SUNNICA ENERGY FARM

EN010106

Volume 6

8.66 Appendix 9C Flood Risk Assessment Addendum

APFP Regulation 5(2)(e)

Planning Act 2008

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

24 March 2023

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

Sunnica Energy Farm

Environmental Statement
Appendix 9C: Flood Risk Assessment Addendum

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1 Introduction

1.1.1 AECOM has been appointed by Sunnica Ltd to undertake a Flood Risk Assessment (FRA) in support of the Development Consent Order (DCO) (the Application) for a solar farm with associated battery storage, identified as Sunnica Energy Farm (herein after referenced as the “Scheme”).

1.1.2 An FRA, including a Drainage Strategy was submitted as Appendix 9C of the Environmental Statement (Application Document Reference EN010106/APP/6.2).

1.1.3 In response to statutory consultation comments and planning policy updates, an FRA Addendum has been prepared to provide additional information relating to;

a. *Change in Planning Policy - Revised Planning Practice Guidance (PPG, August 2022)*

b. *Reference to draft NPS-EN-3 (September 2021)*

c. *Revised online surface water flood risk mapping datasets.*

d. *Revised peak rainfall climate change guidance*

e. *Additional fluvial flood risk modelling of the River Lark for PV panel areas (W10, W11, W15, E01, E02, E03 and E05) and Cam Lodes breach modelling for the Burwell substation extension Option 2)*

1.1.4 This Addendum report should be read in conjunction with the initial FRA for the Scheme; this Addendum will update certain elements of the FRA, it does not replace it.

1.1.5 In addition to the assessment of flood risk, the drainage strategy undertaken for the Scheme has also been reviewed to confirm the current strategy is still suitable taking into account the latest planning guidance, flood risk mapping and climate change updates.

1.1.6 This Addendum calls on the principal objectives of the initial FRA (Version 01, dated 21 January 2022) and associated planning policy already discussed within it.

FRA Addendum Objectives

1.1.7 The objectives of this FRA Addendum are to review the elements noted in 1.1.3 above, to re-assess the policy and flood risk implication to the Scheme, and to confirm no material or adverse residual impact to the Scheme or elsewhere.

2 Draft NPS EN-3

2.1.1 The current NPS EN-3 does not mention a need for an FRA or implications for drainage. However, paragraph 2.50.7 of draft NPS EN-3 notes that an FRA may be required and will need to consider the impacts of drainage, noting:

2.1.2 “This will need to consider the impact of drainage. As solar PV panels will drain to the existing ground, the impact will not in general be significant. Where access tracks need to be provided, permeable tracks should be used, and localised Sustainable Drainage Systems (SuDS), such as swales and infiltration trenches, should be used to control any run-off where recommended. Given the temporary nature of solar PV farms, sites should be configured or selected to avoid the need to impact on existing drainage systems and watercourses. Culverting existing watercourses/drainage ditches should be avoided. Where culverting for access is unavoidable, it should be demonstrated that no reasonable alternatives exist and where necessary it will only be in place temporarily for the construction period.”

2.1.3 This FRA is compliant with paragraph 2.50.7 of draft NPS EN-3, as it considers drainage for the Scheme, with reference to the Drainage Strategy within Annex F of the FRA, Appendix 9C of the ES.

3 Planning Practice Guidance Update

3.1.1 On the 25th of August 2022 the Environment Agency (EA) published the revised PPG on Flood Risk and Costal Change. The change comes in with immediate effect on current and all future assessments of flood risk. The PPG has not been materially updated since 2014.

3.1.2 The update to the PPG has been borne through the various updates to the National Planning Policy Framework (NPPF), in 2018, 2019 and 2021, alongside reports including, but not limited to, the Policy Review of Development in Flood Risk Areas (July 2021) and the Jenkins Review 2019 (published 2021).

3.1.3 The EA published a briefing document in September 2022 to introduce the changes.

3.1.4 This FRA Addendum will consider each element below, pertinent to the Scheme, to confirm the Scheme is still compliant with the new PPG requirements:

3.1.5 Key changes discussed are:

a. *Definition of Flood Risk*

b. *Design Flood*

c. *Sequential and Exception Test*

d. *SuDS (Sustainable Drainage Systems)*

Definition of "flood risk"

3.1.6 The definition now includes flooding from all sources, no longer designated as Flood Zone 2 and 3. The new wording states flood risk as ''flooding from any source, now or in the future'' and that it now also accounts '' for the interactions between these different sources''.

Design Flood

3.1.7 The definition of Design flood' now explicitly includes climate change and surface water risk, as set out in Paragraph 001:

a. *This is a flood event of a given annual flood probability, which is generally taken as:*

   a. *River flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year); or*

   b. *Tidal flooding with a 0.5% annual probability (1 in 200 chance each year); or*

   c. *Surface water flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year),*

   d. Plus an appropriate allowance for climate change

Sequential and Exception Test

3.1.8 There is improved clarity on the Sequential Test. However, the principals are largely unchanged from the previous requirement to locate vulnerable development to areas of lower flood risk.

3.1.9 The primary change, to the wording is to now include flooding from all sources in the Test. The other pertinent changes relating to the Scheme are set out below:

a. Improved clarity for the Sequential Test and Exception Test, with changes to Table 2 of PPG (formerly Table 3) now showing flood zone incompatibility, and no longer indicates whether “development is suitable”. There is no change to the approach of the FRA for this element.

b. Inappropriate to consider likelihood of defence breach in an FRA for planning/DCO consent, without a detailed assessment; i.e. breach assessment is required to confirm flood risk to the Scheme through hydraulic breach modelling). Modelling is discussed in this Addendum to address this point.

c. Functional floodplain starting point 3.3% AEP event (1 in 30 years), not previous 5% (1 in 20 year). The modelling has been updated to include this change, with no built development located within this extent of 1 in 30 years. Flood Zone 3b has been represented within Figures 4-1 and 4-2 of the fluvial modelling technical note in Annex C.

3.1.10 The Scheme location is at low risk from all other courses of flooding; therefore, the Sequential approach and alternative site assessment undertaken in the submitted FRA complies with the additional requirements to consider all forms of flooding.

3.1.11 The detail included in the FRA Addendum and accompanying drainage strategy is appropriate to support the planning application for the development.

Sustainable Drainage Systems (SuDS)

3.1.12 The guidance places an emphasis on SuDS, with clear evidence to be provided to justify that the use of SuDS would be inappropriate.

3.1.13 The definition of SuDS now means the 4-pillars need to be met – and should discourage reliance on underground storage. The 4 pillars of SuDS are:

a. Water Quality

b. Water Quantity

c. Amenity

d. Biodiversity

3.1.14 Below ground storage is not proposed as part of the drainage strategy of the scheme. Above ground swales and attenuation basins that mimic the natural, existing, runoff regime are proposed.

3.1.15 Swales provide natural water quality improvement by trapping and treating pollutants as they travel in the swale.

3.1.16 The drainage strategy has shown that it provides sufficient quantity of attenuation to ensure flood risk is not increase on site or elsewhere, with additional capacity for exceedance events provided within the swales.

3.1.17 The discussion provided within the submitted FRA Version 01, January 2022) regarding the Sequential and Exception Test has been reviewed in line with the revised PPG guidance, as outlined above.

4 Revised Surface Water Flood Risk Mapping

4.1.1 The online long term flood risk map for surface water was updated post DCO submission and has been reviewed to note any key material changes.

4.1.2 From review of the current online surface water flood risk mapping there has been no change to the areas at risk of surface water flooding across the DCO boundary, that was discussed in the submitted FRA (January 2022, Version 01), in terms of:

a. *Definition of surface water flood risk and associated return periods*

b. *Location*

c. *Depth*

d. *Velocity*

4.1.3 It is concluded that there is no change to surface water risk across the Scheme; the overall flood risk from pluvial sources remains Low, relating to the Burwell substation extension Grid Connection Route B, and Very Low for the remaining areas within the DCO boundary.

5 Revised peak rainfall climate change guidance

5.1.1 Guidance on the changes to climate change allowances to peak rainfall was published in May 2022, post DCO submission.

5.1.2 Climate change allowance prior to this update required the Scheme drainage strategy to factor in an allowance of 40%, to account for predicted increases in rainfall intensity, no matter the geographical location of the proposed development.

5.1.3 The current guidance, has mimicked the changes to the fluvial flood risk approach to climate change allowances, which are now based on river catchment areas, as discussed in the submitted FRA.

5.1.4 The peak rainfall climate change allowances also now require a development to be assessed for the 1 in 30 year plus climate change allowance.

5.1.5 The drainage strategy, Annex F of the submitted FRA, has been designed to allow for 40% climate change.

5.1.6 The sole river catchment that the Scheme falls within is the Cam and Ely Ouse catchment. Figure 1 below notes the climate change allowances for the Cam and Ely Ouse:

Cam and Ely Ouse Management Catchment peak rainfall allowances

3.3% annual exceedance rainfall event

Epoch	Central allowance	Upper end allowance
2050s	20%	35%
2070s	20%	35%

1% annual exceedance rainfall event

Epoch	Central allowance	Upper end allowance
2050s	20%	40%
2070s	25%	40%

*Use '2050s' for development with a lifetime up 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

Figure 1: Cam and Ely Ouse Catchment Peak Rainfall allowances (extracted from online catchment mapping, 6 September 2022)

5.1.7 The drainage strategy has been assessed for the 30 year event plus climate change, in the same manner as undertaken for the drainage strategy in Annex F of the submitted FRA.

5.1.8 The current drainage strategy required an average of 51,302m^3 of attenuation storage, for the 1 in 100 plus 40% climate change scenario. The Scheme provides 55,869m^3, greater than the required attenuation storage volume and so provides betterment.

1 in 30 year Runoff Assessment

5.1.9 Assessing the 1in 30 year return period event plus 35% climate change scenario, Figure 2 below presents the MicroDrainage quick storage estimation, the same principal as applied in the submitted FRA.

5.1.10 The calculation was run with FEH data, instead of FSR previously used, in response to statutory consultee comments.

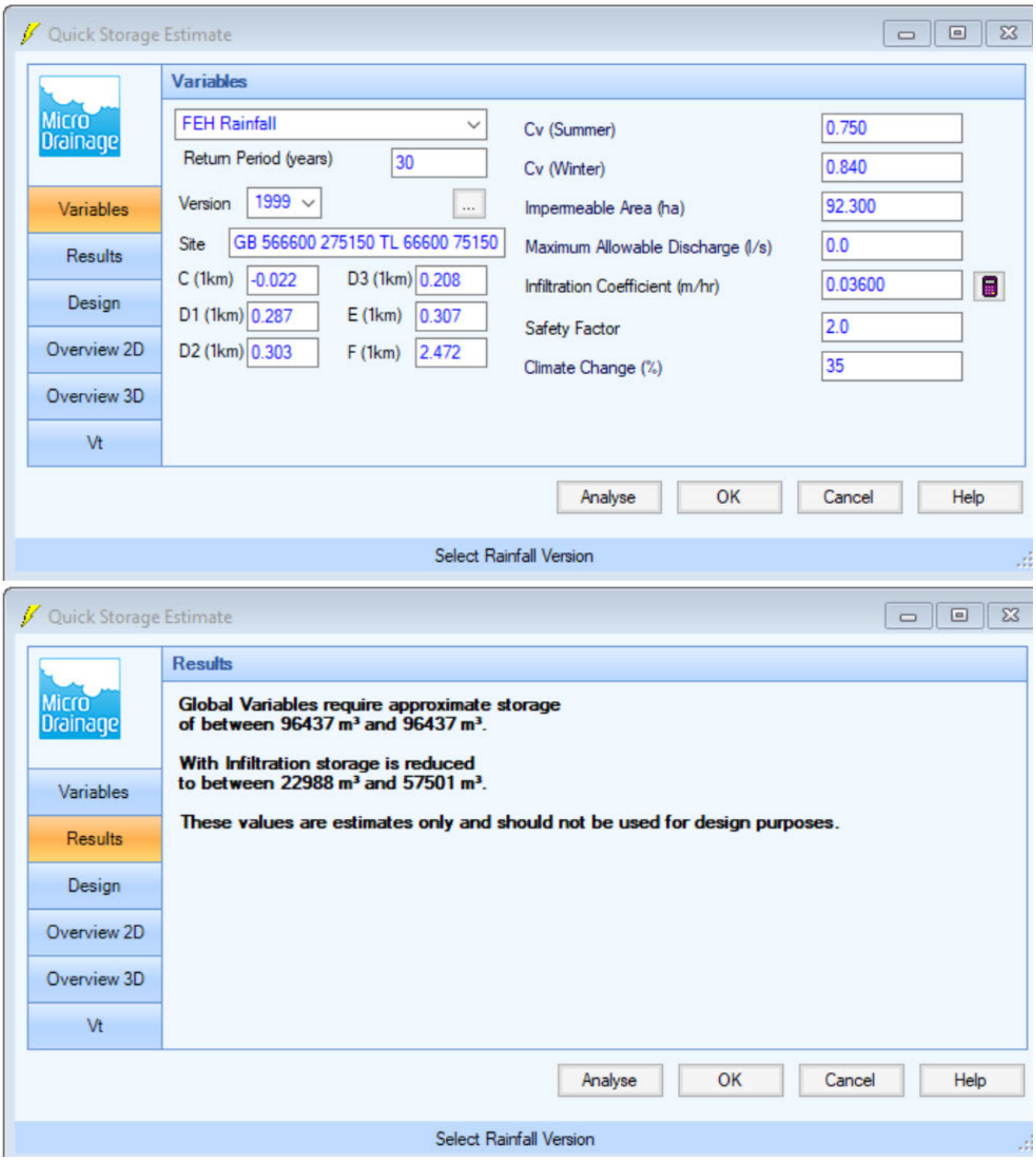


Figure 2: MicroDrainage 1 in 30 yr plus 35% climate change results

5.1.11 Table 1 below summarises the 1 in 30 year attenuation volumes, compared to the available attenuation within the Scheme, based on infiltration, as per the original principals of the strategy.

Table 1 Proposed Storage Features

Total storage required (m^3) 1 in 30 year + 35% Climate Change	Total storage provided (m^3)
22,988 to 57,501 (40,244 average)	55,869.20

5.1.12 The results indicate there is sufficient storage within the system, to provide an additional 16,904.70m^3 capacity in the event of a 1 in 30 year event including an allowance for climate change. This is considered to provide a robust level of capacity.

1 in 100 year Runoff Assessment, including 40% Climate Change

5.1.13 For the 1in 100 year return period event, the Upper End climate change allowance of 40% has not changed, based on the 2070s epoch for the development lifetime as a worst case approach. The current strategy assess this value and, therefore, requires no update.

5.1.14 The calculation was run with FEH data, instead of FSR previously used, in response to statutory consultee comments.

5.1.15 The previous average volume required, using FSR was 51,302m^3. Using FEH data, the required average volume is 56,825m^3. The Scheme provided an overall volume of 55,869.20m^3, using FSR rainfall data. With FEH dataset, there is now a nett deficit difference of -955.80m^3 (Approx. 1.75% less capacity).

5.1.16 FEH data can often provide higher runoff values than FSR, for larger catchment analysis and longer duration storm events. This can be due in part to more recent rainfall data and data from more rainfall gauges than older FSR data. In this case, the higher runoff rates lead to higher attenuation requirements.

5.1.17 Subsequently, the drainage strategy has been reviewed in terms of swales and detention basins, to review and increase attenuation, where feasible. Refer to Figure 3 and Table 2 below for results, Annex A for revised table of swale and basin volumes, and Annex B for the revised Drainage Strategy Plans that reflect increases swales and basins; the Order limits are not space limited; therefore, additional volumes have been relatively simple to provide.

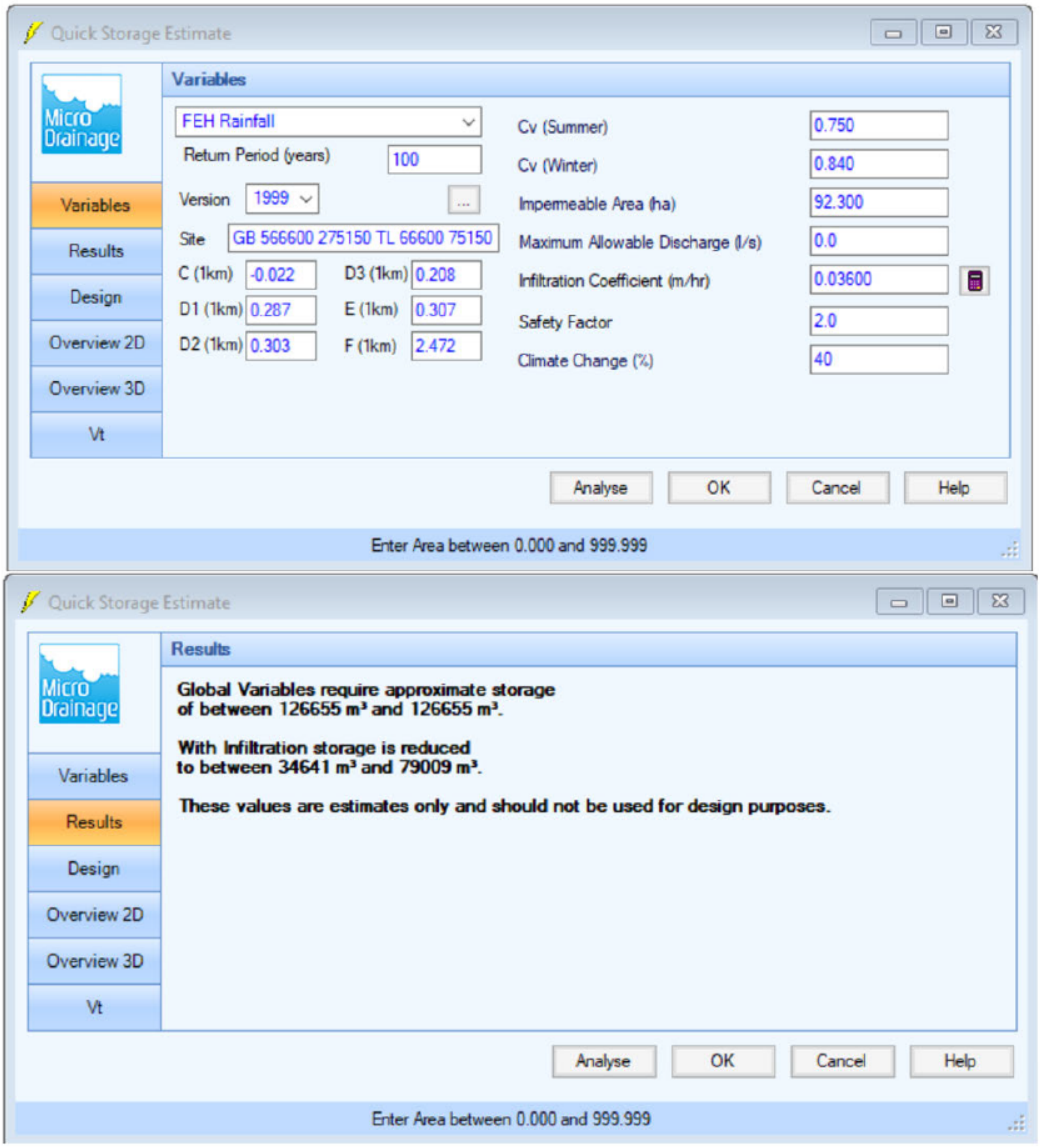


Figure 3: MicroDrainage 1 in 100 yr plus 40% climate change results

Table 2 Proposed Storage Features

Total storage required (m^3) 1 in 30 year + 35% Climate Change	Total storage provided (m^3)
34,641 to 79,909 (56,825 average)	57,245

5.1.18 The results indicate a revised excess capacity of 420m^3 average.

5.1.19 As a result of the revised drainage assessment, the Scheme does not increase flood risk elsewhere.

5.1.20 In conclusion, it is considered that for both the 1 in 30 year event and the 1 in 100 year event, both including climate change, the drainage strategy as submitted with Annex F of the submitted FRA complies fully with the revised guidance.

6 Fluvial Model Review of River Lark and Burwell Lode

6.1.1 During consultation, the EA requested that PV panel areas, for the River Kennett and Lark catchment PV panel areas E01, E02, E03 and E05, and W08, W10, W11, W12 and W15, be assessed using available fluvial models with climate change included, to assess flood risk levels and the impacts to and from the Scheme.

6.1.2 The comments also extended to an assessment of the Burwell Lode for the Burwell substation extension Option 2, for both flood risk levels and for a breach event (refer to section 7 for separate breach assessment).

6.1.3 Revised Scheme Parameter Plans are provided in Annex B of the Addendum, which include the flood map for planning overlaid on to them, to reference for the flood risk discussion.

6.1.4 The EA provided and confirmed the Eastern Rivers model for the River Lark and Kennett catchments, and the Cam Lodes (containing Burwell Lode) model for Burwell substation extension, should be used in the assessment.

6.1.5 The earlier provided Eastern Rivers model showed no hydraulic model result data on a reach of the Lee Brook between Beck Road and the confluence with the River Lark. This section of watercourse runs between PV panel areas E03 and E05. It was, therefore, not possible to use the model to provide flood risk levels for these two areas.

