A14 Cambridge to Huntingdon Improvement Scheme Development Consent Order Application

Representation by the Environment Agency

Deadline 13 – 30th October 2015

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Deadline 13: Environment Agency

Further Information requested by the Examining Authorities

The provision of the following information was requested at the Issue Specific Hearing on 21st October 2015. We have been requested to provide;

- Clarification as to our views of the appropriateness of the modelling undertaken,
- The effects of the A14 proposal on flood risk and drainage; and
- Details for further consideration by the ExA.

1 Introduction

1.1 It is our opinion that the submission of evidence in relation to hydrological and Flood Risk Assessment (FRA) issues should be required prior to the application for any Development Consent Order (DCO). This is in accordance within the National Policy Statement for National Networks, section 5.96 (December 2014).

1.2 You will be aware that this has not occurred within this DCO application and that there have been continual exchanges of information and updates to the submission documents throughout the examination phase up to and including 28th October. The provision of large volumes of hydrological modelling and associated FRA data is not conducive to allowing us time to fully assess it and inform you accordingly. We have therefore been unable to bring to your awareness any site specific issues during the course of the examination

1.3 Within the examination period, we have also been approached by representatives of the applicant wishing to discuss the 'detailed design' phase for the scheme. Due to our resources being committed to this 'first phase' of the design, we have had to restrict any liaison to a minimum.

1.4 We recognise the importance of the A14 as a nationally important strategic road network and also our statutory role in advising on environmental impacts of DCO proposals. We have therefore made every conceivable effort to utilise this submission in order to provide you with an appropriate update, despite serious misgivings as to the timeliness of the provision of information.

1.5 There is a risk that in future, our resources may not be able to facilitate such a reactionary response to the receipt of information. We have been fortunate to do so in this instance in order to provide you with the details that follow within this submission. We have had to utilise staff from other areas and asked them to stop planned, high priority work in order to assess data when submitted. This has often been out of sync with the agreed programme for submission drawn up earlier in the year. This activity should be considered the exception as opposed to the rule, particularly with regards to the complexity and extent of strategic transport networks.

1.6 **We therefore strongly recommend that this practice be discouraged on other DCO applications in order to enable a holistic, inclusive appraisal of the scheme and a transparent investigation into potential flood risk impacts.**

2 Clarification of EA DL13 submission

2.1 This section explains the parameters within which our subsequent comments are made. **All comments within this response are in reference to documents that we received by 12 Noon on Wednesday 28th October.**

2.2 As referred to in section 1.2 of this response (above), we have been in correspondence with the applicant's representatives in relation to the demonstration and assessment of flood risk along the length of the proposed A14 route improvements. There are a total of 10 significant watercourse catchments along the proposed route which you'll be aware of from previous submissions. These are entitled as follows;

- **Alconbury & Ellington Brooks**
- **Cock Brook**
- **Brampton Brook**
- **River Great Ouse**
- **West Brook**
- **Covells & Oxholme Drains**
- **Uttons Drove Drain**
- **Longstanton Brook**
- **Oakington Brook**
- **Beck Brook**

2.3 Each of these watercourses have been subject to specific modelling by the applicant and have individual sections within the holistic FRA, the update of which is to be submitted by the applicant. Our comments within sections 4 to 13 of this response refer specifically to the FRA for each watercourse.

2.4 Where we consider each of these FRAs to be acceptable, we require that as the scheme moves forward into detailed design stage, there are no increases to the flood levels as out within the approved FRAs. Dimensions of crossings have been set out in the individual FRAs, assessed and approved. Any deviation from these dimensions may result in a delay to the approval process that is required as set out within our Protected Provisions within the DCO. Any changes from the approved FRA will require evidence to be provided to demonstrate that there are no increases in flood levels from those set out in the approved FRAs.

2.5 We are aware that this has created an element of risk in relation to the creation of an audit trail to record the different versions of specific elements (model data or its supporting files or the individual FRAs for specific watercourses). We are therefore acting on faith that the updated Flood Risk Assessment that is to be submitted on the same date as this response (Deadline 13) incorporates updated information that we have reviewed and assessed. We therefore offer to check the final information submitted on Deadline 13 (30th October) and provide comment on Deadline 14 (6th November) to clarify that this information collates which that which we have assessed.

