SUNNICA ENERGY FARM

Preliminary Environmental Information Report

Appendix 9A: Flood Risk Assessment

Sunnica Ltd

AUGUST 2020

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
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1. Executive Summary

1.1.1 AECOM has been commissioned to undertake a Flood Risk Assessment (FRA) and outline Drainage Strategy (DS) for the proposed development, Sunnica Energy Farm (TL 67951 72191), approximate postcode IP28 8JG as an appendix to the Preliminary Environmental Information Report (PEI Report).

1.1.2 The existing site covers an area of approximately 1275 hectares, comprising arable fields interspersed with tree shelter belts (linear), small woodland and copses, agricultural fields, and farm access tracks and farm buildings. The location of the Site is described in more detail in Chapter 2 of the PEI Report.

1.1.3 The proposed development; Sunnica Energy Farm comprises two main sites; Sunnica West Site and Sunnica East Site, both split into sites A and B and connected by cable connection routes A and B, with an extension to the existing Burwell National Grid Substation . The proposed development comprises photovoltaic (PV) panels, solar stations, battery energy storage systems and substations and related apparatus, permanent and temporary compound areas, and connection / access routes, and is described in more detail in Chapter 3 of the PEI Report.

1.1.4 This FRA has been prepared in accordance with the requirements of the National Planning Policy Framework, 2019 (NPPF) and the Overarching National Policy Statement for Energy (EN-1), the National Policy Statement for Renewable Energy Infrastructure (EN-3) and the National Policy Statement for Electricity Network Infrastructure (EN-5). The proposed use of the development would be classed as 'Essential Infrastructure'.

1.1.5 The majority of the existing site lies within Flood Zone 1. Three main rivers; the River Lark, the Lee Brook and the River Snail, and one ordinary watercourse divide the Site, this increasing fluvial risk in the locality to Flood Zone 3b, with low lying areas in proximity being at risk within Flood Zone 2 and 3a.

Flood Risk Summary:

Flood Risk Source	Pre-Development Risk	Post Development Risk	Comments
Fluvial	Low	Low/High	The majority of the Site is in Flood Zone 1, but certain areas lie in Flood Zone 2, 3a, 3b. No development will occur in Flood Zone 3b.
Tidal	None	None	Not in a tidal area
Pluvial (Surface Water)	Low	Low	Surface water risk varies throughout the Site indicating patches of the Site which are susceptible to surface water flooding. However, flooding is localised and generally shallow (low risk).
Groundwater	Medium	Medium	Groundwater risk also varies, with all Sites between <25% and >75%. Sunnica East Site (eastern half) and Sunnica West Sites A and B are shown to be within a Source Protection Zone III, with small areas of Source Protection Zone II. Further ground investigation, groundwater monitoring and infiltration testing is recommended to confirm groundwater levels. Infiltration techniques must ensure mitigation measures are put in effect to protect groundwater interaction in these areas.
Sewers	None	None	There are no sewers in the vicinity of the Site.

Artificial Sources	Low (residual)	Low (residual)	Statutory Reservoirs (large raised reservoirs with volumes above ground of 25,000m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. On that basis they are deemed to pose a low (residual) risk. Other artificial sources such as canals and waterways are considered to be regularly maintained and therefore only deemed to pose a low (residual) risk to the proposed development

The proposed development will not increase the risk of flooding on or off site. Surface water runoff from the proposed development will be captured by infiltration SuDS techniques; swales and basis to mimic existing drainage conditions and accommodate the 1 in 100 year return period storm event plus a 40% increase allowance for climate change.

When considered within the context of National, Regional and local planning policy in respect of development and flood risk, the assessment concludes that the proposed development remains safe; does not increase flood risk elsewhere and fulfils the Government's wider criteria for sustainable development.

On this basis, it is concluded that flood risk considerations do not constitute a barrier to the granting of planning consent.

2. Introduction

2.1 Introduction

2.1.1 AECOM Ltd has been commissioned to undertake a Flood Risk Assessment (FRA) and outline Drainage Strategy (DS) for the proposed development, Sunnica Energy Farm - approximate postcode IP28 8JG, centred on grid reference TL 67951 72191 as an appendix to the Preliminary Environmental Information Report .The site location and proposed development are described in more detail in Chapters 3 and 5 of the PEI Report, respectively. It should be noted that a separate Drainage Technical Note has been produced detailing the proposed drainage strategy and is located in Appendix F this report.

2.2 FRA Objectives

2.2.1 The minimum requirements for FRAs as outlined in the NPS EN-1 are to:

- Be proportionate to the risk and appropriate to the scale, nature and location of the project;
- Consider the risk of flooding arising from the project in addition to the risk of flooding to the project;
- Take the impacts of climate change into account, clearly stating the development lifetime over which the assessment has been made;
- Be undertaken by competent people, as early as possible in the process of preparing the proposal;
- Consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure;
- Consider the vulnerability of those using the site, including arrangements for safe access;
- Consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions being made;
- Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes;
- Include the assessment of the remaining (known as ‘residual’) risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular project;
- Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems;
- Consider if there is a need to be safe and remain operational during a worst case flood event over the development’s lifetime; and
- Be supported by appropriate data and information, including historical information on previous events.

2.2.2 The principle objectives of the FRA inclusive of the above are to:

- Identify potential forms of flooding including rivers, watercourses, surface water flooding, groundwater flooding, flooding from sewer systems and other forms of flooding;
- Establish the risk of flooding to the proposed development;
- Determine the effects of the development on flooding elsewhere either through displacement of floodwaters or increased runoff; and
- Suggest appropriate flood mitigation measures, including a strategy for disposal of surface water run-off following the principles of SuDS.

2.3 Scope of Work

2.3.1 In preparing the FRA, AECOM has:

- Obtained relevant data and information from statutory and other authorities;
- Considered the potential sources of flooding;
- Assessed the risk of flooding to the site;
- Assessed the impact of off-site flooding (displaced water) on third parties;
- Considered the impact of climate change; and
- Considered likely mitigation requirements and any residual risk.

2.4 Site Description

2.4.1 The proposed Sunnica Energy Farm comprises of two sites: Sunnica West Site and Sunnica East Site, both split into sites A and B, with a proposed cable corridor that connects the Site to the Burwell National Grid Substation. The Site boundaries are shown in Appendix B (which mimic the Development Consent Order (DCO) limits for the Site).

2.4.2 The Sunnica East Site A is located approximately 3.5 kilometres (km) east of Mildenhall, 0.5km south-east of Isleham and 0.6km south-west of West Row. Sunnica East Site B is located approximately 1.5km south-east of Mildenhall, 1km east of Freckenham and immediately south of Worlington. The Sunnica East Site A straddles the boundary between the counties of Cambridgeshire and Suffolk and falls within the administrative areas of East Cambridgeshire District Council (ECDC) and West Suffolk Council (WSC). Sunnica East B falls within Suffolk and WSC.

2.4.3 The landscape features within the Sunnica East Sites consist of individual trees, hedgerow, tree belts (linear) small woodland block, agricultural fields (arable), farm access tracks, and local transport roads (B1085). The hedgerows within the Sunnica East Sites range between lengths of dense tall vegetation (shrub and tree species), and thin lines of vegetation with sporadic trees present, although the former is a dominant feature. Two of the small woodland blocks are noted as deciduous woodland and are located within the eastern (Summer House Plantation) and southern (Swales Plantation) extents of the Site. The arable fields are of small to moderate size, some of which are of irregular shape.

2.4.4 The landscape features immediately surrounding the Sunnica East Sites comprise a number of small rural villages, including Worlington to the north, Barton Mills to the north-east, Red Lodge to the south, and Freckenham to the west. Industrial land uses adjoin the A11 to the south of the Site, associated with the property identified on mapping as Bay Farm. An industrial installation of a 7.5 MW solar farm is situated adjacent to the south-eastern extent of the eastern parcel of the Sunnica East Site. An Anaerobic Digestion (AD) plant is located to the south of the Sunnica East Sites, immediately east of Bay Farm.

2.4.5 The Sunnica West Site A is located approximately 7km to the east of Burwell, immediately north of the A14 at Newmarket. Sunnica West Site B is approximately 5.5km to the east of Burwell and 0.5km north of Snailwell. The Sunnica West Sites A and B lie within the county of Cambridgeshire and in the ECDC administrative area

2.4.6 The Sunnica West Sites consists of trees, managed hedgerows, tree shelter belts (linear), small woodland and copses, agricultural fields, and farm access tracks. A straight tree-lined avenue bisects the Sunnica West Site A and forms part of a former carriageway to Chippenham Hall, which is located to the north. This land is protected under the register of Historic Parks and Gardens by Historic England. The southern Site boundary is formed by a post and rail fence and sporadic sparse vegetation. Sounds Plantation is a deciduous copse and is located towards the eastern extent of the Sunnica West Site.

2.4.7 The surrounding landscape comprises arable fields interspersed with managed hedgerows, tall shelter belts of trees and in the Chippenham Hall area, a parkland landscape with mature individual trees. Avenue planting is a characteristic of the immediate area, with mature trees present within the Site, and newer tree planting evident along the Chippenham Road to the north of the Site. Much of the area is also characterised by grazed paddocks, horse gallops and exercise tracks, and the British Racing School is located to the south, beyond the A14.

2.5 Study Area

2.5.1 As previously stated, the Sunnica Energy Farm comprises of two sites along with a proposed cable corridor that connect both Sites to the Burwell National Grid substation. For the purpose of assessing

the development's flood risk, the Sites will be further divided into the following areas: this Flood Risk Assessment, the Site will be separated into the following areas:

- Sunnica East Site A
- Sunnica East Site B
- Sunnica West Site A
- Sunnica West Site B
- Grid Connection Route A – Proposed connection route between Sunnica East A and Sunnica East B and Sunnica West A
- Grid Connection Route B – Proposed connection route between Sunnica West A, Sunnica West B and Burwell National Grid Substation
- Burwell National Grid Substation

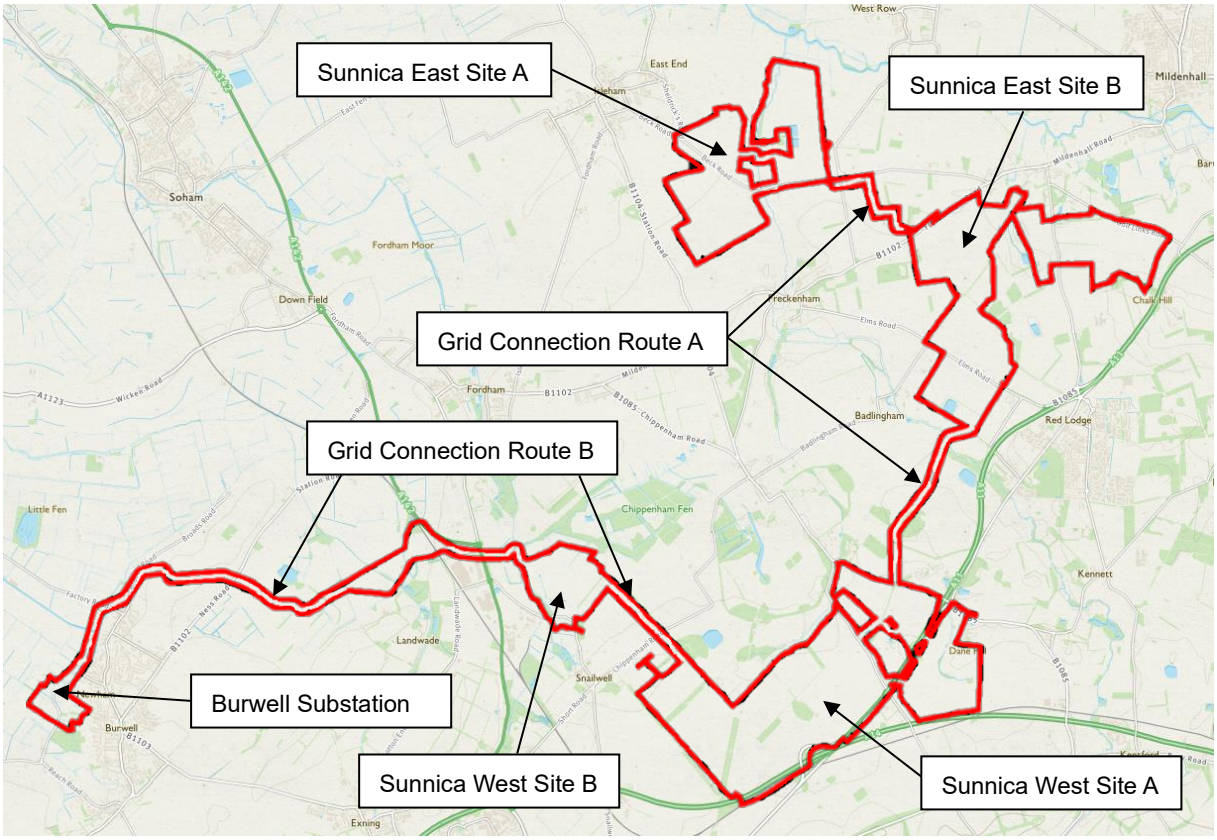


Figure 1 – Site Location (OS Maps)

2.6 Existing Land Use

2.6.1 Most of the Site used for arable farming. Dwellings and commercial/agricultural buildings are located sparsely across the Site but are largely outside any fluvial flood risk areas.

2.6.2 Table 1 below provides the existing site permeable and impermeable areas:

Table 1: Contributing Areas

	Total Area (ha)	Permeable Area (ha)	Impermeable Areas (ha)	Percentage Impermeable
Development Site	1275	1211	64	5%

2.7 Development Proposals

2.7.1 Sunnica Energy Farm comprises of the installation of solar photovoltaic (PV) generating panels and on-site energy storage facilities across two proposed Sites: Sunnica West Site and the Sunnica East Site, within Cambridgeshire and Suffolk respectively, and associated infrastructure for connection to the national grid. The Scheme would allow for the storage of electricity to the National Grid. The proposed development comprises:

- Solar PV modules;
- PV module mounting structures;
- Inverters;
- Transformers;
- Switchgears;
- Onsite cabling;
- One or more Battery Energy Storage Systems (BESS) (expected to be formed of lithium ion batteries storing electrical energy);
- An electrical compound comprising a substation and control building (Sunnica East Site A, Sunnica East Site B and Sunnica West Site A only);
- New substation at Burwell Substation to facilitate the connection to National Grid;
- Office/warehouse (Sunnica East Site A and Sunnica West Site A only)
- Fencing and security measures;
- Drainage;
- Internal access roads and car parking;
- Landscaping including habitat creation areas; and
- Construction laydown areas.

2.7.2 Please refer to Appendix B for the development layout. This layout is illustrative at this stage and may be subject to change.

2.8 Parties Involved

2.8.1 Correspondence has been undertaken with the following Risk Management Authorities when undertaking this FRA:

- Lead Local Flood Authority – Cambridgeshire County Council and Suffolk County Council.
- The Environment Agency

Although not yet contacted, the Internal Drainage Board (IDB) in Burwell, Swaffham IDB, will be contacted to review any proposals, i.e. the Burwell Substation Site as part of this FRA.

3. Existing Legislation and Policy

NATIONAL POLICY

3.1 National Policy Statement (NPS) for Energy

3.1.1 The Overarching National Policy Statement for Energy (NPS) (EN-1) sets out policy regarding the development of nationally significant energy infrastructure projects.

3.1.2 Specific policy relating to flood risk is set out in section 5.7. Paragraph 5.7.9 of this section states 'in determining an application for development consent, the Examining Authority (formerly IPC) should be satisfied that where relevant:

- *the application is supported by an appropriate FRA;*
- *the Sequential Test has been applied as part of site selection;*
- *a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk;*
- *the proposal is in line with any relevant national and local flood risk management strategy*
- *priority has been given to the use of sustainable drainage systems (SuDs) (as required in the next paragraph on National Standards); and*
- *in flood risk areas the project is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed over the lifetime of the development.*

3.1.3 Paragraph 5.7.12 states that the Secretary of State *should not consent development in Flood Zone 2 in England unless it is satisfied that the Sequential Test requirements have been met* and that it '*should not consent development in Flood Zone 3 unless it is satisfied that the Sequential and Exception Test requirements have been met'*. For the Sequential Test, it states the following:

- *Preference should be given to locating projects in Flood Zone 1 in England or Zone A in Wales. If there is no reasonably available site in Flood Zone 1 or Zone A, then projects can be located in Flood Zone 2 or Zone B. If there is no reasonably available site in Flood Zones 1 or 2 or Zones A & B, then nationally significant energy infrastructure projects can be located in Flood Zone 3 or Zone C subject to the Exception Test.*

3.1.4 The overarching objectives of the NPS are addressed within this FRA, however, with regard to the Sequential and Exception Test, the NPS requires the following:

- *If, following application of the sequential test, it is not possible, consistent with wider sustainability objectives, for the project to be located in zones of lower probability of flooding than Flood Zone 3 or Zone C, the Exception Test can be applied. The test provides a method of managing flood risk while still allowing necessary development to occur.*
- *The Exception Test is only appropriate for use where the sequential test alone cannot deliver an acceptable site, taking into account the need for energy infrastructure to remain operational during floods. It may also be appropriate to use it where as a result of the alternative site(s) at lower risk of flooding being subject to national designations such as landscape, heritage and nature conservation designations, for example Areas of Outstanding Natural Beauty (AONBs), Sites of Special Scientific Interest (SSSIs) and World Heritage Sites (WHS) it would not be appropriate to require the development to be located on the alternative site(s).*
- *All three elements of the test will have to be passed for development to be consented. For the Exception Test to be passed:*
  - *It must be demonstrated that the project provides wider sustainability benefits to the community that outweigh flood risk;*
  - *The project should be on developable, previously developed land or, if it is not on previously developed land, that there are no reasonable alternative sites on developable previously developed land subject to any exceptions set out in the technology-specific NPSs; and*

- *A FRA must demonstrate that the project will be safe, without increasing flood risk elsewhere subject to the exception below and, where possible, will reduce flood risk overall.*

▪ *Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the IPC may grant consent if it is satisfied that the increase in present and future flood risk can be mitigated to an acceptable level and taking account of the benefits of, including the need for, nationally significant energy infrastructure as set out in Part 3 above. In any such case the IPC should make clear how, in reaching its decision, it has weighed up the increased flood risk against the benefits of the project, taking account of the nature and degree of the risk, the future impacts on climate change, and advice provided by the EA and other relevant bodies.*

3.1.5 The NPS EN-1 was published in July 2011, prior to the release of the NPPF, and its policies were subsequently developed based on PPS 25 'Development and Flood Risk'. As part of the preparation of the NPPF, the requirements to pass the Sequential and Exception Test listed in PPS 25 were reviewed and updated to the requirements listed in sections 3.3.3 and 3.3.4.

3.2 National Planning Policy Framework (NPPF)

3.2.1 The NPPF was first adopted in March 2012, superseding national planning policy statements and guidance. Flood Risk and Coastal Change Planning Practice Guidance (PPG) was also published in 2014 to support the NPPF.

3.2.2 Chapter 14: Meeting the Challenge of Climate Change, Flooding and Coastal Change (paragraphs. 148-169) sets out the requirements to assess flood risk and climate change for developments.

3.2.3 The assessment of flood risk is based on the definitions in Table 2 below, extracted from the NPPF:

Table 2: Flood Zones – Table 1 of the PPG 2014

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

3.2.4 The PPG classifies the Flood Risk Vulnerability of various land uses in Table 3 below. The More Vulnerable classification encompasses usages such as hospitals and buildings used for dwellings. Less Vulnerable applies to buildings used for general industry, storage and distribution.

Table 3: Flood Risk Vulnerability Classification – Table 2 of the PPG 2014

Development Type	Classifications

Essential infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly vulnerable	• Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”)
More vulnerable	• Hospitals. • Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan
Less vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in “more vulnerable”, and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities).

	• Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
Water-compatible development	• Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

3.2.5 The overall aim is to steer new development to the lowest flood zone, i.e. Flood Zone 1 (Sequential Test). Where there are no reasonably available sites within Flood Zone 1, Flood Zones 2 and 3 may be considered, subject to passing the Exception Test, as required and set out in Table 4 below:

Table 4: Flood Risk Vulnerability and Flood Zone Compatibility – Table 3 of the PPG 2014

Flood Zone	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	×	Exception Test Required	✓	✓
Zone 3b functional floodplain	Exception Test Required	×	×	✓	×

✓	Development is appropriate
✗	Development should not be permitted

3.3 The Sequential Test and Exception Test

3.3.1 The NPPF sets out the Sequential Test, which is a risk-based test that should be applied at all stages of development. The aim of the test is to steer new development to areas with the lowest probability of flooding (Zone 1). This is applied by the Local Authority by means of a Strategic Flood Risk Assessment (SFRA).

3.3.2 Furthermore, large sites partially affected by Flood Zones 2 and 3 should be developed sequentially, placing the most vulnerable land uses in the areas with lowest risk of flooding.

3.3.3 If it is not possible for development to be located in zones with a lower risk of flooding (taking into account wider sustainable development objectives), the NPPF requires the Exception Test to be applied to certain forms of new development. The Exception Test considers the vulnerability of the new development to flood risk. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in national planning guidance.

3.3.4 The NPPF states that for the exception test to be passed it should be demonstrated that:

a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and

b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

3.3.5 Both elements of the Exception Test should be satisfied for development to be allocated or permitted.

LOCAL PLANNING POLICY

3.3.6 As Sunnica Energy Farm is located within two administrative areas, East Cambridgeshire District Council and Forest Heath District Council, there are two the Lead Local Flood Authorities (LLFA), the Cambridgeshire County Council and Suffolk County Council. They will adjudicate the FRA (through consultation with the Environment Agency as necessary) for the site.

3.3.7 The following key planning documents and salient policies have been consulted to inform this FRA.

- West Suffolk Local Plan (consisting of the former Forest Heath and St Edmundsbury areas)
    - Forest Heath District Council Core Strategy, Adopted 2010)
        - Policy CS-4 Reduce Emission, Mitigate and Adapt to future Climate Change
        - Spatial Objective ENV2
    - Forest Heath and St Edmundsbury Local Plan: Joint Development Management Policies Document (Last updated February 2015)
        - Policy DM6 Flooding and Sustainable Drainage
        - Policy DM14 Protecting and Enhancing Natural Resources, Minimising Pollution and Safeguarding from Hazards.

  West Suffolk have commenced a review of the local plan which will set out the long term planning and land use policies for the area, however, no background evidence has yet been produced in relation to ‘Climate change and flood risk’ or the ‘Natural environment’.

- East Cambridgeshire District Council; Local Plan, Adopted April 2015
    - Policy ENV 8 Flood Risk
- East Cambridgeshire District Council, Cambridgeshire Flood and Water Supplementary Planning Document, Adopted March 2016
- Forest Heath District Council and St Edmundsbury Borough Council (FHDC&SE) Strategic Flood Risk Assessment and Water Cycle Study Level 1; August 2009
- Forest Heath District Council (FHDC) Strategic Flood Risk Assessment Level 2; October 2011
- East Cambridgeshire District Council (ECDC) Level 1 and Level 2 Strategic Flood Risk Assessment, October 2017

4. Supporting Information

4.1 Contributing Areas

4.1.1 The area contributing to surface discharge from the Site was estimated for both the proposed and existing site area. The contributing areas for the existing and proposed sites are shown in Table 5 below:

Table 5: Contributing Areas

	Total Area (ha)	Pre-Development PIMP*	Post-Development PIMP	Pre-Development Contributing Area (ha)	Post-Development Contributing Area (ha)
Development Site	1275	5%	5%	64	64

*- Percentage Impermeable (PIMP)

4.2 Flood Risk Mapping

4.2.1 The following section will discuss the existing flood risk in each area of the Site.

4.2.2 No noted historic events are detailed within FHDC&SE and ECDC SFRAs within the order limits.

SUNNICA EAST SITE A

Table 6: Flood Risk Assessment – Sunnica East Site A

Flood Risk Source	*Flood Risk Level*	*Comments*
Fluvial	Low (Majority) Medium – high (North West side)	**Source: *EA Flood Zone Dataset*** The majority of the Site lies in Flood Zone 1, however, Flood Zones 2 and 3a are shown to encroach into the Sites north west corner; from the Lee Brook (Main River) west of the Site in a north/south direction, and north from the River Lark (Main River), refer to Figures 1 and 2 below. **Source: *FHDC&SE SFRA 2009*** SFRA mapping corroborates the EA mapping above. Flood Zones 2 and 3 are shown to be within a defined Flood Warning Area, with properties within the catchment of the River Lark shown to be benefiting from flood defences. **Source: *FHDC SFRA 2011*** No further information provided for the area. **Source: *ECDC SFRA 2017*** SFRA mapping corroborates the EA mapping above. However, the SFRA also identifies Flood Zone 3b is present along the Lee Brook as shown in Figure 2. The areas of Flood Zones 2 and 3 encroaching into the Sites northern boundary from the River Lark retain that designation. The SFRA climate change mapping in Figure 2 shows a slight modification in the location of Flood Zone 3a encroachment, however, this is a negligible increase in extent of this zone. Flood defences are also shown running down the Lee Brook from the River Lark, designed to the 1 in 10 year event **Summary:** The majority of the Site lies in Flood Zone 1, however, an area of Flood Zone 3b is identified along to the Lee Brook running through the west of the Site in a north/south direction and bordering its north west boundary. The Flood Zone 2 and 3a areas continue along the northern boundary of the Sites north east corner originating from the River Lark. Development should not be permitted within the Flood Zone 3b area unless it is water compatible or essential infrastructure as set out in Table 1 of the NPPF PPG. Refer to figures overleaf for relevant map extracts of latest SFRA mapping.

Figure 2: *ECDC 2017* Flood Zone mapping – Flood Zone 3b (Purple), Flood Zone 3 (Dark Blue), Flood Zone 2 (Light Blue)

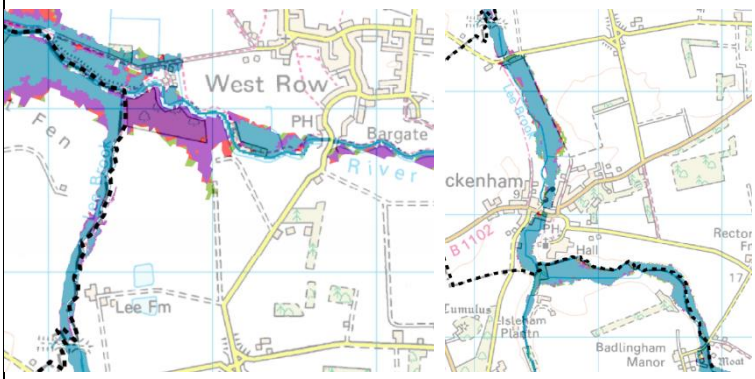


Figure 3: *ECDC 2017* Climate Change mapping – 1 in 100 year (Blue), 1 in 100 year +CC

Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Very Low	**Source: *GOV.uk Flood Risk from Surface Water; FHDC SFRA 2011; ECDC SFRA 2017*** All reference sources indicate that patches of the Site are susceptible to surface water flooding; however, flooding is generally very localised and generally shallow (low risk). Some larger patches are located within the north eastern portion of the Site which are at a high risk. Several field ditches displayed within the Site are also shown to be susceptible to surface water flooding. However, the majority of the Site is at very low risk of surface water flooding.
Groundwater	Low (East side) - Medium (North West side)	**Source: *FHDC&SE SFRA 2009*** No mapping available at the time of writing this report. However, Figure 5-3 of the SFRA displays no record of groundwater flooding on the Site, and the Environment Agency response; Ref EAn/2019/136538, dated 30 August 2019, also sates they have no records of groundwater flooding. **Source: *FHDC SFRA 2011 and ECDC SFRA 2017*** Figure 8-2 and Appendix E of the SFRA displays groundwater risk mapping showing the eastern half of the Site to be within 1km by 1km grid squares of 0% to <25% risk of groundwater emergence. The western portion of the Site graduates from 0% in the south to >=50% <75% in the north in proximity to the River Lark.
Sewers	Low	**Source: *FHDC&SE SFRA 2009 and FHDC SFRA 2011*** To date no sewer records have been received to note potential sewers in the vicinity of the Site. The Forest Heath Water Cycle Study has no records of flooding within the Site, however, historic external flooding is noted within West Row to the north. Due to the greenfield nature of the Site, it is expected that there will be little to no sewerage infrastructure beneath the fields; therefore, the risk is considered low. However, sewer mapping, once received, will be used to confirm this assumption. To date we have not received sewer plans from Anglian Water; however, during consultation Anglian Water has suggested there are assets within the area; these will be investigated and updated in due course when received.
Artificial Sources	Very Low (residual)	The Site is not within or near any registered reservoirs (assumed with volumes >10,000m3) or other artificial sources. The Site is at very low risk of flooding from artificial sources.

SUNNICA EAST SITE B

Review of the FHDC&SE SFRA 2009 shows Sunnica East Site B within Flood Zone 1 and at low risk from all sources. Pluvial risk in Site B is similar to that outlined in Site A and is to be accommodated through the use of SuDS. The Forest Heath Water Cycle Study has no records of flooding within the Site, however, historic internal and external flooding is noted within Red Lodge to the east.

SUNNICA WEST SITE A

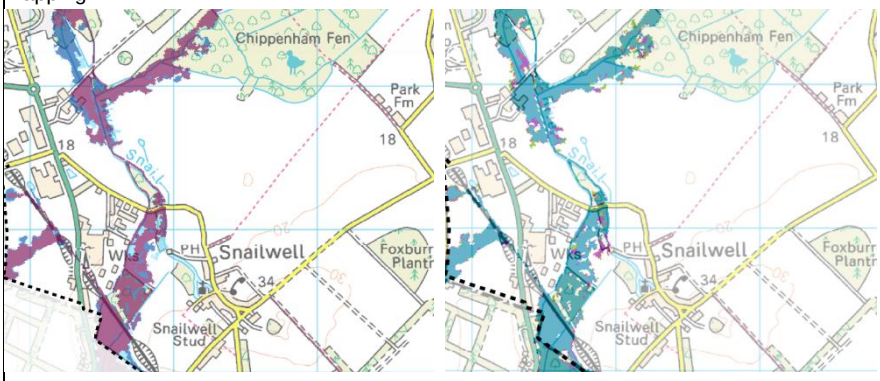
Table 7: Flood Risk Assessment – Sunnica West Site A

Flood Risk Source	*Flood Risk Level*	*Comments*
Fluvial	Low (Majority), Medium – High (West side)	**Source: *EA Flood Zone Dataset*** The majority of the Site lies in Flood Zone 1, however, an area of Flood Zones 2 and 3a encroaches into the Site from an ordinary watercourse along the Sites northern boundary (a tributary of the Lee Brook). These Flood Zones then extend further into the Site in a south easterly direction perpendicular to the ordinary watercourse for approximately 1.6km. Refer to Figure 3 below. **Source: *FHDC&SE SFRA 2009*** SFRA mapping shows no flood risk to the area. **Source: *ECDC SFRA 2017*** SFRA mapping corroborates the EA mapping. However, an area of Flood Zone 3b is shown in proximity to the ordinary watercourse as shown in Figure 4. The SFRA climate change mapping in Figure 4 below shows no major difference in Flood Zone 3a area in proximity to the ordinary watercourse, however the 1.6km encroachment in a south east direction is not shown. As such, a worst-case approach will be used for this assessment. **Summary:** The majority of the Site lies in Flood Zone 1, however, an area of Flood Zone 3b is located in proximity to an ordinary watercourse along the northern boundary of the Site overlaying Flood Zones 2 and 3a. The Flood Zone extends further into the Site in a south eastern direction for 1.6km, designated as Flood Zone 2 and 3a. Development will not be permitted within the Flood Zone 3b area unless it is water compatible or essential infrastructure as set out in Table 1 of the NPPF PPG. Refer to figures below for relevant map extracts of latest SFRA mapping.  Figure 4: *ECDC 2017* Flood Zone (Left) and Climate Change (Right) mapping
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Very Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both reference sources indicate that areas of the Site are susceptible to surface water flooding however, flooding is localised and generally shallow (low risk). The majority of the Site is at very low risk of surface water flooding.
Groundwater	Low (East side), Medium - High (West side)	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk mapping showing the eastern quarter of the Site to be within 1km by 1km grid squares of 0% to <25% risk of groundwater emergence. This risk level increases westward to >=75%. **Source: *FHDC&SE SFRA 2009*** Two locations of historic groundwater flooding are noted between the Sites southern border and Newmarket. **Source: *BGS and MAGIC maps*** The ground makeup of the Site therefore has the potential to have a relatively good infiltration capacity making shallow infiltration SuDS a possibility, subject to further ground investigation, groundwater monitoring and infiltration testing. The majority of the Site lies in a Source Protection Zone III, with a portion of the Site in the west-eastern corner designated Source Protection Zone II. Therefore, any infiltration techniques must ensure mitigation measures are put in effect to protect these zones.
Sewers	Low	**Source: *ECDC SFRA 2017*** To date no sewer records have been received to note potential sewers in the vicinity of the Site. The Anglian Water DG5 register was not available at the time of writing this report. Due to the greenfield nature of the Site, it is expected that there will be little to no sewerage infrastructure beneath the fields; therefore, the risk is considered low. However, sewer mapping, once received, will be used to confirm this assumption.