6.1.6 However the EA noted in an email on 11 October that AECOM had not received all Product 4 model data for the Lee Brook, and subsequently provided the additional flood risk Product 4 data on 17th October for the Lee Brook reach, relevant to PV areas E03 and E05.

6.1.7 The EA considers using a 19% allowance for climate change is an appropriate value for Essential Infrastructure in this location for the Scheme design parameters, based on the online Gov.uk climate change allowance guidance. In this regard, the EA has agreed to the use of the existing Eastern Rivers and Cam Lodes models (which currently includes 20% climate change) to assess design flood depths for the PV panels. Therefore, no additional modelling has been carried out, as 20% exceeds the current climate change requirements for design.

6.1.8 Refer to Annex C for the fluvial modelling technical note, and to Figures 3-1, 3-2., 4-1 and 4-2 and Appendix B of the fluvial model technical note for detail of the modelling approach and results.

6.1.9 The panel design height, and any required mitigation, of the PV panels has been reviewed to provide, as a minimum, 300mm freeboard above the estimated design flood level.

6.1.10 Both the fluvial flood risk to the PV panel areas and the Burwell Substation have also taken into account the Credible Maximum Scenario, agreed with the EA to be 22% climate change allowance, taking into account the design life of the Scheme. This assessment is a sensitivity test to ensure the infrastructure remains operational in an exceedance event and does not necessarily require additional mitigation. Chapter 8 of this Addendum discusses the credible maximum scenario assessment.

Eastern Rivers Model: PV Panel Areas *E01, E02, E03, and E05*

6.1.11 When referencing the online flood map for planning, parts of the PV areas in Sunnica East; E01, E02, E03 and E05 encroach into areas of Flood Zone 2 and 3. It was initially proposed to raise PV panels in these areas by 850mm to ensure no increase in flood risk to the panels and elsewhere. However, the EA requested review of modelled data to assess the flood risk in these areas.

6.1.12 Table 3 below provides the modelled results for the River Lark and Kennett, for PV areas E01, E02, E03 and E05, for the 1 in 100 year plus 20% climate change, and 1 in 1000 year, taken from additional EA supplied Product 4 data (provided on 13th and 17th October 2022), included in Annex E.

Table 3 Eastern Rivers - Modelled River Kennett/Lark Flood levels

PV Area	1 in 100 year (1% AEP) + 20% Climate Change Level (mAOD)	1 in 1000 year (0.1% AEP) Level (mAOD)
E01	2.97	3.02
E02	2.98	3.03
E03	2.96	3.16
E05	3.91	4.09

E01

6.1.13 The modelled 1% AEP plus 20% climate change level from the Product 4 data for E03 is 2.97m AOD.

6.1.14 The minimum ground level in Area E01 is 3.00m AOD, taken from the topographical survey (Annex A). As the topographical survey indicates a minimum ground level of 3.00m AOD, it is considered the PV panels are at low risk of flooding during the design 1 in 100 year plus 20% climate change event.

E02

6.1.15 The modelled 1% AEP plus 20% climate change level from the Product 4 for E03 is 2.98m AOD.

6.1.16 In Area E02, the minimum ground level is 2.85m AOD, taken from the topographical survey (Annex A).

6.1.17 From this data, the flood depth on site would be up to 130mm. The standard 600mm panel height will provide a freeboard in excess of 300mm above the design 1 in 100 year plus 20% climate change event.

6.1.18 It is considered the PV panels are at low risk of flooding during the design 1 in 100 year plus 20% climate change event.

E03

6.1.19 The modelled 1% AEP plus 20% climate change level from the Product 4 for E03 is 2.96m AOD.

6.1.20 The minimum ground level in area E03, from the topographical survey, is 3.45m AOD, 490mm above the predicted flood level.

6.1.21 It is considered the PV panels are at low risk of flooding during the design 1 in 100 year plus 20% climate change event.

E05

6.1.22 The modelled 1% AEP plus 20% climate change level from the Product 4 for E05 is 3.91m AOD.

6.1.23 From the topographical survey and LiDAR data the minimum ground level in E05 is 3.60m AOD, 310mm below the design flood level, i.e. the maximum flood depth to area E05 is 310mm.

Eastern Rivers Model: PV Panel Areas W08, W10, W11 and W15

6.1.24 The following section for PV Areas W08, W10, W11, W12 and W15 seeks to challenge the online flood map for planning outputs and proposes that the PV panel areas are effectively at very low risk of fluvial flooding. Table 4 below indicates the 1 in 100 year plus 20% climate change modelled flood levels for areas W08, W10, W11 and W12 and W15, which forms this discussion.

Table 4 Modelled Eastern Rivers Flood levels

PV Area	1 in 100 year (1% AEP) + 20% Climate Change Level (mAOD)	1 in 1000 year (0.1% AEP) Level (mAOD)
W08	19.29	19.48
W10	No Flood Level Recorded	No Flood Level Recorded
W11	No Flood Level Recorded	No Flood Level Recorded
W12	No Flood Level Recorded	No Flood Level Recorded
W15	No Flood Level Recorded	No Flood Level Recorded

6.1.25 Refer to Topographical Survey in Annex A of this Addendum.

6.1.26 The flood map for planning indicates fluvial floodplain extents extend from the Lee Brook across PV areas W10, W11, W12 and across La Hogue Road eastwards, across the A14 into PV area W15.

6.1.27 It had been proposed in the submitted FRA [application reference AS-010] that the fluvial modelled levels, with 20% climate change included, would not impact areas W10, W11, W12, and W15, contrary to what the flood map for planning indicates. It is also proposed this is the same for PV area W08.

6.1.28 For comparison, the SFRA mapping which includes a 65% allowance for Climate change appears to corroborate the discussion below.

6.1.29 With reference to the topographical survey, levels in PV areas W08, W10, W11, W12 and W15 (Annex A) are noted below:

6.1.30 The flood level noted for parcel W08, for the 1 in 100 year (1% AEP) plus 20% climate change event is 19.29m AOD. Review of the topographical survey indicates the lowest site level in Parcel W08 is approximately 19.6m AOD, 310mm above the 1% AEP plus 20% cc flood level. The 1 in 1000 year (0.1% AEP) level of 19.48m AOD does not encroach into area W08 either, being 120mm below the minimum level in parcel W08

6.1.31 The minimum ground level in W10 is 19.80m AOD. Ground levels in W10 are noted to rise westward up to 22.0m AOD. Levels then continue rising uniformly westward into PV areas W11 and W12 to a height of up to 27.5m AOD.

6.1.32 The minimum ground level in PV area W15 is 23.5m AOD in the east, with levels rising westward up to 27.5m AOD adjacent to the A14 eastern boundary. PV area W15 is separated from the Lee Brook floodplain by the A14 trunk road, which is at a minimum approximate level of 28.0m AOD adjacent to W12, rising northwards to approx. 30m AOD alongside area W15, effectively cutting off flow paths to area W15.

6.1.33 La Hogue Road runs adjacent to PV areas W10, W11 and W12. This road crosses the Lee Brook watercourse. The lowest level of the road by W10 in the western extent of the PV area is 22.0m AOD. Where La Hogue Road crosses the watercourse further west, the level is approximately 19.78m AOD, 220mm lower than the length of road adjacent to W10.

Eastern Rivers Fluvial modelled levels assessment

6.1.34 The modelled 1 in 100 year + 20% climate change level adjacent to area W8, just upstream of W10, is 19.29m AOD. The topographical review above indicates PV Panels W10, W11, W12 and W15 are not impacted by this flood level.

6.1.35 With regards La Hogue Road and the culvert carrying the Lee Brook; should flood waters back up against the culvert headwall during a culvert blockage scenario, the maximum water level that could be reached before overtopping would be 19.78m AOD, approximately 450mm higher than the modelled flood level. Should this occur, flood water would spill over the road northwards and westward away from the PV panels, i.e. not entering the PV panel area land and would not be able to flow eastward due to local levels rising uniformly above 22m AOD up to the A14 at approximately 28.3m AOD.

6.1.36 In area W08, in this scenario with La Hogue Road ground levels and backing up, flood levels could reach a depth of 180mm, which still provides greater than 300mm freeboard to the PV panels

6.1.37 It is concluded that modelled design flood risk levels (1 in 100 year plus 20% climate change) will not encroach into PV areas W10, W11, W12 or W15, and the standard 600mm PV panel height in W08 is sufficient to provide 300mm freeboard, should La Hogue Road culvert block and increase upstream levels to 19.78m AOD.

7 Breach Model Assessment of Burwell Substation Option 2

7.1.1 The Cam Lodes model was initially run to assess the 1 in 100 year plus 19% climate change event, both with scenarios for no-breach and with a breach, of Burwell Lode in relation to the proposed location of Option 2 of the Burwell substation extension. Refer to Section 2.3 of the fluvial model technical note in Annex C for the assessed location of a breach point on Burwell Lode in relation to Burwell substation.

7.1.2 The results of the no-breach scenario confirm Option 2 is not at risk of fluvial flooding, as flooding is contained within the banks of Burwell Lode and surrounding Lodes (Refer to Figure 2-1 in fluvial flood risk technical note in Annex C).

7.1.3 For the breach scenario, in accordance with the requirements associated with earth bank defences on a fluvial watercourse, as presented in Table 1 of the Environment Agency's Breaches of Defences guidance document (2021), the breach width and time to close were set to 40m and 56 hours respectively. At the location of the breach, the defences were effectively removed on the right bank by lowering the elevations of the riverbank to match those of the ground levels behind the defence in the 2018 LiDAR DTM over the 40m wide stretch.

7.1.4 The breach was initiated in the simulation at 33 hours, which reflected the point at which water levels in the channel reached ¾ of the height of the flood defences, in line with the indicative start time provided for a fluvial situation in the Environment Agency's Breaches of Defences guidance document.

7.1.5 The EA responded to the initial AECOM hydraulic model assessment suggesting the EA model was not suitable to base a climate change scenario of 19% on for breach analysis. Due to the nature of this particular essential infrastructure development and the residual flood risk from the breach of the Burwell Lode, it was subsequently agreed with the Environment Agency on 02.11.2022 to model 45% climate change with the current hydraulic model, to provide a robust test for the 19% climate change scenario without the need to produce an updated model. The test is also for the credible maximum scenario sensitivity, instead of 22%, to provide a cautionary increase in flood risk and test appropriate mitigation to ensure the substation will remain operational in times of extreme flooding.

7.1.6 Figure 2.1 of the Flood Risk Technical Note in Annex C indicates that following a breach of the flood defences along the right bank of the Burwell Lode during the 1% AEP + 19% climate change event, 'Option 2' sits within the modelled inundation zone. A maximum flood depth of approximately 0.70m is recorded within the 'Option 2' site along the western boundary; however, across the majority of the site, flood depths do no exceed 0.50m. For the 1% AEP + 45% climate change event (Figure 2.2), the maximum flood depth increases to approximately 0.75m along the western boundary, however the same applies with the +19% climate change event with flood depths across the majority of the site not exceeding 0.50m.

7.1.7 Based on the hydraulic modelling results presented above, the proposed measure of raising the finished floor levels of the substation within the Option 2 boundary by 850mm in the FRA; examination reference [AS-007], would be sufficient and would allow a freeboard of approximately 0.15m during the 1% AEP + 19% climate change event and 0.10m during the 1% AEP + 45% climate change event

8 Credible Maximum Scenario / Mitigation

8.1.1 Nationally significant infrastructure projects (NSIPs) are major infrastructure projects which include solar farms with an output greater than 50MW, which this Scheme falls within.

8.1.2 The online Environment Agency guidance indicates "*If you develop NSIPs you may need to assess the flood risk from a credible maximum climate change scenario*".

8.1.3 The test should be treated as a '*sensitivity test'*, to help you assess how sensitive a proposal is to changes in the climate for different future scenarios. This will ensure a proposed development can be adapted to large-scale climate change over its lifetime.

8.1.4 The EA has agreed, for this Scheme, to assess the credible maximum scenario for the 2050's epoch, which the design life of the solar farm sites within. The climate change allowance for the upper end for this epoch is 22%.

8.1.5 To understand the flood level during a 1% AEP + 22% climate change event (i.e. in line with the Upper End allowances for 2050s for the Cam and Ely Ouse Management Catchment area), as requested by the Environment Agency, further analysis of the existing model results discussed in section 6 and 7 has been undertaken, rather than build new models/assessments.

8.1.6 To validate this approach, a stage-discharge curve graph was developed for each parcel using the Product 4 data (provided in Appendix B of the Flood Risk Technical Note) results provided by the Environment Agency for the model. Refer to Appendix C of the fluvial flood risk technical note in Annex C for the graphs.

PV Areas E0 and, E02

8.1.7 For PV areas E01 and E02 the 1% AEP + 20% climate change flood level is 2.97m AOD and 2.98m AOD respectively. Adopting a conservative approach, it is considered that the 1% AEP + 22% climate change flood level would not exceed the 0.1% AEP flood level which is 3.02m AOD for parcel E01 and 3.03m AOD for parcel E02. These levels have therefore been considered for this credible maximum scenario.

PV Areas E03 and E05

8.1.8 According to the results provided by the Environment Agency for the Eastern Rivers (River Kennett) model, the difference between the 1% AEP flood level (2.91m AOD) and the 1% AEP + 20% climate change (2.96m AOD) at the location of parcels E03 is 0.05m. Applying a conservative approach, an increase of 0.10m has been assumed for the 1% AEP + 22% climate change event, resulting in a flood level of 3.01m AOD.

8.1.9 The same approach has been applied for parcel E05. The difference between the 1% AEP flood level (3.86m AOD) and the 1% AEP + 20% climate change (3.91m AOD) is 0.05m. Applying a conservative approach, an increase of 0.10m has been assumed for the 1% AEP + 22% climate change event, resulting in a flood level of 3.96m AOD.

8.1.10 For areas E01 and E03, the flood depths in the PV areas would increase by no more than 53mm (as the current 20% allowance does not reach the panel areas), which, therefore still provides in excess of the 300mm freeboard with the standard panel height of 600mm.

8.1.11 For Area E02, the flood depths would increase to 160mm, which still provides in excess of the 300mm freeboard with the standard panel height.

8.1.12 For Area E05, the peak flood depth would increase to 360mm. It is proposed to raise panels in the flood extent by a further 100mm to 700mm overall depth (i.e. this would maintain 340mm freeboard, which exceeds the minimum requirement for 300mm).

PV Areas W08, W10, W11, W12 and W15

8.1.13 When applying 20% climate change to the 1 in 100 year event, flood levels are approximately 50mm above the 1 in 100 year flood event. Applying an interpolation to the credible maximum scenario climate change allowance of 22%, using the same cautionary approach for PV areas E01, E02, E03 and E05 cautionary approach, a further 50mm for the 2% increase has been applied. This would raise the flood level adjacent to W08 from 19.29 to 19.34m AOD.

8.1.14 The fluvial model results and topographic survey levels demonstrate flood extents from the Lee Brook effectively still cannot reach PV areas W08, W10, W11, W12 and W15 during the 1 in 100 year event, including an allowance of 22% climate change.

8.1.15 It is considered the maximum flood level in W08 could be 19.78m AOD, i.e. the level of La Hogue Road, during a culvert blockage scenario (as discussed in paragraph 6.1.35 above), with a depth of flooding of 180mm. This still provides greater than 300mm freeboard to PV panels.

8.1.16 It is, therefore, demonstrated the PV panels will remain operational in times of flood.

Burwell Substation Option 2

8.1.17 The model results, as shown in Figure 2.1 and 2.2 of the Fluvial model Technical Note indicate:

a. Option 2, with no bank failure is at low risk of fluvial flooding during the 1 in 100 year plus 20% climate change event.

b. Option 2 during a breach of Burwell Lode, with 19% and 45% climate change, is within the inundation zone, up to a peak depth of 700mm and 750mm respectively. The proposal to raise finished floor levels by 850mm is considered sufficient with 100mm freeboard above the peak inundation level, considering the breach scenario is a residual risk as flood defences along Burwell Lode are considered to be suitably maintained.

8.1.18 The EA responded to the initial AECOM hydraulic model assessment suggesting the EA model was not suitable to base the above levels on. Due to the nature of this particular essential infrastructure development and the residual flood risk from the breach of the Burwell Lode it was subsequently agreed with the Environment

Agency on 02.11.2022 to model 45% climate change with the current model, to provide a robust test for the 19% climate change scenario without the need to produce an updated model. The test is also being used to allow for the credible maximum scenario sensitivity, instead of 22%, to provide a cautionary increase in flood risk and appropriate mitigation to demonstrate the substation will remain operational with floor levels set at 850mm above ground level.

8.1.19 Figure 2.2 of the fluvial flood risk technical note (Annex C) indicates that following a breach of the flood defences along the right bank of the Burwell Lode during the 1% AEP + 45% climate change event, 'Option 2' sits within the modelled inundation zone. A maximum flood depth of approximately 0.75m and a maximum flood level of 1.08m AOD are recorded at the western boundary of 'Option 2'. The results are very similar to the 19% climate change results.

8.1.20 The reason why the flood depths and level are not that different between the two climate change events is because during the +45% event, more overtopping occurs in other areas of the model and therefore the amount of water that flows through the breach does increase with magnitude, but not enough to significantly increase flood depths at the Option 2 site.

8.1.21 Based on the hydraulic modelling results presented above, the proposed measure of raising the finished floor levels of the substation by 850mm in the FRA would be sufficient and would allow a freeboard of approximately 0.15m during the 1% AEP + 19% climate change event and 0.10m during the 1% AEP + 45% climate change event.

9 Summary of Flood Risk Mitigation

PV Panel Areas E01, E02, E03 and E05

9.1.1 It is not considered necessary to raise the PV panels in areas E01, E02 and E03; the standard 600mm panel height provides sufficient freeboard during both design climate change scenarios and for the credible maximum scenario sensitivity test.

9.1.2 In area E05, with credible maximum scenario included, the peak flood depth would increase to 360mm. It is proposed to raise panels in the flood extent by a further 100mm to 700mm within the flood extents to achieve the minimum 300mm freeboard, including for the credible maximum scenario event.

9.1.3 In summary, raising of panels is only proposed in Area E05, by an additional 100mm, in the flood risk extents.

PV Panel Areas W08, W10, W11 and W15

9.1.4 The flood modelling indicates low flood risk to areas W10, W11, W12 and W15 from the 1 in 100 year plus 20% climate change event. It is considered standard panel heights of 600mm will be sufficient in these areas, without the need for raised panels.

9.1.5 It is considered the maximum flood level in W08 could be 19.78m AOD, i.e. the level of La Hogue Road, during a culvert blockage scenario (as discussed in paragraph 6.1.35 above), with a depth of flooding of 180mm. This still provides greater than 300mm freeboard to PV panels.

9.1.6 It is concluded that the Sunnica West A and B site is not at risk of flooding during a design fluvial flood risk event, including the impacts of climate change, and for the credible maximum scenario.

9.1.7 No mitigation is considered necessary to raise the PV panels beyond the standard 600mm height in PV areas W08, W10, W11, W12 and W15.

Burwell substation Option 2

9.1.8 Breach modelling indicates Burwell Substation Option 2 will remain operational during the credible maximum scenario event when assessing the worst-case scenario for 45% climate change.

9.1.9 If infrastructure (buildings/switchgear) is located in the western extents, the proposed 850mm raised floor level will provide at least 100mm freeboard, in the event of a breach of Burwell Lode during a climate change flood event.

9.1.10 Raising the finished floor level by 850mm is, therefore, considered acceptable for the Burwell Substation Option 2.

10 Conclusion

10.1.1 The Flood Risk Addendum has successfully assessed Statutory Consultee comments and, in addition, included a review of the latest Planning Practice Guidance, to ensure the scheme remains compliant.

10.1.2 The draft NPS EN-3 has been reviewed within the Addendum, to confirm the Scheme is compliant with the paragraph 2.50.7 of Draft NPS EN-3.

10.1.3 The review of the PPG also confirms the Scheme remains compliant with planning practice guidance.

10.1.4 The fluvial modelling undertaken confirms no increase in flood risk to the Scheme or elsewhere, through mitigation of raising the PV panels in areas at risk of fluvial flooding. The modelling confirms an overall reduction in flood risk compared to the broadscale mapping provided by the Online Flood Map for Planning.

10.1.5 The FRA Addendum concludes no floodplain compensation is required.

10.1.6 Following the additional information assessed within this Addendum, including the fluvial modelling reviews of the Eastern Rivers and Cam Lodes hydraulic models, it is concluded that there are no adverse impacts on flood risk to the site or elsewhere. There are also no additional mitigation measures required.

10.1.7 The conclusions are commensurate with those that were drawn within the initial Flood Risk Assessment report (Examination reference [**AS-007**]).

