiveness of the noise barriers for residents and canal users.

Section 3.2.9 Comments from the Working Draft Consultation- IWA is not surprised noise and visual impact came strongly through the consultation, as those set out in the working draft were a significant increase on embankments seen in the 'Preferred Route' consultation on Phase 2 in 2013 (Aecom 16.4.13). Although the reductions proposed more recently as a result of design refinements are welcome, these remain very large structures with an unnecessarily high visual impact, and little apparent justification, contrary to HS2 Ltd's own environmental policy.

Section 6.5.1 lists avoidance and mitigation measures proposed for the environmental impacts of this part of the scheme. IWA believes the additional reductions in height it has proposed should be added to these measures, to follow more closely Governments expectations of noise and visual impact reductions in developments, and to better implement HS2 Ltd's own environmental policy.

7.4.73 confirms that the cumulative effect on the Cultural Heritage assets associated with the Trent and Mersey Canal will be 'a temporary and permanent medium adverse impact and a moderate adverse cumulative effect, which is significant.' IWA believes that the further mitigation it has suggested in this response is a worthwhile and necessary step to reduce the significant impact of this project on these assets.

Section 8.4. 25 refers to the impact of 'the construction of a temporary water supply connection to Pyford Brook viaduct satellite compound' as resulting in the permanent loss of approximately 0.6ha of canal bank and canal habitat of the Trent and Mersey Canal. The loss of this habitat is stated will result in a permanent adverse effect on the

structure and function of the canal that is significant at the district/borough level. There are no details or plans showing what is involved in this simple engineering task which makes it so damaging. IWA suggests that HS2 should go back and discuss with CRT how they can obtain a water supply without creating this unnecessary damage to the canal, a Cultural Heritage artefact within a Conservation area, and an area of ecologically significant habitat.

Section 9 health- this section reviews evidence for large infrastructure impacting health at a general population level. Whilst information is not conclusive, as might be expected there is better evidence that noise does affect an individual's health and general performance. Volume 5 (Health Effects) Report HE E58 003 000 quotes WHO in Section 3.6.8:

According to the WHO44, *'excessive noise seriously harms human health and interferes with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behaviour*'.

In IWA's view this confirms the importance of adhering more closely to government policy on noise, as set out elsewhere including DCLG's 2012 NPPF and Defra's NPSE 2010. In order to produce an 'exemplar' project, HS2 will need to deliver more and better mitigation which addresses people's concerns with the degradation of their local environment- which includes increased noise, and visual impacts from construction and eventual operation. It is likely that individuals will regard increased noise as more and more unacceptable.

Section 11. Landscape & Visual Table 22 describes the visual impact of the construction of Pyford Brook viaduct and embankments on views north from the Trent & Mersey Canal as 'The Proposed Scheme will result in a medium magnitude of visual change and moderate adverse effect, which is significant.'

The Table also describes the view north from the Trent and Mersey Canal in the same way.

Section 11.4.13 proposes to bring forward planting where it can be can be established early in the construction programme, including early planting in ecological mitigation sites, which will have the additional benefit of providing some visual screening. IWA agrees this is important and necessary where possible. IWA however also notes that 'After completion there would still be potentially major adverse significant visual effects which would largely remain after 15 years.', and agrees that 'To mitigate these effects additional landscape planting should be undertaken as soon as possible before the start of construction.'

IWA notes that Section 11.4.20 states 'The construction of the Manchester Spur of HS2 Phase One will result in a moderate adverse effect on visual receptors at viewpoint 360.3.001, north east from the Trent and Mersey canal, close to Wood End Lock cottage (a

viewpoint assessed in the HS2 Phase One assessment), which is significant.' Also the combination of this with this project will result in a combined significant effect.

Section 11.5.16 States that 'Footpath users will have close range views of the operation of the Proposed Scheme at the HS2 Phase One (Manchester Spur), Pyford South embankment, Pyford Brook viaduct and Pyford North embankment that will result in major adverse effects that will remain at year 15 and year 60 due to the proximity and scale of the Proposed Scheme.'

Section 13 addresses Sound, noise and vibration. Section 13.4.20 describes non-residential receptors which need to be taken into further consideration. IWA is aware that there are lengths of moorings used for residential full time or part time use on this section of the Trent and Mersey Canal which need to be added to the list (eg Wood End Lock below and above (Long Term)), and other areas short term including Fradley Junction itself. These canal users will also be affected by Operational noise nuisance as has been raised above, and additional noise mitigation will be needed.

In Section 13.5.14 HS2 Ltd dismiss users of footpaths as transient, with users not staying in any one location for long periods- without saying what this 'long period' is. IWA notes that there is no similar qualification in DCLG's NPPF Guidelines (2012), or in Defra's NPSE. Both expressly require sustainable development to reduce noise nuisance without qualifying that by a minimum duration of exposure.

It is IWA's position that HS2 Ltd's approach is not acceptable, and further 'best available technology' engineering and mitigation effects must be deployed at canal crossings and in the vicinity of marinas, short and long-term moorings to reduce transmitted noise as far as possible towards and below the SOAEL level. This would then ensure HS2 Ltd meet the UK Government's Noise Policy Aims for a:
'…situation where the effect lies somewhere between LOAEL and SOAEL. '

The UK Government policy aims do not differentiate between residential, non-residential and temporary receptors in the arbitrary way the Environmental Statement does.

IWA has suggested changes to increase mitigation above, and looks to HS2 Ltd to fulfil its offer in 13.5.38 to continue to 'seek reasonably practicable measures to further reduce or avoid these significant effects. In doing so HS2 Ltd will continue to engage with stakeholders to fully understand the receptor, its use and the benefit of the measures'.

CA2 Colwich to Yarlet

This CA has a reasonable balance of cut and fill, with a 15m high viaduct extended past Great Haywood Marina. The viaduct now starts behind the WCML, improving the openness and visual impact of the previously planned embankment alongside the marina. Nevertheless it still seems unnecessarily high.

Once over the Trent & Mersey Canal, the route runs parallel to the canal and about 2km west of it as far as Stone.

