The Droves Solar Farm

Appendix 12.2: Flood Risk Assessment (Tracked)

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

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12 Flood Risk Assessment (FRA)

12.1 Introduction

Background

12.1.0 This Technical Appendix (TA) presents the assessment of Flood Risk and surface water run-off management. This Flood Risk Assessment (FRA) has been prepared as part of the DCO Application for the Scheme. The Site is described in more detail in **ES Chapter 3: Order limits and Context [APP/6.1]**. The Order limits form the core study area (CSA) for this assessment.

12.1.1 As the CSA is the Order limits, which contains all of the Scheme components as identified as one of the following which is relevant to the FRA:

- Work No. 1: PV Panels and Mounting Structures
- Work No. 2: Battery Energy Storage System (BESS)
- Work No. 3: Customer Substation
- Work No. 4: National Grid Substation, and associated electrical infrastructure
- Work No. 5: Cable Route
- Work No. 8: Access Tracks; and
- Work No. 11: Mitigation and Enhancement Area.

12.1.2 An illustrative Masterplan, that identifies the areas above, is shown on **ES Figure 5.1: Concept Masterplan [APP/6.3]**.

12.1.3 As the Scheme does not have a detailed layout, a detailed drainage strategy cannot be provided at this stage, with the principles and design criteria presented in this document. These criteria will be applied at the detailed design phase and commitment for detailed Sustainable Drainage System (SuDS) secured in the DCO Application through this document.

12.1.4 The CSA is located wholly within the administrative area of Breckland Council (the Council) and Norfolk County Council (NCC).

12.1.5 Due to the rural setting in which the Order limits are located, flooding from artificial sources (e.g., highways drainage) has been scoped out of the assessment.

12.1.6 This document has been updated at Deadline ~~1~~2 to incorporate the Lead Local Flood Authority's (LLFA) comments and to incorporate the Environment Agency's North East Anglian Chalk (NEAC) groundwater model outputs.~~ to differentiate between Flood Zones 3(a) and 3(b) and correct Sequential Test references~~. The document references have not been updated from the original submission. Please refer to the **Guide to the Application [APP/1.3.3~~1~~]** for the list of current versions of documents.

Methodology

12.1.7 This FRA has been undertaken in consultation with the relevant authorities, and with reference to data, documents and guidance published by the EA, the Lead Local Flood Authority (LLFA) (NCC) and the Local Planning Authority (Breckland Council).

12.1.8 The LLFA and EA responded at the PEIR stage with several comments on the FRA and proposed drainage strategy. The consultation and responses, including how feedback has been incorporated into this document can be found in the Consultation Tables to the **Consultation Report [APP/5.1]**.

12.1.9 Additionally, a meeting was held with the LLFA on 9 September 2025 to discuss feedback received at PEIR stage, to seek agreement on the principles of the SuDS Strategy and to discuss the 2D pluvial modelling which informs this assessment.

12.1.10 As such, the methodology applied in the FRA which accompanied the PEIR has been modified in this FRA, whereby flood risk will be classed as Negligible (where little or no risk is identified), Low (where theoretical risk is identified but mitigating factors may influence flood levels) or Moderate to High (where modelled levels or historical events show risk to the Work Areas)).

12.1.11 Several factors will be considered when attributing the residual risk of flooding to the Scheme, including:

- The depth of flooding
- The hazard to life during flood water ingress
- The velocity of floodwater
- Flooding extent / ingress
- Type of infrastructure affected; and
- Intervening structures / flood protection.

12.1.12 The conclusion section of this FRA provides justification for the risk category using professional judgement and experience of assessing similar types of projects/scenarios, such as Cleve Hill Solar Park, Mallard Pass Solar Farm and Great North Road Solar and Biodiversity Park DCOs, in which both the Examining Authority and Secretary of State were content with the approach adopted in the assessment methodology.

12.1.13 As with all modelling, there will be residual uncertainty in the results and as such a freeboard allowance of 300mm will be applied to flood depths during the design process to account for this.

Study Area

12.1.14 The CSA is defined by the Order limits. The Wider Study Area (WSA) is defined as a 5km buffer of the Order limits.

Climate Change Allowances

Fluvial

12.1.15 As the Scheme is Essential Infrastructure, as defined in Annex 3: Flood risk vulnerability classification of the NPPF, and will have an operational lifespan of 60 years the Scheme is required to account for a 33% CC allowance (Higher Central) for the 2080s epoch for the North West Norfolk Management Catchment (Ref 12-1~~Ref 12-1~~).

12.1.16 Where modelling indicates that the required 33% allowance is not available, then a higher proxy value will be used.

12.1.17 For aspects of the Scheme which will remain beyond the 60-year lifespan of the Solar PV arrays, ancillary infrastructure, Customer Substation, and BESS, the Upper End climate change allowance of 57% will be applied to the watercourses within the catchment.

12.1.18 Whilst the LLFA note that a small section of the Scheme is located within the Cam and Ely Ouse Management Catchment, the nearest watercourse with modelled flood risk to the Order limits is approximately 3km east and will not impact the Scheme.

Pluvial

12.1.19 North West Norfolk Management Catchment and the Cam and Ely Ouse Management Catchment peak rainfall Upper End Allowance of 40% for the 2070 epoch has been used to assess pluvial flooding.

SuDS

12.1.20 Whilst the North West Norfolk Management Catchment peak rainfall Central Allowance of 25% for the 2070 epoch is required by the EA, consultation with the LLFA highlighted that a 40% CC allowance should be used where possible.

12.1.21 In accordance with Paragraph 13.1.5 of the Norfolk LLFA Statutory Consultee Guidance (Document Version 7.3, April 2025), the SuDS design for the BESS, Customer Substation and Access Tracks will be sensitivity tested applying a 40% climate change allowance.

12.1.22 This also accords with National Standards for SuDS.

Guidance and Legislation

12.1.23 This document is intended to meet the requirements of:

- Environment Agency (‘EA’)

- National Policy Statement (NPS) for Energy EN-1 (Ref 12-2~~Ref 12-2~~)
- NPS for Renewable Energy EN-3 (Ref 12-3~~Ref 12-3~~)
- NPS for Electricity Networks Infrastructure EN-5 (Ref 12-4~~Ref 12-4~~)
- The Council Strategic Flood Risk Assessment (SFRA) Update (2017)
- The Norfolk County Council (NCC) Flood Investigation Reports for the Breckland Area (2014-2021) and Countywide (2022)
- NCC – Drainage design standards
- NCC – Lead Local Flood Authority Statutory Consultee for Planning. Guidance Document (Version 7.3, April 2025)
- National Fire Chiefs Council (NFCC) – Grid Scale Battery Energy Storage System planning – Guidance for FRS
- NFCC – Grid Scale Battery Energy Storage System planning – Guidance for FRS – July 2024 Update (Ref 12-5~~Ref 12-5~~)
- The National Fire Protection Association (NFPA) 855 Standard for the Installation of Stationary Energy Storage Systems **(**Ref 12-6~~Ref 12-6~~**)**; and
- The revised National Planning Policy Framework ('NPPF').

12.1.24 As outlined in paragraph 5.8.15 of NPS EN-1 the minimum requirements for FRAs are:

- ~~that they should b~~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 Scheme
- Take the impacts of climate change into account, across a range of climate scenarios, 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 and exceedance
- Consider the vulnerability of those using the S~~s~~ite, including arrangements for safe access and escape
- Consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and include information on flood likelihood, speed-of-onset, depth, velocity, hazard and duration

- Identify and secure opportunities to reduce the causes and impacts of flooding overall, making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management
- 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 these risks can be safely managed, ensuring people will not be exposed to hazardous flooding;
- 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. Information should ~~include~~:
    - Describe the existing surface water drainage arrangements for the Site
    - Set out (approximately) the existing rates and volumes of surface water run-off generated by the site. Detail the proposals for restricting discharge rates
    - Set out proposals for managing and discharging surface water from the S~~s~~ite using sustainable drainage systems and accounting for the predicted impacts of climate change. If sustainable drainage systems have been rejected, present clear evidence of why their inclusion would be inappropriate
    - Demonstrate how the hierarchy of drainage options has been followed
    - Explain and justify why the types of SuDS187 and method of discharge have been selected and why they are considered appropriate
    - Explain how sustainable drainage systems have been integrated with other aspects of the development such as open space or green infrastructure, so as to ensure an efficient use of the Site
    - Describe the multifunctional benefits the sustainable drainage system will provide~~;~~
    - Set out which opportunities to reduce the causes and impacts of flooding have been identified and included as part of the proposed sustainable drainage system
    - Explain how run-off from the completed development will be prevented from causing an impact elsewhere; and
    - Explain how the sustainable drainage system been designed to facilitate maintenance and, where relevant, adoption. Set out plans for ensuring an acceptable standard of operation and maintenance throughout the lifetime of the Scheme.
- Detail those measures that will be included to ensure the development will be safe and remain operational during a flooding event throughout the Scheme’s lifetime without increasing flood risk elsewhere
- Identify and secure opportunities to reduce the causes and impacts of flooding overall during the period of construction; and

- Be supported by appropriate data and information, including historical information on previous events.

~~12.1.24~~12.1.25 Importantly, this FRA should identify and secure opportunities to reduce the causes and impacts of flooding overall during the period of construction.

~~12.1.25~~12.1.26 Throughout the early stages of the Scheme design opportunities to identify existing pluvial flow pathways has been undertaken, with a view to identifying positive interventions to reduce the existing impacts of prolonged or intense rainfall events.

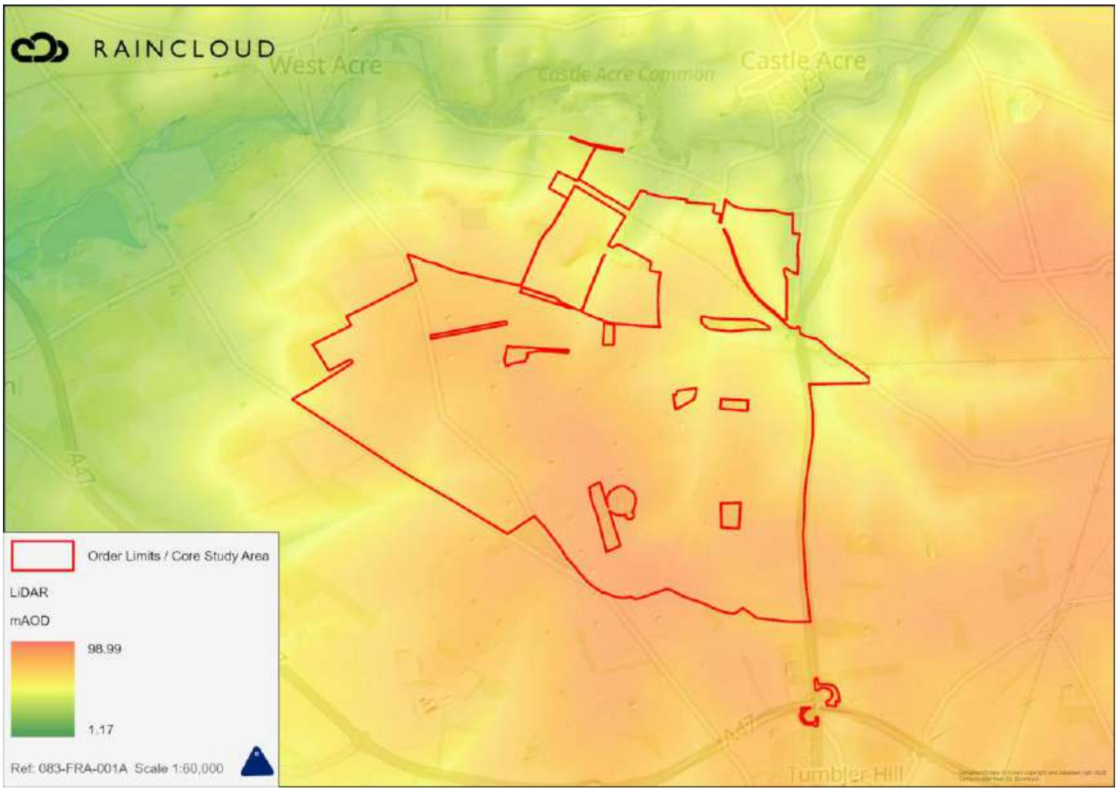
Site Characteristics

~~12.1.26~~12.1.27 The CSA is generally in arable use with areas in the north and south used for pig farming. Agricultural land is interspersed with woodland, as shown in Plate 12-1.

Plate 12-1 Greenfield areas - arable conditions in the central section of the CSA

~~12.1.27~~12.1.28 1m resolution LiDAR data shows that land within the CSA is generally gently sloping, with elevations from ~~37~~85m above ordnance datum (AOD) in the south to ~~85~~37m AOD in the northeast, as shown in Plate 12-2.

Plate 12-2 Topography within the CSA

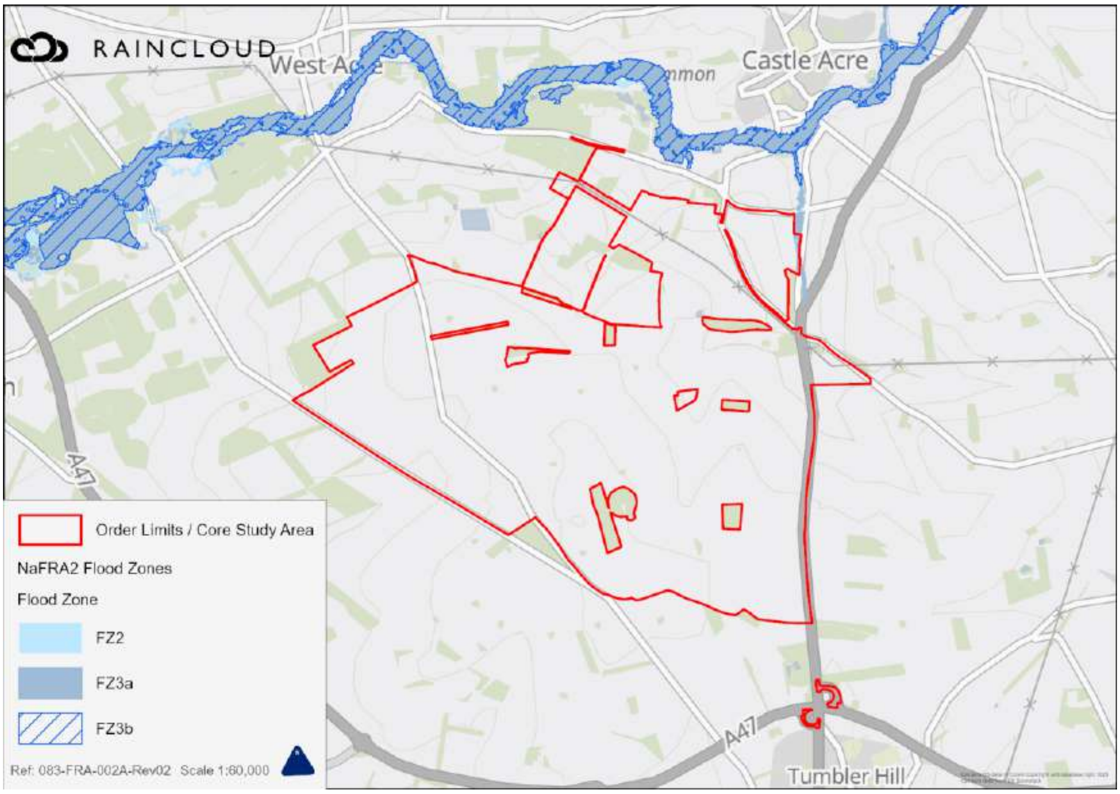


Flood Classification

~~12.1.28~~12.1.29 The EA Flood Map for Planning shows that the CSA is mostly located in Flood Zone 1, with a small section in the north located in Flood Zone 2 and 3, as shown in Plate 12-3 and is shown at A3 scale as Figure A12-1-1 in Annex E of this FRA.

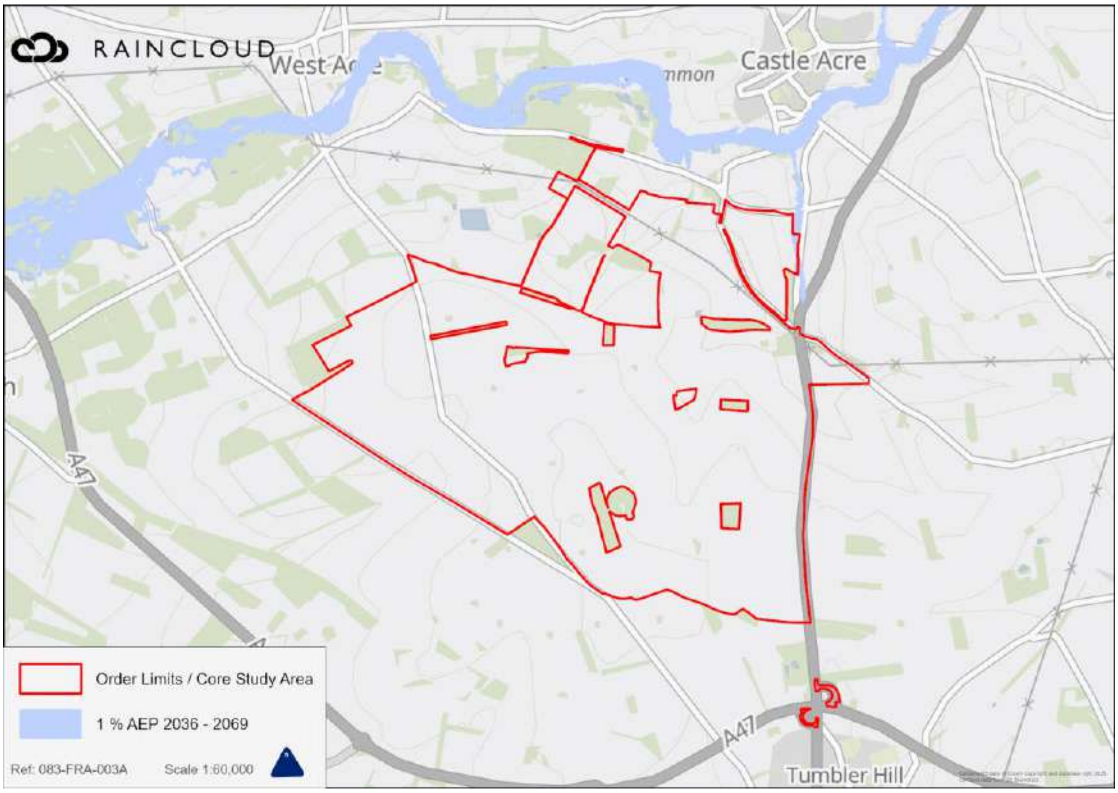
~~12.1.29~~12.1.30 Flood Zone 3b has been derived from the 3.33% AEP event taken from the River Nar model (see section 12.1.33 on further details of the River Nar model).

Plate 12-3 Flood Zones



~~12.1.30~~12.1.31 The EA published new national risk information for flooding and coastal erosion on March 25 2025. This includes future scenarios accounting for climate change (NFRA2), which shows that the CSA is located outside the extents of fluvial flooding beyond the 0.1% AEP event and the 0.1% AEP 2036 - 2069, as shown in Plate 12-4 and at A3 scale as Figure A12-1-2 in Annex E of this FRA.

Plate 12-4 NaFRA2 Flood Map 2036-2069 (reproduced from the Rivers and sea map - EA)



~~12.1.31~~12.1.32 The 1.1ha area modelled to flood from fluvial sources is shown in Plate 12-5.

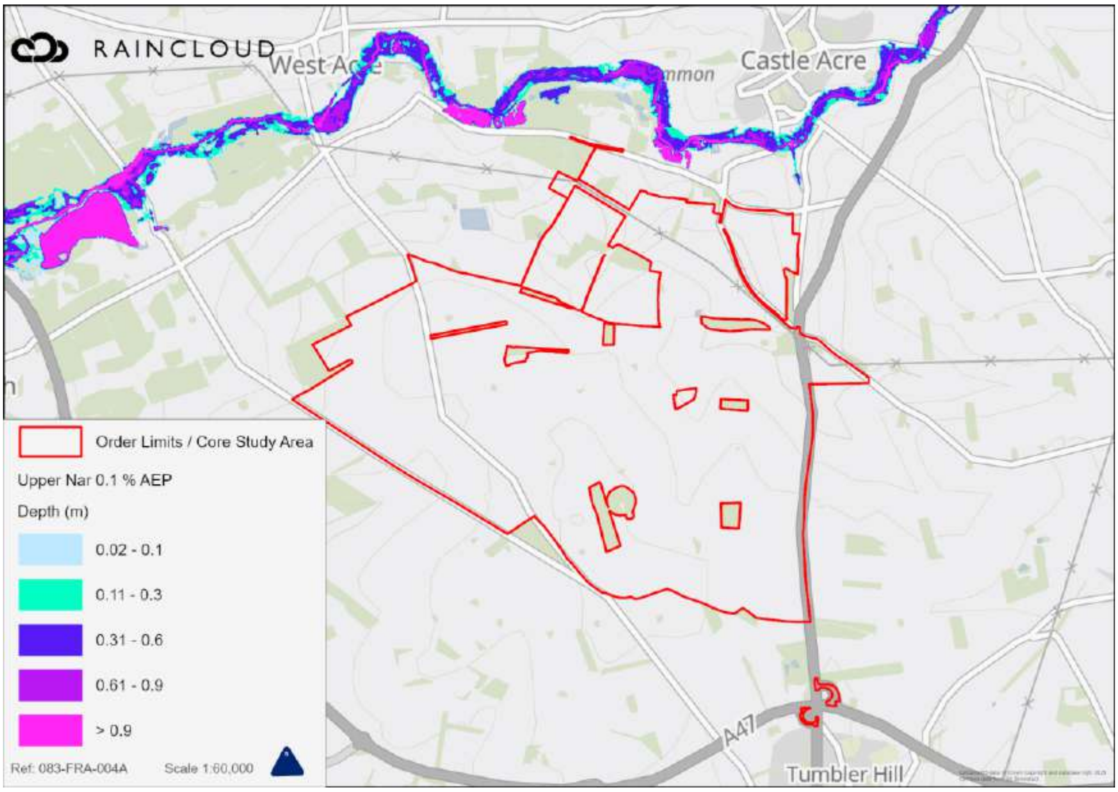
Plate 12-5 Work No. 11 Mitigation area in Flood Zones 2 and 3

~~12.1.32~~12.1.33 The SFRA also notes that hydraulic modelling of the River Nar upstream as far as Marham (downstream of the Breckland District) has been undertaken. Royal Haskoning confirmed that even with a major tidal event on the Great Ouse coincident with a fluvial event on the Nar causing it to back up behind the tidal outfall structure, water levels would not be affected as far upstream as Marham, due to the nature of the river gradient (Mott MacDonald 2007).

~~12.1.33~~12.1.34 A data request regarding flood data was provided by the EA on 25 September 2024. Outputs from the Eastern Rivers Modelling Report – Nar (v1.0 May 2015) – see Annex A, show that the 1% AEP Annual Exceedance Probability (AEP) +20% climate change, the 0.5% AEP and the 0.1% AEP flood outlines do not encroach into the CSA.

~~12.1.34~~12.1.35 Flows used within the River Nar model are 56% higher for the 0.1% AEP than the 1% AEP and, therefore, in the absence of a scenario showing the 33% (Higher allowance) and 57% (Upper end) climate change scenarios required for the 2080's epoch in the North West Norfolk Management Catchment, the 0.1% AEP from the River Nar study has been used as a proxy, as suggested by the EA, and is shown in Plate 12-6and at A3 scale as Figure A12-1-3 in Annex E of this FRA.

Plate 12-6 River Nar – 0.1% AEP Fluvial Flood Depths



~~12.1.35~~12.1.36 No infrastructure associated with the Scheme is located in Flood Zones 2, 3a or 3b. The only aspect of the Scheme located in Flood Zones 2 and 3 is the mitigation area for skylark, which will continue the current plan use.

~~12.1.36~~12.1.37 An unnamed tributary of the River Nar is located to the east of Southacre Road in the eastern section of the CSA, and is shown in Plate 12-7.

Plate 12-7 Unnamed linear Ordinary Watercourse to the east of CSA, looking west

~~12.1.37~~12.1.38 There is a topographical rise of 5m from the southern bank of the unnamed watercourse to the proposed access point in Field 26 to the Scheme, as shown in the profile in Plate 12-7.

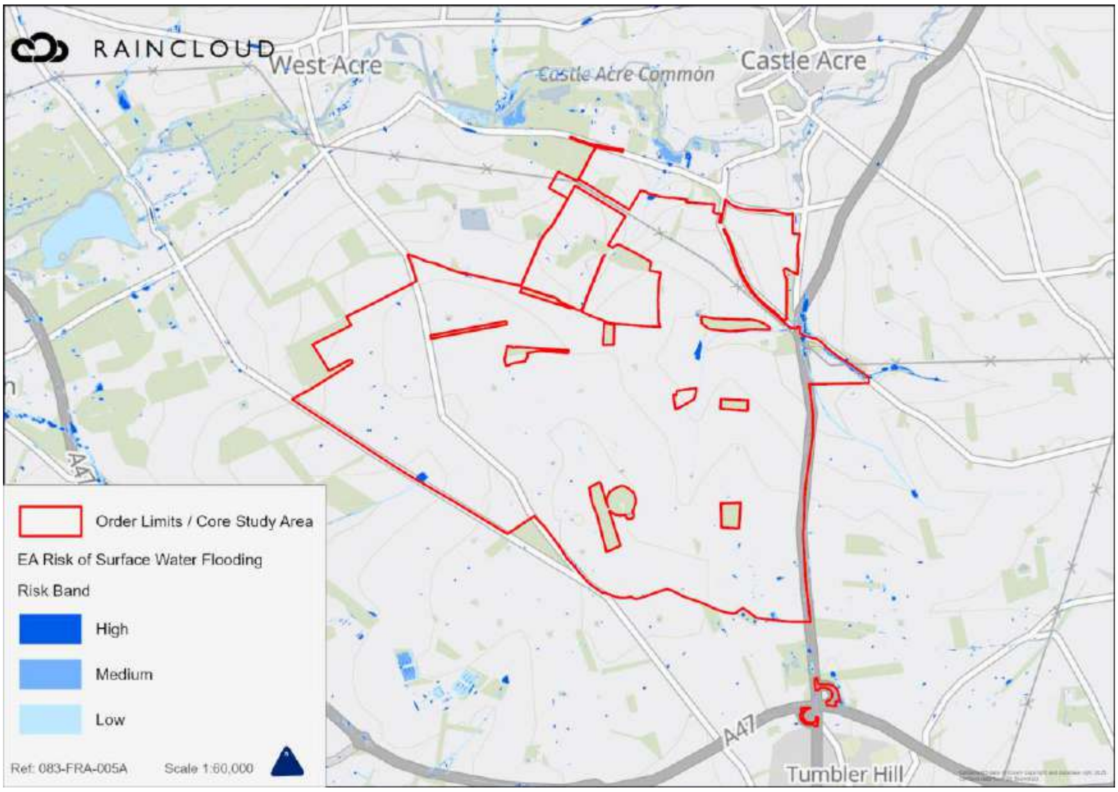
Flood Defences

~~12.1.38~~12.1.39 The EA Asset Management Database (Ref 12-7~~Ref 12Ref 12-7~~) shows that the River Nar is undefended for the reach which passes the Site.

Pluvial Flooding

~~12.1.39~~12.1.40 The *Flood Risk Assessments: Climate Change Allowances Guidance* (Environment Agency 2022) state that *"for modelling large areas (larger than 5 square kilometres) with rural land use, direct rainfall modelling is unlikely to be appropriate"*. As such, the initial constraints process used the best available dataset, which is the EA pluvial flood depth datasets (Risk of Flooding from Surface Water 2025), which do not apply a climate change ("CC") allowance, as shown in Plate 12-8 and at A3 scale as Figure A12-1-4 in Annex E of this FRA.

Plate 12-8 1% AEP Pluvial Flood Extents (EA – RoFSW 2025)



~~12.1.40~~12.1.41 The pluvial flow pathway in the central section of the CSA (Fields 24 and 27) flows through Work No. 2: BESS, Work No. 3: Customer Substation and Work No. 4: National Grid Substation. Observations from the site walkover show superficial cover in Fields 24 and 27 to be free draining and are unlikely to promote overland flow substantial enough to create a pluvial flow pathway, as shown in Plate 12-9 and Plate 12-10.

Plate 12-9 Ground conditions Field 27, looking south

Plate 12-10 Ground conditions Field 24, looking south

~~12.1.41~~12.1.42 The EA pluvial map also shows an area liable to pluvial flooding in Fields 29 and 30. Site observations suggest that topography drains to a low point between the two fields, however topography is not steep and is unlikely to generate flooding depths in this area above 0.5m, as shown in Plate 12-11 and Plate 12-12.

Plate 12-11 Fields 29 and 30 looking south – pluvial flooding area indicated by arrow

Plate 12-12 Fields 29 and 30 looking north – surveyor in pluvial flooding area

[redacted]

Whilst the observations are not a formal challenge to the EA pluvial flood extents~~Regardless~~, pluvial flood depths and flow routes have been verified by direct rainfall method (DRM) 2D pluvial flood modelling in Flood Modeller Pro using the parameters outlined in Table 12-1, while Annex F of this FRA provides a full breakdown of the modelling procedure.

Table 12-1: 2D Pluvial Flood Model Parameters

Return Period	1% AEP
Storm Duration	3 hours
Season	Summer
FEH Rainfall Design Depth	36.72mm
CC Allowance – Central 2070s [Ref. 12-8]	25%
Rural Runoff	55%
Drainage / Infiltration Allowance (0 or 12 mm)	0mm (Ref 12-9~~Ref 12-9~~)
Manning's n Values	• Floodplain - mature row crops: 0.035 (Ref 12-10~~Ref 12-10~~) • Roads: 0.01 • Buildings: N/A; and • Woodland: 0.1.
Model Timestep	1 second
Grid Resolution	2m
Height Data	1m LiDAR, 2022
Mass Error	0.0%
Largest Courant (Cr) Value	3.5

~~12.1.42~~12.1.43 Storm durations used in modelling reflect the nature of the catchment assessed. As the CSA is predominantly rural the peak 1% AEP event has been assessed, in accordance with the parameters outlined within the Table in Section 4.2.1 of the EA's *What is the Risk of Flooding from Surface Water map?* Report (version 2.0 April 2019).

~~12.1.43~~12.1.44 An Active Area for the 2D domain was chosen based on the area of interest i.e. areas modelled to flood on the EA's pluvial flood depth datasets (Risk of Flooding from Surface Water Depth).

~~12.1.44~~12.1.45 Depths below 0.15m have been filtered in accordance with Section 7.3 Depth of the EA's *What is the Risk of Flooding from Surface Water map?* Report (version 2.0 April 2019) (Ref 12-11~~Ref 12-11~~) document and are shown in Plates 12-13 to Plate 12-15 and are shown at A3 scale as Figure A12-1-5 to Figure 12-1-7 in Annex E of this FRA.

Plate 12-13 1% AEP Flood Depths – Raincloud 2D Modelling

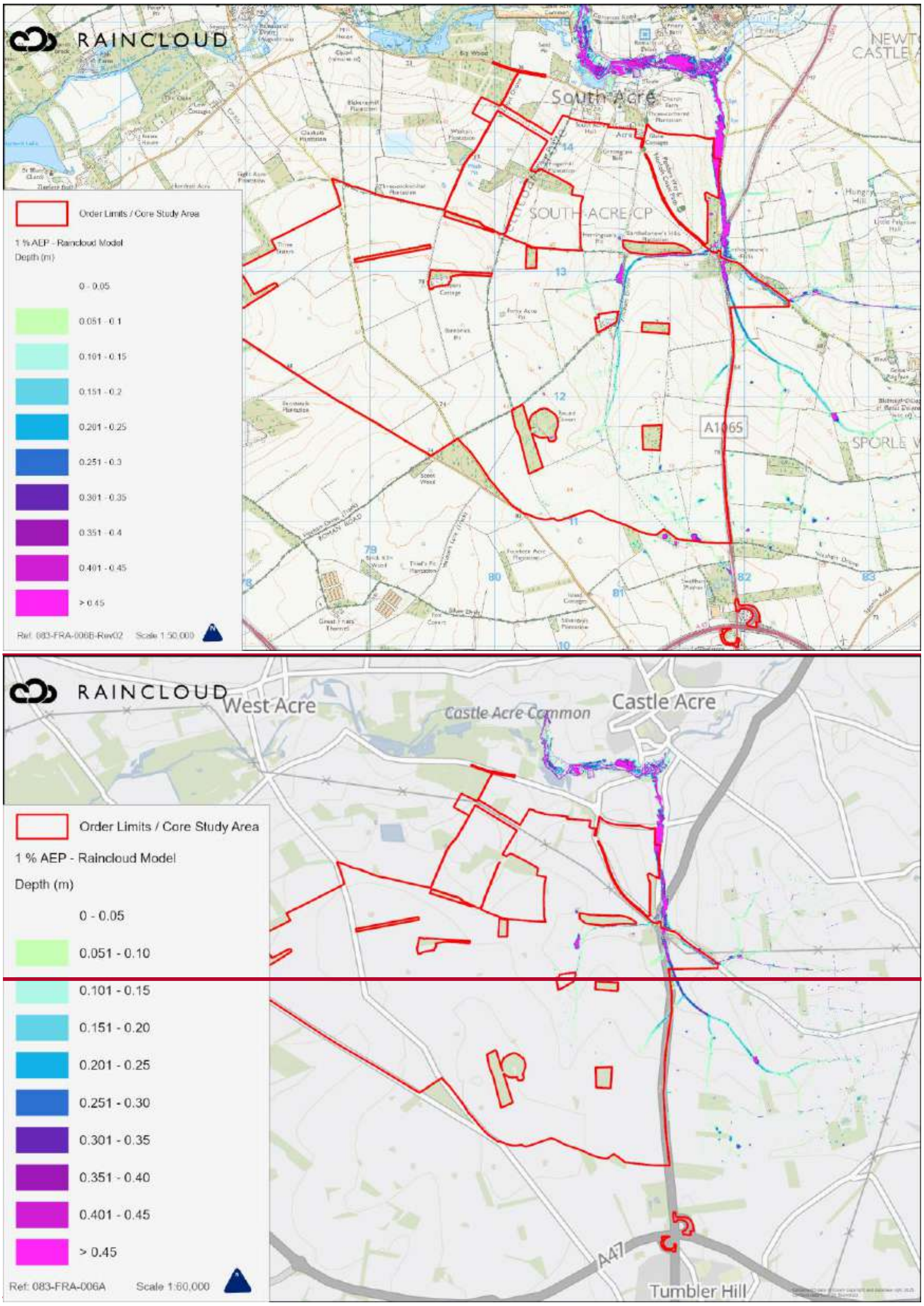


Plate 12-14 1% AEP + 25% CC Flood Depths – Raincloud 2D Modelling

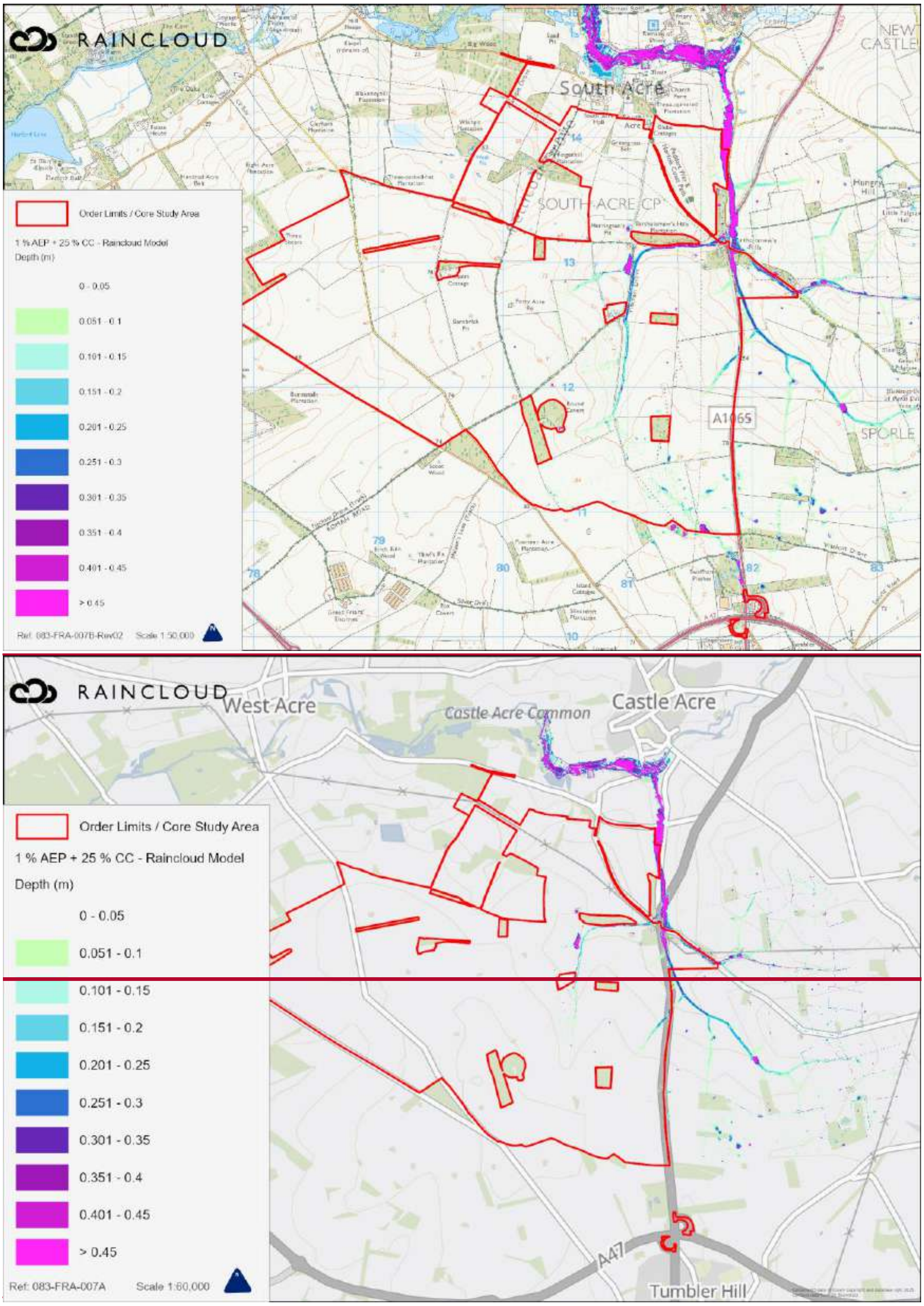
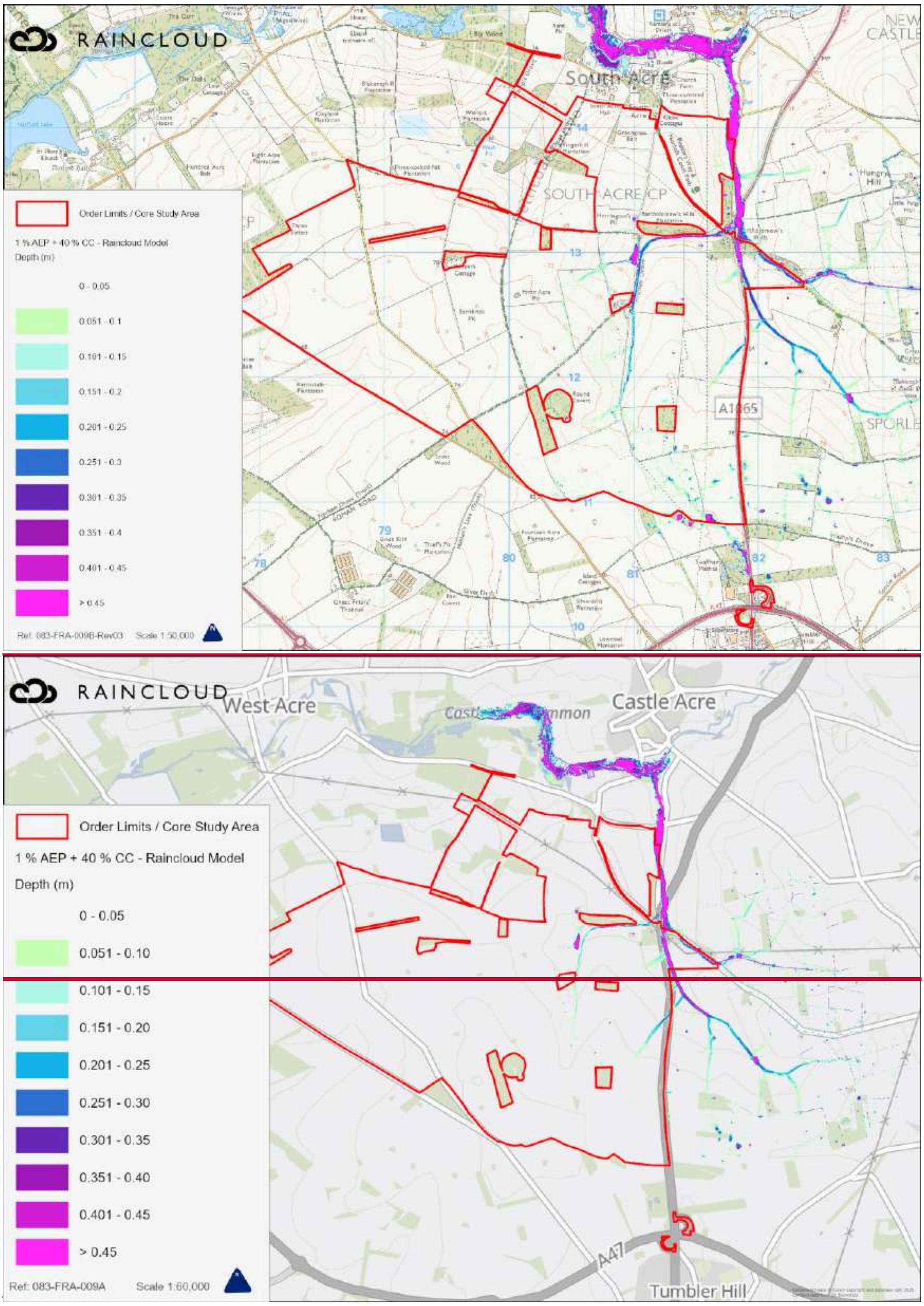


Plate 12-15 1% AEP + 40% CC Flood Depths – Raincloud 2D Modelling



~~12.1.45~~12.1.46 Outputs from Flood Modeller, using the ADI solver using double precision equation solving on a 2m grid resolution, show a good correlation with the EA's pluvial flood modelling (see Plate 12-4).

Groundwater

~~12.1.46~~12.1.47 Figure 7 of the SFRA (Areas Susceptible to Groundwater Flooding) shows that the majority of the CSA is located outside areas classified as at risk of groundwater flooding, with minor areas in the north of the CSA classed as having a <25% risk of groundwater emergence.

~~12.1.47~~12.1.48 Areas identified as at <25% risk of flooding from groundwater are mostly within the Mitigation and Enhancement Areas and Indicative siting zone for the Customer Substation & BESS (Field 35).

~~12.1.48~~12.1.49 No built aspect of the Scheme is located in areas identified as having a 25% or greater risk of groundwater emergence.

Reservoir Flooding

~~12.1.49~~12.1.50 The EA Reservoir Flood Extents - Wet Day dataset shows that ~~N~~no section of the CSA is affected by reservoir flooding should the retaining walls of reservoirs in the catchment fail.

~~12.1.50~~12.1.51 The flood extents from reservoirs follows the River Nar corridor and has been scoped out of this assessment.

Flood History

~~12.1.51~~12.1.52 The Recorded Flood Outlines (EA) dataset shows that no section of the CSA has previously flooded. The nearest recorded flooding from the River Nar is located approximately 10km west (north of Wormegay) and was associated with the 1993 event, where Section 3.4.2 *Historic Records of River Flooding* of the Strategic Flood Risk Assessment (SFRA) notes that the cause of flooding was a breach of flood defences.

~~12.1.52~~12.1.53 The Norfolk County Council (NCC) Flood Investigation Reports for the Breckland Area (2014 - 2021) and Countywide (2022) do not identify any incidents of flooding within the CSA or within close proximity to the CSA.

Flood Studies

~~12.1.53~~12.1.54 Outputs from the Eastern Rivers Modelling Report - Nar (v1.0 May 2015), show that the 1% AEP Annual Exceedance Probability (AEP) +20% climate change, the 0.5% AEP and the 0.1% AEP flood outlines do not encroach into the CSA.

Tidal

~~12.1.54~~12.1.55 The Scheme is not located near a tidally influenced stretch of the River Nar.

~~12.1.55~~12.1.56 As outlined in the **ES Appendix 2.1: Scoping Report [APP/6.4]** and agreed with PINS and the EA, tidal flooding is scoped out of this assessment.

12.2 Flood Risk Assessment

Fluvial

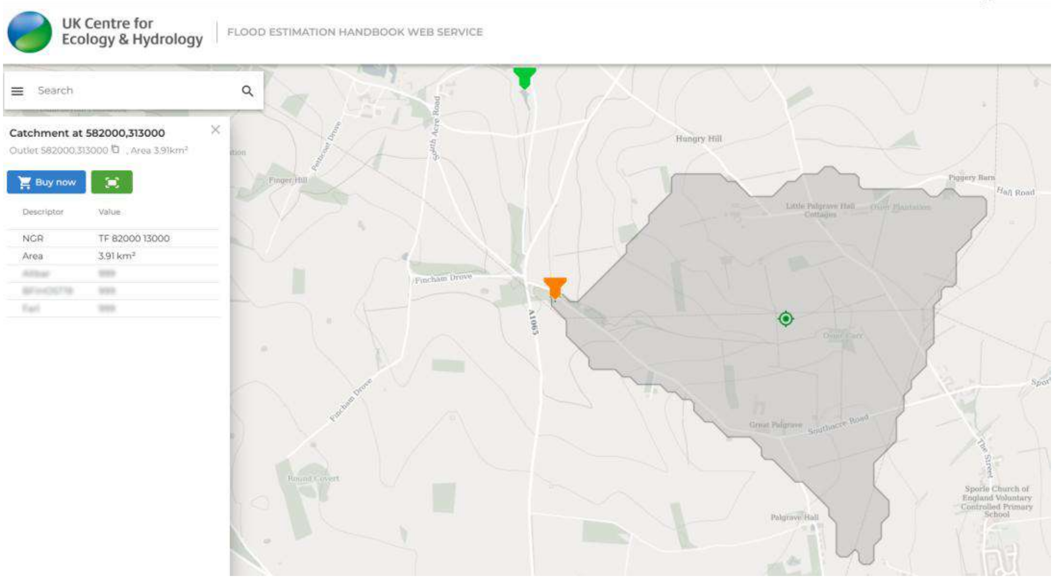
12.2.0 Outputs from the River Nar model show that flows are 56% higher for the 0.1% AEP than the 1% AEP and, therefore, in the absence of a scenario showing the 33% AEP of CC required for the 2080's higher central allowance for the North West Norfolk Management Catchment peak river flow, the 0.1% AEP has been used as a proxy.

12.2.1 All electrical and aboveground infrastructure for the Scheme is located entirely in Flood Zone 1. Only a section of Work No. 11: Skylark and Curlew mitigation, which comprises grassland similar to the existing baseline is located in Flood Zones 2 and 3.

12.2.2 Grassland used for mitigation is classed as Water Compatible (Ref 12-12~~Ref 12-12~~) as per Annex 3: Flood risk vulnerability classification of the NPPF *i.e.* is an appropriate land use type in Flood Zones 2 and 3.

12.2.3 Given the topographical rise up the Scheme from both the River Nar and the unnamed watercourse and the absence of infrastructure within Flood Zones 2 and 3, there will be no loss of flood storage or conveyance during times of flood.

12.2.4 The linear drainage ditch to the north of Southacre Road drains a catchment of 3.9km^2 as it passes the A1065 and is unlikely to be captured in the NaFRA2 flood mapping:



Catchment at 582000,313000

Outlet 582000,313000 , Area 3.91km^2

Descriptor	Value
NGR	TF 82000 13000
Area	3.91 km^2

12.2.5 Given the topographical rise from the unnamed linear drainage ditch adjacent to Southacre Road and the aboveground infrastructure of the Scheme, there is limited potential for flood water to encroach into areas of the CSA which will have new aboveground infrastructure, such as Work Nos 1 to 4.

12.2.6 In the absence of a detailed model from the EA, the results from the 2D pluvial modelling outlined previously have been used as a proxy. As shown in Plate 12-14 and 12-15, the

1% AEP +25% CC and 1% AEP +40% CC events stay within the confines of the unnamed linear drainage ditch and only marginally encroach into Work No 6: Works associated with the Solar PV Site in the east of the CSA.

12.2.7 As such the risk of fluvial flooding to and from the Scheme is Negligible.

Pluvial

12.2.8 The majority of the CSA is located outside areas classified as at risk of flooding for the 1% AEP event, based on the EA Risk of Flooding from Surface Water (RoFSW) mapping and this has been verified using DRM 2D analysis.

Solar PV Pannels and Mounting System

12.2.9 Electrically sensitive infrastructure, such as inverters, will be located outside the 3.3%, 1% and 1% AEP + CC surface water flooding extent, as shown in Plates 12-13 to 12-15 of this FRA.

12.2.10 The CSA is in agricultural (arable and pastoral) use and is mostly free draining, however it has been observed that some areas in the north of the CSA are prone to generating surface water run-off during extreme or prolonged rainfall events and these areas are associated compaction from pig and poultry farming, as shown in Plate 12-16.

Plate 12-16 Areas of surface water ponding and generation

12.2.11 Solar PV arrays will avoid areas of modelled pluvial flood risk or have a leading edge (bottom edge of panels) raised off ground level by approximately 0.4 m, with the exception of areas modelled to flood to a depth of 0.2m or higher for the 1% AEP +40% CC event (in accordance with North West Norfolk Management Catchment peak rainfall allowances (2070s)), whereby the leading edge will be higher, to allow for 300mm freeboard to account for residual uncertainty in the modelling.

12.2.12 Mounting Systems and deer fencing may interact with pluvial flow pathways but have minimal aboveground presence (see Plate 12-17 and Plate 12-18) and are unlikely to materially alter water flow pathways during heavy or prolonged rainfall events which generate overland flows.

Plate 12-17 Example of perimeter deer fence (wooden post and wire mesh)

Plate 12-18 Thin PV Racking Mount

Photo credit: Rob Sutton - Cotswold Archaeology

12.2.13 As such, the impact of pluvial flooding on Solar PV will be **Negligible**.

Integrated Conversion Units / 33kV Sub-distribution Switch Rooms and Standalone Conversion Units

12.2.14 The Applicant has committed that Integrated Conversion Units / 33kV Sub-distribution Switch Rooms and Standalone Conversion Units will not be located within areas of surface water flooding.

12.2.15 As such, the impact of pluvial flooding on Integrated Conversion Units / 33kV Sub-distribution Switch Rooms and Standalone Conversion Units will be Negligible.

Cables

12.2.16 Cables will be located underground in waterproof ducting. Areas of cable trench excavations will not be left open for considerable periods of time therefore limiting the potential interaction with surface water.

12.2.17 As such the risk of pluvial flooding on the Cables is Negligible.

BESS compound, Customer Substation and National Grid Substation

12.2.18 As outlined in previously, minor sections of Work No. 2: BESS compound, Work No 3: Customer Substation and Work No. 4: National Grid Substation are located within an area modelled to be at risk of pluvial flooding for the 1% AEP + 40% CC to a depth of 0.19m.

12.2.19 The EA pluvial flood map outlines have been verified through 2D direct rainfall analysis for the 1% AEP +25% and +40% CC 3-hour summer events using FEH data, as shown in Plate 12-19 and Plate 12-20and are shown at A3 scale as Figure A12-1-8 and Figure A12-1-9 in Annex E of this FRA.

Plate 12-19 Modelled 1% AEP + 25% CC Pluvial Flood Depth

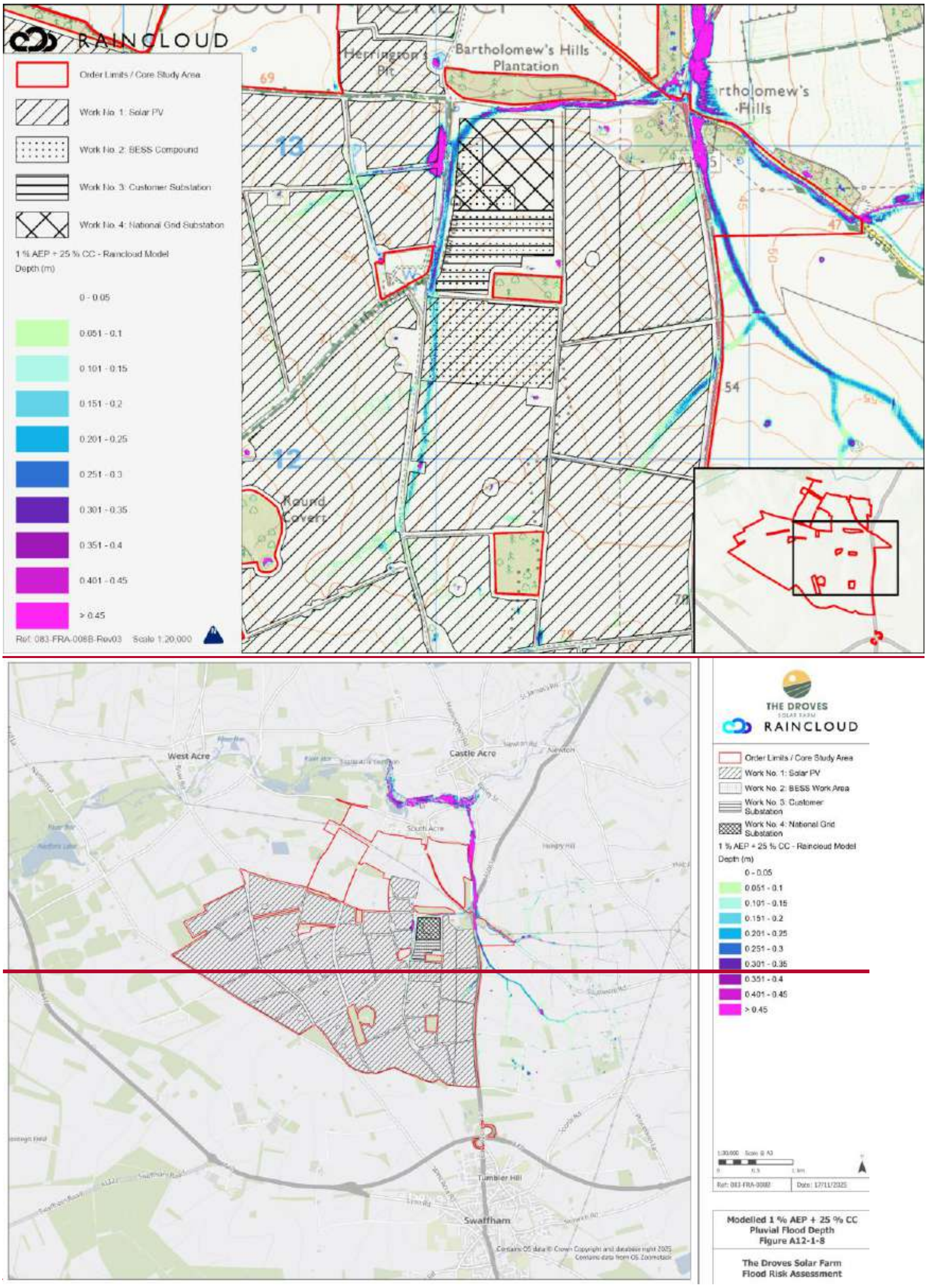
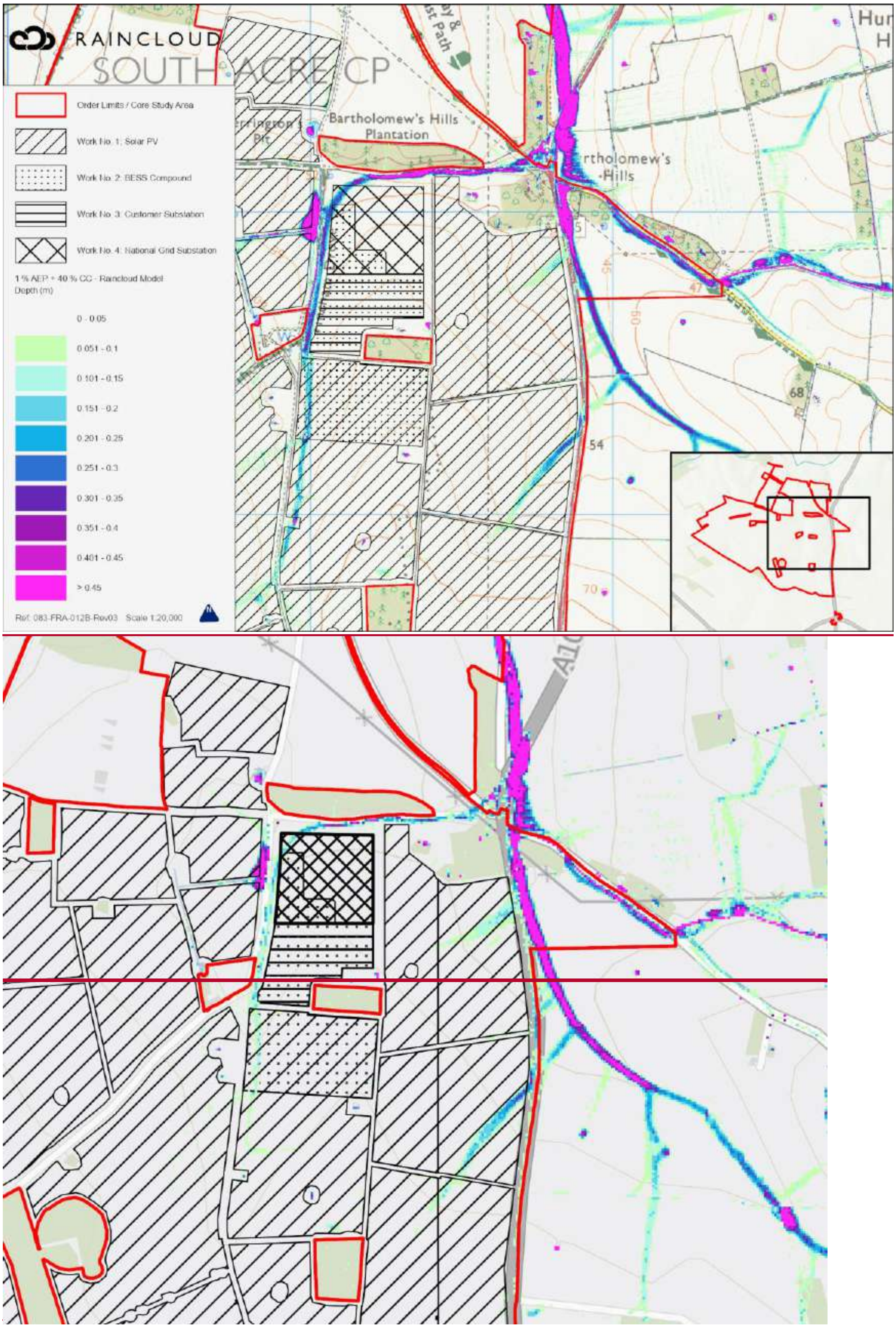


Plate 12-20 Modelled 1% AEP + 40% CC Pluvial Flood Depth



BESS units will avoid areas for flooding greater than 0.4m and be designed to remain operational i.e. have resilience or resistance to the modelled flood depth. As outlined in ~~**ES Chapter 5: The Scheme [APP/6.1]**~~**Design Principles, Commitments and Parameters [APP/5.8.2]**, BESS units will be located outside of pluvial flood pathways or will not be located flush to the existing ground with a minimum clearance of 300 mm above the modelled flood level, following post-development scenario flood modelling. ~~0.1m.~~ BESS units are elevated on corner blocks or a racking frame elevated from the ground, as shown in Plate 12-21.

Plate 12-21 Typical Corner Pads and racking on BESS units

12.2.20 As such, pluvial flooding should not pose a risk to the electrically sensitive aspects of the BESS units or substations.

12.2.21 It should be noted that SuDS will be proposed for Work Nos. 2 to 4 during the detailed design phase of the Scheme and designed to the 1% AEP +40% climate change allowance event, meaning the rainfall is likely to enter the drainage network and be conveyed to the attenuation structure(s) rather than flow overland.

12.2.22 As such the risk of flooding to BESS area is Low.

12.2.23 The Additionally, the indicative siting zone for the National Grid Substation has been refined since PIER (now Work No. 4) and only marginally located within the modelled pluvial flow pathway and the detailed design of the Scheme should be able to avoid the pathway for aboveground infrastructure. As such the risk of flooding to the Customer Substation and National Grid Substation areas is Low.

12.2.24 Management of surface water runoff from the Scheme is detailed in Section 12.4 of this FRA.

Mitigation/Enhancement Areas

12.2.25 The mitigation and enhancement area identified on **ES Figure 5.1: Concept Masterplan [APP/6.3]** is reserved for enhancement measures and these will be compatible with existing flood risk from pluvial sources, and permanent grassland upslope of these areas within these areas will serve to improve the downstream effects of run off.

12.2.26 As such the risk of flooding to Mitigation/Enhancement Areas is Negligible.

12.2.27 The beneficial impacts of enhancement on pluvial flooding are discussed in Section 12.3 of this FRA.

Access

12.2.28 It should be noted that the existing access point off the A1065 in the northeast of the CSA is likely to flood to depths of up to 0.4m during the 1% AEP event (or higher return period).

12.2.29 As such, the existing alternative access route will be retained in order to access the Scheme during times of flood.

12.2.30 The risk of flooding to access to the Scheme is Negligible.

Overall Pluvial Risk

12.2.31 Based on the design of the Scheme to avoid placing large above ground structures (e.g. substations and BESS) within the flow paths of surface water and the land management measures described in Section 12.3, the risk of pluvial flooding to and from the Scheme is **Low**.

Groundwater

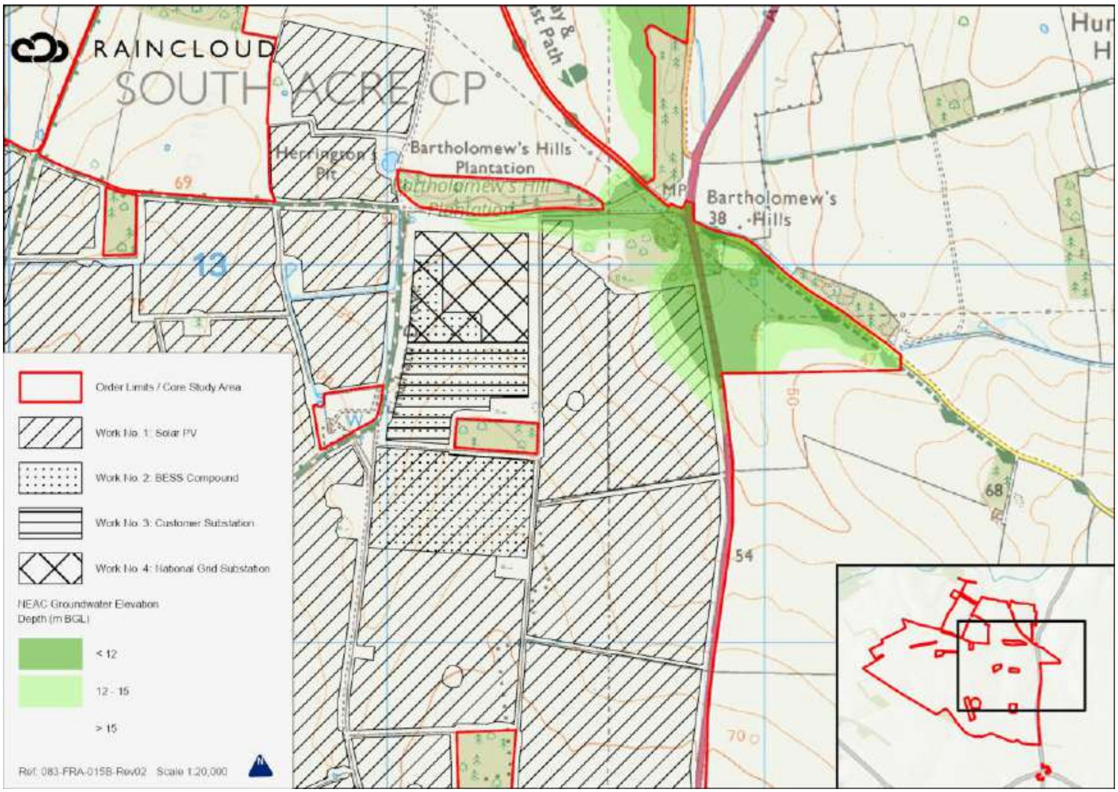
12.2.32 33kV Substations and the BESS compound are the main aspects of Scheme which could be affected should groundwater emerge at the surface, given that the leading edge of PV arrays will elevated from the ground by at least 0.4m, and cables, will be housed in waterproof ducting.

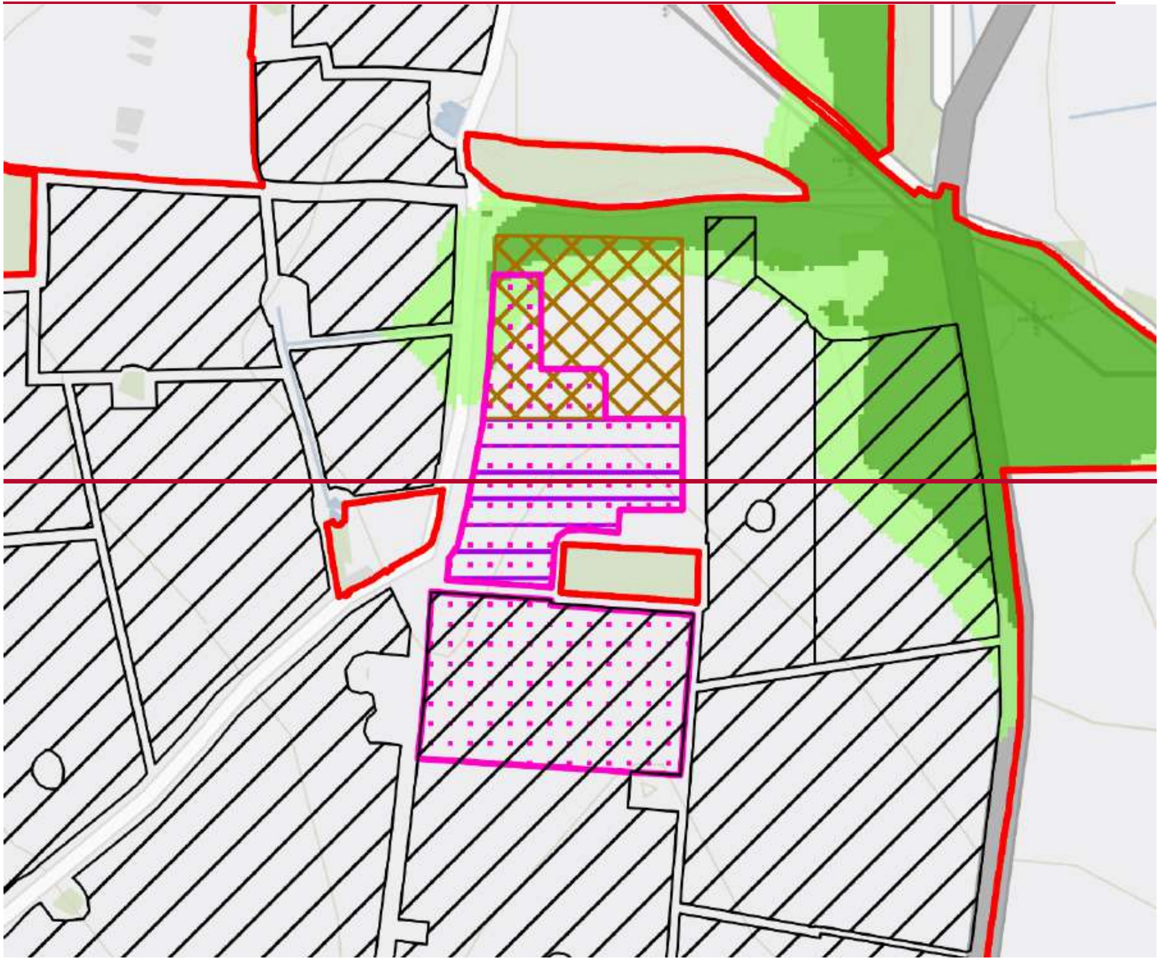
12.2.33 The EA Long Term Flood Risk service (Ref 12-13~~Ref 12-13~~) reports *"Flooding from groundwater is unlikely in this area"*.

12.2.34 BGS borehole records within the CSA show groundwater was not struck to a depth of 6m BGL.

12.2.35 Triangulation of hydrometric monitoring data available on Hydrology Data Explorer, represented in Plate 12-22 and Figure A12-1-11 in Annex E of this FRA, shows that groundwater levels under the CSA are generally not within 15m of surface level, with the exception of a small section of Work No. 2: BESS compound and Work No. 4: National Grid Substation. The northwestern section of Work Nos. 2 to 4 are located in an area where the maximum piled foundation depth (15m) could directly interact with the maximum recorded groundwater level by approximately 0.1 to 3m. It should be noted that **ES Figure 5.1: Concept Masterplan [APP/6.3]** shows that only the BESS units could be located within this area.

Plate 12-22 Depth to groundwater


RAINCLOUD
SOUTH ACRE CP
Herrington's Pit
Bartholomew's Hills Plantation
Bartholomew's Hills
38
MP
69
13
68
54
60
70
Hun
Order Limits / Core Study Area
Work No. 1: Solar PV
Work No. 2: BESS Compound
Work No. 3: Customer Substation
Work No. 4: National Grid Substation
NEAC Groundwater Elevation Depth (m BGL)
< 12
12 - 15
> 15
Ref: 083-FRA-015B-Rev02 Scale 1:20,000
N



12.2.36 As such, it is unlikely groundwater will emerge at ground level and interact with built infrastructure.

12.2.37 Triangulation of hydrometric monitoring data available on Hydrology Data Explorer shows that groundwater levels under the CSA are generally not within 15m of surface level, with the exception of a small section of Work No. 2: BESS Compound, Work No. 3: Customer Substation and Work No. 4: National Grid Substation. The northwestern section of Work Nos. 2 to 4 are located in an area where the maximum piled foundation depth (15m) could directly interact with the maximum recorded groundwater level by approximately 0.1 to 3m. It should be noted that **ES Figure 5.1: Concept Masterplan [APP/6.3]** shows that only the BESS units could be located within this area. It is anticipated that the affected area could be avoided during the detailed design of the Scheme following granting of the DCO.

12.2.38 All piling and foundation methods will be determined via a Foundation Works Risk Assessment (FWRA) due to the high sensitivity and vulnerability of groundwater resources and will be informed by groundwater monitoring. This should be completed once construction methods are confirmed and ground investigation data is available. Groundwater monitoring will be undertaken over a sufficient period to be representative of seasonal variation including worst-case groundwater levels and thus should include monitoring for at least six months, including the winter period.

~~12.2.38~~12.2.39 ~~Once the detailed design is complete, and if the required piling depth exceeds the highest recorded groundwater level, then a Foundation Works Risk Assessment will likely be required to ensure piled foundations do not displace groundwater. This should be completed once construction methods are confirmed and ground investigation data are available.~~

~~12.2.39~~12.2.40 The Solar PV arrays will be raised off the ground by at least 0.4m on a racking system and therefore will not be affected in the event that groundwater emerges at the surface.

~~12.2.40~~12.2.41 Cabling will be within waterproof ducting. The entry point of any cable or ducting into chambers should also be sealed to prevent water ingress.

~~12.2.41~~12.2.42 Infrastructure for the BESS are unlikely to be flush to ground level e.g. by concrete feet, elevating the BESS units by at least 0.3m AGL, as outlined in the Pluvial Flooding assessment in Paragraph 12.2.18 onwards.~~–~~ Should groundwater emanate at ground level, it is likely to spread over a wide area at shallow depth. As such the risk of groundwater interacting with infrastructure is unlikely.

~~12.2.42~~12.2.43 As such the risk of groundwater flooding is Low.

Sequential Test and Exception Test

Sequential Test

~~12.2.43~~12.2.44 NPS EN-1 requires, in reference to the NPPG, that the Sequential Test is undertaken to steer new developments to areas with the lowest risk of flooding.

~~12.2.44~~12.2.45 Similarly, Paragraph 174 of the NPPF states that the aim of the Sequential Test is to steer new development to areas with the lowest risk of flooding from any source.

~~12.2.45~~12.2.46 The CSA is mostly located within Flood Zone 1, with only a small section of Work No. 11: mitigation and enhancement for skylark (curlew area unaffected) is located in Flood Zones 2 and 3 and located within the extents of future flood extents for the lifetime of the Scheme.

~~12.2.46~~12.2.47 Paragraph 175 of the NPPF is clear that areas for mitigation/enhancement are exempt from undertaking the test as no built development, access routes etc. are located in Flood Zones 2 or 3.

~~12.2.47~~12.2.48 **ES Chapter 5: The Scheme [APP/6.1]** outlines the approach to Scheme design and site selection.

~~12.2.48~~12.2.49 In addition to flood risk, key considerations for Site selection have included, as outlined in **ES Chapter 4: Reasonable Alternatives and Design Evolution [APP/6.1]**:

- Proximity to an available grid connection
- Proximity to local communities
- Topography
- Shading
- Solar irradiation levels
- Access to the site for construction
- Archaeological assets
- Agricultural land classification (ALC)
- Landscape designations; and
- Ecological designations.

~~12.2.49~~12.2.50 Only a small section of Work Nos. 2 to 4 are located within a pluvial flow pathway with a maximum flood depth of 0.19 for the 1% AEP +40% CC allowance event. Given the marginal encroachment of the pluvial pathway onto the work area it is expected that aboveground infrastructure can be placed outside the flood extents and therefore demonstrate a sequential approach to the design of the Scheme.

~~12.2.50~~12.2.51 Modelling shows a small section of Work No. 1: Solar PV Area (Fields 25 and 26) have flow pathways for the 1 % AEP + 25% and 40 % CC events. The raised nature of the PV arrays means they will be located above the flood depths and the thin racking will have no perceptible effect on flow pathways.

~~12.2.51~~12.2.52 In applying paragraph 175 of the NPPF, a proportionate approach should be taken as outlined in Paragraph 20 (ID: 7-026-20220825) the NPPG **[Ref. 12-14]** . Where a site-specific flood risk assessment demonstrates clearly that the proposed layout, design, and mitigation measures would ensure that occupiers and users would remain safe from current and future surface water flood risk for the lifetime of the development (therefore addressing the risks identified e.g. by Environment Agency flood risk mapping), without increasing flood risk elsewhere, then the Sequential Test need not be applied.

~~12.2.52~~12.2.53 It should also be noted that Paragraph 12.4.22 of this FRA commits Work Nos. 2 to 4 to a formal SuDS network to have capacity to accept the 1% AEP +40% CC event, meaning the flow pathway will be captured by the drainage network rather than flow uncaptured over the surface of the Work Nos.

~~12.2.53~~12.2.54 For these reasons the Scheme meets the requirements set out in Table 2 of the NPPG's Flood risk and coastal change section and, therefore, meets the requirements of the Sequential Test established under the NPPF and NPS.

~~12.2.54~~12.2.55 The Exception Test does not, therefore, need to be applied.

Summary

~~12.2.55~~12.2.56 The Scheme is classed as Essential Infrastructure, as per Annex 3: Flood risk vulnerability classification of the NPPF, which is appropriate in the Flood Zone 1 in terms of flood risk vulnerability.

~~12.2.56~~12.2.57 The Scheme cannot be located outside pluvial flow pathways as access to the National Grid pylons required for grid connection would traverse the pathways of site location.

~~12.2.57~~12.2.58 The Scheme will be designed to remain operational during prolonged or heavy rainfall events.As such, the Sequential Test is passed i.e. the Scheme appropriately locates Essential Infrastructure in Flood Zone 1, with isolated areas of Work Nos. 1 to 4 and access to existing National Grid pylons in a pluvial flow pathway, as per EA Flood Risk and Coastal Change Guidance.

12.3 Solar PV Area Surface Water Management (Embedded Design)

Construction Phase

Pollution Prevention

12.3.0 Given the relatively short construction phase (anticipated to be 24 months) and gently sloping Site, it is not anticipated that significant amounts of sediment will be generated.

The Scheme will adhere to a detailed Construction Environmental Management Plan (CEMP - to be provided by the Construction Contractor and based on the **oCEMP [APP/7.6]**), which will ensure compliance with the relevant guidance, such as the archived PPGs, as set out in **ES Appendix 12.1: Consultation and Legislation, Planning Policy and Guidance [APP/6.4]**.

Run-off Rates

12.3.1 Rural Sustainable Drainage Systems (RSuDS) and Natural Flood Management (NFM) are not new concepts, but they are not widespread in the rural environment and can present many opportunities for improving the management of water at source. They are a collection of physical structures used to mimic natural processes. In rural environments, it is an approach for managing the detrimental impact of rainfall on fields where run-off is a major threat to the flora, fauna and chemical status of our surface waters.

12.3.2 RSuDS and NFM measures slow down or prevent the transport of pollutants to watercourses by breaking the delivery pathway between the pollutant source and the receptor. By intercepting run-off and trapping sediment before it leaves the field they help maintain and manage the provision of good water quality by preventing the loss of soil, chemicals, nutrients, and faecal organisms. A further benefit is their ability to temporarily capture water and slow down flow. This can reduce localised flooding and provide valuable aquatic habitats in the form of micro-wetlands for farmland wildlife and will encourage the downward movement of water to recharge aquifers.

12.3.3 Research in the United States by Cook & McCuen (2013) outlines that solar panels do not have a significant effect on runoff volumes or peak flows, however where ground beneath panels is bare there may be an increase in peak discharge.

12.3.4 Milazzo et al. (2023) **[Ref. 12-15]** reviews the role of grassland for erosion and flood mitigation in Europe and provides quantification that permanent grassland mitigates better runoff than arable land.

12.3.5 Whilst the Natural England Technical Information Note 101 (TIN101) "*Solar Parks: maximising environmental benefits*" has been archived, the principles relating to solar parks, their siting, their potential impacts and mitigation requirements for the safeguarding of the natural environment are still relevant.

12.3.6 TIN101 states:

> *"The key to avoiding increased run-off and soil into watercourses is to maintain soil permeability and vegetative cover. Permeable land surfaces underneath and between panels should be able to absorb rainfall as long as they are not compacted and there is some vegetation to bind the soil surface".*

12.3.7 As such, a suitable grassland sward will be developed in areas underneath the PV arrays before the construction phase.

PV Array Installation

12.3.8 Whilst the PV arrays and racking system does not involve the installation of hardstanding, the installation methods could lead to soil compaction if not managed properly.

12.3.9 Installation of the racking system (mounting frame) should only occur when soil conditions are suitable e.g. dry enough that tyre imprints are not deeper than a specified depth when tracking across land. The Construction Contractor will be responsible for monitoring conditions, in consultation with the Ecological Clerk of Works, in accordance with a detailed Soil Management Plan which will substantially accord with the submitted **oSRMP [APP/7.13]**, as outlined in paragraphs 4.33 to 4.8.

12.3.10 The mounting framework is likely to be delivered by a vehicle with a trailer and is unlikely to cause soil compaction due to the relatively low wight of the vehicle.

12.3.11 The racking system will then be pile driven into the ground to a depth of typically 1 to 4m, depending on ground conditions using similar tracked mini pile driver machinery, as shown in Plate 12-23.

Plate 12-23 Mini pile driver examples

[redacted]

12.3.12 The PV modules are likely to be secured to the racking system by hand and therefore soil compaction is unlikely to occur during this stage, as shown in Plate 12-24.

Plate 12-24 PV module installation (Ref. 12-16)

[redacted]

12.3.13 Should vehicles cause compaction during the installation of the PV arrays then this will be ameliorated using typical small-scale horticultural machinery and is outlined in the **oSRMP [APP/7.13]**.

Operational Phase

12.3.14 RSuDS components from the construction phase (grassland) will remain in place for the operational phase of the Scheme.

12.3.15 The raised nature of Solar PV Arrays will not prevent soil from absorbing rainwater as the panels will not be placed directly on the ground and each PV Row will be separated, with the same area of soil/grassland available for infiltration as per the baseline scenario.

12.3.16 Once rainfall has fallen off a Soar PV Array, the water will be able to spread and flow along the ground under the Solar PV Arrays evenly into the rain-shadow of the row below, so as to mobilise the same percentage of the ground for infiltration as was available prior to the installation of PV Arrays.

12.3.17 The Solar PV Array will comprise rows of solar panel modules mounted on metal frames and pile driven into the ground to limit the footprint of PV array units.

12.3.18 The PV panels would be mounted at least 0.4m from the ground at the lowest point, depending on modelled flood depths, there will be a requirement to raise the leading edge of the Solar PV arrays in some areas.

12.3.19 Installation of the Solar PV arrays does not involve the introduction of hardstanding at ground level meaning the superficial cover for the majority of the Site will remain the same as the baseline.

12.3.20 As the baseline vegetation is arable crops the establishment of grassland will be beneficial in terms of vegetation cover and soil stabilisation, as the land will not be tilled.

12.3.21 Additionally, the PV array tables will have regular rainwater gaps to prevent water being concentrated along a single drip line. As such, rainfall landing on the solar panels will drain through rainwater gaps and infiltrate into the ground beneath and between each row of panels, as shown in Plate 12-25.

Plate 12-25 Rainwater gaps on PV array table

12.3.22 Control of run-off from the Solar PV Arrays will be implemented through the land management techniques based upon RSuDS methods that will be implemented before the construction phase, in accordance with the EA's guidance (Ref 12-17~~Ref 12-17~~) and this will be secured through the **oLEMP [APP/7.11]**.

12.3.23 The limited installation of impermeable surfaces will prevent a substantial increase in surface water run-off.

12.3.24 Grassland beneath the solar panels and between the rows of Solar PV arrays will be established, in accordance with Natural England guidance, as shown in Plate 12-26.

Plate 12-26 Established grassland and vegetation cover at a Solar Farm

12.3.25 The exact grass seed mix will be determined following soil testing, prior to the construction phase.

12.3.26 The grassland will be managed through an initial and long-term management plan (as outlined in the **oLEMP [APP/7.11]** and will be secured through the corresponding requirement in the **draft DCO [APP/3.1]**.

12.3.27 The promotion of managed grassland will prevent surface water from the drip line from compacting the ground and therefore limit the potential for rilling and soil mobilisation.

12.3.28 An **oOEMP [APP/7.8]** has been prepared in support of the DCO Application, which will include control measures to ensure no significant impacts will arise during the maintenance and replacement activities. Maintenance of solar farm equipment and other regular equipment used onsite, such as any operational vehicles, tools and machinery will be carried out by the relevant operational staff. The maintenance will be carried out based on specific guidance and method statements by appropriately trained staff, in line with the required maintenance schedules. This will minimise the risk of compaction of soils and pollution of watercourses.

12.3.29 It should also be noted that areas for mitigation and enhancement~~large woodland strips~~ will be established~~ along with wildflower meadow~~, which will be largely outside the fence, as shown on ES Figure 5.1: Concept Masterplan [APP/6.3]. These measures will also help to slow surface water before entering the wider hydrological network.

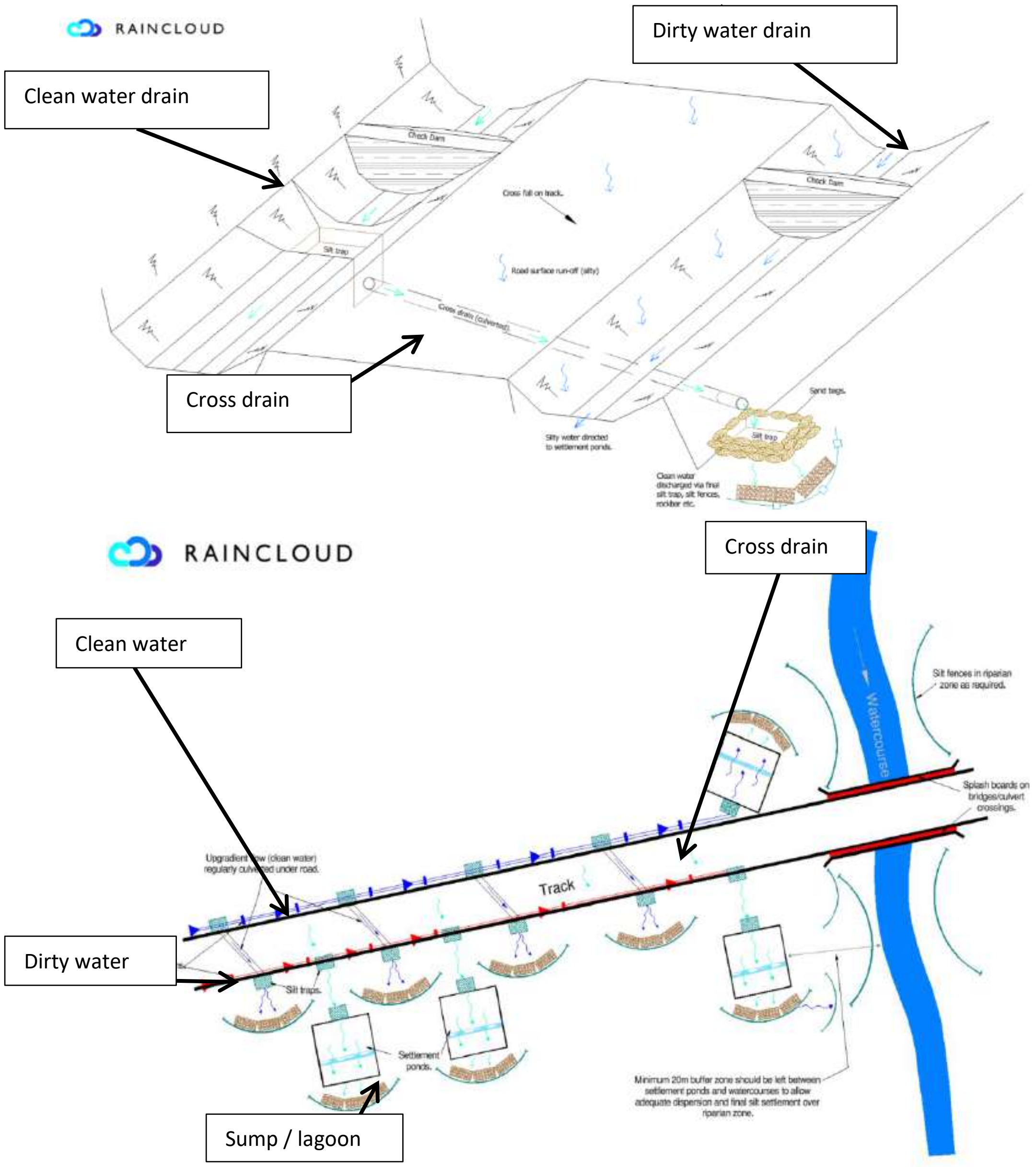
12.3.30 Access tracks will be served by trackside drainage ditches designed to the 1 % AEP + 40 % climate change event, as outlined in the **Design Principles, Parameters and Commitments [APP/5.8.2]**. Along the access tracks, drainage channels on the down-slope would shed track run-off to adjacent rough ground approximately every 30m, to attenuate flow and allow natural filtration to remove sediments. In areas within 50m of a flow or where cross-slopes exceed 1 in 20, drainage channels will be bunded and outflow will be monitored daily in areas with on-going construction activity.

12.3.31 Track surface cross-drains can be installed on tracks with long gradients and limited camber. Measures to ensure hydrological connectivity is maintained between saturated ground and their water source will include the following:

- The site drainage design will, where possible, avoid any severance of saturated areas; and
- The drainage design will incorporate a drainage ditch on the upslope side of all access tracks to ensure limited crossflow and sediment transport, with regular outfalls to the down-slope side which would shed track runoff to adjacent rough ground or discharge to a settlement lagoon or retention pond if necessary, to control flows and sediment transfer.

~~12.3.34~~12.3.32 An example schematic of the track drainage is shown in Plate 12-27.

Plate 12-27 Schematic of Track Drainage



~~12.3.35~~12.3.33 Permanent check dams can also be installed to slow the flow of water in ditches with steeper gradients and straightened channels to prevent erosion of channels. Water within channels should be allowed to flow and should not be stagnant, and tracks should be free from standing water through inclusion of camber or cross-fall.

~~12.3.36~~12.3.34 Sustainable drainage systems such as swales with vegetated channels are preferential and will be designed to intercept, filtrate and convey run-off. Permanent swales and drainage ditches adjacent to access tracks will have outlets at specified intervals to reduce the volume of water collected in a single channel and, therefore, reduce the potential for erosion.

Steeper Slopes

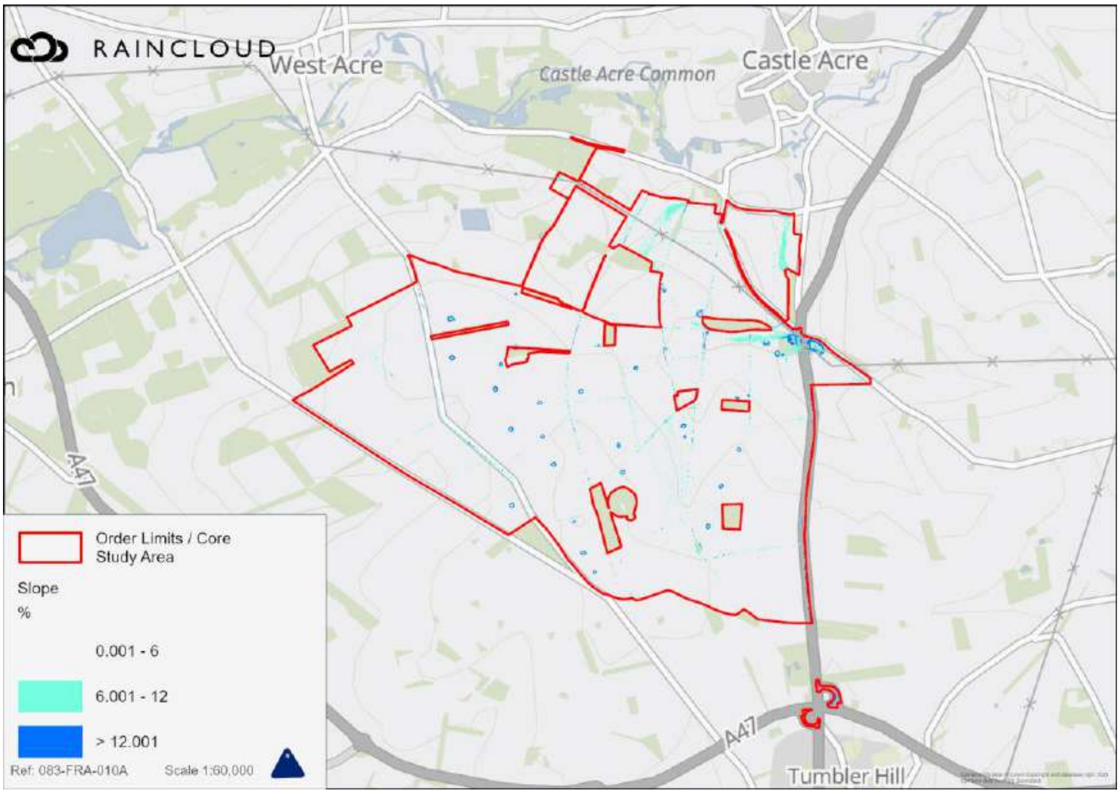
~~12.3.37~~12.3.35 It is reported in Schwyter & Vaughan (Ref 12-18~~Ref 12-18~~) that the amount of soil erosion is directly related to the amount of surface water run-off, which depends on the water infiltration rate and the percentage of the slope. The steeper the slope and the less rapid the water infiltration rate, the more rapid the water run-off rate for a given soil.

~~12.3.38~~12.3.36 It is noted that most soils will generate rapid or very rapid surface water run-off with slopes between 6 to 12%, regardless of soil type.

~~12.3.39~~12.3.37 The majority of the CSA is located on slopes of less than 6%.

~~12.3.40~~12.3.38 The Solar PV area is mostly shallow sloping with steeper slopes confined to the marl pits and field margins, as shown in Plate 12-28 and at A3 scale as Figure 12-1-10 in Annex E of this FRA.

Plate 12-28 Slope within CSA



~~12.3.41~~12.3.39 In areas where PV Arrays run parallel to a slope of 6% or greater or in areas of the Site where concrete feet are used of the Solar PV Mount, active measures such as berms or swales will be considered to slow the flow of surface water run-off as part of construction SuDS, which could be retained for the operational phase of the Scheme.

12.4 BESS and Substations Surface Water Management

12.4.0 As discussed with the LLFA in September 2025, the Scheme has Work No.s and does not have a detailed design at this stage, therefore this FRA [APP/6.4] proposes drainage principles which will be secured through the DCO.

12.4.1 This section outlines how the Scheme will be designed to meet the requirements of:

- National Planning Practice Guidance (2014) (as amended 2025 - Paragraph: 023 Reference ID: 7-023-20220825 and Paragraph: 024 Reference ID: 7-024-20220825)
- The NPPF
- The Environment Act (2021)
- Non-Statutory Technical Standards for Sustainable Drainage Systems (2015)
- Environment Agency (EA) - Rural Sustainable Drainage Systems (RSuDS) (Ref 12-17~~Ref 12-17~~)
- EA – Approach to Groundwater Protection
- EA - Pollution Prevention Guidelines (PPG) Controlled Burn: PPG28 (archived but still relevant)
- CIRIA - Containment systems for the prevention of pollution. Secondary, tertiary and other measures for industrial and commercial premises (C736)
- National Fire Chiefs Council (NFCC) – Grid Scale Battery Energy Storage System planning – Guidance for FRS
- National standards for sustainable drainage systems (SuDS)
- NFCC – Grid Scale Battery Energy Storage System planning – Guidance for FRS - July 2024 Draft Revision **(**Ref 12-19~~Ref 12-19~~**)**
- NFPA 855 Standard for the Installation of Stationary Energy Storage Systems **(**Ref 12-6~~Ref 12-6~~**)**
- Department for Business and Trade - UK Battery Strategy (2023) (Ref 12-20~~Ref 12-20~~Ref 12-20~~Ref 12-20~~)
- NCC - Drainage design standards; and
- NCC - Lead Local Flood Authority Statutory Consultee for Planning. Guidance Document (Version 7.1, June 2024).

Drainage Hierarchy

12.4.2 Infiltration testing was conducted by Rogers Geotechnical Services Ltd. on 6 August 2025 to determine the viability of infiltration. The results provided in Annex B of this FRA shows 'good' drainage results and therefore infiltration is considered to be an appropriate drainage strategy for the BESS and substation compound.

12.4.3 A summary of the results from the infiltration testing are provided in Table 12-2.

Table 12-2: Summary of infiltration results

Location	Soil Infiltration rate (m/sec)	Infiltration rate (m/hr)
TP0	$3.0 \times 10^{-5} – 1.6 \times 10^{-5}$	0.108 - 0.058
TP2	$2.5 \times 10^{-4} – 9.8 \times 10^{-5}$	0.900 – 0.353
TP3	$2.4 \times 10^{-5} – 1.2 \times 10^{-5}$	0.086 – 0.043
TP4	$3.4 \times 10^{-5} – 2.1 \times 10^{-5}$	0.122 – 0.076
TP5	$1.7 \times 10^{-4} – 1.4 \times 10^{-5}$	0.612 – 0.053
TP6	$1.3 \times 10^{-3} – 6.2 \times 10^{-4}$	4.680 – 2.232
TP7	$1.6 \times 10^{-3} – 1.3 \times 10^{-4}$	5.760 – 0.468
TP8	$1.7 \times 10^{-5} – 1.5 \times 10^{-5}$	0.061 – 0.054

12.4.4 Further details regarding the drainage system are provided in Section 12.4.6 to 12.4.23.

12.4.5 The proposed drainage system layout for the Scheme is provided in Annex C of this FRA.

Rainfall Data and Climate Change Allowance

12.4.6 Rainfall profiles have been derived from FEH 2022 data.

12.4.7 The BESS and Substation area is located within the North-West Norfolk Management catchment. The Scheme has a lifetime of 60 years and therefore the 2070s epoch has been applied. The 2070s climate change allowance for the 2070s epochs has been provided in **Table 12-3**.