		To date we have not received sewer plans from Anglian Water; however, during consultation Anglian Water has suggested there are assets within the area; these will be investigated and updated in due course when received.
Artificial Sources	Very Low (residual)	The Site is not within or near any registered reservoirs (assumed with volumes >10,000m3) or artificial sources of flooding. The Site is at very low risk of flooding from artificial sources and reservoirs.

SUNNICA WEST SITE B

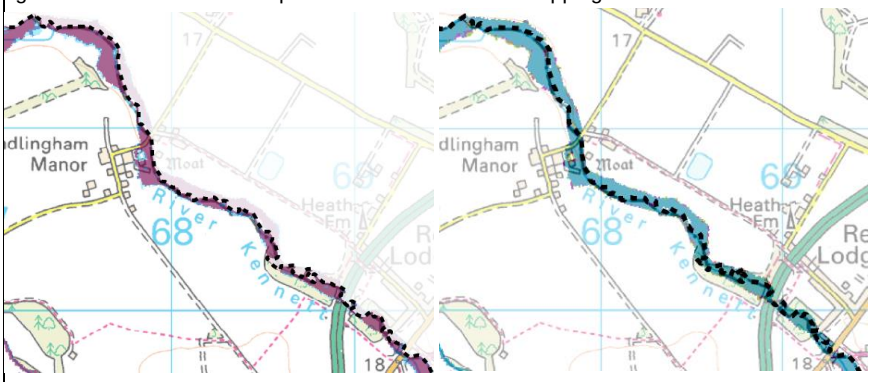
Table 8: Flood Risk Assessment – Sunnica West Site B

Flood Risk Source	***Flood Risk Level***	***Comments***
Fluvial	Low (Majority) Medium – high (North West side)	**Source: *EA Flood Zone Dataset*** The majority of the Site lies in Flood Zone 1, however, an area of Flood Zones 2 and 3a encroaches from the River Snail, running alongside the south western and north western boundaries of the Site. **Source: *FHDC&SE SFRA 2009*** No flood risk is shown. **Source: *East Cambridgeshire District Council (ECDC) Level 1 and Level 2 Strategic Flood Risk Assessment, October 2017*** SFRA mapping corroborates the EA mapping. However, Flood Zone 3b is present overlaying large parts of the Flood Zone 3a areas as shown in Figure 5. The SFRA climate change mapping, as shown in Figure 5, shows the Flood Zone 3a extents effectively matching that of the Flood Zone 2. **Summary:** The majority of the Site lies in Flood Zone 1, however, an area of Flood Zone 3b from the River Snail is located along the south western and north western boundaries of the Site. Development will not be permitted within this area. Refer to figures below for relevant map extracts of latest SFRA mapping.  Figure 5: *ECDC 2017* Flood Zone (Left) and Climate Change (Right) mapping
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Very Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both reference sources indicate that areas of the Site are susceptible to surface water flooding however, flooding is localised and generally shallow (low risk). Several field ditches displayed within the Site are also shown to be susceptible to surface water flooding. The majority of the Site is at very low risk of surface water flooding.
Groundwater	Low (East side) - Medium (West side)	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk mapping showing the majority of the Site lies within 1km by 1km grid squares of >=50% to >75%. A small area to the north of the Site and east of the A11 displays a lower risk (<25%). **Source: *BGS and MAGIC maps*** The ground makeup of the Site therefore presents limited potential for infiltration SuDS but may be suitable for shallow infiltration SuDS. However, this is subject to further ground investigation, groundwater monitoring and infiltration testing. The Site lies in a Source Protection Zone III. Therefore, any infiltration techniques must ensure mitigation measures are put in effect to protect this zone.
Sewers	Low	**Source: *ECDC SFRA 2017*** To date no sewer records have been received to note potential sewers in the vicinity of the Site. The Anglian Water DG5 register was not available at the time of writing this report. Due to the greenfield nature of the Site, it is expected that there will be little to no sewerage infrastructure beneath the fields; therefore, the risk is considered low. However, sewer mapping, once received, will be used to confirm this assumption.

		To date we have not received sewer plans from Anglian Water; however, during consultation Anglian Water has suggested there are assets within the area; these will be investigated and updated in due course when received.
Artificial Sources	Very Low (residual)	The Site is not within or near any registered reservoirs (assumed with volumes >10,000m3) or other artificial sources. The Site is at very low risk of flooding from reservoirs and artificial sources.

GRID CONNECTION ROUTE A (CONNECTING SUNNICA WEST TO EAST)

Table 9: Flood Risk Assessment – Grid Connection Route A

Flood Risk Source	***Flood Risk Level***	***Comments***
Fluvial	Low	**Source: *EA Flood Zone Dataset, ECDC SFRA 2017*** The majority of Site is situated within Flood Zone 1, however, an area of Flood Zones 2 and 3a crosses the connection route – the floodplain of the River Kennet and the River Kennett itself. **Source: *FHDC&SE SFRA 2009*** SFRA mapping corroborates the EA mapping above. **Source: *East Cambridgeshire District Council (ECDC) Level 1 and Level 2 Strategic Flood Risk Assessment, October 2017*** SFRA mapping corroborates the EA mapping. However, Flood Zone 3b is present overlaying large parts of the Flood Zone 3a areas as shown in Figure 6. The SFRA climate change mapping, and shows the Flood Zone 3a extents effectively matching that of Flood Zone 2. **Summary:** The majority of the Site lies in Flood Zone 1, however, an area of Flood Zone 3b from the River Kennet is near the Site. Development should not be permitted within the Flood Zone 3b area unless it is water compatible or essential infrastructure as set out in Table 1 of the NPPF PPG. Refer to figures overleaf for below map extracts of latest SFRA mapping.  Figure 6: *ECDC 2017* Flood Zone (Left) and Climate Change (Right) mapping
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Very Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both sources indicate that areas of the Site are susceptible to surface water flooding; however, flooding is localised and generally shallow (low risk). A higher risk area adjacent to the connection route, approximately 160m perpendicular to the B1085 is shown. This is considered a larger depression. The majority of the Site is at very low risk of surface water flooding.
Groundwater	Low	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk mapping showing that the majority of the Site lies within 1km by 1km grid squares of 0% groundwater risk. The lower portion of the Site increases in risk shown as >=25% <50% groundwater risk.
Sewers	Low	**Source: *ECDC SFRA 2017*** To date no sewer records have been received to note potential sewers in the vicinity of the Site. The Anglian Water DG5 register was not available at the time of writing this report. Due to the greenfield nature of the Site, it is expected that there will be little to no sewerage infrastructure beneath the fields; therefore, the risk is considered low. However, sewer mapping, once received, will be used to confirm this assumption. To date we have not received sewer plans from Anglian Water; however, during consultation Anglian Water has suggested there are assets within the area; these will be investigated and updated in due course when received.
Artificial Sources	Very Low (residual)	The Site is not within or near any registered reservoirs (assumed with volumes >10,000m3) or other artificial sources. The Site is at very low risk of flooding from reservoirs and artificial sources.

GRID CONNECTION ROUTE B (CONNECTING BURWELL SUBSTATION TO SUNNICA WEST SITE)

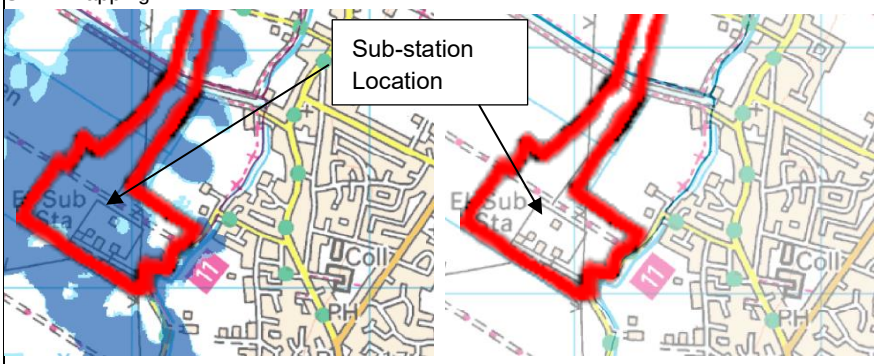
Table 10: Flood Risk Assessment - Grid Connection Route B

Flood Risk Source	***Flood Risk Level***	***Comments***
Fluvial	Low	**Source: *EA Flood Zone Dataset, FHDC&SE SFRA 2009 and ECDC SFRA 2017*** The route is situated largely within Flood Zone 1 but passes through areas of Flood Zones 2 and 3a as shown in Figure 7. The western extent, an area in the centre and the western connection to the Sunnica West Site B is within Flood Zones 2 and 3a. The western extent is within an area of Defended Flood Zone 3a and the edge of the Sunnica West Site B is designated Flood Zone 3b. The SFRA climate change mapping appears to indicate large reductions in the Flood Zone 3a area. It is currently unclear as to the reasons for this; as such, until this is confirmed with the EA, a worst-case approach will be used for this assessment. Refer to figures below for relevant map extracts of latest SFRA mapping.  Figure 7: *ECDC 2017* Flood Zone mapping  Figure 8: *ECDC 2017* Climate Change mapping The SFRA also shows that the Site is not within the Fenland flood defence breach model for Q100 year and Q100 year + Climate Change extents.
Tidal	Low	**Source: *ECDC SFRA 2017*** Not within the Tidal Hazard Mapping (Tidal Great Ouse Breach Modelling) for Q200 and Q200 + Climate Change breach extents.
Pluvial (Surface Water)	Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both reference sources indicate patches of the Site which are susceptible to surface water flooding, however, flooding is localised and generally shallow (low risk). Several field ditches displayed within the Site are also shown to be susceptible to surface water flooding. The majority of the connection route is at low risk of surface water flooding.
Groundwater	Medium - High (Majority)	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk is shown to be generally high (>75%) west of Sunnica West Site B, lowering in some areas to >=50% <75%, however, low risk (<25%) between Sunnica West Sites' A and B.
Sewers	Low	**Source: *ECDC SFRA 2017*** To date no sewer records have been received to note potential sewers in the vicinity of the Site. The Anglian Water DG5 register was not available at the time of writing this report. Due to the greenfield nature of the Site, it is expected that there will be little to no sewerage infrastructure beneath the

		fields; therefore, the risk is considered low. However, sewer mapping, once received, will be used to confirm this assumption. To date we have not received sewer plans from Anglian Water; however, during consultation Anglian Water has suggested there are assets within the area; these will be investigated and updated in due course when received.
Artificial Sources	Very Low (residual)	The Site is not within or near any registered reservoirs (assumed with volumes >10,000m3) or other artificial sources. The Site is at very low risk of flooding from reservoirs and artificial sources.

BURWELL NATIONAL GRID SUBSTATION

Table 11: Flood Risk Assessment - Burwell National Grid Substation

Flood Risk Source	***Flood Risk Level***	***Comments***
Fluvial	Low	**Source: *EA Flood Zone Dataset, Accessed, ECDC SFRA 2017*** The Site is shown to be majority in Defended Flood Zone 3a. However, SFRA climate change maps appear to indicate large reductions in Flood Zone 3a area. It is currently unclear as to the reasons for this; as such, until this is confirmed with the EA, a worst-case approach will be used for this assessment. The SFRA also shows that the Site is not within the Fenland flood defence breach model for Q100 year and Q100 year + Climate Change extents. Figure 9 below indicates the flood risk, including climate change, from the ECDC SFRA. Refer to figures below for relevant map extracts of latest SFRA mapping.  Figure 9: *ECDC 2017* Flood Zone (Left) and Climate Change (Right) mapping
Tidal	Low	**Source: *ECDC SFRA 2017*** Not within the Tidal Hazard Mapping (Tidal Great Ouse Breach Modelling) for Q200 and Q200 + Climate Change breach extents.
Pluvial (Surface Water)	Very Low - Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both reference sources indicate patches of the Site which are susceptible to surface water flooding, however, flooding is localised and shallow (low risk). The majority of the Site is at very low risk of surface water flooding.
Groundwater	High	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk is shown to be high (>75%).
Sewers	Low	**Source: *ECDC SFRA 2017*** To date no sewer records have been received to note potential sewers in the vicinity of the Site. The Anglian Water DG5 register was not available at the time of writing this report. Due to the greenfield nature of the Site, it is expected that there will be little to no sewerage infrastructure beneath the fields; therefore, the risk is considered low. However, sewer mapping, once received, will be used to strengthen this assumption. To date we have not received sewer plans from Anglian Water; however, during consultation Anglian Water has suggested there are assets within the area; these will be investigated and updated in due course when received.
Artificial Sources	Very Low (residual)	The Site is not within or near any registered reservoirs (assumed with volumes >10,000m3) or other artificial sources. The Site is at very low risk of flooding from reservoirs and artificial sources.

4.3 Watercourses

4.3.1 Three main rivers and one ordinary watercourse are shown within / in close proximity to the Site:

- The River Lark running in an east / west direction along the northern border of Sunnica East Site A;

- The Lee Brook, a tributary of the River Lark, running in a south / north direction through the west of the Sunnica East Site A, being shown as the River Kennet in proximity to the southern border of the Sunnica East Site B;
- The River Snail running in a south / north direction along the southern border of the Sunnica West Site B; and
- An ordinary watercourse running along the north-western border of the Sunnica West Site A.

4.4 Geology and Hydrogeology

4.4.1 A desk top assessment has been completed to determine bedrock and superficial geology within the site boundary. These maps indicate the Site to be underlain by a mix of Sand and Gravel members; Head, River Terrace Deposits and Alluvium Superficial Deposits atop Chalk Bedrock. Large portions of the Site are however absent of Superficial Deposits and are directly underlain by the Chalk Bedrock..

4.4.2 The Bedrock covering the majority of the Site is Holywell Nodular Chalk Formation And New Pit Chalk Formation and Zig Zag Chalk Formation, with seams of the Melbourn Rock Member.

4.4.3 Boreholes have not been assessed at this stage due to the high number across the Site. However, SFRA maps have been assessed for groundwater risk potential as described in the tables above. Available boreholes are subject to review at a later stage.

4.4.4 The EA's Online Interactive Maps for Groundwater shows the furthest eastern and western extents of Sunnica East Site and the entirety of the Sunnica West Site to be situated within a Groundwater Source Protection Zone (SPZ) 3 (Total Catchment Zone). A small portion of the Sunnica West Site is also within a Groundwater SPZ 2 (Outer Protection Zone). An SPZ typically means there is an underlying aquifer supplying a borehole for potable use; an SPZ 2 defined by a 400 day travel time from a point below the water table and an SPZ 3 defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source.

4.4.5 Refer to Appendix E – Additional Mapping for reference.

5. Assessment of Flood Risk

5.1 Flood Risk from all Sources

5.1.1 This section assesses the flood risk from the following sources against the Sunnica Site parameter plans within Appendix B:

- Fluvial (Rivers and the Sea);
- Surface Water;
- Sewers;
- Groundwater;
- Artificial waterbodies.

5.1.2 The methodology used to assess the flood risk is detailed below:

- Low: where little risk is identified or any theoretical risk identified is classified as low within Local Authority SFRAs and/or EA flood risk mapping extents, with very low probability of flooding occurring.
- Medium: where risk is identified within Local Authority SFRA and/or EA flood risk mapping extents indicating a medium probability, but manageable flood risk with little to no mitigation required.
- High: where modelled levels within Local Authority SFRA and/or EA flood risk mapping extents show risk to the Development as a high probability of flood risk and where mitigation needs to be considered and residual risks controlled.

5.1.3 As previously mentioned, the proposed development covers a considerable area and the flooding risk affecting different proposed areas of development varies according to each area. Section 5 discusses the flood risk affecting each area of development within the Site individually, using parcel references presented within the Sunnica Site parameter plans, for example; W01 for the Sunnica West Site and E01 for the Sunnica East Site. It is therefore recommended to refer to these plans in Appendix B when reading the below sections.

5.1.4 Through the sequential process and design iterations, all operational compounds and battery storage units have been located out of flood zones. Infrastructure shown to be at flood risk is to mitigated as discussed in as detailed in the below tables and in Sec. 7 Residual Risks and Mitigation.

5.1.5 The following sections reference SuDS measures that will be employed, as set out within the accompanying drainage strategy, to mitigate risks from surface water flooding, and fluvial flooding downstream of the Site.. For further information, please refer to the Drainage Technical Note within Appendix F.

Sunnica East Site A

5.1.6 With the exception of sections E01, E02, E03 and E05, the remainder of Sunnica East Site A and B are considered to be at low risk from all sources of flooding. Refer to Appendix A for layout and areas with identified flood risk.

5.1.7 Surface water risks are generally shown to have little impact to the proposed development and may be mitigated via the use of above ground SuDS features.

PV Panels Structure (Areas E01, E02, E03, E05)

Table 12: Flood Risk Assessment - PV Panels Structure (Areas E01, E02, E03, E05)

Flood Risk Source	*Flood Risk Level*	*Comments*
Fluvial	Low (Majority) Medium – High (Proximity to the River Lark	**(E01)** The majority of the panels lie in Flood Zone 1, however, Zones 2 and 3a encroaches from the north western corner from the Lee Brook and River Lark. However, SFRA climate change mapping shown in Figure 3 indicates a decrease in Flood Zone 3a area in this location. **(E02)** The majority of panels lie in Flood Zone 2, from the River Lark. The remaining area lies in Flood Zone 1. However, SFRA climate change mapping shown in Figure 3 indicates much of the Flood Zone 2 area as Flood Zone 3a.

	and Lee Brook)	**(E03)** The majority of the panels lie in Flood Zone 1, however, an area of Flood Zones 2 and 3a is shown to encroach from the western boundary from the Lee Brook. Flood Zone 3b is shown to occupy approximately half of the Flood Zone 3 area. **(E05)** The majority of panels lie in Flood Zone 1; however, an area of Flood Zone 2 is shown to encroach from the south eastern corner of from the Lee Brook as shown in Figure 2. SFRA climate change mapping shown in Figure 2 shows negligible change in Flood Zone 3a area. The Flood Zone 3b outlined in Figure 2 does not impact PV panels in Sites E01, E02 and E05.
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Low	It is envisaged PV panels will increase surface water runoff locally. In lieu of detailed ground investigation, shallow infiltration SuDS will be implemented to reduce peak rates and peak runoff volumes leaving the Site during storm events; reducing pluvial flood risk on and off-site and reducing downstream flood risk. Similar mitigation measures will be made for the site compound, however, further pollution control measures may need to be included when the compound layout and content is confirmed.
Groundwater	Medium	**(E01, E02)** The PV panels are located in a region of >=50% <75% risk of groundwater emergence. However, there is no known record of groundwater flooding. **(E03, E05)** The PV panels are located between 1km by 1km grid squares of >25% to <75%. However, there is no known record of groundwater flooding. According to BGS geology mapping, three Chalk formations make up the bedrock of the Site; the West Melbury Marly Chalk Formation, the Totternhoe Stone Member and Zig Zag Chalk Formation. The superficial geology varies between Peat and Alluvium in proximity to the Lee Brook, with the remainder of the Site as None Recorded. Chalk has a generally low infiltration capacity; however, Head has the potential to have a relatively good infiltration capacity. Shallow Infiltration SuDS are currently proposed for the development, subject to further ground investigation, groundwater monitoring and infiltration testing.
Sewers	Low	It is not envisaged this risk will increase to the existing with the construction of PV panels.
Artificial Sources	Low (residual)	It is not envisaged this risk will increase to the existing with the construction of PV panels.

Sunnica East Site B

5.1.8 Sunnica East Site B is shown to lie within Flood Zone 1 and to be at low risk from all sources. Pluvial risk in Site B is similar to that outlined in Site A and is to be managed similarly.

Sunnica West Site A

5.1.9 With the exception of W08, W10, W11, W12 and W15, the remainder of the Sunnica West Site A is situated within Flood Zone 1 and not under fluvial influence.

5.1.10 Surface water risks are again shown to have little impact to the proposed development and can be mitigated via the use of above ground SuDS features.

5.1.11 Remaining PV panel areas are considered to present negligible change to existing flood risk and mitigation measures are not likely to be required.

PV Panels Structure (Areas W08, W10, W11, W12 and W15), with Permeable Parking in (W11)

Table 13: Flood Risk Assessment - PV Panels Structure (Areas W08, W10, W11, W12 and W15)

Flood Risk Source	***Flood Risk Level***	***Comments***
Fluvial	Low (Majority) Medium – High (Proximity to the ordinary water-course and the 1.6km south eastern extent)	**(W08)** The majority of panels lie in Flood Zone 1, however, a portion is covered by Flood Zones 2 and 3a encroaching from the ordinary watercourse on the northern boundary. Furthermore, the Flood Zone along the ordinary watercourse is shown to be Flood Zone 3b. **(W10)** The majority of panels lie partially in Flood Zone 1, with approximately half of the Site covered by Flood Zones 2 and 3a, encroaching from the ordinary watercourse on the northern boundary. Approximately half of the Flood Zone 3a along the ordinary watercourse is shown to be Flood Zone 3b (SFRA mapping). **(W11)** The majority of panels lie in Flood Zone 1, however, a portion is covered by Flood Zones 2 and 3 encroaching from the ordinary watercourse on the northern boundary. The area also contains a permeable parking area which is shown to be in majority Flood Zone 2 and 3. **(W12)** The majority of panels lie in Flood Zone 1, however, the northern corner is covered by Flood Zones 2 and 3a encroaching from the ordinary watercourse on the northern boundary.

		(W15) The majority of panels lie in Flood Zone 1, however, large patches of the western portion is covered by Flood Zone 2 and 3a encroaching from the ordinary watercourse on the western boundary. The Flood Zone 3b outlined in Figure 3 does not impact PV panels in Sites W11, W12 and W15. Two solar stations; within **(W10)** and **(W15)**, are placed within Flood Zone 3, with two more in very close proximity; within **(W11)** and **(W15)**. These stations will need to be of the enclosed option and raised above predicted flood levels. Any raising is to be completed via stilted feet and considered to pose negligible impact to existing flood zones.
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Low	It is envisaged PV panels will increase surface water runoff locally. In lieu of detailed ground investigation, shallow infiltration SuDS will be implemented to reduce peak rates and peak runoff volumes leaving the Site during storm events; reducing pluvial flood risk on and off-site and reducing downstream flood risk. Similar mitigation measures will be made for the site compound, however, further pollution control measures may need to be included when the compound layout and content is confirmed.
Groundwater	Medium	**(W08)** The PV panels are located within a 1km by 1km grid square of >75% risk of groundwater emergence. However, there is no record of groundwater flooding. However, no record of groundwater flooding. According to BGS geology mapping, the bedrock of the area is the Holywell Nodular Chalk Formation And New Pit Chalk Formation (undifferentiated) (Chalk) atop River Terrace Deposits. Chalk has a generally low infiltration capacity; however, River Terrace Deposits have relatively good infiltration capacity. **(W10)** The PV panels are located within 1km by 1km grid squares of >=25% to <75% risk of groundwater emergence. However, there is no record of groundwater flooding. According to BGS geology mapping, the bedrock of the area is the Holywell Nodular Chalk Formation And New Pit Chalk Formation (undifferentiated) (Chalk) atop River Terrace Deposits and None Recorded. Chalk can have limited infiltration capacity; however, River Terrace Deposits have relatively good infiltration capacity. **(W11)** The PV panels and permeable parking area are located within 1km by 1km grid squares of >=25% to <75% risk of groundwater emergence. However, there is no record of groundwater flooding. According to BGS geology mapping, the bedrock of the area is the Holywell Nodular Chalk Formation And New Pit Chalk Formation (undifferentiated) (Chalk) atop River Terrace Deposits, Lowestoft Formation and None Recorded. Chalk has a generally low infiltration capacity, however, remaining ground makeup have relatively good infiltration capacity. **(W12)** The PV panels are located within 1km by 1km grid squares of >=50% <75% risk of groundwater emergence. However, there is no record of groundwater flooding. According to BGS geology mapping, the bedrock of the area is the Holywell Nodular Chalk Formation And New Pit Chalk Formation (undifferentiated) (Chalk) atop River Terrace Deposits. Chalk has a generally low infiltration capacity, however, River Terrace Deposits has relatively good infiltration capacity. **(W15)** The PV panels are located within 1km by 1km grid squares of <25% risk of groundwater emergence. However, there is no record of groundwater flooding. According to BGS geology mapping, the bedrock of the area is the Holywell Nodular Chalk Formation And New Pit Chalk Formation (undifferentiated) (Chalk) atop River Terrace Deposits, Head, Lowestoft Formation and None Recorded. Chalk has a generally low infiltration capacity, however, the remaining ground makeup has relatively good infiltration capacity Shallow Infiltration SuDS are currently proposed for the development, subject to further ground investigation, groundwater monitoring and infiltration testing. Furthermore, as all Sites are within a Source Protection Zone III, infiltration techniques must ensure mitigation measures are put in effect to protect these zones methods.
Sewers	Low	It is not envisaged this risk will increase to the existing with the construction of PV panels and site compound.
Artificial Sources	Low (residual)	It is not envisaged this risk will increase to the existing with the construction of PV panels.

Sunnica West Site B

5.1.12 With the exception of W01, the remainder of the Sunnica West Site B (W02) is situated within Flood Zone 1 and not under fluvial influence.

Table 14: Flood Risk Assessment - PV Panels Structure (Sunnica West Site B)

Flood Risk Source	***Flood Risk Level***	***Comments***

Fluvial	Low (Majority) Medium – High (Proximity to the River Snail)	**(W01)** The majority of the Site lies in Flood Zone 1, however, Flood Zone 3b as shown in Figure 4 is located in proximity to the River Snail along the western and northern boundaries of the Site, overlaying Flood Zone 2 and 3a.
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Low	It is envisaged PV panels will increase surface water runoff locally. In lieu of detailed ground investigation, shallow infiltration SuDS will be implemented to reduce peak rates and peak runoff volumes leaving the Site during storm events; reducing pluvial flood risk on and off-site and reducing downstream flood risk. No site compound is noted in this Site. As such, no further pollution control measures are required.
Groundwater	Medium	**(W01 and W02)** The majority of PV panels are located within 1km by 1km grid squares of >=50% <75% risk of groundwater emergence. However, there is no record of groundwater flooding. According to BGS geology mapping, three Chalk formations make up the bedrock of the Site; the Zig Zag Chalk Formation, the Melbourn Rock Member and the Holywell Nodular Chalk Formation and New Pit Chalk Formation (undifferentiated). The superficial geology varies between Alluvium and None Recorded. Chalk has a generally low infiltration capacity, however, Alluvium has relatively good infiltration capacity. Shallow Infiltration SuDS are currently proposed for the development, subject to further ground investigation, groundwater monitoring and infiltration testing. Furthermore, as the Site is within a Source Protection Zone III, infiltration techniques must ensure mitigation measures are put in effect to protect these zones methods.
Sewers	Low	It is not envisaged this risk will increase to the existing with the construction of PV panels and site compound.
Artificial Sources	Low (residual)	It is not envisaged this risk will increase to the existing with the construction of PV panels.

Grid Connection Route A

5.1.13 The cable routes, post development, will have no residual flood risk associated with them, as they will be buried. The tables below for Routes A and B are effectively assessing the construction phase and will inform the construction method statements and risk assessments to ensure flood risk is taken into account and mitigated during construction to avoid increasing the risk of flooding from all sources to nearby areas or downstream.

Table 15: Flood Risk Assessment – Grid Connection Route A (Connecting Sunnica West To East)

Flood Risk Source	***Flood Risk Level***	***Comments***
Fluvial	Low	**Source: *EA Flood Zone Dataset, ECDC SFRA 2017*** The route is situated within Flood Zone 1.
Tidal	Low	Not in a Tidal area
Pluvial (Surface Water)	Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both sources indicate patches of the Site that are susceptible to surface water flooding; however, flooding is localised and generally shallow (low risk). A higher risk area adjacent to the connection route, approximately 160m perpendicular to the B1085 is shown. This area is outside of the Red Line Boundary and is not considered to pose a risk to the development Site. The Site is at very low risk of surface water flooding.
Groundwater	Low (East side) Medium (West side)	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk mapping showing the majority of the Site lies within 1km by 1km grid squares of 0%. The lower portion of the Site increases in risk shown as >=25% <50%. Groundwater flooding may be risk during excavation and laying of cables. Further investigation will be carried out to inform the construction methods for the cable routes and where they cross watercourses.
Sewers	Low	**Source: *ECDC SFRA 2017*** To date there are no sewer records available to note potential sewers in the vicinity of the Site. The Anglian Water DG5 register was not available at the time of writing this report. Due to the greenfield nature of the Site, it is expected that there will be little to no sewerage infrastructure beneath the

		fields; therefore, the risk is considered low. However, sewer mapping, once received, will be used to strengthen this assumption.
Artificial Sources	Low (residual)	The Site is not within or near any registered reservoirs (assumed with volumes >10,000m3). The Site is at very low risk of flooding from reservoirs.

Grid Connection Route B (Connecting Burwell Substation To Sunnica West Site)

Table 16: Flood Risk Assessment - Grid Connection Route B

Flood Risk Source	***Flood Risk Level***	***Comments***
Fluvial	Low	**Source: *EA Flood Zone Dataset*** The route is situated largely within Flood Zone 1, but crosses through areas of Flood Zones 2 and 3a as shown in Figure 5. The western extent, an area in the centre and the western connection to the Sunnica West Site B is within the Flood Zones 2 and 3a. The western extent is within an area of Defended Flood Zone 3a and the edge of the Sunnica West Site B is designated Flood Zone 3b. SFRA climate change mapping appears to indicate large reductions in Flood Zone 3a area. It is currently unclear as to the reasons for this; as such, until this is confirmed with the EA, a worst-case approach will be used for this assessment.
Tidal	Low	**Source: *ECDC SFRA 2017*** Not within the Tidal Hazard Mapping (Tidal Great Ouse Breach Modelling) for Q200 and Q200 + Climate Change breach extents.
Pluvial (Surface Water)	Low	**Source: *GOV.uk Flood Risk from Surface Water; ECDC SFRA 2017*** Both reference sources indicate patches of the Site which are susceptible to surface water flooding, however, flooding is localised and generally shallow (low risk). Several field ditches displayed within the Site are also shown to be susceptible to surface water flooding. Surface water risk increases to patches of high in proximity to Burwell. The majority of the Site is at very low risk of surface water flooding.
Groundwater	Low (East side) Medium (West side)	**Source: *ECDC SFRA 2017*** Appendix E of the SFRA displays groundwater risk is shown to be generally high (>75%) west of Sunnica West Site B, lowering in some areas to >=50% <75%, however, low risk (<25%) between Sunnica West Sites' A and B. Groundwater flooding may be risk during excavation and laying of cables. Further investigation will be carried out to inform the construction methods for the cable routes and where they cross watercourses.
Sewers	Low	**Source: *ECDC SFRA 2017*** To date there are no sewer records available to note potential sewers in the vicinity of the Site. The Anglian Water DG5 register was not available at the time of writing this report. Due to the greenfield nature of the Site, it is expected that there will be little to no sewerage infrastructure beneath the fields; therefore, the risk is considered low. However, sewer mapping, once received, will be used to strengthen this assumption.
Artificial Sources	Low (residual)	The Site is not within or near any registered reservoirs (assumed with volumes >10,000m3). The Site is at very low risk of flooding from reservoirs.

Burwell National Grid Substation Extension

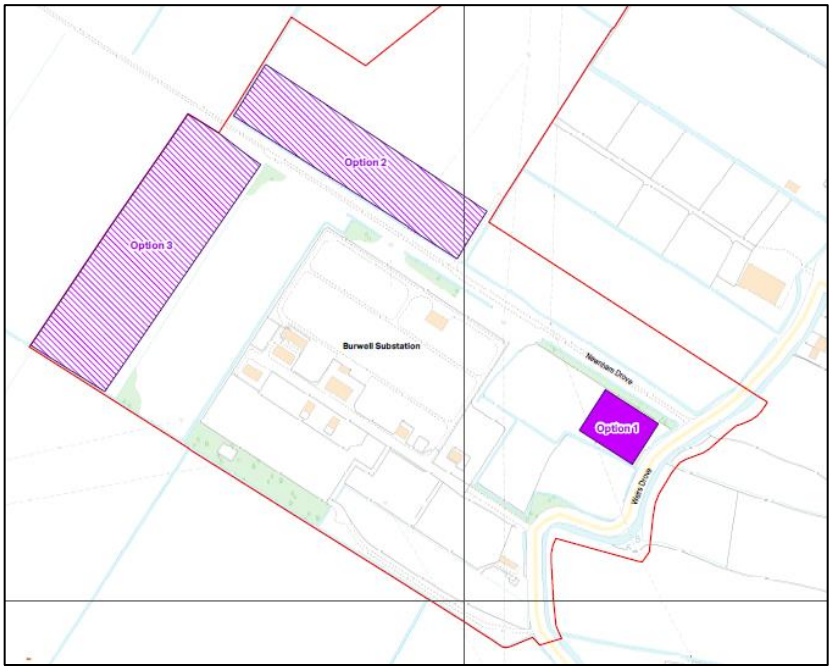


Figure 10: Preferred and Alternative locations for the Burwell National Grid Substation Extension

FLUVIAL RISK

5.1.14 The preferred location for the sub-station extension lies mostly in Flood Zone 1, with approx. 15% in Defended Flood Zone 3a, according to the online flood map for planning and the ECDC SFRA (2017) shown in Figure 9. Alternative locations, however, lie entirely in Defended Flood Zone 3a.

