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Beacon Fen Energy Park

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1. Introduction

1.1 Summary

- 1.1.1 This Technical Note has been prepared in response to the post-acceptance Section 51 advice provided by PINS and provides confirmation on the climate change allowances used in the Flood Risk Assessment (FRA), and a review and comparison of the latest (2025) flood mapping and data against that used in the FRA to confirm that the findings of the FRA remain valid.
- 1.1.2 The Flood Risk Assessment drainage strategy was based on the UKCP18 climate change allowance for rainfall intensity in the Witham Management Catchment. The fluvial flood modelling was based on the UKCP18 climate change allowance for peak river flows in the Witham Management Catchment.
- 1.1.3 The revised National Flood Risk Assessment (NaFRA2) data was made available in January and March 2025. This provided an update to the 'Flood Map for Planning' and the 'Long Term Flood Risk' data, with revised mapping made available online. **Appendix 11.1 Flood Risk Assessment (Document Ref: 6.3 ES Vol.2, 6.3.81)** (herein referred to as "the FRA") was prepared prior to publication of the 2025 data and mapping.
- 1.1.4 The NaFRA mapping shows that the extent of land at risk from surface water flooding and the depth of this flooding would be higher than shown on the previous mapping.
- 1.1.5 The FRA proposes two methods to mitigate against flooding and ensure the development will remain fully operational: raising solar panel heights and raising ground levels (with compensation provided elsewhere within the Site). Whilst the depth and extent of surface water flooding increases in some areas of the Proposed Development, the overall mechanism of the flooding does not change and, therefore, no further methods of mitigation are required. It is considered, therefore, that the findings of the FRA remain valid.

2. Climate Change Allowances

2.1 Fluvial Modelling

- 2.1.1 Bespoke fluvial flood modelling was undertaken as part of the FRA. This modelled fluvial flood extents and depths in the present-day and future scenarios. The future scenarios are based on the Higher peak river flow allowance for the 2080s epoch within the Witham Management Catchment (32% allowance). This is taken from the DEFRA website for Climate Change Allowances and is based on UKCP18 climate change allowances.
- 2.1.2 The proposed surface water drainage strategies for the Solar Array Area, Cable Route Corridor and Bespoke Access Corridor are based on the Upper End peak rainfall allowance for the 3.3% and 1% annual exceedance rainfall events for the 2070s epoch within the Witham Management Catchment (allowances of 35% and 40% respectively). This is also taken from the DEFRA

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website for Climate Change Allowances and is based on UKCP18 climate change allowances.

Fluvial Flood Risk (Flood Map For Planning)

3.1 Fluvial Flooding Extents

- 3.1.1 Section 5.3 of the FRA ('Fluvial Flooding') assesses the risk of fluvial flooding to the Solar Array Area, Cable Route Corridor and Bespoke Access Corridor. This is based on bespoke fluvial flood modelling undertaken by Aegaea Ltd for the Site. The model is a 1D-2D linked model based on LiDAR elevation data, land use, visual surveys, surveyed ditch and watercourse bed levels, and the location of flood defences and pumping stations.
- 3.1.2 Formal acceptance of the fluvial model and its results is awaited from the Environment Agency, however, it is considered that the bespoke 1D-2D model providing flood extents outside of the bunded watercourses provides a more accurate representation of fluvial flood risk at, and in the vicinity of, the Site than the NaFRA2 fluvial flooding dataset. On this basis, it is considered that the conclusions of the FRA with respect to fluvial flooding remain valid.
- 3.1.3 Once formal acceptance of the model has been received, this will be recorded in the Statement of Common Ground with Environment Agency in order to assist the Examining Authority.

4. Surface Water (Pluvial) Flood Risk – Present Day Scenario

4.1 General

- 4.1.1 The assessment of surface water flooding to the Solar Array Area, Cable Route Corridor and Bespoke Access Corridor in Section 5.5 of the FRA ('Surface Water Flooding (Pluvial Flooding)') was carried out prior to the release of the NaFRA2 dataset in 2025.
- 4.1.2 The differences in flood extent and depths in the NaFRA2 dataset and preceding dataset (referred to henceforth as the pre-2025 dataset and pre-2025 mapping) are discussed for each area in turn, below.

4.2 Flood Extents

- 4.2.1 The NaFRA2 dataset and the pre-2025 dataset both classify the risk of surface water flooding as follows:
 - Very Low an annual probability of flooding less than 1 in 1,000 (<0.1%);



- Low an annual probability of flooding between 1 in 1,000 and 1 in 100 (0.1% 1.0%);
- Medium an annual probability of flooding between 1 in 100 and 1 in 30 (1.0% - 3.3%);
- High an annual probability of flooding greater than 1 in 30 (>3.3%).

