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The Planning Inspectorate

2<sup>nd</sup> December 2013

For the attention of Mark Wilson, Principal Case Officer, The Planning Inspectorate

By email: ThamesTunnel@infrastructure.gsi.gov.uk

Tb/tw

Dear Sirs

**Thames Tideway Tunnel/Chambers Wharf  
Downings Roads Moorings SE1 2AX: Further Written Representations  
Unique Reference Number: 10018607**

(1.0) Introduction

- 1.1 Following my earlier Written Submission dated 4<sup>th</sup> November 2013 on behalf of Tower Bridge Yacht And Boat Company and the residential community at Tower Bridge Moorings at Downings Roads, I have had the opportunity to attend two of the public hearings before your Panel, on 12<sup>th</sup> and 22<sup>nd</sup> November respectively.
- 1.2 At these hearings I was able to hear the contributions made by both other Interested Parties and by Thames Water (TW), and also was given the opportunity myself to make brief oral representations, for which I am grateful to the Panel.
- 1.3 In addition, TW agreed to a meeting with some of our berth-holders and ourselves, which took place on 20<sup>th</sup> November.

(2.0) Concerns remaining

2.1 After hearing everything that was said at the two hearings and the TW meeting, our three core concerns remain – and if anything have intensified, namely:

- (a) The effects on the river regime: scour and siltation
- (b) Noise, and the particular vulnerability of houseboats
- (c) Navigational safety

2.2 In addition, there is the cumulative effect on our berth-holders both of these stresses, peculiar to the moorings, with the other impacts that they would be burdened with in common with the rest of the residential community surrounding Chambers Wharf, such as the increase in road traffic, dust and general disruption. This burden falls most heavily on families with children. Among the Downings Roads residents, there are currently six families with young children, most of whom attend one of the three local schools which are themselves severely affected by the TW proposals.

Turning now to the specific issues:

### (3.0) River Regime: Scour and Siltation

3.1 At our meeting with them on 20<sup>th</sup> November, TW conceded that the effects on the river regime of major structures built into the tidal river are extremely difficult to predict with accuracy. The picture is made more complex as a result of the cumulative effect on the river regime, to which the Port of London Authority has drawn attention, resulting from the combination of the various works proposed in and around the River Thames as part of the Thames Tunnel project. In spite of this TW remain wedded to the 'monitor and manage' approach. That is to say: go ahead and build, and if there are adverse impacts in terms of scour or accretion, put mitigation measures into effect only at that stage.

3.2 This is not reassuring. If serious consequences were to follow from the construction of the proposed cofferdam, for example either the undermining or alternatively the silting up of the vessels on the moorings, there is no reasonable mitigation that could be offered short of removal of the houseboats from the moorings. This is unacceptable to our berth-holders.

### (4.0) Noise

4.1 Because of our continuing concerns about the impact of noise and the particular vulnerability of residential vessels, we have decided to commission an independent noise report from Rupert Taylor, acoustic consultants, who are already familiar with Chamber Wharf and TW's proposed works.

4.2 A copy of their report is attached. It concludes that TW's assessment methodology is flawed in three important respects, and that owing to their particular characteristics the residential barges at Downings Roads are likely to be exposed to unacceptable levels of noise for which there is no effective mean of mitigation.

### (5.0) Navigational Safety

5.1 In their document Ref APP20 entitled '*Chambers Wharf: proposed changes to working hours*' TW introduced a proposal to substitute barges of 5,500 tonnes for those originally proposed of 1,500 tonnes. At the Panel's hearing on 12<sup>th</sup> November, reference was made to these same proposals. At that hearing, a representative of the Port of London Authority noted that there

was no precedent for the use of such barges for carrying materials in this part of the tidal Thames. Instead he compared the size of these large barges to the cruise liners which from time to time make a passage upriver past Chambers Wharf to be berthed alongside HMS Belfast. Such vessels are invariably assisted by one, and sometimes two, tugs.

