PLANNING INSPECTORATE ISSUE-SPECIFIC HEARING

on

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PRESENT

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CASE TEAM
BART BARTKOWIAK
TED BLACKMORE
SPENCER BARROWMAN
RYAN SEDGMAN

LOWER THAMES CROSSING
ISABELLA TAFUR
MUSTAFA LATIF-ARAMESH
DR TIM WRIGHT
JOHN CLARK-HUGHES
BARNEY FORREST
[RITA OLIVER?]
LISA DRISCOLL
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LOCAL AUTHORITIES
DOUGLAS EDWARDS KC (Thurrock Council)
ADRIAN NEVE (Thurrock Council)
CHRIS STRATFORD (Thurrock Council)
SHARON JEFFERIES (Thurrock Council)
CATHERINE COPPING (Thurrock Council)
CHRIS HUDSON (Thurrock Council)
DAVID BURGESS (Thurrock Council)
MUBASSIR MALIK (Thurrock Council)
MICHAEL BEDFORD KC (Gravesham Borough Council)
TONY CHADWICK (Gravesham Borough Council)
MARK WOODGER (Essex County Council)
SUSAN LINDLEY (Shorne Parish Council)

STATUTORY PARTIES
[DAVE SERRIE?] (Port of London Authority)
ALEX DILLISTONE (Port of London Authority)
LUCY OWEN (Port of London Authority)
[BOB ALLEN?] (Port of London Authority)
DAVE TERRY (Port of London Authority)
ALISON DABLIN (Port of Tilbury London Ltd)
JULIA STOBIE (Marine Management Organisation)
GREGG SMITH (Marine Management Organisation)
RICHARD PENN (Environment Agency)
HAZEL ANDERSON (Northumbrian Water)

INTERESTED PARTIES
[EMMA POTTER?] (Emergency Services and Safety Partners Steering Group)
LAURA BLAKE (Thames Crossing Action Group)
MURIEL BLAKE (Thames Crossing Action Group)
[LEIGH HUGHES?] (London Veteran Group)

MR TAYLOR: Good morning, everybody, and welcome to issue-specific hearing 5 for the Lower Thames Crossing project. Today, we are dealing with matters relating to tunnelling. Before we introduce ourselves, I just need to deal with a few preliminary matters. Can I check with the case team and the audio-visual staff that we can be heard online and that the recordings and livestream have started? Okay, I'm getting all the right signals, brilliant, so onto introductions. My name is Ken Taylor; I am a member of this panel, part of the Examining Authority for the Lower Thames Crossing application. I'm going to be chairing the hearing today. Before I have my colleagues introduce themselves, there's a few preliminary matters I just need to deal with.

We're not expecting any fire drills today, so the fire evacuation process would be as normal if we hear that happen, and that's to use the fire exits and then go out the main reception door and meet outside the front of reception. I'm not going to go through all the preliminary matters that we go through at the beginning of hearings on the basis that we spent time on Tuesday at issue-specific hearing 3 doing that. If anybody wishes to understand those processes, we now have the recording of the first part of that hearing online on our project website. I will remind everybody that today's session is being recorded, livestreamed and then it will be published. Does anybody have any queries about our recording and publication procedures? I'm not seeing anybody.

I also just want to remind everybody, when you speak, you need to use your mics and please try and speak directly into them, and every time you speak, can you just introduce yourself with your name and the organisation that you're representing? I know this can sometimes seem a bit tedious having to do it every single time you speak, but it does really help, particularly for people either watching online or when anyone listens back to the recording at a later date. My fellow panel members will now introduce themselves, and I will just remind everybody that we do have brief biographies of all of us in our frequently asked questions, which we published as part of our rule 6 letter and again, that can be found on the project website. I will now pass over to my colleague, Mr Smith.

MR SMITH: Thank you very much, Mr Taylor. Good morning, everybody. My name is Rynd Smith; I'm the lead member of this Examining Authority, but as you

can see, it is Mr Taylor's chairmanship today. I will ask questions on matters, if necessary, as they arise.

MR YOUNG: Good morning, everybody. My name's Dominic Young, panel member as well, and like my colleague I may also ask questions as we go along. Thank you.

MR PRATT: Good morning, everybody. Ken Pratt, panel member sitting on this side of the table for a change, and again, I will ask questions as and when I feel it's required.

MR YOUNG: And finally, I'll ask Ms Laver who's joining us remotely to introduce herself.

MS LAVER: Good morning, everybody, Janine Laver, panel member. I am again remote today, but I will be listening throughout. I'm back in person tomorrow, thank you.

MR TAYLOR: Thank you, Ms Laver, so just before we move on, I will also introduce the colleagues we have in the room, as part of the case team who are assisting us today. So we have Bart Bartkowiak, Ted Blackmore, and they're joined by Spencer Barrowman as case officer. The virtual event side of today is being managed by Ryan Sedgman. So as for today's business, you'll have seen the agenda which had been circulated a few weeks ago. I'm now going to go around the room and ask everybody to introduce themselves. We need to know your name and the organisation that you're representing. I think I'm going just to take it – I'm going to go round the table, then I will – we'll go to the virtual room and – in terms of local authorities and statutory parties, and then ask other interested parties to introduce themselves, and then finally, I will go – turn to the applicant team. So could I start with Thurrock Council, please?

MR EDWARDS: Yes, sir. Good morning, sir. My name is Douglas Edwards. I'm a barrister and King's Counsel, and I'm instructed by Thurrock Council to appear at today's hearing.

MR NEVE: Good morning, sir. I'm Adrian Neve and I'm instructed by Thurrock Council. Thank you.

MR STRATFORD: Chris Stratford, planner, here in person today, no connection issues I hope. Thank you.

MS JEFFERIES: Sharon Jefferies from Thurrock Council.

MR TAYLOR: Thank you.

MR EDWARDS: Before you move on, can I indicate that there are four other representatives of Thurrock Council who are not yet online. They'll be joining the hearing at around 11.00 and they're likely to participate in the discussion, so if it helps I can indicate who they are now. The first of those is Catherine Copping from Stantec, who will address contaminated land matters. The second, Chris Hudson, also of Stantec who will address matters concerning waste. Thirdly, David Burgess, again of Stantec, will address water resources matters, and finally, Mubassir Malik of Stantec who will address noise and vibration.

MR TAYLOR: Thank you very much. Yes, Mr Bedford.

MR BEDFORD: Sir, Michael Bedford King's Counsel of Gravesham Borough Council. With me is Mr Tony Chadwick of Gravesham Borough Council. He's the NSIP project manager, but I expect to be making the contributions.

MR TAYLOR: Thank you. Yes, could I move onto the Port of London Authority, please?

MR SERRIE: Good morning, I'm [Dave Serrie?]. I work for LBA. I'm representing Port of London Authority in all matters of tunnelling.

MS DILLISTONE: Good morning, sir. I'm Alex Dillistone from Winckworth Sherwood, representing the Port of London Authority.

MS OWEN: And good morning, sir. I'm Lucy Owen from the Port of London Authority.

MS DILLISTONE: And I should also say we have Bob Allen joining us online who is also a tunnelling expert for the PLA.

MR TAYLOR: Do we have anyone from Essex County Council in the room? Because I was potentially expecting them today. Do we have a hand up online? Yes, please.

MR WOODGER: Good morning, sir. Thank you for your introduction. My name is Mark Woodger. I'm joining you virtually today on behalf of Essex County Council. Thank you.

MR TAYLOR: Thank you very much. Do we have Ms Dablin in the virtual room for the Port of Tilbury London Ltd?

MS DABLIN: Good morning. Yes, Alison Dablin, an associate of Pinsent Masons representing the Port of Tilbury. Thank you.

MR TAYLOR: Thank you, and do we have a representative from the Marine Management Organisation?

MS STOBIE: Yes, we do. Good morning, my name is Julia Stobie. I'm a marine licensing case manager for the MMO, and I'm here this morning with my colleague, Gregg Smith. I'll let Gregg introduce himself. Thank you.

MR TAYLOR: Thank you.

MR GREGG SMITH: Good morning, my name's Gregg Smith. I'm the marine licensing case officer from the MMO.

MR TAYLOR: Thank you, Mr Smith. I'm just going to note that we heard you but we didn't see you, so maybe…

MR GREGG SMITH: Sorry about that; I had the screen –

MR TAYLOR: Yeah, it's nice to put a face to the name. Thank you very much, and then do we have a representative from the Environment Agency?

MR PENN: Good morning, it's Richard Penn from the Environment Agency.

MR TAYLOR: Thank you, and are you alone today?

MR PENN: I am alone today, yeah.

MR TAYLOR: Yeah. Thank you, and then do we have a representative from Northumbrian Water?

MS ANDERSON: Good morning, sir. My name is Hazel Anderson from Winckworth Sherwood, and I will be representing Northumbrian Water trading as Essex and Suffolk Water.

MR TAYLOR: Thank you very much.

MS ANDERSON: Thank you.

MR TAYLOR: And Ms Lindley from Shorne Parish Council, I believe you're joining us.

MS LINDLEY: Good morning, sir. Yes, thank you very much, Susan Lindley from Shorne Parish Council.

MR TAYLOR: Okay, thank you. I believe that's everybody I'm expecting in terms of local authorities and statutory parties, so I'm now going to look to other parties, so is Emma Potter available, who's representing Essex Police and the emergency services group?

MS POTTER: Good morning, sir. Yes, Emma Potter on behalf of Essex Police and the Emergency Services Partners Group.

MR TAYLOR: Okay, and are you the only one joining today from your group?

MS POTTER: Yeah, you'll just have me today.

MR TAYLOR: Okay, thank you, and then Ms Blake from Thames Crossing Action Group.

MS BLAKE: Good morning, sir. Good morning, everybody. Laura Blake, chair of Thames Crossing Action Group. Thank you.

MR TAYLOR: Okay.

MR SMITH: If I can just indicate, Ms Blake, we've got table space. I think you've spoken on most items at most hearings and it would seem to be very sensible if, rather than have Mr Blackmore dancing up and down with a roving microphone, you just come and join the table.

MR TAYLOR: Ms Blake, once you're settled at the table, could you just let me know whether we're expecting Ms Hughes or Ms Muriel Blake to speak?

MS BLAKE: Thank you, sir. Yes, they are both behind me should I need them, but I will probably be the one that's talking. Thank you.

MR TAYLOR: Okay, thank you. Yes, and if they wish to say something, they're free to come up to the table today. Okay, so I believe that's everybody I'm expecting. Before I turn to the applicant, can I just check, is there anybody else in the room who was expecting to speak? And that's both the physical room and the virtual room. I'm not seeing any hands. Okay, so can I now pass over to the applicant?

MS TAFUR: Thank you, and good morning, sir. My name is Isabella Tafur, of Counsel, and I'm representing the applicant, and I expect for this first agenda item that we will hear from Mustafa Latif-Aramesh, on my right, Dr Tim Wright, John Clark-Hughes who sits to my left who's the tunnel lead, Barney Forrest who's the environmental lead, and [Rita Oliver?] from the DCO team is going to be managing the visuals that you'd like to bring up on screen. Thank you.

MR TAYLOR: Yeah. Thank you, Ms Tafur, and the visuals – we may not need them, but I just thought it would be prudent to give you heads up that – and there are some that may prove useful as we go through the morning.

MS TAFUR: That's very helpful, sir, and there are a number of other members of our team who will speak to later agenda items, and I'll perhaps introduce them then.

MR TAYLOR: Yes. That would be – that's absolutely fine, thank you. Okay, so that deals with the introductory elements of the hearing, in terms of people introducing themselves. Can I just check if anybody has any introductory preliminary matters that would need to be addressed now before we move on to the substantive agenda items? I'm not seeing any indication. Okay, so moving

on to agenda item 2 – and this will be brief, just setting out the purpose of this hearing –so the issue-specific hearing today is to discuss matters relating to the tunnelling element of the project. The matters on the agenda are fairly wide-ranging; I am aware of that, so the intention today is to identify and discuss the issues that have emerged for us, as an Examining Authority, during the preparatory work in the early stages of the examination so far.

So in general, the Examining Authority will ask questions to the applicant first relating to each matter, then seek observations from the other people present, and then after that the applicant will be given a right of reply at the end. There's probably one or two agenda items where I may ask the applicant to be fairly brief at the outset because I think it might be more productive to hear from interested parties in substance and then come back as a – to – and deal with your comments and substance at the end.

For most of the items, I'd also like parties to, where possible, try to finalise their comments with a focus on what, if any, changes you would consider should or could be made to the development consent order or the related certified documents that could help to resolve or minimise any outstanding issues or concerns. These comments can be made on a without prejudice basis, so even if you have in principle concerns with the project, it is still helpful to understand your position on any areas where you feel the DCO and related documents could be changed. We do have a session on Monday, issue-specific hearing 7, where we will be specifically speaking about the development consent order. However, it would be useful today if we could discuss any changes in principle and then deal with detail drafting matters, etc., on Monday, so that's really how I'd like to deal with, essentially, all the agenda items.

Okay, so I'm now going to move on to the main item, so looking at agenda item 3, so this is dealing with limits of deviation. My intention, I think, is to take the first two items – so 3(a)(i) and (ii) – together. That seems fairly sensible. Is every reasonably content with that? I'm not seeing any dissent, so this – just make some preliminary comments before I go to the applicant. It is our view, as panel, that this is a very important matter that we do need to try to get to the bottom of sooner rather than later in terms of this examination, so – and essentially, that's my reason for putting this as the first agenda item. So what I would like to do is I'd like the applicant to briefly justify their general approach

to the limits of deviation, and then the related matters in terms of the protection zones dredging and scour protection.

I'm aware that at deadline 3 we had a document, the tunnel depth report, so that's REP3-146, so in your opening comments, if you could make reference to where we are with that now. Then I'm going to go to the interested parties around the room, and I think on this particular item it is probably most appropriate that we start by hearing from the Port of London Authority, and then I'll move to other interested parties. Ms Tafur.

MS TAFUR: Isabella Tafur for the applicant, so with your leave, in a moment we will display the tunnel limits of deviation plan and talk through those specifically, but as an overarching position, we say that the limits of deviation serve a number of important functions. First, they provide a proportionate degree of flexibility to allow the development and optimisation of the detailed design, which isn't available at this stage of the planning process. An optimisation includes the opportunity to refine the design to benefit from latest technology and materials, etc.

The second function is that they provide flexibility to allow for construction tolerances, and that includes things like minor deviation of the tunnel boring machine from the preliminary design alignment, and other foreseeable events such as minor additional excavations or processes to secure the integrity of the works. Thirdly, they allow minor realignment to overcome any unforeseen or unexpected obstructions or impediments that are found, and fourthly, they provide assurance to third parties as to the maximum extent of where the works can take place.

Now, the limits of deviation for the tunnel and tunnel structures are secured in article 6 of the DCO, and in particular the tunnel works in article 6(2), subsections (o) and (p), and the tunnel limits of deviation plan where the horizontal and upper vertical limits of the final constructed tunnel position are shown. In respect of the upper limits of deviation, that is subject to paragraph 99 of schedule 14, the protective provisions for the Port of London Authority, which sets an agreed limit for the upper limits of deviation. I wonder if now would be an appropriate moment to bring up the tunnel limits of deviation plan, and I'll ask Mr Clark-Hughes to talk you through the specific limits in respect of those works.

MR CLARK-HUGHES: Good morning, sir. John Clark-Hughes for the applicant, that's C-L-A-R-K – H-U-G-H-E-S, no 'e' on 'Clark'. So further to what has just been said, article 99, the detailed design and construction of the tunnelling works in the River Thames must, firstly, (a) provide for the protected dredge navigational channel depths of 12.5 metres below chart datum, with an additional 0.5 metres to allow for over-dredging attributable to the standard dredging methodology. On top of that, it must also ensure that the channel depths can be maintained where scour protection is required. At part 2, it is said that prior to commencement of the construction of the tunnelling works, and as soon as reasonably practical after they become available, the applicant must provide to the Port of London Authority the following documents: an approval in principle document, or similar, demonstrating the design requirement has been incorporated into the detailed design, secondly, a design certificate demonstrating that the detailed design of the tunnelling works has satisfied the design requirements, and thirdly, a check certificate completed by an independent person, demonstrating that the detailed design of the tunnelling works has satisfied the design requirement. So these are all protections that are available to the Port of London to ensure that they are completely comfortable with the works before we proceed further.

The undertaker must also supply to the Port of London Authority any drawings referred to in either of the certificates as may be reasonably required, and upon request any further documents. The Port of London Authority in turn, if it is not reasonably satisfied with the design requirements – that they will be met – may within a specified period notify that they do not agree, and then there is an escalation process that allows the matter to be taken through to antiarbitration if required, so hopefully we never get to that position. So that sets out the process as to how the Port of London's involvement is secured.

Moving to the actual works themselves and the limits of deviation, the tunnel numbered works are the road tunnels, Work No.4A, which includes the construction of the twin bored tunnel and the cross-passages. The ground protection tunnel, which is Work No.4B, and that includes the ground protection tunnel and the access shafts there too, drive and reception shafts, and any associated ground treatment works required. The south portal cutting works, that is designated Work No.3A and includes the south portal tunnel approaches,

the deep cutting that leads to the south portal, and the south portal and tunnel approaches at Work No.3C, which include the portal structure and the cut and cover section of tunnel in the south, cross passages, tunnel service building and the south portal tunnel approach works. And then finally, the north portal and tunnel approach works are designated as Work No.5A, and that includes the north portal structure, the cut and cover section of the tunnel, the cross passages, tunnel service building in the north and the north portal tunnel approach, so that's where we set out what is included.

So I'll take them each in turn, so the bored tunnels first, the vertical limits of deviation, the need to find the optimal engineering alignment in consideration of the geology which improves with depth, and the vertical alignment of the highway which tends towards a shallower alignment, so the objective there is to achieve the best balance between those two things. The limit also considers the need to both maintain the current riverbed depth by the PLA, and the future consideration of the PLA that they want to maintain and potentially deepen the navigable channel, so we can see on the drawing being displayed there the limits of deviation that apply. The upper limit of vertical limitation provides a proportionate degree of flexibility to the contractor to potentially develop the tunnel detail design at a shallower depth than the current reference design.

The vertical limit itself varies along the length of the tunnel and at the deepest point is 6.7 metres vertically, and as the tunnel rises towards ground level on either side, this reduces to approximately 3 metres, and this is shown on the plan there with the dash light in the profile. The downwards vertical limit of deviation is unlimited, allowing the contractor to develop the tunnel detailed design at any level below the current reference design, however in practice, other parameters would become dominant. So for example the maximum allowable highway gradient would not allow unlimited depths, but it's standard practice to start with a set vertical limit and an unlimited vertical towards, but in practice that is constrained by other parameters.

The horizontal limits of deviation provide flexibility to the contractors to develop the tunnel design with an area defined 10 metres either side on lateral flexibility. This is identified in the limits of deviation plans, so sheets 15 and 16 which are being displayed. The lateral 10 metres is measured from the outer tunnel wall, as set out in the reference design.

MS TAFUR: Isabella Tafur for the applicant. Sir, would you like us – because there are the other elements that Mr Clark-Hughes identified which was a cut and cover tunnel, the north and south portal tunnel, service buildings and the ground protection tunnel – would you like us to talk you through those as well by reference to this map – plan, or would you like us to turn instead to the tunnel depth report?

MR TAYLOR: Yes, I think I'd like you to turn to the tunnel depth report, I think, and then we can maybe come back to those other elements later.

MS TAFUR: Thank you, sir. Yes, I will ask Dr Wright, then. I will ask Dr Wright to address you on the tunnel depth report and the engagement, generally, with Port of London Authority.

DR WRIGHT: Tim Wright for the applicant. I think before I kick off with the tunnel depth report, it would be worth me just giving my understanding, our understanding, of the position of the Port of London Authority which we are in close discussions with. I think that context is really important to understand why we submitted the tunnel depth report, and the nature of the discussions between our two organisations, and clearly, with them at the table, I hope I get this right and I will welcome any intervention if they would like to modify matters.

MR TAYLOR: Yes, doctor, I'm happy with that approach, yeah.

DR WRIGHT: So we've obviously been talking to the Port of London Authority for a substantial amount of time about the tunnel, and during this discussion we've identified that the Port of London have aspirations to protect the future of the River Thames. So clearly they want to protect the current usage of the River Thames, but they also have sight that potentially in the future they may choose to increase the usage of the River Thames, increasing the capacity by deepening the navigable channel. If they were to deepen navigable channel, that would require them to dredge a deeper channel, and so our initial proposals need to be demonstrated to work in two scenarios: with the current situation in the River Thames, but also in the event that the navigable channel were to deepen.

And alongside that, we are not proposing scour protection for our tunnel and I don't propose to go into that now. However, the Port of London Authority have expressed a concern that the tunnel will be in place for a very long time and therefore they want us to take a precautionary approach such that if scour protection were to be required, that should be demonstrated that it can be

delivered at a future time, and from our perspective, that would be separate to our scheme and under separate consent, and I repeat that we do not consider it necessary. However, that precautionary approach seems sensible, and therefore we've agreed to work within the framework of that precautionary approach as we demonstrate the suitability of the tunnel and its compatibility with the future use of the river.

I will just pause there because I think I would like to then move on to talk about the actual situation, but I think it might be worth just checking with the Port of London if they're satisfied with that characterisation and have anything to add. I'm wary; I don't want to speak on their behalf.

MR TAYLOR: Yes, doctor, I think that's sensible. Just before we do move over to Port of London Authority, just a question from me, in terms that potential need for future scour protection, how is that secured? Would that be – are you intending that that is secured as part of the DCO?

DR WRIGHT: So I go back. We don't consider there to be a need for scour protection; it is not secured as part of the DCO. We're confident in our assessments that demonstrate it is not required. However, if it were to be required in a precautionary basis, then we just need to demonstrate that it could be delivered without impacting the navigable channel.

MR TAYLOR: Mr Smith is going to follow up.

MR SMITH: In that respect, it may help to get to a matter that might otherwise not emerge until later in the discussions, but I'll put on the table, certainly, that my understanding would be that this is very much a matter about securing the long-term strategic functionality of the river channel to service port functions, and therefore it's not so much about securing a specific measure such as possible future scour protection. Because you may not know for 50 years whether you need scour protection, but it means safeguarding enough physical space in the riverbed such that if it does prove to be necessary in 50 years' time – with the tunnel still there and operating for another however many years – it can still be done without prejudicing the tunnel, and indeed without prejudicing the operability of the channel. So that was my sense of how it probably ought be thought of us by us. Now, if it's wrong, either of you do please do come to us.

Then there is a related point, and that is essentially the safeguarding of the ongoing economic function of the river and the port, which includes thinking

about the strategic ambitions of the port, and any reasonably foreseeable future changes to dredge depth, and therefore certainly I think our interest will be in hearing both LTC project team and the port about the degree to which those two sets of potentially competing considerations – in the LTC project team the need to build a cost-efficient tunnel that therefore isn't too deep if you can avoid it, as against the potential demands from the port for future additional dredge depth that you do not currently provide for in your maintenance dredge.

MR TAYLOR: Mr Wright, did you have anything to say before I ask the Port of London Authority to come in?

DR WRIGHT: I'm satisfied with Mr Smith's characterisation of how we should be considering this matter. I think that's right.

MR TAYLOR: Okay, thank you. Ms Dillistone.

MS DILLISTONE: Alex Dillistone for the Port of London Authority. Yes, thank you, Mr Smith, that matches our characterisation of the issues as well. I would say that we would not expect to see the scour protection delivered in the DCO. What the PLA is looking for is a reassurance that if that does need to be provided, whether it is under another authorisation method, there will be enough depth in the dredging to enable future trade within the port. That is our concern. Thank you.

MR TAYLOR: Ms Dillistone, could you just comment on the more general points that Dr Wright raised? Did he characterise the nature of your discussions so far to your satisfaction?

MS DILLISTONE: Yes. I think we have made progress since the last DCO hearings, which we do appreciate, and I will talk to that more when we start talking about our substantive points. Thank you.

MR TAYLOR: Thank you. Back to you, Dr Wright.

DR WRIGHT: Tim Wright for the applicant. Thank you for allowing that little discussion. I think it's important that we are all talking from the same position, so before we then jump into the tunnel depth report, just a statement that I don't see these as competing requirements. National Highways recognise the aspirations of the port. We don't see a conflict. We're confident that our schemes can work together and we see this as a discussion about providing that reassurance and confidence to all parties that they can be delivered together. So

with that, if we then turn – there are two or three controls that we place over the river that are notable.

So one is the placement of the tunnel and the limits of deviation, and the allowance for the tunnel alignment to move vertically within that limit of deviation. There is then – and I should say that this is separate from the limit of deviation, so this doesn't move with the limit of deviation; it is fixed by the order. We applied two protection zones. These protection zones have both a vertical and a lateral implementation and provide a restriction on activities that can happen in the river to protect the asset, if you take it that way. So the zones comprise a first protection zone, which is – that applies the prevention of any dredging, installation of moorings, piling, designation of anchorages, excavations and so on. They are shown in the red zone that can be seen on the screen in relation to the tunnel. In discussion with the Port of London Authority, we recognise that both the – well, firstly, the current use of the river will require them to undertake certain activities without even considering whether you deepen the navigable channel, so there would be a need for maintenance, dredging and placing of moorings, navigational barges.