2.6 To secure actions specified within the FRA we have agreed an additional requirement with the applicant which was relayed by their counsel at the DCO Hearing on 22nd October. The wording of the requirement that we had agreed with the applicant was as follows;

> *Flood risk assessment*
> *"The authorised development must be carried out in accordance with the Flood Risk Assessment including the mitigation measures detailed in it so that no part of the authorised development is predicted to result in any exceedance of the flood levels shown in the Flood Risk Assessment."*

We understand that this would define the FRA as the Deadline 13 version to be submitted and also provide for it to be one of the certified documents covered by Article 41.

2.7 Where another drainage authority has a remit over a watercourse, they must be consulted with regards to any changes to the said watercourse. Our approval of the FRA(s) does not supersede any consent required by any relevant drainage authorities.

2.8 The finalised, holistic FRA should have a unique reference number for any future referral post DCO determination.

2.9 The finalised, holistic FRA should have a unique reference number for any future referral post DCO determination.

3 Code of Construction Practice

3.1 We received updates to the code of construction practice (CoCP) on 26th October 2015. We note that within the updated version HE/A14/EX/124 (CoCP with mark-up) there were some additions within section 14 (Road Drainage and the Water Environment) to which we do not agree.

Under section 14.1.1 there are revisions which we do not consider to be appropriate.

3.2 Bullet point 9 has been amended to refer to a maintenance access of "*6 metres from the top of the bank of main rivers*". We do not agree to this amendment. The byelaw distance appropriate to the location of the proposed scheme is for 9 metres (from the top or toe of the bank of a Main River). Due to this issue being addressed through our protective provisions we did not specify that this distance had to be required within the CoCP. The inclusion of this statement in the CoCP could be in conflict with our interests which the protective provisions are designed to protect. We therefore suggest that it be removed.

3.3 Bullet point 10 refers to temporary soil storage within the floodplain. This is contradictory to our advice that we've provided throughout our liaison with the applicant in relation to this scheme. We have sought assurance from the applicant, through discussions on the individual FRA elements, to ensure that no soil storage areas will be located within the floodplain. We are anticipant that this is to be reflected in the finalised, holistic FRA (to be submitted at Deadline 13). The details within this FRA will be secure via the requirement as detailed in section 2.6, above.

Individual FRA elements

The points made under each watercourse assessment, below, are expressed via specific questions and are summarised in Table 1 at the end of this submission (pages 13 and 14).

4 Alconbury & Ellington Brooks

4.1 What is our view of the appropriate application of the model at this location?

This is an "ISIS TUFLOW" (*a form of computer software*) model based on an earlier Environment Agency (EA) "Alconbury" model. This has added extra detail to model schematisation *incorporating* the Ellington flood relief channel. Standard sensitivity analysis *(an assessment of the implications of any inaccuracies within the model)* has been carried out which has demonstrated that the model is not sensitive to increase/decrease in flows or channel roughness which increases our confidence in the modelling.

The review of this model has, after a minor clarification, been deemed acceptable.

4.2 What are the effects of the A14 proposal?

The Ellington model and FRA shows two areas of open land where peak water levels are expected to rise by up to a maximum of approximately 0.84m during a 1 in 100 and 1 in 25 year flood event.

The Alconbury Brook model and FRA shows no increase in flood levels as a result of the scheme.

4.3 What are the key issues for consideration by the ExA?

The two areas of land where water levels are predicted to increase are in private ownership and Highways England is seeking agreement with affected landowners and the Internal Drainage Board.

We are unclear as to whether the latest predicted increases in flood levels have been communicated to the affected landowners. The submitted landowner report dated June 2015, entitled 'Summary of Changes to Flood Risk on Ellington Brook' states that the maximum increase in flood levels is only 0.31m.