5.2 At the meeting with our berth-holders held on 20<sup>th</sup> November, barges of 5,500 tonnes were again referred to.

5.3 At the subsequent hearing held two days later on 22<sup>nd</sup> November, however, this proposal had apparently been dropped. TW stated that they were now considering the use of barges of 2,300 tonnes. These are much closer in size to the 1,500 tonne barges that were originally proposed.

5.4 These changes at short notice do not inspire confidence in the thoroughness of TW's consideration of alternative strategies. From the point of view of navigational safety and the potentially serious consequences of a collision between a large barge and residential vessels moored at Downings Roads Moorings, any reduction in barge size must be welcomed. However, the smaller the barges proposed for Chambers Wharf, the less compelling is the difference between their capacity and the capacity (around 300 tonnes) of barges capable of servicing the Abbey Mills site by way of Bow Creek. This difference has been stressed by TW as the reason for selecting Chambers Wharf over the alternative at Abbey Mills as the main drive site.

#### (6.0) Abbey Mills

6.1 From my own familiarity with the Abbey Mills site, in my capacity as an architect who has worked on projects in the area of Bow Creek and Leamouth, I do not feel that TW has given full and proper consideration to the use of Abbey Mills rather than Chambers Wharf as a main drive site.

6.2 In the event that Chambers Wharf were to be used, during the proposed works, as a reception rather than a drive site, I believe that the impact on the Downings Roads houseboats, not to mention the larger residential community, would become a tolerable rather than an impossible burden. Looking further ahead, the use of the wharf for both ventilation of and access to the Thames Tunnel can readily be accommodated into the long term redevelopment of the site.

6.2 I would therefore ask the Panel to use its powers to impose a pause on the Inquiry in order to allow the Secretary of State to extend its remit to include alternatives such as Abbey Mills as the main drive site.

#### (7.0) Shad Thames Pumping Station

7.1 At the meeting on 20<sup>th</sup> November we put to TW our concern that, after all the costs and disruption of this major engineering project, the discharges from Shad Thames, the CSO most local to Downings Roads Moorings and Chambers Wharf, will be reduced by less than 25%.

7.2 Their response was that none of the CSOs is going to be capped following completion of the Thames Tunnel. Discharges of untreated sewage into the River Thames will continue albeit on a smaller scale than at present, and therefore there was no reason further to reduce the discharges from the Shad Thames Pumping Station.

7.3 These discharges have a direct effect on the health and well-being of the residents of Downings Roads Moorings, and this response is wholly unsatisfactory. I trust that as a part of the reconsideration of the project referred to above TW's earlier proposals to connect the Shad Thames CSO to the main tunnel can be investigated again, so as to achieve a substantial reduction if not a complete cessation of these unacceptable discharges.

#### (8.0) Invitation

In conclusion, I should like to repeat the invitation already extended to the Panel, to make a site visit to Downings Roads Moorings. Such a visit will clarify for the Panel the mooring community's special vulnerability to the impact of TW's proposals for Chambers Wharf.

Yours faithfully

Nicholas Lacey

for

Tower Bridge Yacht And Boat Company Limited

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2 December 2013

Dear Mr Lacey

**Thames Tideway Tunnel Project (TTT)  
Review of effects of noise on houseboats at Downings Roads Moorings**

Further to our telephone conversation I now report the results of reviewing the assessment of noise at the above location presented in the Environmental Statement (ES) for this project provided by Thames Water Utilities Ltd (TWUL).

This letter first summarises the findings of the review, the details of which follow.

**Summary**

The assessment methodology described in the ES is flawed for the following reasons:

- a. The ambient sound levels were measured at a site remote from the moorings. The ES states that it was at CHW01 (East Lane) though TWUL has subsequently said that it was at CHW03 (Cinnebar Wharf). Both these locations are some distance from the moorings and CHW01 is subject to road traffic noise from which the moorings are well-screened. In consequence the levels attributed to the moorings could have been over-estimated.
- b. Levels of construction and production noise have been under-estimated, since for certain operations during the installation of the cofferdam there does not appear to be any practicable way of providing the screening described and the nearest vessels also lie closer to the working area than is stated in the ES.
- c. No account has been taken of the special characteristics of houseboats, which by their nature are more vulnerable to external noise than conventional dwellings, and which do not lend themselves to conventional mitigation measures.

