Necton Greener Grid Park
Necton, Swaffham

Flood Risk Assessment and Drainage Strategy

For

Statkraft UK LTD

motion

Document Control Sheet

Necton Greener Grid Park

Necton, Swaffham

Statkraft UK LTD

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1.0 Introduction

1.1 Motion has been commissioned by Statkraft UK Ltd to undertake a Flood Risk Assessment (FRA) and Drainage Strategy in support of a planning application for the proposed development at Necton Greener Grid Park, Necton, Swaffham, PE37 8EG. The development proposals for the Greener Grid Park (GGP) will encompass the construction and operation of a Grid services facility designed to support the flexible operation of the National Grid and the decarbonisation of electricity supply. A key function of the facility is to provide critical balancing services and to strengthen and stabilise the electricity network and to facilitate the connection of more renewable energy generation to the system. The site plan can be found in full in **Appendix A**.

1.2 This FRA and Drainage Strategy will discuss the risks to the proposed development from all sources of flooding. This report will also define how the site will manage surface water so that the development does not increase flood risk in the area or to neighbouring properties.

1.3 This FRA and drainage strategy follows the guidance set out in:

- National Planning Policy Framework (NPPF)
- Technical Guidance to the National Planning Policy Framework
- CIRIA SuDS Manual 2015 (C753)
- Environment Agency Rainfall Runoff Management for Developments.

1.4 This FRA and drainage strategy pertains only to the design of the drainage system for the built site. It does not provide details of how the site will be drained during the construction phase. This is considered to be temporary works and can only be prescribed and provided by the eventual appointed contractor.

1.5 This report does not provide information on how the drainage infrastructure will be protected during the construction phase of the project. The provision of this information is the responsibility of the appointed contractor.

2.0 Site Description

Table 2.1 – Site Summary

Site Name	Necton Greener Grid Park.
Location	Necton Greener Grid Park, Necton, Swaffham, PE37 8EG.
Grid Reference	E 588675, N 310413
Site Area	11.5 Ha (approximately).
Development Type	Greener Grid Park (GGP).
Environment Agency (EA) Flood Zone	Flood Zone 1.
Surface Water Flood Risk	Very Low Risk with some small areas at Low risk.
Local Water Authority	Anglian Water.
Local Planning Authority	Breckland District Council (BDC).
Lead Local Flood Authority	Norfolk County Council (NCC).

Site Location and Description

2.1 The site is situated east off the A47. The nearest postcode is PE37 8EG and the grid reference is E 588675, N 310413.

2.2 The site is an agricultural field made up of a wheat crop and can be described as completely greenfield. The northern and southern border of the site comprise of hedgerow with the Necton Onshore substation and pond situated adjacent to the northern boundary. The eastern and western borders are made up of various mature trees and hedges. A cluster of mature trees are situated in the centre of the field. The remaining immediate surrounding area of the site comprise of agricultural fields with hedge borders. The town of Necton is located southwest of the site.

2.3 As detailed in the introduction to this report, the location of the Necton Greener Grid Park can be found in **Appendix A.**

Topography

2.4 A topographic survey of the site has been undertaken by Mining Surveys (UK) Limited in November 2022 and the outputs can be seen in **Appendix B**. The site generally falls from north to south with ground levels ranging from approximately 71.71 metres Above Ordnance Datum (mAOD) to 56.33mAOD.

Geology

2.5 The British Geological Survey (BGS) online Geoindex Mapping indicates that the site is underlain by Lewis Nodular Chalk, Seaford Chalk formation, Newhaven Chalk formation and Culver Chalk formation. There are superficial deposits of Lowerstoft formation Deposits made up of sand, clay and silt. Borehole records from the surrounding area have been obtained from the BGS online index, these can be found in **Appendix C**. The nearest available borehole is approximately 1km south of the site. This Borehole record support the findings of the BGS mapping and confirm that the site is underlain by chalk and clay.

Infiltration Testing

2.6 As part of this application infiltration testing was undertaken by Geo-Environmental Services in December 2022. The results are summarised in Table 2.2 and can be found in full in **Appendix D**. The soakage testing was undertaken in general accordance with BRE Digest 365. Due to the ground conditions three filling and inundation cycles were not completed within any of the trial pits (TP01-TP-05). An infiltration rate, using the standard methodology contained in BRE 365 'Soakaway Design' could only be calculated for test within TP04a. All other tests had an insufficient fall in head to complete the test and enable derivation of the infiltration rate. While an infiltration rate could be derived from the testing in TP04a, the soils encountered were broadly consistent with those in other trial pits where testing was not successful. It is thought that TP04a was close to a land drain so is not representative. Therefore, it is not thought that infiltration testing is viable on site.

Table 2.2 – Infiltration Testing results

Location	Test number	Depth of Pit (m bgl)	Calculated Infiltration rate (m/s)
TP01	1	3.00	Insufficient fall in water to complete test
TP01a	1	0.75	Insufficient fall in water to complete test
TP02	1	3.00	Insufficient fall in water to complete test
TP03	1	3.00	Insufficient fall in water to complete test
TP03a	1	0.79	Insufficient fall in water to complete test
TP04	1	3.00	Insufficient fall in water to complete test
TP04a	1	0.72	$1.0x10^{-5}$
TP05	1	3.00	Insufficient fall in water to complete test

Hydrogeology

2.7 Defra's Magic Map indicates that the site is located in a Principal Groundwater Source Protection Zone (SPZ) and falls within a 'Secondary A' Aquifer designation for superficial geology.

2.8 A flood screening report has been obtained from Envirocheck Landmark Information Group Ltd and this can be found in **Appendix E**. The report shows that the site has limited potential for groundwater flooding to occur according to the BGS Groundwater Flooding Susceptibility maps and that the GeoSmart Information on groundwater flood risk places the site in an area of negligible risk.

Hydrology

2.9 The nearest main river to the site is a River Wissey which runs in a westerly direction approximately 2km south of the site. The nearest watercourse to the site is a tributary of the River Wissey which runs about 100m from the sites southern boundary.

Existing Drainage Regime

2.10 The site is an agricultural field made up of a wheat crop and can be described as completely greenfield due to its undeveloped status.

2.11 A site visit was undertaken in January 2023 which showed that the existing Necton Onshore substation drained to the attenuation pond to the east of the substation and then into a drainage ditch. There are a

number of drainage ditches in close vicinity to the site. The nearest being approximately 300m east of the proposed development site and runs adjacent to the neighbouring agricultural field.

2.12 Asset records obtained from Anglian Water indicate there no surface water or foul water assets in close vicinity to the site. Asset records can be found in full in **Appendix F.**

2.13 The total area of the site is 11.5ha. UKSUDS was used to calculate the QBar Greenfield runoff rate for the entire site showing a result of 32.09 l/s or 2.79 l/s/ha. UKSUDS QBar outputs can be found in **Appendix G.**

3.0 Proposed Development

3.1 The development proposals are for the Greener Grid Park (GGP). The proposed GGP facility will encompass the construction and operation of a Grid services facility designed to support the flexible operation of the National Grid and the decarbonisation of electricity supply. The site layout can be seen in **Appendix A**.

3.2 The site is an agricultural field made up of a wheat crop and can be described as completely greenfield. The proposed development will increase the impermeable areas on site and, therefore, will increase the quantity of surface water runoff from rainfall.

4.0 Legislative and Policy Framework

Flood and Water Management Act

4.1 The Flood and Water Management Act 2010 (FWMA) received Royal Assent on 8th April 2010. The Act was introduced to enforce some of the key proposals set out within UK Government flood and water strategies along with UK Government's response to the Sir Michael Pitt's Review of the summer 2007 floods.

4.2 LLFA's, including Norfolk County Council (NCC), have a responsibility under the FWMA to develop, maintain, apply and monitor the application of a strategy for local flood risk in their area. Local flood risk is defined as flood risk arising from surface run-off, groundwater and ordinary watercourses (i.e. non main rivers). The EA plays a role in managing the watercourses designated as 'main rivers'.

The Environment Agency Flood Map for Planning

4.3 The EA's Flood Map for Planning gives an indicative prediction of areas at risk of fluvial and tidal flooding. The mapping is an amalgamation of modelled flood levels and historical flood event outlines.

4.4 The Flood Map is split into 'Flood Zones', which demarcate the extent of flooding from rivers or the sea for different return periods. The Flood Map for Planning shows the extent of the natural floodplain if there were no defences or other man-made structures. They do not provide a definitive picture of where flooding would occur; rather, they provide an indicative prediction of areas at risk.

4.5 Table 4.1, below, lists the flood zone categories and explains the flood risk probabilities they represent.

Table 4.1 – Flood Zone Categories

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. This is generally delineated as land having a 1 in 30 or greater annual probability of flooding. Local planning authorities should identify in their SFRAs areas of functional floodplain and its boundaries accordingly, in agreement with the EA. (Not separately distinguished from Zone 3a on the Flood Map)

The National Planning Policy Framework

4.6 The NPPF sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. The Technical Guidance to the NPPF provides further information on the policies set out in the NPPF. It encourages development to take place in areas of lower flood risk wherever possible and stresses the importance of preventing increases in flood risk off-site to the wider catchment area. This includes ensuring that flood risk is taken into account at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from those areas where risks are highest.

4.7 A site-specific FRA is required for proposals of 1ha or greater in Flood Zone 1, all proposals for development in Flood Zones 2 and 3, or in an area within Flood Zone 1 that has critical drainage problems (as notified to the local planning authority by the EA). The FRA should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

4.8 Within each Flood Zone, a key factor in determining planning applications for development is the flood risk vulnerability of a development. Table 2 of the Technical Guidance to the NPPF categorises different development types according to their vulnerability to flooding. These categories are:

- Essential infrastructure;
- Highly vulnerable development;
- More vulnerable development;
- Less vulnerable development, and;
- Water-compatible development.

4.9 Within the different Flood Zones each of the above development categories are considered appropriate or not permissible. The Technical Guidance to the NPPF lists these as:

Flood Zone 1:

- All the development categories listed above are appropriate.

Flood Zone 2:

- Water-compatible, less vulnerable development, more vulnerable development and essential infrastructure is appropriate in this zone.