5.1.15 However, the River Great Ouse has a tidal flood defence level of between 1 in 500 year and 1 in 1000 year. The Great Ouse Tidal River Baseline Report (2017), incorporated within the ECDC SFRA mapping, indicates the sub-station site is also not at risk of tidal flooding, or at risk of a tidal breach, for the 1 in 200 year plus climate change event. The Environment Agency will be consulted to confirm the Breach modelling undertaken as part of the SFRA is acceptable and not further modelling is required.

5.1.16 In addition, the ECDC SFRA includes flood risk mapping that includes climate change allowances, based on the current allowances provided by the Environment Agency (65% allowance at the Upper End for the Anglian River Basin Management Plan area). As noted in Figure 9 in section 4, the Site is not at risk of flooding.

SEA LEVEL RISE

5.1.17 The River Great Ouse tidal defences provide a high level of defence and it is not anticipated that significant benefit would be gained from raising the defences further to account for sea level rise (The Great Ouse Tidal River Strategy, 2009). The Burwell sub-station is not within the modelled tidal and non-tidal breach extents; however, it has been estimated, using the Agency's online sea level rise tables for the Anglian River Basin area, sea level could rise by up to approx. 800mm by the year 2080. Liaison with the National Grid and Environment Agency will be undertaken to establish the current tidal flood extent level, and to apply the sea level rise value, to confirm the level of risk to the sub-station and the proposed extension.

5.1.18 The sub-station site will have no structures that would be occupied; with staff generally attending only at times of inspection and maintenance. Any building compounds will be located within Flood Zone 1, taking into account the current climate change mapping extents as the flood zone 2 boundary.

5.1.19 Should sea level rise pose a risk to the Site, mitigation will be incorporated to ensure the sub-station is designed and constructed to remain operational and safe in times of flood, and to ensure there is no increase in flood risk as a result of development, including allowance for sea level rise, complying with the NPPF.

5.1.20 National Grid, who has extensive infrastructure on the Site already, has a flood risk contingency plan, as part of the National Grid Substation Flood Defence Framework (NGFDF) (2019). It has identified all vulnerable sub-stations and implemented plans to provide protection and mitigation for the next 30 to 80 years. Along with a constant monitoring programme of weather and flood alerts, it is considered the Burwell sub-station will be well catered for flood defence mitigation.

5.1.21 The flood risk to structures and the risk to people is considered low when incorporating sea level rise, subject to National Grid and Environment Agency confirmation.

SURFACE WATER AND GROUNDWATER

5.1.22 Surface water risks are shown to have negligible impact to all substation locations and can be mitigated via the use of above ground SuDS features. Groundwater risk is shown to be high (>75%) and the geology is shown to be Chalk so may offer limited potential for infiltration SuDS, however, the Site is not within a Source Protection Zone. This is subject to further ground investigation, groundwater monitoring and infiltration testing.

ARTIFICAL SOURCES

5.1.23 The Site is not at risk from any identified artificial sources (Reservoir / Canal etc).

5.1.24 With the NGFDF and the flood risk to the Site from all other sources (including climate change), the flood risk to sub-station site is considered to be low.

Flood Risk Summary

5.1.25 Following review of the Site, and based on current information available, the following conclusions are presented in Table 17 below:

Table 17: Flood Risk Summary

Flood Risk Source	Pre-Development Risk	Post Development Risk	Comments
Fluvial	Low	Low (majority), Medium – High in proximity to watercourse	The majority of the Site is in Flood Zone 1, but certain areas lie in Flood Zone 2, 3a, 3b. No development will occur in Flood Zone 3b.
Tidal	Very Low except for Burwell Substation	Very Low except for Burwell Substation Extension	Not in a tidal area
Pluvial (Surface Water)	Low	Low	Surface water risk varies throughout the Site indicating patches of the Site which are susceptible to surface water flooding. However, flooding is localised and generally shallow (low risk).
Groundwater	Medium	Medium	Groundwater risk also varies, with all Sites between <25% and >75%, therefore further ground investigation, groundwater monitoring and infiltration testing is recommended to confirm groundwater levels. Furthermore, both the Sunnica East (eastern half) and West A and B Sites are shown to be within a Source Protection Zone III, with small areas of Source Protection Zone II. Therefore, infiltration techniques must ensure mitigation measures are put in effect to protect groundwater interaction in these areas.
Sewers	Low	Low	There are no sewers in the vicinity of the Site.
Artificial Sources	Low (residual)	Low (residual)	Statutory Reservoirs (large raised reservoirs with volumes above ground of 25,000m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. On that basis they are deemed to pose a low (residual) risk. Other artificial sources such as canals and waterways are considered to be regularly maintained and therefore only deemed to pose a low (residual) risk to the proposed development

5.2 The Sequential Test and the Exception Tests

5.2.1 According to Table 2 of the Flood Risk and Coastal Change Planning Practice Guidance published in 2014, the proposed development is classified as 'Essential Infrastructure'. The majority of the development is situated in Flood Zone 1 and thus the Sequential Test need not be applied however there are certain areas that lie in Flood Zone 2, 3a and 3b, which need to undergo the Sequential Test and where relevant, the Exception Test.

5.2.2 Chapter 4 of the PEI Report sets out details of how the proposed development has considered alternatives including sites and layouts. An alternative sites assessment which includes consideration of sites in terms of their susceptibility to flooding, having regard to the Flood Zone within which they are predominantly located will be submitted with the DCO application and will provide evidence to demonstrate the Sequential Test requirements (as required by the NPPF and NPS EN-1) have been met. Details of how the Sequential and

Exception Tests have been met for the proposed development will be provided in an update to this FRA to accompany the DCO application.

6. Drainage Strategy Assessment

6.1.1 Below is a summary of the drainage strategy for the development. Refer to Appendix F for the complete assessment.

6.2 Existing Drainage Arrangements

Existing Surface Water Drainage

6.2.1 The Site is currently greenfield and is assumed to be 95% permeable. Furthermore, it does not appear that there are any formal drainages currently onsite. The ground conditions found onsite are typically good for infiltration. This leads to the understanding that any runoff generated within the Site boundary is discharged via infiltration, however, this will require further investigation through ground investigations at a later stage.

Existing Foul Water Drainage

6.2.2 It is currently understood that there will be no foul water discharge proposed from the Site into the public sewer system; however, this will require further investigation and confirmation with Anglian Water if any foul water is to be discharge to a positive drainage network.

6.3 Proposed Surface Water Drainage Strategy

6.3.1 Subject to a geotechnical investigation, in which groundwater monitoring and infiltration testing is conducted, it is proposed to remove any surface water runoff generated within the Site boundary via infiltration techniques. Based on current understanding, this would mimic the manner that the site currently discharges runoff.

6.3.2 Individual solar panels will be held above the ground surface on four legs. This will avoid sealing the ground with impermeable surfaces. As a result, it is assumed that the Sites impermeable area will remain consistent to its pre-development state. Runoff from the solar panels however will alter the existing routing of runoff.

6.3.3 Currently, it is understood that rainfall on the Site will mostly permeate into the ground where it falls with little or no runoff occurring throughout the Site. The introduction of solar panels will prevent some rainfall permeating to ground where it lands. This could cause concentrated areas of runoff build-up with could result in above ground ponding during heavy rainfall. To prevent ponding occurring around the panels, a series of swales will be constructed to convey surface water runoff to infiltration ponds to be located throughout the Site.

6.3.4 Percentage impermeable areas of compound areas and battery energy storage systems and substations are not yet confirmed (assumed 50% impermeable area), however, increases to existing are to be balanced by infiltration techniques, with exceedance flows captured by surrounding swales.

6.3.5 For further information, please refer to the Drainage Technical Note within Appendix F.

6.4 Proposed Foul Water Drainage Strategy

6.4.1 The two operational office / warehouse blocks will be situated on Sunnica East A and Sunnica West B for management and maintenance of the DCO site. These will contain welfare facilities for the c. up to five permanent members of staff (i.e. low volumes of foul drainage will be generated). At this point in time it is not known how any waste water will be managed. Potential options have been explored within the PEIR Chapter 9 Water Environment and Anglian Water will be consulted as the scheme develops.

7. Residual Risks and Mitigation

7.1 Residual Risks to Site

7.1.1 Risks relating to fluvial risk to PV sites are addressed previously within the Exception Test and will not be discussed further in this section.

7.1.2 The existing Burwell Substation and consequently its proposed extension is within Defended Flood Zone 3a as well as potentially at tidal risk.

7.2 Resilience and Resistance Measures

7.2.1 It is unknown at this stage whether modifications have been made in preventing water entering the existing substation under the National Grid Substation Flood Defence Framework, however, proposed extension works should comply with this framework. Measures should ensure protection from a 1:1,000 year flood event, considering climate change effects expected under a high emission scenario (UKCP09, corresponding to the IPCC SRES A1FI scenario) by 2080. If this is not possible, protection for a 1:200 year flood event, while still considering the effects of climate change at 2050 per a high emission scenario or a 1:1000 flood event at today's levels should be aimed for.

7.2.2 Resistance and resilience measures that should be considered by the applicant are as follows. The list is not exhaustive and not all measures need be employed to affect a more resilient structure;

- Bunding the site with fixed or controllable structures including flood gates.
- Raise foundations and plinths etc thus increasing the floor level above a predicted flood.
- Raising the plant by addition of stilts or floatation devices.
- Adding flood defences to the perimeter. Attention shall be given to any ducting and ventilation which may need to be relocated accordingly.
- Flood storage attenuation and land-management based measures.
- Application of approved proprietary flood protection systems.
- Application of demountable or temporary flood defence equipment where the risk is sufficiently low and temporary protection can be reliably applied.

7.2.3 It is envisaged that the substation extension will be monitored through its operational use for weather-related risks by National Grid, who are registered with the Environment Agency's flood alert system. During construction, registration of the Contractor to the Environment Agency's flood alert system should be included within their Construction Environmental Management Plan (CEMP) and Construction Phase Plan (CPP).

7.3 Safe Access

7.3.1 Through the sequential process and design iterations there are no buildings located within the floodplain, the only structures within the floodplain are PV panels and two solar stations, however, these are atop extended legs to remain above flood levels. All compounds for site staff and battery storage units have been located out of flood zones and it is envisaged access to PV panels would not be undertaken during flooding conditions.

8. Conclusion and Recommendations

8.1.1 This Flood Risk Assessment has been prepared to support the PEI report for the Sunnica Energy Farm.

8.1.2 Following the review of the Site, and based on current information available, the following conclusions are presented in Table 18 below:

Table 18: Flood Risk Summary

Flood Risk Source	Pre-Development Risk	Post Development Risk	Comments
Fluvial	Low	Low (majority), Medium – High in proximity to watercourse	The majority of the Site is in Flood Zone 1, but certain areas lie in Flood Zone 2, 3a, 3b. No development will occur in Flood Zone 3b.
Tidal	Very Low except for Burwell Substation	Very Low except for Burwell Substation Extension	Not in a tidal area
Pluvial (Surface Water)	Low	Low	Surface water risk varies throughout the Site indicating patches of the Site which are susceptible to surface water flooding. However, flooding is localised and generally shallow (low risk).
Groundwater	Medium	Medium	Groundwater risk also varies, with all Sites between <25% and >75%, therefore further ground investigation, groundwater monitoring and infiltration testing is recommended to confirm groundwater levels. Furthermore, both the Sunnica East (eastern half) and West A and B Sites are shown to be within a Source Protection Zone III, with small areas of Source Protection Zone II. Therefore, infiltration techniques must ensure mitigation measures are put in effect to protect groundwater interaction in these areas.
Sewers	None	None	There are no sewers in the vicinity of the Site.
Artificial Sources	Low (residual)	Low (residual)	Statutory Reservoirs (large raised reservoirs with volumes above ground of 25,000m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. On that basis they are deemed to pose a low (residual) risk. Other artificial sources such as canals and waterways are considered to be regularly maintained and therefore only deemed to pose a low (residual) risk to the proposed development

8.1.3 It is the intention to use infiltration SuDS techniques; swales and basins to mimic existing drainage conditions and accommodate the 1 in 100 year return period storm event plus a 40% increase allowance for climate change. At this stage, the exact impermeable area for the proposed is not known, however, it is envisaged that a negligible increase to the existing is likely and a review will be completed at detailed design stage.

8.1.4 Exceedance flows from the Site will not increase the existing flood risk on or off site as a result of the proposed development.

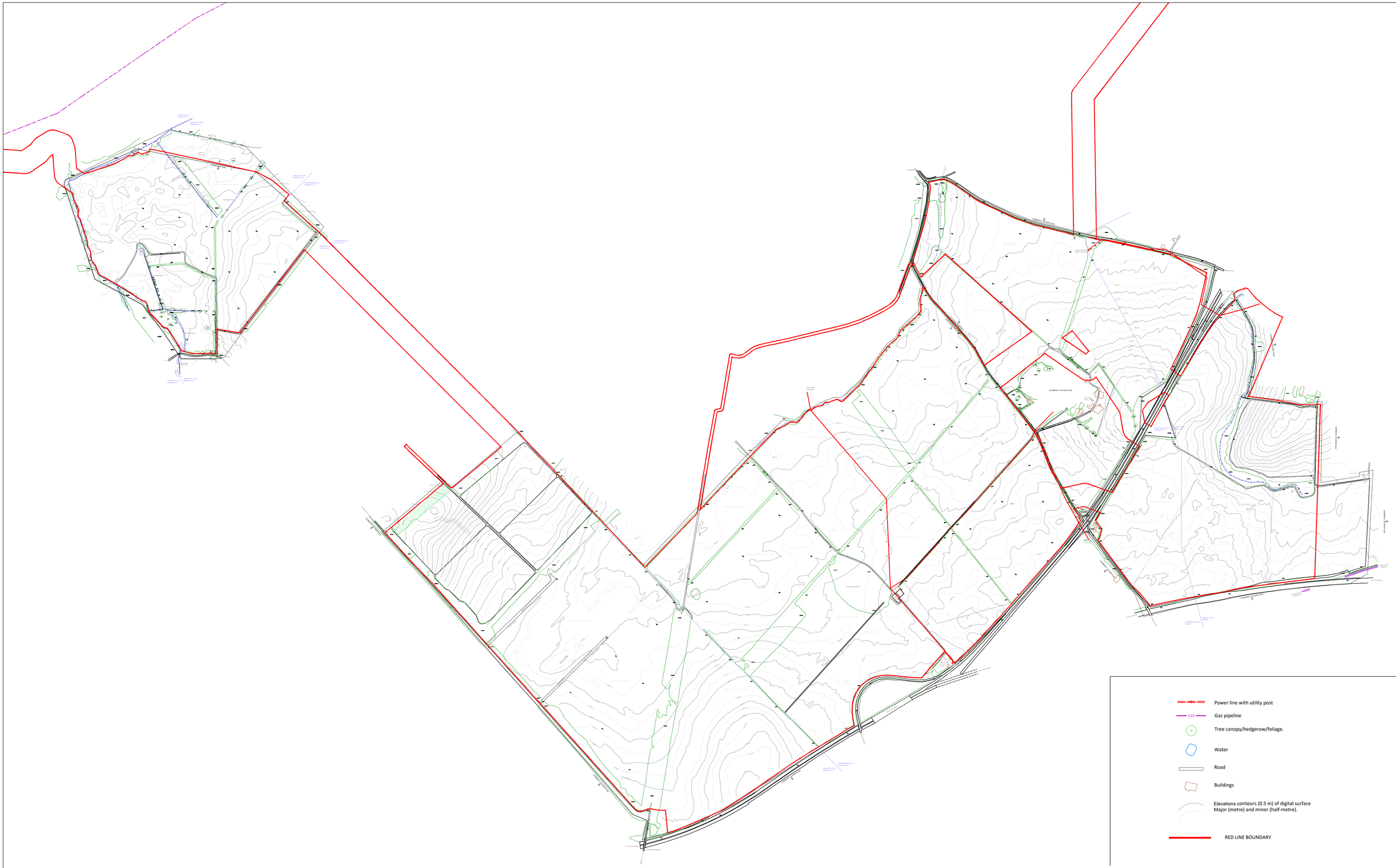
8.1.5 Details of how the Sequential and Exception Tests required by NPS EN-1 and the NPPF have been met for the proposed development will be provided in an update to this FRA to accompany the DCO application.

APPENDICES

Appendix A – Existing Site Topographical Survey

PS Renewables
Green Energy Investments

PROJECT:	SUNNICA PROJECT				
COMPANY:	PS RENEWABLES				
LAYOUT:	TOPOGRAPHIC LAYOUT - EAST				
DRAW BY:	Sergio Serna	PS RENEWABLES: 5 Stubbings Estate Maidenhead, Berkshire SL6 6QL	DATE:	-	NUM.: 5.4.1
DESIGN BY:	Nacho Perez		SCALE:	1:7.500	
CHECK BY:	David Ortiz		SIZE:	A1	



PS Renewables
Green Energy Investments

PROJECT:	SUNNICA PROJECT				
COMPANY:	PS RENEWABLES				
LAYOUT:	TOPOGRAPHIC LAYOUT - WEST				
DRAW BY:	Sergio Serna	PS RENEWABLES: 5 Stubbings Estate Maidenhead, Berkshire SL6 6QL	DATE:	-	NUM.: 5.4.2
DESIGN BY:	Nacho Perez		SCALE:	1:7.500	
CHECK BY:	David Ortiz		SIZE:	A1	

Appendix B – Development Proposals

566000 567000 568000 569000 570000 571000

275000 274000 273000 272000 271000

E01 E02 E03 E04 E05 E07 E08 E09 E10 E11 E12 E13 E14 E15 E16 E17 E18 E19 E20 E21 E22 E23 E24 E25 E26 E27 E28 E29 E30 E31 E32 E33

Office/Warehouse

0 500 1,000m

N

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

LEGEND

- Scheme Boundary
- Public Highway within Scheme

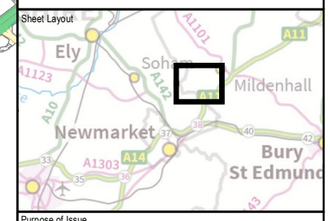
Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Illustrative Locations of Solar Station
- Proposed Road

Green Infrastructure

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

Sheet Layout



Purpose of Issue
PEIR

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
FIGURE 3-1
SUNNICA EAST SITE A AND B
PARAMETER PLAN

Drawn	Checked	Approved	Date
AD	DW	NC	02/09/2020

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

AECOM
Unit 1 Wellbrook Court,
Girton,
Cambridge, CB3 0NA
United Kingdom
Telephone (01223) 488000
www.aecom.com

AECOM

Drawing Number	Rev
60589004_PEIR_SD_001	0

File Name:C:\Users\Anna.Dilello\AECOM Directory\Sunnica Energy Farm - GIS - General\Layout\PEIR\Chapter_3_Scheme_Description\200902_SunnicaEnergyFarm_PEIR_Figure 3-1_SunnicaEastA_B_Parameter_Plan.mxd

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270000 269000 268000 267000 266000

W01 W02 W03 W04 W05 W06 W07 W08 W09 W10 W11 W12 W13 W14 W15 W16 W17

Office/Warehouse

0 500 1,000m

N

File Name:C:\Users\Anna.Dillet\AECOM Directory\Sunnica Energy Farm - GIS - General\Layout\PEIR\Chapter_3_Scheme_Description\200902_SunnicaEnergyFarm_PEIR_Figure 3-2_SunnicaWestA_B_Parameter_Plan.mxd

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

LEGEND

- Scheme Boundary
- Woodstore - 20m Buffer

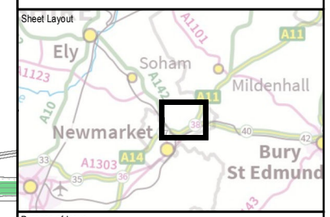
Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Illustrative Locations of Solar Station
- Proposed Road

Green Infrastructure

- Native Grassland Planting within Archaeological Mitigation Areas
- Native Grassland/Wetland
- Native Grassland Planting
- 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)
- Potential Provision of Permissive Route

Sheet Layout



Purpose of Issue: PEIR

Client: SUNNICA LTD

Project Title: sunnica energy farm

Drawing Title: FIGURE 3-2 SUNNICA WEST A AND B PARAMETER PLAN

Drawn	Checked	Approved	Date
AD	DW	NC	02/09/2020

AECOM Internal Project No.: 60589004

Scale @ A3: 1:17,500

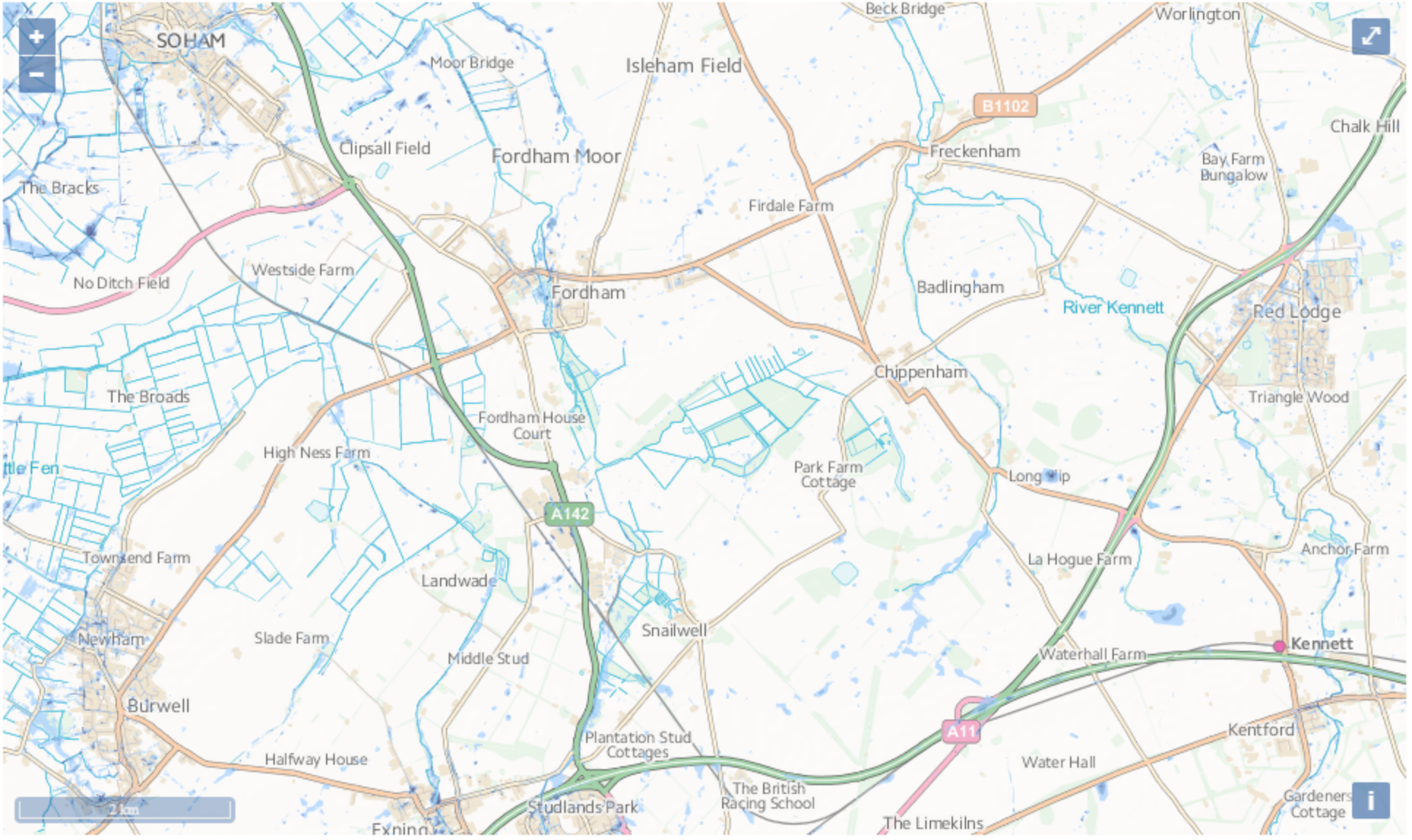
AECOM
Unit 1 Wellbrook Court,
Girton,
Cambridge, CB3 0NA
United Kingdom
Telephone (01223) 488000
www.aecom.com

Drawing Number: 60589004_PEIR_SD_002

Rev: 0

Appendix C – Flood Risk Mapping


Exit full screen
Thistley Green
Isleham Fen
Isleham Marina
West Row
Mildenhall Woods
North Field
B1104
Waterside
Bagsham
A1101
Mildenhall
Croft House
Little London
Isleham
Barton Mills
Concord Farm
Bank Bridge
Worlington
SOHAM
Isleham Field
A11
B1102
Chalk Hill
Clipsall Field
Fordham Moor
Freckenham
Bay Farm Bungalow
The Bracks
Firdale Farm
Westside Farm
No Ditch Field
Fordham
Badlingham
River Kennett
Park Farm
Red Lodge
Chippenham
Herringswell
Triangle Wood
Fordham House Court
High Ness Farm
Park Farm Cottage
Long Slip
A142
Warren Hill Farm Cottages
Townsend Farm
La Hogue Farm
Landwade
Newham
Slade Farm
Snailwell
Middle Stud
Waterhall Farm
Kentford
Burwell
A11
A14
Halfway House
Plantation Stud Cottages
Water Hall
Kentford
Studlands Park
The British Racing School
Gardeners Cottage
Needham Street
Exning
The Limekilns
Snakehall Farm
Selected location
Flood zone 3
Areas benefiting from flood defences
Flood zone 2
Flood zone 1
Flood defence
Main river
Flood storage area

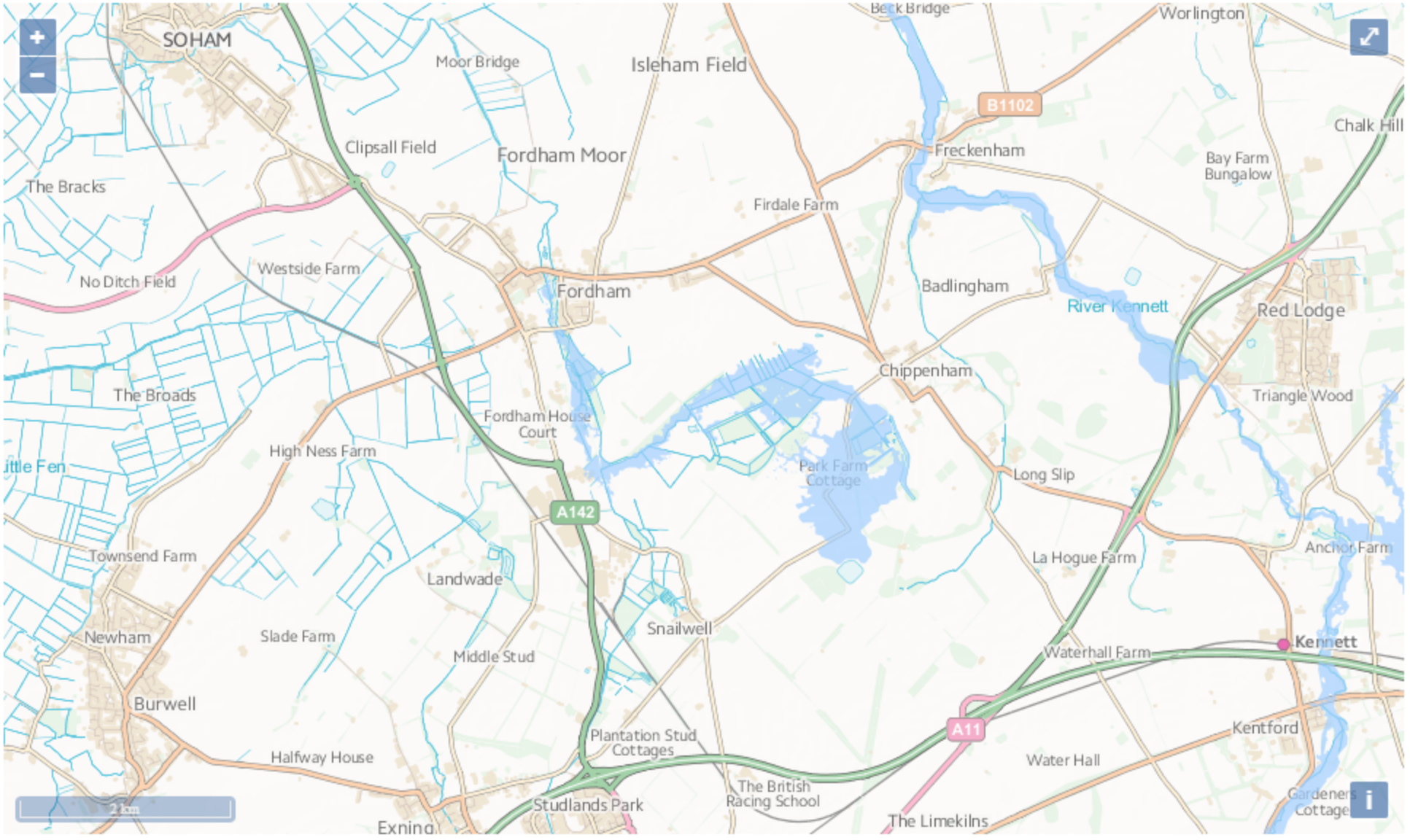


Extent of flooding from surface water

High Medium Low Very low

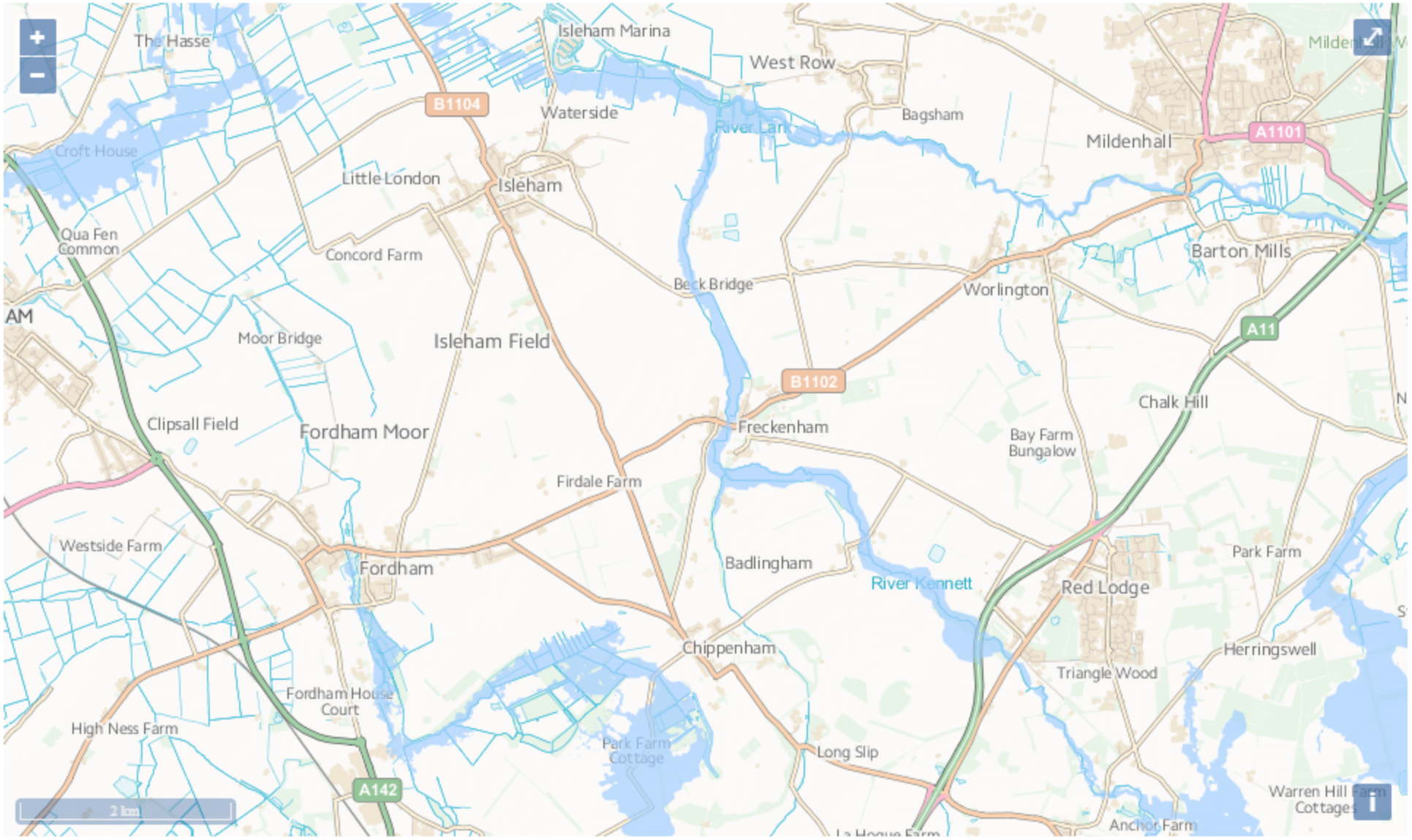
Extent of flooding from surface water

High Medium Low Very low



Extent of flooding from reservoirs

Maximum extent of flooding



Extent of flooding from reservoirs

Maximum extent of flooding

N

Pear Tree Fm

Weston Ditch

Wr Twr

Mildenhall Airfield

Thistley Green

PH

Wr Twr

West Row

Hill Fm

PH

Bargate Fm

Wks

River Lark

East Fen

Snake Brook

Lee Fm

Rectory Fm

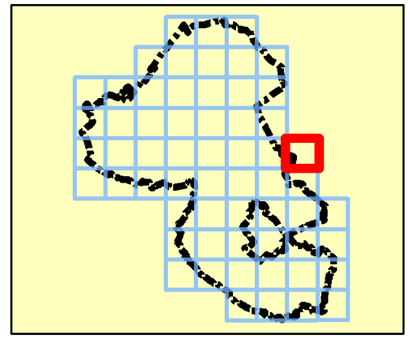
Notes

Zone 1: Comprised of land having a less than 1 in 1,000 annual probability of river or sea flooding in any year.