So we created a first protection zone, which applies a series of – sorry, a second protection zone, shown as orange on the drawing – which applies a series of exemptions to allow the Port of London to continue to undertake their future operations. And in discussion with them, we then – talking about the depths of the navigable channel – ensured that that second protection zone applied at a depth which then allowed them to dredge the – and deepen the navigable channel whilst still being able to also implement their future potential maintenance dredging and the future need for moorages and anchorages, and we consider that these matters are agreed and that's reflected in the statement of common ground with National Highways and the Port of London Authority.

So if I turn to the tunnel depth report, and perhaps this takes us to the crux of the conversation, and if I can ask my colleague to bring up the plan that sits in the back. Now, what this plan does is it overlays two different drawings that are both secured within the application. One is the tunnel limits of deviation plan and the other, it's a river restrictions plan, so that shows in combination how the two plans would work on the depth of the navigable channel, and you'll see as you go along the north-south axis of the river, there is – a point highlighted

on that drawing shows the location where there is the minimum level of cover over the tunnel. Now, that minimum level of cover would exist today if we constructed the tunnel according to the limits of deviation; clearly, if – it's within the navigable channel, and therefore if the Port of London came along either around or after the construction of the tunnel and deepened that navigable channel, that minimum level of cover would in fact decrease, and so the question arises: are there any conflicts or constraints as that minimum level of cover reduces in order to – that would prevent the deepening of the navigable channel at any point in the future?

And so we have undertaken an assessment, or a review of our assessments and a review of the application, and you'll note there's a number of matters that are addressed in the tunnel depth report that identified where that level of cover was a factor in the assessments and a factor in the consideration, so we have revisited those and we have demonstrated that it is compliant.

MR SMITH: Can I just interject very briefly, Dr Wright? And that is on a point of clarification that Ms Laver has also raised on our screens, and this relates to the limit of deviation in relation to the recent change request on the north headwall. Now, in this document, the north portal as shown on screen – or that has been shown on screen – seemed to be the original, and not per the change request, and if that's the case then we need to factor in the change request and then think about whether there are any implications flowing from the change request that indeed then the Port of London Authority also need to consider.

DR WRIGHT: Tim Wright for the applicant, so the change request relating to the limit of deviation on the headwall relates to the movement of the bored tunnel headwall, and as my colleague is highlighting, it's that point 275 metres north on alignment. So if I try to describe and my colleague moves the mouse at the same time, the headwall – if you can mark that on the map – comprises the black vertical line. The change request would increase the amount of limit of deviation that that headwall can move, and that would allow it to relocate – thank you very much – that would allow it to relocate to another location further up the alignment north. It would not change the vertical alignment of the tunnel at that point and therefore has no consequence to the vertical alignment in the area of concern.

MR SMITH: Okay, understood, and as long as you've taken the Port of London Authority on that journey, then I trust all will be well, but they will no doubt tell us if you haven't.

DR WRIGHT: Sir, if can ask my colleague to bring back the original drawing – Tim Wright for the applicant – so there is one remaining area of discussion that we currently have with the Port of London Authority in relation to this matter. So as you reduce the level of cover, we – they have asked us to demonstrate that the level of cover remains sufficient to secure the position of the tunnel. We call it flotation; the possibility – and it's remote risk which we are demonstrating that is not one that applies – that the tunnel is not stable in the ground because of the air within the tunnel causing a flotation effect. So what we have set out in the tunnel depth report is an assessment that shows that that level of cover is sufficient to secure the stability of the tunnel, we are confident in that assessment, and so on.

Where we still have two areas of discussion with the Port of London Authority, one relates to a technical matter that would apply to the tunnel during construction, and the other is an assessment to demonstrate that the amount of capacity space that we have allowed for scour protection would be sufficient to deliver the scour protection that might be necessary on a precautionary basis in the future, so we're confident that that works. We have not yet provided Port of London with the technical assessments that set that out, but they will be provided to Port of London shortly, and I expect that they will provide the reassurance necessary to give them the confidence that this matter would then become agreed.

MR TAYLOR: Thank you, Dr Wright. Could you just indicate an approximate time scale for you submitting the documents to the Port of London Authority?

DR WRIGHT: The documents are in final checking at the moment, so they will be issued – I'm going to be cautious and say within the next two weeks.

MR TAYLOR: Okay. Thank you. Is there anything else from the applicant before I turn to the Port of London Authority? My colleague, Mr Pratt, also has a question.

MR PRATT: Just a matter of clarification for the people who are maybe not as technically minded as yourself and myself, when you were talking about the potential future scour – I forget your exact wordings – I'm assuming, for the non-technically minded, you mean that when or if the Port of London Authority

requires to deepen the navigation channel, the depth between the bottom of the channel and the top of the – your – the tunnel is going to be less, and it's that – you're looking at the potential need for scour protection under those conditions which would obviously be different to the conditions today because you've got a much deeper depth below the navigation channel. Is that correct? And is that what your discussion just now – as I say, I know what I think – what I know I think you mean, I just – for those that aren't so technically minded, could you just explain it in layman's terms, so to speak?

DR WRIGHT: Tim Wright for the applicant, and I will have to explain it in layman's terms because I'm not a coastal engineer. Essentially, as the river flows, it has the potential to displace and move sediment and that can lead to a natural erosion of the riverbed, and that could lead to a natural reduction in the level of cover sitting above the tunnel, so scour protection is an engineering intervention by which you place something on the riverbed that would essentially prevent further erosion of the riverbed and apply protection to that level of cover. However, in order to deliver that scour protection, you need to place that engineering intervention.

To do that, you would have to deepen the river channel in order to be able to place that engineering intervention without simply raising the level of the riverbed, so therefore, the worst-case scenario actually needs to consider the depth of the dredged river channel and the dredge that would be required for the scour protection before the scour protection was put in place. Obviously once the scour protection's in place, then that has a weight to it and a securing factor to it, but there is a moment at the point where you are dredging – before you've installed the scour protection – where you have that minimum level, and that is the one that we are considering and discussing with the Port of London.

MR PRATT: Thank you for the clarification, I'm sure it'll help.

DR WRIGHT: So back to Mr –Tim Wright for the applicant – back to Mr Taylor's question, I don't think there's anything else we want to add on this at the moment. I think that's set out our position.

MR TAYLOR: Okay, thank you, Dr Wright. I've just been informed by our case team that we need to take a short adjournment just to deal with some technical issues, so…

MR SMITH: We'll take a 15-minute break.

MR TAYLOR: Yeah, we'll take a 15-minute break, so it's now 10.45, back at 11.00. Apologies for this, but it's important that we deal with the technical issues.

(Meeting adjourned)

MR TAYLOR: Good morning again, everybody. Ken Taylor, panel member, speaking again. I am resuming this hearing. First, I'm going to pass over to my colleague, Mr Smith.

MR SMITH: Thank you very much, Mr Taylor. Rynd Smith, panel lead, speaking. I thought I should render some form of explanation for the considerably earlier than normal morning break, and that is that it became apparent through liaison between the Examining Authority and the case team during that session that there were two documents from the Port of London Authority submitted at deadline 3, responses to comments on written representations, and comments on the applicant's submissions at deadline 2, that ought have been published in the deadline 3 document set, for reasons that we still remain unclear about, I have to say, hadn't been published and therefore were unsighted by us, but critically, were unsighted by either the applicant or any of the other interested parties, and, given that it was apparent that we were about to move in conversation towards matters that had been raised in those documents, and no doubt the port might have spoken to them, believing that we had all read them, it was important to discover them, important to remedy the fact that they hadn't been published, and then also, just to make sure as a matter of fairness, parties were aware that that was the case.

So the steps that were taken during the break were to, amongst other things, have the case team, I believe, speak to counsel for the applicant, to offer the possibility of a slightly extended break, if needs be, to respond to that material.

Now, I understand that, at least from the applicant's perspective, you have now viewed the two documents, which have been published and have no request for further time.

MS TAFUR: Isabella Tafur for the applicant. Sir, I confess I am not that fast a reader, so I haven't read them or even seen them, but as you've heard from Dr Wright, we have been in close liaison with the Port of London Authority. We don't

understand from a brief discussion with them that there's anything surprising in those documents, and we're very happy to continue and respond as necessary at the next deadline.

MR SMITH: Indeed, and I will then reassure Port of London Authority that we too have read them, because they aren't long documents. So that side of the equation has been dealt with. Any other interested parties expecting to speak this morning, I will flag that if you need the documents, the pair of them are now the highest-level items in the documents tab published, so they can immediately be seen by everybody now. Is there anybody else now who believes they need any additional time before we proceed? That is very good news. In which case, I will hand the hearing back to Mr Taylor.

MR TAYLOR: Thank you, Mr Smith. So I was just about to pass on to the Port of London Authority. I just want to check with the applicant that you've got nothing further and are content.

MS TAFUR: Nothing further from us, sir.

MR TAYLOR: Thank you. Ms Dillistone please.

MS DILLISTONE: Thank you. Alex Dillistone for the Port of London Authority. I will of course bear in mind that the applicant has not seen our deadline 3 submissions, and if it's any reassurance, we weren't really planning on referring to them anyway. Not to say they weren't entirely inconsequential, but they shouldn't have said anything new to the applicant of which you weren't aware already.

I would like to just acknowledge at this point the work that has gone on between ourselves in the time since the last issue-specific hearings, and just to say, we appreciate the work that the applicant has done. Obviously, because of the nature of the hearings and what we need to get through today, we will concentrate on the items that are not resolved, but I just want to acknowledge that from our point of view, we appreciate there has been some movement and an effort by the applicant to provide more information. So we are not there yet. Today will focus on those issues that aren't resolved, but there has been some progress, and we do appreciate that.

In particular, in the document that we'll talk through today, we appreciate the applicant has produced the tunnel depth report, which is document reference ref. 3146. There are still some issues in that that we want to pick up with the applicant, which we've touched on in our deadline 3 submissions, but of which

I think the applicant knows about anyway, such as on scour and references to the DCO that don't, in our view, seem to accurately reflect what the DCO provides for.

Now, the tunnel report is also a technical report. It's not a document that provides commitments, so there are some assumptions that are made in that report that we're not, at this stage, convinced to tie down in the DCO. So the comments that we make today will work on the basis that they're subject to the assumptions in the tunnel depth report being appropriately secured, and we will work with the applicant on that, but for today's purposes, I plan on working on the basis that we accept the high level information provided in the report, and we will use the content of that tunnel depth report to explain the PLA's updated position with regards to the tunnelling concerns.

So in summary, I think we have three main concerns, three main themes. The first is constructability. The second is approvals, and the third is the mitigation of construction risks. So I plan on giving a brief overview of that and then passing on to my colleague, Mr Dave Terry, to talk about the detail of the tunnelling works, because, like Mr Wright, I am not a coastal engineer, and nor am I a tunnelling expert.

So just to run through them in very high-level terms, our first theme of constructability – by that I mean whether or not the tunnel is capable of being constructed according to the information that the applicant has provided. That was, at the last set of issue-specific hearings, our most immediate concern, and we covered in the last set of hearings the interaction between the vertical limits of deviation, the tunnel protection zones, the dredging depth, and potential scour protection, and at that stage, our concern was very much about the constructability of the tunnel due to the gaps and inconsistencies in the information that form part of the application.

The information that has been included in the tunnel depth report and the applicant's revised assessment of the tunnel cover that will be required that has been prepared on a reasonable worst-case scenario – I am pleased to say that we are much more reassured now about whether or not it is possible to construct the level of tunnel while preserving the required level of cover.

There are still some matters which we need to discuss with the applicant, and in particular, in relation to scour, which we dealt with earlier. For example,

the tunnel depth report considers a rock size of 0.034 metres, which is gravel that is only just bigger than a large grain of sand, which is smaller than we would expect at this point in the River Thames. Normally, scour protection would be a minimum thickness of two rocks' size diameters, and 0.5 metre's thickness only allows for a 0.25 diameter, so there are detailed technical issues with the scour in the tunnel depth report, but I will leave those for my colleague, Mr Terry, to discuss.

There is general wear, as Mr Wright has described, but then that also depends on the maximum rate of flow that the cobblers objected to, and that occurs more beneath the keel of a large vessel. I'm sure Mr Terry can discuss that further, and I think we should say at this point that we still do have those scour concerns, because whilst we recognise, as Mr Wright said, that the DCO doesn't provide the scour, Mr Smith is right in saying that if scour is needed, it might be needed in 50 years' time or more, and we simply don't know at this stage, but what we do know is that if scour isn't designed in now, if the possibility of scour isn't accounted for now, then it will be too late once the tunnel is built to do anything about it, if we haven't considered it at this stage.

So the PLA is keen to ensure that there is sufficient space for both scour protection and dredging.

So our second main concern, which is about approvals, is that there is still a difference between the applicant and the PLA as to what the DCO provides for by way of approvals. This is for two reasons. Firstly, because the applicant has made some statements about the approvals which the PLA has, which we do not think are quite right with regards to paragraph 99, and then secondly, even where we do agree on what the wording in the DCO says, and what the physical words are on the page, there is a difference between what we think they achieve, and we've had significant experience with tunnels underneath the River Thames with Silvertown and Tideway's where there have been issues about the wording and what we think that should provide.

The PLA has had experience with asking for information about when a tunnel would be constructed, for example, and not being provided with that information. There is a tunnel where the PLA did not know that tunnelling was going on until it was actually happening. So that was under wording that was very similar to what is in this DCO, and so whilst we agree – I think we are

probably agreed on the applicant that we would expect that kind of information and expect that kind of information to be shared, but it's just with the wording that we have in the DCO in the moment – there have been incidences where we haven't been provided with that information, with that exact same DCO wording.

So I think there is work to be done in just making sure that, whilst we are, I think, aligned on the information that we would expect to see and expect to be provided with that that is tied down, because we haven't had that in the past.

Where I'm talking about the information, the statements that have been made that are not quite correct, I'm talking particularly about paragraph 99 of the protect provisions in the DCO. The applicant mentioned earlier that paragraph 99 provides protection for the PLA and has said that there is an escalation process that provides for approval of the tunnel design.

Now, we acknowledge that the design flexibility that the applicant needs means that the PLA needs some level of approval, and the applicant has stated that the PLA has approval of the design of the tunnel, but that, to us, does not seem quite right.

Paragraph 98, which is the one that provides for approval of detailed design, specifically excludes tunnelling works, and paragraph 99, which deals with tunnelling works, provides, firstly, for a very limited ability for the PLA to have any input on tunnelling works. Where the detailed design and construction of the tunnelling works in the River Thames, it provides that that detailed design must provide for a dredge limit, so the 12.5 metres plus 0.5 metres over-dredge, and that the channel depth can be maintained, and it's if only those elements, those limited elements of the design, are not met that the PLA can refer the matter straight to arbitration.

Now, that is a form of providing some sort of comment, but it's not a very measured form of providing comment. It's to say that if we don't agree with those particular elements of the tunnel design, then we can take the matter straight to arbitration. That does not, to us, seem like the most collaborative way of dealing with it, and we think there is room for a process where there is more dialogue and where we don't have to use a sledgehammer to crack a nut. We have had that issue on previous schemes, where the PLA has had to take a

judgement call as to whether it wants to ignore something that is an issue to avoid having to go straight to arbitration.

MR SMITH: Mm-hmm. Can I just ask at this juncture – I mean, in certain other DCOs in equivalent circumstances, things like some form of standing technical working group have been established and provided for in the face of the order or in protected provisions that essentially means that where two equivalent infrastructures' issues needs to be reconciled around the construction programme of one, or the operational needs of the other, that there is a regularly meeting body, the names and participants of which are known, that deal with that point. Is that the sort of thing that might solve this, rather than potentially having a minor slip, leading to a dispute which then triggers you slap-bang into a form of commercial mediation, which would seem a little overkill?

MS DILLISTONE: Alex Dillistone for the Port of London Authority. I think that would be a much more pragmatic solution, sir, yes.

MR SMITH: Right. Well, we'll leave that on the table. The applicant can respond to it at the end. Apologies, Mr Taylor.

MR TAYLOR: Yes. Please, carry on.

MS DILLISTONE: Thank you, sir. The third issue is the mitigation of construction risks, so they're talking about – on the basis that we accept that the tunnel is constructable, when construction goes ahead, what is the level of risk in constructing that tunnel? And that is something that my colleague, Mr Dave Terry from London Bridge Associates, who are the PLA's tunnelling experts, will be able to help us with.

I think the best place to look, if we can get it up on screen at this juncture, is annex A of the tunnel depth report, which is page 30 of the report as shown on the page, but page 33 if you're looking at the electronic file.

MR TAYLOR: Is that the plan you're expecting to see?

MS DILLISTONE: That is the plan we're talking about. It may help to zoom in a little bit. For those of us at the back of the room, it might help us to zoom in a little bit. Thank you. I'll pass over to Mr Terry.

MR TERRY: Dave Terry on behalf of the PLA. So we've talked a lot this morning about absolute dimensions of cover. A large amount of the information that we'll provide for the PLA today covers the ratio between the cover above the tunnel and the diameter of the tunnel, the C over D ratio. In layman's terms, it's the

size of the tunnel in relation to how much ground is above it, and this is a key aspect. So I'm going to talk about three things today, largely reiterating what my colleague said. I'm going to talk about scour and the need for protection, and try and explain PLA's concerns and the risks.

Although, I would also add that I'm not a coastal engineer. I'm a tunnel engineer. It's becoming apparent we do need a coastal engineer. I was going to talk about the geology. That doesn't specifically answer any concerns, but it's such a key aspect of the tunnelling works and puts into context a lot of the risks around the tunnelling operation. I'm going to talk about specifically the limits of deviation, and the risks to the PLA.

So coming to scour, tunnels require a certain amount of cover above them. The level of the riverbed can change due to planned actions. Obviously, such as dredging, and also due to natural movement of the riverbed. So the PLA have requested that scour protection is considered, because in recent times it's become increasingly common that the owners of existing tunnels have requested, post-construction, to place scour protection. In that case, the solution presented to us is one where you have to put scour protection on to get on with it. An example of this would be the Rotherhithe Tunnel.

So hopefully that puts into context some of our risks. Completely acknowledging Dr Wright's note that we will be getting a scour assessment in a couple of weeks, our position is that, yeah, noted, and we're continuing to review the tunnel depth report on that basis and we'll review the scour assessment when it comes in.

Moving on to geology. So looking at the screen here, the tunnel starts off through the alluvium, it goes through a level of river terrace deposits, and then it enters the chalk, the Seaford chalk formation. So the alluvium is like a silt and clay deposit. It's got lenses and beds of peat, seams of sand and gravel. You go through the river terrace deposits, which are gravelly, sandy clay deposit, and you get into the Seaford chalk formation. The reason for mentioning this is when you refer to the flotation report and the assessed cross section, which is the blue dotted line on the screen, this is at the northern bank of the river, above a location called Diver's Shoal – we would agree with the applicant's assessment of this as being a critical area for two reasons.

Firstly, because it's the area with the lowest cover, and secondly, it's the area of lowest cover where you've got the most inconsistent ground conditions. You haven't got solid cover of chalk above you. You've got chalk, you've got the river's terrace deposits, and then you've got the alluvium. So this is the key thing, but we would agree that that is the correct assessment in that thing.

Just coming on to limits of deviation, to explain our position. So the upper band of limits of deviation to the PLA represent the worst case. It means, in simple terms, that the applicant can construct the tunnel far shallower than is shown on the drawings, in very simple terms.

I'm not going to dwell on the inconsistency in the applicant's information, because I think my colleague said that. It's worth acknowledging the new information in the flotation report, which, to us, has demonstrated the design is buildable and the constructability – not the construction, but the constructability risks have been addressed, but this represents a credible design worst case, not a construction worst case. So credible design worst case for flotation has been assessed, which is the tunnel at the upper most band of limits of deviation and the maximum dredge level achieved at the Diver's Shoal location.

It's just worth reiterating that point. The flotation report is a design-based report. That means from the design, in CDM terms, there is residual risks that need handling on around the construction aspects of the tunnel.

Now, reiterating what my colleague said about approvals, our sole – or the PLA's sole means of approval for construction-related items is the approval in principle, the BD-212 document. So referring to the BD-212 document, there are two relevant sections, one of which is section 3.11, which calls for the applicant to demonstrate risks and hazards considered for design, execution, maintenance and demolition, and the other is clause 8, which [inaudible] for the tunnel support system and method of construction.

In our view, these aren't adequate to document and to close out the risks involved with construction. So Mr Taylor's comment at the start of the session was we would be looking to amend the wording in the DCO. This is one area we would focus on to try and get some aspect of construction risk included in the submission.

It's also worth saying, to back that up, as my colleague mentioned, we have experience from a previous DCO when various assurances were given on

construction information. This wasn't provided, and the first – this is somewhat anecdotal – the first that the PLA heard of the tunnelling operation was through LinkedIn when there was a big celebration that the tunnel had been completed. So that's the situation that we want to avoid through proper wording in the application.

I think it's also worth, just going back to cover-diameter ratio, to try and put our risks in context, and we'll cover some of this when we talk about section 4 later on in the session. The C/D ratio – we are operating at the upper bands of technology here. Obviously, the C/D ratio is dependent on C and dependent on D, fairly obviously. The C is quite low. The D is enormous. This is possibly the third or fourth largest TBM ever to be built and to be operated. Certainly, the largest in the UK, and there are experiences, which we'll come on to when we discuss section 4, when similar cover-diameter ratios haven't ended well for tunnels under rivers. As I say, we'll discuss those at section 4.

MR TAYLOR: Ms Dillistone, is that the end of your submissions at this stage?

MS DILLISTONE: That's the end of our submissions on agenda items 3(a)(i) and (ii).

MR TAYLOR: Okay. Thank you very much. I think now if I can just get an indication from the room, both virtual and in-person, as to – does anyone else wish to speak on this particular matter? I'm just aware it's quite a technical matter that – we do have one hand. Yes. Yes, Ms Dablin, please. Can we take down the slide so that we can see Ms Dablin in full? I note that Ms Lindley wants to come in. I'll bring you in later on. Yes, Ms Dablin.

MS DABLIN: Thank you. Thank you. Alison Dablin for the Port of Tilbury. I don't have anything to add in terms of the technical aspects. The Port of London Authority has that more than sufficiently covered. What I wanted to do, however, was say that the Port of Tilbury fully supports the PLA. We consider that this is an extremely important issue to get resolved.

The PLA does require proper oversight. This needs to be secured in the DCO, and it needs to be in a form that operates in a way that is a lot more successful than previous DCOs has been. I think, from our perspective, the limit of deviation and the headroom over the tunnel – it needs to be sufficient that the tunnel can be constructed without there being an issue, and whilst the risks may be small, anything that can be done to minimise them is something that is worth taking, because the impacts, should there be – I believe the term is 'daylighting'

– should there be an incident where things go wrong, the knock-on effects for the river, the navigational channel, and of course, the port that is located just upstream, would be incredibly severe.

So we just wanted it noted that we fully support the PLA in getting this resolved.

Thank you.

MR TAYLOR: Yes. Thank you, Ms Dablin, and I'm moving on. I will move on shortly to the economic, social impacts. There were issues that arose, so probably we'll want to bring you back in then. Yes, Ms Lindley. I believe you wished to speak.

MS LINDLEY: Thank you, sir. What I just wanted to say is that the discussion so far has been about the shallowness under the river, but there's also problems, or considerations, about shallowness under the adjacent land, and for us south of the river, the adjacent land is the North Kent Marshes, special protection area and Ramsar site, and associated functional land.

MR TAYLOR: Ms Lindley, can I just interject? Because I did ask that Mr Wright initially, for the applicant – initially focus on the river, and I am going to return to the applicant to deal with these limits of deviation, as we refer to them, for the other parts of the tunnel that aren't directly under the river. So it's probably more appropriate that I bring you back in at that point, if that works for you.

MS LINDLEY: Yes, certainly. Thank you.

MR TAYLOR: Okay. Thank you. Can I just check – does the Marine Management Organisation wish to speak on this directly?

MS STOBIE: Hello. Julia Stobie for the Marine Management Organisation. It was just to note, really, that activities associated with the construction or operation of a bored tunnel that are carried out under the seabed are exempt from requiring a marine licence, under article 35 of the 2011 Exempted Activities Order. So the applicant would need to notify the MMO of their intention to carry out these exempt activity. That could be done post-consent. If the applicant is intending to rely on this exemption, they would need to satisfy themselves that they meet the relevant qualifying criteria for that exemption. So that was what I wanted to note on behalf of the MMO.

MR TAYLOR: Thank you. Yeah, that's very clear.

MS STOBIE: Thank you.

MR TAYLOR: So just a final check: anybody else wish to speak on this particular part of the agenda before I go back to the applicant? No. Okay. So to my ears, I think it's encouraging that matters seem to have moved on fairly considerably since we were last discussing these, and it does seem that there's a fairly clear path forward, in terms of what needs to be discussed. So I mean, from my perspective, this has been quite an encouraging conversation. So if I could pass back to the applicant, and first of all, just address how you intend to take forward these potential outstanding issues, and then I'm going to ask you to discuss limits of deviation in respect of the areas not directly under the river.

MS TAFUR: Isabella Tafur for the applicant. We share the PLA's desire for a collaborative working relationship. We think that we have one, and we're keen to continue in that same vein. We will consider and discuss with them the best way to achieve that, whether that requires any additional drafting in the DCO, or the establishment of a different body. We'll take that away and discuss it with them.

As to the notification of the commencement and completion of tunnelling, that's something we entirely expect to notify the PLA of. We would consider that common practice and intend to do it. We hear that they've had some different experience with different developer, and so are happy to go away and discuss with them whether to include, or how to word a notification requirement that does not involve LinkedIn.

