# METHOD STATEMENT REVIEW

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| JBA Project Code | 2022s0454 |
| Contract | |
| Client | |
| Day, Date and Time | |
| Author | Kevin Haseldine |
| Subject | Helios Solar Farm FRA methodology review |

## 1 Introduction

### 1.1 Summary

JBA Consulting was commissioned by the Environment Agency in Spring 2023 to comment on the suitability of a modelling methodology for a Flood Risk Assessment (FRA) associated with a proposed solar farm near Selby in East Yorkshire. The methodology was developed by Aegaea on behalf on Enso Energy.

The Helios Renewable Energy Project seeks to construct, operate, maintain, and eventually decommission a solar farm. The solar farm footprint covers approximately 760 hectares of land close to the villages of Camblesforth and Hirst Courtney, located between the River Ouse to the north and River Aire to the south. Figure 1, showing the site location, is taken from the provided documentation.

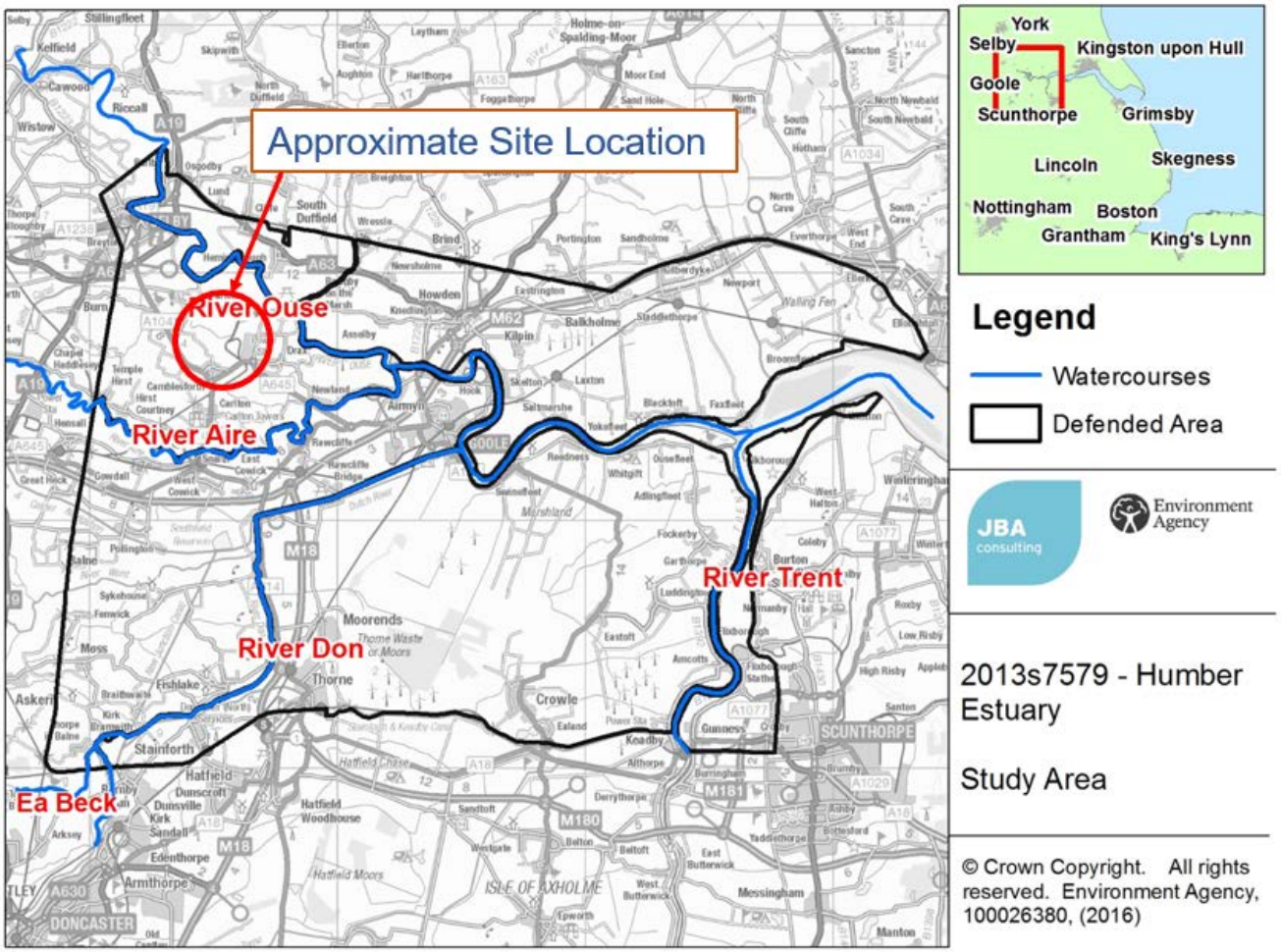


**Figure 1: Site location**

## 1.2 Data

The following files were provided:

