The Lake Lothing (Lowestoft) Third Crossing Order 201[*]

Document SCC/LLTC/EX/47: Environmental Statement Volume 3 - Appendix 18A - Flood Risk Assessment

Annex A: Environment Agency Consultation

Revision 1

Planning Act 2008
The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Foreword

This annex provides details of consultation with the Environment Agency regarding the Flood Risk Assessment (Document Reference 6.3, PINS Document Reference APP-202). The document (Document Reference SCC/LLTC/EX/47) has been updated to reflect, as advised by the Environment Agency in their Relevant Representation, their comments upon the draft Flood Risk Assessment that they provided comment upon pre-submission of the Development Consent Order (DCO) Application as well as further correspondence that has taken place between the Applicant and the Environment Agency since submission of the DCO Application for the Scheme.

Mr Michael Wilks
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Our ref: AE/2016/120907/01-L01
Your ref: *

Date: 05 October 2016

Dear Mr Wilks

THIRD RIVER CROSSING, LAKE LOTHING ENVIRONMENTAL STATEMENT - FLOOD RISK ASSESSMENT METHODOLOGY

Thank you for consulting us on your Flood Risk Assessment methodology. We have reviewed the document submitted and are pleased to see that the most recent flood modelling undertaken by CH2MHill on behalf of Waveney District Council dated 2014 will be used and will be reviewed as part of the study.

Model Runs

We have noted that the model will be run for the 0.5% Annual Exceedence Probability event with and without climate change allowances and the 0.1% AEP event. We would recommend that the 5% AEP with and without climate change is also considered as this is considered the functional floodplain in the SFRA. Climate change should also be considered on the extreme 0.1% AEP climate change event. It may be useful to refer to the Lowestoft Cumulative Land Raising Study undertaken in 2008 and available here which undertook a similar exercise:

http://www.eastsuffolk.gov.uk/assets/Planning/Waveney-Local-Plan/Cumulative-Land-Raising-Study/01-Cumulative-Land-Raising-Study-Main-Document.pdf

We agree with the approach to undertake a baseline and post development run. It is important to ensure that the proposed crossing does not increase flood risk elsewhere and where possible reduces flood risk overall in line with Paragraph 102 of the National Planning Policy Framework (NPPF). If the modelling shows there is likely to be an impact elsewhere mitigation will be required, potentially in the form of compensatory storage.

Climate Change

As the proposals will be considered as a Nationally Significant Infrastructure Project (NSIP) you should refer to the National Policy Statement for National Networks paragraphs 4.41 – 4.44. It is important that the impact of and resilience to future flooding is considered and mitigation against future flood risk elsewhere is implemented where necessary. Section 4.41 of the NPS states that if transport infrastructure has safety-critical elements and the design life of the asset is 60 years or greater, the applicant should apply the UK Climate Projections 2009 (UKCP09) high emissions scenario against the 2080's projections at the 50% probability level.
UKCP09 relative sea level rise projections are available for three emission scenarios for the 10th, 50th and 90th percentiles. They are available on the UKCP09 user interface on their website. These allowances should be used to inform the design and mitigation of the crossing.

You will also need to determine the lifetime of the crossing. If the lifetime is significantly beyond 2115 we recommend that mean sea level rise projections are extrapolated out to 2200 using a linear approach, based on the rate of rise between 2105 and 2115.

Safety critical elements of the design should be assessed against the H++ estimates (high risk, low probability scenario) for sea level rise to assess a credible maximum scenario. We would not normally expect the design or mitigation to be provided to this level but the crossing should be assessed against this scenario to understand the picture of risk. This data is also available on the UKCP09 website.
You should be aware that the next set of climate change projections (UKCP18) replacing UKCP09 is due in 2018.

We are happy to be consulted throughout the production of the FRA and model re-run to provide advice and guidance in accordance with our cost recovery programme. We would ask that the model is submitted for review once complete along with the FRA and modelling technical note.

Yours sincerely

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End

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Our ref: AE/2016/121040/01-L01
Your ref: *

Date: 23 November 2016

Dear Mr Wilks

LAKE LOTHING ENVIRONMENTAL STATEMENT - FLOOD RISK ASSESSMENT METHODOLOGY THIRD RIVER CROSSING, LAKE LOTHING, LOWESTOFT

I write in response to your email enquiry of 31 October requesting clarification regarding methods for extrapolating data where the design life of the project exceeds the published UK Climate Projections 2009 (UKCP09) and appropriate use of the H++ scenarios. There is considerable overlap for the questions posed and so our flood risk specialist has answered your questions as one single reply.