MR TAYLOR: Yeah, okay. Thank you, Ms Tafur, and it's likely that this is a topic we're going to return to on Monday, but I can foresee that in future deadlines we will get additional drafting and clear positions on where you've got to. So yeah, if I could ask us now to move on to other relevant limits of deviation, please.

MS TAFUR: Isabella Tafur for the applicant. I'll ask Mr Clark-Hughes, then, to take where he left off, and perhaps to show the limits of deviation plan again.

MR CLARK-HUGHES: John Clark-Hughes for the applicant. I believe I finished describing the tunnel limits of deviation themselves, so I'll move on to the cut and cover section of the tunnel. The horizontal limits of deviation in that regard are 10 metres, to align with the limits of the bored tunnel. Obviously, the two must match. So that's fairly straightforward. There are a series of associated

limits on the bored tunnel headwall, and the cut and cover portal, ensuring the alignment can be continuous.

In respect of the headwall, the bored tunnel could be extended to the north by up to 275 metres, and that is the figure that you were referring to earlier as being the subject of the change notification. It might be useful to just talk around that a little bit further, and just explain that, as my colleague referred to and as is being shown on screen at the moment, it is merely the boundary between the bored tunnel and the cut and cover tunnel that moves.

So from a driver experience point of view, there's no difference. It's still tunnel. It's just that the construction technique is varied. The reason for the requirement to have that limit of deviation is so that we can maximise in the detailed design the best possible case for that portal structure, and the cut and cover structure.

There is a balance to be struck between bored tunnelling and open cut and cover, and it's not an easy or clear cut balance. On the one hand, bored tunnelling is relatively more expensive in the round than cut and cover. However, where the ground is poor and significant ground improvement work is required, then that ratio changes, and it's possible that it could become preferable to continue in bored tunnel and have less of a cut and cover structure.

That balance is very much predicated on construction technique and methodology, and is therefore probably a matter at detailed design and not at the moment, and that's why the limit of deviation is sought, and why it seems to be such a large figure when we're talking about vertical limits of deviation of three metres, and horizontal of 10 metres, but in this longitudinal sense, we're talking hundreds of metres, which has, perhaps, alarmed some people, thinking, 'Why does it need to be such a large number?'

Hopefully, I've given an explanation there as to why that's the case, but will take further questions, if necessary, on that.

MR TAYLOR: At this point, can I just interject? So I cut Ms Lindley off because I wanted to bring her in later. Now, her concern is partly the bored tunnel element, but under the marshes. Could you just address that specifically before we move on?

MR CLARKE-HUGHES: Yeah, so the limits of deviation for the bored tunnel on the southern side are the same. It is true that it is shallower at that point than in

generality, but it's deeper than the worst-case position that we were discussing at the pinch point at Diver's Shoal. So the C/D ratio that was being referred to is better at that point, so we have what we consider to be a sensible and proportionate limit of deviation to allow for the things that we spoke about at the top of the meeting where we outlined the four main criteria that set out why the limits of deviation are, in fact, a good thing and a protection to all concerned.

At the figures that we're talking about, they are, in comparison to the scale of the project – they're relatively modest, and we're entirely confident that they're appropriate for the circumstance.

MR TAYLOR: Okay. Thank you. I will ask Ms Lindley to comment later and I may come back to you in due course.

MR CLARK-HUGHES: Certainly.

MR TAYLOR: Okay. Please, carry on.

MR CLARK-HUGHES: Also in north, the cut and cover portal itself could be extended, but in the northward direction only one metre. So that is the point that is the actual, physical end of tunnelling, so that has a very low limit of deviation on it, because the environmental statement is based on that position, and clearly, that is something that would make a significant difference to assessment, so there is a relatively minor allowance there, just, essentially, for tolerance purposes and nothing more. In the south, the cut and cover could be extended to the north by 50 metres, and to the south, again, by only a single metre, for the same reason, because that is the physical extent of the tunnelling work and the point on which the environmental statement is based.

The limited deviation for the north and soul portal tunnel buildings, the actual buildings themselves, are required because they allow the location of the tunnel service buildings to be fixed in accordance with a final, determined design of the cut and cover element. Obviously, the two are elated. One sits above the other, so there is a natural connection between the limits of deviation. The north tunnel service building can move 125 metres north, or 10 metres south, but only 10 metres laterally, and only 0.5 metres vertically, and that provides a maximum height, therefore, of 6.15 metres AOD, which is obviously a key parameter, in terms of landscape and vision assessment. So that's why that has a less than one metre limit of deviation onwards.

The south tunnel service building, in similar vein, can move 50 metres north or south, but only 10 metres laterally. The 10 metres, obviously, matches the tunnel limit of deviation, with an absolute zero vertically, again, for landscape and visual reasons, and that provides for a height of 6.19 metres AOD.

The flexibility is more limited in the south. Because of the ground conditions being less complex, there is less need for flexibility. In all cases, as we described at the outset, the limits of deviation provide a proportionate balance between the need for certainty that the planning process requires versus the need for flexibility that the design and construction process requires. So we're attempting to balance those two disparate requirements, and hence come to a proportionate and sensible arrangement in terms of the limits of deviation.

The limits of deviation for the ground protection tunnel, which is the potential smaller tunnel that sits above the two main alignment bores in the south, and specifically, below the marshes, the Ramsar area – that has its own set of limits of deviation. The ground protection tunnel is situated between the south of Lower Higham Road and to the north of the Medway Canal and North Kent railway, and it extends to an approximate 825 metres, as shown on the plan that's on screen at the moment. About 825 being the reference design, so obviously, if the limits of deviation are applied, there is some flex in that figure.

The underground structure would allow the contractor to carry out ground treatment works under the Thames Estuary, and marshes from inside what is, effectively, an added, provided solely for that purpose. So it's a small tunnel, relatively – 5.8 metres outside diameter. So it's still quite large, but small in terms of relativity to the main bore, and it provides what we would term a grouting gallery or a grouting [inaudible]. It means you can do work from inside of that tunnel to improve the ground as may be required for either general stability for the river terrace gravels, which are in the crown of the tunnel at that point, or for face interventions, for maintenance or repair that might be required to the tunnel boring machine itself, or for the construction of cross passages, and those can be seen on the section that's on screen.

There will be somewhere either four or five cross passages will occur within that area, so no matter where you shuffle those, provided the spacing remains the same, there's always going to be four or five of them are going to arrive within that area, and therefore, a potential construction technique is to

create what we've referred to as a safe haven, so a grouted construction zone that you construct the cross passages within.

A ground protection tunnel may not be needed, however. Depending on the selected tunnel boring machine, which is a detailed design matter, the ground treatment intervention strategy may be possible from within the head of the TBM itself, so from within the head of the tunnel boring machine.

As has been noted, we are very large scale with this tunnel, and in this regard, that is helpful, because it means that the size of the machine allows for part of the construction of the head and the hollow spokes – sorry, of the spokes to be hollow, such that they are accessible from within, which avoids the need then to go on to the pressurised side of the head, which is what the ground protection is all about. So if you can avoid the need to go beyond the head, then you clearly don't need to do any additional ground treatment.

The reason it's in the application is because we seek permission to build it, on the grounds that if it's required, we would need to do so. If we do not include it in the application and it subsequently is discovered that it is required, we wouldn't have the necessary powers and obviously, we would be subject to criticism that it hadn't been assessed and wasn't part of the application, and so forth. So it's included entirely on a precautionary basis so that we present a reasonable worst-case, and we assess the worst-case envelope.

The environment assessment indeed was done on the assumption that the ground protection tunnel is needed, as that is the reasonable worst-case envelope.

The vertical upper limits of deviation provide flexibility to the contractor to develop the ground protection tunnel. It's a shallower depth than the current reference design, and as this structure may be needed in relation to the contractor's construction methodology for the twin bored main tunnels, its upper limit of deviation takes into account the twin bored tunnels' own limit of deviation. Obviously, the two are related and as one rises, so would the other, and the opposite.

Similar to the road tunnels, the downward limit of deviation is unlimited, but again, for the reasons that I gave earlier, in practice, other parameters would become dominant, and you clearly wouldn't go any deeper than the main tunnel was going because, in order for it to be functional, you need to preserve the

relative difference in vertical alignment between the two so it sits above the pair of bored main tunnels.

In the longitudinal sense, the flexibility to the contractor is to be able to find the best position for the launch and reception shafts, or the access points for the construction of the ground protection tunnel.

I should just perhaps add at this point: the ground protection tunnel serves no permanent operational purpose. It is entirely temporary for construction purposes and is assessed on that basis.

The lateral, again, limits of deviation follow the same as the main tunnel and for the same reasons. Wherever the pair of main tunnels go, you would expect that the ground protection tunnel would be symmetrically placed to the centre, in order to achieve the ground treatment required.

That concludes what I intended to say on the matter, but obviously happy to take any questions, sir.

MR TAYLOR: Okay, thank you. No immediate questions from me. So Ms Lindley, I'm going to bring you in first to speak on the matter that you wanted to raise, and then I'll invite other parties to speak.

MS LINDLEY: Thank you, sir. Well, obviously, our concerns are about the risks to the marshes. This overlaps with the next points, really, about some dewatering and the risk of ground water drawdown, and obviously, it's bad enough from the main tunnel, but the ground protection tunnel increases this, because it's even shallower. I note that it was said earlier that the reason for tunnelling deeper is because of poor soil conditions, and also that – sorry – the characteristics of the land and geology improves with depth. So I think our desire would be for the main tunnel to be lower and for a TBM to be used that didn't require a ground protection tunnel, because that would greatly reduce the risks.

The other concern, obviously, is the fact that grout is going to be injected so closely underneath the marshes. This is, of course, in the North Kent Marshes, special protection area, which has an ecosystem that connects with the Ramsar site. Part of it – the far end of it, northern end of it – is in the Ramsar site. So we are concerned about this matter of chemicals being injected as well.

So really, that's all I wanted to say at this point. Thank you very much.

MR TAYLOR: Okay, yeah. Thank you, Ms Lindley. Some of the matters you've raised are going to come up later in the agenda, and potentially tomorrow, I think, as

well, when we discuss some other wider environmental issues. So can I just check – does any other interested party wish to speak? Yes, please, from Gravesham Council.

MR BEDFORD: Thank you, sir. Michael Bedford from Gravesham Borough Council. On this, I'm going to ask Mr Chadwick, the NSIP project manager, to explain the concern.

MR CHADWICK: Good morning. Tony Chadwick from Gravesham Borough Council. As has already been indicated by the applicant, clearly, this is an optional additional item that they are hoping to avoid, and Gravesham Borough Council would indeed agree with them that that would be an ideal position, that this is not needed.

As has already been highlighted, the risk factor here is that you are going under the marshes, you may penetrate the water table, you may affect the water levels on the marshes, which would therefore impact the… This is all one system. Regardless of whether the bit you're actually under is SSSI or not, or whatever, it's all affecting the same hydrological system, and that, clearly, would have a major impact on the area.

So that's the risk factor that we're concerned about, and it's really making sure that there is adequate provision there to what is going to happen if such an event did happen, and also, the site where the boring machine is extracted on the marshes also interacts with the Metropolitan Police firing range, so there's actually a safety hazard on that one. High velocity, but it's not welcome. So the Borough Council is concerned about the overall process can be managed in a way that minimises impact, but also what happens if it does go wrong.

Thank you, sir.

MR TAYLOR: Thank you. Does anybody else wish to speak on this?

MS BLAKE: Yes.

MR TAYLOR: Yes, Ms Blake, and just before you come in, Ms Blake, I think I will just ask if Emma Potter, who is representing emergency service safety group, might want to just come in to add to any comments we've heard from Gravesham Council. Ms Blake, please.

MS BLAKE: Thank you very much, sir. Laura Blake, Thames Crossing Action Group. I'm not sure if it's really an appropriate moment, and this obviously is a very technical level conversation that's being had, so forgive me if it's not the right

time or thing to be saying, but just looking at this, we've covered the aspect of the water side of it and also the deviation on the land.

My concern as I was just listening to everything was the fact that, obviously, with Tilbury Fields being raised considerably compared to the level of the land now, the impact that the potential water flow would have on the river, on all the aspects that we're discussed today, on the actual extra water that would be flowing in the river and the impact that that would have on everything, where it's not actually able to go in the marshes and the floodplain – I would hope that that had been taken into account, but I have learned in the years of looking into LTC that I should assume nothing.

Thank you.

MR TAYLOR: Okay. Thank you, Ms Blake. The applicant's obviously heard that. I suspect that that's not an issue we're going to get to in detail today, but it is a matter that we can address going forward. Yes. Can I just ask if Ms Potter has any comments?

MS POTTER: Good afternoon. Good morning, even. Emma Potter from the steering group for the safety partnership. I think, to be fair, it's something that I'd like to relay back to the group, our steering group, after this hearing, just for the fact this is not within our proximity or gift to comment on at this time, but it is something I'll relay back, with your permission.

MR TAYLOR: Yeah, that's absolutely fine. So there is an opportunity to do a written version of comments, so yes, deadline 4 will be ideal if you can make that. Okay, so I don't think I'm getting any indications from anyone else wishing to speak. So my intention, I'm going to go back to the applicant, then we are going to take another short break, because I appreciate the other one was quite impromptu.

MS TAFUR: Isabella Tafur for the applicant. So I'm going to ask Mr Forrest, who's the environment lead, to address the concerns raised by Ms Lindley. I think a number of her points and others – the point raised by Ms Blake about Tilbury Fields, for example – will be picked up in a later agenda item, so I don't propose to respond to those now.

MR FORREST: Barney Forrest for the applicant. I'm the environment lead on the project, and I was just going to, I guess, reassure Ms Lindley that the importance of the Thames Estuary marshes, SSSI and Ramsar site has been taken into account fully in our assessment, and we've engaged both with Natural England

and the Environment Agency in relation to the water aspects of the tunnelling process and the risks associated with that.

It's worth noting that we have, in specific relation to the ground protection tunnel, got a REAC item, which is within our code of construction practice. It's reference RDWE018A, and it's around the ground protection tunnel, and the construction methods around the construction tunnel. So we recognise the risk that Ms Lindley speaks to, and we've sought to mitigate it through the controls within the application.

Just to reference back to the discussions with Natural England, on the sensitivity of that receptor, we've got a statement of common ground item with them, which is 2.1.57, and that's an agreement that the ground protection tunnel does not lead to adverse impacts on the Ramsar, and just as a point of clarification, the SPA element of that designation doesn't extent into the area which we're tunnelling under. It's simply the Thames Estuary marshes, Ramsar site, and SSSI.

MR SMITH: I think it's probably worth noting, to remind everybody, that one of the dimensions of our investigations does relate to habitats regulations assessment, which brings within scope the protected designated sites that we've just briefly referred to. For a range of reasons, quite a lot of that investigation is being carried out in writing, and I would remind everybody that, in the words of the 2008 overarching provisions, this is a primarily written procedure. So just because it's not happening in the hearing doesn't mean it's not happening, and I would like to reassure everybody that these matters are very central in the minds of the ExA.

MR FORREST: Thank you, sir. That was the extent that I was planning to respond on that point, but I'd echo the point that we have extensive discussions with Natural England on that regulation assessment, and those discussions are ongoing and are pretty well advanced, particularly in relation to this area and the Thames Estuary marshes.

MR TAYLOR: Thank you, Mr Forrest. Anything more from the applicant?

MS TAFUR: No, sir. Nothing further.

MR TAYLOR: Okay. So I'm intending to take a break, but before I do I'm just going to explain how I want to take the next item. So essentially, I'm wanting to cover matters that relate to social and economic effects. Some of this largely relates

to the matters that we've discussed, and to the extent to the people become content that the protections are in place – now, I presume that those economic impacts will either fall away entirely or at least be minimised, and so my intention, really, is to turn to the applicant but only briefly, hear from other parties, and then come back to the applicant. I think that's a sensible way forward for the next item. So it's nearly 11.55. If we're back by 12.10, I'd be grateful. So I'm going to adjourn the hearing now.

(Meeting adjourned)

MR TAYLOR: Good afternoon, everybody. I'm going to resume this hearing. It's Ken Taylor, panel member, speaking. Just for a bit of housekeeping – because we had a slightly disrupted morning – my intention is we're still going to take a lunch break at the usual time in case people have made arrangements, so roughly 1.15 – I won't interrupt the flow of business – until 2.15 is what we're aiming for. Okay, so now I'd like to move onto the next agenda item, which really flows from the conversation that we've just had, so this is dealing with economic and social effects on river traffic, so if the applicant could set out their case very briefly, and then I'm going to move to the parties. And I think I'll go to the Port of London Authority first again, and then bring in other interested parties as appropriate, so Ms Tafur.

MS TAFUR: Isabella Tafur for the applicant. Also, in relation to the potential conflict between the tunnel and the existing or developing plans of the PLA to deepen the navigable channel, you've heard our position, which is the tunnel proposals don't affect or prevent existing or future plans. And, as a result, we don't consider there to be any adverse environmental or social effects arising from the tunnel.

MR TAYLOR: Thank you. I'm basically keeping it brief. Yes, could I now ask if the Port of London Authority wish to speak on this?

MS DILLISTONE: Thank you, sir. Alex Dillistone for the Port of London Authority. We have said before how the port is the country's largest port, the busiest inland waterway, and that 79% of vessel arrivals to the Thames in 2022 were upstream of the order scheme, so clearly, if there are issues with the tunnel, it would have had an economic effect, and we cover those in some detail, the effects, IS-81[?]

in the summary of our submissions on that. They're in document reference REP-1271, and we also put it in our written reps, which is document reference REP-1269. I don't propose on going over those again today because I don't think it would say anything new.

But what I can say is that we don't anticipate, at this stage, any routine significant effects on river traffic as a result of the construction of the scheme if the construction of the scheme goes as planned. But there is a possibility of effects on river traffic if the risks that my colleague Mr Terry has described materialise during the operation of the scheme, and those we propose on dealing with them later when it gets to mitigation in agenda item 5.

I've also described earlier our outstanding issues with scour and the tunnel depth report, so that's what I'm talking about when I refer to the issue of 'if the scheme doesn't go as planned'. But if the construction of the scheme does go as planned, and if these risks do not materialise, and if we can get to a point where we are satisfied there is enough protection for the PLA, then we are satisfied that those economic effects will not occur.

MR TAYLOR: Thank you, Ms Dillistone. I guess that really does underline the importance of the conversation we've just had earlier this morning. Can I now get – sorry, Mr Smith, do you wish to…?

MR SMITH: Yes, there was one other residual question that may have a very brief answer. I suspect it probably does. But it's almost a reading the banns-type question because I think it probably needs to be put now so that it can be put to bed. And that is the question about an appraisal of the nature of future traffic in the Thames, the future marine traffic in the Thames, and the issue of under keel clearance. Now, obviously, the working assumptions are that the limits of deviation, as you will continue to discuss them, and then what will be secured in the order will provide you for all expected future market/strategic needs for the future use and development of the port.

MS DILLISTONE: Alex Dillistone for the Port of London Authority. The PLA has done some significant work on the future depth that are required and is satisfied that the 12.5-metre dredging with an 0.5-metre over-dredge would be sufficient for the future needs of the port, so as long as that is secured, and we're satisfied with that, then we're happy with it.

MR SMITH: Yeah, it was an obvious question, but I didn't want it to go unasked and unanswered. Thank you.

MS DILLISTONE: Thank you.

MR TAYLOR: Thank you, Mr Smith. It's clear. Can I get an indication from other interested parties who wish to speak on this particular item? I am seeing Ms Dablin. Yes, please come in.

MS DABLIN: Thank you. Alison Dablin for the Port of Tilbury. Just to follow Ms Dillistone's lead, the impacts of the tunnel on the Port of Tilbury in terms of the economic impacts really occur if something goes wrong with it, either during construction or operation, so I know Ms Dillistone suggested that she would deal with that under item 5. And it might also be sensible if we go into some more detail in that agenda item as well. We'll agree with the PLA that should the tunnel be constructed with the appropriate dredging allowance and nothing go wrong, then the economic impacts to the port from the tunnel are, essentially, none.

MR SMITH: And just following up my banns reading question then to the Port of London Authority, there's nothing that you have as essentially twinkles in your commercial eye that you haven't been in dialogue with the Port of London Authority about that might suggest any additional, for example, capital or maintenance dredge requirement over and above that that's proposed to be provided for in the order here.

MS DABLIN: No, we are very satisfied that 12.5 metres and 0.5 metres over-dredge is the appropriate dredging allowance based on everything that we're aware of to date. Thank you.

MR TAYLOR: Thank you, Ms Dablin. Just a final check for anybody else who wants to come in on this before I return to the applicant. I'm not seeing any hands, so Ms Tafur.

MS TAFUR: Isabella Tafur for the applicant. Nothing further from us. Thank you, sir.

MR TAYLOR: Thank you. Okay, so moving on, now wanting to deal with monitoring and then any potential remedial works and future maintenance, so, first of all, I want to go to the applicant to set out their approach to ongoing monitoring and then what the approach would be, maintenance issues and how remedial works would be dealt with, and then I'm going to move to the other parties. And again, just to reiterate, if the interested parties have any concerns, I would like to have

an understanding of how you feel those could or should be dealt with in the DCO and related documents. Ms Tafur.

MS TAFUR: Isabella Tafur for the applicant. So I'm going to ask Mr Latif-Aramesh to address you on this topic.

MR LATIF-ARAMESH: Good morning. Mr Latif-Aramesh for the applicant. We will be brief, and the first thing to say is we recognise the importance of monitoring and managing these works, and so what I'm going to set out is a brief description of how the protective provisions in the draft order, which are given for the benefit of the Port of London Authority, address the issues relating to monitoring remedial works and future maintenance.

Paragraphs 98 and 99 of schedule 14 are the provisions which I'd like to focus on in particular. There are other provisions in part 9 of schedule 14 that have been developed through extensive and long-standing engagement with the PLA, as have the two that I'm going to focus on, and so what I can say – and I'm sure Ms Dillistone will correct me if I'm speaking out of turn, is that they are, in large parts, agreed.

Paragraph 98 relates to the approval of the detailed design of the works. Specifically, it provides that the applicant must not exercise any specified function or begin the construction of any specified work until plans of the work or function have been approved in writing by the PLA.

Paragraph 98 sets out the process which the applicant must follow in seeking that approval, and it specifies the terms on which the PLA may give its approval. Now, in particular, sub-paragraph 4 specifies that the approval can be subject to the reasonable modifications for 'the protection of the performance of the functions connected – the functions of the PLA connected with environmental protection.'

The terms 'specified function' and 'specified work' are defined in each case in the protective provisions. A specified function means any exercise of a power under the order, excluding those related to compulsory acquisition in circumstances where the exercise of that power affects the River Thames or any function of the PLA. A specified work, on the other hand, is any part of the authorised development which is, may be or takes place in, on, under or over the surface of land below the level of mean high water forming parts of the River

Thames. Again, it includes any work which may affect the River Thames or the function of the PLA.

Paragraph 99, which Ms Dillistone touched on this morning, as has Mr Clark-Hughes, relates to the detailed design of the tunnelling works. In particular, it provides that the detailed design and construction of the tunnelling works must meet the depths that we've been discussing in quite a bit of detail this morning. Paragraph 99 also provides for the provision of documentation and drawings evidencing that the design requirements have been met and the process which must be followed where the PLA is not reasonably satisfied that those conditions have been met.

On the question of remedial works and other protective works, we draw your attention specifically to paragraph 103. That provision provides that if a specified work is constructed, or if a specified function is exercised other than in accordance with the requirements of the protective provisions, and then, separately, if it gives rise to consequences which would be materially detrimental to traffic or the flow or regime of the River Thames, then the PLA, by notice, may require that the applicant, at its own expense, complies with the remedial requirement specified in the notice.

Paragraph 103 sets out the nature of the requirements which the PLA may impose in this regard, and if no further action – and of the further action which the PLO may take where the requirements of that notice are not complied with.

Now, it's worth drawing your specific attention to sub-paragraph 2 of paragraph 103 because it sets out the remedial requirements can include measures for 'preventing, mitigating or making good sedimentation, scouring, currents or wave action or other material changes to the riverbed so far as they are required by the needs of traffic.' So, in the applicant's view, that provides appropriate protection in the context of remedial works that may need to take place.

On the question of monitoring, I would just very briefly note paragraph 105, which relates to requirements as to the surveys that are carried out on the River Thames in relation to the works.

And then, finally, just paragraph 112, the PLA may give notice in relation to any decayed or abandoned works, which sets out a similar process that's contained in the provisions that I've discussed already.

We note that monitoring and management is going to be discussed under agenda items 4 and 5, so I think I'll leave it there. But that gives the broad overview of the applicant's position.

MR TAYLOR: Thank you, Mr Latif-Aramesh. Could I go to the Port of London Authority first, please?

MS DILLISTONE: Thanks, sir. Alex Dillistone for the Port of London Authority. We recognise that there are paragraphs within the protective provisions which do deal with protective action to be taken by the applicant. We are proposing to go into detail on those today, as we can pick up more detail points on the drafting of the DCO at the DCO hearing, but what I would say is that there are risks in the construction of the tunnel. The risks, as we see them, are high impact and low probability, but if they do occur, the impact is high.

The extent to which they are covered at the moment in the protective provisions is largely sufficient. But we have had the experience with the applicant's previous works, which, we note, is reflected in the drafting of paragraph 102, new sub-paragraph 2 in the deadline 3 version.