Solar Array Area

- 4.2.2 Surface water flood extents shown on the NaFRA2 mapping (see Drawing No. ST19595-510-P0.01 sheet 1 to 4) are generally larger within the Solar Array Area than shown on the pre-2025 mapping (see Drawing No. ST19595-451-1, ST19595-452-1 and ST19595-453-1). Whilst there are no new significant areas of surface water flooding, the extent of flooding in 'at risk' areas on pre-2025 mapping is now generally greater. Some areas previously shown to be at a Low to Medium risk are now shown to be at a High risk.
- 4.2.3 In pre-2025 mapping approximately 112.5ha of the 529ha Solar Array Area was at a Low risk of flooding and 29.8ha was at a High risk of flooding. NaFRA2 mapping shows that approximately 154.9ha is at a Low risk of flooding and 41.6ha is at a High risk of flooding. This equates to a 37.6% increase and 39.6% increase, respectively.
- 4.2.4 Previously, areas of High and Medium risk were generally situated in the south-west of the Solar Array Area or adjacent to watercourses. Away from this area, portions of land in the north-east of the Solar Array Area and along the course of Hodge Dike were at a Low risk of flooding.
- 4.2.5 NaFRA2 mapping shows that a greater proportion of land in the north-east of the Solar Array Area is at a Low risk of flooding, with land previously at a Low risk in this area now considered to be at a High risk. Notwithstanding this increase in affected areas, the majority of these fields are already adequately mitigated as a result of the fluvial flood risk modelling results. This mitigation is discussed in further detail in Section 6.
- 4.2.6 As per the FRA, it is considered (taking into account the NaFRA2 dataset) that the majority of surface water flooding within the central, northern and eastern areas of the Solar Array Area is generated within the Solar Array Area, with no significant incoming overland flow routes from off-site.
- 4.2.7 Areas of land in the south-western corner of the Solar Array Area previously shown to be at Low or Medium risk of flooding are now shown to be at a High risk of flooding. Notwithstanding this, there are some areas where the High risk surface water flood extent is now marginally less extensive particularly along the route of Hodge Dike close to the centre of the site. The flooding mechanisms remain unchanged, with three overland flow routes being impeded within the Solar Array Area.
- 4.2.8 Areas within the BESS area previously shown to be at Low or Medium risk of flooding are now shown to be at a High risk. These long narrow sections are coincident with the alignment of the field boundaries and can be observed in other agricultural fields in the vicinity. It is considered that these represent plough lines or 'tram lines' for agricultural vehicles within the fields and not evidence of a more significant flooding issue. These are temporary seasonal features required for maintaining crops and will likely be removed during construction works and the risk of flooding would, therefore, also be removed.



Cable Route Corridor

4.2.9 As with the Solar Array Area, surface water flooding is more extensive as compared to the pre-2025 dataset with more areas at a High risk of flooding, particularly in northern and central sections. When compared to the overall size of the Cable Route Corridor, this increase is relatively minimal. The general mechanisms remain the same with overland flow routes affecting northern and central sections of the corridor. Areas at risk in southern sections of the Cable Route Corridor and at the Bicker Fen Substation remain unchanged from the pre-2025 dataset and are generally associated with ponding of runoff within topographical depressions.

Bespoke Access Corridor

4.2.10 The NaFRA2 mapping shows that the northern and southern sections remain at a High risk of flooding, with the flooding more extensive at the southern end of the corridor when compared to the pre-2025 dataset. Other than small, isolated depressions, there are no other sections of the corridor at risk of flooding, as per the pre-2025 dataset.

4.3 Flood Depths

Solar Array Area

- 4.3.1 The latest flood depth mapping indicates the likelihood (ie Low, Medium and High) of flooding to a minimum of a given depth threshold (namely 0.2m, 0.3m, 0.6m and 0.9m). Individual maps for each depth are provided within the NaFRA2 dataset. For the purposes of this assessment, the data itself has been interrogated using GIS software to create five depth bands indicating where flooding would reach a minimum of 0.2m, 0.3m, 0.6m, 0.9m and 1.2m in the Medium likelihood (ie 1 in 100 year) scenario. This data is reproduced as Drawing No. ST19595-511-P0.02 (sheet 1 to 4).
- 4.3.2 Generally, the NaFRA2 data shows that depth of surface water flooding is greater than the pre-2025 dataset (shown on Drawing No. ST19595-450-1). The extent of flooding where depths would reach a minimum of 0.6m is now more extensive than the areas within the '0.6 0.9m' and '0.9 1.2m' bands using the pre-2025 dataset. This continues to relate to areas in the south-west of the Solar Array Area only. Outside the perimeter watercourse channels, the maximum depth of flooding does not exceed 0.9m in the Medium likelihood scenario.