Table 12-3: North-West Norfolk Management Catchment peak rainfall allowances: 2070s Epoch

Return Period	Central Allowance%	Upper End Allowance%
3.33%	20	35
1%	25	40

12.4.8 The NCC guidance document for surface water drainage on developments with a lifetime beyond 2100, states ‘the 2070s climate change epoch ‘Upper End’ allowance must be used in the initial design of any surface water drainage system’. As such, the 40% climate change allowance has been applied to the drainage design criteria.

12.4.9 An Urban Creep allowance has not been applied to calculations as the Scheme is not a residential site i.e. not residential and no further hardstanding areas will be installed during the operational phase.

Impermeable Area

12.4.10 The maximum potential impermeable areas of the BESS, Customer Substation and National Grid Substation Compounds are shown in Plate 12-29 and at A3 scale as Figure 12-1-12 in Annex E of this FRA. As there is no detailed design, and as a conservative approach, the entirety of Work Nos. 2 to 4 are assumed to be 100% impermeable.

Plate 12-29 Contributing Catchments and Impermeable Areas

12.4.11 The BESS, Customer Substation and National Grid Substation Compounds are divided in 2 catchments, as shown in Plate 12-29. A breakdown of each catchment, including the impermeable area and percentage of impermeable area is provided in Table 12-4.

Table 12-4: Catchment Characteristics

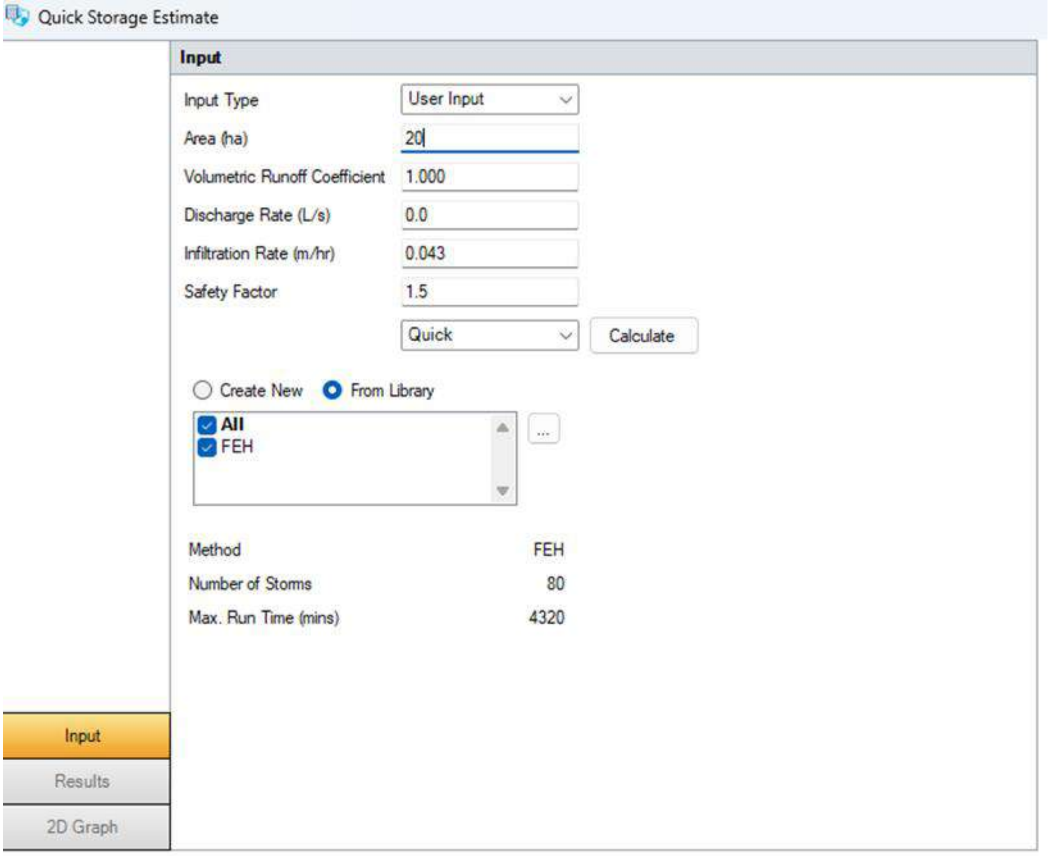
Catchment	Area (ha)	Impermeable Area (ha)	% Impermeable
1	12	12	100
2	8	8	100
Total	**20**	**20**	-

12.4.12 Each catchment has a Cv value of 1.0 as per feedback from the LLFA and Table 2 of the NCC Guidance Document for Surface Water Drainage.

Quick Storage Estimate

12.4.13 A quick storage estimate for the Site's impermeable area (20 ha) using FEH data and an infiltration rate 0.043m/hr shows the Site requires approximately 30,187m^3 however accounting for infiltration, the required storage is reduced to 8,313 – 17,234m^3, as shown in Plate 12-30.

Plate 12-30 InfoDrainage – Quick storage estimates

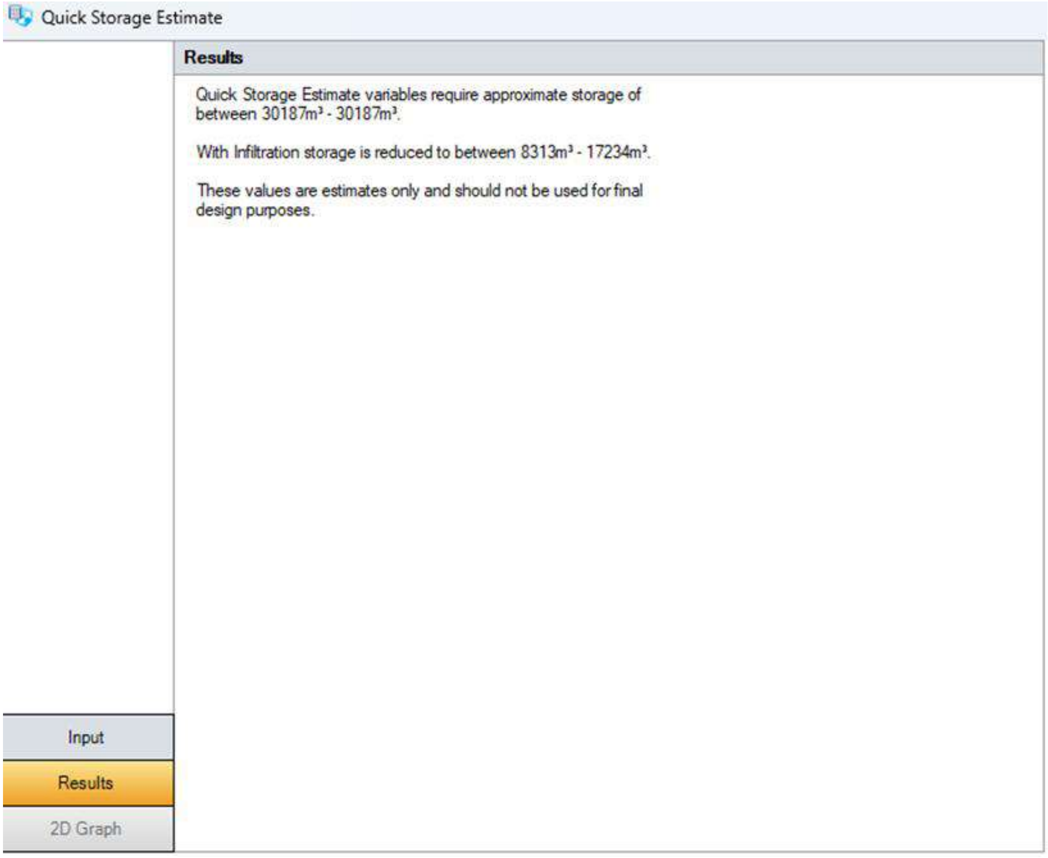


Input Type: User Input
Area (ha): 20
Volumetric Runoff Coefficient: 1.000
Discharge Rate (L/s): 0.0
Infiltration Rate (m/hr): 0.043
Safety Factor: 1.5
Quick

○ Create New ● From Library

☑ All
☑ FEH

Method	FEH
Number of Storms	80
Max. Run Time (mins)	4320



Quick Storage Estimate variables require approximate storage of between 30187m³ - 30187m³.

With Infiltration storage is reduced to between 8313m³ - 17234m³.

These values are estimates only and should not be used for final design purposes.

12.4.14 Full InfoDrainage outputs are provided in Annex D of this FRA

Surface Water Drainage Strategy

12.4.15 No earthworks/levels are available at this stage for the BESS, Customer Substation and National Grid Substation Compounds and, therefore, the levels with the topographical survey have been used within the drainage design. The drainage strategy has been designed in InfoDrainage (version 2026.3).

12.4.16 The BESS and substation compounds drainage design consists of 2 drainage catchments which will connect to manholes via filter drains. Filter drain locations will be confirmed at detailed design stage (i.e. so there is no clash with underground utilities and cables). A pipe network will connect the manholes to a tank. The tank will service as a dual purpose, to provide surface water attenuation for the compound and provide sufficient capacity for fire suppression water in the event of a fire. Further details regarding the tanks use for fire suppression are provided in Section 12.4.

~~12.4.16~~12.4.17 Any infrastructure that is to remain in place after the lifetime of the Scheme, such as the National Grid Substation and Grid Connection Infrastructure, will retain the drainage features which serve it.

~~12.4.17~~12.4.18 An outline maximum area for the attenuation basin are provided in Annex C.

12.4.19 An automatic penstock will be located on the downstream manhole of the tank(s) to provide a mechanism to stop flow reaching the infiltration basin in the event of a fire. The penstock will prevent potentially contaminated water entering the infiltration basin and ultimately the ground.

~~12.4.18~~12.4.20 In the event that the penstock automated system fails, there will be an option to manually close the penstock valve which will be subject to a programme of regular inspection and maintenance.

12.4.21 All surface water ultimately drains into the infiltration basin via the piped network and tank. As outlined in the **oOEMP [APP/7.8.2]**, the drainage system outfall will have an installed 'sentinel' monitoring system, to quickly identify if pollutants are found to be entering the drainage system and enable remedial action.

~~12.4.19~~12.4.22 The infiltration basin used in the worst-case calculations ~~-~~has a 1.5m depth, base area of 12,000m^2 and 14,500m^2, side slope 1:4 and a volume 19,845m^3. An outline maximum area for the infiltration basin area provided in Annex C of this FRA.

Results – Critical Return Period

~~12.4.20~~12.4.23 The Critical Return Period for the design event, 1% AEP event +40% CC allowance, is the 960-minute summer event. The maximum depth within the infiltration basin is shown to be 1.457 m. The Critical Return Period result is shown in Plate 12-31. Full results are provided in Annex D of this FRA.

Plate 12-31 InfoDrainage Critical Return Period Results

Critical Storm Per Item

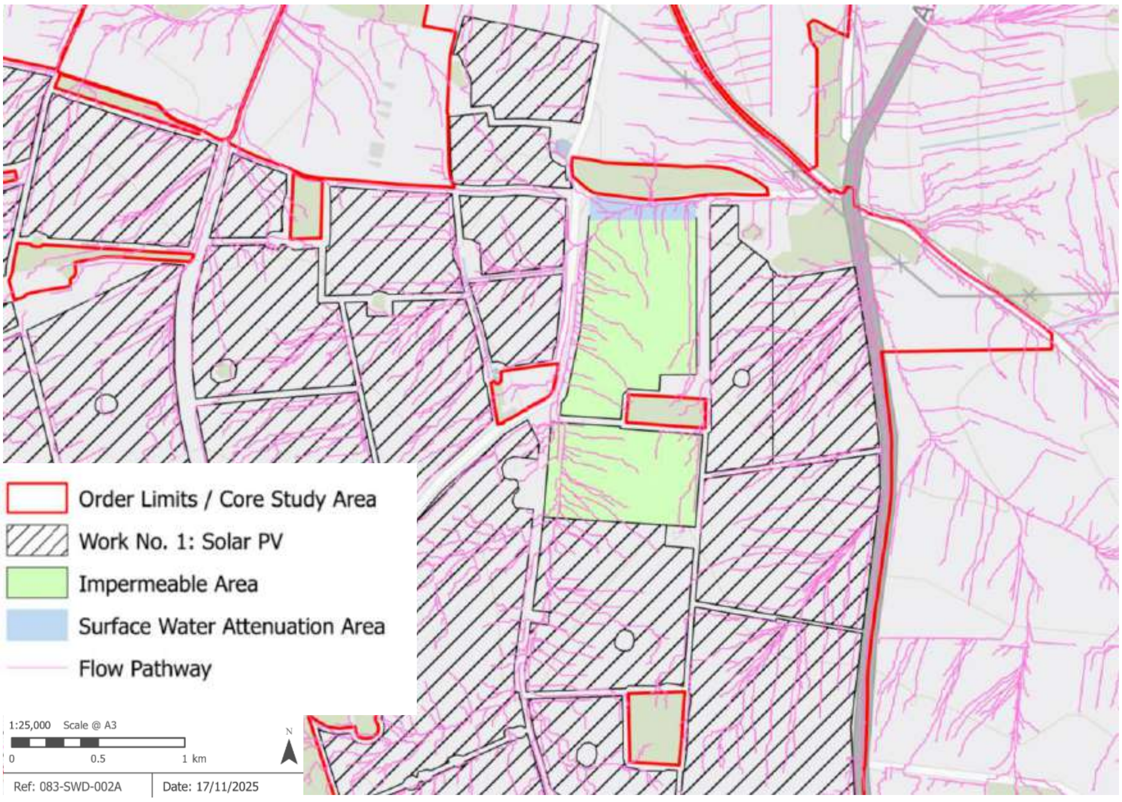
Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)	Status
Pond	FEH: 100 years: +40 %: 960 mins: Winter	51.457	51.457	1.457	1.457	1094.6	19230.223	0.000	12244.188	0.0	0.000		3	OK

~~12.4.21~~12.4.24 The previous more conservative design for the infiltration basin had a half drain time for the critical storm event is 1,531 minutes. It is expected that the current design will have a similar half drain time. The most conservative infiltration rate has been used, and it is assumed that all the work areas are 100% impermeable. This conservative approach is likely to overestimate the half drain time required for the final drainage system as part of the detailed design of the Scheme. Detailed design will confirm that the Work areas will not be 100% impervious, and half drain time will likely be less than 24 hours.

Overland and Exceedance Flows

~~12.4.22~~12.4.25 The SuDS system has been designed to accommodate the 1% AEP +40% CC allowance event and therefore should the designed storm be exceeded then flows could be as per the natural typography to the north of the BESS and Substation Compounds, as shown in Plate 12-32 and at an A3 scale as Figure 12-1-13 in Annex E of this FRA.

Plate 12-32 Exceedance Flow Pathways



~~12.4.23~~12.4.26 None of the Scheme infrastructure or third-party property exists within the exceedance flow pathway.

The Simple Index Approach (SIA) Tool

~~12.4.24~~12.4.27 As the operational phase of the Scheme will involve occasional maintenance visits and will involve significantly less than 300 traffic movements per day (as per the SIA guidance), Table 26.2 Pollution hazard indices for different land use classifications of the SuDS Manual identifies that the Scheme has a Pollution Hazard Level of Low, 'non-residential car parking with infrequent change (e.g., schools, offices) i.e., < 300 traffic movements/day', equating to a Land Use Pollution Index of 0.5 (SS), 0.4 (metals) and 0.4 (hydrocarbons).

~~12.4.25~~12.4.28 A SIA has been developed on behalf of the EA (and other Regulators such as SEPA) to support the implementation of the water quality management design methods set out in the SuDS Manual, with appropriate cross-referencing to the relevant 'Design Conditions' in the tool.

~~12.4.26~~12.4.29 The semi permeable/porous road and an infiltration basin will be sufficient to effectively mitigate any suspended solids, metals and hydrocarbons held within surface water at the Scheme prior to discharging into the unnamed watercourse outside the Site, as the Aggregated Pollution Mitigation Indices for the run-off area are 0.85 (SS), 0.8 (metals) and 0.95 (hydrocarbons).

~~12.4.27~~12.4.30 As such, the treatment of the surface water run-off will meet the minimum requirements of the pollution mitigation indices outlined in the SIA Tool.

Responsibilities and Long-Term Management

~~12.4.28~~12.4.31 In the rare event of a battery unit fire the NFCC guidance recommends the ability to capture firewater and not have uncontained releases to the hydrological environment.

~~12.4.29~~12.4.32 A drainage option which will utilise a piped network to drain the BESS Compound and Customer and National Grid Substations to a contaminated water tank, prior to draining to an infiltration basin is proposed as a way of attenuating the increase in surface water run-off rates at the Scheme.

~~12.4.30~~12.4.33 SuDS features will incorporate a 3.5m wide access or buffer strip for vehicles to access the future for maintenance and this will be confirmed following detailed design of the Scheme prior to the construction phase.

12.4.34 It will be the responsibility of the Scheme operator to maintain effective drainage measures and rectify drainage measures that are not functioning adequately during the lifetime of the Scheme. A nominated person will also have responsibility for reporting on the functionality of drainage measures.

It will be the responsibility of NGET (or the equivalent future regulator) to maintain effective drainage measures that remain in situ for the National Grid S~~s~~ubstation and the Grid Connection Infrastructure after the Decommissioning phase of the Scheme.

~~12.4.31~~12.4.35 Where areas remain positively drained through the lifetime of the Scheme, the SuDS measures serving these areas will be checked on a regular basis. Should drainage measures require dredging or unblocking, this will be undertaken as soon as practicable.

~~12.4.32~~12.4.36 A maintenance scheme for all drainage infrastructure will be agreed with the LLFA prior to the construction phase commencing and is secured in Section 2.14 of the **oOEMP [APP/7.8]**.

Fire Suppression

Procedure

~~12.4.33~~12.4.37 In the rare event of a battery fire, the procedure will be outlined in the **oBSMP [APP/7.14]**.

~~12.4.34~~12.4.38 The Scheme operator will follow the accepted strategy of allowing a battery related fire to self-consume, reducing unnecessary risk of injury to site and firefighting personnel.

~~12.4.35~~12.4.39 Should a fire occur, the effected enclosure will be allowed to self-consume until the fire is extinguished through consumption of the combustible materials within the battery container/enclosure. The firefighting procedure will be to apply water for fire suppression to adjacent BESS enclosures as a way of reducing the temperature of the adjacent containers.

~~12.4.36~~12.4.40 As water will not be directly applied to affected BESS container, there is reduced potential for suppression water to become contaminated.

Fire Suppressant Volume

~~12.4.37~~12.4.41 Based on recommendations in NFPA 855 Standard for the Installation of Stationary Energy Storage Systems and NFCC – Grid Scale Battery Energy Storage System planning – Guidance for FRS, a burn time of 2 hours and a requirement of 1,900l/min of fire suppression water has been used to calculate the volume of fire suppressant water required to be stored onsite in the event of a container fire.

~~12.4.38~~12.4.42 This equates to 228m^3 of storage.

~~12.4.39~~12.4.43 The SuDS structures serving the BESS compound will be sized to accommodate the 1% AEP +40% CC and an additional 228m3~~,~~ based on current guidance, and is subject to change based on guidance at the time of detailed design of the Scheme. ~~and t~~This will be sufficient for storing the full fire suppressant volume during an extreme rainfall event. The firefighting water will not exclusively rely on an Anglian Water connection.

12.4.44 A penstock, linked to an automated system, will be placed on the manhole downstream of the contaminated water tank(s) and would be shut off in the event of a fire suppression event. In the event that the penstock automated system fails, there will be an option to manually close the penstock valve which will be subject to a programme of regular inspection and maintenance. This will isolate the system and prevent potentially contaminated water from reaching the infiltration basin(s) and therefore limit the potential for contaminants to enter the hydrogeological environment.

12.4.45 It would remain closed until the captured water has been ~~testing of the captured water has taken place. Water will then either be~~ removed offsite by tankers to a licenced facility and drainage features cleaned prior to any shut-off valves being re-opened. ~~or discharged to the unnamed field drain (subject to agreement with the EA).~~

12.4.46 As per discussions with the EA, a programme of regular maintenance and testing of the penstocks is incorporated and secured as part of Table 37 of the **oOEMP [APP/7.8.2]**.

12.4.47 If concrete foundations beneath the BESS are used, this will form a sealed surface and no infiltration to the ground is possible. If compacted gravel is used as the surface, an impermeable membrane or liner will be installed so that the drainage system beneath the BESS is fully sealed. Any spills, leaks, or firewater runoff is captured and managed through a contained drainage system and cannot reach the Principal Aquifer.

~~12.4.41~~

12.4.48 It is recommended that the BESS Compound has a shallow bund or cut-off permitter drain to limit the potential for run-off to leave the Scheme and drain to the contaminated water tank.

~~12.4.42~~12.4.49 As such, in the event of a battery fire, suppressant does not require testing as it will not be released to the wider hydrological environment.

~~12.4.43 As per discussions with the EA a programme of regular maintenance and testing of the penstocks is incorporated and secured as part of Table 37 of the **oOEMP [APP/7.8]**.~~

12.5 Ancillary infrastructure

12.5.0 Inverters and conversion units will incorporate a clean aggregate surround which will promote infiltration and will be calculated to store the 1 % AEP +40% CC event within the void space.

12.5.1 An example conversion unit surround is shown in Plate 12-33.

Plate 12-33 Conversion unit gravel surround

12.6 Conclusion & Recommendations

12.6.0 The Order limits are mostly located in Flood Zone 1 (99.5%), while 0.5% lies in Flood Zone 2 and Flood Zone 3, associated with land for skylark mitigation. The Scheme is located outside the 1% AEP +20% CC and the 0.1% AEP modelled flood outlines for the River Nar.

12.6.1 The Scheme is classified as Essential Infrastructure and is therefore compatible with Flood Zones 1, 2 and 3.

12.6.2 Groundwater levels are likely to be variable across the CSA and was struck at 40m BGL within a borehole adjacent to the western boundary of the CSA.

12.6.3 2D rainfall modelling has identified two shallow depth pluvial flow pathways in the east of the CSA. BESS units will not be flush to the ground and will be elevated from the ground by approximately 300mm. As such the Scheme will remain safe and operational should pluvial flooding occur.

12.6.4 Surface water runoff from the Solar PV will be managed through RSuDS and NFM techniques such as grassland/wildflower, which will act to bind soils, slow surface water and increase water quality compared to the baseline scenario.

12.6.5 Tidal and reservoir flooding were scoped out of the assessment, as agreed with the EA and PINS.

12.6.6 The Scheme is compliant with the NPS EN-1, NPS EN-3, NPS EN-5, NPPF and local planning policy, including Policy ENV09 Flood Risk & Surface Water Drainage of the Adopted Local Plan.

References

Ref 12-1 EA Climate Change Allowances: Peak River Flow https://environment-test.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgmtcatid=3065

Ref 12-2 National Policy Statement (NPS) for energy (EN-1) (2024) https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1

Ref 12-3 National Policy Statement (NPS) for renewable energy infrastructure (EN-3) (2024) https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3

Ref 12-4 National Policy Statement for electricity networks infrastructure (EN-5) (2024) https://www.gov.uk/government/publications/national-policy-statement-for-electricity-networks-infrastructure-en-5

Ref 12-5 National Fire Chiefs Council https://nfcc.org.uk/

Ref 12-6 NFPA 855 – Standard for the Installation of Stationary Energy Storage Systems (2026) https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=855

Ref 12-7 EA Asset Management https://environment.data.gov.uk/asset-management/index.html

Ref 12-8 EA Climate Change Allowances: Peak Rainfall https://environment-test.data.gov.uk/hydrology/climate-change-allowances/rainfall?mgmtcatid=3052

Ref 12-9 Monte Carlo approach used to derive the national default 12 mm per hour drainage rate value disapplied due to rural catchment

Ref 12-10 Manning's n for Channels (Chow, 1959)

Ref 12-11 Risk of flooding from surface water – understanding and using the map (2025) https://assets.publishing.service.gov.uk/media/5db6ded540f0b6379a7acbb8/What-is-the-Risk-of-Flooding-from-Surface-Water-Map.pdf

Ref 12-12 National Planning Policy Framework Annex 3: Flood risk vulnerability classification (2012) https://www.gov.uk/guidance/national-planning-policy-framework/annex-3-flood-risk-vulnerabilityclassification#:~:text=nature%20conservation%20and%20biodiversity

Ref 12-13 Check your long term flood risk Web Application https://check-long-term-flood-risk.service.gov.uk/risk

Ref 12-14 Flood risk and coastal change guidance (2025) https://www.gov.uk/guidance/flood-risk-and-coastal-change#the-sequential-approach-to-the-location-of-development:~:text=In%20applying%20paragraph,not%20be%20applied.

Ref 12-15 The role of grassland for erosion and flood mitigation in Europe: A meta-analysis. Agriculture, Ecosystems & Environment Volume 348, 1 June 2023, 108443 [redacted]

Ref 12-16 Keele University

Ref 12-17 Environment Agency, 2012. Rural Sustainable Drainage Systems (RSuDS). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291508/scho0612buwh-e-e.pdf

Ref 12-18 Schwyter, A., Vaughan, K. (2020) Introduction to Soil Science Laboratory Manual, University of Wyoming Libraries https://batch.libretexts.org/print/Letter/Finished/geo-14422/Full.pdf

Ref 12-19 Draft Guidance on Grid Scale Battery Energy Storage Systems (BESS) (2024) [redacted] guidance/

Ref 12-20 UK Battery Strategy (2023) https://www.gov.uk/government/publications/uk-battery-strategy

Annex A: EA Data

From: Enquiries_EastAnglia
To: [redacted]
Subject: EAN/2024/374708 - Response for your auto Product 4 request for 580518,313637 - Swaffham - [redacted]
Your ref: BKNTRYRDFF62
Date: 25 September 2024 14:48:44
Attachments: [redacted]

Dear [redacted],

Enquiry regarding Product 4 request for 580518,313637 - Swaffham - [redacted]

Thank you for your enquiry which was received on 02 September 2024.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

The area selected for the auto Product 4 is slightly too large. Therefore, we have provided you with the product 5, 6 and 7 for the model associated with this area in addition.

Product 4:
Please find the information requested for Product 4 attached in the PDF titled: BKNTRYRDFF62

If you have any comments regarding the attached letter please contact our Partnership & Strategic Overview team directly by email at pso.eastanglia@environment-agency.gov.uk

Products 5,6 & 7:
The information we hold has been uploaded to our sharefile system and can be accessed using the following link:

[redacted]

Please note the above link will expire on: 20/12/2024

A copy of the Flood Risk Assessment (FRA) advisory note is attached to my email.

Further Asset Management Data and Information can be found online using this link: https://environment.data.gov.uk/asset-management/index.html

Name	Product 4
Description	Detailed Flood Risk Assessment Map for 580518,313637 -

	Swaffham - [redacted]
Licence	Open Government Licence
Information Warnings	The maps provided are to be used in conjunction with the **Datasheet**. Please read the Datasheet and take note of information contained within the **'Important Information'** section.
Information Warning - OS background mapping	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2024 Ordnance Survey OS AC0000807064.

Abstract

Name	Products 5, 6 and 7
Description	**Upper River Nar MP7** Product 5 – Eastern Rivers Modelling Report: River Nar, July 2015, JBA Consulting. Product 6 – Output data of Eastern Rivers Modelling: Upper River Nar, MP7, July 2015, JBA Consulting. Product 7 – Calibrated and Verified Model Input data of Eastern Rivers Modelling: Upper River Nar, MP7, July 2015, JBA Consulting.
Licence	The following information is not available under the Open Government Licence but we may be able to license it to you under the Environment Agency Conditional Licence Environment Agency Conditional Licence: However, you MUST first check the supporting information and the above link to determine if the conditions on use are suitable for your purposes. If they aren't, this information is not provided with a licence for use, and the data is provided for read right only.

Conditions	1.0 You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you. 2.0 Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice. 3.0 We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentialities of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights. 4.1 The Information may contain some data that we believe is within the definition of "personal data" under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data comprises names of individuals or commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual. 4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data. 5.0 The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km2. Information about the operation of flood assets should not be published. 6.1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as "the Data". 6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its internal

	purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.
Information Warnings	Please be aware that model data is not raw, factual or measured but comprises of estimations or modelled results based on the data available to us.
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. May contain Ordnance Survey data © Crown copyright 2024 Ordnance Survey OS AC0000807064.

Coastal Modelling

You may be aware that some Local Planning Authorities have updated their Strategic Flood Risk Assessments (SFRAs) using data from this modelling study. As SFRA's are not updated regularly we agreed that they could use draft outputs as we wanted to ensure that the SFRA's were not out of date as soon as they were published.

If you are using our 2018 Coastal Flood Modelling Data outputs: Please refer to page 13 of the Product 4 supporting document.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences,)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- Current Flood Warnings

-

What's In Your BackYard (WIYBY) is no longer available.

Most of the data is still available via other sharing services such as DATA.GOV.UK, MAGIC map and new GOV.UK digital services. Where the datasets are no longer available as maps, you will be able to download and use within specialist applications.

To find out all the services the Environment Agency have available, please click here.

For any other enquiries please send your request to us at:
Enquiries_EastAnglia@environment-agency.gov.uk.

-

Additional information

-

Please be aware that we now charge for planning advice provided to developers, agents and landowners. If you would like advice to inform a future planning application for this site then please complete our https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion and email it to our Sustainable Places team. planning.eastanglia@environment-agency.gov.uk. They will initially provide you with a free response identifying the following:

-

- the environmental constraints affecting the proposal;
- the environmental issues raised by the proposal;
- the information we need for the subsequent planning application to address the issues identified and demonstrate an acceptable development;
- any required environmental permits.

If you require any further information from them (for example, a meeting or the detailed review of a technical document) they will need to set up a charging agreement. Further information can be found on our website.

Climate Change Allowances

For information on the use climate change allowances in Flood Risk Assessments, please see the attached document - **East_Anglian_External Climate Change Allowances Guidance_March2022.pdf**.

The guidance provides climate change allowances for peak river flow, peak rainfall, sea level rise, wind speed and wave height. The guidance provides a range of allowances to assess fluvial flooding, which varies depending on which management catchment a site lies within. It advises on which allowances to use for assessing the impact of climate change on fluvial flood risk based on vulnerability classification, flood zone and development lifetime.

If you want to discuss this please call our Sustainable Places team on 020 8474 5242 (West).

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards,

[redacted]

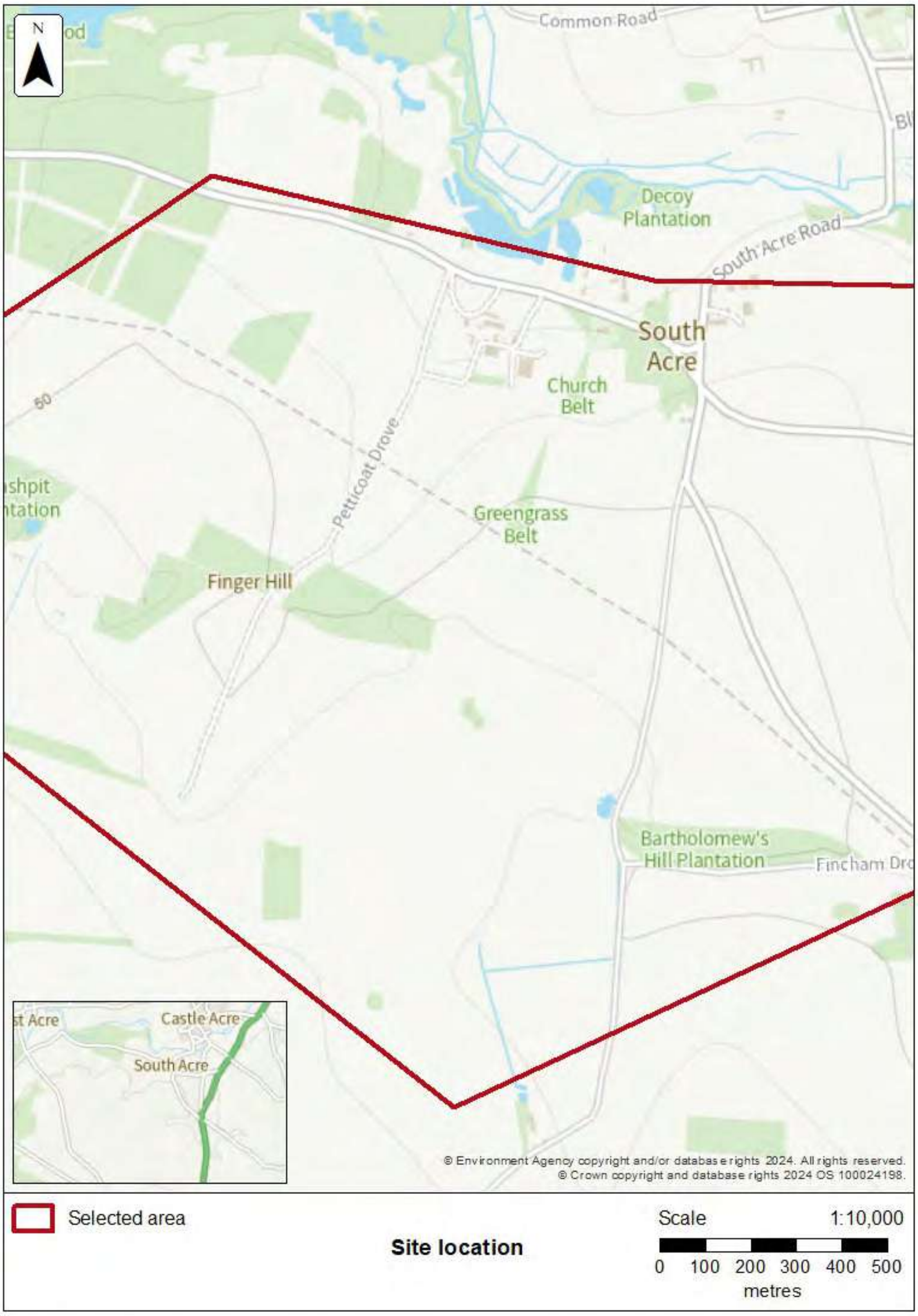
Customers & Engagement Officer
Customers & Engagement Team, East Anglia Area
Environment Agency
Environment Agency | Iceni House, Cobham Road, Ipswich IP3 9JD

Environment Agency | Bromholme Lane, Brampton, Huntingdon, Cambridgeshire, PE28 4NE

Flood risk assessment data

Location of site: 580678 / 313731 (shown as easting and northing coordinates)
Document created on: 2 September 2024
This information was previously known as a product 4.
Customer reference number: BKNTRYRDFF62

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- modelled data
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Information that's unavailable

This document **does not** contain:

- historic flooding
- flood defences and attributes

We do not have historic flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to floodng from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

We aren't able to display flood defence locations and attributes as there are no formal flood defences in the area of interest.

Surface water and other sources of flooding

Use the long term flood risk service to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

Or you can contact your Lead Local Flood Authority for further information.

Your Lead Local Flood Authority is Breckland.

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: EAn_EasternRivers_UpperNar_MP7_2015
Scenario(s): Defended fluvial, defended climate change fluvial
Date: 1 November 2015

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

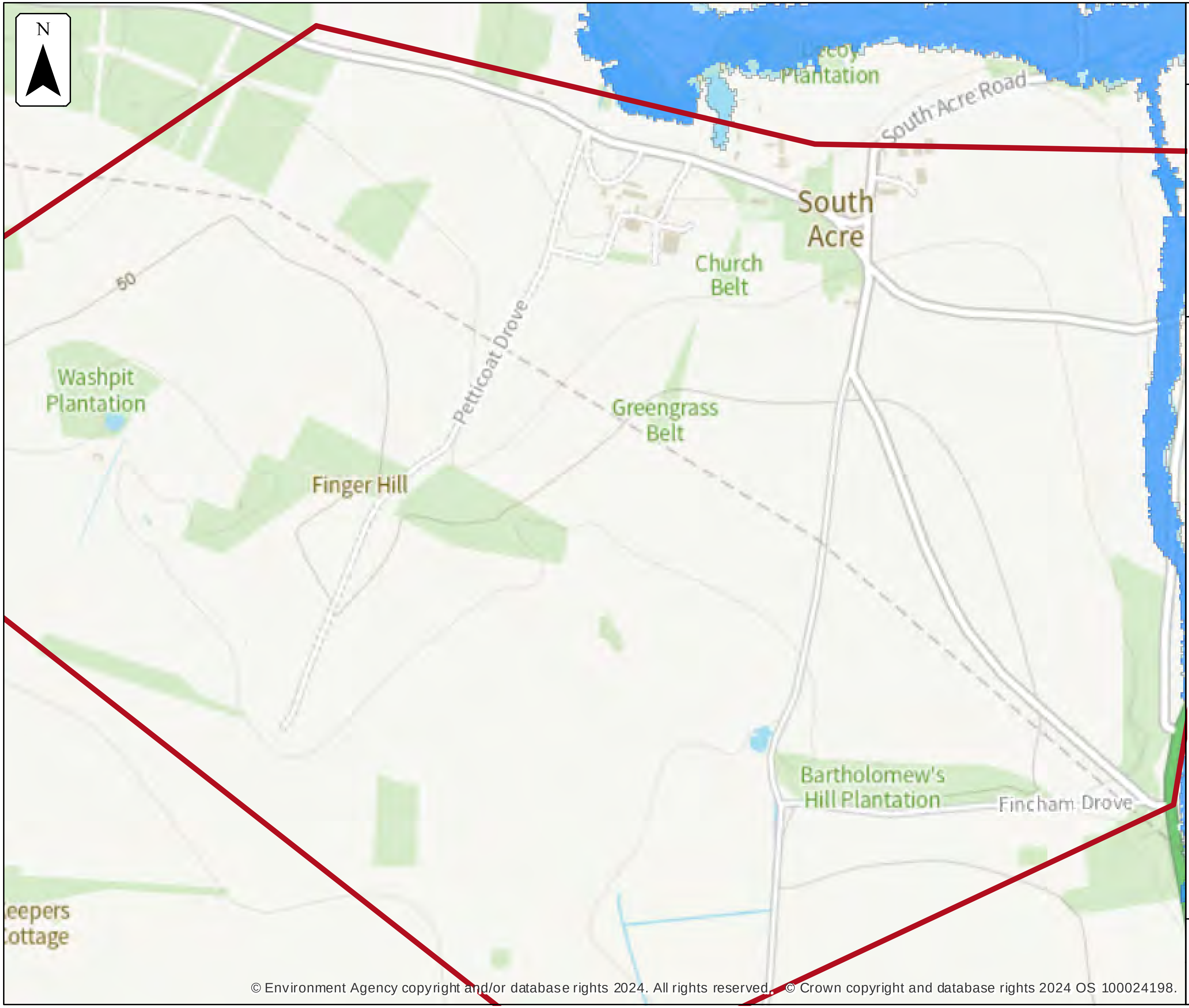
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

The flood zones are not currently being updated. The last update was in November 2023. Some of the flood zones may have changed, however all source data is included in the models below.



Environment Agency

Flood map for planning

Location (easting/northing)
580678/313731

Scale
1:10,000

Created
2 Sep 2024

▭	Selected area
🟦	Flood zone 3
▨	Flood zone 2

0 100 200 300 400 500
metres

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- map(s) showing the approximate water levels for the return period with the largest flood extent for a scenario and table(s) of sample points providing details of the flood risk for different return periods

Climate change

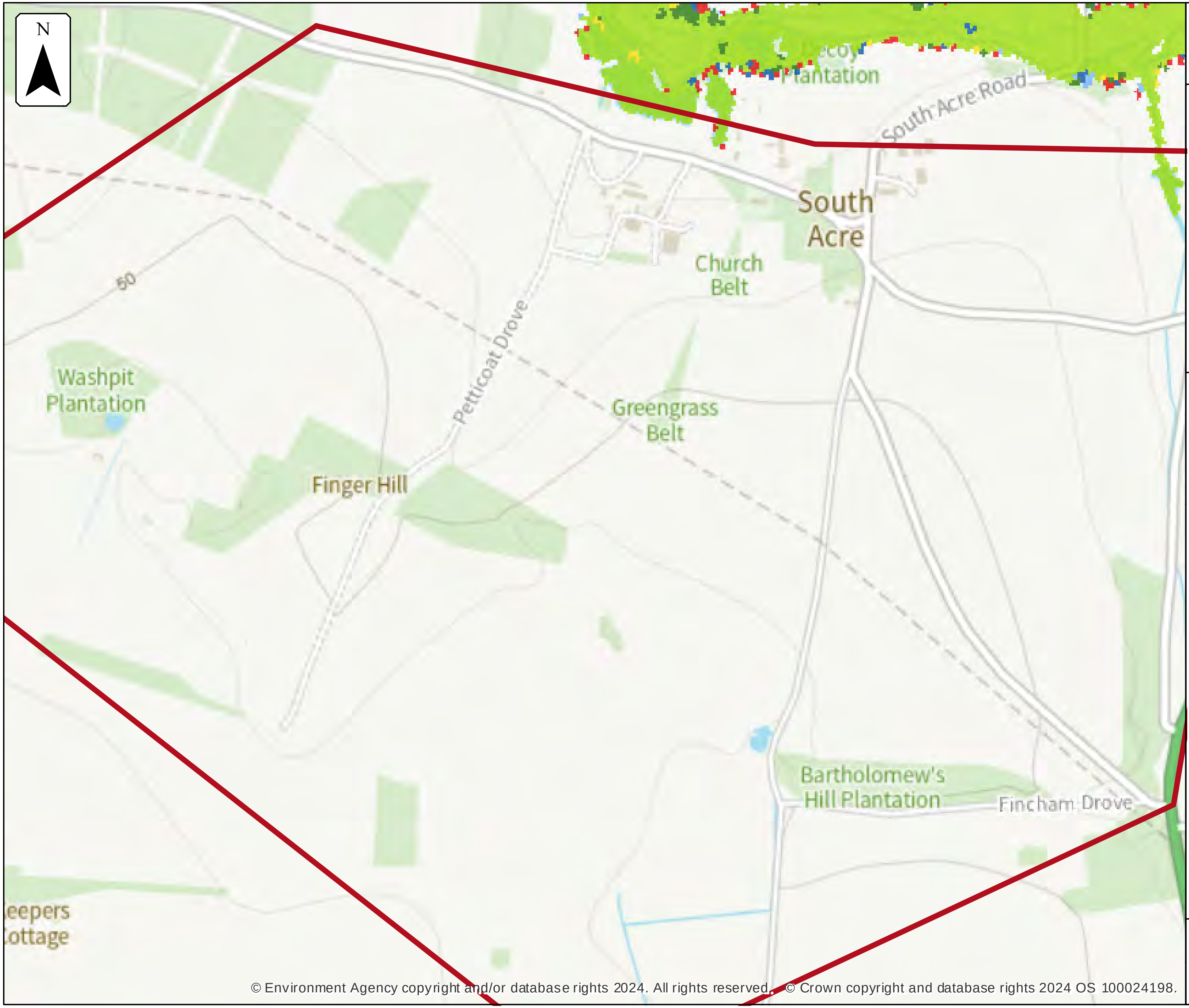
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled fluvial: risk of flooding from rivers where there are flood defences
- Defended climate change modelled fluvial: risk of flooding from rivers where there are flood defences, including estimated impact of climate change



Environment Agency

Defended modelled fluvial extent

Location (easting/northing)
580678/313731

Scale
1:10,000

Created
2 Sep 2024

Model name
EAn EasternRivers UpperNar MP7 2015

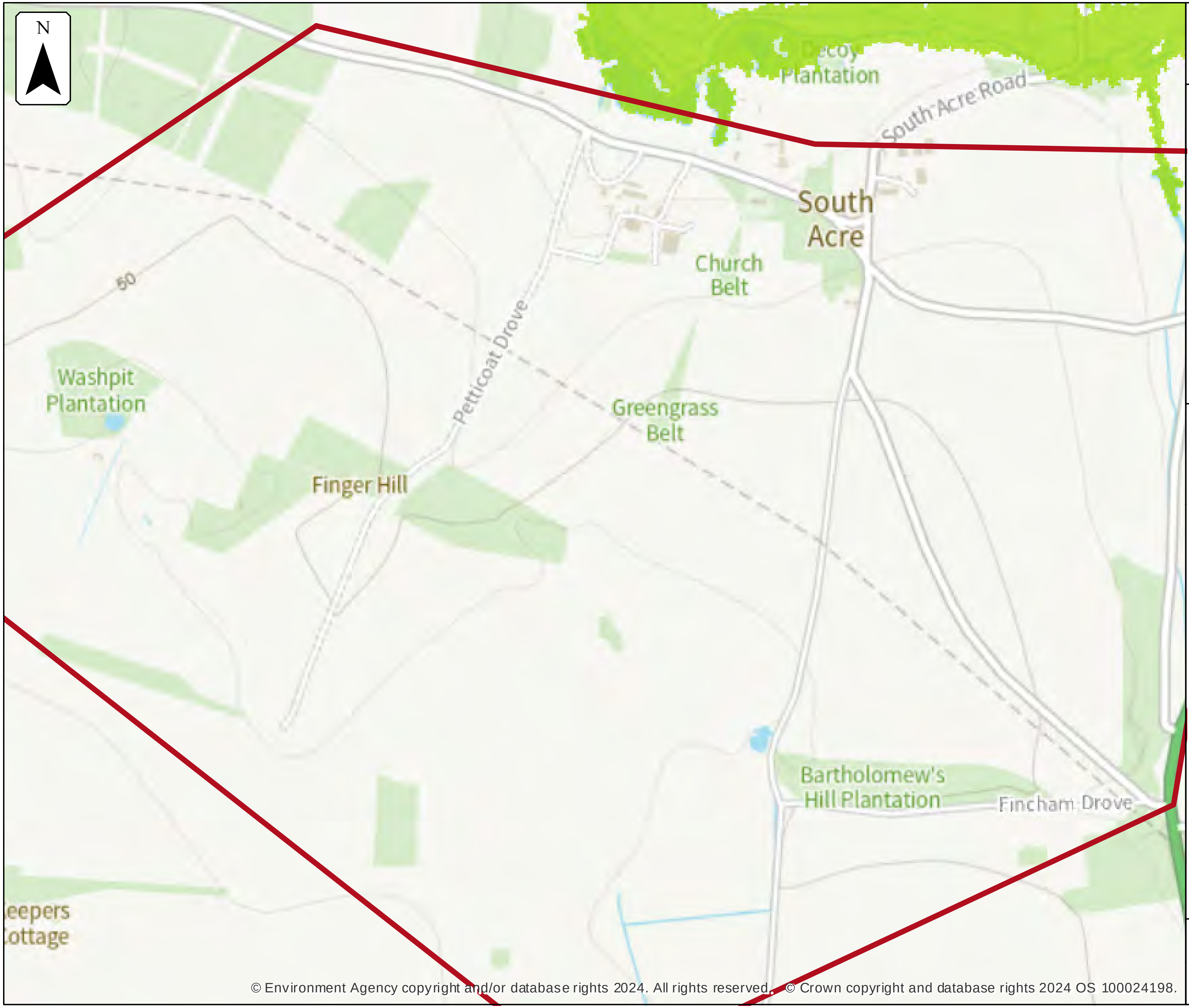
▭ Selected area

Modelled flood extent

- 🟩 5% AEP
- 🟩 2% AEP
- 🟨 1.33% AEP
- 🟦 1% AEP
- 🟦 0.5% AEP
- 🟥 0.1% AEP

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defended climate change modelled fluvial extent

Location (easting/northing)
580678/313731

Scale	Created
1:10,000	**2 Sep 2024**

Model name
EAn EasternRivers UpperNar MP7 2015

▭ Selected area

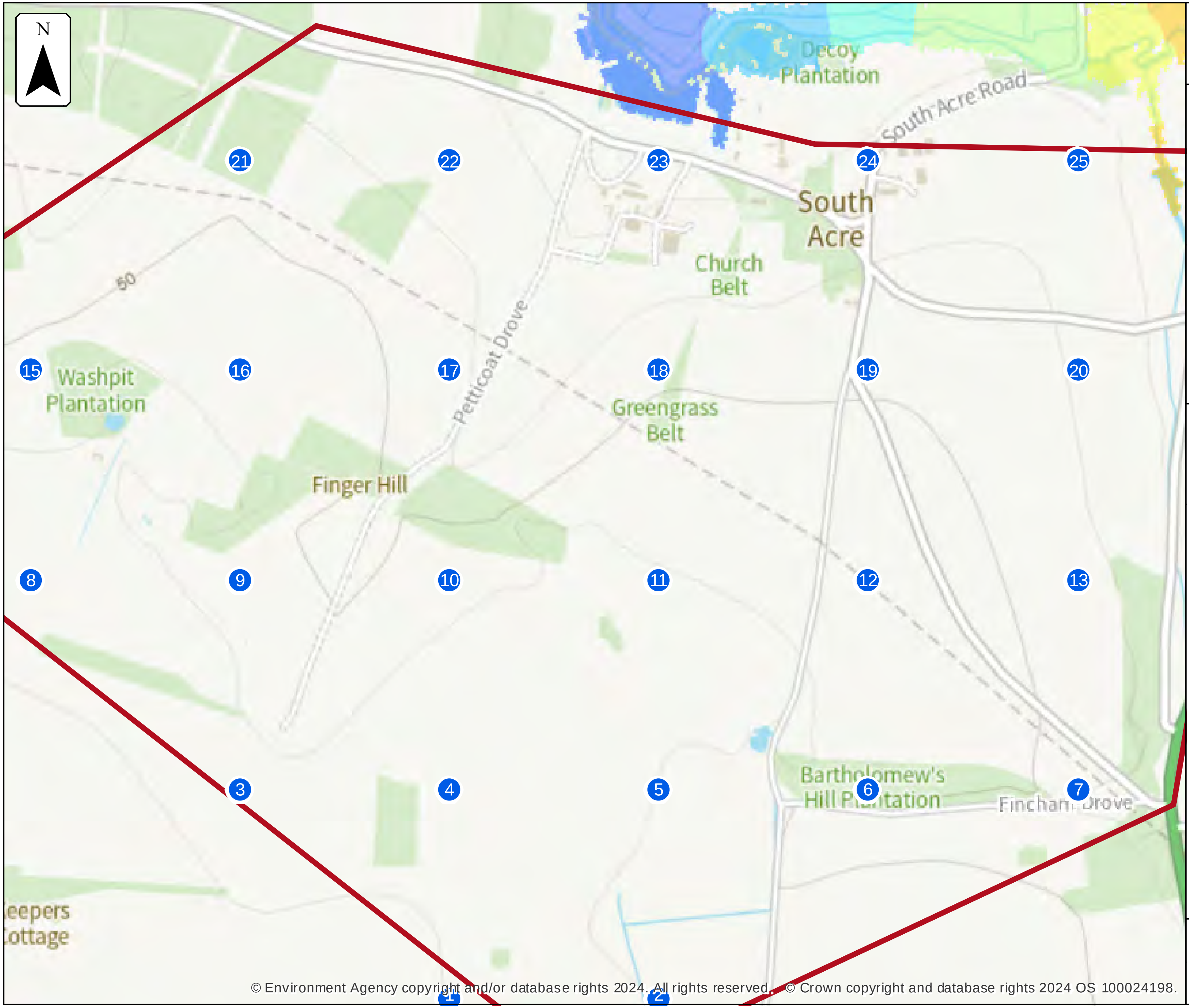
— Main river

Modelled flood extent

🟩 1.0% AEP (+20%)

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defended modelled fluvial extent and height

Location (easting/northing)
580678/313731

Scale
1:10,000

Created
2 Sep 2024

Model name
EAn EasternRivers UpperNar MP7 2015

▭ Selected area

— Main river

Modelled 2D grid

Water level in mAOD

🟦 0 - 25.0
🟦 25.0 - 25.375
🟦 25.375 - 25.75
🟦 25.75 - 26.125
🟩 26.125 - 26.5
🟨 26.5 - 26.875
🟨 26.875 - 27.25
🟧 27.25 - 27.625
🟥 27.625 - 28.0

This map shows the 0.1% AEP height data

0 100 200 300 400 500
metres

Sample point data

Defended

Label	Easting	Northing	5% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth
1	580395	312767	NoData	NoData	NoData	NoData	NoData	NoData
2	580803	312767	NoData	NoData	NoData	NoData	NoData	NoData
3	579987	313175	NoData	NoData	NoData	NoData	NoData	NoData
4	580395	313175	NoData	NoData	NoData	NoData	NoData	NoData
5	580803	313175	NoData	NoData	NoData	NoData	NoData	NoData
6	581211	313175	NoData	NoData	NoData	NoData	NoData	NoData
7	581619	313175	NoData	NoData	NoData	NoData	NoData	NoData
8	579579	313583	NoData	NoData	NoData	NoData	NoData	NoData
9	579987	313583	NoData	NoData	NoData	NoData	NoData	NoData
10	580395	313583	NoData	NoData	NoData	NoData	NoData	NoData
11	580803	313583	NoData	NoData	NoData	NoData	NoData	NoData
12	581211	313583	NoData	NoData	NoData	NoData	NoData	NoData
13	581619	313583	NoData	NoData	NoData	NoData	NoData	NoData
14	579171	313991	NoData	NoData	NoData	NoData	NoData	NoData
15	579579	313991	NoData	NoData	NoData	NoData	NoData	NoData
16	579987	313991	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	5% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth
17	580395	313991	NoData	NoData	NoData	NoData	NoData	NoData
18	580803	313991	NoData	NoData	NoData	NoData	NoData	NoData
19	581211	313991	NoData	NoData	NoData	NoData	NoData	NoData
20	581619	313991	NoData	NoData	NoData	NoData	NoData	NoData
21	579987	314399	NoData	NoData	NoData	NoData	NoData	NoData
22	580395	314399	NoData	NoData	NoData	NoData	NoData	NoData
23	580803	314399	NoData	NoData	NoData	NoData	NoData	NoData
24	581211	314399	NoData	NoData	NoData	NoData	NoData	NoData
25	581619	314399	NoData	NoData	NoData	NoData	NoData	NoData
26	582027	314399	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			0.89	0.95	0.97	0.99	1.04	1.16

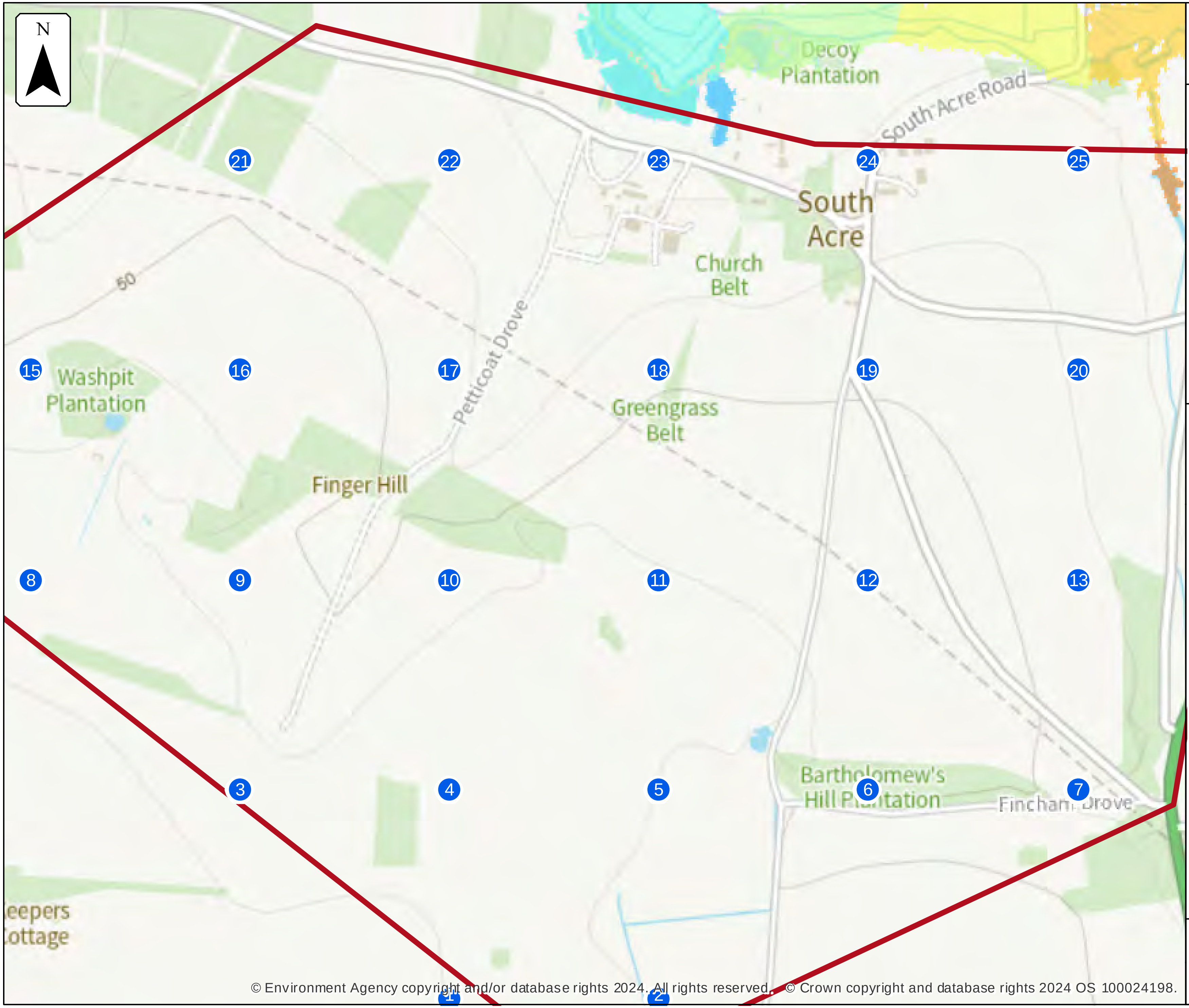
Data in this table comes from the EAn EasternRivers UpperNar MP7 2015 model.
Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
If no height or depth data is available for a scenario, no table will be shown.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Defended

Label	Easting	Northing	5% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height
1	580395	312767	NoData	NoData	NoData	NoData	NoData	NoData
2	580803	312767	NoData	NoData	NoData	NoData	NoData	NoData
3	579987	313175	NoData	NoData	NoData	NoData	NoData	NoData
4	580395	313175	NoData	NoData	NoData	NoData	NoData	NoData
5	580803	313175	NoData	NoData	NoData	NoData	NoData	NoData
6	581211	313175	NoData	NoData	NoData	NoData	NoData	NoData
7	581619	313175	NoData	NoData	NoData	NoData	NoData	NoData
8	579579	313583	NoData	NoData	NoData	NoData	NoData	NoData
9	579987	313583	NoData	NoData	NoData	NoData	NoData	NoData
10	580395	313583	NoData	NoData	NoData	NoData	NoData	NoData
11	580803	313583	NoData	NoData	NoData	NoData	NoData	NoData
12	581211	313583	NoData	NoData	NoData	NoData	NoData	NoData
13	581619	313583	NoData	NoData	NoData	NoData	NoData	NoData
14	579171	313991	NoData	NoData	NoData	NoData	NoData	NoData
15	579579	313991	NoData	NoData	NoData	NoData	NoData	NoData
16	579987	313991	NoData	NoData	NoData	NoData	NoData	NoData
17	580395	313991	NoData	NoData	NoData	NoData	NoData	NoData
18	580803	313991	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	5% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height
19	581211	313991	NoData	NoData	NoData	NoData	NoData	NoData
20	581619	313991	NoData	NoData	NoData	NoData	NoData	NoData
21	579987	314399	NoData	NoData	NoData	NoData	NoData	NoData
22	580395	314399	NoData	NoData	NoData	NoData	NoData	NoData
23	580803	314399	NoData	NoData	NoData	NoData	NoData	NoData
24	581211	314399	NoData	NoData	NoData	NoData	NoData	NoData
25	581619	314399	NoData	NoData	NoData	NoData	NoData	NoData
26	582027	314399	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			27.07	27.10	27.10	27.10	27.13	27.14

Data in this table comes from the EAn EasternRivers UpperNar MP7 2015 model.
Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
If no height or depth data is available for a scenario, no table will be shown.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.



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Environment Agency

Defended climate change modelled fluvial extent and height

Location (easting/northing)
580678/313731

Scale	Created
1:10,000	**2 Sep 2024**

Model name
EAn EasternRivers UpperNar MP7 2015

🟥 Selected area

— Main river

Modelled 2D grid

Water level in mAOD

🟦	0 - 24.0
🟦	24.0 - 24.5
🟦	24.5 - 25.0
🟦	25.0 - 25.5
🟩	25.5 - 26.0
🟨	26.0 - 26.5
🟨	26.5 - 27.0
🟧	27.0 - 27.5
🟥	27.5 - 28.0

This map shows the
1.0% AEP +20% height data

Sample point data

Defended climate change

Label	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
			Depth	**Height**
1	580395	312767	NoData	NoData
2	580803	312767	NoData	NoData
3	579987	313175	NoData	NoData
4	580395	313175	NoData	NoData
5	580803	313175	NoData	NoData
6	581211	313175	NoData	NoData
7	581619	313175	NoData	NoData
8	579579	313583	NoData	NoData
9	579987	313583	NoData	NoData
10	580395	313583	NoData	NoData
11	580803	313583	NoData	NoData
12	581211	313583	NoData	NoData
13	581619	313583	NoData	NoData
14	579171	313991	NoData	NoData
15	579579	313991	NoData	NoData
16	579987	313991	NoData	NoData

Label	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
			Depth	Height
17	580395	313991	NoData	NoData
18	580803	313991	NoData	NoData
19	581211	313991	NoData	NoData
20	581619	313991	NoData	NoData
21	579987	314399	NoData	NoData
22	580395	314399	NoData	NoData
23	580803	314399	NoData	NoData
24	581211	314399	NoData	NoData
25	581619	314399	NoData	NoData
26	582027	314399	NoData	NoData
Max value in selected area:			1.07	27.19

Data in this table comes from the EAn EasternRivers UpperNar MP7 2015 model.
Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
If no height or depth data is available for a scenario, no table will be shown.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

Your Lead Local Flood Authority is Breckland.

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

Find out more about flood risk activity permits

Help and advice

Contact the East Anglia Environment Agency team at enquiries_eastanglia@environment-agency.gov.uk for:

- more information about getting a product 5, 6, 7 or 8
- general help and advice about the site you're requesting data for

Annex B: Infiltration Testing

Environmental
Geotechnical
Specialists

RGS

SOAKAWAY
LETTER
REPORT

job number	C5239/25/E/8044	date	06.08.2025

site address
Swaffham Road,
Swaffham,
Norfolk,
PE37 7HY

written by	[redacted]	checked by	[redacted]

issued by [redacted]

Please consider the environment before printing this report.

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<ENVIRONMENTAL><GEOTECHNICAL>

Contents

Appendices

Report on Soakaway Testing

Location:	**Swaffham Road** Swaffham, Norfolk, PE37 7HY		
For:	Raincloud Consulting Ltd		
Report No.	C5239/25/E/8044	Report Date:	August 2025

For and on behalf of **Rogers Geotechnical Services Ltd**

[redacted]	[redacted]
[redacted] Geo-environmental Technician	[redacted] Engineering Director

Report Summary[1]

Item	**Comments**	**Section**
Geology	Superficial Geology – Lowestoft Formation Bedrock Geology – White Chalk Subgroup	4.
Strata Conditions	Topsoil overlying silty, gravelly sand representative of the Lowestoft Formation and weathered White Chalk Subgroup.	5.
Groundwater	No groundwater strikes recorded during investigation.	5.
Suitability of Soakaways	Strata appears suitable for soakaways. However, caution recommended due to the risk of dissolution features associated with the White Chalk Subgroup.	7.

---

[1] This summary should not be relied upon to provide a comprehensive review. All of the information contained in this document should be considered.

1. Introduction

We thank you for your request to undertake percolation testing at the above-mentioned site and take pleasure in enclosing the results of this work. The RGS crew were mobilised to site on the 29th of July, with the bulk of the investigation undertaken on the 30th and the 31st July, with reinstatement and demobilisation completed on the 1st of August. This report describes the work undertaken, presents the data obtained and discusses the results of the tests

2. Limitations

The recommendations made and opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between trial pit positions, these are for guidance only and no liability can be accepted for their accuracy.

This report has been prepared in accordance with our understanding of current best practice. However, new information or legislation, or changes to best practice may necessitate revision of the report after the date of issue.

3. Fieldworks

Nine trial pits were excavated in order to undertake soakaway testing, the positions of which are shown in Appendix 1. It should be appreciated that some trial pits were terminated after 1 or 2 tests due to ground conditions and time constraints. The soakaway tests were undertaken at the base of the pit at depths rational to the construction of soakaways. The soils exposed in the trial pits were logged on site in general accordance with BS5930: 2015 +A1: 2020, and full descriptions are given on the trial pit records which are presented in Appendix 2.

Once excavations were completed, the trial pits were carefully re-instated with the arisings. Whilst every care was taken during the infilling process, including compacting of the infill at regular intervals with the arm of the excavator, it should be appreciated that some mounding of the surface may have resulted. Moreover, the infilled soils may be subjected to settlement over time, such that a depression in the surface may also occur. Therefore, the locations of any pits undertaken in this investigation should be conveyed to the current site user, as the mounds or depressions associated with the pits may present a risk to current site operations. Furthermore, it must be realised that the infilled pits represent an area of disturbance within the site soils, thus the soils at the pit locations may vary characteristically compared to the undisturbed ground. As such, foundations placed in this disturbed material may not perform as anticipated.

4. Geology

The available published geological data for the site has been examined and the following table presents the anticipated geology.

Table 1: Geological Data for the Site

Strata Type	Strata Name[2]	Previous Name[3]	Description[3]
Superficial Geology	Lowestoft Formation	Lowestoft Till	The Lowestoft Formation forms an extensive sheet of chalky till, together with outwash sands and gravels, silts and clays.
Solid Geology	White Chalk Subgroup	Middle and Upper Chalk Undivided	Chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout.

5. Strata Conditions

In accordance with the geology of the area, the succession has been shown to include the following:

Table 2: Generalised Strata Profile

Depth m below ground level to underside of layer	**Strata Type**	**Positions Layer Revealed**	**Groundwater Strikes** m below ground level
0.30 – 0.40	TOPSOIL (Brown, silty, slightly gravely SAND)	All	None
1.00 – +1.60	Brown, silty, slightly gravelly SAND [LOWESTOFT FORMATION]	TP0-TP02, TP4, TP6-TP8	None
+1.40 – +1.45	Brown, brown, silty, slightly gravelly SAND [LOWESTOFT FORMATION]	TP0 & TP1	None
+1.35	White, locally light brown, silty, sandy GRAVEL [WEATHERED WHITE CHALK SUBGROUP]	TP2	None
+1.25 – +1.50	Light brown, silty, slightly gravelly SAND [WEATHERED WHITE CHALK SUBGROUP]	TP3, TP5 & TP6	None

’+’ denotes that the strata extended below the termination depth of the investigated positions, thus the extent of the deposit is only proven to the depths indicated.

It should be appreciated that the superficial Lowestoft Formation while not indicated to cover the entire site was present in a number of locations. This formation was present in all trial pits except TP2, TP3 and TP5. Indeed, it appears that these superficial deposits may be present in a crescent shape around the centre of the site.

---

[2] Sources: British Geological Survey (NERC) Map Sheets 160; Swaffham; Solid and Drift Edition, and Geology of Britain Viewer [*online resource from www.bgs.ac.uk*]

[3] Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [*online resource from www.bgs.ac.uk*]

6. Insitu Testing

6.1 Soakaway Test

The pit was trimmed and squared as much as practicable to avoid trial pit collapse. It was intended to achieve a depth of up to 2.0m before testing, however, competent ground resulted in shallower depths being achieved. Water was then introduced into the pit at a controlled rate to prevent collapse of the sides and the level monitored at time intervals relative to a reference bar at ground level. The results obtained from the soakaway tests are presented at Appendix 3 and are summarised below:

Table 3: Soakaway Test Results

Location	Soakage Area Dimensions (average) (m)	Depths of soaked strata (m)	Soil Description (of soaked strata)	Infiltration Rate (m/sec)	*Drainage Characteristics
TP0	0.3 x 1.7	1.00 to 1.45	Side – Clayey, silty, slightly gravelly SAND Base – *As above*	3.0×10^{-5} 1.6×10^{-5}	Good
TP1	0.3 x 1.5	0.87 to 1.40	Side – Clayey, silty, slightly gravelly SAND Base – *As above*	N/A	Practically impermeable
TP2	0.3 x 1.35	0.96 to 1.35	Side – Silty, sandy GRAVEL Base – As above	2.5 x 10-4 1.1 x 10-4 9.8 x 10-5	Good
TP3	0.3 x 1.4	0.94 to 1.25	Side – Silty, slightly gravelly SAND Base – *As above*	2.4 x 10-5 1.2 x 10 -5	Good
TP4	0.3 x 1.7	1.10 to 1.50	Side – Silty, slightly gravelly SAND Base – *As above*	3.1 x 10-5 3.4 x 10-5 2.1 x 10-5	Good
TP5	0.3 x 1.4	1.04 to 1.50	Side – Silty, slightly gravelly SAND Base – *As above*	1.4 x 10-5 1.7 x 10-4 9.6 x 10-5	Good
TP6	0.3 x 1.5	1.22 to 1.45	Side – Silty, slightly gravelly SAND Base – *As above*	1.3 x 10-3 6.2 x 10-4 9.8 x 10-4	Good
TP7	0.3 x 1.5	1.02 to 1.35	Side – Silty, slightly gravelly SAND Base – *As above*	1.6 x 10-3 3.9 x 10-4 1.3 x 10-4	Good
TP8	0.3 x 1.5	1.31 to 1.60	Side – Silty, slightly gravelly SAND Base – *As above*	1.5 x 10-5 1.7 x 10-5	Good

*Based on the most onerous results for each test.

During the soakaway test within TP1, the water level did not achieve a fall from 75% to 25% of the effective depth of the storage volume. It is considered that the initial movement was observed as water filling any gaps and fissures within the granular material at the side of the pit. On this basis, the test could not be completed within the scope of the method provided in BRE Digest 365 due to the poor soakage rate of the exposed soils within this particular trial pit. Due to the negligible water movement it was not possbile to extrapolate the results obtained in order to obtain a soil infiltration rate.

All other tests at the remaining locations were carried out successfully as the water level achieved a fall from 75% to 25% of the effective depth of the storage volume. It should be appreciated that it was not possible to carry out three rounds of testing within all trial pits due to time constraints.

7. Discussion

The soils encountered beneath the topsoil were found to be typical of the superficial Lowestoft Formation and the weathered fraction of the underlying White Chalk Subgroup. As demonstrated in Section 5 above, the superficial soils are locally absent. However, subsequent drainage characteristics appear to be comparable across the site, with the exception of the in the area of TP1 where the soil appeared to be more clayey. In this instance, the infiltration testing has revealed that the soils have good drainage characteristics.

It should be appreciated that incredibly fast soakage rates were noted within trial pits TP2, TP6 and TP7. These soakage rates are attributed to fractures within the White Chalk Subgroup. The drainage designers must appreciate that such fractures within the White Chalk Subgroup can sometimes be associated with, or lead to the development of, dissolution features. For instance, LiDAR scans of the local area appear to show surface depressions, possibly associated with sinkholes that are caused by dissolution features. As such, whilst the granular soils at the near surface have demonstrated good drainage characteristics, soakaways should be treated with caution due to the risk of causing further dissolution features via the adding of water to the ground through a soakaway. It may be reasoned that the proposed development is relatively low risk, but the potential for surface depressions should still be considered. Should the drainage area be spread over a larger area than necessary, this would allow the discharge of water to dissipate, thus reducing the risk.

8. References

- Building Research Establishment (BRE) Digest 365, *Soakaway Design*, September 1991.
- British Standards Institution (2015 +A1: 2020) BS 5930: *Code of practice for ground investigations*, B.S.I., London.
- Barnes, G. (2000). *Soil Mechanics Principle and Practice.* 2nd ed. London: Macmillan Press Ltd, p.47.

Appendix 1

Site Plan

Notes:

Environmental
Geotechnical
Specialists

Rogers Geotechnical Services Ltd

Offices 1 & 2, Barncliffe
Business Park,
Near Bank,
Shelley,
Huddersfield,
HD8 8LU

Telephone: 0843 50 66 87
www.rogersgeotech.co.uk

Client:

Raincloud Consulting Ltd

Job Number:

C5239/25/E/8044

Project Details:

Swaffham Road, Swaffham,
Norfolk, PE37 7HY

Scale: Not to scale - reference only

Appendix 2

Trial Pit Records and Photographs

Trial Pit Log

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Trialpit No **TP0** Sheet 1 of 1
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.7 × 0.3 Depth 1.45	Date 31/07/2025
Client: Raincloud Consulting Ltd			Scale 1:25 Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.00		▨	Brown, silty, slightly gravelly, fine to coarse SAND with low cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
				1.45		▨	Brown, clayey, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
							End of pit at 1.45 m

Remarks:

Stability: Stable

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Trial Pit Log

Trialpit No	**TP1**
Sheet 1 of 1	
Project Name:	Swaffham Road
Project No.	C5239/25/E/8044
Co-ords:	-
Level:	
Date	31/07/2025
Location:	Swaffham, Norfolk, PE37 7HY
Dimensions (m):	1.5 × 0.3
Depth	1.40
Scale	1:25
Client:	Raincloud Consulting Ltd
Logged	SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.00		▨	Brown, silty, slightly gravelly, fine to coarse SAND with low cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
				1.40		▨	Brown, clayey, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint. [LOWESTOFT FORMATION]
							End of pit at 1.40 m

Remarks:

Stability: Stable

Trial Pit Log

Trialpit No
TP2
Sheet 1 of 1

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Date 30/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.35 × 0.3 Depth 1.35	Scale 1:25
Client: Raincloud Consulting Ltd			Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.35		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.35		░	White, locally light brown, silty,, sandy, sub-angular to sub-rounded and fine to coarse GRAVEL of chalk and flint with moderate cobble content and low boulder content. Sand is fine to coarse. Cobbles are sub-angular to sub-rounded of chalk and flint. Boulders are sub-angular to sub-rounded of flint. [WEATHERED WHITE CHALK SUBGROUP]
							End of pit at 1.35 m

Remarks:

Stability: Stable

Environmental
Geotechnical
Specialists

Trial Pit Log

Trialpit No
TP3
Sheet 1 of 1

Project Name: Swaffham Road
Project No. C5239/25/E/8044
Co-ords: -
Level:
Date 30/07/2025

Location: Swaffham, Norfolk, PE37 7HY
Dimensions (m): 1.4 0.3
Depth 1.25
Scale 1:25

Client: Raincloud Consulting Ltd
Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.25		▒	Light brown, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of chalk and flint. Cobbles are sub-angular to sub-rounded of chalk and flint. [WEATHERED WHITE CHALK SUBGROUP]
							End of pit at 1.25 m

1
2
3
4
5

Remarks:

Stability: Stable

Trial Pit Log

Trialpit No
TP4
Sheet 1 of 1

Project Name: Swaffham Road
Project No. C5239/25/E/8044
Co-ords: -
Level:
Date 30/07/2025

Location: Swaffham, Norfolk, PE37 7HY
Dimensions (m): 1.7 × 0.3
Depth 1.50
Scale 1:25

Client: Raincloud Consulting Ltd
Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.50		░	Brown, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
							End of pit at 1.50 m

1
2
3
4
5

Remarks:

Stability: Stable

Trial Pit Log

Trialpit No
TP5
Sheet 1 of 1

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Date 30/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.4 × 0.3 Depth 1.50	Scale 1:25
Client: Raincloud Consulting Ltd			Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.50		⁙	Light brown, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of chalk and flint. Cobbles are sub-angular to sub-rounded of chalk and flint. [WEATHERED WHITE CHALK SUBGROUP]
							End of pit at 1.50 m

Remarks:

Stability: Stable

Trial Pit Log

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Trialpit No **TP6** Sheet 1 of 1 Date 30/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.5 × 0.3 Depth 1.45	Scale 1:25
Client: Raincloud Consulting Ltd			Logged SH

Water Strike	**Samples and In Situ Testing**			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.35		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.35		▨	Brown, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
				1.45		▨	Light brown, silty, slightly gravelly, fine to coarse SAND with low cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of chalk and flint. Cobbles are sub-angular to sub-rounded of chalk and flint. [WEATHERED WHITE CHALK SUBGROUP]

End of pit at 1.35 m

Remarks:

Stability: Stable

Trial Pit Log

Trialpit No
TP7
Sheet 1 of 1

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Date 31/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.5 × 0.3 Depth 1.35	Scale 1:25
Client: Raincloud Consulting Ltd			Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.35		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.35		⁙	Brown, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]

End of pit at 1.35 m

Remarks:

Stability: Stable

Trial Pit Log

Trialpit No
TP8
Sheet 1 of 1

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Date 31/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.5 × 0.3 Depth 1.60	Scale 1:25
Client: Raincloud Consulting Ltd			Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.60		▒	Brown, silty, slightly gravelly, fine to coarse SAND with low cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
							End of pit at 1.60 m

Remarks:

Stability: Stable

Photo 1: TP0

Photo 2: TP2

Environmental
Geotechnical
Specialists

Site Name:

Swaffham Road

Job No:

C5239/25/E/8044

t. 0843 50 666 87

www.rogersgeotech.co.uk

Photo 1: TP3

Photo 2: TP4

Environmental Geotechnical Specialists	Site Name: **Swaffham Road**	Job No: **C5239/25/E/8044**	**t. 0843 50 666 87** www.rogersgeotech.co.uk

Photo 1: TP5

Photo 2: TP6

Environmental
Geotechnical
Specialists

Site Name:

Swaffham Road

Job No:

C5239/25/E/8044

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Photo 1: TP7

Photo 2: TP8

Environmental
Geotechnical
Specialists

Site Name:

Swaffham Road

Job No:

C5239/25/E/8044

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Appendix 3

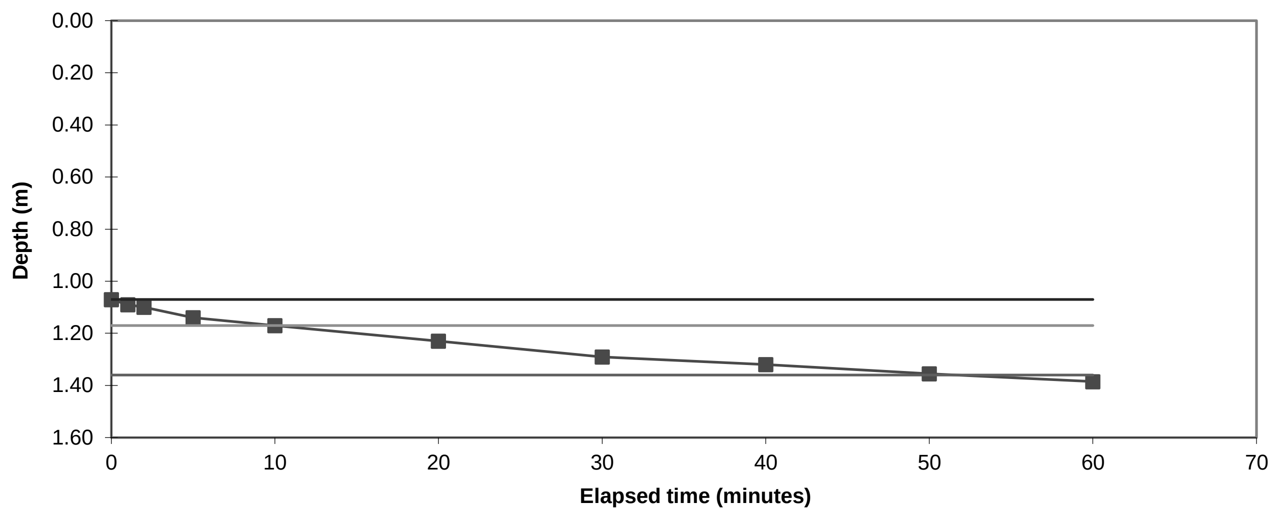
Soakaway Results

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP0
Test No: 1
Date: 31.07.2025
Length (m): 1.700
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.45
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.070		
1	1.090		
2	1.100		
5	1.140		
10	1.170		
20	1.230		
30	1.290		
40	1.320		
50	1.355		
60	1.385		



Start water depth for analysis (mbgl): 1.07
75% effective depth (mbgl): 1.17 Elapsed time (mins): 10.0
50% effective depth (mbgl): 1.26
25% effective depth (mbgl): 1.36 Elapsed time (mins): 51.7
Base of soakage zone (mbgl): 1.45

Volume outflow between 75% and 25% effective depth (m³): 0.097
Mean surface area of outflow (m^2): 1.27
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 41.7

Soil infiltration rate (m/s):	**3.0E-5**

Remarks Results processed following BRE 365 (2007).

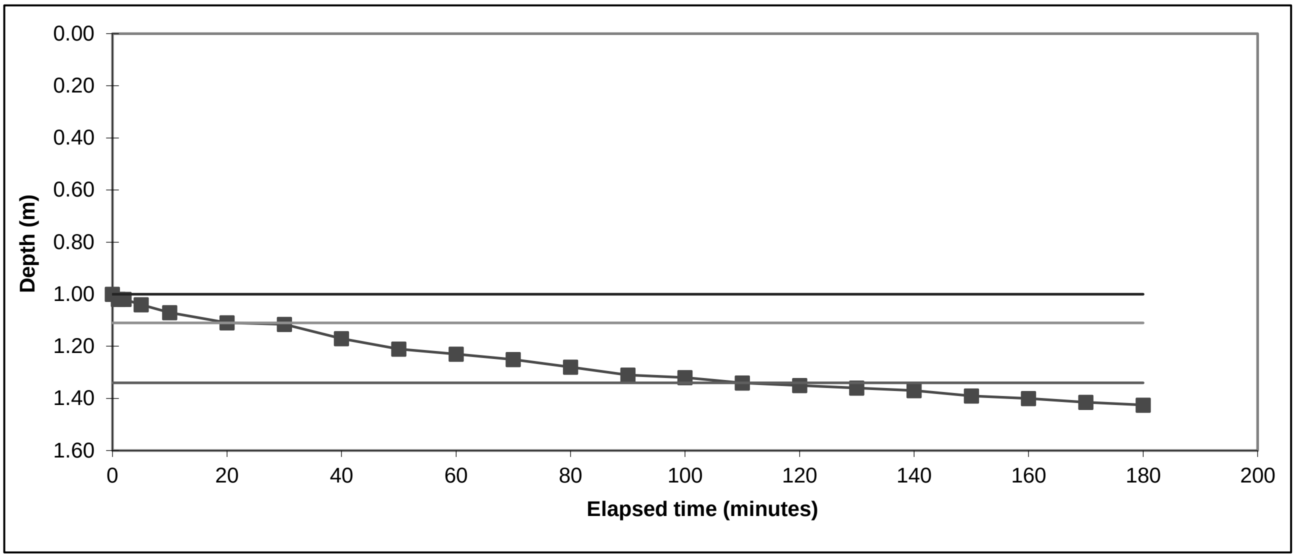
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP0
Test No: 2
Date: 31.07.2025
Length (m): 1.700
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.45
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.000	110	1.340
1	1.020	120	1.350
2	1.020	130	1.360
5	1.040	140	1.370
10	1.070	150	1.390
20	1.110	160	1.400
30	1.115	170	1.415
40	1.170	180	1.425
50	1.210		
60	1.230		
70	1.250		
80	1.280		
90	1.310		
100	1.320		



Start water depth for analysis (mbgl): 1.00
75% effective depth (mbgl): 1.11 — Elapsed time (mins): 20.0
50% effective depth (mbgl): 1.23
25% effective depth (mbgl): 1.34 — Elapsed time (mins): 110.0
Base of soakage zone (mbgl): 1.45

Volume outflow between 75% and 25% effective depth (m³): 0.117
Mean surface area of outflow (m^2): 1.39
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 90.0

Soil infiltration rate (m/s):	**1.6E-5**

Remarks Results processed following BRE 365 (2007).

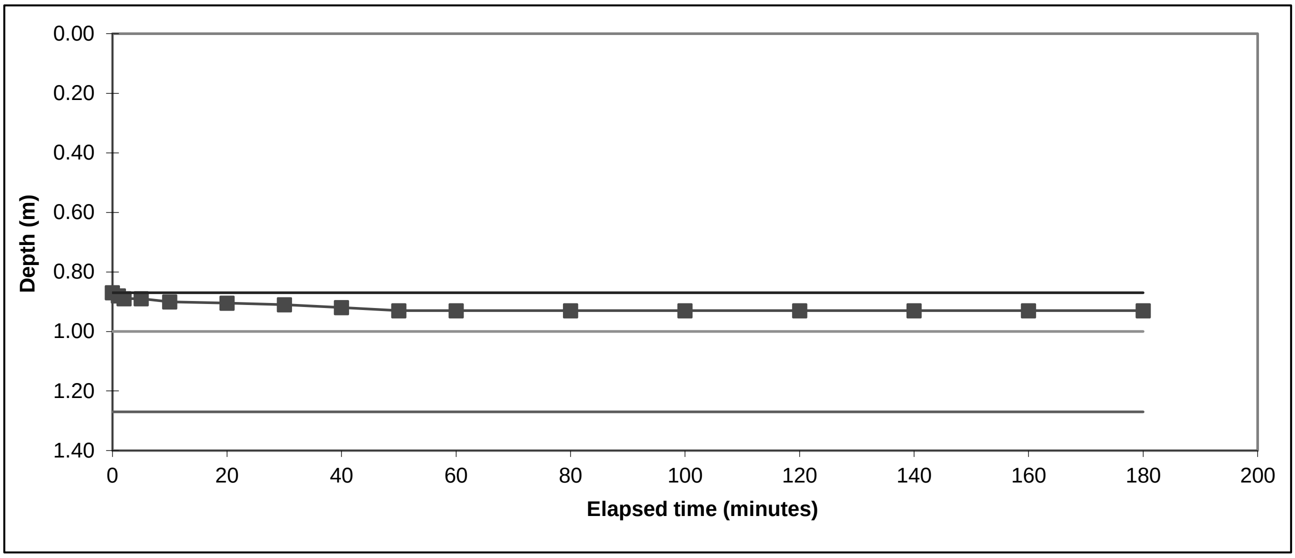
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP1
Test No: 1
Date: 31.07.2025
Length (m): 1.500
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.40
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.870	160	0.930
1	0.880	180	0.930
2	0.890		
5	0.890		
10	0.900		
20	0.905		
30	0.910		
40	0.920		
50	0.930		
60	0.930		
80	0.930		
100	0.930		
120	0.930		
140	0.930		



Start water depth for analysis (mbgl):	0.87		
75% effective depth (mbgl):	1.00	Elapsed time (mins):	#N/A
50% effective depth (mbgl):	1.14		
25% effective depth (mbgl):	1.27	Elapsed time (mins):	#N/A
Base of soakage zone (mbgl):	1.40		

Volume outflow between 75% and 25% effective depth (m³):
Mean surface area of outflow (m^2): 1.39
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins):

Soil infiltration rate (m/s):	**Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.**

Remarks
Results processed following BRE 365 (2007).
Ground appears to be practically impermeable.

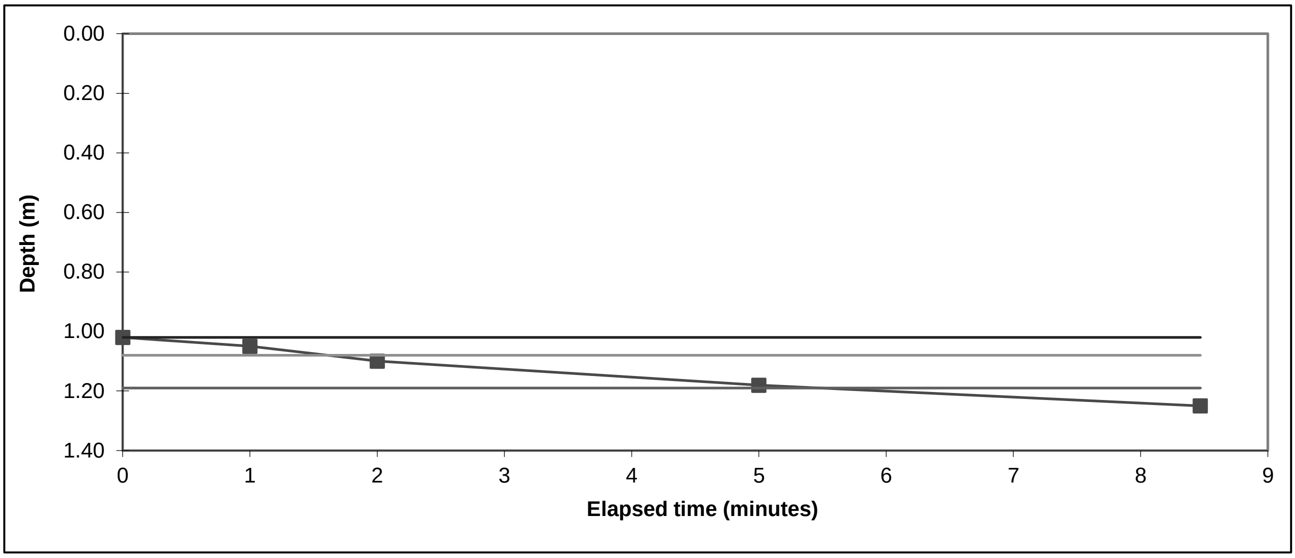
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP2	Test No:	1	Date:	30.07.2025
Length (m):	1.350	Datum Height:	0.00	m agl	
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.25	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.020		
1	1.050		
2	1.100		
5	1.180		
8.47	1.250		



Start water depth for analysis (mbgl):	1.02		
75% effective depth (mbgl):	1.08	Elapsed time (mins):	1.6
50% effective depth (mbgl):	1.14		
25% effective depth (mbgl):	1.19	Elapsed time (mins):	5.5
Base of soakage zone (mbgl):	1.25		

Volume outflow between 75% and 25% effective depth (m³): 0.045

Mean surface area of outflow (m^2): 0.77
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 3.9

Soil infiltration rate (m/s):	**2.5E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain out into a sinkhole. New base of pit due to silt and sand settlement.

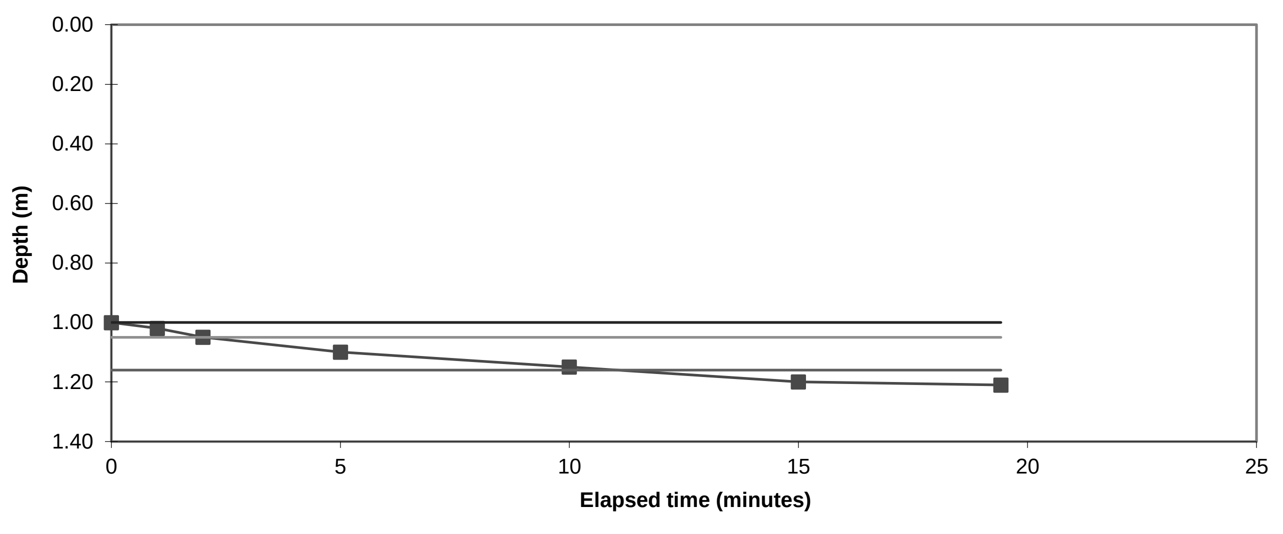
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP2
Test No: 2
Date: 30.07.2025
Length (m): 1.350
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.21
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.000		
1	1.020		
2	1.050		
5	1.100		
10	1.150		
15	1.200		
19.42	1.210		



Start water depth for analysis (mbgl):	1.00		
75% effective depth (mbgl):	1.05	Elapsed time (mins):	2.0
50% effective depth (mbgl):	1.11		
25% effective depth (mbgl):	1.16	Elapsed time (mins):	11.0
Base of soakage zone (mbgl):	1.21		

Volume outflow between 75% and 25% effective depth (m³): 0.045
Mean surface area of outflow (m^2): 0.74
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 9.0

Soil infiltration rate (m/s):	**1.1E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain out into a sinkhole. New base of pit due to silt and sand settlement.

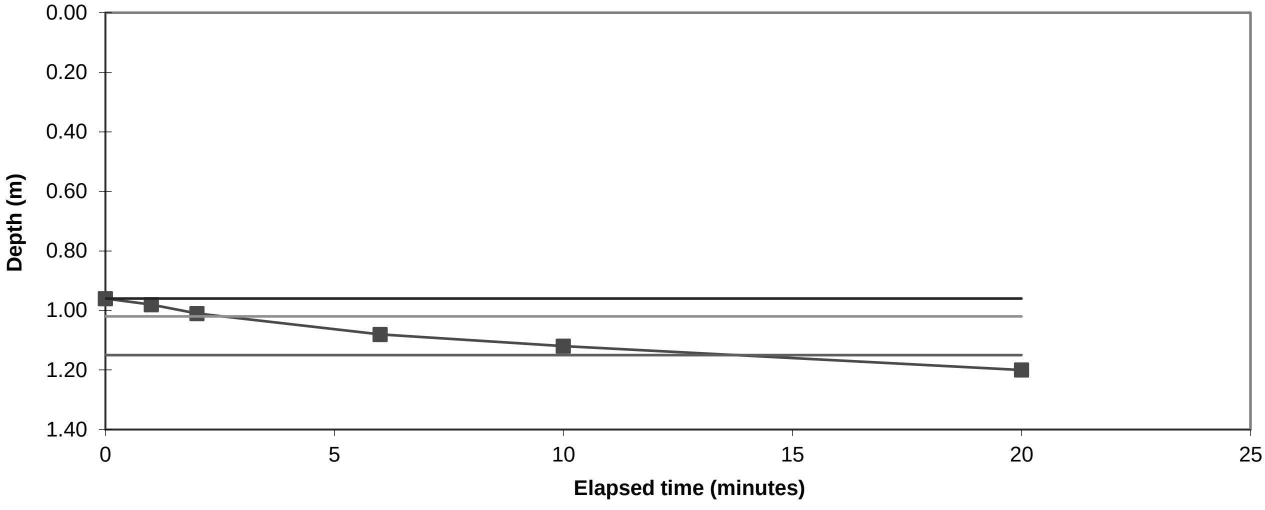
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP2	Test No:	3	Date:	30.07.2025
Length (m):	1.350	Datum Height:	0.00	m agl	
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.21	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.960		
1	0.980		
2	1.010		
6	1.080		
10	1.120		
20	1.200		



Start water depth for analysis (mbgl):	0.96		
75% effective depth (mbgl):	1.02	Elapsed time (mins):	2.6
50% effective depth (mbgl):	1.09		
25% effective depth (mbgl):	1.15	Elapsed time (mins):	13.8
Base of soakage zone (mbgl):	1.21		

Volume outflow between 75% and 25% effective depth (m³): 0.053

Mean surface area of outflow (m^2): 0.80
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 11.2

Soil infiltration rate (m/s):	**9.8E-5**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain out into a sinkhole.