In conclusion, if TWUL's proposals for Chambers Wharf were to proceed, the residential vessels are likely to be exposed to internal noise at levels which exceed the criterion in the ES for significant daytime effects even though the ES reports no significant effects there. Internal levels could also be above a level that in the case of conventional dwellings would qualify them for insulation under the project's Noise Insulation Policy. However, owing to the houseboats' characteristics the noise will not be capable of effective mitigation.

## Structure of the Review

First the methodology used in the ES to assess the effects of airborne noise on dwellings is set out. Next, the location of the moorings and some special characteristics of the construction and use of the houseboats there are described. The results of the review are then presented including the implications of applying the ES assessment methodology to the particular case of the houseboats. Finally, I have referred to our discussion about the transmission of noise to the houseboats through the water.

## Assessment methodology in the ES for effects from airborne noise

The project's general environmental assessment methodology is set out in Volume 2 Section 3 of the ES; specific factors in relation to the Chambers Wharf worksite are included in Volume 20 (including Appendix G). Mitigation issues are dealt with in Schedule 2 of the Statement of Reasons (which describes the project's Noise Insulation and Temporary Re-housing Policy) and the Code of Construction Practice Volume 1 Part A (project-wide) and the Code of Construction Practice Part B (specific to each worksite).

The assessment method has three stages followed by a mitigation stage where necessary:

- 1 ***Determine the level of construction noise*** (*Vol 2 paragraph 9.5.19*)
- 2 ***Determine the construction noise threshold level*** (*Vol 2 paragraph 9.5.20*)
- 3 ***If the level of construction noise exceeds the threshold level apply further procedures to determine whether the effect is 'significant'*** (*Vol 2 paragraphs 9.5.21 et sequi*)
- 4 ***Where significant effects are predicted despite the application of mitigation on site, a Noise Insulation and Temporary Re-housing Policy is applied*** (*Code of Construction Practice Part A, paragraph 6.5.2*)

### ***1 Determine the level of construction noise***

Using the procedure in British Standard 5228 (BS5228), the ES includes predictions of the typical, minimum, and maximum construction noise levels for the daytime, evening and night-time periods at each of 11 receptors (CW01 – CW11) in the vicinity of the Chambers Wharf worksite. For the houseboats (receptor reference CW10) the values are: 52dB<sup>1</sup> (40dB min, 60dB max), 47dB (27dB min – 47dB max), and 43dB (30dB min, 43dB max) respectively. In the BS5228 procedure the levels are predicted using information about the sound power levels of the construction plant expected to be used and factors such as the distance between the plant and the receptor, and any acoustic screening present.

### ***2 Determine the construction noise threshold level***

The construction threshold levels in the ES were determined using Method 1 (the 'ABC' method) from BS5228 which requires the existing (ambient) noise level to be known for each of the three periods mentioned above. To provide that information a baseline noise survey was undertaken at 5 locations (CHW01 to CHW05). One of those survey locations (CW 03) was opposite the site on the northern bank of the river, the rest were close to the worksite. The results from those 5 survey locations were assigned to one or more of the 11 receptor locations.

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<sup>1</sup> All noise levels are L<sub>Aeq</sub> value averaged over the relevant time period.