5 Cock Brook

5.1 What is our view of the appropriate application of the model at this location?

This is an "ISIS TUFLOW" model based on the EA Alconbury model, which was truncated (*isolated to an appropriate area of interest, upstream and downstream of the A14 route)*. The Cock Brook model incorporated new survey data. Standard sensitivity analysis has been carried out which has demonstrated that the model is sensitive to both change in flows and roughness in some locations with a potential increase to peak water levels of 0.13m (as a result of an increase in flows) and 0.1m (for an increase in roughness within the channel).

There is only one minor issue with this model which is a slight difference in the flow through the A1 culvert. The difference occurs between that given within the hydrology report and that within the baseline model. This is unlikely to result in any significant impacts and we have sought clarification from the applicant. Subject to clarification of this minor issue, the model will be deemed acceptable.

5.2 What are the effects of the A14 proposal?

The model and FRA show increases in flood levels on open land up to 0.5m in a 1 in 100 year flood event. However these areas are to be permanently acquired by the applicant and do not affect property so we have no further concerns.

5.3 What are the key concerns for the EA for consideration by the ExA?

We have no areas of concern.

6 Brampton Brook (incorporating the Grafham Road Drain)

6.1 What is our view of the appropriate application of the model at this location?

This is an "ISIS TUFLOW" model based on an earlier EA model. This was updated to ensure the right level of detail was achieved. Updates included new survey data *for ground levels* and reduced grid cell size *(in essence, this comprises of a more focussed model, increasing the scale that is being used to obtain more definitive and accurate results)*. Standard sensitivity analysis has been carried out and has demonstrated that the model is more sensitive to the inflow information used within the model. After concerns were raised regarding how the sensitivity test was carried out for the downstream boundary, Jacobs undertook an extra sensitivity run which resulted in the potential for a small increase of 2mm on the predicted 1 in 100 year level.

The review of this model has, after clarification and the extra sensitivity run, been deemed acceptable.

6.2 What are the effects of the A14 proposal?

The Brampton Brook and Grafham Road Drain models and FRAs indicate that there will be a reduction in levels during the 1 in 100 year flood event. The FRAs state that with the scheme there are no increases in flood levels and no increases in flood risk to properties in Brampton Village.

6.3 What are the key concerns for the EA for consideration by the ExA?

We have no areas of concern.

7 River Great Ouse

7.1 What is our view of the appropriate application of the model at this location?

This is an "ISIS TUFLOW" model based on the EA "Lower Ouse downstream" model and has been truncated to the location of the proposed A14 route. Standard sensitivity analysis was carried out as well as sensitivity on the grid cell size. The sensitivity analysis has shown the model to be more sensitive to an increase/decrease in flow with an average water level increase of 0.12m and decrease of -0.15m.

The original model that was submitted incorporated a constriction in flow to represent the piers for the crossing. It was agreed that there needed to be an extra sensitivity scenario run to allow for consideration of the piers being askew (i.e. not in parallel alignment) to the flow of flood water. The applicant provided the extra results which demonstrated no more than a 2mm additional increase in water levels at Buckden Marina.

The review of this model has, after clarification and the extra sensitivity run, been deemed acceptable.

7.2 What are the effects of the A14 proposal?

The model and FRA indicate that there will be an increase in in-channel water levels up to 0.1m during the 1 in 100 year flood event approximately 200m upstream of the crossing.

A maximum increase in flood level of 0.02m is predicted within an area of open farmland. The model and FRA also predict an increase in flood levels further upstream at Buckden Marina of up to 6mm during a 1 in 100 year flood event, including an allowance for climate change.

7.3 What are the key concerns for the EA for consideration by the ExA?

We understand that discussions have taken place with the affected landowners regarding the increase in flood level up to 0.02m.

Although there is a slight increase in flood levels at Buckden Marina, the affected properties have been built with high finished floor levels and table 10.5 within the FRA demonstrates that floor levels are set at least 600mm above the predicted 1 in 100 year flood level including an allowance for climate change. This indicates that there will be no increase in flood risk to these properties.

However, access and egress routes at Buckden Marina may be affected by the increase in flood levels predicted in this area. Sensitively testing of changes to the piers for the viaduct show that flood levels in this area could be increased by a further 2mm. Therefore, it must be ensured that the viaduct crossing is designed so that there is no increase in flood levels beyond 6mm for the 1 in 100 year flood event, including an allowance for climate change, as the scheme moves into detailed design stage.