Use of Climate Change scenarios and extrapolating data

Before we can determine the appropriate climate change allowances it is important to note the text in the National Planning Policy Statement. It states that if transport infrastructure has safety-critical elements and the design life of the asset is 60 years or greater, the applicant should apply the UK Climate Projections 2009 (UKCP09) high emissions scenario against the 2080's projections at the 50% probability level. Therefore it is important to determine if the bridge has safety-critical elements or is considered safety critical as this will inform the climate change allowances that need to be considered and if you need to consider the high emissions climate change scenario and H++ scenario.

If the bridge is considered safety critical the high emissions scenario and H++ scenario needs to be considered as outlined in our previous rs. As the lifetime of the proposal is up to 2140 climate change should be considered over this lifetime.

Please accept my apologies for the confusion in relation to the data available on the UKCP09 website. You are correct that the data on the UKCP09 website is only available up to the year 2100. For the high emissions scenario you will need to extrapolate out to 2140 using a linear approach.

The H++ data is also not available on the UKCP09 website. For the H++ scenario data please refer to Table 5 of the following document: https://www.gov.uk/government/publications/adapting-to-climate-change-for-risk-management-authorities. The table provides allowances up to 2115. The guidance

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does not provide instruction on how to extend these allowances beyond 2115 again you will need to determine a suitable approach for our consideration.
As stated above these allowances are only applicable if the bridge has safety-critical elements so it is important this is confirmed first.

We look forward to receiving the revised model for review in due course.

Yours sincerely

[redacted]

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End

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Our ref: AE/2017/121576/02-L01
Your ref: *

Date: 25 May 2017

Dear Julia

LAKE LOTHING ENVIRONMENTAL STATEMENT - INTERIM FLOODING ASSESSMENT REPORT THIRD RIVER CROSSING, LAKE LOTHING, LOWESTOFT

Thank you for consulting us on the Interim Flood Risk Assessment and draft model. We have reviewed the model submitted and our comments can be found in the attached documents entitled 'Lowestoft 3rd Crossing Model Review Certificate' and 'Review_Questions_Reference_List'. The issues highlighted should be addressed. We are happy to be re-consulted once this has been reviewed. We have also reviewed the accompanying report and have the following comments to make.

The report submitted clearly sets out the development, reasoning and justification for the modelling work undertaken. It is understood that this is an interim report and not a full Flood Risk Assessment (FRA). A full FRA will be undertaken once the design of the crossing has been finalised.

A review of the existing models in the area has been undertaken. A new 2D model has been constructed in order to get the level of detail required for this scheme. This model will be used to assess the impact of the proposed third crossing of Lake Lothing. We note that the model has been run for a baseline and post-development scenario for the 5% (1 in 20), 0.5% (1 in 200) and 0.1% (1 in 1000) annual probability event both with and without climate change as previously advised. Fluvial inputs for three watercourses have been assessed and input into the model as detailed in section 3.3 of the report. We note that the flood events quoted above were assessed. For future reference we would usually consider the design event for fluvial flooding to be the 1% (1 in 100) annual probability event rather than the 0.5% (1 in 200) annual probability which is the design event for tidal flooding. This should not be an issue as the 0.5% event is a larger event and as stated in section 3.3.5 the model was found to be insensitive to fluvial

inflows as the harbour is tidally driven. As a result the final model will not include a fluvial representation as stated in section 4.3.6.

Two climate change scenarios have been run as detailed in section 3.2.5 and 3.2.6. Please refer to our previous email correspondence with Julia Hunt of 11/04/17 and 28/04/17 which discusses the climate change scenarios that should be considered and the guidance in the National Policy Statements on this topic. This email also discussed the Environment Agency's Extreme Sea Levels that have been used in the model. It is important to note that we are in the process of revising our flood modelling for the Essex Norfolk and Suffolk coast and that new extreme sea levels are available. We advised that these could be requested by emailing Enquiries_EastAnglia@environmentagency.gov.uk.

We are pleased to see that the final FRA will assess the offsite impacts in both the post development and during construction phases as noted in section 5.3.1. Section 6.1.9 also states that the final FRA will assess the flood risk to the scheme itself which is important to understand. This is particularly important if the crossing is considered safety critical and essential infrastructure and therefore will be designed to remain operational in times of flood.

Whilst we note the bridge deck itself is above the 0.1% (1 in 1000) H++annual probability flood level consideration should also be given to the flood risk posed to the remainder of the scheme to inform decision makers on the safety of the crossing in the event of a flood.
Figure 1-2 shows the proposed road alignment of the C13A crossing design. It would be useful to know if the road network is likely to be raised as this would need to be considered in the FRA. This could remove floodplain storage and alter flood flow paths.
Once the design of the bridge has been finalised it would be helpful to include a cross section of the crossing including elevations within the FRA.