Cable Route Corridor

4.3.3 As with the Solar Array Area, the NaFRA 2 data shows that surface water flooding would be deeper in the Medium likelihood scenario. The area where flood depths would reach a minimum of 0.3m is larger than the areas within the 0.15 – 0.3m and 0.3 – 0.6m bands using the pre-2025 dataset, however, the depth of flooding along the Cable Route Corridor would still not exceed 0.6m (excluding the watercourse channels).

Bespoke Access Corridor

4.3.4 As with the Cable Route Corridor, the extent of the area where flood depths would reach a minimum of 0.3m in the Medium likelihood scenario is greater using the NaFRA2 data, than shown by the pre-2025 dataset. The latest data



shows that the depth of flooding would not exceed 0.6m in the Medium likelihood scenario.

5. Surface Water (Pluvial) Flood Risk – Climate Change Scenario

5.1 General

- 5.1.1 The NaFRA2 dataset also includes the extent and depths of surface water flooding in the 2040 2060 scenario to demonstrate the effects of climate change. Climate change modelling is based on the latest UK Climate Change Projections (UKCP18). This is in accordance with the post-acceptance Section 51 advice received in May 2025.
- 5.1.2 Surface water flood extent mapping is included as Drawing No: ST19595-512-P0.02 (sheets 1-4) and depth mapping is included as Drawing No: ST19595-513-P0.02 (sheets 1-4).
- 5.1.3 The NaFRA2 dataset only includes the 2040 2060 climate change scenario and whilst the Proposed Development has an operational life of 40 years (ie beyond 2060) it is considered that this data is the best available data to determine the impacts of climate change on surface water flood risk at the Site.
- 5.1.4 Flood mapping for a climate change scenario was not included in the pre-2025 dataset and was not, therefore, assessed in the FRA.
- 5.1.5 The differences between the present day (2025) scenario and the climate change (2040 2060) scenario are discussed below.

5.2 Flood Extents and Depth

Solar Array Area

- 5.2.1 The areas at risk of flooding in the present day scenario are shown to be slightly more extensive in the climate change scenario. Notwithstanding this, there are no significant new areas of the Solar Array Area affected, and no new overland flow routes shown to be present.
- 5.2.2 The minimum depth of flooding in the Medium likelihood climate change scenario is also greater than in the present day scenario. There are, however, no new fields within the Site where flooding would exceed 0.6m when compared to the present day scenario. Additional flood risk mitigation measures would not, therefore, be required to 'future-proof' the Proposed Development within the Solar Array Area.

Cable Route Corridor

5.2.3 The extent of surface water flooding and depth of flooding also increases along the Cable Route Corridor in the climate change scenario. As with the Solar Array Area, no new overland flow routes are created. Flooding will also not encroach into any construction compounds that are unaffected in the present day scenario.



Bespoke Access Corridor

5.2.4 As with other areas of the Site, the climate change scenario mapping does not show any new overland flow routes or flooding encroaching into new areas of the Bespoke Access Corridor when compared to the present day scenario. The depth of flooding away from watercourses is sufficiently shallow to be passable on foot for the purposes of emergency access and egress.

6. Conclusions

6.1.1 It is considered that the findings of **Appendix 11.1 Flood Risk Assessment** (**Document Ref: 6.3 ES Vol.2, 6.3.81**) remain valid and that flood risk could be mitigated by either increasing the height of solar panel tables or by modifying ground levels. These mitigation measures are already proposed within other areas of the Site.

Solar Array Area

- 6.1.2 The latest EA surface water mapping (NaFRA2 dataset) shows that the mechanisms for flooding at the Site remain unchanged with areas in the west of the Site affected by overland flow routes from off site, and areas at risk in the north-east affected by surface water runoff generated within the Site. The NaFRA2 data shows that flooding will, be more widespread and to a greater depth when compared to the pre-2025 dataset, however, the existing mitigation measures adopted continue to be effective as described below.
- 6.1.3 Solar panel tables will have a leading edge of either 0.8m above ground level (referred to as 'standard' panels for the purposes of this Technical Note) or leading edge of 1.3m above ground level (referred to as 'raised' panels). The layout was designed based on a uniform panel height within each field with individual fields having either standard or raised panels (as shown on Drawing Ref: ST19595-396).
- 6.1.4 Based on the NaFRA2 surface water flood risk data there are no areas outside of the watercourse channels where flood depths exceed 1.2m in the Medium likelihood scenario in both the present-day and climate change scenarios. Flooding would always, therefore, be below the leading edge of the raised panel tables and solar panels could still be constructed in all areas of the Site.
- 6.1.5 The NaFRA2 surface water flood depth data shows that areas where raised panel tables would be required due to the depth of surface water flooding are coincident with areas that require raised panel tables due to the depth of fluvial flooding as assessed and determined within the FRA. There would, therefore, be no need to revise the panel heights in these fields or provide further mitigation.
- 6.1.6 The NaFRA2 data does, however, show that fields 1.24 and 1.25 would now flood to depths of between 0.6m and 0.9m despite being unaffected by fluvial flooding. If flood depths exceed 0.8m, the standard panel tables would not be viable in these fields as previously proposed and mitigation measures would be required.