Flood Zone 3a:

- Water-compatible and less vulnerable development is appropriate in this zone. Highly vulnerable development should not be permitted in this zone.

Flood Zone 3b:

- Only water-compatible development and essential infrastructure that has to be there should be permitted in this zone.

4.10 The above information sets out the basis by which developments must be assessed in terms of flood risk. Later in this report the proposed development will be reviewed against the Flood Zone in which it is located. This will inform the appropriateness of the proposed reconstruction, as per the advice within the Technical Guidance to the NPPF.

Lead Local Flood Authority

4.11 As of April 2015, the LLFA became a statutory consultee on all major planning applications. The LLFA is required to assess planning applications in respect of surface water drainage and sustainable drainage systems. NCC is the LLFA for the Necton Area.

Environment Agency Flood Map

4.12 The EA Flood Map shows that the site is wholly located within Flood Zone 1 (less than 1 in 1000 annual probability of flooding from rivers or the sea). The EA Flood map is provided in **Appendix H**.

4.13 In accordance with the NPPF, Necton Greener Grid Park is classed as a 'Essential Infrastructure' land use and as such the proposed development is appropriately located within in Flood Zone 1.

The Sequential and Exception Tests

4.14 The NPPF specifies that the suitability of all new development in relation to flood risk should be assessed by applying the Sequential Test to demonstrate that there are no reasonably alternative sites available in areas with a lower probability of flooding that would be appropriate to the type of proposed development.

4.15 The development site is located within Flood Zone 1 so therefore passes the Sequential and Exception Test.

5.0 Current Flood Risk

5.1 Flooding can arise from a variety or combination of sources. These may be natural or artificial and may be affected by climate change. These are discussed, in the following two sections and summarised in the next chapter. The probability of any likely impacts is also assessed.

Flooding from Rivers and the Sea

5.2 A review of the EA's Flood Map for Planning (**Appendix H**) shows that the entire site is located within Flood Zone 1 (less than 1 in 1000 annual probability of flooding from rivers or the sea).

5.3 The Envirocheck Flood Screening Report in **Appendix E** places the site outside of any fluvial or tidal flood risk areas.

5.4 Grid Park Facilities are considered to be 'Essential Infrastructure' under the NPPF and is appropriate in Flood Zone 1. Therefore, the development is appropriately located.

Surface Water Flooding

5.5 Surface water, or pluvial flooding, results from rainfall-generated overland flow, where rainwater has not yet reached a watercourse or sewer and where the local drainage systems become overwhelmed. Pluvial flooding often occurs during short, very intense storms, but can also occur during longer periods of rainfall when the ground is already saturated, or where land has low permeability due to development.

5.6 In these conditions surface water can build up where the topography allows it to converge or pond. Where it gathers it will travel down prevailing gradients. Pluvial flooding then occurs at locations where significant surface water flow paths converge, at localised low points and/or due to overland obstructions. In urban areas pluvial flooding often occurs where the built environment channels overland flow routes (down roads that are bounded by kerbs, for example) or where there are obstacles to the natural overland flow routes. Boundary walls and buildings are often the main causes and, hence, the likelihood of pluvial flooding to impact property and gardens.

5.7 Pluvial flooding is exacerbated in many cases by the mistreatment or failure of the below ground infrastructure (including partial or full blockages of gullies and/or within the combined sewers and the accumulation of fats, oils and greases within the sewer networks).

5.8 Generally speaking, pluvial flooding is less of an issue in rural areas. This is partly because the natural 'greenfield' state of land allows for the interception of rainfall and the slowing down of overland flow, so the accumulation of surface water is less likely. It is also because there are much less 'receptors' of surface water flooding in rural areas and many incidences of surface water flooding in rural areas go unnoticed or unreported as they are of no consequence.

5.9 The Envirocheck Flood Screening Report in **Appendix E** provides detailed information on surface water flood risk on the site. Referring to the JBA Pluvial Flood Risk Mapping (undefended), it shows that the site is not at risk of surface water flooding from the 1 in 30-year (3.3% AEP) pluvial flood event, the 1 in 200-year (0.5% AEP) pluvial flood event and from the 1 in 1,000-year (0.1% AEP) pluvial flood event.

5.10 The EA surface water flood map for the site can be found in **Appendix I**. This mapping shows that the majority of the site is located wholly within in the 'very low' surface water flood risk category (greater than a 1 in 1,000 AEP surface water flood event).

5.11 Therefore, it is considered that the site is at a low risk of surface water flooding. The development is considered to be 'Essential Infrastructure' by the NPPF which means that it is appropriate in this location with regards to the levels of local surface water flood risk.

Groundwater Flooding

5.12 The risk of groundwater flooding is dependent on local geological and hydrogeological conditions at any given time. Groundwater levels rise during wet winter months and fall again in the summer when rainfall is low and extractions are higher. In very wet winters, rising groundwater levels can reactivate flow in ephemeral streams that only flow for part of the year or even lead to the flooding of normally dry land.

5.13 BGS mapping and the local boreholes have identified that the development site is underlain by Thanet Formation made up of sand, silt and clay with superficial deposits of Tidal Flat Deposits made up of clay and silt. This geology is generally thought to be hydraulically unproductive and at low susceptibility to groundwater flooding.

5.14 As mentioned in paragraph 2.8, the Envirocheck Flood Screening Report in **Appendix E** shows that the site has limited potential for groundwater flooding to occur according to the BGS Groundwater Flooding Susceptibility maps and that the GeoSmart Information on groundwater flood risk places the site in an area of negligible risk.

5.15 Therefore, the site is considered to be at very low risk of flooding from groundwater.

Flooding from Infrastructure Failure

5.16 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or because of a reduction in capacity due to collapse, siltation, blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

5.17 Typically, sewer systems are constructed to accommodate rainstorms with a 30-year return period or less, depending on their age. Consequently, rainstorm events greater than 1 in 30-years would be expected to result in surcharging of some parts of the sewer system. In fact, due to most gullies being poorly maintained and often partially blocked with silt, leaves and other debris, their capacity is often estimated to be closer to the 1 in 10-year storm.

5.18 There are no known sewers in the vicinity of the site. There are no records of flooding from the on-site sewerage in the vicinity of the site. Therefore, the site is considered to be at low risk of flooding from infrastructure failure.

5.19 Looking forward, the development's drainage must be designed in accordance with Sewers for Adoption, The Design and Construction Guidance (DCG), Building Regulations Approved Document Part H and BS EN 752. This will minimise the future risk of flooding due infrastructure failure.

Flooding from Artificial sources

5.20 The EA provides a map showing the maximum potential flood extent should all reservoirs with a capacity of greater than 25,000 cubic metres fail and release the water they hold.

5.21 The map shows that the site would not experience flooding in this scenario. There are no other significant artificial waterbodies (such as canals) in proximity of the site.

6.0 Future Flood Risk & Climate Change

6.1 The 2021 NPPF and the supporting Technical Guidance document sets out how flood risk should be considered over the lifetime of a development. This requires an increase in flood risk due to climate change to be taken into account. Both peak river flows and rainfall intensity should be assessed.

Peak River Flows

6.2 Because the site is not close to any watercourses or near to any higher risk flood zones, increases in future peak river flows do not need to be considered.

Peak Rainfall Intensity

6.1 With climate change it is becoming more common to see rainfall events of higher intensity, particularly in the southeast of England. Increased rainfall intensity affects river levels and drainage systems, with the result being an increase in surface water flooding and sewerage surcharge.

6.2 The NPPF states that, for flood risk assessments, the Peak Rainfall Allowances Map should be referenced to found out what the anticipated changes in peak rainfall are. For residential developments, which have a minimum lifespan of 100 years, the upper end climate change allowances for both the 3.3% AEP and 1% AEP events should be used.

6.3 The development site lies within the Stour Management Catchment. In this catchment, the upper end climate change allowance for the 3.3% AEP and 1% AEP rainfall events are 40% and 45%, respectively. Therefore, the development can expect peak rainfall increases of this magnitude and should use these percentage increases in the assessment of future surface water flood risk.

6.4 The majority of the site is at 'very low' risk of surface water flooding and is anticipated to remain that way.

6.5 In addition, it is important that:

- Any changes to the land in this area must remain sensitive to the local surface water flood risk. This will ensure that any natural overland flow routes and surface water pathways will remain the same and the conveyance of surface water is not impeded.
- The surface water strategy for the site takes the latest climate change predictions into account, so as not to increase flood risk on- or off-site.

Residual Flood Risk

6.6 It is important to recognise that flood risk can never be fully mitigated and there will always be a residual risk of flooding. The residual risk is associated with several potential risk factors, including (but not limited to):

- A flood event that exceeds that for which the local flood defences or local drainage system has been designed to withstand.
- A residual danger posed to property and life because of flood defence failure through overtopping or structural collapse.
- General uncertainties inherent in the prediction of flooding.

6.7 Modelling of flood events is not an exact science. Therefore, there is an inherent uncertainty in the prediction of flood levels and extents used in the assessment of flood risk. EA's Flood Map for Planning is largely based upon detailed modelling within the area. However, other mapping products require numerous assumptions to be made. Whilst they all provide a good depiction of flood risk for specific modelled conditions, all modelling requires the making of core assumptions, and these might not occur

in the open and dynamic environment of a flood event. Also, the EA's Flood Map for Planning and other flood modelling is updated regularly. Interested parties are recommended to keep abreast of this so that a significant change or increase in flood risk can be determined.

Table 6.1 – Residual Flood Risk

Flood Source	Risk Level				Comment
	High	Medium	Low	Very Low	
Fluvial				X	Flood Zone 1
Tidal				X	Tidal Flood Zone 1, far inland
Groundwater				X	Geology is hydraulically unproductive.
Surface Water				X	The site is at low surface water flood risk
Canals				X	There are no canals in the vicinity.
Reservoirs				X	The Reservoir Flood Risk Map places the site well outside a maximum extent of flooding
Infrastructure Failure				X	No evidence that existing infrastructure has failed.
Increase due to Climate Change				X	Increased peak river flows and rainfall intensities are not expected to affect any infrastructure or properties.