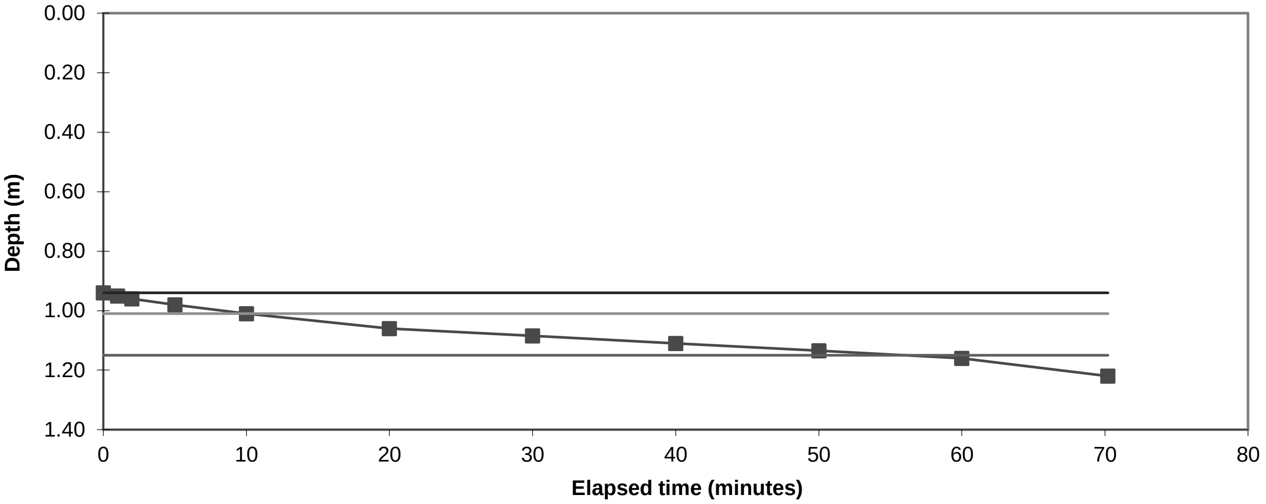
Client:	Raincloud Consulting Ltd	**Job No:**	
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044	

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP3
Test No: 1
Date: 30.07.2025
Length (m): 1.400
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.22
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.940		
1	0.950		
2	0.960		
5	0.980		
10	1.010		
20	1.060		
30	1.085		
40	1.110		
50	1.135		
60	1.160		
70.21	1.220		



Start water depth for analysis (mbgl):	0.94		
75% effective depth (mbgl):	1.01	Elapsed time (mins):	10.0
50% effective depth (mbgl):	1.08		
25% effective depth (mbgl):	1.15	Elapsed time (mins):	56.0
Base of soakage zone (mbgl):	1.22		

Volume outflow between 75% and 25% effective depth (m³): 0.059
Mean surface area of outflow (m^2): 0.90
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 46.0

Soil infiltration rate (m/s): **2.4E-5**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

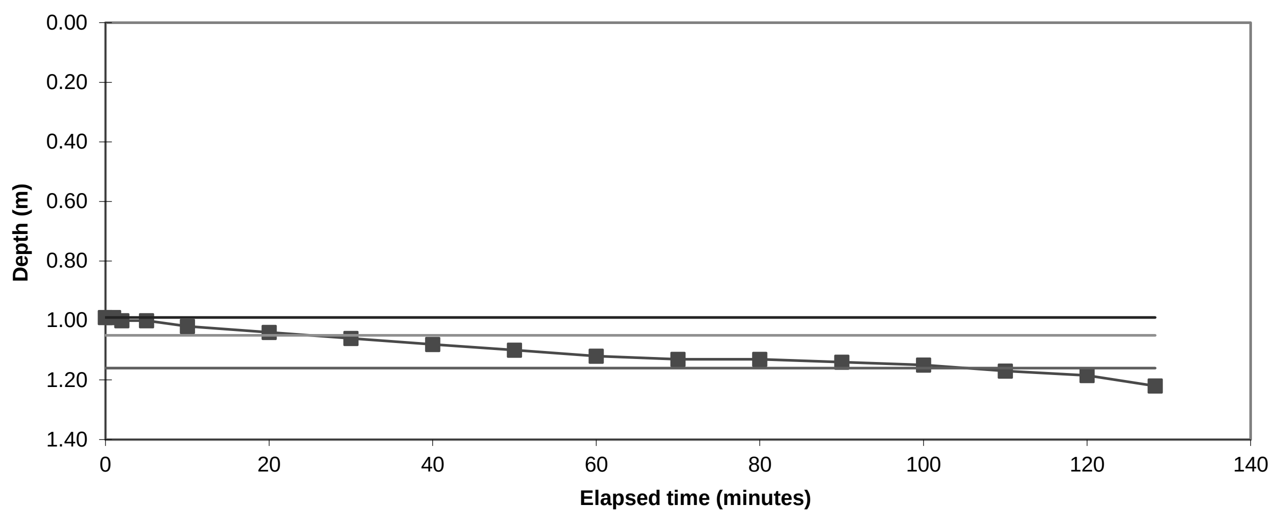
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP3
Test No: 2
Date: 30.07.2025
Length (m): 1.400
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.22
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.990	110	1.170
1	0.990	120	1.185
2	1.000	128.33	1.220
5	1.000		
10	1.020		
20	1.040		
30	1.060		
40	1.080		
50	1.100		
60	1.120		
70	1.130		
80	1.130		
90	1.140		
100	1.150		



Start water depth for analysis (mbgl): 0.99
75% effective depth (mbgl): 1.05 Elapsed time (mins): 25.0
50% effective depth (mbgl): 1.11
25% effective depth (mbgl): 1.16 Elapsed time (mins): 105.0
Base of soakage zone (mbgl): 1.22

Volume outflow between 75% and 25% effective depth (m³): 0.046
Mean surface area of outflow (m^2): 0.79
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 80.0

Soil infiltration rate (m/s): **1.2E-5**

Remarks Results processed following BRE 365 (2007).

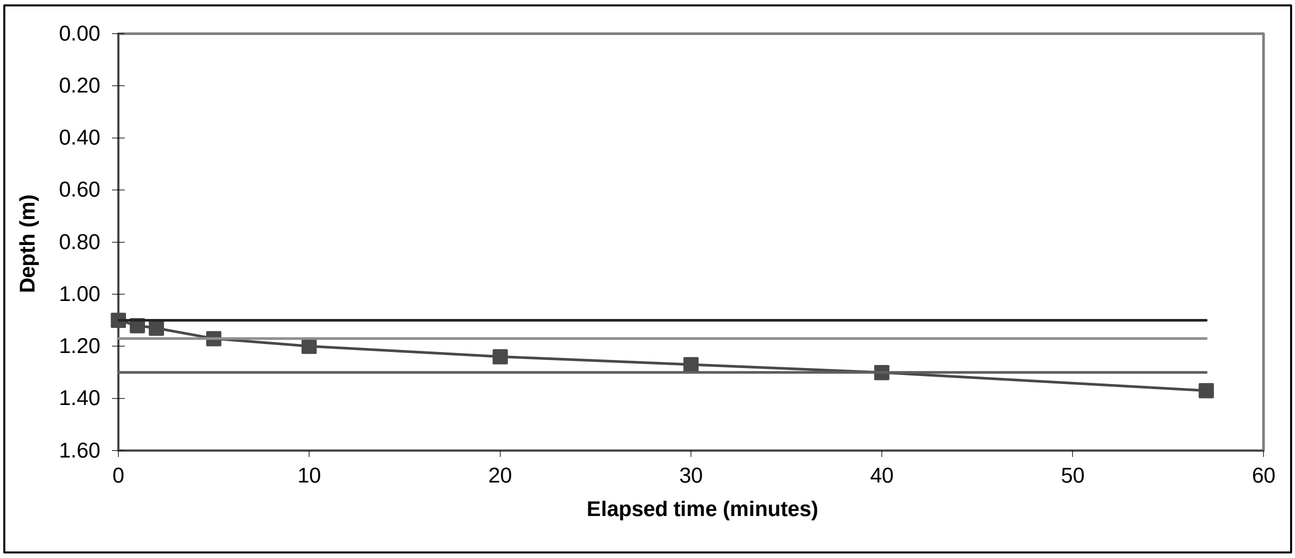
Client: Raincloud Consulting Ltd
Site: Swaffham Road, Swaffham, Norfolk, PE37 7HY
Job No: C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP4	Test No:	1	Date:	30.07.2025
Length (m):	1.700	Datum Height:	0.00 m agl		
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.37	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.100		
1	1.120		
2	1.130		
5	1.170		
10	1.200		
20	1.240		
30	1.270		
40	1.300		
57	1.370		



Start water depth for analysis (mbgl):	1.10		
75% effective depth (mbgl):	1.17	Elapsed time (mins):	5.0
50% effective depth (mbgl):	1.24		
25% effective depth (mbgl):	1.30	Elapsed time (mins):	40.0
Base of soakage zone (mbgl):	1.37		

Volume outflow between 75% and 25% effective depth (m³): 0.066

Mean surface area of outflow (m^2): 1.03
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 35.0

Soil infiltration rate (m/s): **3.1E-5**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

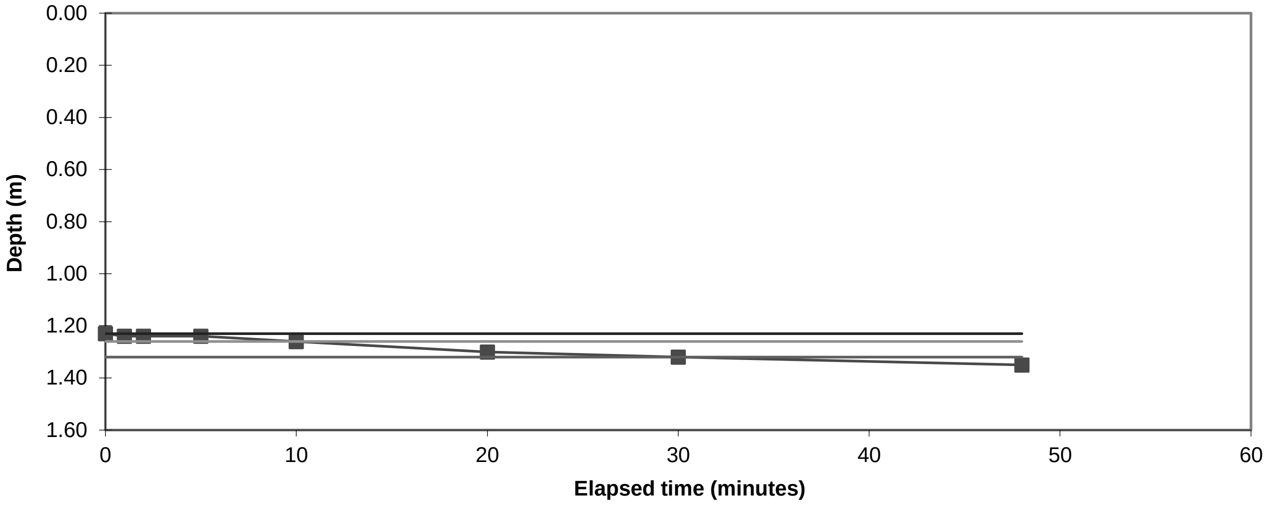
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP4
Test No: 2
Date: 30.07.2025
Length (m): 1.700
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.35
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.230		
1	1.240		
2	1.240		
5	1.240		
10	1.260		
20	1.300		
30	1.320		
48	1.350		



Start water depth for analysis (mbgl):	1.23		
75% effective depth (mbgl):	1.26	Elapsed time (mins):	10.0
50% effective depth (mbgl):	1.29		
25% effective depth (mbgl):	1.32	Elapsed time (mins):	30.0
Base of soakage zone (mbgl):	1.35		

Volume outflow between 75% and 25% effective depth (m³): 0.031
Mean surface area of outflow (m^2): 0.75
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 20.0

Soil infiltration rate (m/s): **3.4E-5**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

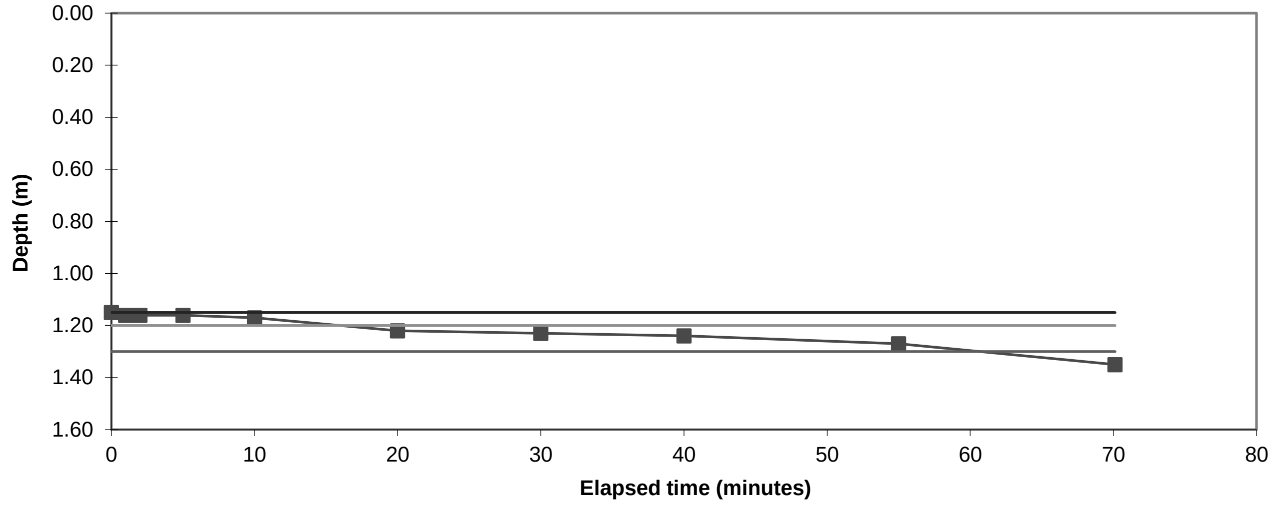
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP4
Test No: 3
Date: 30.07.2025
Length (m): 1.700
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.35
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.150		
1	1.160		
2	1.160		
5	1.160		
10	1.170		
20	1.220		
30	1.230		
40	1.240		
55	1.270		
70.12	1.350		



Start water depth for analysis (mbgl):	1.15		
75% effective depth (mbgl):	1.20	Elapsed time (mins):	16.0
50% effective depth (mbgl):	1.25		
25% effective depth (mbgl):	1.30	Elapsed time (mins):	60.7
Base of soakage zone (mbgl):	1.35		

Volume outflow between 75% and 25% effective depth (m³): 0.051
Mean surface area of outflow (m^2): 0.91
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 44.7

Soil infiltration rate (m/s): **2.1E-5**

Remarks Results processed following BRE 365 (2007).

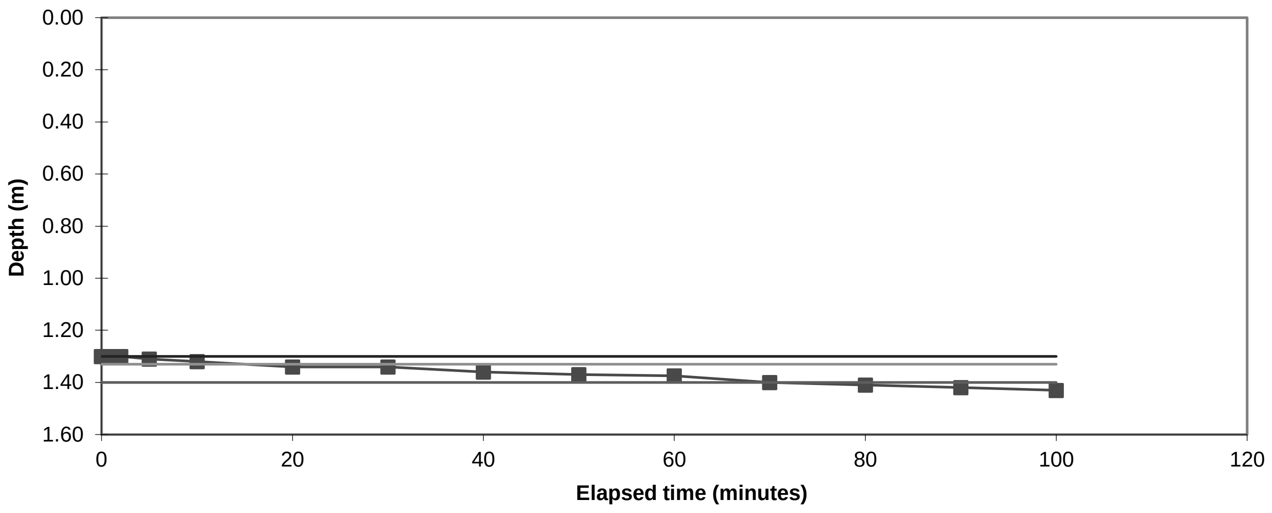
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP5
Test No: 1
Date: 30.07.2025
Length (m): 1.400
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.43
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.300		
1	1.300		
2	1.300		
5	1.310		
10	1.320		
20	1.340		
30	1.340		
40	1.360		
50	1.370		
60	1.375		
70	1.400		
80	1.410		
90	1.420		
100	1.430		



Start water depth for analysis (mbgl):	1.30		
75% effective depth (mbgl):	1.33	Elapsed time (mins):	15.0
50% effective depth (mbgl):	1.37		
25% effective depth (mbgl):	1.40	Elapsed time (mins):	70.0
Base of soakage zone (mbgl):	1.43		

Volume outflow between 75% and 25% effective depth (m³): 0.029
Mean surface area of outflow (m^2): 0.62
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 55.0

Soil infiltration rate (m/s): **1.4E-5**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

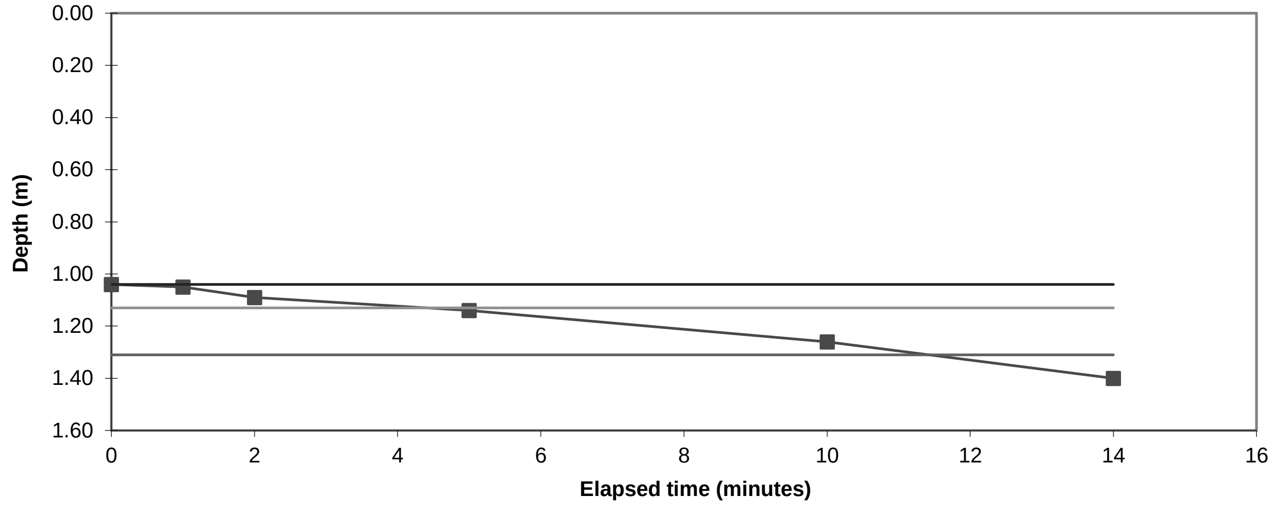
Client: Raincloud Consulting Ltd
Site: Swaffham Road, Swaffham, Norfolk, PE37 7HY
Job No: C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP5 Test No: 2 Date: 30.07.2025
Length (m): 1.400 Datum Height: 0.00 m agl
Width (m): 0.30 Granular infill: None
Depth (m): 1.40 Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.040		
1	1.050		
2	1.090		
5	1.140		
10	1.260		
14	1.400		



Start water depth for analysis (mbgl):	1.04		
75% effective depth (mbgl):	1.13	Elapsed time (mins):	4.4
50% effective depth (mbgl):	1.22		
25% effective depth (mbgl):	1.31	Elapsed time (mins):	11.4
Base of soakage zone (mbgl):	1.40		

Volume outflow between 75% and 25% effective depth (m³): 0.076
Mean surface area of outflow (m^2): 1.03
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 7.0

Soil infiltration rate (m/s):	**1.7E-4**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

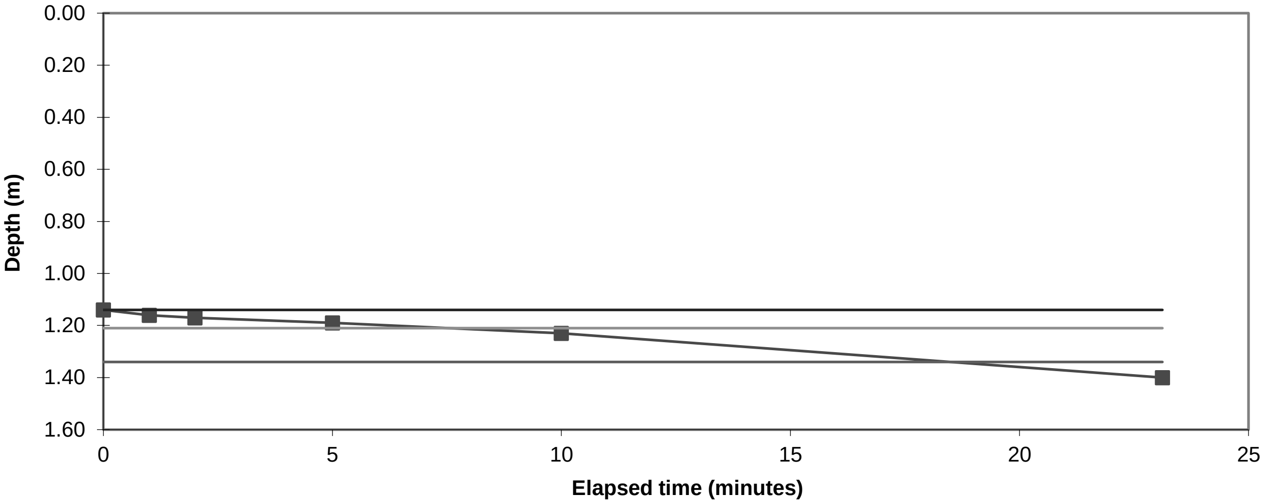
Client:	Raincloud Consulting Ltd	**Job No:**	
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044	

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP5
Test No: 3
Date: 30.07.2025
Length (m): 1.400
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.40
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.140		
1	1.160		
2	1.170		
5	1.190		
10	1.230		
23.12	1.400		



Start water depth for analysis (mbgl):	1.14		
75% effective depth (mbgl):	1.21	Elapsed time (mins):	7.5
50% effective depth (mbgl):	1.27		
25% effective depth (mbgl):	1.34	Elapsed time (mins):	18.5
Base of soakage zone (mbgl):	1.40		

Volume outflow between 75% and 25% effective depth (m³): 0.055
Mean surface area of outflow (m^2): 0.86
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 11.0

Soil infiltration rate (m/s): **9.6E-5**

Remarks Results processed following BRE 365 (2007).

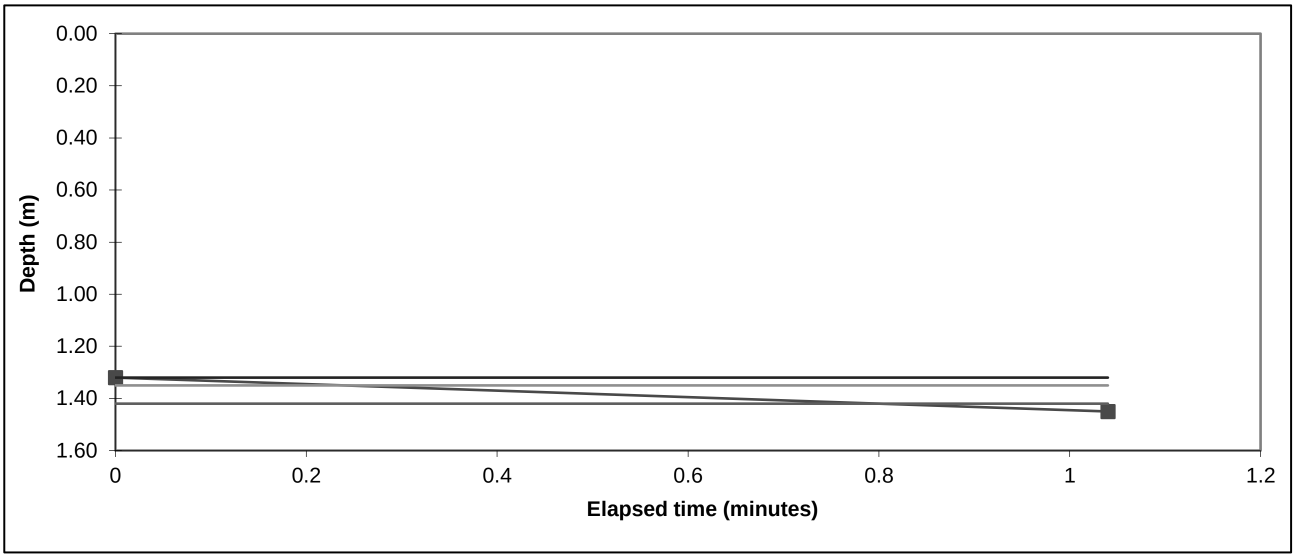
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP6	Test No:	1	Date:	30.07.2025
Length (m):	1.500	Datum Height:	0.00	m agl	
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.45	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.320		
1.04	1.450		



Start water depth for analysis (mbgl):	1.32		
75% effective depth (mbgl):	1.35	Elapsed time (mins):	0.2
50% effective depth (mbgl):	1.39		
25% effective depth (mbgl):	1.42	Elapsed time (mins):	0.8
Base of soakage zone (mbgl):	1.45		

Volume outflow between 75% and 25% effective depth (m³):	0.031
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	0.67
Time for outflow between 75% and 25% effective depth (mins):	0.6

Soil infiltration rate (m/s):	**1.3E-3**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

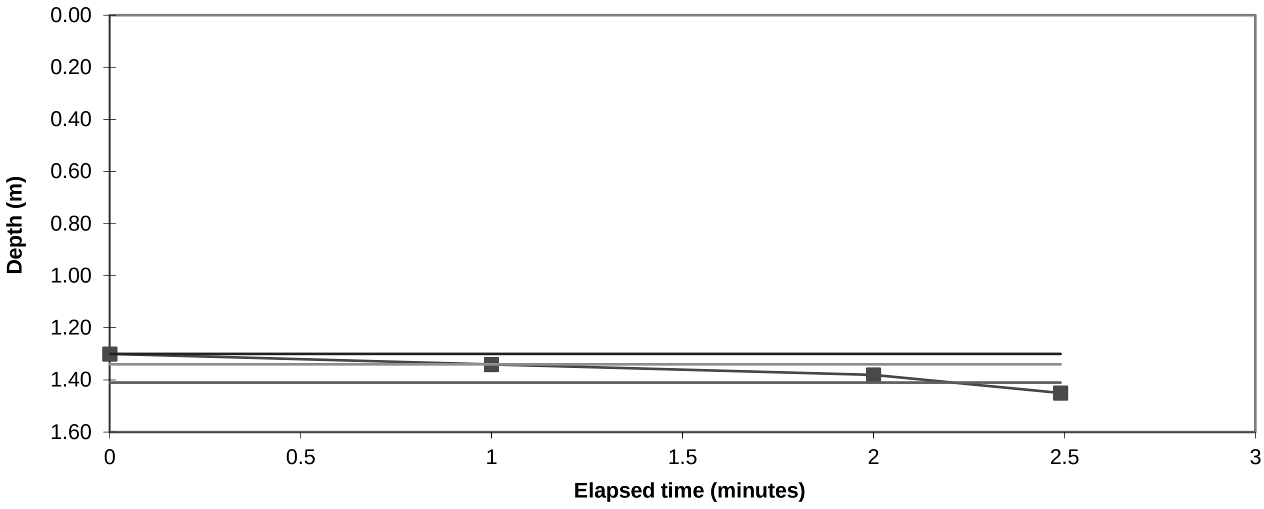
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP6	Test No:	2	Date: 30.07.2025
Length (m):	1.500	Datum Height:	0.00	m agl
Width (m):	0.30	Granular infill:	None	
Depth (m):	1.45	Porosity of infill:	1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.300		
1	1.340		
2	1.380		
2.49	1.450		



Start water depth for analysis (mbgl):	1.30		
75% effective depth (mbgl):	1.34	Elapsed time (mins):	1.0
50% effective depth (mbgl):	1.38		
25% effective depth (mbgl):	1.41	Elapsed time (mins):	2.2
Base of soakage zone (mbgl):	1.45		

Volume outflow between 75% and 25% effective depth (m³):	0.031
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	0.70
Time for outflow between 75% and 25% effective depth (mins):	1.2

Soil infiltration rate (m/s): **6.2E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

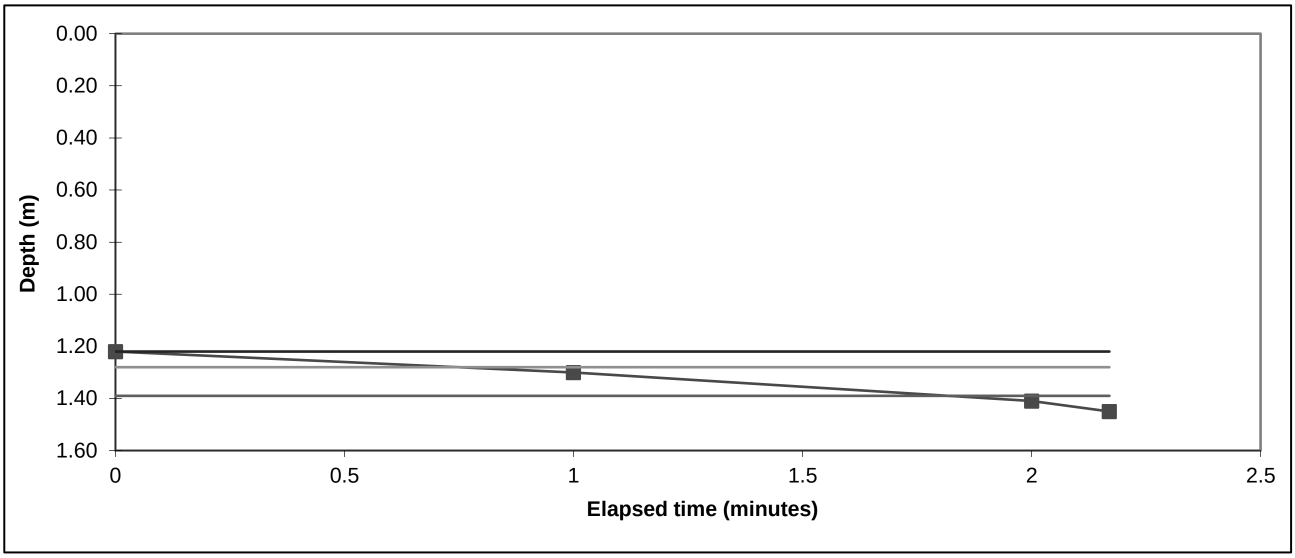
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP6 Test No: 3 Date: 30.07.2025
Length (m): 1.500 Datum Height: 0.00 m agl
Width (m): 0.30 Granular infill: None
Depth (m): 1.45 Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.220		
1	1.300		
2	1.410		
2.17	1.450		



Start water depth for analysis (mbgl):	1.22		
75% effective depth (mbgl):	1.28	Elapsed time (mins):	0.8
50% effective depth (mbgl):	1.34		
25% effective depth (mbgl):	1.39	Elapsed time (mins):	1.8
Base of soakage zone (mbgl):	1.45		

Volume outflow between 75% and 25% effective depth (m³): 0.049
Mean surface area of outflow (m^2): 0.85
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 1.0

Soil infiltration rate (m/s):	**9.8E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

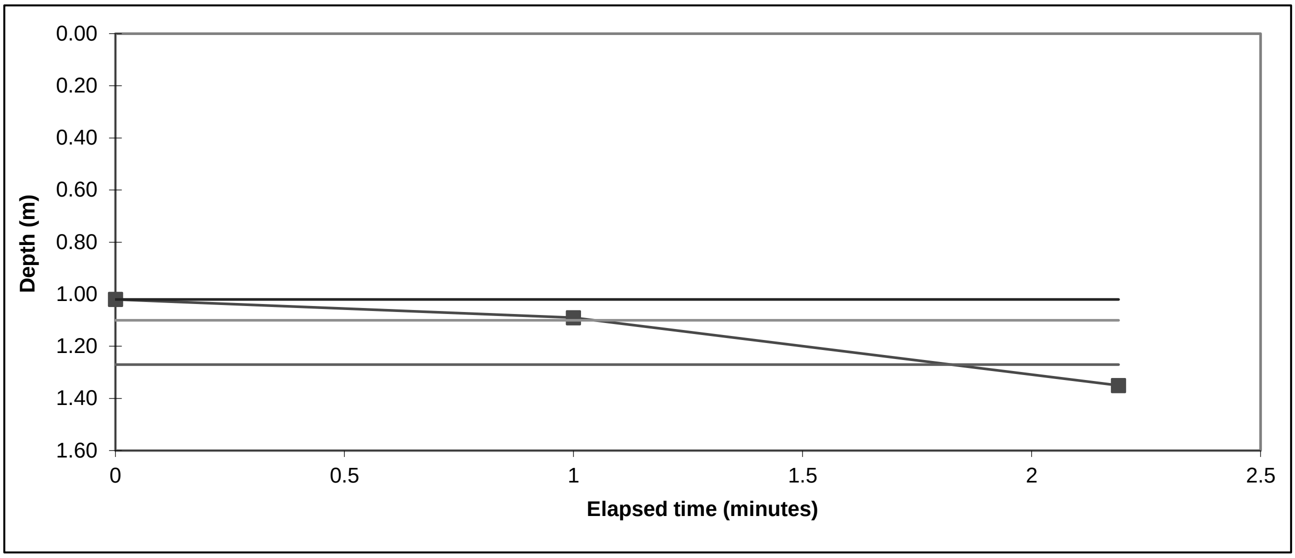
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP7
Test No: 1
Date: 31.07.2025
Length (m): 1.500
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.35
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.020		
1	1.090		
2.19	1.350		



Start water depth for analysis (mbgl):	1.02		
75% effective depth (mbgl):	1.10	Elapsed time (mins):	1.0
50% effective depth (mbgl):	1.19		
25% effective depth (mbgl):	1.27	Elapsed time (mins):	1.8
Base of soakage zone (mbgl):	1.35		

Volume outflow between 75% and 25% effective depth (m³): 0.077
Mean surface area of outflow (m^2): 1.03
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 0.8

Soil infiltration rate (m/s): **1.6E-3**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

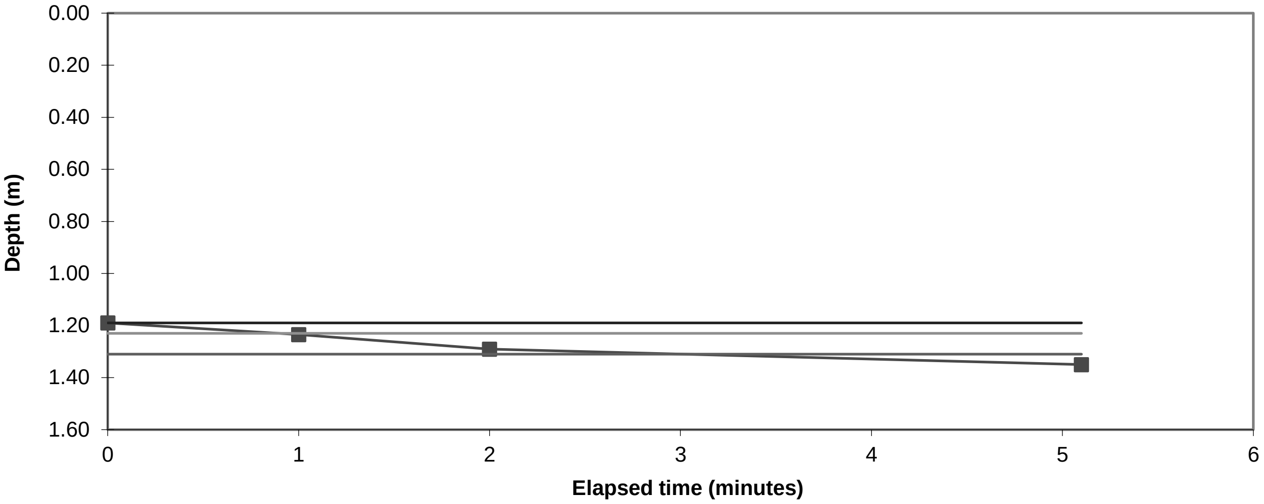
Client: Raincloud Consulting Ltd
Site: Swaffham Road, Swaffham, Norfolk, PE37 7HY
Job No: C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP7
Test No: 2
Date: 31.07.2025
Length (m): 1.500
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.35
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.190		
1	1.235		
2	1.290		
5.1	1.350		



Start water depth for analysis (mbgl):	1.19		
75% effective depth (mbgl):	1.23	Elapsed time (mins):	0.9
50% effective depth (mbgl):	1.27		
25% effective depth (mbgl):	1.31	Elapsed time (mins):	3.0
Base of soakage zone (mbgl):	1.35		

Volume outflow between 75% and 25% effective depth (m³): 0.036
Mean surface area of outflow (m^2): 0.74
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 2.1

Soil infiltration rate (m/s): **3.9E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

Client: Raincloud Consulting Ltd
Site: Swaffham Road, Swaffham, Norfolk, PE37 7HY
Job No: C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

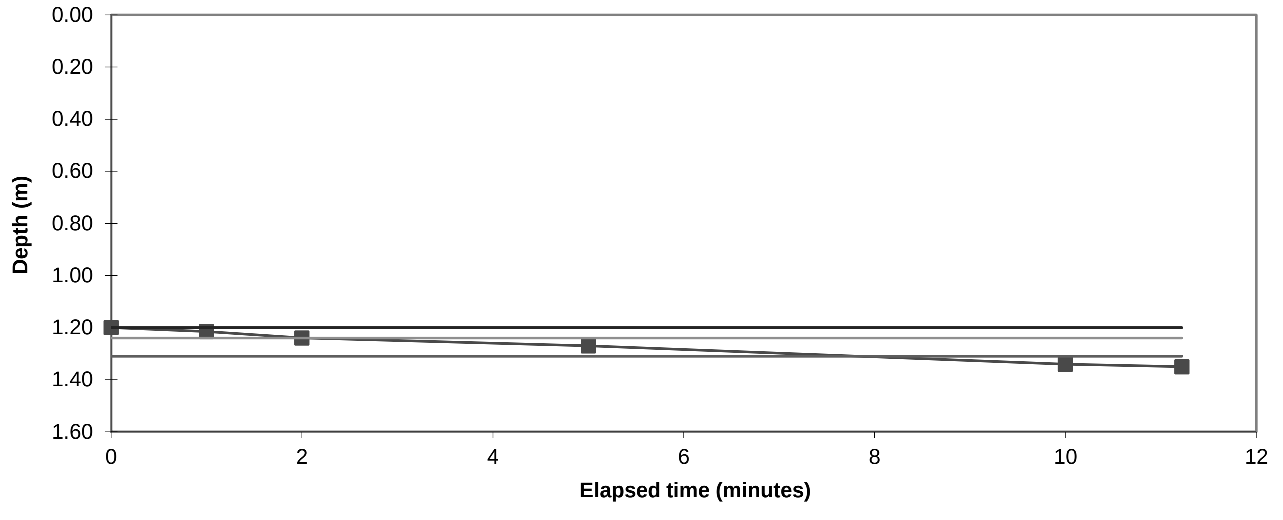
Trial Pit No: TP7 Test No: 1 Date: 31.07.2025

Length (m): 1.500 Datum Height: 0.00 m agl

Width (m): 0.30 Granular infill: None

Depth (m): 1.35 Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.200		
1	1.215		
2	1.240		
5	1.270		
10	1.340		
11.22	1.350		



Start water depth for analysis (mbgl):	1.20		
75% effective depth (mbgl):	1.24	Elapsed time (mins):	2.0
50% effective depth (mbgl):	1.28		
25% effective depth (mbgl):	1.31	Elapsed time (mins):	7.9
Base of soakage zone (mbgl):	1.35		

Volume outflow between 75% and 25% effective depth (m³): 0.032

Mean surface area of outflow (m^2): 0.70
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 5.9

Soil infiltration rate (m/s): **1.3E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

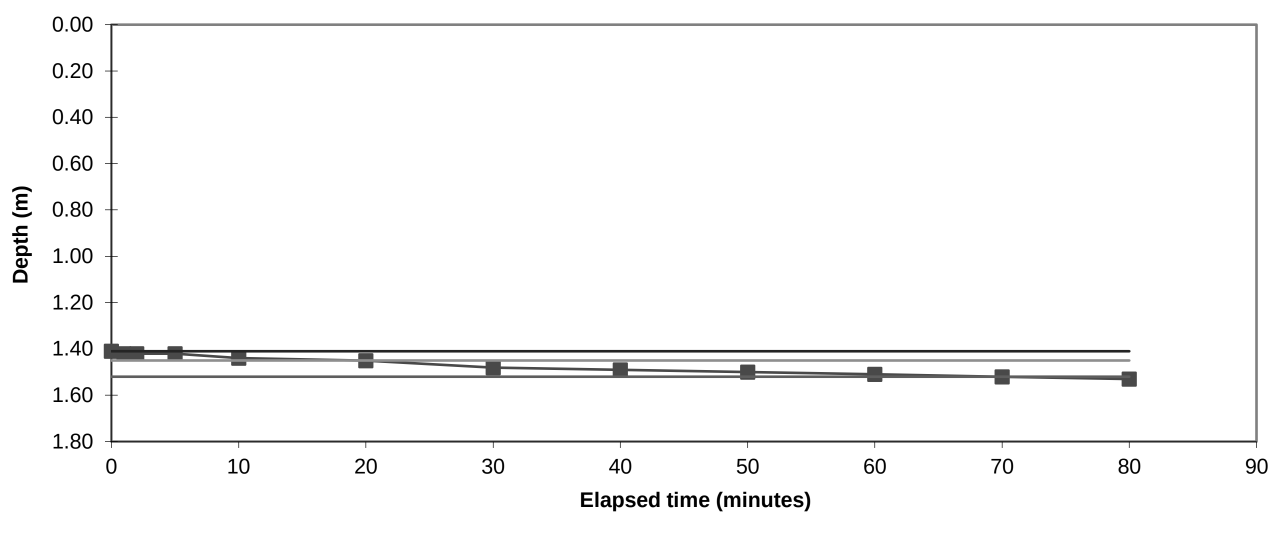
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP8	Test No:	1	Date:	31.07.2025
Length (m):	1.500	Datum Height:		0.00	m agl
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.56	Porosity of infill:	1		(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.410		
1	1.420		
2	1.420		
5	1.420		
10	1.440		
20	1.450		
30	1.480		
40	1.490		
50	1.500		
60	1.510		
70	1.520		
80	1.530		



Start water depth for analysis (mbgl):	1.41		
75% effective depth (mbgl):	1.45	Elapsed time (mins):	20.0
50% effective depth (mbgl):	1.49		
25% effective depth (mbgl):	1.52	Elapsed time (mins):	70.0
Base of soakage zone (mbgl):	1.56		

Volume outflow between 75% and 25% effective depth (m³): 0.032

Mean surface area of outflow (m^2): 0.70
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 50.0

Soil infiltration rate (m/s):	**1.5E-5**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

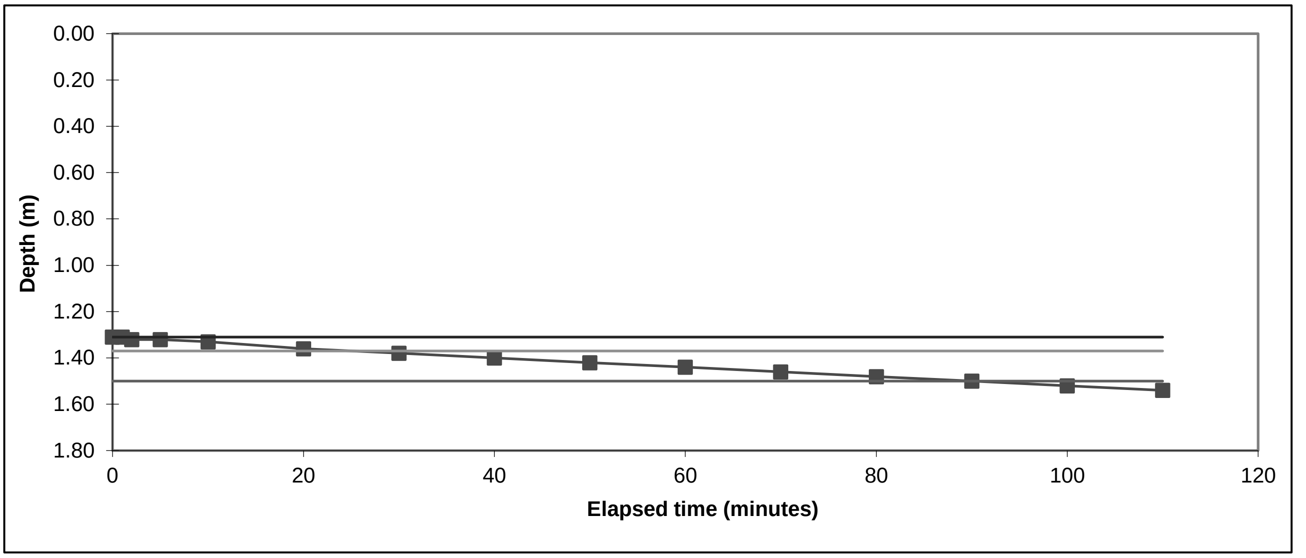
Client:	Raincloud Consulting Ltd	**Job No:**	
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044	

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP8
Test No: 2
Date: 31.07.2025
Length (m): 1.500
Width (m): 0.30
Depth (m): 1.56
Datum Height: 0.00 m agl
Granular infill: None
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.310	110	1.540
1	1.310		
2	1.320		
5	1.320		
10	1.330		
20	1.360		
30	1.380		
40	1.400		
50	1.420		
60	1.440		
70	1.460		
80	1.480		
90	1.500		
100	1.520		



Start water depth for analysis (mbgl):	1.31		
75% effective depth (mbgl):	1.37	Elapsed time (mins):	25.0
50% effective depth (mbgl):	1.44		
25% effective depth (mbgl):	1.50	Elapsed time (mins):	90.0
Base of soakage zone (mbgl):	1.56		

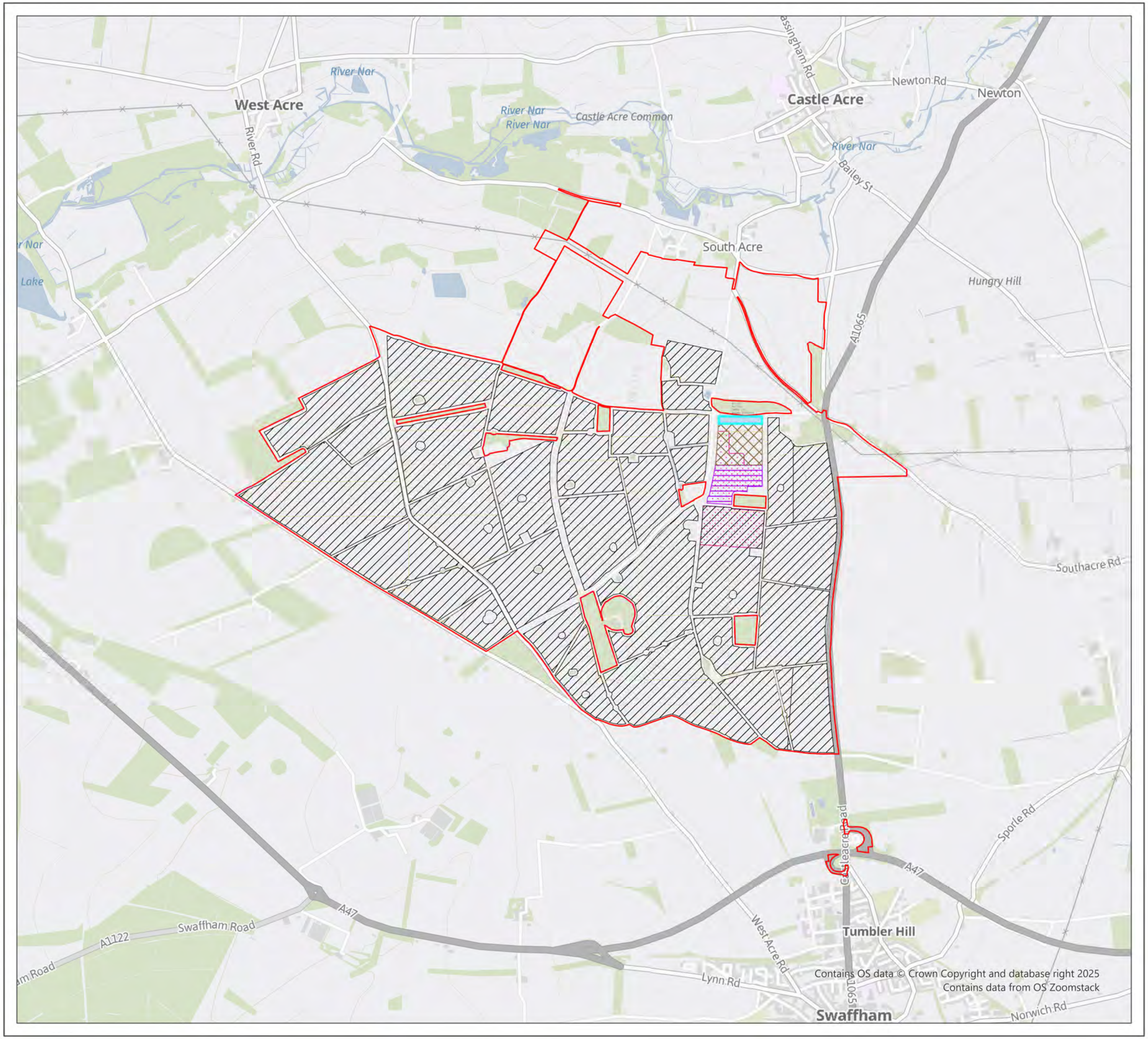
Volume outflow between 75% and 25% effective depth (m³): 0.058
Mean surface area of outflow (m^2): 0.88
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 65.0

Soil infiltration rate (m/s): **1.7E-5**

Remarks Results processed following BRE 365 (2007).

Client: Raincloud Consulting Ltd
Site: Swaffham Road, Swaffham, Norfolk, PE37 7HY
Job No: C5239/25/E/8044

Annex C: Outline Surface Water Attenuation Area



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Contains data from OS Zoomstack

THE DROVES
SOLAR FARM

RAINCLOUD

🟥 Order Limits / Core Study Area
▨ Work No. 1: Solar PV
▨ Work No. 2: BESS Compound
▨ Work No. 3: Customer Substation
▨ Work No. 4: National Substation
🟧 Proposed Track
🟦 Surface Water Attenuation Area

1:25,000 Scale @ A3

0 0.5 1 km

N

Ref: 083-SWD-003

Date: 17/11/2025

Outline Surface Water Attenuation Area Annex C

The Droves Solar Farm Flood Risk Assessment

Annex D: InfoDrainage Results

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Catchment Area 1

Type : Catchment Area

Area (ha)	14.262

Preliminary Sizing

Volumetric Runoff Coefficient	1.000
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area 2

Type : Catchment Area

Area (ha)	11.084

Preliminary Sizing

Volumetric Runoff Coefficient	1.000
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Pond

Type : Pond

Dimensions

Exceedance Level (m)	51.500
Depth (m)	1.500
Base Level (m)	50.000
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.014
Total Volume (m³)	24909.021

Depth (m)	Area (m²)	Volume (m³)
0.000	15250.00	0.000
1.500	18000.00	24909.021

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area 1
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area 2
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.043
Side Infiltration Rate (m/hr)	0.043
Safety Factor	1.5
Perimeter	Circular
Length (m)	224.931
Friction Scheme	Manning's n
n	0.035

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Inflow Summary Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area 1	Pond		Time of Concentration	14.262	100	0	100	14.262
Catchment Area 2	Pond		Time of Concentration	11.084	100	0	100	11.084
TOTAL		**0.0**		**25.346**				**25.346**

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Network Design Criteria Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Title: Rainfall Analysis Criteria	www.raincloud-consulting.co.uk:		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Summary Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area 1	FEH: 100 years: +40 %: 15 mins: Summer	14.26	12803.8	5769.399
Catchment Area 2	FEH: 100 years: +40 %: 15 mins: Summer	11.08	9951.0	4483.900

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FEH: 100 years: +40 %: 960 mins: Winter	51.472	51.472	1.472	1.472	1387.2	24404.129	0.000	15353.863	0.0	0.000	2.027	OK

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Phase Management Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

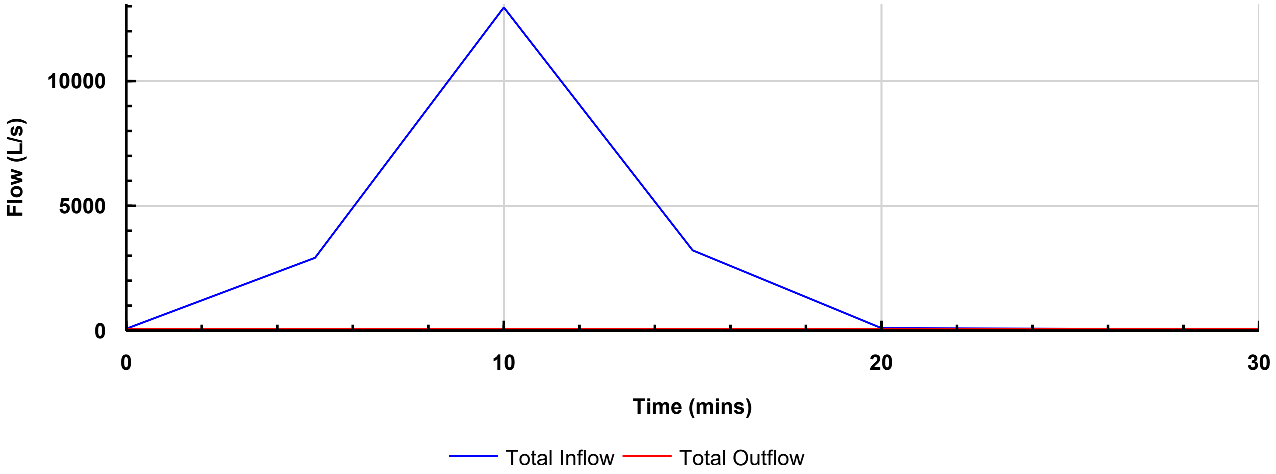
1.5mBasin
FEH: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Tables

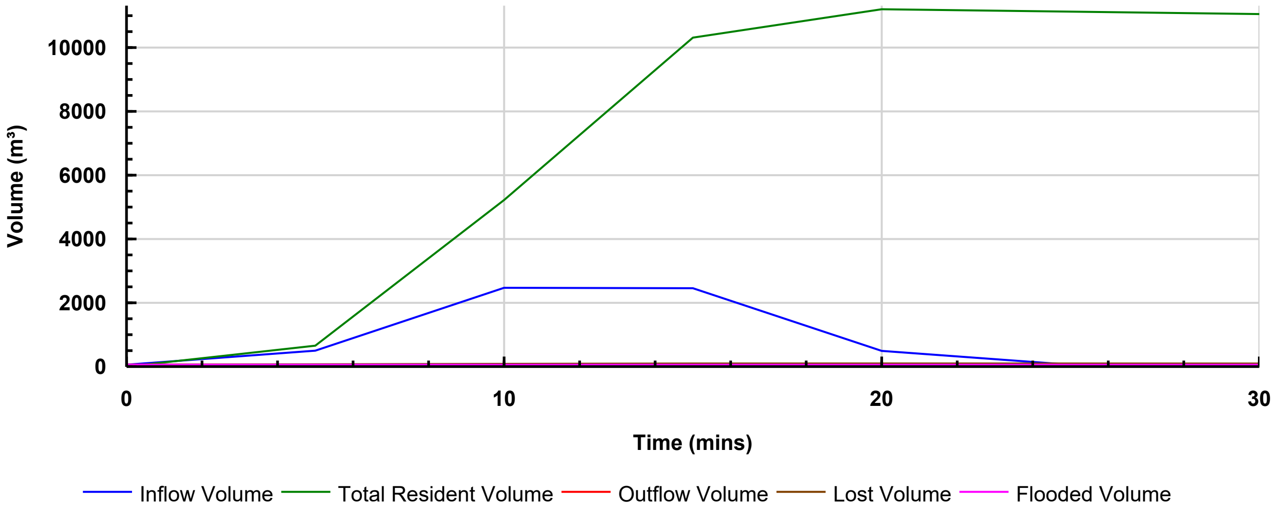
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
TOTAL	12950.9	5710.912	0.0	0.000

Graphs

Flow Graph



Volume Graph



The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Inflow Results Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

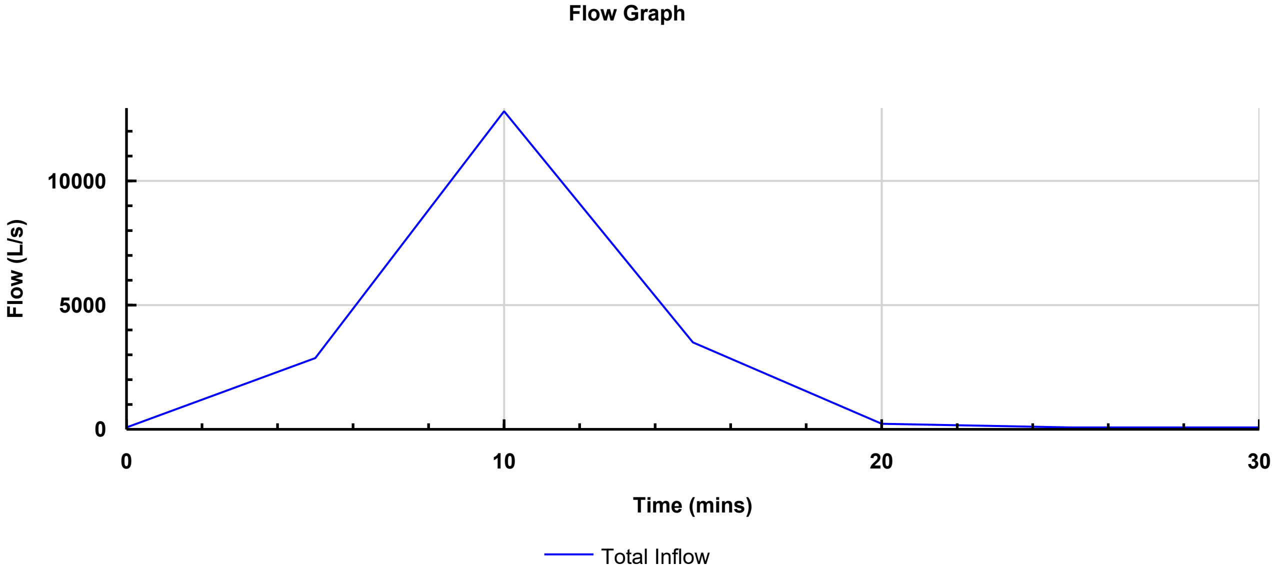
Catchment Area 1
Critical Storm: FEH: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	12803.8
Total Inflow Volume (m³)	5769.399

Graphs



The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Inflow Results Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

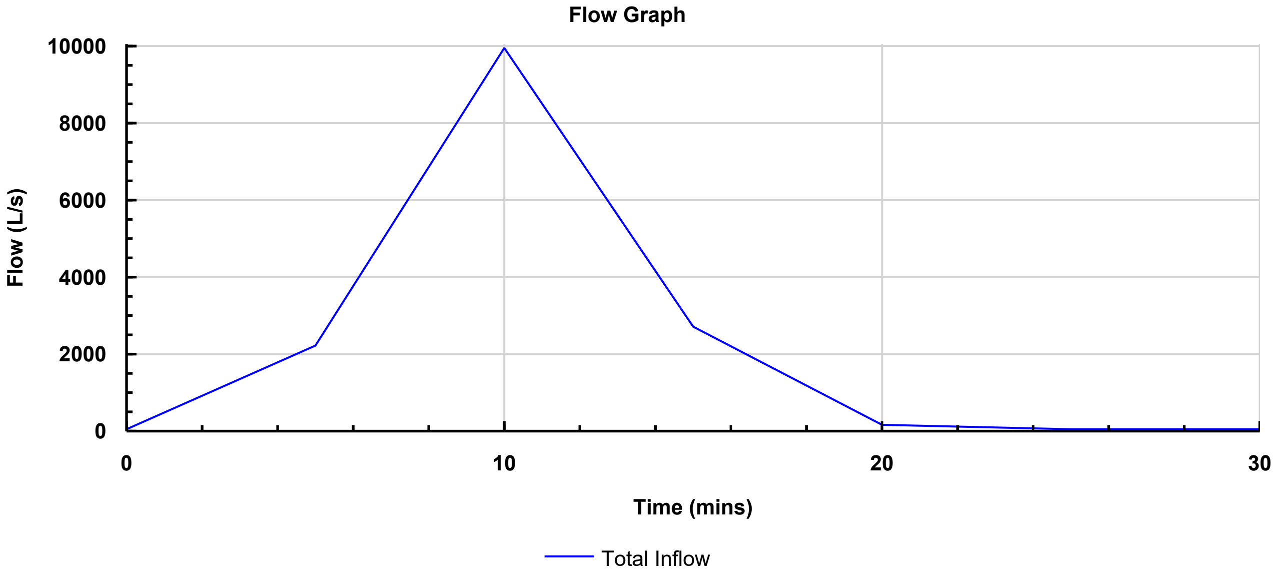
Catchment Area 2
Critical Storm: FEH: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	9951.0
Total Inflow Volume (m³)	4483.900

Graphs

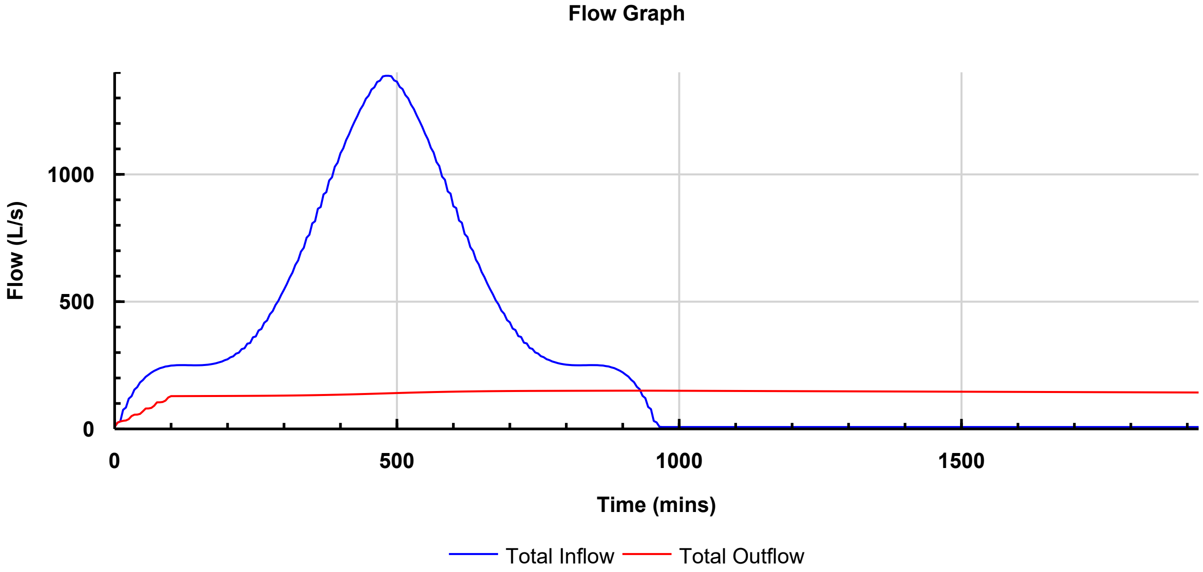


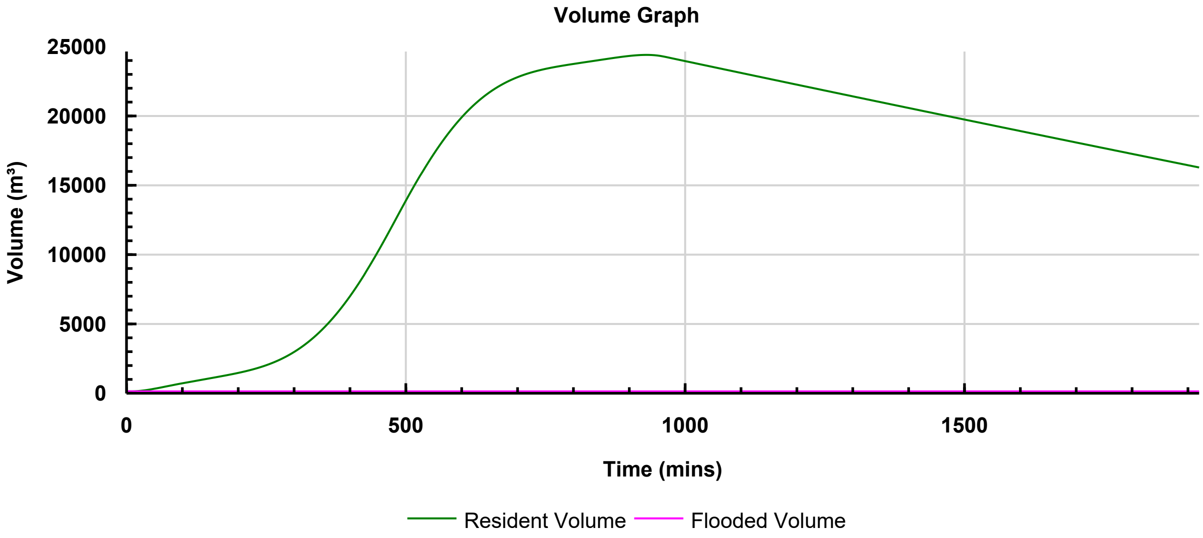
The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Control Results Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Pond
Critical Storm: FEH: 100 years: Increase Rainfall (%): +40: 960 mins: Winter

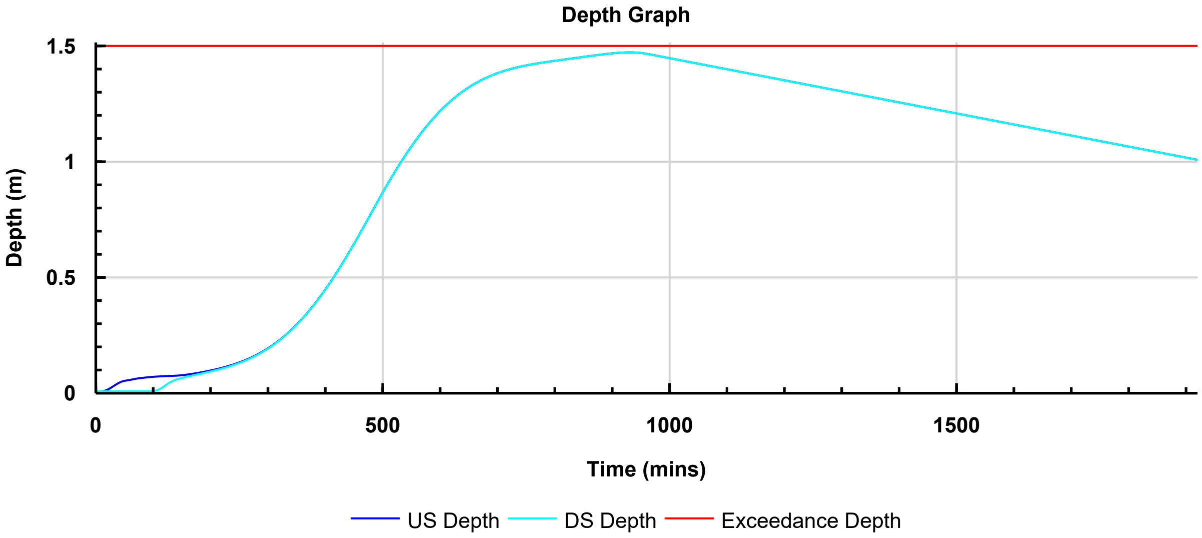
Type : Pond

Graphs

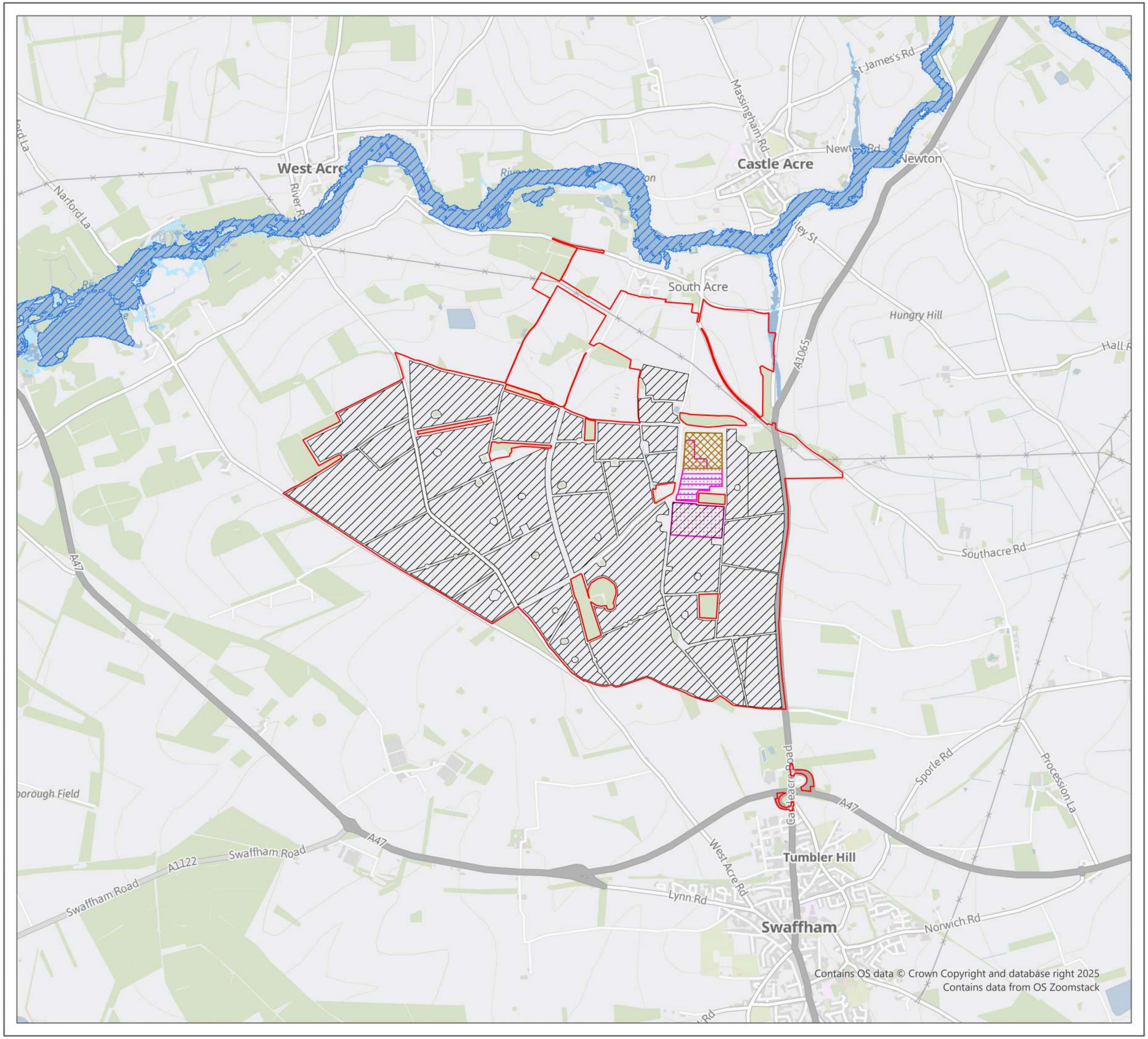




The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Control Results Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		



Annex E: A3 Scale Figures



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THE DROVES
SOLAR FARM

RAINCLOUD

- ▭ Order Limits / Core Study Area

NaFRA2 Flood Zones

Flood Zone

- 🟦 FZ2
- 🟦 FZ3a
- ▨ FZ3b
- ▨ Work No. 1: Solar PV
- ▦ Work No. 2: BESS Compound
- ▤ Work No. 3: Customer Substation
- ▩ Work No. 4: National Grid Substation

1:30,000 Scale @ A3

0 0.5 1 km

N

Ref: 083-FRA-002B-Rev02 | Date: 02/01/2026

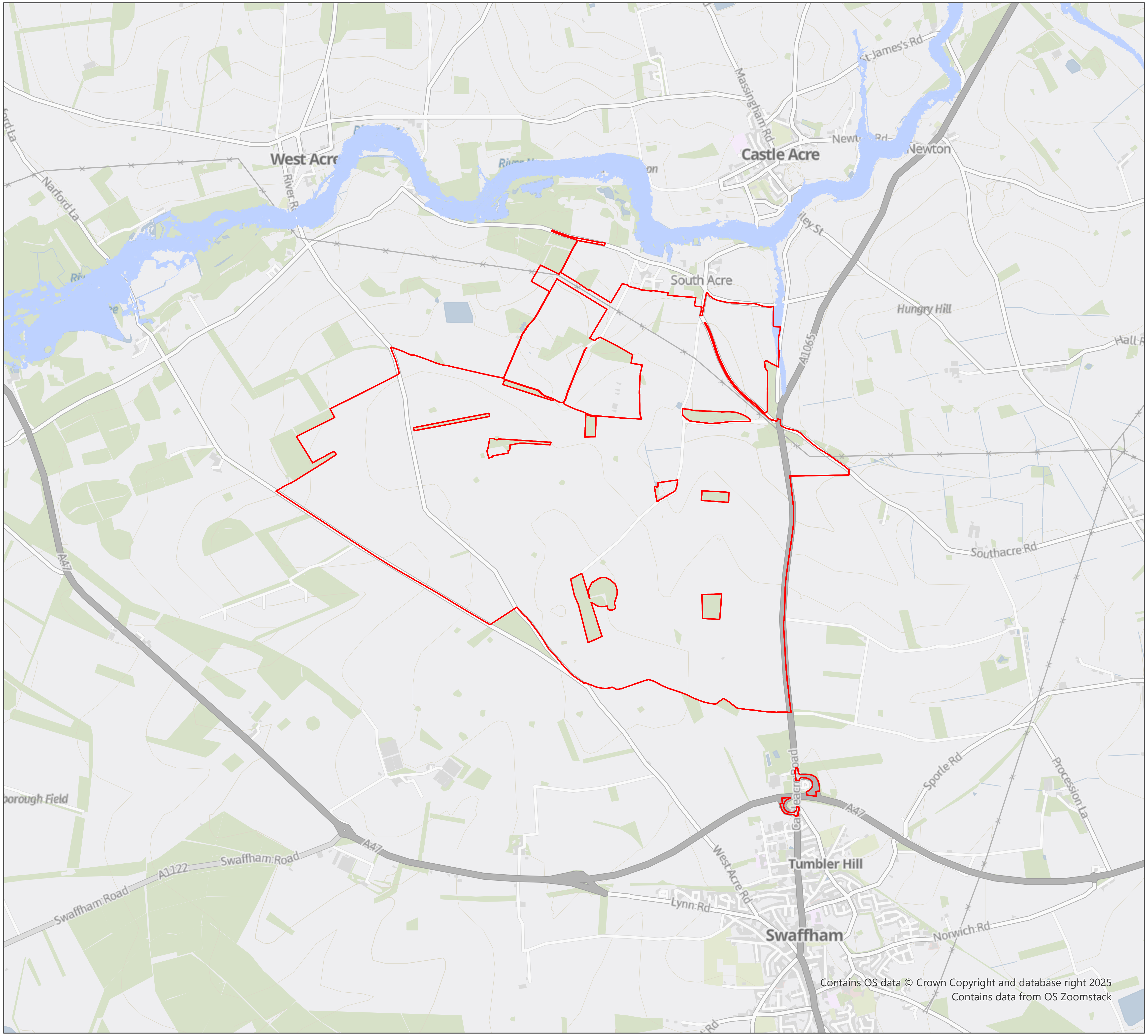
Flood Zones
Figure A12-1-1

**The Droves Solar Farm
Flood Risk Assessment**

THE DROVES
SOLAR FARM

RAINCLOUD

🟥 Order Limits / Core Study Area
🟦 1 % AEP 2036 - 2069

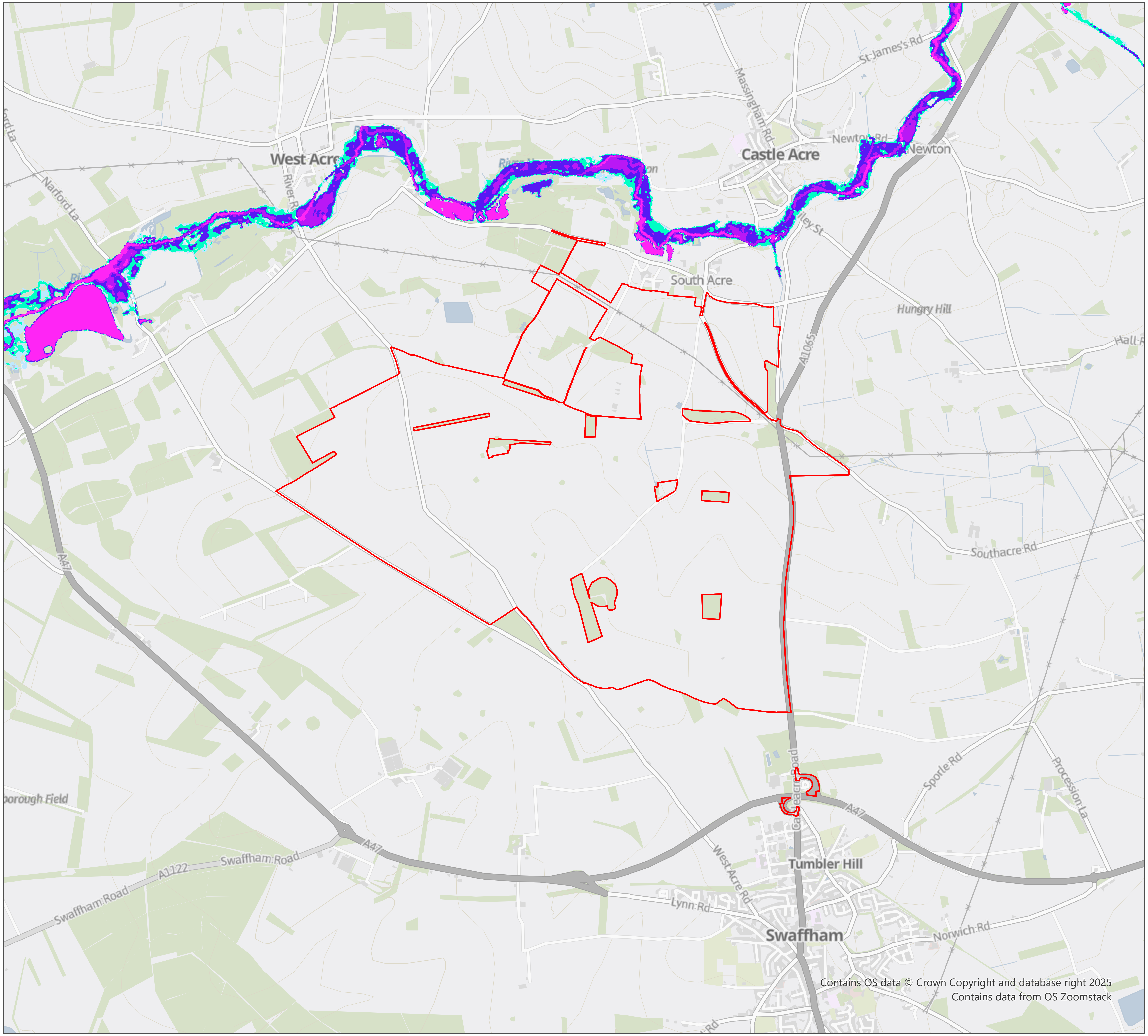


1:30,000 Scale @ A3
0 0.5 1 km
N

Ref: 083-FRA-003B
Date: 17/11/2025

NaFRA2 Flood Map 2036-2069 (reproduced from the Rivers and Sea map - EA)
Figure A12-1-2

The Droves Solar Farm
Flood Risk Assessment



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THE DROVES
SOLAR FARM

RAINCLOUD

▭ Order Limits / Core Study Area

Upper Nar 0.1 % AEP

Depth (m)

■	0.02 - 0.1
■	0.11 - 0.3
■	0.31 - 0.6
■	0.61 - 0.9
■	> 0.9

1:30,000 Scale @ A3

0 0.5 1 km

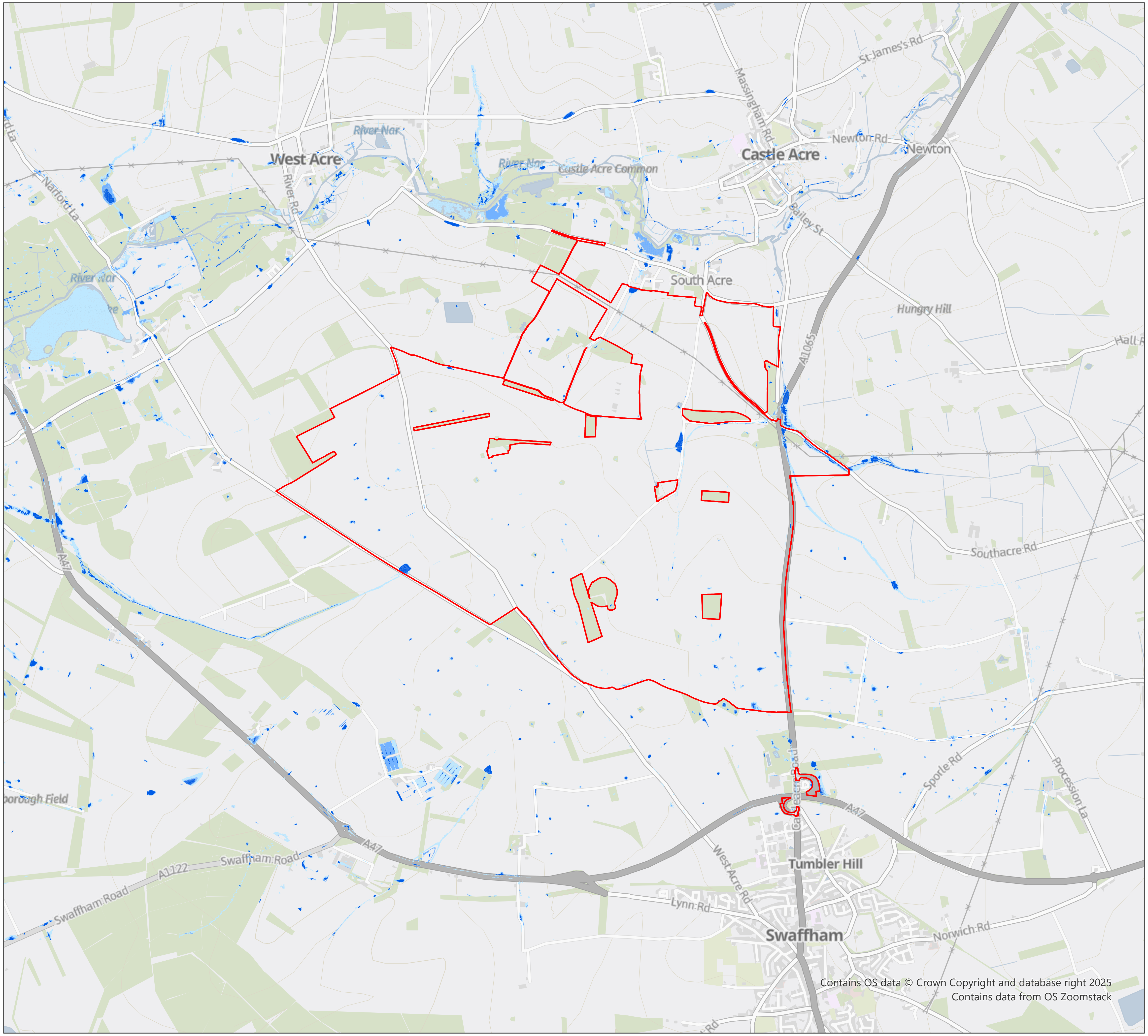
N

Ref: 083-FRA-004B

Date: 17/11/2025

River Nar - 0.1% AEP
Fluvial Flood Depths
Figure A12-1-3

The Droves Solar Farm
Flood Risk Assessment



THE DROVES
SOLAR FARM
RAINCLOUD

▭ Order Limits / Core Study Area

EA Risk of Surface Water Flooding

Risk Band

🟦 High

🟦 Medium

🟦 Low

1:30,000 Scale @ A3

0 0.5 1 km

N

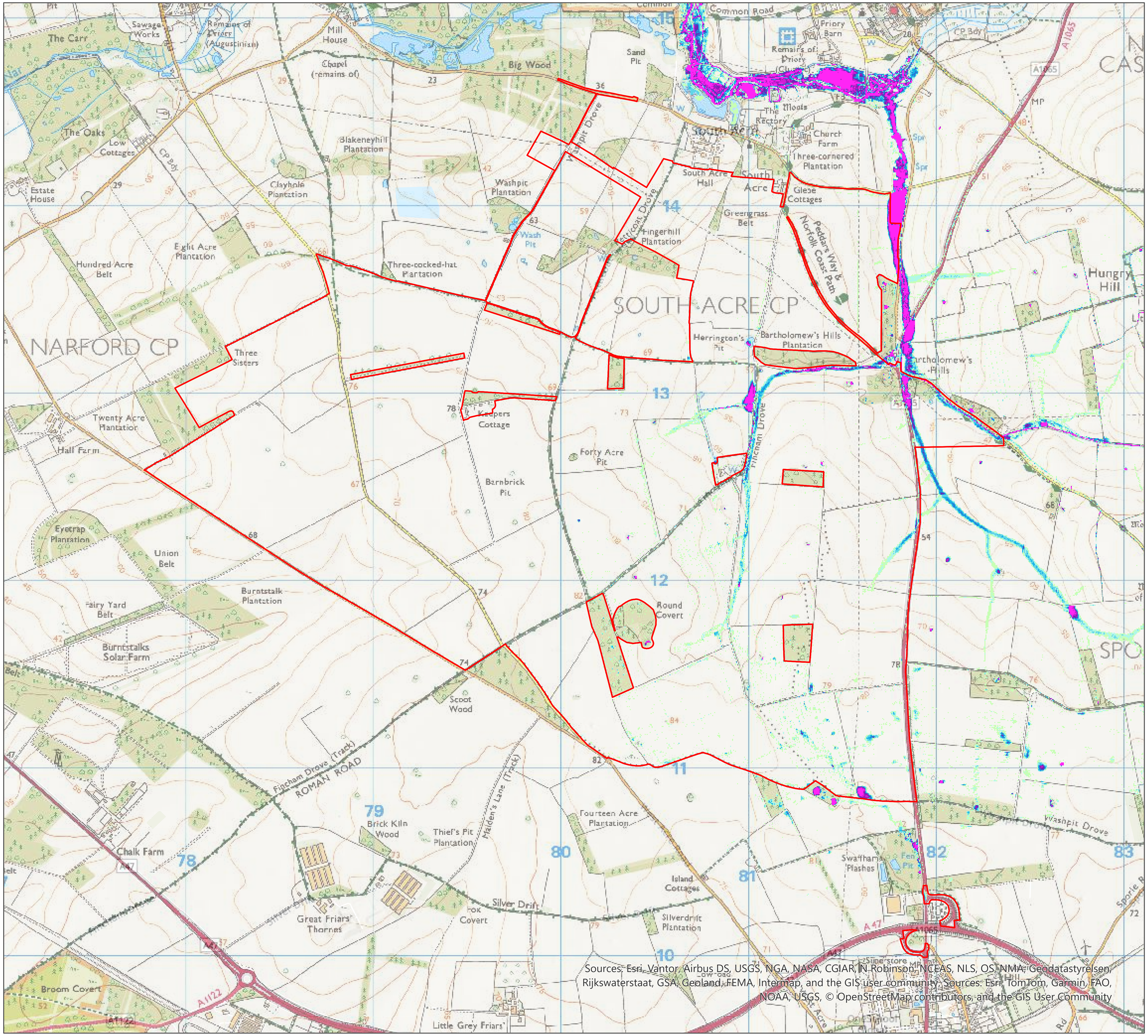
Ref: 083-FRA-005B

Date: 17/11/2025

1 % AEP Pluvial Flood Extents (EA - RoFSW 2025)

Figure A12-1-4

The Droves Solar Farm Flood Risk Assessment



Sources: Esri, Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

THE DROVES
SOLAR FARM

RAINCLOUD

▭ Order Limits / Core Study Area

1 % AEP - Raincloud Model

Depth (m)

- 0 - 0.05
- 🟩 0.051 - 0.1
- 🟦 0.101 - 0.15
- 🟦 0.151 - 0.2
- 🟦 0.201 - 0.25
- 🟦 0.251 - 0.3
- 🟪 0.301 - 0.35
- 🟪 0.351 - 0.4
- 🟪 0.401 - 0.45
- 🟪 > 0.45

1:20,000 Scale @ A3

0 0.5 1 km

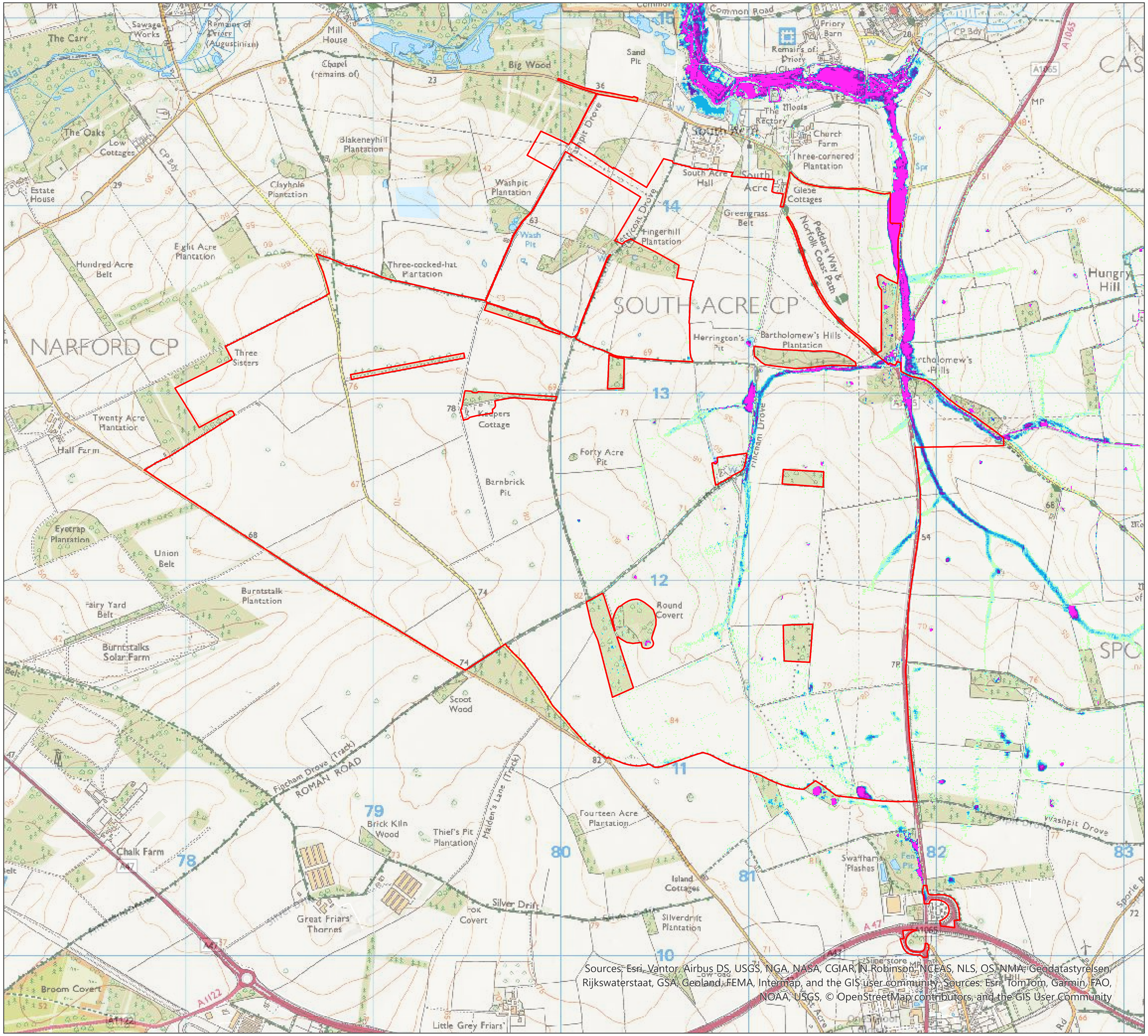
N

Ref: 083-FRA-006A-Rev02 | Date: 08/06/2026

1 % AEP Flood Depths - Raincloud 2D Modelling

Figure A12-1-5

The Droves Solar Farm Flood Risk Assessment



Sources: Esri, Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community. Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

THE DROVES
SOLAR FARM

RAINCLOUD

☐	Order Limits / Core Study Area

1 % AEP + 25 % CC - Raincloud Model Depth (m)

	0 - 0.05
🟩	0.051 - 0.1
🟦	0.101 - 0.15
🟦	0.151 - 0.2
🟦	0.201 - 0.25
🟦	0.251 - 0.3
🟪	0.301 - 0.35
🟪	0.351 - 0.4
🟪	0.401 - 0.45
🟪	> 0.45