- **EN010140-000007-EN010140 - Scoping Report.pdf**

  Environmental Impact Assessment Scoping Report describing proposed methodologies for completing development assessments for cultural heritage, landscape, biodiversity, water, transport and access, noise, climate change, socioeconomics and soil / agricultural.

- **Helios Renewable Energy Project Flood Model Scoping Document.pdf**

  Summary of existing hydraulic models for the development area and discussion of proposed approach to inform development plans.

# 2 Methodology review

## 2.1 Nature of study area

The provided reports describe how the development site lies within an area benefitting from a system of flood defences, with raised embankments and walls running adjacent to the rivers Ouse and Aire. These features protect the low-lying floodplains between each river from fluvial, tidal, or combined flooding. Many of the floodplains within the Humber Estuary area are below in-channel water levels, with the course of each river dictated by the position of the defence network. The flood defences are actively maintained by the Environment Agency given the vital function they perform. If the defences were not present, the low-lying floodplains would be uninhabitable.

The proposed methodology acknowledges this, stating that "given the nature of the development and the relative likelihood of such [undefended] scenarios during the lifetime of the development, it would not be proposed to use undefended scenarios as part of the modelling framework". This is appropriate as it is exceptionally unlikely that all flood defences along the subject rivers would fail simultaneously.

## 2.2 Use of existing models

The methodology describes how two existing hydraulic models will be used to inform FRA modelling; the Upper Humber (2016) model and the Lower Aire (2017). These models represented the defended scenario with all flood defence networks in place, offering a more realistic prediction of flood risk to the site of interest than undefended scenarios (although undefended scenarios were also included).

Both models are detailed and include good representation of the site of interest and may be suitable for use. However, the methodology fails to acknowledge the existence of the Humber 2100+ Extreme Water Levels[1] (HEWL) project. This was completed in 2020 by the Environment Agency and saw major revisions undertaken to the joint probability analysis (i.e., assessment of the likelihood of concurrent fluvial / tidal or fluvial / fluvial events), applying new boundary conditions to an estuary-wide 1D model. A summary HEWL report includes a map showing which models / datasets offer the best representation of extreme water levels for different areas with the Humber Estuary. This is shown below in Figure 2; the proposed solar farm site lies within a reach where HEWL results should be used.

The FRA project should make use of the HEWL project. Whilst the Upper Humber and Lower Aire model are likely to include more detail in terms of local topography compared to the HEWL 1D only model, the HEWL supersedes the boundary conditions of these older models. It is recommended that Aegaea revisit the modelling methodology with the HEWL included. The update should consider the relevant merits of each of the three models / projects and identify how each can be used to offer the best representation of flood risk at the site.

[1] Environment Agency, 2020. Humber 2100+ Extreme Water Levels. Prepared by Jacobs.