7.0 Surface Water Drainage Strategy

Proposed Surface Water Drainage Strategy

7.1 Current planning policy and Environment Agency (EA) guidance requires developments to employ SuDS (Sustainable Drainage Systems) techniques wherever feasible. Careful design of SuDS features can ensure that a development's surface water drainage closely reflects the natural hydrology of the pre-developed site.

7.2 SuDS will attenuate and treat surface water run-off quantities at the source (source control) in line with NPPF and EA policies.

7.3 Source control systems treat surface water close to the point of origin, in features such as soakaways, permeable paving and swales, to name a few.

7.4 The existing and proposed impermeable areas for the development site are summarised in Table 7.1 below. This demonstrates that the proposed development will increase the hardstanding area of the site.

Table 7.1 – Existing and proposed Surface cover

Land Use	Impermeable Area		Gardens and Landscaping	
	Area (ha)	% Cover	Area (ha)	% Cover
Existing	0	0	2.8	100
Proposed	1.8	64	1.0	36

The Drainage Hierarchy

7.5 The drainage hierarchy is a sequential check that intends to ensure that all practical and reasonable measures are taken to manage surface water as high up the hierarchy (with '1' being the highest) as possible, and that the amount of surface water managed at the bottom of the hierarchy is minimised. The Planning Practice Guidance to the National Planning Policy Framework (NPPF) states that "*Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable*".

7.6 The drainage hierarchy presented in the NPPF presents only four tiers of drainage options. This has been expanded on and adopted by others and now can be viewed as the following:

1. Store rainwater for later use
2. Use infiltration techniques, such as porous surfaces in non-clay areas
3. Attenuate rainwater in ponds or open water features for gradual release
4. Attenuate rainwater by storing in tanks or sealed water features for gradual release
5. Discharge rainwater direct to a watercourse
6. Discharge rainwater to a surface water sewer/drain
7. Discharge rainwater to the combined sewer.
8. Discharge rainwater to the foul sewer.

7.7 The first two tiers of the drainage hierarchy ensure that surface water is retained within the site boundary and does not increase flood risk to others. This is always the most preferable method of surface water management.

7.8 The next six tiers of the hierarchy provide regional control, but with decreasing levels of pollution removal and reduced potential for amenity and habitat creation with each tier of the drainage hierarchy.

7.9 Within the lower six tiers of the drainage hierarchy, there must be some form of flow restriction, so that off-site surface water discharge resembles greenfield runoff rates, as much as is reasonably practicable. This requires on-site storage facilities, which may include ponds, swales, subsurface storage tanks and System C (non-infiltration) permeable paviours with flow control devices. Again, methods that provide the most potential for amenity and pollution removal should be favoured.

7.10 Each tier of the drainage hierarchy has been considered for the surface water drainage for the development site. In order of preference, the outcome of these considerations is below.

Tier 1 - Store rainwater for later use

7.11 The site has limited opportunities to use water reuse and recycling techniques. However, waterbutts could be considered.

Tier 2 - Use Infiltration techniques, such as porous surfaces in non-clay areas

7.12 As detailed in Chapter 2 infiltration techniques are not viable on site.

Tier 3 - Attenuate rainwater in ponds or open water features for gradual release

7.13 Ponds and open water features are SuDS features that offer surface water attenuation, pollution mitigation and amenity and biodiversity benefits.

7.14 A hydraulic model has been produced using MicroDrainage to represent the proposed drainage. The MicroDrainage model results can be found in **Appendix I**.

7.15 The proposed drainage strategy can be found in full in **Appendix J.** In order to attenuate the additional surface water from the development it is proposed to have an attenuation pond which covers an area of 582m^2 and a depth of 1m. The surface water will be restricted by a hydrobrake to 5.2l/s which is the Qbar greenfield runoff rate for the site. The ground treatment will be crushed stone and 300mm type 3 subbase which will be used as attenuation storage on site.

7.16 Tier 4 - Attenuate rainwater by storing in tanks or sealed water features for gradual release

7.17 This tier of the drainage hierarchy will not be needed for surface water discharge.

Tier 5 - Discharge rainwater direct to a watercourse

7.18 As stated above, it is proposed to discharge surface water to the drainage ditch to the east of the site. at a restricted rate of 5.2 l/s, which is the Qbar greenfield runoff rate for the site.

Tier 6 - Discharge rainwater to a surface water sewer/drain

7.19 This tier of the drainage hierarchy will not be needed for surface water discharge.

Tier 7 - Discharge rainwater to the combined sewer

7.20 This tier of the drainage hierarchy will not be needed for surface water discharge.

Tier 8 - Discharge rainwater to the foul sewer

7.21 This tier of the drainage hierarchy will not be needed for surface water discharge.

Surface Water Runoff Quality

7.22 The 2021 NPPF (Section 174) states that the development should not have a detrimental impact on the environment, including the water environment. The technical guidance to the NPPF provides further advice on the benefits of ensuring runoff quality is to an appropriate standard.

7.23 The CIRIA SuDS Manual provides guidance on the treatment of surface water runoff. With regards to the parking areas and access road, Table 4.3 of the CIRIA SuDS Manual rates the pollution hazard from individual property driveways, residential car parks and low traffic roads as 'low'. To mitigate a 'low' pollution hazard, the CIRIA SuDS Manual recommends using a simple index approach in line with Section 26.7.1. This is discussed, below.

7.24 Table 26.2 of the CIRIA SuDS Manual provides pollution hazard indices for different land use classifications. The land use classification that requires consideration for the parking areas on the site is in Table 7.2 below.

Table 7.2 – Excerpt from Table 26.2 of CIRIA SuDS Manual

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4

7.25 To deliver adequate pollution treatment and mitigation, the CIRIA SuDS Manual recommends using a SuDS component that has a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type).

7.26 Table 26.3 of the CIRIA SuDS Manual provides indicative SuDS mitigation indices for each SuDS type. Table 7.3, below, which is an excerpt from Table 26.3, shows the mitigation index for a pond or wetland.

Table 7.3 – Excerpt from Table 26.3 of CIRIA SuDS Manual

Type of SuDS Component	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Pond or wetland	0.7	0.7	0.5

7.27 The mitigation indices for a pond and wetland exceed those of the highest pollution hazard index figures from Table 7.2. As can be seen, the pollution mitigation indices offered by a pond easily exceeds the pollution hazard indices for all contaminant types.

8.0 Summary and Conclusion

8.1 Motion has been commissioned by Statkraft Uk LTD to undertake a Flood Risk Assessment (FRA) and Drainage Strategy in support of a planning application for the proposed development at Necton Greener Grid Park, Necton, Swaffham, PE37 8EG. The development proposals for the Greener Grid Park (GGP) will encompass the construction and operation of a Grid services facility designed to support the flexible operation of the National Grid and the decarbonisation of electricity supply. A key function of the facility is to provide critical balancing services and to strengthen and stabilise the electricity network and to facilitate the connection of more renewable energy generation to the system.

8.2 The site is an agricultural field made up of a wheat crop and cam be described as completely greenfield.

8.3 The nearest main river to the site is a River Wissey which runs in a westerly direction approximately 2km south of the site. The nearest watercourse to the site is a tributary of the River Wissey which runs about 100m from the sites southern boundary.

8.4 The EA Flood Map shows that the site is wholly located within Flood Zone 1 (less than 1 in 1000 annual probability of flooding from rivers or the sea).

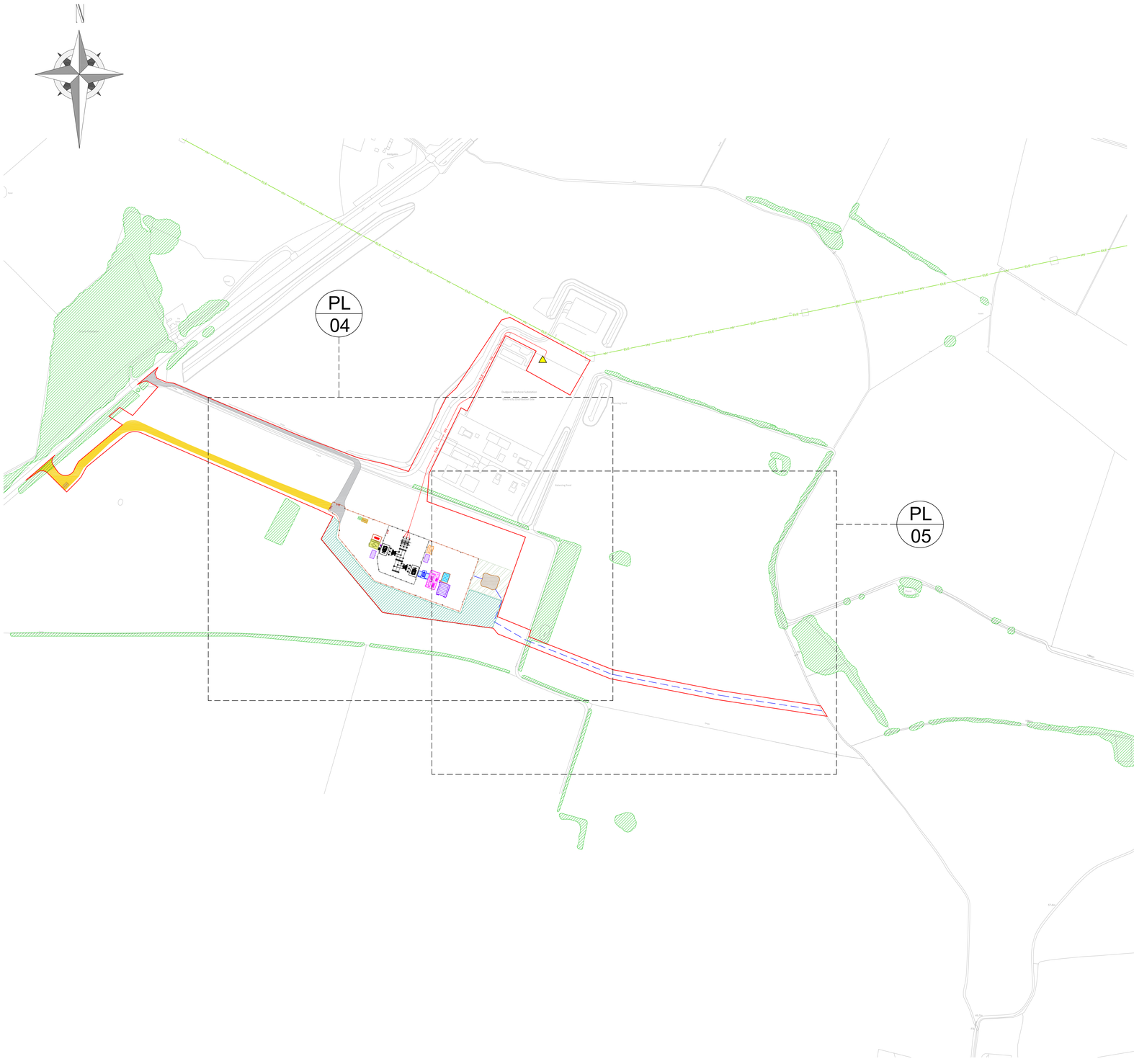
8.5 The site is considered to be low risk of flooding from rivers and sea, surface water, ground water, Infrastructure Failure and artificial sources.