- 6.1.7 Since it is not possible to confirm the exact depth of flooding from NaFRA2 surface water flood risk data, we are currently reviewing the data in order to identify what further assessment (in respect of the FRA and, potentially, the ES) may be required. Following this, we would then provide an update to the Examining Authority. Should it be confirmed that surface water flooding in Field 1.24 and Field 1.25 would exceed 0.8m in the 1 in 100 year (plus climate change) return period, mitigation would be required. If this is the case, the types of mitigation already identified and considered within the ES would be suitable and would be committed to the affected areas to ensure that the panels are not impacted by flooding and that the Proposed Development would remain operational.
- 6.1.8 Areas shown to be at risk of surface water flooding within the BESS site are considered to be the result of the LiDAR data, used in the modelling, picking up the tramlines and plough lines within the fields. These are created by the agricultural machinery passing between lines of crops, or from the ploughing of the fields and surface water is shown to pond in these isolated, artificial low spots. These features generally do not remain once crops are harvested and the potential for ponding is, therefore, removed. Once the site is crossed laterally by plant during the construction works these plough lines will be lost and the risk of flooding will, therefore, be removed.
- 6.1.9 Updates to the fluvial Flood Map for Planning do not alter the conclusion of the FRA with respect to fluvial flood risk. Bespoke fluvial flood risk modelling data is used in the FRA, which shows that fluvial flooding is shallower, and less extensive within the Site than shown on the Flood Map for Planning.

Cable Route Corridor

- 6.1.10 The NaFRA2 data shows that flooding would be more extensive and at greater depth in the Medium likelihood scenario, but that the mechanisms for flooding remain the same and there are no new significant areas at risk.
- 6.1.11 Since the cable will be installed below ground, the only potential impacts of flooding to the Proposed Development would be during installation where stockpiled material may impede or divert overland flow routes. In order to ensure flood risk is not increased or flood flows diverted, it is proposed that long sections of trenches will not be left open and stockpiled materials will not be placed where they could affect existing overland flow routes. Regardless of the fact that the application of the latest EA modelling shows the potential for more extensive and deeper flooding in sections of the Cable Route Corridor, all risks would still be mitigated as detailed in the FRA (Document Ref: 6.3 ES Vol.2, 6.3.81).
- 6.1.12 There are a series of temporary construction compounds along the Cable Route Corridor. Any compounds previously unaffected are anticipated to remain unaffected. Where required, offices and welfare cabins located within the temporary construction compounds will be elevated above ground level sufficiently high enough to ensure flood water does not enter the cabins and to allow overland flood flows to pass beneath without diversion, as detailed within the FRA.
- 6.1.13 Whilst the NaFRA2 data does not contain velocity modelling, it can be assumed that flooding across land will be at relatively low velocity due to shallow gradients, and that as the depths of flooding would be less than 0.6m,



there would be safe routes away from flooded areas on foot if emergency access/egress is required.

6.1.14 Updates to the fluvial Flood Map for Planning do not alter the conclusions of the FRA with respect to fluvial flood risk as bespoke modelling data is used in the assessment.

Bespoke Access Corridor

- 6.1.15 The NaFRA2 surface water flood mapping shows that flooding would be more extensive and at greater depth in the Medium likelihood scenario, but that the mechanisms for flooding remain the same and there are no new significant areas at risk.
- 6.1.16 As the depth of flooding would be less than 0.6m and is assumed to flow at low velocity, emergency access and egress would be feasible.
- 6.1.17 Updates to the fluvial Flood Map for Planning do not alter the conclusions of the FRAwith respect to fluvial flood risk as the results of bespoke 1D-2D fluvial flood risk modelling are used within the FRA which are more accurate than the modelling represented by the Flood Map for Planning.

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BFEP Appendices





