1:20,000 Scale @ A3

0 0.5 1 km

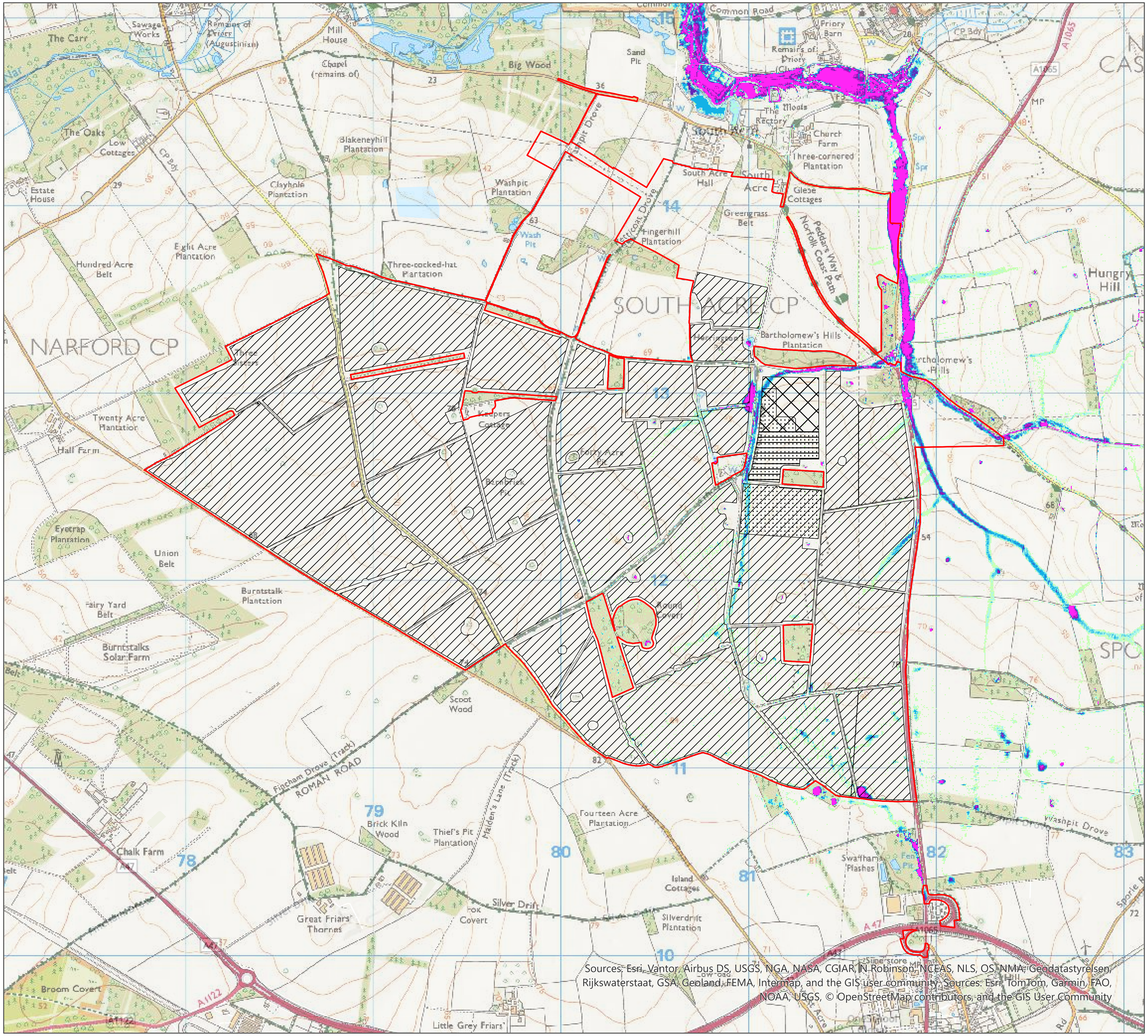
N

Ref: 083-FRA-007A-Rev02 Date: 08/06/2026

1 % AEP + 25 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-1-6

The Droves Solar Farm Flood Risk Assessment



Sources: Esri, Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

THE DROVES
SOLAR FARM

RAINCLOUD

- ▭ Order Limits / Core Study Area
- ▨ Work No. 1: Solar PV
- ▦ Work No. 2: BESS Compound
- ▤ Work No. 3: Customer Substation
- ☒ Work No. 4: National Grid Substation

1 % AEP + 25 % CC - Raincloud Model

Depth (m)

- 0 - 0.05
- 🟩 0.051 - 0.1
- 🟩 0.101 - 0.15
- 🟦 0.151 - 0.2
- 🟦 0.201 - 0.25
- 🟦 0.251 - 0.3
- 🟪 0.301 - 0.35
- 🟪 0.351 - 0.4
- 🟪 0.401 - 0.45
- 🟪 > 0.45

1:20,000 Scale @ A3

0 0.55 1.1 km

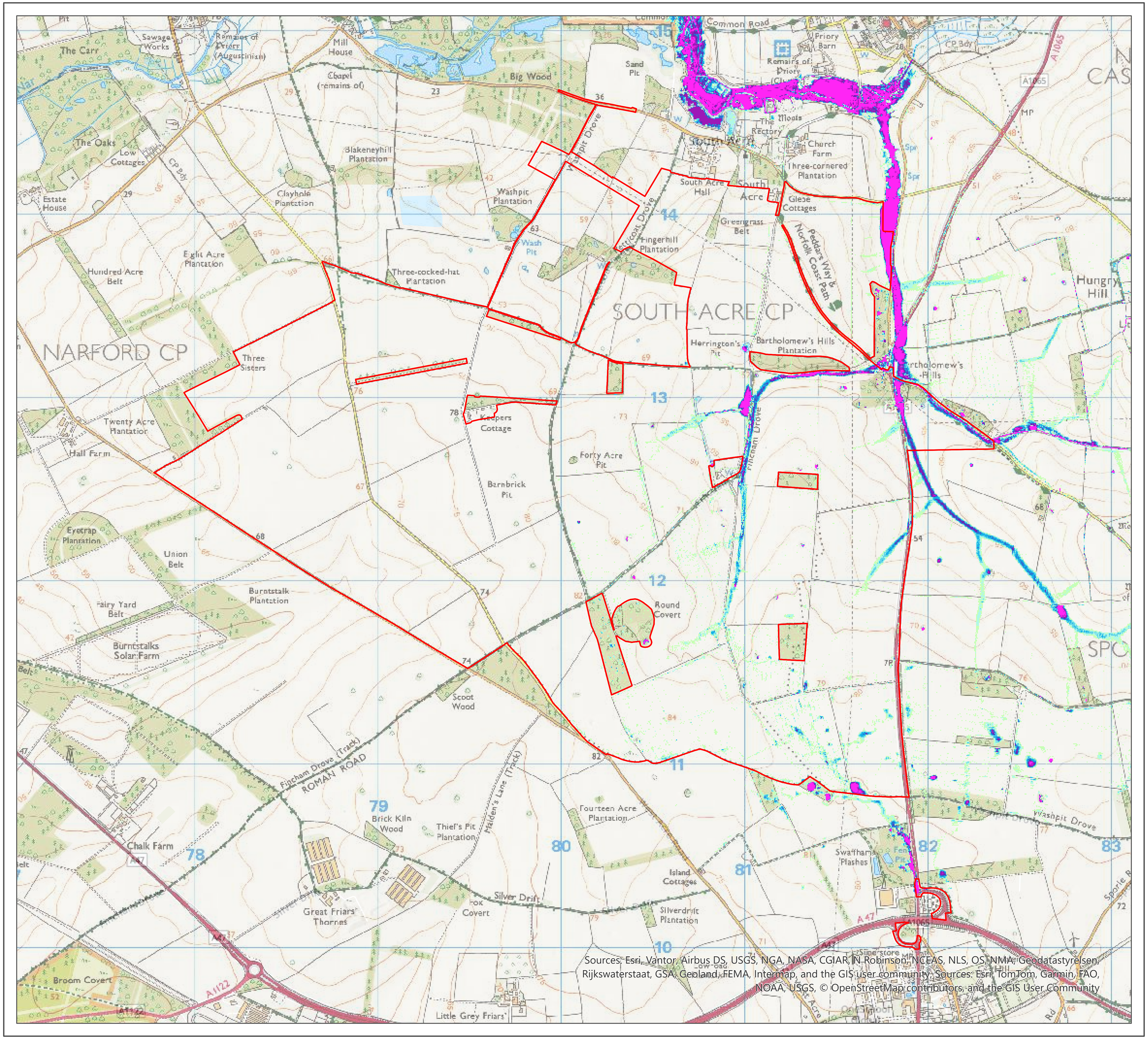
N

Ref: 083-FRA-008A-Rev03 | Date: 08/06/2026

1 % AEP + 25 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-1-7

**The Droves Solar Farm
Flood Risk Assessment**



Sources: Esri, Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

THE DROVES
SOLAR FARM

RAINCLOUD

▭ Order Limits / Core Study Area

1 % AEP + 40 % CC - Raincloud Model Depth (m)

- 0 - 0.05
- 🟩 0.051 - 0.1
- 🟦 0.101 - 0.15
- 🟦 0.151 - 0.2
- 🟦 0.201 - 0.25
- 🟦 0.251 - 0.3
- 🟪 0.301 - 0.35
- 🟪 0.351 - 0.4
- 🟪 0.401 - 0.45
- 🟪 > 0.45

1:20,000 Scale @ A3

0 0.5 1 km

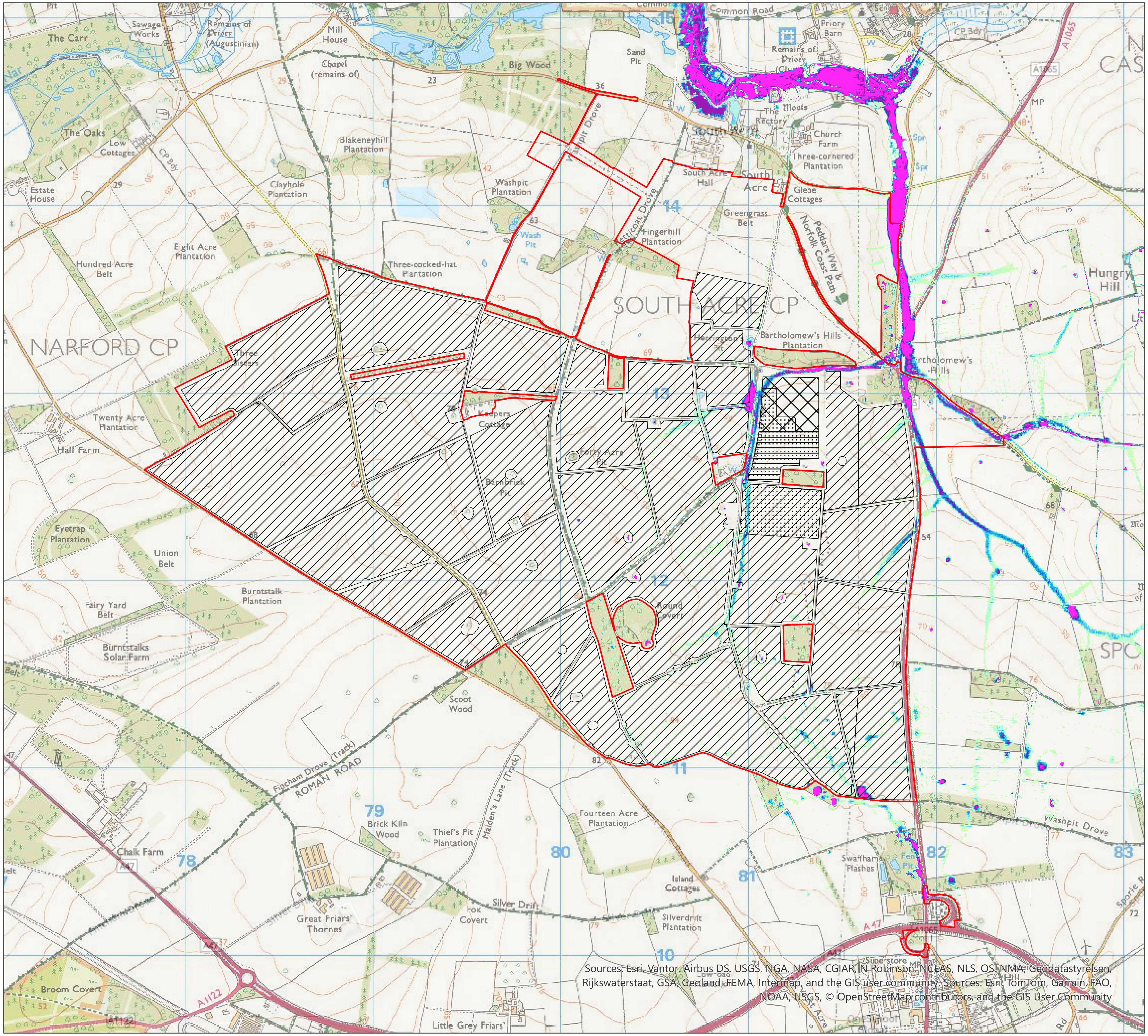
N

Ref: 083-FRA-009A-Rev03 | Date: 08/06/2026

1 % AEP + 40 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-1-8

The Droves Solar Farm Flood Risk Assessment



Sources: Esri, Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community. Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

THE DROVES
SOLAR FARM

RAINCLOUD

▢	Order Limits / Core Study Area
▨	Work No. 1: Solar PV
░	Work No. 2: BESS Compound
☰	Work No. 3: Customer Substation
▩	Work No. 4: National Grid Substation

1 % AEP + 40 % CC - Raincloud Model

Depth (m)

	0 - 0.05
🟩	0.051 - 0.1
🟦	0.101 - 0.15
🟦	0.151 - 0.2
🟦	0.201 - 0.25
🟦	0.251 - 0.3
🟪	0.301 - 0.35
🟪	0.351 - 0.4
🟪	0.401 - 0.45
🟪	> 0.45

1:20,000 Scale @ A3

0 0.5 1 km

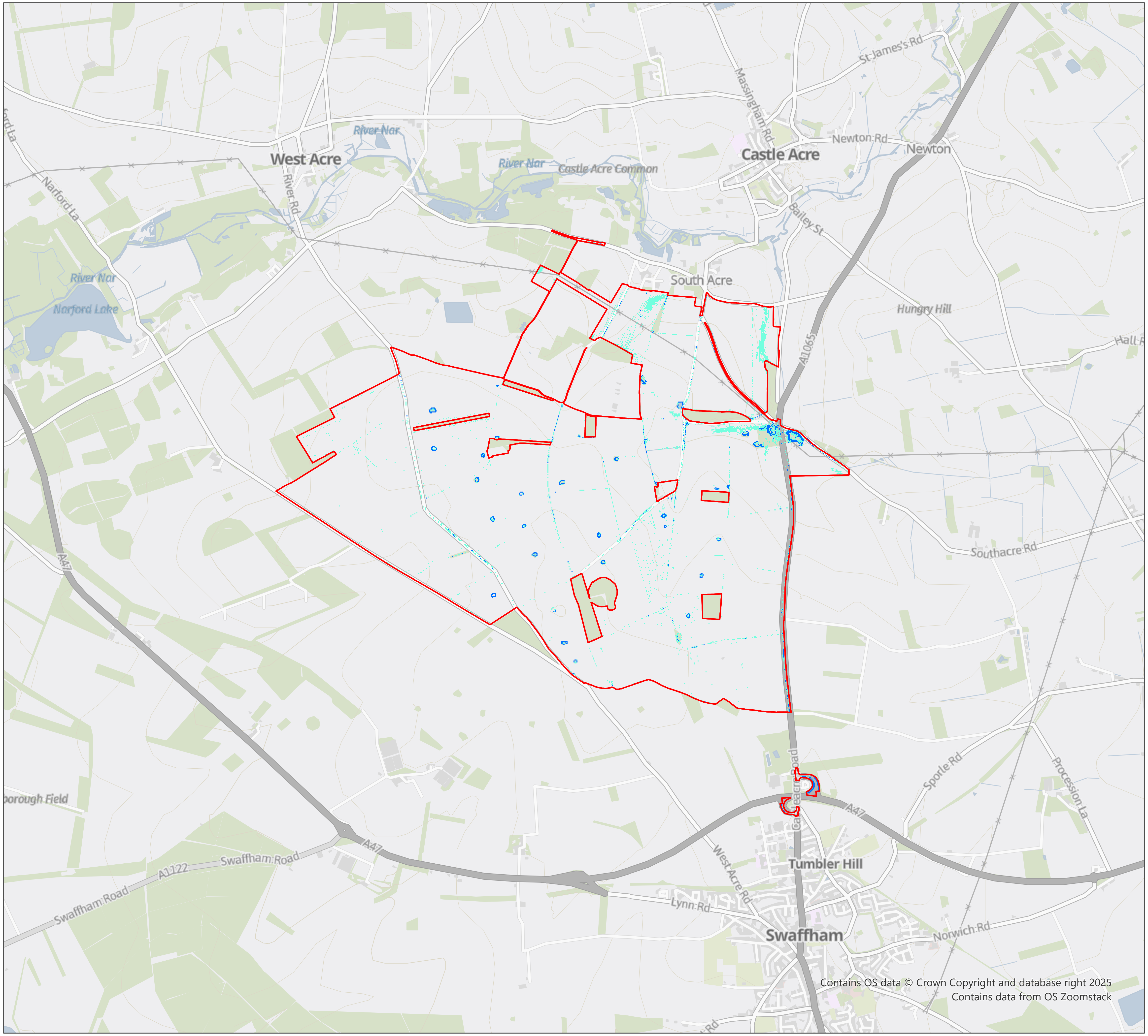
N

Ref: 083-FRA-012A-Rev03 | Date: 08/06/2026

1 % AEP + 40 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-1-9

The Droves Solar Farm Flood Risk Assessment



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SOLAR FARM

RAINCLOUD

☐ Order Limits / Core Study Area

Slope

%

0.001 - 6

🟩 6.001 - 12

🟦 > 12.001

1:30,000 Scale @ A3

0 0.5 1 km

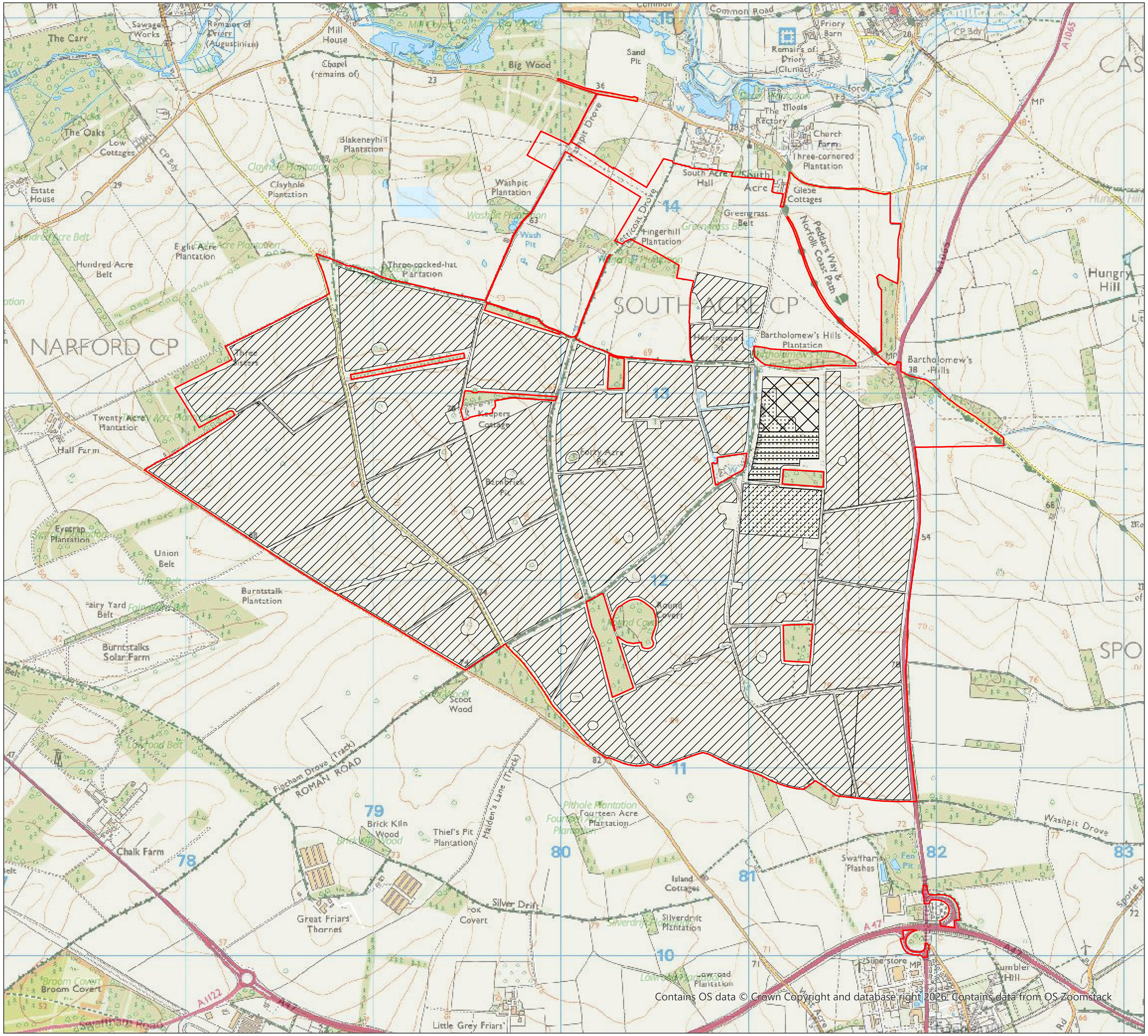
N

Ref: 083-FRA-010B

Date: 17/11/2025

Slope of CSA
Figure A12-1-10

The Droves Solar Farm
Flood Risk Assessment



THE DROVES
SOLAR FARM

RAINCLOUD

🟥	Order Limits / Core Study Area
▨	Work No. 1: Solar PV
⁘	Work No. 2: BESS Compound
☰	Work No. 3: Customer Substation
☒	Work No. 4: National Grid Substation

NEAC Groundwater Elevation

Depth (m BGL)

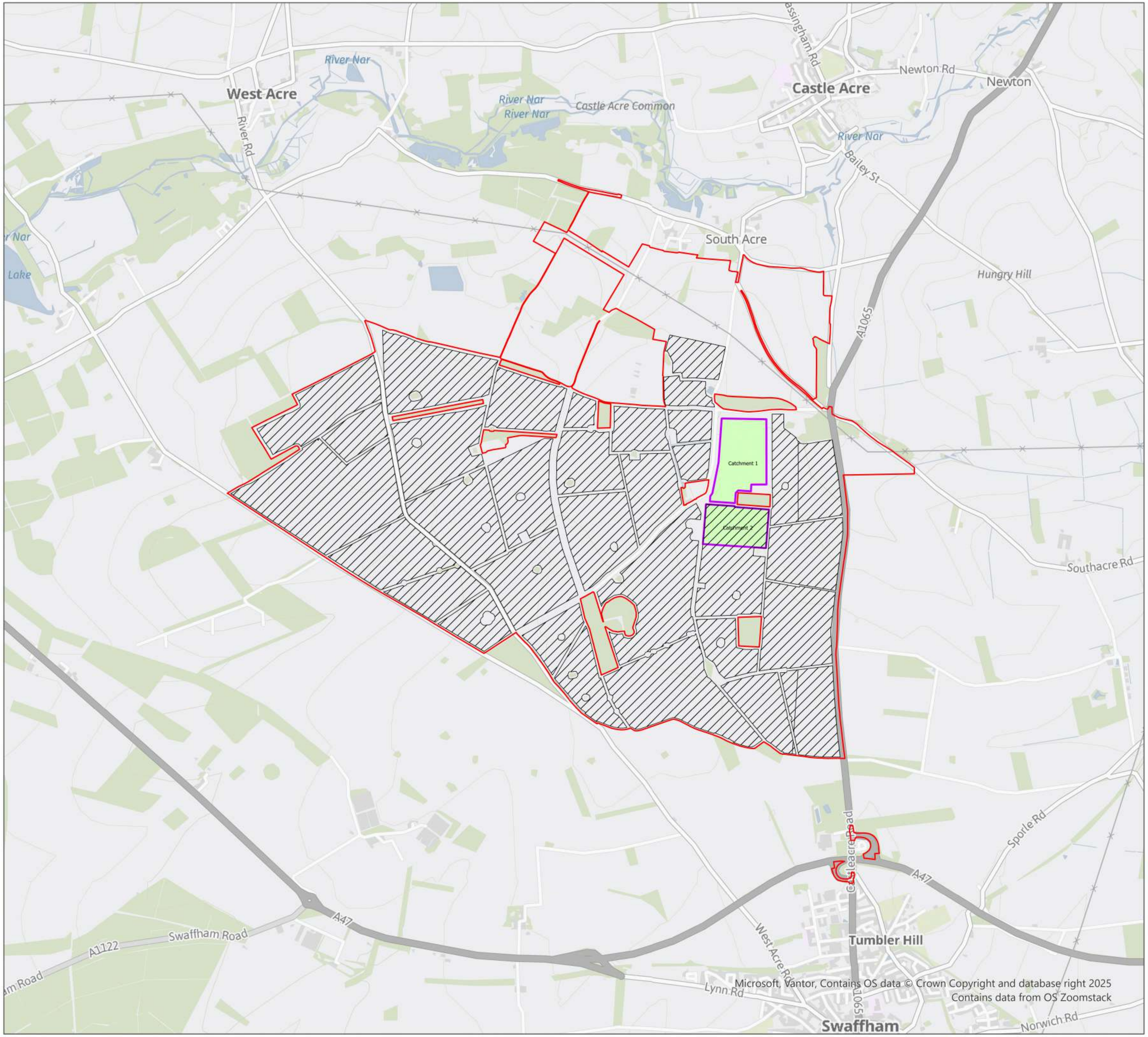
🟩	< 12
🟩	12 - 15
	> 15

Ref: 083-FRA-015A-Rev02 | Date: 08/06/2026

Work No. Interaction with NEAC Groundwater Elevation

Figure A12-1-10

The Droves Solar Farm Flood Risk Assessment



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THE DROVES
SOLAR FARM

RAINCLOUD

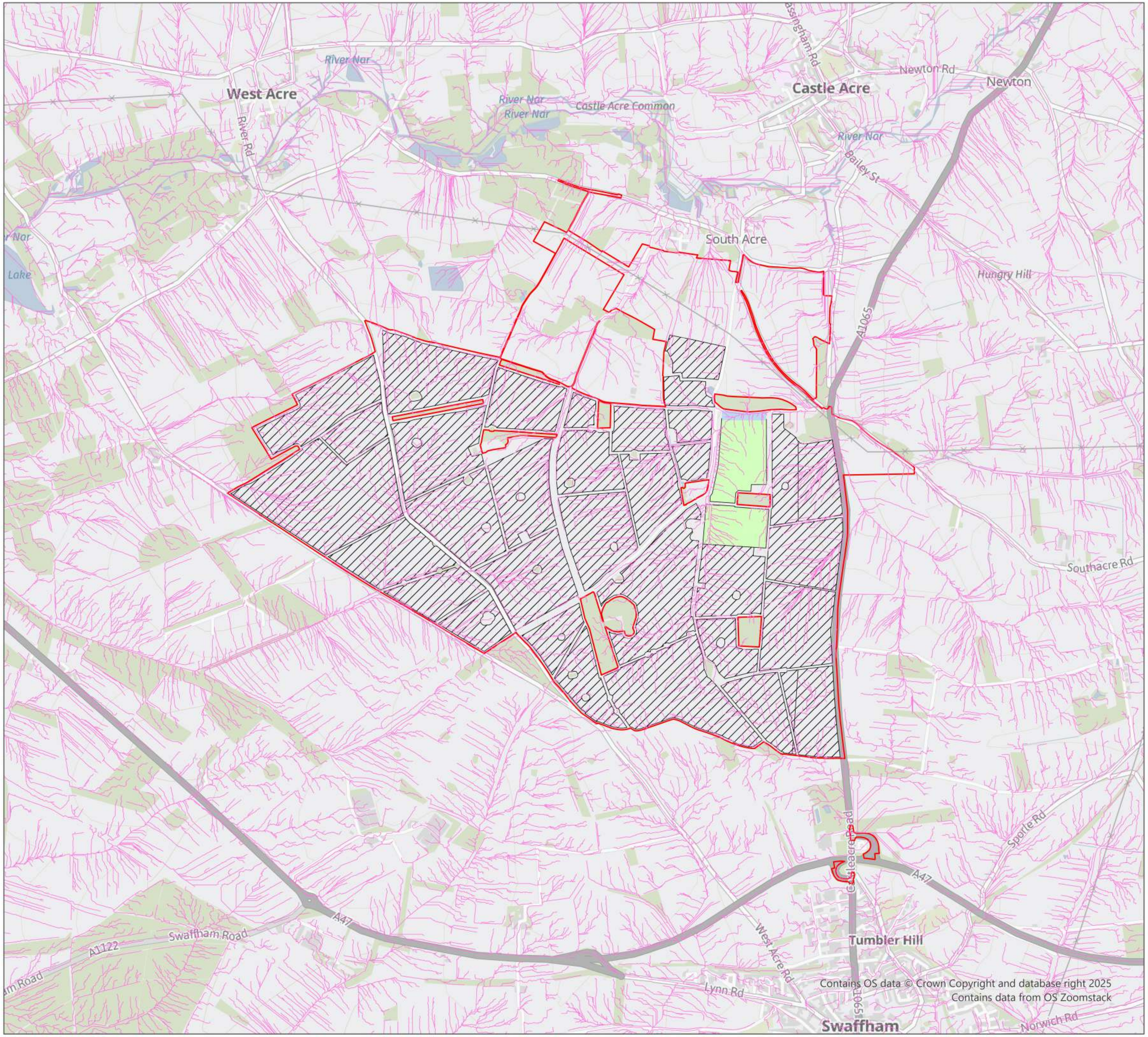
🟥 Order Limits / Core Study Area
▨ Work No. 1: Solar PV
🟩 Impermeable Area
🟪 Catchment

1:25,000 Scale @ A3
0 0.5 1 km
N

Ref: 083-SWD-001A
Date: 17/11/2025

Contributing Catchments and Impermeable Areas
Figure A12-1-12

The Droves Solar Farm Flood Risk Assessment



THE DROVES
SOLAR FARM

RAINCLOUD

□ Order Limits / Core Study Area
▨ Work No. 1: Solar PV
🟩 Impermeable Area
🟦 Surface Water Attenuation Area
— Flow Pathway

1:25,000 Scale @ A3

0 0.5 1 km

N

Ref: 083-SWD-002A

Date: 17/11/2025

Exceedance Pathways
Figure A12-1-13

The Droves Solar Farm
Flood Risk Assessment

Annex F: 2D Modelling Report

Issue Sheet

Report Prepared for: The Droves Solar Farm Limited.
DCO Submission

Appendix F - Pluvial Flood Modelling Report

Prepared by: Raincloud Consulting			
Approved by: Island Green Power			
Revision	Date	Technical lead (Initials):	Approved by (Initials):
Final v 0.1	19/10/2025	LN	HS
Revision v 0.2	09/06/2026	LN	HS

List of Contents

List of Tables

List of Appendices

12 Modelling Report

12.1 Introduction

12.1.1 This technical note presents the results of the hydraulic modelling carried out to verify pluvial flood depths and flow routes within the Order limits of the ~~Scheme River Nar~~ catchment.

12.1.2 The hydraulic modelling has been calculated using the direct rainfall method (DRM) 2D pluvial flood modelling in Flood Modeller Pro.

~~12.1.2~~12.1.3 Direct rainfall 2D modelling was undertaken to assess the worst-case pluvial conditions in the absence of a detailed hydraulic model for the ordinary watercourse. The results indicate that flooding is largely confined to the ditch corridor and does not interact with the Scheme infrastructure.

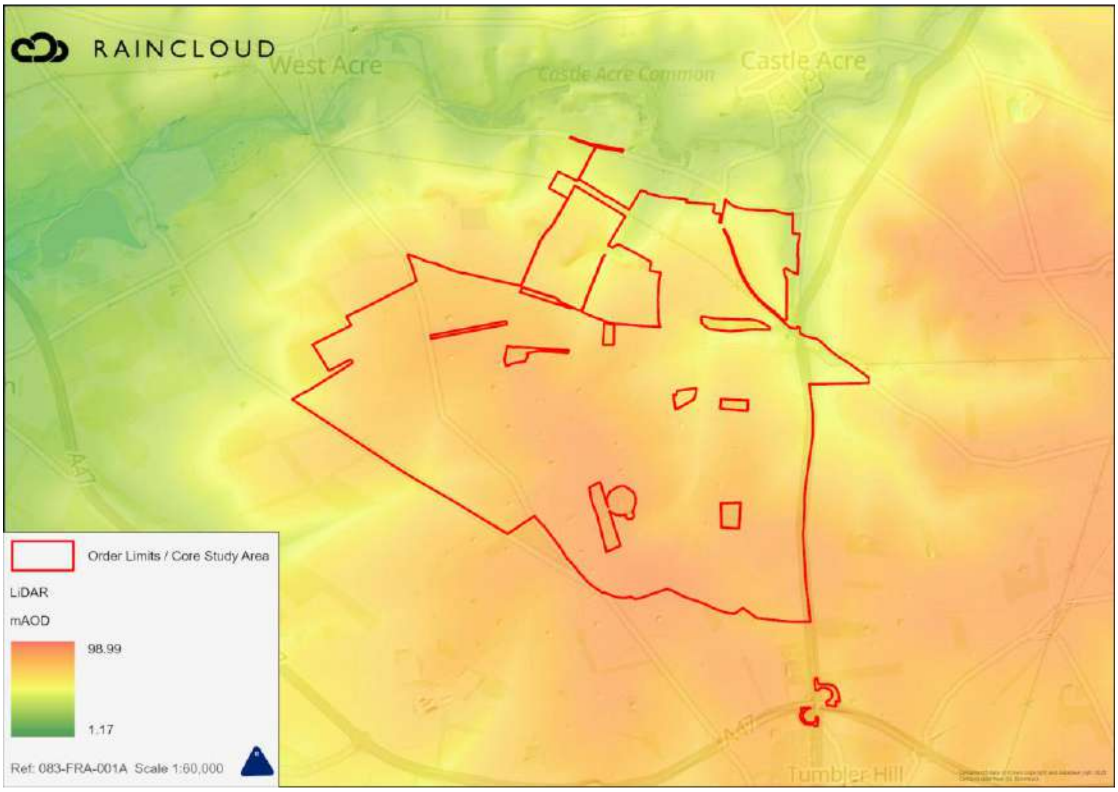
12.2 Study Area

Site Inspections/Topography

12.2.1 Site walkovers were initially taken on 1st October 2024. An additional walkover was undertaken in September 2025 to verify the results of the 2D rainfall modelling as part of the **ES Appendix 12.2: Flood Risk Assessment** [**APP/6.4**].

12.2.2 1 metre (m) resolution Lidar data shows that land within the CSA is generally gently sloping, with elevations from 85~~37~~ m above ordnance datum (AOD) in the south to ~~85~~37 m AOD in the northeast, as shown in Figure B12-1-1.

Plate B12-1-1: Topography within CSA



Watercourses

12.2.3 The Core and Wider Study Areas are located within the primary catchment of the River Nar, which is located approximately 540 m north of the CSA at its nearest point.

12.2.4 An unnamed tributary of the River Nar is located to the east of Southacre Road in the eastern section of the CSA. There is a topographical rise of 5 m from the southern bank of the unnamed watercourse to the proposed access point to the Scheme.

Catchment

12.2.5 The River Nar catchment extent ('the Catchment'), grid reference TF818144, located southwest of South Acre, and is shown in Plate B12-1-2.

Plate B12-1-2: Catchment Extent

Catchment at 581800,314400

Descriptor	Value
NGR	TF 81800 14400
Area	12.2 km²
Altbar	69 m
Aspbar	345 degrees
Aspvar	0.24
BFIHOST	0.833
BFIHOST19	0.855
BFIHost19Scaled	0.855
CentroidEasting	582329 m
CentroidNorthing	312432 m
Dplbar	3.19 km
Dpsbar	25.6 m/km
DrainDensity	0 km/km²
Farl	0.999
Far2015	1
Fpdbar	0.254 cm
Fpext	0.0636
Fploc	1.031
Ldp	5.44 km
PROPWET	0.31
Rmed1D	28 mm
Rmed1H	11.1 mm
Rmed2D	37.5 mm
Saar1970	606 mm
SAAR6190	604 mm
Saar2020	764 mm
Sprhost	14.84 %
Urbconc1990	
Urbconc2000	
Urbext1990	0.0006
Urbext2000	0.0016
Urbext2015	0.0028
Urbloc1990	

12.2.6 The Catchment is predominately agricultural, with a few minor roads included.

12.2.7 The total extent based on the Flood Estimation Handbook (FEH) is 12.2 km^2.

12.3 Methodology

Modelling Approach

12.3.1 A direct rainfall approach using 2D hydraulic modelling software Flood Modeller Pro (version 7.3.9316.27677) has been used.

12.3.2 Rainfall profiles (hyetographs) are derived using catchment descriptors from the FEH Web Service are used alongside ReFH2 software to generate rainfall depth duration frequency (DDF) estimates. DDF catchment descriptors are shown within Appendix 1 of this Report.

12.3.3 The rainfall events of known probability are directly applied to ground surface and routed overland to provide an indication of potential surface water depths.

12.3.4 These depths were retrieved for a range of return periods and storm durations for both Summer and Winter storm profiles.

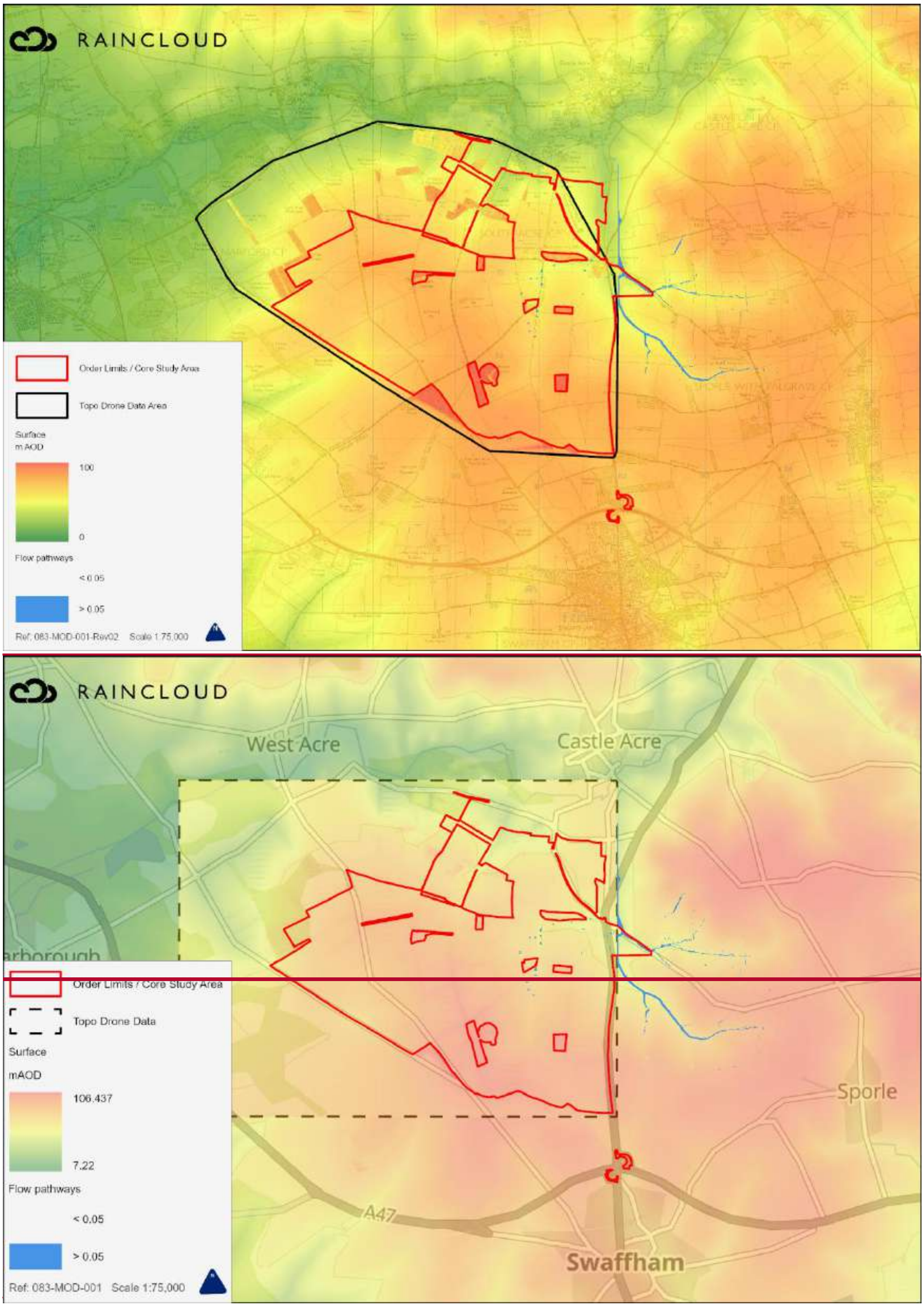
Topography

12.3.5 The 2022 LiDAR DTM with a horizontal resolution of 1m was retrieved from the Environmental Agency open source web portal. A 2m grid resolution was used in the model.

12.3.6 Topographical levels have been obtained from a drone survey for Site and was merged with the LiDAR from outside of the Site boundary.

~~12.3.6~~12.3.7 Resolution of the topographical drone data does not provide a sufficiently accurate topographical base for modelling fine details, including flow pathways, compared to the LiDAR data and leads to an underrepresentation of pluvial flooding within the Site, as shown in Plate B12-1-3.

Plate B12-1-3: Flow pathways with Topographical drone data and LiDAR



~~12.3.7~~12.3.8 Flow pathways obtained using LiDAR are at a higher resolution than pathways obtained using the topographical data, and therefore topographical data derived from drone survey has been discounted for flood modelling.

~~12.3.8~~12.3.9 LiDAR data levels were spot checked against drone derived topographical levels in open fields. A good correlation was found between LiDAR and topographical data values. As such, LiDAR data was used as the surface layer for flood modelling.

~~Mesh Modifications~~Roughness

~~12.3.9~~12.3.10 Surface roughness values were determined by industry standard methods (Chow, 1959).

~~12.3.10~~12.3.11 A default global Manning's n roughness of 0.035 was initially applied to the whole catchment, representing mature row crops[1].

~~12.3.11~~12.3.12 The OS MasterMap land use data identifies roads. buildings, and woodlands. The height of these layers are adjusted above or below LiDAR elevation within the model and are shown within Table B12-1-1.

Table B12-1-1: Land use data and LiDAR elevation

Land Cover	Height Adjusted (m)
Roads	- 0.01
Buildings	+ 2.0
Woodland	+ 0.1

Structures

~~12.3.12~~12.3.13 There are no structures, such as river culverts, embankments and flow controls that have been incorporated into the model. This is to enable a worst-case scenario to be produced.

12.4 Rainfall Analysis

Rainfall Zone

12.4.1 The Rainfall Zone relates to the area where rainfall is applied to the 2D domain~~ and was chosen to reflect the EA pluvial pathways and depths which could impact the placement or function of electrically sensitive infrastructure of the Scheme~~. The FEH catchment was used as the Rainfall Zone,~~The Rainfall Zone ~~and is shown in Plate B12-1-4.

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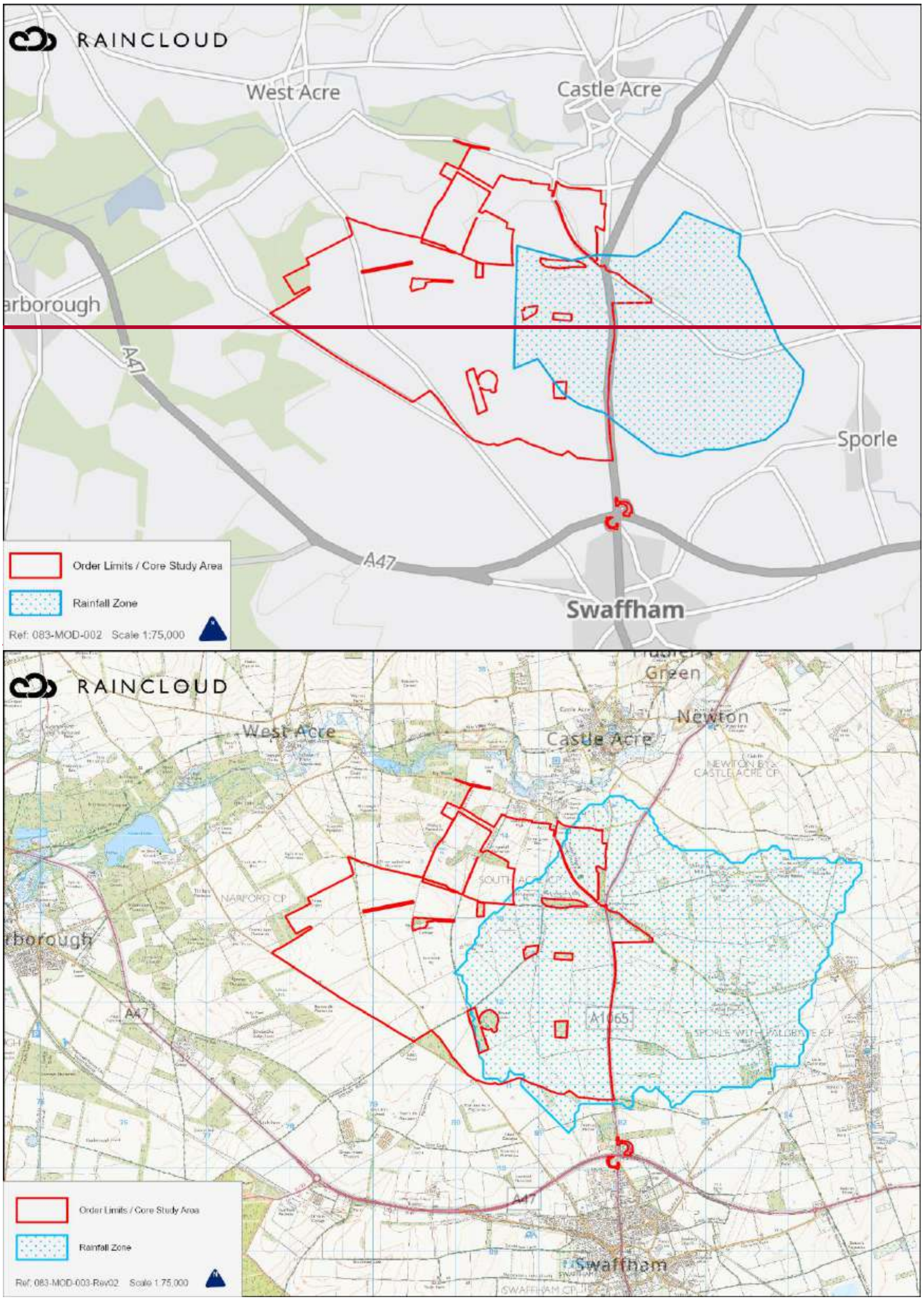
[1] Manning's n for Channels (Chow, 1959)

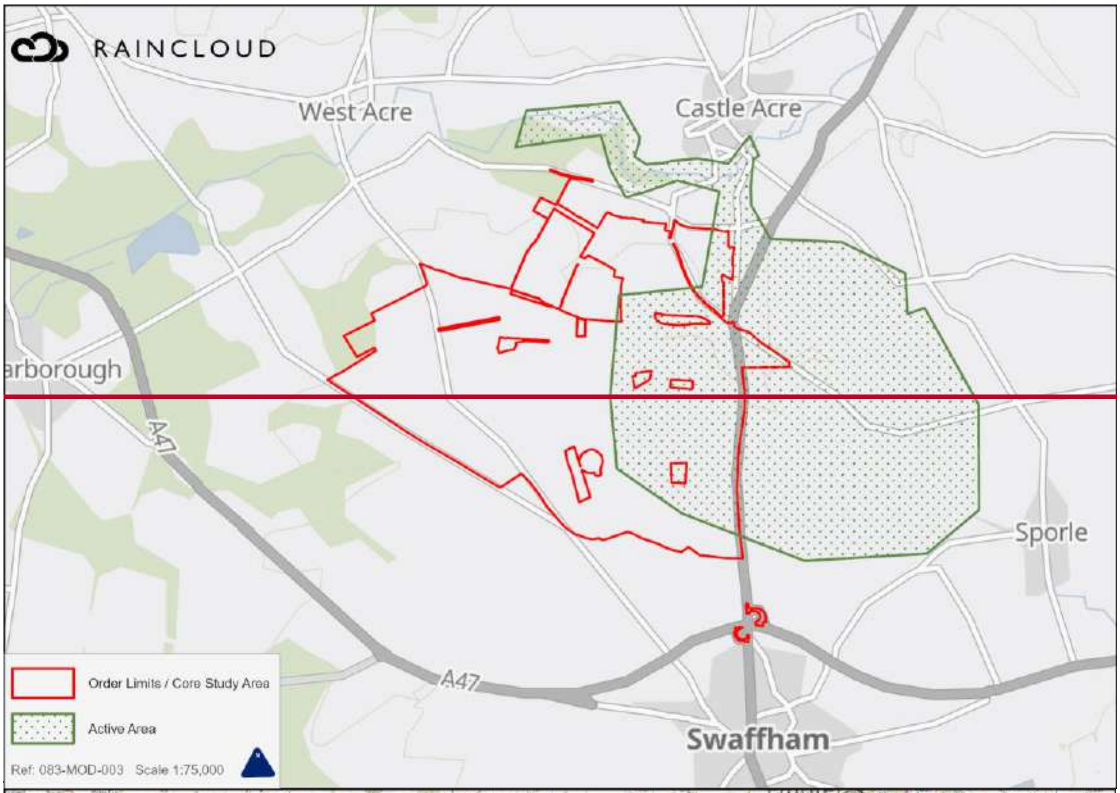
Plate B12-1-4: Rainfall Zone

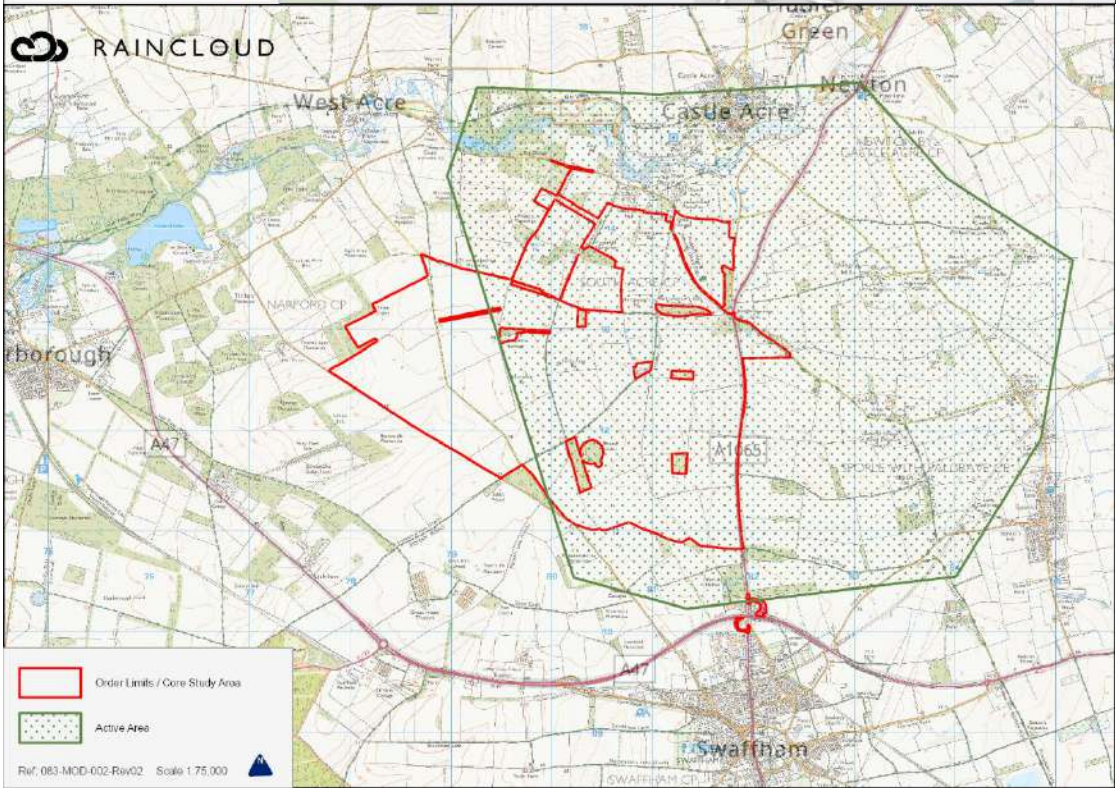


Active Area

12.4.2 Plate B12-1-5 shows the features of the 2D domain used to represent the pluvial flood plain and its structures. The extent of the 2D domain was adjusted during the model stages of the modelling, with the active area set to allow flood waters in the modelled events flow unimpeded through the model and not ‘glasswall’.

Plate B12-1-5: Active Area





Climate Change Allowances

12.4.3 The latest climate change allowances for peak rainfall were applied to the rainfall hyetographs input. Table B12-1-2 shows the Environment Agency climate change allowances for peak rainfall intensity for North West Norfolk Management Catchment[2].

Table B12-1-2: Climate Change Peak Rainfall Intensities - DEFRA

Allowance	Total Potential Anticipated Change for the 2050's	Total Potential Anticipated Change for the 2070's
Central	20%	25%
Upper End Allowance	40%	40%

North West Norfolk Management Catchment peak rainfall Central Allowance of 25% for the 2070 epoch was initially used to assess pluvial flooding.

12.4.4 However, there is the potential that some elements of the Scheme, such as the National Grid Substation which may remain operational beyond the proposed design life of 60 years, and therefore an uplift of 40% to the rainfall within the direct rainfall modelling is applied.

12.4.5 Therefore, the Central Allowance and the Upper End Allowance for the 2070's epoch have been applied to the direct rainfall hyetographs for the 1% AEP event.

Return Periods

12.4.6 Hyetographs for the following rainfall events were generated:

~~3.33% AEP~~

- 1% AEP
- 1% AEP plus 25 % CC; and
- 1% AEP plus 40 % CC.

Storm Duration

12.4.7 The model was run for a duration of 3 hours for each event to allow surface water flows to pass through the catchment following the end of the storm.

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[2] https://environment-test.data.gov.uk/hydrology/climate-change-allowances/rainfall?mgmtcatid=3065

12.4.8 The critical storm duration was the summer 3-hour storm duration as it resulted in the greatest surface water depths and therefore is used for design runs.

12.4.9 The net rainfall value from ReFH2 was applied to the model, as ReFH2 net rainfall accounts for infiltration and other hydrological processes and is deemed an appropriate methodology by the EA, as per the Flood Estimation guidelines.

12.4.10 The ReFH2 net rainfall does not account for losses to the sewer network or highways drainage network and therefore provides a worst-case scenario to the Site.

12.4.11 A summary of the 2D Pluvial Flood Model parameters are outlined in Table B12-1-3.

Table B12-1-3: 2D Pluvial Flood Model Parameters

Return Period	1% AEP
Storm Duration	3 hours
Season	Summer
FEH Rainfall Design Depth	36.72mm
CC Allowance – Central 2070s [Ref. 12-8]	25%
Rural Runoff	55%
Drainage / Infiltration Allowance (0 or 12 mm)	0mm (Ref 12-9)
Manning's n Values	Floodplain - mature row crops: 0.035 (Ref 12-10) Roads: 0.01 Buildings: N/A; and Woodland: 0.1.
Model Timestep	1 second
Grid Resolution	2m
Height Data	1m LiDAR, 2022

Mass Error	0.0%
Largest Courant (Cr) Value	3.5

12.5 Model Results

12.5.1 Outputs from Flood Modeller Pro are presented as mapped pluvial flood extents and depths in Appendix 2. Flood depths below 0.05 m have been filtered in accordance with Section 7.3 Depths of the EA’s What is the Risk of Flooding from Surface Water map? Report (version 2.0 April 2019) document.

Model Health

12.5.2 The model simulation log files show that peak and final mass error is less than 0.01% for all events. The log files are shown in Plate B12-1-6.

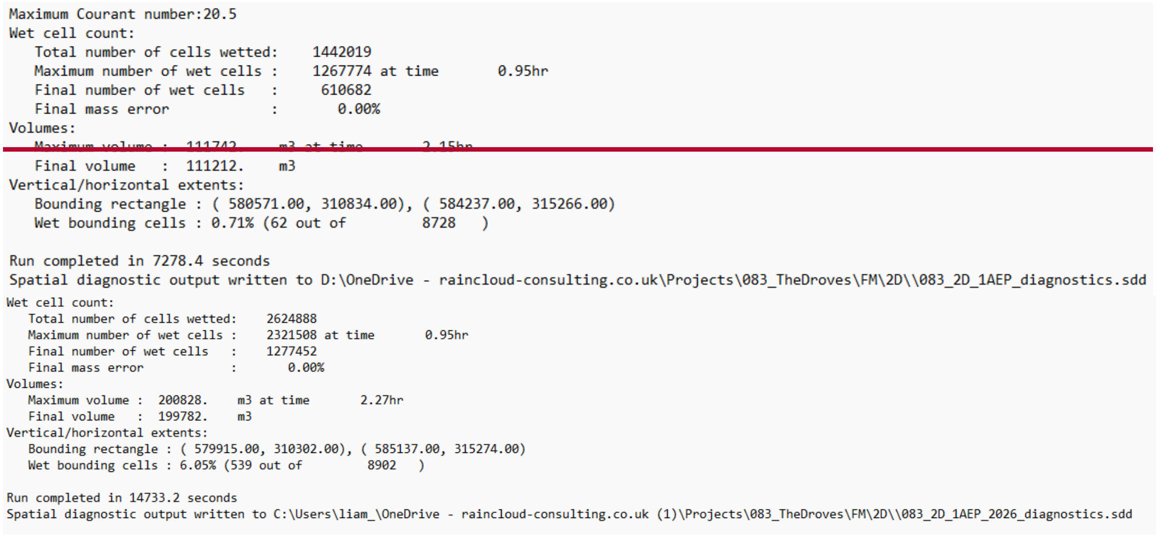
12.6 Model Proving

Run performance

12.6.1 The time step used was set at 1 second.

The total mass error is within +/-1.0% for all model runs undertaken, as demonstrated in Plate B12-1-6.

Plate B12-1-6: Mass error for 1% AEP and 1 % AEP + 40~~25~~% climate change run



```
Maximum Courant number:20.5
Wet cell count:
   Total number of cells wetted:    1442019
   Maximum number of wet cells :    1267774 at time       0.95hr
   Final number of wet cells   :     610682
   Final mass error            :       0.00%
Volumes:
   Maximum volume :  111742.     m3 at time       2.15hr
   Final volume   :  111212.     m3
Vertical/horizontal extents:
   Bounding rectangle : ( 580571.00, 310834.00), ( 584237.00, 315266.00)
   Wet bounding cells : 0.71% (62 out of         8728    )

Run completed in 7278.4 seconds
Spatial diagnostic output written to D:\OneDrive - raincloud-consulting.co.uk\Projects\083_TheDroves\FM\2D\\083_2D_1AEP_diagnostics.sdd
Wet cell count:
   Total number of cells wetted:    2624888
   Maximum number of wet cells :    2321508 at time       0.95hr
   Final number of wet cells   :    1277452
   Final mass error            :       0.00%
Volumes:
   Maximum volume :  200828.    m3 at time       2.27hr
   Final volume   :  199782.    m3
Vertical/horizontal extents:
   Bounding rectangle : ( 579915.00, 310302.00), ( 585137.00, 315274.00)
   Wet bounding cells : 6.05% (539 out of         8902    )

Run completed in 14733.2 seconds
Spatial diagnostic output written to C:\Users\liam_\OneDrive - raincloud-consulting.co.uk (1)\Projects\083_TheDroves\FM\2D\\083_2D_1AEP_2026_diagnostics.sdd
```

```
Maximum Courant number:18.9
Wet cell count:
   Total number of cells wetted:    1521236
   Maximum number of wet cells :    1352147 at time       0.93hr
   Final number of wet cells   :     656684
   Final mass error            :       0.01%
Volumes:
   Maximum volume :  140405.     m3 at time       2.13hr
   Final volume   :  139856.     m3
Vertical/horizontal extents:
   Bounding rectangle : ( 580211.00, 310832.00), ( 584237.00, 315292.00)
   Wet bounding cells : 0.93% (81 out of         8728   )

Run completed in 6469.8 seconds
Spatial diagnostic output written to D:\OneDrive - raincloud-consulting.co.uk\Projects\083_TheDroves\FM\2D\\083_2D_1AEP_CC_diagnostics.sdd
```

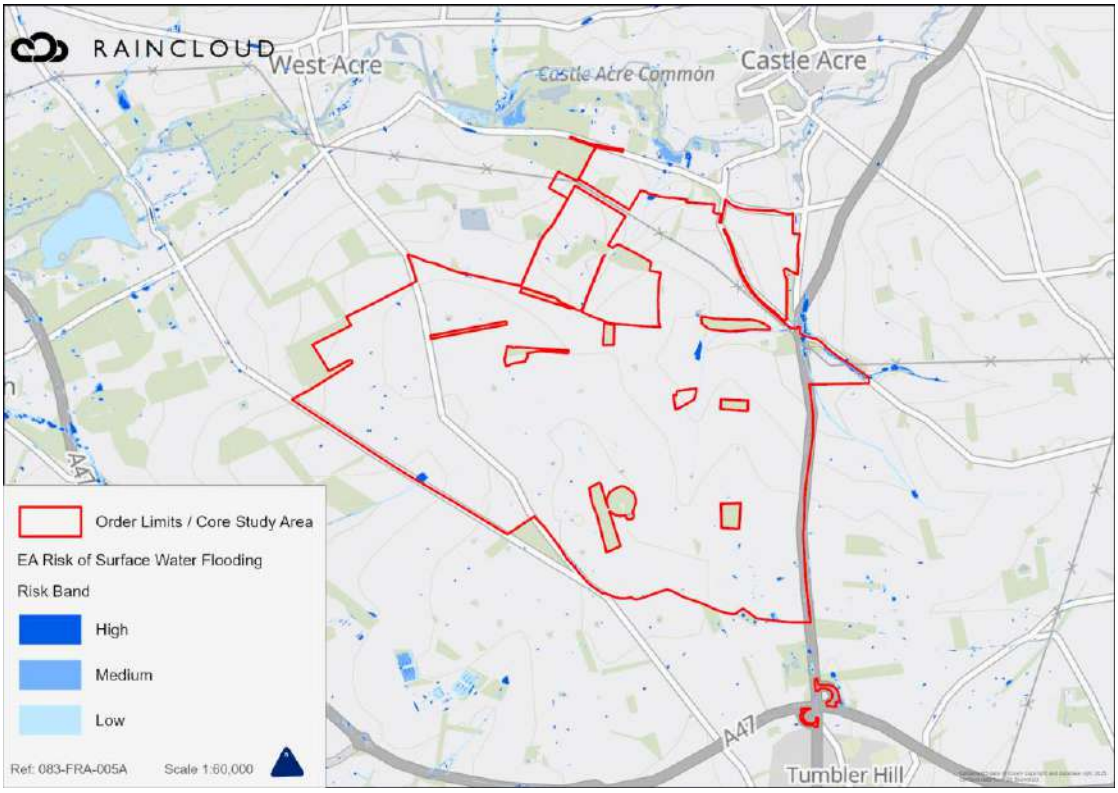
```
Maximum Courant number:9.5
Wet cell count:
   Total number of cells wetted:    2837182
   Maximum number of wet cells :    2442539 at time       1.00hr
   Final number of wet cells   :    1401975
   Final mass error            :       0.00%
Volumes:
   Maximum volume :  281872.    m3 at time       2.08hr
   Final volume   :  280804.    m3
Vertical/horizontal extents:
   Bounding rectangle : ( 579827.00, 310296.00), ( 585137.00, 315298.00)
   Wet bounding cells : 3.33% (296 out of         8902   )

Run completed in 12234.2 seconds
Spatial diagnostic output written to C:\Users\LiamNovins\OneDrive - raincloud-consulting.co.uk (1)\Projects\083_TheDroves\FM\2D\083_2D_1AEP_40CC_2026_results\083_2D_1AEP 1_rt_diag\083_2D_1AEP 1_diagnostics.sdd
```

Calibration and Validation

12.6.2 There is no river (flow or level) gauge situated within an appropriate distance of this location to provide calibration data.

12.6.3 Flood extents generated for this study are similar to those shown on the Environment Agency RoFSW for the 1% AEP event, suggesting the use of 'Net Rainfall' hyetographs and losses included within the ReFH2 model represents the catchment well. The comparison can be seen from Plate B12-1-7.

Figure B12-1-7: EA RoSWF 2025 Flood Extents



Modelling Assumptions

12.6.4 The representation of any complex system by a model requires a number of assumptions to be made:

- LiDAR is representative of the land surface and no errors have been introduced through the filtering algorithms
- ReFH design rainfall inflows accurately represent rainfall for a given return period storm event
- OS MasterMap is an accurate representation of ground cover; and
- Where roughness zones have not been implemented, a Manning's n value of 0.035 ~~is~~ to represent~~ative.~~ predominant agricultural land use has been adopted, in accordance with Scenario 3 Floodplains A1 shortgrass values from Chow 1959.

Limitations

12.6.5 Whilst the accuracy of a hydraulic model depends largely on the accuracy of the hydrological, topographical and structural data some assumptions and uncertainty can be introduced as part of the modelling process. These could include:

- Estimates of model parameters such as roughness, structure coefficients and percentage runoffs are representative; and
- Decisions made during model proving.

12.6.6 Calibration events were not available, as such the model was calibrated against the EA RoFSW data which has its own limitations. In the absence of historical event data this was deemed the most appropriate option.

12.6.7 No 1D structures were included within the model. The purpose of the modelling is to compare the existing Site scenario to the Scheme scenario, focusing on the Sites runoff and not structures within the model domain therefore it was deemed not applicable to implement into the model setup. No structure data was available at the time of modelling. In addition, the model does not account for the sewer system.

12.6.8 Surface water flood model representing solar farm do not include the solar panels within the model as it is not possible to do so within a 2D domain. It is recognised that solar panels are not impermeable and therefore can be excluded from the model and the solar panel underlying conditions should be represented to provide the most accurate modelling.

12.7 Conclusions

12.7.1 The pluvial flood modelling undertaken demonstrates that the use of high-resolution LiDAR data provides more credible results compared to lower resolution topographical drone data.

12.7.2 The model was applied to a range of design storm events, with hyetographs generated for the ~~3.33% AEP,~~ 1% AEP, and 1% AEP plus climate change events.

12.7.3 The resulting flood extents for the 1% AEP event show good agreement with the EA's RoFSW mapping, providing confidence in the model outputs.

Appendix 1: FEH Catchment Descriptors

UK Design Flood Estimation

Generated on Wednesday, July 30, 2025 2:48:32 PM by CharlieHadden
Printed from the ReFH2 Flood Modelling software package, version 4.1.8879.22310

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 1527-2A6A

Site name: FEH_Catchment_Descriptors_581800_314400_v5_0_1

Easting: 581800

Northing: 314400

Country: England, Wales or Northern Ireland

Catchment Area (km²): 12.2

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 100 year 1.25 CC

Summary of results

Rainfall - FEH22 (mm):	75.96	Total runoff (ML):	49.10
Total Rainfall (mm):	70.00	Total flow (ML):	129.56
Peak Rainfall (mm):	47.41	Peak flow (m³/s):	1.80

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:00:00 [09:00:00]	Yes
Timestep (hh:mm:ss)	01:00:00	No
SCF (Seasonal correction factor)	0.98	No
ARF (Areal reduction factor)	0.94	No
Seasonality	Summer [Winter]	Yes
Climate change factor	1.25	Yes

Loss model parameters

Name	Value	User-defined?
Cini (mm)	24.61	No
Cmax (mm)	1047.37	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	5.21	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0.01	No
BL (hr)	73.12	No
BR	3.34	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0.03	No
Effective URBEXT2000	0	n/a
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	11.2952	0.0000	0.3330	0.0000	0.014	0.014
01:00:00	47.4141	0.0000	2.7261	0.0138	0.0142	0.0279
02:00:00	11.2952	0.0000	0.9658	0.1530	0.0177	0.171
03:00:00	0.0000	0.0000	0.0000	0.4434	0.0306	0.474
04:00:00	0.0000	0.0000	0.0000	0.7733	0.0572	0.831
05:00:00	0.0000	0.0000	0.0000	1.1022	0.0981	1.2
06:00:00	0.0000	0.0000	0.0000	1.4128	0.153	1.57
07:00:00	0.0000	0.0000	0.0000	1.5827	0.218	1.8
08:00:00	0.0000	0.0000	0.0000	1.4818	0.283	1.77
09:00:00	0.0000	0.0000	0.0000	1.2917	0.342	1.63
10:00:00	0.0000	0.0000	0.0000	1.1000	0.391	1.49
11:00:00	0.0000	0.0000	0.0000	0.9106	0.431	1.34
12:00:00	0.0000	0.0000	0.0000	0.7398	0.462	1.2
13:00:00	0.0000	0.0000	0.0000	0.6269	0.487	1.11
14:00:00	0.0000	0.0000	0.0000	0.5389	0.506	1.05
15:00:00	0.0000	0.0000	0.0000	0.4533	0.522	0.975
16:00:00	0.0000	0.0000	0.0000	0.3684	0.533	0.902
17:00:00	0.0000	0.0000	0.0000	0.2844	0.541	0.825
18:00:00	0.0000	0.0000	0.0000	0.2005	0.545	0.745
19:00:00	0.0000	0.0000	0.0000	0.1168	0.544	0.661
20:00:00	0.0000	0.0000	0.0000	0.0400	0.54	0.581
21:00:00	0.0000	0.0000	0.0000	0.0054	0.534	0.54
22:00:00	0.0000	0.0000	0.0000	0.0000	0.527	0.527
23:00:00	0.0000	0.0000	0.0000	0.0000	0.52	0.52
24:00:00	0.0000	0.0000	0.0000	0.0000	0.513	0.513
25:00:00	0.0000	0.0000	0.0000	0.0000	0.506	0.506
26:00:00	0.0000	0.0000	0.0000	0.0000	0.499	0.499
27:00:00	0.0000	0.0000	0.0000	0.0000	0.492	0.492
28:00:00	0.0000	0.0000	0.0000	0.0000	0.486	0.486
29:00:00	0.0000	0.0000	0.0000	0.0000	0.479	0.479
30:00:00	0.0000	0.0000	0.0000	0.0000	0.472	0.472
31:00:00	0.0000	0.0000	0.0000	0.0000	0.466	0.466
32:00:00	0.0000	0.0000	0.0000	0.0000	0.46	0.46
33:00:00	0.0000	0.0000	0.0000	0.0000	0.453	0.453

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
34:00:00	0.0000	0.0000	0.0000	0.0000	0.447	0.447
35:00:00	0.0000	0.0000	0.0000	0.0000	0.441	0.441
36:00:00	0.0000	0.0000	0.0000	0.0000	0.435	0.435
37:00:00	0.0000	0.0000	0.0000	0.0000	0.429	0.429
38:00:00	0.0000	0.0000	0.0000	0.0000	0.423	0.423
39:00:00	0.0000	0.0000	0.0000	0.0000	0.418	0.418
40:00:00	0.0000	0.0000	0.0000	0.0000	0.412	0.412
41:00:00	0.0000	0.0000	0.0000	0.0000	0.406	0.406
42:00:00	0.0000	0.0000	0.0000	0.0000	0.401	0.401
43:00:00	0.0000	0.0000	0.0000	0.0000	0.395	0.395
44:00:00	0.0000	0.0000	0.0000	0.0000	0.39	0.39
45:00:00	0.0000	0.0000	0.0000	0.0000	0.385	0.385
46:00:00	0.0000	0.0000	0.0000	0.0000	0.38	0.38
47:00:00	0.0000	0.0000	0.0000	0.0000	0.374	0.374
48:00:00	0.0000	0.0000	0.0000	0.0000	0.369	0.369
49:00:00	0.0000	0.0000	0.0000	0.0000	0.364	0.364
50:00:00	0.0000	0.0000	0.0000	0.0000	0.359	0.359
51:00:00	0.0000	0.0000	0.0000	0.0000	0.354	0.354
52:00:00	0.0000	0.0000	0.0000	0.0000	0.35	0.35
53:00:00	0.0000	0.0000	0.0000	0.0000	0.345	0.345
54:00:00	0.0000	0.0000	0.0000	0.0000	0.34	0.34
55:00:00	0.0000	0.0000	0.0000	0.0000	0.336	0.336
56:00:00	0.0000	0.0000	0.0000	0.0000	0.331	0.331
57:00:00	0.0000	0.0000	0.0000	0.0000	0.327	0.327

Appendix

Catchment descriptors

Name	Value	User-defined value used?
Area (km^2)	12.2	No
ALTBAR	69	No
ASPBAR	345	No
ASPVAR	0.24	No
BFIHOST	0.83	No
BFIHOST19	0.86	No
DPLBAR (km)	3.19	No
DPSBAR (mkm^{-1})	25.6	No
FARL	1	No
LDP	5.44	No
PROPWET	0.31	No
RMED1H	11.1	No
RMED1D	28	No
RMED2D	37.5	No
SAAR (mm)	694	No
SAAR4170 (mm)	696	No
SPRHOST	14.94	No
URBEXT2000	0	No
URBEXT1990	0	No
URBCONC	0	No
URBLOC	0	No
DDF parameter C	-0.02	No
DDF parameter D1	0.28	No
DDF parameter D2	0.34	No
DDF parameter D3	0.29	No
DDF parameter E	0.31	No
DDF parameter F	2.47	No
DDF parameter C (1km grid value)	-0.02	No
DDF parameter D1 (1km grid value)	0.28	No
DDF parameter D2 (1km grid value)	0.32	No
DDF parameter D3 (1km grid value)	0.31	No
DDF parameter E (1km grid value)	0.31	No
DDF parameter F (1km grid value)	2.47	No

UK Design Flood Estimation

Generated on Wednesday, July 30, 2025 2:47:43 PM by CharlieHadden
Printed from the ReFH2 Flood Modelling software package, version 4.1.8879.22310

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details

Checksum: 1527-2A6A

Site name: FEH_Catchment_Descriptors_581800_314400_v5_0_1

Easting: 581800

Northing: 314400

Country: England, Wales or Northern Ireland

Catchment Area (km²): 12.2

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 100 year 1.4 CC

Summary of results

Rainfall - FEH22 (mm):	85.07	Total runoff (ML):	58.83
Total Rainfall (mm):	78.41	Total flow (ML):	154.88
Peak Rainfall (mm):	53.10	Peak flow (m³/s):	2.15

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:00:00 [09:00:00]	Yes
Timestep (hh:mm:ss)	01:00:00	No
SCF (Seasonal correction factor)	0.98	No
ARF (Areal reduction factor)	0.94	No
Seasonality	Summer [Winter]	Yes
Climate change factor	1.40	Yes

Loss model parameters

Name	Value	User-defined?
Cini (mm)	24.61	No
Cmax (mm)	1047.37	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	5.21	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0.01	No
BL (hr)	73.12	No
BR	3.34	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0.03	No
Effective URBEXT2000	0	n/a
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	12.6507	0.0000	0.3812	0.0000	0.014	0.014
01:00:00	53.1038	0.0000	3.2660	0.0157	0.0142	0.0299
02:00:00	12.6507	0.0000	1.1749	0.1810	0.0184	0.199
03:00:00	0.0000	0.0000	0.0000	0.5280	0.0339	0.562
04:00:00	0.0000	0.0000	0.0000	0.9231	0.0656	0.989
05:00:00	0.0000	0.0000	0.0000	1.3170	0.115	1.43
06:00:00	0.0000	0.0000	0.0000	1.6900	0.18	1.87
07:00:00	0.0000	0.0000	0.0000	1.8961	0.258	2.15
08:00:00	0.0000	0.0000	0.0000	1.7770	0.337	2.11
09:00:00	0.0000	0.0000	0.0000	1.5494	0.407	1.96
10:00:00	0.0000	0.0000	0.0000	1.3198	0.466	1.79
11:00:00	0.0000	0.0000	0.0000	1.0928	0.514	1.61
12:00:00	0.0000	0.0000	0.0000	0.8877	0.551	1.44
13:00:00	0.0000	0.0000	0.0000	0.7520	0.581	1.33
14:00:00	0.0000	0.0000	0.0000	0.6467	0.604	1.25
15:00:00	0.0000	0.0000	0.0000	0.5442	0.623	1.17
16:00:00	0.0000	0.0000	0.0000	0.4425	0.637	1.08
17:00:00	0.0000	0.0000	0.0000	0.3417	0.646	0.988
18:00:00	0.0000	0.0000	0.0000	0.2411	0.651	0.892
19:00:00	0.0000	0.0000	0.0000	0.1408	0.65	0.791
20:00:00	0.0000	0.0000	0.0000	0.0485	0.646	0.694
21:00:00	0.0000	0.0000	0.0000	0.0066	0.638	0.645
22:00:00	0.0000	0.0000	0.0000	0.0000	0.63	0.63
23:00:00	0.0000	0.0000	0.0000	0.0000	0.621	0.621
24:00:00	0.0000	0.0000	0.0000	0.0000	0.613	0.613
25:00:00	0.0000	0.0000	0.0000	0.0000	0.605	0.605
26:00:00	0.0000	0.0000	0.0000	0.0000	0.596	0.596
27:00:00	0.0000	0.0000	0.0000	0.0000	0.588	0.588
28:00:00	0.0000	0.0000	0.0000	0.0000	0.58	0.58
29:00:00	0.0000	0.0000	0.0000	0.0000	0.572	0.572
30:00:00	0.0000	0.0000	0.0000	0.0000	0.565	0.565
31:00:00	0.0000	0.0000	0.0000	0.0000	0.557	0.557
32:00:00	0.0000	0.0000	0.0000	0.0000	0.549	0.549
33:00:00	0.0000	0.0000	0.0000	0.0000	0.542	0.542

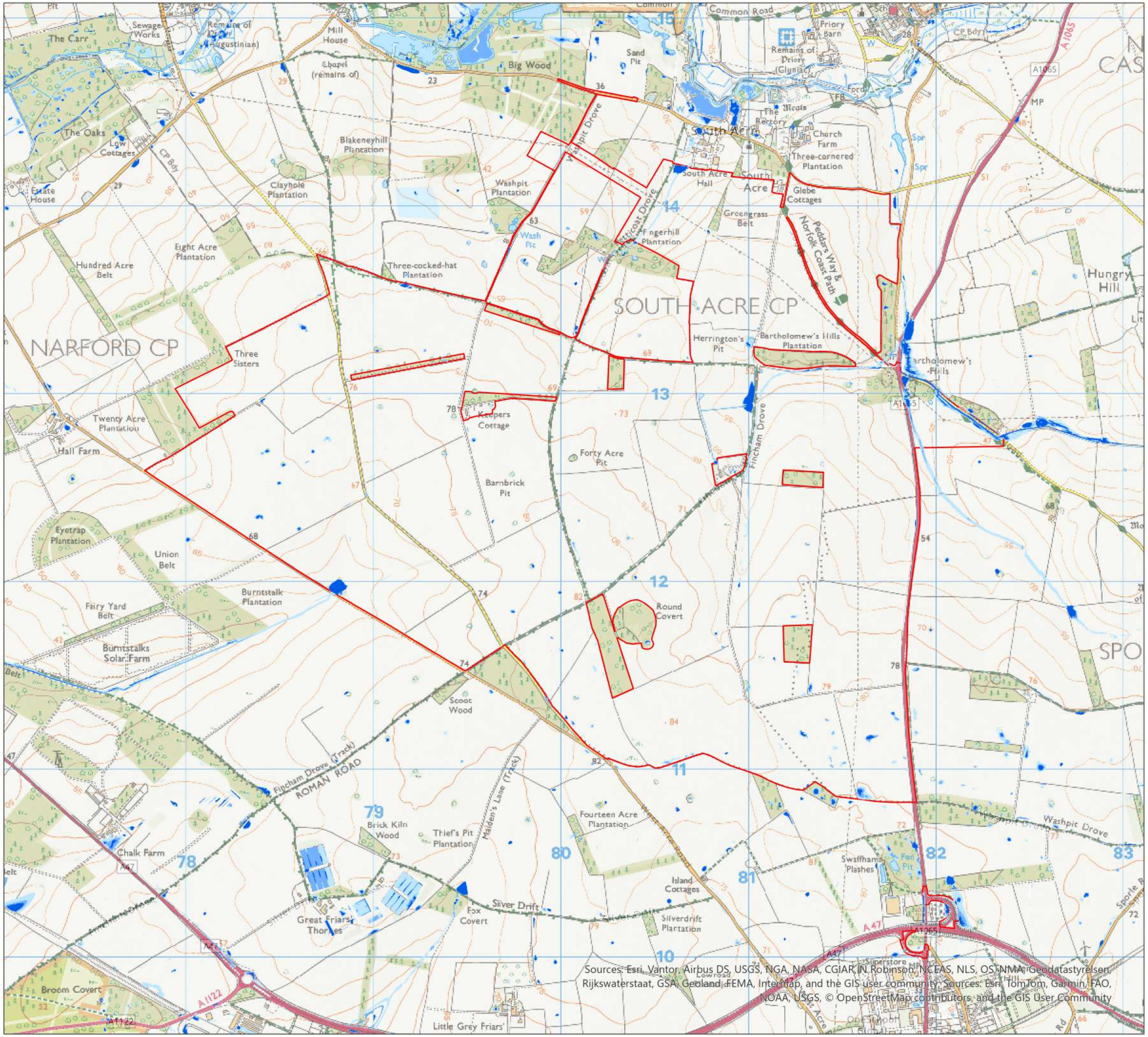
Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
34:00:00	0.0000	0.0000	0.0000	0.0000	0.535	0.535
35:00:00	0.0000	0.0000	0.0000	0.0000	0.527	0.527
36:00:00	0.0000	0.0000	0.0000	0.0000	0.52	0.52
37:00:00	0.0000	0.0000	0.0000	0.0000	0.513	0.513
38:00:00	0.0000	0.0000	0.0000	0.0000	0.506	0.506
39:00:00	0.0000	0.0000	0.0000	0.0000	0.499	0.499
40:00:00	0.0000	0.0000	0.0000	0.0000	0.492	0.492
41:00:00	0.0000	0.0000	0.0000	0.0000	0.486	0.486
42:00:00	0.0000	0.0000	0.0000	0.0000	0.479	0.479
43:00:00	0.0000	0.0000	0.0000	0.0000	0.473	0.473
44:00:00	0.0000	0.0000	0.0000	0.0000	0.466	0.466
45:00:00	0.0000	0.0000	0.0000	0.0000	0.46	0.46
46:00:00	0.0000	0.0000	0.0000	0.0000	0.454	0.454
47:00:00	0.0000	0.0000	0.0000	0.0000	0.447	0.447
48:00:00	0.0000	0.0000	0.0000	0.0000	0.441	0.441
49:00:00	0.0000	0.0000	0.0000	0.0000	0.435	0.435
50:00:00	0.0000	0.0000	0.0000	0.0000	0.429	0.429
51:00:00	0.0000	0.0000	0.0000	0.0000	0.424	0.424
52:00:00	0.0000	0.0000	0.0000	0.0000	0.418	0.418
53:00:00	0.0000	0.0000	0.0000	0.0000	0.412	0.412
54:00:00	0.0000	0.0000	0.0000	0.0000	0.407	0.407
55:00:00	0.0000	0.0000	0.0000	0.0000	0.401	0.401
56:00:00	0.0000	0.0000	0.0000	0.0000	0.396	0.396
57:00:00	0.0000	0.0000	0.0000	0.0000	0.39	0.39

Appendix

Catchment descriptors

Name	Value	User-defined value used?
Area (km^2)	12.2	No
ALTBAR	69	No
ASPBAR	345	No
ASPVAR	0.24	No
BFIHOST	0.83	No
BFIHOST19	0.86	No
DPLBAR (km)	3.19	No
DPSBAR (mkm^{-1})	25.6	No
FARL	1	No
LDP	5.44	No
PROPWET	0.31	No
RMED1H	11.1	No
RMED1D	28	No
RMED2D	37.5	No
SAAR (mm)	694	No
SAAR4170 (mm)	696	No
SPRHOST	14.94	No
URBEXT2000	0	No
URBEXT1990	0	No
URBCONC	0	No
URBLOC	0	No
DDF parameter C	-0.02	No
DDF parameter D1	0.28	No
DDF parameter D2	0.34	No
DDF parameter D3	0.29	No
DDF parameter E	0.31	No
DDF parameter F	2.47	No
DDF parameter C (1km grid value)	-0.02	No
DDF parameter D1 (1km grid value)	0.28	No
DDF parameter D2 (1km grid value)	0.32	No
DDF parameter D3 (1km grid value)	0.31	No
DDF parameter E (1km grid value)	0.31	No
DDF parameter F (1km grid value)	2.47	No

Appendix 2: Pluvial Flood Depths



Sources: Esri, Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community; Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

THE DROVES
SOLAR FARM

RAINCLOUD

□ Order Limits / Core Study Area

EA Risk of Surface Water Flooding

Risk Band

■ High

■ Medium

■ Low

1:20,000 Scale @ A3

0 0.5 1 km

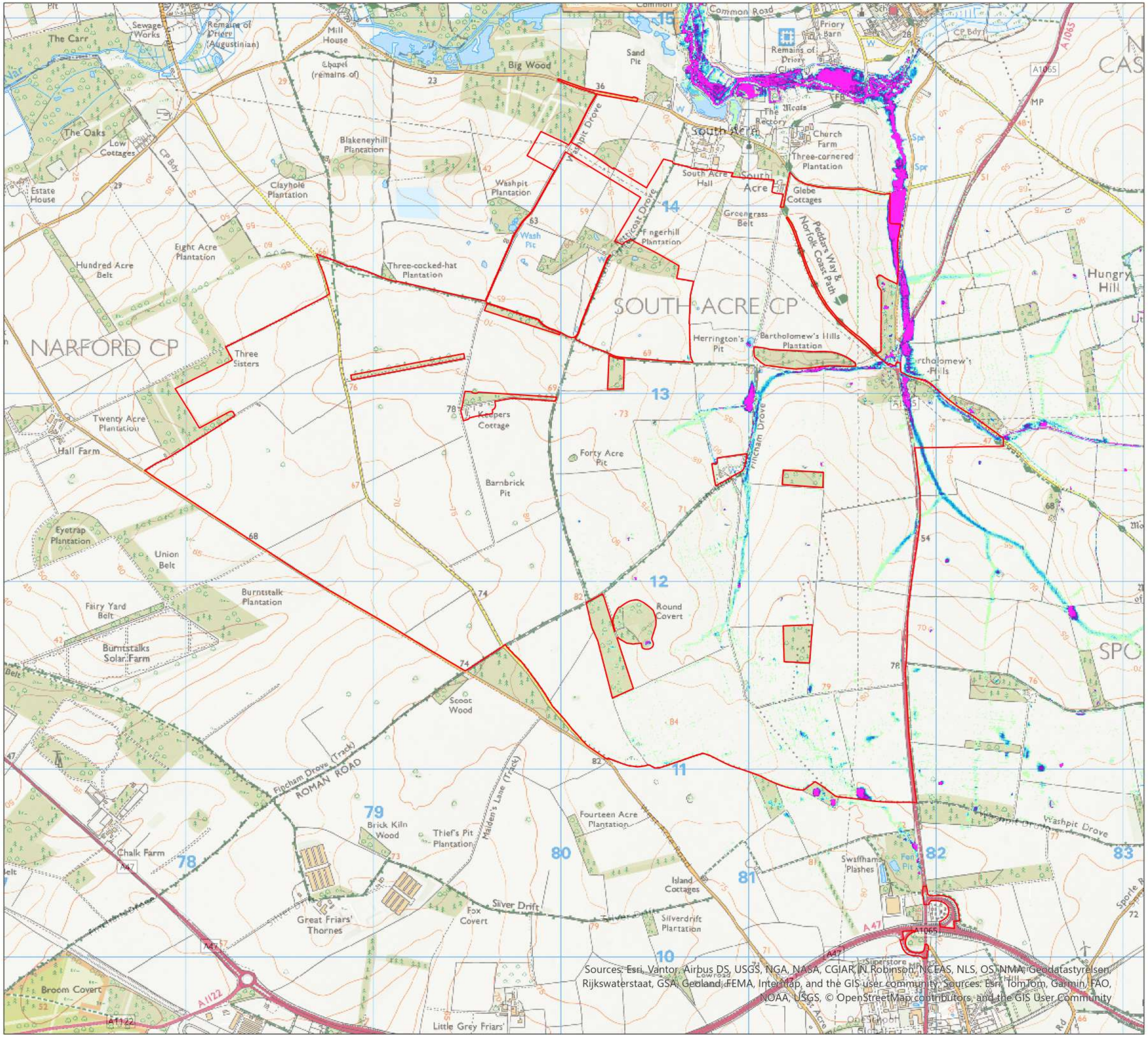
N

Ref: 083-MOD-005-Rev02 | Date: 11/06/2026

1 % AEP Pluvial Flood Extents (EA - RoFSW 2025)

Figure A12-2-1

The Droves Solar Farm Modelling Report



Sources: Esri, Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

THE DROVES
SOLAR FARM

RAINCLOUD

□ Order Limits / Core Study Area

1 % AEP - Raincloud Model

Depth (m)

- 0 - 0.05
- 🟩 0.051 - 0.1
- 🟦 0.101 - 0.15
- 🟦 0.151 - 0.2
- 🟦 0.201 - 0.25
- 🟦 0.251 - 0.3
- 🟪 0.301 - 0.35
- 🟪 0.351 - 0.4
- 🟪 0.401 - 0.45
- 🟪 > 0.45

1:20,000 Scale @ A3

0 0.5 1 km

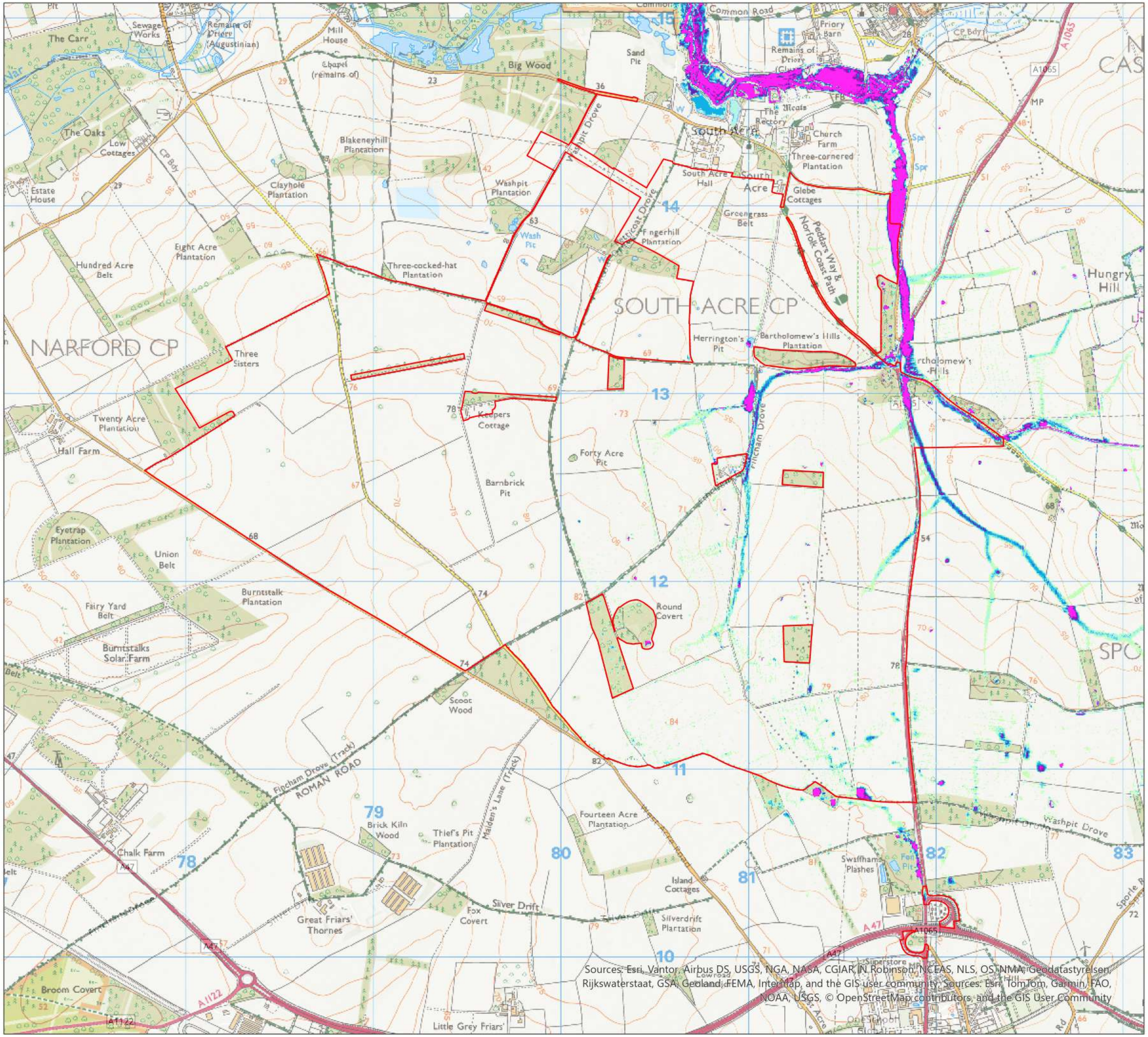
N

Ref: 083-MOD-006A-Rev02 Date: 11/06/2026

1 % AEP Flood Depths - Raincloud 2D Modelling

Figure A12-2-2

The Droves Solar Farm Modelling Report



Sources: Esri, Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community; Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

THE DROVES
SOLAR FARM

RAINCLOUD

▭ Order Limits / Core Study Area

1 % AEP + 25 % CC - Raincloud Model Depth (m)

- 0 - 0.05
- 🟩 0.051 - 0.1
- 0.101 - 0.15
- 0.151 - 0.2
- 🟦 0.201 - 0.25
- 🟦 0.251 - 0.3
- 🟪 0.301 - 0.35
- 🟪 0.351 - 0.4
- 🟪 0.401 - 0.45
- 🟪 > 0.45

1:20,000 Scale @ A3

0 0.5 1 km

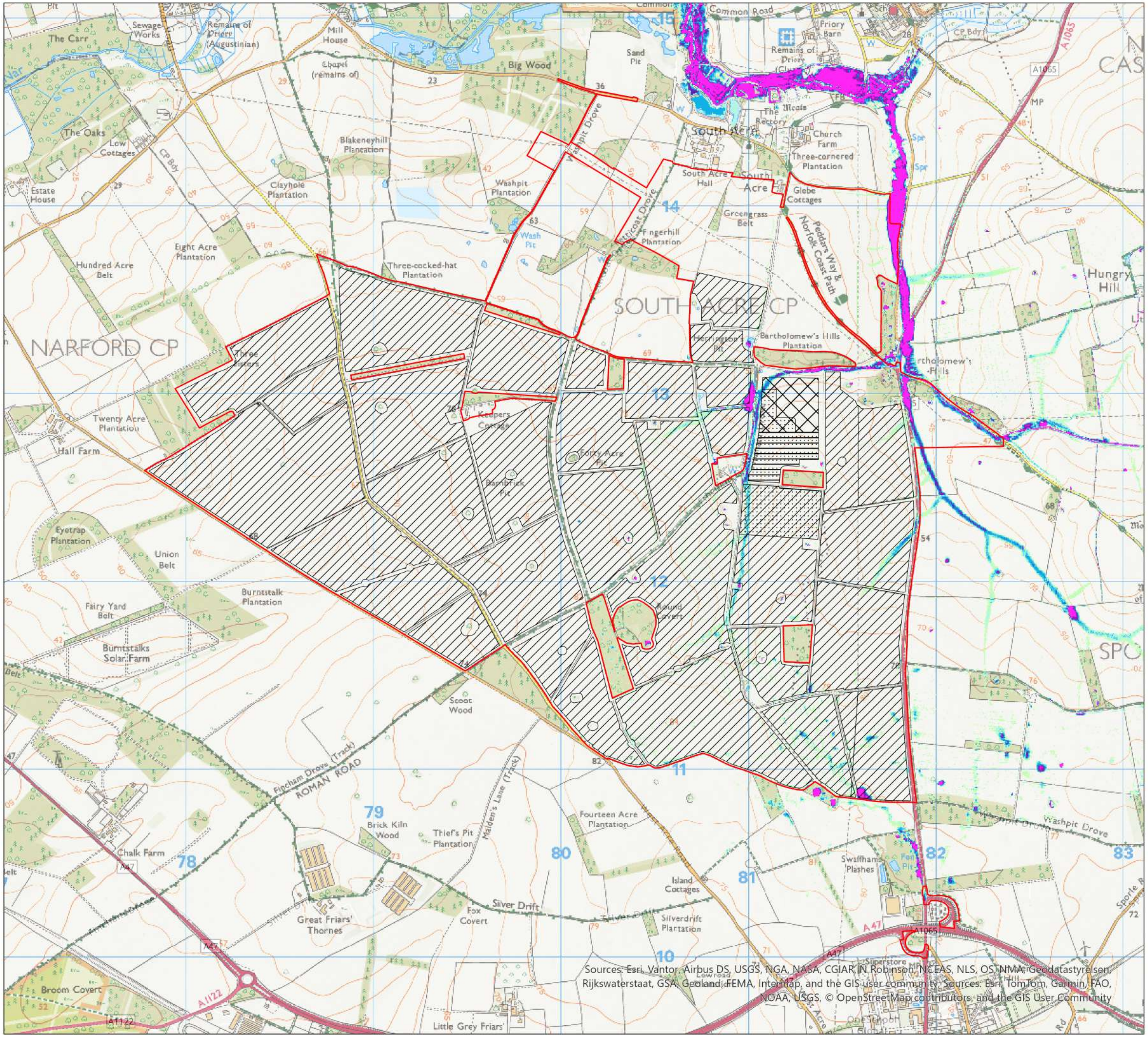
N

Ref: 083-MOD-007A-Rev02 Date: 11/06/2026

1 % AEP + 25 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-2-3

The Droves Solar Farm Modelling Report



Sources: Esri, Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community; Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

THE DROVES
SOLAR FARM

RAINCLOUD

- 🟥 Order Limits / Core Study Area
- ▨ Work No. 1: Solar PV
- ▒ Work No. 2: BESS Compound
- ☰ Work No. 3: Customer Substation
- ☒ Work No. 4: National Grid Substation

1 % AEP + 25 % CC - Raincloud Model Depth (m)

- 0 - 0.05
- 🟩 0.051 - 0.1
- 0.101 - 0.15
- 0.151 - 0.2
- 0.201 - 0.25
- 🟦 0.251 - 0.3
- 0.301 - 0.35
- 🟪 0.351 - 0.4
- 0.401 - 0.45
- > 0.45

1:20,000 Scale @ A3

0 0.55 1.1 km

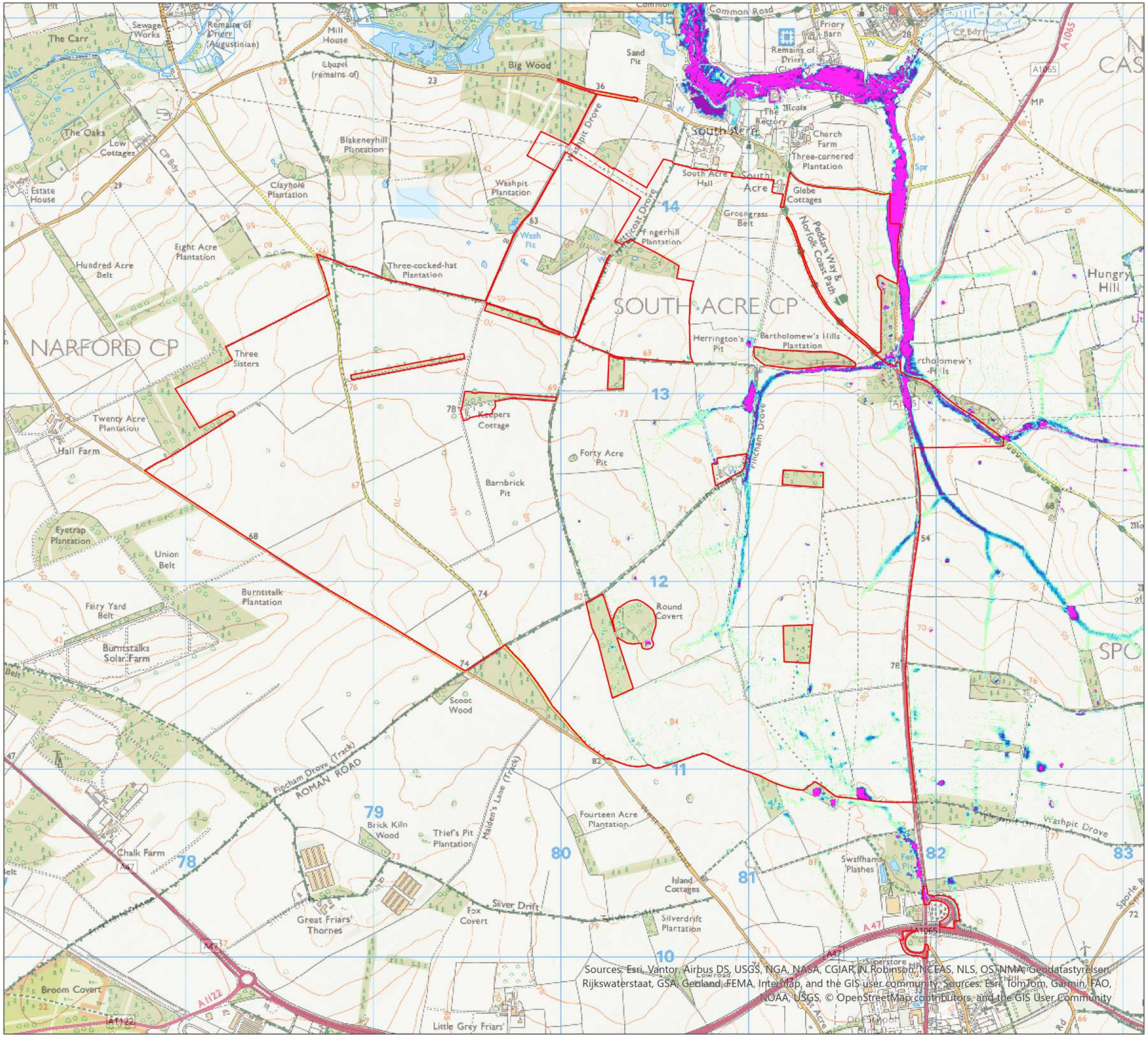
N

Ref: 083-MOD-008A-Rev03 Date: 11/06/2026

1 % AEP + 25 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-2-4

The Droves Solar Farm Modelling Report



Sources: Esri, Vantor, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap, and the GIS user community; Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

THE DROVES
SOLAR FARM

RAINCLOUD

□ Order Limits / Core Study Area

1 % AEP + 40 % CC - Raincloud Model Depth (m)

	0 - 0.05
🟩	0.051 - 0.1
🟦	0.101 - 0.15
🟦	0.151 - 0.2
🟦	0.201 - 0.25
🟦	0.251 - 0.3
🟪	0.301 - 0.35
🟪	0.351 - 0.4
🟪	0.401 - 0.45
🟪	> 0.45

1:20,000 Scale @ A3

0 0.5 1 km

N

Ref: 083-MOD-009A-Rev03 Date: 11/06/2026

1 % AEP + 40 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-2-5

The Droves Solar Farm Modelling Report

Annex G: EnviroCheck Report

From: Enquiries_EastAnglia
To: [redacted]
Subject: EAN/2024/374708 - Response for your auto Product 4 request for 580518,313637 - Swaffham - [redacted] Your ref: BKNTRYRDFF62
Date: 25 September 2024 14:48:44
Attachments: [redacted]

Dear Liam,

Enquiry regarding Product 4 request for 580518,313637 - Swaffham - [redacted]

Thank you for your enquiry which was received on 02 September 2024.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

The area selected for the auto Product 4 is slightly too large. Therefore, we have provided you with the product 5, 6 and 7 for the model associated with this area in addition.