8.6 In order to attenuate the additional surface water from the development it is proposed to have an attenuation pond which covers an area of 582m^2 and a depth of 1m. The surface water will be restricted by a hydrobrake to 5.2l/s which is the Qbar greenfield runoff rate for the site. The ground treatment will be crushed stone and 300mm type 3 subbase which will be used as attenuation storage on site.

Appendix A

Site Plan

A0



1 NECTON SITE LAYOUT PLAN

 Scale: 1:2500@A0

0 50 100 150 200 250m
SCALE 1:2500

Revisions:

Revision	Date	Revision Notes	Drawn	Inspected
01	02.05.23	First Issue	GF	JM
02	24.05.23	Amendments to Site Layout	MC	JM
03	06.06.23	BNG Added	GF	JM
04	03.07.23	Revised	MC	JM
05	05.07.23	POC and SUDs Basin Amended	CS	JM

LEGEND:

- PLANNING APPLICATION BOUNDARY
- TEMPORARY CONSTRUCTION ACCESS
- PERMANENT SITE ACCESS OPTION
- EXISTING O/H ELEC CABLE (ELE — HV — ELE)
- WELDMESH FENCE 3.4m High
- PALISADE FENCE 3.4m High
- PROPOSED CABLE ROUTE (INDICATIVE) (ELE — HV — ELE)

SITE INFRASTRUCTURE:

- SECURITY GATE (3.4m High)
- CCTV & LIGHT COLUMN 6m High
- AUX TX 3m (W) x 2m (L) x 3.6m (H)
- COOLER WITH NOISE ATTENUATING WALL 4m (H) 8.2m (W) x 2.8m (L) x 2.5m (H)
- COMMS HOUSE 7m (W) x 13m (L) x 3.5m (H)
- OFFICES 3.1m (W) x 9.8m (L) x 3.5m (H)
- STORES 2.4m (W) x 6.1m (L) x 2.60m (H)
- EMERGENCY GENERATOR 3.5m (W) x 12.95m (L) x 3.5m (H)
- SC BUILDING 15m (W) x 12.5m (L) x 7m (H)
- COOLERS 2 WITH NOISE ATTENUATING WALL 4m (H) 9.7m (W) x 12.9m (L) x 2.83m (H)
- HISC BUILDING 18m (W) x 28m (L) x 11m (H)
- CONTROL CONTAINERS 16m (W) x 21m (L) x 5.2m (H)
- HV YARD (42.2m (W) x 78.60m (L) x 11.87m (H)
- CIRCUIT BREAKER & AUXILIARY TRANSFORMER 12.5m (W) x 18.4m (L) x 10m (H)

VEGETATION:

- PROPOSED VEGETATION
- EXISTING VEGETATION
- BIODIVERSITY NET GAIN
- SUDs BASIN
- DRAINAGE PIPELINE CORRIDOR (INDICATIVE)

Project:

Necton Greener Grid Park

Client:

Statkraft

Statkraft UK Ltd.
19th Floor, 22 Bishopsgate
London, EC2N 4BQ
Tel: +44 (0) 20 7549 1000

Drawn by:

CADmando
2D , 3D CAD & BIM SERVICES

CADmando Design & Draughting Solutions Ltd
The Long Barn, The Courtyard, Severn Drive, Tewkesbury Business Park, GL20 8GD
Tel: +44 (0) 1684 850019
Mob: +44 (0) 7814436910

Status:

PLANNING

Drawing Title:

Site Layout Plan

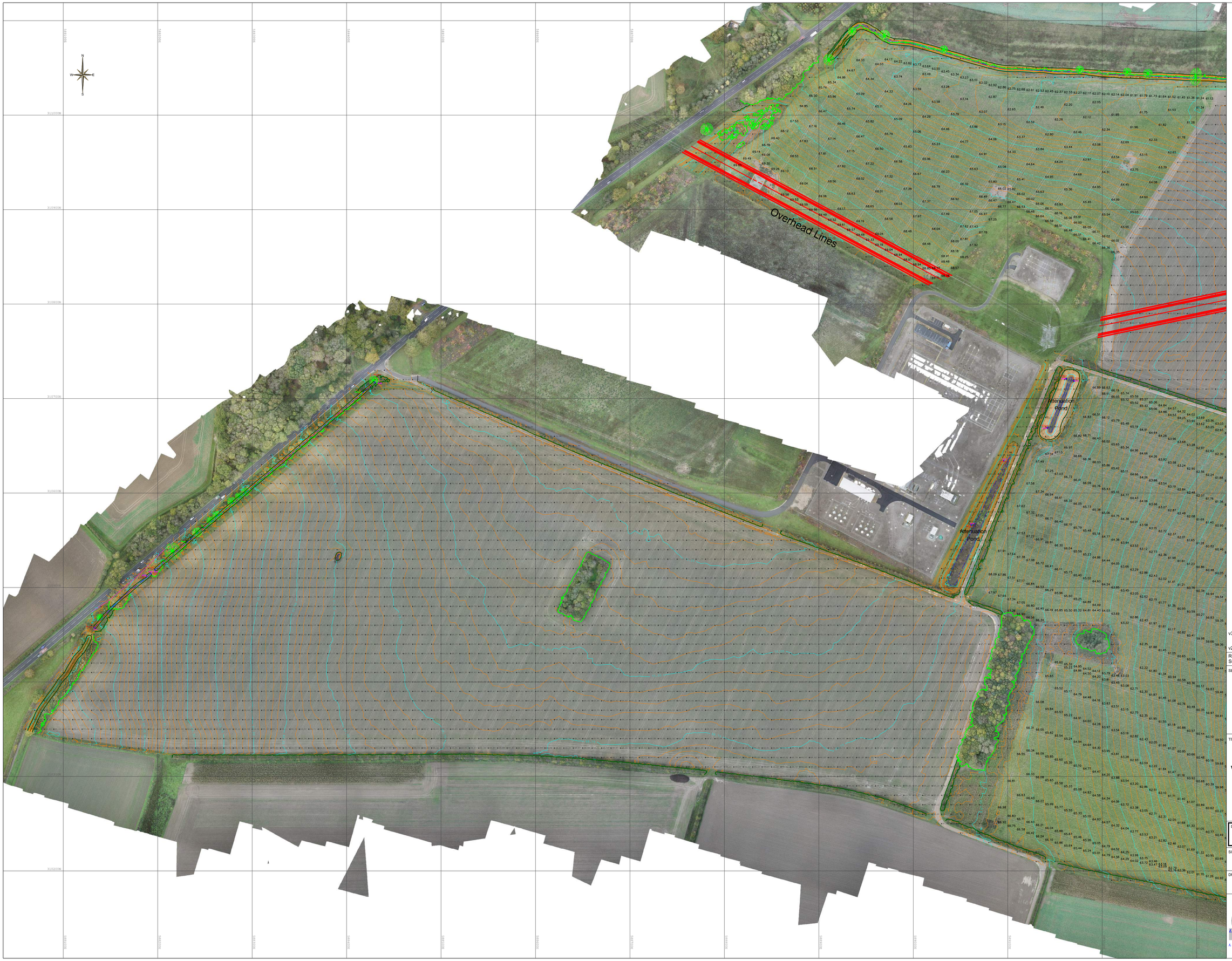
Drawn:	Checked:	First Issued:
GF	JM	02.05.2023

Project Code: **STA002-** Drawing Number: **PL-03**

Sheet Size:	Scale:	Revision:
A0	**1:2500**	**05**

Appendix B

Topographic Data



LEGEND

Approximate Water Level
Barrier
Bench
Bollards
Bottom of Bank
Brick Path
Bottom of Kerb
Bridge
Building
Catch Pit
Channel
Child Play Equipment
Chimney
Cobbled Path
Column Base
Communication Tower
Concrete Column
Concrete Pole
Conductor Lines
Contours-Normal
Contours-Prominent
Conveyor Beam
Corrugated Sheet
Culvert
Door
Drain
Eaves
Edge of Concrete
Edge of Grass
Edge of Road
Edge of Tarmac
Edge of Track
Edging strip
Electric Box
Electricity Pole
Fence Chain and Link
Fence Post and Board
Fence Post and Panel
Fence Post and Wire
Footpath
Gate
Gate opening
Gulley
Hedge

Inspection Cover
Interior Wall
Ladder
Lamp Post
Marker Post
Metal Fence
Paving Slab
Pergola
Post
Pylon
Ridge
Ridge and Eave Heights
Road Barrier
Road Marking
Roof
RSJ Column
Ruins
Sign
Signal Light
Sill
Spot Levell
Stay
Steel Column
Steelwork
Steps
Stockpile
Stone Bollard
Structure
Tank/Silo
Top of Bank
Temporary Fence
Top of Kerb
Tree
Tree Canopy
Tree Trunk
Vegetation
Walkway
Wall
WC
Well
Window

Notes:

Survey related to "OS Net" using real time correction with Trimble VRS Now.

Levels related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM02.