There it refers to needing to remove GI structures that were installed in the River Thames, and we have had the experience, which I know the applicant will acknowledge, of material that has been placed within the River Thames not being removed for several years despite repeated requests, and so the PLA is particularly concerned that there may be issues, either with the applicant or potentially, if there are contractors in future that take over that have not been involved in the DCO process.

Once we are no longer before the Examining Authority, there may be less impetus for the applicant to progress these works and be seen to adhere to the requirements that are within the DCO or outside of them as part of separate authorisation processes, so, to the extent that there are risks, we are very keen to make sure that those risks are acknowledged and addressed. And I will pass to my colleague, Mr Terry, to cover the monitoring remedial works in the future and maintenance risks.

MR TERRY: Dave Terry for PLA. I was going to use this section to highlight some of the risks in tunnelling if that's agreeable with the panel. If it's helpful to the room, I'd also like to go through the types of TBM that can be used.

MR TAYLOR: Sorry, Ken Taylor, panel member – because that is essentially the next agenda item, the specific approach to whether it's appropriate to have flexibility on that matter, so if you could – yeah, you could focus on the maintenance – monitoring and remedial works, maintenance issues specifically, and then pick up with that later.

MR TERRY: Dave Terry, PLA. Yeah, understood. So the idea of risk in tunnelling comes back to the C-over-D ratio, and what it actually means to the construction of the tunnel and the risks that may involve remedial works and further monitoring in the tunnel.

So, as we said before, the C-over-D ratio is, simply put, the amount of ground above the TBM. The amount of ground above the TBM affects the amount of pressure that you can put into the head of the TBM, which is a fundamental aspect of closed-face tunnelling, which LTC will use. With this low C-over-D ratio, this makes the tunnelling operation a lot more sensitive, i.e. you've got a low C and a big D. We know that there's conservatisms in the flotation calculations. However, 0.57 historically is a low C-over-D ratio, although acknowledging again the flotation report, this does – the 0.57 is a credible worst design case.

So we talked about previous tunnels. Up until Silvertown, which has just been completed, the largest TBM tunnel was 8.8 metres, which was the Lee Tunnel in east London, which was also on a slurry TBM. Silvertown is – now won that crown – has an OD of 11.91 metres, but a cover-to-diameter ratio of 0.62 and, as I said previously, the LTC machine is now – will be ranked in the top five from a size point of view.

As my colleagues have said, from a risk management point of view, the risks, you would classify them as HILP risks, which is high impact, low probability, and they're principally around the risks of improper control of the excavation, which would lead to a blowout of the riverbed, or what's also called a daylighting event.

This is normally controlled by the parameters that you operate the TBM to, which we can come onto when we talk about the types of TBM. It's principally the pressure in the cuthead. With such a large machine, it's more sensitive with a low cover that adds another degree of sensitivity to it. This isn't a perceived risk. There are events where this has happened. In June 1998, when

the fourth Elbe Tunnel was constructed in Germany, a large diameter to reach slurry TBM has been used, very similar to that proposed for LTC, with an approximate cover-to-diameter ratio of 0.5.

Events conspired during cuthead intervention, which is where the TBM is stopped to effect repairs to the cutting tools and to the face. There was a collapse of ground into the cutter head, which led to a chimney forming to the surface, which obviously would lead to the remedial works at the clauses – that the clause describes. It's also worth saying subsequent events during this incident led to the scour protection of the rock arm that had been placed to make good the hole that was in the riverbed, filled the cutter head and blocked it, which impeded further progress, so this is just to demonstrate that the risks that the pair here are talking about are very real.

And I'll come back to something that the applicant said about the size of the machine means that you can have these hollow spokes, which are in the cutting head of the machine. It's obviously a very good risk mitigation measure. But there's a counter-argument to that in that the TBM will be going through chalk, which contains flint, which has a high degree of wear on the cutter head, so you can't rule out the possibility of having to do an intervention under the river, with the degree of wear that you might expect. That's it from me on that particular point. Thank you.

MR TAYLOR: Okay, thank you very much. Can I now get an indication from the other interested parties in the room, both physical and virtual, if anyone wants to speak on this. I'm not seeing anybody, so I'm going to pass back to the applicant.

MS TAFUR: Isabella Tafur for the applicant. Thanks, sir. We understand the PLA's concerns. We've spoken to them already. We will continue to engage because of the very risks that Mr Terry has identified. We have proposed what we consider to be robust protective provisions, but we, as we've said, we'll continue to engage with the PLA to ensure that any – seek to ensure that any outstanding concerns they have will be addressed.

MR SMITH: And, of course, in terms of the detail to protective provisions, if we need to ventilate those on Monday morning, we will.

MR TAYLOR: Okay, so thank you, everybody. So now I'm going to move on to agenda item 4, which is essentially the tunnel boring methodology. First, I do want to deal with this issue of the types of tunnel boring machine, and then we're going

to move on to the matter of one versus two tunnel boring machines. So, in the first instance, again, I wanted to start with the applicant, and I'll call first on the Port of London Authority.

So, at the moment, my understanding is that the DCO would allow flexibility in terms of types of machine that could be used, and that matter would be fixed at a later date. So I'm going to be asking the other interested parties if they feel that that degree of flexibility is appropriate or whether a very specific type of machine should be secured at this stage. But, from the applicant, I'd like to understand a little more of your justification for keeping that degree of flexibility, both in terms of why you might need that degree of flexibility, and then also why you're content that risk implications are and can be appropriately managed. So we can start there, please.

MS TAFUR: Isabella Tafur for the applicant. I will start, and to the extent that Mr Clark-Hughes has anything to add, I'll turn to him afterwards. So the project is currently at preliminary design stage, and the delivery of the scheme is to be procured on a design and construct form of contract, and it will be for the appointed contractor to determine the detailed design. And we say that, given the stage of design development we're at, it's appropriate to maintain flexibility in terms of the tunnel boring machine, which, as we've explained in the previous submissions, we think it's already – that flexibility is already provided for in the DCO itself and in the control documents, none of which will restrict us to a type of machine.

And we've also explained in our environmental statement addendum, which is REP-2040, that we don't consider there to be any materially new or different effects, whether it's one or two tunnel boring machines. And I can outline the position –

MR TAYLOR: If we could leave the one versus two to the next discussion, please.

MS TAFUR: Sure. I'll ask Mr Clark-Hughes if there's anything further he wants to add on the reasons for not specifying at this stage the type of tunnel boring machine.

MR TAYLOR: Think it would be helpful to have some technical background to that. Thank you.

MR CLARK-HUGHES: John Clark-Hughes for the applicant. It's really just in support of what my colleague has just outlined. It's the reason for flexibility, that we don't think it's appropriate to constrain the choice of machine type at this stage.

Having said that, the choice of machine type is a subject of many parameters, but the first and foremost that drives that choice is the predominant ground type. And for that reason, we have anticipated a member of the slurry family of tunnel boring machines to be the appropriate and selected machinery.

Within that family, there are then various variants, and we do not wish to constrain that choice at the moment because I'm very much delving into the realms of methodology and construction process and procedure rather than the design of the final bill asset, and we see that as very much the contractor's area of expertise, along with the machine manufacturers.

The type of machine we're talking about, the diameter that my colleague from the PLA's referred to, are obviously, very large – there aren't that many machine manufacturers that are capable of that type of machine, and they are very expert, so we think it would be incorrect to take the presumption that we should specify and secure the particular type of machine.

The assumption that it's a slurry machine then allows the assessment of that methodology as part of the environmental statement and the assessment of the supporting and ancillary equipment at ground level that goes with a slurry machine, so, namely, a treatment plan, fairly obviously, with all the other things that go with it, such that we think that means that we've presented an appropriate assessment. We think it's sensible to make the presumption this will be a member of the slurry family, but that we would not go further than that and go down the various branches of specificity and try and constrain the choice any further.

MR TAYLOR: Can I come in at this point? It might be a question more for Ms Tafur. Is it nailed down that it would be a TBM in the slurry family or not?

MS TAFUR: Sir, no, it's not nailed down. But clearly, there are controls which prevent the applicant from carrying out any construction works which result in materially new or materially different environmental impacts to those which have been assessed, so we say it's beneficial to retain flexibility to account for potential future developments. And there's effectively no downside in that we are constrained to not cause environmental impacts through our construction choices that go beyond those assessed in the environmental statement.

MR TAYLOR: Just to clarify, the reason you, at this stage, want to keep even that degree of flexibility is if there are future technological developments in tunnel boring

machines that might mean that's a different type. Is that why you want the flexibility – because, otherwise, it seems like everything you're saying to us is already pushing you down the road of this slurry family.

MS TAFUR: Isabella Tafur for the applicant. Sir, I believe that, even with technological developments, the expectation is that it will be from the slurry family, as Mr Clark-Hughes has described it. That's my understanding. I don't know if he has anything to add to that about potential future developments.

But what I would say is that, whether or not it is specified – well, effectively, we don't see the particular benefit – any benefit – in specifying it, given that the controls already exist to ensure that we can't go beyond that which has been assessed in the environmental statement.

MR PRATT: Ken Pratt, panel member. You seem to have gone down this slurry family. There are other types of machines. The idea of the environmental impact and whatever is based on, in theory, worst-case scenario. Have you actually produced anything which gives the indication that the slurry family is the worst-case scenario in comparison with the other opportunities that there might be out there at present? Now, I'm not talking about crystal ball gazing at this point in time, but if you could, if it's in the documentation, can you just highlight, please?

MS TAFUR: Isabella Tafur for the applicant. I'm going to ask Mr Forrest to address you on this.

MR FORREST: Barney Forrest for the applicant. What I would say is, we've used a slurry tunnel boring machine as the basis for our assessment as a reasonable worst case, not extreme worse case because it is the type of machinery you would use to tunnel in chalk. You wouldn't use any other type of tunnel boring machine from any other family to put a tunnel into chalk because it wouldn't be appropriate and it wouldn't be safe.

There's the environmental concern side of it, but there's also the safety of our personnel who'll been doing the works. That's as important a consideration in the construction, so we've assessed a reasonable worst case. We've not assessed an extreme worst case where we used inappropriate construction techniques. Is that a fair answer?

MR TAYLOR: I understand the answer that you're giving, but where it leaves me is just to query why this isn't just made clear at this stage. That's the bit I'm still

struggling to understand, but I think – I mean, I want to just park that for now, and then, when I come back to you at the end, maybe, you could respond to that because I'm just – there's just a slight disconnect for me as to the reluctance to just be super clear at this stage. So could I now turn to the Port of London Authority, please?

MR TERRY: Dave Terry for PLA. So, in principle, we would agree that ECO should maintain the flexibility to use a different type of TBM. All the TBMs mentioned, the closed-face machines, we would agree that's the right thing to do. I think if you limit the choice, you're ruling out the impact of any further information that the constructor of the scheme might gain. I think you're implying a level of knowledge of the scheme that isn't yet there because you're in preliminary design, so I agree.

In terms of a slurry machine being the worst case, I probably gently disagree with that one. And it'd be interesting to see how the impact of the different machines have been accounted for in the design to date because my understanding is we've assessed the flotation of the tunnel, but it doesn't include construction effect, but, broadly speaking, we do agree.

I'd also, again, with the greatest respect, the use of another machine, as long as it's a closed-face machine, I don't think you could ever say it's unsafe. And different types of machine have been used in chalk before. For example, Align on High Speed 2 at the minute, on central contract C1, are using a slightly different machine. All that points to the fact that the DCO should maintain the flexibility. I'll conclude.

MR TAYLOR: Thank you. Can I just ask you to clarify on that? I just wanted to understand the degree of flexibility, so you think how the applicant's approach at the moment is appropriate or that it should be reduced to the machines in the slurry family, as we're referring to them.

MR TERRY: Dave Terry, PLA. Can I answer that with a slight anecdote? So there was a tunnel under the River Thames – I think it was for the Docklands Light Railway extension, and there was four bidders, and it was through chalk. It was a very difficult launch, very shallow through alluvium and river terrace deposits, and it went through the chalk under the river. And three bidders proposed a slurry machine, and one bid had proposed an earth pressure balance machine.

The two were both closed-faced. They just use a different mechanism to support the ground, using slightly different approaches.

I was on one of the teams that proposed a slurry machine, and we had a slight giggle at the fact that someone had proposed an EPB for chalk. The EPB machine won the bid. They won the job. The job was undertaken very safely and very effectively, with no real incidents under the river. So I think the DCO should maintain complete flexibility, up to the point of it being a closed-face machine, so any TBM with closed-face and this method of supporting the ground, to me, would be suitable. It shouldn't necessarily be confined to a slurry family.

MR TAYLOR: Thank you. I'm going to ask Mr Smith to come in, and I may have a question as well, but probably for the applicant.

MR SMITH: Yes, there is a natural flow on there, which is that, for very clear reasons at this particular design stage, one can therefore see why one wouldn't specify a slurry family machine right now. However, the nature of the assessment that's then taken place in the environmental statement has worked broadly, as Mr Forrest has suggested, within the output or effect assumptions that flow from a broad strategic choice of a machine likely to be in the slurry family.

I guess I'm just throwing up the question, which is, your Rochdale envelope is then your Rochdale envelope. To the degree that we can with the expertise around the table, and if it can't be done with the expertise around this table now at some point in the examination, I guess that raises the residual question, which is, we've talked about narrowing the Rochdale envelope for potentially good reasons, but is there possibly an argument that it's not broad enough to maintain the flexibility necessary to possibly use a non-slurry family machine? Does the ES provide sufficient assessment of operating flexibility?

MR CLARK-HUGHES: John Clark-Hughes for the applicant. The fundamental difference from an environmental assessment point of view between the different types of machine is the nature of the material arising. So, in a slurry-type machine, the material is slurrified and is then treated in a slurry treatment plant to produce a chalk cake. In the other variety of machine, it comes as a the dry material with or without the addition of various conditioning foams and such like.

To the extent that either of those may become the chosen methodology, I don't think it makes any material difference to the assessment. I'll pass to my colleague, Mr Forrest, to comment a little further on that. But I think, at that level, the assessment of environmental impacts would very largely be the same, so I don't think it's actually a particularly material question. I think it's obviously an interesting point.

We're in the realms of the sort of difference between what we think might happen practically versus what's actually secured from a planning perspective in the DCO, and I do appreciate the difference, albeit, clearly, I'm not a planning expert. So I think we know where we're going, but we haven't and do not wish to go as far as securing it within the DCO for the reasons that were given. Do you want to add more on the assessment side?

MR FORREST: Barney Forrest for the applicant. So, in terms of what my colleague's just said, the material coming out, and this both ways, waste material management and servicing of the tunnel boring machine and the infrastructure you might require for that, and in that sense, the slurry treatment plan is a larger piece of infrastructure than you might require for, say, the management of arisings on excavated material as it comes out of the tunnel. So, in terms of a reasonable worst case, we've assessed something which has more infrastructure at the tunnel portal compound than you would under a different tunnel boring machine.

In terms of the impacts around dewatering or ground-borne noise, we'd consider those to be within the same bounds. And the assessment that we've undertaken would be appropriate for that side of the assessment of the Rochdale envelope associated with that particular element. I can't think off the top of my head any other elements that would necessarily be different. There may be slightly more – no, I think it would all be pretty much the same, to be honest.

MR SMITH: Well, look, at the risk of just labouring this point, but again, I think it's an important point to be able to go past and then, if it is dead, put it to bed. If, for example, you were dealing with a process that led you to dry arisings, or broadly dry material arisings as opposed to a liquified or slurry arising, yes, you've characterised the headworks processing as requiring less land, creating less immediate impact in that location because you're receiving dry materials.

But that does also then give you some alternative options in terms of the handling of that driver to which you could presumably directly handle by vehicle and potentially move to a broader range of disposal locations than earlier in the construction process than maybe you would have anticipated if you're looking at a slurry arising process where you then have to treat and dewater that material before you're moving it. And you're probably looking at moving it less far.

I know I'm skating over an enormous amount of detail at a very high level here. But I guess what I'm trying, though, to understand is whether there would be anything emerging from a process with dry arisings that meant that you might actually approach more than just the simple headworks design and delivery in a different way. And therefore, you might need to describe the effects of the project for environmental assessment purposes in a different way.

If the answer to that is no, then move on, but if it's possibly yes, it may need a little more reflection later on in the examination.

MR FORREST: Barney Forrest for the applicant. I believe it's no because our material handling strategy is not just based on the type of materials that's coming out, but our desire to reduce the distance that we're transporting material and thus reduce the impact on local communities through vehicle movements or river movements, were that to be the chosen option, but also to reduce the carbon impact of moving material a greater distance.

So, regardless of whether the material is excavated in a liquified form or in a solid form, our desire is to reduce the distance it goes and, to that extent, our assessment covers that.

MR SMITH: So you wouldn't view the fact that you had a residual constraint, in effect, on the geographical scope of your movements that had been developed to deal with a liquified arising – if you ended up dealing with dry arisings, you'd live with that.

MR FORREST: Absolutely. And indeed, to an extent, some of the arisings are dry as they come out from the excavation of the tunnel portals before we launched the tunnel boring machine, so there is an element which allows for the treatment and storage and management of dry excavated material as well as slurry.

MR TAYLOR: Thank you. Just reflecting on that immediate conversation, I think it would be helpful in the post-hearing note that we address this issue and give a robust justification as to why it doesn't, in your view, create worse

environmental national effects than has been assessed. That would help. I think I've got a final question on this to the applicant. And I'm aware I need to ask other interested parties if they want to comment on this issue.

So, reflecting on what Mr Terry said, where he agrees flexibility is necessary, but his view is, it's necessary, but it's got to be closed-face, in the closed-face family. My question is, is that secure in the DCO, which I don't think it is, and if not, should it be?

MS TAFUR: Isabella Tafur for the applicant. I don't believe it is, and we will – that is certainly the intention, that it will be a closed-face machine. And we'll take that away and consider that, sir. I mean, as a broad matter of principle, you will understand that, at this early stage, the desire is not to constrain the contractors to the particular machine they choose to use for a particular work, and that we think it's an important general proposition to retain sufficient flexibility for the contractors. We understand in certain exceptional circumstances, there may be scope for further narrowing the options that are now at this stage, so we will give some consideration to that.

MR TAYLOR: Ken Taylor, panel member. I am aware of one DCO where it has been narrowed down to a closed-face tunnel boring machine. There were specific reasons for that, which are not entirely comparable to what we're dealing with today. Okay, I'm now going to turn to the wider rooms. Can I have an indication if anybody wants to speak on this matter? Yes, I will go to Thurrock Council first, please.

MR EDWARDS: Yes, thank you, sir. Douglas Edwards for Thurrock Council. So, on the particular matter arising from agenda item 4(a)(i) and the discussion at this stage, which is the type of tunnel boring machine, Thurrock Council's position is that it understands the need for flexibility and is not seeking specification at this stage as to the type of boring machine.

We do have one or two more substantive things to say about the power to elect between using a single or two tunnel boring machines and, more particular, the associated impacts of that, but we'll come to that in due course. So can I just reserve Thurrock's position in light of the discussion that's already taken place on this item? If there is going to be some further information provided by National Highways as a result of that discussion, obviously, we'll review that and deal with any consequences, as far as the council is concerned, in writing.

And, sir, so as far as the point about the Rochdale envelope is concerned and the approach that the council has taken, is that the applicant has specified that Envelope. It has put that forward as the parameter against which the environmental effects will be assessed. If that changes as a result of a choice taken further down the line as to the type of tunnel boring machine, then, essentially, they'll either to stay within those parameters, or they have to make an application arising from it if they change it, so that's the basis from which Thurrock Council has assessed this particular matter. And it seems to us that that's the appropriate basis to move forward.

MR TAYLOR: Thank you very much. Yes, we will return to the number of machines soon. Yes, from Gravesham Council, please.

MR BEDFORD: Thank you, sir. Michael Bedford, Gravesham Borough Council. Sir, I think our concern is not for the council to seek to be prescriptive about the methodologies and the techniques which are used, but simply to ensure that the outcome achieves the result that we understand the applicant intends to achieve.

That is to say that the working is from the north and back through the north, and provided that that is secured, in a sense, the mechanics, we're content to leave to the applicant. And we understand from our dialogue with the applicant that the applicant is intending to clearly commit to that. We know that there is a REAC commitment, MW-009. I think I might have got that reference wrong, so don't quote me on that. We'll check it in the post-hearing submissions.

But, I say, provided that that is secured and that, I think, there are a number of ancillary documents, which perhaps need to be brought up to date with that. We've had some dialogue with the applicant about that. And I think, again, we're on the same page that, I say, if those matters are secured, then it becomes, I say, for the applicant to deliver within the commitments that the applicant is making.

MR TAYLOR: Thank you, Mr Bedford. That is my clear understanding, but I will ask the applicants to briefly confirm that. So, Ms Blake, I believe you wanted to speak.

MS BLAKE: Thank you, sir. Laura Blake, Thames Crossing Action Group. Again, I appreciate it is a very technical level conversation. But as a representative of the communities, in regards to the environmental impacts, I appreciate you

asking the applicant to actually put something in the post-events in regards to environmental impacts, because we do have concerns on that. But just on a more general aspect of the impacts that we see that there could be, in regards to a more general as well as on this specific topic, of so much being left to the contractors, this may be standard practice, but for communities that doesn't give us reassurance. So I just wanted to bring that up and flag it up amongst the technicalities of this, that this equals lives and impacts in the communities. So we would just like some kind of reassurance onto the meaningful engagement that we would hope to see, should the project go ahead, to give that reassurance and contact points for the communities, bearing in mind that throughout the investigation there have been a number of incidents where communications have been poor and that we have had to step in as an action group trying to assist between residents that have experienced issues with the applicant. So I just wanted to put that on record now. Thank you, sir.

MR TAYLOR: Thank you, Ms Blake. That point you've made is – I appreciate you've made that a number of times for a number of particular matters, so it is – we've noted that as a wider point that covers a whole range of construction issues. So maybe just do a final check. Is there anybody else wishing to speak on this before I ask the applicant to give final reply? I'm not seeing anybody. So Ms Tafur.

MS TAFUR: Isabella Tafur for the applicant. So just to note that there does seem to be a general agreement as to the benefits of retaining a certain degree of flexibility to the constraints to which the applicant is already subject in terms of staying within the Rochdale envelope. I would just like to confirm the point that Ms Bedford made about the REAC commitment from the north, back through the north and the REAC reference is MW009. That's in the most recent iteration in response to concerns raised by Gravesham. I think Dr Wright may have something to add.

DR WRIGHT: Tim Wright for the applicant. I recognise that you took it away for another hearing, but I did just want to talk about the community very briefly and draw your attention to sections 5.2.11 to 5.2.15 of the code of construction practice, which puts an obligation to set up community liaison groups, and we do intend to continue to liaise with the community and work through the

construction process, though happy to talk about that at a separate session because of your agenda you want to keep to.

MR TAYLOR: Yes, thank you, doctor. I am keen to stick to the agenda, because we've still got a fair amount to get through, but I'm grateful that we probably need to enter that discussion, even free written questions or a future hearing, but yes. Thank you. Okay, so conscious of time, so it's just after 1.00. I'm going to stick as close as I can to the timing of having lunch at 1.15.

So moving on to the next issue, I suspect what will happen is I will ask the applicant to set out their position and then we'll break before opening it up to wider discussion. So this is the matter of the number of machines, either a single machine or having two, and I want the applicant to set out their view as to why you think DCO and the assessment didn't constrain you to having two machines. And then, if there's time before lunch, the potential benefits you might see off the single option. I appreciate we've had quite a lot of this in writing, so we don't need vast amounts of detail on this, but if you could set that that out.

MS TAFUR: Isabella Tafur for the applicant. In summary, the applicant's position is that the DCO does and should allow for both options of a single or two tunnel boring machines. As we set out issue specific hearing one and in our post-submission written summary, the use of a single tunnel boring machine is within the scope of the environmental assessments in the ES. It wouldn't and doesn't result in any materially new or materially different environmental effects from the use of two TBMs. The DCO application contains no constraint or commitment, either in the draft DCO itself or in the control documents that requires the use of two TBMs. And so we say that the application contains a proportionate degree of construction flexibility, which extends to the ability to employ a single TBM.

The decision on construction methodology hasn't been made and will be made at the detailed design and delivery stage. And as we've discussed before, it's commonplace for DCO applications at this stage to allow for an appropriate degree of flexibility, provided always that the controls provided for in terms of environmental impacts are sufficient and adhered to, which we say they are in this case.

In response to an action point raised by the Examining Authority at the first issue-specific hearing, we have produced an environmental statement addendum, which outlines how the works would be undertaken if a single TBM were used, both starting and finishing at the north portal, rather than two TBMs, which would both start at the north and then finish at the south portal. And we say that that review demonstrates that the construction effects and conclusions reported in the ES reflect the reasonable worst-case scenario for both a single or two TBMs. A single TBM method would involve no physical changes to the permanent works of the project footprint presented in the DCO. It wouldn't require the applicant to seek new powers over land to deliver the works. The overall length of the construction programme set out in the DCO application would remain the same regardless of whether it was one or two. And, as we've said, we've provided that REAC commitment to Gravesham to confirm that it'll be from the north to the north. So we have summarised and reiterate our position that the use of a single TBM wouldn't constitute a change to the DCO application, that no change is required to the draft DCO or any of the other application materials, and we say that the addendum that was submitted in response to the previous issue raised has demonstrated that there will be no additional environmental impacts.