Figure 2-1 shows the extent of the existing CH2M 1D-2D model. It is understood the new model developed for this study will have a smaller domain. Section 4.2.2 states that it was not deemed necessary to include the majority of the Kirkley Stream floodplain as it is outside of the study area for this assessment. Further justification is required to explain why this decision has been taken. The post-development maps provided in section 5.1 appear to show changes in depth across the Kirkley Stream floodplain so the crossing could have impacts in the section of floodplain not included. Has this section of Kirley Stream not been included as the impacts are considered negligible?

We note that verification against the 2013 tidal surge historic flood extent has been undertaken and a good commentary is provided in section 4.5 of the report. It should be noted that we hold photographs and accompanying location maps which may aid this verification and improve the understanding of the historic outline provided. If this information has not be obtained already and would be useful it may be requested by emailing our Customers and Engagement team on the email address above.
Section 5.3 discusses the post-development results for present day and climate change events. Tables and maps have been provided to illustrate the change in level and depth in Lake Lothing and the harbour itself as well as the surrounding floodplain. The change in level and depth appears to be small generally speaking. However, section 6.1.7 correctly identifies that mitigation will still need to be investigated in line with the proposed mitigation approach in the Environmental Impact Assessment Scoping Report dated February 2017 which was previously submitted to us for review. Section 6.1.8 goes on to say that as the design of the crossing has not been finalised it is hoped that the need for flood mitigation can be designed out, which would be the first preference. If

mitigation is required, we are pleased to note that this will be done in consultation with the Environment Agency.

We trust that this information is helpful.

Yours sincerely

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cc Suffolk County Council

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As stated in our previous email response dated 28/04/17 it is not clear which climate change allowances should be applied using the policy and guidance available. However the NPS for National Networks states the applicant should apply the UK Climate Projections 2009 (UKCP09) high emissions scenario against the 2080 projections at the 50% probability level over the lifetime of the infrastructure.

A recent investigation has found that these levels (50% high emissions) can be lower than those provided in the NPPF sea level allowances in Table 3 available on our website here: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-3.

It is understood that this is because the tidal UKCP09 projections available on the UKCP09 website are based on the Intergovernmental Panel on Climate Change (IPCC) fourth assessment report. Since this was published the possible magnitude of sea level rise has attracted renewed attention, and a number of researchers have suggested that the IPCC numbers underestimate the potential sea level rise range during the 21st century.

For this reason the 'Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities' document recommends that RMAs do not use the central estimates (50th percentile) of relative sea level rise from UKCP09 as the climate change allowances for their investment decisions. Instead, it is recommended that the upper confidence band (95th percentile) medium emission projection is used as the climate change allowance. These allowances are provided in Table 5 on page 15 of the document referred to above.

Therefore the tidal sea level allowances within Table 3 of the NPPF on our website were not changed to reflect the UKCP09 model as it was seen to be an underestimated. On this basis it is possible that both the medium and high emissions scenarios tidal allowances are lower than those provided in the NPPF Table 3.

Therefore we recommend that a comparison is made between the following allowances to understand the difference between them and establish the worst case. This does not mean that the model needs to be run for all of these scenarios rather a comparison of the mm per year allowances and a calculation of the total climate change allowance over the lifetime of the crossing can be made.

We would recommend that the worst case allowances should then be used to inform the design of the crossing.

Please note the list below does not include the H++ scenario which should still be run as well. As discussed previously we would not expect mitigation to this level.

- NPPF Table 3 tidal allowances.
- UKCP09 50% high emissions (as advised in section 4.41 of the NPS for National Networks)
- UKCP09 95% high emissions
- UKCP09 95% medium emissions (as advised on page 14 of the Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities).
- Upper end allowance in Table 5 of the Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities.

You will note that we have not included the UKCP09 50% medium emissions allowance. This is in line with the guidance on page 14 of the Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities which states that the central allowances should not be used. We have included the UKCP09 50% high emissions allowance as this is specifically required in the National Networks NPS.

We would be happy to discuss this further in a telephone conversation if it would be helpful as we appreciate the varying guidance available on this topic is not clear.