Product 4:
Please find the information requested for Product 4 attached in the PDF titled:
[redacted]

If you have any comments regarding the attached letter please contact our Partnership & Strategic Overview team directly by email at pso.eastanglia@environment-agency.gov.uk

Products 5,6 & 7:
The information we hold has been uploaded to our sharefile system and can be accessed using the following link:

[redacted]

Please note the above link will expire on: 20/12/2024

A copy of the Flood Risk Assessment (FRA) advisory note is attached to my email.

Further Asset Management Data and Information can be found online using this link: https://environment.data.gov.uk/asset-management/index.html

Name	Product 4
Description	Detailed Flood Risk Assessment Map for 580518,313637 -

	Swaffham - PE322AD
Licence	Open Government Licence
Information Warnings	The maps provided are to be used in conjunction with the **Datasheet**. Please read the Datasheet and take note of information contained within the **'Important Information'** section.
Information Warning - OS background mapping	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2024 Ordnance Survey OS AC0000807064.

Abstract

Name	Products 5, 6 and 7
Description	**Upper River Nar MP7** Product 5 – Eastern Rivers Modelling Report: River Nar, July 2015, JBA Consulting. Product 6 – Output data of Eastern Rivers Modelling: Upper River Nar, MP7, July 2015, JBA Consulting. Product 7 – Calibrated and Verified Model Input data of Eastern Rivers Modelling: Upper River Nar, MP7, July 2015, JBA Consulting.
Licence	The following information is not available under the Open Government Licence but we may be able to license it to you under the Environment Agency Conditional Licence Environment Agency Conditional Licence: However, you MUST first check the supporting information and the above link to determine if the conditions on use are suitable for your purposes. If they aren't, this information is not provided with a licence for use, and the data is provided for read right only.

Conditions	1.0 You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you. 2.0 Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice. 3.0 We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentialities of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights. 4.1 The Information may contain some data that we believe is within the definition of “personal data” under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data comprises names of individuals or commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual. 4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data. 5.0 The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km2. Information about the operation of flood assets should not be published. 6.1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as “the Data”. 6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its internal

	purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.
Information Warnings	Please be aware that model data is not raw, factual or measured but comprises of estimations or modelled results based on the data available to us.
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. May contain Ordnance Survey data © Crown copyright 2024 Ordnance Survey OS AC0000807064.

Coastal Modelling

You may be aware that some Local Planning Authorities have updated their Strategic Flood Risk Assessments (SFRAs) using data from this modelling study. As SFRA's are not updated regularly we agreed that they could use draft outputs as we wanted to ensure that the SFRA's were not out of date as soon as they were published.

If you are using our 2018 Coastal Flood Modelling Data outputs: Please refer to page 13 of the Product 4 supporting document.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences,)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- Current Flood Warnings

What's In Your BackYard (WIYBY) is no longer available.

Most of the data is still available via other sharing services such as DATA.GOV.UK, MAGIC map and new GOV.UK digital services. Where the datasets are no longer available as maps, you will be able to download and use within specialist applications.

To find out all the services the Environment Agency have available, please click here.

For any other enquiries please send your request to us at:
Enquiries_EastAnglia@environment-agency.gov.uk.

Additional information

Please be aware that we now charge for planning advice provided to developers, agents and landowners. If you would like advice to inform a future planning application for this site then please complete our https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion and email it to our Sustainable Places team. planning.eastanglia@environment-agency.gov.uk. They will initially provide you with a free response identifying the following:

-

- the environmental constraints affecting the proposal;
- the environmental issues raised by the proposal;
- the information we need for the subsequent planning application to address the issues identified and demonstrate an acceptable development;
- any required environmental permits.

If you require any further information from them (for example, a meeting or the detailed review of a technical document) they will need to set up a charging agreement. Further information can be found on our website.

Climate Change Allowances

For information on the use climate change allowances in Flood Risk Assessments, please see the attached document - [redacted] [redacted].

The guidance provides climate change allowances for peak river flow, peak rainfall, sea level rise, wind speed and wave height. The guidance provides a range of allowances to assess fluvial flooding, which varies depending on which management catchment a site lies within. It advises on which allowances to use for assessing the impact of climate change on fluvial flood risk based on vulnerability classification, flood zone and development lifetime.

If you want to discuss this please call our Sustainable Places team on 020 8474 5242 (West).

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards,

[redacted]

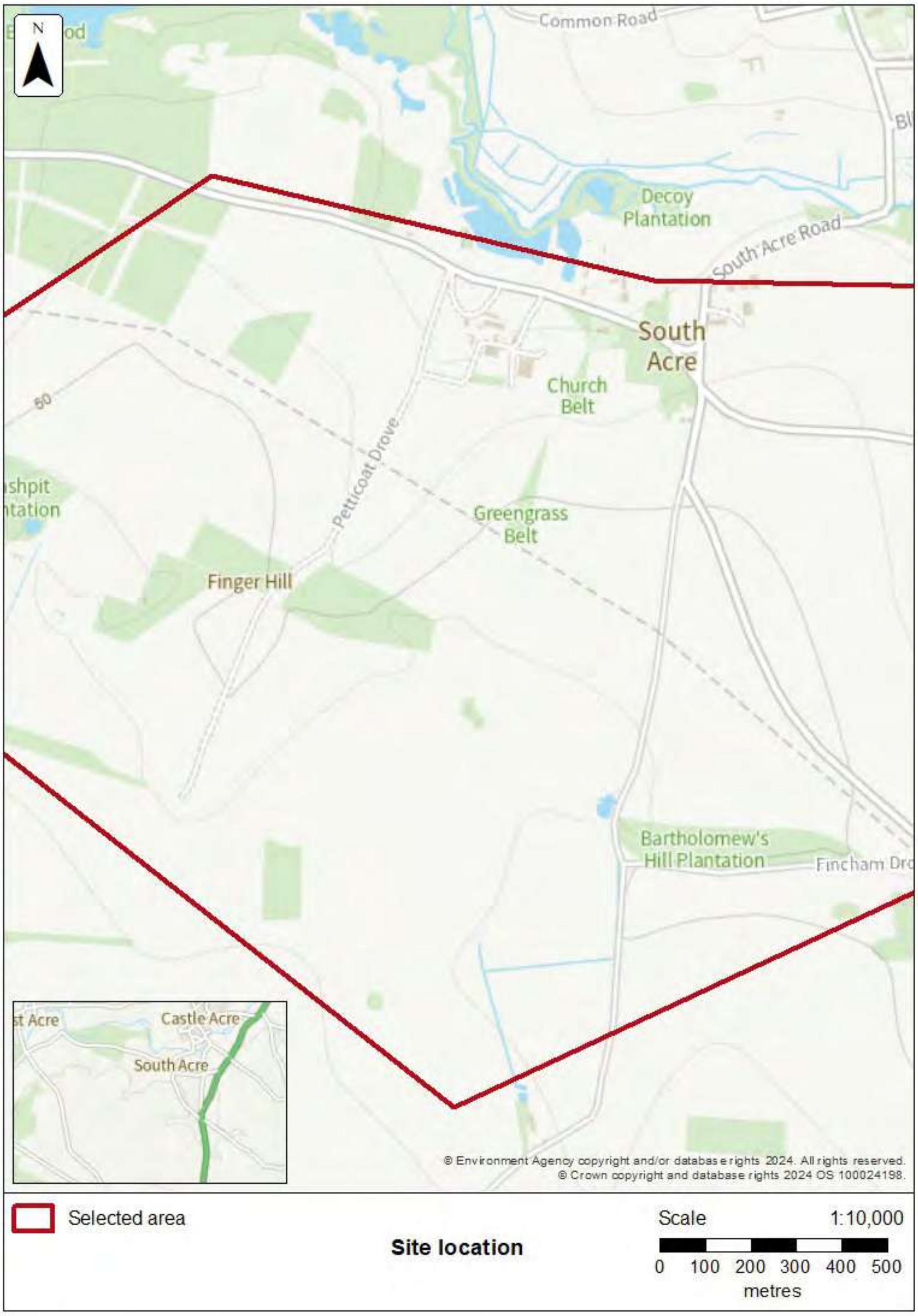
Customers & Engagement Officer
Customers & Engagement Team, East Anglia Area
Environment Agency
Environment Agency | Iceni House, Cobham Road, Ipswich IP3 9JD

Environment Agency | Bromholme Lane, Brampton, Huntingdon, Cambridgeshire, PE28 4NE

Flood risk assessment data

Location of site: 580678 / 313731 (shown as easting and northing coordinates)
Document created on: 2 September 2024
This information was previously known as a product 4.
Customer reference number: BKNTRYRDFF62

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- modelled data
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Information that's unavailable

This document **does not** contain:

- historic flooding
- flood defences and attributes

We do not have historic flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to floodng from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

We aren't able to display flood defence locations and attributes as there are no formal flood defences in the area of interest.

Surface water and other sources of flooding

Use the long term flood risk service to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

Or you can contact your Lead Local Flood Authority for further information.

Your Lead Local Flood Authority is Breckland.

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: EAn_EasternRivers_UpperNar_MP7_2015
Scenario(s): Defended fluvial, defended climate change fluvial
Date: 1 November 2015

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

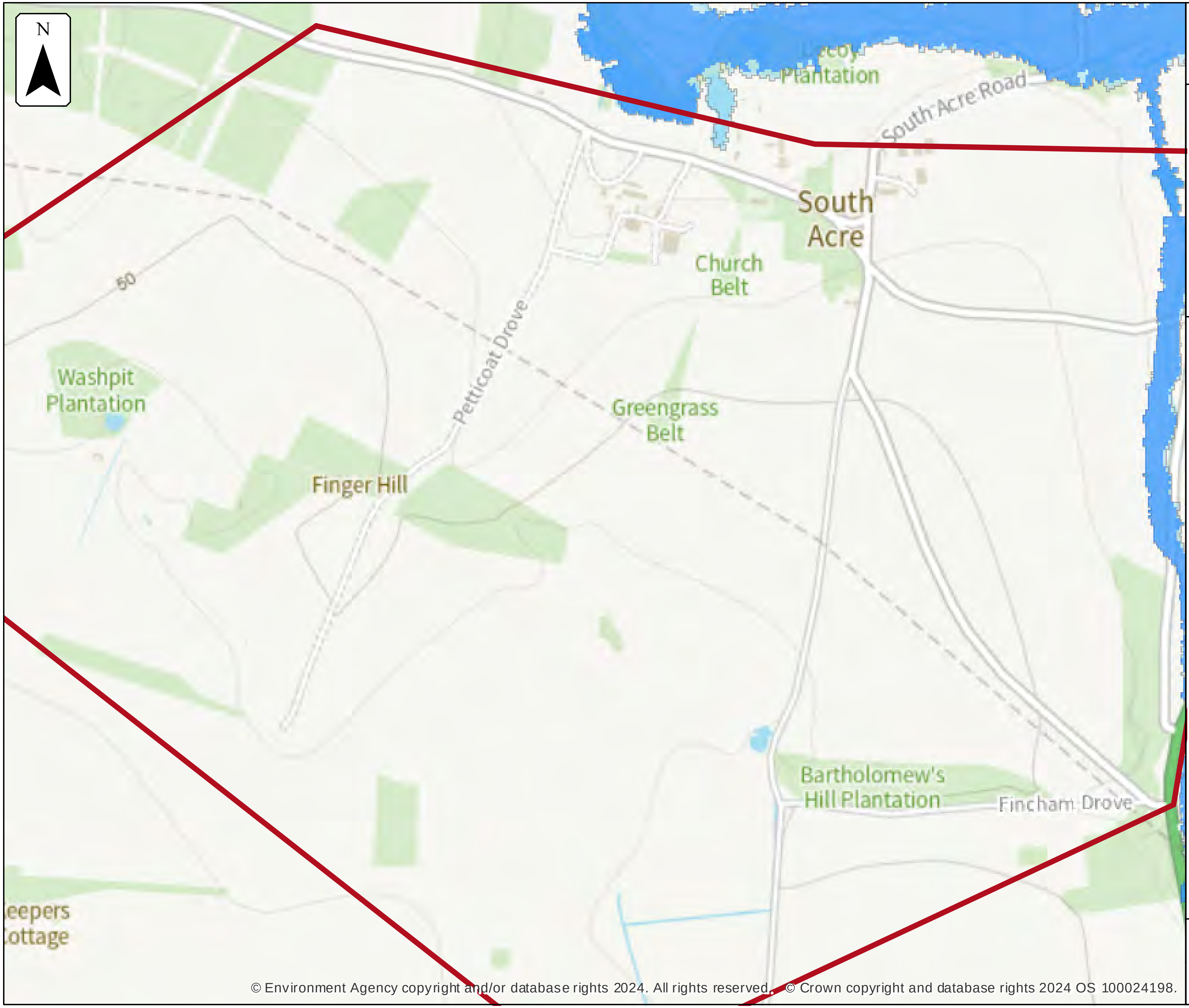
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

The flood zones are not currently being updated. The last update was in November 2023. Some of the flood zones may have changed, however all source data is included in the models below.



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Environment Agency

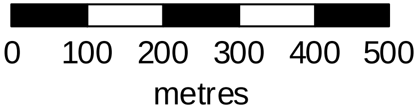
Flood map for planning

Location (easting/northing)
580678/313731

Scale
1:10,000

Created
2 Sep 2024

🟥	Selected area
🟦	Flood zone 3
🟦	Flood zone 2



Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- map(s) showing the approximate water levels for the return period with the largest flood extent for a scenario and table(s) of sample points providing details of the flood risk for different return periods

Climate change

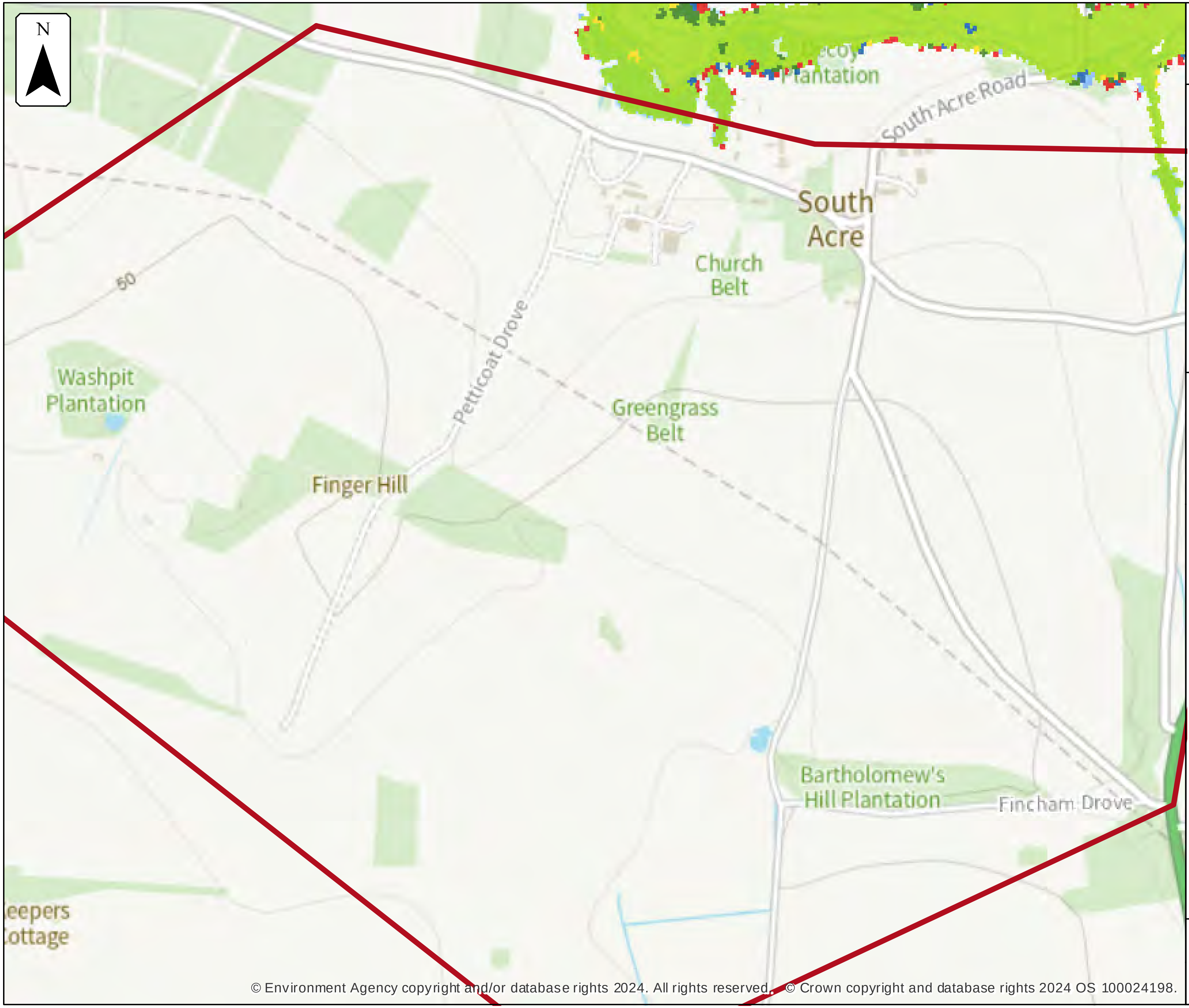
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled fluvial: risk of flooding from rivers where there are flood defences
- Defended climate change modelled fluvial: risk of flooding from rivers where there are flood defences, including estimated impact of climate change



Environment Agency

Defended modelled fluvial extent

Location (easting/northing)
580678/313731

Scale	Created
1:10,000	**2 Sep 2024**

Model name
EAn EasternRivers UpperNar MP7 2015

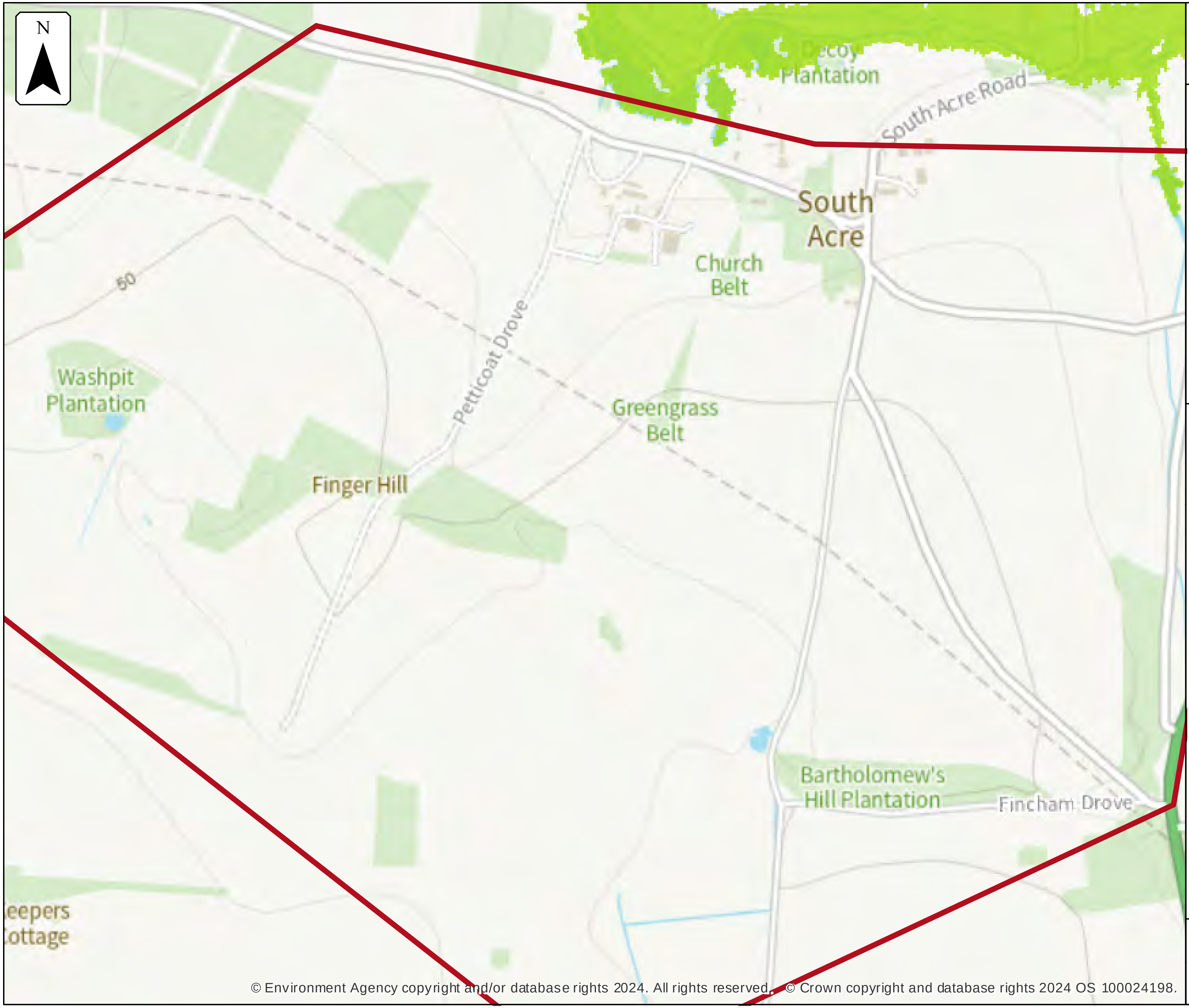
☐ Selected area

Modelled flood extent

🟩	5% AEP
🟩	2% AEP
🟨	1.33% AEP
🟦	1% AEP
🟦	0.5% AEP
🟥	0.1% AEP

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defended climate change modelled fluvial extent

Location (easting/northing)
580678/313731

Scale	Created
1:10,000	**2 Sep 2024**

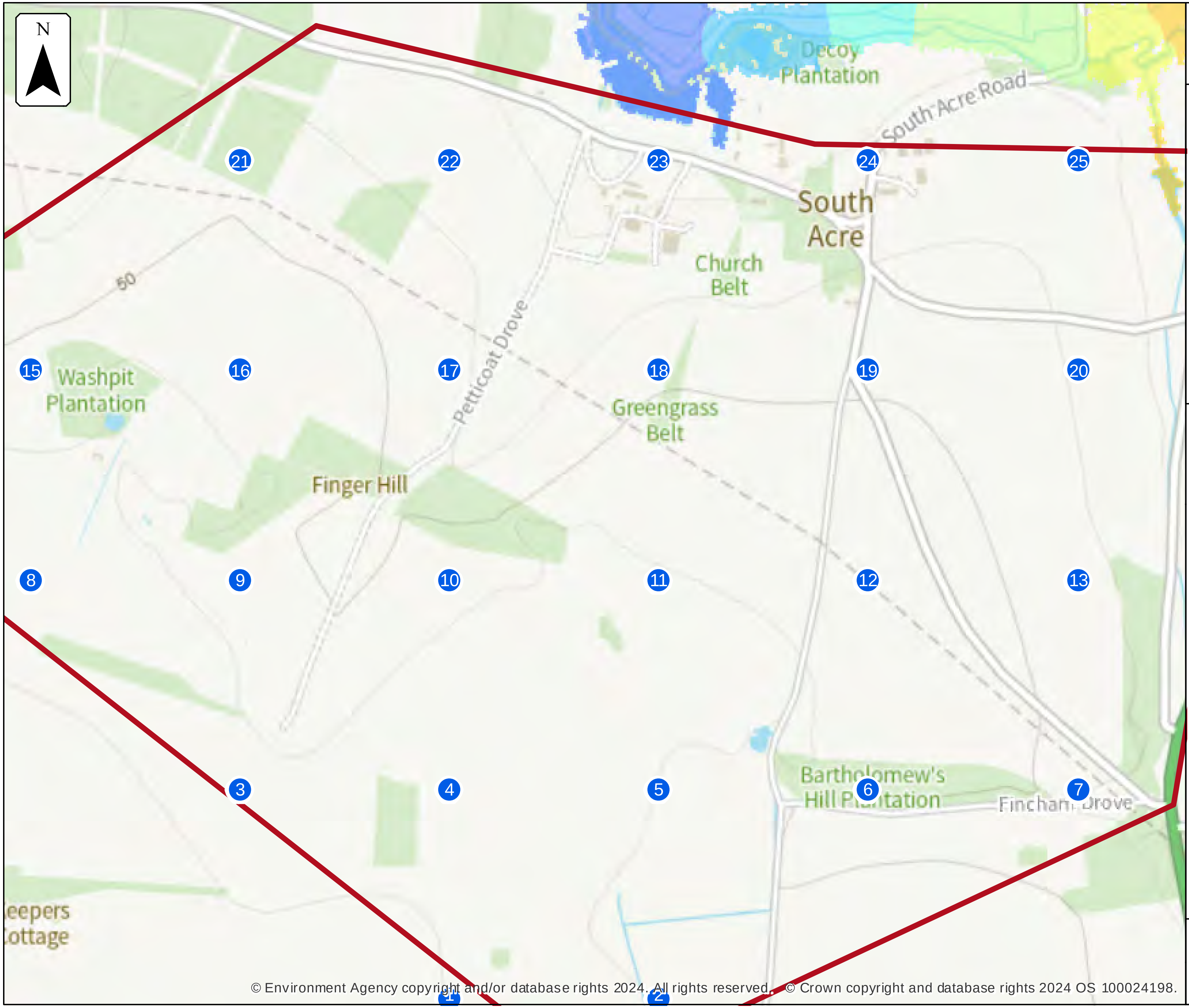
Model name
EAn EasternRivers UpperNar MP7 2015

▭ Selected area
— Main river

Modelled flood extent
🟩 1.0% AEP (+20%)

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defended modelled fluvial extent and height

Location (easting/northing)
580678/313731

Scale
1:10,000

Created
2 Sep 2024

Model name
EAn EasternRivers UpperNar MP7 2015

▭ Selected area
— Main river

Modelled 2D grid
Water level in mAOD
🟪 0 - 25.0
🟦 25.0 - 25.375
🟦 25.375 - 25.75
🟦 25.75 - 26.125
🟩 26.125 - 26.5
🟨 26.5 - 26.875
🟨 26.875 - 27.25
🟧 27.25 - 27.625
🟥 27.625 - 28.0

This map shows the 0.1% AEP height data

0 100 200 300 400 500
metres

Sample point data

Defended

Label	Easting	Northing	5% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth
1	580395	312767	NoData	NoData	NoData	NoData	NoData	NoData
2	580803	312767	NoData	NoData	NoData	NoData	NoData	NoData
3	579987	313175	NoData	NoData	NoData	NoData	NoData	NoData
4	580395	313175	NoData	NoData	NoData	NoData	NoData	NoData
5	580803	313175	NoData	NoData	NoData	NoData	NoData	NoData
6	581211	313175	NoData	NoData	NoData	NoData	NoData	NoData
7	581619	313175	NoData	NoData	NoData	NoData	NoData	NoData
8	579579	313583	NoData	NoData	NoData	NoData	NoData	NoData
9	579987	313583	NoData	NoData	NoData	NoData	NoData	NoData
10	580395	313583	NoData	NoData	NoData	NoData	NoData	NoData
11	580803	313583	NoData	NoData	NoData	NoData	NoData	NoData
12	581211	313583	NoData	NoData	NoData	NoData	NoData	NoData
13	581619	313583	NoData	NoData	NoData	NoData	NoData	NoData
14	579171	313991	NoData	NoData	NoData	NoData	NoData	NoData
15	579579	313991	NoData	NoData	NoData	NoData	NoData	NoData
16	579987	313991	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	5% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth
17	580395	313991	NoData	NoData	NoData	NoData	NoData	NoData
18	580803	313991	NoData	NoData	NoData	NoData	NoData	NoData
19	581211	313991	NoData	NoData	NoData	NoData	NoData	NoData
20	581619	313991	NoData	NoData	NoData	NoData	NoData	NoData
21	579987	314399	NoData	NoData	NoData	NoData	NoData	NoData
22	580395	314399	NoData	NoData	NoData	NoData	NoData	NoData
23	580803	314399	NoData	NoData	NoData	NoData	NoData	NoData
24	581211	314399	NoData	NoData	NoData	NoData	NoData	NoData
25	581619	314399	NoData	NoData	NoData	NoData	NoData	NoData
26	582027	314399	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			0.89	0.95	0.97	0.99	1.04	1.16

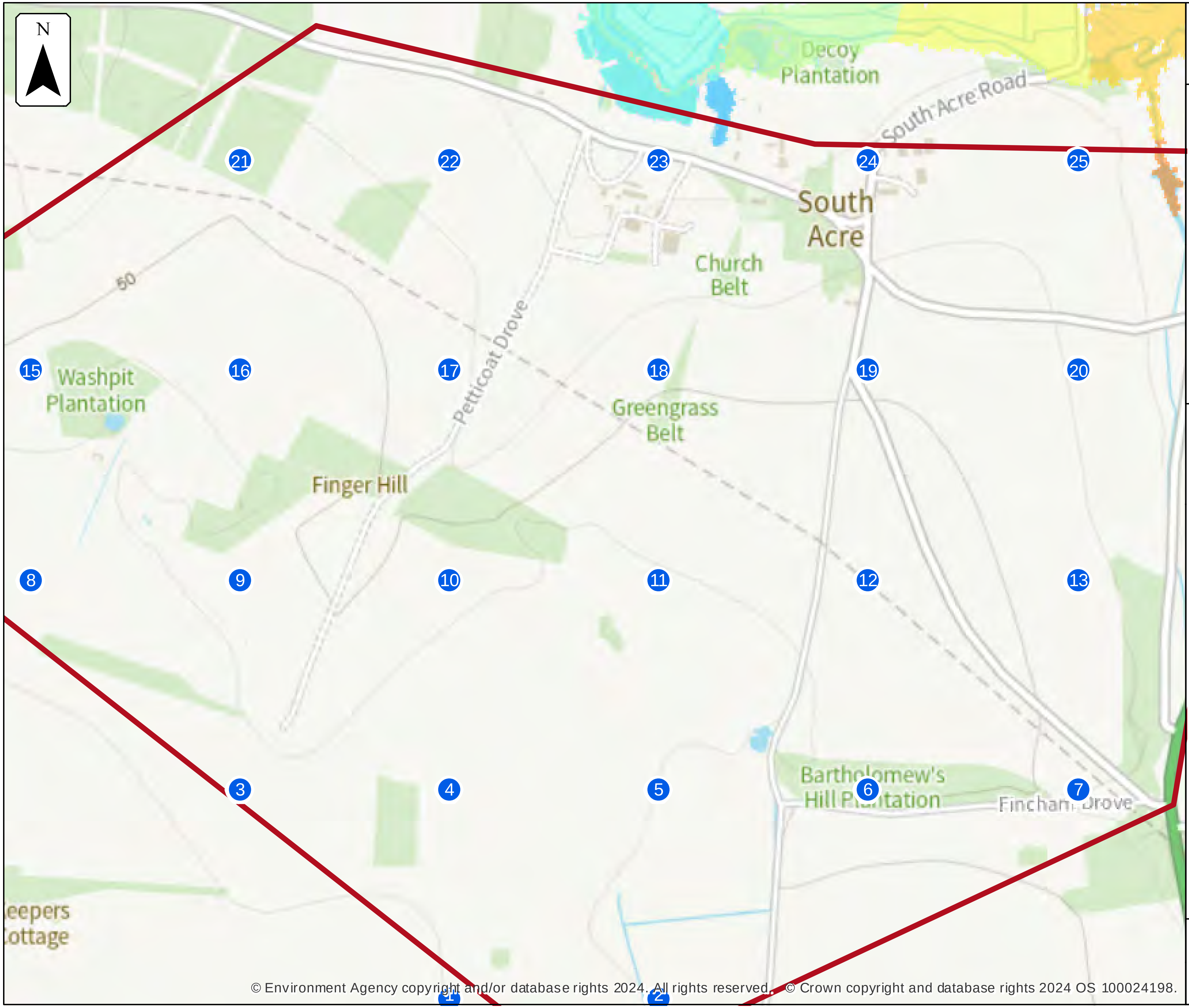
Data in this table comes from the EAn EasternRivers UpperNar MP7 2015 model.
Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
If no height or depth data is available for a scenario, no table will be shown.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Defended

Label	Easting	Northing	5% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height
1	580395	312767	NoData	NoData	NoData	NoData	NoData	NoData
2	580803	312767	NoData	NoData	NoData	NoData	NoData	NoData
3	579987	313175	NoData	NoData	NoData	NoData	NoData	NoData
4	580395	313175	NoData	NoData	NoData	NoData	NoData	NoData
5	580803	313175	NoData	NoData	NoData	NoData	NoData	NoData
6	581211	313175	NoData	NoData	NoData	NoData	NoData	NoData
7	581619	313175	NoData	NoData	NoData	NoData	NoData	NoData
8	579579	313583	NoData	NoData	NoData	NoData	NoData	NoData
9	579987	313583	NoData	NoData	NoData	NoData	NoData	NoData
10	580395	313583	NoData	NoData	NoData	NoData	NoData	NoData
11	580803	313583	NoData	NoData	NoData	NoData	NoData	NoData
12	581211	313583	NoData	NoData	NoData	NoData	NoData	NoData
13	581619	313583	NoData	NoData	NoData	NoData	NoData	NoData
14	579171	313991	NoData	NoData	NoData	NoData	NoData	NoData
15	579579	313991	NoData	NoData	NoData	NoData	NoData	NoData
16	579987	313991	NoData	NoData	NoData	NoData	NoData	NoData
17	580395	313991	NoData	NoData	NoData	NoData	NoData	NoData
18	580803	313991	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	5% AEP	2% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height
19	581211	313991	NoData	NoData	NoData	NoData	NoData	NoData
20	581619	313991	NoData	NoData	NoData	NoData	NoData	NoData
21	579987	314399	NoData	NoData	NoData	NoData	NoData	NoData
22	580395	314399	NoData	NoData	NoData	NoData	NoData	NoData
23	580803	314399	NoData	NoData	NoData	NoData	NoData	NoData
24	581211	314399	NoData	NoData	NoData	NoData	NoData	NoData
25	581619	314399	NoData	NoData	NoData	NoData	NoData	NoData
26	582027	314399	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			27.07	27.10	27.10	27.10	27.13	27.14

Data in this table comes from the EAn EasternRivers UpperNar MP7 2015 model.
Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
If no height or depth data is available for a scenario, no table will be shown.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.



Environment Agency

Defended climate change modelled fluvial extent and height

Location (easting/northing)
580678/313731

Scale	Created
1:10,000	**2 Sep 2024**

Model name
EAn EasternRivers UpperNar MP7 2015

▭ Selected area
— Main river

Modelled 2D grid
Water level in mAOD

🟪	0 - 24.0
🟦	24.0 - 24.5
🟦	24.5 - 25.0
🟦	25.0 - 25.5
🟩	25.5 - 26.0
🟨	26.0 - 26.5
🟨	26.5 - 27.0
🟧	27.0 - 27.5
🟥	27.5 - 28.0

This map shows the
1.0% AEP +20% height data

0 100 200 300 400 500
metres

Sample point data

Defended climate change

Label	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
			Depth	**Height**
1	580395	312767	NoData	NoData
2	580803	312767	NoData	NoData
3	579987	313175	NoData	NoData
4	580395	313175	NoData	NoData
5	580803	313175	NoData	NoData
6	581211	313175	NoData	NoData
7	581619	313175	NoData	NoData
8	579579	313583	NoData	NoData
9	579987	313583	NoData	NoData
10	580395	313583	NoData	NoData
11	580803	313583	NoData	NoData
12	581211	313583	NoData	NoData
13	581619	313583	NoData	NoData
14	579171	313991	NoData	NoData
15	579579	313991	NoData	NoData
16	579987	313991	NoData	NoData

Label	Easting	Northing	1% AEP (+20%)	1% AEP (+20%)
			Depth	Height
17	580395	313991	NoData	NoData
18	580803	313991	NoData	NoData
19	581211	313991	NoData	NoData
20	581619	313991	NoData	NoData
21	579987	314399	NoData	NoData
22	580395	314399	NoData	NoData
23	580803	314399	NoData	NoData
24	581211	314399	NoData	NoData
25	581619	314399	NoData	NoData
26	582027	314399	NoData	NoData
Max value in selected area:			1.07	27.19

Data in this table comes from the EAn EasternRivers UpperNar MP7 2015 model.
Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
If no height or depth data is available for a scenario, no table will be shown.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

Your Lead Local Flood Authority is Breckland.

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

Find out more about flood risk activity permits

Help and advice

Contact the East Anglia Environment Agency team at enquiries_eastanglia@environment-agency.gov.uk for:

- more information about getting a product 5, 6, 7 or 8
- general help and advice about the site you're requesting data for

Annex B: Infiltration Testing

Environmental
Geotechnical
Specialists

RGS

SOAKAWAY
LETTER
REPORT

job number	C5239/25/E/8044	date	06.08.2025

site address
Swaffham Road,
Swaffham,
Norfolk,
PE37 7HY

written by	[redacted]	checked by	[redacted]
issued by	[redacted]		

Please consider the environment before printing this report.

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<ENVIRONMENTAL><GEOTECHNICAL>

Rogers Geotechnical Services Ltd
Offices 1 & 2 Barncliffe Business Park, Near Bank, Shelley, Huddersfield, HD8 8LU
☎ 01484 604354 Company No. 5130864

Contents

Appendices

Report on Soakaway Testing

Location:	Swaffham Road Swaffham, Norfolk, PE37 7HY		
For:	Raincloud Consulting Ltd		
Report No.	C5239/25/E/8044	Report Date:	August 2025

For and on behalf of **Rogers Geotechnical Services Ltd**

[redacted]	[redacted]
[redacted] Geo-environmental Technician	[redacted] Engineering Director

Report Summary[1]

Item	Comments	Section
Geology	Superficial Geology – Lowestoft Formation Bedrock Geology – White Chalk Subgroup	4.
Strata Conditions	Topsoil overlying silty, gravelly sand representative of the Lowestoft Formation and weathered White Chalk Subgroup.	5.
Groundwater	No groundwater strikes recorded during investigation.	5.
Suitability of Soakaways	Strata appears suitable for soakaways. However, caution recommended due to the risk of dissolution features associated with the White Chalk Subgroup.	7.

---

[1] This summary should not be relied upon to provide a comprehensive review. All of the information contained in this document should be considered.

1. Introduction

We thank you for your request to undertake percolation testing at the above-mentioned site and take pleasure in enclosing the results of this work. The RGS crew were mobilised to site on the 29th of July, with the bulk of the investigation undertaken on the 30th and the 31st July, with reinstatement and demobilisation completed on the 1st of August. This report describes the work undertaken, presents the data obtained and discusses the results of the tests

2. Limitations

The recommendations made and opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between trial pit positions, these are for guidance only and no liability can be accepted for their accuracy.

This report has been prepared in accordance with our understanding of current best practice. However, new information or legislation, or changes to best practice may necessitate revision of the report after the date of issue.

3. Fieldworks

Nine trial pits were excavated in order to undertake soakaway testing, the positions of which are shown in Appendix 1. It should be appreciated that some trial pits were terminated after 1 or 2 tests due to ground conditions and time constraints. The soakaway tests were undertaken at the base of the pit at depths rational to the construction of soakaways. The soils exposed in the trial pits were logged on site in general accordance with BS5930: 2015 +A1: 2020, and full descriptions are given on the trial pit records which are presented in Appendix 2.

Once excavations were completed, the trial pits were carefully re-instated with the arisings. Whilst every care was taken during the infilling process, including compacting of the infill at regular intervals with the arm of the excavator, it should be appreciated that some mounding of the surface may have resulted. Moreover, the infilled soils may be subjected to settlement over time, such that a depression in the surface may also occur. Therefore, the locations of any pits undertaken in this investigation should be conveyed to the current site user, as the mounds or depressions associated with the pits may present a risk to current site operations. Furthermore, it must be realised that the infilled pits represent an area of disturbance within the site soils, thus the soils at the pit locations may vary characteristically compared to the undisturbed ground. As such, foundations placed in this disturbed material may not perform as anticipated.

4. Geology

The available published geological data for the site has been examined and the following table presents the anticipated geology.

Table 1: Geological Data for the Site

Strata Type	Strata Name[2]	Previous Name[3]	Description[3]
Superficial Geology	Lowestoft Formation	Lowestoft Till	The Lowestoft Formation forms an extensive sheet of chalky till, together with outwash sands and gravels, silts and clays.
Solid Geology	White Chalk Subgroup	Middle and Upper Chalk Undivided	Chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout.

5. Strata Conditions

In accordance with the geology of the area, the succession has been shown to include the following:

Table 2: Generalised Strata Profile

Depth m below ground level to underside of layer	Strata Type	Positions Layer Revealed	Groundwater Strikes m below ground level
0.30 – 0.40	TOPSOIL (Brown, silty, slightly gravely SAND)	All	None
1.00 – +1.60	Brown, silty, slightly gravelly SAND [LOWESTOFT FORMATION]	TP0-TP02, TP4, TP6-TP8	None
+1.40 – +1.45	Brown, brown, silty, slightly gravelly SAND [LOWESTOFT FORMATION]	TP0 & TP1	None
+1.35	White, locally light brown, silty, sandy GRAVEL [WEATHERED WHITE CHALK SUBGROUP]	TP2	None
+1.25 – +1.50	Light brown, silty, slightly gravelly SAND [WEATHERED WHITE CHALK SUBGROUP]	TP3, TP5 & TP6	None

'+' denotes that the strata extended below the termination depth of the investigated positions, thus the extent of the deposit is only proven to the depths indicated.

It should be appreciated that the superficial Lowestoft Formation while not indicated to cover the entire site was present in a number of locations. This formation was present in all trial pits except TP2, TP3 and TP5. Indeed, it appears that these superficial deposits may be present in a crescent shape around the centre of the site.

---

[2] Sources: British Geological Survey (NERC) Map Sheets 160; Swaffham; Solid and Drift Edition, and Geology of Britain Viewer [*online resource from www.bgs.ac.uk*]

[3] Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [*online resource from www.bgs.ac.uk*]

6. Insitu Testing

6.1 Soakaway Test

The pit was trimmed and squared as much as practicable to avoid trial pit collapse. It was intended to achieve a depth of up to 2.0m before testing, however, competent ground resulted in shallower depths being achieved. Water was then introduced into the pit at a controlled rate to prevent collapse of the sides and the level monitored at time intervals relative to a reference bar at ground level. The results obtained from the soakaway tests are presented at Appendix 3 and are summarised below:

Table 3: Soakaway Test Results

Location	Soakage Area Dimensions (average) (m)	Depths of soaked strata (m)	Soil Description (of soaked strata)	Infiltration Rate (m/sec)	*Drainage Characteristics
TP0	0.3 x 1.7	1.00 to 1.45	Side – Clayey, silty, slightly gravelly SAND Base – *As above*	3.0×10^{-5} 1.6×10^{-5}	Good
TP1	0.3 x 1.5	0.87 to 1.40	Side – Clayey, silty, slightly gravelly SAND Base – *As above*	N/A	Practically impermeable
TP2	0.3 x 1.35	0.96 to 1.35	Side – Silty, sandy GRAVEL Base – As above	2.5 x 10-4 1.1 x 10-4 9.8 x 10-5	Good
TP3	0.3 x 1.4	0.94 to 1.25	Side – Silty, slightly gravelly SAND Base – *As above*	2.4 x 10-5 1.2 x 10 -5	Good
TP4	0.3 x 1.7	1.10 to 1.50	Side – Silty, slightly gravelly SAND Base – *As above*	3.1 x 10-5 3.4 x 10-5 2.1 x 10-5	Good
TP5	0.3 x 1.4	1.04 to 1.50	Side – Silty, slightly gravelly SAND Base – *As above*	1.4 x 10-5 1.7 x 10-4 9.6 x 10-5	Good
TP6	0.3 x 1.5	1.22 to 1.45	Side – Silty, slightly gravelly SAND Base – *As above*	1.3 x 10-3 6.2 x 10-4 9.8 x 10-4	Good
TP7	0.3 x 1.5	1.02 to 1.35	Side – Silty, slightly gravelly SAND Base – *As above*	1.6 x 10-3 3.9 x 10-4 1.3 x 10-4	Good
TP8	0.3 x 1.5	1.31 to 1.60	Side – Silty, slightly gravelly SAND Base – *As above*	1.5 x 10-5 1.7 x 10-5	Good

*Based on the most onerous results for each test.

During the soakaway test within TP1, the water level did not achieve a fall from 75% to 25% of the effective depth of the storage volume. It is considered that the initial movement was observed as water filling any gaps and fissures within the granular material at the side of the pit. On this basis, the test could not be completed within the scope of the method provided in BRE Digest 365 due to the poor soakage rate of the exposed soils within this particular trial pit. Due to the negligible water movement it was not possbile to extrapolate the results obtained in order to obtain a soil infiltration rate.

All other tests at the remaining locations were carried out successfully as the water level achieved a fall from 75% to 25% of the effective depth of the storage volume. It should be appreciated that it was not possible to carry out three rounds of testing within all trial pits due to time constraints.

7. Discussion

The soils encountered beneath the topsoil were found to be typical of the superficial Lowestoft Formation and the weathered fraction of the underlying White Chalk Subgroup. As demonstrated in Section 5 above, the superficial soils are locally absent. However, subsequent drainage characteristics appear to be comparable across the site, with the exception of the in the area of TP1 where the soil appeared to be more clayey. In this instance, the infiltration testing has revealed that the soils have good drainage characteristics.

It should be appreciated that incredibly fast soakage rates were noted within trial pits TP2, TP6 and TP7. These soakage rates are attributed to fractures within the White Chalk Subgroup. The drainage designers must appreciate that such fractures within the White Chalk Subgroup can sometimes be associated with, or lead to the development of, dissolution features. For instance, LiDAR scans of the local area appear to show surface depressions, possibly associated with sinkholes that are caused by dissolution features. As such, whilst the granular soils at the near surface have demonstrated good drainage characteristics, soakaways should be treated with caution due to the risk of causing further dissolution features via the adding of water to the ground through a soakaway. It may be reasoned that the proposed development is relatively low risk, but the potential for surface depressions should still be considered. Should the drainage area be spread over a larger area than necessary, this would allow the discharge of water to dissipate, thus reducing the risk.

8. References

- Building Research Establishment (BRE) Digest 365, *Soakaway Design*, September 1991.
- British Standards Institution (2015 +A1: 2020) BS 5930: *Code of practice for ground investigations*, B.S.I., London.
- Barnes, G. (2000). *Soil Mechanics Principle and Practice.* 2nd ed. London: Macmillan Press Ltd, p.47.

Appendix 1

Site Plan

Notes:

RGS
Environmental
Geotechnical
Specialists

Rogers Geotechnical Services Ltd

Offices 1 & 2, Barncliffe
Business Park,
Near Bank,
Shelley,
Huddersfield,
HD8 8LU

Telephone: 0843 50 66 87
www.rogersgeotech.co.uk

Client:

Raincloud Consulting Ltd

Job Number:

C5239/25/E/8044

Project Details:

Swaffham Road, Swaffham,
Norfolk, PE37 7HY

Scale: Not to scale - reference only

ground investigation
drilling & excavation
insitu testing
laboratory testing & gas monitoring
engineering consultancy
surveying & flood risk assessments
training, CPD & expert witness
... delivered using our own drilling rigs / crews / soils lab / engineers

Appendix 2

Trial Pit Records and Photographs

Trial Pit Log

Trialpit No	**TP0**
Sheet 1 of 1	

Project Name:	Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Date 31/07/2025
Location:	Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.7 × 0.3 Depth 1.45	Scale 1:25
Client:	Raincloud Consulting Ltd			Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.00		▒	Brown, silty, slightly gravelly, fine to coarse SAND with low cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
				1.45		▒	Brown, clayey, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
							End of pit at 1.45 m

Remarks:

Stability: Stable

Trial Pit Log

Trialpit No
TP1
Sheet 1 of 1

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Date 31/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.5 × 0.3 Depth 1.40	Scale 1:25
Client: Raincloud Consulting Ltd			Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.00		▨	Brown, silty, slightly gravelly, fine to coarse SAND with low cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
				1.40		▨	Brown, clayey, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint. [LOWESTOFT FORMATION]

End of pit at 1.40 m

Remarks:

Stability: Stable

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Trial Pit Log

Trialpit No
TP2
Sheet 1 of 1

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Date 30/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.35 × 0.3 Depth 1.35	Scale 1:25
Client: Raincloud Consulting Ltd			Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.35		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.35		░	White, locally light brown, silty,, sandy, sub-angular to sub-rounded and fine to coarse GRAVEL of chalk and flint with moderate cobble content and low boulder content. Sand is fine to coarse. Cobbles are sub-angular to sub-rounded of chalk and flint. Boulders are sub-angular to sub-rounded of flint. [WEATHERED WHITE CHALK SUBGROUP]
							End of pit at 1.35 m

Remarks:

Stability: Stable

AGS

Trial Pit Log

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Trialpit No **TP3** Sheet 1 of 1
			Date 30/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.4 × 0.3 Depth 1.25	Scale 1:25
Client: Raincloud Consulting Ltd			Logged SH

Water Strike	**Samples and In Situ Testing**			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.25		▨	Light brown, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of chalk and flint. Cobbles are sub-angular to sub-rounded of chalk and flint. [WEATHERED WHITE CHALK SUBGROUP]
							End of pit at 1.25 m

Remarks:

Stability: Stable

Trial Pit Log

Trialpit No
TP4
Sheet 1 of 1

Project Name:	Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Date 30/07/2025
Location:	Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.7 × 0.3 Depth 1.50	Scale 1:25
Client:	Raincloud Consulting Ltd			Logged SH

Water Strike	**Samples and In Situ Testing**			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.50		▒	Brown, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
							End of pit at 1.50 m

Remarks:

Stability: Stable

Trial Pit Log

Trialpit No	**TP5**
	Sheet 1 of 1
Project Name:	Swaffham Road
Project No.	C5239/25/E/8044
Co-ords:	-
Level:	
Date	30/07/2025
Location:	Swaffham, Norfolk, PE37 7HY
Dimensions (m):	1.4 × 0.3
Depth	1.50
Scale	1:25
Client:	Raincloud Consulting Ltd
Logged	SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.50		⁙	Light brown, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of chalk and flint. Cobbles are sub-angular to sub-rounded of chalk and flint. [WEATHERED WHITE CHALK SUBGROUP]
							End of pit at 1.50 m

Remarks:

Stability: Stable

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Trial Pit Log

Trialpit No
TP6
Sheet 1 of 1

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Date 30/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.5 × 0.3	Scale 1:25
Client: Raincloud Consulting Ltd		Depth 1.45	Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.35		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.35		▒	Brown, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
				1.45		▒	Light brown, silty, slightly gravelly, fine to coarse SAND with low cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of chalk and flint. Cobbles are sub-angular to sub-rounded of chalk and flint. [WEATHERED WHITE CHALK SUBGROUP]

End of pit at 1.35 m

1
2
3
4
5

Remarks:

Stability: Stable

AGS

Trial Pit Log

Trialpit No
TP7
Sheet 1 of 1

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:	Date 31/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.5 × 0.3 Depth 1.35	Scale 1:25
Client: Raincloud Consulting Ltd			Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.35		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.35		⁙	Brown, silty, slightly gravelly, fine to coarse SAND with moderate cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]

End of pit at 1.35 m

Remarks:

Stability: Stable

Trial Pit Log

Trialpit No
TP8
Sheet 1 of 1

Project Name: Swaffham Road	Project No. C5239/25/E/8044	Co-ords: - Level:		Date 31/07/2025
Location: Swaffham, Norfolk, PE37 7HY		Dimensions (m): 1.5 × 0.3 Depth 1.60		Scale 1:25
Client: Raincloud Consulting Ltd				Logged SH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40		▨	TOPSOIL (Brown, silty, slightly gravelly, fine to coarse SAND. Gravel is sub-angular to sub-rounded and fine to coarse of flint).
				1.60		⁘	Brown, silty, slightly gravelly, fine to coarse SAND with low cobble content. Gravel is sub-angular to sub-rounded and fine to coarse of flint. Cobbles are sub-angular to sub-rounded of flint. [LOWESTOFT FORMATION]
							End of pit at 1.60 m

Remarks:

Stability: Stable

Photo 1: TP0

Photo 2: TP2

Photo 1: TP3

Photo 2: TP4

Photo 1: TP5

Photo 2: TP6

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Site Name:

Swaffham Road

Job No:

C5239/25/E/8044

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Photo 1: TP7


Photo 2: TP8

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Site Name:

Swaffham Road

Job No:

C5239/25/E/8044

Appendix 3

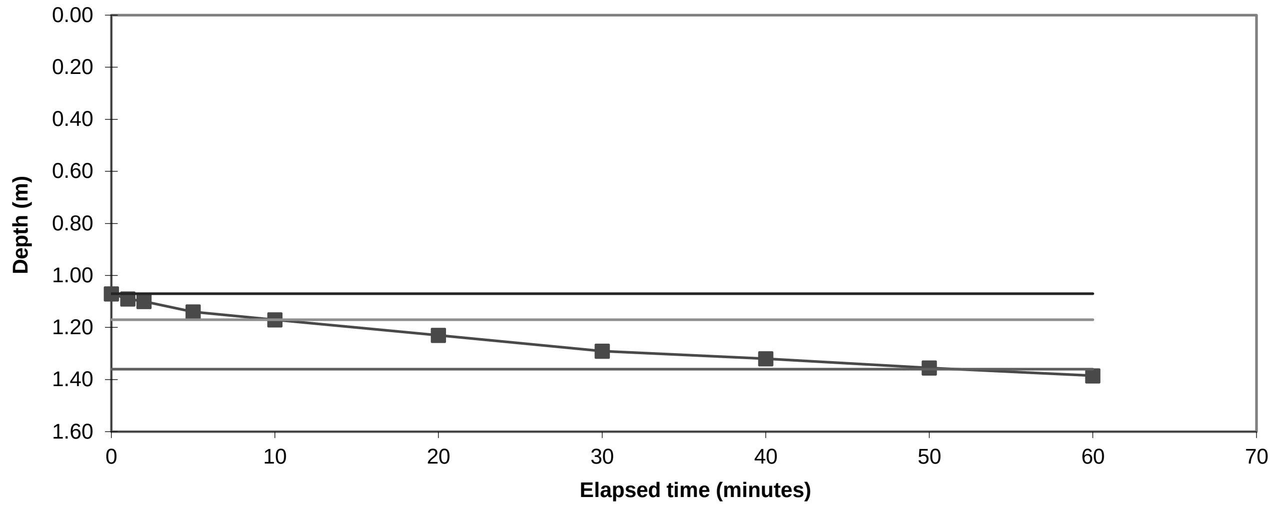
Soakaway Results

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP0	Test No:	1	Date:	31.07.2025
Length (m):	1.700	Datum Height:	0.00	m agl	
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.45	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.070		
1	1.090		
2	1.100		
5	1.140		
10	1.170		
20	1.230		
30	1.290		
40	1.320		
50	1.355		
60	1.385		



Start water depth for analysis (mbgl):	1.07		
75% effective depth (mbgl):	1.17	Elapsed time (mins):	10.0
50% effective depth (mbgl):	1.26		
25% effective depth (mbgl):	1.36	Elapsed time (mins):	51.7
Base of soakage zone (mbgl):	1.45		

Volume outflow between 75% and 25% effective depth (m³):	0.097
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	1.27
Time for outflow between 75% and 25% effective depth (mins):	41.7

Soil infiltration rate (m/s):	**3.0E-5**

Remarks Results processed following BRE 365 (2007).

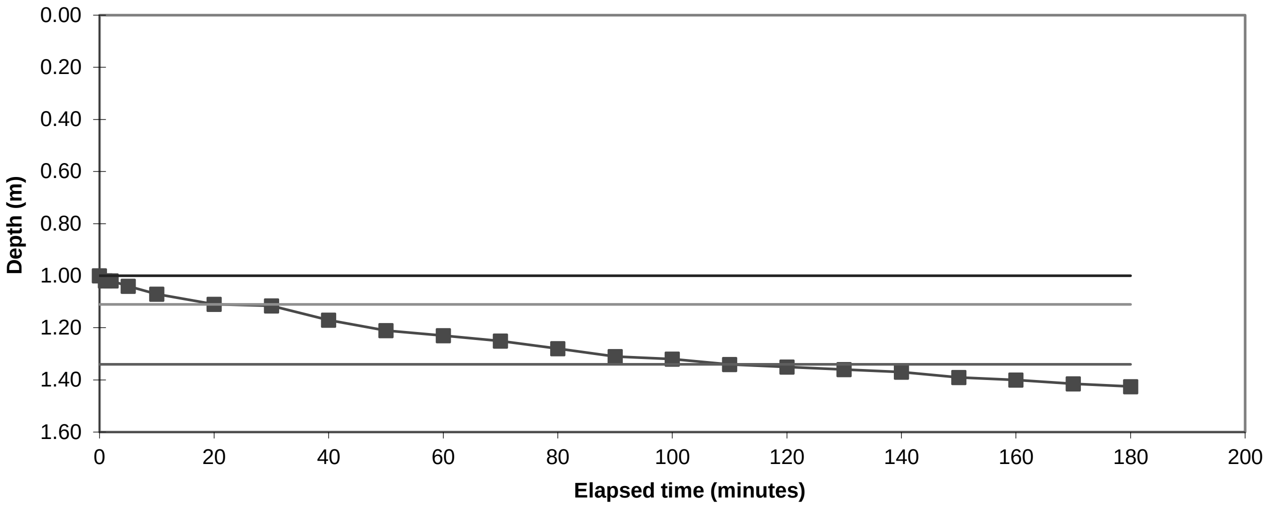
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP0
Test No: 2
Date: 31.07.2025
Length (m): 1.700
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.45
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.000	110	1.340
1	1.020	120	1.350
2	1.020	130	1.360
5	1.040	140	1.370
10	1.070	150	1.390
20	1.110	160	1.400
30	1.115	170	1.415
40	1.170	180	1.425
50	1.210		
60	1.230		
70	1.250		
80	1.280		
90	1.310		
100	1.320		



Start water depth for analysis (mbgl): 1.00
75% effective depth (mbgl): 1.11 Elapsed time (mins): 20.0
50% effective depth (mbgl): 1.23
25% effective depth (mbgl): 1.34 Elapsed time (mins): 110.0
Base of soakage zone (mbgl): 1.45

Volume outflow between 75% and 25% effective depth (m³): 0.117
Mean surface area of outflow (m^2): 1.39
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 90.0

Soil infiltration rate (m/s): **1.6E-5**

Remarks Results processed following BRE 365 (2007).

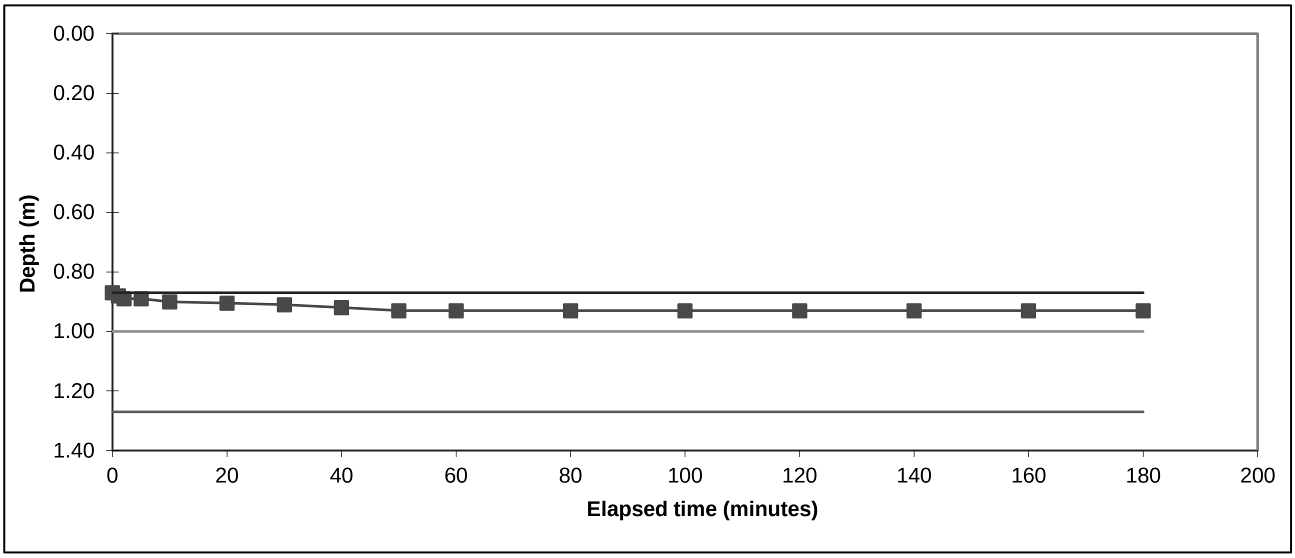
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP1 Test No: 1 Date: 31.07.2025
Length (m): 1.500 Datum Height: 0.00 m agl
Width (m): 0.30 Granular infill: None
Depth (m): 1.40 Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.870	160	0.930
1	0.880	180	0.930
2	0.890		
5	0.890		
10	0.900		
20	0.905		
30	0.910		
40	0.920		
50	0.930		
60	0.930		
80	0.930		
100	0.930		
120	0.930		
140	0.930		



Start water depth for analysis (mbgl):	0.87		
75% effective depth (mbgl):	1.00	Elapsed time (mins):	#N/A
50% effective depth (mbgl):	1.14		
25% effective depth (mbgl):	1.27	Elapsed time (mins):	#N/A
Base of soakage zone (mbgl):	1.40		

Volume outflow between 75% and 25% effective depth (m³):
Mean surface area of outflow (m^2): 1.39
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins):

Soil infiltration rate (m/s):	**Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.**

Remarks Results processed following BRE 365 (2007).
Ground appears to be practically impermeable.

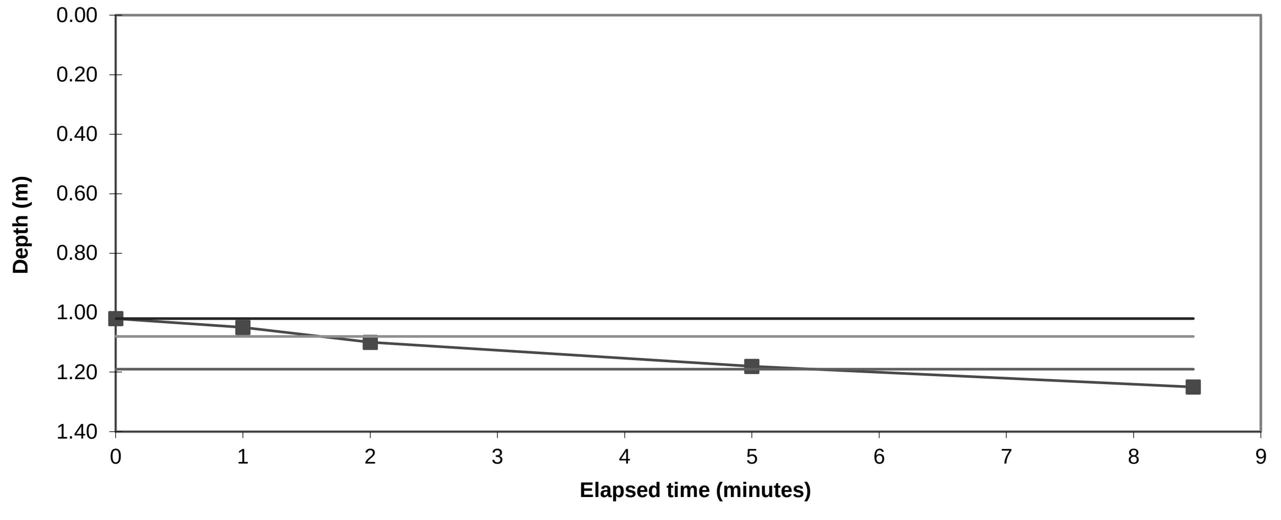
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP2	Test No:	1	Date:	30.07.2025
Length (m):	1.350	Datum Height:		0.00	m agl
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.25	Porosity of infill:		1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.020		
1	1.050		
2	1.100		
5	1.180		
8.47	1.250		



Start water depth for analysis (mbgl):	1.02		
75% effective depth (mbgl):	1.08	Elapsed time (mins):	1.6
50% effective depth (mbgl):	1.14		
25% effective depth (mbgl):	1.19	Elapsed time (mins):	5.5
Base of soakage zone (mbgl):	1.25		

Volume outflow between 75% and 25% effective depth (m³): 0.045

Mean surface area of outflow (m^2): 0.77
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 3.9

Soil infiltration rate (m/s):	**2.5E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain out into a sinkhole. New base of pit due to silt and sand settlement.

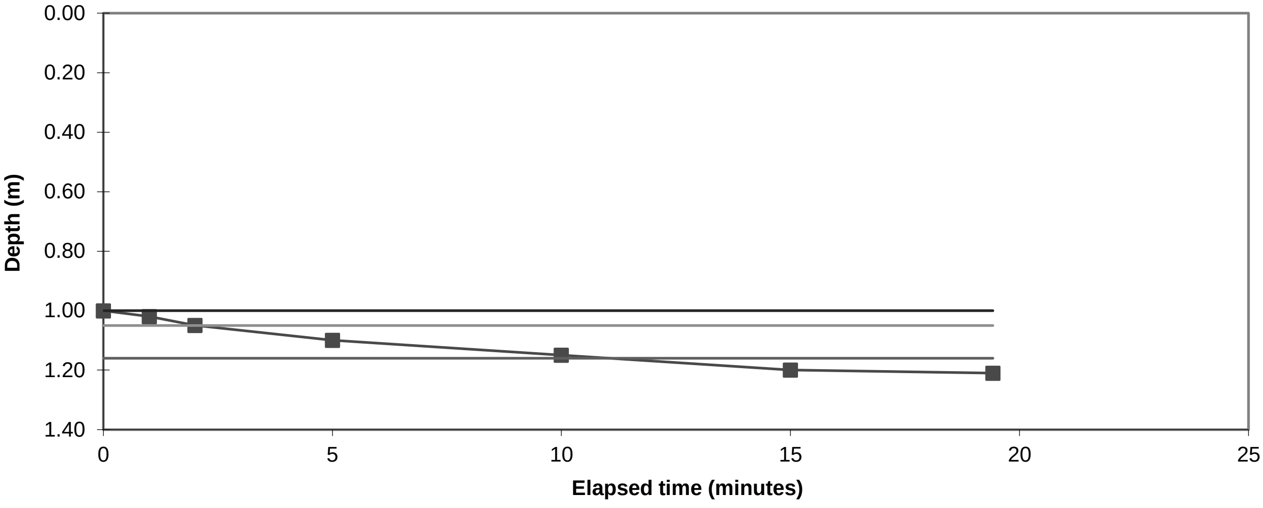
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP2
Test No: 2
Date: 30.07.2025
Length (m): 1.350
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.21
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.000		
1	1.020		
2	1.050		
5	1.100		
10	1.150		
15	1.200		
19.42	1.210		



Start water depth for analysis (mbgl):	1.00		
75% effective depth (mbgl):	1.05	Elapsed time (mins):	2.0
50% effective depth (mbgl):	1.11		
25% effective depth (mbgl):	1.16	Elapsed time (mins):	11.0
Base of soakage zone (mbgl):	1.21		

Volume outflow between 75% and 25% effective depth (m³): 0.045
Mean surface area of outflow (m^2): 0.74
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 9.0

Soil infiltration rate (m/s): **1.1E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain out into a sinkhole. New base of pit due to silt and sand settlement.

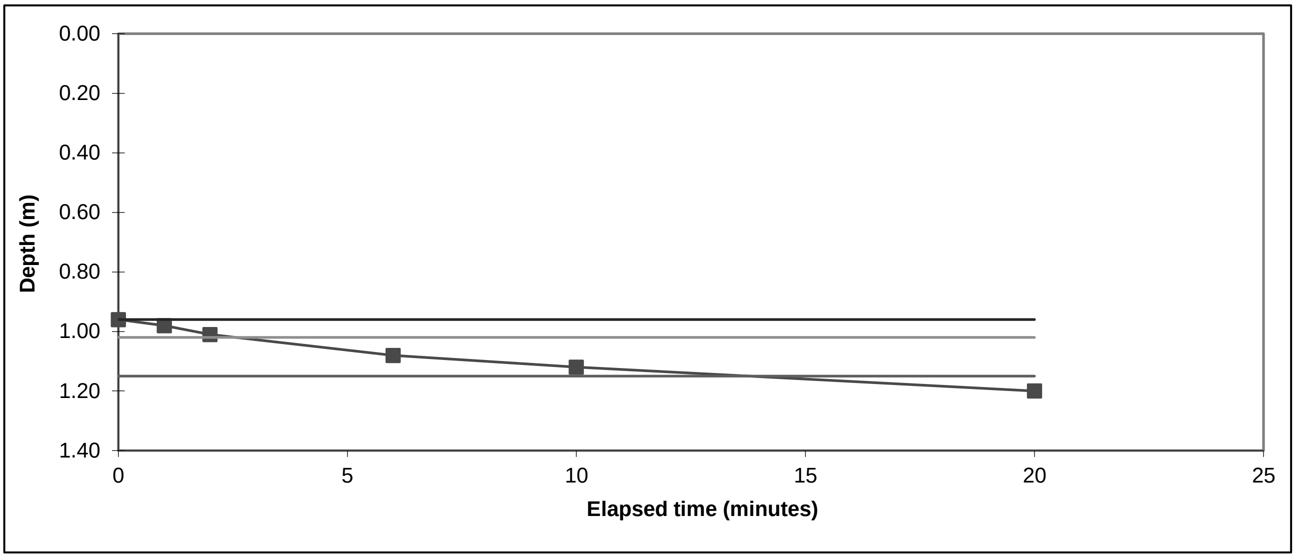
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP2
Test No: 3
Date: 30.07.2025
Length (m): 1.350
Width (m): 0.30
Depth (m): 1.21
Datum Height: 0.00 m agl
Granular infill: None
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.960		
1	0.980		
2	1.010		
6	1.080		
10	1.120		
20	1.200		



Start water depth for analysis (mbgl):	0.96		
75% effective depth (mbgl):	1.02	Elapsed time (mins):	2.6
50% effective depth (mbgl):	1.09		
25% effective depth (mbgl):	1.15	Elapsed time (mins):	13.8
Base of soakage zone (mbgl):	1.21		

Volume outflow between 75% and 25% effective depth (m³): 0.053
Mean surface area of outflow (m^2): 0.80
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 11.2

Soil infiltration rate (m/s):	**9.8E-5**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain out into a sinkhole.

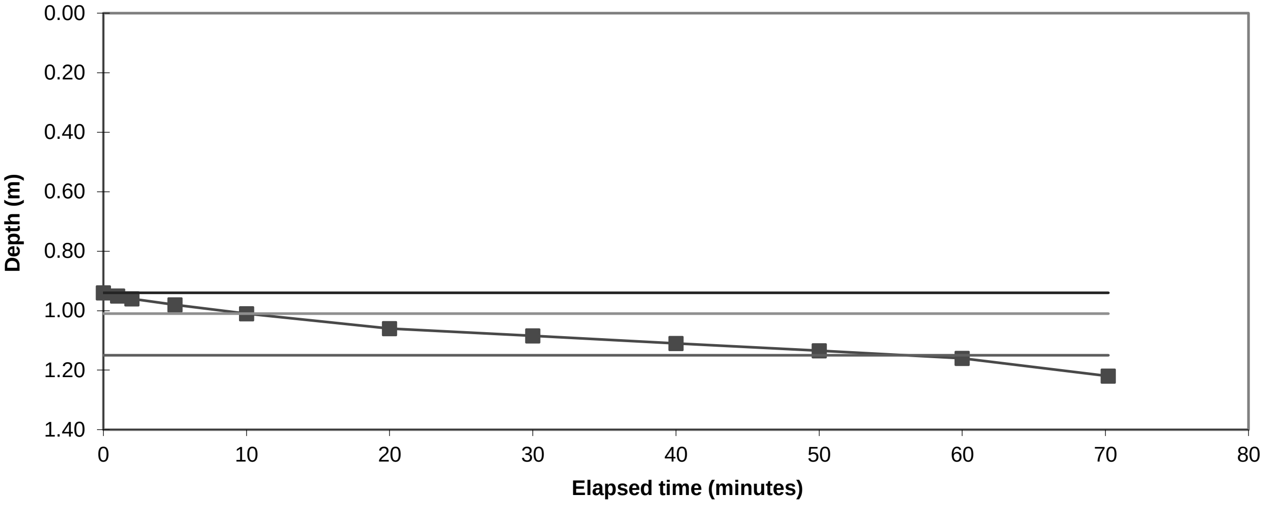
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP3	Test No:	1	Date:	30.07.2025
Length (m):	1.400	Datum Height:	0.00	m agl	
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.22	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.940		
1	0.950		
2	0.960		
5	0.980		
10	1.010		
20	1.060		
30	1.085		
40	1.110		
50	1.135		
60	1.160		
70.21	1.220		



Start water depth for analysis (mbgl):	0.94		
75% effective depth (mbgl):	1.01	Elapsed time (mins):	10.0
50% effective depth (mbgl):	1.08		
25% effective depth (mbgl):	1.15	Elapsed time (mins):	56.0
Base of soakage zone (mbgl):	1.22		

Volume outflow between 75% and 25% effective depth (m³): 0.059

Mean surface area of outflow (m^2): 0.90
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 46.0

Soil infiltration rate (m/s):	**2.4E-5**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

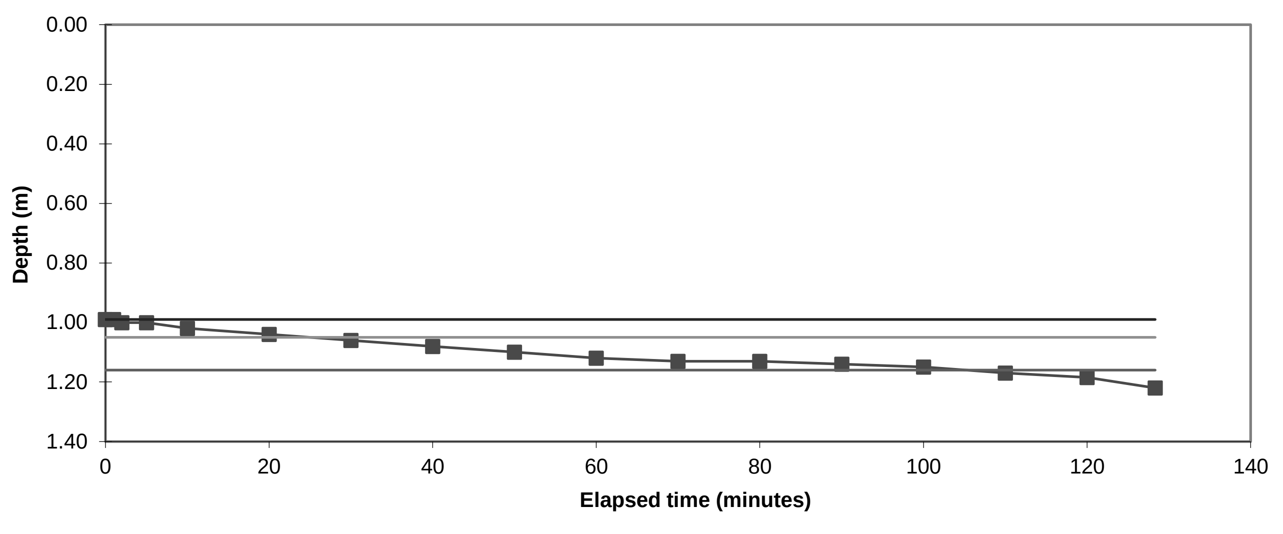
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP3
Test No: 2
Date: 30.07.2025
Length (m): 1.400
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.22
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	0.990	110	1.170
1	0.990	120	1.185
2	1.000	128.33	1.220
5	1.000		
10	1.020		
20	1.040		
30	1.060		
40	1.080		
50	1.100		
60	1.120		
70	1.130		
80	1.130		
90	1.140		
100	1.150		



Start water depth for analysis (mbgl): 0.99
75% effective depth (mbgl): 1.05 Elapsed time (mins): 25.0
50% effective depth (mbgl): 1.11
25% effective depth (mbgl): 1.16 Elapsed time (mins): 105.0
Base of soakage zone (mbgl): 1.22

Volume outflow between 75% and 25% effective depth (m³): 0.046
Mean surface area of outflow (m^2): 0.79
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 80.0

Soil infiltration rate (m/s):	**1.2E-5**

Remarks Results processed following BRE 365 (2007).

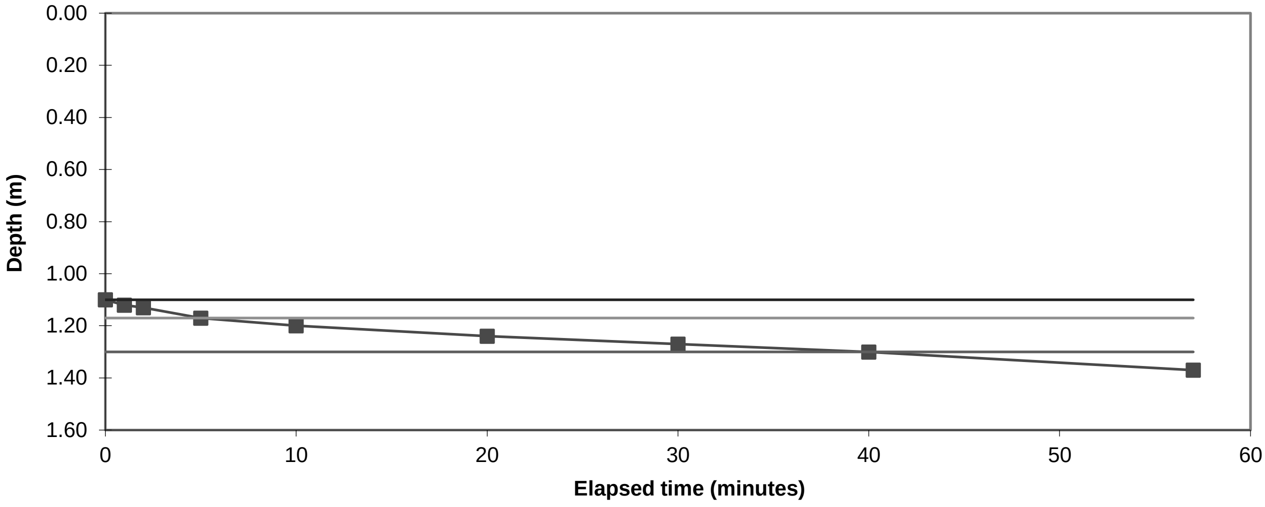
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP4	Test No:	1	Date:	30.07.2025
Length (m):	1.700	Datum Height:	0.00 m agl		
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.37	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.100		
1	1.120		
2	1.130		
5	1.170		
10	1.200		
20	1.240		
30	1.270		
40	1.300		
57	1.370		



Start water depth for analysis (mbgl):	1.10		
75% effective depth (mbgl):	1.17	Elapsed time (mins):	5.0
50% effective depth (mbgl):	1.24		
25% effective depth (mbgl):	1.30	Elapsed time (mins):	40.0
Base of soakage zone (mbgl):	1.37		

Volume outflow between 75% and 25% effective depth (m³): 0.066

Mean surface area of outflow (m^2): 1.03
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 35.0

Soil infiltration rate (m/s):	**3.1E-5**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

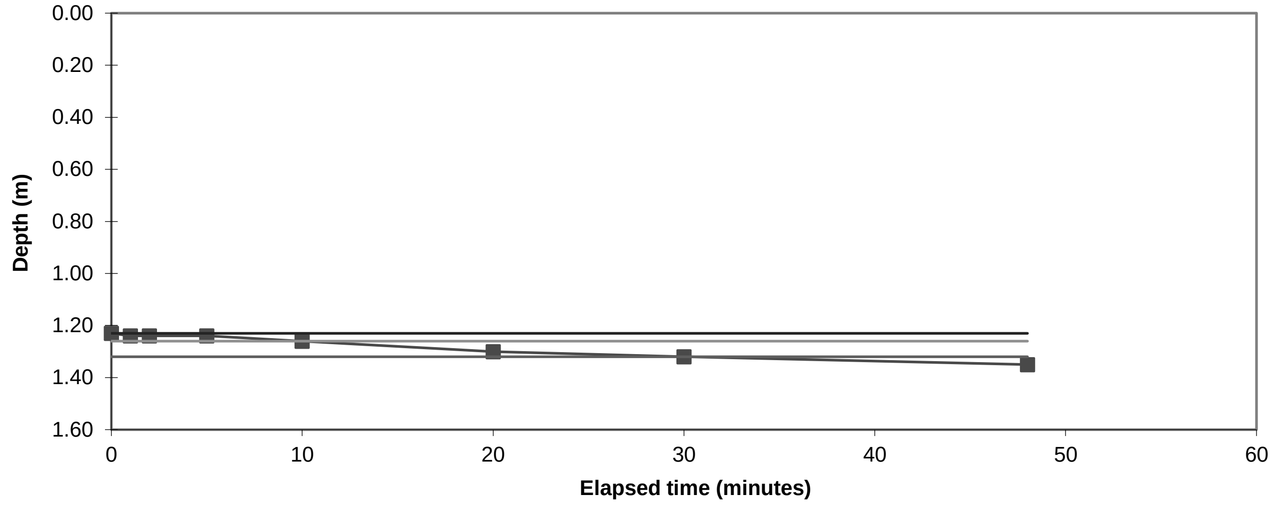
Client:	Raincloud Consulting Ltd	**Job No:**	
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044	

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP4	Test No:	2	Date:	30.07.2025
Length (m):	1.700	Datum Height:	0.00 m agl		
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.35	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.230		
1	1.240		
2	1.240		
5	1.240		
10	1.260		
20	1.300		
30	1.320		
48	1.350		



Start water depth for analysis (mbgl):	1.23		
75% effective depth (mbgl):	1.26	Elapsed time (mins):	10.0
50% effective depth (mbgl):	1.29		
25% effective depth (mbgl):	1.32	Elapsed time (mins):	30.0
Base of soakage zone (mbgl):	1.35		

Volume outflow between 75% and 25% effective depth (m³): 0.031

Mean surface area of outflow (m^2): 0.75
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 20.0

Soil infiltration rate (m/s):	**3.4E-5**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

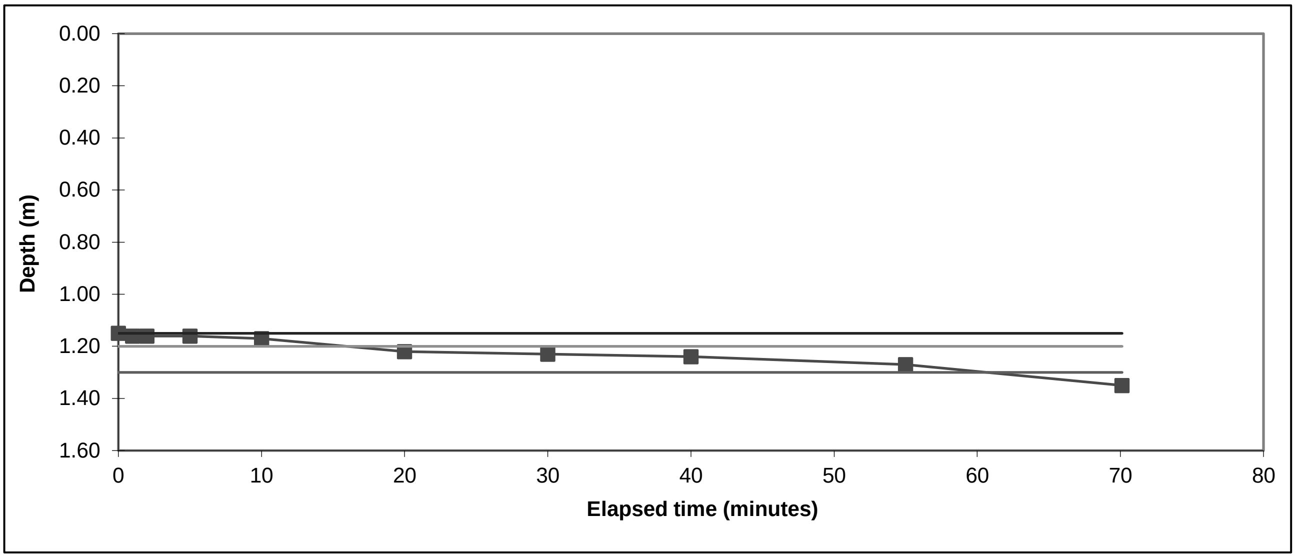
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP4	Test No:	3	Date:	30.07.2025
Length (m):	1.700	Datum Height:	0.00	m agl	
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.35	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.150		
1	1.160		
2	1.160		
5	1.160		
10	1.170		
20	1.220		
30	1.230		
40	1.240		
55	1.270		
70.12	1.350		



Start water depth for analysis (mbgl):	1.15		
75% effective depth (mbgl):	1.20	Elapsed time (mins):	16.0
50% effective depth (mbgl):	1.25		
25% effective depth (mbgl):	1.30	Elapsed time (mins):	60.7
Base of soakage zone (mbgl):	1.35		

Volume outflow between 75% and 25% effective depth (m³): 0.051

Mean surface area of outflow (m^2): 0.91
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 44.7

Soil infiltration rate (m/s):	**2.1E-5**

Remarks Results processed following BRE 365 (2007).