Sorry, briefly, you asked if there were any benefits of a single as compared to a double – as compared to, sorry, two tunnel boring machines. And I'm just going to ask Mr Forrest to address you on that.

MR FORREST: So, outside of the physical tunnel boring machine, the embedded carbon and energy required to create, move it and drive it is the other benefit associated with a single tunnel boring machine. And we set out, I think, in our note, but that's the main difference. But, again, it's not significant in terms of carbon in our assessment of carbon. So it's within the envelope that we've presented, and given that two is slightly worse, that's a reasonable worst case.

MR SMITH: In respect of this item, I mean, if Mr Taylor breaks this fairly shortly and we are then hearing from other interested parties on this point after lunch, essentially, again, there is almost a banns reading dimension to this, which is that we have asked the in-principle questions very early in the examination. We've received now a written case from the applicant setting out its store, as it sees it, in relation to this matter, and it's therefore the opportunity for essentially

final discussion around the table, if there are interested parties who for any reason broadly dispute the basis or scope of the opinions that the applicant has offered to us in documentation that we've received so far.

So that essentially then means that, once we're through this and we've had this discussion, it should be clear that we have then ventilated and examined that issue reasonably robustly. Now, if there is a substantial outstanding disagreement on it, by the middle of this afternoon we're going to know. At that point we will then regroup and think about what further examination steps would be necessary, but we won't make that judgment until we've heard what others have said.

MR TAYLOR: Thank you, Mr Smith. I think what I'll do is I want to take an indication of who wants to speak on this topic, because I imagine there might be a fair few people, so if people could indicate both in the room and the virtual room by raise of hands, just so I can get a rough idea of the numbers. Okay. I'm just conscious of time. Mr Edwards, I don't think you're going to make your points in five minutes, are you? No, okay. So it's essentially 1.10. It's sensible if we break for lunch now, 1.10 until 2.10, and I'll see you all back then. So the hearing is adjourned.

(Meeting adjourned)

MR TAYLOR: Good afternoon, everybody. Ken Taylor, panel member, speaking. I'm reopening this hearing, but before we move on to the substantive business, my colleague, Mr Smith, just wants to address a procedural matter.

MR SMITH: Thank you very much, Mr Taylor. I'm conscious that early on Monday morning we will be opening issue-specific hearing number 7, where we will be reviewing the DCO. I'd spoken briefly at the beginning of issue-specific hearing number 3 about the remit of that hearing and its agenda, but I'm very conscious that there are people in the room here today who weren't at that, and that, given that a number of matters have arisen today that might end up being dealt with in the agenda for that hearing, I thought it would be worth just giving a quick piece of coverage of how that hearing itself will proceed.

What we intend with that hearing is that it is initially what I have referred to previously as a monitoring point. It's a hearing that enables us to check in,

principally with the applicant, in relation to changes proposed to the draft development consent order since issue-specific hearing number 2, to ask them questions about whether there are any changes not yet submitted but under consideration, and them therefore to provide us a sort of forward vision into what the potential emerging work programme of the draft development consent order might be.

And then the main business item, agenda item 3(c), relates to draft development consent order matters arising from other issue-specific hearings. Now, that is very deliberately a broad basket and catch-all. The design intention of it as an agenda item is to enable them to be a place where, instead of us spending time talking about the detailed mechanics of DCO drafting flowing on from the individual environmental issues and/or planning merits matters discussed around these tables in all of these issue-specific hearings, we stop at the point where we reach the gates to the DCO, we migrate into issue-specific hearing number 7, and we have the conversations there around, essentially, the detail of drafting at that point.

Now, I just want to check that a) that's understood, and b) that there aren't any outstanding procedural concerns about that as a course of action, because of course what we don't want to do is to create a table for that discussion to occur around on Monday and then suddenly find that nobody wants to be at it. I'll come to the applicant at the end, but if anybody wants to address us on the arrangements for that, feel free to now. So I'll go to Thurrock Council first.

MR EDWARDS: Douglas Edwards for Thurrock Council. Thank you for that. That's very clear and we'll prepare for that session accordingly.

MR SMITH: Thank you very much. And in relation to preparation, I'm very, very conscious that there are, in a sense, no detailed papers for that agenda item, but we all know what we've spoken about in this week, and those matters that bear on DCO drafting, particularly the matters that we've dealt with in detail today, for example around protected provisions, are perfectly proper matters to bring forward at that time. Anything else that anybody else want to address us on? The applicant, do you need to respond at all? No. Excellent. In which case, I'll return to the substantive agenda and Mr Taylor.

MR TAYLOR: Thank you, Mr Smith. Yeah, so the point we got to was the applicant has set out their initial views in terms of the use of two tunnel boring machines

or having a single one, and we're at the point where I was going to see the parties' views. I would like to start that with Thurrock Council, so Mr Edwards, please. And just before you start, Mr Edwards, it might be helpful as appropriate that the interested parties refer to the applicant's addendum to the ES on this matter and the relevant paragraph numbers. That would be helpful.

MR EDWARDS: Thank you, sir. Douglas Edwards for Thurrock Council. Sir, in respect of agenda item 4(a)(i) bullet point 2, I'm going to start and then I'm going to hand over to Adrian Neve of Stantec who sits to my right. He's a civil engineer and transport planner who will deal with some of the technical detail.

In terms of Thurrock Council's position in respect of that agenda item, the council does not object in principle to a power being reserved through the DCO for National Highways to elect whether to use a single or to two tunnel boring machine, and the council is conscious in respect of this particular matter, as it was in the matter dealt with before lunch concerning the type of machine that the Rochdale envelope does provide the parameters in terms of the environmental effects which have been assessed, that, as discussed before lunch, the contractor and National Highways engaging them cannot go outside in any material respect.

The council does, however, have concerns in respect of the associated impacts of the approaches, and those concerns are essentially twofold: firstly, the council does not consider that the environmental impacts of the two options in terms of tunnel boring has been properly assessed, justified or indeed described in the evidence base in support of the application. Mr Neve will expand upon that briefly in a moment, but there is a particular concern in respect of the differences in terms of the number and profile of worker movements depending upon which tunnel boring option is pursued. That's working movements particularly on the highway.

Secondly, the council does not consider that appropriate controls have been secured at implementation stage in terms of the method of tunnelling and its consequences. Again, the area of particular concern is what the council considers to be inadequate consideration of and commitment to use of non-road-based transport opportunities for the movement of plants, machinery and materials required in association with the tunnelling operations, which, logically, if there are two tunnel boring machines used, is going to mean that

there are going to be increased movements. And the particular concern of the council, which is one that we understand to be shared by the PLA, is the extent to which there's been a proper consideration of and commitment to use of the river to transport plant machinery and materials in respect of the tunnel boring operation.

So those, in summary, are the two headline points that the council have, and both relate to the associated impact of the tunnelling approaches. Unless I can be of any further assistance in terms of a general overview, I'm going to ask Mr Neve just to explain briefly some of the technical detail behind that.

MR TAYLOR: Mr Neve, please.

MR NEVE: Thank you. Mr Neve on behalf of Thurrock Council. If I can just start by referring to our local impact report, it's a fairly lengthy reference, but it's a local impact report, which is appendix C and then annex 4, paragraph 1.12 of our local impact report. Just to help, on which page that is on, it's on electronic page 862. I'd like to say it's towards the end but it's not. It's 75% of the way through. It's a very brief reference, sorry.

So it's effectively referring to National Highways' reference to the project being a pathfinder project, and so National Highways has bounced[?] the project as a pathfinder project and claims that Lower Thames Crossing will be the greenest ever built in the UK. National Highways' net zero highways document: 'Our 2030, 2040, 2050 plan emphasises the commitment to use our Lower Thames Crossing scheme as a key project to test low-carbon innovation and approaches', which is page 18 and second bullet, 'and encourages our supply chain partner to use the lowest' – and there is a strange wording within the document which I'll come back to in another way that I've interpreted, so it says 'to use the lowest form of feasible and available transport', and I've assumed within that 'lowest form', it means lowest environmental damaging. I don't know if there's any other contrary view on that. And then that's on page 19, second bullet, under 'Transporting material to our sites'.

So the context there is that there's this drive from National Highways to adopt the environmental principles of transport. And what I'm saying is that what we need to think about is driving down the environmental impacts and therefore the associated impacts of the movement of those materials, and we've had lots of conversations over what is the outline materials handling plan, which

is application document 338, and how that gives control and management and governance to the processes of handling that material.

As Mr Edwards has referred, we have a joint letter that was put in, a joint technical note that was put in, between ourselves and the Port of London Authority. That was the appendix C, annex 4. I read[?] from that part, so that was the joint letter and it's contained within our local impact report, which looks at and suggests to National Highways how we should be looking at a much broader review of the way that materials are handled, plant and equipment are handled, to try and drive down some of that impact that is on the local road network, though the suite of control documents is much broader. When it talks about the traffic management plan, there's a suite of documents – again, a lot of conversation about this yesterday, but within the outline materials handling plan, there's table 7.1 which looks at the movement of excavating material.

So there's one commitment within the outline materials handling plan which talks about the import of bulk aggregates to the north portal, and the commitment is an overarching commitment but relates specifically to the north portal, which amounts to 35% of bulk aggregates to the project. Over and above that, what the materials handling plan tends to forget is that there's an awful lot of material other than [inaudible] aggregate that's coming in in significant quantities. There's an awful lot of material that's being moved as well within the project, without the project, and that includes, for instance, an estimation of hazardous excavated material, which is [quoted integral?] 7.1 of the outline materials handling plan, 154,000 cubic metres. That equates to around 36,000, 36,500 lorry movements onto the network.

Obviously there are broader movements of material across the project. If you take the other movements off from the project, that adds on another 74,000 movements onto the network. So we're talking in total, as I said, not just around the tunnelling aspect but, in the broader sense, nearly 110,000, 120,000 movements of just excavated material. Over and above that, we're then talking about all the associated materials that go with the tunnel boring machines, etc.

So what I'm asking is that we take that opportunity to squeeze down and control and commit to a better use of the river to feed the equipment and the materials. So in our response to the addendum to the ES and, prior to that, to the minor refinements consultation, we set out a number of Thurrock's concerns

and then, with the submission, there effectively six elements that were, to our view, outstanding, and a lot of those are outlined, but it's about that commitment is the primary one.

Then there is this change in worker profile that comes through from the potential alternative mechanism for the tunnelling, which brings on a change in the Asda the roundabout which could be a worsening of that. And I asked yesterday if we could have some confirmation from National Highways as to exactly how workers are accessing the north portal, which is the major workforce access for the project. And so I think it is within addendum C, table C4, it identifies that at phase 2. I think there's an extra 200 – sorry, just to give you – that's on electronic page 108 of 155, so much better. So at phase 2 we're looking at up to 220, 230 additional movements over and above that which has been previously examined within the two TBM option.

So there are changes. There are changes that need to be reflected within that assessment of the impact on Asda roundabout, and at D3 we've had some modelling of that Asda roundabout yet to be confirmed – our view on that, but that won't be tested as scenario.

We've mentioned about the – there's an unsubstantiated claim that the one TBM option will save 38,000 tonnes of carbon dioxide or carbon equivalent. We need to understand how that is substantiated. And then I talked about the 154,000 tonnes of material as non-hazardous material that is leaving the project, so looking at how that can be better handled to reduce that environmental impact, and then further coordination across the control documents.

Finally, one important point is the change in method of management of the tunnel boring process – is we echo what the emergency services have said: that we as a council – we are responsible for local roads, we are responsible for the local borough, but we do need to be part of the emergency preparedness planning, which at the moment I don't think there's a commitment that – it should be a fairly simple commitment but there isn't a commitment for the borough to be involved. Thank you. Brevity [inaudible].

MR TAYLOR: Thank you. Could I go to Gravesham Council next, please?

MR BEDFORD: Thank you, sir. Michael Bedford, Gravesham Borough Council. We've already made our overall position clear on not wanting, as it were, to delve into the detail of how the applicant chooses to construct the tunnel,

provided that the appropriate protections are good, and reference has been made to MW-009 already.

That point also applies to the issue as between one tunnel boring machine and two tunnel boring machines, and, sir, specifically you will be aware that in the environmental statement addendum as submitted at deadline 3, I think paragraph C 2.12 and C 2.13 – that's in the appendix C of that document. C 2.12 repeats the commitment and then C 2.13 makes it explicit that that commitment stands whether it's one TBM or two TBM, and so, provided that the commitment is there and secured, that provides us with reassurance.

I do repeat the point I made this morning just briefly. We do think that there is probably a need for some of the ancillary documents and things like the material handling plan and the construction management plan to be finessed just to make sure the language is consistent with that approach. We think that's very much a matter of detail and we can have dialogue – which we have been having useful dialogue with the applicant, so we don't need to take up examination hearing time on that. It's just a note that at the moment we think there might be a few niggles to be ironed out to make sure all the documents are effectively saying the same thing about the particular issue. Thank you, sir.

MR TAYLOR: Thank you, sir. Okay, thank you, Mr Bedford. On that final point, the potential need to finesse language, we could potentially briefly pick that up on Monday or following the relevant deadlines as you progress with those discussions.

MR BEDFORD: Yes, thank you, sir.

MR TAYLOR: Yes, Port of London Authority, please.

MS DILLISTONE: Alex Dillistone, Port of London Authority. Mr Terry will address the detailed technical points, but I thought that, given the submissions that Mr Edwards had made on behalf of Thurrock Council, we should just say at this point that the PLA is strongly of the view that the applicant is light on commitments to using the river. The PLA's experience on previous projects, on Silvertown and Tideway, is that unless these commitments are tied down to use the river, that it simply won't happen.

I don't want to deviate from the agenda and I will make points about waste and material handling at agenda item 7 on construction matters, but I think it is worth noting that the PLA agreed with Thurrock Council on this.

We'd also pick up at that point that in the statement of common ground between National Highways and Thurrock, paragraph 5.4.4.12, that National Highway states that the tunnel boring machinery will be imported[?] or imported via the river with connections to the local road network, but that because the tunnel boring machinery hasn't been procured, they can't make a commitment to use it at that stage. We don't see why there can't be a commitment to use the river at this station, and we would just support Thurrock's comments on that. And I'll pass over to Mr Terry to talk about the two TBMs.

MR TERRY: Dave Terry for the PLA. In principle, from a technical tunnelling point of view, no objection to either one or two TBMs, but I would add a small caveat to this, and it comes back to the PLA's theme of addressing construction risk as part of the follow-on of the DCO. When you operate one TBM, obviously there's one machine going through the ground. When you operate two, if you operate them in a certain way, side by side, that can introduce additional risk in terms of ground stability. So what we'd like to see, if the option is for two, is to have some facility to describe how that risk is managed by the constructor.

MR TAYLOR: Thank you, Mr Terry. Maybe not to respond immediately but just a matter for you to think on and liaise with Ms Dillistone about how you see that being secure wording, and again we can briefly pick that up on Monday and then take it forward in writing.

Can I just see who else wishes to speak? I just want to go to the virtual room because I see Ms Lindley's hand is up. Are you wishing to speak on this matter?

MS LINDLEY: Yes please, sir. There were just a couple of things I wanted to raise. Firstly, in the difference between having one TBM and two on the main tunnels, there is one big difference, which is 24-hour working at the south portal, because under the two-TBMs scenario that wouldn't happen, but with the one TBM being turned around it will. Also, just in terms of what was just said, I believe, when I looked at the documents, actually the two TBMs, although we tend to think of them as being operated simultaneously, they're not in fact simultaneous when you look at the documentation, but I'm sure the applicant will confirm that.

The other point I wanted to make has got several sections, but it's going back to the ground preparation tunnel. We haven't had any discussion about the

type of TBM for the ground preparation tunnel because that will obviously affect the kind of arisings from the tunnel being either liquid or solid. Obviously solid arisings, from what we heard earlier, are more likely to have some contamination mixed in with them, which would be a concern in that location.

The other things that we've asked about the methodology for this – the ground preparation tunnel and the grouting – whether it's been used in a similar soil situation elsewhere and what the outcomes were of that, particularly in terms of safety and chemical contamination. And there was some discussion about the ground preparation tunnel not being in the SPA or Ramsar site. That's not actually true because the landing area is in the Ramsar site and involves some modification to the ditch network there. And also, as both we and Gravesham said, the water ecosystem is common, so it makes no difference whether you're in or outside the Ramsar site. If you're within the marsh's ecosystem complex, then it's all one and the same as regards contamination. Thank you very much.

MR TAYLOR: Okay, thank you, Ms Lindley. I just want to put the applicant on notice that, when I come back to you, I'd like you to answer those specific points about the ground protection tunnel that's been raised. Can I just see anyone else who wants to speak on this matter? I am not seeing any hands. Okay, so I will return to the applicant.

MS TAFUR: Isabella Tafur for the applicant. So dealing with those in the order in which they arose, I heard the concerns obviously that Thurrock raised and we've seen those concerns before. A number of those concerns didn't seem to me to relate to the question of one versus two tunnel boring machines, which I understand to be the agenda item, for example the treatment of arisings and the use of the river. I didn't understand that to relate to any differential between one or two tunnel boring machines.

MR TAYLOR: I will just come in there. If we can park that, we can come back to it when we do a waste and material management agenda item and keep the focus on the number of machines.

MS TAFUR: Thank you, sir. Also Thurrock raised a concern about their involvement in the emergency preparedness planning, which again I didn't understand to relate to any differential between one or two tunnel boring machines, so I won't address that under this.

MR TAYLOR: I think, Ms Tafur, I'll pass back to Thurrock and just clarify whether and, if so, how it relates to the different approaches and then come back to you.

MR EDWARDS: Sir, I'm perfectly content for this message to be dealt with later on the agenda, if that's more convenient to the applicant. We raised these matters under the heading of 'Associated impact of the approaches', which is a matter that is squarely raised within agenda item 4.1(ii). Sir, as long as they're addressed at some stage during the course of the examination, and ideally today, I'm certainly not going to take a particular stand on when they're addressed, but it seems to me, sir, and it seems to us, they were matters that directly arose from the tunnelling methods that were going to be adopted and that's why they were raised at this stage.

MR TAYLOR: I think my preference would be that we deal with them a little later on in the agenda.

MS TAFUR: Isabella Tafur for the applicant. Something that was raised that did relate to one versus two was what I think was described as the unsubstantiated claim as to CO2 savings associated with one versus two. Now, we obviously stand by our assessment of that and we haven't seen any technical response that casts any doubt onto that in our minds. However, the point remains that, provided we are within the envelope assessed of two tunnel boring machines, then whether or not there's a saving in carbon dioxide isn't really the point in issue. Provided there's no impact over and above those associated with two tunnel boring machines then we'll be within the relevant Rochdale envelope. There was then a discussion about the –

MR TAYLOR: Ms Tafur, can I just jump in there before you move on? So my understanding from what you've just said would then be that – because you're saying that the single tunnel boring machine would save carbon – the worst-case scenario – and so then you're saying, as long as, getting through this process, we don't end up tying you down to a single option that you have assessed the worst-case scenario on –

MS TAFUR: Isabella Tafur for the applicant. Precisely that, sir, yes.

There was then a discussion about the worker profile and the Asda roundabout, and I do think we touched on the Asda roundabout and the construction assessment yesterday, and we committed, because there were various time constraints, to providing you with a note on the robustness of the

construction traffic assessment, because we haven't actually explored that in a hearing. I appreciate it's addressed in the transport assessment. So when we come to provide that note which explains the approach to construction traffic modelling, we will address that point about any differential arising from one or two tunnel boring machines, if we may.

In response to the point raised by Gravesham about finessing language, we're very happy to sit down with them. I think it may be that you want to raise it or discuss it in the DCO hearing, but I think it relates more to control documents than to any wording in the DCO itself, but we're very happy to sit down with Gravesham and resolve those issues.

There were two points, one raised by Mr Terry about the additional ground instability concerns that may arise if two tunnel boring machines are used simultaneously, and then there was a concern raised by Ms Lindley about grouting and whether this construction methodology or tunnel methodology had been used in similar conditions previously. She also raised a point about Mr Forrest having said that the site was not in the Ramsar, which wasn't quite correct, because what he said yesterday was that it wasn't in the SPA, but it was in the Ramsar site.

But I'm going to ask Mr Clark-Hughes to deal with the additional instability point and the previous examples of use of this tunnelling in similar conditions.

MR CLARK-HUGHES: John Clark-Hughes for the applicant. So in relation to the question of two machines working in parallel, the intent, in the two-TBM scenario, that there is a three-month stagger between launching the two machines for precisely that point. That is an assumption on which the environmental assessment is based, but it's not secured. That is the intended position – three months' stagger between the two.

MR TAYLOR: So my immediate question is: does it need to be secured, or maybe not in those very precise terms, but that there is some mechanism to ensure that that is considered? And again, it might be something that we need to take away and explore on Monday, but –

MR CLARK HUGHES: By all means we can discuss it further on Monday, but I would give a straightforward response that I don't think it does need to be secured because, even if you didn't have the stagger, all it would mean is that your risk

assessment, your construction methodology and your design would have to take into account the interaction between the two machines. It's perfectly possible to launch the two machines side by side, but the assumption is there's a three-month stagger, but there would be no detriment. You'd just have to take that into account in your construction methodology, or we would have to take that into account.

In relation to 'have we experienced similar conditions?', could I just clarify – was the question around the main tunnel boring machines or was it around the ground protection tunnel?

MR TAYLOR: Ms Lindley asked a specific question around the ground protection tunnel, seeking clarity on what method would be used for that, and then, yeah, she was asking, 'Has this type of form of construction been used elsewhere in similar ground conditions?'

MR CLARK HUGHES: Okay. Thank you. So the answer is very straightforward. Yes, many, many times. So we have, nationally, lots and lots of experience of driving in the clays and in the gravels. It's simply a question of selecting the appropriate machine for the ground condition.

MR TAYLOR: And are you able to provide any clarity of what that would be for the ground protection tunnel or at least the likely options?

MR CLARK HUGHES: The likely options would be down the earth pressure balance machine family, but as to the specific type I wouldn't wish to commit.

MR TAYLOR: And is that for similar reasons to we discussed this morning?

MR CLARK HUGHES: Absolutely the same reasons.

MR TAYLOR: Thank you. I note we now have – Ms Dablin has her hand raised so I'll bring her in. And I do want to actually check back with Thurrock Council if they want to comment on some of the matters, particularly in respect of any evidence that you have that would counter the applicant's view that there would be a potential carbon saving. Can I go to Ms Dablin first and then come to you? Thank you. Ms Dablin.

MS DABLIN: Thank you. Alison Dablin for the Port of Tilbury. Just to respond to Ms Tafur's indication that the applicant's going to provide some further information about the construction worker transport numbers in relation to the one-TBM and the two-TBM scenario, I'm just going to request: can we have some additional information about how construction worker transport movements have been

assessed generally? Because as I mentioned yesterday, it's our understanding that they are not going to be required to go down pre-defined routes and as such, in the absence of a route being secured, our understanding so far has been that they have been not included in an assessment on the Asda roundabout. It would be very useful if clarity could be obtained on this point. Thank you.

MR TAYLOR: Thank you, Ms Dablin. Mr Edwards please.

MR EDWARDS: Thank you. Douglas Edwards for Thurrock Council. So far as the point about the profile and timing, we'll wait to see what the applicant comes back with and make any further representations accordingly. On the point about the lack of any commitment to using river-borne opportunities for movement, we'll see what the applicant has to say later in their agenda when they provide their response to that.

On the specific point about the carbon savings, Mr Neve was quite specific in the point that he made, which was that the applicant had not explained or justified the figure of £38,000, which is the figure that's been raised today, and we see that as nothing more than an assertion. And the point that's being made is the applicant, if they wish to put that forward in evidence, it needs to be justified and explained what the derivation of that figure is.

But there is, in light of the way the points are now being put by the applicant, there is a more general point about this: that saving will only accrue if one tunnel boring machine is used, as I understand the position. The applicant is reserving itself the opportunity to use two tunnel boring machines should it elect to do so, and in those circumstances – and bearing in mind there is no commitment to using one tunnel boring machine – with respect, the Examining Authority cannot rely upon that saving as a benefit because there is no guarantee that that benefit will be forthcoming, so in the circumstances, in my submission, very little weight can be attached to that in any event.

MR SMITH: There is quite an important issue that arises there, and that is that obviously when we are conducting the process of the planning balance, we have to consider, in all respects, the relevant Rochdale max: what is the worst-case effect, and has it been assessed? And if it has been assessed, that is the thing that's decanted in that wonderful set of weighing scales that we use for the purposes of finding the balance. Now, in this particular instance, I don't believe there's any dispute around the table other than that Rochdale worst-case max is

two TBMs, as assessed originally in the ES. So I think the point that you make flows.

MR TAYLOR: Thank you. Ms Tafur, do you wish to come back on any of those points?

MS TAFUR: Isabella Tafur for the applicant. I don't believe I do need to come back. I wholeheartedly agree with what Mr Smith just said a moment ago. I mean, I would like to just briefly confirm in respect of the Asda roundabout what my – the commitment that I made a moment ago was that we would explain in further detail our approach to the construction traffic assessment, because we didn't have the opportunity yesterday to explain why we consider it to be based on a number of very robust assumptions. We have already addressed, in our ES addendum, the small increase in the number of workers in that area associated with a single tunnel boring machine, so we can point to that in the summary that we provide but there won't be further numerical – or calculation.