In Recreation, Leisure and Open Space 2.1.18-19 two important inland waterways related features are referred to. The first of these is the Trent and Mersey Canal Walk, one of 3 important named Public Rights of Way which are a key recreational resource, in this case linked to the resource represented by the canal itself in its Conservation Area.

The second is the Great Haywood Marina, described as offering 'temporary residential mooring points for canal boats and includes a convenience store, a café and a farm shop, which are located near to the entrance to the marina.' The marina also offers boat brokerage business and maintenance services such as painting and general repair work, with a covered workshop into which boats can be put once taken out of the water. The 'temporary moorings' referred to are generally procured on a 12 month contract, with a small number of additional 'visitor moorings' for boats in the area for shorter periods. These boats can be occupied for any period during this contract, and as such represent a residential facility similar to a holiday cottage for the owner. The marina and closely associated businesses together employ 30 to 40 people but would lose some of their trade if the attractiveness of the marina is damaged.

In addition to these 155 berths which may at any point be occupied, the premises also have a flat for the residence of the marina manager. These berths and other residential facilities have not been recognised in the Sound, Noise and Vibration survey and mitigation work, an omission which needs to be addressed.

Not yet included here (but in Environmental Baseline 6.3.4 below) are the mooring facilities above and below Hoo Mill Lock on the Trent and Mersey Canal, those above being on-line (that is, moored against one bank of the canal) and those below both on-line and in a small off-line basin to the east of the canal. These facilities also need to be recognised in the Sound, Noise and Vibration survey and mitigation work.

Section 2.1.33 contains changes to the design since the working draft EIA, and include a reduction in the height of Great Haywood Viaduct to 15.4m. along with its approach

embankment. Whilst this is welcome it remains a very significant structure, which IWA believes will benefit from further lowering into the environment as is explained below. The HS2 viaduct crosses the existing railway, which is already on embankment, and on the 2015 plans was shown as just 12.3m high where it crosses the Trent & Mersey Canal. However, it was then raised to 16.5m at that point without any explanation, making it even more visually intrusive and potentially radiating noise over a wider area, before this 1m reduction.

Section 'Description of the Proposed Scheme-Colwich to Colwich Bridleway 35 accommodation overbridge and on to Mill Lane autotransformer station': The route enters this section on Morton North Embankment, up to 9m high. The height of these structures seems to be governed by the height necessary to cross the Macclesfield to Colwich Railway, with route plan C861-ARP-CV-DPP-000-011003 Rev P08 giving a track level of 76m. AoD for that, and 89.4m AoD for HS2. The 13.4m difference between the two rail levels appears to indicate there is scope for further reduction in Moreton North's embankment height. This would then allow reduction in the height of the Great Haywood viaduct, reducing its visual and noise impact.

As suggested above for Trent Embankments and Gt Haywood viaduct, the height of Moreton North embankment could be reduced to reduce noise and visual intrusion, as well as making the cutting deeper to reduce the height of the crossing of the T&M Canal and River Trent. Landscaping and noise fence barriers would still be useful in minimising noise nuisance for Moreton Farm and Grange Farm.

It may be advantageous to replace the Moreton retaining wall proposed adjacent to Moreton House, with a 'cut and cover' tunnel for the section past the house, further improving mitigation of noise to this particular location in conjunction with reducing noise and visual impact elsewhere, provided the route could be reduced to the minimum needed to cross the Macclesfield to Colwich Railway at minimum height, and likewise Trent South embankment, Gt Haywood Viaduct and Trent North embankment, reducing noise and visual nuisance over a very wide area, whilst also reducing the cost of the embankments.

Retaining the proposed noise and visual screening will further improve their effectiveness in mitigating visual and noise impacts, and achieving the UK Government's Noise Policy Aims for a:

'…situation where the effect lies somewhere between LOAEL and SOAEL. '

The UK Government policy aims do not differentiate between residential, non-residential and temporary receptors in the arbitrary way the Environmental Statement does.

2.3.40 Trent South embankment main compound sets out construction activities to be carried out from this compound. These include construction of a temporary roundabout at the junction of Hoo Mill Lane, Ingestre Park Road, Great Haywood Road, and Mill Lane and

connection to a site haul road. The report also confirms the roads will remain open- essential as it provides access to Great Haywood marina and the moorings above and below Hoo Mill Lock, all of which include regular residential use.

2.3.41 mentions footpath diversions, including one around a temporary bridge to be constructed to take a haul road across the Trent and Mersey Canal. Plan CT-05-212 does not show any further information on the temporary bridge, its location or clearance. Neither is there any information on second (and third, fourth and fifth) temporary bridges identified in the Bill which this EIA accompanies. Any canal crossings will need to be agreed with the Canal and River Trust, who will specify air and towpath clearances, and the need to maintain the navigation and towpath in a safe usable condition at all times for users. IWA wants to see these details agreed with CRT to ensure this safeguard is in place, and unnecessary crossings eliminated.

Section 2.5.5 discusses other options considered to mitigate impact on Moreton House, to which IWA has offered a further suggestion above which has other advantages in mitigation for Moreton House and elsewhere. This is discussed further in 'Community' in 6.4.12-13

6.4.14 Recreational facilities outlines the land required from Great Haywood Marina's operational site for construction of the Great Haywood viaduct and associated utility works. This will require approximately 2.5ha of land within the north and east of the Great Haywood Marina for approximately three years and three months. This land is used, according to the report, as amenity grassland ancillary to the main function of the marina, and an area of parking, which provides approximately 20 parking spaces. IWA understands that the area is a wildlife compensatory area required by a planning condition associated with permission for constructing the marina. The total area of land required is stated to be approximately 41% of the overall site, however this report states rather optimistically that this will not impact on the number of mooring stages available at the marina, and so will not change the ability of the recreational visitor to use Great Haywood Marina for mooring boats. In practice the vast majority of boaters access their boat by car, to bring down food, clothing bedding and equipment to maintain the boat along with other members of the boat crew. It should also be pointed out that of the 'other basins in the area', only Aston Marina of those listed is not affected by HS2 construction to a greater or lesser extent. Without access by car the berth is of little use, and trade may well move to areas unaffected by HS2, driving jobs and economic activity from the area. HS2 needs to make more effort to preserve existing businesses in place, as a more effective mitigation than paying compensation, which should be a last resort.