Annexes

Annex A – Revised Surface Water Attenuation Volumes

Catchment No.	Area (ha.)	PIMP	Impermeable Area (ha.)	Storage Required (m³)	Total Volume Available (m³)	Ref S.Cn.1	Ref S.Cn.2	Ref S.Cn.3	Ref S.Cn.4	Ref S.Cn.5	Ref P.Cn.1	Ref P.Cn.2	Ref P.Cn.3	Ref P.Cn.4
1	5.1	10%	0.5	288	837	679	79	79	0	0	0	0	0	0
2	5.4	10%	0.5	310	640	213	319	108	0	0	0	0	0	0
3	3.2	10%	0.3	185	160	160	0	0	0	0	0	0	0	0
4	8.9	10%	0.9	506	583	326	257	0	0	0	0	0	0	0
5	32.1	10%	3.2	1826	679	447	231	0	0	0	0	0	0	0
6	26.5	10%	2.6	1506	638	638	0	0	0	0	0	0	0	0
7	25.3	10%	2.5	1438	720	720	0	0	0	0	0	0	0	0
8	7.1	10%	0.7	402	525	525	0	0	0	0	0	0	0	0
9	4.3	10%	0.4	245	304	153	151	0	0	0	0	0	0	0
10	23.3	10%	2.3	1327	548	386	162	0	0	0	0	0	0	0
11	23.3	10%	2.3	1328	609	609	0	0	0	0	0	0	0	0
12	19.5	10%	2	1111	2432	253	329	480	0	0	1370	0	0	0
13	8.8	100%	8.8	7287	872	228	397	248	0	0	0	0	0	0
14	12.8	10%	1.3	729	729	446	284	0	0	0	0	0	0	0
15	19.6	10%	2	1114	765	342	423	0	0	0	0	0	0	0
16	15.2	10%	1.5	862	1297	244	153	0	0	0	900	0	0	0
17	13.9	10%	1.4	790	1198	190	117	76	315	0	200	300	0	0
18	22.5	10%	2.3	1282	1888	488	0	0	0	0	700	700	0	0
19	25.5	10%	2.6	1451	1466	0	366	302	270	528	0	0	0	0
20	NO LONGER USED													
21	NO LONGER USED													
22	NO LONGER USED													
23	11.9	10%	1.2	679	443	283	160	0	0	0	0	0	0	0

24	15.8	10%	1.6	669	1980	180	0	0	0	0	600	600	600	0
25	11.8	10%	1.2	900	520	179	341	0	0	0	0	0	0	0
26	4.3	10%	0.4	247	374	184	190	0	0	0	0	0	0	0
27	4	100%	4	5501	740	162	228	138	212	0	0	0	0	0
28	8.4	100%	8.4	2021	401	236	166	0	0	0	0	0	0	0
29	9.9	10%	1	564	2970	0	0	0	0	0	2970	0	0	0
30	3.3	10%	0.3	187	300	0	0	0	0	0	300	0	0	0
31	7.9	10%	0.8	450	4319	203	157	0	0	0	3960	0	0	0
32	15.7	10%	1.6	894	1352	140	89	157	149	216	150	150	150	150
33	15	10%	1.5	855	1284	520	164	0	0	0	300	300	0	0
34	17	10%	1.7	964	1420	177	146	97	0	0	300	400	300	0
35	5.4	10%	0.5	307	787	241	195	0	0	0	200	150	0	0
36	10.2	10%	1	600	643	293	0	0	0	0	350	0	0	0
37							NO LONGER USED							
38	7.4	10%	0.7	422	1000	0	0	0	0	0	1000	0	0	0
39	8.7	10%	0.9	492	1075	309	159	257	0	0	350	0	0	0
40	11.3	10%	1.1	641	1377	176	417	0	0	0	785	0	0	0
41	11.1	10%	1.1	632	3134	140	483	0	0	0	512	1000	1000	0
42	47	10%	4.7	2736	5653	1368	0	0	0	0	705	3580	0	0
43	3.8	10%	0.4	219	400	0	0	0	0	0	400	0	0	0
44	9	10%	0.9	559	834	211	330	293	0	0	0	0	0	0
45	8.1	100%	8.1	1916	1250	0	0	0	0	0	1250	0	0	0
46	9	10%	0.9	513	711	176	134	0	0	0	400	0	0	0
47	8.8	10%	0.9	498	755	155	0	0	0	0	600	0	0	0
48	7.5	10%	0.8	427	785	185	0	0	0	0	600	0	0	0
49	4.4	10%	0.4	2480	2328	153	380	207	346	242	300	300	400	0
50	4.5	100%	4.5	2760	2293	255	315	0	0	0	1075	648	0	0
51	17	10%	1.7	1011	401	401	0	0	0	0	0	0	0	0
52	17	10%	1.7	1010	828	111	570	148	0	0	0	0	0	0

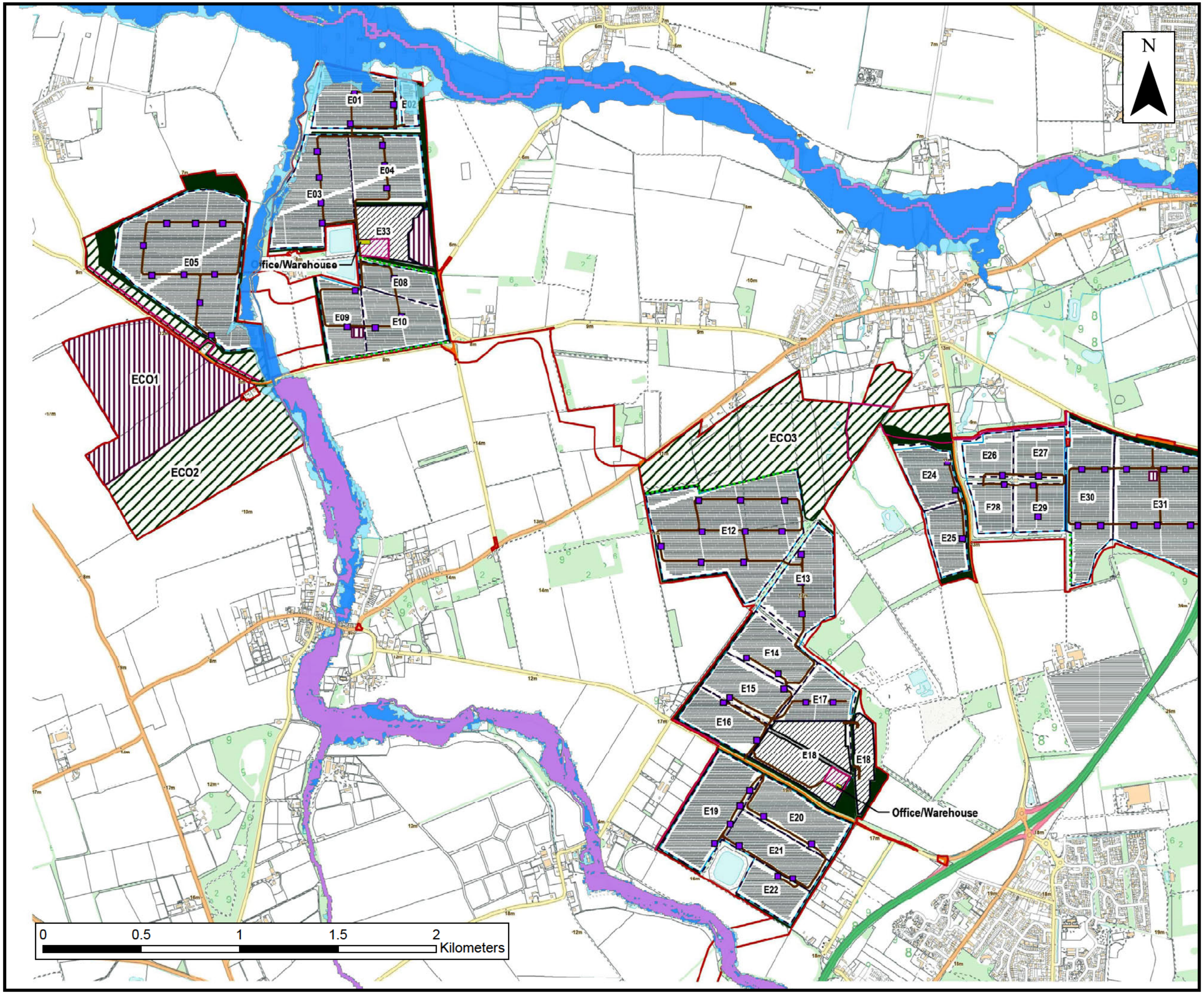
Annex B – Development Parameter Plans

Figure 4.1 and 4.2 of the Flood Risk Technical Note to indicate Flood Zone 3b extents.

Figure 6.1 and Figure 6.2 including additional Flood Map for Planning and

Temporary Construction Compounds

Topographical Survey for Sunnica East and West



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LEGEND

- Flood Zone 3B
- The Order limits
- Public Highway within Scheme

Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Flood Zone 2
- Flood Zone 3
- Illustrative Locations of Solar Stations
- Proposed Road
- Potential Provision of Permissive Route

Green Infrastructure

- Native Grassland Planting
- Native Grassland Planting within Archaeological Mitigation Areas
- Proposed Woodland (new planting or infilling of existing vegetation)
- Proposed Hedgerow (new planting or infilling of existing vegetation)

Note: Developable fields previously referred to as E06, E07, E11 and E23 are no longer being developed with solar infrastructure and now form part of the mitigation strategy; however, the field numbering for the remaining developable fields has been retained for consistency.
Document Reference: EN010106/APP/6.3
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Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
SUNNICA EAST PARAMETER PLAN AND FLOOD ZONES

Drawn	Checked	Approved	Date
RJG	RM	RS	21/09/2022

AECOM Internal Project No.	Scale @ A3
60589004	1:18,000

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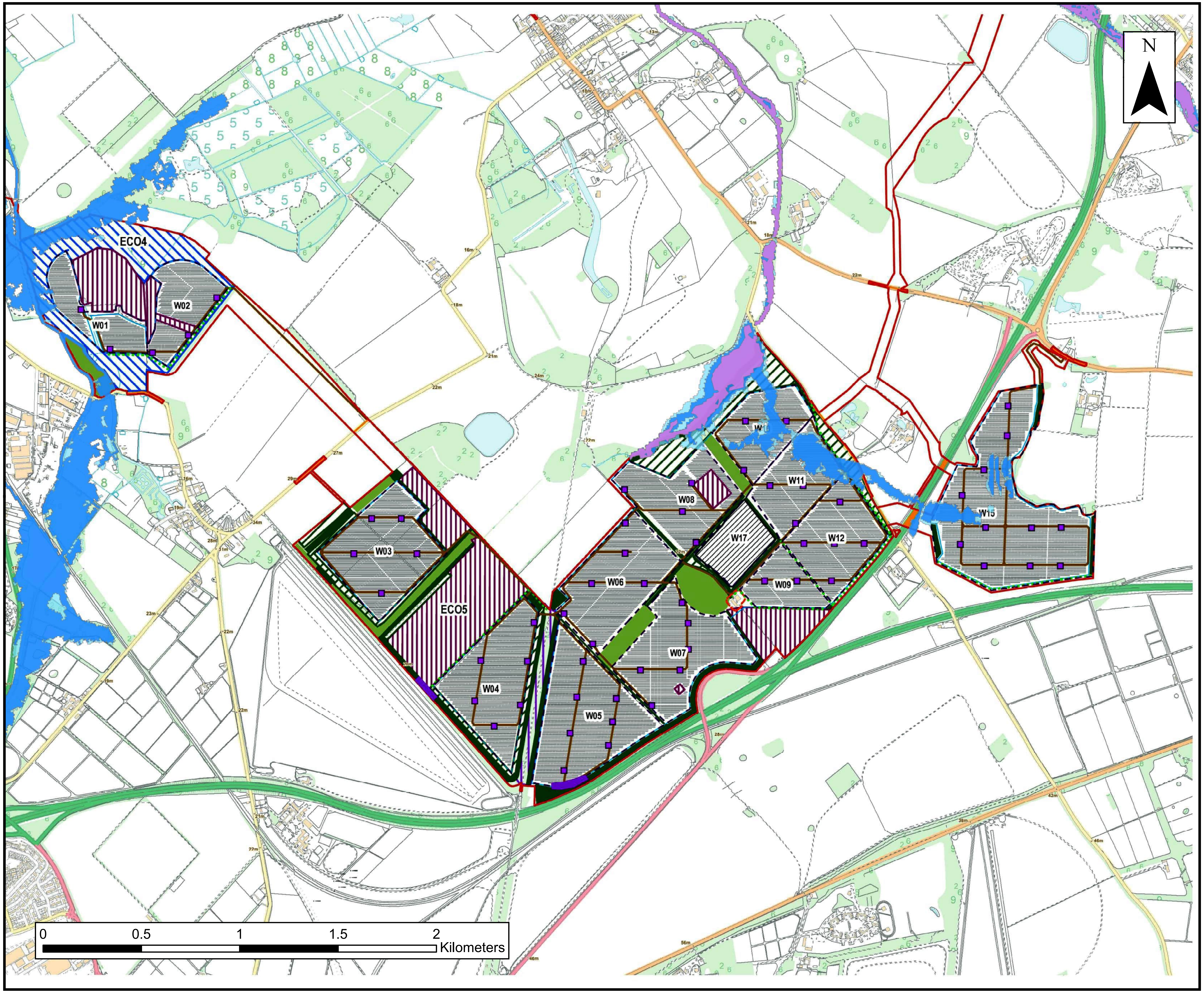

LEGEND

- Flood Zone 3B
- The Order limits
- Public Highway within Scheme

Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Flood Zone 2
- Flood Zone 3
- Illustrative Locations of Solar Stations
- Proposed Road
- Potential Provision of Permissive Route

Green Infrastructure

- Native Grassland Planting
- Native Grassland Planting within Archaeological Mitigation Areas
- Proposed Woodland (new planting or infilling of existing vegetation)
- Proposed Hedgerow (new planting or infilling of existing vegetation)

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Drawing Title
SUNNICA WEST PARAMETER PLAN AND FLOOD ZONES

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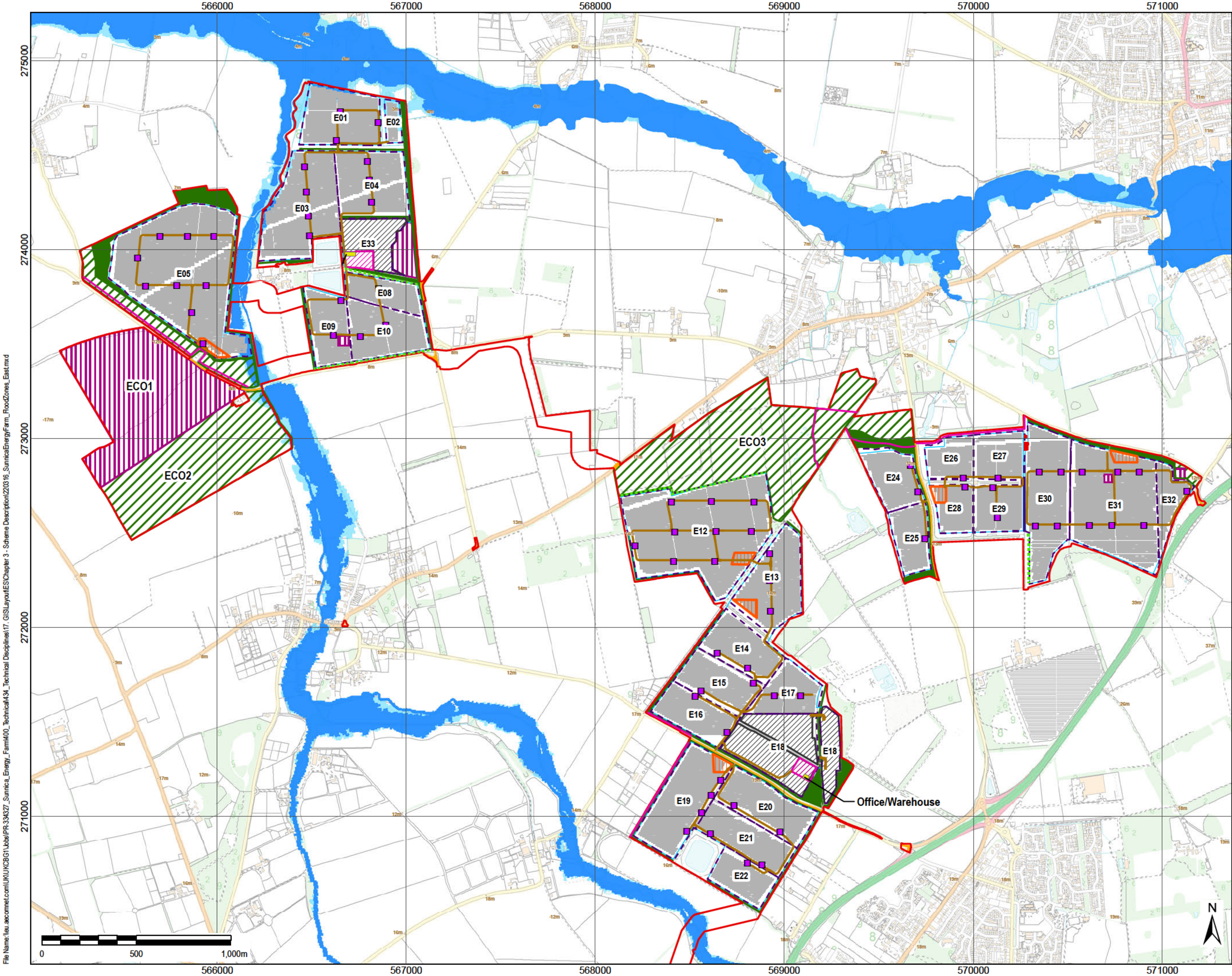

Note Developable fields previously referred to as E06 E07 E11 and E23 are no longer being developed with solar infrastructure and now form part of the mitigation strategy however the field numbering for the remaining developable fields has been retained for consistency.

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Cambridge

Purpose of Issue
FRA ADDENDUM

Client
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Project Title
sunnica energy farm

Drawing Title
FIGURE 6-1
SUNNICA EAST
PARAMETER PLAN
AND FLOOD ZONES

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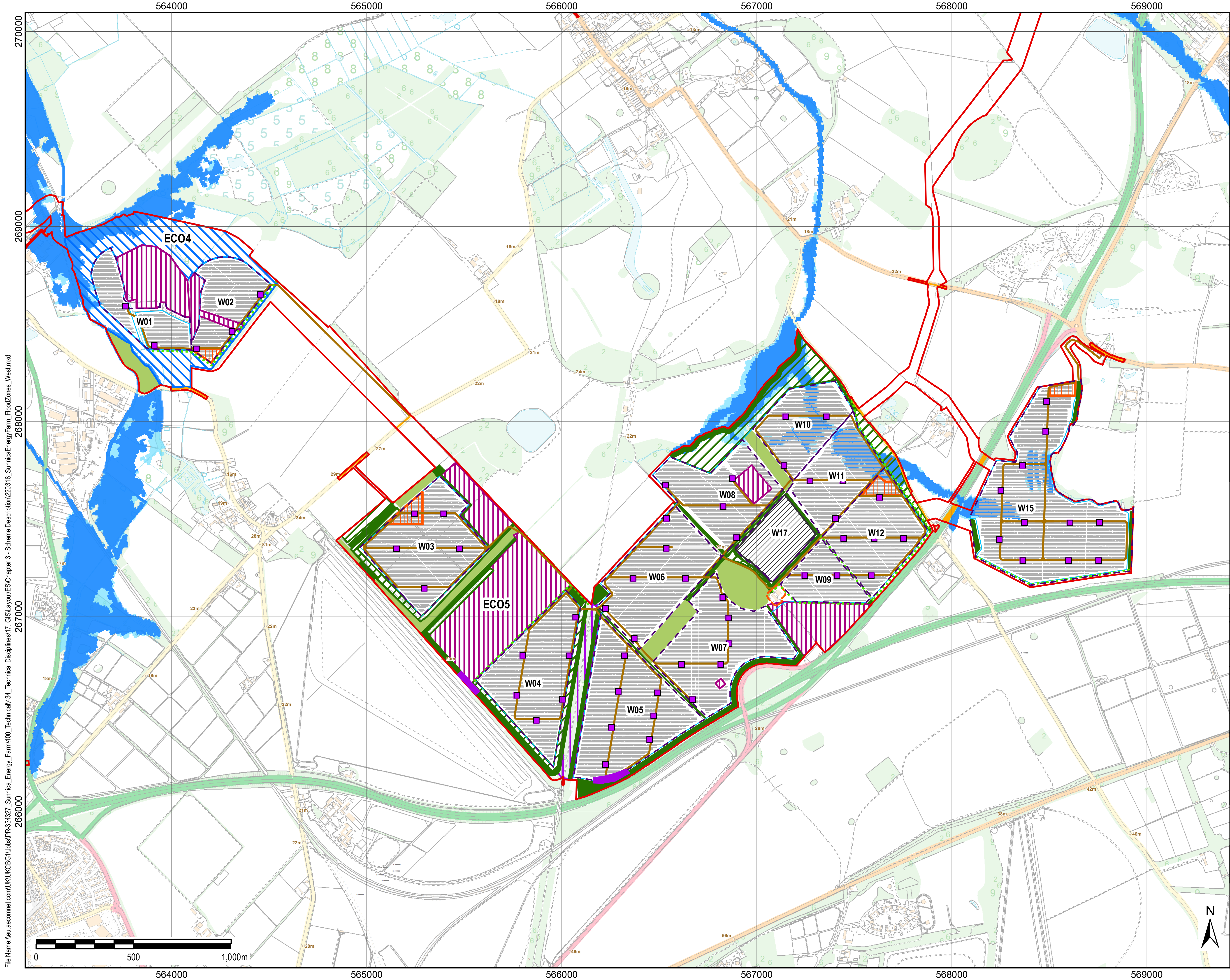