Every effort has been made to identify all visible above ground features. However, bare in mind that at the time of survey, some features may have been obscured.

Treat levels in dense vegetation with caution.
Treat levels in water with caution.

Visible features detailed on the survey may not represent the legal ownership boundries.

Rev. Suffix	Date	Details
v3	09/01/23	Add Re-surveyed ditch and detail and Added surveyed detail to Attenuation ponds
v2	20/12/22	Add estimated ditches, Road and Track and ammend contours and levels

SITE

Necton
Swaffam
PE37 8EG

TITLE

Topographical Survey
with 250mm Contour interval
and Spot levels
To OS Grid and Datum

DWG. No.	REV
NT/DWD/HV/001	V3

SCALE	DATE
1:1750	03/11/2022

DRAWN	STATUS
H.Vaughan	Draft

Mining Surveys (UK) Ltd

Land Surveying, Measured Building Surveys, Hydrographic Surveys 3D Visualisation, Planning, Design and Evaluation

3, The Bridge Business Centre, Beresford Way, Dunston, Chesterfield, Derbyshire S41 9FG
Tel 01246 268444 / 07798 843146 / 07798 863164 Fax 01246 268129

Appendix C

BGS Borehole Records

May Gurney	May Gurney (Technical Services) Limited	JOB No. 44880
LOCATION: PROPOSED HOUSING DEV. OFF CHANTRY COURT, NECTON, NORFOLK TF80NE/18		
COMMENCED: 16.9.88 COMPLETED: 16.9.88	DIAMETER: 150mm	BOREHOLE No: 4

DESCRIPTION	LEGEND	DEPTH (m)	REDUCED LEVEL	SAMPLE/ TEST	DEPTH (m)	REMARKS
GROUND LEVEL		0.00	44.04	B1	0.00-0.70	
Dark brown sandy TOPSOIL with abundant rootlets and some sub angular fine to coarse gravel				J1	0.10	
		0.70	43.34	S	0.70	N = 11
LOOSE to MEDIUM DENSE grey and orange-brown slightly clayey silty fine to medium SAND with some sub angular fine to coarse gravel				B2	0.70-1.50	
				J2	1.00	
				S	1.50	N = 5
		1.70	42.34	B3	1.70-2.30	
SOFT grey slightly sandy silty CLAY				J3	1.90	
		2.30	41.74	S	2.30	N = 19
FIRM grey slightly sandy silty CLAY with much fine to medium chalk gravel and occasional flint becoming very sandy and very silty				B4	2.30-3.10	
				J4	2.70	
				S	3.10	N = 15
(GLACIAL TILL)				B5	3.10-4.30	
				J5	3.50	
		4.30	39.74	J6	4.30	
FIRM grey very silty CLAY with a little chalk gravel				S	4.60	N = 18
(GLACIAL TILL)			38.94	J7	5.00	
END OF BOREHOLE		5.10				

GROUNDWATER NOTES

DATE/TIME	STRUCK	STANDING	RATE OF RISE	DEPTH OF CASING	DEPTH OF SEAL
16.9.88	DRY				

REMARKS

SAMPLE/TEST KEY

J	Jar disturbed sample
B	Bulk disturbed sample
U	Undisturbed sample (No of Blows)
P	100mm dia. piston sample
W	Water sample
S	Standard Penetration Test
C	Cone Penetration Test
N	= No. blows per 300mm penetration
FHT	Falling Head (results elsewhere)
V	Vane test

Appendix D

Infiltration Testing

16th December 2022

Our ref: GE21178/TU01/221216

Geo-Environmental

Neil Jaques
Motion
84 North Street
Guilford
GU1 4AU

By email only

Dear Neil,

RE: Necton Greener Grid, Necton – Soakage Testing

Geo-Environmental Services Limited (Geo-Environmental) was instructed by Motion to undertake trial pit soakage testing at the above named site.

We write to present the results of the supplementary soakage testing undertaken. The soakage tests were undertaken in accordance with BRE Digest 365 'Soakaway Design', albeit that three test cycles could not be completed in any location as discussed below.

Scope of Works

The following scope of works was agreed with the Client:

- Excavation of 5No. trial pits to a depth of 3m bgl.
- Undertake soakage testing in general accordance with BRE365 within each of the trial pits.

The intrusive investigation was undertaken on 13th and 14th December 2022 with the works supervised by a Geo-Environmental Engineer. Testing was limited to a two day period as agreed with the Client, i.e. to establish feasibility of infiltration.

Following our discussion (TU and NJ) on the 14th of December (2nd day of soakage testing), regarding encountered conditions and overnight soakage results, it was decided that 3No. additional shallow trial pits to 0.80m would be excavated and undertake soakage testing within these.

Site Description

The site comprised a rectangular portion of an agricultural field (wheat crop) situated west off of the A47. Access was gained to site via a track into the field running parallel with the road to the substation. This track ran around the perimeter of the field.

The northern and southern border of the field comprised a hedge, with the Necton Onshore Substation and pond situated adjacent to the northern boundary. The eastern and western borders consisted of various mature trees and hedges. A cluster of mature trees was situated in the centre of the field. The remaining immediate surrounding areas comprised further agricultural fields with tree/hedge borders. The town of Necton was located southwest of site.

Ground Conditions

The ground conditions encountered during the investigation were broadly consistent with the published sequence of strata. In summary, ground conditions typically comprised a mantle of Topsoil overlying soils inferred to be of the Lowestoft Formation.

Topsoil was encountered in all locations to a depth of 0.30m bgl and typically consisted of brown clayey slightly gravelly silt.

Soils inferred to be the Lowestoft Formation were encountered from beneath the Topsoil to depths of 3m bgl (maximum depth of investigation). The deposits typically comprised initial shallow soils of slightly sandy gravelly clay above gravelly clay. The colouration of these deposits was typically brown, orangish brown and grey. Flint cobbles were encountered in all trial pits. Clays were noted to range in consistency between stiff and very stiff. Gravels consisted of fine to coarse subrounded to angular flint and chalk. Groundwater was encountered within TP04 at 2.9m bgl.

Figure 2 presents the trial pit locations. For more detailed description of the ground conditions, reference should be made to the exploratory hole logs enclosed in Appendix A.

Geotechnical testing of recovered samples is ongoing and results will be issued in due course.

Soakage Testing

The soakage testing was undertaken in general accordance with BRE Digest 365. Due to encountered ground conditions three filling and inundation cycles were not completed within any of the trial pits (TP01-TP05). An infiltration rate, using the standard methodology contained in BRE Digest 365 'Soakaway Design', could only be calculated for test within TP04a. All other tests had an insufficient fall in head to complete the test and enable derivation of an infiltration rate. The results of the testing undertaken in trial pits TP01-TP05 and TP01a, TP03a and TP04a are summarised in Table 1 below with the results presented in Appendix B.

Location	Test Number	Depth of Pit (m bgl)	Calculated infiltration rate (m/s)
TP01	1	3.00	Insufficient fall in water to complete test
TP01a	1	0.75	Insufficient fall in water to complete test
TP02	1	3.00	Insufficient fall in water to complete test
TP03	1	3.00	Insufficient fall in water to complete test
TP03a	1	0.79	Insufficient fall in water to complete test
TP04	1	3.00	Insufficient fall in water to complete test
TP04a	1	0.72	1.0×10^{-5}
TP05	1	3.00	Insufficient fall in water to complete test

Table 1 Summary of Soakage Testing Results

On the basis of the results from testing undertaken and the observed ground conditions to date it is considered that the discharge of storm water to the ground via soakaways at the original targeted depth (3m) would be ineffective. Whilst an infiltration rate could be derived from the testing in TP4a, the soils encountered were broadly consistent with those in other trial pits where testing was not successful. In addition, if further test cycles could be completed, it is likely that the infiltration rate might reduce. It is also possible that TP4a was located close to a land drain (not encountered) and outflow from the pit might be influenced by this and not reflective of soil infiltration alone. As such, it is considered that assumption of infiltration sufficient for a soakaway in the vicinity of TP4a might be unreliably optimistic. On the basis of the testing undertaken, it is anticipated that on-site storage and attenuation of storm water would be required.

It is noteworthy that the substation to the north of the site included a basin which may form part of the storm water management solution on that site.

Closure

We trust we have interpreted your request correctly and provided sufficient information for your current requirements. If you have any questions or queries in relation the information provided at this stage, please do not hesitate to contact the undersigned.