The Construction Phase plan CT-05-212 shows the land take to include use of the Marina access track through the farm, which would potentially be extremely disruptive to its operation and should be removed.

Section 11. Landscape & Visual Table 29 describes the visual impact of the construction of Great Haywood viaduct and associated embankments on views across the landscape.

The construction will have 'a high magnitude of change and major adverse effects, which is significant.'
Moreover, the impact of operation on the landscape is confirmed as 'Operation of the Proposed Scheme at year 60 will remain a high magnitude of change and a major adverse effect, which is significant.'

With respect to the alluvial lowland landscape, the impact on the 'intimate scale and character of the Trent and Mersey Canal Conservation Area will be degraded by the scale of the viaduct.' Again the report confirms that 'Operation of the Proposed Scheme at year 60 will remain a high magnitude of change and major adverse effect, which is significant'.

Views from the Trent and Mersey Canal are impacted as 'the scale of the viaduct will dominate and be a substantial change to the historic character and scale of the view', and 'Scheme at year 60 will remain a medium magnitude of visual change and moderate adverse effects, which is significant.

Section 11.5.11 proposes to bring forward planting where it can be can be established early in the construction programme, including early planting in ecological mitigation sites, which will have the additional benefit of providing some visual screening. IWA agrees this is important and necessary where possible. IWA also notes that 'After completion there would still be potentially major adverse significant visual effects which would largely remain after 15 years.', and agrees that 'To mitigate these effects additional landscape planting should be undertaken as soon as possible before the start of construction.' However IWA notes the report says no further mitigation can be achieved due to the scale and size of the changes being made- and believes the small changes it has proposed to lower structures as far as possible into their surroundings are worth pursuing given the scale and duration of the impact.

Section 13 Sound Noise and Vibration: Appendix SV-001-000 – Annex G sets out HS2's approach to boat moorings. In that report in 2.2.3 HS2 dismisses 'temporary and static moorings' as, by their nature, transitory with users staying only for short periods of time (e.g. a few hours at a time). As users are therefore not exposed to increased noise for long periods any adverse noise effects on users are not considered significant. As has been explained above, and below in comment on Appendix SV-001-000, boaters navigating the waterways continuously will moor for up to 14 days and nights at a time, and on occasion will take a long term mooring alongside the canal as can be seen above and below Hoo Mill Lock, or in a marina such as Great Haywood. In a similar way, recreational boaters will retain a berth at a marina for a year at a time, which they will visit frequently and use as a 'holiday

cottage', and so will in future experience noise nuisance over a long period of time. The same use applies to boaters who hire a boat on a commercial basis for a holiday for a week, weekend or longer.

The increases in noise due to construction and operation of the Proposed Scheme mentioned in Annex G will adversely affect the acoustic character of the area around such facilities, which as baseline SNV data in Appendix SV-002-000 shows are often tranquil. IWA is pleased to see that Section 2.2.5 does recognise the need to protect permanent moorings which are treated as residential, but allowing for the lower sound insulation provided by the 'shell' of a boat compared to a house.

A main construction compound including worker accommodation off the A51 for the Trent South Embankment is now shown in CT 05-212 which would be operational from 2020 for 6 years (Figure 6) plus setup. This is just across the existing railway from the boatyard and mooring basin at Hoo Mill and could have a significant noise impact on the moorers and users of this facility, the Trent & Mersey Canal and the residents of Hoo Mill Lock Cottage. However, there does not appear to be any specific assessment of this or any proposed mitigation. IWA would like to see consideration of provision of temporary noise fencing along the existing railway embankment to minimise potential noise impacts from the compound.

Operational Noise: There will be up to 24 trains per hour when the full Phase 2 route is operational, or one every 2½ minutes on average. The Operational Sound Contour Maps (SV-01-106 & SV-02-106) indicate fence barriers on the south side of the viaduct 5m then 4m high with a bund or barrier on the adjacent embankment beyond the existing railway at up to 3m high. On the north side noise fencing begins in the east at 3m, then 2m, 3m and 4m. This results in predicted daytime sound levels of 55 to 60dB across Great Haywood Marina. IWA would like to see the noise fence barriers increased to reduce the noise levels across the marina, to take account of the residential requirement for the marina manager's accommodation, and the residential use of the 155 boats potentially moored in the marina. When added to the potential benefit of a further lowering of the viaduct track level, a more tolerable ambient noise will result for those spending recreational time on the canal, at a lower level between LOAEL and SOAEL as UK government policy expects.

Photomontages in the Mapbook indicate the proposed method of construction of the Trent & Mersey Canal Viaduct. LV-01-587 shows a 'Viaduct Launching Yard' pushing the deck across the valley from the eastern side. LV-01-636 shows this to be a thick concrete deck with a bulky appearance that is visually very intrusive. Reinforced concrete is notorious for unattractive weathering so it is not clear how discoloration will be prevented to maintain its grey-white appearance. Consideration should be given to using a painted steel deck which would be slimmer and less intrusive, with a more attractive and consistent appearance.

The visualisation LV-01-587 also shows existing trees remaining right up against the viaduct but this is most unlikely as they will need to be felled for construction access and to prevent leaves and branches falling on the lines. A more realistic impression should be provided.

Consultation Question 4: Comments on Volume 3 Route Wide Effects

Table 3 identifies that for these significant infrastructure projects, the majority of the carbon footprint arises from the initial construction process. The carbon footprint of 120 years of operation is just under 2.3% of that generated by its construction. The operation results from the generation of the electricity used to power the rolling stock, which may decarbonise further over time, but is currently expected to be 250,000 tonnes CO_2 equivalent.

Section 4.3.28 refers to how HS2 Ltd has embedded mitigation in its design process. However IWA has identified (in detailed comments above) several points where this does not appear to have taken place, so there remains concern that HS2 Ltd has not succeeded in embedding this process despite its claims.

One of the benefits claimed is design to a 1:100 year flood defence measure. IWA notes that this is a standard across the board requirement for any project, since EA updated its advice for developers in February 2016.