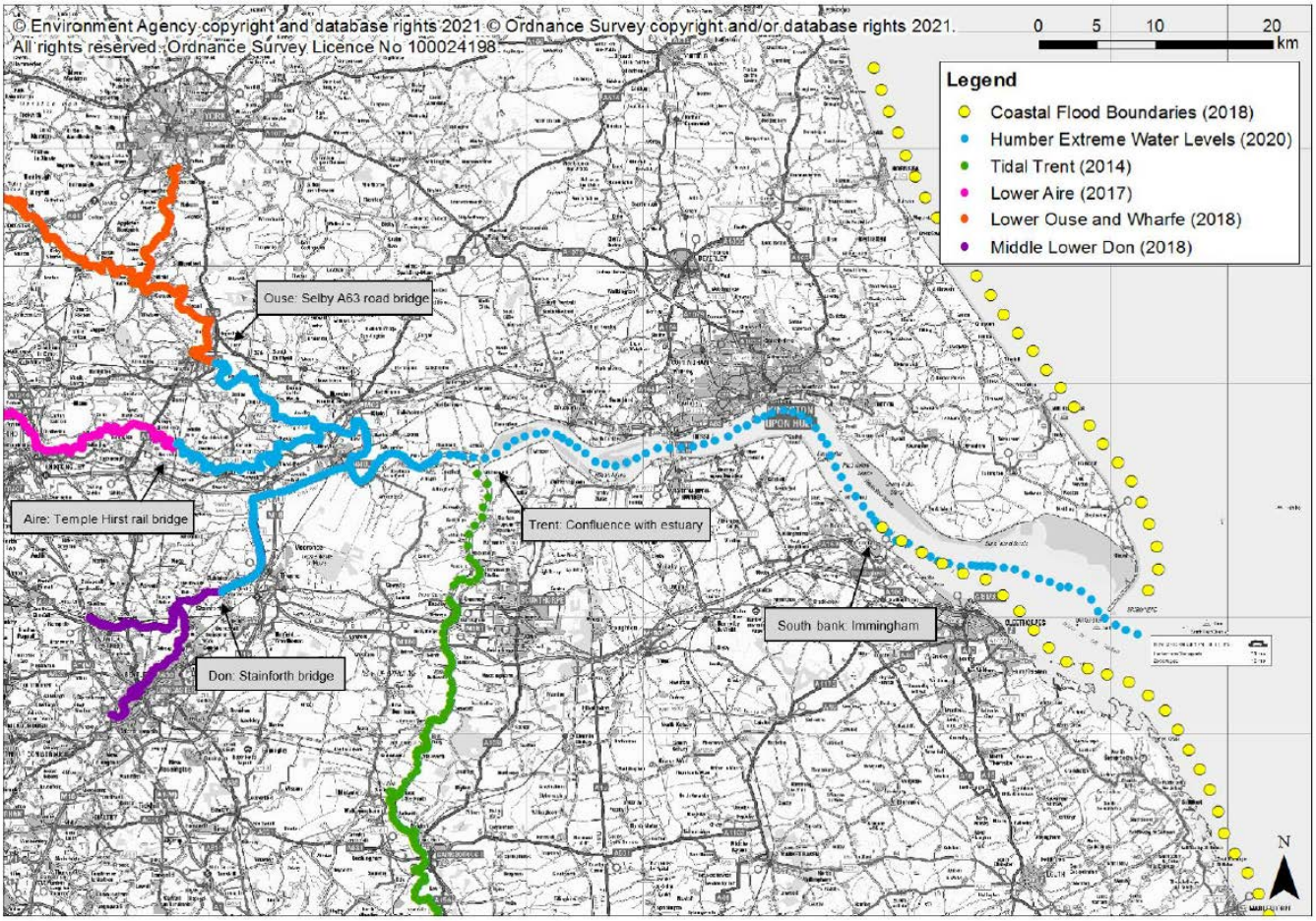


**Figure 2: Datasets used to define the water level profile on the Humber estuary and its tidal tributaries**

## 2.3 Flood risk at the site

As stated above, there is no benefit in re-assessing undefended flood risk.

If no ground modifications are proposed within the current defended / breach flood extents, and the flooded area contains no staffed facilities, it may be suitable to simply design solar panels to be resistant to floodwaters. If this is the case, existing model results should used to justify the lack of new modelling requirement.

However, the existing methodology does describe loss of floodplain storage associated with supporting pillars, local land raising and placement of new culverts. Given the resolution of existing models, it will not be possible to represent each solar panel pillar within any new modelling. The existing methodology describes how volumetric displacement analysis will be used to assess the impact of pillars. This, dependent on the exact methods used, seems broadly appropriate.

Some defended or breach modelling may be required dependant on the location of ground modification and new culverts. If the area is impacted by flooding, it is expected Aegaea would undertake new model simulations and use these results to inform development plans. The following approaches should be considered:

- Confirm which model will be used to inform new model geometry (Upper Humber, Lower Aire or HEWL).
- Update of boundary conditions using HEWL results. Consider joint probability requirements (i.e., is the critical flood risk at the site of interest driven by extreme fluvial flows on the Ouse, extreme fluvial flows on the Aire, extreme tidal levels, or a combination of each?).
- Re-runs of defended scenarios using new boundaries to revise baseline risk.
- Use of new breach scenarios using new boundaries to revise baseline risk.
- Modelling of development changes for defended and breach scenarios.

Of the above, the current methodology fails to discuss either the HEWL or breach scenarios.

## 3 Conclusions

It is not possible at present to definitively state the required tasks for the Helios solar farm FRA. However, it is essential the proposed approaches are re-visited considering results from the 2020 HEWL project. It is recommended the modelling methodology is re-written based on a review of the HEWL outputs and an assessment of development plans against existing defended and breach model results.