Zone 2: Comprised of land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding or 1 in 200 and 1 in 1,000 annual probability of sea flooding in any year.

Zone 3a: This zone comprises land assessed as having a greater than 1in 100 annual probability of river flooding or a greater than 1 in 200 annual probability of flooding from sea in any year.

Zone 3b: This zone comprises land where water has to flow or be stored in times of flood (the functional floodplain).
The SFRA identified this Flood Zone as land which would flood with an annual probability of 1 in 20 years, where detailed modelling exists. In the absence of detailed hydraulic model information, a precautionary approach should be adopted for Flood Zone 3b with the assumption that the extent of Flood Zone 3b would be equal to Flood Zone 3a. If development is shown to be in Flood Zone 3a, further work should be undertaken as part of a detailed site specific flood risk assessment to define the extent of Flood Zone 3b.



Legend

- Council boundary
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Draft
C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX B
FLOOD ZONE MAPS

Index Number: ECDC_30

JBA consulting

East Cambridgeshire District Council

Notes

Zone 1: Comprised of land having a less than 1 in 1,000 annual probability of river or sea flooding in any year.

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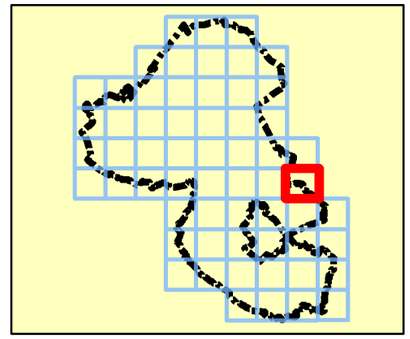


Legend

- Council boundary
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Draft
C		

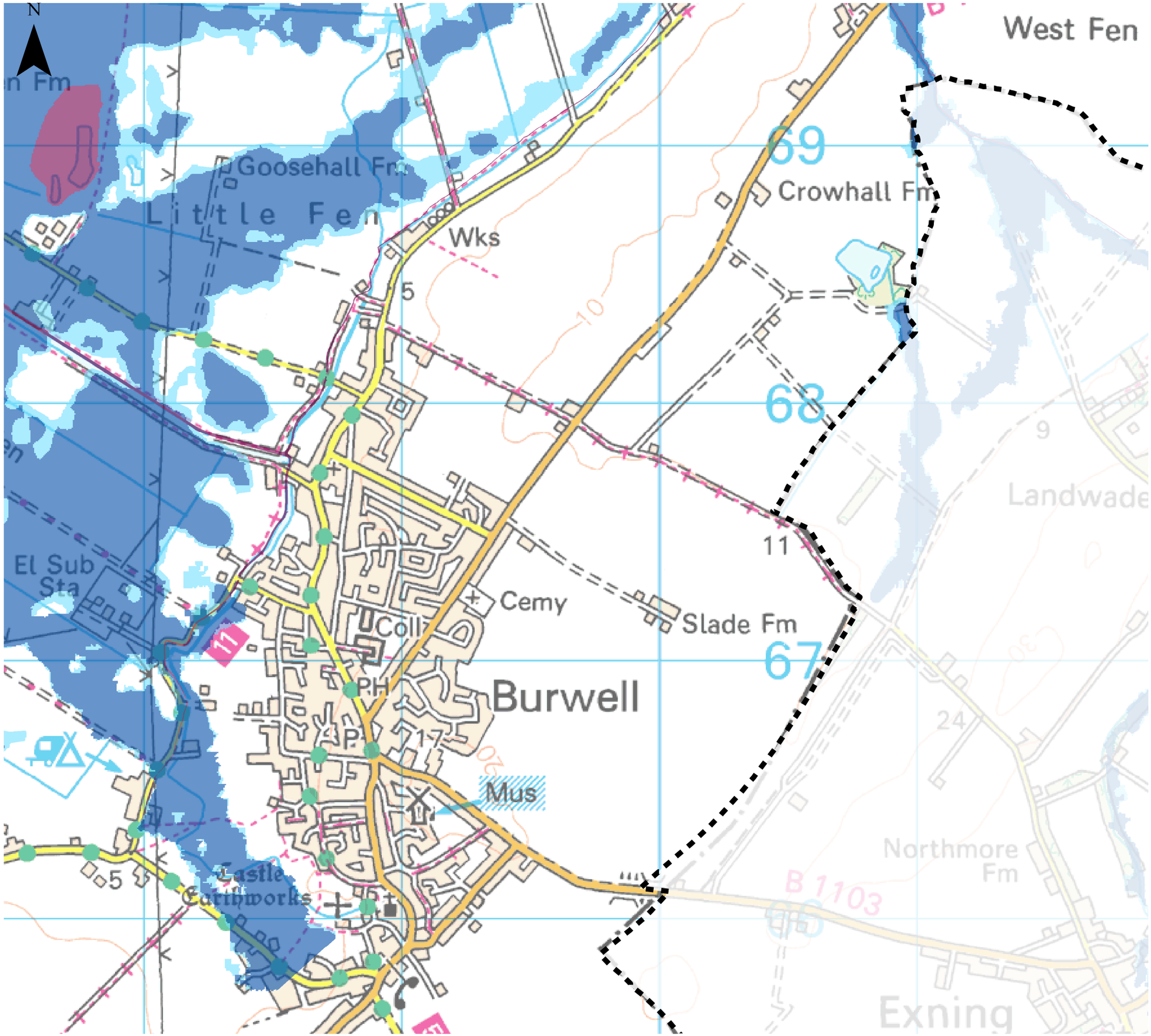
EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX B
FLOOD ZONE MAPS

Index Number: ECDC_38

JBA consulting

East Cambridgeshire District Council



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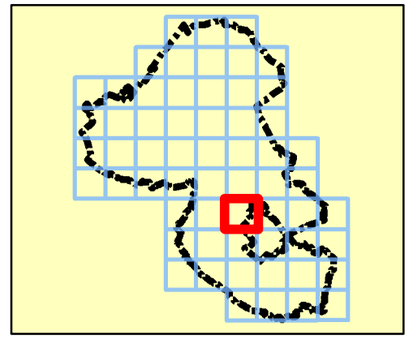


Legend

- Council boundary
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Draft
C		

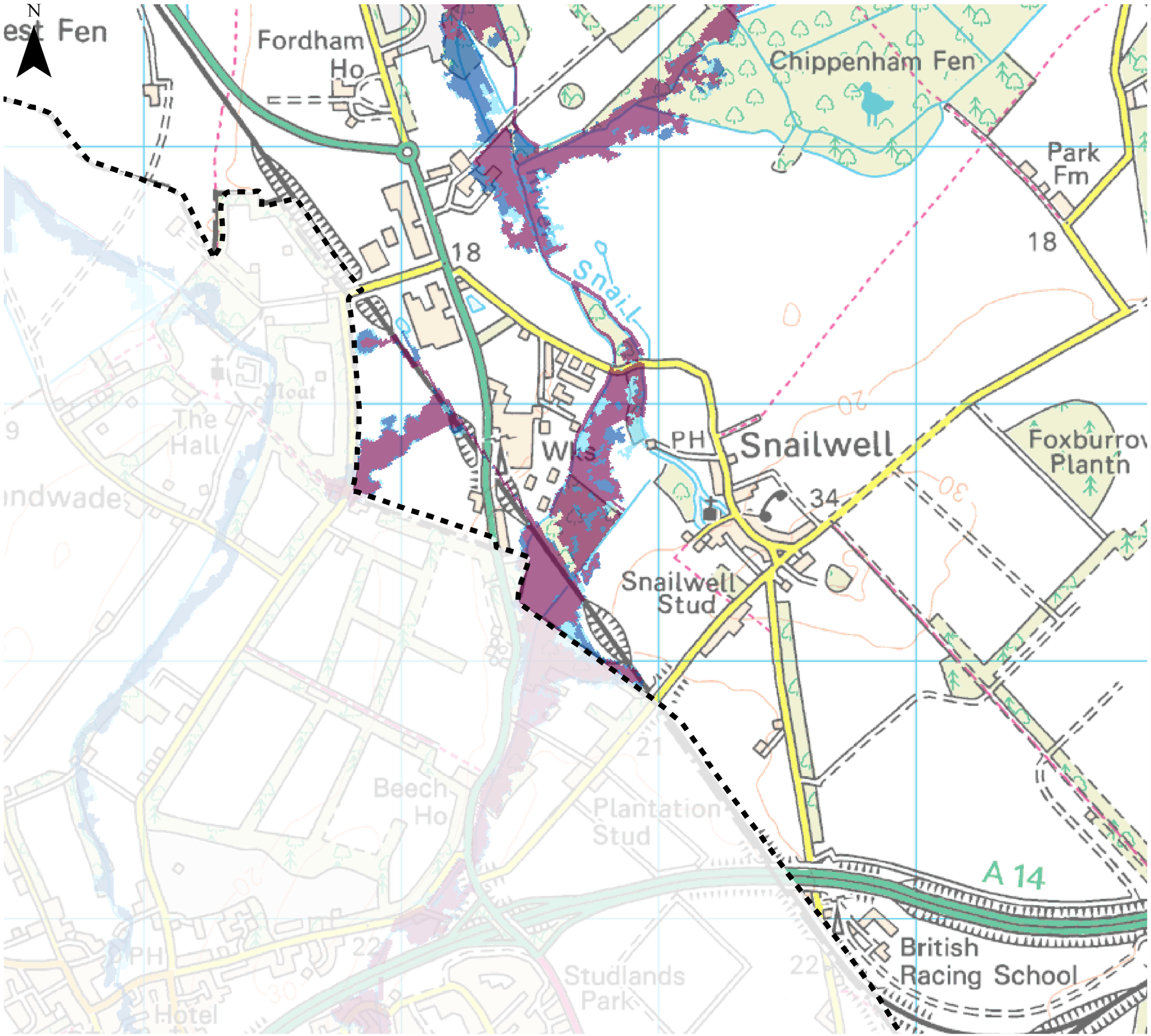
EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX B
FLOOD ZONE MAPS

Index Number: ECDC_41

JBA consulting

East Cambridgeshire District Council



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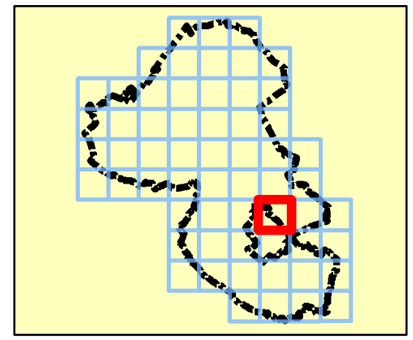

Legend

- Council boundary
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Draft
C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX B
FLOOD ZONE MAPS

Index Number: ECDC_42

JBA consulting

East Cambridgeshire District Council

Notes

Zone 1: Comprised of land having a less than 1 in 1,000 annual probability of river or sea flooding in any year.

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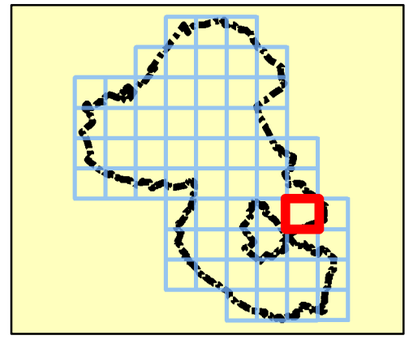


Legend

- Council boundary
- Flood Zone 3b
- Flood Zone 3a
- Flood Zone 2

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Draft
C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX B
FLOOD ZONE MAPS

Index Number: ECDC_43

JBA consulting

East Cambridgeshire District Council

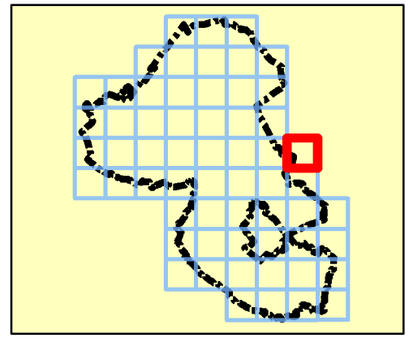
Notes

The climate change map shows the potential impacts that climate change may have on river flows and, subsequently, on flood events.

Where models exist in the study area, the 2080 climate change allowances have been applied to the 1 in 100 year flows for the defended scenario.
Central: 25%
Higher Central: 35%
Upper End: 65%

Developers should assess the flood risk implications of climate change to development as part of a detailed Flood Risk Assessment.

Key Plan



Legend

Council boundary

1 in 100 year defended scenario

1 in 100-year climate change (2080s)

Central

Higher Central

Upper End

0 0.2 0.4 0.8 1.2 km

REF	Date	Comments
A	Jan 2017	Draft
B	Feb 2017	Final
C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX C
CLIMATE CHANGE MAPS

Index Number: ECDC_30

JBA consulting

East Cambridgeshire District Council

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The climate change map shows the potential impacts that climate change may have on river flows and, subsequently, on flood events.

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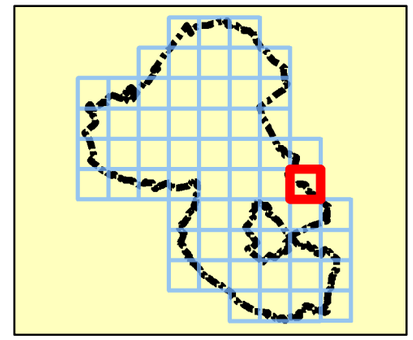

Legend

Council boundary

1 in 100 year defended scenario

1 in 100-year climate change (2080s)

Central

Higher Central

Upper End

0 0.2 0.4 0.8 1.2 km

REF	Date	Comments
A	Jan 2017	Draft
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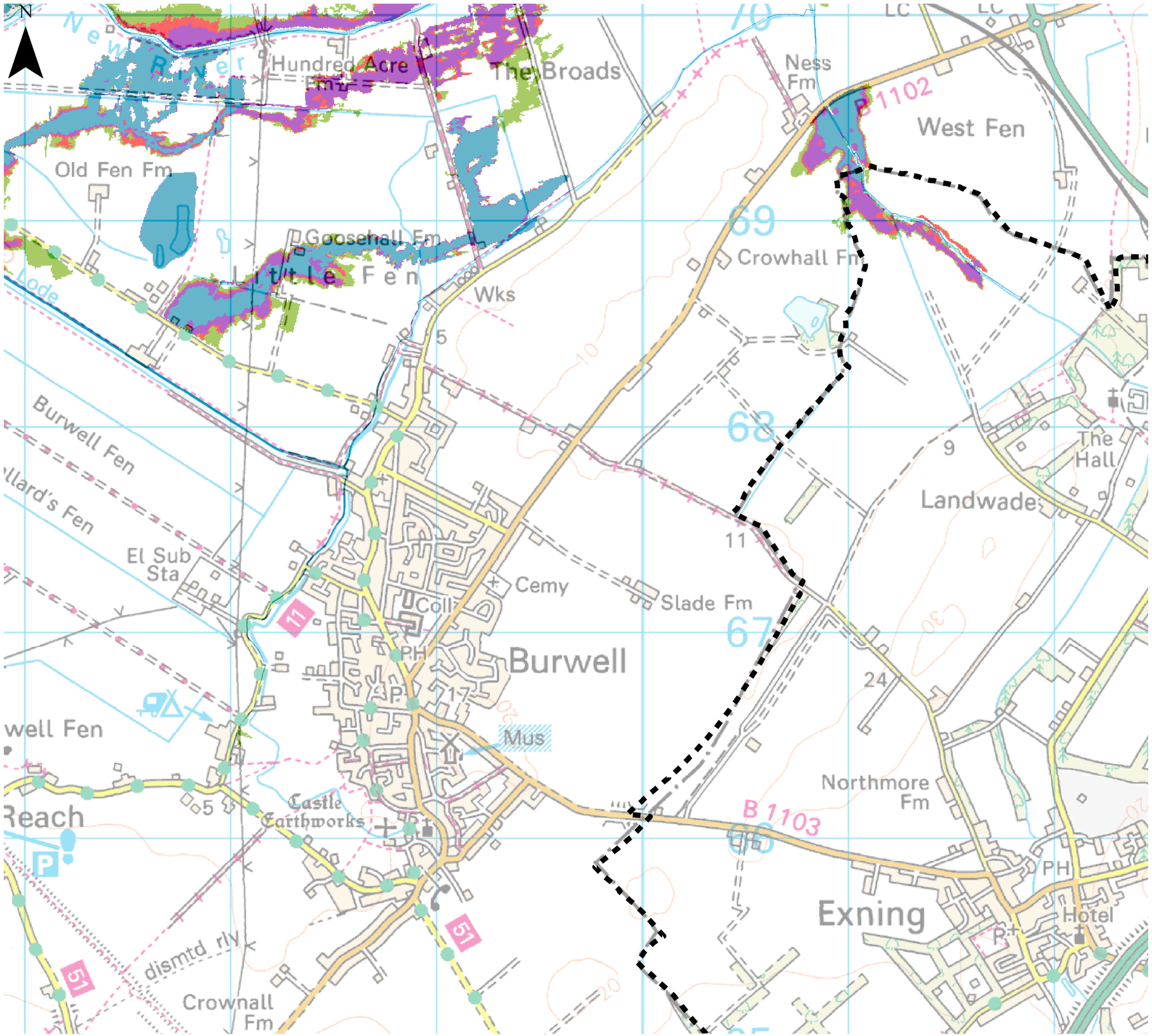
EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX C
CLIMATE CHANGE MAPS

Index Number: ECDC_38

JBA consulting

East Cambridgeshire District Council



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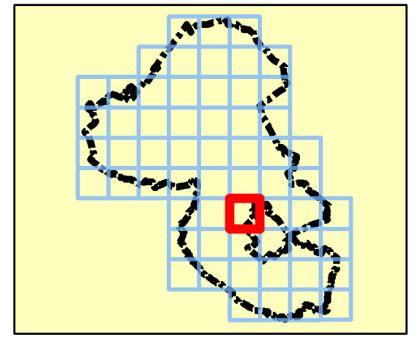

Legend

Council boundary

1 in 100 year defended scenario

1 in 100-year climate change (2080s)

Central

Higher Central

Upper End

0 0.2 0.4 0.8 1.2 km

REF	Date	Comments
A	Jan 2017	Draft
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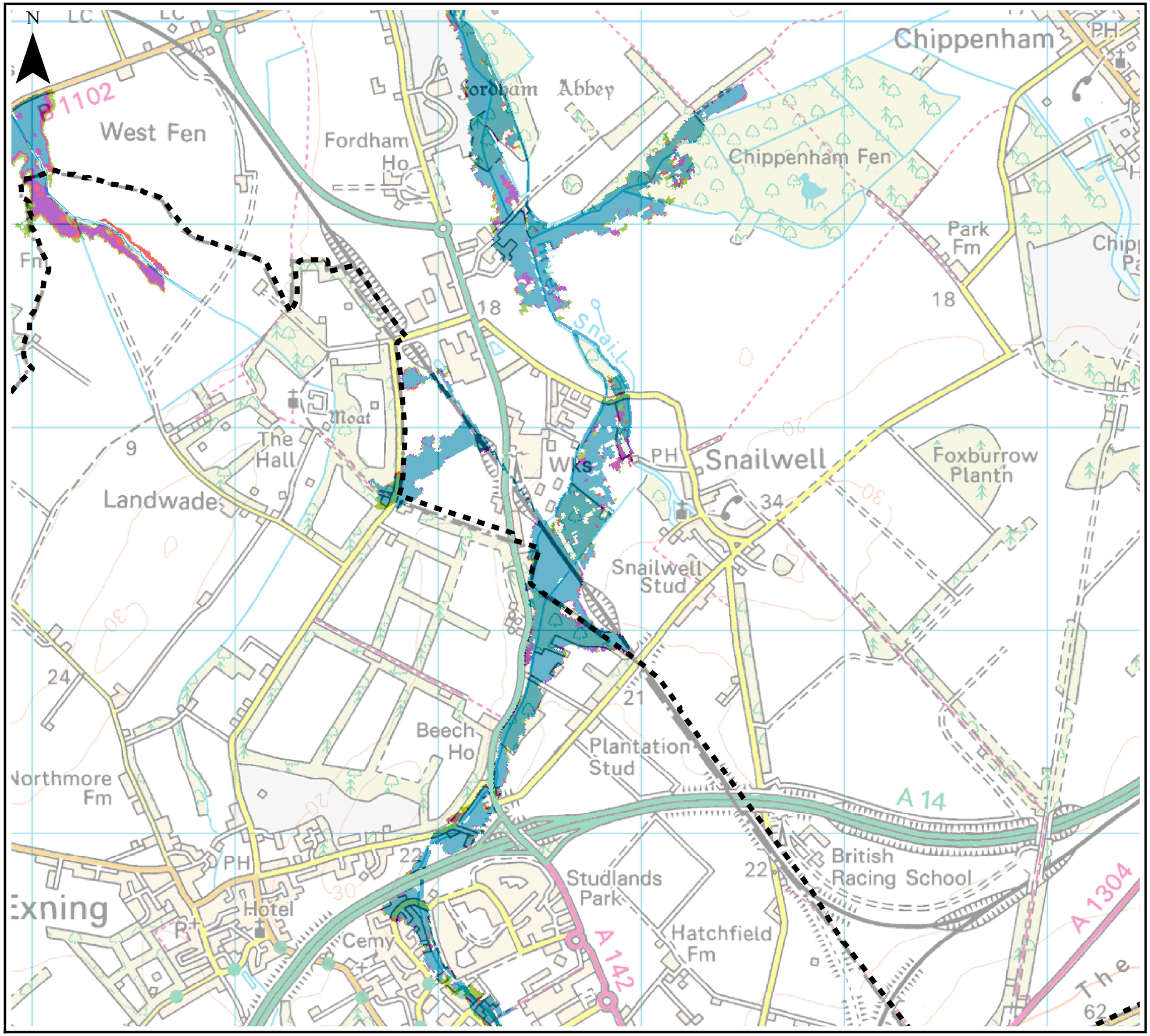
EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX C
CLIMATE CHANGE MAPS

Index Number: ECDC_41

JBA consulting

East Cambridgeshire District Council



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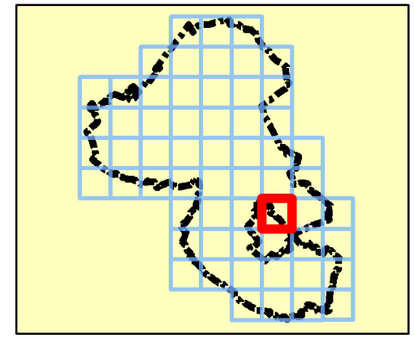

Legend

Council boundary

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Central

Higher Central

Upper End

0 0.2 0.4 0.8 1.2 km

REF	Date	Comments
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EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX C
CLIMATE CHANGE MAPS

Index Number: ECDC_42

JBA consulting

East Cambridgeshire District Council

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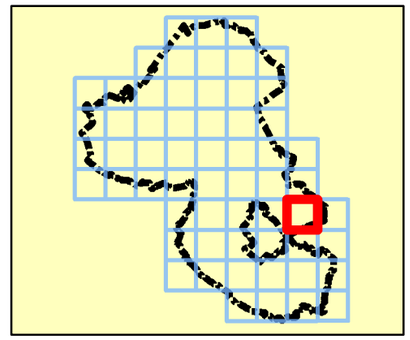

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Central

Higher Central

Upper End

0 0.2 0.4 0.8 1.2 km

REF	Date	Comments
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C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX C
CLIMATE CHANGE MAPS

Index Number: ECDC_43

JBA consulting

East Cambridgeshire District Council

Notes

The updated Flood Map for Surface Water (uFMfSW) shows the flooding that takes place from the 'surface runoff' generated by rainwater (including snow and other precipitation) which:
(a) is on the surface of the ground (whether or not it is moving), and
(b) has not yet entered a watercourse, drainage system or public sewer.

The uFMfSW will pick out natural drainage channels, rivers, low areas in the floodplain and flow paths between buildings but it will only indicate flooding caused by local rainfall.

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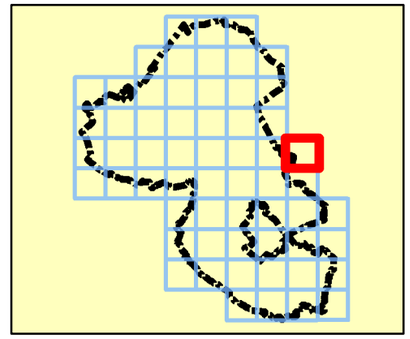

Legend

- Council boundary
- uFMfSW* 30-year Extent
- uFMfSW* 100-year Extent
- uFMfSW* 1,000-year Extent

*updated Flood Map for Surface Water

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Final
C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX D
SURFACE WATER FLOOD MAPS

Index Number: ECDC_30

JBA consulting

East Cambridgeshire District Council

Notes

The updated Flood Map for Surface Water (uFMfSW) shows the flooding that takes place from the 'surface runoff' generated by rainwater (including snow and other precipitation) which:
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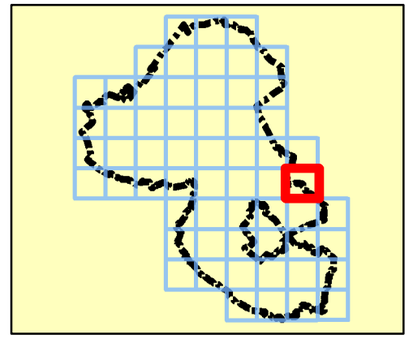

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0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Final
C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX D
SURFACE WATER FLOOD MAPS

Index Number: ECDC_38

JBA consulting

East Cambridgeshire District Council

N

West Fen

n Fm

Goosehall Fm

Little Fen

Wks

69

Crowhall Fm

68

Landwade

El Sub Sta

Cemy

Slade Fm

67

Burwell

P.H

Mus

Castle Earthworks

Northmore Fm

B 1103

Exning

Notes

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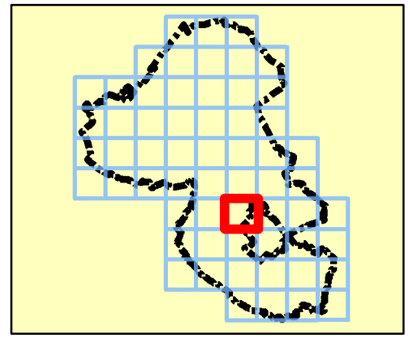

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EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX D
SURFACE WATER FLOOD MAPS

Index Number: ECDC_41

JBA consulting

East Cambridgeshire District Council

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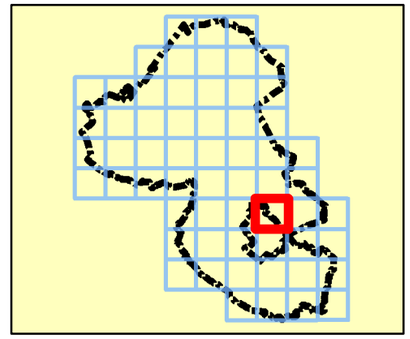

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- uFMfSW* 100-year Extent
- uFMfSW* 1,000-year Extent

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0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
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C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX D
SURFACE WATER FLOOD MAPS

Index Number: ECDC_42

JBA consulting

East Cambridgeshire District Council

Notes

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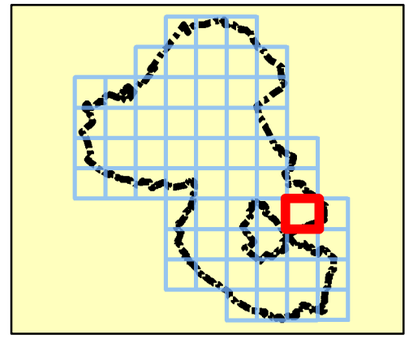

Legend

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- uFMfSW* 1,000-year Extent

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0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Final
C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX D
SURFACE WATER FLOOD MAPS

Index Number: ECDC_43

JBA consulting

East Cambridgeshire District Council

N

Pear Tree Fm

Weston Ditch

Wr Twr

Mildenhall Airfield

Thistley Green

Wr Twr

PH

P

ty Fm

East Fen

Lee Brook

West Row

PH

Hill Fm

Bargate Fm

River Lark

Wks

Lee Fm

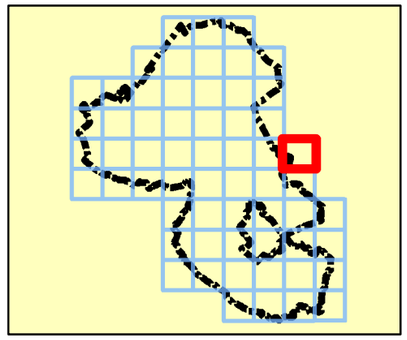
Rectory Fm

Notes

The Areas Susceptible to Groundwater Flooding (AStGWF) is a strategic scale map showing groundwater flood areas on a 1km square grid. The data was produced to annotate indicative Flood Risk Areas for Preliminary Flood Risk Assessment (PFRA) studies and allow the Lead Local Flood Authorities (LLFAs) to determine whether there may be a risk of flooding from groundwater.

This data shows the proportion of each 1km grid square where geological and hydrogeological condition show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring. It does not take account of the chance of flooding from groundwater rebound. This dataset covers a large area of land, and only isolated locations within the overall susceptible area are actually likely to suffer the consequences of groundwater flooding.

The AStGWF data should be used only in combination with other information, for example local data or historic data. It should not be used as sole evidence for any specific flood risk management, land use planning or other decisions at any scale. However, the data can help to identify areas for assessment at a local scale where finer resolution datasets exist.



Legend

MLC_main_drains

Council boundary

Areas Susceptible to Groundwater Flooding

Classification

≥ 75%

≥ 50% <75%

≥ 25% < 50%

< 25%

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Final
C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX E
GROUNDWATER FLOOD MAPS

Index Number: ECDC_30

JBA consulting

East Cambridgeshire District Council

N

Fleckenham

Tumulus

Isleham Plantn

Badlingham Manor

Rectory Fm

Heather Fm

Red Lodge

Chippenham

B1102

B1104

Lee Brook

River Kennet

Moat

dismtd

PH

Hall

66

67

68

69

9

11

17

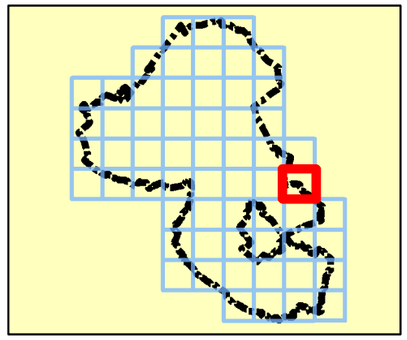
18

Notes

The Areas Susceptible to Groundwater Flooding (AStGWF) is a strategic scale map showing groundwater flood areas on a 1km square grid. The data was produced to annotate indicative Flood Risk Areas for Preliminary Flood Risk Assessment (PFRA) studies and allow the Lead Local Flood Authorities (LLFAs) to determine whether there may be a risk of flooding from groundwater.

This data shows the proportion of each 1km grid square where geological and hydrogeological condition show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring. It does not take account of the chance of flooding from groundwater rebound. This dataset covers a large area of land, and only isolated locations within the overall susceptible area are actually likely to suffer the consequences of groundwater flooding.

The AStGWF data should be used only in combination with other information, for example local data or historic data. It should not be used as sole evidence for any specific flood risk management, land use planning or other decisions at any scale. However, the data can help to identify areas for assessment at a local scale where finer resolution datasets exist.



Legend

MLC_main_drains

Council boundary

Areas Susceptible to Groundwater Flooding

Classification

- ≥ 75%
- ≥ 50% <75%
- ≥ 25% < 50%
- < 25%

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Final
C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX E
GROUNDWATER FLOOD MAPS

Index Number: ECDC_38

JBA consulting

East Cambridgeshire District Council

N

West Fen

Goosehall Fm

Little Fen

Wks

69

Crowhall Fm

68

Landwade

El Sub Sta

Cemy

Slade Fm

67

Burwell

Mus

Castle Earthworks

Northmore Fm

B 1103

Exning

Notes

The Areas Susceptible to Groundwater Flooding (AStGWF) is a strategic scale map showing groundwater flood areas on a 1km square grid. The data was produced to annotate indicative Flood Risk Areas for Preliminary Flood Risk Assessment (PFRA) studies and allow the Lead Local Flood Authorities (LLFAs) to determine whether there may be a risk of flooding from groundwater.