In Section 5 Community, there is a suggestion in 5.1.3 that the reference to experience from Crossrail and HS1 on Construction worker impacts on community resources can be used for HS2. However, the ability of large urban areas such as encountered in these two projects to assimilate this impact is completely different to that experienced across the majority of HS2's Y route, let alone that in this project.

Section 6 Cultural Heritage identifies a significant effect on designated heritage assets through direct physical impact, two of which are the Trent and Mersey Conservation Area. This comment rather misses the point that the scheme affects several parts of the same Conservation Area, which magnifies the impact. IWA has identified further mitigation which can be implemented, on reducing noise and visual impacts, and believes HS2 Ltd needs to work harder to mitigate these impacts.

Section 7.5.5- it is good to see this commitment to preventing the project inadvertently assisting the spread of alien species. IWA volunteers actively meet to remove Himalayan Balsam from waterways, which are a key means of it spreading, and moving soil and spoil is an easy way of unwittingly doing this whilst reinstating construction sites.

Section 8.2.4 refers to those health impacts from the project, including noise and visual impact (not actually included). IWA covers this in the question on Volume 5 below, where there is detailed discussion on HS2's approach. For canal users, noise is a route wide issue and will be experienced by individual users, as well as canal users in combination, as a route wide effect.

Visual effects are also route wide due to the number of canal crossings and close passings.

8.4.1 Avoidance and Mitigation measures- HS2 Ltd Claims (as in Vol 1) that vertical alignment of the route has been designed largely to reduce visual and noise intrusion as far as reasonably practicable. However, the plans significantly increasing the heights of the viaducts and embankments across the Trent valley north of Fradley and at Great Haywood (compared with 2015) without explanation contradict this. Hence IWA has proposed the lowering of viaducts and embankments in these and other areas to better minimise the visual and noise impact, as HS2 Ltds' Environmental Policy (11 April 2017 Revision P01) sets out:

- design visible elements of the built and landscaped environment in both rural and urban areas to be sympathetic to their local context, environment and social setting;
- effectively manage and control noise and vibration to avoid significant adverse impacts on health and quality of life;

8.6.3 makes a statement on the impact of noise on health across a 60 year period, based on DALYS, and indicating a 17% increase in the impact of noise. This is hard to understand with regard to noise nuisance likely to be experienced by canal users in the project area, even after not taking any account for people other than those in residential boats or housing- such as people in recreational activity, or working within the reach of noise nuisance at around over SOAEL? Specifically, those users who have choices and can avoid the noise nuisance may well do so, leading to lengths of the Trent and Mersey Canal becoming 'no go' areas for the use of existing recreational moorings whilst holidaying on a canal hire boat, or by moving a private hire boat from one marina affected by noise and visual nuisance such as the Great Haywood Marina whilst the Great Haywood Viaduct is being constructed, and later once the operational railway creates regular noise nuisance for marina berths occupied by owners boats., as trains pass eventually every 2.5 minutes. IWA considers more noise mitigation is needed, to get nearer to the current quiet ambience at these locations.

Figure 9 sets out the 'Health Burden' arising from the construction and operation of the railway. Presumably this assessment works for any individual experiencing noise nuisance and this close to the track. This will include boaters moored in an area to be affected by noise nuisance, or walkers using footpaths within this range. This confirms IWA's view that it is not appropriate for HS2 Ltd to decide they are not obliged to mitigate noise nuisance for

other than residential receptors, which is clearly not government's intention either in DCLG's NPPF 2012, or DEFRA's NPSE.

Figure 10 shows residential properties affected by noise nuisance. This does not include people who are exposed to noise nuisance, other than because they live in an affected property. Those experiencing noise nuisance outside will get a higher dose of health-affecting noise, albeit probably for a shorter period of time. These individuals are apparently airbrushed out of existence, because HS2 Ltd do not want to address noise nuisance, and despite the fact that most people will consider noise and visual impact to be the greatest change the project will create for them.

Section 8.6.15 concludes that the number of individual residents whose health is affected will be a very small number. Surely this analysis of the impact of noise nuisance from HS2 on anyone in its noise creation zone means HS2 should be working to eliminate all noise above SOAEL where it can potentially affect a Member of the Public going about their lawful business, if the nuisance arises from the proposed presence of HS2 operation. This is a simple task, and ensures HS2 noise does not rise above that which creates a health hazard. This would, from IWA's point of interest, cover people using canals, footpaths and similar and also go some way to ensure the Polluter, in this case those who construct and operate the railway, have to invest to reduce this impact and bring it down to a more reasonable level.

Question 5

Please let us know your comments on Volume 4: Off-route effects and map book

Volume 4 focuses on two areas, where conventional rail lines are to be modified to improve both to facilitate the HS2 services that will run on the conventional Crewe to Manchester Line (part of the WCML) north of Crewe, and south of Crewe, where it runs in parallel with the Proposed Scheme in the Whitmore Heath to Madeley (CA4) and South Cheshire (CA5) areas.

Section 4 covers in more detail the changes proposed to the WCML north of Crewe, with 4.1.2 identifying that proposed modifications to the Crewe to Manchester railway line comprise two distinct areas of works: at Maw Green (located approximately 2.5km north of Crewe Station); and Sandbach (located approximately 5.5km north of Crewe Station) respectively. These works are required to enable the conventional train services, which stop at Sandbach and other stations, to be regulated in either direction, allowing HS2 trains to overtake these stopping services. They are also claimed to assist in the efficient operation of freight services.

At Maw Green:

- All works are stated to be within the corridor of the existing railway
- The works run along a 600m length of the WCML
- The works provide 3 additional crossings at Maw Green, to allow trains to move from one track to another.
- Minor realignment of existing tracks is required, along with changes to tracks and signalling

Potential canal impacts begin where the Trent & Mersey Canal is crossed by the WCML on the edge of Ettiley Heath (Plan CT 06-244) just before (S of) the Hall Lane crossing, and continue around Ettiley Heath. A triangle of Network Rail land known as 'Rookery Bridge Road Rail Access Point' between the WCML, Hall Green Lane and the canal will be used, along with 'Sandbach Station satellite compound', to carry out the works. The canal towpath is not apparently affected. As has been stated in Question 1 above, this waterway is regularly in use throughout the year, and any work will need to facilitate boat traffic passing in safety, and the Canal and River Trust consulted.