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LEGEND

- The Order limits
- Woodstore - 20m Buffer
- Public Highway within Scheme
- Proposed Fencing

Proposed Scheme Plan

- Developable Area
- Solar PV Array
- BESS and Substation
- Compound Area for Construction (Temporary)
- Boundary Fence
- Flood Zone 2
- Flood Zone 3
- Illustrative Location of Solar Stations
- Proposed Road

Green Infrastructure

- Native Grassland Planting
- Native Grassland Planting within Archaeological Mitigation Areas
- Native Grassland/Wetland
- Heritage Offset with additional planting along The Avenue
- Proposed Woodland (new planting or infilling of existing vegetation)
- Retained Woodland
- Proposed Hedgerow (new planting or infilling of existing vegetation)

Note: Developable fields previously referred to as W13 and W14 are no longer within the Order limits; however, the field numbering for the remaining developable fields has been retained for consistency.
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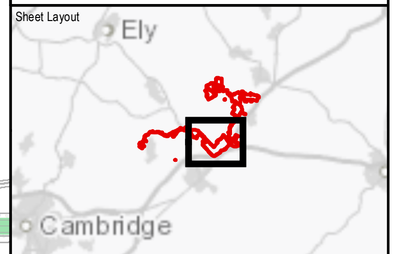

Purpose of Issue
FRA ADDENDUM

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FIGURE 6-2
SUNNICA WEST A AND B
PARAMETER PLAN
AND FLOOD ZONES

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PS Renewables
Green Energy Investments

PROJECT:	SUNNICA ENERGY FARM DEVELOPMENT CONSENT ORDER (DCO)
COMPANY:	PS RENEWABLES
LAYOUT:	TOPOGRAPHIC LAYOUT - EAST

DRAW BY:	Sergio Serna	PS RENEWABLES: 5 Stubbings Estate Maidenhead, Berkshire SL6 6QL	DATE:	-	Rev.: 5.4.1
DESIGN BY:	Nacho Perez		SCALE:	1:7.500	
CHECK BY:	David Ortiz		SIZE:	A1	

Power line with utility post
Gas pipeline
Tree canopy/hedgerow/foliage.
Water
Road
Buildings
Elevations contours (0.5 m) of digital surface
Major (metre) and minor (half-metre).
RED LINE BOUNDARY

Rev.	Date	Description Of change
02		
01		
00		

PS Renewables
Green Energy Investments

PROJECT:	SUNNICA ENERGY FARM DEVELOPMENT CONSENT ORDER (DCO)				
COMPANY:	PS RENEWABLES				
LAYOUT:	TOPOGRAPHIC LAYOUT - WEST				
DRAW BY:	Sergio Serna	PS RENEWABLES: 5 Stubbings Estate Maidenhead, Berkshire SL6 6QL	DATE:	-	Rev.: 5.4.2
DESIGN BY:	Nacho Perez		SCALE:	1:7.500	
CHECK BY:	David Ortiz		SIZE:	A1	

Annex C – Flood Risk Assessment Technical Note

Sunnica Energy Farm

Flood Risk Assessment Technical Note

Sunnica Ltd

Project Number: 60589004

December 2022

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
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Revision History

Revision	Revision date	Details	Verified	Position
1	23/09/2022	Draft Issue	Rob Sweet	Associate
2	18/10/2022	Updated draft issue	Rob Sweet	Associate
3	14/11/2022	Updated draft issue following EA comment	Rob Sweet	Associate
4	29/11/2022	Updated draft issue following further EA comments	Rob Sweet	Associate
5	05/12/2022	Final	Rob Sweet	Associate

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Table of Contents

Figures

Tables

1 Background

In accordance with the requirements of the National Planning Policy Framework (NPFF)[1], the Overarching National Policy Statement for Energy (EN-1)[2], and the National Policy Statement for Electricity Network Infrastructure (EN-5)[3], a Flood Risk Assessment (FRA)[4] and an outline Drainage Strategy (DS) were produced in January 2021 for the proposed Sunnica Energy Farm (hereafter referred to as the 'Proposed Development' or the 'Scheme').

The Proposed Development will consist of photovoltaic (PV) panels, solar stations, battery energy storage systems (BESS), substations, permanent and temporary construction compounds, access routes, and grid connection routes. The solar PV panels will be erected at four sites (Sunnica East Site A, Sunnica East Site B, Sunnica West Site A, and Sunnica West Site B) located within the counties of Cambridgeshire and Suffolk, and in the administrative areas of East Cambridgeshire District Council (ECDC) and West Suffolk Council (WSC). These sites will be connected by two grid connection routes (A and B) to the existing Burwell National Grid Substation. The scheme will encompass an area of approximately 1,113 hectares.

As a large renewable energy project the Proposed Development is classified as a Nationally Significant Infrastructure Project (NSIP). In alignment with the scheme's status as a NSIP, an application for a Development Consent Order (DCO) was made to the Planning Inspectorate. Under Schedule 1 of the Infrastructure Planning Regulations 2017[5], the Environment Agency is classified as a statutory consultee, and therefore must be consulted for all DCOs. As part of the consultation process for this scheme, the Environment Agency issued a relevant representation on 16 March 2022, which identified a number of outstanding issues relating to flood risk within the draft DCO application (Appendix A). A number of these issues are being addressed through an updated FRA while some are being addressed as part of this Technical Note. Issues addressed as part of this Technical Note include:

Issue 1.1: *Inadequate assessment of residual flood risk at Burwell Substation resulting from a potential breach of the Burwell Lode/Reach Lode flood defences. This prevents the appraisal of the proposal to raise the finished floor levels at the site to 850mm above ground level.*

Issue 1.3: *The FRA indicates that some of the solar PV panels will be located within Flood Zone 3. The proposed mitigation measures for these PV panels is to raise them 850mm above ground level. As no modelled flood levels have been provided in the FRA, it is unclear whether these will be raised high enough to ensure they would remain operational in the event of flooding and there be no impedance to floodwater flows.*

Issue 1.4: *Drawings documenting the site layout in relation to the flood zone extents haven't been included in the FRA, which are required to demonstrate that a sequential approach has been taken to the site layout. The FRA states that no above ground development will be located in Flood Zone 3b but this has not been demonstrated in the FRA.*

AECOM have been commissioned by Sunnica Energy Farm (hereafter referred to as 'the Client') to resolve the outstanding issues in the draft DCO application flagged by the Environment Agency in their relevant representation response (as listed above). This Technical Note outlines the measures taken by AECOM to resolve the three issues and summarises their significance in the context of the existing FRA.

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[1] National Planning Policy Framework (2021): https://www.gov.uk/government/publications/national-planning-policy-framework--2 [Accessed July 2022].
[2] Overarching National Policy Statement for Energy (EN-1): [redacted] [Accessed August 2022].
[3] National Policy Statement for Electricity Networks Infrastructure (EN-5) (2011): https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47858/1942-national-policy-statement-electricity-networks.pdf [Accessed August 2022].
[4] Sunnica Energy Farm Flood Risk Assessment (2021)
[5] Infrastructure Planning Regulations 2017: https://www.legislation.gov.uk/uksi/2017/572/contents/made [Accessed August 2022].

2 Issue 1.1 – Residual Risk

2.1 Introduction

Within the relevant representation response to the draft DCO application, the Environment Agency specified that in the case of the Burwell substation extension, the Environment Agency's Flood Map for Planning should take precedence over the East Cambridge District Council SFRA's mapping for the defended climate change scenario (which shows the substation extension to be positioned outside of the modelled flood extent), as the former is based on the undefended scenario.

The Environment Agency advised that for the purposes of the Sequential and Exception Tests, Burwell Substation should be deemed to lie within Flood Zone 3a, as shown by the Environment Agency's Flood Map for Planning (Figure 2), and breach modelling should be undertaken to determine the predicted flood level/depth in the event of a breach of the Burwell Lode/Reach Lode flood defences during a 1% AEP flood event (including an appropriate allowance for climate change). Therefore, as documented in the succeeding sections, AECOM liaised with the Environment Agency to confirm the requirements and location of the breach within the vicinity of the Burwell Substation, and to procure the hydraulic model at the location of the substation.

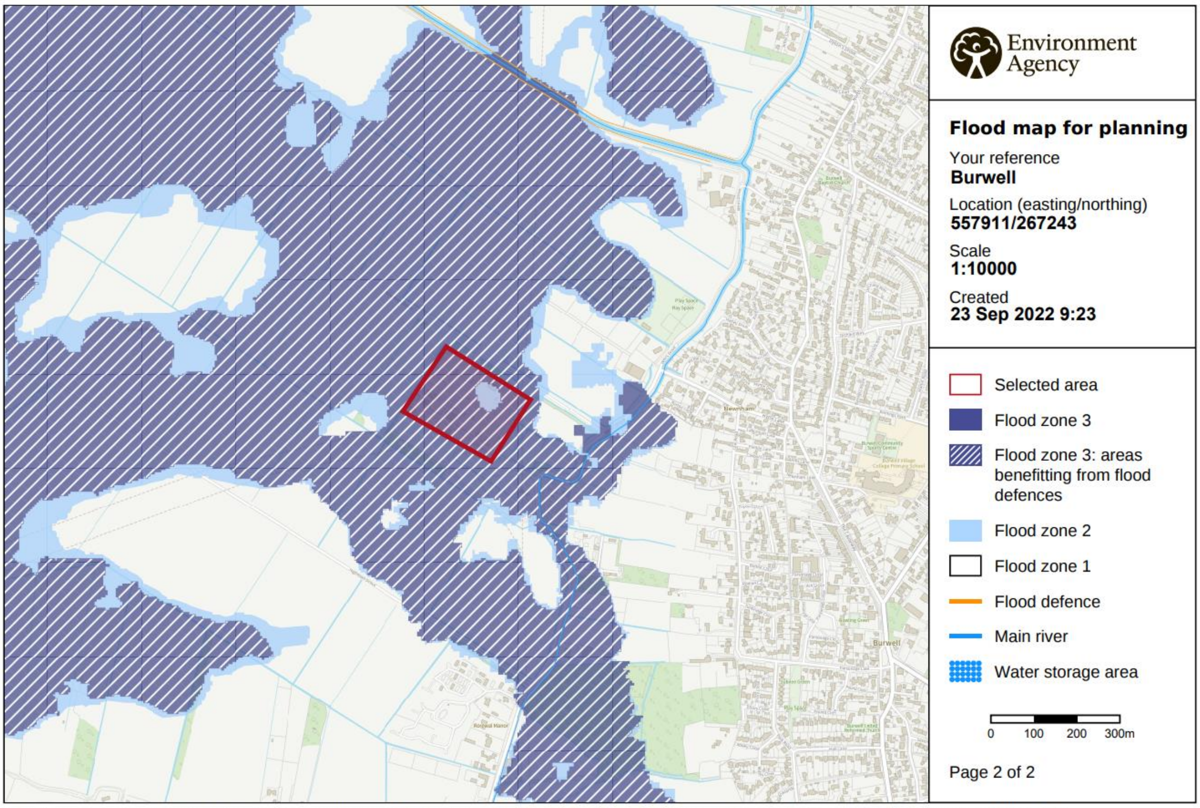

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Figure 2: Environment Agency's Flood Map for Planning (September, 2022)

2.2 Hydraulic model

In order to conduct the breach analysis, the Cam Lodes model, dated 22 February 2012, was procured from the Environment Agency. The Cam Lodes model was produced as part of Phase 2 of the River Cam Flood Mapping Improvements Project; this was undertaken by Halcrow Group Limited on behalf of the Environment Agency[6].

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[6] River Cam Flood Mapping Report – River Cam Flood Mapping Improvements Phase 2 (2012) [Accessed August 2022].

The 1D-2D (ISIS-TUFLOW) Cam Lodes model comprises the following watercourses:

- Bottisham Lode, from Little Wilbraham Fen (NGR: TL525585) to its confluence with the River Cam (NGR: TL510658);
- Swaffham Lode, from White Droveway near Swaffham Bulbeck (NGR: TL553634) to its confluence with the River Cam (NGR: TL523672);
- Reach Lode, from The Hythe, Reach (NGR: TL565664) to its confluence with the River Cam(NGR: TL538699);
- The Weirs, from Welsumme Farm (NGR: TL580663) to its confluence with Burwell Lode (NGR: TL586678);
- Catch Water Drain, from the New River (NGR: TL608700) to its confluence with Burwell Lode (NGR: TL586678);
- Burwell Lode, from Anchor Lane Farm (NGR: TL586678) to its confluence with Reach Lode (NGR: TL548693);
- New River and Monks Lode, from Chalk Farm near Landwade (NGR: TL619686) to its confluence with Wicken Lode (NGR: TL560702); and
- Wicken Lode, from Lode Lane, Wicken (NGR: TL563705) to its confluence with Reach Lode (NGR: TL542696).

On the assumption that the level in the River Cam would be too high to allow discharge via gravity, the downstream boundaries of the Lodes were taken to be the pumping stations located at the downstream limit of each Lode, which are represented by abstraction units. In addition, a large drain known as Commissioner's Drain which runs beneath some of the Lodes was represented within the model using ESTRY 1D culvert units linked to the 2D domain via SX boundaries. It should be noted however that the Environment Agency were unable to provide the modelling files for these features and therefore they were excluded from the model. It is not envisaged however that this will impact the breach simulations. A grid size of 6m was applied for the TUFLOW 2D domain.

2.3 Simulations

Two scenarios were initially simulated using the hydraulic model, namely the 1% AEP + 19% climate change baseline event (defended) (19% refers to the latest Higher Central allowance in the 2080s epoch for the Cam and Ely Ouse Management Catchment[7]), and a breach scenario for the same event. The modelled flood depths and levels from the breach modelling were then reviewed to provide updated finished floor levels at the 'Option 2' site located to the north of the existing Burwell Substation (as shown in Figure 2.1).

A sensitivity scenario was also simulated as requested by the Environment Agency for the 1% AEP + 45% climate change event (defended) (45% refers to the latest Upper End allowance in the 2080s epoch for the Cam and Ely Ouse Management Catchment) and a breach scenario for the same event. This was undertaken to confirm whether the proposed finished floor level of the substation was sufficient during the more extreme climate change scenario.

The original topographic data included within the received model was derived from a 2m composite LiDAR Digital Terrain Model (DTM) obtained in March 2011, and NEXTMAP Synthetic Aperture Radar (SAR) procured in June 2011. In the two scenarios simulated for the purposes of this Technical Note, the original topographic data was replaced with 1m resolution DTM generated as part of the National LiDAR programme in 2018[8].

The Environment Agency did not provide a specific breach location when contacted, however they suggested that the breach should be in close proximity to the substation, ideally at a low spot on the existing flood defence and in a location where there are no topographic barriers to floodwaters reaching the site.

[7] Cam and Ely Ouse Management Catchment peak river flow allowances: https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgmtcatid=3009 [Accessed August 2022].
[8] National LiDAR Programme: https://environment.data.gov.uk/dataset/2e8d0733-4f43-48b4-9e51-631c25d1b0a9 [Accessed August 2022].

Following a review of LiDAR elevations behind the defence, and between the defence and the Option 2 site, the breach location was positioned on the right bank of the Burwell Lode, as shown in Figure 2.1 and Figure 2.2. This is approximately 370m upstream of the Burwell Lode’s confluence with Catch Water Drain. This location was selected on the basis of its proximity to the substation, and the presence of a flow pathway between Burwell Lode and the Option 2 site.

In accordance with the requirements associated with earth bank defences on a fluvial watercourse, as presented in Table 1 of the Environment Agency’s Breaches of Defences guidance document (2021)[9], the breach width and time to close were set to 40m and 56 hours respectively. At the location of the breach, the defences were effectively removed on the right bank by lowering the elevations of the riverbank to match those of the ground levels behind the defence in the 2018 LiDAR DTM over the 40m wide stretch. The breach was initiated in the simulation at 33 hours and 29.25 hours for the 1% AEP + 19% climate change event and 1% AEP + 45% climate event respectively, which reflected the point at which water levels in the channel reached ¾ of the height of the flood defences during each event. This is in line with the indicative start time provided for a fluvial situation in the Environment Agency’s Breaches of Defences guidance document.

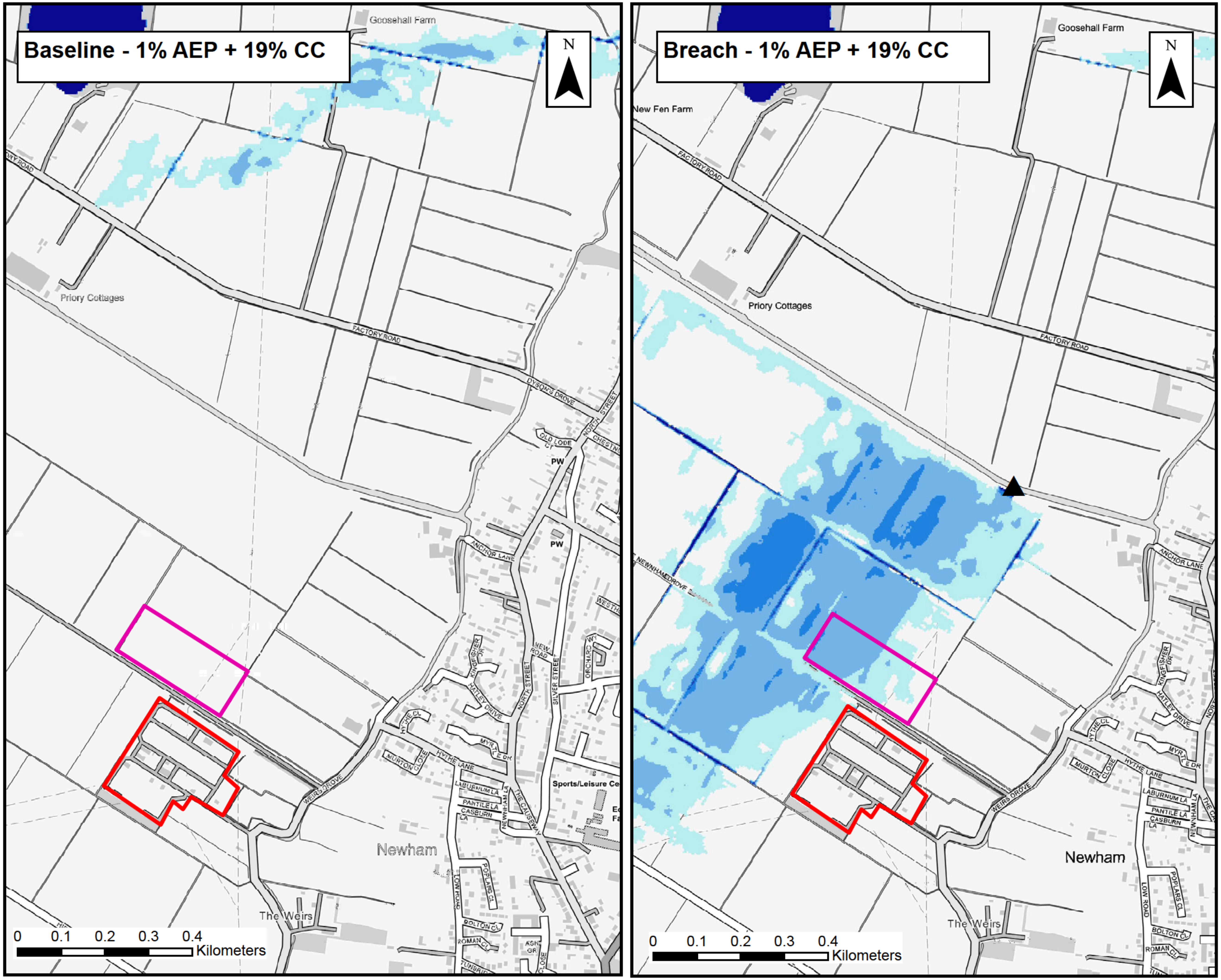
Figure 2.1 illustrates the baseline (defended) scenario for the 1% AEP + 19% climate change alongside the breach scenario for the same event. Figure 2.2 presents the baseline (defended) scenario and breach scenario for the 1% AEP + 45% climate change event.

2.4 Summary of results

Figure 2.1 indicates that following a breach of the flood defences along the right bank of the Burwell Lode during the 1% AEP + 19% climate change event, ‘Option 2’ sits within the modelled inundation zone. A maximum flood depth of approximately 0.70m is recorded within the ‘Option 2’ site along the western boundary however across the majority of the site, flood depths do no exceed 0.50m. For the 1% AEP + 45% climate change event (Figure 2.2), the maximum flood depth increases to approximately 0.75m along the western boundary, however the same applies with the +19% climate change event with flood depths across the majority of the site not exceeding 0.50m.