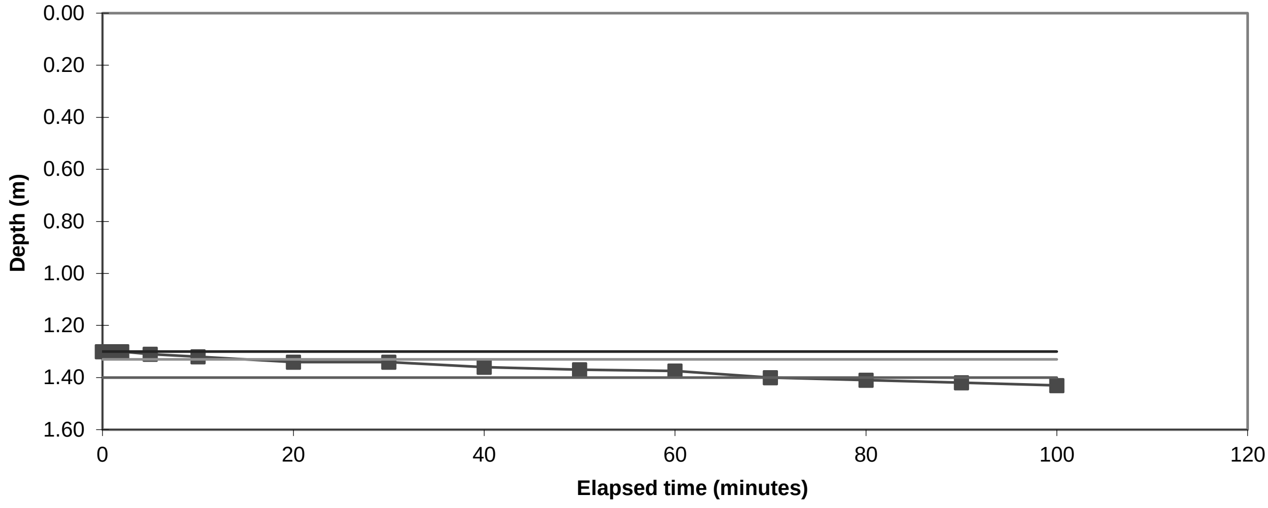
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP5
Test No: 1
Date: 30.07.2025
Length (m): 1.400
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.43
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.300		
1	1.300		
2	1.300		
5	1.310		
10	1.320		
20	1.340		
30	1.340		
40	1.360		
50	1.370		
60	1.375		
70	1.400		
80	1.410		
90	1.420		
100	1.430		



Start water depth for analysis (mbgl): 1.30
75% effective depth (mbgl): 1.33 Elapsed time (mins): 15.0
50% effective depth (mbgl): 1.37
25% effective depth (mbgl): 1.40 Elapsed time (mins): 70.0
Base of soakage zone (mbgl): 1.43

Volume outflow between 75% and 25% effective depth (m³): 0.029
Mean surface area of outflow (m^2): 0.62
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 55.0

Soil infiltration rate (m/s): **1.4E-5**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

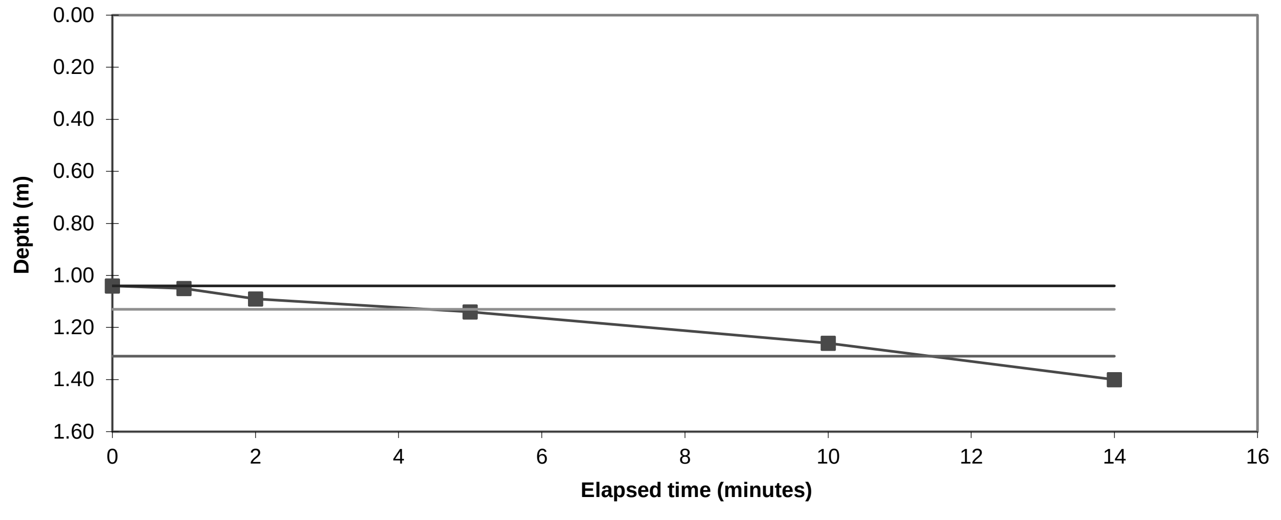
Client:	Raincloud Consulting Ltd	**Job No:**	
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044	

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP5	Test No:	2	Date:	30.07.2025
Length (m):	1.400	Datum Height:	0.00	m agl	
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.40	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.040		
1	1.050		
2	1.090		
5	1.140		
10	1.260		
14	1.400		



Start water depth for analysis (mbgl):	1.04		
75% effective depth (mbgl):	1.13	Elapsed time (mins):	4.4
50% effective depth (mbgl):	1.22		
25% effective depth (mbgl):	1.31	Elapsed time (mins):	11.4
Base of soakage zone (mbgl):	1.40		

Volume outflow between 75% and 25% effective depth (m³): 0.076

Mean surface area of outflow (m^2): 1.03
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 7.0

Soil infiltration rate (m/s):	**1.7E-4**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

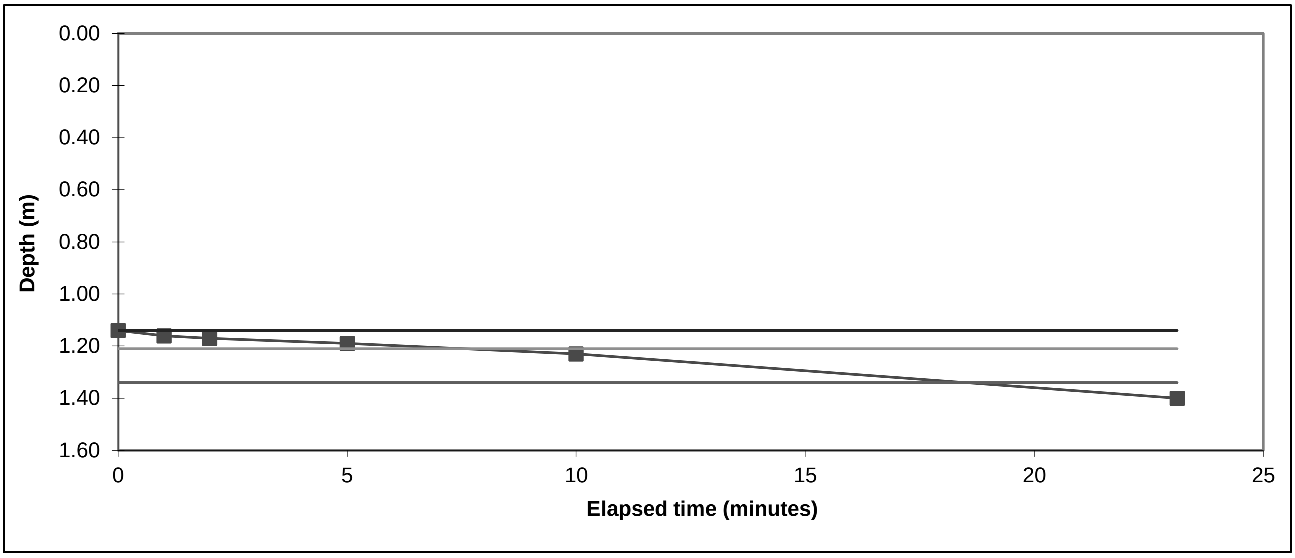
Client:	Raincloud Consulting Ltd	**Job No:**	
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044	

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP5
Test No: 3
Date: 30.07.2025
Length (m): 1.400
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.40
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.140		
1	1.160		
2	1.170		
5	1.190		
10	1.230		
23.12	1.400		



Start water depth for analysis (mbgl):	1.14		
75% effective depth (mbgl):	1.21	Elapsed time (mins):	7.5
50% effective depth (mbgl):	1.27		
25% effective depth (mbgl):	1.34	Elapsed time (mins):	18.5
Base of soakage zone (mbgl):	1.40		

Volume outflow between 75% and 25% effective depth (m³): 0.055

Mean surface area of outflow (m^2): 0.86
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 11.0

Soil infiltration rate (m/s):	**9.6E-5**

Remarks Results processed following BRE 365 (2007).

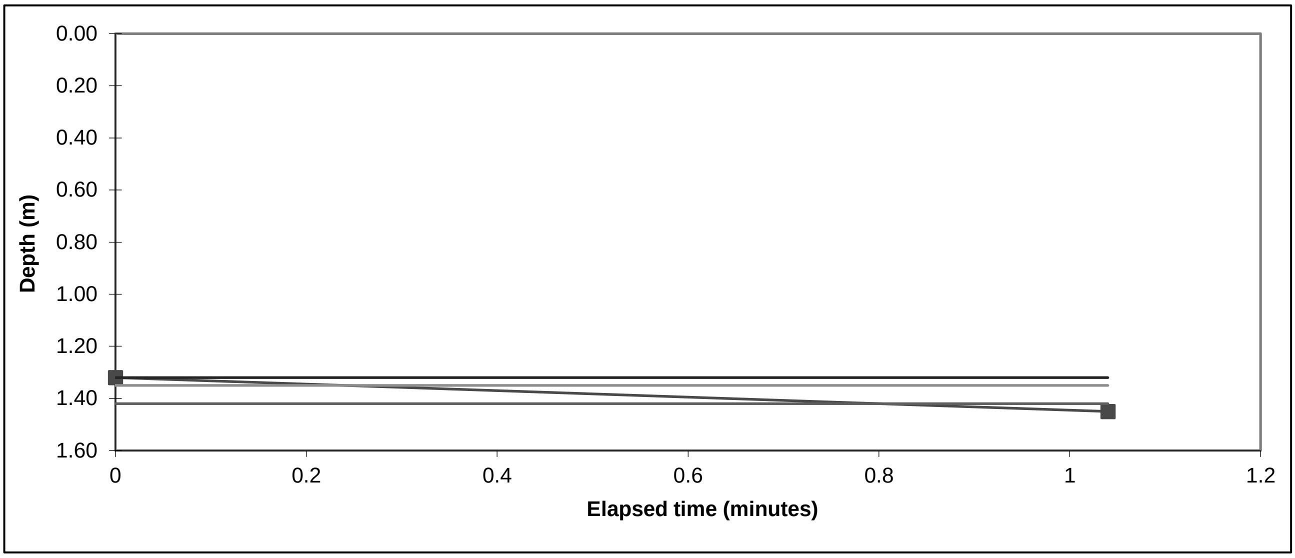
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP6	Test No:	1	Date:	30.07.2025
Length (m):	1.500	Datum Height:	0.00	m agl	
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.45	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.320		
1.04	1.450		



Start water depth for analysis (mbgl):	1.32		
75% effective depth (mbgl):	1.35	Elapsed time (mins):	0.2
50% effective depth (mbgl):	1.39		
25% effective depth (mbgl):	1.42	Elapsed time (mins):	0.8
Base of soakage zone (mbgl):	1.45		

Volume outflow between 75% and 25% effective depth (m³): 0.031

Mean surface area of outflow (m^2): 0.67
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 0.6

Soil infiltration rate (m/s):	**1.3E-3**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

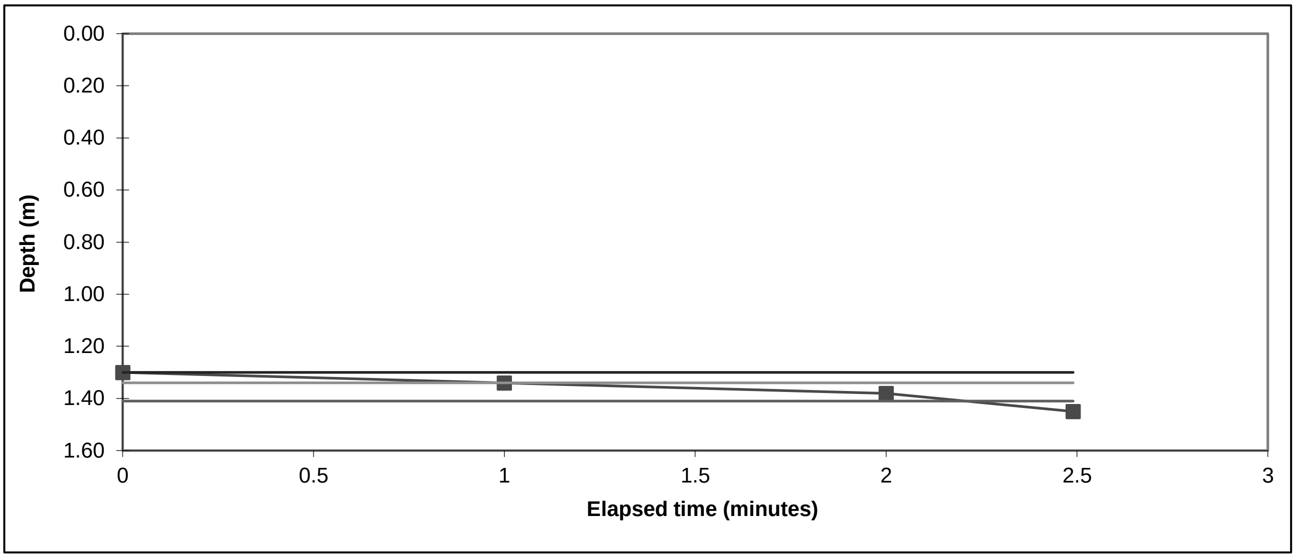
Client:	Raincloud Consulting Ltd	**Job No:**	
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044	

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP6	Test No:	2		Date:	30.07.2025
Length (m):	1.500		Datum Height:		0.00	m agl
Width (m):	0.30		Granular infill:	None		
Depth (m):	1.45		Porosity of infill:	1		(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.300		
1	1.340		
2	1.380		
2.49	1.450		



Start water depth for analysis (mbgl):	1.30		
75% effective depth (mbgl):	1.34	Elapsed time (mins):	1.0
50% effective depth (mbgl):	1.38		
25% effective depth (mbgl):	1.41	Elapsed time (mins):	2.2
Base of soakage zone (mbgl):	1.45		

Volume outflow between 75% and 25% effective depth (m³): 0.031

Mean surface area of outflow (m^2): 0.70
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 1.2

Soil infiltration rate (m/s):	**6.2E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

Client:	Raincloud Consulting Ltd	**Job No:**	
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044	

Rogers Geotechnical Services L

Soakaway Test

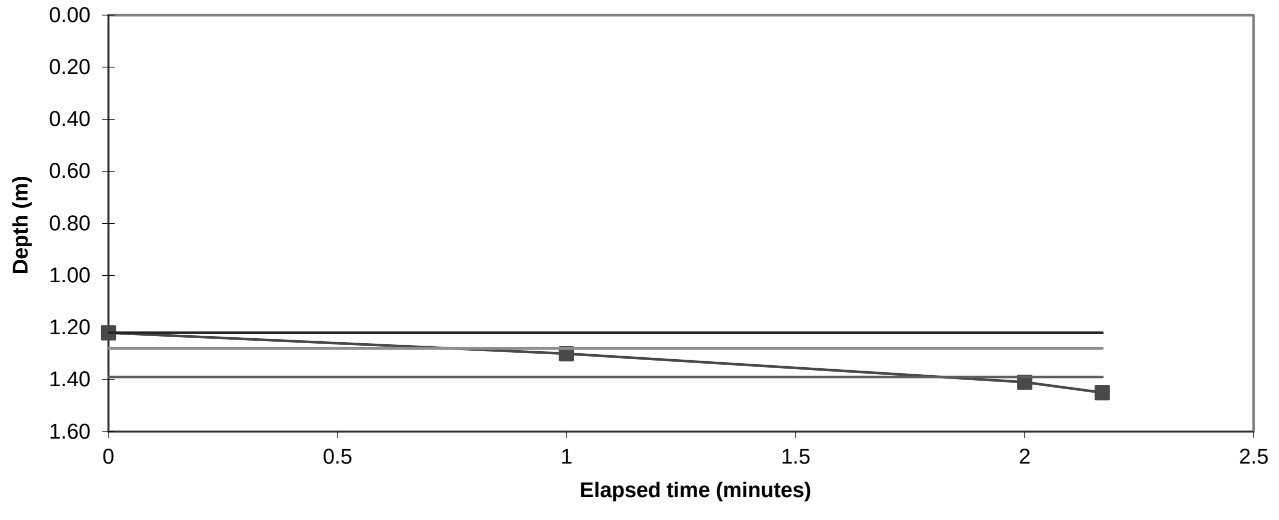
Trial Pit No: TP6 Test No: 3 Date: 30.07.2025

Length (m): 1.500 Datum Height: 0.00 m agl

Width (m): 0.30 Granular infill: None

Depth (m): 1.45 Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.220		
1	1.300		
2	1.410		
2.17	1.450		



Start water depth for analysis (mbgl): 1.22

75% effective depth (mbgl): 1.28 Elapsed time (mins): 0.8

50% effective depth (mbgl): 1.34

25% effective depth (mbgl): 1.39 Elapsed time (mins): 1.8

Base of soakage zone (mbgl): 1.45

Volume outflow between 75% and 25% effective depth (m³): 0.049

Mean surface area of outflow (m^2): 0.85
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 1.0

Soil infiltration rate (m/s): **9.8E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

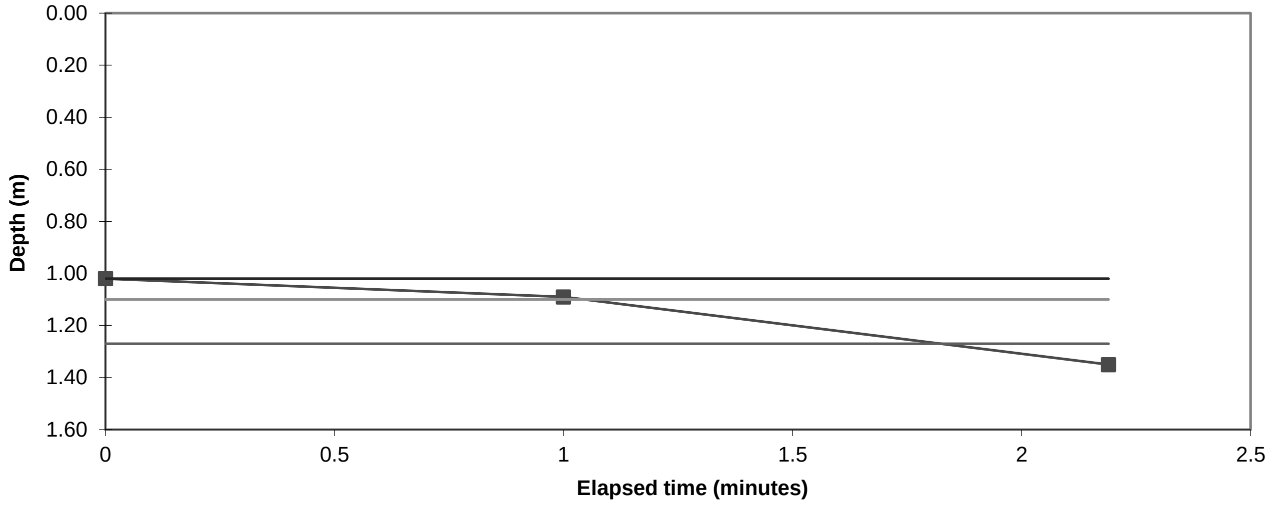
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP7
Test No: 1
Date: 31.07.2025
Length (m): 1.500
Datum Height: 0.00 m agl
Width (m): 0.30
Granular infill: None
Depth (m): 1.35
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.020		
1	1.090		
2.19	1.350		



Start water depth for analysis (mbgl): 1.02
75% effective depth (mbgl): 1.10 Elapsed time (mins): 1.0
50% effective depth (mbgl): 1.19
25% effective depth (mbgl): 1.27 Elapsed time (mins): 1.8
Base of soakage zone (mbgl): 1.35

Volume outflow between 75% and 25% effective depth (m³): 0.077
Mean surface area of outflow (m^2): 1.03
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 0.8

Soil infiltration rate (m/s): **1.6E-3**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

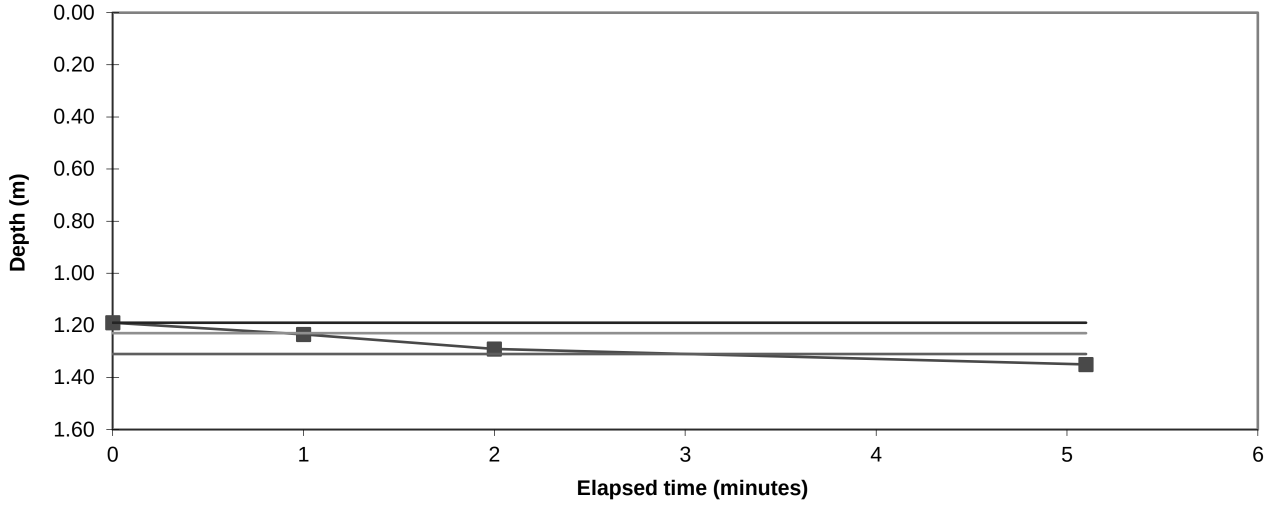
Client: Raincloud Consulting Ltd
Site: Swaffham Road, Swaffham, Norfolk, PE37 7HY
Job No: C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP7	Test No:	2	Date:	31.07.2025
Length (m):	1.500	Datum Height:		0.00	m agl
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.35	Porosity of infill:		1	(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.190		
1	1.235		
2	1.290		
5.1	1.350		



Start water depth for analysis (mbgl):	1.19		
75% effective depth (mbgl):	1.23	Elapsed time (mins):	0.9
50% effective depth (mbgl):	1.27		
25% effective depth (mbgl):	1.31	Elapsed time (mins):	3.0
Base of soakage zone (mbgl):	1.35		

Volume outflow between 75% and 25% effective depth (m³): 0.036

Mean surface area of outflow (m^2): 0.74
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 2.1

Soil infiltration rate (m/s): **3.9E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

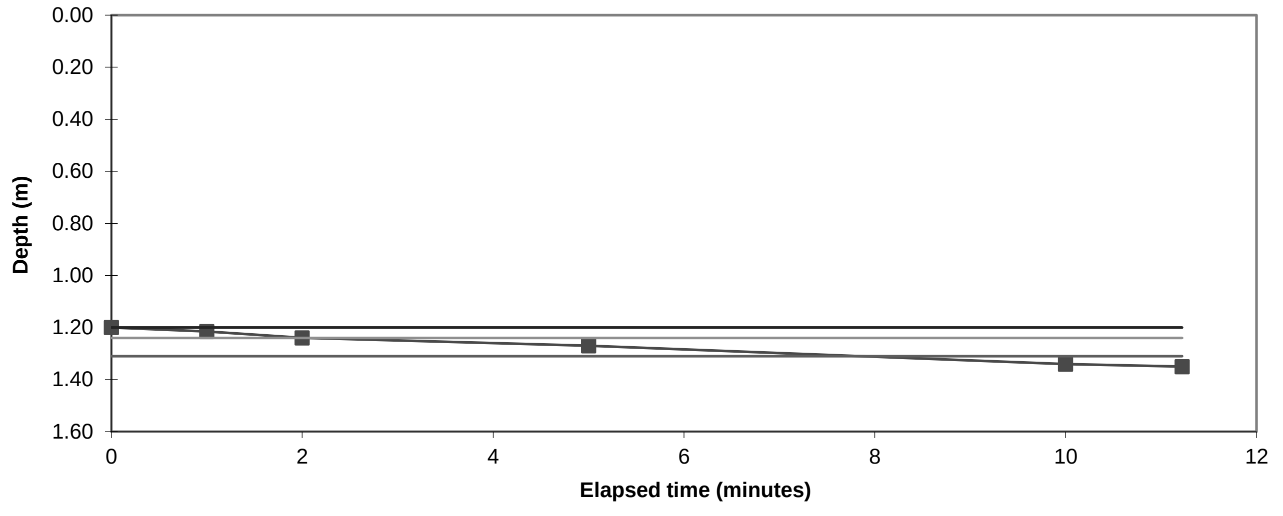
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No: TP7
Test No: 1
Date: 31.07.2025
Length (m): 1.500
Width (m): 0.30
Depth (m): 1.35
Datum Height: 0.00 m agl
Granular infill: None
Porosity of infill: 1 (assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.200		
1	1.215		
2	1.240		
5	1.270		
10	1.340		
11.22	1.350		



Start water depth for analysis (mbgl):	1.20		
75% effective depth (mbgl):	1.24	Elapsed time (mins):	2.0
50% effective depth (mbgl):	1.28		
25% effective depth (mbgl):	1.31	Elapsed time (mins):	7.9
Base of soakage zone (mbgl):	1.35		

Volume outflow between 75% and 25% effective depth (m³): 0.032
Mean surface area of outflow (m^2): 0.70
(side area at 50% effective depth + base area)
Time for outflow between 75% and 25% effective depth (mins): 5.9

Soil infiltration rate (m/s): **1.3E-4**

Remarks Results processed following BRE 365 (2007).
Water appeared to drain into a sinkhole.

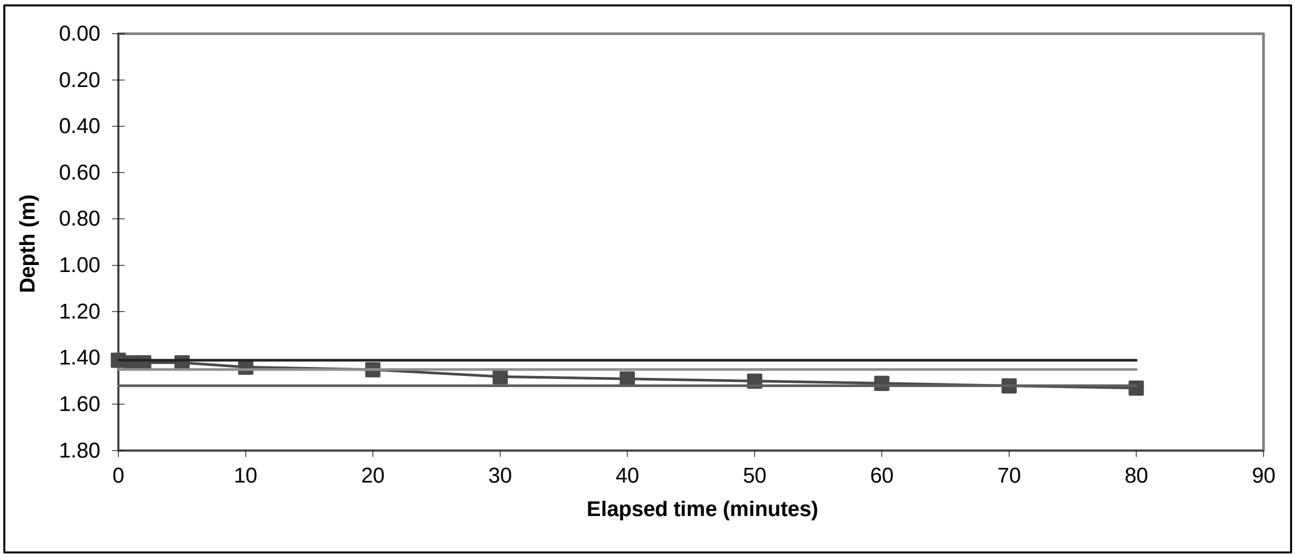
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP8	Test No:	1	Date:	31.07.2025
Length (m):	1.500	Datum Height:	0.00	m agl	
Width (m):	0.30	Granular infill:	None		
Depth (m):	1.56	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.410		
1	1.420		
2	1.420		
5	1.420		
10	1.440		
20	1.450		
30	1.480		
40	1.490		
50	1.500		
60	1.510		
70	1.520		
80	1.530		



Start water depth for analysis (mbgl):	1.41		
75% effective depth (mbgl):	1.45	Elapsed time (mins):	20.0
50% effective depth (mbgl):	1.49		
25% effective depth (mbgl):	1.52	Elapsed time (mins):	70.0
Base of soakage zone (mbgl):	1.56		

Volume outflow between 75% and 25% effective depth (m³): 0.032

Mean surface area of outflow (m^2): 0.70
(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins): 50.0

Soil infiltration rate (m/s):	**1.5E-5**

Remarks Results processed following BRE 365 (2007).
New base of pit due to silt and sand.

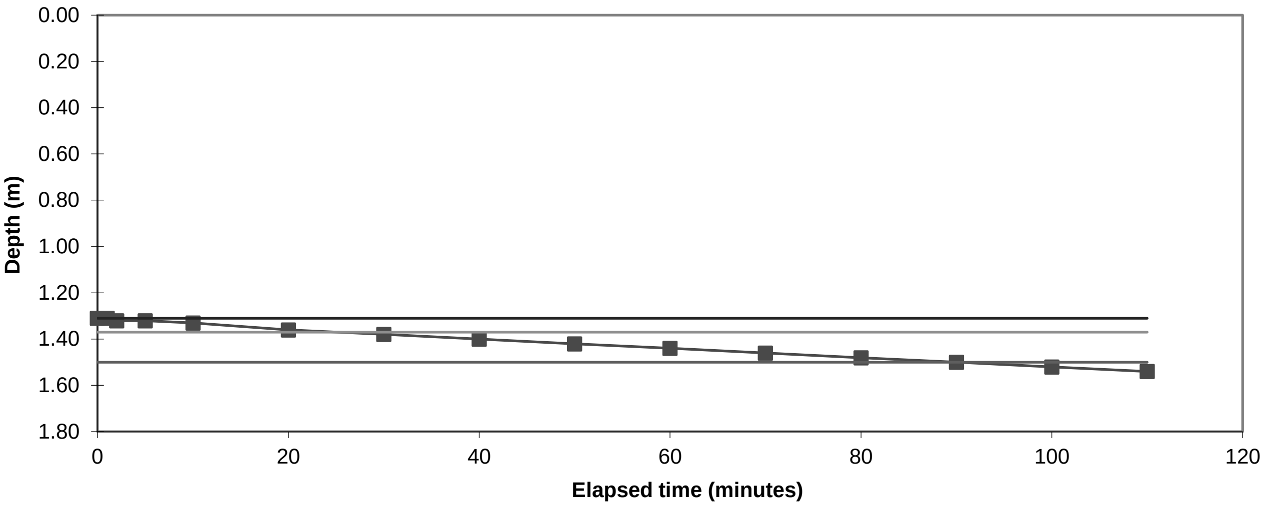
Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP8	Test No:	2		Date:	31.07.2025
Length (m):	1.500		Datum Height:		0.00	m agl
Width (m):	0.30		Granular infill:	None		
Depth (m):	1.56		Porosity of infill:	1		(assumed)

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.310	110	1.540
1	1.310		
2	1.320		
5	1.320		
10	1.330		
20	1.360		
30	1.380		
40	1.400		
50	1.420		
60	1.440		
70	1.460		
80	1.480		
90	1.500		
100	1.520		



Start water depth for analysis (mbgl):	1.31		
75% effective depth (mbgl):	1.37	Elapsed time (mins):	25.0
50% effective depth (mbgl):	1.44		
25% effective depth (mbgl):	1.50	Elapsed time (mins):	90.0
Base of soakage zone (mbgl):	1.56		

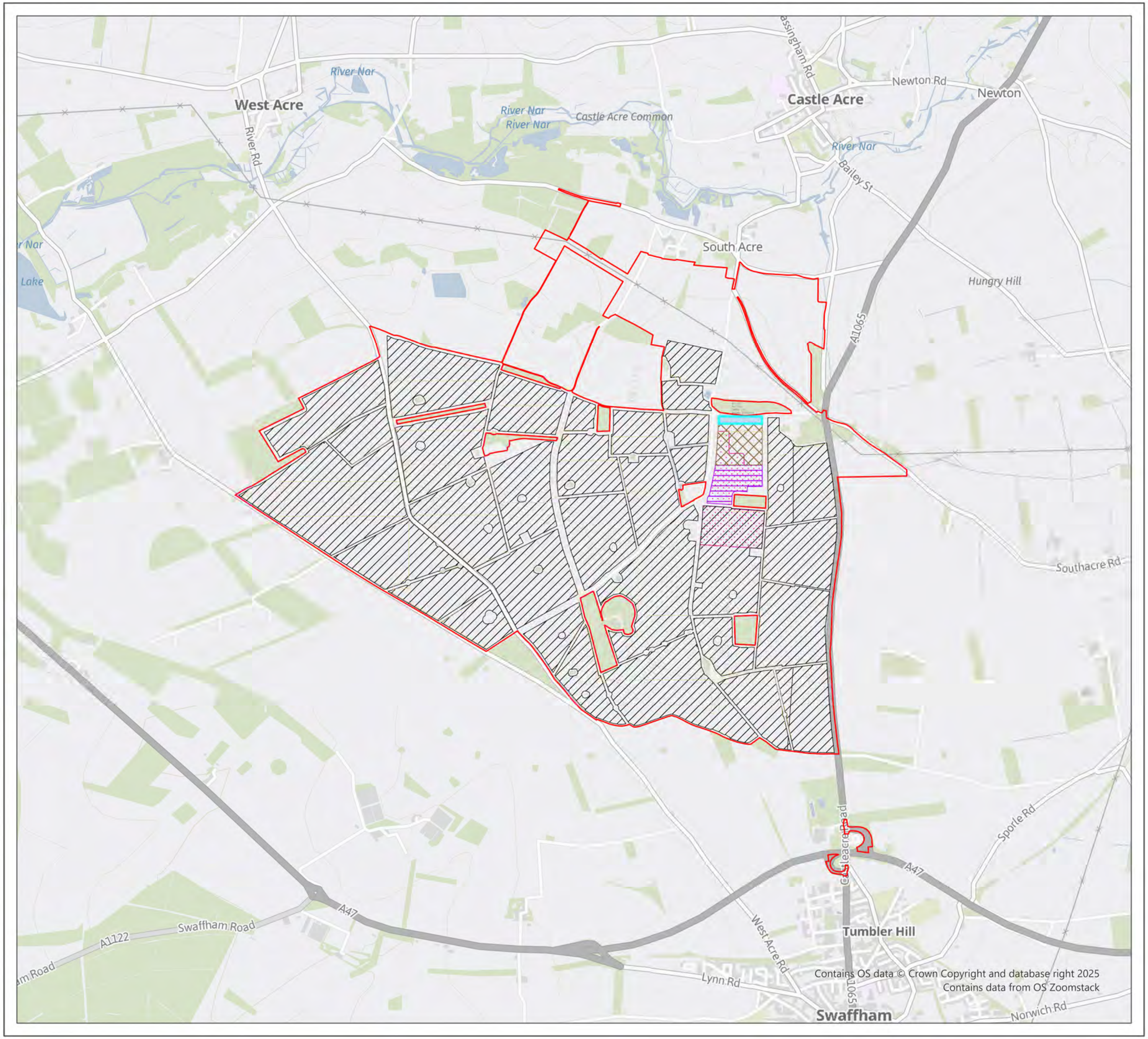
Volume outflow between 75% and 25% effective depth (m³):	0.058
Mean surface area of outflow (m^2): (side area at 50% effective depth + base area)	0.88
Time for outflow between 75% and 25% effective depth (mins):	65.0

Soil infiltration rate (m/s):	**1.7E-5**

Remarks Results processed following BRE 365 (2007).

Client:	Raincloud Consulting Ltd	**Job No:**
Site:	Swaffham Road, Swaffham, Norfolk, PE37 7HY	C5239/25/E/8044

Annex C: Outline Surface Water Attenuation Area



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THE DROVES
SOLAR FARM

RAINCLOUD

🟥	Order Limits / Core Study Area
▨	Work No. 1: Solar PV
▨	Work No. 2: BESS Compound
▤	Work No. 3: Customer Substation
▩	Work No. 4: National Substation
🟧	Proposed Track
🟦	Surface Water Attenuation Area

1:25,000 Scale @ A3

0 0.5 1 km

N

Ref: 083-SWD-003

Date: 17/11/2025

Outline Surface Water Attenuation Area Annex C

The Droves Solar Farm Flood Risk Assessment

Annex D: InfoDrainage Results

Catchment Area 1

Type : Catchment Area

Area (ha)	14.262

Preliminary Sizing

Volumetric Runoff Coefficient	1.000
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area 2

Type : Catchment Area

Area (ha)	11.084

Preliminary Sizing

Volumetric Runoff Coefficient	1.000
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Pond

Type : Pond

Dimensions

Exceedance Level (m)	51.500
Depth (m)	1.500
Base Level (m)	50.000
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.014
Total Volume (m³)	24909.021

Depth (m)	Area (m²)	Volume (m³)
0.000	15250.00	0.000
1.500	18000.00	24909.021

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area 1
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area 2
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.043
Side Infiltration Rate (m/hr)	0.043
Safety Factor	1.5
Perimeter	Circular
Length (m)	224.931
Friction Scheme	Manning's n
n	0.035

The Droves:

Date:
11/09/2025

Designed by:
EL

Checked by:
LN

Approved By:
LN

Report Details:
Type: Inflow Summary
Storm Phase: 1.5mBasin

www.raincloud-consulting.co.uk:

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area 1	Pond		Time of Concentration	14.262	100	0	100	14.262
Catchment Area 2	Pond		Time of Concentration	11.084	100	0	100	11.084
TOTAL		**0.0**		**25.346**				**25.346**

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Title: Rainfall Analysis Criteria	www.raincloud-consulting.co.uk:		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

The Droves:

Date:
11/09/2025

Designed by:
EL

Checked by:
LN

Approved By:
LN

Report Details:
Type: Inflows Summary
Storm Phase: 1.5mBasin

www.raincloud-consulting.co.uk:

Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area 1	FEH: 100 years: +40 %: 15 mins: Summer	14.26	12803.8	5769.399
Catchment Area 2	FEH: 100 years: +40 %: 15 mins: Summer	11.08	9951.0	4483.900

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FEH: 100 years: +40 %: 960 mins: Winter	51.472	51.472	1.472	1.472	1387.2	24404.129	0.000	15353.863	0.0	0.000	2.027	OK

The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Phase Management Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

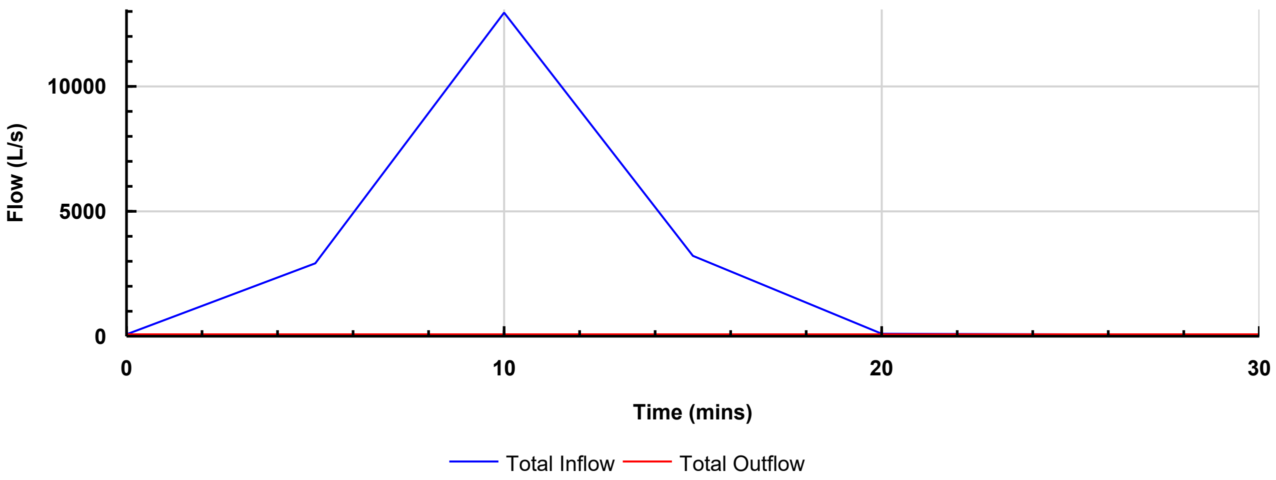
1.5mBasin
FEH: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Tables

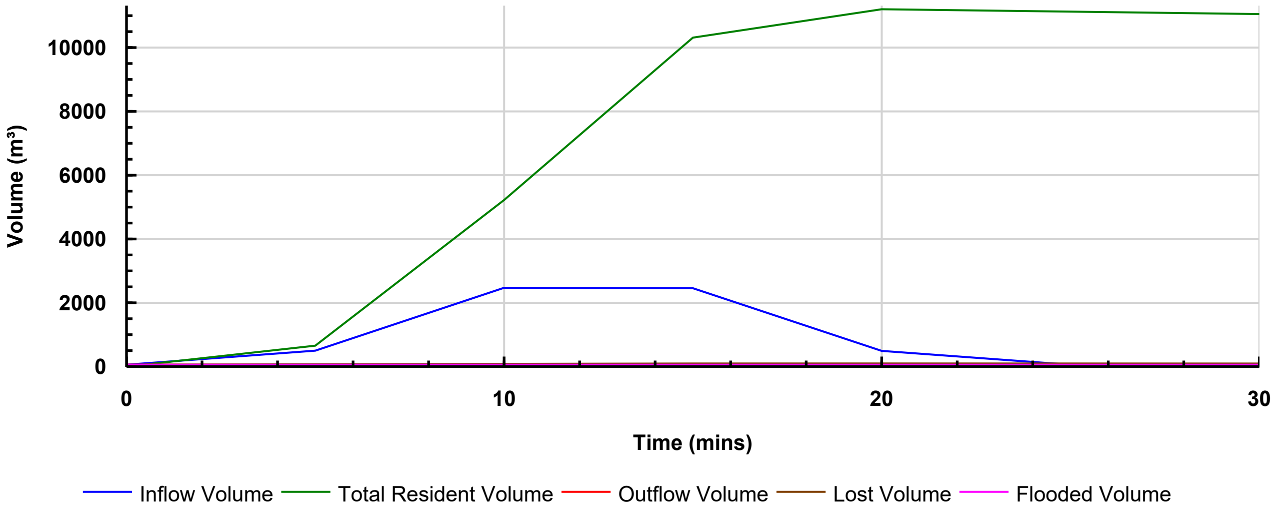
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
TOTAL	12950.9	5710.912	0.0	0.000

Graphs

Flow Graph



Volume Graph



The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Inflow Results Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Catchment Area 1
Critical Storm: FEH: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

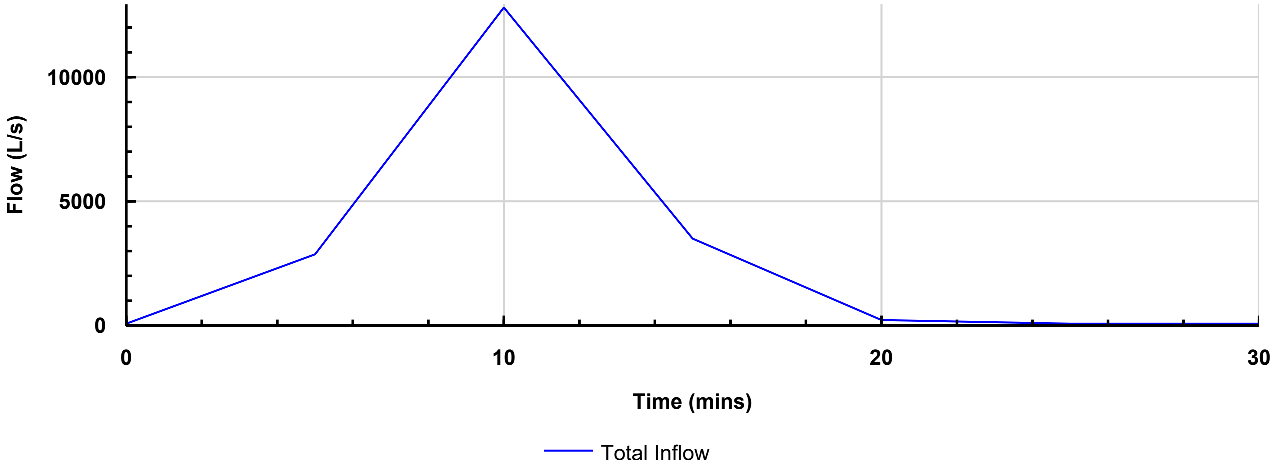
Type : Catchment Area

Inflow

Max. Inflow (L/s)	12803.8
Total Inflow Volume (m³)	5769.399

Graphs

Flow Graph



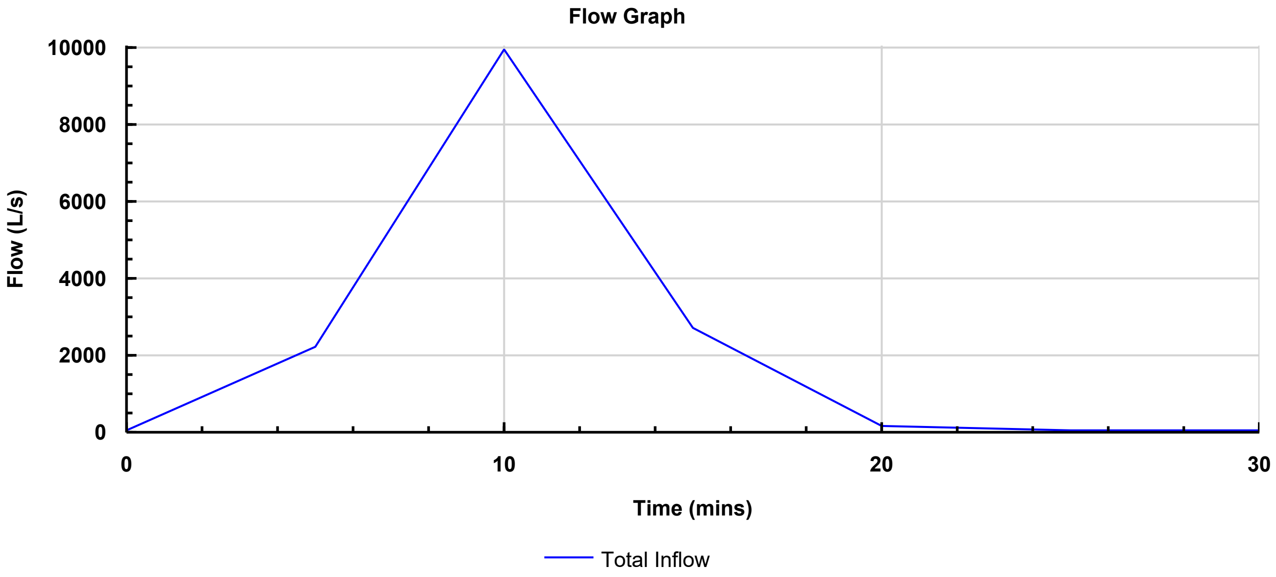
Catchment Area 2
Critical Storm: FEH: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	9951.0
Total Inflow Volume (m³)	4483.900

Graphs

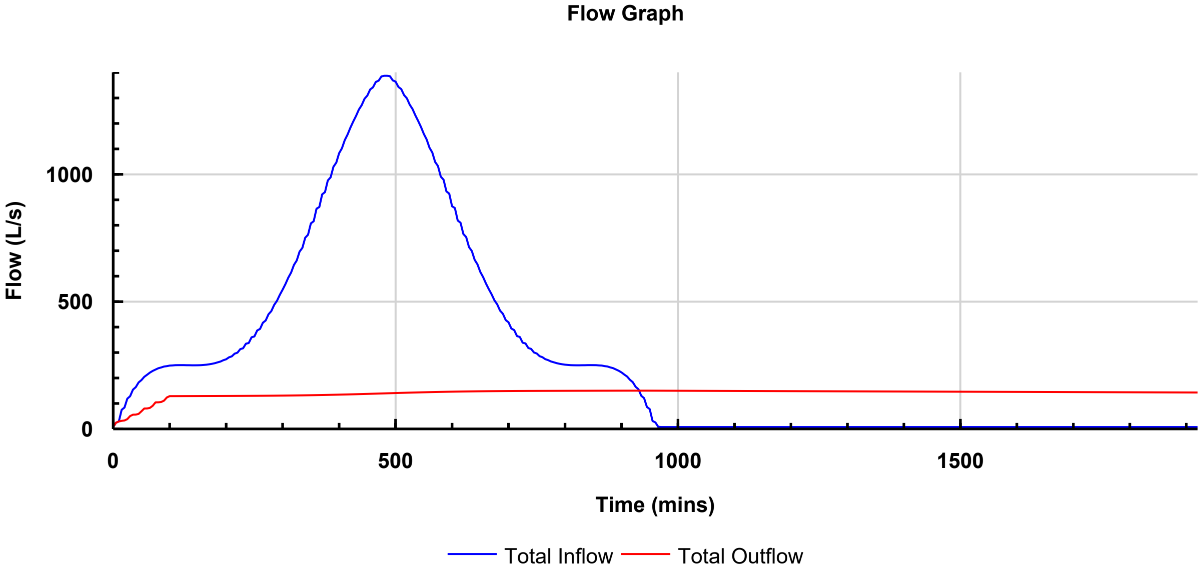


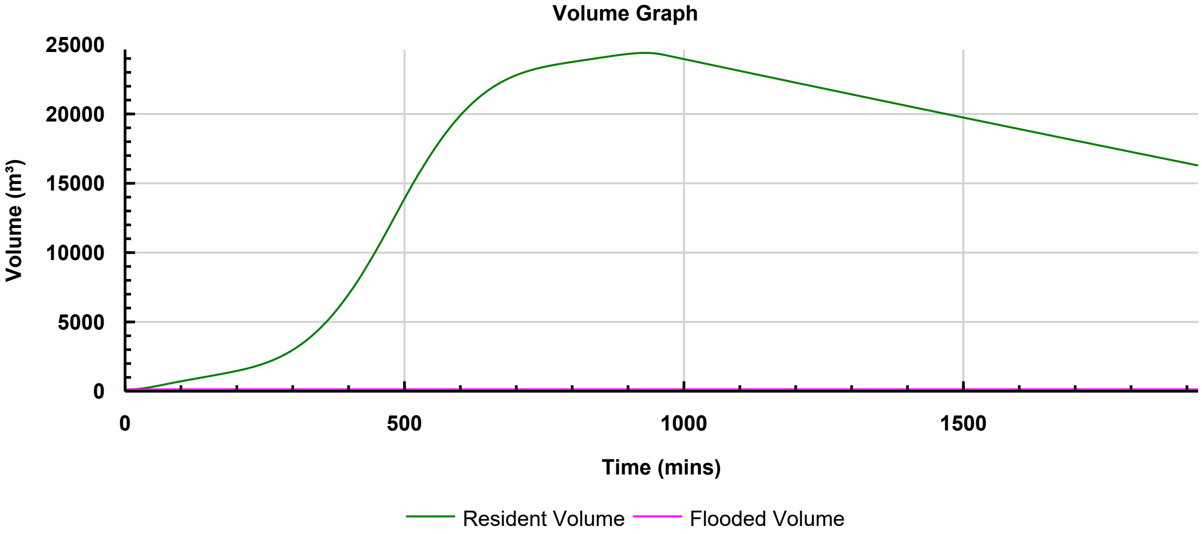
The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Control Results Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		

Pond Type : Pond

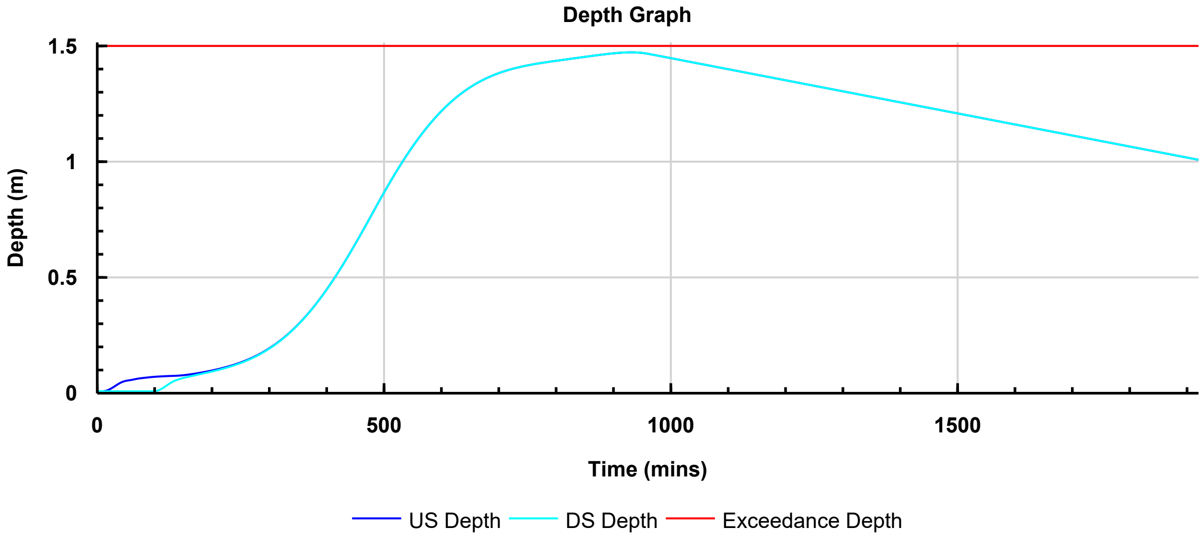
Critical Storm: FEH: 100 years: Increase Rainfall (%): +40: 960 mins: Winter

Graphs

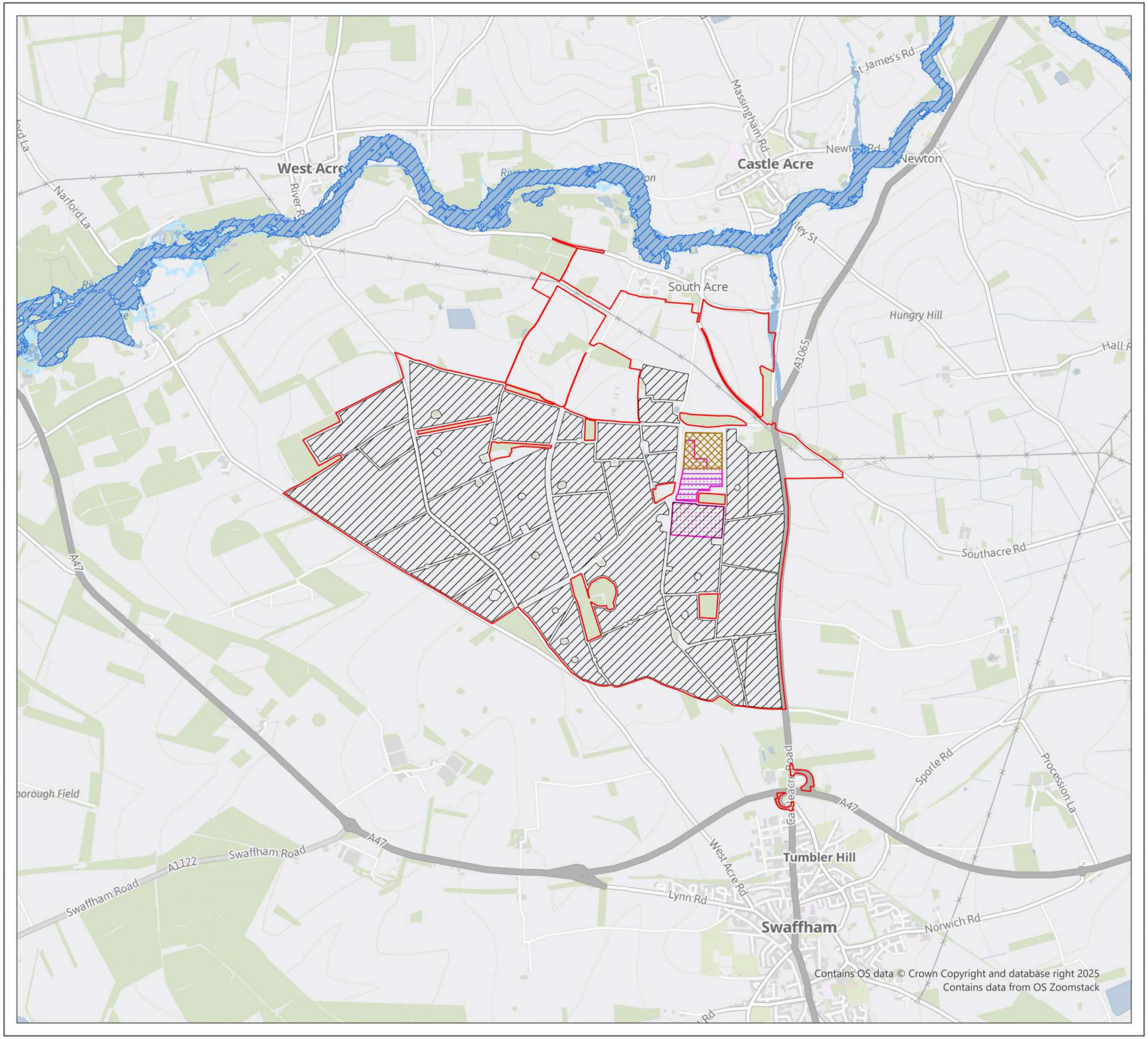




The Droves:	Date: 11/09/2025		
	Designed by: EL	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Control Results Storm Phase: 1.5mBasin	www.raincloud-consulting.co.uk:		



Annex E: A3 Scale Figures



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THE DROVES
SOLAR FARM

RAINCLOUD

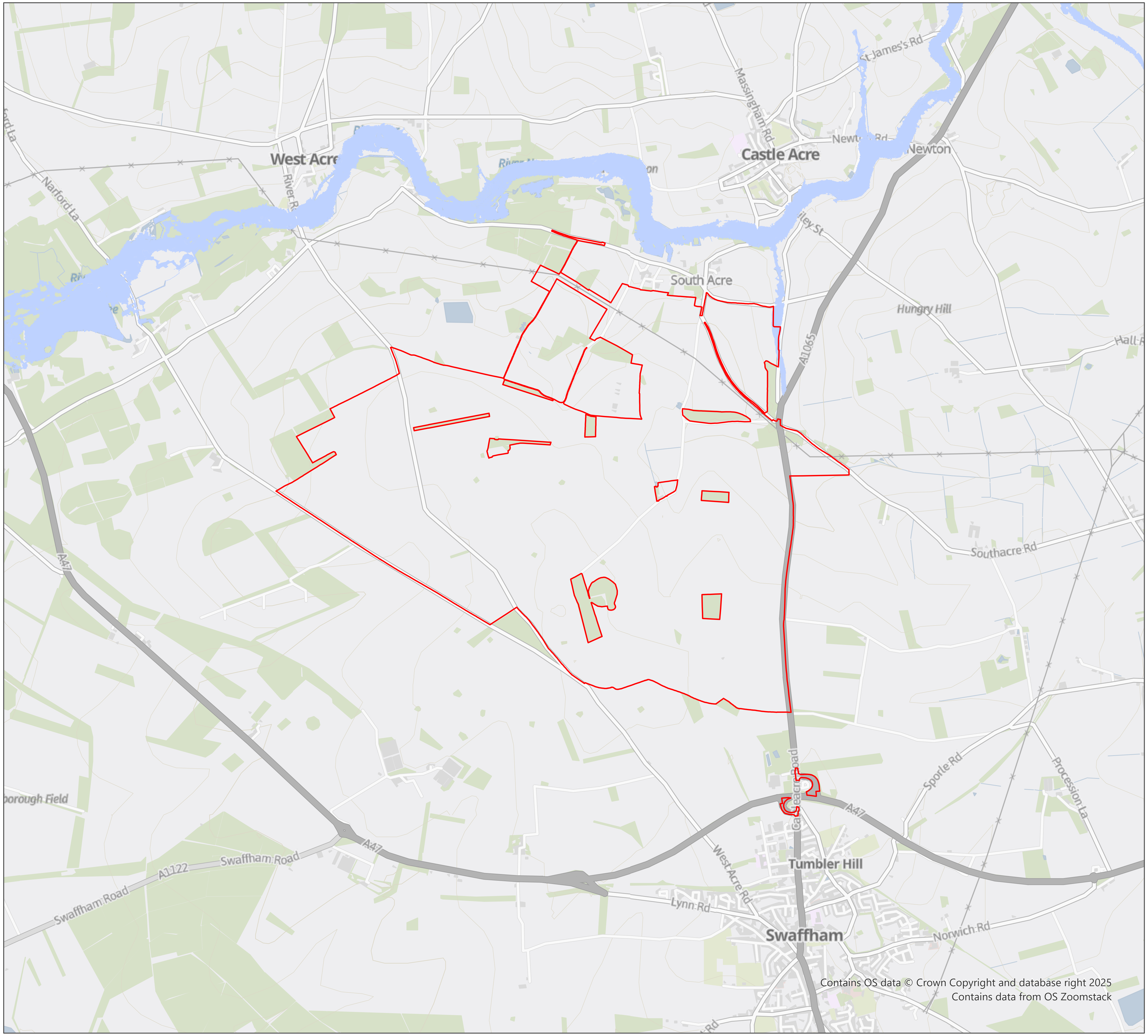
▭	Order Limits / Core Study Area
NaFRA2 Flood Zones	
Flood Zone	
🟦	FZ2
🟦	FZ3a
▨	FZ3b
▨	Work No. 1: Solar PV
▨	Work No. 2: BESS Compound
▤	Work No. 3: Customer Substation
▩	Work No. 4: National Grid Substation

1:30,000 Scale @ A3
0 0.5 1 km
N

Ref: 083-FRA-002B-Rev02 Date: 02/01/2026

Flood Zones
Figure A12-1-1

The Droves Solar Farm Flood Risk Assessment



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THE DROVES
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RAINCLOUD

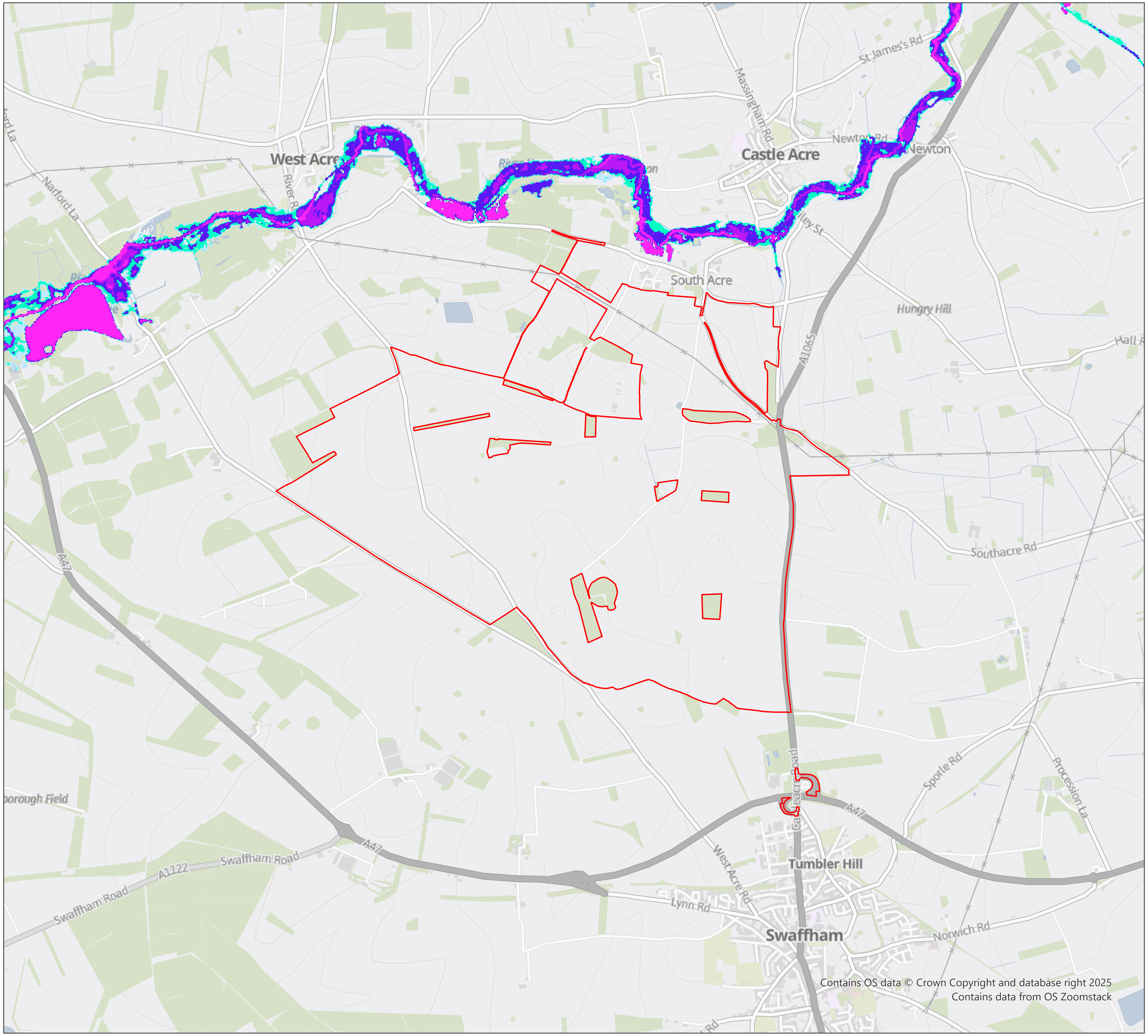
□ Order Limits / Core Study Area
🟦 1 % AEP 2036 - 2069

1:30,000 Scale @ A3
0 0.5 1 km
N

Ref: 083-FRA-003B | Date: 30/09/2025

NaFRA2 Flood Map 2036-2069 (reproduced from the Rivers and Sea map - EA)
Figure A12-1-2

The Droves Solar Farm
Flood Risk Assessment



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RAINCLOUD

🟥 Order Limits / Core Study Area

Upper Nar 0.1 % AEP

Depth (m)

- 🟦 0.02 - 0.1
- 🟩 0.11 - 0.3
- 🟦 0.31 - 0.6
- 🟪 0.61 - 0.9
- 🟪 > 0.9

1:30,000 Scale @ A3

0 0.5 1 km

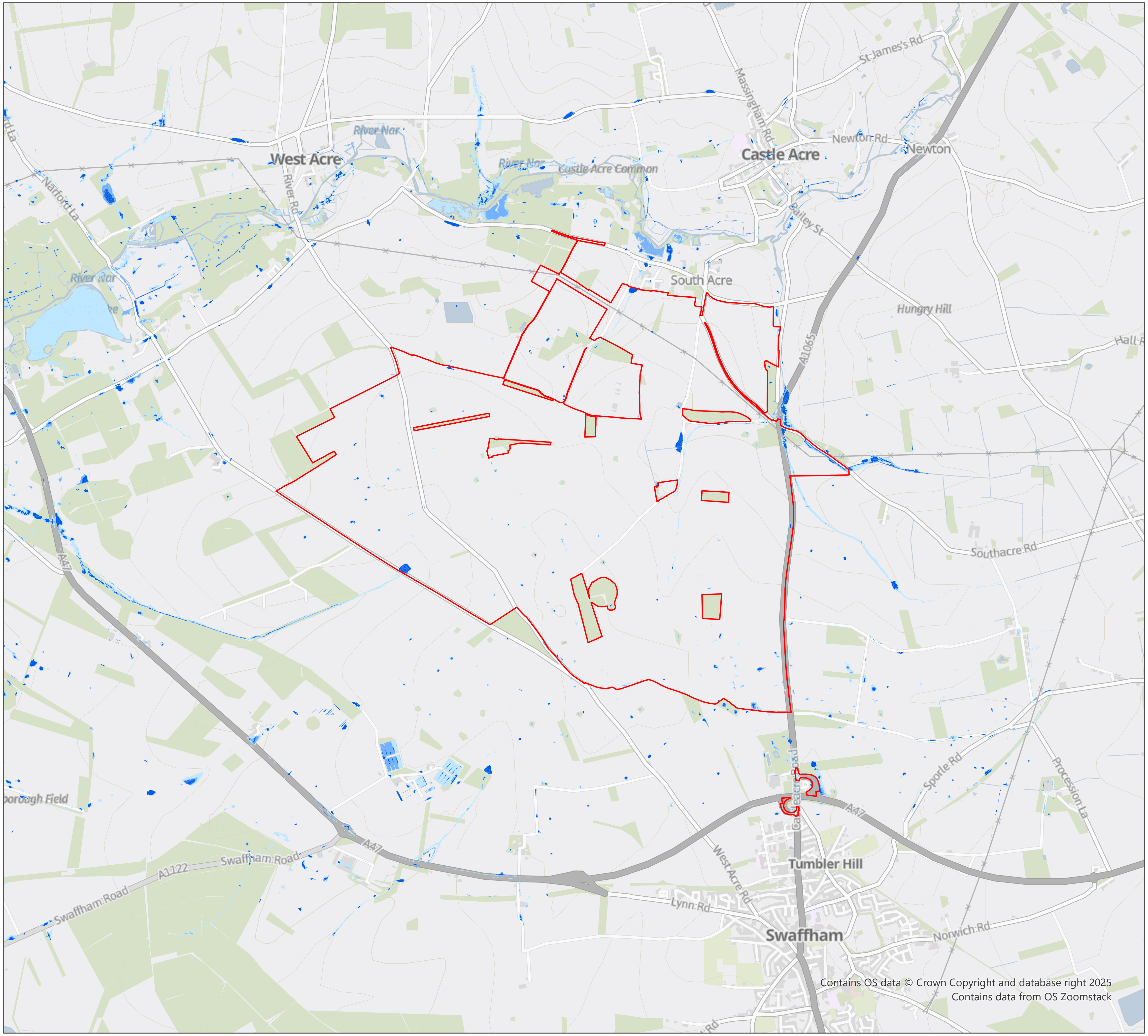
N

Ref: 083-FRA-004B | Date: 30/09/2025

River Nar - 0.1% AEP Fluvial Flood Depths

Figure A12-1-3

The Droves Solar Farm Flood Risk Assessment



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THE DROVES
SOLAR FARM

RAINCLOUD

☐ Order Limits / Core Study Area

EA Risk of Surface Water Flooding

Risk Band

🟦 High

🟦 Medium

🟦 Low

1:30,000 Scale @ A3

0 0.5 1 km

N

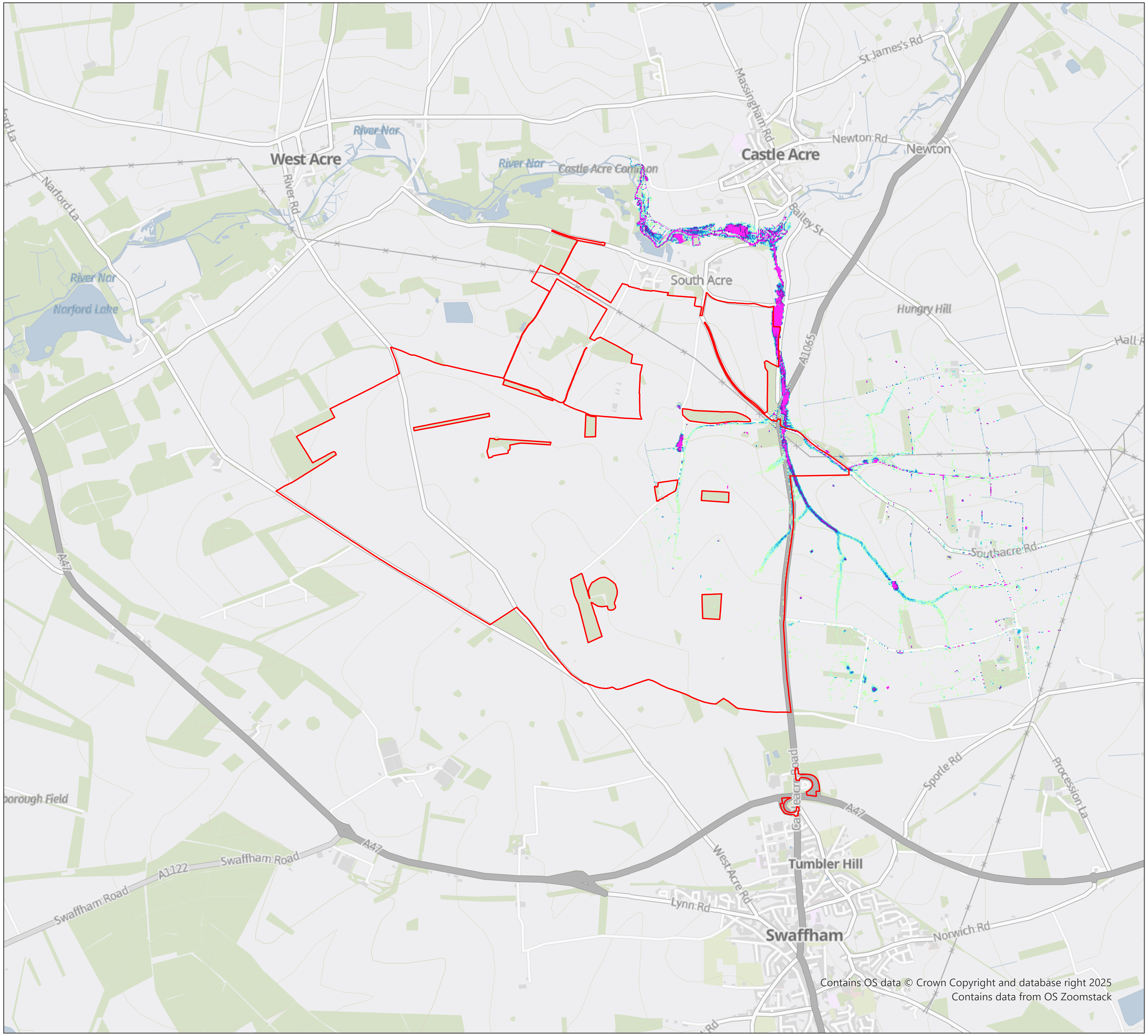
Ref: 083-FRA-005B

Date: 30/09/2025

1 % AEP Pluvial Flood Extents (EA - RoFSW 2025)

Figure A12-1-4

The Droves Solar Farm
Flood Risk Assessment



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THE DROVES
SOLAR FARM

RAINCLOUD

☐ Order Limits / Core Study Area

1 % AEP - Raincloud Model

Depth (m)

- ☐ 0 - 0.05
- 🟩 0.051 - 0.10
- 🟦 0.101 - 0.15
- 🟦 0.151 - 0.20
- 🟦 0.201 - 0.25
- 🟦 0.251 - 0.30
- 🟪 0.301 - 0.35
- 🟪 0.351 - 0.40
- 🟪 0.401 - 0.45
- 🟪 > 0.45

1:30,000 Scale @ A3

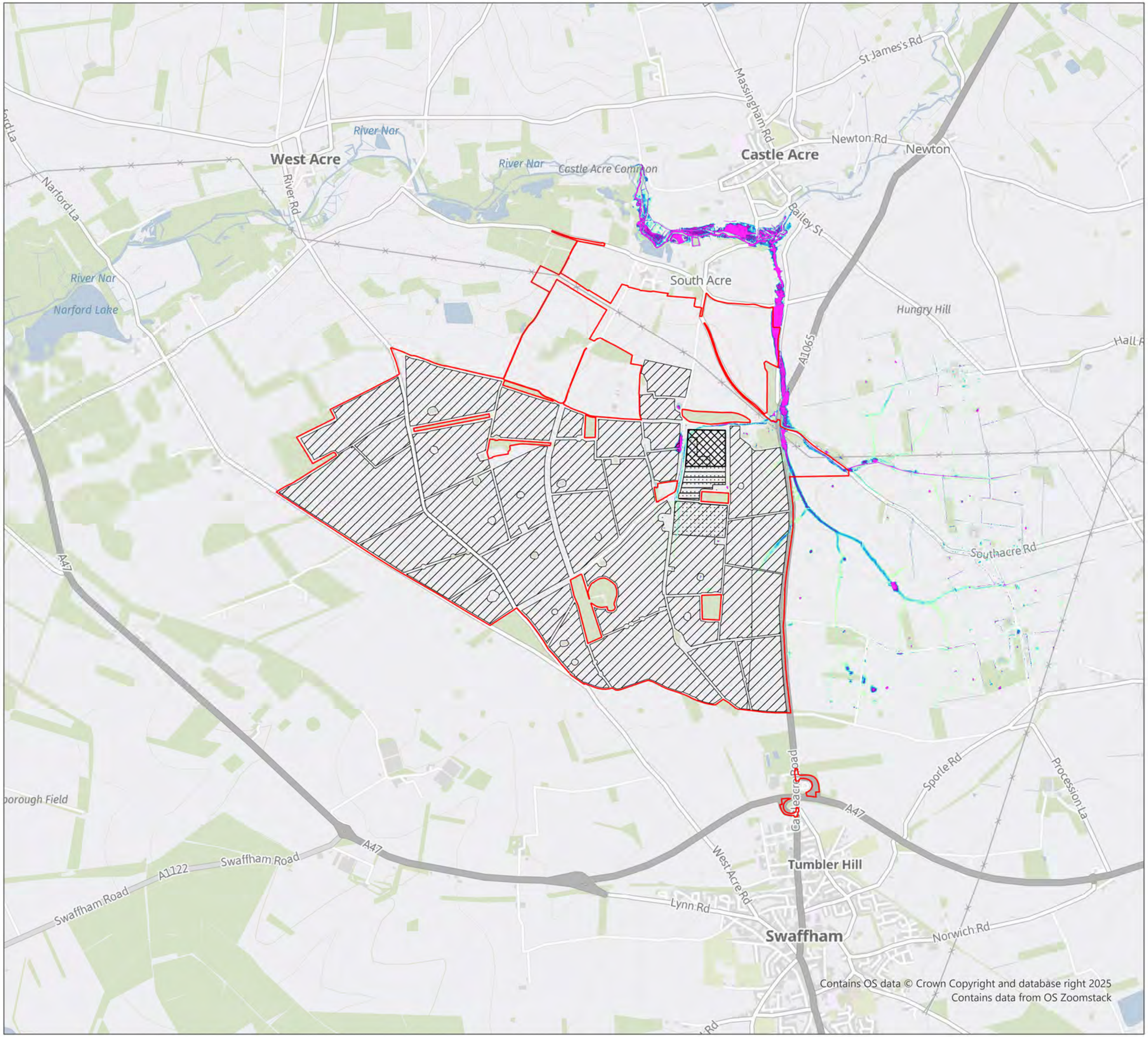
0 0.55 1.1 km

N

Ref: 083-FRA-006B	Date: 30/09/2025

1 % AEP Flood Depths - Raincloud 2D Modelling
Figure A12-1-5

The Droves Solar Farm Flood Risk Assessment



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THE DROVES
SOLAR FARM

RAINCLOUD

☐	Order Limits / Core Study Area
▨	Work No. 1: Solar PV
⬚	Work No. 2: BESS Work Area
☰	Work No. 3: Customer Substation
▩	Work No. 4: National Grid Substation

1 % AEP + 25 % CC - Raincloud Model

Depth (m)

	0 - 0.05
🟩	0.051 - 0.1
🟦	0.101 - 0.15
🟦	0.151 - 0.2
🟦	0.201 - 0.25
🟦	0.251 - 0.3
🟪	0.301 - 0.35
🟪	0.351 - 0.4
🟪	0.401 - 0.45
🟪	> 0.45

1:30,000 Scale @ A3

0 0.5 1 km

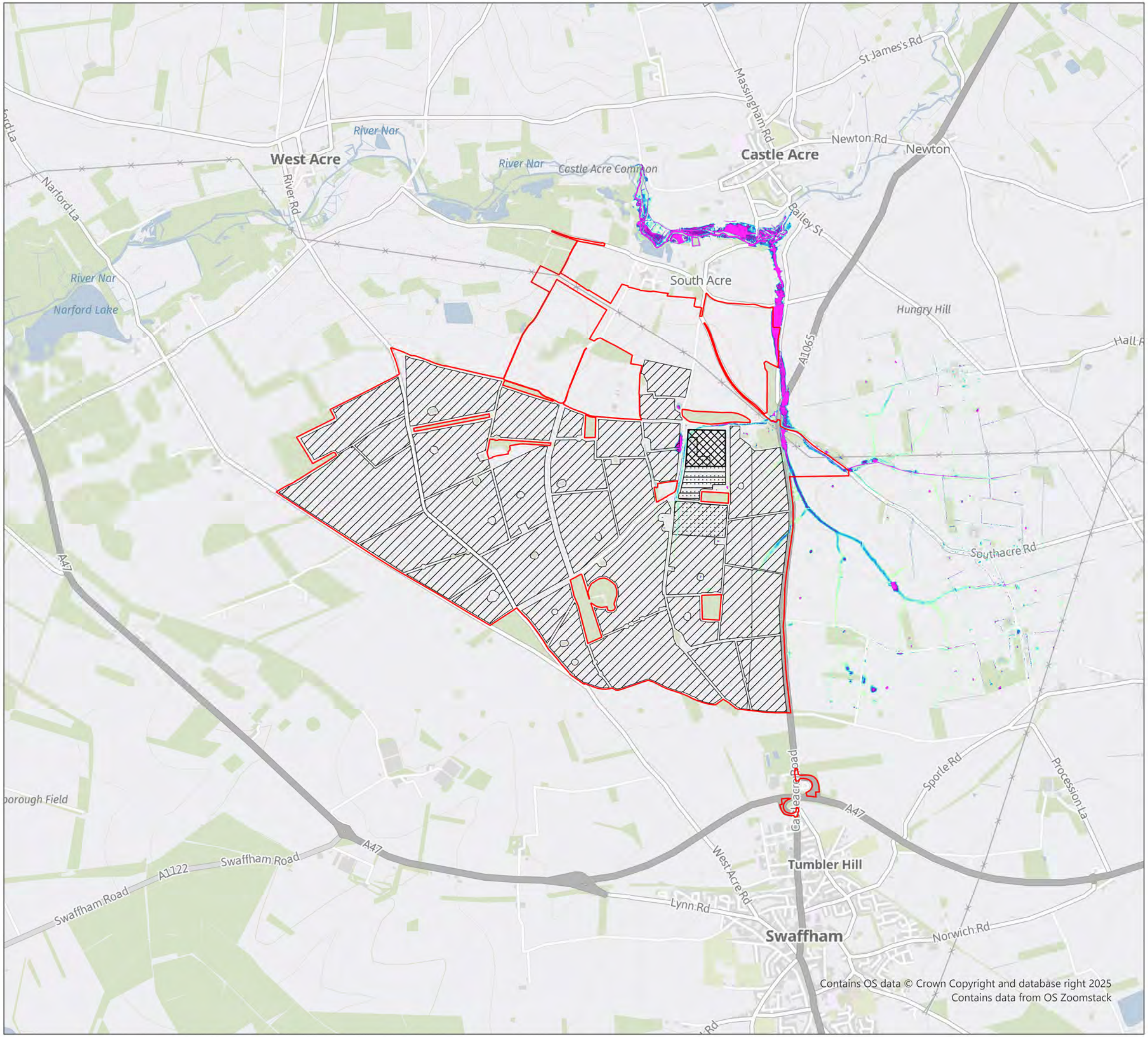
N

Ref: 083-FRA-007B Date: 17/11/2025

1 % AEP + 25 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-1-6

The Droves Solar Farm
Flood Risk Assessment



THE DROVES
SOLAR FARM

RAINCLOUD

□ Order Limits / Core Study Area
▨ Work No. 1: Solar PV
▒ Work No. 2: BESS Work Area
☰ Work No. 3: Customer Substation
▦ Work No. 4: National Grid Substation

1 % AEP + 25 % CC - Raincloud Model Depth (m)

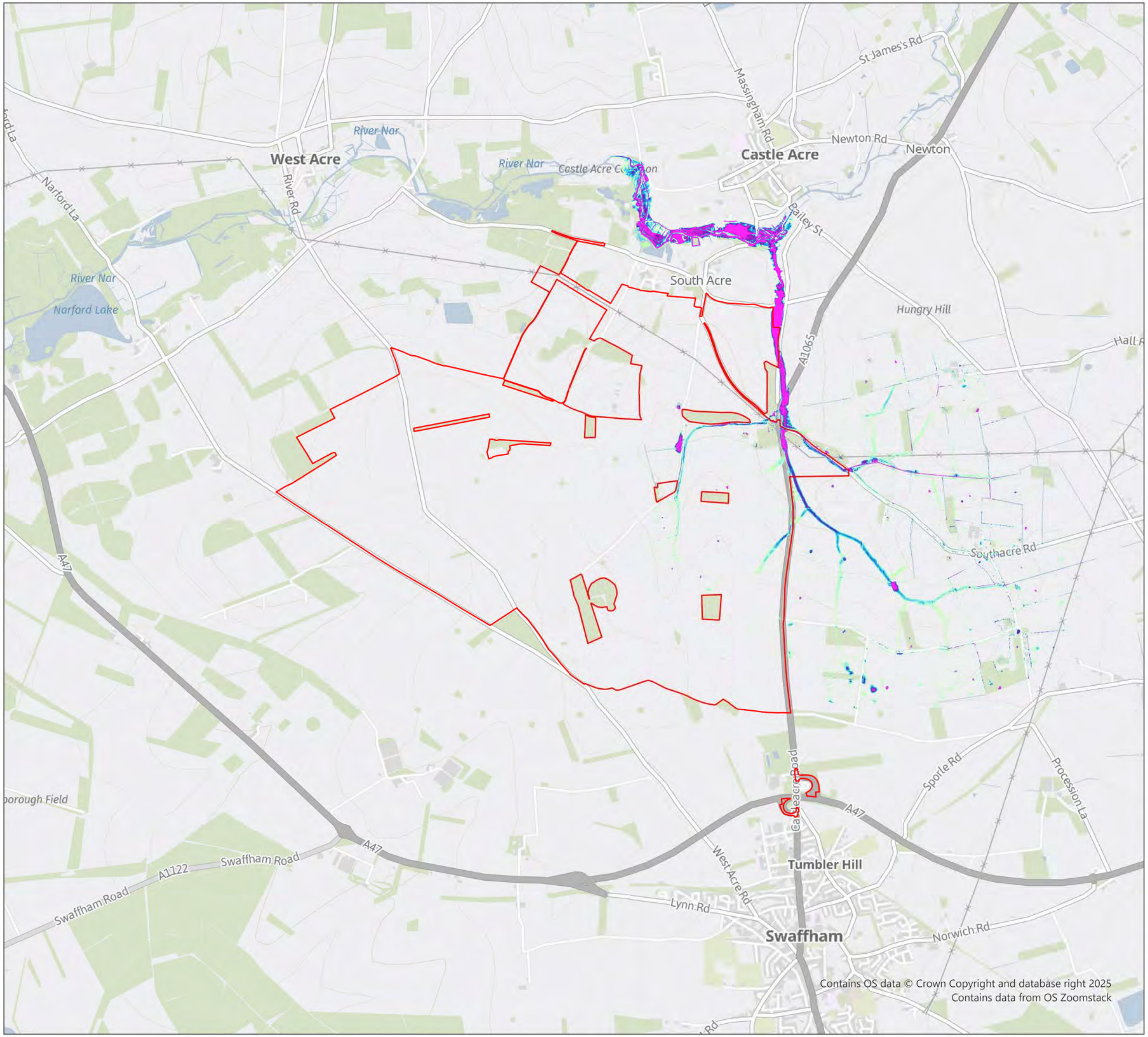
0 - 0.05
🟩 0.051 - 0.1
🟦 0.101 - 0.15
🟦 0.151 - 0.2
🟦 0.201 - 0.25
🟦 0.251 - 0.3
🟪 0.301 - 0.35
🟪 0.351 - 0.4
🟪 0.401 - 0.45
🟪 > 0.45

1:30,000 Scale @ A3
0 0.5 1 km
N

Ref: 083-FRA-008B | Date: 17/11/2025

Modelled 1 % AEP + 25 % CC Pluvial Flood Depth Figure A12-1-8

The Droves Solar Farm Flood Risk Assessment



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RAINCLOUD

☐ Order Limits / Core Study Area

1 % AEP + 40 % CC - Raincloud Model Depth (m)

- 0 - 0.05
- 🟩 0.051 - 0.10
- 🟦 0.101 - 0.15
- 🟦 0.151 - 0.20
- 🟦 0.201 - 0.25
- 🟦 0.251 - 0.30
- 🟪 0.301 - 0.35
- 🟪 0.351 - 0.40
- 🟪 0.401 - 0.45
- 🟪 > 0.45

1:30,000 Scale @ A3

0 0.5 1 km

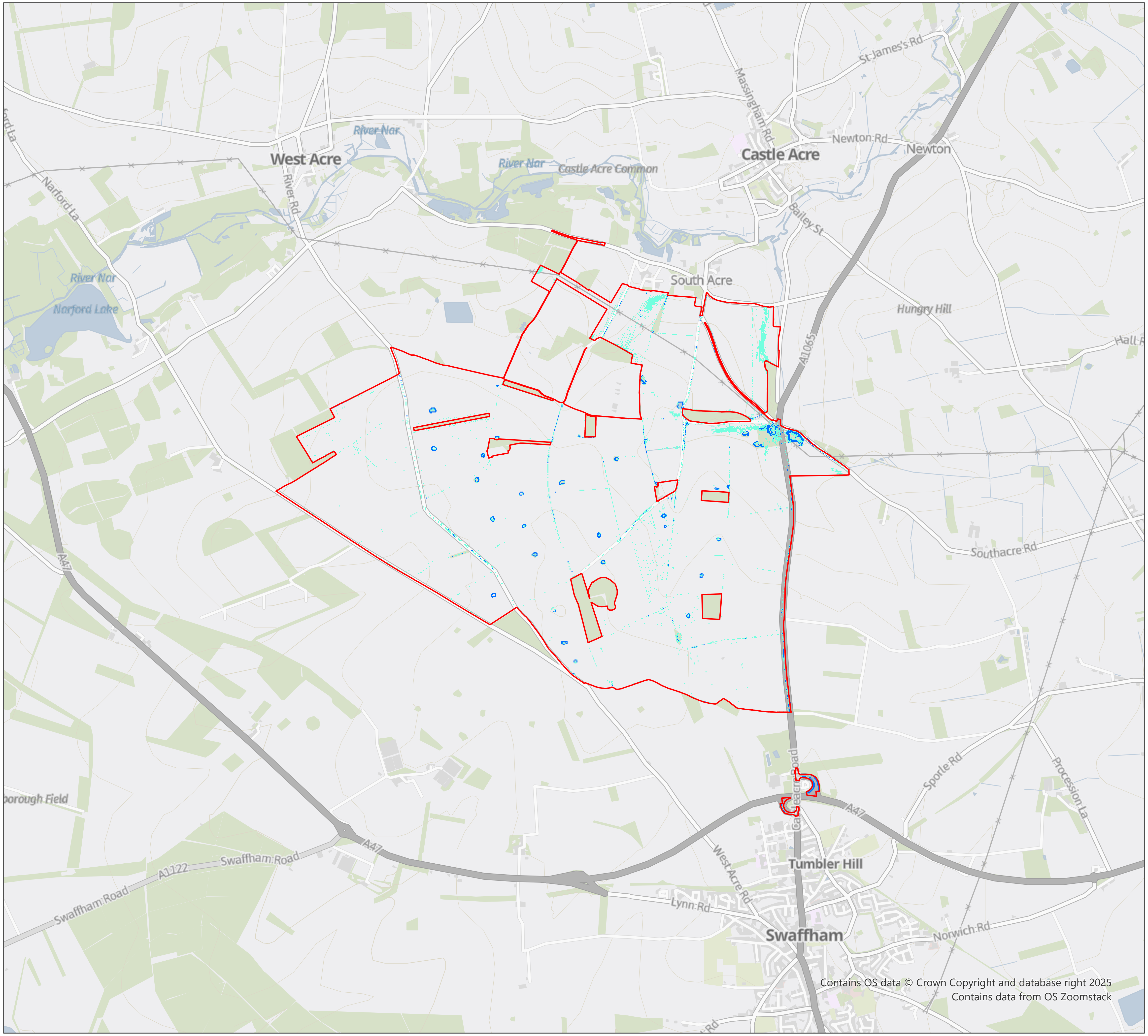
N

Ref: 083-FRA-009B	Date: 17/11/2025

1 % AEP + 40 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-1-7

The Droves Solar Farm Flood Risk Assessment



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RAINCLOUD

☐ Order Limits / Core Study Area

Slope

%

0.001 - 6

▨ 6.001 - 12

🟦 > 12.001

1:30,000 Scale @ A3

0 0.5 1 km

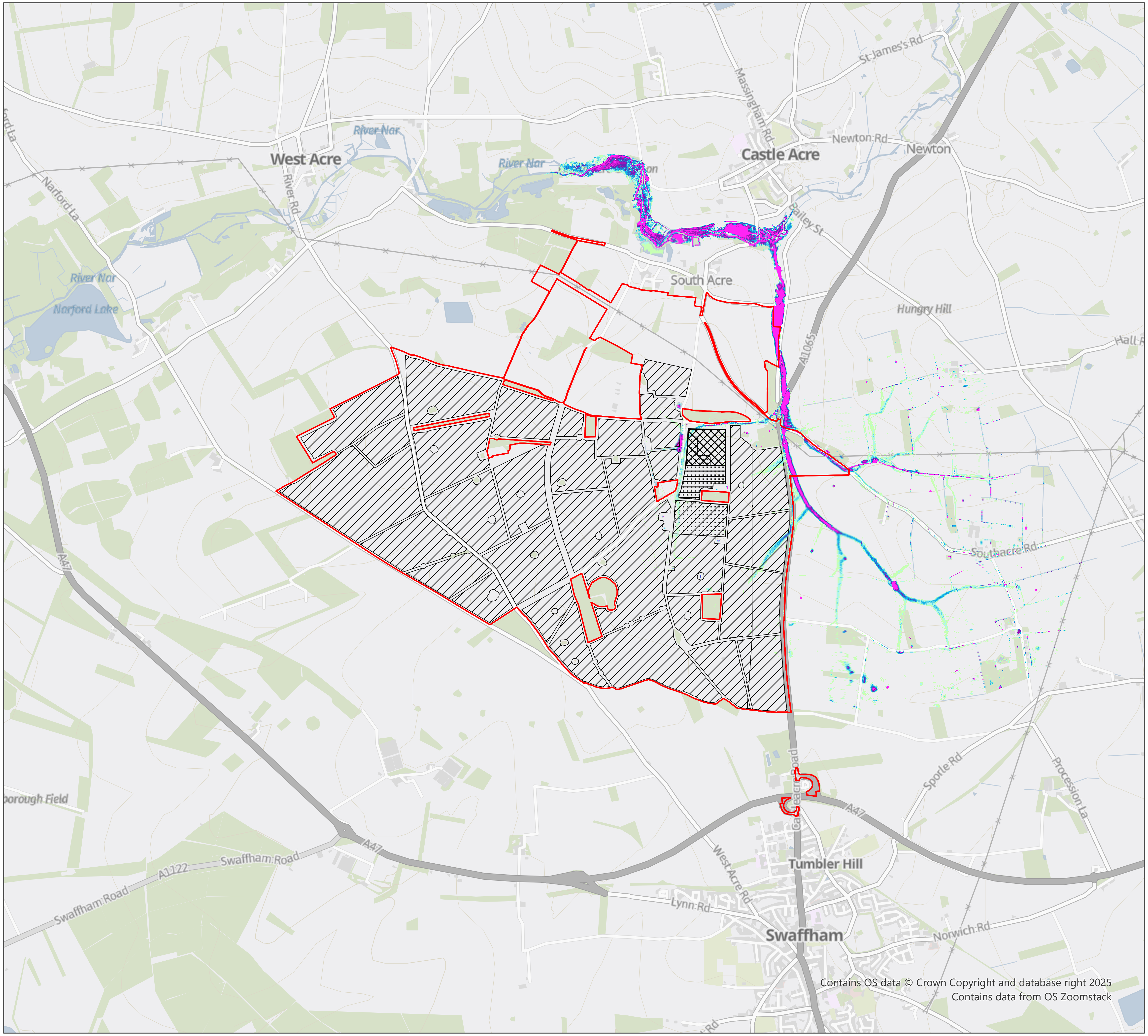
N

Ref: 083-FRA-010B	Date: 30/09/2025

Slope of CSA

Figure A12-1-10

The Droves Solar Farm
Flood Risk Assessment



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RAINCLOUD

▨ Work No. 1: Solar PV

░ Work No. 2: BESS

☰ Work No. 3: Customer Substation

▩ Work No. 4: National Grid Substation

1 % AEP + 40 % CC - Raincloud Model

Depth (m)

	0 - 0.05
🟩	0.051 - 0.10
🟦	0.101 - 0.15
🟦	0.151 - 0.20
🟦	0.201 - 0.25
🟦	0.251 - 0.30
🟪	0.301 - 0.35
🟪	0.351 - 0.40
🟪	0.401 - 0.45
🟪	> 0.45

1:30,000 Scale @ A3

0 0.5 1 km

N

Ref: 083-FRA-012B

Date: 17/11/2025

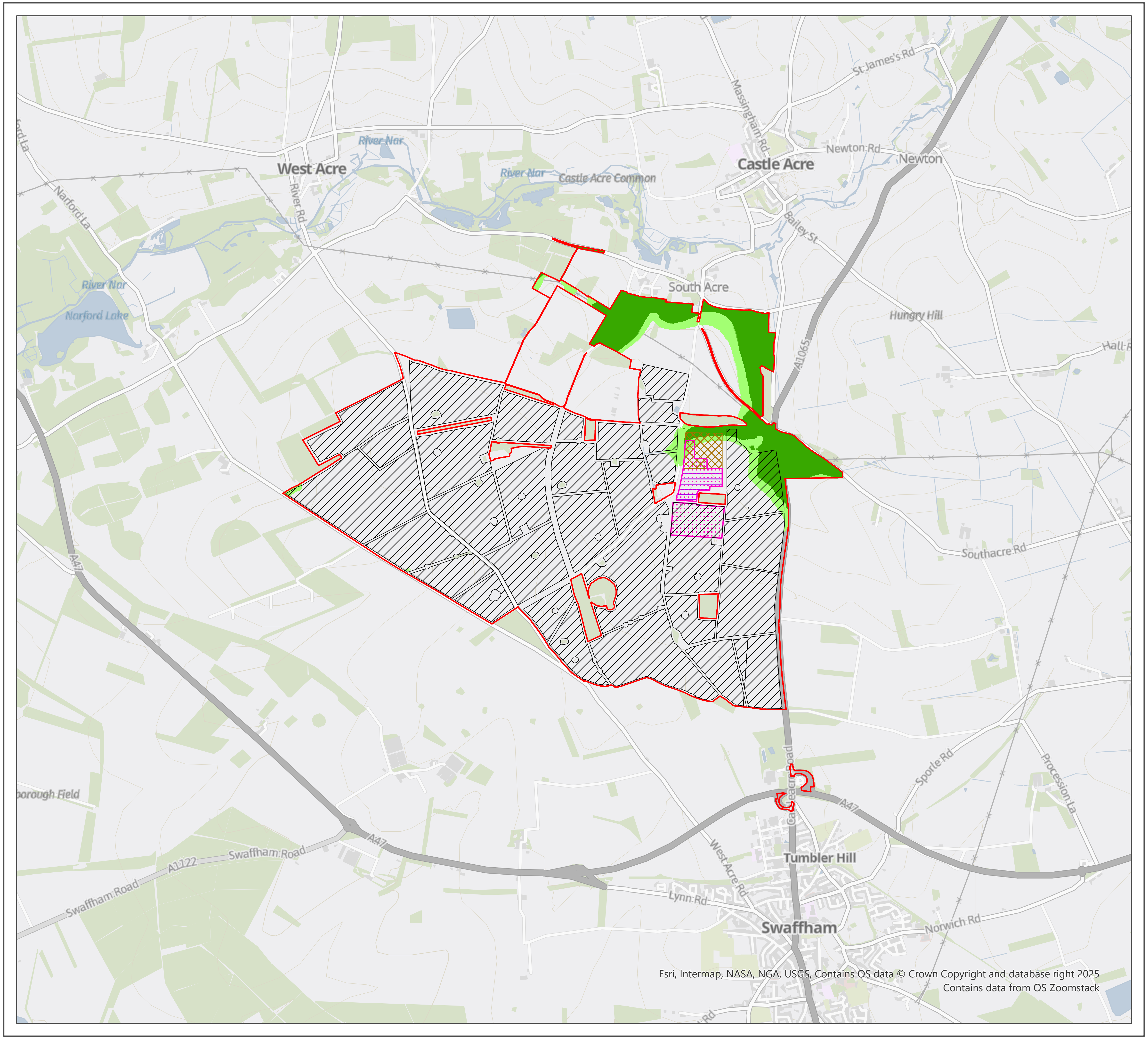
Modelled 1 % AEP + 40 % CC Pluvial Flood Depth

Figure A12-1-9

The Droves Solar Farm
Flood Risk Assessment

THE DROVES
SOLAR FARM

RAINCLOUD



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🟥 Order Limits / Core Study Area
▨ Work No. 1: Solar PV
▦ Work No. 2: BESS Compound
▤ Work No. 3: Customer Substation
▩ Work No. 4: National Grid Substation

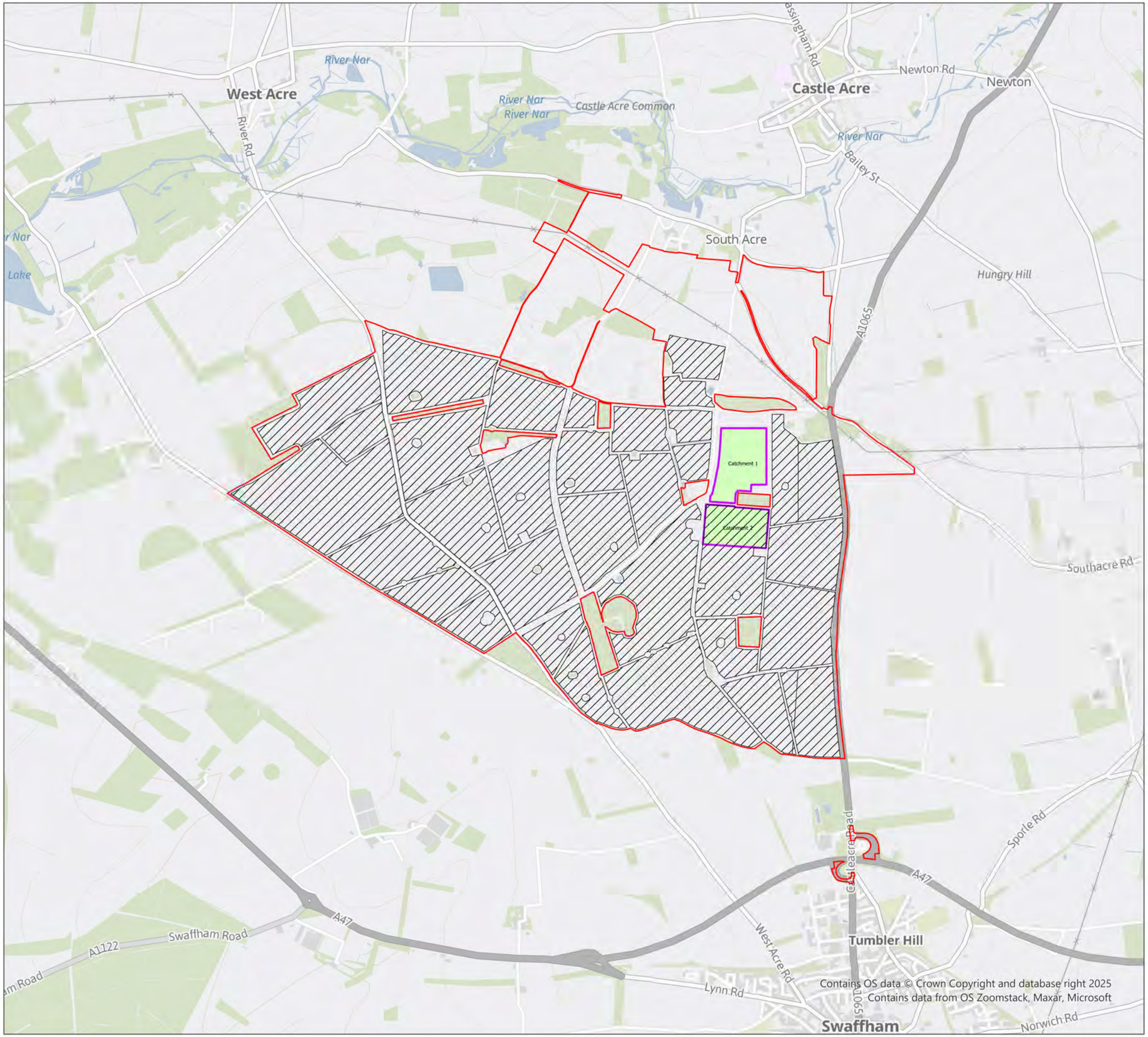
Minimum Groundwater Depth
Depth (m BGL)
🟩 < 12
🟩 12 - 15
> 15

1:30,000 Scale @ A3
0 0.5 1 km
N

Ref: 083-FRA-015B2 | Date: 17/11/2025

Minimum Groundwater Depths
Figure 12-1-11

The Droves Solar Farm
Flood Risk Assessment



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THE DROVES
SOLAR FARM

RAINCLOUD

🟥	Order Limits / Core Study Area
▨	Work No. 1: Solar PV
🟩	Impermeable Area
🟪	Catchment

1:25,000 Scale @ A3

0 0.5 1 km

N

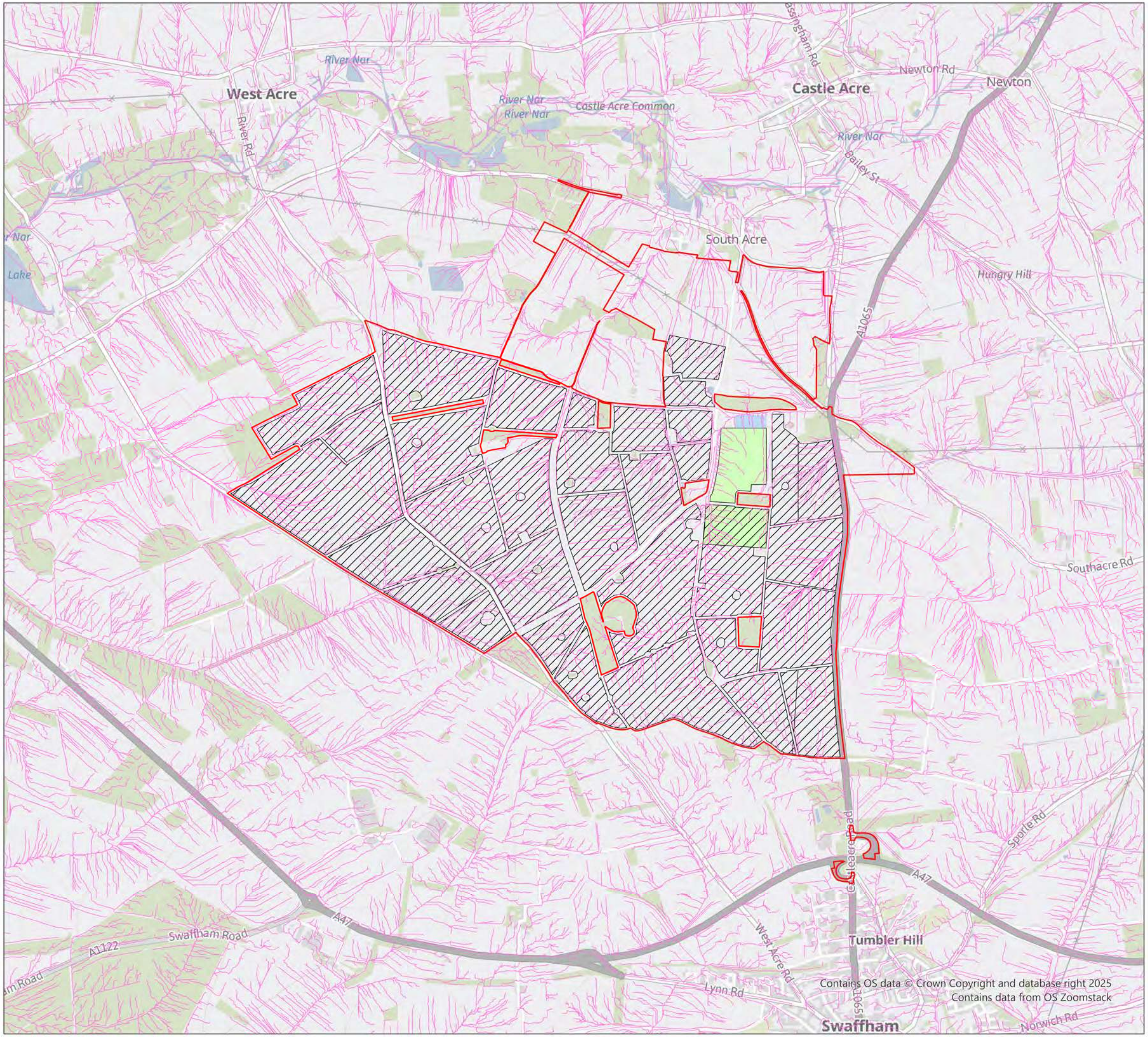
Ref: 083-SWD-001A

Date: 01/10/2025

Contributing Catchments and Impermeable Areas

Figure A12-1-12

The Droves Solar Farm Flood Risk Assessment



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THE DROVES
SOLAR FARM

RAINCLOUD

🟥	Order Limits / Core Study Area
▨	Work No. 1: Solar PV
🟩	Impermeable Area
🟦	Proposed Attenuation Basin Area
—	Flow Pathway

1:25,000 Scale @ A3

0 0.5 1 km

N

Ref: 083-SWD-002A

Date: 01/10/2025

Exceedance Pathways

Figure A12-1-13

The Droves Solar Farm Flood Risk Assessment

Annex F: 2D Modelling Report

The Droves Solar Farm

Environmental Statement (ES)
Volume 4, Annex F: Pluvial Flood Modelling Report

Date: November 2025

Planning Inspectorate Reference: EN0110013
Document Reference: APP/6.4
APFP Regulation 5(2)(a)

Issue Sheet

Report Prepared for: The Droves Solar Farm Limited.
DCO Submission

Appendix F - Pluvial Flood Modelling Report

Prepared by: Raincloud Consulting			
Approved by: Island Green Power			
Revision	Date	Technical lead (Initials):	Approved by (Initials):
Final v 0.1	19/10/2025	LN	HS

List of Contents

List of Tables

List of Appendices

12 Modelling Report

12.1 Introduction

12.1.1 This technical note presents the results of the hydraulic modelling carried out to verify pluvial flood depths and flow routes within the River Nar catchment.