At Sandbach:

- All works are stated to be within the corridor of the existing railway
- Work extends along a 1.5km section of the WCML
- The works involve the removal of five track crossings and the re-laying of seven crossings.
- Minor realignment of existing tracks is required, horizontally and vertically, along with changes to overhead electrical gear, tracks and signalling
- To accommodate changes to the overhead gear, bridge Number 18 (Sandbach Footpath 46) needs to be raised by 1m. This will mean it is closed for 3 months.
- The work at both sites is expected to take less than a year.

As a result of this work, once Phase 2a is operational, there are likely to be three HS2 trains per hour in each direction using the Crewe to Manchester railway line through Maw Green and Sandbach for a defined period. This corresponds to a maximum of two additional HS2 trains in each direction over and above the HS2 trains assessed in Volume 4 of the HS2 Phase One ES. These trains will replace the existing conventional fast services. Once HS2 Phase 2b is operational, HS2 trains will move to use the Phase 2b infrastructure to reach Manchester Piccadilly Station, instead of this route.

No information is provided on additional noise nuisance created by running HS2 trains over this section. IWA would like to know what HS2 assesses the additional nuisance as, and if appropriate what mitigation is proposed particularly at the canal crossing, and close running around the outskirts of Ettiley Heath as this noise will not necessarily be the same as that

from the existing railway traffic, and is a consequence of this project therefore should be included in this EIA.

Question 6

Please let us know your comments on Volume 5: Technical appendices and map books.

In general the CA specific information provided in the section of Volume 5 does not add to the information expressed in Volume 2 for each Community Area.

Route wide environmental reports are of interest, since they are used to evidence & set out criteria HS2 Ltd then employ in assessing impacts and their significance throughout the EIA.

Report E36 Cultural heritage route-wide historic landscape character report (CH-005-000) sets out the impact of the project on Historic Landscapes.
In 2.2.1 The assessment identified 19 HLCA, four of which are predicted to experience a 'significant effect' as a result of the Proposed Scheme. IWA notes two of these four relate to the significant impact of the crossing of the River Trent and Trent and Mersey Canal by the Great Haywood Viaduct and associated embankments.

- HLCA 7 Trent Valley and Weston
- HLCA 8 Tixall and Ingestre Parklands

IWA believes HS2 Ltd can further reduce the impact of the route on the landscape and canal and river by exploring IWA's suggestion that the route can be further reduced in height at the crossing, and as a result visual and noise nuisance can be minimised over a wide area and for many receptors, to an extent.

Report E58 Health Route-wide commentary on health evidence base (HE-003-000)
This report collates research from the last 10 years which links changes in health determinants with health outcomes, and specifically reviews available evidence relating to high speed rail, conventional rail, road or other major infrastructure projects.
Evidence is found in 3.6.3 that shows some link between Landscape and Visual impacts and health, where attractiveness, noise and other pollution, are adversely affected.
Section 3.6.8-10 discussed evidence linking noise nuisance to health. In addition to a Noise Association comment that rural areas can report bigger and more widespread noise nuisance than expected, and a European Commission publication that cited evidence that living in a quiet area 'had a positive impact on health', WHO reported in 2017 *'excessive noise seriously harms human health and interferes with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and*

psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behaviour'.
Evidence that access to green space has a positive effect on health was considered to be moderate, that for physical activity was considered strongly linked. However evidence linking access to services to health and wellbeing was considered to be moderate.

Report E61 Sound, noise and vibration methodology, assumptions and assessment (SV-001-000)
This report provided an introduction to HS2 Ltd's sound, noise and vibration assessment policy and methodology reported in Volume 5, and in individual Volume 2 Community Area reports. This is somewhat unhelpful, as the information can only be accessed and HS2 Ltd's assumptions and conclusions be checked after a great deal of research through the EIA.
The report covers both noise impact from construction and operation.
The report section 3 reviews significance, referring to Defra's NPSE 2010 and DCLG's National Planning Policy Framework 2012.
Section 3.1.4 discusses the work to ensure consistent assessment of significance along the HS2 route, as required by the EIA process. It also refers to 'ensuring that mitigation provides reasonable benefit compared to cost and has precedence in the assessment of schemes such as HS2 Phase 1 ...'. However IWA observes that this is not a reason to allow HS2 Ltd to avoid putting in place mitigation, rather that the EIA process requires mitigation, and if the developer is not able or prepared to provide it, the project would presumably not be approved. Defra and DCLG's policies are both aimed at ensuring noise levels do not increase from new development, especially when the receptors'- usually members of the public- health is significantly at risk. Levels at which this occurs are available world-wide, as mentioned in Vol 5 E58 (HE-003-000).
Section 3.1.9 appears again to consider 'significance' a tool for reducing mitigation within the project: 'It may therefore be argued that the definition of significance needs to reflect in part the approach to providing mitigation and the efficacy of the mitigation unless the level of exposure is in itself significant'. IWA would refer to the Control of Pollution Act 1974, requiring Best Practice Measures to mitigate or prevent pollution. Noise barriers are 'best available technology', so if property specified and fitted <u>will</u> be effective, otherwise the polluter's obligations have not been met.
This is usefully highlighted in the box quoting NPSE, which applies individually to each receptor affected:

[The Policy] Aims Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development [To]
1. avoid significant adverse impacts on health and quality of life;
2. mitigate and minimise adverse impacts on health and quality of life; and
3. where possible, contribute to the improvement of health and quality of life.

In IWA's view it is hard to see how a new rail route developed through currently quiet and tranquil areas of countryside can be approved without reducing noise nuisance experienced by all and any receptor below the SOAEL at least, and from government's point of view ideally driven by better mitigation as far below SOAEL as reasonably practicable. In some CA noise impact plans, noise is estimated clearly to be above SOAEL and therefore IWA believes it needs to be reduced further. This is helpfully summarised in a statement in 3.1.24, and further expanded in in 3.1.25 in terms of using better mitigation to drive noise impacts down to levels between LOAEL and SOAEL.
Section 4 then describes receptors as divided between 'residential' and 'non-residential' receptors, defining these:

- residential is applied to permanent dwellings (i.e. houses, apartments etc.).
- Hotels, hospitals and other buildings where people sleep but are not 'permanent' residences are considered as non- residential receptors.