Based on the hydraulic modelling results presented above, the proposed measure of raising the finished floor levels of the substation within the Option 2 boundary by 850mm in the FRA, would be sufficient and would allow a freeboard of approximately 0.15m during the 1% AEP + 19% climate change event and 0.10m during the 1% AEP + 45% climate change event.

[9] LIT 56413 Environment Agency Breaches of Defence Guidance (2021)



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LEGEND

- ▲ Breach Location
- Option 2
- Burwell Substation

1% AEP + 19% Climate Change max depth (m)

- 0.0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1.0
- > 1.0

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Purpose of Issue
FOR ENVIRONMENT AGENCY CONSULTATION

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
MODELLED FLOOD DEPTHS FOR THE 1% AEP + 19% CLIMATE CHANGE BASELINE AND BREACH EVENTS

Drawn	Checked	Approved	Date
RJG	RM	RS	22/11/2022

AECOM Internal Project No.	Scale @ A3
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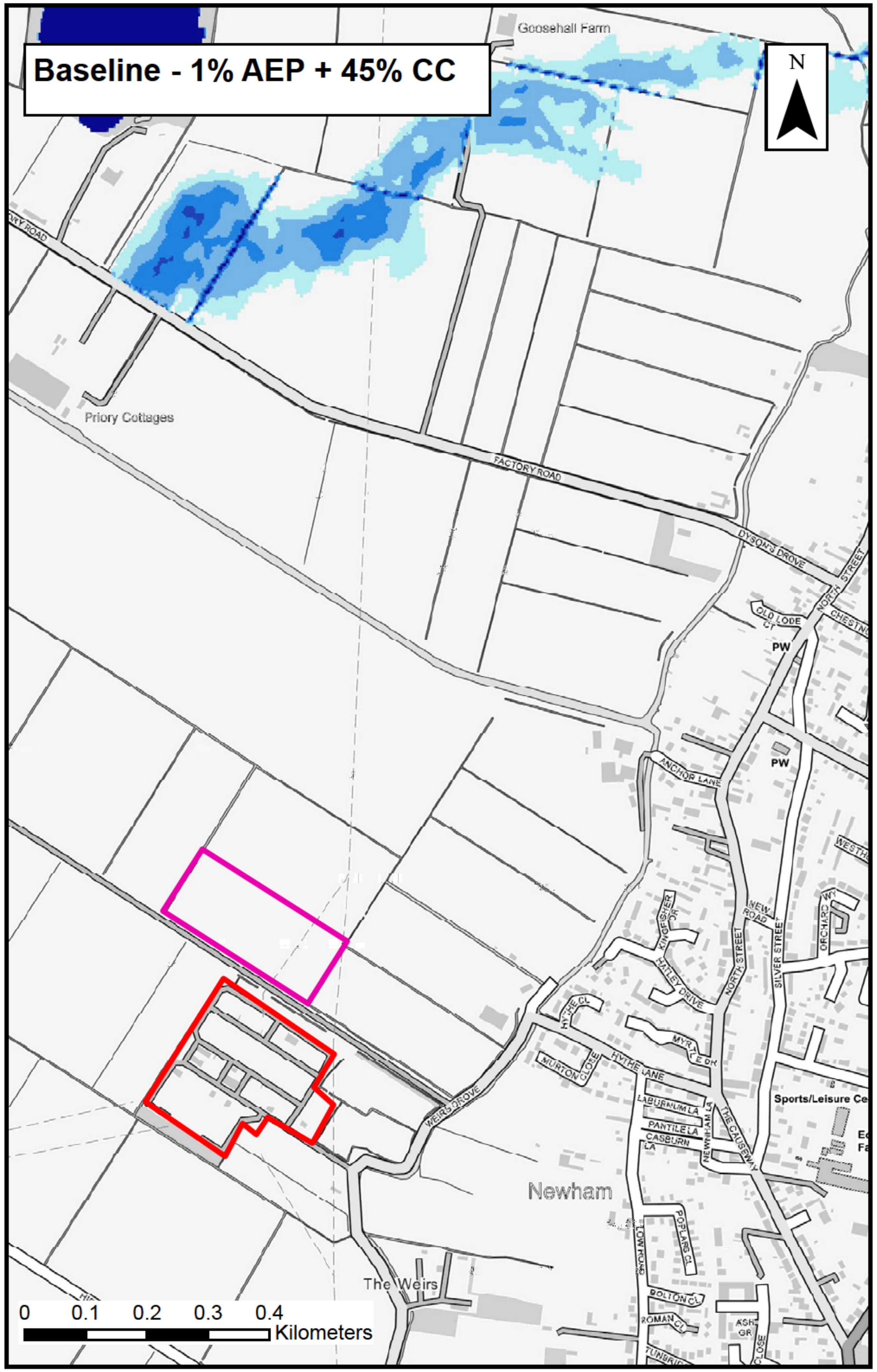

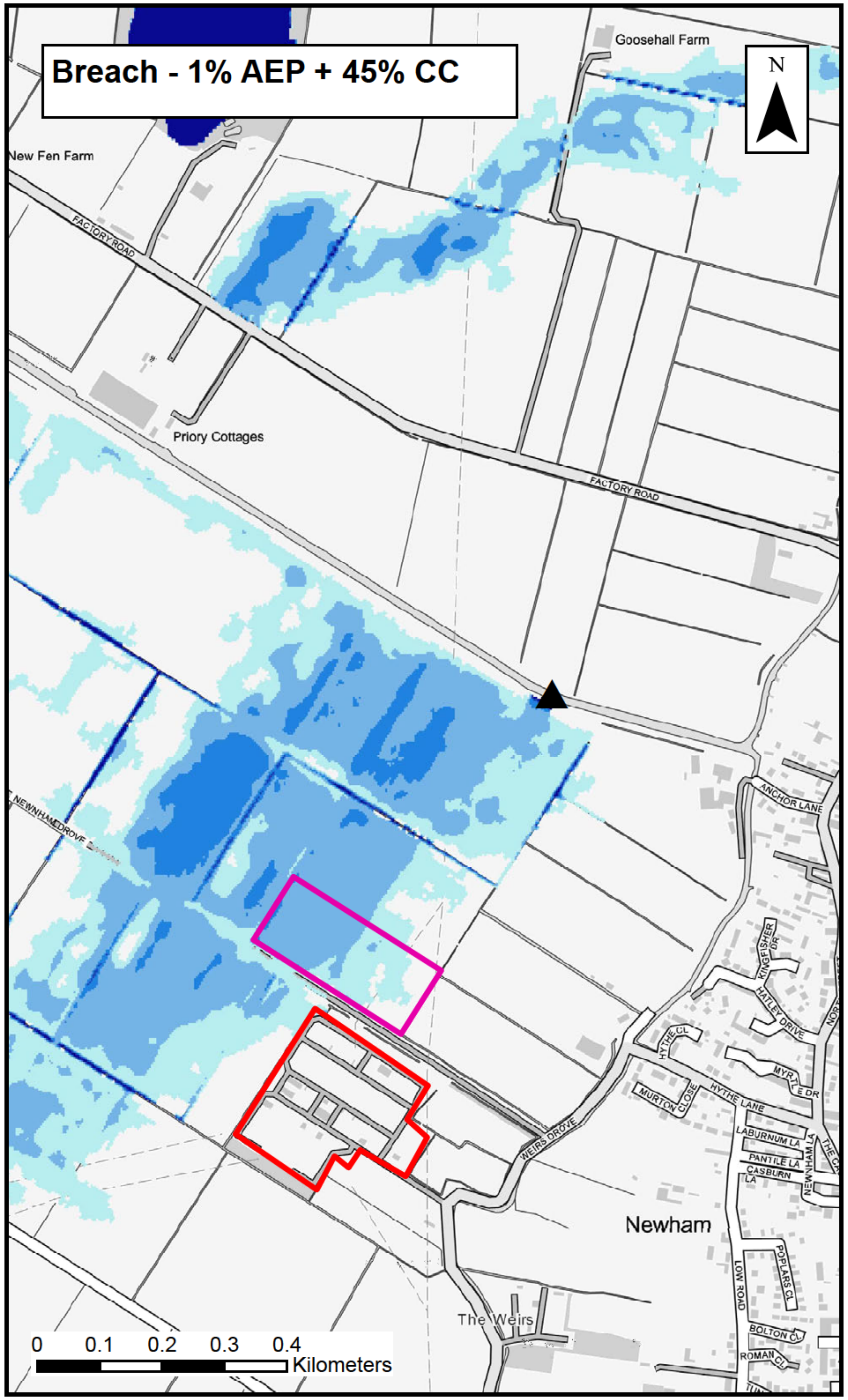

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LEGEND

- Breach Location
- Option 2
- Burwell Substation

1% AEP + 45% Climate Change max depth (m)

- 0.0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1.0
- > 1.0

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MODELLED FLOOD DEPTHS FOR THE 1% AEP + 45% CLIMATE CHANGE BASELINE AND BREACH EVENTS

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FIGURE 2.2

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3 Issue 1.3 – Modelled Flood Levels

3.1 Introduction

The existing FRA overlayed the SFRA climate change extents on to a topographic survey in order to determine whether the proposed mitigation measure of raising the PV panels to 850mm above ground level was adequate. However, within the relevant representation the Environment Agency stipulated that this was not an acceptable method for estimating the 1% AEP plus climate change flood level. Results from detailed hydraulic modelling of the surrounding watercourses have therefore been used to review the efficacy of the proposed mitigation measures at the location of the PV panels located within Flood Zones 3. These are provided in the following sub-sections.

3.2 Hydraulic model

Hydraulic models encompassing the River Lark and the River Kennett were provided by the Environment Agency. The two models procured were originally developed by JBA Consulting on behalf of the Environment Agency as part of the Eastern Rivers instalment of the Water and Environmental Management framework. They form two of the thirteen modelling packages (MPs) generated as part of this project. The River Kennett model, or MP13, dated July 2015, consists of three watercourses: the River Kennett, the Chippenham tributary, and the Denham Stream[10]. Upstream sections of MP13 were represented entirely within a 2D TUFLOW model due to the absence of channel survey data. However, downstream of Dalham, the section of the River Kennett which is most relevant to the sites (Sunnica West Sites A and B) under consideration here, a 1D/2D ISIS TUFLOW approach was utilised to represent the river channel and the floodplain. This model utilised a grid resolution of 10m for the 2D TUFLOW domain.

With regards to the River Lark, the sections of this watercourse proximal to Sunnica East Sites A and B are covered by the 1D/2D ISIS TUFLOW Lower Rivers model, or MP1, dated October 2015[11]. MP1 consists of the Cut off Channel, the River Lark, the River Wissey, and the Little Ouse. A coarse grid resolution of 24m was employed for the TUFLOW domain due to the size of the model (450km^2).

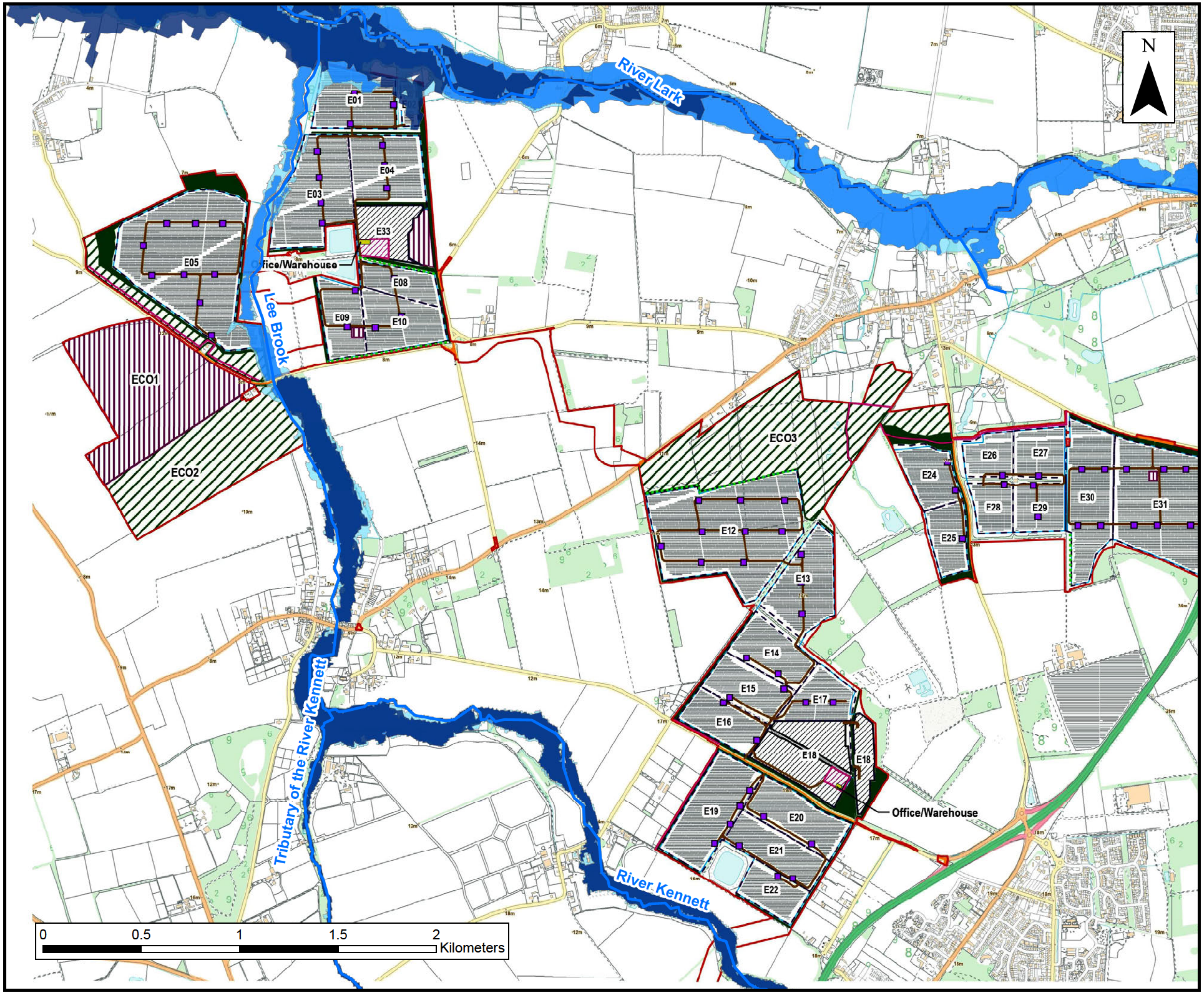
3.3 Overview of parcel locations

The modelled flood levels from the Lower Rivers and River Kennett modelling packages for the design event (1% AEP + 20% climate change) were reviewed for the locations of the solar panels within Flood Zones 3, which included parcels E01, E03, E05, W08, W10, W11, W12 and W15. Parcel E02 was also included although this coincides with Flood Zone 2 only.

Parcels E01 and E02 are located at the northern end of Sunnica East Site A adjacent to the River Lark and Lee Brook confluence, whilst E03 and E05 are positioned immediately to the south at the same site and abut the Lee Brook (Figure 3.1).

Parcels W08, W10, W11, W12 and W15 are located at Sunnica West Site B, with the first two parcels adjoining a small tributary of the River Kennett just south of Chippenham (Figure 3.2).

[10] Eastern Rivers Modelling Report: River Lark and River Kennett July 2015 [Accessed August 2022].
[11] Eastern Rivers Modelling Report: Lower Rivers October 2015 [Accessed August 2022].



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LEGEND

- Watercourses
- 1% AEP + 20% CC Flood Extent
- The Order limits
- Public Highway within Scheme

Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Flood Zone 2
- Flood Zone 3
- Illustrative Locations of Solar Stations
- Proposed Road
- Potential Provision of Permissive Route

Green Infrastructure

- Native Grassland Planting
- Native Grassland Planting within Archaeological Mitigation Areas
- Proposed Woodland (new planting or infilling of existing vegetation)
- Proposed Hedgerow (new planting or infilling of existing vegetation)

Note: Developable fields previously referred to as E06, E07, E11 and E23 are no longer being developed with solar infrastructure and now form part of the mitigation strategy; however, the field numbering for the remaining developable fields has been retained for consistency.
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Drawing Title
SUNNICA EAST PARAMETER PLAN AND WATERCOURSES

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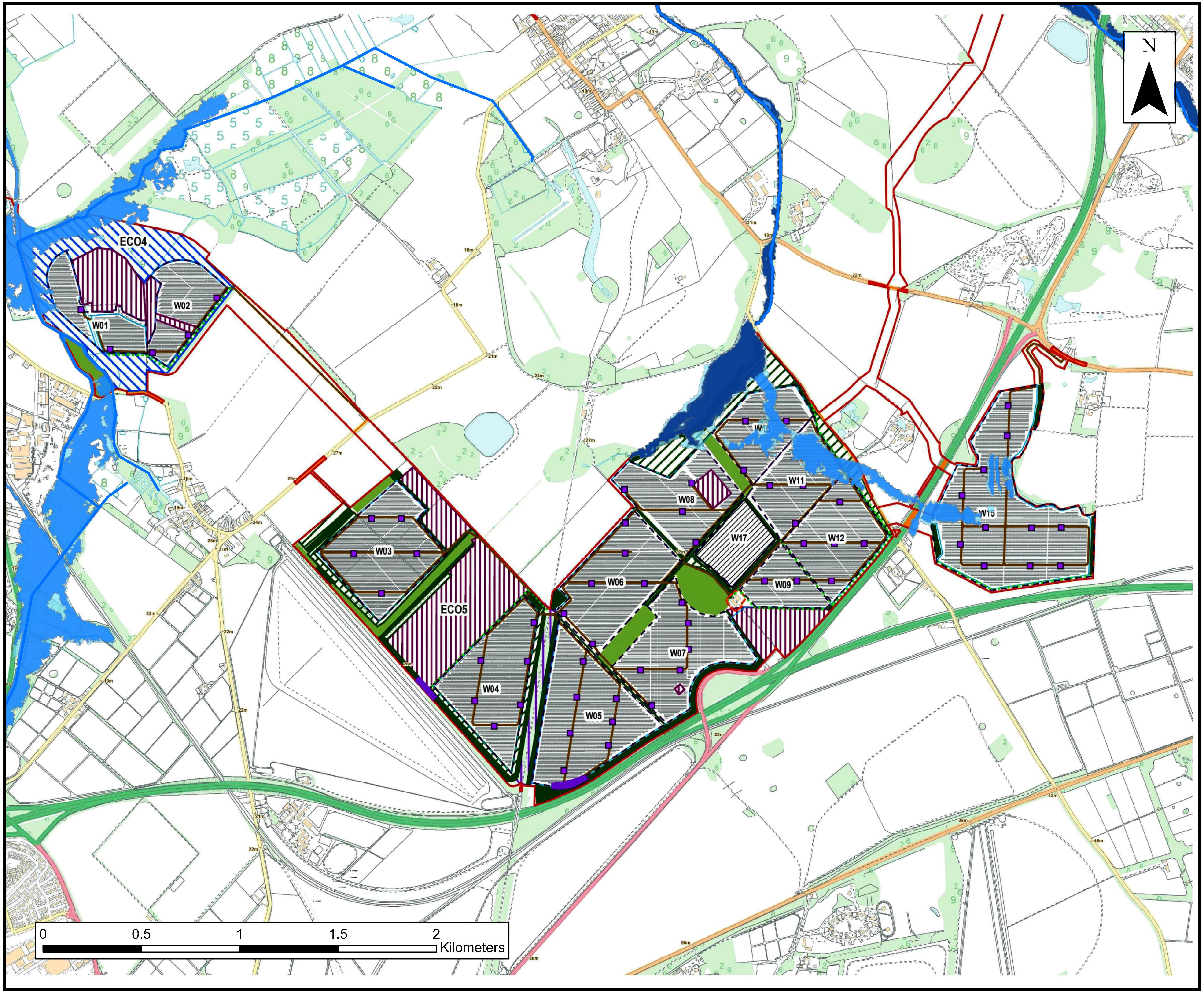

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LEGEND

- Watercourses
- 1% AEP + 20% CC Flood Extent
- The Order limits
- Public Highway within Scheme

Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Flood Zone 2
- Flood Zone 3
- Illustrative Locations of Solar Stations
- Proposed Road
- Potential Provision of Permissive Route

Green Infrastructure

- Native Grassland Planting
- Native Grassland Planting within Archaeological Mitigation Areas
- Proposed Woodland (new planting or infilling of existing vegetation)
- Proposed Hedgerow (new planting or infilling of existing vegetation)

Note: Developable fields previously referred to as W13 and W14 are no longer within the Order Limits; however, the field numbering for the remaining developable fields has been retained for consistency.
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Purpose of Issue
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Project Title
sunnica energy farm

Drawing Title
SUNNICA WEST PARAMETER PLAN AND WATERCOURSES

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FIGURE 3.2	02

3.4 Summary of modelled flood levels

The 1% AEP + 20% climate change flood level data and depth grids from the Lower Rivers (MP1) and River Kennett (MP13) modelling packages were utilised to extract the maximum flood levels for parcels E01, E02, E03, E05 and W08 as shown in Table 3.1. The modelled nodes used for each parcel where flood level data was extracted, is also shown in Table 3.1 with the Environment Agency's Product Data included in Appendix B. For W08, the flood level was extracted from the River Kennett 2D grid results as this parcel was not located directly adjacent to the watercourse and therefore a level was extracted at the point where floodwater reached the boundary of the parcel. It should be noted that flood depths have been calculated by comparing the in-channel flood level against the site-specific topographic data.