As the examining authority we believe that you are required to determine as to the acceptability of this flood risk. There is a contrast between current policy and HE guidance. The "National Policy Statement for National Networks" (December 2014) states that there should be no increase in flood risk from a scheme (section 5.96) whereas the applicant's "Design Manual for Roads and Bridges" (DMRB – Volume 11 Section 3, Part 10) categorises an increase in flood risk of up to 10mm as 'minor adverse'.

8 West Brook

8.1 What is our view of the appropriate application of the model at this location?

This is an "ISIS TUFLOW" model based upon the EA Lower Ouse downstream model. This model was truncated to only represent the West Brook, further detail was then incorporated from the Atkins 2009 model to represent the Huntingdon Award Drain and Hilton Drain. Standard sensitivity analysis was carried out which showed the model to be sensitive to a decrease in flows at the scheme on West Brook, to changes of flows and roughness on Hilton Drain and that on Huntingdon Award Drain less sensitive to all changes.

Concerns were raised regarding how some on the inflows were applied to the model on Huntingdon Award Drain. We requested that the applicant consider testing an alternative hydrological inflow. This change resulted in out-of-bank flooding in the baseline scenario from an undersized culvert which had not been shown previously. For the design run the crossing was altered from a culvert to a bridge which has removed the out-of-bank flooding.

The review of this model has, after clarifications and the revised inflow hydrology schematisation, been deemed acceptable.

8.2 What are the effects of the A14 proposal?
The model and FRA indicate that there will be a reduction of in-channel levels for the 1 in 100 year flood event both upstream and downstream of the scheme. In between the two Borrow Pits on the downstream side of the A14 there is an increase in flood levels up to 0.35m. This increase is within open land and is to be permanently acquired by HE with no property affected.

8.3 What are the key concerns for the EA for consideration by the ExA?
We have no areas of concern.

9 Covells & Oxholme Drains

9.1 What is our view of the appropriate application of the model at this location?
This is a "Flood Modeller TUFLOW" model based on two Atkins "ISIS" models from 2009. The applicant has taken the model for Oxholme Drain and Covells Drain and combined them into one for the purposes of this modelling work. After these models were combined, extra detail was added to revise how some of the culverts were represented and a 2D domain *(a detailed representation of the floodplain)* was created. Standard sensitivity analysis was carried out which showed the model to be sensitive to a decrease in flows at the scheme on Oxholme Drain and sensitive to both changes in flow and roughness on Covells Drain.

The review of this model has, after clarifications, been deemed acceptable.

9.2 What are the effects of the A14 proposal?
The model and revised FRA (dated October 2015) shows a reduction in water levels both upstream and downstream of the new crossings.

9.3 What are the key concerns for the EA for consideration by the ExA?
We have no areas of concern.

10 Uttons Drove

10.1 What is our view of the appropriate application of the model at this location?
This is a "Flood Modeller" model based on the Atkins "ISIS 2009" model. Some culverts within the Atkins model were found to be incorrectly sized. This has been updated with some cross sections also being extended to ensure that the model represents the floodplain correctly. Standard sensitivity analysis has been carried out which has demonstrated that the model is not sensitive to increase/decrease in flows or channel roughness which increases our confidence in the modelling.

The review of this model has, after a minor clarification, been deemed acceptable.

10.2 What are the effects of the A14 proposal?

The model and revised FRA dated October 2015 indicate the following changes:

- A localised increase in in-channel water levels for a 36m length of Utton's Drove Drain upstream and downstream of the new A14.
- A localised area where there is a change in the 1 in 100 year flood extent, including an allowance for climate change, upstream of the new A14. A maximum increase in flood level of 0.07m is predicted in this area during the 1 in 100 year flood event, including an allowance for climate change.

10.3 What are the key concerns for the EA for consideration by the ExA?

We have no concerns as all the locations where water levels are predicted to increase are within land to be permanently acquired by the scheme.