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Our ref: AE/2018/122631
Your ref:
Date: 08 May 2018

Dear Julia

LAKE LOTHING THIRD CROSSING: FLOOD RISK ASSESSMENT AND MODEL FILES

Thank you for consulting us on the draft Flood Risk Assessment (FRA) and updated model. These documents have been reviewed by our flood risk specialists and our national flood modelling team whose comments and observations are detailed below. I have appended to this letter the review questions and certificate detailing what has been considered in the review of the submitted Tuflow model. You will note from the certificate that there is one area of major concern, a minor issue and one item that is not considered best practice.

Flood Modelling

We have reviewed the model submitted and our comments can be found in the attached documents entitled 'Lowestoft 3rd crossing review cert_18042018' and 'Review_Questions_Reference_List'. The issues highlighted should be addressed. The main points raised are that the results for all runs should be provided and that any investigation of model error messages should be documented in the model report.

Calibration

In addition we note that the model could not be calibrated so it was verified against the 2013 tidal surge. Section 4.6 of the draft FRA discusses this and highlights a few areas where the model does not show the flooding detailed within the historic flood map and justifies this with various explanations. This could also be justified by the fact that the 2013 flooding did not solely occur because of overtopping. It is understood that water was able to flow through a broken tidal flap on one of the outfalls into Lake Lothing.

Kirkley Stream

As mentioned in our previous response dated 25 May 2017 it is understood the new model developed for this study has a smaller domain than the previous modelling in this area. It is understood that it was not deemed necessary to include the majority of the

Kirkley Stream floodplain as the impacts are considered negligible. Please can it be clarified whether this means that there is an increase in food depth of up to 0.02m? Has it been confirmed that there will not be an increase in flood extent here which could be considered a major impact?

We are happy to be re-consulted once this has been reviewed.

Flood Risk Assessment

We have also reviewed the accompanying draft FRA and have the following comments to make.

An FRA should assess all sources of flooding and provide sufficient information on the characteristics of flooding at the site, such as frequency, depth, hazard, velocity, speed of onset, and duration. In this case the off-site risk must also be considered in the same way in order to determine if there is any significant change to flood risk elsewhere. The FRA details the likely levels and depths of flooding in the baseline and scheme scenarios but it does not illustrate the likely hazard expected as a result of the flooding. Whilst we accept that the bridge deck itself is well above even the H++ levels the approach roads are still at risk. During a flood, the journey for site users to safe, dry areas completely outside the extent of a 1% (1 in 100) / 0.5% (1 in 200) flood event (including allowances for climate change), should not involve crossing areas of potentially fast flowing water. Safe access and egress routes should be assessed in accordance with the guidance document 'FD2320 (Flood Risk Assessment Guidance for New Developments)'. This guidance should be used to add more detail to the FRA to illustrate the risk expected to the roads and bridge during an event so that the planning inspectorate fully understands the risk posed to the scheme and so they can make an informed decision on flood risk.

Where safe access cannot be achieved an emergency flood plan must be considered. The plan should deal with matters of evacuation and refuge, and should demonstrate that people will not be exposed to flood hazards. The emergency flood plan should be submitted as part of the FRA and will need to be agreed with the planning inspectorate. As this development is a bridge rather than a residential development the nature of the plan will of course be different. The plan may need to consider issues such as whether the bridge will be closed in the event of a flood. We are pleased to note that a flood response plan will be produced for the 'during construction' phase as well.

It should be noted that the Environment Agency does not normally comment on or approve the adequacy of flood emergency response procedures accompanying development proposals, as we do not carry out these roles during a flood. Our involvement with this scheme during an emergency will be limited to delivering flood warnings to occupants/users covered by our flood warning network.

The Planning Practice Guidance to the National Planning Policy Framework states that those proposing developments should take advice from the emergency services when producing an evacuation plan for the development as part of the flood risk assessment.

In all circumstances where warning and emergency response is fundamental to managing flood risk, we advise that the inspectorate formally considers the emergency planning and rescue implications of new development in making their decisions. As such, we recommend Emergency Planners and the Emergency Services are consulted to determine whether the proposals are safe in accordance with the guiding principles of the Planning Practice Guidance (PPG).

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Impact Assessment Criteria & Mitigation

Table 6-2 and 6-3 illustrate the impact assessment criteria employed to assess whether mitigation is required for any changes in flood risk as a result of the scheme. As we previously highlighted in our response to the scoping report opinion dated 28 March 2017 the impact assessment criteria presented provides a basic framework for assessing whether mitigation is required. However we would advise that any increases in flood risk to any vulnerability of development should be investigated to establish the likely consequence upon that specific site/development.