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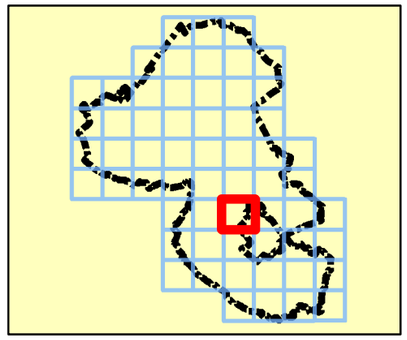


Legend

MLC_main_drains

Council boundary

Areas Susceptible to Groundwater Flooding

Classification

- ≥ 75%
- ≥ 50% <75%
- ≥ 25% < 50%
- < 25%

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Final
C		

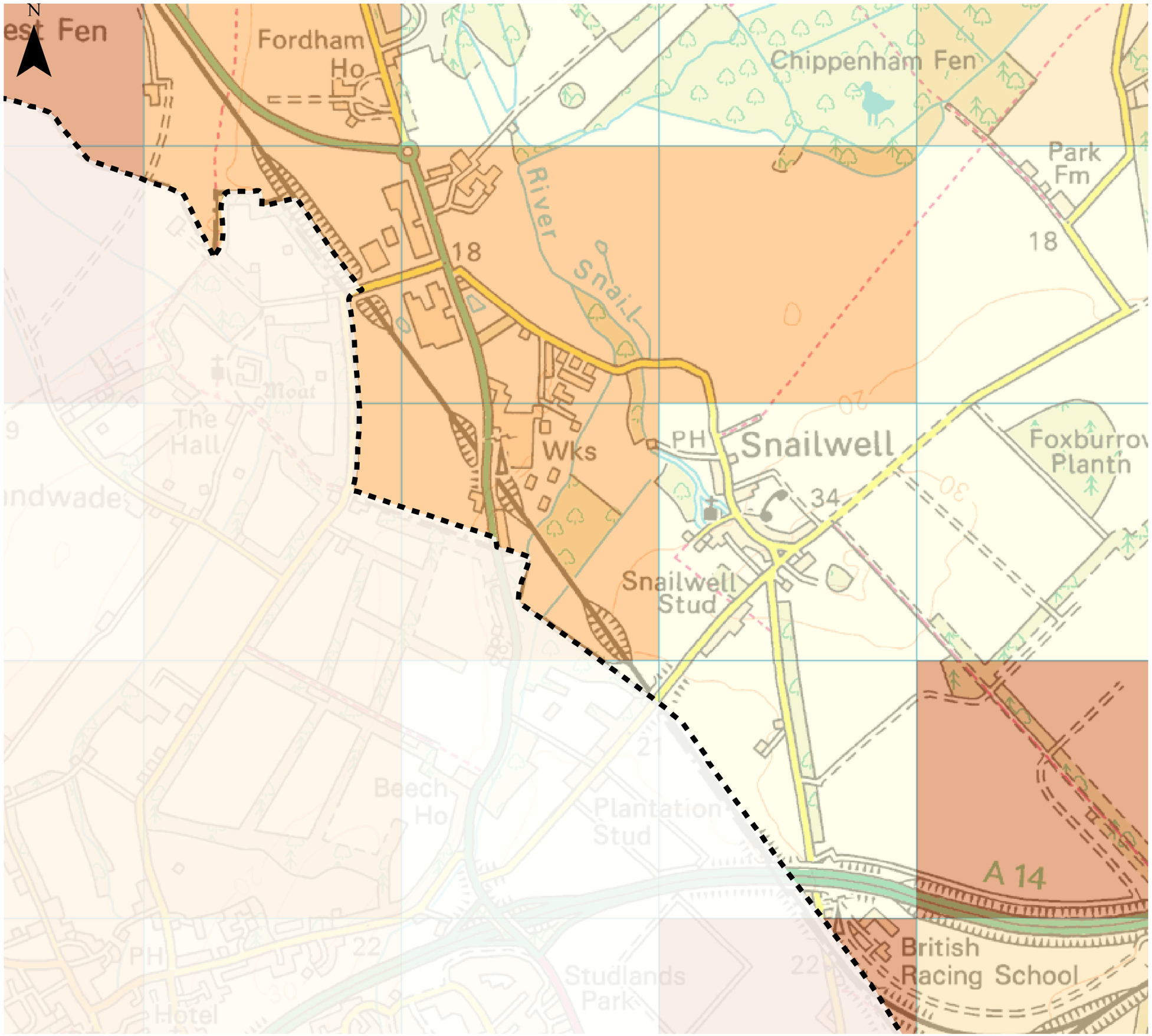
EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX E
GROUNDWATER FLOOD MAPS

Index Number: ECDC_41

JBA consulting

East Cambridgeshire District Council



Notes

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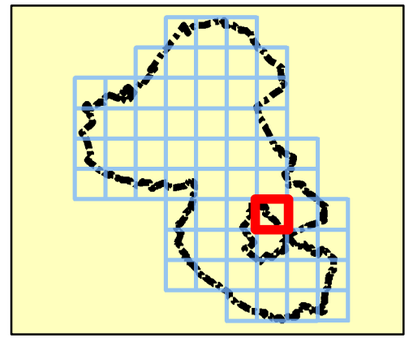


Legend

MLC_main_drains

Council boundary

Areas Susceptible to Groundwater Flooding

Classification

- ≥ 75%
- ≥ 50% <75%
- ≥ 25% < 50%
- < 25%

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Final
C		

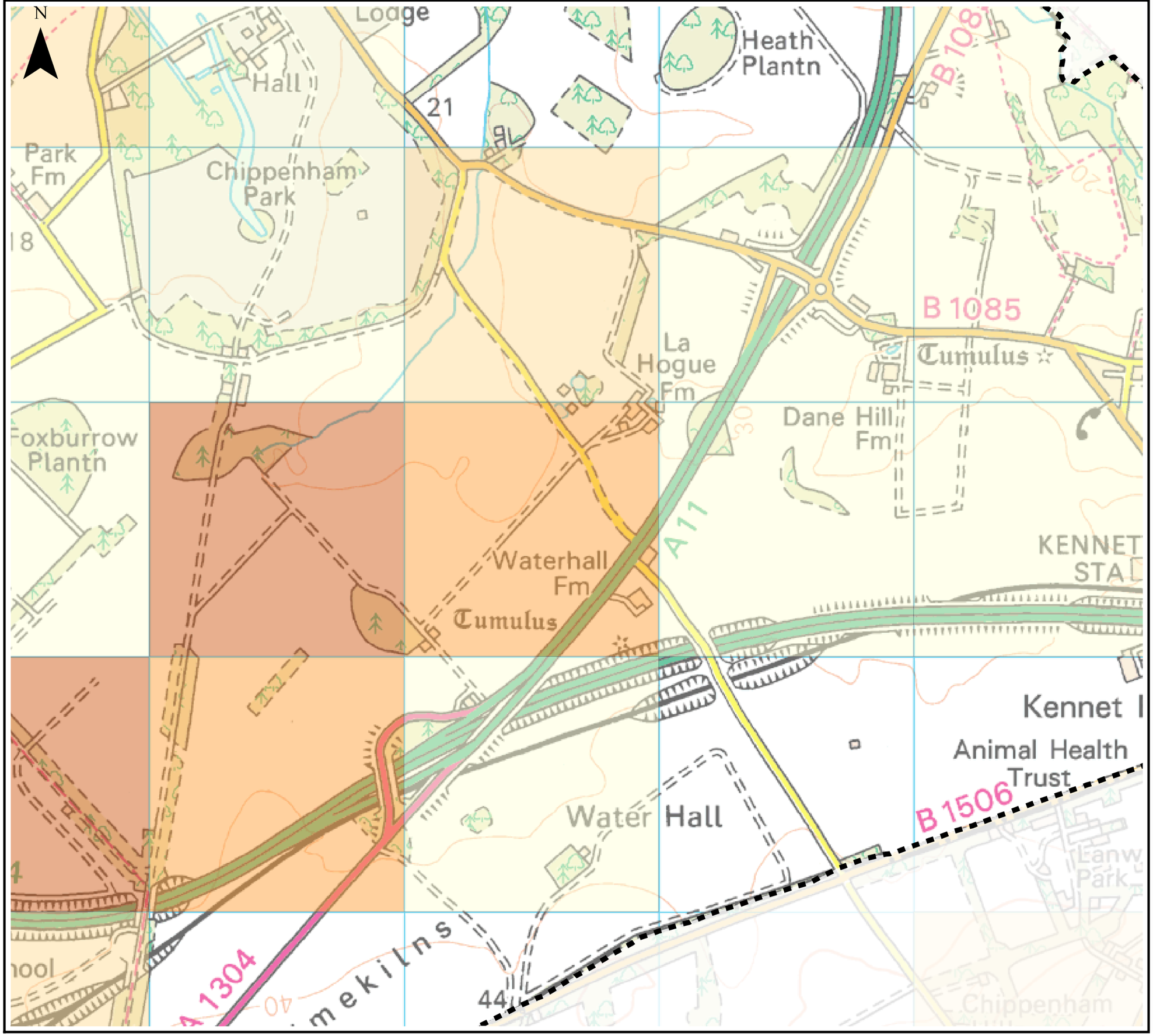
EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX E
GROUNDWATER FLOOD MAPS

Index Number: ECDC_42

JBA consulting

East Cambridgeshire District Council

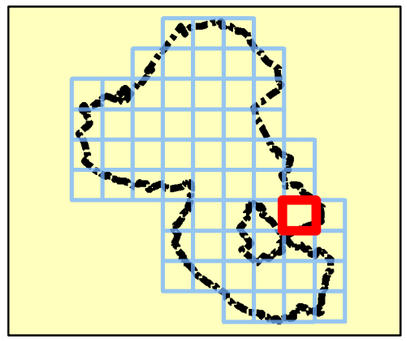


Notes

The Areas Susceptible to Groundwater Flooding (AStGWF) is a strategic scale map showing groundwater flood areas on a 1km square grid. The data was produced to annotate indicative Flood Risk Areas for Preliminary Flood Risk Assessment (PFRA) studies and allow the Lead Local Flood Authorities (LLFAs) to determine whether there may be a risk of flooding from groundwater.

This data shows the proportion of each 1km grid square where geological and hydrogeological condition show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring. It does not take account of the chance of flooding from groundwater rebound. This dataset covers a large area of land, and only isolated locations within the overall susceptible area are actually likely to suffer the consequences of groundwater flooding.

The AStGWF data should be used only in combination with other information, for example local data or historic data. It should not be used as sole evidence for any specific flood risk management, land use planning or other decisions at any scale. However, the data can help to identify areas for assessment at a local scale where finer resolution datasets exist.



Legend

MLC_main_drains

Council boundary

Areas Susceptible to Groundwater Flooding

Classification

- ≥ 75%
- ≥ 50% <75%
- ≥ 25% < 50%
- < 25%

0 0.15 0.3 0.6 0.9 km

REF	Date	Comments
A	Aug 2016	Draft
B	Feb 2017	Final
C		

EAST CAMBRIDGESHIRE DISTRICT COUNCIL

APPENDIX E
GROUNDWATER FLOOD MAPS

Index Number: ECDC_43

JBA consulting

East Cambridgeshire District Council

Map no: 0103-BM01397-02

Map no: 0104-BM01397-02

Map no: 0105-BM01397-02

Map no: 0106-BM01397-02

Map no: 0114-BM01397-02

Map no: 0109-BM01397-02

Map no: 0110-BM01397-02

Map no: 0111-BM01397-02

Map no: 0112-BM01397-02

Map no: 0113-BM01397-02

FOREST HEATH DISTRICT

THETFORD

NEWMARKET

MUNDS

MAP LEGEND

- Forest Heath District Boundary
- St Edmundsbury Borough Boundary
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3a
- Flood Zone 3b
- Flood Zone 3a (with climate change)
- Main River
- Raised Flood Defence
- Culverted Channel
- Waste Water Treatment Works
- Historic External Sewer Flooding
- Historic Internal Sewer Flooding
- Historic Groundwater Flooding
- Historic Fluvial Flooding

Forest Heath Sites

- Residential
- Employment
- Hospital Expansion
- Cemetary
- General Development Areas

St Edmundsbury Sites

- Residential
- Employment
- West Suffolk College
- New Local Centre
- Sugar Restoration Area

NOTES

1. This map shows Flood Zones as defined in Table D.1 of PPS25 within the boundaries of Forest Heath & St Edmundsbury Council, ignoring the presence of any existing flood defences. It should be read in conjunction with the supporting information presented in the Strategic Flood Risk Assessment Level 1 Report, prepared by Hyder Consulting December 2008.

2. Flood Zones 1, 2, 3a and 3b refer to the probability of river and sea flooding only, ignoring the presence of defences. They also ignore additional risk due to blockages of river channels and structures.

3. The sites in the St Edmundsbury Council area were taken from the 2007 LDF for employment and updated information in October 2008 for the potential residential allocations.

4. The sites within the Forest Heath Council boundary were taken from their LDF 2006.

5. The effects of possible climate change over the next 100 years have been represented for Flood Zone 3a, where these model outlines have been currently completed. The locations where further modelling will be required are indicated in the Level 1 SFRA report.

6. All flood risk areas at the boundaries of the study area need special attention when used for any purpose as the map only shows areas at risk within the respective Council Boundary.

Map Tile Location

NTP	LAF	TRG	Final	March 09
NTP	LAF	TRG	Draft	Dec 08
DRAWN	CHECKED	APPROVED		DATE

Forest Heath District Council

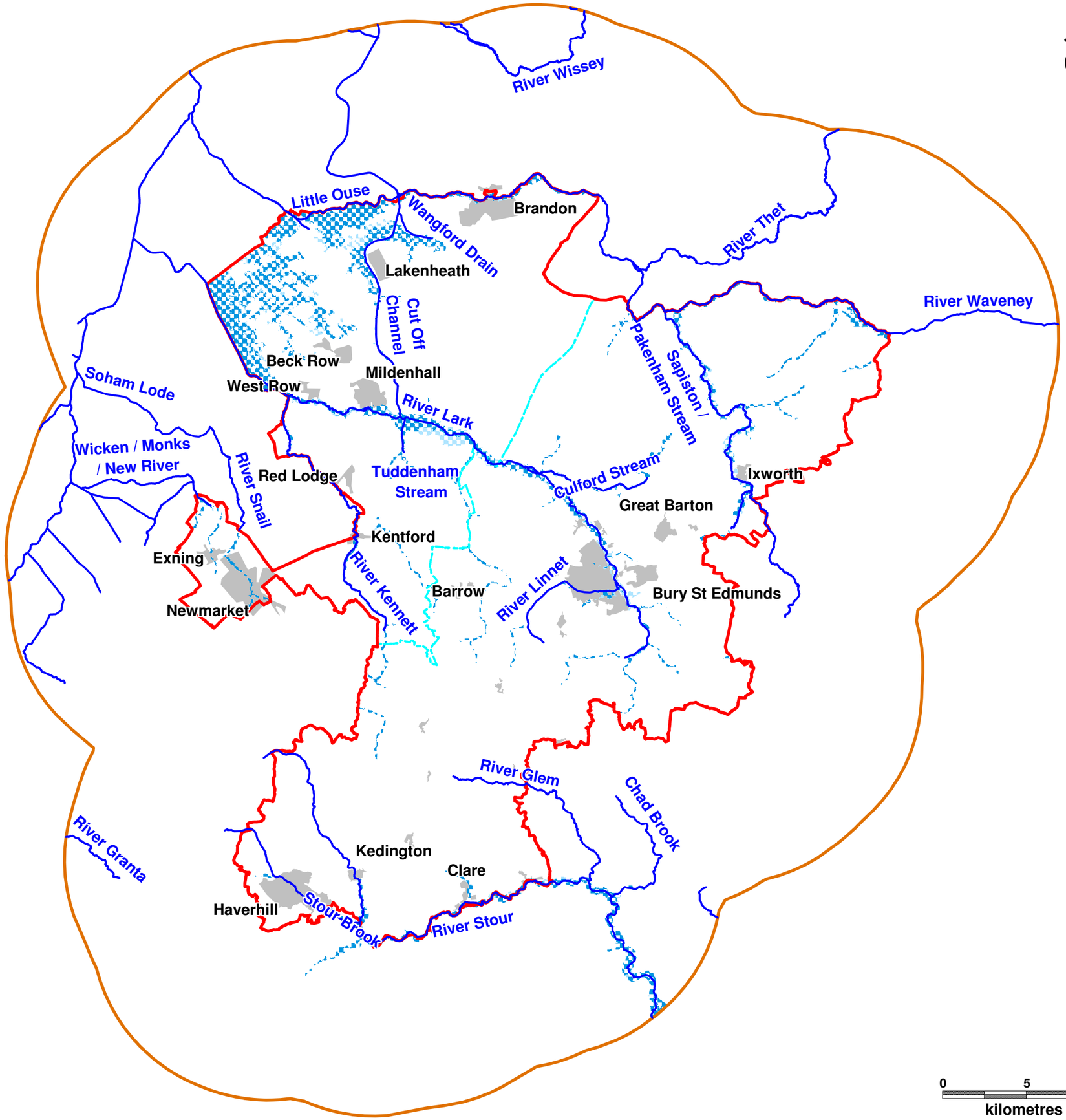
St Edmundsbury Borough Council

Forest Heath District Council & St Edmundsbury Borough Council Strategic Flood Risk Assessment & Water Cycle Study

Strategic Flood Risk Assessment Level 1 Map Study Area - North

Hyder Consulting

DRAWING NO.	FIGURE NO	SCALE	REVISION
0101-BM01397-BMD-02	SFRA-01	1:60,000	02



LEGEND

- Study Area
- 10km Buffer Zone
- Division between Forest Heath District and St Edmundsbury Borough
- Major Settlement
- Main EA River
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3

Rev	Drw	Chk	Apd		Date
01	NTP	LAF	TRG		Dec 2008

Forest Heath District Council

St Edmundsbury Borough Council

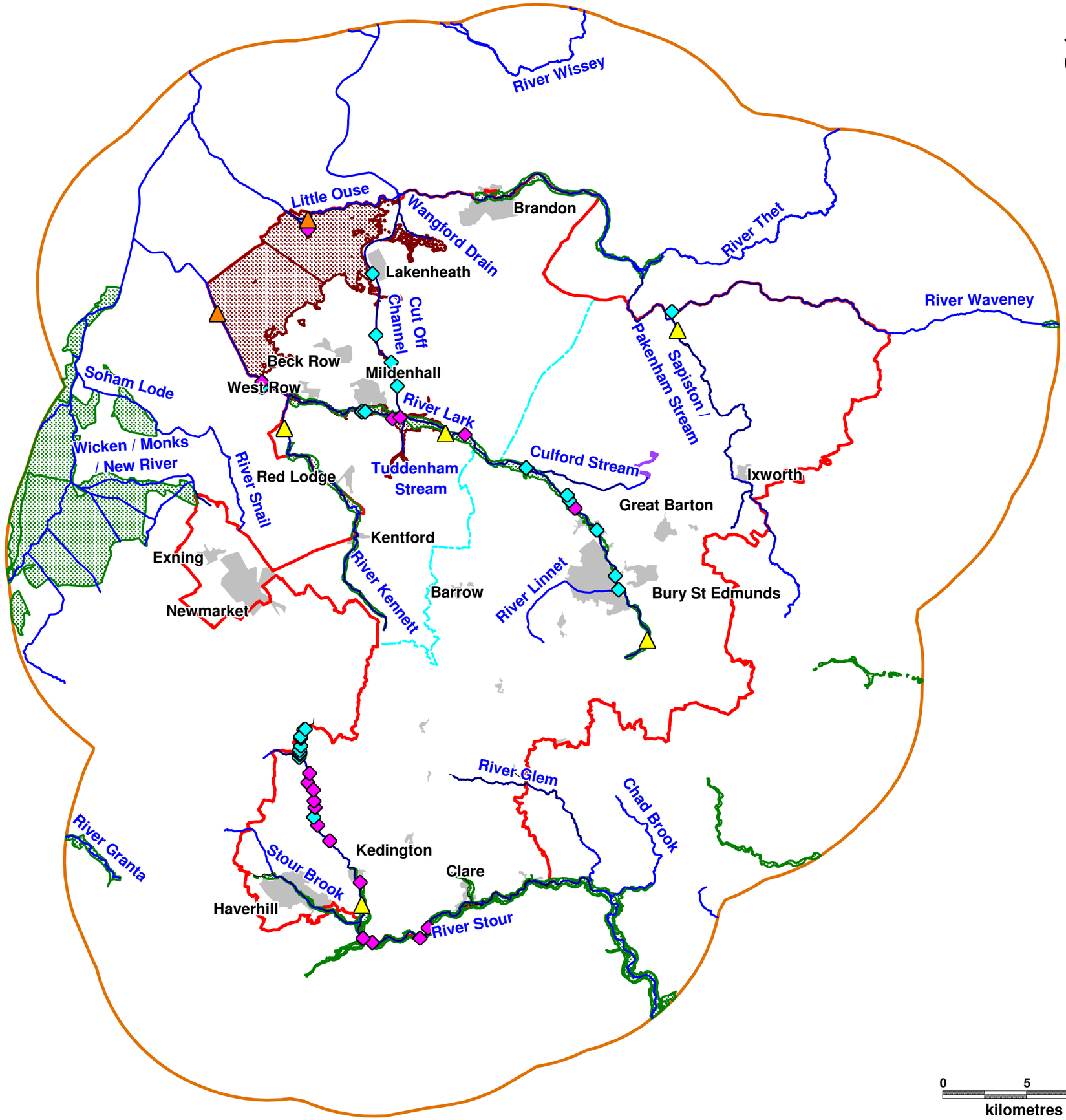
FOREST HEATH & ST EDMUNDSBURY STRATEGIC FLOOD RISK ASSESSMENT AND WATER CYCLE STUDY

FOREST HEATH DISTRICT COUNCIL & ST EDMUNDSBURY BOROUGH COUNCIL

EA FLOOD ZONES

Hyder Consulting

Drawing	Figure	Scale	Rev
0042-BM01397-BMD-01	J2	NTS	01



0 5 10
kilometres

Based upon the Ordnance Survey's 1:50,000 maps with the permission of Her Majesty's Stationery Office (c) Crown Copyright. Licence No. 100019675 2008

LEGEND

- Study Area
- 10km Buffer Zone
- Division between Forest Heath District and St Edmundsbury Borough
- Major Settlement
- Main EA River
- Areas Benefiting From Flood Defences
- Flood Warning Area
- Sluice / Gate
- Weir
- Gauging Station
- Pumping Station
- Reservoir

Rev	Drw	Chk	Apd		Date
01	NTP	LAF	TRG		Dec 2008

Forest Heath District Council

St Edmundsbury Borough Council

FOREST HEATH & ST EDMUNDSBURY STRATEGIC FLOOD RISK ASSESSMENT AND WATER CYCLE STUDY

FOREST HEATH DISTRICT COUNCIL & ST EDMUNDSBURY BOROUGH COUNCIL

FLOOD RISK MANAGEMENT MEASURES

Hyder Consulting

Drawing	Figure	Scale	Rev
0043-BM01397-BMD-01	J3	NTS	01

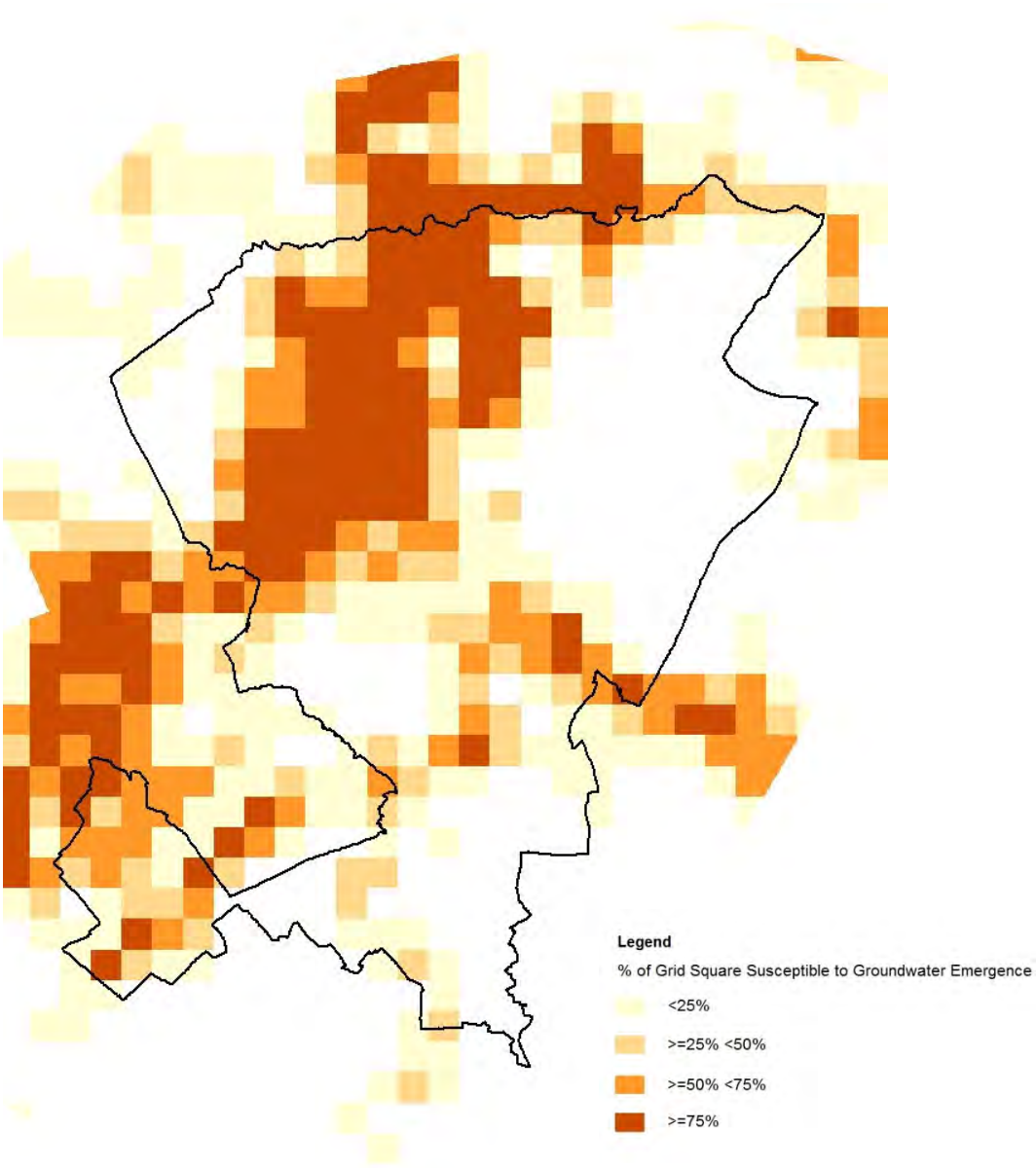
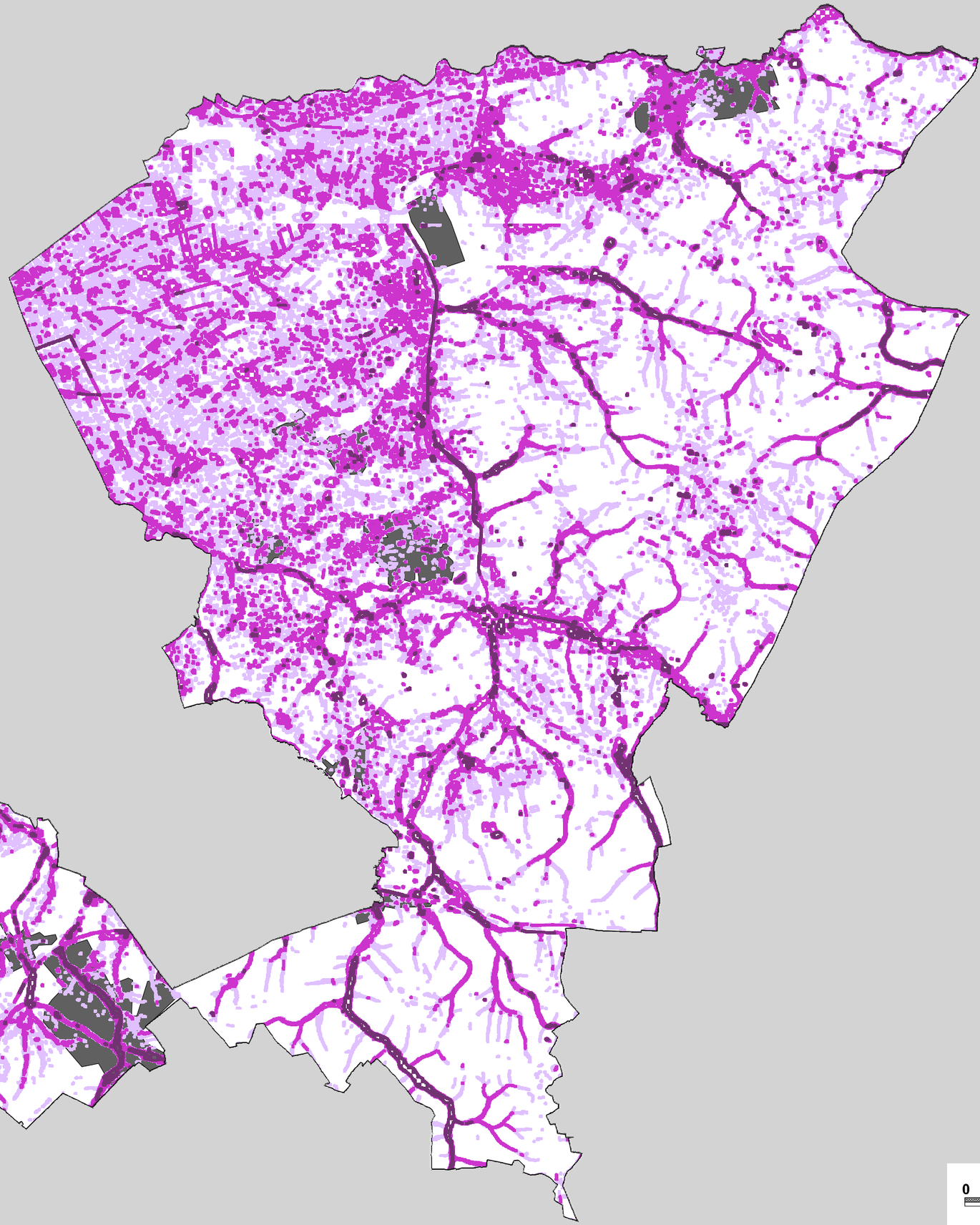


Figure 8-2 Areas Susceptible to Groundwater Flooding (source Environment Agency)

There is a band of higher susceptibility running the north west to south west across the district. Main settlements within this band are Brandon, Lakenheath, Beck Row, and West Row. Newmarket also contains areas of higher susceptibility. This mapping should therefore inform site specific FRAs in terms of their investigations into groundwater flooding.

A study into the collation, monitoring and risk assessment for chalk aquifers produced as part of the DEFRA Strategy for Flood and Coastal Erosion Risk Management study[16] sets out a number of recommendations for effective monitoring and collation of groundwater flooding information in chalk catchments. Of note, it recommended that a national database collating records of flooding from all sources (including groundwater) be developed and that this should be updated with future records of groundwater flooding supplied by the Environment Agency, other organisations and the public. This makes a link with duties of an LLFA (Suffolk CC) and also for FHDC to contribute to this process given their knowledge of the area.



LEGEND

Areas Susceptible to Surface Water Flooding

- More (>1.0m)
- Intermediate (0.3m - 1.0m)
- Less (0.1m - 0.3m)
- Main Settlements
- Forest Heath Boundary

The map shows areas that are susceptible to surface water flooding. It has been produced using a simplified method that excludes:

Underground sewerage and drainage systems;
Smaller over ground drainage systems;
Buildings.

This map shows the Environment Agency Areas Susceptible to Surface Water Flooding (2008) which have been provided to Forest Heath District Council under Special License. This data and map is strictly for internal use only.