12.1.2 The hydraulic modelling has been calculated using the direct rainfall method (DRM) 2D pluvial flood modelling in Flood Modeller Pro.

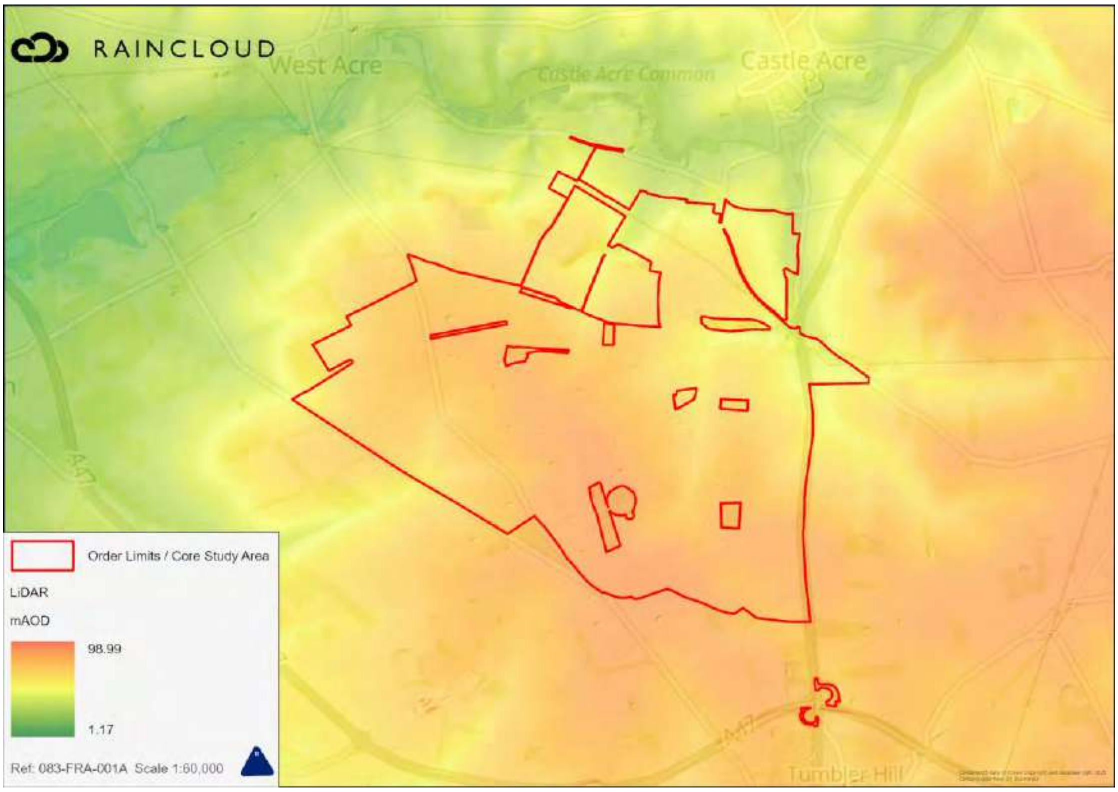
12.2 Study Area

Site Inspections/Topography

12.2.1 Site walkovers were initially taken on 1st October 2024. An additional walkover was undertaken in September 2025 to verify the results of the 2D rainfall modelling as part of the **ES Appendix 12.2: Flood Risk Assessment** [**APP/6.4**].

12.2.2 1 metre (m) resolution Lidar data shows that land within the CSA is generally gently sloping, with elevations from 37 m above ordnance datum (AOD) in the south to 85 m AOD in the northeast, as shown in Figure B12-1-1.

Plate B12-1-1: Topography within CSA



Watercourses

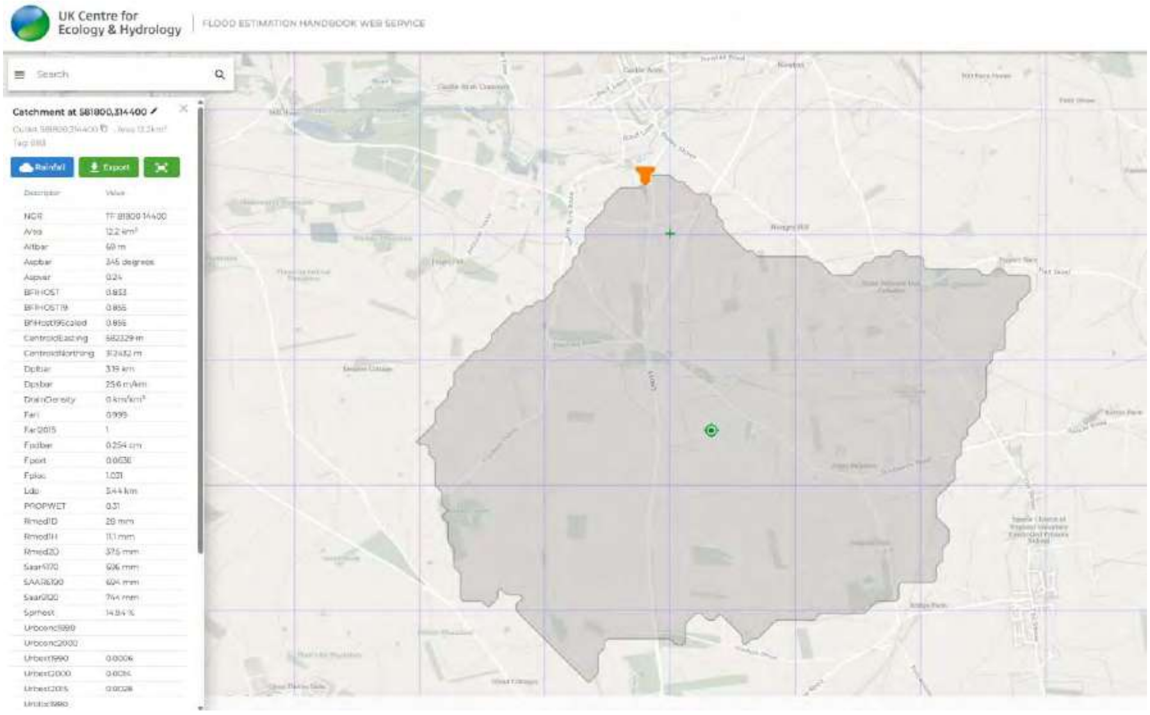
12.2.3 The Core and Wider Study Areas are located within the primary catchment of the River Nar, which is located approximately 540 m north of the CSA at its nearest point.

12.2.4 An unnamed tributary of the River Nar is located to the east of Southacre Road in the eastern section of the CSA. There is a topographical rise of 5 m from the southern bank of the unnamed watercourse to the proposed access point to the Scheme.

Catchment

12.2.5 The River Nar catchment extent ('the Catchment'), grid reference TF818144, located southwest of South Acre, and is shown in Plate B12-1-2.

Plate B12-1-2: Catchment Extent



12.2.6 The Catchment is predominately agricultural, with a few minor roads included.

12.2.7 The total extent based on the Flood Estimation Handbook (FEH) is 12.2 km^2.

12.3 Methodology

Modelling Approach

12.3.1 A direct rainfall approach using 2D hydraulic modelling software Flood Modeller Pro (version 7.3.9316.27677) has been used.

12.3.2 Rainfall profiles (hyetographs) are derived using catchment descriptors from the FEH Web Service are used alongside ReFH2 software to generate rainfall depth duration frequency (DDF) estimates. DDF catchment descriptors are shown within Appendix 1 of this Report.

12.3.3 The rainfall events of known probability are directly applied to ground surface and routed overland to provide an indication of potential surface water depths.

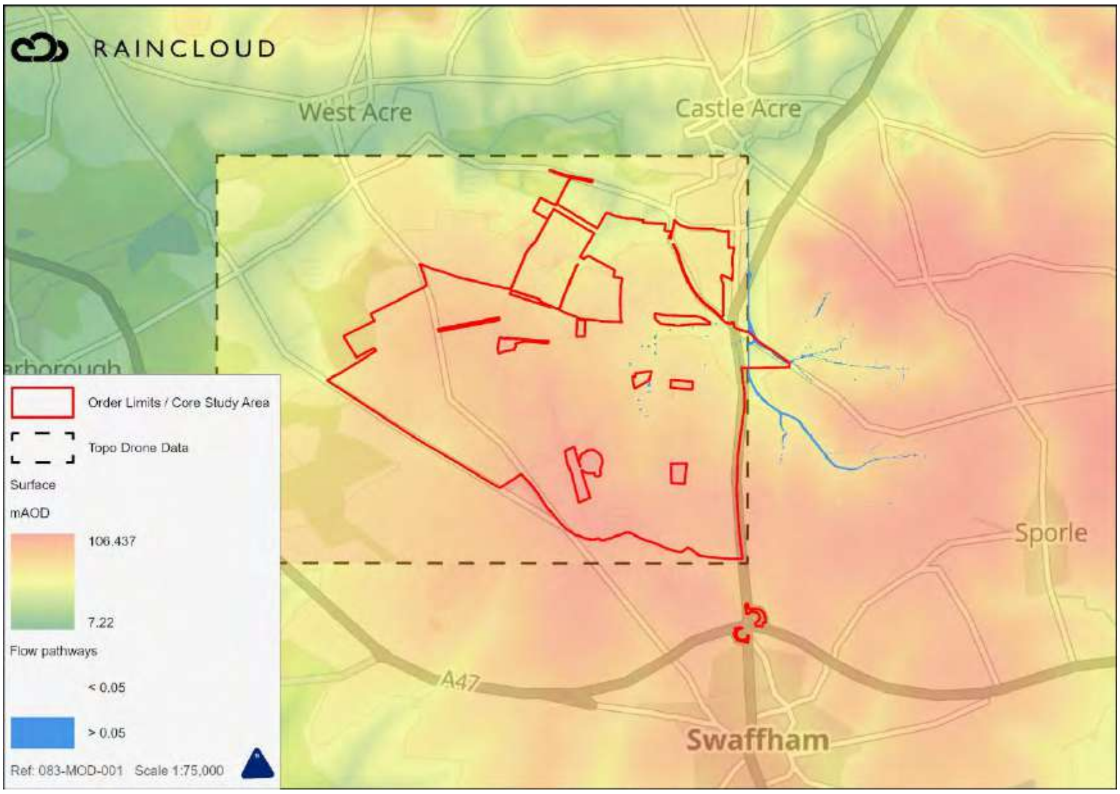
12.3.4 These depths were retrieved for a range of return periods and storm durations for both Summer and Winter storm profiles.

Topography

12.3.5 The 2022 LiDAR DTM with a horizontal resolution of 1m was retrieved from the Environmental Agency open source web portal. A 2m grid resolution was used in the model.

12.3.6 Topographical levels have been obtained from a drone survey for Site and was merged with the LiDAR from outside of the Site boundary. Resolution of the topographical drone data does not provide a sufficiently accurate topographical base for modelling fine details including flow pathways compared to the LiDAR data and leads to an underrepresentation of pluvial flooding within the Site, as shown in Plate B12-1-3.

Plate B12-1-3: Flow pathways with Topographical drone data and LiDAR



12.3.7 Flow pathways obtained using LiDAR are at a higher resolution than pathways obtained using the topographical data, and therefore topographical data derived from drone survey has been discounted for flood modelling.

12.3.8 LiDAR data levels were spot checked against drone derived topographical levels in open fields. A good correlation was found between LiDAR and topographical data values. As such, LiDAR data was used as the surface layer for flood modelling.

Mesh Modifications

12.3.9 Surface roughness values were determined by industry standard methods (Chow, 1959).

12.3.10 A default global Manning's n roughness of 0.035 was initially applied to the whole catchment, representing mature row crops[1].

12.3.11 The OS MasterMap land use data identifies roads. buildings, and woodlands. The height of these layers are adjusted above or below LiDAR elevation within the model and are shown within Table B12-1-1.

Table B12-1-1: Land use data and LiDAR elevation

Land Cover	Height Adjusted (m)
Roads	- 0.01
Buildings	+ 2.0
Woodland	+ 0.1

Structures

12.3.12 There are no structures, such as river culverts, embankments and flow controls that have been incorporated into the model.

12.4 Rainfall Analysis

Rainfall Zone

12.4.1 The Rainfall Zone relates to the area where rainfall is applied to the 2D domain and was chosen to reflect the EA pluvial pathways and depths which could impact the placement or function of electrically sensitive infrastructure of the Scheme. The Rainfall Zone is shown in Plate B12-1-4.

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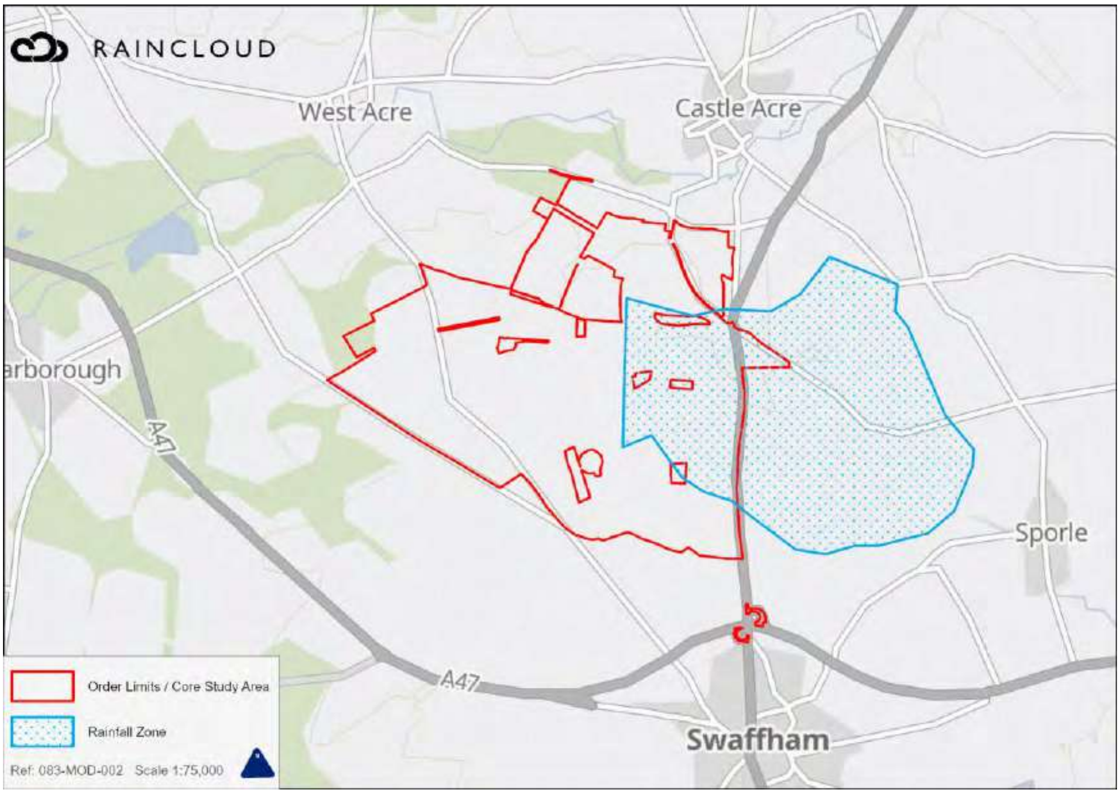
[1] Manning's n for Channels (Chow, 1959)

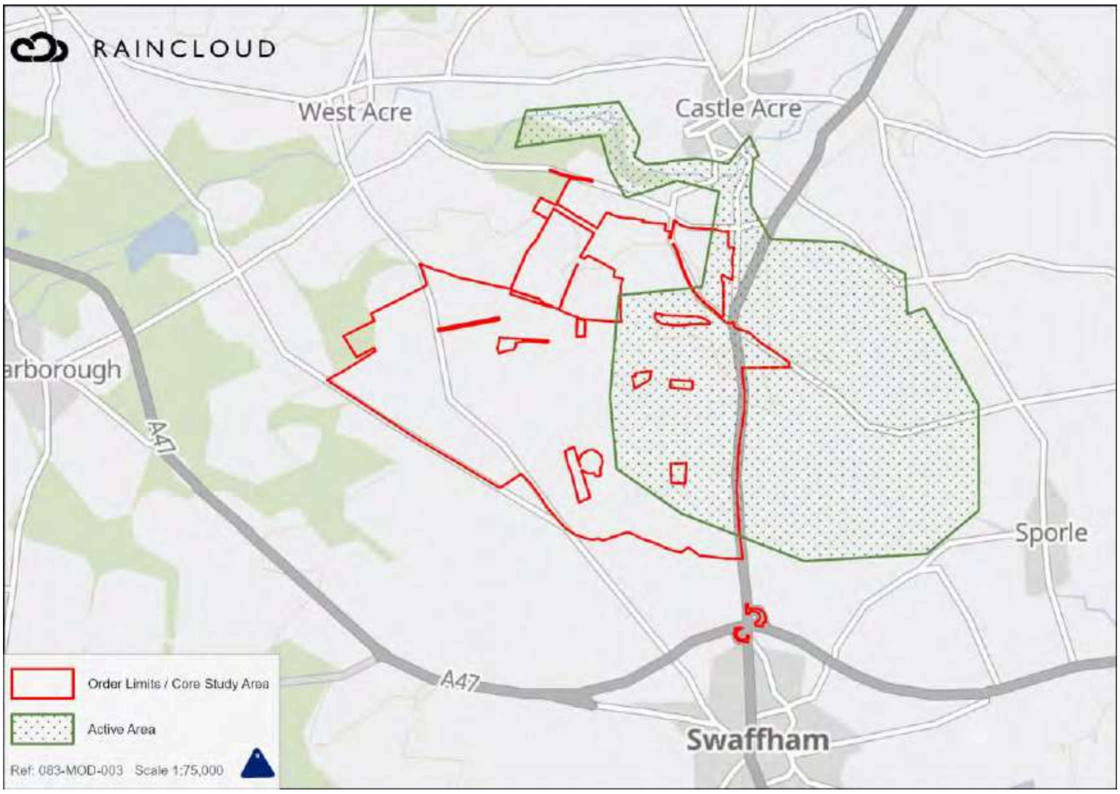
Plate B12-1-4: Rainfall Zone



Active Area

12.4.2 Plate B12-1-5 shows the features of the 2D domain used to represent the pluvial flood plain and its structures. The extent of the 2D domain was adjusted during the model stages of the modelling, with the active area set to allow flood waters in the modelled events flow unimpeded through the model and not ‘glasswall’.

Plate B12-1-5: Active Area



Climate Change Allowances

12.4.3 The latest climate change allowances for peak rainfall were applied to the rainfall hyetographs input. Table B12-1-2 shows the Environment Agency climate change allowances for peak rainfall intensity for North West Norfolk Management Catchment[2].

Table B12-1-2: Climate Change Peak Rainfall Intensities - DEFRA

Allowance	Total Potential Anticipated Change for the 2050's	Total Potential Anticipated Change for the 2070's
Central	20%	25%
Upper End Allowance	40%	40%

12.4.4 North West Norfolk Management Catchment peak rainfall Central Allowance of 25% for the 2070 epoch was initially +used to assess pluvial flooding.

---

[2] https://environment-test.data.gov.uk/hydrology/climate-change-allowances/rainfall?mgmtcatid=3065

12.4.5 However, there is the potential that some elements of the Scheme, such as the National Grid Substation which may remain operational beyond the proposed design life of 60 years, and therefore an uplift of 40% to the rainfall within the direct rainfall modelling is applied.

12.4.6 Therefore, the Central Allowance and the Upper End Allowance for the 2070's epoch have been applied to the direct rainfall hyetographs for the 1% AEP event.

Return Periods

12.4.7 Hyetographs for the following rainfall events were generated:

- 3.33% AEP
- 1% AEP
- 1% AEP plus 25 % CC; and
- 1% AEP plus 40 % CC.

Storm Duration

12.4.8 The model was run for a duration of 3 hours for each event to allow surface water flows to pass through the catchment following the end of the storm.

12.4.9 The critical storm duration was the summer 3-hour storm duration as it resulted in the greatest surface water depths and therefore is used for design runs.

12.4.10 The net rainfall value from ReFH2 was applied to the model, as ReFH2 net rainfall accounts for infiltration and other hydrological processes and is deemed an appropriate methodology by the EA, as per the Flood Estimation guidelines.

12.4.11 The ReFH2 net rainfall does not account for losses to the sewer network or highways drainage network and therefore provides a worst-case scenario to the Site.

12.5 Model Results

12.5.1 Outputs from Flood Modeller Pro are presented as mapped pluvial flood extents and depths in Appendix 2. Flood depths below 0.05 m have been filtered in accordance with Section 7.3 Depths of the EA's What is the Risk of Flooding from Surface Water map? Report (version 2.0 April 2019) document.

Model Health

12.5.2 The model simulation log files show that peak and final mass error is less than 0.01% for all events. The log files are shown in Plate B12-1-6.

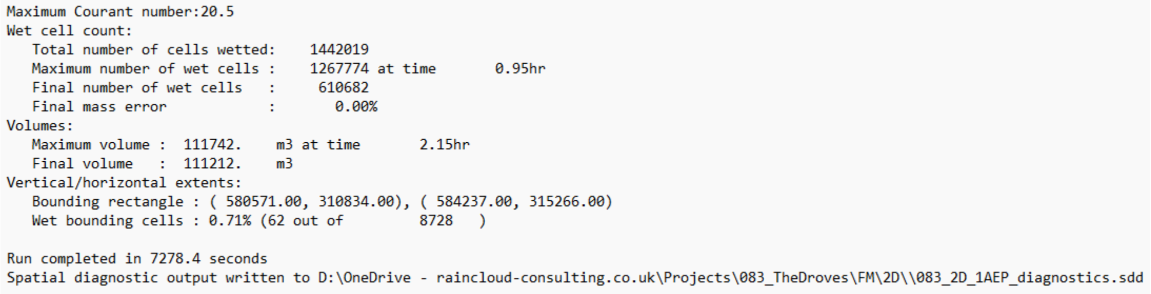
12.6 Model Proving

Run performance

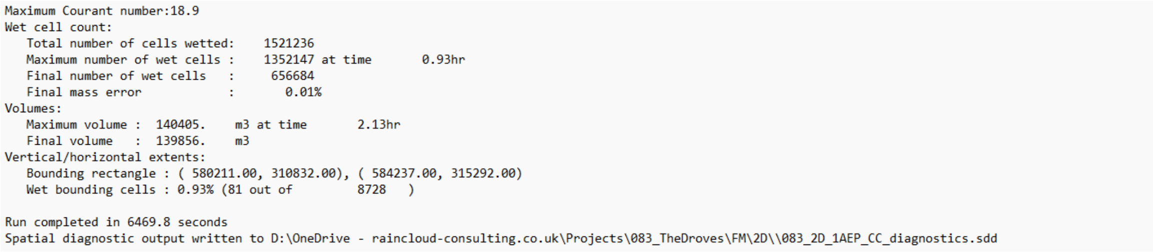
The time step used was set at 1 second.

The total mass error is within +/-1.0% for all model runs undertaken, as demonstrated in Plate B12-1-6.

Plate B12-1-6: Mass error for 1% AEP and 1 % AEP + 25% climate change run



```
Maximum Courant number:20.5
Wet cell count:
   Total number of cells wetted:    1442019
   Maximum number of wet cells :    1267774 at time       0.95hr
   Final number of wet cells   :     610682
   Final mass error            :       0.00%
Volumes:
   Maximum volume :  111742.    m3 at time       2.15hr
   Final volume   :  111212.    m3
Vertical/horizontal extents:
   Bounding rectangle : ( 580571.00, 310834.00), ( 584237.00, 315266.00)
   Wet bounding cells : 0.71% (62 out of         8728   )

Run completed in 7278.4 seconds
Spatial diagnostic output written to D:\OneDrive - raincloud-consulting.co.uk\Projects\083_TheDroves\FM\2D\\083_2D_1AEP_diagnostics.sdd
```



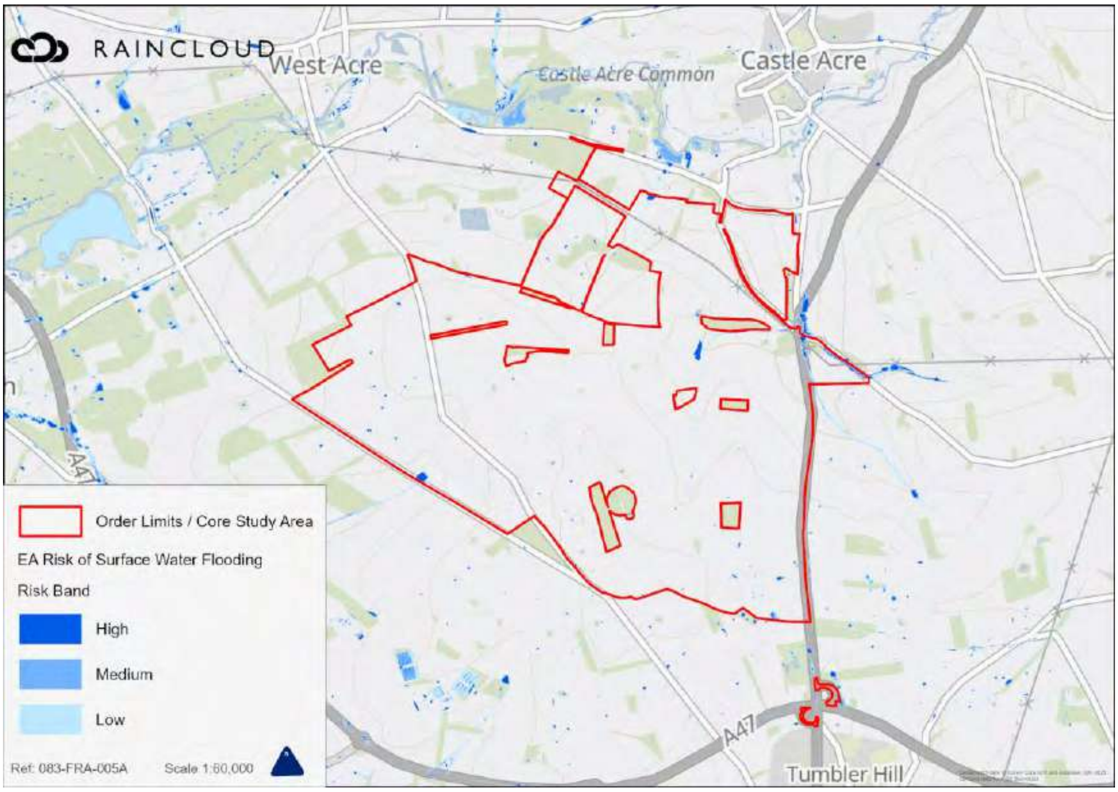
```
Maximum Courant number:18.9
Wet cell count:
   Total number of cells wetted:    1521236
   Maximum number of wet cells :    1352147 at time       0.93hr
   Final number of wet cells   :     656684
   Final mass error            :       0.01%
Volumes:
   Maximum volume :  140405.    m3 at time       2.13hr
   Final volume   :  139856.    m3
Vertical/horizontal extents:
   Bounding rectangle : ( 580211.00, 310832.00), ( 584237.00, 315292.00)
   Wet bounding cells : 0.93% (81 out of         8728   )

Run completed in 6469.8 seconds
Spatial diagnostic output written to D:\OneDrive - raincloud-consulting.co.uk\Projects\083_TheDroves\FM\2D\\083_2D_1AEP_CC_diagnostics.sdd
```

Calibration and Validation

12.6.1 There is no river (flow or level) gauge situated within an appropriate distance of this location to provide calibration data.

12.6.2 Flood extents generated for this study are similar to those shown on the Environment Agency RoFSW for the 1% AEP event, suggesting the use of ‘Net Rainfall’ hyetographs and losses included within the ReFH2 model represents the catchment well. The comparison can be seen from Plate B12-1-7.

Figure B12-1-7: EA RoSWF 2025 Flood Extents



Modelling Assumptions

12.6.3 The representation of any complex system by a model requires a number of assumptions to be made:

- LiDAR is representative of the land surface and no errors have been introduced through the filtering algorithms
- ReFH design rainfall inflows accurately represent rainfall for a given return period storm event
- OS MasterMap is an accurate representation of ground cover; and
- Where roughness zones have not been implemented, a Manning’s n value of 0.035 is representative.

Limitations

12.6.4 Whilst the accuracy of a hydraulic model depends largely on the accuracy of the hydrological, topographical and structural data some assumptions and uncertainty can be introduced as part of the modelling process. These could include:

- Estimates of model parameters such as roughness, structure coefficients and percentage runoffs are representative; and
- Decisions made during model proving.

12.6.5 Calibration events were not available, as such the model was calibrated against the EA RoFSW data which has its own limitations. In the absence of historical event data this was deemed the most appropriate option.

12.6.6 No 1D structures were included within the model. The purpose of the modelling is to compare the existing Site scenario to the Scheme scenario, focusing on the Sites runoff and not structures within the model domain therefore it was deemed not applicable to implement into the model setup. No structure data was available at the time of modelling. In addition, the model does not account for the sewer system.

12.6.7 Surface water flood model representing solar farm do not include the solar panels within the model as it is not possible to do so within a 2D domain. It is recognised that solar panels are not impermeable and therefore can be excluded from the model and the solar panel underlying conditions should be represented to provide the most accurate modelling.

12.7 Conclusions

12.7.1 The pluvial flood modelling undertaken demonstrates that the use of high-resolution LiDAR data provides more credible results compared to lower resolution topographical drone data.

12.7.2 The model was applied to a range of design storm events, with hyetographs generated for the 3.33% AEP, 1% AEP, and 1% AEP plus climate change events.

12.7.3 The resulting flood extents for the 1% AEP event show good agreement with the EA's RoFSW mapping, providing confidence in the model outputs.

Appendix 1: FEH Catchment Descriptors

UK Design Flood Estimation

Generated on Wednesday, July 30, 2025 2:48:32 PM by CharlieHadden
Printed from the ReFH2 Flood Modelling software package, version 4.1.8879.22310

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details

Checksum: 1527-2A6A

Site name: FEH_Catchment_Descriptors_581800_314400_v5_0_1

Easting: 581800

Northing: 314400

Country: England, Wales or Northern Ireland

Catchment Area (km²): 12.2

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 100 year 1.25 CC

Summary of results

Rainfall - FEH22 (mm):	75.96	Total runoff (ML):	49.10
Total Rainfall (mm):	70.00	Total flow (ML):	129.56
Peak Rainfall (mm):	47.41	Peak flow (m³/s):	1.80

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:00:00 [09:00:00]	Yes
Timestep (hh:mm:ss)	01:00:00	No
SCF (Seasonal correction factor)	0.98	No
ARF (Areal reduction factor)	0.94	No
Seasonality	Summer [Winter]	Yes
Climate change factor	1.25	Yes

Loss model parameters

Name	Value	User-defined?
Cini (mm)	24.61	No
Cmax (mm)	1047.37	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	5.21	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0.01	No
BL (hr)	73.12	No
BR	3.34	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0.03	No
Effective URBEXT2000	0	n/a
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	11.2952	0.0000	0.3330	0.0000	0.014	0.014
01:00:00	47.4141	0.0000	2.7261	0.0138	0.0142	0.0279
02:00:00	11.2952	0.0000	0.9658	0.1530	0.0177	0.171
03:00:00	0.0000	0.0000	0.0000	0.4434	0.0306	0.474
04:00:00	0.0000	0.0000	0.0000	0.7733	0.0572	0.831
05:00:00	0.0000	0.0000	0.0000	1.1022	0.0981	1.2
06:00:00	0.0000	0.0000	0.0000	1.4128	0.153	1.57
07:00:00	0.0000	0.0000	0.0000	1.5827	0.218	1.8
08:00:00	0.0000	0.0000	0.0000	1.4818	0.283	1.77
09:00:00	0.0000	0.0000	0.0000	1.2917	0.342	1.63
10:00:00	0.0000	0.0000	0.0000	1.1000	0.391	1.49
11:00:00	0.0000	0.0000	0.0000	0.9106	0.431	1.34
12:00:00	0.0000	0.0000	0.0000	0.7398	0.462	1.2
13:00:00	0.0000	0.0000	0.0000	0.6269	0.487	1.11
14:00:00	0.0000	0.0000	0.0000	0.5389	0.506	1.05
15:00:00	0.0000	0.0000	0.0000	0.4533	0.522	0.975
16:00:00	0.0000	0.0000	0.0000	0.3684	0.533	0.902
17:00:00	0.0000	0.0000	0.0000	0.2844	0.541	0.825
18:00:00	0.0000	0.0000	0.0000	0.2005	0.545	0.745
19:00:00	0.0000	0.0000	0.0000	0.1168	0.544	0.661
20:00:00	0.0000	0.0000	0.0000	0.0400	0.54	0.581
21:00:00	0.0000	0.0000	0.0000	0.0054	0.534	0.54
22:00:00	0.0000	0.0000	0.0000	0.0000	0.527	0.527
23:00:00	0.0000	0.0000	0.0000	0.0000	0.52	0.52
24:00:00	0.0000	0.0000	0.0000	0.0000	0.513	0.513
25:00:00	0.0000	0.0000	0.0000	0.0000	0.506	0.506
26:00:00	0.0000	0.0000	0.0000	0.0000	0.499	0.499
27:00:00	0.0000	0.0000	0.0000	0.0000	0.492	0.492
28:00:00	0.0000	0.0000	0.0000	0.0000	0.486	0.486
29:00:00	0.0000	0.0000	0.0000	0.0000	0.479	0.479
30:00:00	0.0000	0.0000	0.0000	0.0000	0.472	0.472
31:00:00	0.0000	0.0000	0.0000	0.0000	0.466	0.466
32:00:00	0.0000	0.0000	0.0000	0.0000	0.46	0.46
33:00:00	0.0000	0.0000	0.0000	0.0000	0.453	0.453

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
34:00:00	0.0000	0.0000	0.0000	0.0000	0.447	0.447
35:00:00	0.0000	0.0000	0.0000	0.0000	0.441	0.441
36:00:00	0.0000	0.0000	0.0000	0.0000	0.435	0.435
37:00:00	0.0000	0.0000	0.0000	0.0000	0.429	0.429
38:00:00	0.0000	0.0000	0.0000	0.0000	0.423	0.423
39:00:00	0.0000	0.0000	0.0000	0.0000	0.418	0.418
40:00:00	0.0000	0.0000	0.0000	0.0000	0.412	0.412
41:00:00	0.0000	0.0000	0.0000	0.0000	0.406	0.406
42:00:00	0.0000	0.0000	0.0000	0.0000	0.401	0.401
43:00:00	0.0000	0.0000	0.0000	0.0000	0.395	0.395
44:00:00	0.0000	0.0000	0.0000	0.0000	0.39	0.39
45:00:00	0.0000	0.0000	0.0000	0.0000	0.385	0.385
46:00:00	0.0000	0.0000	0.0000	0.0000	0.38	0.38
47:00:00	0.0000	0.0000	0.0000	0.0000	0.374	0.374
48:00:00	0.0000	0.0000	0.0000	0.0000	0.369	0.369
49:00:00	0.0000	0.0000	0.0000	0.0000	0.364	0.364
50:00:00	0.0000	0.0000	0.0000	0.0000	0.359	0.359
51:00:00	0.0000	0.0000	0.0000	0.0000	0.354	0.354
52:00:00	0.0000	0.0000	0.0000	0.0000	0.35	0.35
53:00:00	0.0000	0.0000	0.0000	0.0000	0.345	0.345
54:00:00	0.0000	0.0000	0.0000	0.0000	0.34	0.34
55:00:00	0.0000	0.0000	0.0000	0.0000	0.336	0.336
56:00:00	0.0000	0.0000	0.0000	0.0000	0.331	0.331
57:00:00	0.0000	0.0000	0.0000	0.0000	0.327	0.327

Appendix

Catchment descriptors

Name	Value	User-defined value used?
Area (km^2)	12.2	No
ALTBAR	69	No
ASPBAR	345	No
ASPVAR	0.24	No
BFIHOST	0.83	No
BFIHOST19	0.86	No
DPLBAR (km)	3.19	No
DPSBAR (mkm^{-1})	25.6	No
FARL	1	No
LDP	5.44	No
PROPWET	0.31	No
RMED1H	11.1	No
RMED1D	28	No
RMED2D	37.5	No
SAAR (mm)	694	No
SAAR4170 (mm)	696	No
SPRHOST	14.94	No
URBEXT2000	0	No
URBEXT1990	0	No
URBCONC	0	No
URBLOC	0	No
DDF parameter C	-0.02	No
DDF parameter D1	0.28	No
DDF parameter D2	0.34	No
DDF parameter D3	0.29	No
DDF parameter E	0.31	No
DDF parameter F	2.47	No
DDF parameter C (1km grid value)	-0.02	No
DDF parameter D1 (1km grid value)	0.28	No
DDF parameter D2 (1km grid value)	0.32	No
DDF parameter D3 (1km grid value)	0.31	No
DDF parameter E (1km grid value)	0.31	No
DDF parameter F (1km grid value)	2.47	No

UK Design Flood Estimation

Generated on Wednesday, July 30, 2025 2:47:43 PM by CharlieHadden
Printed from the ReFH2 Flood Modelling software package, version 4.1.8879.22310

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 1527-2A6A

Site name: FEH_Catchment_Descriptors_581800_314400_v5_0_1

Easting: 581800

Northing: 314400

Country: England, Wales or Northern Ireland

Catchment Area (km²): 12.2

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 100 year 1.4 CC

Summary of results

Rainfall - FEH22 (mm):	85.07	Total runoff (ML):	58.83
Total Rainfall (mm):	78.41	Total flow (ML):	154.88
Peak Rainfall (mm):	53.10	Peak flow (m³/s):	2.15

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:00:00 [09:00:00]	Yes
Timestep (hh:mm:ss)	01:00:00	No
SCF (Seasonal correction factor)	0.98	No
ARF (Areal reduction factor)	0.94	No
Seasonality	Summer [Winter]	Yes
Climate change factor	1.40	Yes

Loss model parameters

Name	Value	User-defined?
Cini (mm)	24.61	No
Cmax (mm)	1047.37	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	5.21	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0.01	No
BL (hr)	73.12	No
BR	3.34	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m^3/s)	0	No
Exporting drained area (km^2)	0	No
Urban area (km^2)	0.03	No
Effective URBEXT2000	0	n/a
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	12.6507	0.0000	0.3812	0.0000	0.014	0.014
01:00:00	53.1038	0.0000	3.2660	0.0157	0.0142	0.0299
02:00:00	12.6507	0.0000	1.1749	0.1810	0.0184	0.199
03:00:00	0.0000	0.0000	0.0000	0.5280	0.0339	0.562
04:00:00	0.0000	0.0000	0.0000	0.9231	0.0656	0.989
05:00:00	0.0000	0.0000	0.0000	1.3170	0.115	1.43
06:00:00	0.0000	0.0000	0.0000	1.6900	0.18	1.87
07:00:00	0.0000	0.0000	0.0000	1.8961	0.258	2.15
08:00:00	0.0000	0.0000	0.0000	1.7770	0.337	2.11
09:00:00	0.0000	0.0000	0.0000	1.5494	0.407	1.96
10:00:00	0.0000	0.0000	0.0000	1.3198	0.466	1.79
11:00:00	0.0000	0.0000	0.0000	1.0928	0.514	1.61
12:00:00	0.0000	0.0000	0.0000	0.8877	0.551	1.44
13:00:00	0.0000	0.0000	0.0000	0.7520	0.581	1.33
14:00:00	0.0000	0.0000	0.0000	0.6467	0.604	1.25
15:00:00	0.0000	0.0000	0.0000	0.5442	0.623	1.17
16:00:00	0.0000	0.0000	0.0000	0.4425	0.637	1.08
17:00:00	0.0000	0.0000	0.0000	0.3417	0.646	0.988
18:00:00	0.0000	0.0000	0.0000	0.2411	0.651	0.892
19:00:00	0.0000	0.0000	0.0000	0.1408	0.65	0.791
20:00:00	0.0000	0.0000	0.0000	0.0485	0.646	0.694
21:00:00	0.0000	0.0000	0.0000	0.0066	0.638	0.645
22:00:00	0.0000	0.0000	0.0000	0.0000	0.63	0.63
23:00:00	0.0000	0.0000	0.0000	0.0000	0.621	0.621
24:00:00	0.0000	0.0000	0.0000	0.0000	0.613	0.613
25:00:00	0.0000	0.0000	0.0000	0.0000	0.605	0.605
26:00:00	0.0000	0.0000	0.0000	0.0000	0.596	0.596
27:00:00	0.0000	0.0000	0.0000	0.0000	0.588	0.588
28:00:00	0.0000	0.0000	0.0000	0.0000	0.58	0.58
29:00:00	0.0000	0.0000	0.0000	0.0000	0.572	0.572
30:00:00	0.0000	0.0000	0.0000	0.0000	0.565	0.565
31:00:00	0.0000	0.0000	0.0000	0.0000	0.557	0.557
32:00:00	0.0000	0.0000	0.0000	0.0000	0.549	0.549
33:00:00	0.0000	0.0000	0.0000	0.0000	0.542	0.542

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
34:00:00	0.0000	0.0000	0.0000	0.0000	0.535	0.535
35:00:00	0.0000	0.0000	0.0000	0.0000	0.527	0.527
36:00:00	0.0000	0.0000	0.0000	0.0000	0.52	0.52
37:00:00	0.0000	0.0000	0.0000	0.0000	0.513	0.513
38:00:00	0.0000	0.0000	0.0000	0.0000	0.506	0.506
39:00:00	0.0000	0.0000	0.0000	0.0000	0.499	0.499
40:00:00	0.0000	0.0000	0.0000	0.0000	0.492	0.492
41:00:00	0.0000	0.0000	0.0000	0.0000	0.486	0.486
42:00:00	0.0000	0.0000	0.0000	0.0000	0.479	0.479
43:00:00	0.0000	0.0000	0.0000	0.0000	0.473	0.473
44:00:00	0.0000	0.0000	0.0000	0.0000	0.466	0.466
45:00:00	0.0000	0.0000	0.0000	0.0000	0.46	0.46
46:00:00	0.0000	0.0000	0.0000	0.0000	0.454	0.454
47:00:00	0.0000	0.0000	0.0000	0.0000	0.447	0.447
48:00:00	0.0000	0.0000	0.0000	0.0000	0.441	0.441
49:00:00	0.0000	0.0000	0.0000	0.0000	0.435	0.435
50:00:00	0.0000	0.0000	0.0000	0.0000	0.429	0.429
51:00:00	0.0000	0.0000	0.0000	0.0000	0.424	0.424
52:00:00	0.0000	0.0000	0.0000	0.0000	0.418	0.418
53:00:00	0.0000	0.0000	0.0000	0.0000	0.412	0.412
54:00:00	0.0000	0.0000	0.0000	0.0000	0.407	0.407
55:00:00	0.0000	0.0000	0.0000	0.0000	0.401	0.401
56:00:00	0.0000	0.0000	0.0000	0.0000	0.396	0.396
57:00:00	0.0000	0.0000	0.0000	0.0000	0.39	0.39

Appendix

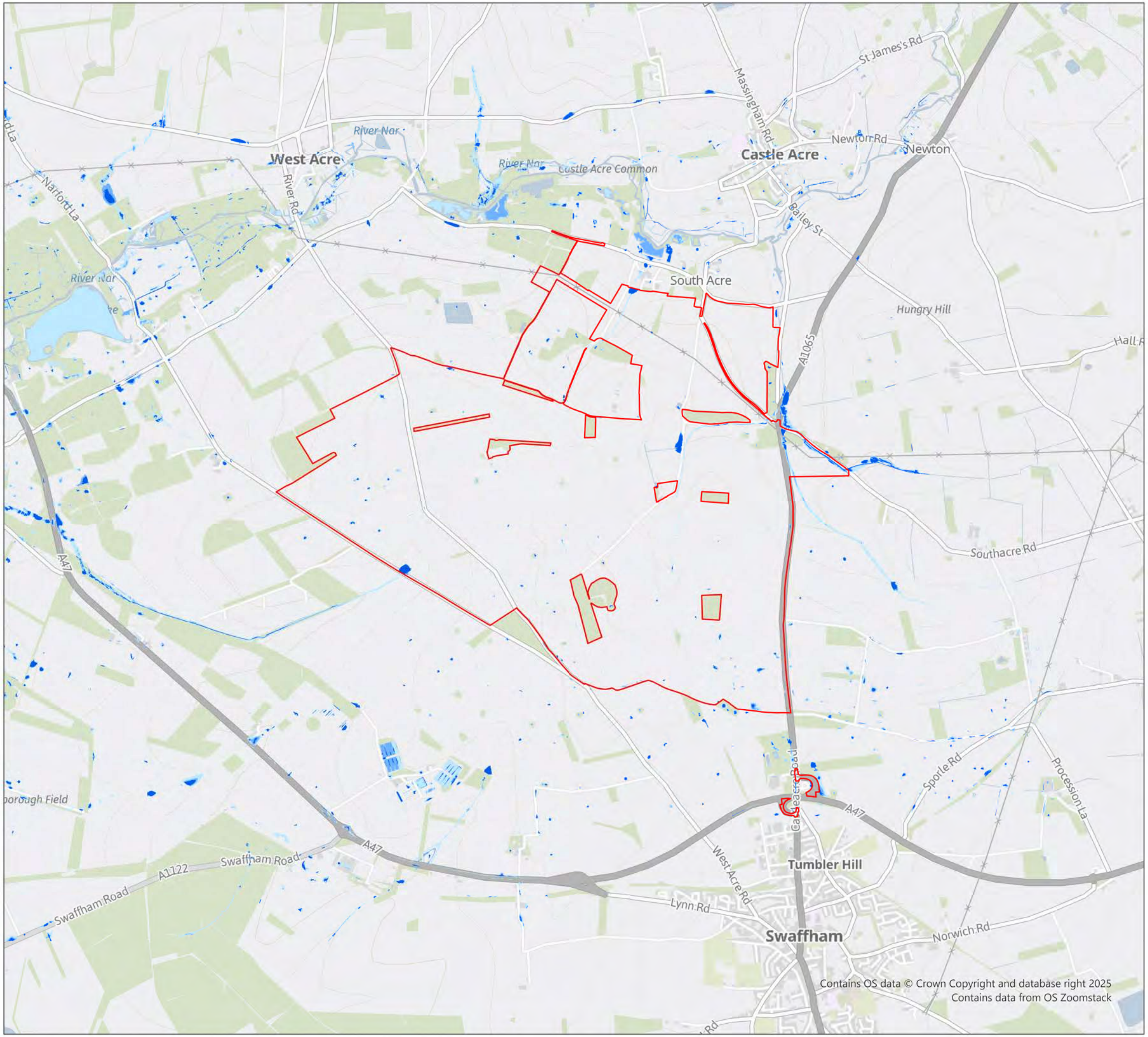
Catchment descriptors

Name	Value	User-defined value used?
Area (km^2)	12.2	No
ALTBAR	69	No
ASPBAR	345	No
ASPVAR	0.24	No
BFIHOST	0.83	No
BFIHOST19	0.86	No
DPLBAR (km)	3.19	No
DPSBAR (mkm^{-1})	25.6	No
FARL	1	No
LDP	5.44	No
PROPWET	0.31	No
RMED1H	11.1	No
RMED1D	28	No
RMED2D	37.5	No
SAAR (mm)	694	No
SAAR4170 (mm)	696	No
SPRHOST	14.94	No
URBEXT2000	0	No
URBEXT1990	0	No
URBCONC	0	No
URBLOC	0	No
DDF parameter C	-0.02	No
DDF parameter D1	0.28	No
DDF parameter D2	0.34	No
DDF parameter D3	0.29	No
DDF parameter E	0.31	No
DDF parameter F	2.47	No
DDF parameter C (1km grid value)	-0.02	No
DDF parameter D1 (1km grid value)	0.28	No
DDF parameter D2 (1km grid value)	0.32	No
DDF parameter D3 (1km grid value)	0.31	No
DDF parameter E (1km grid value)	0.31	No
DDF parameter F (1km grid value)	2.47	No

Appendix 2: Pluvial Flood Depths

THE DROVES
SOLAR FARM

RAINCLOUD



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🟥 Order Limits / Core Study Area

EA Risk of Surface Water Flooding

Risk Band

- 🟦 High
- 🟦 Medium
- 🟦 Low

1:30,000 Scale @ A3

0 0.5 1 km

N

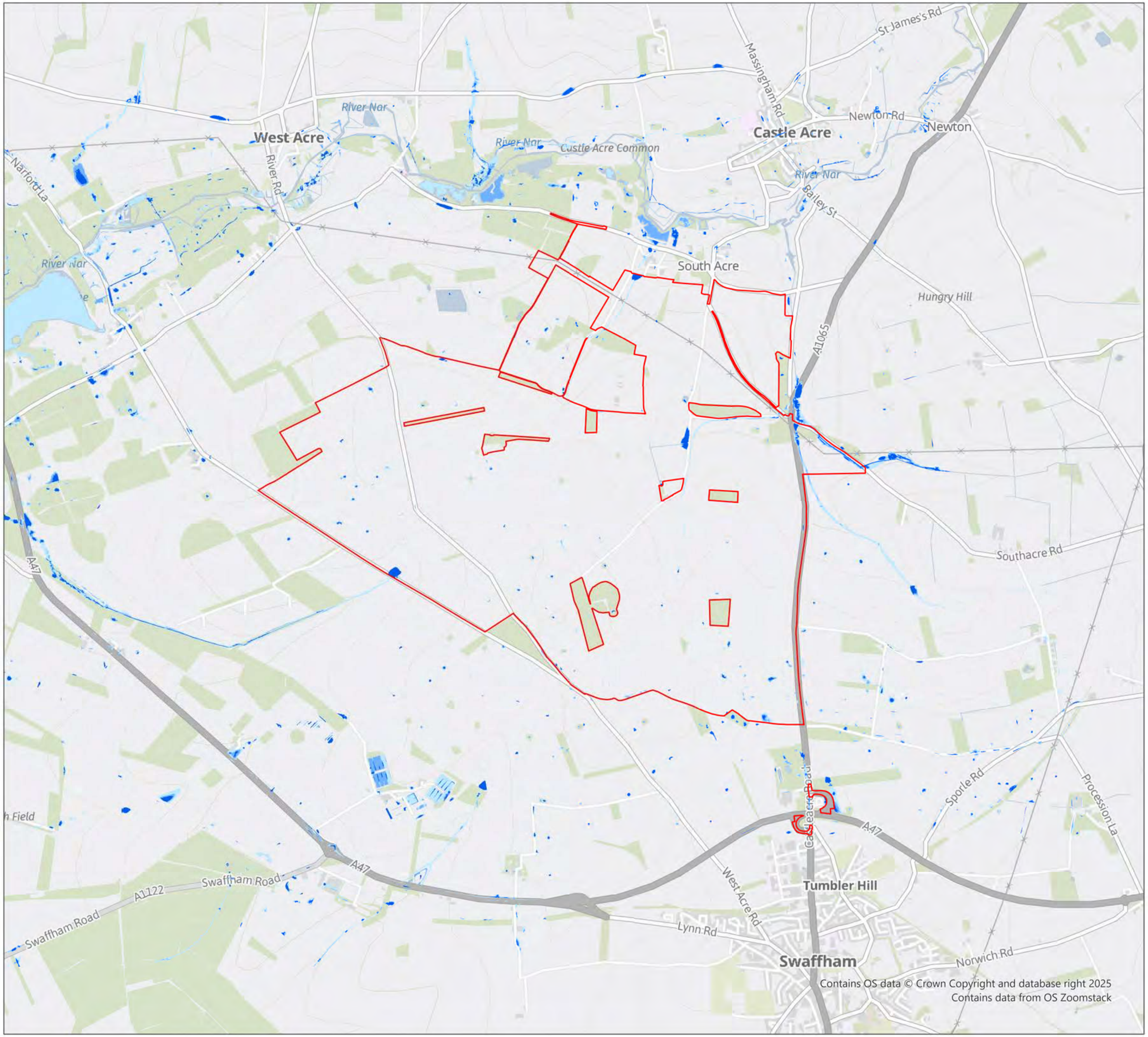
Ref: 083-FRA-005B	Date: 17/11/2025

1 % AEP Pluvial Flood Extents (EA - RoFSW 2025)
Figure A12-2-1

The Droves Solar Farm Modelling Report

THE DROVES
SOLAR FARM

RAINCLOUD



☐ Order Limits / Core Study Area

EA Risk of Surface Water Flooding

Risk Band

■ High

■ Medium

■ Low

1:28,286 Scale @ A3

0 0.5 1 km

N

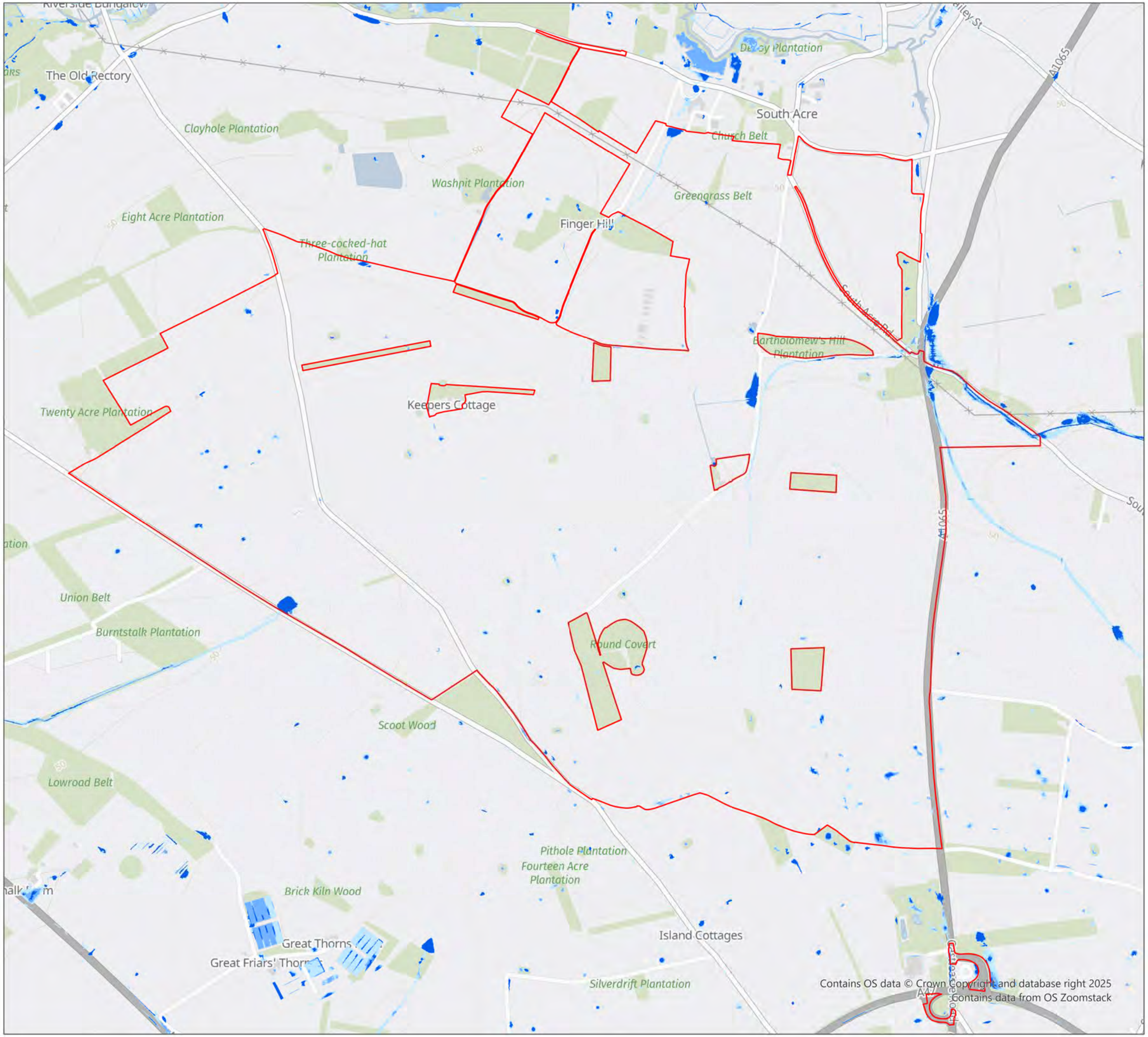
Ref: 083-FRA-005B

Date: 17/11/2025

1 % AEP Pluvial Flood Extents (EA - RoFSW 2025)

Figure A12-2-1

The Droves Solar Farm Modelling Report



THE DROVES
SOLAR FARM

RAINCLOUD

🟥 Order Limits / Core Study Area

EA Risk of Surface Water Flooding Risk Band

🟦 High

🟦 Medium

🟦 Low

1:17,679 Scale @ A3

0 0.3 0.6 km

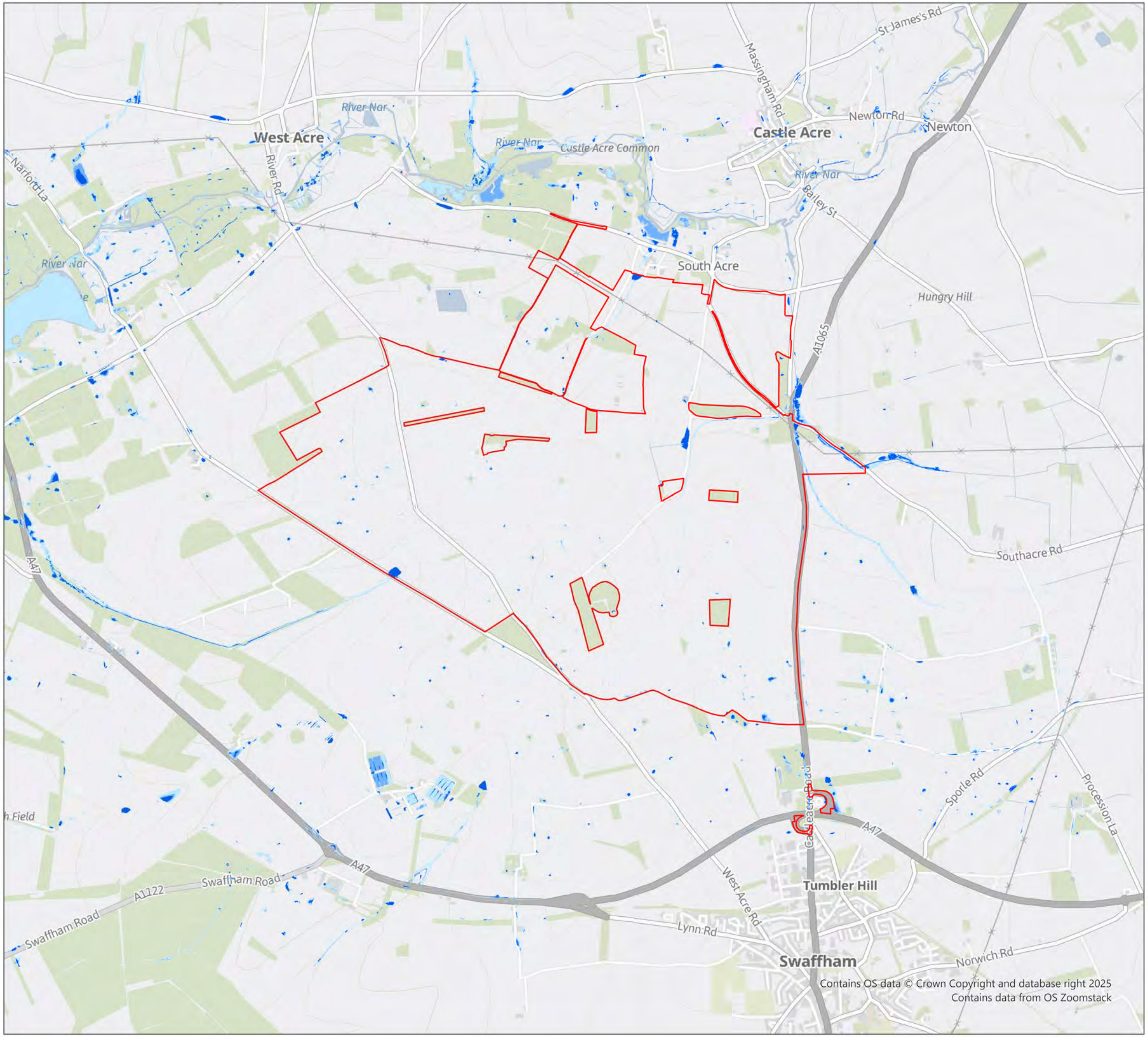
N

Ref: 083-FRA-005B

Date: 17/11/2025

1 % AEP Pluvial Flood Extents (EA - RoFSW 2025)
Figure A12-2-1

The Droves Solar Farm Modelling Report



THE DROVES
SOLAR FARM

RAINCLOUD

▭ Order Limits / Core Study Area

EA Risk of Surface Water Flooding

Risk Band

🟦 High

🟦 Medium

🟦 Low

1:28,286 Scale @ A3

0 0.5 1 km

N

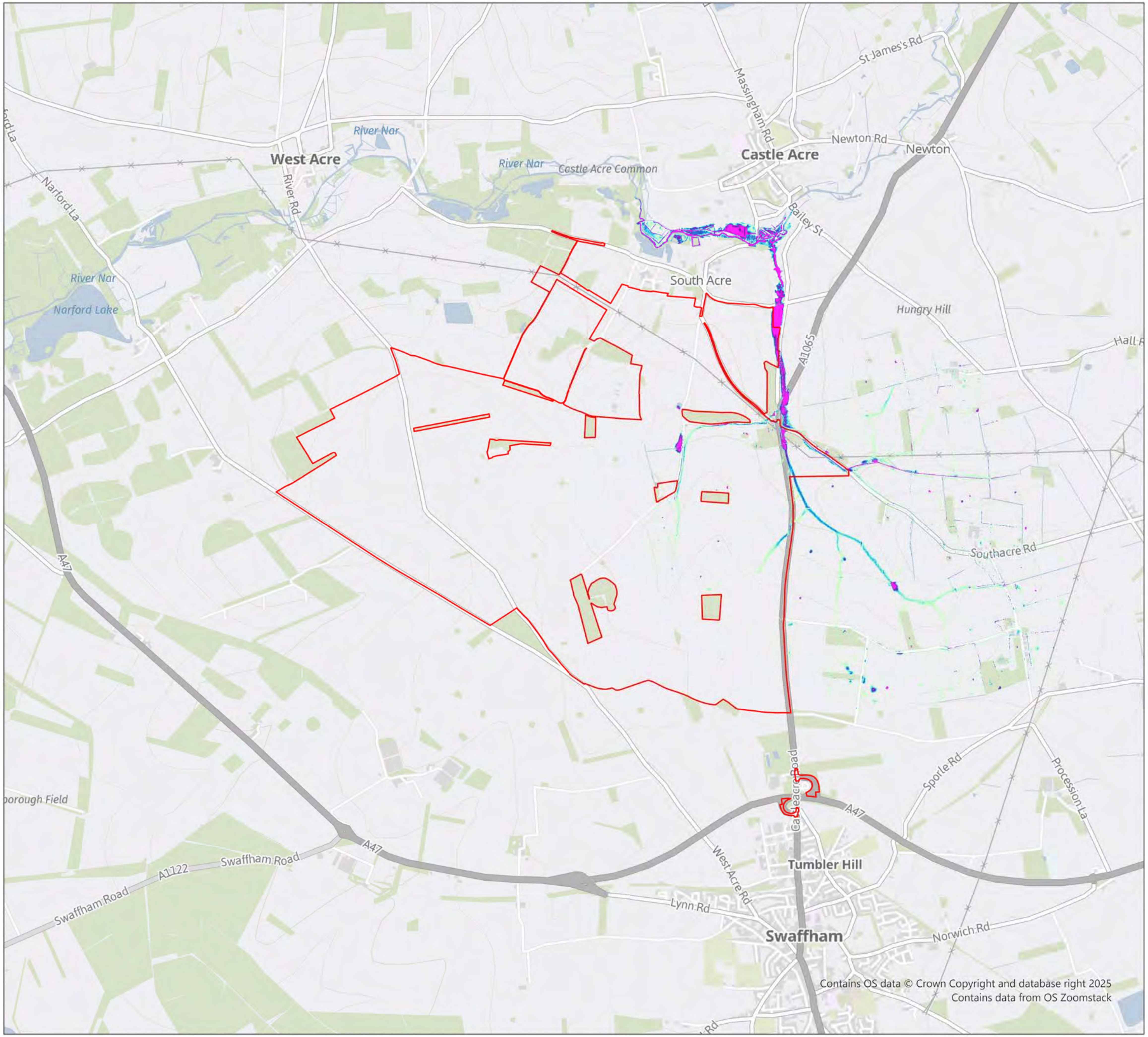
Ref: 083-FRA-005B

Date: 17/11/2025

1 % AEP Pluvial Flood Extents (EA - RoFSW 2025)

Figure A12-2-1

The Droves Solar Farm Modelling Report



THE DROVES
SOLAR FARM

RAINCLOUD

🟥 Order Limits / Core Study Area

1 % AEP - Raincloud Model

Depth (m)

	0 - 0.05
🟩	0.051 - 0.10
🟦	0.101 - 0.15
🟦	0.151 - 0.20
🟦	0.201 - 0.25
🟦	0.251 - 0.30
🟪	0.301 - 0.35
🟪	0.351 - 0.40
🟪	0.401 - 0.45
🟪	> 0.45

1:30,000 Scale @ A3

0 0.5 1 km

N

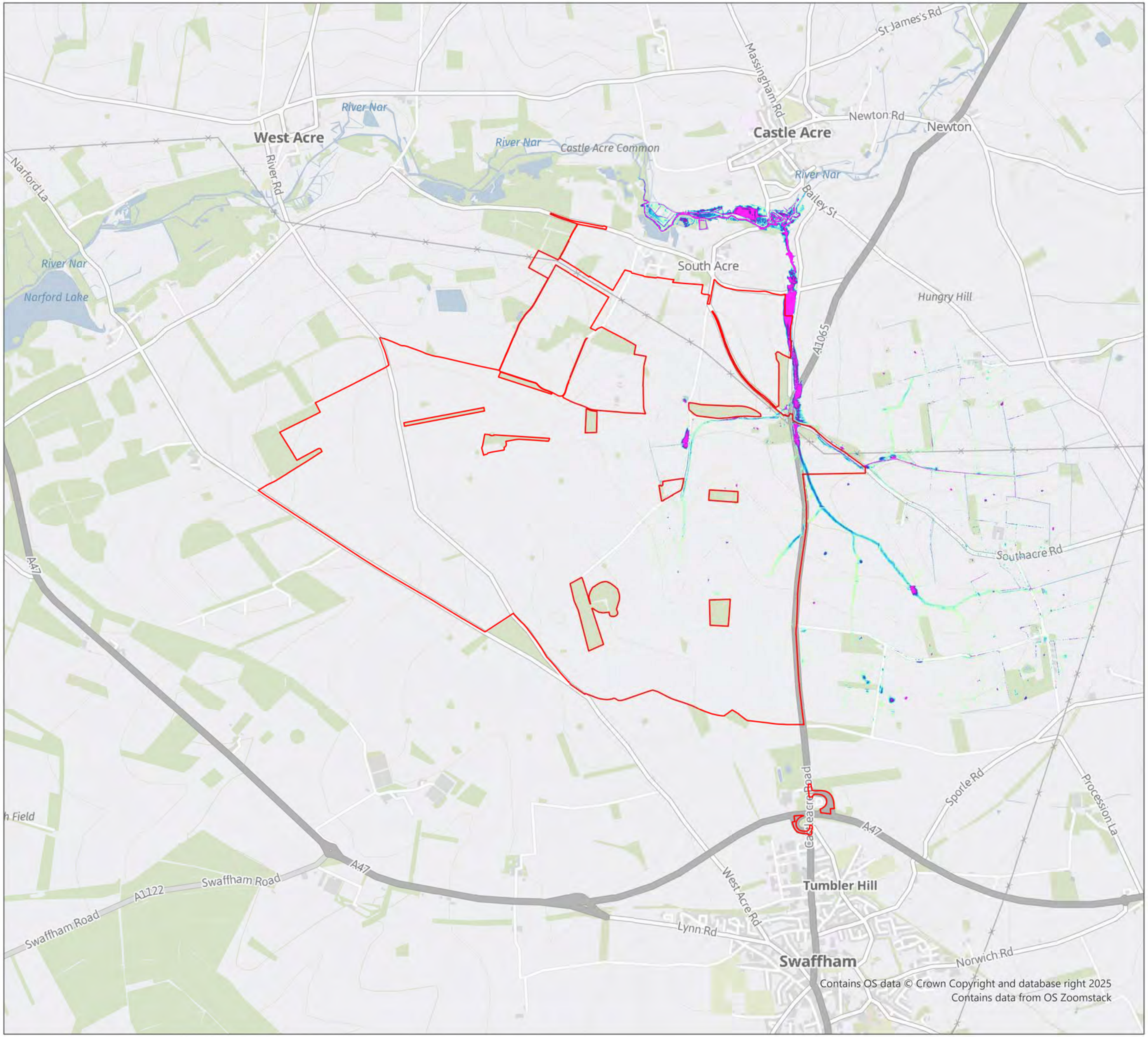
Ref: 083-FRA-006B

Date: 17/11/2025

1 % AEP Flood Depths - Raincloud 2D Modelling

Figure A12-2-2

The Droves Solar Farm Modelling Report



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THE DROVES
SOLAR FARM
RAINCLOUD

🟥 Order Limits / Core Study Area

1 % AEP - Raincloud Model

Depth (m)

⬜	0 - 0.05
🟩	0.051 - 0.10
▨	0.101 - 0.15
▨	0.151 - 0.20
▨	0.201 - 0.25
🟦	0.251 - 0.30
🟪	0.301 - 0.35
🟪	0.351 - 0.40
▨	0.401 - 0.45
▨	> 0.45

1:28,286 Scale @ A3

0 0.5 1 km

N

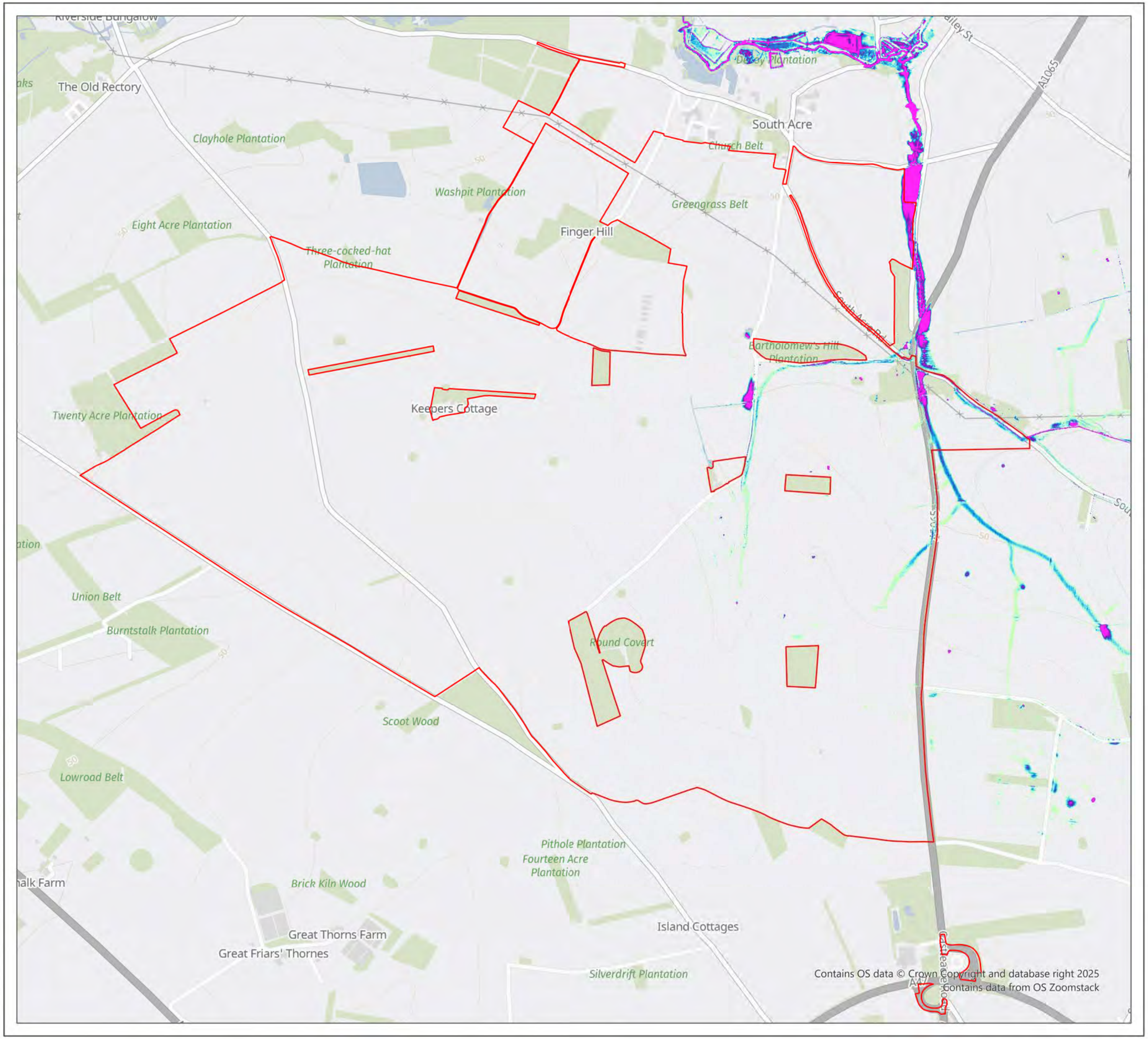
Ref: 083-FRA-006B

Date: 17/11/2025

1 % AEP Flood Depths - Raincloud 2D Modelling

Figure A12-2-2

The Droves Solar Farm Modelling Report



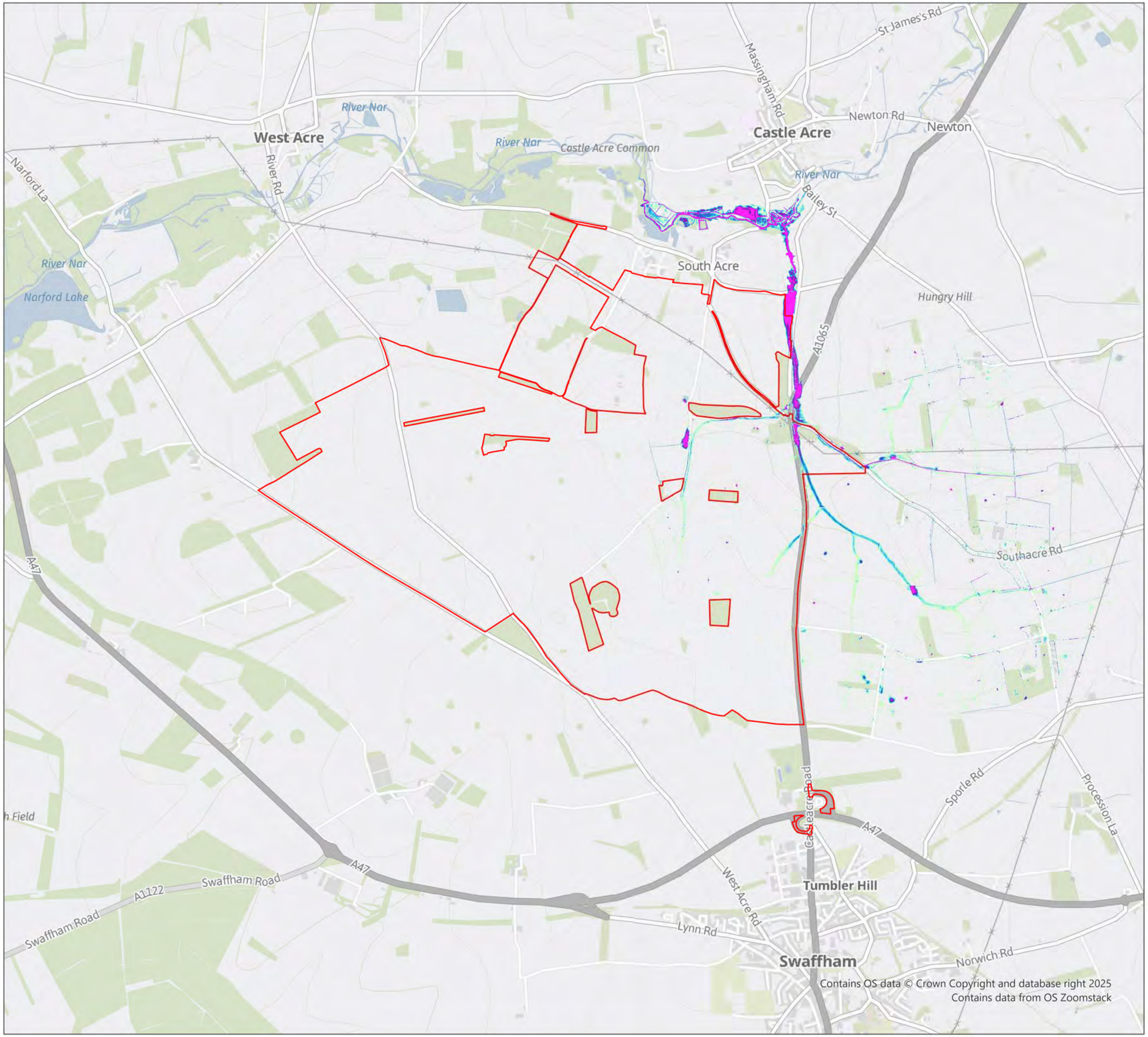
Ref: 083-FRA-006B

Date: 17/11/2025

1 % AEP Flood Depths - Raincloud 2D Modelling

Figure A12-2-2

The Droves Solar Farm Modelling Report



THE DROVES
SOLAR FARM

RAINCLOUD

☐ Order Limits / Core Study Area

1 % AEP - Raincloud Model
Depth (m)

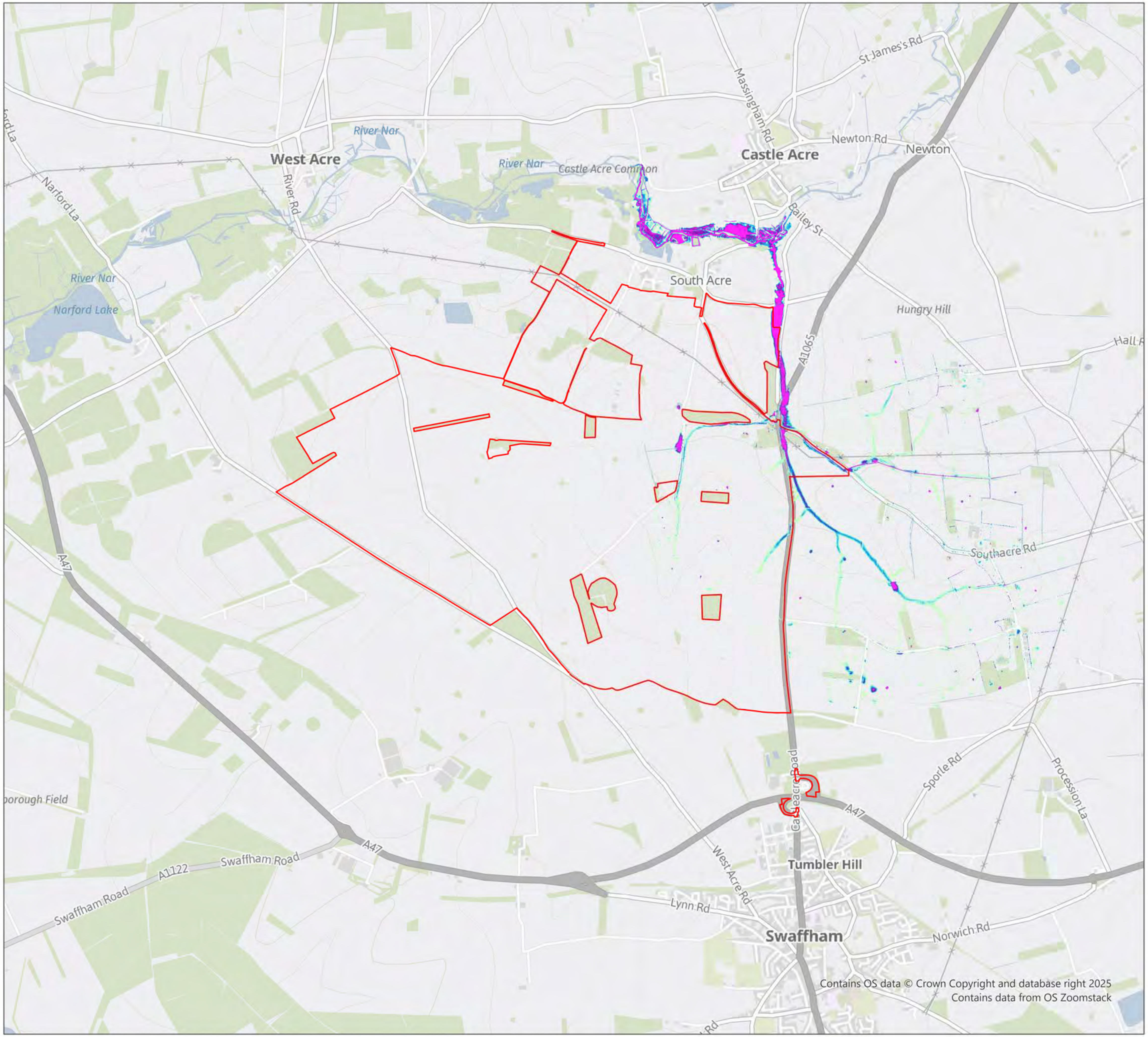
	0 - 0.05
🟩	0.051 - 0.10
🟦	0.101 - 0.15
🟦	0.151 - 0.20
🟦	0.201 - 0.25
🟦	0.251 - 0.30
🟪	0.301 - 0.35
🟪	0.351 - 0.40
🟪	0.401 - 0.45
🟪	> 0.45

1:28,286 Scale @ A3
0 0.5 1 km
N

Ref: 083-FRA-006B
Date: 17/11/2025

1 % AEP Flood Depths - Raincloud 2D Modelling
Figure A12-2-2

The Droves Solar Farm Modelling Report



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THE DROVES
SOLAR FARM

RAINCLOUD

🟥 Order Limits / Core Study Area

1 % AEP + 25 % CC - Raincloud Model

Depth (m)