Cross-comparison of the modelled flood levels and the parcel locations demonstrated that parcels W10, W11, W12, and W15 were positioned outside the modelled flood extent for the 1% AEP + 20% climate change event. No flood levels or depths are therefore included within Table 3.1 for these parcels.

It should also be highlighted that where an * is presented, this indicates that the flood level was extracted from the 1D modelled channel node closest to each parcel and in some cases (where flood depths are 0.00m), the existing ground level is higher than the modelled flood level.

Table 3.1: Summary of modelled flood levels

Parcel	Modelled Node Data Extracted	1% AEP + 20% climate change flood level (m AOD)	Maximum Flood depth (m)	Depths above 850mm (Y/N)
E01	LARK_15913	2.97*	0.00	N
E02	LARK_16112	2.98*	0.13	N
E03	KEN_01000	2.96*	0.00	N
E05	KEN_01700u	3.91*	0.31	N
W08	n/a	19.29	0.00	N
W10	n/a	0.00	0.00	N
W11	n/a	0.00	0.00	N
W12	n/a	0.00	0.00	N
W15	n/a	0.00	0.00	N

The results of the above analyses presented in Table 3.1 can be summarised as follows:

- For parcels E01, E02 and E03 the modelled flood level for the 1% AEP + 20% climate change event ranges between 2.96m AOD and 2.98m AOD. When compared against the site-specific topographic data, the maximum flood depth is approximately 0.00m, 0.13m and 0.00m for each parcel respectively. For E01 and E03 the ground level of the parcel is greater than the 1D in-channel flood level.
- For parcel E05, the modelled flood level for the 1% AEP + 20% climate change event is 3.91m AOD (extracted from 1D node KEN_01700u). When compared against the site-specific topographic data, the maximum flood depth within the parcel is approximately 0.31m.
- The flood level noted for parcel W08 for the 1% AEP + 20% climate change event is 19.29m AOD. This has been extracted from the 2D results of the River Kennett model. Review of the topographical survey indicates that the lowest site level in parcel w08 is approximately 19.60m AOD, 0.31m above the 1% AEP + 20% climate change flood level.

- The hydraulic modelling for the River Kennett indicates that floodwater during the 1% AEP + 20% climate change event doesn't extend to parcels W10, W11, W12, and W15, as denoted by the flood level of 0.00m AOD and flood depth of 0.00m.

To understand the flood level during a 1% AEP + 22% climate change event (i.e. in line with the Upper End allowances for 2050s for the Cam and Ely Ouse Management Catchment area), as requested by the Environment Agency, further analysis of the results has been undertaken.

Parcels E03 and E05

According to the results provided by the Environment Agency for the Eastern Rivers (River Kennett) model, the difference between the 1% AEP flood level (2.91m AOD) and the 1% AEP + 20% climate change (2.96m AOD) at the location of parcels E03 is 0.05m. Applying a conservative approach, an increase of 0.10m has been assumed for the 1% AEP + 22% climate change event, resulting in a flood level of 3.01m AOD.

The same approach has been applied for parcel E05. The difference between the 1% AEP flood level (3.86m AOD) and the 1% AEP + 20% climate change (3.91m AOD) is 0.05m. Applying a conservative approach, an increase of 0.10m has been assumed for the 1% AEP + 22% climate change event, resulting in a flood level of 3.96m AOD.

Parcels E01 and E02

For parcels E01 and E02 a different approach has been applied as data is assessed from a different watercourse (River Lark) and therefore a different model (Lower Rivers model). For these parcels the 1% AEP + 20% climate change flood level is 2.97m AOD and 2.98m AOD respectively. Adopting a conservative approach, it has been assumed that the 1% AEP + 22% climate change flood level would not exceed the 0.1% AEP flood level which is 3.02m AOD for parcel E01 and 3.03m AOD for parcel E02. These levels have therefore been considered for this climate change event.

To validate this approach, a stage-discharge curve was developed for each parcel using the results provided by the Environment Agency for the Lower Rivers model and Eastern Rivers model (Appendix C). This confirmed that the flood levels generated from the stage-discharge approach (2.99m AOD for E01, 3.00m AOD for E02, 2.97m AOD for E03 and 3.92m AOD for E05) are less than those levels proposed above.

3.5 Finished Floor Levels

It is not considered necessary to raise the PV panels in areas E01, E02 and E03 as the standard 600mm panel height provides sufficient freeboard during both design climate change scenarios and for the credible maximum scenario (as stated in 9.1.1 of the FRA Addendum).

Within the FRA Addendum, section 8.1.11 states that the solar PV panels in area E05 would be raised by an additional 100mm, to a total of 700mm above ground level, in order to provide flood protection. With this increase, the results in Table 3.1 indicate that for these PV panel areas, the panels are raised sufficiently above the 1% AEP + 20% climate change level with a freeboard of 300mm or greater. With the additional depth of PV panels in E05, the same also applies when considering the 1% AEP + 22% climate change event (credible maximum scenario).

It is noted that the proposed mitigation levels of PV panels in Flood Zone 3a are lower than those stated in the original FRA (i.e. 850mm); the FRA Addendum review of modelled climate change levels from the supplied Environment Agency Product 4 data has provided lower flood levels than the flood level estimated from the flood map for planning, which was previously used to assess flood risk.

With regards to the other PV areas listed in Table 3.1, they are outside the modelled flood extents for the 1% AEP + 20% climate change events (W08, W10, W11 and W12, and W15), from a comparison of the topographic information and modelling results (as documented within the revised FRA Addendum report). The same applies for the 1% AEP + 22% climate change event.

4 Issue 1.4 – Updated Drawings

4.1 Introduction

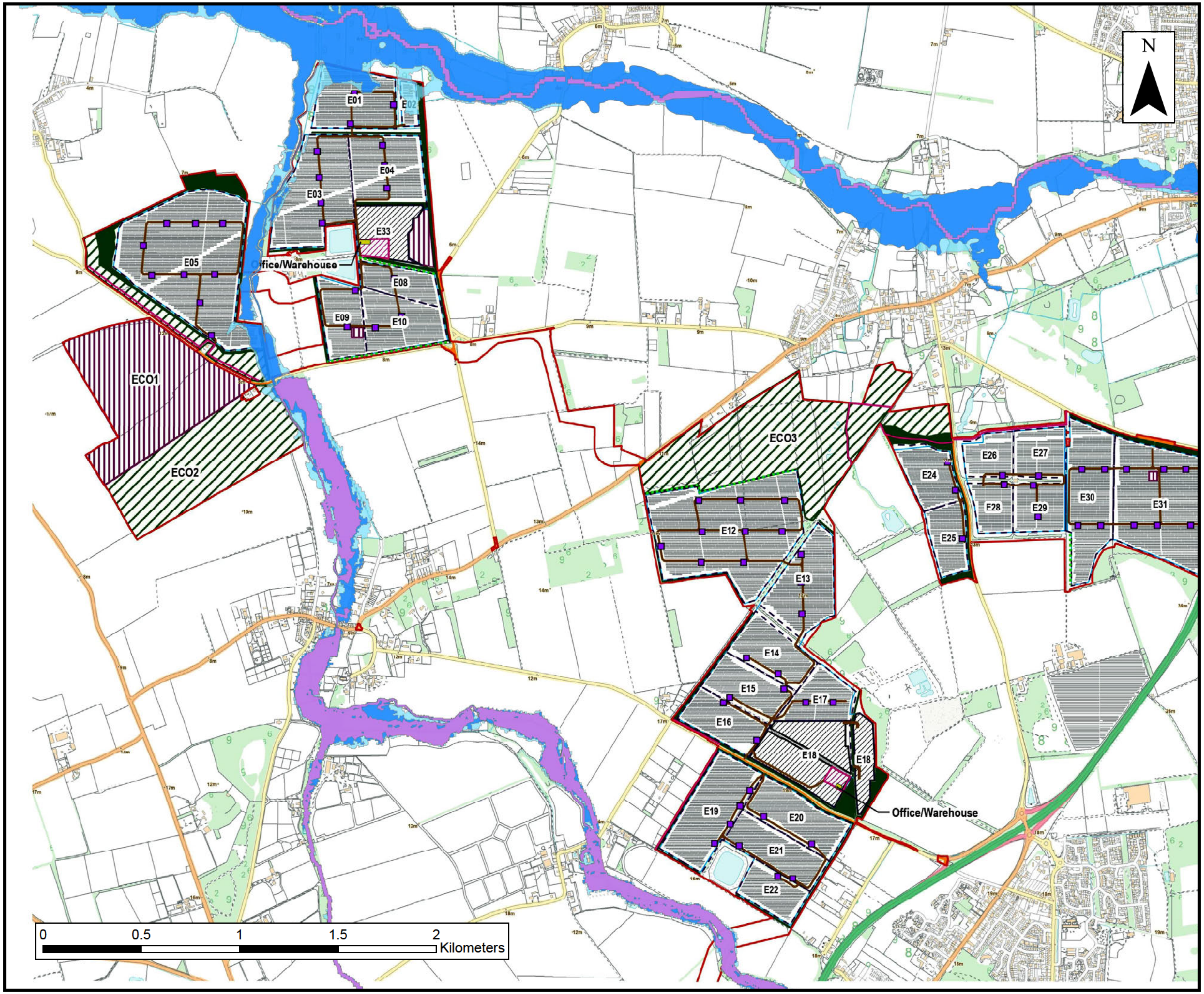
Drawings depicting the layout of the sites in relation to the flood zone extents were not provided in the FRA. Given that these are required to demonstrate a sequential approach to the site layout has been applied, and to portray which parts of the Proposed Development are sited within Flood Zones 2 and 3, the Environment Agency's relevant representation stipulated that such drawings must be included clearly showing the site arrangement relative to the extents of Flood Zones 2, 3a and 3b.

4.2 Creation of site layout maps

Figures showing the schematisation of Sunnica East Sites A and B, and Sunnica West Sites A and B have been produced. The schematisations in each figure have been overlaid with the extents for Flood Zones 2, 3a and 3b. The extents for Flood Zones 2[12] and 3[13] were downloaded from DEFRA'S Data Services Platform for the four sites. In accordance with recent changes (August 2022) to the Planning Practice Guidance (PPG)[14] the 3.3% AEP flood extent generated by the Lower Rivers (MP1) model was utilised to show Flood Zone 3b for the River Lark in Figure 4.1. However, as the 3.3% AEP flood extent was unavailable for the River Kennett (MP13) model, the 5% AEP flood extent was retained for the River Kennett in Figures 4.1 (upstream of Beck Road) and Figure 4.2.

Figures 4.1 and 4.2 were then employed to demonstrate that a sequential approach had been applied to the proposed development, such that no above ground development would be constructed in areas coinciding with Flood Zone 3b.

[12] Flood Map for Planning (Rivers and Sea) – Flood Zone 2: https://environment.data.gov.uk/dataset/86ec354f-d465-11e4-b09e-f0def148f590 [Accessed August 2022].
[13] Flood Map for Planning (Rivers and Sea) – Flood Zone 3: https://environment.data.gov.uk/dataset/87446770-d465-11e4-b97a-f0def148f590 [Accessed August 2022].
[14] Planning Practice Guidance: https://www.gov.uk/government/collections/planning-practice-guidance [Accessed September 2022].



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Flood Zone 3B
- The Order limits
- Public Highway within Scheme

Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Flood Zone 2
- Flood Zone 3
- Illustrative Locations of Solar Stations
- Proposed Road
- Potential Provision of Permissive Route

Green Infrastructure

- Native Grassland Planting
- Native Grassland Planting within Archaeological Mitigation Areas
- Proposed Woodland (new planting or infilling of existing vegetation)
- Proposed Hedgerow (new planting or infilling of existing vegetation)

Note: Developable fields previously referred to as E06, E07, E11 and E23 are no longer being developed with solar infrastructure and now form part of the mitigation strategy; however, the field numbering for the remaining developable fields has been retained for consistency.
Document Reference: EN010106/APP/6.3
APFP Regulation: 5(2)(a)

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Purpose of Issue
FOR ENVIRONMENT AGENCY CONSULTATION

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
SUNNICA EAST PARAMETER PLAN AND FLOOD ZONES

Drawn	Checked	Approved	Date
RJG	RM	RS	21/09/2022

AECOM Internal Project No.	Scale @ A3
60589004	1:18,000

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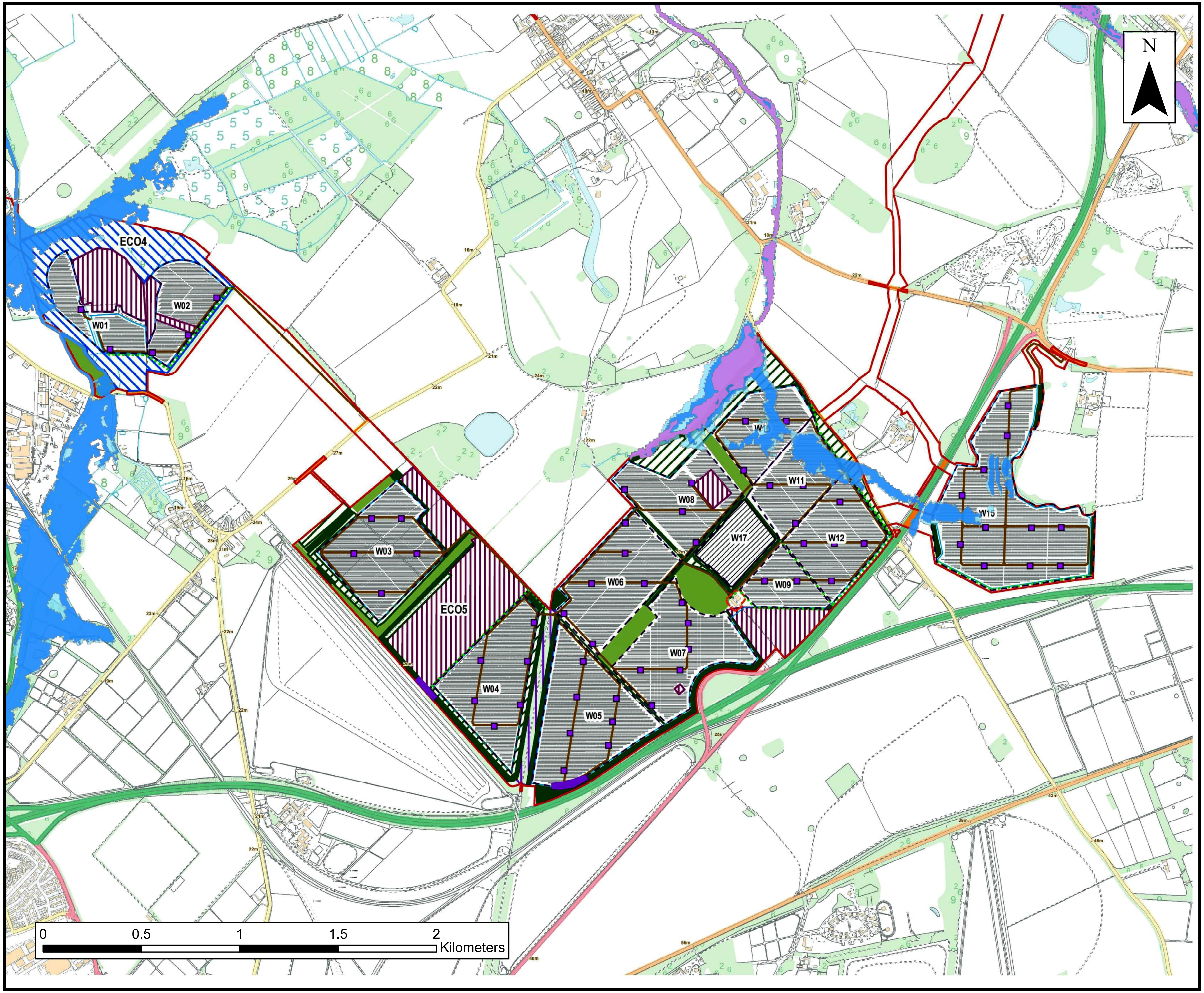
Drawing Number	Rev
FIGURE 4.1	01



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Flood Zone 3B
- The Order limits
- Public Highway within Scheme

Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Flood Zone 2
- Flood Zone 3
- Illustrative Locations of Solar Stations
- Proposed Road
- Potential Provision of Permissive Route

Green Infrastructure

- Native Grassland Planting
- Native Grassland Planting within Archaeological Mitigation Areas
- Proposed Woodland (new planting or infilling of existing vegetation)
- Proposed Hedgerow (new planting or infilling of existing vegetation)

Note: Developable fields previously referred to as W13 and W14 are no longer within the Order limits; however, the field numbering for the remaining developable fields has been retained for consistency.
Document Reference: EN010106/APP/6.3
APFP Regulation: 5(2)(a)
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Purpose of Issue
FOR ENVIRONMENT AGENCY CONSULTATION

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
SUNNICA WEST PARAMETER PLAN AND FLOOD ZONES

Drawn	Checked	Approved	Date
RJG	RM	RS	24/03/2023

AECOM Internal Project No.	Scale @ A3
60589004	1:18,000

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Drawing Number	Rev
FIGURE 4.2	02

Appendix A - Environment Agency Response

DRAFT

The Planning Inspectorate
Temple Quay House
Temple Quay
Bristol
BS1 6PN

Our ref: AC/2022/130910/01-L01
Your ref: EN010106

Date: 16 March 2022

Dear Sir/Madam

APPLICATION FOR DEVELOPMENT CONSENT ORDER - SUNNICA ENERGY FARM - RELEVANT REPRESENTATION ON BEHALF OF THE ENVIRONMENT AGENCY

Please find enclosed the Relevant Representation on behalf of the Environment Agency in relation to the above application for a Development Consent Order (DCO).

The Environment Agency's Role

We are a statutory consultee on all applications for development consent orders. We have a responsibility for protecting and improving the environment, as well as contributing to sustainable development.

We have three main roles:

We are an environmental regulator – we take a risk-based approach and target our effort to maintain and improve environmental standards and to minimise unnecessary burdens on business. We issue a range of permits and consents.

We are an environmental operator – we are a national organisation that operates locally. We work with people and communities across England to protect and improve the environment in and integrated way. We provide a vital incident response capability.

We are an environmental advisor – we compile and assess the best available evidence and use this to report on the state of the environment. We use our own monitoring information and that of others to inform this activity. We provide technical information and advice to national and local governments to support their roles in policy and decision-making.

One of our specific functions is as a Flood Risk Management Authority. We have a general supervisory duty relating to specific flood risk management matters in respect of flood risk arising from Main Rivers or the sea.

Pre-application consultation

We have been working with the applicant, Sunnica, and their consultants to advise them on the environmental constraints and opportunities associated with the scheme.

Environment Agency
Bromholme Lane, Brampton, Huntingdon, PE28 4NE.
Customer services line: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk
Cont/d..

We are in discussions with the applicant to agree a Statement of Common Ground (SoCG) that we will continue to progress throughout the application process.

Overview and issues of concern

This Relevant Representation contains an overview of the project issues, which fall within our remit. We are of the opinion that most, hopefully all, of these issues can be resolved and in this Relevant Representation we provide suggested solutions.

We reserve our right to add to or amend the matters set out in this Relevant Representation. We will keep the matters set out under review and update the Examining Authority on progress with the resolution of these issues at the appropriate point as the pre-examination stage or examination itself progresses.

There are still outstanding issues in the documents that have been submitted as part of the draft DCO application and accompanying information that require further attention or resolution. These are:

1. **Flood risk**
   - Further details required to ensure that the scheme remains operational during a flood event and does not increase flood risk elsewhere, and to demonstrate that a sequential approach has been taken to the site layout

These matters are discussed in full in the attached appendix.

Please do not hesitate to contact me if you require any further information.

We look forward to continuing to work with the applicant to resolve the matters outlined within our Relevant Representation to ensure the best environmental outcome for the project.