A	AMM	LAF	LAF		MAY 2011
Rev	Drw	Chk	Apd		Date

Forest Heath District Council

Environment Agency

FOREST HEATH STRATEGIC FLOOD RISK ASSESSMENT

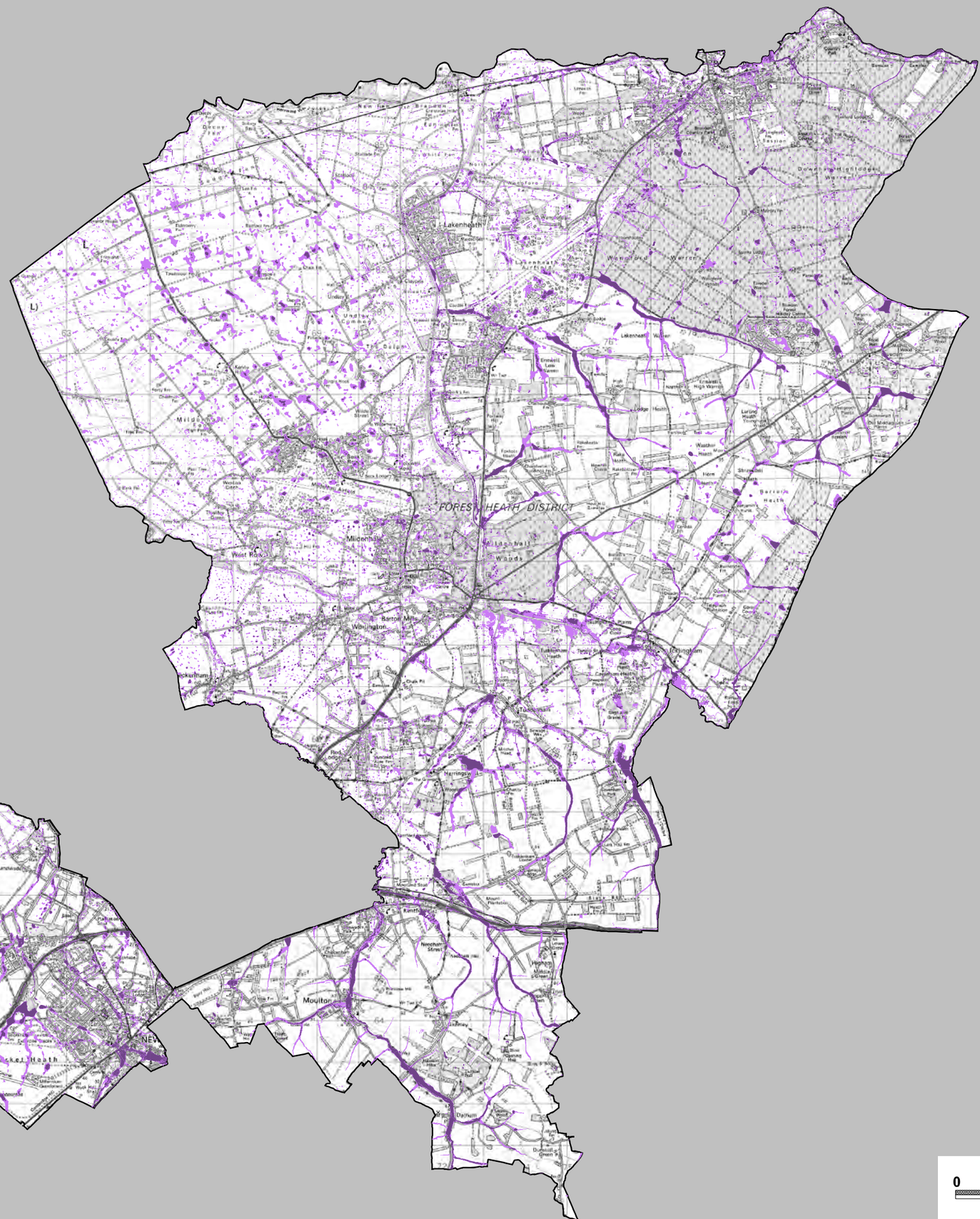
FOREST HEATH DISTRICT COUNCIL

SURFACE WATER SUCEPTIBILITY

Hyder Consulting

Drawing	Figure	Scale	Rev
0202-BM01397-BMD-01	A-2	NTS	A

0 5 10
kilometres



0 5 10
kilometres

LEGEND

DEEP (>0.3M)

SHALLOW (>0.1M)

This map gives an indication of the broad areas likely to be at risk of surface water flooding. It is not suitable for use at an individual property scale due to the method used.

Rev	Drw	Chk	Apd		Date
A	CLG	LAF	LAF		OCT 2011

Forest Heath District Council

Environment Agency

FOREST HEATH STRATEGIC FLOOD RISK ASSESSMENT

FOREST HEATH DISTRICT COUNCIL

FLOOD MAP FOR SURFACE WATER 0.5% AEP (1 IN 200 CHANCE OF OCCURRENCE IN ANY GIVEN YEAR)

Hyder Consulting

Drawing	Figure	Scale	Rev
0204-BM01397-BMD-01	A-4	NTS	A

Appendix D – EA Guidance

Thames Area Climate Change Allowances

Guidance for their use in flood risk assessments

Jan 2017

We recently updated our national guidance on climate change allowances for Flood Risk Assessments. The following information provides additional local guidance which applies to developments within our Thames area boundary.

Climate change allowances - overview

The National Planning Practice Guidance refers planners, developers and advisors to the Environment Agency to our guidance on considering climate change in Flood Risk Assessments. We updated this guidance in February 2016 and it should be read in conjunction with this document to inform planning applications, local plans, neighbourhood plans and other projects. It provides:

- Climate change allowances for peak river flow, peak rainfall, sea level rise, wind speed and wave height
- A range of allowances to assess fluvial flooding, rather than a single national allowance
- Advice on which allowances to use for assessments based on vulnerability classification, flood zone and development lifetime

Updated climate change allowances guidance:

https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

National Planning Practice Guidance:

http://planningguidance.communities.gov.uk/

Assessing climate change impacts on fluvial flooding

Table A below indicates the level of technical assessment of climate change impacts on fluvial flooding appropriate for new developments depending on their scale and location (flood zone). Please note that this should be used as a guide only. Ultimately, the agreed approach should be based on expert local knowledge of flood risk conditions, local sensitivities and other influences.

Applicants and consultants may contact the Environment Agency at the pre-planning application stage to confirm the assessment approach on a case-by-case basis. We provide standard guidance free of charge or bespoke advice for a fee for developments for which we are a statutory consultee. If your development is instead covered by Flood Risk Standing Advice, we recommend you contact the relevant Local Planning Authority for their guidance and confirmation of the assessment approach. Flood Risk Standing Advice can be found here:

https://www.gov.uk/flood-risk-assessment-local-planning-authorities

Table A defines three possible approaches to account for flood risk impacts due to climate change in new development proposals:

1. **Basic -** Developer can add an allowance to the 'design flood' (i.e. 1% annual probability) peak levels to account for potential climate change impacts. The allowance should be derived and agreed locally by Environment Agency teams.
2. **Intermediate -** Developer can use existing modelled flood and flow data to construct a stage-discharge rating curve, which can be used to interpolate a flood level based on the required peak flow allowance to apply to the ‘design flood’ flow.
3. **Detailed -** Perform detailed hydraulic modelling, through either re-running Environment Agency hydraulic models (if available) or construction of a new model by the developer.

Table A – Indicative guide to assessment approach

Vulnerability classification	Flood zone	Assessment by development type		
		Minor	Small-Major	Large-Major
Essential infrastructure	Zone 2	Detailed		
	Zone 3a	Detailed		
	Zone 3b	Detailed		
Highly vulnerable	Zone 2	Intermediate/Basic	Intermediate/Basic	Detailed
	Zone 3a	Not appropriate development		
	Zone 3b	Not appropriate development		
More vulnerable	Zone 2	Basic	Basic	Intermediate/Basic
	Zone 3a	Basic	Detailed	Detailed
	Zone 3b	Not appropriate development		
Less vulnerable	Zone 2	Basic	Basic	Intermediate/Basic
	Zone 3a	Basic	Basic	Detailed
	Zone 3b	Not appropriate development		
Water compatible	Zone 2	None		
	Zone 3a	Intermediate/Basic		
	Zone 3b	Detailed		

Definitions of terms in Table A

Minor

1-9 dwellings/less than 0.5 ha; office/light industrial under 1ha; general industrial under 1 ha; retail under 1 ha; travelling community site between 0 and 9 pitches.

Small-Major

10 to 30 dwellings; office/light industrial 1ha to 5ha; general industrial 1ha to 5ha; retail over 1ha to 5ha; travelling community site over 10 to 30 pitches.

Large-Major

30+ dwellings; office; light industrial 5ha+; general industrial 5ha+; retail 5ha+; gypsy/traveller site over 30+ pitches; any other development that creates a non-residential building or development over 1000 sqm.

Further info on vulnerability classifications:

http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-2-flood-risk-vulnerability-classification/

Further info on flood zones:

http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-2-flood-risk-vulnerability-classification/

Specific local considerations

Where the Environment Agency and the applicant or their consultant has agreed that a basic level of assessment is appropriate, the figures in Table B below can be used as an allowance for potential climate change impacts on peak design (i.e. 1% annual probability) fluvial flood level rather than undertaking detailed modelling.

Table B – Local allowances for potential climate change impacts

Watercourse	Central	Higher central	Upper
Thames	500mm	700mm	1000mm

Use of these allowances will only be accepted after discussion with the Environment Agency.

Fluvial food risk mitigation

Please use the national guidance to find out which allowances to use to assess the impact of climate change on flood risk.

For planning consultations where we are a statutory consultee and our Flood Risk Standing Advice does not apply, we use the following benchmarks to inform flood risk mitigation for different vulnerability classifications.

These benchmarks are a guide only. We strongly recommend you contact us at the pre-planning application stage to confirm this on a case-by-case basis. Please note you may be charged for pre-planning advice.

For planning consultations where we are not a statutory consultee or where our Flood Risk Standing Advice does apply, we recommend local planning authorities and developers use these benchmarks but we do not expect to be consulted.

Essential Infrastructure

For these developments, our benchmark for flood risk mitigation is for it to be designed to the **upper end** climate change allowance for the epoch that most closely represents the lifetime of the development, including decommissioning.

Highly Vulnerable

For these developments in flood zone 2, the **higher central** climate change allowance is our minimum benchmark for flood risk mitigation. In sensitive locations it may be necessary to use the **upper end** allowance.

More Vulnerable

For these developments in flood zone 2, the **central** climate change allowance is our minimum benchmark for flood risk mitigation. In flood zone 3 the **higher central** climate change allowance is our minimum benchmark for flood risk mitigation. In sensitive locations it may be necessary to use the **higher central** (in flood zone 2) and the **upper end** allowance (in flood zone 3).

Water Compatible or Less Vulnerable

For these developments, the **central** climate change allowance for the epoch that most closely represents the lifetime of the development is our minimum benchmark for flood risk mitigation. In sensitive locations it may be necessary to use the **higher central** to inform built in resilience, particularly in flood zone 3.

Further info on our Flood Risk Standing Advice:

https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities

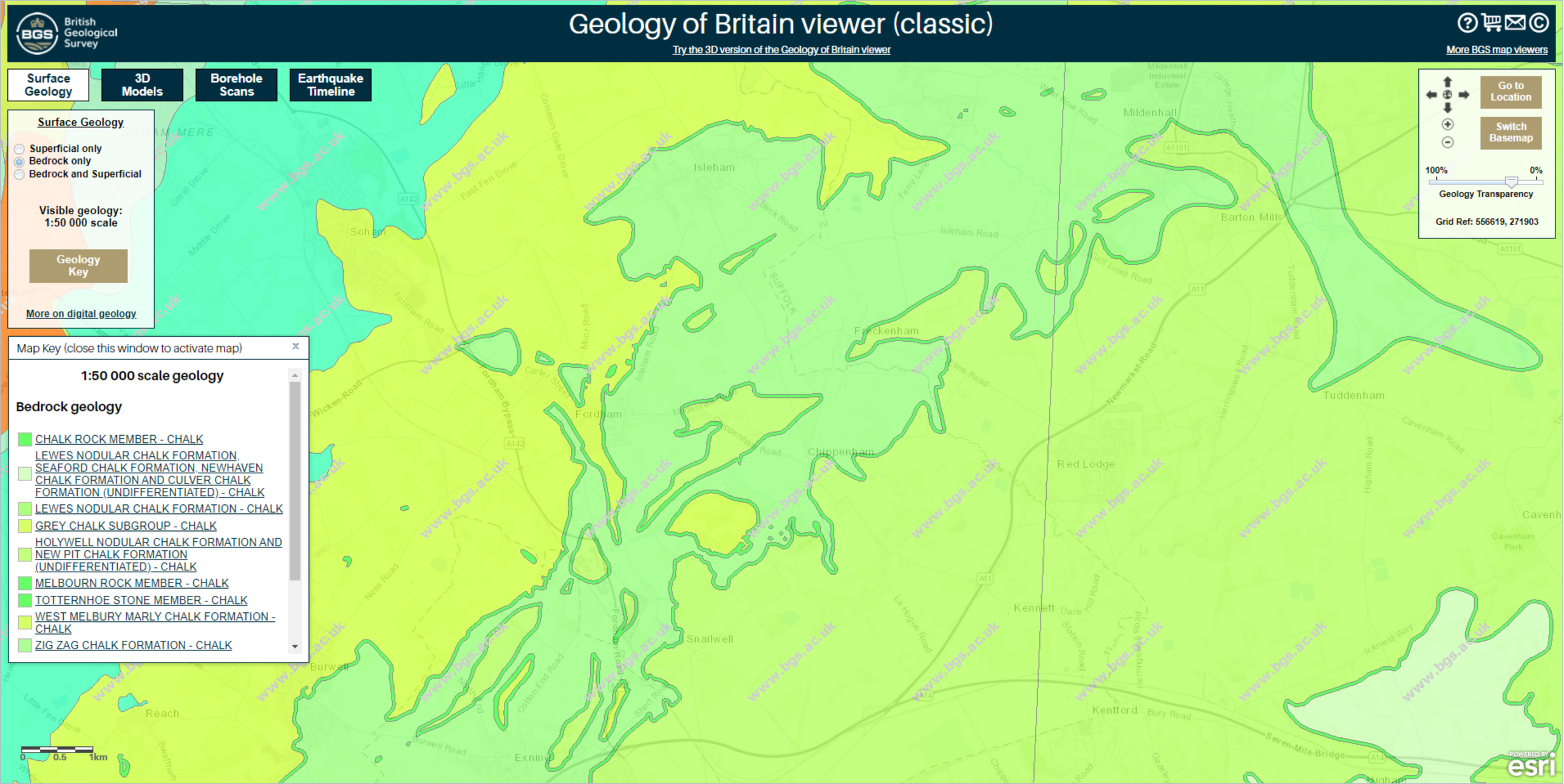
There may be circumstances where local evidence supports the use of other data or allowances. Where you think this is the case we may want to check this data and how you propose to use it.

For more information

Please contact our Thames area Customers and Engagement team:

Enquiries_THM@environment-agency.gov.uk

Appendix E – Additional Mapping


British Geological Survey
Geology of Britain viewer (classic)
Try the 3D version of the Geology of Britain viewer
More BGS map viewers
Surface Geology
3D Models
Borehole Scans
Earthquake Timeline
Surface Geology
Superficial only
Bedrock only
Bedrock and Superficial
Visible geology: 1:50 000 scale
Geology Key
More on digital geology
Map Key (close this window to activate map)
1:50 000 scale geology
Bedrock geology
CHALK ROCK MEMBER - CHALK
LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION, NEWHAVEN CHALK FORMATION AND CULVER CHALK FORMATION (UNDIFFERENTIATED) - CHALK
LEWES NODULAR CHALK FORMATION - CHALK
GREY CHALK SUBGROUP - CHALK
HOLYWELL NODULAR CHALK FORMATION AND NEW PIT CHALK FORMATION (UNDIFFERENTIATED) - CHALK
MELBOURN ROCK MEMBER - CHALK
TOTTERNHOE STONE MEMBER - CHALK
WEST MELBURY MARLY CHALK FORMATION - CHALK
ZIG ZAG CHALK FORMATION - CHALK
Go to Location
Switch Basemap
100%
0%
Geology Transparency
Grid Ref: 556619, 271903
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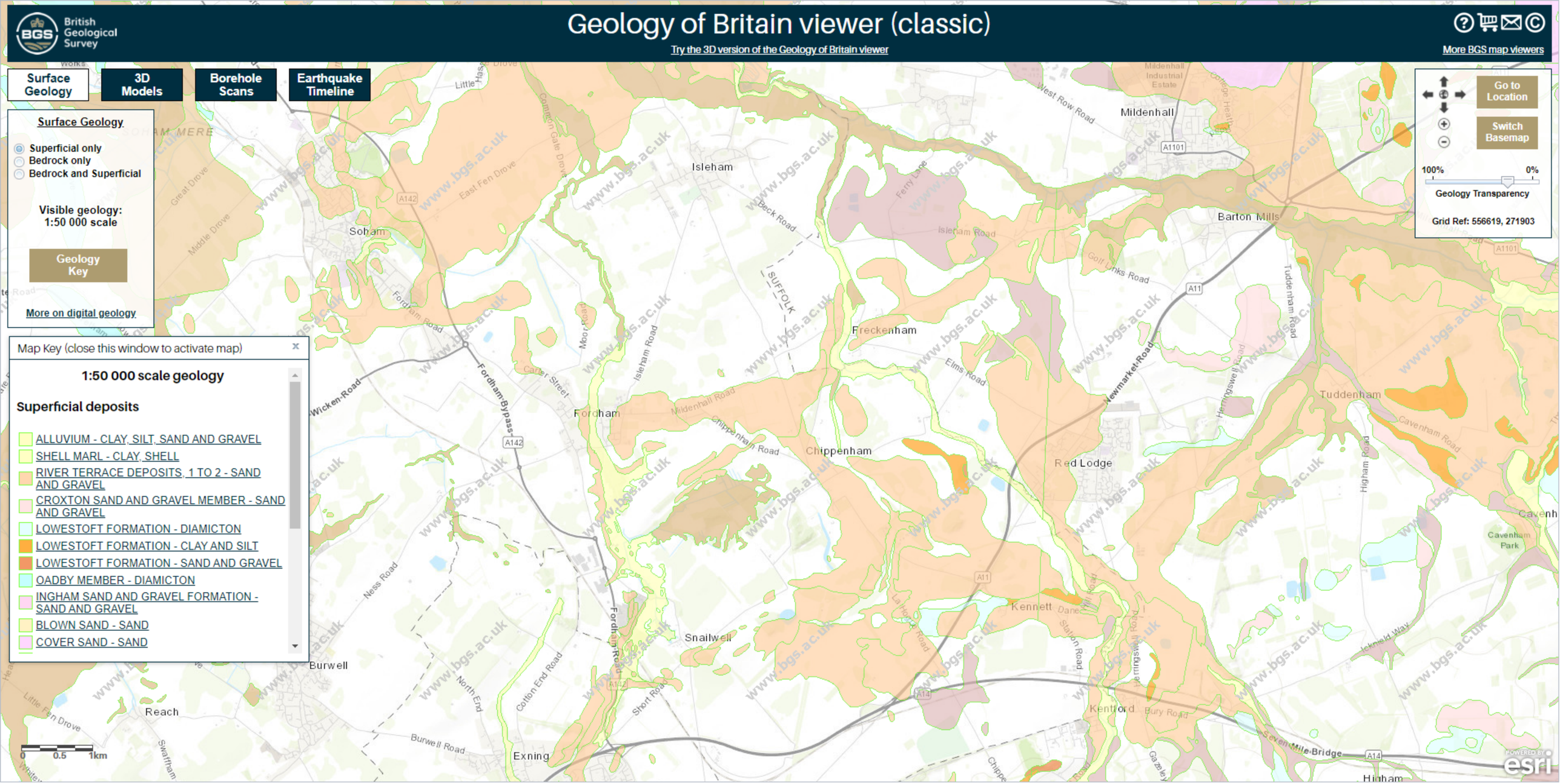
0.5
1km
Isleham
Soham
Fordham
Freckenham
Chippenham
Barton Mills
Mildenhall
Tuddenham
Red Lodge
Kennett
Snailwell
Burwell
Reach
Exning
Kentford
Cavenham
SUFFOLK
A142
A11
A14
A1101
POWERED BY esri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Try the 3D version of the Geology of Britain viewer
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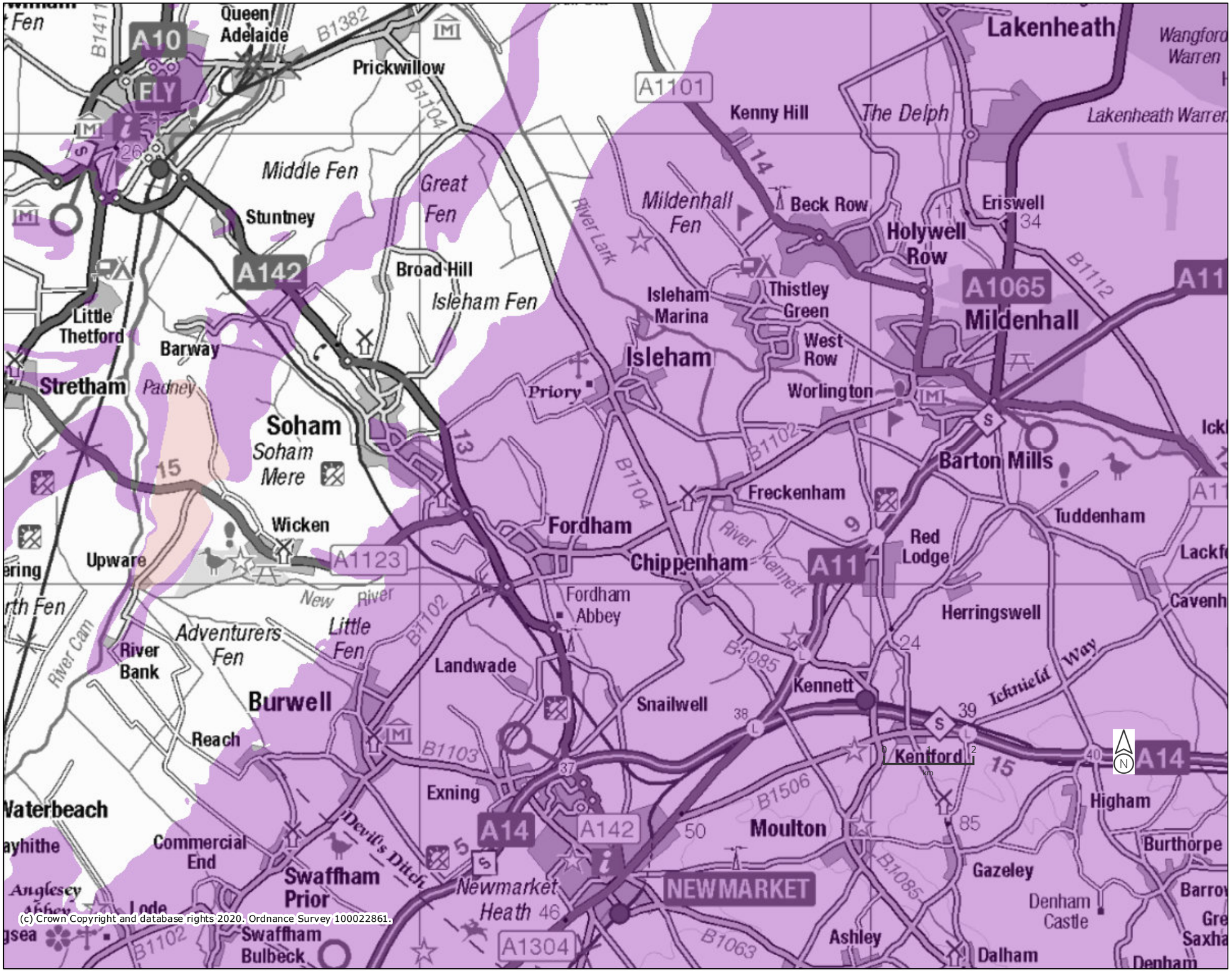
Surface Geology
3D Models
Borehole Scans
Earthquake Timeline
Surface Geology
Superficial only
Bedrock only
Bedrock and Superficial
Visible geology: 1:50 000 scale
Geology Key
More on digital geology
Map Key (close this window to activate map)
1:50 000 scale geology
Superficial deposits
ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
SHELL MARL - CLAY, SHELL
RIVER TERRACE DEPOSITS, 1 TO 2 - SAND AND GRAVEL
CROXTON SAND AND GRAVEL MEMBER - SAND AND GRAVEL
LOWESTOFT FORMATION - DIAMICTON
LOWESTOFT FORMATION - CLAY AND SILT
LOWESTOFT FORMATION - SAND AND GRAVEL
OADBY MEMBER - DIAMICTON
INGHAM SAND AND GRAVEL FORMATION - SAND AND GRAVEL
BLOWN SAND - SAND
COVER SAND - SAND
Go to Location
Switch Basemap
100%
0%
Geology Transparency
Grid Ref: 556619, 271903
Isleham
Soham
Mildenhall
Barton Mills
Freckenham
Fordham
Chippenham
Red Lodge
Tuddenham
Snailwell
Burwell
Reach
Exning
Kennett
Kentford
Higham
Cavenham Park
Wicken Road
Fordham Bypass
Newmarket Road
A142
A11
A1101
A14
0 0.5 1km
esri

MAGIC

Sunnica Ltd



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Legend

Aquifer Designation Map (Bedrock) (England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unproductive

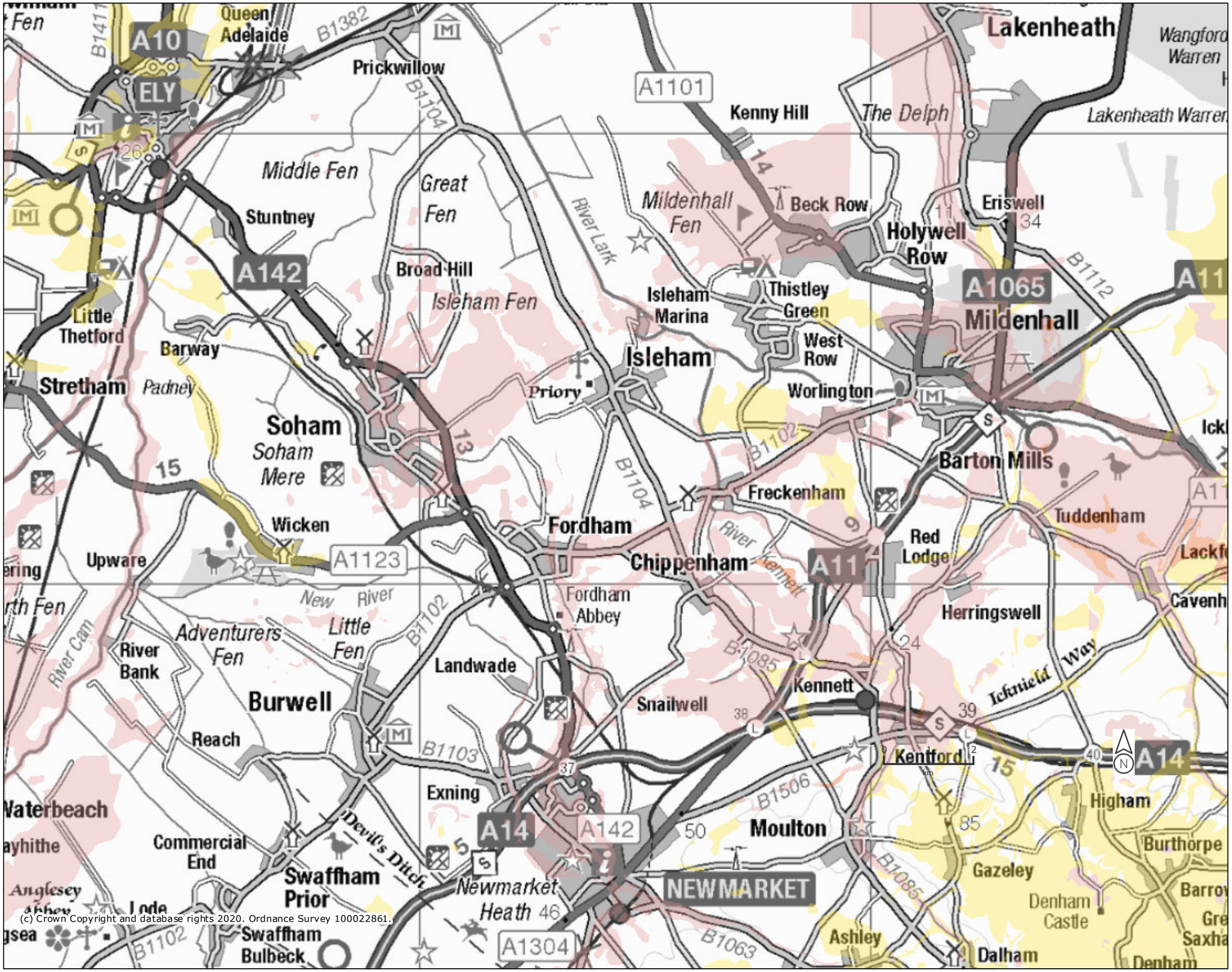
Projection = OSGB36
xmin = 542700
ymin = 261800
xmax = 586000
ymax = 282600

0 1.5 3
km

Map produced by MAGIC on 26 August, 2020.

MAGIC

Sunnica Ltd



Legend

Aquifer Designation Map (Superficial Drift) (England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes+landslip)
- Unproductive

Projection = OSGB36
xmin = 542700
ymin = 261800
xmax = 586000
ymax = 282600

0 1.5 3 km

Map produced by MAGIC on 26 August, 2020.

Sunnica Ltd

Legend

Source Protection Zones merged (England)

- Zone I - Inner Protection Zone
- Zone I - Subsurface Activity
- Zone II - Outer Protection Zone
- Zone II - Subsurface Activity
- Zone III - Total Catchment
- Zone III - Subsurface Activity
- Zone of Special Interest

Projection = OSGB36
xmin = 552500
ymin = 265600
xmax = 573900
ymax = 276600

0 0.8 1.6
km

Map produced by MAGIC on 26 August, 2020.

Appendix F – Drainage Technical Note

Drainage Technical Note

Project number	Client	Date	Document Ref:
60589004	Sunnica Ltd	07/08/2020	60589004-DOC-DC-001
Prepared by	**Checked By**	**Verified By**	**Approved by**
Alastair Rohrer	Chris Brandon	Carl Pledger	

Introduction

Project Description and Background

AECOM has been commissioned to undertake an outline Drainage Strategy (DS) as part of the preparation of a Preliminary Environmental Impact Report (PEIR) for the proposed development, Sunnica Energy Farm (TL 67951 72191), approximate postcode IP28 8JG. The site location and proposed development are described in more detail in Chapters 3 and 5 of the PEI Report, respectively.

The existing site covers an area of approximately 1,292 hectares, comprising arable fields interspersed with tree shelter belts (linear), small woodland and copses, agricultural fields, and farm access tracks and farm buildings.

The proposed development, Sunnica Energy Farm, comprises two main sites: Sunnica West Site and Sunnica East Site. Both sites are split into sites A and B and connected by cable connection routes A and B, with a further connection toward Burwell (south-west of the site) to the Burwell National Grid Substation.

The maximum developable areas are as follows:

- Sunnica East Site A – 179.0 ha
- Sunnica East Site B – 238.7 ha
- Sunnica West Site A – 345.5 ha
- Sunnica West Site B – 36.2 ha
- Totalling 799.40 ha
- The remaining areas (492.6ha) will be set aside for environmental and arachnological mitigation.

The four sites (Sunnica East Site A, Sunnica East Site B, Sunnica West Site A and Sunnica West Site B) will comprise the principal infrastructure as follows:

- Solar PV modules;
- PV module mounting structures;
- Inverters;
- Transformers;
- Switchgears;
- Onsite cabling;
- One or more Battery Energy Storage Systems (BESS) (expected to be formed of lithium ion batteries storing electrical energy);
- An electrical compound comprising a substation and control building (Sunnica East Site A, Sunnica East Site B and Sunnica West Site A only);
- Office/warehouse (Sunnica East Site A and Sunnica West Site A only)

- Fencing and security measures;
- Drainage;
- Internal access roads and car parking;
- Landscaping including habitat creation areas; and
- Construction laydown areas

The Scheme would allow for the storage and export of up to 500 megawatts (MW) electrical generation capacity.

This Technical Note will discuss the drainage strategy proposed to handle surface water generated within the site boundary.