The scheme has been designed to produce a 'negligible' effect on flood risk. Section 7 of the FRA discusses flood risk mitigation and suggests that mitigation is not required as the maximum increase in flood depth in the design event 0.5% (1 in 200) annual probability event with an allowance for climate change is up to 0.02m in the floodplain which is classified as negligible in Table 6-2. Whilst 2cm is likely to have a minor impact elsewhere the FRA should still identify and quantify any changes in flood depth, extent, frequency and hazard and illustrate the consequences of these changes upon the receptors in the area in more detail. We are unlikely to object on this point as the depths are small and are likely to be insignificant but we suggest this is discussed in further detail in the FRA in order to illustrate and justify the flood risk impact to the planning inspectorate so they may make an informed decision.

The FRA could also provide further detail to illustrate the changes in flood risk between the baseline and scheme scenarios. At present the FRA does not show exactly where the areas of change in flood risk are or discuss the receptors that would be impacted in the floodplain. We note that the model report contains depth mapping in Figures 5-2 and 5-3 which shows the changes in flood depth and where they occur. It would be useful to have these for a range of events and displaying hazard rating with some discussion to explain what this impact will mean.

Section 7.1.1 states that mitigation should be provided in line with table 6-3 for highly vulnerable development and suggests this is not required due to the current high depth of flooding at that location. Therefore an additional 2cm will not have an impact. This provides some justification but this should be justified and explained for any increases in flood depth. For example will these changes in flood depth mean more properties are at risk than before? What are the receptors in the area? Is the change of 2cm likely to have an impact on the existing flood depths in the floodplain? Again we agree the depths are small but it is still important to illustrate the impact of the proposed scheme upon flood risk to the planning inspectorate so they can make an informed decision.

It should be noted that similar increases in flood depth (of approximately 2cm) were considered minor within the Lowestoft Cumulative Land raising Study which was undertaken by Scott Wilson on behalf of Waveney District Council dated June 2008. This study could be considered in the FRA.

In addition to the above please can it be confirmed how the change in depths quoted for the floodplain were derived? Are these based on the in channel points (P-1 to P-16) or are they based on the on-site depths within the floodplain? Is there an increase in 2cm across the whole floodplain area? Is this an average or the maximum change? Please can it also be confirmed that there is no change in flood extent as this is not discussed or evidenced clearly. It would be useful to have comparable maps of the baseline and scheme scenarios for a range of events within the FRA to clearly illustrate any changes in extents. It is important to note that flood extents must not be increased as a result of the scheme.

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Flood Risk During Construction

It is understood that cofferdams will be required in order to install and construct the bridge crossing. Section 8 of the FRA states that construction within Lake Lothing will last approximately ten months. Section 8.1.3 states that the coffer dams will temporarily displace water within Lake Lothing and reduce flood storage.

The cofferdams will be designed to incorporate removable walls so they may be flooded should an event occur that would exceed the height of the quay wall. It is not clear how the removal of the cofferdam walls would be instigated. When would the removable walls be taken out? How would it be known when a significant enough flood event would occur to warrant this? It should also be determined how quickly it could be removed. Is it possible for it to be removed quickly enough before the effect of a flood is felt? Also is there a possibility that once the cofferdam wall is removed it could damage the works and could building materials/chemicals could enter the watercourse and harm the environment?

It would be helpful to understand why the cofferdams have not be included as a model run to illustrate their impact upon flood risk. A model run may show that there is no impact upon flood risk as the current day runs incorporating the scheme do not appear to increase flood risk elsewhere. Potentially this may mean the removal of the cofferdams may not be necessary as a flood risk mitigation measure. As the proposals are temporary (10 months) climate change allowances would not need to be considered.

Flood Risk Activity Permit

As advised in our previous responses under the Environmental Permitting (England and Wales) Regulations 2016 an environmental permit for flood risk activities may be required for work in, under, over or within 8m of a fluvial main river or flood defence structure or culvert or within 16m of a tidal main river or flood defence structure or culvert. The proposed third crossing will cross the main river known as the 'Lake Lothing Landspring and Tributary' and the facilitating works will include cofferdams within Lake Lothing itself. A bespoke permit is therefore likely to be required for both the permanent and temporary works.

The Environmental Permitting Regulations take a risk based approach that enables us to focus regulatory effort towards activities with highest flood or environmental risk. Lower risk activities can be excluded or exempt and only higher risk activities will require a permit. The bridge crossing itself will require a bespoke permit. Any other facilitating works may fall under one or more of the following:

- An Exclusion
- An Exemption
- A Standard Rules Permit
- A Bespoke permit

Application forms and further information can be found at: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits. If you require further advice please email FDCENS@environment-agency.gov.uk.