Yours sincerely
For and on Behalf of Geo-Environmental

TRAVIS UNDERDOWN BSc (Hons), FGS
Consultant Engineer
travis.underdown@gesl.net

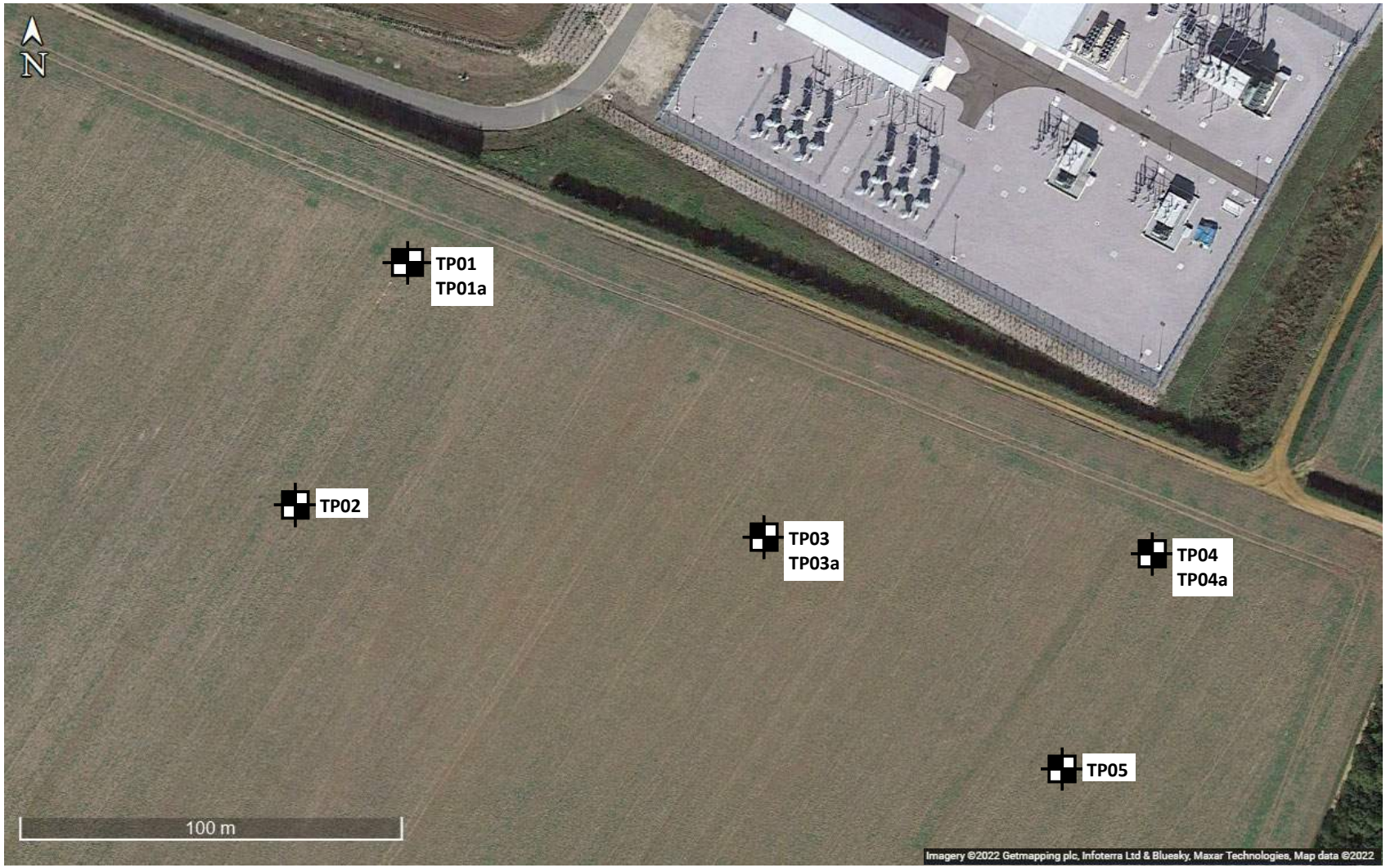
Enc Figure 1 – Site Location Plan
Figure 2 – Exploratory Hole Location Plan
Appendix A – Exploratory Hole Logs
Appendix B – Soakage Testing Results

Figures

Figure 1
Site Location Plan

Project:	Necton Greener Grid, Necton, PE37 8EG Motion			**Title**	Site Location Plan
Client:		2.0		**Geo-Environmental Services Ltd** **Unit 7 Danworth Farm, Cuckfield Road** **Hurstpierpoint, West Sussex BN6 9GL** **+44(0)1273 832972 www.gesl.net**	Geo-Environmental
Ref No:	GE21178	**Revision:**	12/12/2022		
Drawn:	TM	**Date:**	Not To Scale		
Figure:	1	**Scale:**			

Figure 2
Exploratory Hole location
Plan



Project:	Necton Greener Grid Park, Necton, PE37 8EG			**Title**	Explotary Hole Location Plan (Aerial Photograph)
Client:	Motion			**Geo-Environmental Services Ltd** **Unit 7 Danworth Farm, Cuckfield Road** **Hurstpierpoint, West Sussex BN6 9GL** **+44(0)1273 832972 www.gesl.net**	Geo-Environmental
Ref No:	GE21178	**Revision:**	2.0		
Drawn:	TU	**Date:**	11/07/2023		
Figure:	2	**Scale:**	Scale on Map		

Appendices

Geo-Environmental

Appendix A
Preliminary Exploratory Hole Logs

Geo-Environmental

Contract Name:		Client:			Trial Pit ID:
Necton Greener Grid, Necton		Motion			TP01
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
GE21178	13/12/2022	TU		PRELIM	
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used:	Date Printed:	Scale:
	5888820.2	310549.9	71.38mOD	JCB 3CX	15/12/2022	1:25

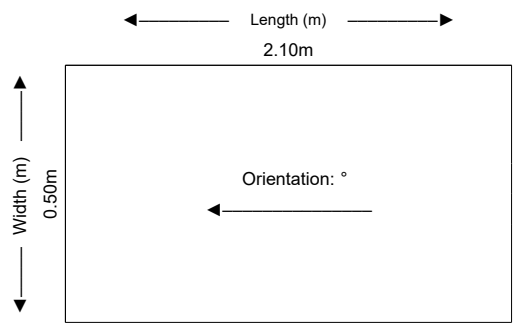
Weather: Frosty | Hole Termination: | Stability: Sides stable

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				(0.30)		Crop over brown clayey slightly gravelly SILT. Gravel is fine to medium subrounded to angular. Occasional rootlets. TOPSOIL		
			71.08	0.30		Stiff orangish brown mottled grey slightly sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse subrounded to angular flints and chalks. Occasional flints cobbles LOWESTOFT FORMATION		
0.50	D1							
		PP=2kg/cm2						
1.00	B1							
1.00	D2			(1.60)				
		PP=2.5kg/cm2						
1.50	D3							
		PP=2.5kg/cm2						
			69.48	1.90		Very stiff light brown and greyish very gravelly CLAY. Gravel is fine to coarse subrounded to angular flints and chalks. LOWESTOFT FORMATION		
2.00	B2							
2.00	D4							
		PP=3kg/cm2						
				(1.10)				
2.50	D5							
		PP=3kg/cm2						
3.00	D6		68.38	3.00		End of Trial Pit at 3.00m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Dimensions:

Final Depth: 3.00m



Inclination: °

Photo:

Geo-Environmental

Contract Name: Necton Greener Grid, Necton			Client: Motion		Trial Pit ID: TP01a
Contract Number: GE21178	Date Started: 14/12/2022	Logged By: TU	Checked By:	Status: PRELIM	Sheet 1 of 1
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used: JCB 3CX	Date Printed: 15/12/2022	Scale: 1:25
Weather: Frosty and sunny	Hole Termination:		Stability: Sides stable		

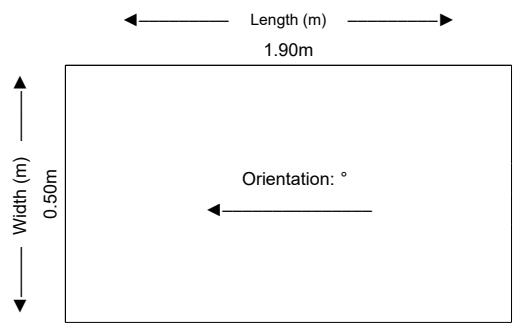
Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				(0.30) 0.30		Crop over brown clayey slightly gravelly SILT. Gravel is fine to medium subrounded to subangular flints. Occasional rootlets. TOPSOIL			
0.50	D1	PP=2kg/cm2		(0.50) 0.80		Stiff orangish brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to coarse subrounded to angular flints and chalks. LOWESTOFT FORMATION			
						End of Trial Pit at 0.80m			

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Dimensions:

Photo:

Final Depth: 0.80m



Inclination: °

Geo-Environmental

Contract Name:		Client:			Trial Pit ID:
Necton Greener Grid, Necton		Motion			TP02
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
GE21178	13/12/2022	TU		PRELIM	
Trial Pit Log	Easting: 588787.3	Northing: 310488.4	Ground Level: 70.91mOD	Plant Used: JCB 3CX	Date Printed: 15/12/2022	Scale: 1:25

Weather: Frosty | Hole Termination: | Stability: Sides stable

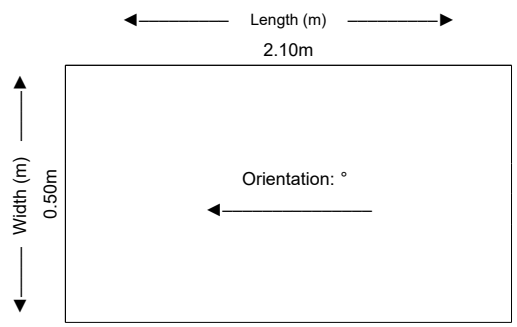
Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				(0.30)		Crop over clayey slightly gravelly SILT. Gravel is fine to medium subrounded to angular flints. Frequent rootlets. Singular brick fragment. TOPSOIL		
			70.61	0.30				
0.50	D1					Stiff orangish brown mottled grey sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse subrounded to angular flints LOWESTOFT FORMATION		
				(1.10)				
1.00	D2							
			69.51	1.40				
1.50	B1					Very stiff greyish brown gravelly CLAY. Gravel is fine to coarse subrounded to angular flints and chalks. LOWESTOFT FORMATION		
1.50	D3							
2.00	D4							
				(1.60)				
2.50	D5							
3.00	B2		67.91	3.00		End of Trial Pit at 3.00m		
3.00	D6							

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Dimensions:

Photo:

Final Depth: 3.00m



Inclination: °

Geo-Environmental

Contract Name:		Client:			Trial Pit ID:
Necton Greener Grid, Necton		Motion			TP03
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
GE21178	13/12/2022	TU		PRELIM	
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used:	Date Printed:	Scale:
	588912.1	310479.0	70.40mOD	JCB 3CX	15/12/2022	1:25

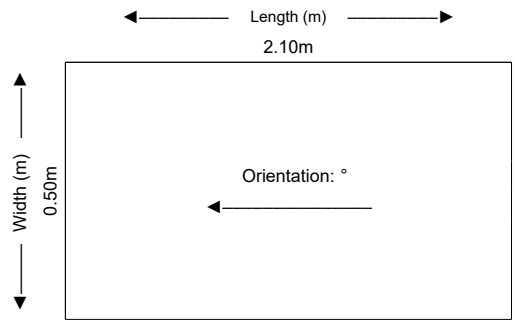
Weather: Frosty and sunny | Hole Termination: | Stability: Sides stable