	0 - 0.05
🟩	0.051 - 0.1
🟦	0.101 - 0.15
🟦	0.151 - 0.2
🟦	0.201 - 0.25
🟦	0.251 - 0.3
🟪	0.301 - 0.35
🟪	0.351 - 0.4
🟪	0.401 - 0.45
🟪	> 0.45

1:30,000 Scale @ A3

0 0.5 1 km

N

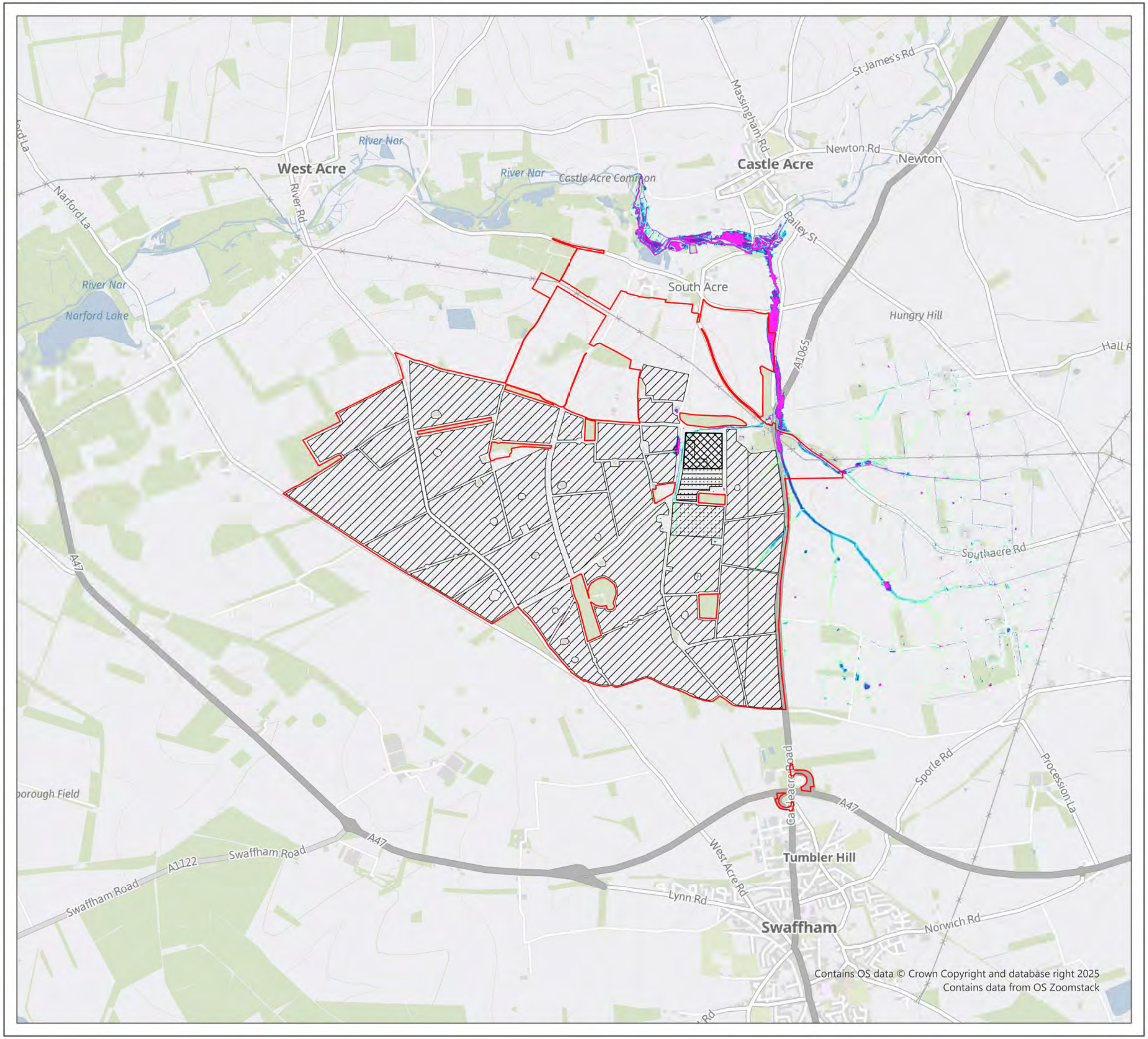
Ref: 083-FRA-007B

Date: 17/11/2025

1 % AEP + 25 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-2-3

The Droves Solar Farm Modelling Report



THE DROVES
SOLAR FARM

RAINCLOUD

- ▭ Order Limits / Core Study Area
- ▨ Work No. 1: Solar PV
- ▒ Work No. 2: BESS Work Area
- ☰ Work No. 3: Customer Substation
- ▩ Work No. 4: National Grid Substation

1 % AEP + 25 % CC - Raincloud Model

Depth (m)

- 0 - 0.05
- 🟩 0.051 - 0.1
- 🟦 0.101 - 0.15
- 🟦 0.151 - 0.2
- 🟦 0.201 - 0.25
- 🟦 0.251 - 0.3
- 🟪 0.301 - 0.35
- 🟪 0.351 - 0.4
- 🟪 0.401 - 0.45
- 🟪 > 0.45

1:30,000 Scale @ A3

0 0.5 1 km

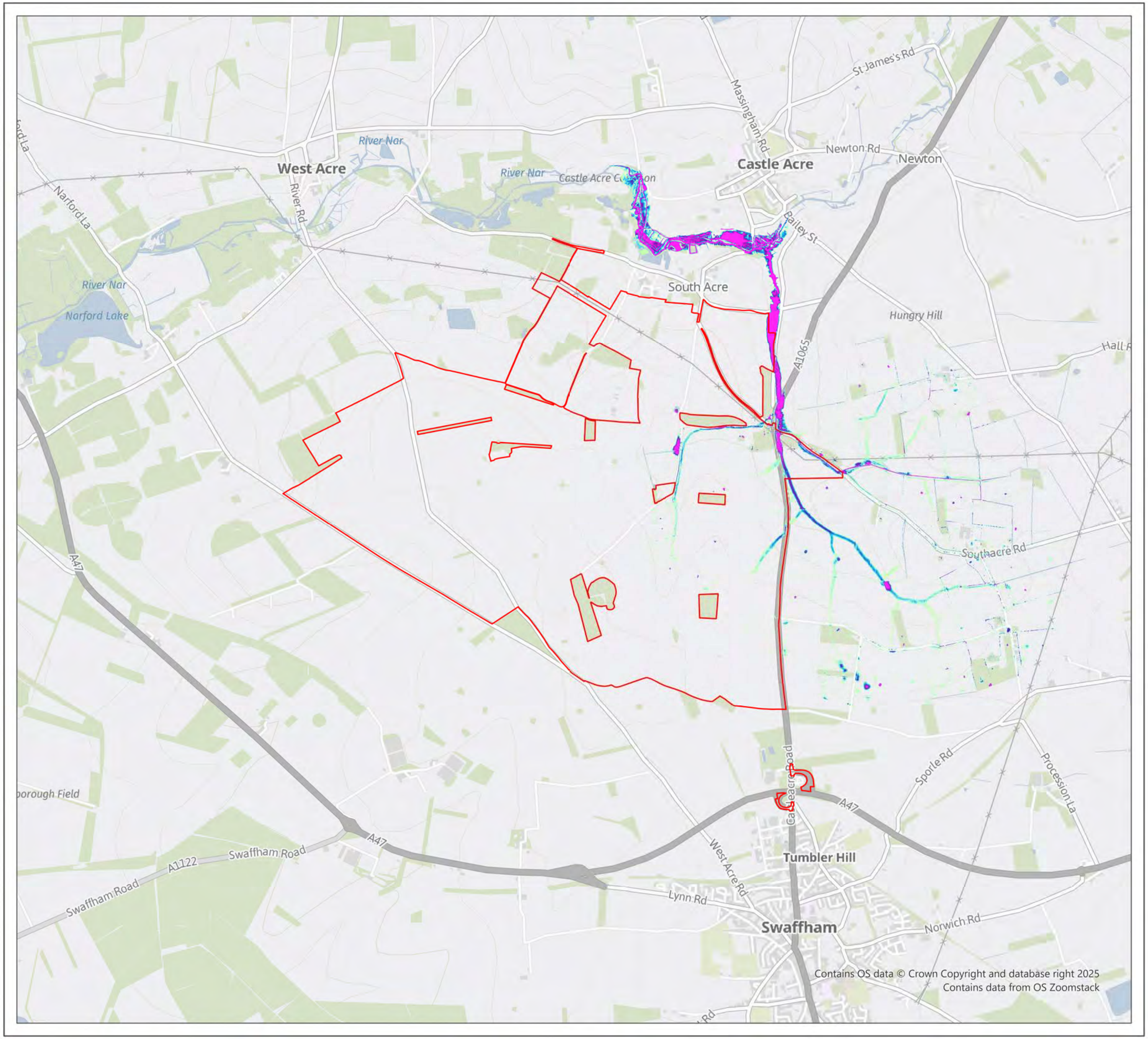
N

Ref: 083-FRA-008B	Date: 17/11/2025

Modelled 1 % AEP + 25 % CC Pluvial Flood Depth

Figure A12-2-4

The Droves Solar Farm Modelling Report



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THE DROVES
SOLAR FARM

RAINCLOUD

🟥 Order Limits / Core Study Area

1 % AEP + 40 % CC - Raincloud Model

Depth (m)

- 0 - 0.05
- 🟩 0.051 - 0.10
- 🟩 0.101 - 0.15
- 🟦 0.151 - 0.20
- 🟦 0.201 - 0.25
- 🟦 0.251 - 0.30
- 🟪 0.301 - 0.35
- 🟪 0.351 - 0.40
- 🟪 0.401 - 0.45
- 🟪 > 0.45

1:30,000 Scale @ A3

0 0.5 1 km

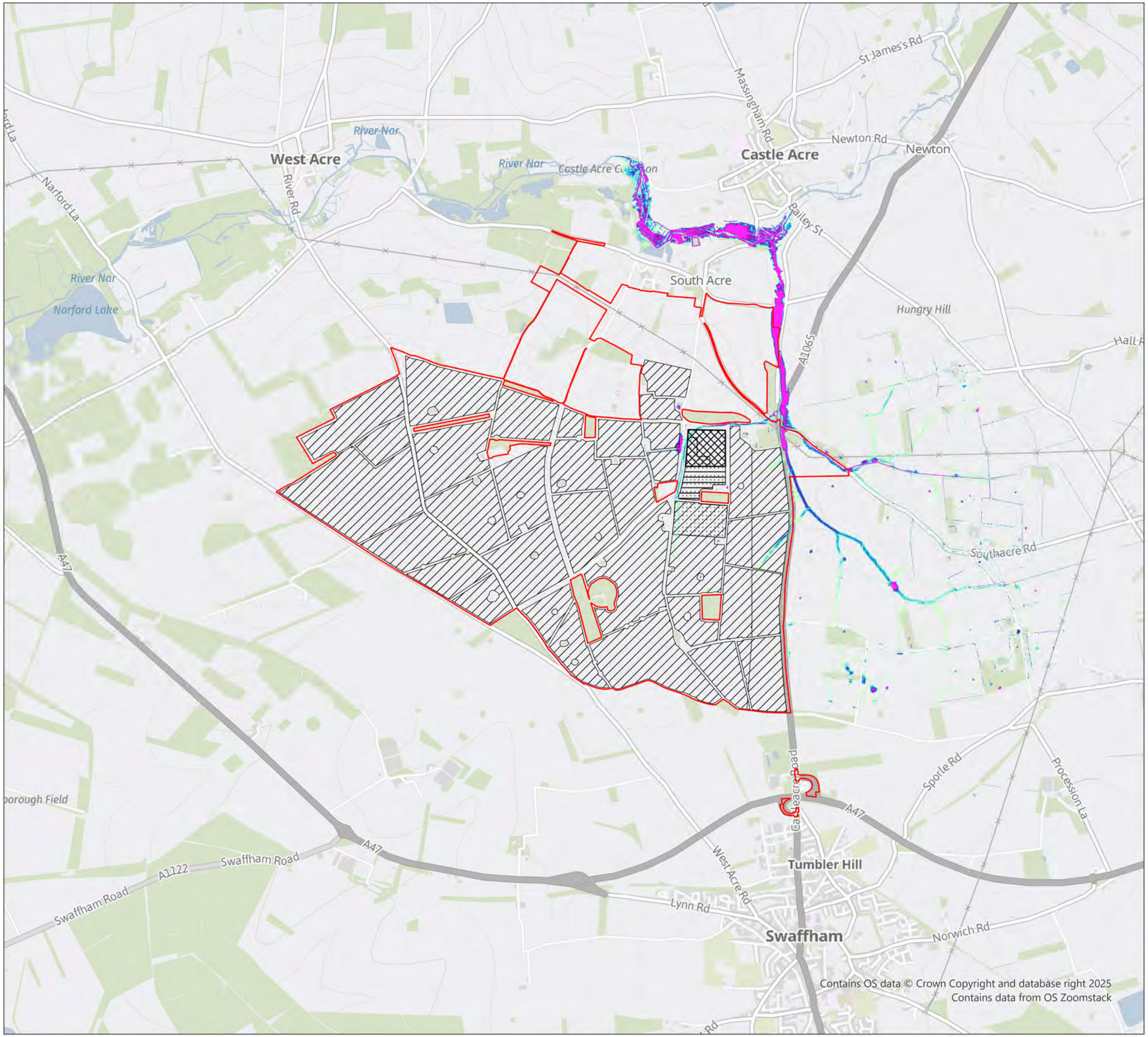
N

Ref: 083-FRA-009B	Date: 17/11/2025

1 % AEP + 40 % CC Flood Depths - Raincloud 2D Modelling

Figure A12-2-4

The Droves Solar Farm Modelling Report



THE DROVES
SOLAR FARM

RAINCLOUD

▨ Work No. 1: Solar PV

░ Work No. 2: BESS

▤ Work No. 3: Customer Substation

▦ Work No. 4: National Grid Substation

1 % AEP + 40 % CC - Raincloud Model

Depth (m)

	0 - 0.05
🟩	0.051 - 0.10
🟦	0.101 - 0.15
🟦	0.151 - 0.20
🟦	0.201 - 0.25
🟦	0.251 - 0.30
🟪	0.301 - 0.35
🟪	0.351 - 0.40
🟪	0.401 - 0.45
🟪	> 0.45

1:30,000 Scale @ A3

0 0.5 1 km

N

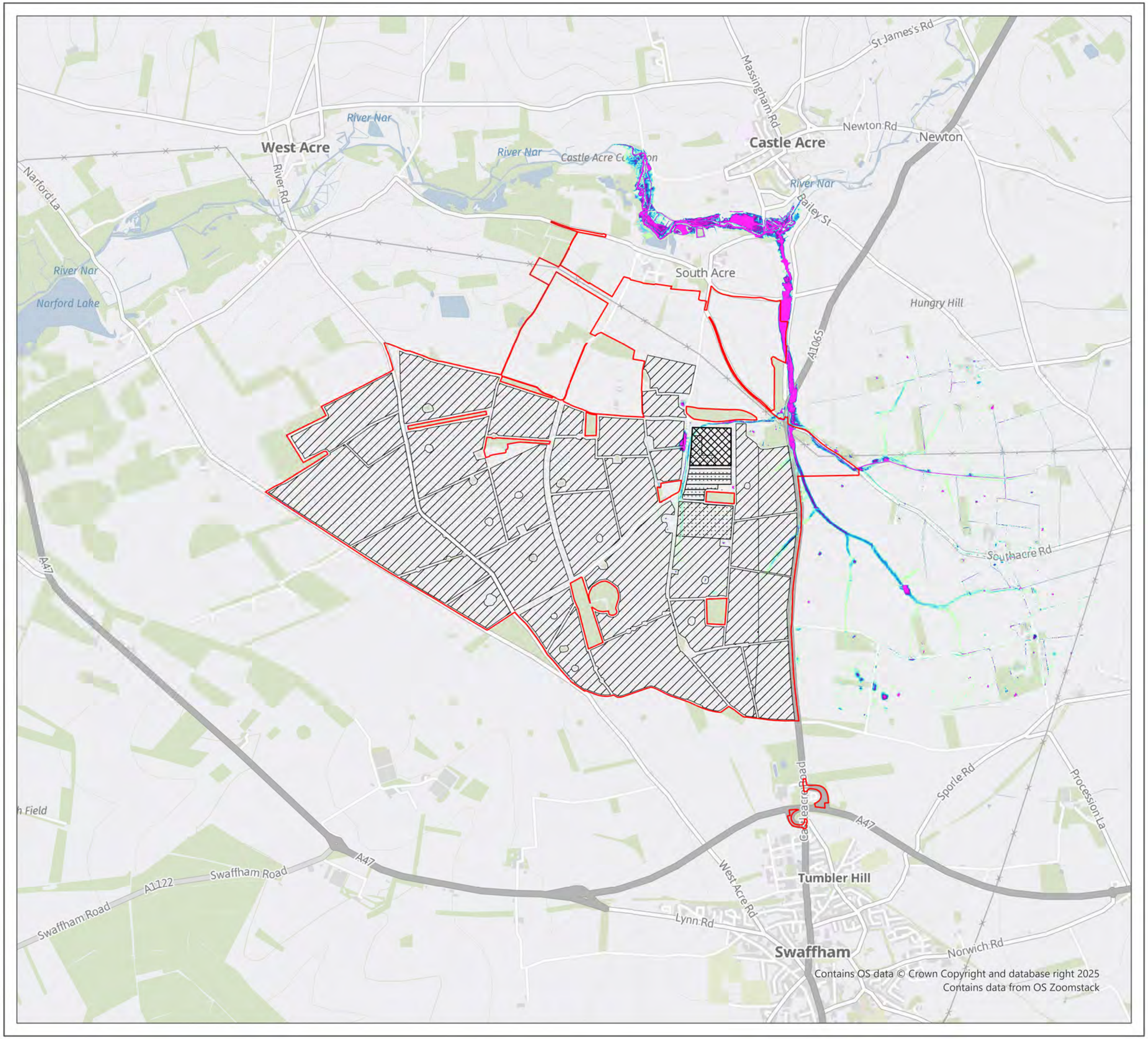
Ref: 083-FRA-012B

Date: 17/11/2025

Modelled 1 % AEP + 40 % CC Pluvial Flood Depth

Figure A12-2-6

The Droves Solar Farm Modelling Report



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THE DROVES
SOLAR FARM

RAINCLOUD

▨ Work No. 1: Solar PV

▨ Work No. 2: BESS

▤ Work No. 3: Customer Substation

▩ Work No. 4: National Grid Substation

1 % AEP + 40 % CC - Raincloud Model

Depth (m)

	0 - 0.05
🟩	0.051 - 0.10
🟦	0.101 - 0.15
🟦	0.151 - 0.20
🟦	0.201 - 0.25
🟦	0.251 - 0.30
🟪	0.301 - 0.35
🟪	0.351 - 0.40
🟪	0.401 - 0.45
🟪	> 0.45

1:28,286 Scale @ A3

0 0.5 1 km

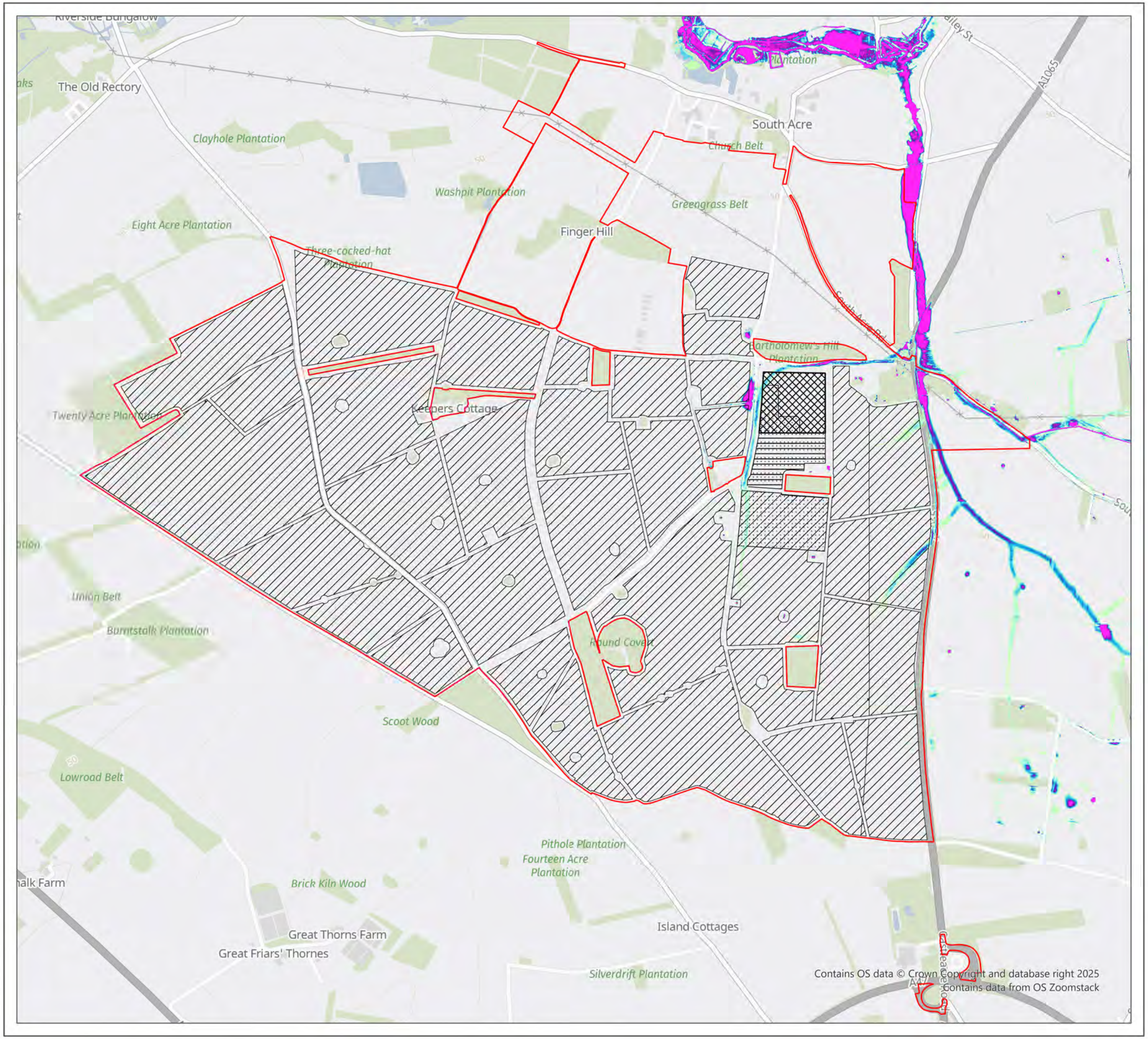
N

Ref: 083-FRA-012B

Date: 17/11/2025

Modelled 1 % AEP + 40 % CC Pluvial Flood Depth
Figure A12-2-6

The Droves Solar Farm Modelling Report



THE DROVES SOLAR FARM

RAINCLOUD

▨	Work No. 1: Solar PV
░	Work No. 2: BESS
☰	Work No. 3: Customer Substation
▩	Work No. 4: National Grid Substation

1 % AEP + 40 % CC - Raincloud Model

Depth (m)

	0 - 0.05
🟩	0.051 - 0.10
🟦	0.101 - 0.15
🟦	0.151 - 0.20
🟦	0.201 - 0.25
🟦	0.251 - 0.30
🟪	0.301 - 0.35
🟪	0.351 - 0.40
🟪	0.401 - 0.45
🟪	> 0.45

1:17,679 Scale @ A3

0 0.3 0.6 km

N

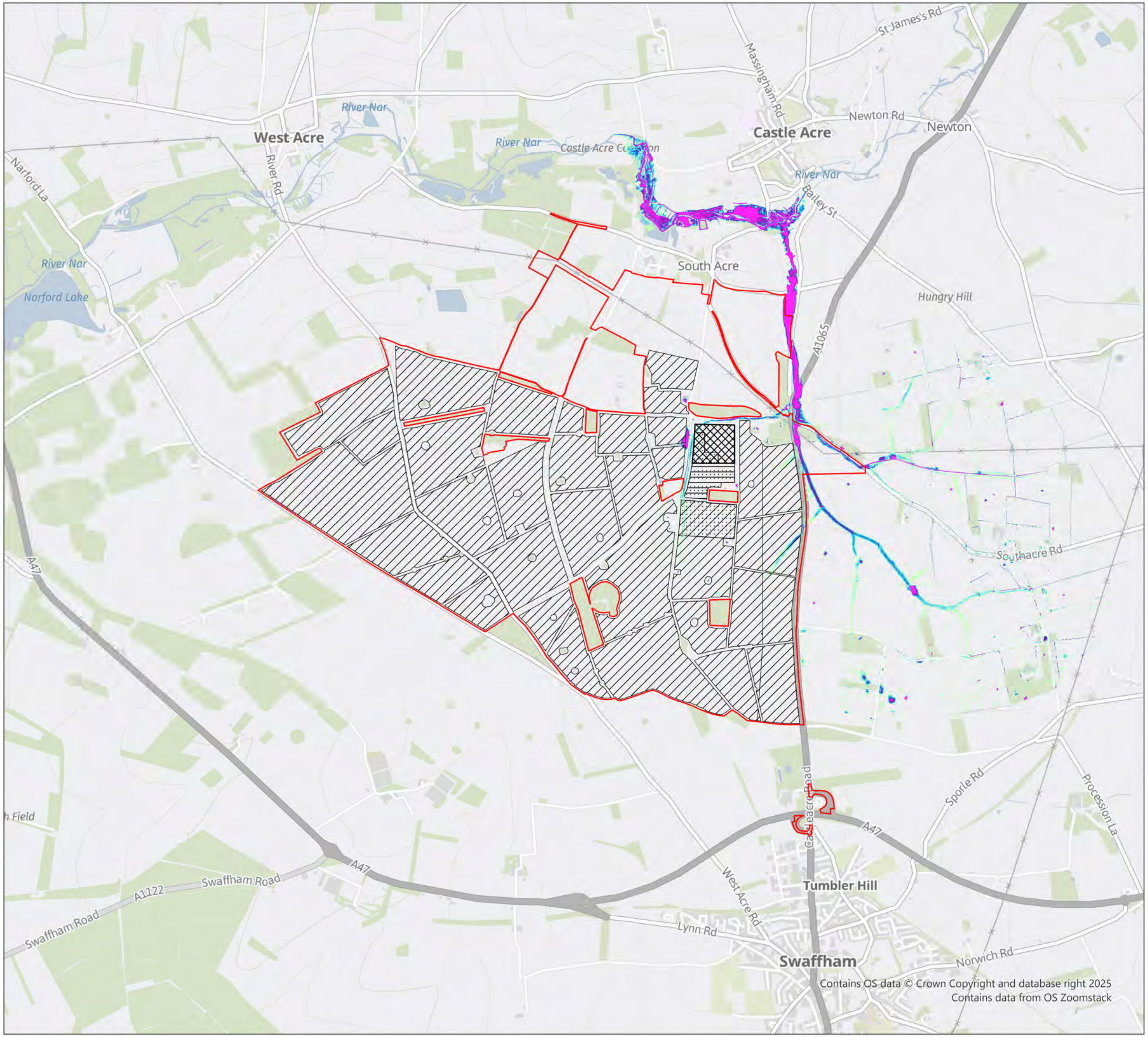
Ref: 083-FRA-012B

Date: 17/11/2025

Modelled 1 % AEP + 40 % CC Pluvial Flood Depth

Figure A12-2-6

The Droves Solar Farm Modelling Report



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THE DROVES
SOLAR FARM

RAINCLOUD

- ▨ Work No. 1: Solar PV
- ▨ Work No. 2: BESS
- ▤ Work No. 3: Customer Substation
- ▩ Work No. 4: National Grid Substation

1 % AEP + 40 % CC - Raincloud Model

Depth (m)

- 0 - 0.05
- 0.051 - 0.10
- 0.101 - 0.15
- 0.151 - 0.20
- 0.201 - 0.25
- 0.251 - 0.30
- 0.301 - 0.35
- 0.351 - 0.40
- 0.401 - 0.45
- > 0.45

1:28,286 Scale @ A3

0 0.5 1 km

N

Ref: 083-FRA-012B | Date: 17/11/2025

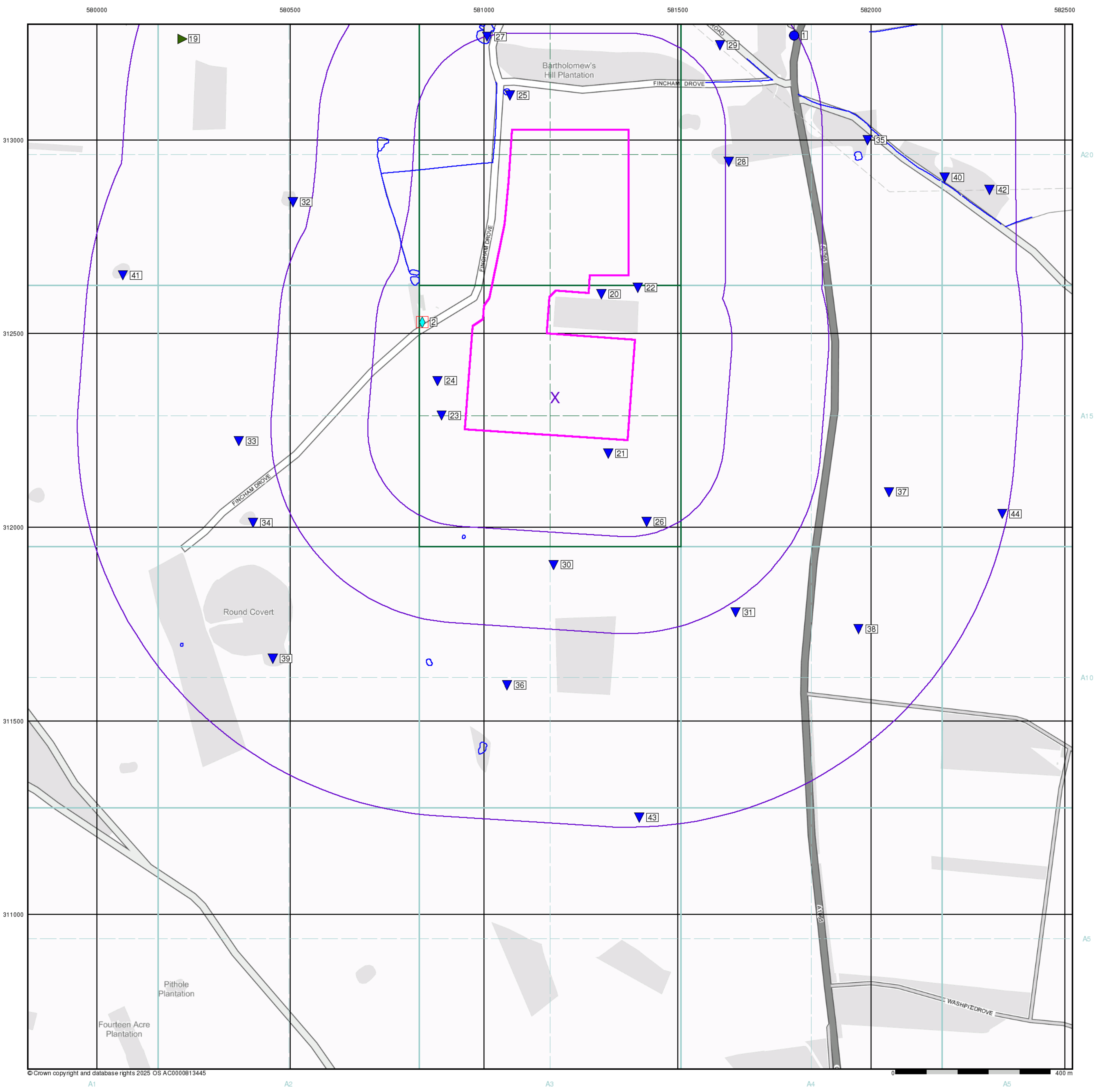
Modelled 1 % AEP + 40 % CC Pluvial Flood Depth

Figure A12-2-6

The Droves Solar Farm Modelling Report

THE DROVES
SOLAR FARM

Annex G: EnviroCheck Report



Envirocheck®

LANDMARK INFORMATION GROUP®

General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point
- 8 Map ID
- □ Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Historical Prosecutions
- Prosecutions
- Registered Radioactive Substance
- River Network or Water Feature
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

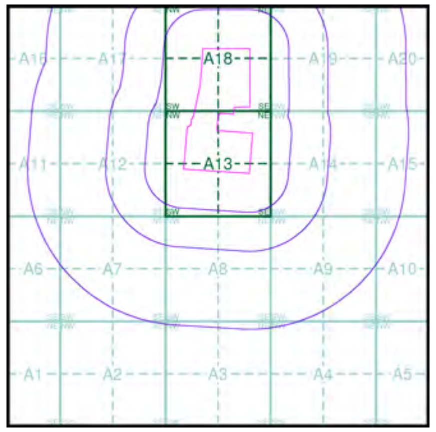
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Geological

- BGS Recorded Mineral Site

Site Sensitivity Map - Slice A



N

Order Details

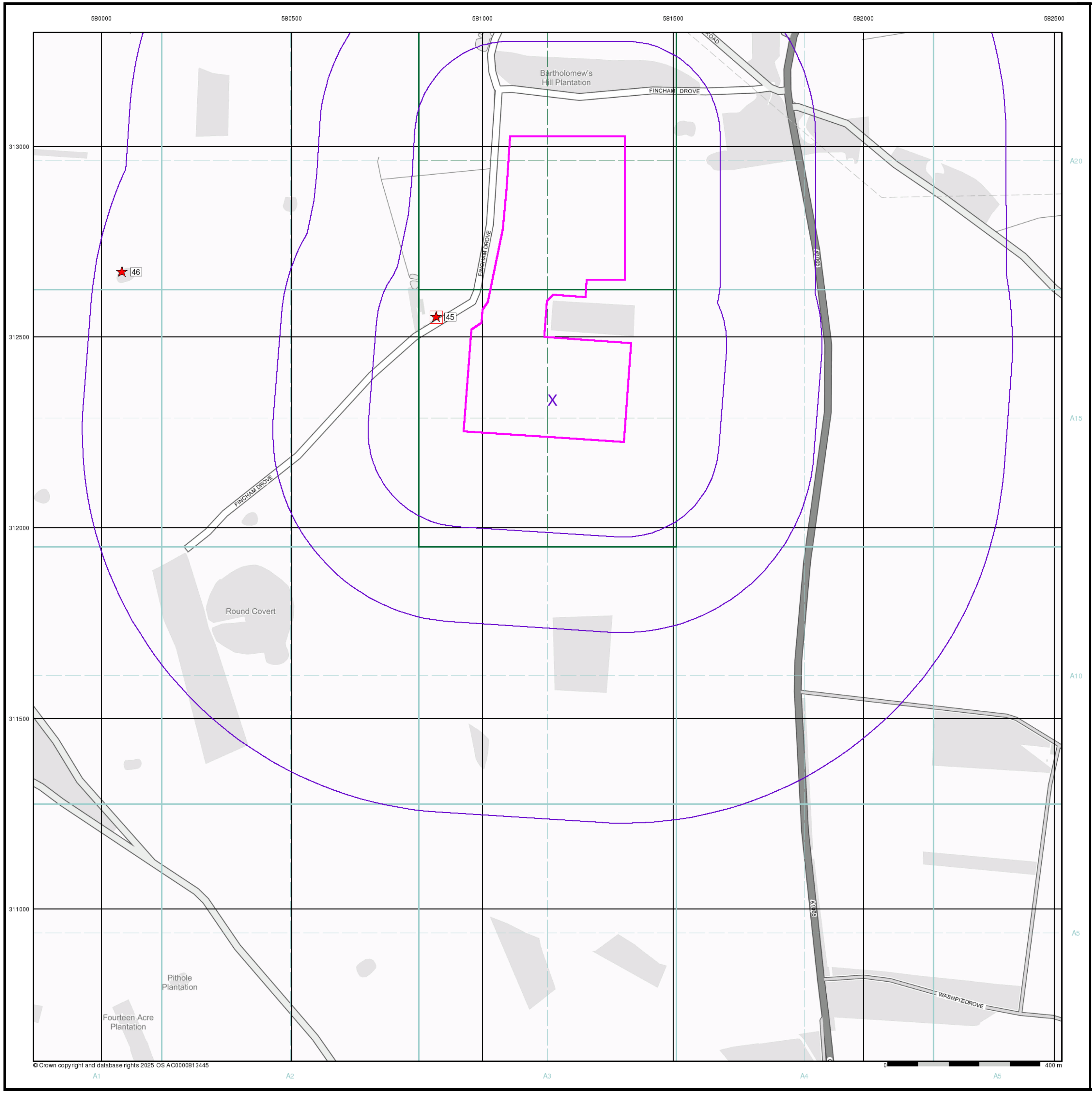
Order Number:	389564812_1_1
Customer Ref:	083
National Grid Reference:	581180, 312330
Slice:	A
Site Area (Ha):	25.74
Search Buffer (m):	1000

Site Details

Site at 581170,312625

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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LANDMARK INFORMATION GROUP®

Industrial Land Use Map

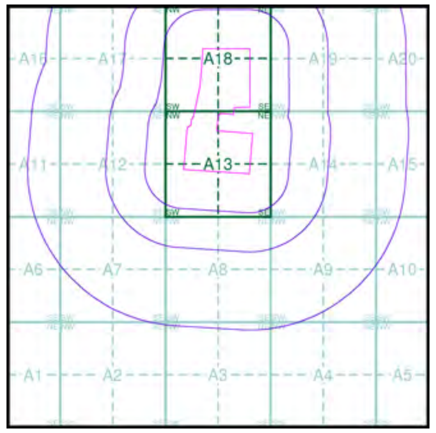
General

Specified Site
Specified Buffer(s)
X Bearing Reference Point
🟥 Slice
8 Map ID

Industrial Land Use

★ Contemporary Trade Directory Entry
★ Fuel Station Entry
★ Points of Interest - Commercial Services
★ Points of Interest - Education and Health
★ Points of Interest - Manufacturing and Production
★ Points of Interest - Public Infrastructure
★ Points of Interest - Recreational and Environmental
Underground Electrical Cables

Industrial Land Use Map - Slice A



N

Order Details

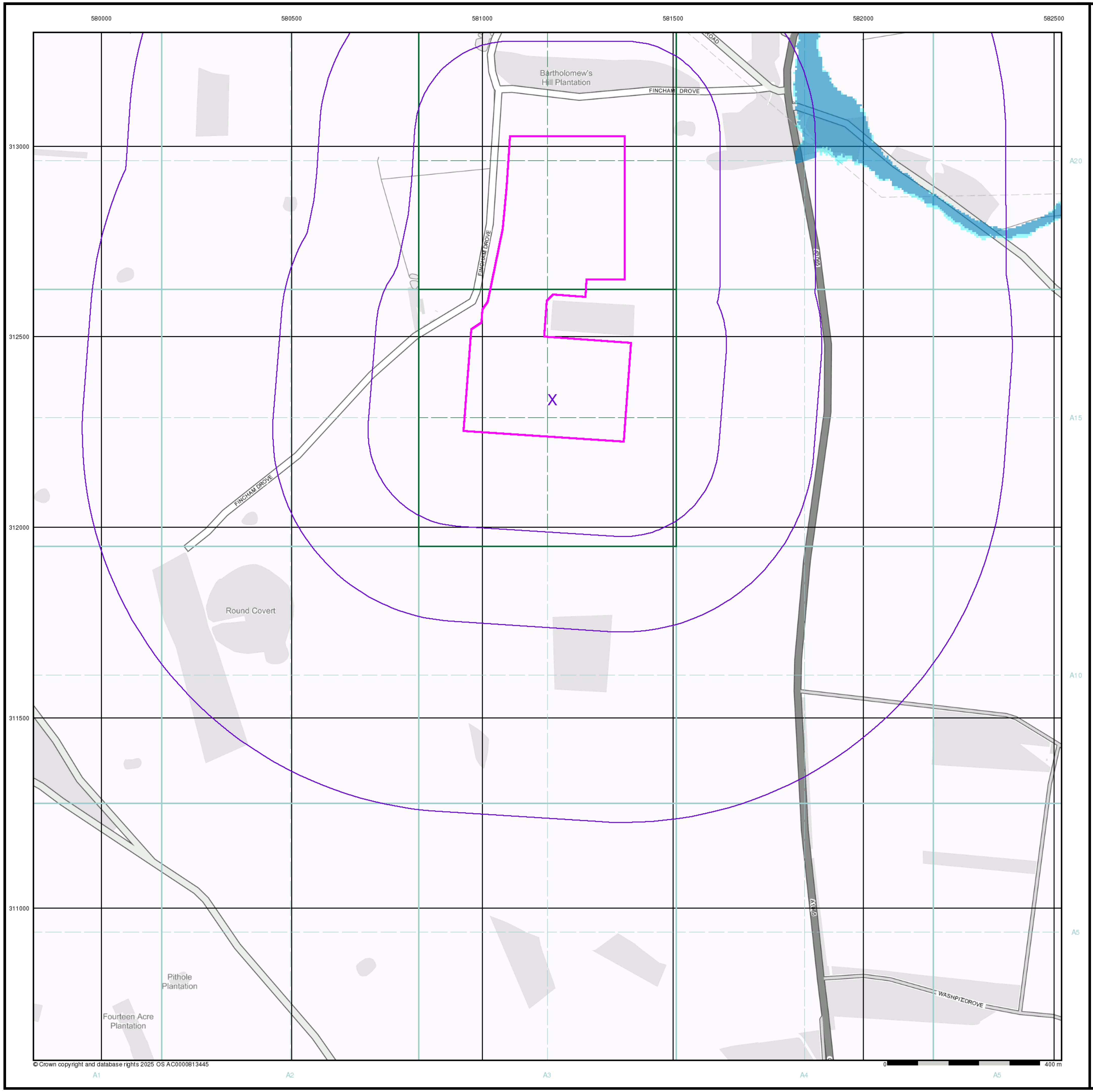
Order Number:	389564812_1_1
Customer Ref:	083
National Grid Reference:	581180, 312330
Slice:	A
Site Area (Ha):	25.74
Search Buffer (m):	1000

Site Details

Site at 581170,312625

Landmark
INFORMATION GROUP

Tel:	0844 844 9952
Fax:	0844 844 9951
Web:	www.envirocheck.co.uk



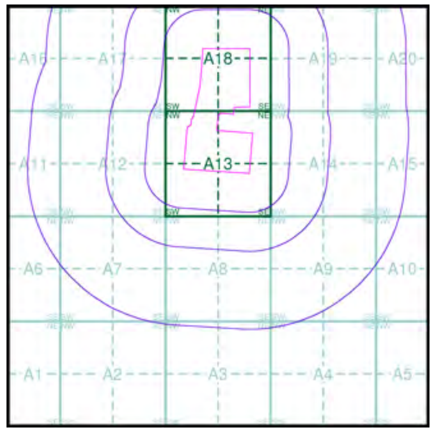
General

- Specified Site
- Specified Buffer(s)
- X Bearing Reference Point

Agency and Hydrological (Flood)

- 🟦 Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- 🟦 Flooding from Rivers or Sea without Defences (Zone 3)
- ▨ Area Benefiting from Flood Defence
- ▨ Flood Water Storage Areas
- -·- Flood Defence

Flood Map - Slice A



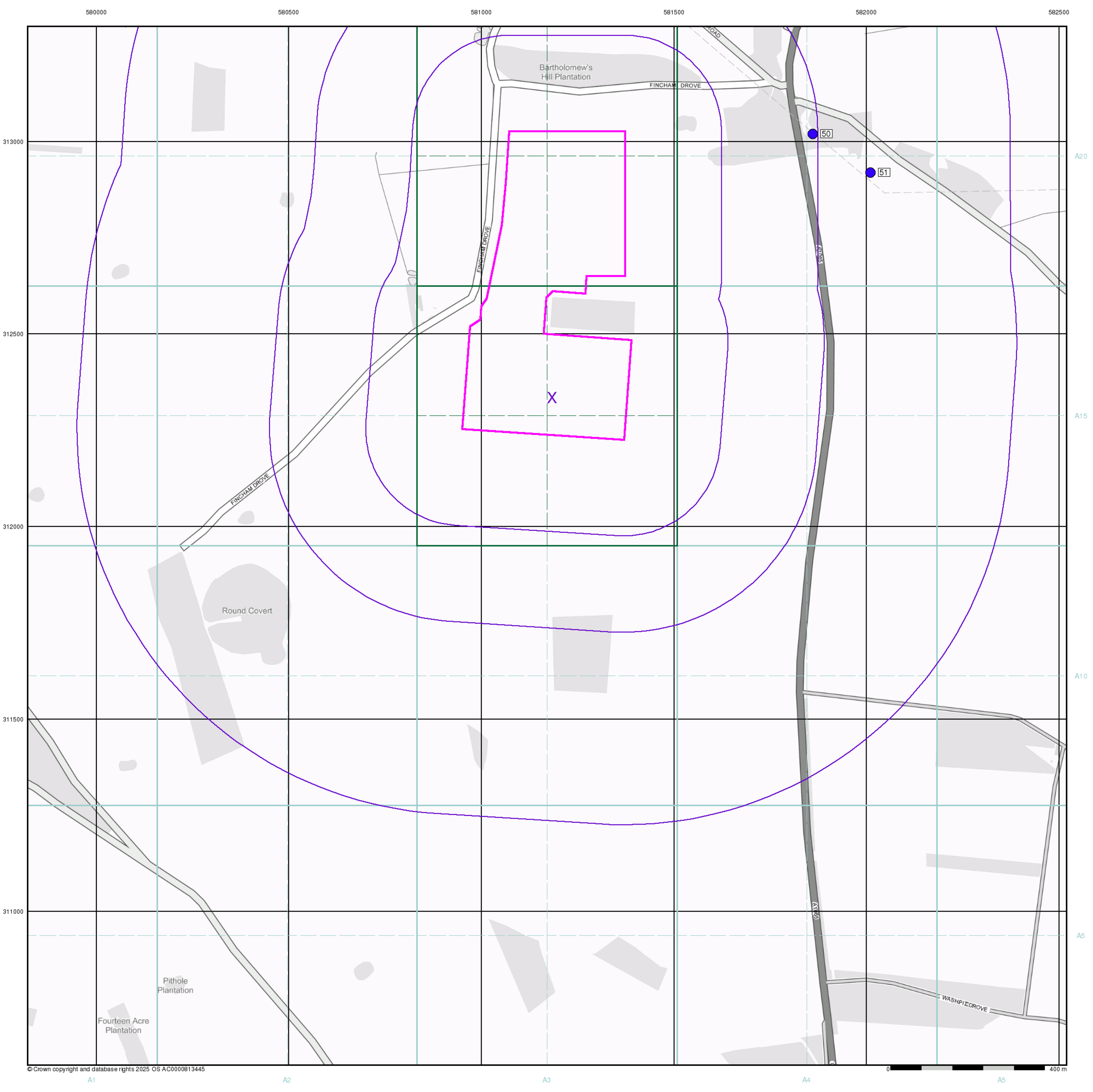
N

Order Details

Order Number:	389564812_1_1
Customer Ref:	083
National Grid Reference:	581180, 312330
Slice:	A
Site Area (Ha):	25.74
Search Buffer (m):	1000

Site Details

Site at 581170,312625



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Envirocheck®

LANDMARK INFORMATION GROUP®

General

- ⬠ Specified Site
- ⬠ Specified Buffer(s)
- X Bearing Reference Point
- 8 Map ID
- ☐ Several of Type at Location

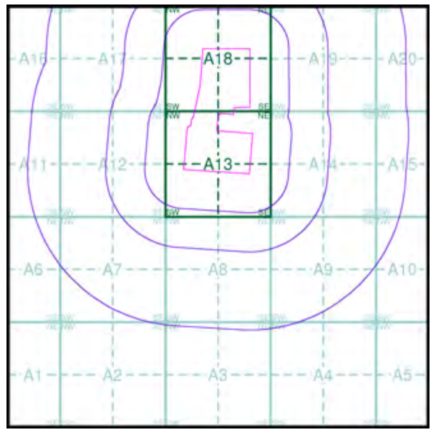
Agency and Hydrological (Boreholes)

- ● BGS Borehole Depth 0 - 10m
- ● BGS Borehole Depth 10 - 30m
- ● BGS Borehole Depth 30m +
- ● Confidential
- ○ Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



Order Details

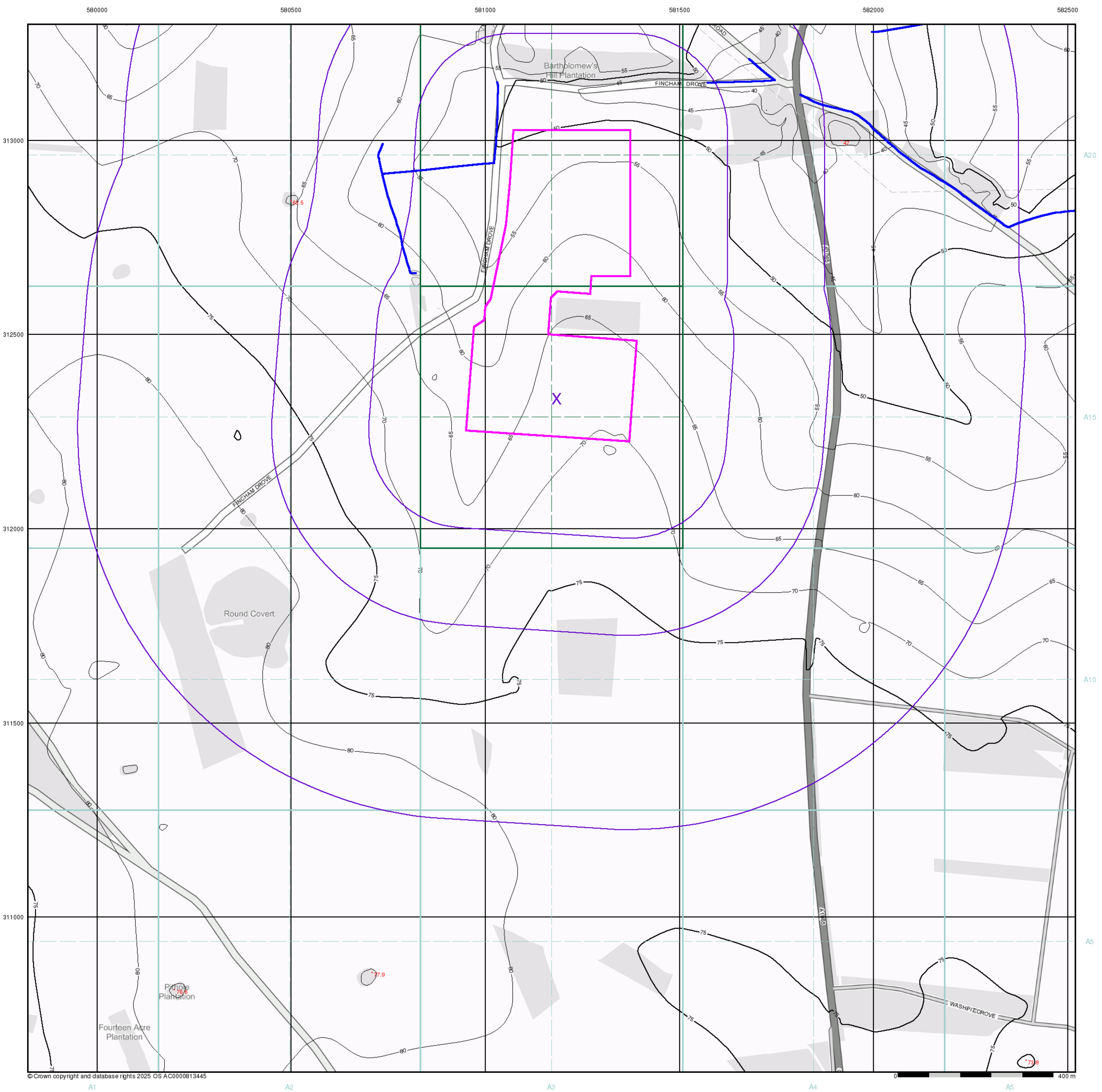
Order Number:	389564812_1_1
Customer Ref:	083
National Grid Reference:	581180, 312330
Slice:	A
Site Area (Ha):	25.74
Search Buffer (m):	1000

Site Details

Site at 581170,312625

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



Envirocheck®

LANDMARK INFORMATION GROUP®

General

Specified Site

Specified Buffer(s)

X Bearing Reference Point

OS Water Network Data

Canal	Drain
Reservoir	Other
Foreshore	Lake
Marsh	Transfer
Tidal River	Lock Or Flight Of Locks
Inland River	Sea

Contours (height in meters)

Standard Contour

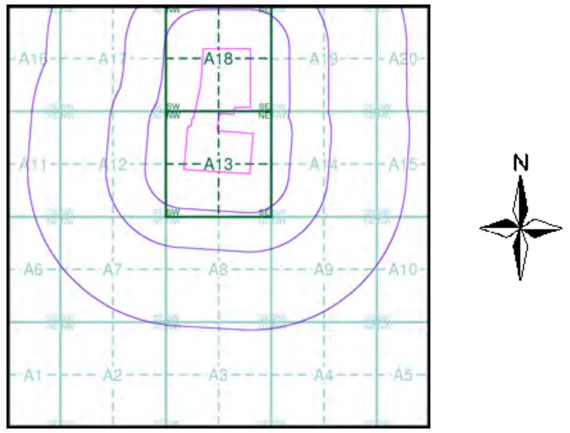
Master Contour

Spot Height 167.3

MLW Mean Low Water

MHW Mean High Water

OS Water Network Map - Slice A



Order Details

Order Number:	389564812_1_1
Customer Ref:	083
National Grid Reference:	581180, 312330
Slice:	A
Site Area (Ha):	25.74
Search Buffer (m):	1000

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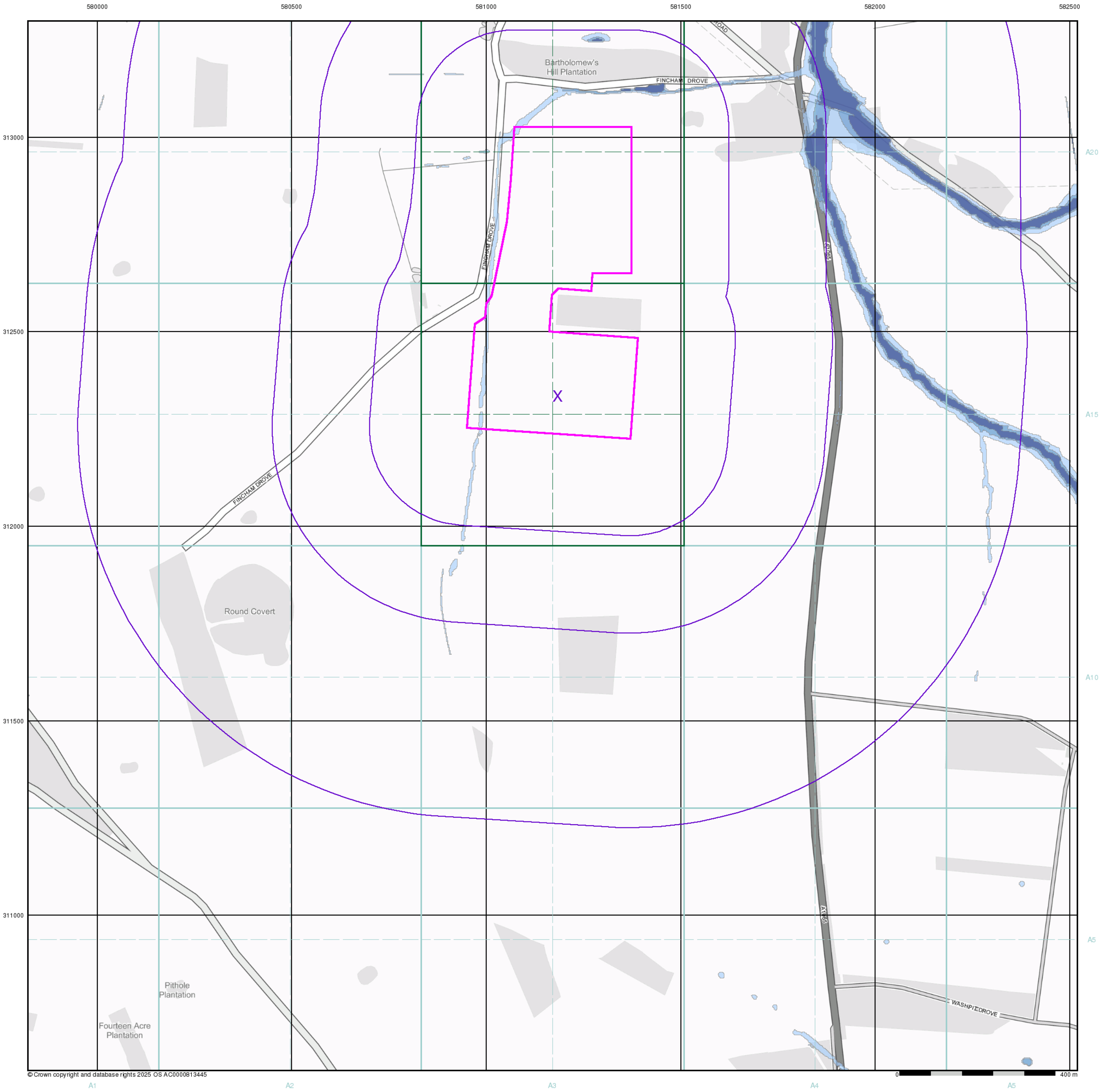
Site at 581170,312625

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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General

- ⬠ Specified Site
- ⬠ Specified Buffer(s)
- X Bearing Reference Point

Risk of Flooding from Surface Water

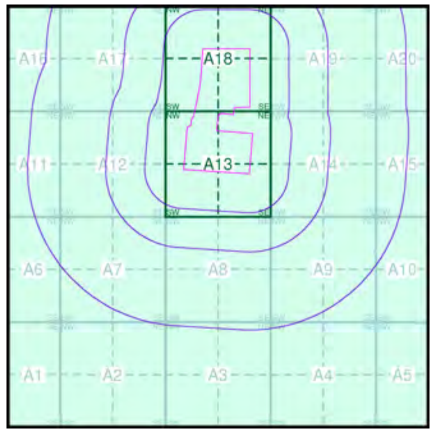
- 🟦 High - 30 Year Return
- 🟦 Medium - 100 Year Return
- 🟦 Low - 1000 Year Return

Suitability

See the suitability map below

- 🟩 National to county
- 🟧 County to town
- 🟦 Town to street
- 🟪 Street to parcels of land
- 🟨 Property

EA/NRW Suitability Map - Slice A



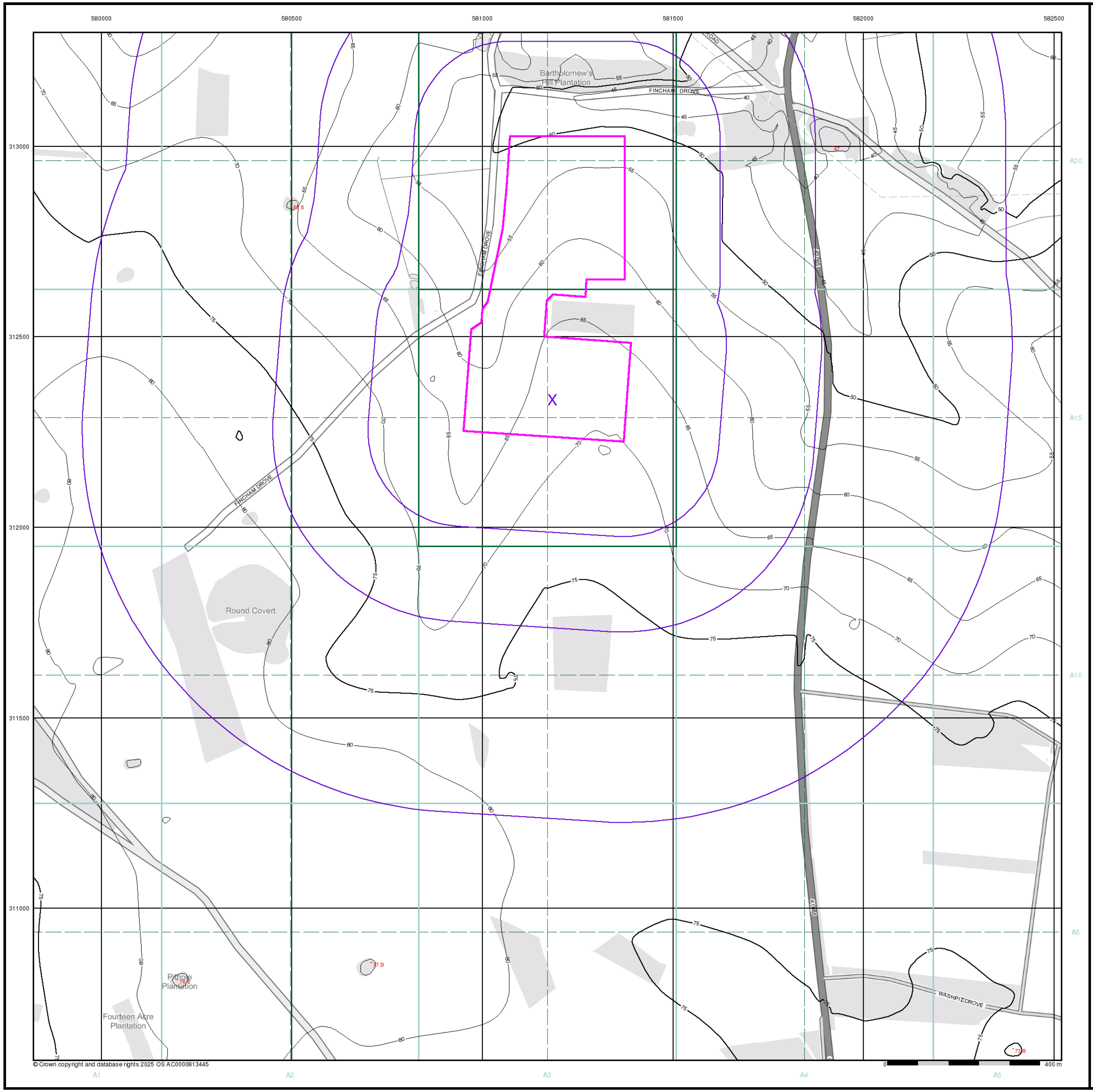
N

Order Details

Order Number:	389564812_1_1
Customer Ref:	083
National Grid Reference:	581180, 312330
Slice:	A
Site Area (Ha):	25.74
Search Buffer (m):	1000

Site Details

Site at 581170,312625



Envirocheck®

LANDMARK INFORMATION GROUP®

WFD Surface Waters Map

General

Specified Site
Specified Buffer(s)
X Bearing Reference Point
Slice
Map ID

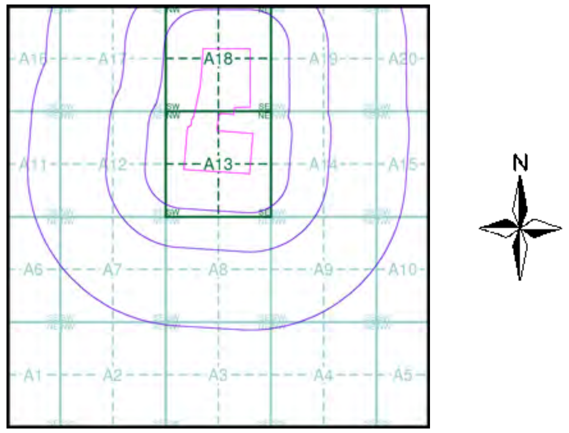
Water Framework Directive - Surface Water Quality

- 🟩 High
- 🟩 Good
- 🟧 Moderate
- 🟥 Poor
- 🟥 Bad

Contours (height in meters)

Standard Contour
Master Contour
Spot Height 167.3
MLW Mean Low Water
MHW Mean High Water

WFD Surface Waters Map - Slice A



Order Details

Order Number:	389564812_1_1
Customer Ref:	083
National Grid Reference:	581180, 312330
Slice:	A
Site Area (Ha):	25.74
Search Buffer (m):	1000

Site Details

Site at 581170,312625

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
389564812_1_1

Customer Reference:
083

National Grid Reference:
581180, 312330

Slice:
A

Site Area (Ha):
25.74

Search Buffer (m):
1000

Site Details:

Site at 581170,312625

Client Details:

[redacted]
Raincloud Consulting Ltd
WESTMINSTER PLACE
York
YO26 6RW

Contents

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.
In this datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Radon Potential dataset Copyright Notice

Information supplied from a joint dataset compiled by The British Geological Survey and Public Health England. The probability result is only valid for properties above ground. All basement and cellar areas are considered to be at additional risk from high radon levels. If an underground room such as a cellar or basement makes up part of the living or working accommodation, the property should be tested regardless of Radon Affected Area status.

Natural Resources Wales Copyright Notice

Report Version v53.0

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1	Yes		Yes	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents					
Prosecutions					
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls					
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 1		Yes		
Pollution Incidents to Controlled Waters	pg 1				1
Historical Prosecutions					
Registered Radioactive Substances					
Substantiated Pollution Incident Register					
Water Abstractions	pg 1		6		(*18)
Water Industry Act Referrals					
Groundwater Vulnerability Map	pg 7	Yes	n/a	n/a	n/a
Groundwater Vulnerability - Soluble Rock Risk	pg 8	3	n/a	n/a	n/a
Groundwater Vulnerability - Local Information			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 8	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 8	Yes	n/a	n/a	n/a
Source Protection Zones	pg 8	2			
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences				n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 9		4	3	7
Water Framework Directive - Catchment	pg 10	Yes			Yes
Water Framework Directive - Groundwater	pg 11	Yes			
Water Framework Directive - Surface Waters					

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Landfill Coverage	pg 12	2	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)					
Potentially Infilled Land (Water)	pg 12				1
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 13	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 13	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites	pg 14		7	4	14
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability	pg 18	Yes	n/a	n/a	n/a
Man-Made Mining Cavities	pg 19		1		
Natural Cavities					
Non Coal Mining Areas of Great Britain	pg 19	Yes		n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 19	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards	pg 19	Yes	Yes	n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 19	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 19	Yes		n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 20	Yes		n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries					
Fuel Station Entries					
Points of Interest - Commercial Services					
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 21		5		1
Points of Interest - Public Infrastructure					
Points of Interest - Recreational and Environmental					
Underground Electrical Cables					

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones	pg 22	2			1
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (S)	0	1	581184 312335
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A19SW (NE)	335	1	581800 312750
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A19SW (NE)	427	1	581800 312900
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A19NE (NE)	445	1	581850 313100
	Nearest Surface Water Feature	A18SW (N)	42	-	581024 312960
1	**Pollution Incidents to Controlled Waters** Property Type: Road Location: Kings Lynn District Authority: Environment Agency, Anglian Region Pollutant: Oils - Other Oil Note: Tributary Of Nar Incident Date: 4th November 1994 Incident Reference: 1581 Catchment Area: Not Given Receiving Water: Potential Groundwater Cause of Incident: Fire Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A19NW (NE)	508	2	581800 313300
2	**Water Abstractions** Operator: Priory Pigs Licence Number: 6/33/58/*G/0248 Permit Version: 6 Location: Borehole At South Acre Authority: Environment Agency, Anglian Region Abstraction: General Farming And Domestic Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 14th December 2023 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	129	2	580847 312553
2	**Water Abstractions** Operator: Priory Pigs Licence Number: 6/33/58/*G/0248 Permit Version: 4 Location: Borehole At South Acre Authority: Environment Agency, Anglian Region Abstraction: General Farming And Domestic Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 2018 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	132	2	580840 312530

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
2	**Water Abstractions** Operator: Priory Pigs Licence Number: 6/33/58/*G/0248 Permit Version: 5 Location: Borehole At South Acre Authority: Environment Agency, Anglian Region Abstraction: General Farming And Domestic Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 29th March 2018 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	132	2	580840 312530
2	**Water Abstractions** Operator: Narstate Ltd Licence Number: 6/33/58/*G/0248 Permit Version: 3 Location: Borehole At South Acre Authority: Environment Agency, Anglian Region Abstraction: General Farming And Domestic Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	132	2	580840 312530
2	**Water Abstractions** Operator: Narstate Ltd Licence Number: 6/33/58/*G/0248 Permit Version: 2 Location: Borehole At South Acre Authority: Environment Agency, Anglian Region Abstraction: General Farming And Domestic Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 24th November 2006 Permit End Date: 31st March 2008 Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	132	2	580840 312530
2	**Water Abstractions** Operator: Narstate Ltd Licence Number: 6/33/58/*G/0248 Permit Version: 1 Location: Borehole At South Acre Authority: Environment Agency, Anglian Region Abstraction: General Farming And Domestic Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 1st April 2006 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	132	2	580840 312530

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Wales Family Partnership Licence Number: 6/33/58/*s/035 Permit Version: Not Supplied Location: Drains Authority: Environment Agency, Anglian Region Abstraction: Spray Irrigation Abstraction Type: Not Supplied Source: Stream Daily Rate (m3): 12 Yearly Rate (m3): 436400 Details: Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A16NE (NW)	1068	2	580001 313001
	Water Abstractions Operator: South Pickenham Estate Co Ltd Licence Number: 6/33/58/*G/0274/R01 Permit Version: 1 Location: Borehole At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 1st April 2016 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1389	2	582480 311390
	Water Abstractions Operator: South Pickenham Estate Co Ltd Licence Number: 6/33/58/*G/0274/R01 Permit Version: 1 Location: Borehole At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Storage Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 1st April 2016 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1389	2	582480 311390
	Water Abstractions Operator: Palgrave Farming Co Ltd Licence Number: 6/33/58/*G/0274 Permit Version: 2 Location: Borehole At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 11th February 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1389	2	582480 311390

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Palgrave Farming Co Ltd Licence Number: 6/33/58/*G/0274 Permit Version: 2 Location: Borehole At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Storage Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 11th February 2008 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1389	2	582480 311390
	Water Abstractions Operator: Palgrave Farming Co Ltd Licence Number: 6/33/58/*G/0274 Permit Version: 1 Location: Borehole At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 5th April 2007 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1389	2	582480 311390
	Water Abstractions Operator: Palgrave Farming Co Ltd Licence Number: 6/33/58/*G/0274 Permit Version: 1 Location: Borehole At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Storage Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 January Authorised End: 31 December Permit Start Date: 5th April 2007 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1389	2	582480 311390
	Water Abstractions Operator: Palgrave Farming Co Ltd Licence Number: 6/33/58/*G/0239 Permit Version: 101 Location: Borehole No.2 At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 15th June 2006 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1389	2	582480 311390

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: British Field Products Ltd Licence Number: 6/33/58/*g/186 Permit Version: Not Supplied Location: Boreholesporle Authority: Environment Agency, Anglian Region Abstraction: Spray Irrigation Abstraction Type: Not Supplied Source: Well And Borehole Daily Rate (m3): 185 Yearly Rate (m3): 4800000 Details: Not Supplied Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 100m	A10SW (SE)	1389	2	582480 311390
	Water Abstractions Operator: British Field Products Ltd Licence Number: 6/33/58/*g/224 Permit Version: Not Supplied Location: Borehole At, SWAFFHAM Authority: Environment Agency, Anglian Region Abstraction: Spray Irrigation Abstraction Type: Not Supplied Source: Well And Borehole Daily Rate (m3): 253 Yearly Rate (m3): 4800000 Details: C Chalk 11; Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1392	2	582480 311385
	Water Abstractions Operator: Palgrave Farming Co Ltd Licence Number: 6/33/58/*G/0239 Permit Version: 100 Location: Borehole No.2 At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: C Chalk 11; Status: Temporary Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 24th February 1999 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1396	2	582485 311385
	Water Abstractions Operator: The South Pickenham Estate Company Limited Licence Number: 6/33/58/*G/0274/R03 Permit Version: 1 Location: Borehole At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Storage Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 1st April 2024 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1403	2	582487 311377

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: The South Pickenham Estate Company Limited Licence Number: 6/33/58/*G/0274/R03 Permit Version: 1 Location: Borehole At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 1st April 2024 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1403	2	582487 311377
	Water Abstractions Operator: South Pickenham Estate Co Ltd Licence Number: 6/33/58/*G/0274/R02 Permit Version: 1 Location: Borehole At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 1st April 2018 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1403	2	582487 311377
	Water Abstractions Operator: South Pickenham Estate Co Ltd Licence Number: 6/33/58/*G/0274/R02 Permit Version: 1 Location: Borehole At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Storage Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 March Permit Start Date: 1st April 2018 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	A10SW (SE)	1403	2	582487 311377
	Water Abstractions Operator: Palgrave Farming Co Ltd Licence Number: 6/33/58/*G/0239 Permit Version: 101 Location: Borehole No.1 At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: Not Supplied Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 15th June 2006 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(S)	1985	2	581810 310290

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: British Field Products Ltd Licence Number: 6/33/58/*g/224 Permit Version: Not Supplied Location: Borehole At, SWAFFHAM Authority: Environment Agency, Anglian Region Abstraction: Spray Irrigation Abstraction Type: Not Supplied Source: Well And Borehole Daily Rate (m3): 68 Yearly Rate (m3): 982000 Details: C Chalk 11; Status: Revoked Authorised Start: Not Supplied Authorised End: Not Supplied Permit Start Date: Not Supplied Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(S)	1985	2	581810 310290
	Water Abstractions Operator: Palgrave Farming Co Ltd Licence Number: 6/33/58/*G/0239 Permit Version: 100 Location: Borehole No.1 At Swaffham Authority: Environment Agency, Anglian Region Abstraction: General Agriculture: Spray Irrigation - Direct Abstraction Type: Water may be abstracted from a single point Source: Groundwater Daily Rate (m3): Not Supplied Yearly Rate (m3): Not Supplied Details: C Chalk 11; Status: Temporary Authorised Start: 01 April Authorised End: 31 October Permit Start Date: 24th February 1999 Permit End Date: Not Supplied Positional Accuracy: Located by supplier to within 10m	(S)	1990	2	581810 310285
	Groundwater Vulnerability Map Combined Classification: Secondary Superficial Aquifer - High Vulnerability Combined Vulnerability: High Combined Aquifer: Productive Bedrock Aquifer, Productive Superficial Aquifer Pollutant Speed: High Bedrock Flow: Well Connected Fractures Dilution: <300 mm/year Baseflow Index: >70% Superficial Patchiness: <90% Superficial Thickness: 3-10m Superficial Recharge: No Data	A18NW (N)	0	2	581162 313000
	Groundwater Vulnerability Map Combined Classification: Principle Bedrock Aquifer - High Vulnerability Combined Vulnerability: High Combined Aquifer: Productive Bedrock Aquifer, No Superficial Aquifer Pollutant Speed: High Bedrock Flow: Well Connected Fractures Dilution: <300 mm/year Baseflow Index: >70% Superficial Patchiness: <90% Superficial Thickness: 3-10m Superficial Recharge: No Data	A18NE (N)	0	2	581184 313000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Groundwater Vulnerability Map Combined Classification: Principle Bedrock Aquifer - High Vulnerability Combined Vulnerability: High Combined Aquifer: Productive Bedrock Aquifer, No Superficial Aquifer Pollutant Speed: High Bedrock Flow: Well Connected Fractures Dilution: <300 mm/year Baseflow Index: >70% Superficial Patchiness: <90% Superficial Thickness: <3m Superficial Recharge: No Data	A13NE (S)	0	2	581184 312335
	Groundwater Vulnerability Map Combined Classification: Secondary Superficial Aquifer - High Vulnerability Combined Vulnerability: High Combined Aquifer: Productive Bedrock Aquifer, Productive Superficial Aquifer Pollutant Speed: High Bedrock Flow: Well Connected Fractures Dilution: <300 mm/year Baseflow Index: >70% Superficial Patchiness: <90% Superficial Thickness: <3m Superficial Recharge: Low	A13NW (W)	0	2	581000 312335
	Groundwater Vulnerability Map Combined Classification: Secondary Superficial Aquifer - High Vulnerability Combined Vulnerability: High Combined Aquifer: Productive Bedrock Aquifer, Productive Superficial Aquifer Pollutant Speed: High Bedrock Flow: Well Connected Fractures Dilution: <300 mm/year Baseflow Index: >70% Superficial Patchiness: <90% Superficial Thickness: <3m Superficial Recharge: No Data	A13NW (W)	0	2	581028 312344
	Groundwater Vulnerability - Soluble Rock Risk Classification: Significant Risk - Low Possibility	A18NE (N)	0	2	581184 313000
	Groundwater Vulnerability - Soluble Rock Risk Classification: Significant Risk - Low Possibility	A13NW (W)	0	2	581000 312335
	Groundwater Vulnerability - Soluble Rock Risk Classification: Significant Risk - Low Possibility	A13NE (S)	0	2	581184 312335
	Bedrock Aquifer Designations Aquifer Designation: Principal Aquifer	A13NE (S)	0	2	581184 312335
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - Undifferentiated	A13NW (W)	0	2	581028 312344
3	**Source Protection Zones** Name: Not Supplied Source: Environment Agency, Head Office Reference: Not Supplied Type: Zone III (Total Catchment): The total area needed to support the discharge from the protected groundwater source.	A13NE (S)	0	2	581184 312335
4	**Source Protection Zones** Name: Not Supplied Source: Environment Agency, Head Office Reference: Not Supplied Type: Zone II (Outer Protection Zone): Either 25% of the source area or a 400 day travel time whichever is greater.	A13NE (S)	0	2	581184 312335

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
5	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 498.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A18SW (N)	42	3	581022 312941
6	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 12.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A17SE (NW)	199	3	580821 312658
7	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 266.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A17SE (NW)	210	3	580808 312657
8	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 257.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A19NW (NE)	234	3	581573 313148
9	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 60.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A17SE (NW)	330	3	580734 312913
10	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 21.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A17NE (NW)	333	3	580728 312972
11	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 434.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A19NW (NE)	449	3	581812 313118

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
12	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 296.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A19NE (NE)	672	3	581996 313279
13	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 6.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A19SE (NE)	804	3	582177 312896
14	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 59.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A19SE (NE)	809	3	582182 312892
15	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 6.1 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A20SW (NE)	857	3	582231 312858
16	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 122.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A20SW (NE)	863	3	582236 312855
17	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 14.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A20SW (E)	961	3	582334 312783
18	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 426.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Cam Ely Ouse and South Level Primacy: 1	A20SW (E)	974	3	582347 312776
	Water Framework Directive - Catchment Class Code: River Catchment WaterBody Name: Nar upstream of Abbey Farm WaterBody ID: GB105033047791 Operational Catchment: North West Norfolk Rivers Management Catchment: North West Norfolk Catchment Name: North West Norfolk	A13NE (S)	0	2	581184 312335
	Water Framework Directive - Catchment Class Code: River Catchment WaterBody Name: Gadder WaterBody ID: GB105033047880 Operational Catchment: Wissey Management Catchment: Cam and Ely Ouse Catchment Name: Cam & Ely Ouse	A8SE (S)	709	2	581331 311517

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Framework Directive - Groundwater Waterbody Name: North West Norfolk Chalk Waterbody ID: GB40501G400200 URL Address: https://environment.data.gov.uk/catchment-planning/WaterBody/GB40501G400200 Overall Rating: Poor Chemical Rating: Poor Quantitative Measure: Poor Year: 2019	A13NE (S)	0	2	581184 312335

Waste

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Landfill Coverage Name: Norfolk County Council - Has supplied landfill data		0	4	581184 312335
	Local Authority Landfill Coverage Name: Breckland District Council - Has no landfill data to supply		0	5	581184 312335
19	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1906	A17NW (NW)	887	6	580217 313261

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: White Chalk Subgroup	A13NE (S)	0	1	581184 312335
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (W)	0	1	581028 312344
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A13NE (S)	0	1	581184 312335
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18NW (N)	0	1	581162 313000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 20 - 40 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A18NE (N)	62	1	581225 313089
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 20 - 40 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A19NW (NE)	279	1	581676 312985
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19NE (NE)	504	1	581877 313000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 20 - 40 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A19SE (NE)	553	1	581935 312945
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19NE (NE)	627	1	582000 313000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 20 - 40 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: <15 mg/kg	A19SE (NE)	729	1	582166 312927
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A7NW (SW)	864	1	580265 311725
20	**BGS Recorded Mineral Sites** Site Name: South Acre Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194420 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A13NE (NE)	32	1	581302 312606
21	**BGS Recorded Mineral Sites** Site Name: Swaffham Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194430 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A13SE (SE)	34	1	581320 312195

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Recorded Mineral Sites				
22	Site Name: South Acre Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194421 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A13NE (NE)	36	1	581396 312623
	BGS Recorded Mineral Sites				
23	Site Name: Fincham Drove Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194419 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A13NW (W)	63	1	580890 312293
	BGS Recorded Mineral Sites				
24	Site Name: Fincham Drove Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194418 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A13NW (W)	81	1	580879 312382
	BGS Recorded Mineral Sites				
25	Site Name: Bartholomew'S Hills Plantation Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194391 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Lowestoft Formation Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A18NW (N)	94	1	581066 313119
	BGS Recorded Mineral Sites				
26	Site Name: Swaffham Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194431 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A13SE (SE)	213	1	581419 312018
	BGS Recorded Mineral Sites				
27	Site Name: Herrington'S Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194390 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Lowestoft Formation Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A18NW (N)	254	1	581007 313271

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
28	**BGS Recorded Mineral Sites** Site Name: Bartholomew'S Hills Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194422 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A19SW (NE)	258	1	581631 312948
29	**BGS Recorded Mineral Sites** Site Name: Bartholomew'S Hills Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194389 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A19NW (NE)	325	1	581609 313249
30	**BGS Recorded Mineral Sites** Site Name: Swaffham Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194435 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A8NE (S)	330	1	581179 311907
31	**BGS Recorded Mineral Sites** Site Name: Swaffham Plashes Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 195395 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A9NW (SE)	522	1	581649 311785
32	**BGS Recorded Mineral Sites** Site Name: South Acre Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194416 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A17SE (NW)	549	1	580506 312844
33	**BGS Recorded Mineral Sites** Site Name: Fincham Drove Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194417 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A12SW (W)	585	1	580366 312227

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
34	**BGS Recorded Mineral Sites** Site Name: Fincham Drove Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194432 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A12SW (W)	596	1	580403 312016
35	**BGS Recorded Mineral Sites** Site Name: Bartholomew'S Hills Gravel Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194425 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Lowestoft Formation Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A19NE (NE)	617	1	581990 313004
36	**BGS Recorded Mineral Sites** Site Name: Swaffham Plashes Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 195393 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A8SW (S)	648	1	581059 311596
37	**BGS Recorded Mineral Sites** Site Name: Swaffham Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194428 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A14SE (E)	688	1	582045 312095
38	**BGS Recorded Mineral Sites** Site Name: Swaffham Plashes Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 195396 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A9NE (SE)	768	1	581966 311741
39	**BGS Recorded Mineral Sites** Site Name: Round Covert Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 195388 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A7NW (SW)	769	1	580454 311665

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Recorded Mineral Sites				
40	Site Name: Bartholomew'S Hills Gravel Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194423 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Lowestoft Formation Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A20SW (NE)	816	1	582189 312907
	BGS Recorded Mineral Sites				
41	Site Name: Forty Acre Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194415 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A16SE (W)	915	1	580067 312655
	BGS Recorded Mineral Sites				
42	Site Name: Bartholomew'S Hills Gravel Pit Location: South Acre, King'S Lynn, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194424 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Lowestoft Formation Commodity: Sand and Gravel Positional Accuracy: Located by supplier to within 10m	A20SW (NE)	931	1	582304 312875
	BGS Recorded Mineral Sites				
43	Site Name: Swaffham Plashes Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 195394 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A3NE (S)	971	1	581400 311255
	BGS Recorded Mineral Sites				
44	Site Name: Swaffham Pit Location: Swaffham, Norfolk Source: British Geological Survey, National Geoscience Information Service Reference: 194429 Type: Opencast **Status:** **Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Cretaceous Geology: White Chalk Subgroup Commodity: Chalk Positional Accuracy: Located by supplier to within 10m	A15SW (E)	986	1	582338 312039
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Mining Instability				
	Mining Evidence: Conclusive Rock Mining Source: Ove Arup & Partners Boundary Quality: As Supplied	A18NE (N)	0	6	581184 313000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Man-Made Mining Cavities Easting: 581000 Northing: 313000 Distance: 71 Quadrant Reference: A18 Quadrant Reference: NW Bearing Ref: N Cavity Type: Chalk Mine-Details Unknown Commodity: Chalk Solid Geology Detail: No Details Superficial Geology Detail: Glacial Sand and Gravel, Glacial Till	A18NW (N)	71	6	581000 313000
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	1	581184 312335
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	1	581184 312335
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	1	581184 312335
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	1	581184 312335
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	0	1	581028 312344
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A18NE (N)	58	1	581294 313085
	Potential for Ground Dissolution Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A18NW (N)	95	1	581160 313120
	Potential for Landslide Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	1	581184 312335
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	0	1	581028 312344
	Potential for Landslide Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	37	1	580914 312328
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A18NE (N)	58	1	581294 313085
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A18NW (N)	95	1	581160 313120
	Potential for Landslide Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A18NW (N)	113	1	581113 313138
	Potential for Landslide Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A18NE (N)	162	1	581406 313184
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	1	581184 312335
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	0	1	581028 312344
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	37	1	580914 312328

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A18NE (N)	162	1	581406 313184
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	1	581184 312335
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	0	1	581028 312344
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A18NE (N)	62	1	581225 313089
	Radon Potential - Radon Affected Areas Affected Area: The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	1	581184 312335
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13NE (S)	0	1	581184 312335

Industrial Land Use

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
45	**Points of Interest - Manufacturing and Production** Name: Tank Location: PE32 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A13NW (NW)	97	7	580879 312546
45	**Points of Interest - Manufacturing and Production** Name: Tanks Location: PE32 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	100	7	580878 312553
45	**Points of Interest - Manufacturing and Production** Name: Tank Location: PE32 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A13NW (NW)	114	7	580859 312536
45	**Points of Interest - Manufacturing and Production** Name: Tank Location: PE32 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A13NW (NW)	118	7	580855 312534
45	**Points of Interest - Manufacturing and Production** Name: Tanks Location: PE32 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A13NW (NW)	118	7	580855 312538
46	**Points of Interest - Manufacturing and Production** Name: Workings (Dis) Location: PE32 Category: Extractive Industries Class Code: Unspecified Quarries Or Mines Positional Accuracy: Positioned to an adjacent address or location	A16SE (W)	930	7	580054 312670

Sensitive Land Use

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
47	**Nitrate Vulnerable Zones** Name: Anglian Chalk Description: Groundwater Source: Environment Agency, Head Office	A13NE (S)	0	2	581184 312335
48	**Nitrate Vulnerable Zones** Name: Nar Upstream Of Abbey Farm Nvz Description: Surface Water Source: Environment Agency, Head Office	A13NE (S)	0	2	581184 312335
49	**Nitrate Vulnerable Zones** Name: Ely Ouse And Cut-Off Channel Nvz Description: Surface Water Source: Environment Agency, Head Office	A8NW (S)	589	2	580912 311665

Data Currency

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
Breckland District Council - Environmental Health Department	July 2025	Annual Rolling Update
Environment Agency - Head Office	November 2023	Annually
Discharge Consents		
Environment Agency - Anglian Region	July 2025	Quarterly
Enforcement and Prohibition Notices		
Environment Agency - Anglian Region	March 2013	
Integrated Pollution Controls		
Environment Agency - Anglian Region	January 2009	
Integrated Pollution Prevention And Control		
Environment Agency - Anglian Region	October 2024	Bi-Annually
Local Authority Integrated Pollution Prevention And Control		
Breckland District Council - Environmental Health Department	December 2024	Variable
Local Authority Pollution Prevention and Controls		
Breckland District Council - Environmental Health Department	December 2024	Not Applicable
Local Authority Pollution Prevention and Control Enforcements		
Breckland District Council - Environmental Health Department	December 2024	Variable
Nearest Surface Water Feature		
Ordnance Survey	September 2025	
Pollution Incidents to Controlled Waters		
Environment Agency - Anglian Region	September 1999	
Historical Prosecutions		
Environment Agency, Anglian Region	March 2013	Not Applicable
Registered Radioactive Substances		
Environment Agency - Anglian Region	May 2023	
Environment Agency - Head Office	May 2023	
Substantiated Pollution Incident Register		
Environment Agency - Anglian Region - Central Area	July 2025	Quarterly
Water Abstractions		
Environment Agency - Anglian Region	July 2025	Quarterly
Water Industry Act Referrals		
Environment Agency - Anglian Region	October 2017	
Groundwater Vulnerability Map		
Environment Agency - Head Office	June 2018	As notified
Groundwater Vulnerability - Soluble Rock Risk		
Environment Agency - Head Office	June 2018	As notified
Bedrock Aquifer Designations		
Environment Agency - Head Office	January 2018	As notified
Superficial Aquifer Designations		
Environment Agency - Head Office	January 2018	As notified
Source Protection Zones		
Environment Agency - Head Office	August 2025	Bi-Annually
Extreme Flooding from Rivers or Sea without Defences		
Environment Agency - Head Office	December 2023	As notified
Flooding from Rivers or Sea without Defences		
Environment Agency - Head Office	December 2023	As notified
Areas Benefiting from Flood Defences		
Environment Agency - Head Office	February 2023	
Flood Water Storage Areas		
Environment Agency - Head Office	June 2025	Quarterly

Data Currency

Agency & Hydrological	Version	Update Cycle
Flood Defences Environment Agency - Head Office	August 2022	
OS Water Network Lines Ordnance Survey	October 2025	Quarterly
Surface Water 1 in 30 year Flood Extent Environment Agency - Head Office	May 2018	Annually
Surface Water 1 in 100 year Flood Extent Environment Agency - Head Office	May 2018	Annually
Surface Water 1 in 1000 year Flood Extent Environment Agency - Head Office	May 2018	Annually
Surface Water Suitability Environment Agency - Head Office	February 2016	Annually
BGS Groundwater Flooding Susceptibility British Geological Survey - National Geoscience Information Service	May 2013	As notified
Water Framework Directive - Catchment Environment Agency - Head Office	July 2025	Annually
Water Framework Directive - Groundwater Environment Agency - Head Office	July 2025	Annually

Waste	Version	Update Cycle
BGS Recorded Landfill Sites British Geological Survey - National Geoscience Information Service	November 2002	As notified
Historical Landfill Sites Environment Agency - Head Office	April 2025	Bi-Annually
Integrated Pollution Control Registered Waste Sites Environment Agency - Anglian Region	January 2009	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries) Environment Agency - Anglian Region - Central Area	July 2025	Quarterly
Licensed Waste Management Facilities (Locations) Environment Agency - Anglian Region - Central Area	April 2025	Bi-Annually
Local Authority Landfill Coverage Breckland District Council - Environmental Health Department Norfolk County Council - Planning & Transportation - Minerals & Waste	February 2003 February 2003	Not Applicable Not Applicable
Local Authority Recorded Landfill Sites Breckland District Council - Environmental Health Department Norfolk County Council - Planning & Transportation - Minerals & Waste	October 2018 October 2018	
Potentially Infilled Land (Non-Water) Landmark Information Group Limited	December 1999	
Potentially Infilled Land (Water) Landmark Information Group Limited	December 1999	
Registered Landfill Sites Environment Agency - Anglian Region - Central Area	March 2006	Not Applicable
Registered Waste Transfer Sites Environment Agency - Anglian Region - Central Area	April 2018	
Registered Waste Treatment or Disposal Sites Environment Agency - Anglian Region - Central Area	June 2015	

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH) Health and Safety Executive	June 2025	Bi-Annually
Explosive Sites Health and Safety Executive	March 2017	
Notification of Installations Handling Hazardous Substances (NIHHS) Health and Safety Executive	August 2001	
Planning Hazardous Substance Enforcements Norfolk County Council - Planning & Transportation - Minerals & Waste Breckland District Council - Health and Housing	June 2007 March 2023	Annual Rolling Update Variable
Planning Hazardous Substance Consents Breckland District Council - Health and Housing Norfolk County Council - Planning & Transportation - Minerals & Waste	July 2022 June 2007	Variable Annual Rolling Update

Geological	Version	Update Cycle
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	January 2009	As notified
BGS Estimated Soil Chemistry British Geological Survey - National Geoscience Information Service	December 2015	As notified
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	April 2025	Bi-Annually
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB) Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011 November 2020	As notified
Coal Mining Affected Areas The Coal Authority - Property Searches	February 2023	
Mining Instability Ove Arup & Partners	June 1998	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	April 2020	As notified
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	As notified
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	As notified
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	As notified
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	As notified
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	As notified
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	November 2024	Annually
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	November 2024	Annually

Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	September 2025	Quarterly
Fuel Station Entries Green Street Advisor (UK) Ltd	August 2025	Quarterly
Points of Interest - Commercial Services PointX	September 2025	Quarterly
Points of Interest - Education and Health PointX	September 2025	Quarterly
Points of Interest - Manufacturing and Production PointX	September 2025	Quarterly
Points of Interest - Public Infrastructure PointX	September 2025	Quarterly
Points of Interest - Recreational and Environmental PointX	September 2025	Quarterly
Underground Electrical Cables National Grid	January 2024	

Sensitive Land Use	Version	Update Cycle
Ancient Woodland Natural England	September 2025	Bi-Annually
Areas of Adopted Green Belt Breckland District Council	July 2025	Quarterly
Areas of Unadopted Green Belt Breckland District Council	July 2025	Quarterly
Areas of Outstanding Natural Beauty Natural England	November 2025	Bi-Annually
Environmentally Sensitive Areas Natural England	August 2023	
Forest Parks Forestry Commission	May 2023	Not Applicable
Local Nature Reserves Natural England	August 2025	Bi-Annually
Marine Nature Reserves Natural England	August 2025	Bi-Annually
National Nature Reserves Natural England	July 2025	Bi-Annually
National Parks Natural England	September 2025	Annually
Nitrate Sensitive Areas Natural England	April 2023	Not Applicable
Nitrate Vulnerable Zones Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA) Environment Agency - Head Office	April 2016 November 2024	Annually
Ramsar Sites Natural England	August 2025	Bi-Annually
Sites of Special Scientific Interest Natural England	May 2025	Bi-Annually
Special Areas of Conservation Natural England	July 2025	Bi-Annually
Special Protection Areas Natural England	May 2025	Bi-Annually

Data Suppliers

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	Map data
Environment Agency	Environment Agency
Scottish Environment Protection Agency	SEPA Scottish Environment Protection Agency
The Coal Authority	The Coal Authority
British Geological Survey	BGS 1835 British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL
Centre for Ecology and Hydrology	CEH Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL
Natural Resources Wales	Cyfoeth Naturiol Cymru Natural Resources Wales
Scottish Natural Heritage	SCOTTISH NATURAL HERITAGE
Natural England	NATURAL ENGLAND
Public Health England	Public Health England
Ove Arup	ARUP
Stantec UK Ltd	Stantec

Useful Contacts

Contact	Name and Address	Contact Details
1	**British Geological Survey - Enquiry Service** British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
3	**Ordnance Survey** Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.co.uk
4	**Norfolk County Council - Planning & Transportation - Minerals & Waste** County Hall, Martineau Lane, Norwich, Norfolk, NR1 2DH	Telephone: 0844 800 8020 Fax: 0844 800 8012 Email: information@norfolk.gov.uk Website: www.norfolk.gov.uk
5	**Breckland District Council - Environmental Health Department** Elizabeth House, Walpole Loke, Dereham, Norfolk, NR19 1EE	Telephone: 01362 656350 Fax: 01362 656266 Website: www.breckland.gov.uk
6	**Landmark Information Group Limited** Landmark Information Group, Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0330 036 6619 Fax: 0844 844 9951 Email: helpdesk@landmark.co.uk Website: www.landmark.co.uk
7	**PointX** 5-6 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
8	**Natural England** County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Landmark Information Group, Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0330 036 6618 Fax: 0844 844 9951 Email: helpdesk@landmark.co.uk Website: www.landmark.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.

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