11 Longstanton

11.1 What is our view of the appropriate application of the model at this location?

This is a "Flood Modeller" model which the applicant created in August 2015. Standard sensitivity analysis has been carried out which has demonstrated that the model is sensitive to changes in flows at the scheme location with potential for an additional 0.12m on predicted water levels.

There have been no concerns raised over this model and it is deemed acceptable.

11.2 What are the effects of the A14 proposal?

The scheme results in a negligible reduction in flood levels during the 1 in 100 year flood event. During the 1 in 100 year flood event there is no out of bank flooding within the scheme extent. The FRA is deemed acceptable.

11.3 What are the key concerns for the EA for consideration by the ExA?

We have no concerns.

12 Oakington

12.1 What is our view of the appropriate application of the model at this location?

This is an "ISIS TUFLOW" model based on the EA "Girton 2013" model. More detailed has been added to the model. From a modelling perspective our review has not raised any major concerns about the methodology applied. However, we have sought clarification on a few minor points. Standard sensitivity analysis was carried out with demonstrated the model to be relatively sensitive to an increase in flows throughout the model.

Subject to clarification of this minor issue, the model will be deemed acceptable.

12.2 What are the effects of the A14 proposal?

The FRA states that the extension of the existing A14 crossing over the Oakington Brook will result in a slight reduction in peak water levels just upstream and downstream. However the modelling has shown that further downstream the scheme results in a rise of up to 3mm on the 1 in 100 year flood event within the village of Oakington. The village is very sensitive to flooding and has suffered from numerous flood events over the years with internal property flooding.

12.3 What are the key concerns for the EA for consideration by the ExA?

Due to the scheme there is a rise of up to 3mm on the 1 in 100 year flood event further downstream within the village of Oakington in an area prone to property flooding. In line with NPS, we would like the scheme to result in no increase in flood risk to property. We need to raise this as an area of concern as this is the only area where the scheme results in an increase to property flooding up to a 1 in 100 year flood event.

As with section 7.3 of this response, we are of the opinion that you are required to determine as to the acceptability of this flood risk considering the contrast between current policy and HE guidance.

12.4 Flood Risk in Oakington

There are significant sensitivities for this community as a result of historic flood events. Property flooding has occurred even following the installation of Property Level Protection. The recent flood events, including the flooding that happened in the summer of 2014 is still in the minds of the local community.

We, the EA, cannot justify any further Grant in Aid funding to help the community due to the results of cost / benefit analysis.

If the A14 will increase in flood risk to properties in Oakington, even if deemed to a negligible extent, then is there any opportunity within the DCO to specify the need for some kind of compensation, agreement or means of investigating future betterment with the Oakington community, given their current risks from flooding.

13 Beck Brook

13.1 What is our view of the appropriate application of the model at this location?

This is a "Flood Modeller TUFLOW" model based upon the EA "Girton model 2013". A new section of 1D channel has been included within this model to add the required detail for the FRA. Standard sensitivity analysis has been carried out which has demonstrated that the model is sensitive to changes in flows with potential for an additional 0.18m of water levels in some locations.

We have raised concerns with regard to the location of the downstream boundary. The boundary is too close to the area of interest (the A14 proposal) being upstream of the village of Oakington. This reduces confidence in the results presented especially when coupled with the sensitivity test.

The review of this model, as it is currently, has been deemed unacceptable.

13.2 What are the effects of the A14 proposal?

The FRA shows an increase in flood level on the upstream side of the A14 Access Road with an increase in flood levels for the 1 in 100 year flood event ranging from 1mm to 0.5m over an area of open land. As the affected land is to remain with the applicant's ownership we have no concerns with this. There are some slight increases in flood levels on the downstream side for the 1 in 100 year flood event of less than 10mm and this is deemed to be within open land. However, there is very little detail on this as the downstream extent is very short so we are unable to determine what the effects, if any, would be further downstream.

13.3 What are the key concerns for the EA for consideration by the ExA?

On the upstream side the increases in flood levels will be on land permanently acquired by HE. However, the model does not extent sufficiently downstream to demonstrate there are no flood risk impacts further downstream.