MR TAYLOR: Thank you. Okay. Right. In which case, I am content to move onto the next agenda item, so 4(b). And we're looking at water resource management and then followed by dewatering issues. So again, I'm going to take the general approach I have where I want the applicant to set out their general position, and I've got a few key points I went them to focus on, and then I will go to the parties. I think I'm going to probably – just to give pre-warning – come to Northumbrian Water Limited, operating as Essex and Suffolk Water, first on this matter, and then probably ask the Environment Agency to come in second, and then I'll move to other local authorities and statutory interested parties.

So in terms of the applicant, what I'd like you to do is to briefly set out the general approach, but again, lots of this is in writing so not in huge amounts of detail. But really, the focus is on using tunnel boring machines, particularly in the [slurry family?], does have very large-scale water usage issues, so it's how is that managed appropriately and then any knock-on effects and ways to mitigate potential impacts on the local community, so both commercial and residents in the area that there aren't – that adverse impacts are avoided as far as possible to those. That's where I'd like you to start, please.

MS TAFUR: Isabella Tafur for the applicant. I'd like to introduce two new members of the team, if I may, before we just move forward. [Lisa Driscoll?] sits to my left, who's the water environment lead, and Federico Fragalà sits to her left, who is a hydrogeologist. We'll start – we had prepared for broad topics, and we were

seeking some guidance, so it's source and supply of water for potable and non-potable uses, treatment and disposal of wastewater, management and control of impact on water resources, e.g., groundwater and surface water quality and flows, and flood risk management and drainage during construction. I'm sorry, so forgive me, in the kerfuffle of everybody changing seats, I wasn't quite sure which of those four you would like us to begin with?

MR TAYLOR: Apologies. Yes, so to begin with, it is the resourcing of the water required, particularly in relation to the high levels of water needed for the tunnel boring machines, and then – yes, safeguarding the impacts on the local community water resources, water supply are the main ones I'd like to focus on, initially.

MS TAFUR: Isabella Tafur for the applicant. Thank you very much for that, sir. I'll ask Ms Driscoll to address you on those matters.

MS DRISCOLL: Lisa Driscoll for the applicant. So if we cover, to start with, the source of water for the TBMs. The water supply to the tunnel boring machine is intended to be groundwater that is abstracted from a Northumbrian Water borehole located in Linford. This borehole is currently subject to an existing Environment Agency abstraction licence, and it is intended that we would agree abstraction rates with Northumbrian Water prior to commencing any tunnelling works, and that the supply would be restrained within the limits of the existing abstraction licence. And that's secured in our application through one of our commitments within the REAC, which is RDWE00.

And if we considered – if for some reason there was an interruption to that source for the TBM, then there is an alternative, to use [inaudible] water, which would be supplied via a permanent water supply piped into the northern tunnel portal building, which is described in Work No. MU29. So in terms of both of those options, we've had discussions with regards to water demand with Essex and Suffolk Water, who are the operating company for Northumbrian Water.

So in terms of that water then being used and us needing to discharge back into the environment, at the northern tunnel construction compound, there's proposed to be a new outfall that discharges into the River Thames. That outfall would cross the intertidal zone via a shallow sheet pile trench, would be 300 to 400 metres long, and then there would be constructed an outfall which is in the

– sorry, below the mean high water line, so that the discharge is always made into the wet channel of the River Thames, and that ensures that there's always dilution available for that discharge. Prior to discharge, the water would undergo treatment at the portal site, and the discharge itself would be governed in terms of its quality via an Environment Agency discharge consent that the project would secure. And again, there's a commitment to this within the REAC. I can also describe the proposals at the southern tunnel portal, if that's helpful.

MR TAYLOR: Yes please.

MS DRISCOLL: Yeah, okay. So at the southern tunnel portal, the greatest source of – the greatest type of water that we'd need to manage in terms of volume would be rainfall runoff. So in terms of runoff that is generated from areas that have got a low risk of being contaminated, so roofs from offices and things, hardstand, that water would be separated and that would be encouraged to infiltrate into the ground, and that replicates the regime that's there at present.

But in areas, for example, where we've got the stockpiles of chalky material, there's a risk that runoff from those areas might be contaminated with fines of chalk. So it's proposed to treat that runoff through a series of treatment lagoons which would be present on the internal construction compound, and then that water would be discharged into – it's a watercourse that we refer to in the application as 'the western ditch', and it's a designated Environment Agency main river. And in discussion with Natural England and the Environment Agency, we've agreed that that discharge would be subject to a discharge consent, and the parameters of that consent in terms of both quality and discharge rate, they would be agreed with both of those bodies. And again, that's secured via one of our commitments in the REAC.

MR PRATT: Ken Pratt, panel member. You said that – I just want to get this straight in my head. Discharge consent at the southern side, rainfall runoff, and potential contamination from the chalky area, and you're restricting discharge rates. On the northern side where there – it is, to all intents and purposes, freshwater coming from the ground or from a potable water source, when it's going into the watercourse system, it's going straight into the River Thames through an outfall consent that you're not expecting to have any discharge conditions put on it, apart from the fact it's below the high water level. So it could actually be running along as a normal ditch, so to speak, into the river between high level

and low water levels, at normal times. So there's no discharge rate – you're not expecting a rate to be an issue on the northern bank; it's just going to go straight into the river under all conditions?

MS DRISCOLL: Lisa Driscoll for the applicant. Yes, that's correct. Because it would be discharging into a tidal region of the River Thames, we wouldn't expect there to be any discharge rate restriction on that outfall.

MR PRATT: Ken Pratt, panel member. Thank you very much for that. How does – if you said it's going into – on the northern side, you said it's going into a trench. Are you meaning a – so you're digging a ditch out; to all intents and purposes, putting it into the river. I'm just trying to get the terminology. To me, a trench is the width of a bucket on the back of an excavator, straight sides, whatever length it needs to be. You normally put a pipe in the bottom and whatever else. If it's a ditch, presumably that ditch needs consent from the agency under the – at least the Land Drainage Act, if not the Water Resources Act, to construct a watercourse. Is that the case, or is it something different?

And my last question on this one is if you're in an area which is below the high tide level, I believe there's a flat valve on the end of the outfall, but is it in floodplain, and if so, will the agency – and this might be a question for the agency later on now – are the agency content with the protectives for any contamination from the one and two tunnel boring machines? And what about quantities of water, particularly if you're using one tunnel boring machine, going back to our discussion of a minute or two ago? When you get to the south side and the tunnel boring machine turns around and then goes back north, if you're supplying the water from the northern side to go to the southern side to come back to the northern side to get decontaminated to discharge into the northern side trench, into the river, has that all been agreed or in the process of being agreed with the appropriate authorities?

MR TAYLOR: Just before you answer, one of the questions I was seeking to get clarity on is the issue of the actual water usage in terms of the tunnel boring machines, which Mr Pratt has just raised, so in answering some of his other questions, if you could also make sure that you do cover that issue because the actual use of the water resource and making sure that is appropriate and doesn't affect – significantly affect others.

MS DRISCOLL: Lisa Driscoll for the applicant. Apologies for any confusion. The trench I referred to, that would just be a means of constructing a pipeline so it would be a pipeline that would cross the intertidal area which would have an outfall at its end, so not an open trench or a ditch or anything of that means. It would be a buried pipeline.

MR PRATT: Thank you for that clarity. A trench, to me, is not a pipeline but never mind. Thank you. Would it help if I split up my question a little bit for you?

MS DRISCOLL: Yes, thank you.

MR PRATT: Right. First one was that which you've just answered. The second one was really, probably, as my colleague said, about the quantity of water, but also getting it from one side to the other and back again.

MS TAFUR: Isabella Tafur for the applicant. I'm sorry sir, I think we might need to bring Mr Clark-Hughes back on this point. If I could just ask him to swap seats. If you could swap seats for a moment, thank you.

MR CLARK-HUGHES: John Clark-Hughes for the applicant. The method of installing the pipeline would be through a wet cofferdam, so the concept is a trench, with a trench that is allowed to fill on the tide. So you support the trench with sheet piling. You are not seeking to exclude the tide, so you lay in a wet trench across. And that is exactly the process and procedure we've used previously in similar circumstances, and that was agreed with the Environment Agency and the MMO on prior projects, so we're anticipating no difficulty in agreeing that, although there would obviously be control measures around it.

In terms of the discharge itself, we would expect a permit for discharge that would have conditions on it in relation to quality discharge, so we fully expect that there would be suspended solids limits and there would be other pollution control limits that we would have to adhere to, and obviously we would agree that with the Environment Agency and the MMO, and any other consent-granting bodies that will require to be involved in that discussion.

To the point of volume, we sized the requirement on an expected conservative worst-case scenario. The system is a closed system, so once the tunnel boring machine is up and operating, there is, in theory, no water usage. It's a recirculating system. In practice, of course, there is always some losses, and therefore we expect to have to top up. However, the maximum requirement is at the beginning when you charge the system, and that's what we've sized the

system on, but you only require that once, when you charge the system in the first place.

MR PRATT: And presumably at the end when you get rid of it all. Ken Pratt, panel member. Just one question on that. Presumably you've assumed the worst-case scenario of two machines working at the same time for your quantities.

MR CLARK-HUGHES: That's correct. The demand is instantaneous at point of charging, so we assumed we would charge one machine and would use an amount of water to do that, and then in the two TBM scenario, three months later we would repeat the process and charge the second circuit, and again, we'd use an amount of water. The strategy of using the non-potable water is quite simply because for the construction process, it doesn't need to be potable so there is no benefit, no point in it being treated to a potable standard. By using the non-potable supply that is available and adjacent, we're taking any detriment away that would otherwise be placed on the potable network, so there is otherwise no detriment.

MR PRATT: Thank you for that.

MR CLARK-HUGHES: I should also add, the outfall – I spoke about [inaudible] discharge, but it'll also be subject to river works licence with the PLA as well. I should've said that.

MR TAYLOR: Thank you. One additional matter I'd like you to address at this stage. So from what we've discussed, discharging the water back into the watercourses, there are – and this matter was raised at the hearing yesterday – there are former landfill sites and the potential for that resulting in contamination, leachates, and that going back into the water environment, and so whether – how that is proposed to be managed, could be addressed.

MR EDWARDS[?]: And this is with specific reference to the northern portal?

MR TAYLOR: The northern portal, yep.

MR CLARK-HUGHES: I'm happy, yeah. John Clark-Hughes for the applicant. The first point to note is that the alignment does not pass underneath the East Tilbury landfill. We're adjacent to the west but we're not underneath the East Tilbury landfill. The concern is migration in an east west direction to bring contaminated water into the cycle. The protection against that would be a cutoff to ensure that there is no path. That would be agreed with the Environment Agency and the methodology, in fact, has already been discussed, substantially agreed in our

terms and would be associated with continuous monitoring of borehole water quality to show that there was no migration.

MR TAYLOR: Thank you. Anything else from the applicant at this stage?

MS TAFUR: Isabella Tafur for the applicant. No, nothing from us at this stage. Thank you.

MR TAYLOR: Okay, can I ask the representative from Northumbrian Water please to comment on these matters?

MS ANDERSON: Thank you sir. Hazel Anderson from Winckworth Sherwood, representing Northumbrian Water who in this area trade as Essex and Suffolk Water. So there's a number of points I would like to make. I think, going all the way back to the beginning, the point to stress from Essex and Suffolk – so if I can call them that – point of view is that it can only supply the amount of water that it is entitled to abstract under its abstraction licence, and it is heartened to see that the applicant has recognised that in the REAC, in Appendix 2 of document APP-336, and that is in, as they mentioned earlier, their commitment RDWE003, so from that point of view, Essex and Suffolk doesn't have a concern as to the quantity of water seeking to be taken from the Linford well.

We have raised in written representations, our representation REP-1265, that Essex and Suffolk have concerns about the ongoing use of Linford well for supply because the water resources management plan 24, which Essex and Suffolk Water is currently finalising, does have a requirement for Linford to be brought back into public water supply in the future. I think at this stage, so it would be fair to say that there have been productive discussions with the applicant as recently as late August in which concerns about the arrangements that are being negotiated in a separate agreement about water supply and water arrangements and timings and so on were helpfully discussed, and indeed we are waiting on sight of reassurances in writing in a draft agreement from the applicant.

And so I think at this stage it would be perhaps unfair to delve too deeply into the detail of that but simply to say that we were reassured from what was said in the meetings that we are heading to a successful conclusion on matters that we're concerned about. We would just say that we would hope that if our expectations are not properly addressed in what we receive in future, we would clearly reserve our right to come back and raise those points in future hearings,

but at the moment, we think that these are matters that are currently being suitably addressed in a separate agreement. I'm not sure if that's sufficient for your needs now, sir, but hopefully that can allay at least some initial concerns.

MR TAYLOR: Thank you. I think what I'll do is when I come back to the applicant at the end of this agenda item, I'll want to just seek some understanding from them as to timescales that they're looking to progress these discussions with you, just so that we're clear that we're on the right track. Thank you.

MS ANDERSON: Thank you.

MR TAYLOR: Could I now hear from the representative from the Environment Agency please?

MR PENN: Good afternoon, Richard Penn from the Environment Agency. I think I'll present my reply back in three stages. So I'll start with the resources issue. So we do issue licences for abstraction of groundwater and surface water and as part of that we look at the environmental – potential environmental impacts of that and also impacts on existing licence holders. The abstraction licence for Lyndon does have conditions within it, and we are comfortable that the position that's been outlined by the applicant in terms of the volumes they would need within that licence – are comfortable that that is covered off in in the REAC.

In – moving on, perhaps, then to some of the comments around the treatment and discharge, the applicant is correct; we would expect there to be discharge permits applied for in respect to the north portal and the south portal. And both of those would have limits on them in terms of the quality of water that could be discharged. The difference between the south port and the north portal is, as the applicant has said, at the north portal, it would be discharged into the tidal Thames, and the volume of water discharged into that body will be miniscule compared to the current flow so wouldn't need any conditions relating to flow. On the southern portal, discharge is into a smaller watercourse and therefore we would put limits on the rate of discharge from that one.

The last point I think, which may link into some later points as well, is the concerns about impacts on terrestrial ecosystems and East Tilbury landfill, which was just raised in this one. We asked for a hydrogeological risk assessment; I think those are within the from statement in APP-458 and APP-459. That hydrogeological risk assessment has been wide-ranging in scope and has looked at various different receptors that could be impacted by the

movement and use of water. And we're satisfied that the proposals that have come forward don't have an impact on terrestrial ecosystems and wouldn't have an impact on East Tilbury landfill, and so with respect, again, we have secured those things within the REAC and are comfortable with the proposals performed by the applicant. I'll pause there to see if we want to delve a little bit deeper into any of those high-level answers.

MR TAYLOR: Thank you. I think that's sufficient at this stage, but I might ask you to come back in due course.

MR PENN: Okay, thank you.

MR TAYLOR: Okay, thank you. So now I want to turn to the wider room. Can I just get an indication of who else would like to speak on this matter? Yes, I see Thurrock Council please.

MR EDWARDS: As I indicated at the start of today, Mr David Burgess of Stantec has been helping Thurrock Council on these matters. He's in the virtual room, so with your permission I'm going to hand over to him after just a very brief introduction if I may. So Thurrock doesn't have any concerns in terms of water sourcing for the works. I understand Mr Burgess does have some observations in terms of the arrangements for discharge of water on the north side, and so there is also a more general point. And so if I can pick up Ms Tafur's list of potential topics this morning, the last of the topics was flood risk and drainage during construction, and this doesn't arise for anything the applicant has said but Mr Burgess does have a concern and observation in terms of the arrangements for discharge from the northern construction compound. So I'm happy to ask Mr Burgess to deal with it at this stage or at some later stage, whichever you think is appropriate.

MR TAYLOR: I think if we leave flood risk and drainage because I want to go back to the applicant to get them to discuss their overview first and then we can return to it.

MR EDWARDS: Well if I can ask Mr Burgess then to join the examination. Thank you, Mr Burgess. In light of the indication, can you just set out any concerns you've got or comments that you have in respect of what you've heard from the applicant thus far, particularly in the context of disposal of water.

DAVID BURGESS: It's David Burgess on behalf of Thurrock Council. I think it was mentioned that flood risk and drainage aspects we would deal with later, so I think I should wait on that one. Is that correct?

MR TAYLOR: Yes, that was correct.

DAVID BURGESS: Okay, and again, as mentioned, we have no water resources in terms of sourcing comments.

MR TAYLOR: Thank you. So I see Ms Lindley has her hand up in the virtual room.

MS LINDLEY: Thank you very much. Just two points I wanted to make. First of all, it was said that the rainfall runoff in the southern compound will be low risk, but the point is that that risk doesn't exist presently as the land is fields in cultivation. So if you introduce hardstanding and vehicles parked on such hardstanding, not to mention all the other construction vehicles, that's introducing a risk of pollution to the local aquifers which doesn't currently exist.

The second point is that the drainage arrangements from the chalk storage areas in the south drain into [inaudible] marsh, where a lagoon is proposed. That's actually an area that's prone to flooding in winter anyway. Also, the arrangements – what's actually going to be in that area, remains vague because the plans show square outlines which haven't yet been explained, and this is close to houses, so if there were going to be pumps there are questions, obviously, for pollution on that. And so we would like to know what the full plans are for that area.

And I've got a subsidiary question about the duration of existence of the chalk stockpiles, because originally there was discussion about the chalk stockpile to the east of the tunnel portal being left in situ for a long time and only being removed gradually to landfill. I couldn't find anything further about that in the documents submitted for the DCO, so I just wondered if that point could be clarified, because obviously if there is prolonged storage then that prolongs the duration of vehicle movements, disturbance, dust, etc, use of the local road network, and risk of contamination. Thank you very much.

MR TAYLOR: Thank you very much. So can I just check, is there anybody else wishing speak on these matters in the room? I'm not seeing any indication, thank you. Okay, so I'll return to the applicant on this matter.

MS TAFUR: Isabella Tafur for the applicant. In response to Northumbrian Water, so we welcome the comments about the positive engagement which is reflective of

our experience with them as well. The draft agreement to which was mentioned is to be returned to them today. I'm not sure the comments from the Environment Agency require a particular response from us other than to welcome their confirmation that they are satisfied with those matters. In respect to Ms Lindley, there were, I think, three points. The first was about the rainfall runoff in the south compound being low risk but currently there's no risk, and I'm going to ask Ms Driscoll to address you on that.

MS DRISCOLL: Lisa Driscoll for the applicant. The discharge of runoff from areas of the compound that don't have the risk of the in-train[?] chalk, that would be tubed to ground via vegetative systems such as [inaudible] so they offer treatment for any contaminants that were in the runoff, offering that safeguard in terms of pollution.

I think the second point raised was the potential for the discharge to increase flood risk in the receiving watercourses, and it's – a condition of the Environment Agency discharge consent would be that we restricted our discharge back to green field runoff rates, which are very low in this area because of the geology, so one to two litres per second, so that would reduce any impact on flood risk in the receiving catchment.

MS TAFUR: Isabella Tafur for the applicant. In respect of the proposed lagoons and Ms Lindley's concerns that at the moment there is insufficient detail, the response to that is that that detail will follow at detailed design stage and there's nothing further that can be provided at this stage, as I understand it. She also had a concern about the storage of materials and its, I think, removal off site, if I can summarise it that way. I will come back to you on that. I understand that her concerns may relate to a previous proposal which involved the storage of materials and transportation off site before the proposal for chalk part came in, and the reuse of that material, but I will just check again and confirm that in writing in our written summary.

MR TAYLOR: Thank you very much. So just, again, a little bit on housekeeping. I'm aiming to have an afternoon break in about 10 minutes or so. I think it might then be useful to use this time to go to the applicant to talk about the flood risk and drainage element, and then I think we'll take a break before opening it up to the parties to raise issues. Okay.

MS DRISCOLL: Lisa Driscoll for the applicant. So section 16 of part 6 of the submitted flood risk assessment, which is document REP-1171, provides an assessment of flood risk during construction for each of the catchments that we've split the scheme into. That provides a broader view and some broad commitments and principles to managing flood risk during construction, but given that, at this stage of design, we haven't got very detailed construction – compound layouts and things like that, there's a commitment secured within the REAC and RDWE001 for the contractor to develop a construction phase flood risk assessment, that will look at things in that next level of detail. That would dovetail with a construction phase drainage plan, which would specifically focus on the management of surface water runoff from work sites and demonstrate how each site's water would be managed so there are no offsite impacts. So there are two key commitments as to managing flood risk during construction.

I think the other point to probably cover is flood protection to the northern portal, being our most vulnerable component. So the scheme design is such that the northern portal of the tunnel has been protected by flood bunds and flood walls. The height of those bends and walls has been set to allow for the latest guidance on climate change, in addition to a freeboard, which is an extra margin of safety, if you like, over and above your design flood level plus your climate change allowance. And that freeboard is one metre. And the efficacy of the defences, if you like, has been tested by [inaudible] hydraulic modelling of the West Tilbury main catchment, as well as a defence in the Thames breaching those defences.

MR TAYLOR: Thank you. Is that all at this stage?

MS DRISCOLL: Yes.

MR TAYLOR: So I think it is, in order to not disrupt the flow once I go to the other interested parties in the room, I will take a 15-minute break now. So if we can come back at 3.40 please, and then I will open this up to wider conversation. So I'll adjourn the hearing now. Thank you.

(Meeting adjourned)

MR TAYLOR: Good afternoon again everybody. I'm going to reopen this hearing. Again, I just want to briefly start with some housekeeping matters. I'm just

conscious of time because we still have quite a lot of matters on the agenda to discuss. I don't really want us to go much beyond 5.30 this evening. So if we get to the point where it's looking that we're unlikely to achieve that, I think the most appropriate means would be to not deal with agenda item 7 today and then deal with that through a mixture of written questions and potentially a hearing or part of a hearing in October and November sessions because I'm aware that that's actually quite a wide ranging agenda item as well. It does cover a lot and I'd rather not leave it half finished. So that's my current way forward, I think. Does anyone have any massively dissenting views on that before I push on? No, I'm not seeing anything. Okay, so where we left off, I was about to start with Thurrock Council to come to address some of the flood risk drainage matters. Please.

MR EDWARDS: Thank you, sir. Douglas Edwards for Thurrock Council. I think I can now confidently say that Mr Burgess does have some observations to make in respect of this matter. So if I can invite Mr Burgess to rejoin the examination on screen.

MR BURGESS: Thank you, Douglas. David Burgess on behalf of Thurrock Council. So the council position is that the approach to water resources has broadly been concluded. However, as has been mentioned, there are some potential challenges with flood risk and drainage arising during tunnelling operations and our concern in terms of Thurrock Council particularly relates to operations at the north portal side. So, as Lisa Driscoll has mentioned, the FRA part 6, which is document REP-1170, does describe the construction phase measures and also it's mentioned within section 12 of the flood risk assessment part 8, which is for reference APP-467.

So we recognise that the applicant's position is that the contractor will be responsible for site specific flood risk assessment, specification of temporary works, service water management and compensatory flood storage during the construction phase. However, we do not feel this is really shown adequately within temporary works plans. So having looked at the temporary works plans and with reference to volume B, document number AS035, the temporary works plans do show things like the construction main compound.

However, they do not really show sufficient information on flood risk and water management features, namely diversions of drains and water courses,

flood compensatory storage areas or the proposed treatment and discharge locations, and we do recognise that some of this detail of temporary works may be deferred to future stages. However, additional clarification would be needed in terms of how these proposed temporary measures may be included and particularly how they may reasonably be accommodated within the main works compound. So the council requests that the applicant update the temporary measures plans in terms of particularly the temporary works plans, showing at least indicatively some of the potential locations for the water management features.

So notably, the diversions that would be required, storage areas, compensatory storage areas, as well as the treatment and discharge proposals. So in particular with regards to these flood compensatory areas and storage areas at least indicatively showing how these may be reasonably located within the plans. We also note the concern which was discussed by the Environment Agency about the water quality. So in terms of discharge into the Thames, has the applicant considered how to treat the water arising on the compound and if so, where that would be located within the compound.

Just one further issue on the same location. So with regards to north portal junction and north portal ramp – and this now concerns the operational phase – we did notice a discrepancy in terms of how the water would be collected and discharged at the bottom of the north portal ramp. So on the drawings – and I'll reference the drawing – the drainage plans, volume B, reference APP-048. The drawing shows the discharge will be directly to the River Thames. However, within the flood risk assessment part 7 – so this is document APP-466 – it describes the discharge of that pump system being towards the basins within north portal junction. So we also request the applicant clarifies what the proposed discharge is of that north portal ramp, whether that will be directly towards the Thames or whether it will be towards the basins at the north portal junction. So those are my main points for now. Thank you, sir.

MR TAYLOR: Okay, can I just see a raise of hands in the room and also virtual room – and yes, for Gravesham Council, please.

MR BEDFORD: Thank you, sir. Michael Bedford, Gravesham Borough Council. So we're just concerned whether there is something of a discrepancy between an issue that has been dealt with – apparently satisfactorily – in terms of what the

Environment Agency told you and what the applicant responded to us in its comments on our local impact report, and the issue was in terms of the rainfall affecting the southern portal and in relation to, as it were, the clean runoff – we understand the point about infiltration – but in relation to what you might call the contaminated runoff, the suggestion of discharge to lagoons and then release in due course to the main river that was identified and the suggestion that that would be controlled by a discharge licence with regulation of the discharge rate. That in principle seemed satisfactory.