Section 4.1.21 defines levels of noise greater than 45 dB (LpASmax) (measured indoors, near the centre of any dwelling room on the ground floor) as being likely to experience a significant adverse noise effect from construction or operation of the Proposed Scheme. Section 4.1.36 goes on to qualify this in that the nuisance must be experienced (or presumably be likely to be experienced) for more than a month to qualify for this effect. Section 4.1.52 and Tables 4 & 5 then confirm HS2 Ltd will use a 'worst case scenario' to evaluate significance for non- residential receptors, which is helpful given the complexity of identifying exposure by receptors in receptors such as schools or hospitals.

Section 5 goes on to discuss airborne noise, dividing receptors into either of two types:

- people, primarily where they live ('residential receptors') in terms of
    - individual dwellings and
    - on a wider community basis, including any shared community open areas; and
- community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels, collectively described as 'non-residential receptors' and 'quiet areas'.

IWA would suggest this rather narrow but tidy approach overlooks the fact that people live in places other than permanent dwellings- such as boats, on moorings permanently or transiently or moving from one to another. Residence might be as part of a journey, or as part of a recreation. Having either disrupted by noise nuisance would be unacceptable according to Defra and DCLG's noise policies. A specific location may potentially permanently contain people in their residence, or people in a recreational facility, who change from time to time as others move to the location as part of their recreation activity

or as their lifestyle. It is not appropriate for HS2 Ltd to discriminate against these individuals by not being prepared to mitigate the significant noise nuisance from this project, especially when compared to a pre-project baseline situation.
Section 5.1.1 sets Table 6 as a matrix of SOAELs for differing duration and intensity of construction noise. IWA want to see these criteria widened to include the wider variety of locations being used as outlined above, and including for example the location as a specific mooring which is itself regularly used, but by different receptors.

Section 5.1.19-25 details the SOAEL for residential receptors at various locations and times. However, this again uses too narrow a definition of where and under what circumstances these receptors experience the noise nuisance. This IWA believes needs extending to apply more accurately by other people in other circumstances as set out by IWA above.
IWA agrees with the statement in 5.1.26 on people's perception of noise. In many cases the current 'environment without the proposed scheme' is fairly tranquil. The situation set out in 5.1.29 may well be seen to exist at a boat marina, or at a canal visitor mooring where a group of boats may either routinely be moored on a long-term basis, or the moorings may be occupied frequently but by different boats. IWA considers that these areas should still be able to enjoy levels of noise below SOAEL.
Annex C Section 2.2.22 mentions provision of noise insulation in the event of significant noise impact. For residences such as boats, this will need to be more specific given the differing ability of the boat's construction to mitigate noise on the façade, and the different ventilation needs of a boat. For example, Boat Safety Certificates look for a minimum amount of ventilation on board which should not be intercepted without safety risk.

Annex D2 - Operational assessment -airborne sound
Section 3.1.8 states that a 'multifactor' modelling tool is required to properly assess and predict rolling stock noise for trains travelling 'at very high speeds' above 300kph. Is this what HS2 Ltd have done, or are doing? The narrative suggests so without being specific. What noise generation has been used for modelling impacts?
3.1.14 (and again at 5.1.6) makes the assumption that HS2 will procure rolling stock which will meet specific criteria of operation and maintenance to achieve the sound noise predictions used in this EIA, otherwise IWA would presume that the trains would be operating outside the criteria used to justify the project. In view of the uncertainty around who will purchase & operate the rolling stock, and maintain the track, IWA considers their noise performance should be specified as part of the EIA and any necessary undertakings given by the promoter to ensure this happens. Covering the issue with a specific rolling stock EMR including performance on noise appears appropriate.

Annex G - Assessment of effects (route-wide)
This annex sets out the approach of the project to certain route-wide receptor specific effects.

Section 2.2.1 and 2.2.2 refer to users of Public Rights of Way. Here HS2 suggests that use of them is for short duration, at varying distances from the HS2 track, and is in essence avoidable. IWA disagrees with this summation. By creating a nuisance on a public right of way, the project is degrading a walker's right to use the path in the way they can today. By exposing walkers to the noise from a close- passing train, Fig 4 Appendix SV-001-000 – Annex D2 shows walkers will be exposed to 88dB LpAeq,tp total passby sound @25m from the train, when it is travelling at 300kph. At the track design speed for this section of the project, 400kph, the exposure would be closer to 95-100 dB LpAeq,tp. On opening in 2027, 6 trains each way will be operating, rising to 12 trains each way in the Colwich-Yarlet area, or a train passing every 2.5 minutes on average, with a duration of 2.5 seconds for a 200m train. This will change a stroll in the country to something rather less enjoyable unless the walker enjoys the protection of landscaping or noise fence barriers of some sort. The suggestion in this section that walkers will have to tolerate this does not seem reasonable. The same nuisance effect will be experienced by boaters and canal walkers in those sections where the canal runs alongside a section of HS2 track, or more briefly when HS2 crosses over a canal. Boaters cannot avoid this navigation, as like the train they have to use the route provided initially.

Section 2.2.3 Moorings- this sets out HS2's understanding of boaters' rights of use on moorings, as: '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). People generally use such moorings when starting on journeys to other locations along the waterways network or whilst en-route between locations. 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, as users will not be exposed to any increased noise for long periods any adverse noise effects on users are not considered significant.' IWA disputes this as an accurate description of use of moorings. Boaters can moor up to the towpath side of a canal anywhere other than where this would obstruct navigation. A boat represents a fully equipped residence, and can remain moored for up to 14 days in this one place, and then must move on to another similar location as part of their journey, and moor again. At other locations on the non-towpath side, by arrangement with the landowner and navigation authority, a boater may moor their boat permanently, as can be seen on the canal immediately above and below Hoo Mill Lock, and a couple of miles further up the Trent and Mersey Canal. These are known as 'on line moorings'. Some boaters will moor their boat permanently in a marina, and either use it as a 'holiday cottage' at the weekend, or as a permanent residence. During these periods the occupier will effectively be residential, and suffer the noise nuisance associated with the location. Mooring a 50' boat at Great Haywood Marina is advertised at over £2000 per year, plus other services such as mains electricity and water supply whereas online berths will be lower cost, with fewer services. IWA considers that these berths should enjoy noise mitigation to below SOAEL, and ideally nearer midway between LOAEL and SOAEL, as otherwise users will avoid the area,

and the various commercial operators of these mooring businesses and those who offer other services to passing boaters will lose business and have to downsize or move as a result of the nuisance.