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				(0.30)		Crop over brown clayey slightly gravelly SILT. Gravel is fine to medium subrounded to subangular flints. Frequent rootlets. TOPSOIL			
			70.10	0.30		Stiff orangish brown sandy slightly gravelly CLAY. Sand is fine. Gravel is fine to coarse subrounded to subangular flints and chalks. Occasional flint cobbles. LOWESTOFT FORMATION			
0.50	D1	PP=2kg/cm2		(0.50)			0.5		
			69.60	0.80		Stiff light brown gravelly CLAY. Gravel is fine to coarse subrounded to subangular flints and chalks. Occasional flint cobbles LOWESTOFT FORMATION			
		PP=2.5kg/cm2							
1.00	D2						1.0		
		PP=3kg/cm2							
1.50	B1						1.5		
1.50	D3								
		PP=3kg/cm2							
				(2.20)					
2.00	D4						2.0		
		PP=3.5kg/cm2							
2.50	B2						2.5		
2.50	D5								
		PP=3.5kg/cm2							
3.00	D6		67.40	3.00		End of Trial Pit at 3.00m	3.0		
							3.5		

Dimensions:

Photo:

Final Depth: 3.00m



Inclination: °

Geo-Environmental

Contract Name:		Client:			Trial Pit ID:
Necton Greener Grid, Necton		Motion			TP03a
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
GE21178	14/12/2022	TU		PRELIM	
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used:	Date Printed: / Scale:
				JCB 3CX	15/12/2022 / 1:25

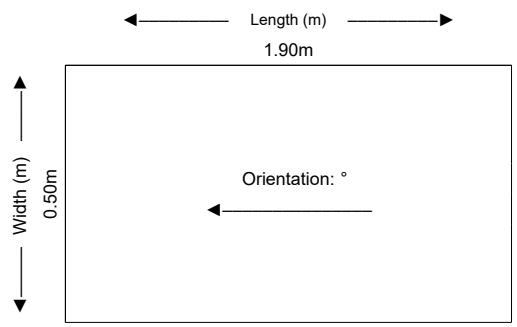
Weather: Frosty and sunny | Hole Termination: | Stability: Sides stable

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
0.50	D1	PP=2kg/cm2		(0.30) 0.30		Crop over brown clayey slightly gravelly SILT. Gravel is fine to medium subrounded to angular flints. Frequent rootlets. TOPSOIL		
				(0.50) 0.80		Stiff light brown mottled grey slightly sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse subrounded to angular flints and chalks. LOWESTOFT FORMATION		
						End of Trial Pit at 0.80m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Dimensions:

Final Depth: 0.80m



Inclination: °

Photo:

Geo-Environmental

Contract Name:		Client:			Trial Pit ID:
Necton Greener Grid, Necton		Motion			TP04
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
GE21178	13/12/2022	TU		PRELIM	
Trial Pit Log	Easting: 589021.7	Northing: 310461.8	Ground Level: 69.01mOD	Plant Used: JCB 3CX	Date Printed: 15/12/2022	Scale: 1:25

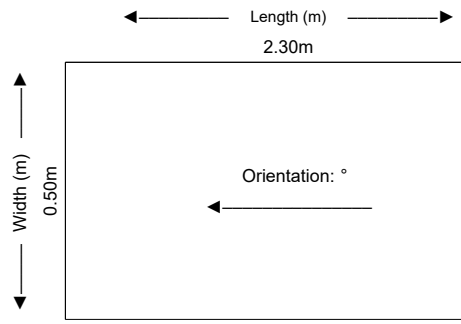
Weather: Frosty and sunny | Hole Termination: | Stability: Sides stable

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				(0.30)		Crop over brown clayey slightly gravelly SILT. Gravel is fine to medium subrounded to angular flints. Occasional rootlets. TOPSOIL			
			68.71	0.30		Stiff brown slightly silty slightly gravelly CLAY. Gravel is fine to medium subrounded to subangular flints and chalks. LOWESTOFT FORMATION		
0.50	D1	PP=2kg/cm2		(0.60)			0.5	
		PP=2kg/cm2						
			68.11	0.90		Stiff greyish light brown very gravelly CLAY. Gravel is fine to coarse subrounded to angular flints and chalks. Frequent flint cobbles. LOWESTOFT FORMATION		
1.00	B1						1.0	
1.00	D2							
		PP=2.5kg/cm2						
1.50	D3						1.5	
		PP=2.5kg/cm2						
				(2.10)				
2.00	B2						2.0	
2.00	D4							
		PP=2.5kg/cm2						
2.50	D5						2.5	
		PP=3kg/cm2						
3.00	D6		66.01	3.00		End of Trial Pit at 3.00m	3.0	
							3.5	

Dimensions:

Photo:

Final Depth: 3.00m



Inclination: °

Geo-Environmental

Contract Name:		Client:			Trial Pit ID:
Necton Greener Grid, Necton		Motion			TP04a
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
GE21178	14/12/2022	TU		PRELIM	
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used:	Date Printed: / Scale:
				JCB 3CX	15/12/2022 / 1:25

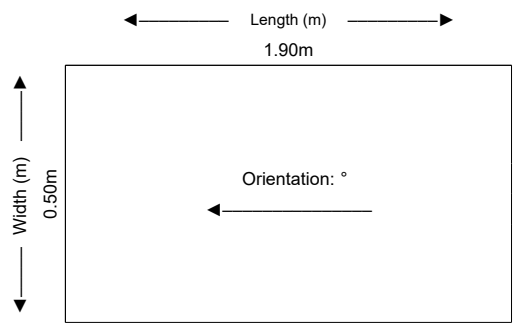
Weather: Frosty and sunny | Hole Termination: | Stability: Sides stable

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
0.50	D1	PP=2kg/cm2		(0.30) 0.30		Crop over brown clayey slightly gravelly SILT. Gravel is fine to medium subrounded to subangular flints. Occasional rootlets. TOPSOIL		
				(0.50) 0.80		Stiff brown and orangish brown slightly sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse subrounded to angular flints and chalks. LOWESTOFT FORMATION		
						End of Trial Pit at 0.80m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Dimensions:

Final Depth: 0.80m



Inclination: °

Photo:

Geo-Environmental

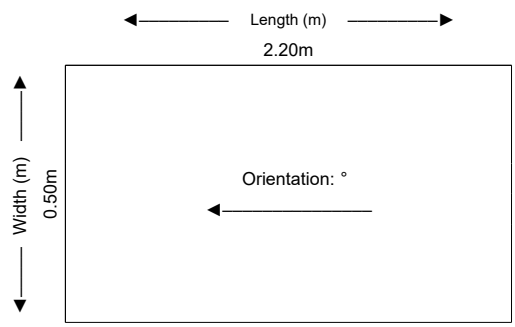
Contract Name:		Client:			Trial Pit ID:
Necton Greener Grid, Necton		Motion			TP05
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
GE21178	13/12/2022	TU		PRELIM	
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used:	Date Printed:	Scale:
	588991.1	310402.5	69.11mOD	JCX 3CX	15/12/2022	1:25

Weather: Frosty and sunny | Hole Termination: | Stability: Sides stable

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				(0.30)		Crop over brown clayey slightly gravelly SILT. Gravel is fine to medium subrounded to subangular flints. Frequent rootlets. TOPSOIL			
			68.81	0.30				
				(0.30)		Stiff greyish light brown slightly sandy gravelly CLAY. Sand is fine. Gravel is fine to coarse subrounded to angular flints and chalks. LOWESTOFT FORMATION		
0.50	D1	PP=2kg/cm2	68.51	0.60			0.5	
		PP=2kg/cm2				Stiff greyish light brown gravelly CLAY. Gravel is fine to coarse subrounded to angular flints and chalks. Frequent flint cobbles. LOWESTOFT FORMATION		
1.00	D2						1.0	
		PP=2.5kg/cm2						
1.50	B1						1.5	
1.50	D3							
		PP=2.5kg/cm2		(2.40)				
2.00	D4						2.0	
		PP=2kg/cm2						
2.50	D5						2.5	
		PP=2.5kg/cm2						
3.00	B2		66.11	3.00		End of Trial Pit at 3.00m	3.0	
3.00	D6							
							3.5	

Dimensions:

Final Depth: 3.00m



Inclination: °

Photo:

Geo-Environmental

Appendix B
Soakage Testing Results

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name : Necton Greener Grid, Necton Motion **Job No. :** GE21178 **Client :** **Date :** 13/12/2022

Pit reference	**TP01**		
Test reference	Test1	Test2	Test3
Pit depth (m)	3.00		
Pit width (m)	0.50	-	-
Pit length (m)	2.10	-	-
Depth to standing water (m)		-	-

Test 1

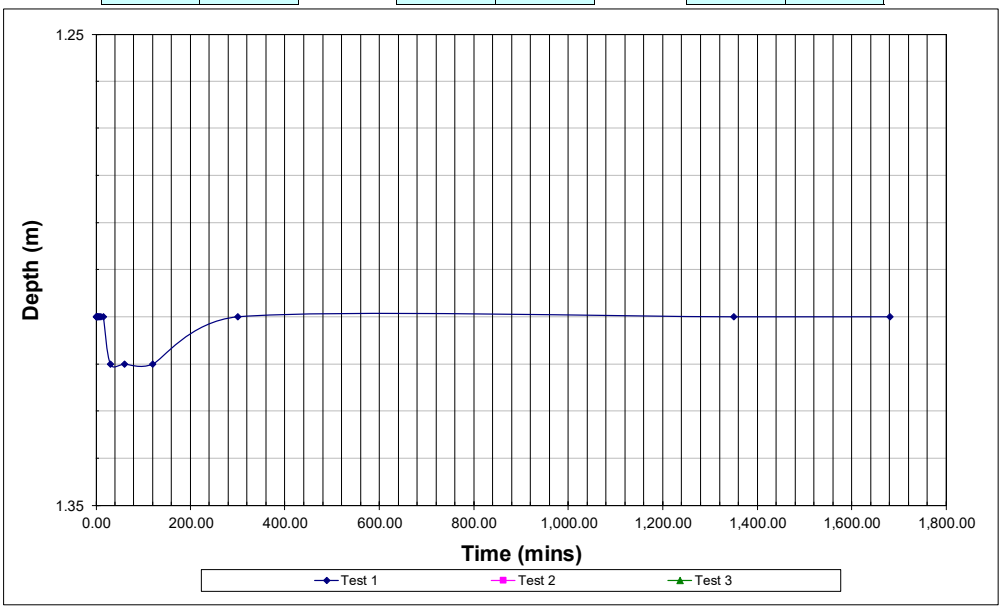
Time (min)	Depth (m)
0.0	1.31
1.0	1.31
2.0	1.31
3.0	1.31
5.0	1.31
7.0	1.31
10.0	1.31
15.0	1.31
30.0	1.32
60.0	1.32
120.0	1.32
300.0	1.31
1350.0	1.31
1680.0	1.31