We then also heard reassuringly from the Environment Agency that they would expect to restrict that discharge to greenfield runoff rates, so effectively no worsening to effectively baseline conditions. However, in our local impact report we had raised an issue in relation to that matter, in particular in what we have said at paragraphs 14.9 to 14.12 of the local impact report, and we'd drawn attention in particular to the sensitivity of the hydrological network particularly given the presence of the marshes, the [inaudible] nature conservation interests there, and we had drawn attention to the risks if there's an extreme weather event, which obviously are becoming more and more frequent as either a consequence of climate change or at least a coincidence together with climate change matters.

The applicant's response to that concern, as expressed by us in their REP-2058, and it was at page 123; they recognised that it would be discharged to the lagoons. They said it's a robust treatment system that is secured by a commitment RDWE033, designed in line with EA requirements with regard to capacity and treatment standards, but it then went on to say, it is not practicable to design such treatment systems to accommodate extreme weather events. In the very unlikely scenario of such an event happening during the construction period, the capacity of the treatment system would be exceeded.

Runoff would flow according to the topography towards the north, as would happen under current/baseline conditions. The consequent risk to Ramsar ditch network water quality, however, would be reduced by the substantial dilution of the compound runoff. I'm afraid to say we didn't find that terribly reassuring and we would welcome some clarification as to whether there is any mechanism for improving, presumably the capacity of the lagoons to cater for the extreme events and if not, how one can ensure that discharge will be

regulated to greenfield runoff rates, because that area, there seemed to be a bit of a tension between what the EA was saying and the applicant's response to us. Thank you, sir.

MR TAYLOR: Thank you. Yes, Ms Blake, please.

MS BLAKE: Thank you, sir. Laura Blake, Thames Crossing Action Group. I just wondered if we could maybe please ask for some clarity and clarification on the landfill sites. The applicant earlier mentioned East Tilbury marshes landfill would be avoided in this regard. In the research that we've done, there is actually East Tilbury landfilled, but it is around the area of the portals and to the west of the portals. So I just wondered if we could have some clarity on that impact and whether the Environment Agency are also, when they commented earlier, were in regards to both landfills or if we were specifically talking about the East Tilbury Marshes landfill, please? Thank you.

MR TAYLOR: Thank you, Ms Blake. Can I just check if there's anybody else wishing to speak on this topic before I go back to the applicant? I'm not seeing anyone. So, Ms Tafur.

MS TAFUR: Isabella Tafur for the applicant. In response to the point raised by Gravesham, which I understand relate to extreme events such as that which took place in South Korea. I'll ask Dr Wright to address you on that.

DR WRIGHT: There we go. Found it. Tim Wright for the applicant. Yes, so the direct representation we were responding to said, 'We are concerned about what happens if there is an extreme weather event, as has just happened in South Korea,' and you may recall there were some severe and tragic floods in South Korea. However, they were an extreme weather event that goes beyond what we would consider to be the level of rainfall events that will be normal, that you would design for in construction. Obviously we do consider higher rainfall events, but the South Korea event was unusual in its extreme nature. Thank you.

MS TAFUR: Isabella Tafur for the applicant. In respect of the points raised by Mr Burgess on behalf of Southwark as to the detail that's provided in the temporary construction works drawings, again, that is a result of the stage that we are in the design process, but it is worth noting that both the flood risk construction drainage and a construction drainage assessment are required and secured through the REAC and both of those assessments are to be approved pursuant to requirement 8 by the Secretary of State, and we say that that offers adequate

control, that flood risk and construction drainage matters will be appropriately addressed at detailed design stage. I think there was also a factual query from Mr Burgess which was about the discharge of the pump system and where that was proposed to discharge, and I would like to ask Ms Driscoll just to address you on that, please.

MS DRISCOLL: Ms Driscoll on behalf of the applicant. I can just clarify that that discharge would be directed to the basins and they would be stored and treated in those basins prior to discharge rather than directly into the River Thames.

MS TAFUR: Isabella Tafur for the applicant, and finally, sir, I think the point raised by Ms Blake was directed towards the Environment Agency and whether their comments had related just to East Tilbury landfill or to both.

MR TAYLOR: Thank you, Ms Tafur. I think I will see if the representative from the Environment Agency could come back online and then just clarify. Did you hear what Ms Blake raised a few moments ago?

MR PENN: Yes, I did. So my comments in relation to – I think that the question was raised around the impacts on East Tilbury landfill, so my comments were directed around that. My other comment around the whole of the hydrogeological risk assessment looked at all of the receptors within the red line boundary, made an assessment against that. So we're comfortable that all things have been considered, but my earlier comment was directed at East Tilbury.

MR TAYLOR: Thank you for that clarification. Mr Forrest, is that you finished on these points? Okay, thank you. Okay, I am going to move on now with the agenda to the next item which relates to dewatering, and again, I want to go to the applicant first, just to set out at high level the strategy and matters relating to that. Then I'm going to – just to put people on notice – I think I first want to go to the Environment Agency and then potentially to Northumbrian Water (Essex and Suffolk Water) and then I will open it up to the wider room.

MS TAFUR: Isabella Tafur for the applicant. I am going to introduce Mr Federico Fragalà, who's a hydrogeologist, to deal with this matter, please.

MR FRAGALÀ: I'm Federico Fragalà on behalf of the applicant. So in terms of dewatering, just to be familiar with the term, this is a term commonly used to describe the removal of surface water or groundwater from a particular location, such as an excavation during the construction, and would typically comprise pumping water from out an excavation, so that the excavation is dry and it is

under stable condition basically. In terms of approach to dewatering, I will start first from the south, if that's okay, from the south portal, which is the easiest one. So at the south portal we are not proposing any dewatering because the south portal will be well above the groundwater table, so no dewatering is needed. The excavation will be well above the groundwater table and this is reflected of course in our hydrogeological risk assessment application document 458.

In terms of ground protection tunnel, we are proposing that the groundwater removal from the ground protection tunnel will be limited by use of mitigation measure and the serial construction method that will reduce the ingress of groundwater into the tunnel. So we have a real commitment, which is RDWE018A in our environmental setting appendix 22, code of construction practice. This commitment basically confirms that methods such as wet excavation and placement of grout plug within the shaft will be used. So that will limit the ingress on groundwater into the shaft in the ground protection tunnel, and also of course, the tunnel will be drilled with the TBM, which is a closed face machine and will be lined as the tunnel progresses.

So the tunnel will be lined. There will be basically no ingress or minimal ingress of groundwater in compliance with the Lower Thames crossing specification for tunnelling, basically. So the two elements cover the south of the river. For the tunnel, I think this has been covered also by my colleague, but basically the tunnel boring machine we are proposing is a closed face and will balance the pressure of groundwater. So there will be absolutely no dewatering into the tunnel because it's a closed face and this [inaudible] will counterbalance the pressure of groundwater. As the tunnel progresses, the tunnel will be lined – it will be segmented lined – and therefore there will be no need for dewatering during the tunnel.

In terms of cross passage, we also have a commitment in the register of environmental action and commitment and this is the RDWE020 which state that we basically propose to use either ground freezing or grouting to construct the cross passage and that will limit the ingress of groundwater during these construction works. That has covered the south of the river. I will move now to the north portal, to the north of the river. So the north portal box – the structure and the ramp – this will be below the groundwater table and will be at

the greatest depth close to aquifer, which are under artesian pressure, and therefore there is a need to use groundwater control measures to limit the dewatering.

We have a commitment, commitment GS 021 in our register of environmental action and commitment, which basically state that we would use deep low permeability barrier around the excavation of the north portal, like, for example, diaphragm walls, which will limit the ingress of groundwater into the construction. This will be deep enough and will penetrate – will cut off – the more permeable geology basically. The same commitment basically states that any need of additional supplementary mitigation, such as grouting to form a low permeability plug below the excavation would be to reduce ingress or groundwater, would be informed by the result of the modelling and in consultation with the Environment Agency.

So basically, this is our approach to dewatering. We have a commitment that basically referred to a series of mitigation measures to reduce the ingress of groundwater during the construction works. We have assessed the risk of these activities through detailed groundwater modelling for both the north of the river and the south of the river, and the details of that groundwater modelling can be found in annex JNK of the hydrogeological risk assessment. A reminder that this is a two volumes document. It's a big document. The results of the modelling and our adversary risk assessment has been discussed in several occasions with the Environment Agency and has been agreed with the Parliament Agency as well. So I think this covers the bit of dewatering. Thank you, sir.

MR TAYLOR: Thank you. I do have an initial question. It might be more for Ms Tafur or Dr Wright. So my understanding from what I've read – and now what we've heard – is this largely depends on having closed face tunnel boring. So it goes back to my question earlier. Does this need to be tied down at this stage?

MS TAFUR: Isabella Tafur for the applicant. We hear what you're saying, sir, and we will go away and think about that.

MR TAYLOR: I appreciate that. Okay, I'd like to hear from the Environment Agency next, please.

MR PENN: Good afternoon. Richard Penn, Environment Agency. So yes, this is an issue that came up very early in discussions because of the risk to groundwater

and associated or dependent ecosystems. We have worked extensively with the applicant over this and the extent of the ground investigations and hydrogeological risk assessment and the mitigations proposed. We are comfortable with what's being proposed. Dewatering will require permitting and that's something that we can pick up at a more detailed design stage, but the use of diaphragm walls and grout plugs have been broadly agreed as appropriate mitigation.

MR TAYLOR: Thank you. I wonder if you have any views on whether it is necessary to tie down that it would be a closed face tunnel boring system used, given what we've heard today from the applicant.

MR PENN: As others have done, I'm not an engineer, so I think anything that will materially change the assessment that's been put in front of us, we would need to review that. So I welcome the applicant's decision, take that away and look at that and we'd be willing to enter into discussions if they need to change; a broader approach.

MR TAYLOR: Thank you. Yes, that seems a sensible way forward. I just want to check, does Essex and Suffolk Water wish to speak on this matter at all?

MS ANDERSON: Thank you, sir. Hazel Anderson from Winckworth Sherwood, representing Northumbrian Water, operating as Essex and Suffolk Water. Sir, on dewatering from the tunnel particularly, we have nothing that we wish to say, but thank you for inviting us.

MR TAYLOR: Okay, thank you. Yes, now I want to just check, in the wider rooms, does anybody else have any comments they wish to make? I'm not seeing any raised hands. Okay, thank you very much, everyone. So I'll now move on. So we're on to agenda item 5, which is general monitoring. Now, just want to be clear, we've talked about monitoring throughout the day on specific topics.

So really what I'm seeking to achieve today is some of the wider approaches to monitoring in relation to tunnelling activities, and then a specific area we want to focus on is essentially risks or unexpected incidents. We've had brought to our attention a number of incidents that have happened recently in and around other tunnelling projects. So I have put the applicant on notice that we want to discuss those under this agenda item, but if other parties have general queries/comments they wish to raise in a general sense under monitoring, this is the time to do so. So, Ms Tafur, can I come to you first, please?

MS TAFUR: Isabella Tafur for the applicant. As you've said, sir, we've referred to monitoring and mitigation a number of times. So we hear what you say and we'll come on to deal with specifics if you'd like us to, but as a matter of generality, we say that there are extensive monitoring, reporting and remediation matters that are secured by various control documents, including the code of construction practice, which incorporates the REAC, the draft DCO, including its requirements and protective provisions, in particular with the PLA, the site waste management plan and various other control documents. Now, I don't know, sir, if you wanted us to launch into the unexpected incidents or if you wanted to hear from others about their particular concerns, which we could then respond to.

MR TAYLOR: Yes, so maybe if we do deal with the generalities first, so we don't begin to muddle topics. So yes, can I just see with hands raised, who wishes to speak on this topic? I see Thurrock and Gravesham. Cool. Yes, okay. Just double checking anyone in the virtual room. If you just pop the yellow hand up and I'll come to you in due course, and I'll start with Thurrock Council, please.

MR EDWARDS: Douglas Edwards for Thurrock Council. I'll hand directly over to Mr Neve, who's got some points on the general matter of monitoring.

MR NEVE: Thank you, sir. Adrian Neve, on behalf of Thurrock Council. Very brief really, but just to reiterate the points that we've made previously about these controlled documents and when we are looking at them as a collective or collaborative suite of documentation, that when we're talking about monitoring and management – and we've had various discussions about this previously – but bringing in the aspects of materials handling and things so that it is a collective mechanism to monitor and manage the processes. Really nothing much more to say than that. Thank you.

MR TAYLOR: Thank you. If I move on to Gravesham Borough Council, please.

MR BEDFORD: Thank you, sir. Michael Bedford, Gravesham Borough Council. A general theme of some of our earlier comments has been whether or not the monitoring arrangements are sufficiently tightly secured. That applies across the piece. It applies to tunnelling, but probably less so than some other areas. So I think all I'll say at this stage is that in our post hearing submissions, if we've got specific comments on particular control documents relating to tunnelling, we'll identify those there rather than taking up time now.

MR TAYLOR: Thank you, Mr Bedford. I think that's an appropriate way forward, but it is important that we do get to some of these detailed matters and get matters agreed as far as we can. So yes, that's a sensible approach. Port of London Authority, please.

MS DILLISTONE: Alex Dillistone for the Port of London Authority. I'll bear in mind Mr Smith's earlier comments about dealing with the DCO on Monday, but it is worth noting at this point that there is a possibility of effects on river traffic if the risks that Mr Terry described earlier materialised during the operation of the scheme, or even during construction of the scheme. We heard from Mr Terry that there is a risk of daylighting or blowout during tunnel construction, and we have also heard the applicant's view that these risks are addressed in the PLA's protective provisions and as I said, we will cover those in detail on Monday, but for this point, I think it's worth noting that from our point of view, they're not adequately covered. I think there are two ways of managing risks for unexpected incidents, and the first is to make sure that the risk does not –

MR TAYLOR: Ms Dillistone, can we leave the unexpected incidents?

MS DILLISTONE: Okay, fine.

MR TAYLOR: Because I'm going to – can we talk slightly more generalities first and then I'll come back to you on that point shortly.

MS DILLISTONE: Thank you.

MR TAYLOR: Thank you. Ms Blake, please.

MS BLAKE: Thank you very much, sir. Laura Blake, Thames Crossing Action Group. I think I probably was jumping the gun as well because I wanted to comment on the incidents, so apologies.

MR TAYLOR: Fine, I will come back to you shortly. I just want to double-check, anybody else wanting to speak on the generalities of monitoring? No. Then I will go back to the applicant. So if we can deal with the significant risks, unexpected incidence matter, please.

MS TAFUR: Isabella Tafur for the applicant. Yes, sir. I'll ask Dr Wright, I think, to deal with the unexpected incidents and emergency preparedness, if that's the point you'd like to turn on to.

DR WRIGHT: Dr Wright for the applicant. So I think I've got two key things that I'd like to say. One is in relation to the emergency preparedness procedures. So in the code of construction practice REP-3/104, we set out the requirement for

emergency preparedness procedures, and it is worth noting that we did actually modify this at deadline 1 to change the wording slightly. So within that, I'll try and summarise rather than read it in full, but there is a requirement to prepare emergency preparedness procedures, setting out notification procedures in the event of discovery of unexploded ordinance, flood emergency response procedures, requirement to run emergency rescue drills, and so on and so forth.

And these procedures, as per paragraph 6.9.1, are required to be produced in consultation with the emergency services Kent and Essex resilience forums and other relevant stakeholders, which includes local highways authorities, as a specific drawn out example. I won't go further than that, though there is more information, obviously, in the code of construction practice about what those would require, and then I would just – perhaps I'm jumping the gun here as well – but in response to the Port of London Authority, just to say that we continue to have discussions with them about the nature of the protective provisions and would look to continue to carry on that discussion in a productive way.

MR TAYLOR: Thank you, Dr Wright. Yes, could I see who wishes to speak on this particular matter again? So Thurrock and – yeah, that's okay, and I see some hands appear in virtual. I will start with Thurrock Council and then come to the others.

MR EDWARDS: So thank you. Douglas Edwards for Thurrock Council. Mr Stratford is going to make some representations on this matter.

MR STRATFORD: Very small representations. Chris Stratford for Thurrock Council. I notice Emma Potter has her hand up, so I was going to lead into her, so I won't. We are comfortable with the fact, I believe, that both the emergency services are now included, as Tim Wright has pointed out, and that we are included in the process for developing the strategies. I know that since Thurrock is part of the Emergency Services Steering Group – as are other local authorities – it may be that within their representation, they may cover more detail, but that's all. Thank you.

MR TAYLOR: Thank you. I think it might then be appropriate to ask Ms Potter to come in at this stage before I move on to other people.

MS POTTER: Good afternoon. Emma Potter, on behalf of the Emergency Services and Safety Partner Steering Group. It's just to identify the main points from an emergency service provision perspective. It's really around the construction

phase element of this process, and I think the main concern is around areas such as the haul roads and access to them, but actually, when we're looking at the preparedness procedures, around making sure that currency[?] at the appropriate stages. I think there are concerns around that engagement at the appropriate time and again reflect everything that Thurrock have regarding those matters, because I appreciate this is also addressed yesterday as part of the modelling functionality.

MR TAYLOR: So Ms Potter, just to be clear, so is the steering group still of the view that there is some way to go in terms of the detail of engagement and how that's carried out?

MS POTTER: Yes, so with regard to the clarification around that, within the DCO and how it functions, I think there would be required, that level of extra clarity.

MR TAYLOR: Okay, I will just put the applicant on notice. I'd like you to respond to that when I come back to you, please. Sorry, Gravesham Borough Council, do you wish to speak on this issue?

MR BEDFORD: Are we still on 5 or are we moving into 6?

MR TAYLOR: We are on 5. I wanted to deal with unexploded ordinance as a separate matter, so if it purely relates to that, we can leave that.

MR BEDFORD: Yeah, I did have a small point on 6, but…

MR TAYLOR: Fine, I will come back to you. If we could go to the Port of London Authority, please.

MR TERRY: Thank you. Dave Terry on behalf of PLA. Yeah, this comes down to recurring theme that I've been mentioning with regards to tunnelling works. I mentioned the C/D ratio and how this lends a high degree of sensitivity to the tunnelling works. At the moment, this falls into two things that we would like to address the risks as we see them. Firstly is the ongoing construction monitoring and I apologise for not mentioning that when we went round first.

Secondly, it's the involvement in the emergency planning. We've quoted a previous example from a project where the mitigation was to put a cofferdam in the river, which we weren't consulted on. So it's that level of involvement that we want. There is a joint code of practice for the risk management of tunnelling works and one of the ongoing themes through that document is consultation with third parties and getting their agreement to things. At the

moment, our vehicle for looking at this is the AIP and we don't think that the AIP has sufficient detail in it to address our concerns. So thank you.

MR TAYLOR: Are you able to briefly outline where you feel it lacks detail?

MR TERRY: Sorry, Dave Terry, PLA. It doesn't have a specific section for mitigating and having involvement in emergency response planning. There is a brief section on tunnelling methodology, but in terms of risk mitigation and managing construction risk, it doesn't go far enough. It's an improvement in principle for a design document, not one that's designed to manage construction risk.

MR TAYLOR: Thank you. So obviously I'm aware that you and the applicant are working together in a number of matters. So just want the assurance when I come back to the applicant that that is on the table.

MR SEDGMAN: There's a potential fold over or integration question about the relationship between construction risk management in that setting and operational risk for river users/ navigational risk. Is that the direction of shift that you're seeking or am I not in the right place? So, say, for example, if you were looking to mitigate the risk of an incident affecting the river floor and possibly different techniques for resolving that, is that the sort of detail that you're looking to see injected into this?

MR TERRY: Yes, essentially, because it's the ineffective or improper – if I can use that word – control of the tunnelling operation, that would lead to that kind of consequence, so it's a – I was going to say happy combination. That's entirely the wrong words. It's a combination of the two. It would be a tunnelling event that would cause an operational risk.

MR SEDGMAN: So, firstly, you'd be looking at a in principle risk identification ranking process in terms of operational risks on the river and then a second stage view on the degree to which there were specific risks that required to be identified and managed upfront.

MR TERRY: Yes, and also how PLA could get sight of how those are managed, because there's obviously going to be a high degree of control over the tunnelling operation and to satisfy ourselves, we would ideally like to see how that's managed on a day to day basis. Now, we quoted a previous project where the tunnel was done and we didn't find out about it until later on. That's exactly what we're trying to avoid, is we want the ongoing involvement so we can have a view on the risks.

MR SEDGMAN: And hence when I was thinking about where the best place is, if that's the road down which we're going, where the best place is for it to be done, is it in a specific control document around tunnelling construction control or is it a navigational risk assessment? Or does it need to be in a bit of both or somewhere else?

MR TERRY: So, from previous project experience, you would produce something like an excavation control plan which would detail how you manage the risks with the tunnelling. There'd be one for the board tunnels and there'll be a separate one for the cross passages per se. I'll hand over to my colleague for a view on the navigational risk assessment.

MS DILLISTONE: Thank you, Mr Terry, and thank you, sir. Alex Dillistone for the PLA. I think it's perhaps helpful to take a step back and look at the different kinds of risk. We're seeking to address two main things. Firstly, to make sure that risks do not materialise, and secondly, that if they do, they are properly dealt with, and on the first, the applicant has mentioned today – and in the tunnel depth report – that the PLA can improve the tunnel design to resolve the fact that risks might materialise. We don't believe that is correct. The applicant is not committed to involving the PLA in ensuring that tunnelling risks do not materialise. So there are different ways of dealing that. One could be in a separate document. Another could be in dealing with that through the protective provisions, so we can raise that on Monday.

On the second, the remediation provisions of protective provisions do not seem to include the tunnelling works, so there is no real provision for the PLA to be involved in remediation of those either, and so there is a point about monitoring during construction of the tunnel that PLA needs sight of and also involvement in the emergency response planning because the COCP – this may be one other way of addressing it – that provides at paragraph 6.9.1 that the emergency procedures will be produced in engagement with the emergency services and other relevant stakeholders but not the PLA, so it will be helpful for the PLA to be included in that. So, just to recap, I think it is two main points. It's, one, to make sure the risk does not materialise and the second, to make sure that the PLA is involved in making sure that those risks are adequately dealt with. Thank you.

MR TAYLOR: Thank you very much. Ms Dablin, I see your hand is raised in the virtual room.

MS DABLIN: Thank you. Alison Dablin for the Port of Tilbury. As I alluded to earlier, we firmly support and fully support the PLA in their ambition to get this resolved satisfactorily. The location of the Port of Tilbury being upstream of the tunnel means that should there be one of these low risk/high impact events, it is the Port of Tilbury in particular that will be feeling the immediate implications if there is an interruption to use of the navigational channel. We set out in a relevant representation some information as to the value of the Port of Tilbury to the economy, something that is clearly recognised by government in the Port's NPS, and were there to be an issue during construction that caused an issue in using the navigable channel for ships of the type that visit the Port of Tilbury – or indeed in a remedial manner, should they do something like build a cofferdam without appropriate oversight – the knock on costs to the economy would be huge.

As such, Port of Tilbury are firmly of the view that this is something that needs to be resolved on a very precautionary basis, that the PLA does need to have proper and fulsome oversight and that is something that does need to be watertight within the DCO, and that we should learn from the errors of previous DCOs in terms of where that oversight has potentially had lacunas and fallen down, and we have an opportunity to remedy that in this situation, and given the potential implications of those circumstances recurring and an event happening, I think there is a very strong justification for taking a very precautionary approach and as such, we fully support the PLA in attempting to resolve this. Thank you.

MR TAYLOR: Thank you, Ms Dablin. That was a very clear submission. Ms Blake, please.

MS BLAKE: Thank you very much, sir. Laura Blake, Thames Crossing Action Group. Something that I'd like to highlight is the fact that with the Lower Thames Crossing being a pathfinder project and talk of using hydrogen and electric vehicles, this is obviously a new direction in construction and a lot of the equipment is actually in prototype stage at this time, and we know the dangers and the recent increase in awareness of electric vehicle fires.

When we're talking about construction and the tunnelling in particular, I just want to highlight the fact that with this being a new aspect of construction, what kind of assessment and precautions are being put in place in regards to this new technology/new equipment? That is not something that would have been experienced before. We are aware there was a Silvertown fire. That was in regard to the conveyor belt, but it does highlight that these fires do occur in construction in the tunnels. So with this new aspect, I just want to make sure that that is included and covered if that is the way that they're going to proceed. Thank you.

MR TAYLOR: Thank you very much, Ms Blake. Just a final check, if anybody else in the rooms want to raise points. No. Ms Tafur, please, for the applicant.

MS TAFUR: Isabella Tafur for the applicant. Sir, I'm going to turn to Mr Wright in a moment to see if there's anything he wants to add. We've heard and already touched upon in some detail the concerns raised by the Port of London Authority and reflected by the Port of Tilbury as to construction risks and the way in which to deal with those, and as you've heard already, we will continue to engage with the PLA and hopefully to overcome those concerns. I think there were some concerns raised on behalf of the Emergency Services Group as to what would be contained within the emergency preparedness plan and I think Dr Wright will address you on that.

DR WRIGHT: Tim Wright for the applicant. I think before going into that detail it would be worth just touching on how the emergency preparedness plan is secured. It's part of the environmental management plan second iteration which is secured by requirement 4, paragraph 2, which says, 'No part of the authorised development is to commence until an EMP second iteration.' Substantially, in accordance with the code of construction practice for that part, has been submitted to and approved in writing by the Secretary of State following consultation and so forth. Point being that it is no part of the authorised development is to commence. So the requirement is to do this upfront. I think that's the first and important point to make. In terms of –

MR TAYLOR: Sorry, doctor, before you move on, just to come back on that point, being substantially in accordance with the code of construction practice does mean that we need to be satisfied that that level of detail is sufficient because what comes

after essentially hangs off the back of that. So it's just a point I want to table. Mr Smith.