As stated above, Section 2.2.4 is an inaccurate description of static moorings as used on inland waterways navigations. On these, long term residential use can be permitted, and so they need to be considered as potentially significantly affected by noise due to construction or operation of the Proposed Scheme.

IWA is pleased to see HS2 Ltd's commitment to treat permanent moorings as residential, as set out in Section 2.2.5 Permanent moorings are treated as residential, but allowing for the lower sound insulation provided by the 'shell' of a boat compared to a house.

Annex H - Health Evidence Base

IWA agrees with WHO's view on noise According to the World Health Organization (WHO), 'In some situations, but not always, noise may adversely affect the health and well-being of individuals or populations'. More recently, the WHO has stated that 'Environmental noise is a threat to public health, having negative impacts on human health and well-being'.

The Babisch noise effects model encapsulates the empirical effect observed as individuals respond to unwanted noise. Many canal users come to inland waterways to experience the calm and tranquillity often found there, which will be dispelled by some aspects of the HS2 developments proposed. It is not clear whether the result will be to drive people away to other quiet places, or whether users will come to accept the situation. Mitigation of levels to between LOAEL and SOAEL offers the best chance of this result.

IWA agrees it is correct to say that, as in 2.1.2, typically there is no threshold of effect but the effect increases slowly with increasing noise exposure. However, as is set out in this report, there is as yet no clear and evidenced link between levels of noise and individual health effects beyond that of impact on sleep, and a more general understanding that tolerance of noise appears to be diminishing rather than increasing. Only by reducing noise nuisance to within government's expectation

IWA Position on Noise Affecting Waterway Users

UK government noise policy (Defra NPSE 2010, DCLG NPPF 2012) sets out three aims, the first of which is to 'avoid significant adverse impacts on health and quality of life.' The policy states:

'any receptor forecast to experience an absolute 'end state' exposure from the source that exceeds the relevant SOAEL [Significant Observable Adverse Effect Level] should be

identified as being subject, in EIA terms, to a likely significant adverse effect. This would reflect the aim to avoid significant effects on health and quality of life.'

In the noise appendices HS2 Ltd set out upper limits for the SOAEL for the project by reference to WHO and UK Noise Insulation regulations:

'For night-time, the World Health Organization's Night Noise Guidelines for Europe introduced an Interim Target of 55 dB $L_{PAeq,8hr}$ measured outdoors. This is the noise threshold used for category 'C' of the ABC impact criteria at night (refer to section 14 of the SMR) and again can be taken to be a SOAEL [significant observable adverse effect level] During the daytime the free-field level of 65 dB $L_{pAeq,0700-2300}$ is considered a SOAEL. This is consistent with the daytime trigger level in the UK Noise Insulation (Railways and other guided systems) Regulations...'

HS2 Ltd then quantified change in noise levels as another aspect of sound from the project which can be identified by receptors as noise, by reference to the table below:

Table 7: SMR Table 41 Airborne sound from operational train or road movements - impact criteria

Long term Impact Classification	**Short term Impact Classification**	**Sound level change dB $L_{pAeq,T}$ (positive or negative) T = either 16hr day or 8hr night**
Negligible	Negligible	≥ 0 dB and < 1 dB
Minor		≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3 dB and < 5 dB
Moderate	Major	≥ 5 dB and < 10 dB
Major		≥ 10 dB

Annexes set out the basis for modelling sound generation and transmission from HS2 by reference to HS1, academic papers on European high speed trains and other sources set out in Volume 5 Route Wide Effects. From these (See Figure 4 below) a maximum noise level within 25m of an HS2 train is indicated as >90dB at up to 360 kph.

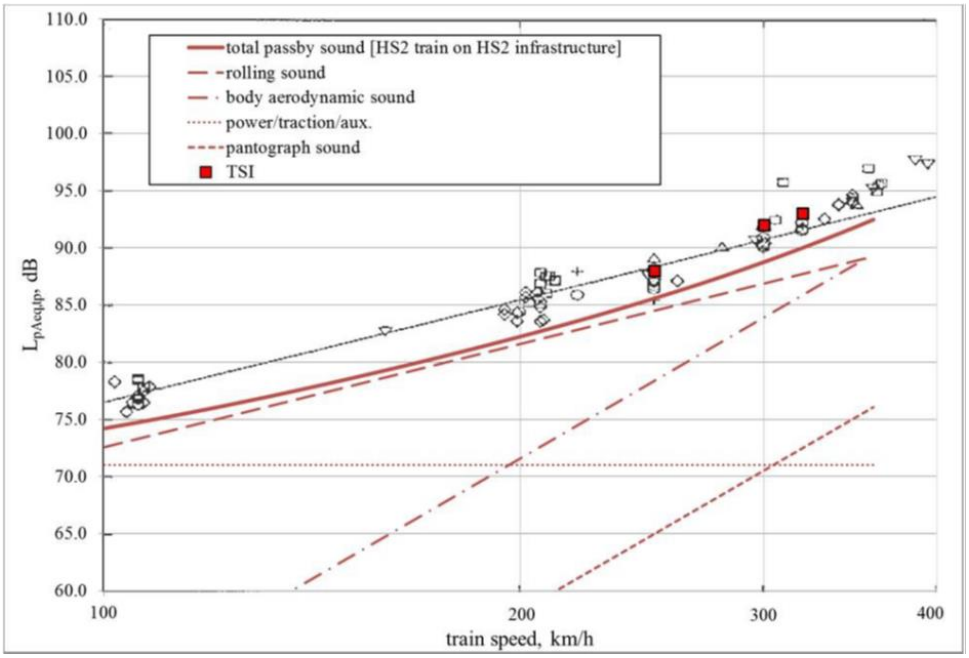

Fig 4 Appendix SV-001-000 – Annex D2: LpAeq,tp vs speed for total and source component pass-by sound at 25m from the track predicted using the HS2 trains source terms

However the appendices consider users of such facilities as Public Rights of Way and locations that have temporary and static moorings or permit occasional overnight stays such as static moorings, camp sites or caravan parks but do not permit long term residential use, as transient receptors. Users of such facilities are not considered by HS2 Ltd to be significantly affected by noise due to construction or operation of the Proposed Scheme due to the short and irregular exposure to noise from the Proposed Scheme. Permanent

moorings are however treated as residential, whilst allowing for the lower sound insulation provided by the 'shell' of a boat compared to a house.