It is possible to dis-apply the requirement for these permits and consider these under the Development Consent Order itself. If this is preferred we will require greater detail as part of the DCO application so we may undertake the assessment required in order

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to satisfy a permit. Detailed design drawings and method statements for how the works will be undertaken will be required and will need to be agreed with the Environment Agency. We may also need to append certain conditions that we would usually append to a permit.

If you have not already done so we recommend you contact the Marine Management Organisation (MMO) as some of your work may need to be considered under an MMO licence.

Strategic Flood Risk Assessment (SFRA)

The FRA refers to the 2008 SFRA for the area. This is currently being updated by Waveney District Council and Suffolk Coastal District Council (known as East Suffolk Council). The data referred to in the SFRA has now been superseded. It may be possible to contact East Suffolk Council to obtain this document once it is completed to ensure the most up to date version is being referred to in the FRA. This may depend on the timescales of the scheme and SFRA as to whether it can be included.

Other advice: Other Sources of Flooding

In addition to the above flood risk, the site may be within an area at risk of flooding from surface water, reservoirs, sewer and/or groundwater. We have not considered these risks in any detail as we are not a statutory consultee on these sources, but you should ensure these risks are all considered fully.

I hope that you have found this information useful.

Yours sincerely

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2.0 Environmental Statement Volume 3 Appendices – Appendix 18A

2.1 In summary, we are very concerned that our previous advice has not been adhered to in respect of flood modelling and as a result we cannot rely on the conclusions drawn in the Flood Risk Assessment (FRA). In addition, the FRA does not address the increase in hazard and risk offsite which arises from the proposed development. The emergency procedures referenced in this section rely on practices already in place that do not take into account the proposed development. To ensure safety it is necessary for procedures to be drawn up that take account of the situation that will exist if the proposal is granted consent. We have also set out the detail required in order to grant a Flood Risk Activity Permit or approve disapplication.

2.2 Flood Modelling

2.3 In our pre-application response referenced AE/2018/122631 and dated 8 May 2018 we highlighted issues within the model that need to be addressed. Our letter can be found at Appendix A.

2.4 We are concerned that there is no explanation or detail provided to show that these outstanding modelling issues have been resolved within the FRA.

2.5 Until it is confirmed that the modelling issues have been resolved the information used within this FRA could be incorrect and cannot be relied upon. As such this FRA is unacceptable.

2.6 Flood Risk Assessment & Environmental Statement:

2.7 Section 9.1.10 : Investigation of the off-site flood risk. The FRA confirms that some areas within the port will be at an increased risk as a result of the scheme change flow patterns, but that no buildings are affected by these changes. This risk has been illustrated in the Hazard maps (Figures 6-10 and 6-11) for the 0.5% (1 in 200) Annual Exceedence probability (AEP), plus an allowance for climate change.

2.8 Section 9.1.10 of the FRA details an increase in hazard from Danger for Most to Danger to All within the port infrastructure, but no increase in risk where buildings are sited. It is unknown whether the developer has communicated this change in risk to the affected parties.

2.9 Section 6.1.30 confirms that in a 0.5% (1 in 200) annual exceedance probability, plus an allowance for climate change event that the scheme shows no increase in flood extent.

2.10 The Secretary of State should decide on whether it is acceptable for the scheme to result in an increase in the hazard to water compatible development.

2.11 Section 7.1.2 of the FRA states that given the baseline level of flood risk within Lowestoft, t it is not possible to completely remove the risk of flooding to the access roads during a tidal flood event. As safe access cannot be achieved an emergency

flood plan must be considered. The plan should deal with matters of evacuation and refuge, and should demonstrate that people will not be exposed to flood hazards. The emergency flood plan should be submitted as part of the FRA and will need to be approved.

2.12 Section 9.1.10 of the FRA states that due to the existing wide spread significant / extreme hazard shown in the baseline scenario that there will already be emergency procedures in place and that therefore no additional assessment is required due to the scheme. However, any existing emergency procedures will not consider issues such as whether the bridge will be closed in the event of a flood, which may need to be considered.

2.13 As this development is a bridge rather than a residential development for which the existing emergency procedures were drafted, those procedures do not address the issues specific to a bridge development.

2.14 It should be noted that the Environment Agency does not normally comment on or approve the adequacy of flood emergency response procedures accompanying development proposals, as we do not carry out these roles during a flood. Our involvement with this scheme during an emergency will be limited to delivering flood warnings to occupants/users covered by our flood warning network.

2.15 The Planning Practice Guidance to the National Planning Policy Framework states that those proposing developments should take advice from the emergency services when producing an evacuation plan for the development as part of the flood risk assessment. In all circumstances where warning and emergency response is fundamental to managing flood risk, we advise that the adequacy of emergency planning and rescue implications of new development is considered by decision makers.