Yours sincerely

Alison Craggs
Sustainable Places Advisor

[redacted]
Direct e-mail planning.brampton@environment-agency.gov.uk

Relevant Representations
On behalf of the Environment Agency

Flood Risk
The submitted Flood Risk Assessment (FRA), ref. EN010106/APP/6.2, dated 21 January 2021 is considered to be unacceptable for the following reasons:

Issue 1.1 – Inadequate assessment of residual flood risk at Burwell Substation
Burwell Substation extension is located within Flood Zone 3a on both our Flood Map for Planning and East Cambridgeshire District Council's SFRA maps (see Appendix B of SFRA). The SFRA climate change mapping (Appendix C of SFRA) shows the site to be located outside of any defended climate change scenario. However, the SFRA climate change maps should not be considered to supersede the flood zones shown our Flood Map, as indicated in para 4.1.23 of the FRA, as our Flood Map is based on the undefended scenario whereas the SFRA climate change maps are based on the defended scenario. In addition, the Environment Agency mapping included in Annex C of the FRA, which shows the 1 in 100 year plus 20% climate change flood extent, is also based on the defended scenario. There is likely to be a residual risk of flooding in this area in the event of a breach of the Burwell Lode / Reach Lode flood defences. As no assessment of this residual risk has been undertaken as part of the FRA, it is unknown whether the proposal to raise finished floor levels 850mm above ground levels would be adequate to prevent the extension from flooding in the event of a breach. As solar farms are classed as 'essential infrastructure', it is important to ensure they remain operational in the event of flooding.

Solution
Burwell Substation should be considered to lie within Flood Zone 3a for the purpose of applying the Sequential and Exception Tests and the FRA should be amended accordingly. The FRA should include breach analysis / modelling to determine the predicted flood depth in the event of a breach of the flood defences during a 1 in 100 year event, including an appropriate allowance for climate change. The predicted flood depth in the event of a breach should be used to recommend appropriate flood mitigation measures (e.g. raising finished floor levels of the extension above this depth).

Issue 1.2 – Solar stations located within Flood Zone 3
Table 13 of the FRA states that two of the solar stations (within W10 and W15) are located within Flood Zone 3 and two other solar stations are located in very close proximity to Flood Zone 3 (within W11 and W15). The FRA states that these solar stations will need to be raised above predicted flood levels but the relevant predicted flood levels are not included in the FRA. In addition, no consideration has been given to the potential loss of floodplain and increase in flood risk elsewhere. It is not acceptable to assume that if stilts are used there would be no material impact on flood risk elsewhere, as indicated in the FRA, as voids can become blocked by debris over time and may be used for storage purposes.

Solution
The FRA should include details of proposed floodplain compensation for any increase in built footprint within the modelled 1 in 100 year flood extent, including an appropriate allowance for climate change. Floodplain compensation is required to ensure there will be no increase in flood risk elsewhere, in accordance with the requirements of the NPPF. We would expect calculations to be provided showing the volume lost to the development and the volume gained by the compensation area for a number of horizontal slices (usually 200mm thick) up to the 1 in 100 year flood level including an

Cont/d..

allowance for climate change. We would also expect some cross-sectional drawings to be provided showing the volume lost and gained within each slice.

Issue 1.3 – Solar PV panels located within Flood Zone 3
The FRA indicates that some of the solar PV panels will be located within Flood Zone 3. The proposed mitigation measure for these PV panels is to raise them 850mm above ground level. As no modelled flood levels have been provided in the FRA, it is unclear whether these will be raised high enough to ensure they would remain operational in the event of flooding and there would be no impedance to flood water flows. Paragraph 4.3.9 of the FRA states that the estimated climate change fluvial extent is approximately 3.6mAOD. However, this level has been estimated by overlaying the SFRA climate change maps onto a topographic survey, which is not an acceptable method for estimating the 1 in 100 year flood level including an allowance for climate change.

Solution
Drawings should be provided that clearly show the location of the PV panels in relation to the extent of Flood Zone 3b and Flood Zone 3a. Modelled flood levels / depths should be included in the FRA and the PV panels should be raised above the relevant 1 in 100 year modelled flood level / depth, including an appropriate allowance for climate change.

Issue 1.4 – No drawings showing site layout in relation to Flood Zones
No drawings have been included in the FRA showing the site layout in relation to the flood zone extents. This is required to demonstrate that a sequential approach has been taken to the site layout and to clearly show which parts of the development are located within flood risk areas and therefore require flood risk mitigation measures. The FRA states that no above ground development will be located within Flood Zone 3b but this has not been demonstrated in the FRA.

Solution
Drawings should be included in the FRA that clearly showing the proposed site layout in relation to the extent of Flood Zone 3b, Flood Zone 3a and Flood Zone 2.

Issue 1.5 – Temporary use of land within the floodplain
No drawings have been included in the FRA to show the proposed location of any temporary site compounds and storage areas in relation to the flood zone extents. All site compound areas / storage areas should be located outside the extent of Flood Zone 3, or outside the 1 in 100 year modelled flood extent, to ensure there is no loss of floodplain and no increase in flood risk elsewhere during the construction phase.

Solution
Drawings should be included in the FRA which clearly show the location of any proposed temporary site compounds and storage areas in relation to the extent of Flood Zones 2 and 3. If any temporary site compounds or storage areas need to be located within the floodplain then it will need to be demonstrated that adequate floodplain compensation can be provided to ensure there is no increase in flood risk elsewhere.

Disapplication of Legislation and Protective Provisions

The applicant seeks to disapply the need for flood risk activity permits under the Environmental Permitting (England and Wales) Regulations 2016. We are content to agree to this in principle subject to the agreement of a satisfactory form of protective provisions for the benefit of the Environment Agency. We are currently in discussions with the applicant about this.

The applicant also seeks to disapply a number of local Acts. We consider the applicant should explain the need for the disapplication of the relevant legislation.

Groundwater and Contaminated Land
We are satisfied that our previous comments and recommendations have been brought forward into the draft DCO, including requirements for further site investigations to confirm ground conditions / update conceptual site models and risk assessments, then to take appropriate mitigation actions in line with relevant guidance.

Specifically, we note the following Draft DCO Schedule 2 Requirements:

- 12 (surface and foul water drainage)
- 14 (construction environmental management plan)
- 18 (ground conditions / contamination)

and the following commitments in the supporting documents:

- Consultation Report - Table 6-18.
- Framework CEMP – Table 3-10.

Pollution Prevention
We have reviewed the following documents:

- Volume 6 Environmental Statement. 6.2 Appendix 16D: Unplanned Atmospheric Emissions from Battery Energy Storage Systems (BESS) (ref EN010106)
- Volume 7. 7.6 Outline Battery Fire Safety Management Plan. (ref ENV010106)

We are satisfied that an appropriate assessment of risk and mitigation measures has been considered.

Biodiversity
We are satisfied that an appropriate assessment of risk and mitigation measures have been considered.

End

Appendix B – Environment Agency Data

DRAFT

Reference Number	222441
Site	Site adjacent to River Lark, near West Row / Worlington
Customer	Christopher Brandon
NGR	TL6651675068

Datasheet - Product 4

17 October 2022

This datasheet provides supporting information for your Product 4. It will be clearly indicated if we are unable to provide information to fulfil any part of your request.

Model Summary

Model Name	Model Code
Eastern Rivers - River Kennett (MP13)	EA052372_013

Important Information

The following information should considered when using the material provided to fulfil this request.

Information	
Limited Modelled Extents Provided	We have only provided a limited number of modelled flood extents for clarity. If you require further extents we will be happy to provide them.

Modelled Water Levels and Flows

The following tables provide modelled in channel water level and flow values. Values are provided for Annual Exceedence Probability (AEP) events, which is the probability of a given event occurring in any one year. This is not a return period.

The fluvial models used to produce these results are intended for strategic scale use only.

If the tables show a value of -9999, this indicates that we have no level or flow data for that particular AEP or node point.

Level Data

Level values are measured in metres above Ordnance Datum (m aOD).

All level data included are subject to standard modelling tolerance of +/-150 millimetres.

Present Day Levels

Node	Model	Easting	Northing	20%	10%	5%	4%	2%	1.33%	1%	0.5%	0.1%
KEN_01000	EA052372_013	566209	274180	2.678	2.757	2.808	2.82	2.854	2.886	2.909	2.954	3.155
KEN_01380	EA052372_013	566173	273850	3.248	3.306	3.343	3.353	3.381	3.409	3.429	3.468	3.59
KEN_01700u	EA052372_013	566187	273559	3.721	3.757	3.788	3.797	3.821	3.845	3.863	3.9	4.089
KEN_02009d	EA052372_013	566234	273286	4.563	4.723	4.883	4.933	5.056	5.16	5.243	5.433	6.055

Climate Change Levels

Node	Model	Easting	Northing	1%+20%cc	1%+25%cc	1%+35%cc	1%+65%cc	0.5%+20%cc	0.1%+20%cc
KEN_01000	EA052372_013	566209	274180	2.961	-9999	-9999	-9999	-9999	-9999
KEN_01380	EA052372_013	566173	273850	3.475	-9999	-9999	-9999	-9999	-9999
KEN_01700u	EA052372_013	566187	273559	3.907	-9999	-9999	-9999	-9999	-9999
KEN_02009d	EA052372_013	566234	273286	5.469	-9999	-9999	-9999	-9999	-9999

Flow Data

Flow values are measured in cubic metres per second (cumecs - m3/s).

Present Day Flows

Node	Model	Easting	Northing	20%	10%	5%	4%	2%	1.33%	1%	0.5%	0.1%
KEN_01000	EA052372_013	566209	274180	5.232	6.196	7.067	7.31	8.044	8.824	9.416	10.70	19.46
KEN_01380	EA052372_013	566173	273850	5.236	6.201	7.064	7.311	8.045	8.826	9.42	10.70	15.82
KEN_01700u	EA052372_013	566187	273559	5.241	6.205	7.068	7.312	8.047	8.828	9.421	10.71	19.89
KEN_02009d	EA052372_013	566234	273286	5.241	6.205	7.067	7.312	8.685	9.644	10.12	11.00	16.60

Flow Data

Flow values are measured in cubic metres per second (cumecs - m3/s).

Present Day Flows

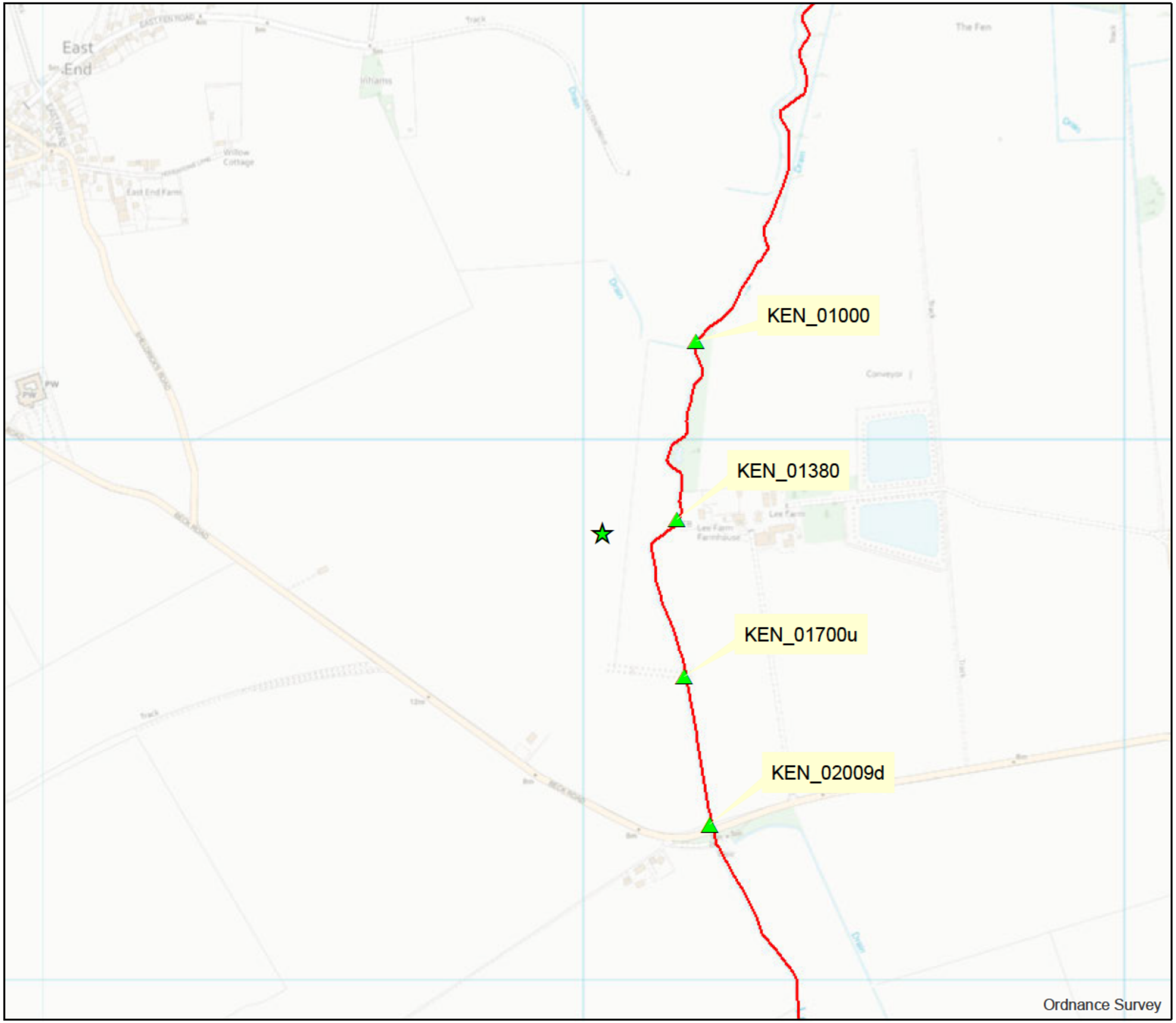
Node	Model	Easting	Northing	20%	10%	5%	4%	2%	1.33%	1%	0.5%	0.1%
KEN_01000	EA052372_013	566209	274180	5.232	6.196	7.067	7.31	8.044	8.824	9.416	10.70	19.46
KEN_01380	EA052372_013	566173	273850	5.236	6.201	7.064	7.311	8.045	8.826	9.42	10.70	15.82
KEN_01700u	EA052372_013	566187	273559	5.241	6.205	7.068	7.312	8.047	8.828	9.421	10.71	19.89
KEN_02009d	EA052372_013	566234	273286	5.241	6.205	7.067	7.312	8.685	9.644	10.12	11.00	16.60

Climate Change Flows

Node	Model	Easting	Northing	1%+20%cc	1%+25%cc	1%+35%cc	1%+65%cc	0.5%+20%cc	0.1%+20%cc
KEN_01000	EA052372_013	566209	274180	10.93	-9999	-9999	-9999	-9999	-9999
KEN_01380	EA052372_013	566173	273850	10.93	-9999	-9999	-9999	-9999	-9999
KEN_01700u	EA052372_013	566187	273559	10.94	-9999	-9999	-9999	-9999	-9999
KEN_02009d	EA052372_013	566234	273286	11.29	-9999	-9999	-9999	-9999	-9999

Modelled Node Point Locations centred on Area E05, Sunnica Solar Farm

NGR TL6600973865
Ref 222441
Created 17/10/2022



Environment Agency
Bromholme Lane,
Brampton,
Cambridgeshire
PE28 4NE

Environment Agency

Legend

- Site
- Node Point Locations
- Main river

0 0.125 0.25 0.5 km

Information

Model Tolerance - Any data included in this product is subject to a standard modelling tollerance of +/- 150mm.The fluvial models used to produce these results are intended for strategic scale use only.

Flood Risk Assessments - The Environment Agency recommends any Flood Risk Assessment should only consider these results in the context of a site specific assessment.

AEP - Annual Exceedance Probability - The probability of a given event occurring in any one year. Please note this is not a return period.

Strategic Scale Model - This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences if present.

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Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY Tel: 03708 506 506 (Mon-Fri 8-6).
Email: enquiries@environment-agency.gov.uk

Datasheet - Product 4

13 October 2022

Reference Number	222441
Site	Site adjacent to River Lark, near West Row / Worlington
Customer	Christopher Brandon
NGR	TL6651675068

This datasheet provides supporting information for your Product 4. It will be clearly indicated if we are unable to provide information to fulfil any part of your request.

Model Summary

Model Name	Model Code
Eastern Rivers - Cut Off Channel (MP1)	EA052372_001

Important Information

The following information should considered when using the material provided to fulfil this request.

Information	
Limited Modelled Extents Provided	We have only provided a limited number of modelled flood extents for clarity. If you require further extents we will be happy to provide them.

Modelled Water Levels and Flows

The following tables provide modelled in channel water level and flow values. Values are provided for Annual Exceedence Probability (AEP) events, which is the probability of a given event occurring in any one year. This is not a return period.

The fluvial models used to produce these results are intended for strategic scale use only.

If the tables show a value of -9999, this indicates that we have no level or flow data for that particular AEP or node point.

Level Data

Level values are measured in metres above Ordnance Datum (m aOD).

All level data included are subject to standard modelling tolerance of +/-150 millimetres.

Present Day Levels

Node	Model	Easting	Northing	20%	10%	5%	4%	2%	1.33%	1%	0.5%	0.1%
KEN_00600	EA052372_013	566379	274526	2.255	2.304	2.342	2.352	2.381	2.41	2.432	2.473	2.614
KEN_01000	EA052372_013	566209	274180	2.678	2.757	2.808	2.82	2.854	2.886	2.909	2.954	3.155
LARK_15278	EA052372_001	566313	275157	2.3	2.45	2.55	2.58	2.72	2.76	2.78	2.82	2.95
LARK_15441	EA052372_001	566480	275100	2.31	2.46	2.56	2.6	2.73	2.77	2.79	2.84	2.98
LARK_15604	EA052372_001	566610	275139	2.31	2.47	2.57	2.6	2.73	2.77	2.8	2.84	2.99
LARK_15913	EA052372_001	566790	275033	2.33	2.49	2.59	2.62	2.75	2.79	2.81	2.86	3.02
LARK_16112	EA052372_001	566960	274968	2.34	2.5	2.6	2.63	2.76	2.8	2.82	2.86	3.03

Climate Change Levels

Node	Model	Easting	Northing	1%+20%cc	1%+25%cc	1%+35%cc	1%+65%cc	0.5%+20%cc	0.1%+20%cc
KEN_00600	EA052372_013	566379	274526	2.48	-9999	-9999	-9999	-9999	-9999
KEN_01000	EA052372_013	566209	274180	2.961	-9999	-9999	-9999	-9999	-9999
LARK_15278	EA052372_001	566313	275157	2.94	-9999	-9999	-9999	-9999	-9999
LARK_15441	EA052372_001	566480	275100	2.96	-9999	-9999	-9999	-9999	-9999
LARK_15604	EA052372_001	566610	275139	2.96	-9999	-9999	-9999	-9999	-9999
LARK_15913	EA052372_001	566790	275033	2.97	-9999	-9999	-9999	-9999	-9999
LARK_16112	EA052372_001	566960	274968	2.98	-9999	-9999	-9999	-9999	-9999

Flow Data

Flow values are measured in cubic metres per second (cumecs - m3/s).