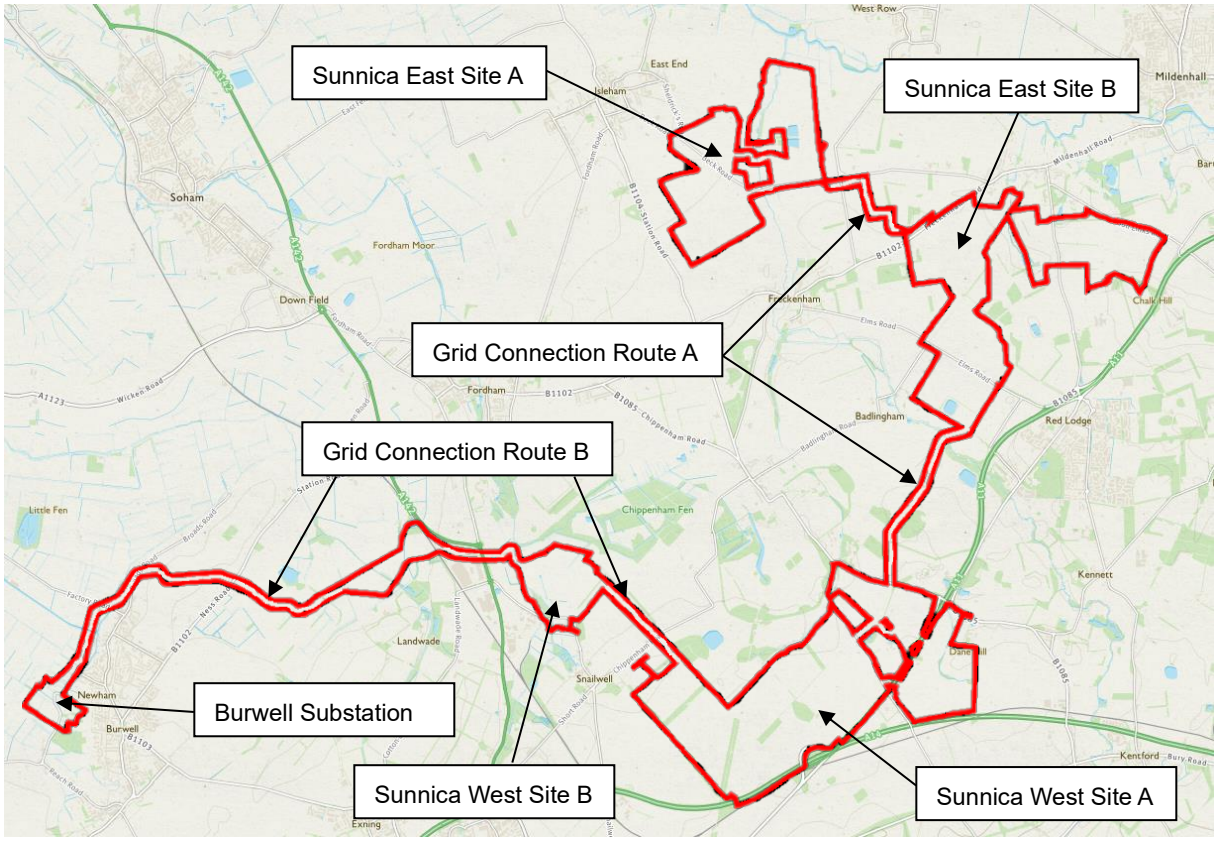


Figure 1: Sunnica Energy Farm Proposal

Design Assumptions

The following design assumptions have been used to produce this assessment. All assumptions will need to be checked with the approving authority throughout the preliminary design phase.

- Existing levels for the site have been taken from drone topographical survey conducted by Above Surveying Ltd on behalf of Sunnica Ltd. The proposed development will not alter the existing levels found on-site.
- Due to the size of the site, a ground investigation is cost prohibitive at this stage. Instead, information on the site ground conditions have been determined through a desktop study: British Geological Survey (BGS) show the majority of the south of the site lies within the Holywell Nodular Chalk Formation and Woburn Sands Formation, whilst the majority of the north of the site lies in the Zig Zag Chalk Formation. Where the BGS had information on Superficial Deposits, they indicate areas of sand and gravel.
- An infiltration rate of 1 x 10^{-5} m/s has been assumed. This is based on a conservative infiltration rate estimation for soil suitable for infiltration, referenced from CIRIA SuDS Manual (C753).

- The drainage system has been designed to accommodate the 1 in 100-year storm, plus a 40% allowance for an increase in peak rainfall intensity due to climate change.
- A Volumetric Runoff Coefficient (Cv) of 1 has been used in this design. The percentage impermeable area (PIMP) value was assumed to be 10% for the solar fields and 50% for compound areas 100%.
- FSR rainfall data has been used for this assessment.
- In accordance with BRE365, a minimum of 1m should be provided between the base on any infiltration system and the groundwater table to allow for fluctuations in the groundwater level and to protect groundwater quality. As groundwater levels are not known at this stage, proposed infiltration attenuation features have been kept shallow (maximum depth of 600mm) to the lower the possibility of encountering groundwater.

Supporting Information

Flood Risk

The potential flood risk to the proposed development is summarised in Table 1 below. For further detail on the site's potential flood risk, refer to the Flood Risk Assessment (60589004-DOC-FRA-001, January 2020).

Table 1: Flood Risk Summary

Flood Risk Source	Pre-Development Risk	Post Development Risk	Comments
Fluvial	Low	Low/High	The majority of the site is in Flood Zone 1, but certain areas lie in Flood Zone 2, 3a, 3b. No development will occur in Flood Zone 3b.
Tidal	None	None	Not in a tidal area
Pluvial (Surface Water)	Low	Low	Surface water risk varies throughout the site indicating patches of the site which are susceptible to surface water flooding. However, flooding is localised and generally shallow (low risk).
Groundwater	Medium	Medium	Groundwater risk also varies, with all sites between <25% and >75%. Sunnica East (eastern half) and West A and B sites are shown to be within a Source Protection Zone III, with small areas of Source Protection Zone II. Further ground investigation, groundwater monitoring and infiltration testing is recommended to confirm groundwater levels. Infiltration techniques must ensure mitigation measures are put in effect to protect groundwater interaction in these areas.
Sewers	None	None	There are no sewers in the vicinity of the site.
Artificial Sources	Low (residual)	Low (residual)	Statutory Reservoirs (large raised reservoirs with volumes above ground of 25,000m^3 or over) are regularly inspected and maintained as set out in the Reservoirs Act 1975. On that basis they are deemed to pose a low (residual) risk. Other artificial sources such as canals and waterways are considered to be regularly maintained and therefore only deemed to pose a low (residual) risk to the proposed development

Existing Drainage

The existing site is currently greenfield. It consists of individual trees, hedgerow, tree belts (linear) small woodland block, agricultural fields (arable) and farm access tracks. There is currently no formal drainage system within the site boundary. It is assumed that for low intensity rainfall events, rainfall would infiltrate to ground where it lands. For rainfall events where rainfall intensity exceeds the local rate of infiltration, it is assumed that any runoff generated within the site would naturally flow overland to low spots within the site where it would collect and infiltrate as the event subsides. Where parts of the site interact with watercourses, excess runoff will naturally drain form the catchment into the watercourse.

Geology and Hydrogeology

The bedrock and superficial geology for the area has been identified from mapping produced by the British Geological Survey. These maps indicate Superficial Deposits are absent for portions of the site. However, there are areas of sand and gravel from Glacial River Terrace Deposits throughout portions of the site.

The Bedrock covering the majority of the south of the site is Holywell Nodular Chalk Formation and New Pit Chalk Formation, whilst the majority of the north of site is the Zig Zag Chalk Formation. Both bedrock geologies are chalk member formations.

The EA's Online Interactive Maps for Groundwater shows the site is situated partly within a Groundwater Source Protection Zone 3 (Total Catchment Zone). An SPZ typically means there is an underlying aquifer supplying a borehole for potable use.

Proposed Drainage Arrangements

Surface Water Drainage Strategy

As previously mentioned, Sunnica Energy Farm is currently a greenfield site. It is assumed that rainfall will mostly permeate into the ground where it falls and that any runoff generated within arable fields collects in local low spots where it infiltrates to ground, or enter a watercourse as appropriate where the site drainage interacts with one The proposed surface water drainage strategy for the Sunnica Energy Farm aims to mimic the natural drainage conditions of the site as much as possible.

The proposed solar panels with be held above ground individually on four legs. This prevents sealing the ground with an impermeable surface allowing rainfall/runoff to infiltrate to ground throughout the site. As a result, it is assumed that the site's impermeable area will remain consistent to its pre-development state. The introduction of solar panels, however, may alter the existing flow routes throughout the site. The impermeability of the solar panels will prevent rainfall infiltrating to ground where it falls, whilst the collective orientation of the panels could direct runoff to common areas leading to concentrated overland flow routes.

To prevent ponding occurring around the solar panels or overland flow routes directing runoff off site, a series of swales and infiltration basins will be constructed within the solar panel fields in identified low spots throughout the site to collect and store runoff, allowing it to infiltrate to ground. The locations of the proposed swales and detention basins can be seen in WPP-ACM-XX-DR-C-ZZ-001 to WPP-ACM-XX-DR-C-ZZ-008, in Appendix F.

Throughout the site, there are several areas demarcated as archaeology or heritage areas that will not contain solar panels. No drainage infrastructure is proposed for these areas. Swales or infiltration basins will be positioned to prevent any runoff from the solar panel fields flowing into these areas. Similarly, no drainage is proposed for the cable routes; the cables will be buried, and the routes will be restored to greenfield conditions. Throughout the site, there will also be compound areas and Battery Energy Storage Systems (BESS) and substations that have an impermeable surface. The proposed swales and detention basins have been sized to accommodate the increased runoff from these areas.

Contributing Areas

The total area contributing to the proposed drainage system is presented in Table 2 below. In calculating this area, the following assumptions were made:

- Heritage, Archaeological Mitigation, Ecology Enhancement and Proposed Woodland areas were deemed to contribute 0% of their total area to runoff.
- Compound, BESS and Substation areas were deemed to contribute 50% of their total area to runoff.

- As the solar panel fields are greenfield areas, the contributing area for calculations was pro-rata'd to represent an effective impermeable area in order to calculate runoff volumes using the MicroDrainage software (as it only allows impermeable areas to include in the calculation. It is generally accepted that 10% of the greenfield area would represent the equivalent impermeable area in MicroDrainage or other modelling software. As previously mentioned, the solar panels will be held above ground on four-legged stands. This will allow most rainfall to infiltrate ground within the solar field.
- Cable routes were not deemed to contribute any runoff to the drainage system. The proposed cable will be buried, and the greenfield conditions will be restored.

Table 2: Contributing Areas

	Area (ha)	Pre-Development PIMP* (%)	Post-Development PIMP (%)	Pre-Development Contributing Area (ha) to existing drainage system	Post-Development Contributing Area (ha) to proposed drainage system
Sunnica East	564	0%	8%	0	45.8
Sunnica West	562	0%	8%	0	42.7
Cable Routes	166	0%	0%	0	0

*- Percentage Impermeable (PIMP)

Greenfield Runoff Rates

The equivalent greenfield runoff rates for the site have been calculated for the site using HR Wallingford's UKSuDS Greenfield Runoff Rate Estimation tool based on the proposed contributing impermeable area. These rates are shown Table 3.

Table 3: Greenfield Discharge Rates

Return Period (years)	Discharge Rate (l/s) (1292.5 ha)
1	101.7
30	115.7
100	283.5
QBar	412.0

Proposed Discharge Rates

As mentioned earlier, it is not intended to discharge surface water runoff off site. Instead any surface water runoff generated within the solar field or compound areas will be disposed of via infiltration to mimic existing conditions. As a full ground investigation for the entire site would be cost prohibitive at this stage, the site's infiltration potential has been assessed based on the desktop study.

As mentioned earlier, the site lies in areas of sand and gravel; ground material typically associated with good infiltration rates. As a conservative approach, the site infiltration rate has been modelled with an infiltration rate of 1 x 10^{-5}m/s. The percentage of impermeable area for compound areas and battery energy storage systems and substations has not not yet confirmed (assumed 50% impermeable area), however, increases to existing contributing area are to be balanced by infiltration techniques, with exceedance flows captured by surrounding swales.

Proposed Attenuation

Attenuation will be required onsite to temporarily store any surface water runoff generated within the site boundary before it is infiltrated to ground. Attenuation will be provided in the form of swales and infiltration basins. These features have been strategically located based on existing overland flow routes to capture runoff. The swales/infiltration basins will be 600 mm deep with 1 in 3 side slopes. Check dams will be placed strategically within swales to optimise their storage potential. Where

the attenuation lies within the solar field, the legs of the solar panel will be extended so that the solar panel lies above any potential flooding.

The attenuation features have been sized to accommodate the 1 in 100 year event plus a 40% allowance for climate change. The required storage volume was determined for the entire site using MicroDrainage's 'Quick Storage Estimate' tool. The volume of storage required for specific solar fields, compound area or substation areas was determined proportionately based on the contributing area. The 'Quick Storage Estimate' tool provides an upper and lower estimate for the storage volume required, as shown in Figure 2.

Figure 2: MicroDrainage Quick Storage Estimator Analysis

The proposed development would provide minimal alterations to the existing topography and ground conditions on-site. It was therefore assumed a portion of runoff generated would infiltrate to ground before it reached a proposed storage feature or would become trapped in a local low spot. As such, it was decided that the upper estimate for the storage volume required would result in redundant storage. The required storage volume was therefore based on the average of the upper and lower estimate. The total storage to be provide onsite is presented in Table 4 below. For a detail breakdown of the storage to provide for each catchment, refer to Appendix C.

Details of the proposed storage features are shown below in Table 4

Table 4: Proposed Storage Features

Total storage required (m^3)	Total storage provided (m^3)
32,976 to 77,301 (average: 55,139)	53,420

Water Quality

CIRIA C753 The SuDS Manual sets out a simplistic method that can be used to assess the level of treatment a drainage system could potentially provide to captured surface water runoff. This method is known as the Simple Index Approach; it states the following:

Total SuDS Mitigation Index ≥ Pollution hazard index

Surface water runoff from the solar fields, compound areas and substation areas will drain runoff overland to either swales or infiltration basins. From here, runoff will infiltrate to ground. Table 5 below lists the pollutant hazard indices and mitigation indices used as part of the Simple Index Approach. This demonstrates the potential treatment to surface water runoff provided by the proposed drainage strategy.

Table 5. Assessment against CIRIA C753 The SuDS Manual Simple Index Approach

Land use	Pollution Hazard Indices			
	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Solar panels*	Very Low	0.2	0.2	0.05
Low Traffic roads and non-residential car parking with infrequent change (i.e. <300 traffic movements/day)**	Low	0.5	0.4	0.4

*The pollution hazard indices for solar panels has been based on residential roofs. The outside casing of the panel is constructed from glass, which is unlikely to create a significant pollution risk.

**Compound areas and substation areas

Type of SuDS Component	Mitigation indices		
	TSS	Metals	Hydrocarbons
Swales	0.5	0.6	0.6
Infiltration Basin	0.5	0.5	0.6

Exceedance Flows

The proposed surface water drainage network has been designed to accommodate runoff from all storms up to and including the 100 year +40% return period. For an extreme storm event, any exceedance flows that cannot be retained by the proposed attenuation flow overland, following the existing topography, where ultimately, they will be contained within natural low spots within the site or they will flow into neighbouring fields.

Amenity and Ecological Value of SuDS Features

Due to the nature of the proposed development, personnel involved in the development will have minimal interaction with the proposed drainage features. Consequently, the potential amenity benefit provided by the drainage is not considered relevant to the design. The design of the drainage, however, will be discreet so that is does not hinder the aesthetic value of the site.

Incorporating swales and infiltration basins within the solar fields should maintain some ecological value within the fields that may be lost from the introduction of solar panels.

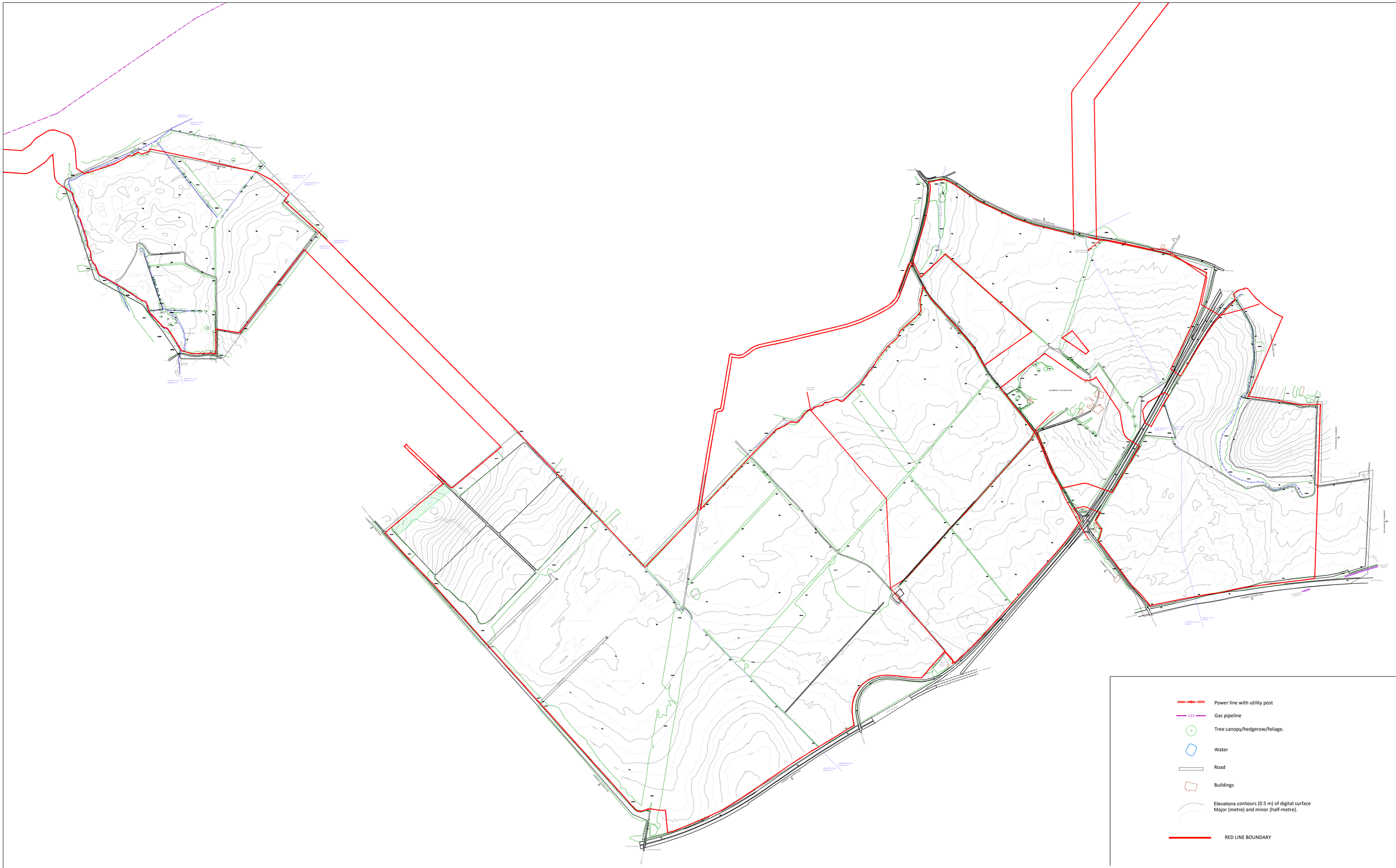
Adoption and Maintenance

The proposed drainage strategy will be maintained by a private company. All proposed drainage features should be maintained according to standard practice. Refer to Appendix E for maintenance schedules of proposed SuDS features.

Appendix A – Topographic Surveys

PS Renewables
Green Energy Investments

PROJECT:	SUNNICA PROJECT				
COMPANY:	PS RENEWABLES				
LAYOUT:	TOPOGRAPHIC LAYOUT - EAST				
DRAW BY:	Sergio Serna	PS RENEWABLES: 5 Stubbings Estate Maidenhead, Berkshire SL6 6QL	DATE:	-	NUM.: 5.4.1
DESIGN BY:	Nacho Perez		SCALE:	1:7.500	
CHECK BY:	David Ortiz		SIZE:	A1	



PS Renewables
Green Energy Investments

PROJECT:	SUNNICA PROJECT				
COMPANY:	PS RENEWABLES				
LAYOUT:	TOPOGRAPHIC LAYOUT - WEST				
DRAW BY:	Sergio Serna	PS RENEWABLES: 5 Stubbings Estate Maidenhead, Berkshire SL6 6QL	DATE:	-	NUM.: 5.4.2
DESIGN BY:	Nacho Perez		SCALE:	1:7.500	
CHECK BY:	David Ortiz		SIZE:	A1	

Appendix B – Proposed Development Layout

566000 567000 568000 569000 570000 571000

275000 274000 273000 272000 271000

E01 E02 E03 E04 E05 E07 E08 E09 E10 E11 E12 E13 E14 E15 E16 E17 E18 E19 E20 E21 E22 E23 E24 E25 E26 E27 E28 E29 E30 E31 E32 E33

Office/Warehouse

0 500 1,000m

N

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

LEGEND

- Scheme Boundary
- Public Highway within Scheme

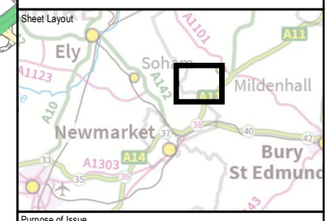
Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Illustrative Locations of Solar Station
- Proposed Road

Green Infrastructure

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

Sheet Layout



Purpose of Issue
PEIR

Client
SUNNICA LTD

Project Title
sunnica energy farm

Drawing Title
FIGURE 3-1
SUNNICA EAST SITE A AND B
PARAMETER PLAN

Drawn	Checked	Approved	Date
AD	DW	NC	02/09/2020

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

AECOM
Unit 1 Wellbrook Court,
Girton,
Cambridge, CB3 0NA
United Kingdom
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AECOM

Drawing Number	Rev
60589004_PEIR_SD_001	0

File Name:C:\Users\Anna.Dilello\AECOM Directory\Sunnica Energy Farm - GIS - General\Layout\PEIR\Chapter_3_Scheme_Description\200902_SunnicaEnergyFarm_PEIR_Figure 3-1_SunnicaEastA_B_Parameter_Plan.mxd

564000 565000 566000 567000 568000 569000

270000 269000 268000 267000 266000

W01 W02 W03 W04 W05 W06 W07 W08 W09 W10 W11 W12 W13 W14 W15 W16 W17

Office/Warehouse

0 500 1,000m

N

File Name:C:\Users\Anna.Dillet\AECOM Directory\Sunnica Energy Farm - GIS - General\Layout\PEIR\Chapter_3_Scheme_Description\200902_SunnicaEnergyFarm_PEIR_Figure 3-2_SunnicaWestA_B_Parameter_Plan.mxd

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

LEGEND

- Scheme Boundary
- Woodstore - 20m Buffer

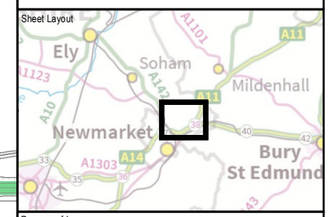
Proposed Scheme Plan

- Developable Area
- Boundary Fence
- BESS and Substation
- Compound Area (Permanent)
- Solar PV Array
- Illustrative Locations of Solar Station
- Proposed Road

Green Infrastructure

- Native Grassland Planting within Archaeological Mitigation Areas
- Native Grassland/Wetland
- Native Grassland Planting
- 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)
- Potential Provision of Permissive Route

Sheet Layout



Purpose of Issue: PEIR

Client: SUNNICA LTD

Project Title: sunnica energy farm

Drawing Title: FIGURE 3-2 SUNNICA WEST A AND B PARAMETER PLAN

Drawn	Checked	Approved	Date
AD	DW	NC	02/09/2020

AECOM Internal Project No.: 60589004

Scale @ A3: 1:17,500

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Unit 1 Wellbrook Court,
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Telephone (01223) 488000
www.aecom.com

Drawing Number: 60589004_PEIR_SD_002

Rev: 0

Appendix C – Proposed Attenuation Volume

Catchment No.	Area (ha.)	PIMP	Impermeable Area (ha.)	Storage Required (m^3)	Total Volume Available (m^3)	Ref $S.C_n.1$	Ref $S.C_n.2$	Ref $S.C_n.3$	Ref $S.C_n.4$	Ref $S.C_n.5$	Ref $P.C_n.1$	Ref $P.C_n.2$	Ref $P.C_n.3$	Ref $P.C_n.4$
1	5.1	10%	0.5	316	837	679	79	79	-	-	-	-	-	-
2	5.4	10%	0.5	339	640	213	319	108	-	-	-	-	-	-
3	3.2	10%	0.3	202	160	160	-	-	-	-	-	-	-	-
4	8.9	10%	0.9	554	583	326	257	-	-	-	-	-	-	-
5	32.1	10%	3.2	2001	679	447	231	-	-	-	-	-	-	-
6	26.5	10%	2.6	1650	638	638	-	-	-	-	-	-	-	-
7	25.3	10%	2.5	1576	618	618	-	-	-	-	-	-	-	-
8	7.1	10%	0.7	441	383	383	-	-	-	-	-	-	-	-
9	4.3	10%	0.4	268	304	153	151	-	-	-	-	-	-	-
10	23.3	10%	2.3	1454	548	386	162	-	-	-	-	-	-	-
11	23.3	10%	2.3	1455	609	609	-	-	-	-	-	-	-	-
12	19.5	10%	2.0	1217	1962	253	329	480	-	-	900	-	-	-
13	12.8	50%	6.4	3992	872	228	397	248	-	-	-	-	-	-
14	12.8	10%	1.3	798	729	446	284	-	-	-	-	-	-	-
15	19.6	10%	2.0	1220	765	342	423	-	-	-	-	-	-	-
16	15.2	10%	1.5	945	1297	244	153	-	-	-	900	-	-	-
17	13.9	10%	1.4	866	1198	190	117	76	315	-	200	300	-	-
18	22.5	10%	2.3	1405	1872	472	-	-	-	-	700	700	-	-
19	38.6	10%	3.9	2406	1255	189	326	302	270	168	-	-	-	-
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21	24.7	10%	2.5	1539	1362	556	455	350	-	-	-	-	-	-
22	19.1	10%	1.9	1190	889	119	327	205	239	-	-	-	-	-
23	11.9	10%	1.2	744	443	283	160	-	-	-	-	-	-	-
24	15.8	10%	1.6	986	130	130	-	-	-	-	-	-	-	-
25	11.8	10%	1.2	733	1722	180	342	-	-	-	400	400	400	-
26	4.3	10%	0.4	271	374	184	190	-	-	-	-	-	-	-
27	9.7	50%	4.8	3013	740	162	228	138	212	-	-	-	-	-
28	3.6	50%	1.8	1107	401	236	166	-	-	-	-	-	-	-
29	9.9	10%	1.0	618	2000	-	-	-	-	-	2000	-	-	-
30	3.3	10%	0.3	205	300	-	-	-	-	-	300	-	-	-
31	7.9	10%	0.8	493	4059	203	157	-	-	-	3700	-	-	-
32	15.7	10%	1.6	979	1202	140	89	157	149	216	150	150	150	150
33	15.0	10%	1.5	937	1284	520	164	-	-	-	300	300	-	-

Catchment No.	Area (ha.)	PIMP	Impermeable Area (ha.)	Storage Required (m^3)	Total Volume Available (m^3)	Ref $S.C_n.1$	Ref $S.C_n.2$	Ref $S.C_n.3$	Ref $S.C_n.4$	Ref $S.C_n.5$	Ref $P.C_n.1$	Ref $P.C_n.2$	Ref $P.C_n.3$	Ref $P.C_n.4$
34	17.0	10%	1.7	1057	1420	177	146	97	-	-	300	400	300	-
35	9.8	10%	1.0	613	851	156	195	-	-	-	200	150	150	-
36	16.5	10%	1.6	1025	1050	-	-	-	-	-	350	350	350	350
37	6.5	10%	0.7	408	600	184	167	-	-	-	250	-	-	-
38	7.4	10%	0.7	462	700	-	-	-	-	-	700	-	-	-
39	8.7	10%	0.9	539	1125	309	159	257	-	-	400	-	-	-
40	11.3	10%	1.1	702	942	176	417	-	-	-	350	-	-	-
41	11.1	10%	1.1	692	3623	140	483	-	-	-	1000	1000	1000	-
42	48.1	10%	4.8	2998	1792	900	315	227	-	-	350	-	-	-
43	3.8	10%	0.4	240	400	-	-	-	-	-	400	-	-	-
44	9.8	10%	1.0	613	834	211	330	293	-	-	-	-	-	-
45	6.7	50%	3.4	2099	2982	90	194	199	-	-	2500	-	-	-
46	9.0	10%	0.9	562	711	176	134	-	-	-	400	-	-	-
47	8.8	10%	0.9	546	755	155	-	-	-	-	600	-	-	-
48	7.5	10%	0.8	467	785	185	-	-	-	-	600	-	-	-
49	27.2	10%	2.7	1695	2328	153	380	207	346	242	300	300	400	-
50	4.9	50%	2.4	1512	570	255	315	-	-	-	-	-	-	-
51	17.8	10%	1.8	1108	401	401	-	-	-	-	-	-	-	-
52	17.8	10%	1.8	1107	828	111	570	148	-	-	-	-	-	-

Appendix D – Greenfield Runoff Rates

Appendix E – Maintenance Schedules

Infiltration Basins

Infiltration basins are vegetated open surface basins designs to store water and allow it to infiltrate into the ground. Vegetation provides amenity benefit and filtration of pollutants and is therefore as important to its function as the basin itself. A schedule setting out the maintenance operations, actions and frequency is included below. Please also refer to the manufacturer's operation and maintenance manual for any inlet structures or valves if available.

CIRIA C753 TABLE 13.2 Operation and maintenance requirements for infiltration basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter, debris and trash	Monthly
	Cut grass – for landscaped areas and access routes	Monthly (during growing season) or as required
	Cut grass – meadow grass in and around basin	Half yearly: spring (before nesting season) and autumn
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
Occasional maintenance	Reseed areas of poor vegetation growth	Annually, or as required
	Prune and trim trees and remove cuttings	As required
	Remove sediment from pre-treatment system when 50% full	As required
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realign the rip-rap	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	As required
	Relevel uneven surfaces and reinstate design levels	As required
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and pre-treatment systems for silt accumulation; establish appropriate silt removal frequencies	Half yearly
	Inspect infiltration surfaces for compaction and ponding	Monthly

Swales

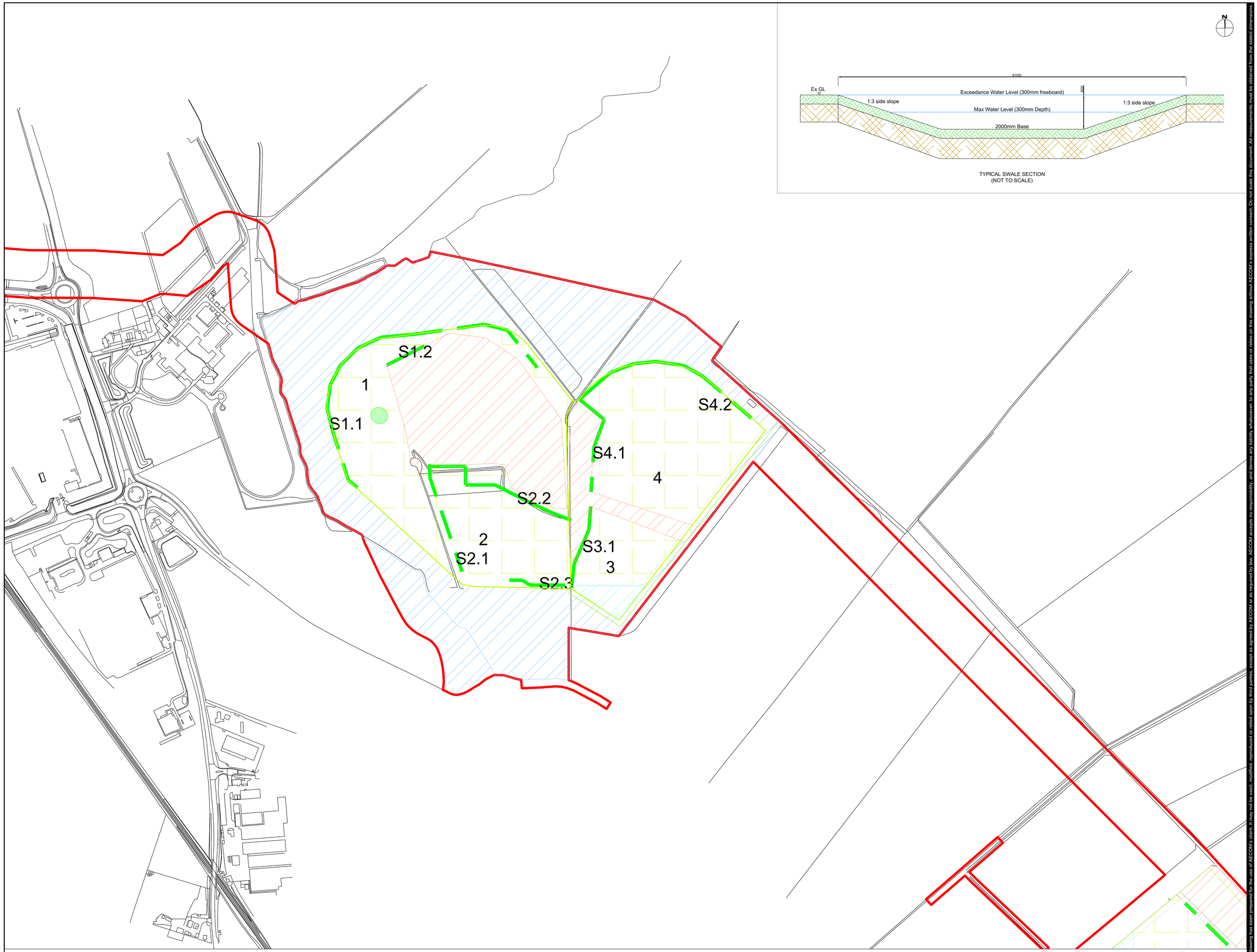
Swales are man-made linear depressions designed to convey water along a specified route. Upkeep of swales and their inlets and outlets is key to their function.

A schedule setting out the maintenance operations, actions and frequency is included below. Please also refer to the manufacturers operation and maintenance manual for any inlet structures if available.