2.16 Impact Assessment Criteria & Mitigation Table 6-2 and 6-3. This table illustrates the impact assessment criteria employed to assess whether mitigation is required for any changes in flood risk as a result of the scheme. As previously advised in our response to the scoping report opinion dated 28 March 2017, the impact assessment criteria presented provides a basic framework for assessing whether mitigation is required. However, we would advise that any increases in flood risk to any vulnerability of development should be investigated to establish the likely consequence upon that specific site/development.

2.17 Section 7 of the FRA discusses flood risk mitigation and suggests that mitigation is not required as the maximum increase in flood depth in the design event - 0.5% (1 in 200) annual probability event with an allowance for climate change is up to 0.02m- in the floodplain; which has been classified as negligible in Table 6-2. Section 7.1.1 states that mitigation should be provided in line with table 6-3 for highly vulnerable development and then suggests that this is not required due to the current high depth of flooding at that location and concludes that an additional 2cm will not have an impact. Decision makers will need to form a view as to whether or not an additional 2cm flood depth requires mitigation.

2.16 Flood Risk During Construction

2.17 It is understood that cofferdams will be required in order to install and construct the bridge crossing. Section 8 of the FRA states that construction within Lake Lothing will last approximately ten months. Section 8.1.3 states that the coffer dams will

temporarily displace water within Lake Lothing and reduce flood storage. The FRA states that the cofferdams will be designed to incorporate removable walls so they may be flooded should an event occur that exceeds the height of the quay wall. The applicant has not made clear how the removal of the cofferdam walls would be instigated. This should be clarified.

2.18 Section 8.3.3 of the FRA shows that in the 0.5% (1 in 200) annual exceedance probability, plus an allowance for climate change event; that the cofferdams would result in an increase of 0.02m in water level. This increase is limited to the water level in channel by the structure. As part of the flood risk activity permit application (or application to disapply this requirement) the applicant will need to provide more detail.

3.0 Document 6.3: Environmental Statement, Volume 3 Appendices, Appendix 17C, Sediment Transport Assessment

3.1 In summary, whilst it is possible that the risk to the water environment is low, and we expect that the fundamental conclusions are correct; there is insufficient evidence presented to confirm this. We are also concerned that the Assessment has not considered impacts during construction and therefore has not provided sufficient evidence to make an informed decision.

3.2 The Assessment does not provide a comparison with measured velocities therefore, it is impossible to confirm if they are of the correct order of magnitude.

3.3 The Assessment quotes typical sediment sizes smaller than 0.003mm; and using Fig 5.2, erosion velocities are in excess of 1m/s for sediment of this size. The Assessment quotes anecdotal evidence from the Harbour Master stating that speeds are 'low' within the harbour which we have interpreted (in the absence of further detail) to be below 1 m/s.

3.4 By applying the assumptions outlined at 3.3 it is plausible to conclude that relatively small changes to the flow regime within the harbour will not cause erosion post construction but it should be noted that this conclusion has relied on anecdotal evidence.

3.5 The study has only considered the effects and condition post construction. No evidence for environmental impact during construction has been presented. The impacts during construction should have been assessed because there is risk of releasing significant amounts of sediment into suspension. We consider that the risk of sediment transport during construction to be as great if not greater than post construction.

3.6 Our comments for this study are numerous therefore, we have included them as a table appended to this Representation

4.0 Environmental Statement Volume 3 Appendix 17A - WFD Assessment

4.1 In summary, we do not agree with some of the assumptions used in the Assessment nor that the data supplied in some sections is sufficient. As such we do not yet consider the Assessment to be complete.

4.2 WFD Assessment for the Bure & Waveney & Yare & Lothing transitional water, Section 2 Biology – scoping template. The applicant has assumed that there are no higher or lower sensitivity habitats present within the area of the proposed scheme and has therefore not considered this section. Lower sensitivity habitats will be present and this section should be updated to consider the questions in relation to the footprint of the activity.

4.3 The on-line sources of information used, Magic and the WFD summary information table, are incomplete for this waterbody. The applicant may use their own survey data to show the presence of lower sensitivity soft sediment subtidal and intertidal habitats.

4.4 As online habitat information is incomplete for the rest of this WFD waterbody, we recommend the applicant considers if the footprint of their activity is 1% or more of the subtidal area or the intertidal area. We estimate the subtidal area of the waterbody is approximately 420 ha. The applicant should provide details in this section of the predicted size of footprint during construction as well as the footprint of the piers.