Present Day Flows

Node	Model	Easting	Northing	20%	10%	5%	4%	2%	1.33%	1%	0.5%	0.1%
KEN_00600	EA052372_013	566379	274526	5.229	6.191	7.064	7.307	8.041	8.817	9.408	10.70	15.67
KEN_01000	EA052372_013	566209	274180	5.232	6.196	7.067	7.31	8.044	8.824	9.416	10.70	19.46
LARK_15278	EA052372_001	566313	275157	9.81	11.76	13.03	13.4	14.77	15.6	16.14	18.62	26.79
LARK_15441	EA052372_001	566480	275100	6.49	7.71	8.12	8.32	8.88	9.05	9.28	9.64	16.92
LARK_15604	EA052372_001	566610	275139	6.49	7.71	8.12	8.31	8.87	9.05	9.28	9.64	16.91
LARK_15913	EA052372_001	566790	275033	6.5	7.71	8.11	8.31	8.87	9.05	9.28	9.64	16.01
LARK_16112	EA052372_001	566960	274968	6.5	7.72	8.11	8.31	8.87	9.05	9.27	9.64	16.89

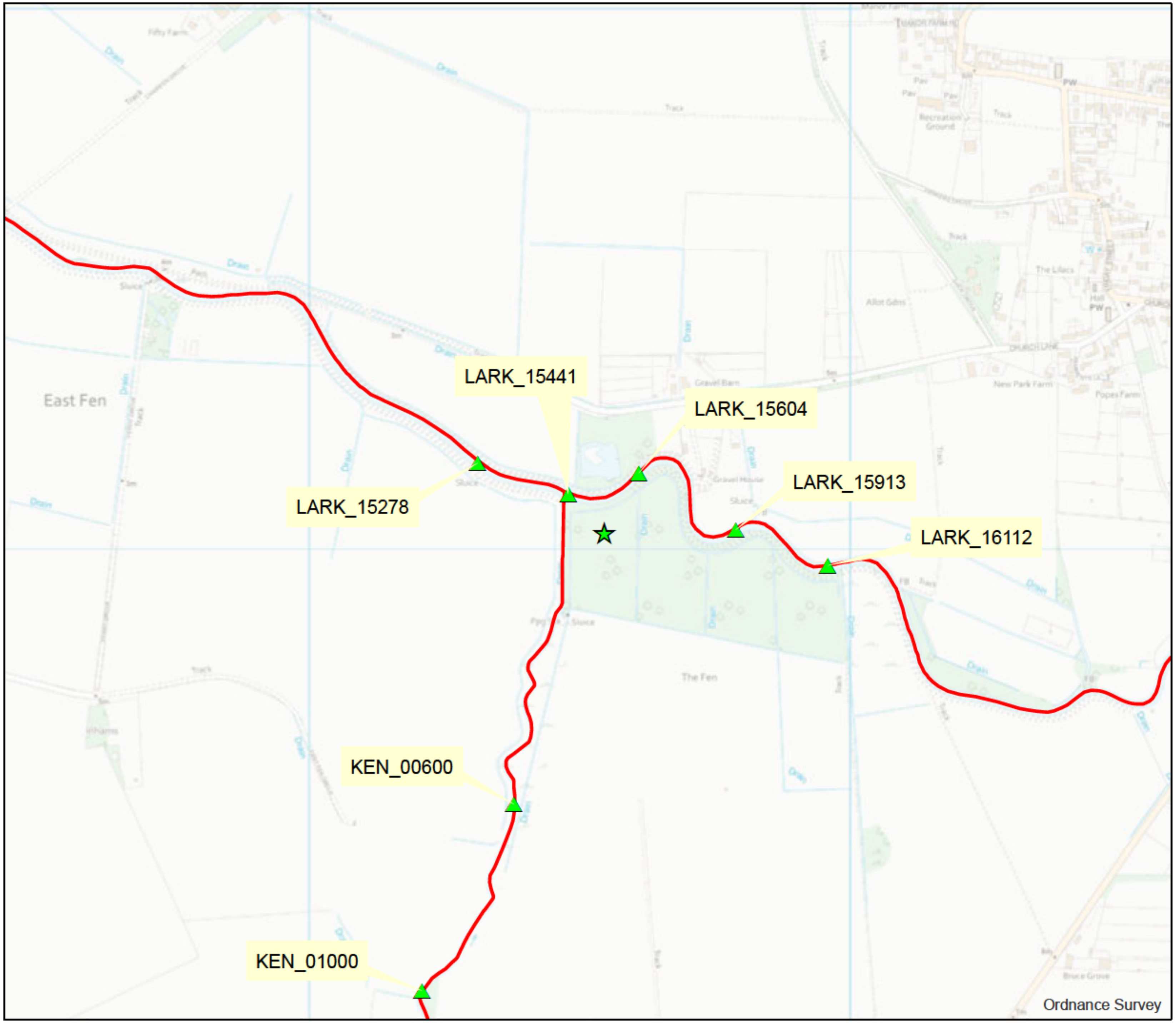
Climate Change Flows

Node	Model	Easting	Northing	1%+20%cc	1%+25%cc	1%+35%cc	1%+65%cc	0.5%+20%cc	0.1%+20%cc
KEN_00600	EA052372_013	566379	274526	10.93	-9999	-9999	-9999	-9999	-9999
KEN_01000	EA052372_013	566209	274180	10.93	-9999	-9999	-9999	-9999	-9999
LARK_15278	EA052372_001	566313	275157	18.16	-9999	-9999	-9999	-9999	-9999
LARK_15441	EA052372_001	566480	275100	9.86	-9999	-9999	-9999	-9999	-9999
LARK_15604	EA052372_001	566610	275139	9.85	-9999	-9999	-9999	-9999	-9999
LARK_15913	EA052372_001	566790	275033	9.7	-9999	-9999	-9999	-9999	-9999
LARK_16112	EA052372_001	566960	274968	9.8	-9999	-9999	-9999	-9999	-9999

Modelled Node Point Locations centred on Sunnica Solar Farm

NGR TL6651675068
Ref 222441
Created 13/10/2022

Environment Agency
Bromholme Lane,
Brampton,
Cambridgeshire
PE28 4NE



Legend

- Site
- Node Point Locations
- Main river

0 0.125 0.25 0.5 km

Information

Model Tolerance - Any data included in this product is subject to a standard modelling tollerance of +/- 150mm.The fluvial models used to produce these results are intended for strategic scale use only.

Flood Risk Assessments - The Environment Agency recommends any Flood Risk Assessment should only consider these results in the context of a site specific assessment.

AEP - Annual Exceedance Probability - The probability of a given event occurring in any one year. Please note this is not a return period.

Strategic Scale Model - This model has been designed for catchment wide flood risk mapping. It should be noted that it was not created to produce flood levels for specific development sites within the catchment. Modelled outlines take into account catchment wide defences if present.

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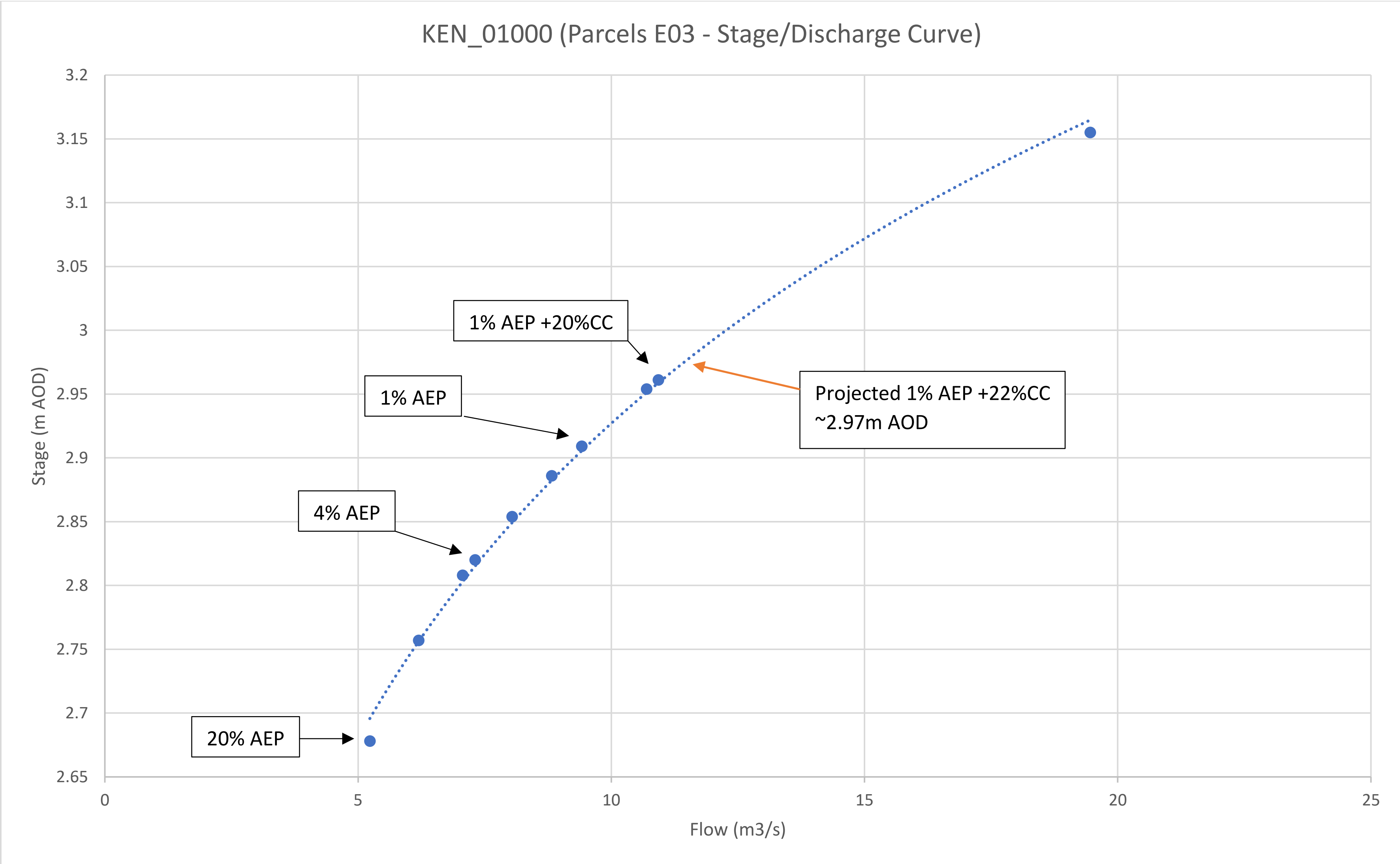
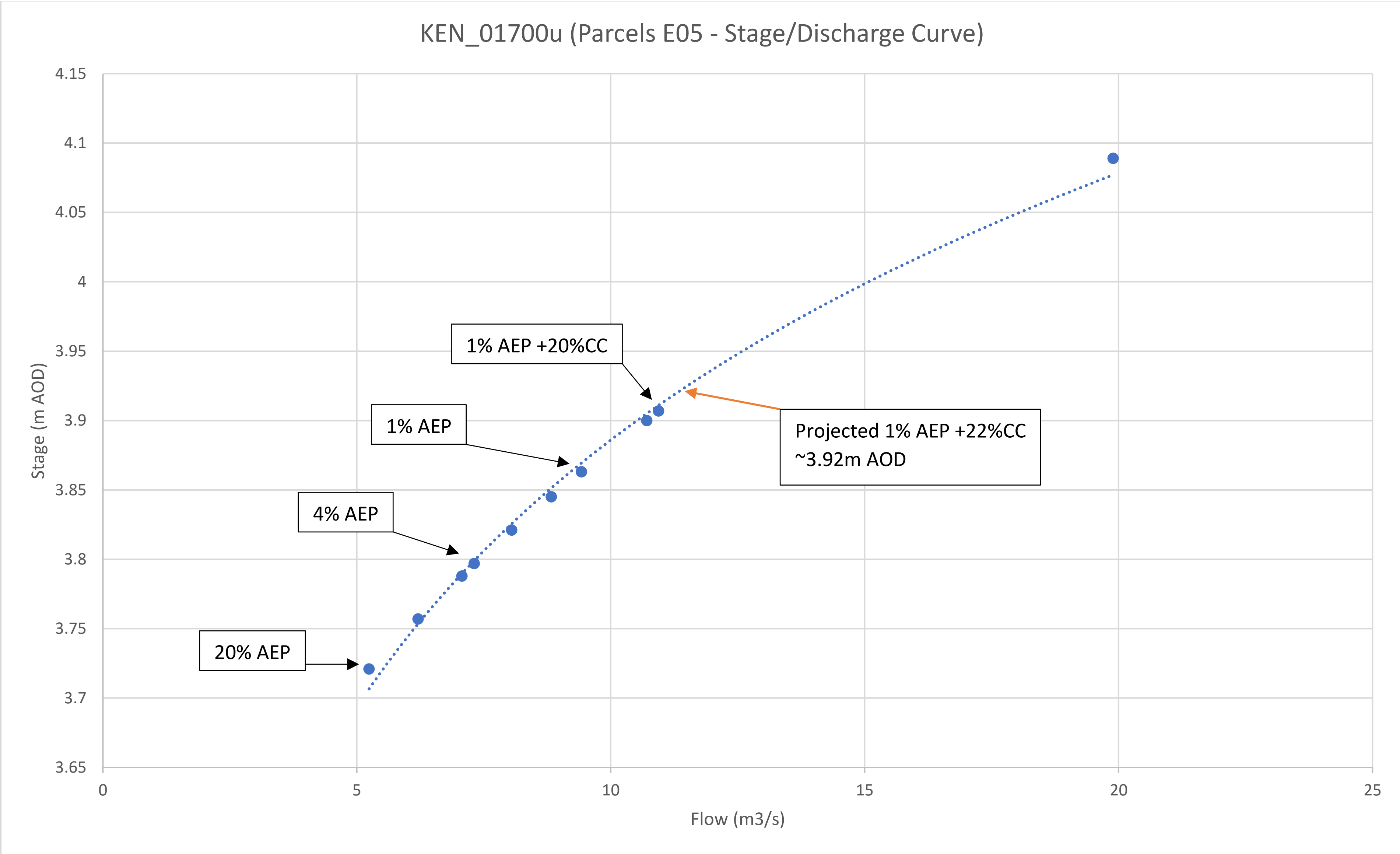
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY Tel: 03708 506 506 (Mon-Fri 8-6).
Email: enquiries@environment-agency.gov.uk

Appendix C – Stage-Discharge Graphs

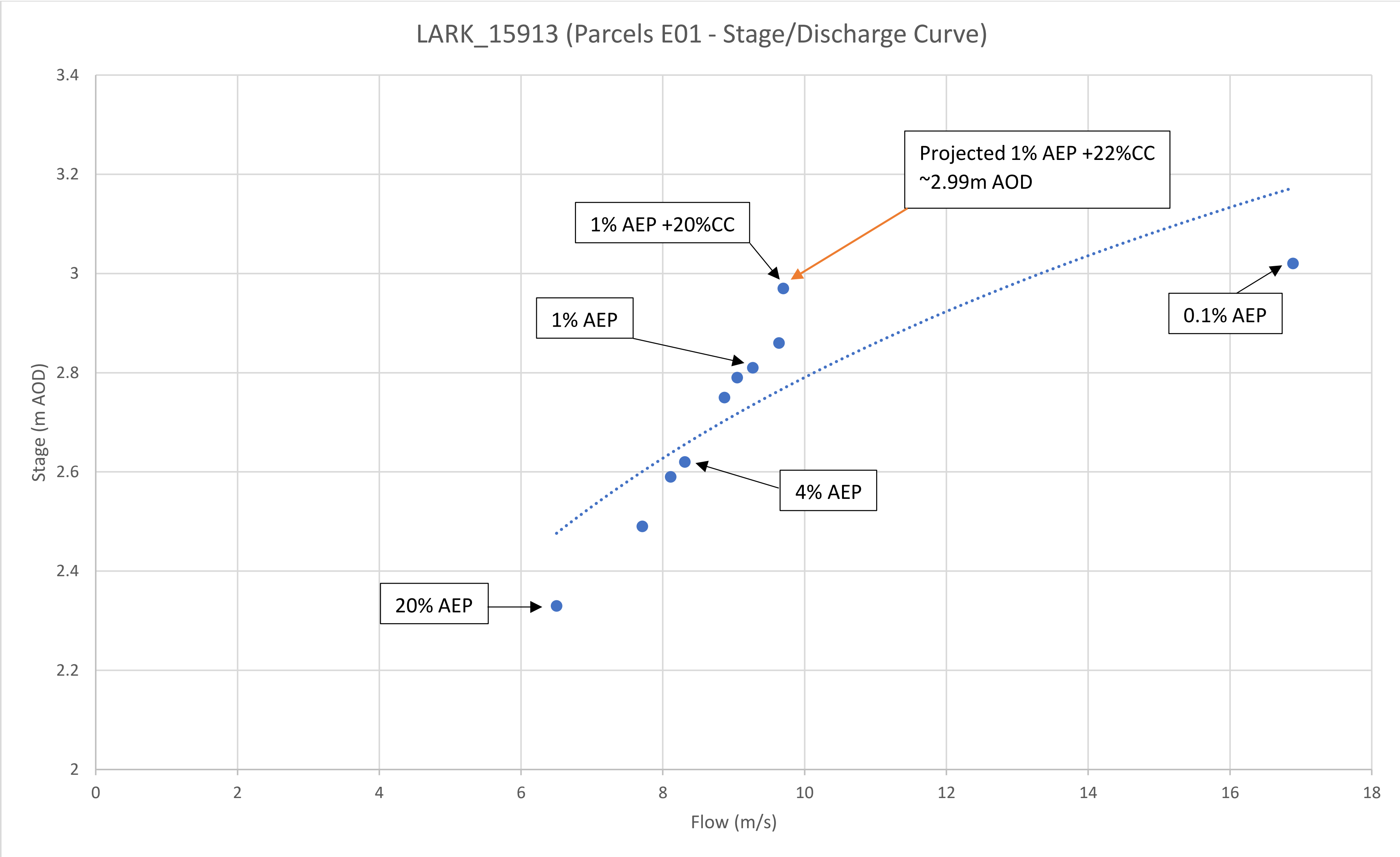
DRAFT

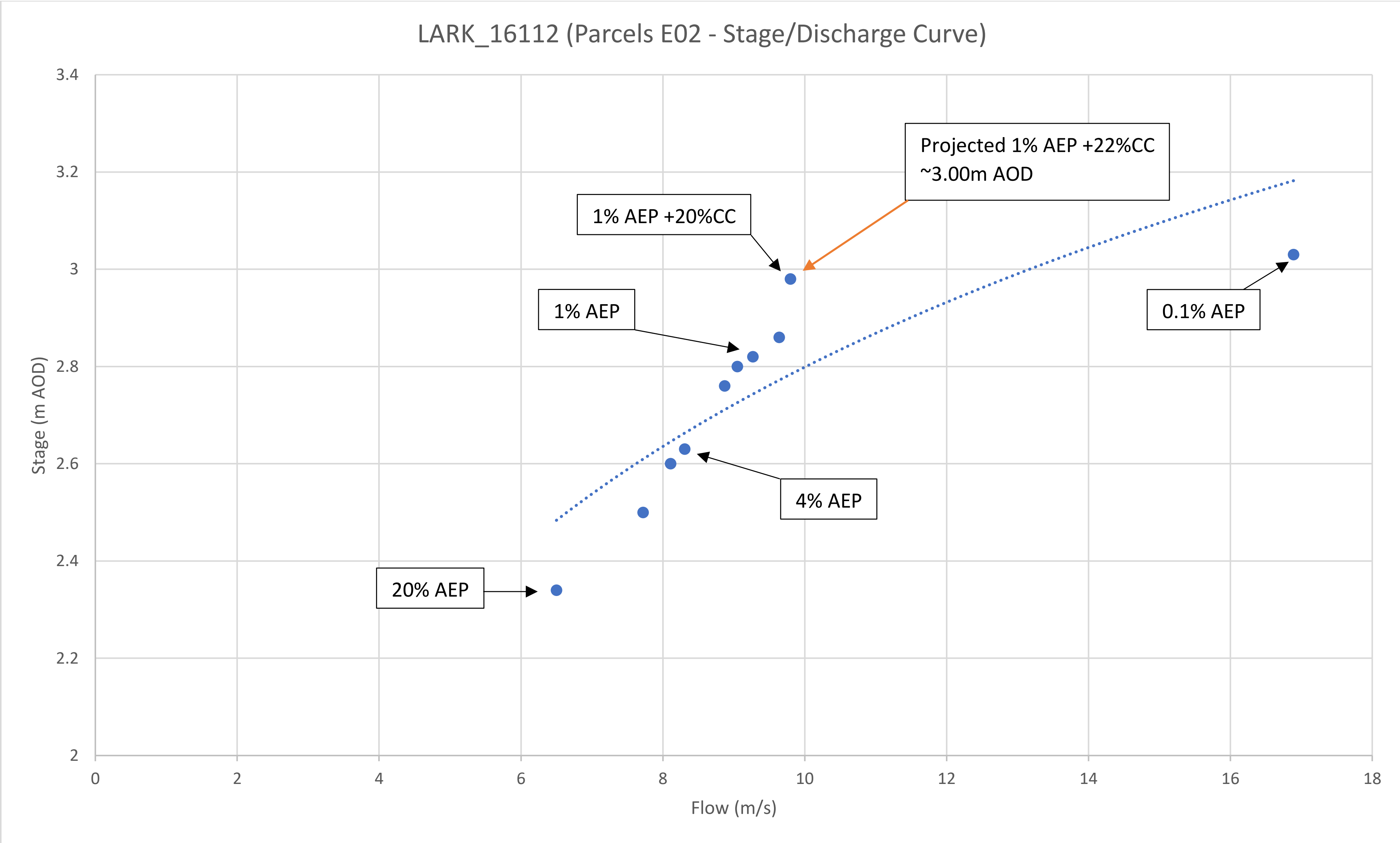


KEN_01000 (Parcels E03 - Stage/Discharge Curve)
Stage (m AOD)
Flow (m3/s)
3.2
3.15
3.1
3.05
3
2.95
2.9
2.85
2.8
2.75
2.7
2.65
0
5
10
15
20
25
1% AEP +20%CC
1% AEP
4% AEP
20% AEP
Projected 1% AEP +22%CC
~2.97m AOD



KEN_01700u (Parcels E05 - Stage/Discharge Curve)
Stage (m AOD)
4.15
4.1
4.05
4
3.95
3.9
3.85
3.8
3.75
3.7
3.65
0
5
10
15
20
25
Flow (m3/s)
1% AEP +20%CC
1% AEP
4% AEP
20% AEP
Projected 1% AEP +22%CC
~3.92m AOD


LARK_15913 (Parcels E01 - Stage/Discharge Curve)
Projected 1% AEP +22%CC
~2.99m AOD
1% AEP +20%CC
1% AEP
0.1% AEP
4% AEP
20% AEP
Stage (m AOD)
Flow (m/s)
3.4
3.2
3
2.8
2.6
2.4
2.2
2
0
2
4
6
8
10
12
14
16
18


LARK_16112 (Parcels E02 - Stage/Discharge Curve)
Stage (m AOD)
Flow (m/s)
3.4
3.2
3
2.8
2.6
2.4
2.2
2
0
2
4
6
8
10
12
14
16
18
Projected 1% AEP +22%CC
~3.00m AOD
1% AEP +20%CC
1% AEP
0.1% AEP
4% AEP
20% AEP

[redacted]

[redacted]