### **3 Determine whether there is a significant effect**

The ES explains (Volume 2 Section 3 paragraph 9.5.22) that although BS 5228 describes situations in which the construction noise level exceeds the threshold as a 'significant effect', in the ES exceeding the threshold was only deemed to indicate a potential significant effect and that a further stage was applied involving professional judgement to determine whether to designate a given situation as a significant effect. In the case of residential receptors factors taken into account included:

- 1 For the daytime, whether with closed windows the internal noise level exceeded 40dB – the 'reasonable standard defined in British Standard 8233; exceedances for periods of up to 1 month would not necessarily be deemed to be significant.
- 2 For the night-time, the Interim Threshold value of 55 dB (outside) contained in the WHO Night Noise Guidelines for Europe (NNGs) was applied. The ES explains the basis for this selection. British Standard 8233 (BS8233) describes an internal noise level at night of 35dB as 'reasonable' and the WHO NNGs use a noise reduction from outside to inside of 21dB;  $35 + 21 = 56$  dB. The noise reduction value of 21dB is greater than the figure of 10–15dB found in other publications<sup>2</sup> but the reduction of 21dB in the NNGs is averaged from survey data which took into account the proportion of the year that windows are opened for ventilation at night and the extent to which they are opened.

### **4 Noise Insulation and Temporary Re-housing Policy**

This policy sets out trigger levels which if exceeded will entitle occupiers of dwellings to an offer of noise insulation or temporary re-housing provided certain conditions are met. Trigger levels are set for the day, evening, and night-time periods and they include sub-periods of 1-hour within each of them. Among the conditions that must be met to qualify for an offer of noise insulation (or re-housing) is that the relevant level must be exceeded for at least ten out of fifteen consecutive days.

The Statement of Reasons notes (Schedule 2 paragraph 7.1) that for certain kinds of dwelling (including houseboats) noise insulation is not a viable option and so, where an entitlement to noise insulation is identified they will be treated on a case by case basis and temporary re-housing might be considered.

### **Location of the Houseboats and the Ambient Noise Survey Locations**

In the ES the houseboats, which are actually lying at the Downings Roads moorings are incorrectly described as "moored at Tempus Wharf". The ES also incorrectly states that they are "located 100m from the western boundary of the proposed worksite at Chambers Wharf", whereas the nearest residential vessels are actually around 80m from the proposed worksite. They have been allocated receptor reference number CW10 and the ambient noise levels assigned were those from noise survey location CHW01 (ES Vol 20 Table 9.4.1, page 12). That survey location is close to the worksite's western boundary and largely screened from the river but adjacent to East Lane, to the north of Chambers Street. Two other survey locations (CHW02 and CHW03) have either a partial or a completely unrestricted view of the river while being better screened from local road traffic compared to survey location CHW01. The daytime threshold value derived from CHW01 is 5dB higher than those for CHW02 and CHW03, the evening threshold value is the same as for those locations, and the night-time value is the same as that at CHW02 and 6dB lower than that at CH03.

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<sup>2</sup> Paragraph 9.5.48 of this part of the ES refers to other WHO guidance, BS 8233, and PPG24.

I understand that at a meeting between some of the berth-holders and TWUL on 20 November you queried the suitability of this survey location for the houseboats. TWUL said that the survey location used was CW03 (Cinnebar Wharf, *i.e.*, on the opposite bank of the river) but undertook to carry out an additional ambient noise survey nearer to the houseboats' location.

### **Characteristics of the construction and use of the Houseboats**

There are three aspects of the construction and use of Houseboats that are different from typical dwellings and which can affect the noise reduction from outside to inside.

First, for a variety of reasons the habitable areas tend to have few soft furnishings and so the amount of acoustic absorption is lower than for a more conventional dwelling. Consequently, for a given noise level outside the boat, the internal noise level will be higher than for a more conventionally furnished dwelling. This factor is relevant whether the windows are closed or open.

Secondly, I understand that few of these houseboats have any superstructure above the deck – the accommodation is below the deck within the hull. Any accommodation above deck level comprises inhabited wheel-houses and the like, which are invariably of lightweight construction, usually designed to be collapsible so as to reduce air draft for passage-making under low bridges. Thus the construction of the boats is quite different from normal masonry/concrete buildings and so with closed windows (which are all single-glazed) the noise reduction from outside to inside could be lower than for closed single-glazing in normal buildings.