On this basis, HS2 expects (amongst others) waterway users whether on boats or towpaths to be exposed to levels of noise above the project-determined SOAEL of 65dB (daytime) 55dB (night time), or a 'Major' change in noise levels of ≥5dB because the impact will be transient. In practice these levels could be as high as >90dB for a boat or towpath user passing under a low bridge whilst a train passes close overhead, and represent a change in sound pressure of over 20dB every 2.5 minutes lasting for 2.5 seconds or more. This is considered acceptable by HS2, despite the context that without the project going ahead waterway users could still enjoy the current absence of noise without detriment, and in many locations little attempt has been proposed to reduce noise levels to below SOAEL with best available technology despite the UK Government's stated policy on noise pollution'… to avoid significant effects on health and quality of life.'

It is IWA's position that this is not acceptable, and further 'best available technology' engineering and mitigation effects must be deployed at canal crossings and in the vicinity of marinas, short and long-term moorings to reduce transmitted noise as far as possible below the SOAEL level. This would move towards the UK Government's Noise Policy Aims for a: '…situation where the effect lies somewhere between LOAEL and SOAEL. '

The UK Government policy aims do not differentiate between residential, non-residential and temporary receptors in the arbitrary way the Environmental Impact Assessment does, and sees new developments such as HS2 as an opportunity to manage noise creation sustainably. IWA is pleased to see HS2 Ltd repeats this aim in its own Environmental Policy (April 2017), whose purpose is:

'This policy provides a framework for environmental protection and management for HS2 and its operations. It also acts to fulfil the environmental commitments established through HS2's Sustainability Policy and our strategic goal of creating an environmentally sustainable solution and being a good neighbour to local communities.'

In the Policy's List of Environmental Principles, the Principle on Noise is set out as to:

'effectively manage and control noise and vibration to avoid significant adverse impacts on health and quality of life'

IWA believes there is more to do to achieve this, and has set out some further information and suggestions in this Consultation Response to assist attainment of this for Phase 2A.

IWA General Principles for Protection of Waterways Impacted by HS2

The following principles with respect to waterways need to be applied to HS2's proposals for phase 2a:

- Protection of Routes – No canal should be lost or blocked, whether a restoration project or a navigation in use, and where the route crosses a waterway, the waterway should be restored to a minimum of navigation standard, whether the navigation is presently extant or not.
- Navigation – There should be minimal disruption to navigation during the construction phase, and any necessary impacts should be integrated with the navigation authority's planned stoppage programmes.
- Waterway gauge - there should be no detriment to the constructed gauge of any waterway due to HS2, particularly in respect of headroom, taking account of any proposed enhancements on freight waterways. Any waterway crossings or other alterations to the waterway should comply with the appropriate navigation authority's policy of headroom over water, over towpaths, and on minimum width.
- Mitigation – wherever possible mitigation should be completed in advance of construction.
- Betterment – opportunities should be sought to achieve betterment for waterways within the planning process as compensation for environmental and heritage damage caused by HS2's construction and operation.

Waterway Design Principles for the HS2 Project

HS2 will have a significant number of interactions with and impact on waterways as it is constructed and moves into operation. In IWA's experience, these impacts can be significantly improved by good thoughtful design as can the operability and maintainability of the structures both for the railway and the waterway. Canal & River Trust have taken a lead in documenting a series of 'general design principles that guide the post-planning development of HS2 design within the corridor of the waterways.' IWA is very supportive of this work, and believes use of these Design Principles will facilitate good design within the waterway context. Use of these principles should be a requirement of designs with a waterway interface and impact.

Summary

IWA considers that HS2 should review and change its whole approach to noise mitigation to comply with Government Policy, and to recognise all waterway users as receptors requiring noise protection at least equivalent to residential receptors, for all the reasons given above.

Wherever possible, the visual impact of the railway on the waterways and their users should also be minimised. In particular, the following design changes should be made:

In CA1 Fradley to Colton:

- The height of the route across the Trent and Bourne Brook valley, including the Kings Bromley viaduct, Bourne embankment and River Trent viaduct, should be reduced to the minimum necessary for the road and river crossings to limit visual impact and noise propagation over a wide area and to reduce construction costs.
- Noise barriers across the Phase 1 Manchester spur bridge over the Trent & Mersey Canal at Fradley should be raised and extended onto the adjacent embankments to provide more effective acoustic screening for the canal moorings, navigation and towpath users, nearby residential properties and the Conservation Area.
- The construction details for a temporary water supply to Pyford Brook Viaduct Satellite Compound need to be reviewed to minimise impacts on the Trent & Mersey Canal banks and habitat.

In CA2 Colwich to Yarlet:

- The height of the viaduct alongside Great Haywood Marina should be reduced to the minimum necessary to bridge the existing railway line to help limit noise and visual impacts.
- The noise fencing across Great Haywood viaduct should be further raised to the maximum possible to provide better noise protection for the residentially used moorings, manager's flat, and the other marina, canal and towpath users, and to limit damage to the marina and associated businesses.
- Further details should be provided of the two proposed temporary bridges over the Trent & Mersey Canal at Great Haywood and any impacts on the navigation and towpath should be minimised.
- An adequate temporary noise fence barrier should be provided along the boundary of the Trent South Embankment Main Compound with the existing railway to reduce noise impacts on the canal and boat moorings around Hoo Mill.

Ends.

The Inland Waterways Association
Island House,
Moor Road,
Chesham,
HP5 1WA