CIRIA C753 TABLE 17.1 Operation and maintenance requirements for swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Appendix F Drainage General Arrangements



TYPICAL SWALE SECTION
(NOT TO SCALE)

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KEY PLAN - WEST SIDE

KEY

LAYOUT

- RED LINE BOUNDARY
- SOLAR FIELD AREA
- ARCHAEOLOGICAL MITIGATION AREA
- COMPOUND AREA (TEMPORARY)
- COMPOUND AREA (PERMANENT)
- ECOLOGY ENHANCEMENT
- BATTERY STORAGE / COMPOUND
- SWALE (0.6m DEEP)
- INFILTRATION BASIN (0.6m DEEP)

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P3	02.09.20	BOUNDARY UPDATE
P2	03.08.20	BOUNDARY UPDATE
P1	04.10.19	PRELIMINARY

ISSUE PURPOSE / SUITABILITY

PROJECT NUMBER

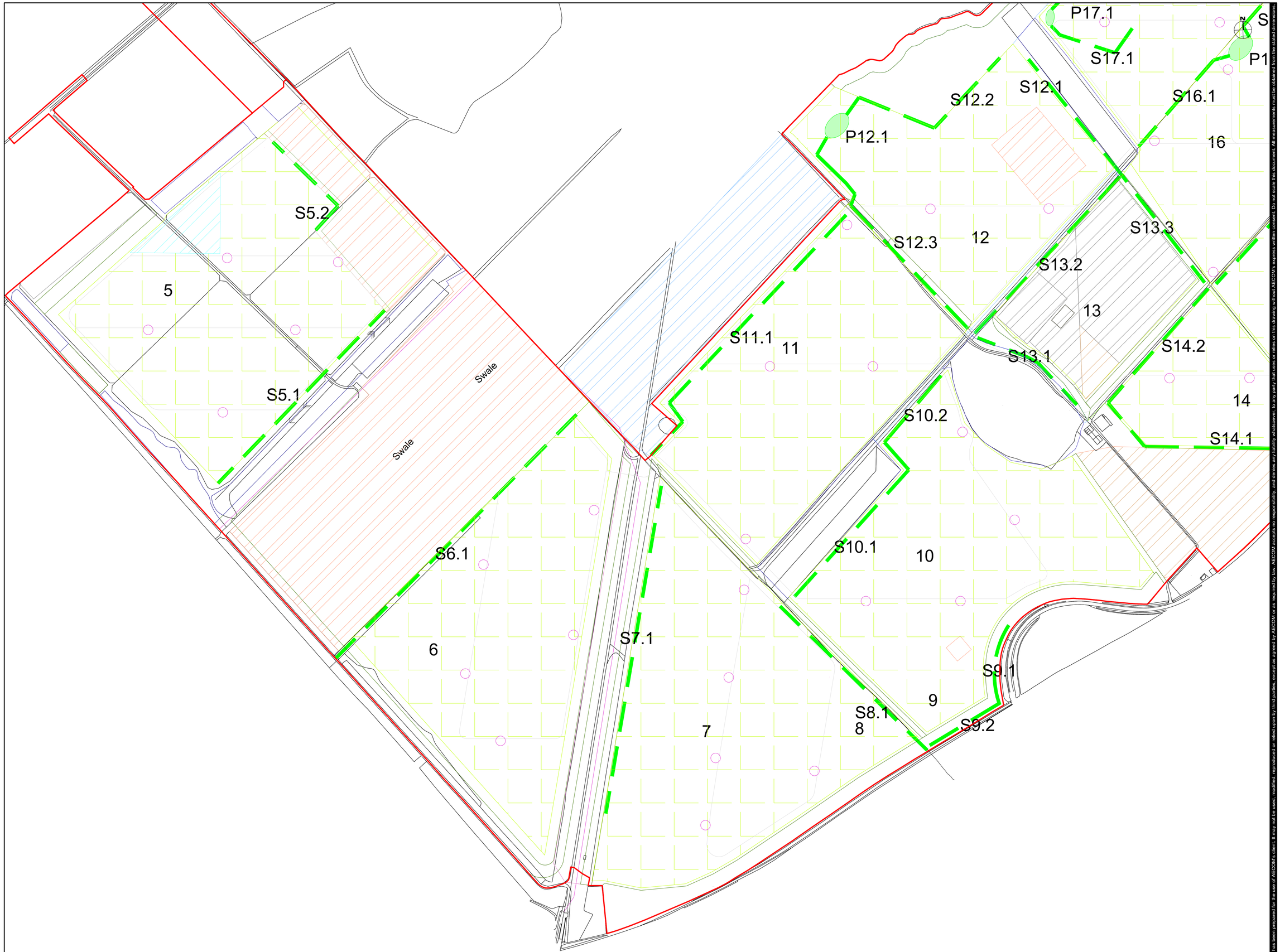
60589004

SHEET TITLE

SUNNICA ENERGY FARM
DRAINAGE STRATEGY
GENERAL ARRANGEMENT
WEST SITE (SHEET 1 OF 3)

SHEET NUMBER

WPP-ACM-XX-DR-C-ZZ-001



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KEY PLAN - WEST SIDE

KEY

LAYOUT

- RED LINE BOUNDARY
- SOLAR FIELD AREA
- ARCHAEOLOGICAL MITIGATION AREA
- COMPOUND AREA (TEMPORARY)
- COMPOUND AREA (PERMANENT)
- ECOLOGY ENHANCEMENT
- BATTERY STORAGE / COMPOUND
- SWALE (0.6m DEEP)
- INFILTRATION BASIN (0.6m DEEP)

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P2	03.08.20	BOUNDARY UPDATE
P1	04.10.19	PRELIMINARY

ISSUE PURPOSE / SUITABILITY

PROJECT NUMBER

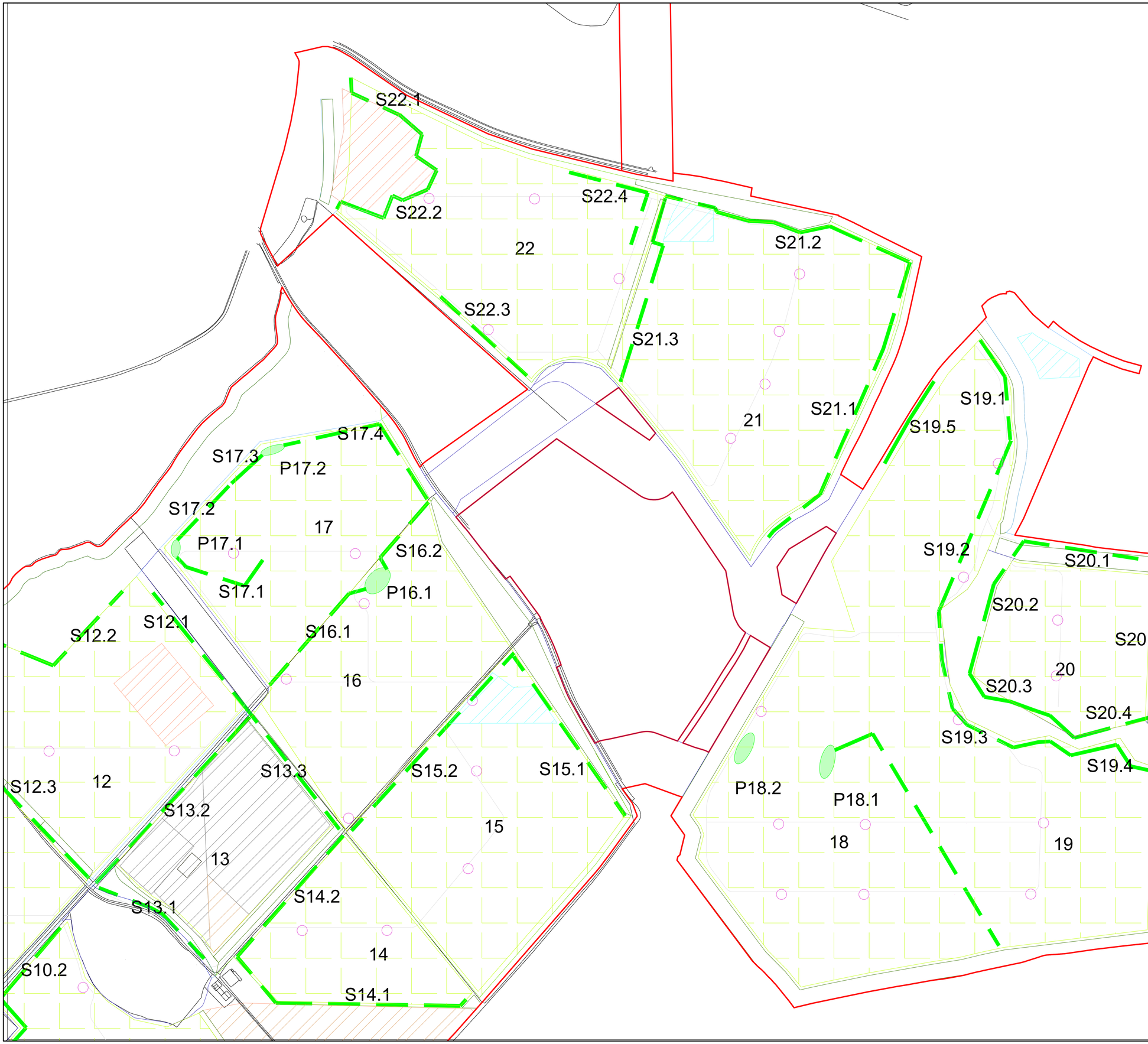
60589004

SHEET TITLE

SUNNICA ENERGY FARM
DRAINAGE STRATEGY
GENERAL ARRANGEMENT
WEST SITE (SHEET 2 0F 3)

SHEET NUMBER

WPP-ACM-XX-DR-C-ZZ-002



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KEY PLAN - WEST SIDE

KEY

LAYOUT

- RED LINE BOUNDARY
- SOLAR FIELD AREA
- ARCHAEOLOGICAL MITIGATION AREA
- COMPOUND AREA (TEMPORARY)
- COMPOUND AREA (PERMANENT)
- ECOLOGY ENHANCEMENT
- BATTERY STORAGE / COMPOUND
- SWALE (0.6m DEEP)
- INFILTRATION BASIN (0.6m DEEP)

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P2	03.08.20	BOUNDARY UPDATE
P1	04.10.19	PRELIMINARY

ISSUE PURPOSE / SUITABILITY

PROJECT NUMBER

60589004

SHEET TITLE

SUNNICA ENERGY FARM
DRAINAGE STRATEGY
GENERAL ARRANGEMENT
WEST SITE (SHEET 3 OF 3)

SHEET NUMBER

WPP-ACM-XX-DR-C-ZZ-003

AREA HAS NO TOPOGRAPHICAL SURVEY DATA - UNABLE TO DETERMINE SWALE LOCATIONS

GROUND VERY UNEVEN WITH MULTIPLE LOW SPOTS AND HIGH SPOTS IN THIS AREA. MAY BE REQUIRE SOME EARTHWORKS REMEDIATION TO CREATE FLOW ROUTES TO SWALES OR A BASIN

51
P45.1
S45.2
52
S52.2
S52.3
S45.3
45
S45.1
S46.2
46
P48.1
P46.1
48
P47.1
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P49.1
S49.3
S49.4
S49.3
S49.5
S49.2

0 150 Meters

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KEY PLAN - EAST SIDE

KEY

LAYOUT

- RED LINE BOUNDARY
- SOLAR FIELD AREA
- ARCHAEOLOGICAL MITIGATION AREA
- COMPOUND AREA (TEMPORARY)
- COMPOUND AREA (PERMANENT)
- ECOLOGY ENHANCEMENT
- BATTERY STORAGE / COMPOUND
- SWALE (0.6m DEEP)
- INFILTRATION BASIN (0.6m DEEP)

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P2	03.08.20	BOUNDARY UPDATE
P1	04.10.19	PRELIMINARY

ISSUE PURPOSE / SUITABILITY

KEY PLAN

PROJECT NUMBER

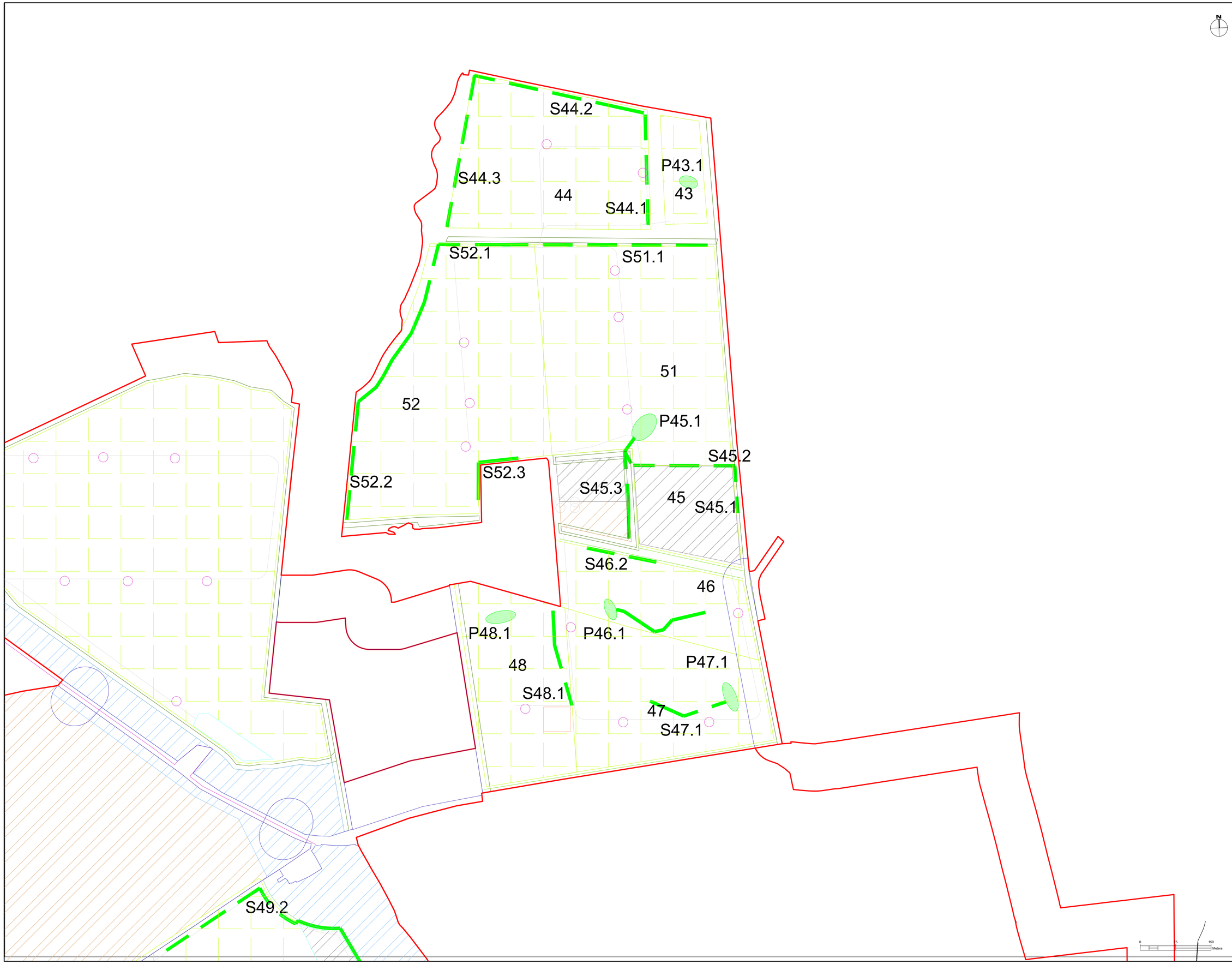
60589004

SHEET TITLE

SUNNICA ENERGY FARM
DRAINAGE STRATEGY
GENERAL ARRANGEMENT
EAST SITE (SHEET 1 OF 5)

SHEET NUMBER

WPP-ACM-XX-DR-C-ZZ-004



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KEY PLAN - EAST SIDE

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- ARCHAEOLOGICAL MITIGATION AREA
- COMPOUND AREA (TEMPORARY)
- COMPOUND AREA (PERMANENT)
- ECOLOGY ENHANCEMENT
- BATTERY STORAGE / COMPOUND
- SWALE (0.6m DEEP)
- INFILTRATION BASIN (0.6m DEEP)

ISSUE/REVISION

P2	03.08.20	BOUNDARY UPDATE
P1	04.10.19	PRELIMINARY
I/R	DATE	DESCRIPTION

ISSUE PURPOSE / SUITABILITY

KEY PLAN

PROJECT NUMBER

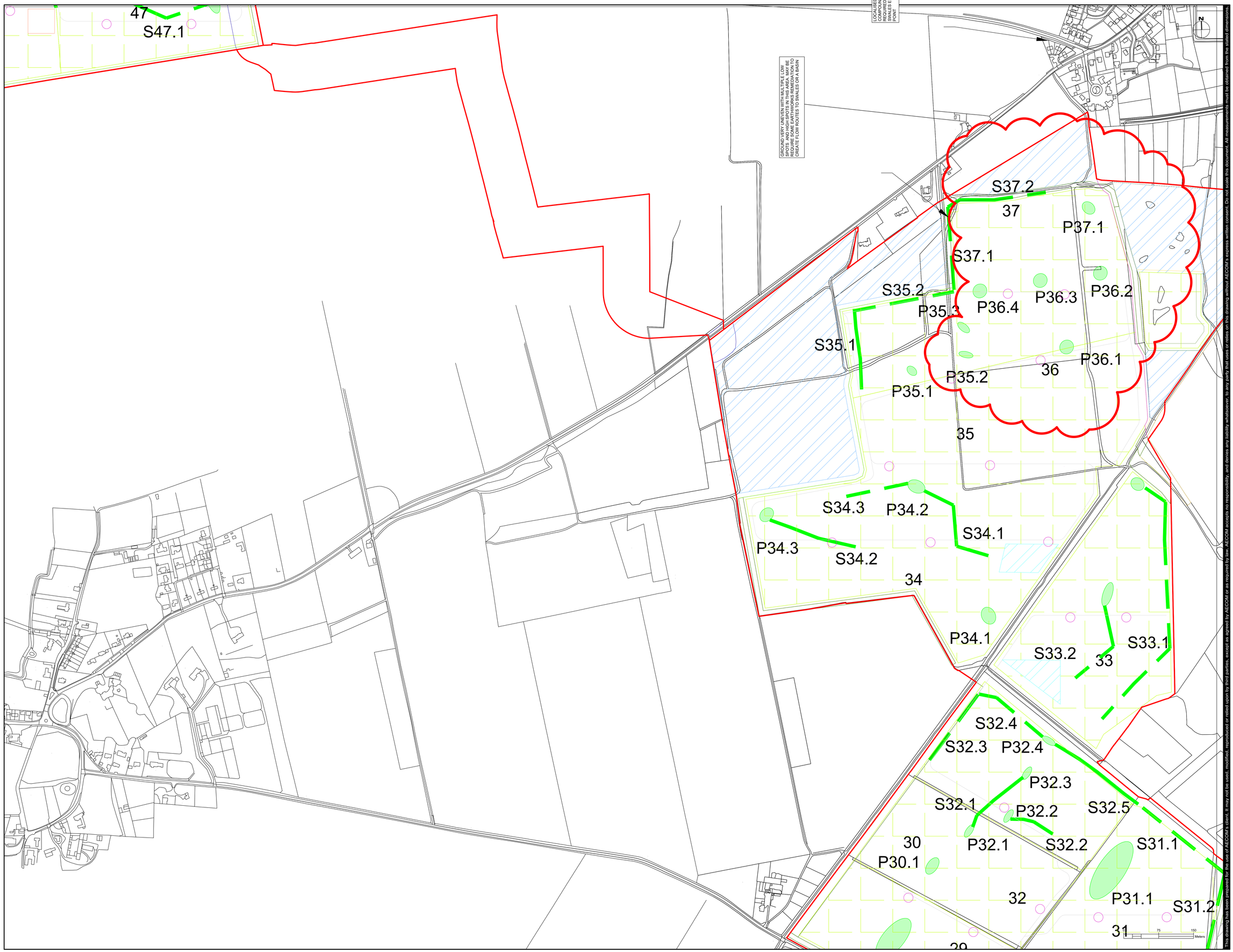
60589004

SHEET TITLE

SUNNICA ENERGY FARM
DRAINAGE STRATEGY
GENERAL ARRANGEMENT
EAST SITE (SHEET 2 OF 5)

SHEET NUMBER

WPP-ACM-XX-DR-C-ZZ-005



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KEY PLAN - EAST SIDE

KEY

LAYOUT

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- SOLAR FIELD AREA
- ARCHAEOLOGICAL MITIGATION AREA
- COMPOUND AREA (TEMPORARY)
- COMPOUND AREA (PERMANENT)
- ECOLOGY ENHANCEMENT
- BATTERY STORAGE / COMPOUND
- SWALE (0.6m DEEP)
- INFILTRATION BASIN (0.6m DEEP)

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P2	03.08.20	BOUNDARY UPDATE
P1	04.10.19	PRELIMINARY

ISSUE PURPOSE / SUITABILITY

KEY PLAN

PROJECT NUMBER

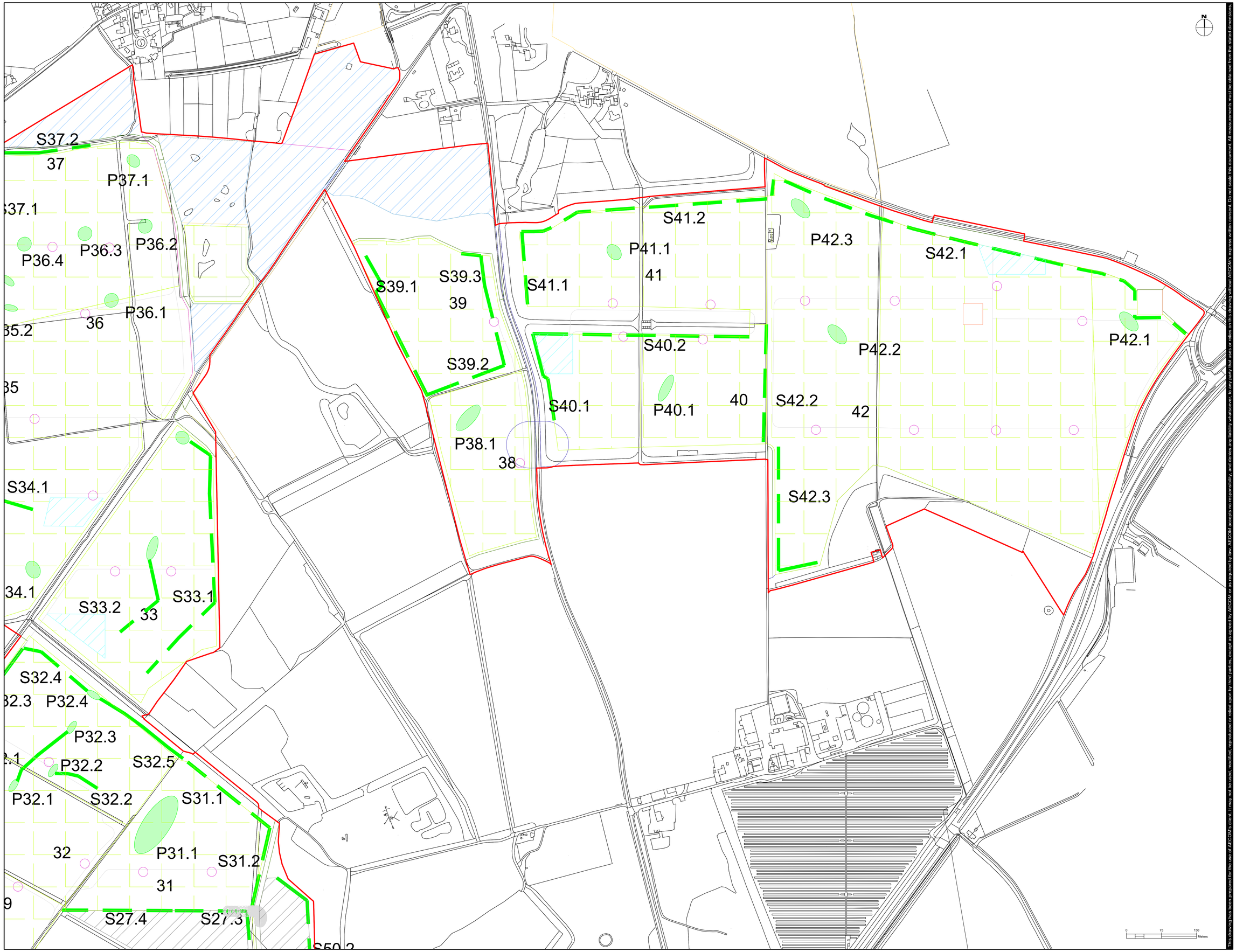
60589004

SHEET TITLE

SUNNICA ENERGY FARM
DRAINAGE STRATEGY
GENERAL ARRANGEMENT
EAST SITE (SHEET 3 OF 5)

SHEET NUMBER

WPP-ACM-XX-DR-C-ZZ-006



AECOM

PROJECT

sunnica energy farm

CLIENT

SUNNICA LTD

CONSULTANT

AECOM Limited
Marlborough House
63-77 Victoria Street
St.Albans, AL1 3ER
T: +44-20-7061-7000
www.aecom.com

NOTES

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS WHERE SHOWN ARE IN MM.
3. SITE LEVELS BASED ON DRONE FLOWN TOPOGRAPHICAL SURVEY BY ABOVE SURVEYS Ltd.
4. SITE BACKGROUND TAKEN FROM OS BASE MAP DATASET AND SHOULD NOT BE USED FOR DETAILED DESIGN PURPOSES
5. SITE LAYOUT BASED ON DESIGN SEF_SOL_SchemeBoundary_ParameterPlans_200715 ITERATION 4 FOR BOTH EAST AND WEST SITES,BY PS RENEWABLES, PLANS UN-DATED.
6. DRAINAGE SWALES PROPOSED WITH INFILTRATION SUBJECT TO FURTHER ON SITE GROUND INVESTIGATIONS. NO PIPED DRAINAGE PROPOSED OTHER THAN OUTLETS TO WATERCOURSES WHERE REQUIRED.
7. HIGH LEVEL DRAINAGE ASSESSMENT IS BASED ON TOPOGRAPHICAL CATCHMENT RUNOFF CONTOUR MODEL, AND NOT CURRENTLY BASED ON DETAILED RUNOFF RATES AND VOLUMES. THIS WILL BE PREPARED AT PLANNING STAGE AND SWALES ADJUSTED TO SUIT IF REQUIRED.
8. NO DRAINAGE ASSESSMENT HAS BEEN CARRIED OUT FOR THE PLANNED MITIGATION AREAS, WHERE NO PV PANEL / COMPOUND AREA DEVELOPMENT IS TAKING PLACE. IT IS ASSUMED THESE AREAS WILL DRAIN AS EXISTING.
9. STORAGE AREAS AND COMPOUNDS HAVE NOT BEEN INCLUDED IN DRAINAGE STRATEGY AS DETAILS ON IMPERMEABLE AREAS ARE NOT KNOWN, THEREFORE ARE ASSUMED TO DRAIN INTO PROPOSED SWALES AND STORAGE BASINS.
10. THE DESIGN OF PV PANEL LAYOUTS, BY OTHERS, IS ASSUMED TO HAVE CONSIDERED ACCESS AND MAINTENANCE REQUIREMENTS. ACCESS AROUND FIELDS IS ASSUMED TO BE PROVIDED AS A NATURAL BUFFER BETWEEN FENCES AND PANELS AND WILL FACILITATE ACCESS TO MAINTAIN SWALES AND BASINS.

KEY PLAN - EAST SIDE

KEY PLAN

LAYOUT

- RED LINE BOUNDARY
- SOLAR FIELD AREA
- ARCHAEOLOGICAL MITIGATION AREA
- COMPOUND AREA (TEMPORARY)
- COMPOUND AREA (PERMANENT)
- ECOLOGY ENHANCEMENT
- BATTERY STORAGE / COMPOUND
- SWALE (0.6m DEEP)
- INFILTRATION BASIN (0.6m DEEP)

ISSUE/REVISION

P2	03.08.20	BOUNDARY UPDATE
P1	04.10.19	PRELIMINARY
I/R	DATE	DESCRIPTION

ISSUE PURPOSE / SUITABILITY

KEY PLAN

PROJECT NUMBER

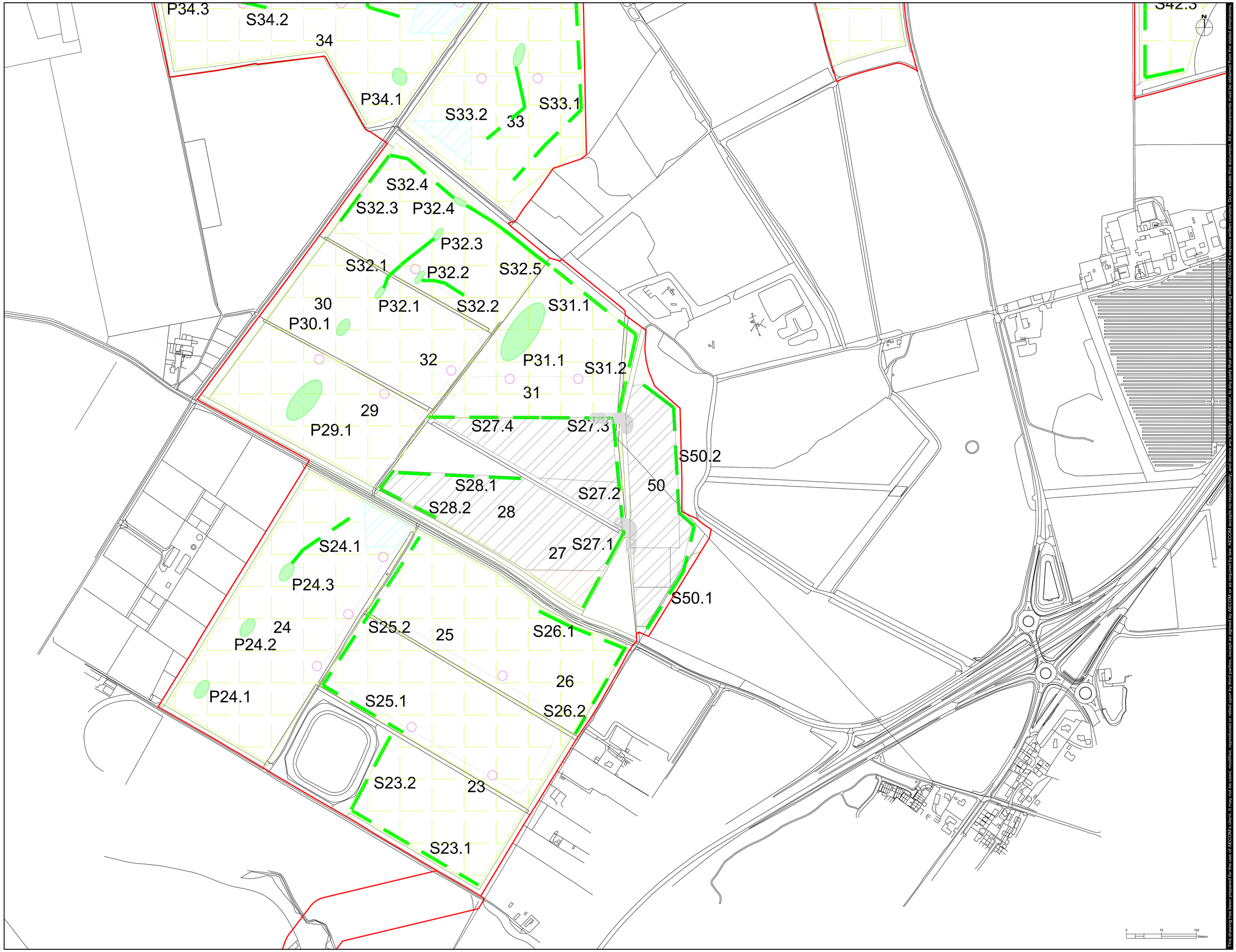
60589004

SHEET TITLE

SUNNICA ENERGY FARM
DRAINAGE STRATEGY
GENERAL ARRANGEMENT
EAST SITE (SHEET 4 OF 5)

SHEET NUMBER

WPP-ACM-XX-DR-C-ZZ-007



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KEY PLAN - EAST SIDE

KEY PLAN

LAYOUT
- RED LINE BOUNDARY
- SOLAR FIELD AREA
- ARCHAEOLOGICAL MITIGATION AREA
- COMPOUND AREA (TEMPORARY)
- COMPOUND AREA (PERMANENT)
- ECOLOGY ENHANCEMENT
- BATTERY STORAGE / COMPOUND
- SWALE (0.6m DEEP)
- INFILTRATION BASIN (0.6m DEEP)

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P2	03.08.20	BOUNDARY UPDATE
P1	04.10.19	PRELIMINARY

ISSUE PURPOSE / SUITABILITY

KEY PLAN

PROJECT NUMBER

60589004

SHEET TITLE

SUNNICA ENERGY FARM
DRAINAGE STRATEGY
GENERAL ARRANGEMENT
EAST SITE (SHEET 5 OF 5)

SHEET NUMBER

WPP-ACM-XX-DR-C-ZZ-008