Thirdly, because of the propensity of houseboats of this kind to condensation, occupiers are likely to keep their windows open for longer periods (and perhaps to a wider extent) than would be necessary for occupiers of conventional houses. Thus the option to close windows is likely to be less practicable for these houseboats and this means that the noise reduction from outside to inside is likely to be lower than for conventional dwellings whether considering short periods or in relation to the 'annual average' that led to the WHO NNG figure of 21dB.

### **Review of ES assessment of airborne construction noise at the houseboats**

Three issues have been identified in the review – the predicted construction noise levels, the ambient noise, and the assessment methodology.

#### ***Predicted construction noise levels and screening***

According to the ES the following factors have been taken into account when determining the noise levels at the houseboats from worksite activities: distance, screening by the site hoarding, screening by the hoarding at the edge of the coffer dam, and screening by existing buildings (Volume 20 paragraph 9.5.62, on p21). The Code of Construction Practice Part B states that there will be a 2.4m hoarding on the eastern and western edges of the cofferdam (Doc Ref 7.19.2, p 5).

The wall of the coffer dam will be constructed from piles and from details provided in Volume 20 Appendix G (Table G.12) the pile driving plant appears to be the main source of noise for this activity. Insufficient information is provided to enable the predictions in the ES to be replicated but in the absence of any screening the piling equipment is estimated to produce a level of 70dB at the houseboats (*i.e.*, a point 100m from the plant). That is consistent with the maximum (daytime) noise level in the ES

of 60dB including screening. However, because the nearest residential vessels are around 80m rather than 100m from the worksite the worst case noise levels would be about 2dB higher, *ie*, 72dB unscreened and 62dB if screening were to be practicable.

However, it is not clear how the hoarding at the edge of the coffer dam can be supported before the piled wall has been constructed, and so how it can provide protection from that part of the construction. Furthermore, it is not known whether the height of 2.4m been reviewed to confirm that it will be sufficient to screen the houseboats from the piling rig when it is at maximum height (*ie*, when a pile is first inserted).

***Ambient noise level used for the houseboats***

Although TWUL has stated that survey location used was CHW03, the ES report that CHW01 was used. In any event, TWUL has acknowledged that the survey location used is remote from the houseboats and undertaken to carry out a further survey at another, more relevant, location.

***Application of the assessment methodology in relation to the houseboats***

The methodology uses the predicted level of construction noise and the BS5228 threshold value to identify receptors for further review. For the daytime the next step is to determine whether the internal noise level exceeds 40dB with closed windows. For the night-time the test purports to be an internal level of 35dB, but it assumes that the noise level difference between inside an outside is 21dB with partially open windows based on the ‘annual average’ from the WHO NNG surveys.

The three characteristics of houseboats noted above mean that even with closed windows there is a risk that internal levels will be higher than for conventional dwellings; since in practice the windows are likely to be open for much of the time, the internal noise levels are likely to be higher not only in comparison to the ‘standard’ daytime assumption of closed windows but for the night-time assumption of windows partially open for an ‘average’ proportion of the year. However, the first stage of the methodology, which is based on typical dwellings and behaviour, excludes the houseboats before their special characteristics can be considered.

Table 1 below provides illustrative figures on the potential for the internal noise level criterion of 40dB (daytime) to be exceeded even though the external level (nominally 60dB) is below the threshold value (currently 70dB). The table uses the maximum external noise level reported in the ES (60dB at 100m including the effects of screening) and I have then calculated the internal noise levels for different combinations of open/closed windows and with/without screening.

- i. The first column shows the external noise level: 60dB is the maximum value stated in the ES (Volume 20 Table 9.5.1) and the value of 70 dB is an estimated value assuming no screening (*eg*, during initial piling of the wall of the coffer dam).
- ii. The second column shows whether open or closed (single-glazed) are being considered.
- iii. Column three shows the value assumed for the noise reduction from outside to inside. Two values are shown for closed windows because the value varies; 25dB is around the middle of the range and 20dB is at the lower end. Two values are also shown for open windows the range used is typically 10 to 15dB.
- iv. Column four shows the internal noise levels derived for each situation from the external noise levels and the values assumed for façade noise reduction and screening.