4.5 Section 17.4.5 – While Lake Lothing is in name a lake it is not suitable to classify it as such. The document later states that it is completely tidal, however while fluvial input is restricted by the lock structure the waterbody should be classified as an estuary, or at the least transitional.

4.6 Section 17.4.28 – the section on Geomorphology is very sparse and does not contain the sort of information that we should expect. While the hydromorphological regime has been discussed in other sections of the report this section should contain information on the following as an environmental baseline: Tidal prism of the waterbody, Sediment budget and particle size i.e. D50 and classification (clays or silts), Tidal range (micro, meso or macrotidal), Tidal symmetry (or asymmetry), Extent of intertidal area at MLWS, Channel Length, Classification of the waterbody, Fluvial inputs (m3s).

4.7 Section 17.5.4 -The waterbody is frequently referred to as a river, this is geomorphologically incorrect. Similar with regards to stream beds, unless referring to the fluvial tributaries, which are unlikely to have gravel beds used for spawning in a tidal system dominated by fine sediment. Possible impacts from an increase in fine sediment are likely to affect shellfish populations were they present.

4.8 Section 17.5.30 – While modelling has been completed which has deemed the chances of erosion to be minimal, monitoring should be undertaken to ensure that scour is minimal.

4.9 Section 4 - WFD protected areas - can the applicant also confirm that they have considered if there is a risk from the activity to the bathing water at Lowestoft (Lowestoft North of Claremont Pier Bathing Water)?

4.10 We welcome the statement that the applicant will consider mitigation measures for fish during construction and measures that could improve the waterbody.

4.11 The risk to groundwater in the deep principal aquifer Crag has been deemed low in part due to the assumption of hydraulic continuity between layered granular deposits. However, an assessment of groundwater heads data is required to confirm this assumption i.e. by determining the vertical gradient between aquifer layers

4.12 We are pleased to note that the bored piling method has been selected for the piling works in order to reduce the risk of creating preferential pathways for contamination; the installation of temporary or permanent casing should also reduce the risks, as will the maintenance of a hydrostatic head with bentonite and filling from the base up with cement appropriate for the situation; cement suitable for saline water may be required.

4.13 An assessment of the salinity of groundwater at the northern and southern sites should also be provided; if it is not saline, further assessment will needed to determine how the piling will be undertaken within Lake Lothing itself without introducing saline water into the underlying aquifers.

4.14 Section 17.6.19 states that the impact of piling on groundwater flow will be negligible given the proposed piling size and density. Whilst Appendix 12A (Interim Piling Works Risk Assessment) provides details of potential number of piles per bridge support and pile depth, further information will be needed on the design and density in order to confirm the likely negligible impacts on local groundwater flow.

4.15 We are pleased to note that road drainage will be passed through settlement ponds prior to discharge and that flow control devices, penstock valves and oil separators will be employed to ensure sufficient treatment and or/isolation of pollution; clearly the ponds and oil separators must have the capacity to deal with the largest storm event for this proposal to be sufficient. There also needs to be agreed provision for ongoing maintenance of the drainage schemes. Whilst section 17.6.19 states that no drainage effluent will be discharged to groundwater section 17.1.3 suggests that discharges may be made to ground. The Environment Agency would wish to review any proposals to discharge to ground and a full risk assessment would be required.

4.16 Section 17.5.30 – While modelling has been completed which has deemed the chances of erosion to be minimal, monitoring should be undertaken to ensure that scour is minimal.

RECORD OF TELEPHONE CONVERSATION

23rd November 2018

BARBARA MOSS-TAYLOR (ENVIRONMENT AGENCY) AND JULIA HUNT (WSP)

B M-T: involved in a teleconference with Michael Wilks (Suffolk County Council PM) on the Statement of Common Ground with the Environment Agency (EA) for the Lake Lothing Third Crossing.

The outstanding matters for the Flood Risk Assessment (FRA) concern whether the bridge should be closed during a flood event and the flood evacuation plan.

B M-T explained that the FRA doesn't have to state that the bridge has to be closed during flood events, rather the FRA should assess the risk during flooding and come to a conclusion about whether there is a need to close the bridge during flood events.

It may also not be necessary to have a flood evacuation plan but the FRA must outline the flood risk and make a recommendation about whether a Scheme specific evacuation plan is required.

If the EA are happy that a matter has been properly considered, they would then leave the matter to the local authority who are responsible for emergency planning in Lowestoft.

Suffolk do not currently have an emergency plan in place for the A47 bridge, therefore there may not need to be one for the Scheme.