MR SMITH: Well, no, I was merely just going then to go on to the specifics or say for example, responses to points that were being raised by Port of London Authority. If there is a view that there ought be additional specific control measures for river works, however, whatever mechanism we're looking at in terms of how those might be delivered, then the relevant hat pegs in the first iteration of the environmental management plan – the COCP – are either there or they're not, and if they're not, that's the thing that we need to be concerned about in terms of then thinking about whether specific amendments to that need to come in during the examination so that in due time what is generally in accordance with that plan is then brought forward dealing with the expectation that there will be control measures.

DR WRIGHT: Dr Wright for the applicant. So my reference to the emergency preparedness plans was really in reference to the submission made by Essex Police and to let them understand the process there and where to look for the content of what that might contain, and of course we'd welcome any further discussion with Essex Police. If they see that there would be additional content, we're happy to discuss that there.

Moving to the Port of London Authority, we think that they are slightly different in their role as custodian of the river and we think that a different framework is actually more appropriate for that, and so that's why we have introduced the protective provisions for the protection of the Port of London Authority and we see those as the appropriate vehicle for carrying those requirements. We recognise and have heard from Port of London. As my colleague has explained, we are not in agreement on those provisions at the moment, but we've heard their submission. We've also had other discussions. We'll continue to work together and I am fairly confident that through the form of protected provision – paragraph 98/99 – we will be able to reach an agreement which hopefully we can bring back to you shortly with satisfaction in that matter.

MR TAYLOR: Okay. Thank you, doctor. I just reiterate that the panel do see this as an extremely important matter that does need to be resolved.

DR WRIGHT: Dr Wright for the applicant. I totally accept that. I see it as an important matter myself. I think we all do. So that's critical. I did just want to go to the

remediation mention from the Port of London and paragraph 103 of the protective provisions does not, as I understand it, have a restriction on the applicability. So my understanding is that it isn't precluding the tunnel but as always, different people can read words in different ways and if you read it in a different way then let's have a look at it together.

MR TAYLOR: Thank you, doctor. That seems a very sensible way forward. Ms Tafur or Dr Wright, could you please respond to the comments that Ms Blake raised as well? Thank you.

MS TAFUR: Isabella Tafur for the applicant. As I understand it, Ms Blake's concerns related to construction related risks, and I think Dr Wright can address you on those.

DR WRIGHT: Dr Wright for the applicant, and we are a pathfinder project. We are trying to change the paradigm around construction with a view to the net zero target that we're trying to achieve. That will require the use of new technologies that are perhaps different and trying to bring forward, and people will have heard our plans around hydrogen. That does obviously have risks associated with hydrogen that need to be managed appropriately, and what I would just like to provide a reassurance is that we will be working with all of the appropriate bodies to make sure that the activities we carry out on site consider the appropriate safety requirements and address any need that is associated with that. It is a developing industry and I'm sure we will be working with regulatory stakeholders as much as with our own contractors to try and find the right way to do this safely, and we will continue to do that as we develop our plans and implement them on site and hopefully leave a legacy behind of how to do this the right way, that other people will be able to take advantage of on their construction sites in the future. Thank you.

MR TAYLOR: Thank you very much. Okay, so I'm going to move on to item 6. On a similar theme, but specifically around unexploded ordinance, and again, I'd like the applicant just at a high level to detail how this is – I appreciate we have a lot in writing – and then I'll go to the parties in the usual way. Thank you, Ms Tafur.

MS TAFUR: Isabella Tafur for the applicant. The project commissioned Zetica, a specialist in unexploded ordinance assessments, to carry out a desk study and risk assessment, and that is presented in an appendix of the ES, document

reference APP-433. It presents an unexploded ordinance, hazard assessment, hazard zone plans, and recommended risk management techniques, and the report concludes that the overwhelming majority of unexploded ordinance poses a low risk. There are no examples of high or very high risk, and it makes a number of recommendations for the limited areas which were identified as a moderate risk.

There are various requirements secured through the code of construction practice, which require, for example, the contractors to carry out preconstruction risk assessments to determine the possibility of finding unexploded ordinance within the construction area and to then prepare a response procedure and to implement it in response to the discovery of any unexploded ordinance, and that will include notifications to the relevant local authorities and emergency services, and there is a separate requirement upon the contractors to comply with all the recommendations included in that report appended to the ES. So that is the position at high level.

MR TAYLOR: Thank you, Ms Tafur. I'm going to come to you, Mr Bedford, first, but before I do, can I just get a general indication of who else would like to speak on this issue? Thank you. If anyone in the virtual room, yes, if you put your hands up, thank you, but Mr Bedford, if you can start us off, please.

MR BEDFORD: Thank you, sir. Michael Bedford, Gravesham Borough Council. So you'll appreciate we dealt with this in section 10 of our local impact report in particular at paragraphs 10.9 to 10.12 and we saw the response that the applicant provided to that in REP-2058. We've obviously also looked at the desk based study and then how that's translated into, I think, section 6.11 of the code of construction practice, and the two elements in 6.11 are effectively the two elements that Ms Tafur has just summarised to you in her opening remarks.

Just to say, in headline terms, obviously the principle of preparing for the discovery of unexploded ordinance is understood by the applicant and also the preparation of strategies to deal with that, but that is very high level and obviously you don't react until you've actually found something and how you react will depend on what you find, but we think that there is a lack of detail in thinking through what will be the likely nature of reactions in the documentation thus far. So taking in particular the example of evacuation of residents from their homes to some alternative venue, there is a need to consider, well, given

we know where the route is, we know where the works are, what are the likely venues, what are their capacities and what is their likely availability?

We know that there's a particular issue about the cascades which might have otherwise been considered as a suitable facility, and so I think the way that we would put it is that what we really want to see is that the risk assessment that is undertaken by the contractor pre-works actually explores and ventilates how one would deal with an incident in advance, including, as I say, in particular, what arrangements would be made for emergency accommodation for any displaced residents, whereas that level of detail is so far lacking from the documentation. I'm sure that's capable of being addressed, but that's really our concern that, yes, there are fine words in principle, but there's a lack of substance to the detail.

MR TAYLOR: So essentially you feel that you just need an expansion of what's already there, so it is clear if evacuation is required, that venues, etc., etc., have been thought through.

MR BEDFORD: Yeah, but it needs to be considered, obviously, in advance of an event. There's no good finding – you need to go and find somewhere for 50 people. If nobody's actually thought about, 'Well, what possible locations might there be within one kilometre, two kilometres of an event?'

MR TAYLOR: Yeah, sure. Mr Bedford, I fully understand what you're saying. I happen to live in a part of the country where not too – well, relatively regularly – an unexplored bomb is discovered during a construction project. So, yes, I am aware of the need for evacuation. If I could go to Thurrock Council next please.

MR EDWARDS: Douglas Edwards for Thurrock Council. So I can be very brief because Thurrock Council share exactly the same concerns that you've heard from Gravesham and we suggest that the approach that Mr Bedford has set out for Gravesham is the right one. As Mr Bedford says, the areas of risk have been identified, including those of medium levels of risk. We know what the route is and therefore it would not be onerous – so far as National Highways are concerned and their contractor – to carry out the level of planning and preparedness that Mr Bedford has identified.

And so we'd also, so far as that process is concerned, given the potential level of disruption, that it would be appropriate for a commitment to be given that not only the local highway authority who are involved in the preparation of

that plan, as has been confirmed this afternoon in terms of the emergency preparedness plan, but the local authorities in general, no doubt could assist and would have some interest and degree of involvement, certainly in temporary accommodation plans. So we'd just add that to what has been said on behalf of Gravesham this afternoon.

MR TAYLOR: Thank you very much. If I could go to the Port of London Authority next, please.

MS DILLISTONE: Thank you, sir. Alex Dillistone for the Port of London Authority. The PLA is concerned about the potential impact of UXO, particularly when it comes to dredging and the limitations that the DCO places on the PLA's ability to deal with UXO. Now, we know from the Unexploded Ordinance Death Study and Risk Assessment, which is document reference APP-433, that potential sources of unexploded ordinance have been identified on parts of the site, including in the river. The study assigns a moderate unexploded ordinance hazard level to the River Thames and advises that the main anticipated ordinance hazard is from airdropped unexploded ordinance and unexploded antiaircraft shells. LTC's proposed risk mitigation for the River Thames is set out on page 15 of the report and the general preference in the report is for mitigation by avoidance.

Now, that approach is generally similar to the approach that was taken for the Silvertown Tunnel project, but it has the undesirable result of leaving unexploded ordinance in situ very close to the tunnel, which creates a risk for any dredging vessels, other port traffic and tunnel users as well as to the tunnel itself. I think it may help just to work through an example from the Silvertown Tunnel project here because, on that one, surveys were carried out prior to tunnelling which identified 252 significant anomalies, nine of which were considered to be potential unexploded ordinance, which is not a huge proportion, but nevertheless nine are significant.

The mitigation decided by the developer there placed a five metre exclusion zone around the target and therefore because none of the anomalies were within five metres of the tunnel, they have been left in situ. So the mitigation for that unexploded ordinance is to simply leave it where it is. Now, that is done on the basis of the applicant's perspective – on the basis that the risk is acceptable for the tunnel – but it doesn't take into account the effects on the

PLA, particularly the effects that there would be on any dredging. Now, knowing that specific potential unexploded ordinance exists, any future dredging of the navigational channel should, from the PLA's perspective, take that risk into account. Not only the consequence to the dredger and the port traffic, but also to the tunnel and its users.

So what we want to do is to avoid the potential of conflict between the different parties and make sure that it's not just the tunnel that is taken into account, but also the PLA's dredging and any other river use. So we want to avoid that situation for Lower Thames Crossing – the situation that's happened with Silvertown – particularly given that in this location, the volume of river traffic is greater and the future dredging requirements are deeper and wider. The navigational channel, as the panel will know, is much wider in this location than it was for Silvertown, so we propose that the applicant introduce a commitment to consult the PLA on decisions on how to deal with unexploded ordinance and take into account the risk to river activity, not just the risk to the tunnel.

MR TAYLOR: Thank you, Ms Dillistone. I see Ms Stobie from the Marine Management Organisation in the virtual ring. Could we hear from you, please?

MS STOBIE: Yes, thank you. Julia Stobie for the MMO. It would be good to have more details about what would happen if UXO are found. So what would the applicant's intention be? Would they intend to lift and shift? Would they intend to carry out deflagration? It would be good to have some more details around this. Thank you.

MR TAYLOR: Thank you very much. Ms Blake, please.

MS BLAKE: Thank you very much, sir. Laura Blake, Thames Crossing Action Group. Obviously, as a local resident and representing those in the local area, we're very aware of the risk of unexploded ordinance and it is something that has been raised as a concern for a long while now from residents in the community, both in the river, obviously, with the additional threat of trigger incidents going down to the SS Richard Montgomery, which would have an effect as far and wide up into London with tidal waves. But also, on a local level, we're aware, through ground investigations, that constructors actually hit a gas mains in Kent.

We have residents that also know from local experience and knowledge passed down through generations living in areas of areas where there are an unexploded ordinance, and residents have had to live with that threat and worry

of literally waking up through ground investigations alone, let alone moving forward to construction, of not knowing whether today is going to be the day when ground investigations and constructors actually come across this ordinance and whether they're going to find it in a way where it is safe to deal with it, or whether the first they know is when goes off – bang.

So that's something that we feel is something – it's all very well, with respect to everyone sitting around here, to be working out plans of what happens, but I think it would also be good just to give that reassurance that the residents would be the ones that are impacted and we need to make sure that we are being heard and that we are being taken into account on the impact it's having on us as individuals and as communities, and the concerns and the worry and stress that that is bringing on a daily basis, when constructors are in our area. Thank you.

MR TAYLOR: Thank you very much, Ms Blake. So, yes, I'm going to go to the applicant now, please, to respond.

MS TAFUR: Isabella Tafur, for the applicant. Sir, as you'll appreciate, the emergency preparedness plan requires provision to be made for dealing with unexploded ordinance. That's a specific entry in the code of construction practice, required by the emergency preparedness plan. We say that that is something that really needs to be addressed by the contractors who are going to be engaging in this work and that it's not appropriate to provide further detail at this stage.

Now we hear and understand absolutely Ms Blake's concerns on behalf of the local residents. We acknowledged them. We would like to reassure her that we are aware of the risks associated with unexploded ordinance. Those risks have been assessed prior to the application and characterised, and recommendations have been put in place for mitigation, which will be further developed in the emergency preparedness plan, in respect of which the relevant stakeholders will be involved. As to the issue raised by the Port of London Authority, we have spoken with them about that issue, which they're raised with us directly in one of the breaks, that the decision on whether to remove or leave in situ, as it were, shouldn't just take into account the protection of the tunnel, but also other assets and matters of concern to them, and we're going to engage with them in discussions on that, as on other matters. Thank you.

MR TAYLOR: Thank you very much. Okay.

MS BLAKE: Sorry, sir. I know it's unusual, but may I just jump in on the fact that – Laura Blake, Thames Crossing Action Group. Sorry – with regard to one particular incident on concerns over at UXO? We and residents have actually presented information in one location in South Ockendon, specifically in consultations and within DCO submissions, and the applicant hasn't actually acknowledged it in any form, so maybe we could ask the applicant to address that, please. Thank you.

MR TAYLOR: Yes. Ms Tafur, we'll come back to you and it might well be that the solution is that you address this in writing in the post-hearing.

MS TAFUR: Isabella Tafur, for the applicant. I think that sounds sensible, sir. Thank you.

MR TAYLOR: Okay. I think, given the time – so we still have a little bit of time. My intention would be to move on to item 7, but only to seek to try to deal with 7(a)(i), which deals with waste and material management, I think, partly for time. I don't think we will get any further, but also that sits more broadly within some of the more technical matters we've been discussing today, and then the remaining matters do focus on some issues in terms of impacts on the local community, and so it might be an appropriate split. Can I just look around the room to see if anyone has any concern about that, or if everyone's reasonably happy to just deal with this one more item? Yes, Thurrock Council.

MR EDWARDS[?]: Just a matter of practicality – I mean, if you do finish number 1 relatively smartly, would it be possible to move on to 2 and 3, to see? The reason that we've had such [inaudible] on the other end of the line to deal with the noise stuff for about five hours, it would be helpful if we could deal with that, but it's entirely up to you – just a small request.

MR TAYLOR: I think we'll just have to take a view as to how far we get because I think it's – I do appreciate the point you're making.

MR SMITH: Yes, briefly, I think an observation that I would make is that we're obviously very grateful for the fact that your expert has been on hand because the agenda did flag that we would deal with this matter. But I think equally we also have to reflect the fact that these are, amongst other things, very long, very intense working days and they have to be delivered within a quality-managed framework, which is, at the end of the day, we have to render account for ourselves and deliver a report to the Secretary of State, that doesn't leave things

out by accident, because people were trying to push too hard at 6.00 or 7.00 in the evening, when at the same time, they are expected to be in preparation for another round of hearing that will take place tomorrow, so – and those matters bear on yourselves, just as they bear on all of the other interested parties and ourselves.

So I will say that I think we can be reasonably liberal about pushing on for 15/20 minutes, half an hour, but when we've got a whole new range of topics that we know, as a matter of experience, are going to take considerably longer than that – I mean, if I look at that 7(a)(ii) item, I'd say I do know it will probably take more than half an hour to address and so therefore my judgment would be that actually, that has to live to fight another day, with deep apologies to those who have been on hand.

MR TAYLOR: Okay, thank you. So we will move on with item 7(a)(i). So this is seeking to address waste material management specifically around the tunnelling part of the project. To an extent, we have covered some of this already today, so we don't want to go over some of the ground that's already being covered, but if I could go to the applicant first to again set out the general approach, and the matter that's been raised by the Port of London Authority and Thurrock Council and others, about use of the river, I'd like you to address that into particular, please.

MS TAFUR: Isabella Tafur, for the applicant. Thank you for that, sir. On the use of the river point, the outlying materials handling plan, which is APP-338, contains an obligation on the project to use port facilities for at least 80% by weight of bulk aggregates imported to the north portal area. Now, we've seen and heard from both Thurrock and from the Port of London Authority, that they would like an enhanced commitment and they have given examples, I think, including – I think it was Silvertown today, but a tideway tunnel in writing, where they say better commitments have been achieved. Now, we've responded to that point in our response to the LIRs and that's REP-2065, page 121, it begins. But essentially, there are differences between the projects, which explain the ability to make enhanced commitments in those cases.

So the Silvertown Tunnel, 100% of the construction was within one kilometre of the river. The equivalent for the Lower Thames Crossing is 13%. For the Thames Tideway Tunnel, it was 92% within one kilometre of the river,

so again, 13% in our case, and the difficulty, given that difference, is that, if we do bring more by river, that will result in more road movements, particularly in the south, because the compounds are not adjacent to the river, and so that will add more construction traffic onto the roads with the consequential impacts. So we say that we struck the right balance, given the particular circumstances of this project.

Sir, there's a lot more we could say on waste and other matters, but I wonder if, given your correct summation that this is something that had been raised by a number of parties, if you might want to bring those in before we talk about anything else.

MR TAYLOR: Yes – entirely happy to take that approach. Can I just see a raising of hands as to who'd like to speak on this particular topic? Okay. Fine, thank you. Again, I'll start with Thurrock.

MR EDWARDS: Thank you very much indeed. Douglas Edwards, for Thurrock Council. Can I just begin and then I'll hand over to my colleague to deal with some other matters relating to it? We hear at what is said on behalf of National Highways and, with respect, it isn't really an answer to the point that was made clearly in respect to agenda item 4. It is fully accepted there are certain parts of the construction project that are so remote from the river that would not make it feasible or realistic to use the river as a means of transport. So, as you will have noted, the concern expressed by Thurrock, and indeed reflected in writing by the Port of London Authority, is the use of the river for the purposes of the importation of plant machinery and materials, relating to the tunnelling operation, and that, in terms proximity to the river, does not give rise to the same disbenefits that would arise if you're talking about the use of the river for constructing materials further to the north of the alignment, and that is the particular point that we raised. That is the particular point that we raised in writing, and that is the particular point that the National Highways, as the applicant, has not, we submit, properly responded to, or given a reason why it can't give a greater degree of commitment than it's done so far, consistent with its general policy and objectives in terms of delivering pathfinder projects. So that's our general response, and I'll cede –

MR TAYLOR: Mr Edwards, before you bring Mr Neve in, and it probably isn't for now, but for you to think about, is what precisely you would like to see changed to

deal with that issue of specifically, importation of plant machinery, etc, relating to the construction of the tunnels and how you would like to see the current commitments amended to meet your satisfaction. It might not be helpful to go into it in too much detail immediately.

MR EDWARDS: Well, sir, I can give you a headline response to that. The way we see this being delivered is by a greater degree of commitment, given in the outline materials handling plan, that seems to be the appropriate vehicle for doing so. There may be other means of doing so, but that seems to us to be the most direct means of addressing the points and, sir, with your permission, we'll deal with that in writing in our written summary in due course.

MR SMITH: Just interjecting into that discussion, and again, don't feel compelled to respond to this orally now, but as written submissions emerge on this point, please, factor this in, which is that if one is specifying that additional particular measures about, for example, tunnelling planned movement are to be planned for as river movements in a way that they are not specifically at present, then there are some contingent questions. For example, is temporary wharfage needed? If temporary wharfage is needed, can that be sited on land within the proposed order limits, within the red line boundary of the application as made, or does that imply a need for additional land, and if so, how will that additional land be procured and indeed, amongst other things, brought into this process, because it can be relatively easy to talk about the broad-brush benefits of an additional river freight approach? But, given where we currently are in the process, if we start to need more land, then we are tight up against the need to actually describe what that land is, and then think about how it might be brought into the process.

MR EDWARDS: Thank you very much indeed, sir. We'll take those points on board. I'm not going to respond to them in detail at this stage, but, sir, what I just will say is that certainly your colleagues will have no doubt had an opportunity to look at it in appendix C, annex 4 to the LIR – is the joint technical statement that was prepared by Thurrock Council, along with the PLA, that does address these matters, including looking at the opportunities that the existing port facilities offer in terms of achieving the objective that we've identified. But we'll come back to you in writing on that. I think Mr Neve may have something to add at this stage.

MR NEVE: Okay. Thank you, sir. Adrian Neve on behalf of Thurrock Council. Really, I don't want to overemphasise what Mr Edwards has already added, but our local impact report and the joint response that we've provided from the Port of London Authority, it sets out in significant detail where we think that the project should look at, and the types of movement, the types of materials, as I said, the types of plant, even to the aspects of moving welfare potentially. We come back to this point about the pathfinder project. There are opportunities that could be taken with better rigour on how to move different elements of the project, primarily around the tunnelling compound, because we accept it's the primary pit, or the primary driving site for the tunnel. But there are also opportunities, once the Tilbury viaduct is in place, to actually, if the project so desired, to start to move materials within the trace element as well. We are saying, concentrate on the tunnelling aspect, but it doesn't mean to see they can't look to the broader points. So it's around that. It's around that control mechanism. That's probably enough to leave it there. Thank you.

MR TAYLOR: Thank you very much. I think I will go to the Port of London Authority next and I'll come back to you Mr Bedford, because I suspect there will be some similar themes with Thurrock.

MS DILLISTONE: Thank you, sir. Alex Dillistone, for the Port of London Authority. The PLA has previously stated our position that the applicant has not made sufficient use of the river and that, we believe, there's a missed opportunity to make the most of the existing wharfs. We've set this out in writing in our responses to written representations at deadline 3. I was going to give you a document reference number and then realised, the reason I couldn't find it was because it has been uploaded today, so that would explain that one. We've also explained in our written submissions the importance of river transport, both in our deadline 3 submissions and in the joint statement with the Port of Tilbury London Gateway, and the document reference for that is REP-3196. I don't propose, given the time constraints, on saying more than that today, and I think everything is set out that we need to set out in our written submissions.

MR TAYLOR: Thank you very much, and then, Mr Bedford, can I now come back to you, please.

MR BEDFORD: Thank you, sir. Michael Bedford, Gravesham Borough Council. Just briefly, sir, in our local impact report we didn't make a specific point about river

traffic, but we do endorse the points that have been made, both by the Port of London Authority and Thurrock Council, on the general benefits of achieving more, if it can be achieved. So the only point I was going to make is in our local impact report, we did make some specific comments on the applicant's approach to materials and waste handling. They've responded in their comment on our local impact report. We don't really think that they've seriously engaged with some of our concerns and so we since have to leave it there for the purposes of this afternoon, but if there's anything we can say in our post-hearing submissions that – I think we are providing a more specific ask that we think that the applicant ought to take on board – then we will do that.

MR TAYLOR: Yes. Thank you. Ms Blake, did you want to come in on this, or not? Can I just check, does anybody else on this particular matter – nope. Okay. Ms Tafur, for the applicant, please.

MS TAFUR: Isabella Tafur, for the applicant. So we say that the appropriate approach is secured through the outline material handling plan where we've referred already to that 80% figure. There is also a requirement in paragraph 1.3.7 of the outline plan to engage with suppliers to proactively maximise utilisation of the river. In addition to that baseline commitment to 80%, there's discussion at paragraph 1.3.11 of multimodal options to reduce reliance on heavy good vehicles on the road network. Essentially, at this stage, there remains a large degree of uncertainty as to the type of plant the contractors will use, where they'll be sourcing it from, whether existing facilities will be able to cope with the plant that's required for the tunnelling and whether any additional wharfing or land requirements would arise. We say that we've already got a commitment to explore maximisation of multimodal, including river transport, and that's sufficient at this stage.

MR TAYLOR: Thank you very much, Ms Tafur. I think my view is that I want to probably leave everything now for today. There are some general written questions that everyone will be busily responding to on waste and material management, and it might be that some of the more general matters on that, we will return to, either in further written questions, or at a future hearing, and then essentially, leave items 7(a)(ii) and (iii) off for either written questions, or potentially a mixture of written questions and being addressed at a future hearing. So I'm going to close off the main agenda items.

So just moving on now to agenda item 8, so dealing with next steps. So this is really in the usual manner, so post-hearing submissions provided by deadline 4, please. We've discussed a lot of matters today that will lead into an initial discussion on Monday at issue-specific hearing 7, relating to the development consent order. We'll also publish action points relating to this hearing as soon as we can. I don't intend to list off the remaining hearings that we have coming up, other than to say, we are back here at 10.00 tomorrow morning for issue-specific hearing 6.

I just want to take this opportunity to thank everybody for their contributions today, and apologies that we didn't get through the entire hearing, especially for those that were waiting around for those last agenda items. But I feel it is probably the most sensible way forward to close now. So I'm going to pass over to my colleagues just to do the goodbyes, and I'm going to start with my colleague, Ms Laver, who has been joining us virtually today.

MS LAVER: Yes. Good evening, everybody. I will be back in person tomorrow, so see you then. Thank you.

MR PRATT: Good night, everybody. We'll see you tomorrow morning.

MR YOUNG: Thank you, and also see you tomorrow.

MR SMITH: Rynd Smith, panel lead, saying, good night to you all, and again, see you tomorrow, if you're going to be with us. Thank you very much.

MR TAYLOR: Yes. Good night from me. Thank you, everybody. This hearing is now closed.

(Meeting concluded)