The table shows that for closed single-glazed windows the maximum external noise level reported in the ES (60dB) can lead to an internal level of 40dB (the table does not mean that the level of 40dB could not be exceeded, it depends on the noise reduction of the façade). For the case of open windows, or for closed windows and unscreened plant, internal noise levels up to 50 dB are predicted.

**Table 1** Illustrative figures for daytime noise levels at houseboats

External Level L <sub>Aeq</sub> - dB	Window Condition	Noise reduction dB	Internal Level L <sub>Aeq</sub> - dB
<i>Max in ES</i>	<i>Closed single-glazing</i>		
60		20 - 25	35 - 40
<i>Unscreened sources</i>			
70		20 - 25	45 - 50
<i>Max in ES</i>	<i>Open window</i>		
60		10 - 15	45 - 50

The table therefore illustrates the flaw in the methodology the first stage of which excludes them from further consideration on the basis that the external construction noise level (60dB) is below the external threshold level (currently 70dB) even though the internal noise level could exceed 40dB which is used as the final criterion for locations that are not eliminated by the first stage.

There is also an anomaly in the approach to the duration of noise in the ES that could lead to special cases such as the houseboats being excluded from subsequent stages of consideration. Under the ES methodology, even if the construction noise level exceeds the BS5228 threshold, the duration of the exceedance is taken into account and the ES states that durations in the daytime not exceeding one month are not necessarily regarded as a 'significant effect'. However, under the project's Noise Insulation and Temporary Re-housing Policy (the NITR Policy) if the external daytime construction noise level at a residential receptor exceeds one of a number of trigger levels for more than 10 out of 15 consecutive days then the noise conditions to qualify for insulation or re-housing are met. It is implicit in that policy that the external trigger levels are set on the basis of the noise reduction of a typical facade with closed windows and on that basis the trigger level for daytime (0800-1800) is set at 75dB and so for a façade reduction of 20 to 25dB the internal level would be in the range 50 to 55dB.

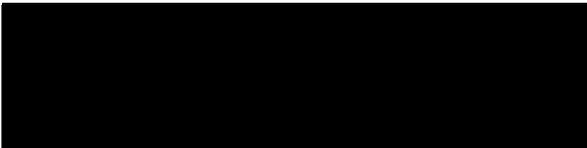
Table 1 shows that even with an external level of only 60dB, an internal level of up to 50 dB could occur for the houseboats, but that situation might be excluded from consideration if the duration of the exceedance is less than 1 month even though a conventional dwelling experiencing internal levels of 50dB for more than 10 out of 15 consecutive days would be considered for further mitigation under the NITR Policy.

Finally, you mentioned a further unusual phenomenon that the houseboats manifest in relation to noise. You explained that inside the houseboats it is possible to hear vessels some way away as they approach the moorings and even to distinguish the type of boat. You also mentioned that a similar effect occurs at sea when on deck: a large ship passing at some distance cannot be heard but below deck it is audible. As we

discussed, this phenomenon probably arises from a combination of factors: noise from the engine and other sources below the water's surface will not be radiated appreciably into the air, the energy can be transmitted with relatively little loss over long distances underwater, and the receptor has a large surface area (the hull) below the water line. This phenomenon might mean that there is an additional path for noise from river transport associated with the TTT works in relation to the houseboats.

This effect could also be relevant to the vibratory piling method that might be employed to construct the coffer dam and for which significant effects from groundborne vibration are predicted in the ES for nearby land-based receptors. Because a substantial length of pile will be vibrating below the water line there could be an effect in the houseboats analogous to groundborne noise (that is on the assumption that the level of vibration would be too low to cause 'feelable' vibration there). This potential for underwater noise transmission merits further investigation by TWUL.

Yours sincerely



Stuart Dryden

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