END

Table 1: A14 Improvements – Modelling and FRA checklist

The following are details of the Hydrological Models and additional submissions relating to the A14 improvement scheme and associated DCO.

Model	Model Submission Rev.1	EA Response date to Rev.1	Model Resubmission Rev.2	EA Response date to Rev.2	EA Position on Model	FRA Submission Rev.1	EA Response date to Rev.1	FRA Review Submission Rev.2	EA Response date to Rev.2	EA position on FRA and Model submitted
Alconbury & Ellington	20/08/2015	23/09/2015	Yes	Satisfactory		16/06/15	28/07/15	2/10/15	Ready to reply now Model comments dealt with.	The model is acceptable. The FRA is acceptable subject to landowner report dated June 2015 being updated to reflect increase in predicted maximum flood level in relation to Ellington Brook (please refer so section 4.3, above).
Cock Brook	Existing – 13/10/2015					16/10/15	Ongoing			We have minor queries in relation to the Model as described within the above text (section 5.1, above). However, there are no significant concerns arising from the information provided.
	Design – 16/10/2015		Not yet – EA to reply to applicant	Full model received on 16/10/15 unable to review before 21/10/15 Hearing – Satisfactory subject to minor amendments.						
Brampton Brook	07/10/2015	Reviewed 16/10/2015 .	Yes	Satisfactory		14/10/15	Ongoing			The model and FRA are considered acceptable and identify no further areas of concern.
R. Great Ouse	11/08/2015	28/09/2015	Yes	Satisfactory		17/08/15	28/09/15	14/10/15	Ongoing	FRA = There are some issues for consideration of the Examining Authority – see section 7.3, above.
West Brook	27/07/2015	11/09/2015	Yes	Satisfactory		17/08/15	11/09/15	14/10/15	Ongoing	The model and FRA are considered acceptable and identify no further areas of concern.
Covells & Oxholme	17/08/2015	Model reviewed but no formal response as applicant informed us they needed to amend the models, resubmitted 7th Oct				30/9/15		14/10/15	ongoing	The model and FRA are considered acceptable and identify no further areas of concern.
	07/10/2015	EA reviewed. Formal response regarding minor issues sent 20/10/2015.	Yes	Satisfactory						

Model	Model Submission Rev.1	EA Response date to Rev.1	Model Resubmission Rev.2	EA Response date to Rev.2	EA Position on Model	FRA Submission Rev.1	EA Response date to Rev.1	FRA Review Submission Rev.2	EA Response date to Rev.2	EA position on FRA and Model submitted
Uttons Drove	Model files - 04/09/2015	23/09/2015		Waiting on response from Jacobs on our comments on their first submission		30/9/15		14/10/15	ongoing	
	Hydrology report – 09/10/2015	Reviewed by Hydrology team	Yes	Hydrology should be updated from 2009 to more recent hydrology including any recent events However, this has been deemed satisfactory for this purpose.						The model and FRA are considered acceptable and identify no further areas of concern.
Longstanton	22/10/2015	Reviewed and no issues found.	Not Required	Satisfactory		30/9/15	Need to send formal response – acceptable.			The model and FRA are acceptable subject to revision to relevant drawing in Annex N – We will send a detailed, formal response to the applicant.
Oakington	16/10/15		Not yet – EA to reply to applicant	Received on 16/10/2015 unable to review before Hearing on 21/10. – Satisfactory subject to minor amendments.		17/10/15	Ongoing			The FRA has identified issues for consideration of the Examining Authority – see section 12.3 and 12.4, above. We have minor queries in relation to the Model as described within the above text (See section 12.1, above)
Beck Brook	Existing 09/10/2015					14/10/15	Response parked until model issues overcome.			Model concerns remain. The downstream boundary is only 300m from the site of interest. The downstream boundary may be having an influence at the site and may need to be reconsidered.
	Design 14/10/2015	Reviewed 20/10/15	Yes	Concerns which need to be overcome with model.						

***Draft Lower Ouse model was supplied to Jacob's April / May 2014. Final Lower Ouse model supplied 27 May 2015

KEY	
	Model and FRA considered acceptable. No significant issues to inform the ExA.
	Outstanding issues for consideration by the ExA