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	3.00	0.00	0.00
Effective depth (m)	1.69	0.00	0.00
75% effective depth (m)	1.73	0.00	0.00
50% effective depth (m)	2.16	0.00	0.00
25% effective depth (m)	2.58	0.00	0.00
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.89	0.00	0.00
ap 50	5.444	#VALUE!	#VALUE!
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	**Insufficient fall in water to complete test**	
Soil infiltration rate (mm/hr)	**Insufficient fall in water to complete test**	

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Necton Greener Grid, Necton	**Job No. :** Motion	GE21178
Client :	**Date**	:	14/12/2022

Pit reference	**TP01a**		
Test reference	Test1	Test2	Test3
Pit depth (m)	0.75		
Pit width (m)	0.50	-	-
Pit length (m)	1.90	-	-
Depth to standing water (m)	-	-	-

Test 1

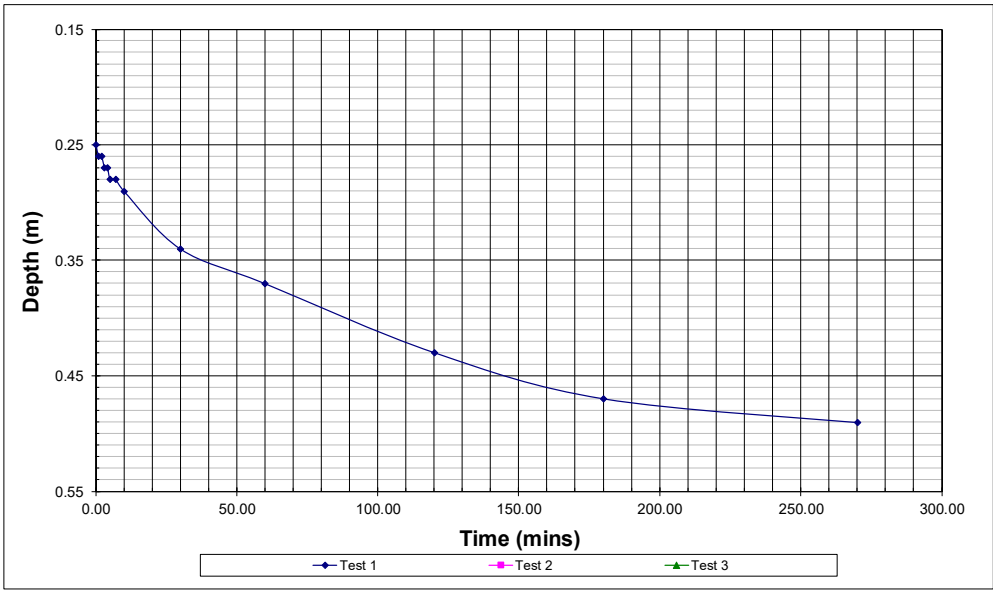
Time (min)	Depth (m)
0.0	0.25
1.0	0.26
2.0	0.26
3.0	0.27
4.0	0.27
5.0	0.28
7.0	0.28
10.0	0.29
30.0	0.34
60.0	0.37
120.0	0.43
180.0	0.47
270.0	0.49

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	0.75	0.00	0.00
Effective depth (m)	0.50	0.00	0.00
75% effective depth (m)	0.38	0.00	0.00
50% effective depth (m)	0.50	0.00	0.00
25% effective depth (m)	0.63	0.00	0.00
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.24	0.00	0.00
ap 50	2.15	#VALUE!	#VALUE!
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	**Insufficient fall in water to complete test**	
Soil infiltration rate (mm/hr)	**Insufficient fall in water to complete test**	

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Necton Greener Grid, Necton	**Job No. :** Motion	GE21178
Client :	**Date**	:	13/12/2022

Pit reference	**TP02**		
Test reference	Test1	Test2	Test3
Pit depth (m)	3.00		
Pit width (m)	0.50	-	-
Pit length (m)	2.10	-	-
Depth to standing water (m)	-	-	-

Test 1

Time (min)	Depth (m)
0.00	1.55
1.00	1.55
2.00	1.55
3.00	1.55
4.00	1.55
5.00	1.55
7.00	1.55
10.00	1.55
15.00	1.55
30.00	1.57
60.00	1.57
120.00	1.59
235.00	1.62
290.00	1.64
1380.00	1.82
1550.00	1.83

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)

Max. depth (m)	3.00	0.00	0.00
Effective depth (m)	1.45	0.00	0.00
75% effective depth (m)	1.91	0.00	0.00
50% effective depth (m)	2.28	0.00	0.00
25% effective depth (m)	2.64	0.00	0.00
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.76	0.00	0.00
ap 50	4.82	#VALUE!	#VALUE!
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	**Insufficient fall in water to complete test**	
Soil infiltration rate (mm/hr)	**Insufficient fall in water to complete test**	

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Necton Greener Grid, Necton	**Job No. :** Motion	GE21178
Client :	**Date**	:	13/12/2022

Pit reference	**TP03**		
Test reference	Test1	Test2	Test3
Pit depth (m)	3.00		
Pit width (m)	0.55	-	-
Pit length (m)	2.10	-	-
Depth to standing water (m)	-	-	-

Test 1

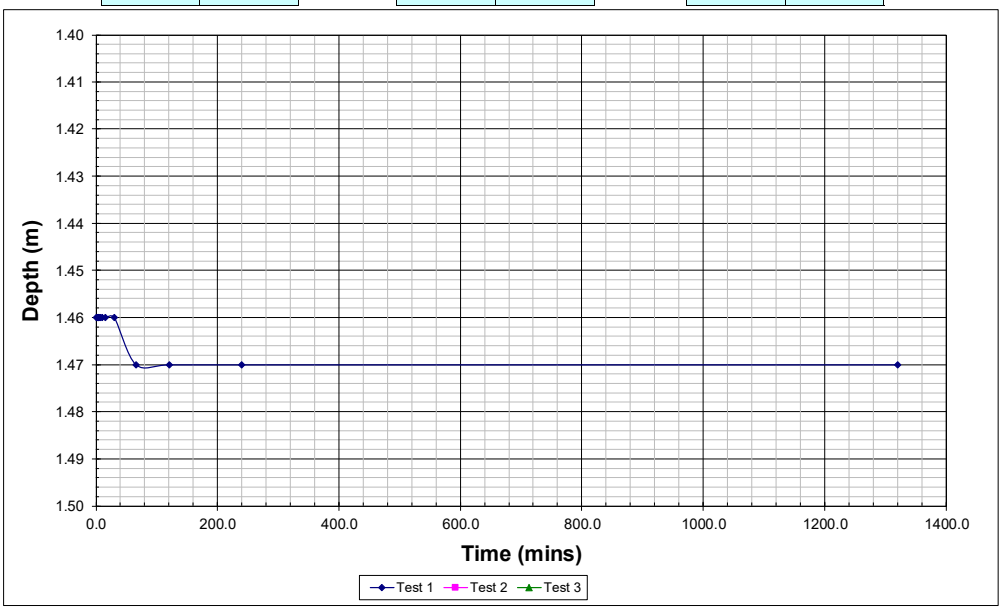
Time (min)	Depth (m)
0.0	1.46
1.0	1.46
2.0	1.46
3.0	1.46
4.0	1.46
5.0	1.46
7.0	1.46
10.0	1.46
15.0	1.46
30.0	1.46
66.0	1.47
120.0	1.47
240.0	1.47
1320.0	1.47

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	3.00	0.00	0.00
Effective depth (m)	1.54	0.00	0.00
75% effective depth (m)	1.85	0.00	0.00
50% effective depth (m)	2.23	0.00	0.00
25% effective depth (m)	2.62	0.00	0.00
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.89	0.00	0.00
ap 50	5.236	#VALUE!	#VALUE!
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	**Insufficient fall in water to complete test**	
Soil infiltration rate (mm/hr)	**Insufficient fall in water to complete test**	

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0

Geo-Environmental	**Soakaway Test Results (after BRE Digest 365)**	**Geo-EnvironmentalServices Limited** Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Necton Greener Grid, Necton	**Job No. :** Motion	GE21178
Client :	**Date**	:	14/12/2022

Pit reference	**TP03a**		
Test reference	Test1	Test2	Test3
Pit depth (m)	0.79		
Pit width (m)	0.50		
Pit length (m)	1.90		
Depth to standing water (m)			

Test 1

Time (min)	Depth (m)
0.0	0.30
1.0	0.31
2.0	0.31
3.0	0.31
4.0	0.31
5.0	0.31
7.0	0.31
10.0	0.31
30.0	0.33
60.0	0.36
120.0	0.39
180.0	0.42

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)

Max. depth (m)	0.79	0.00	0.00
Effective depth (m)	0.49	0.00	0.00
75% effective depth (m)	0.42	0.00	0.00
50% effective depth (m)	0.55	0.00	0.00
25% effective depth (m)	0.67	0.00	0.00
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.23	0.00	0.00
ap 50	2.126	0	0
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	**Insufficient fall in water to complete test**	
Soil infiltration rate (mm/hr)	**Insufficient fall in water to complete test**	

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0

Geo-Environmental	**Soakaway Test Results (after BRE Digest 365)**	**Geo-EnvironmentalServices Limited** Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Necton Greener Grid, Necton	**Job No. :** Motion	GE21178
Client :	**Date**	:	13/12/2022

Pit reference	**TP04**		
Test reference	Test1	Test2	Test3
Pit depth (m)	3.00		
Pit width (m)	0.50		
Pit length (m)	2.30		
Depth to standing water (m)			

Test 1

Time (min)	Depth (m)
0.0	1.69
1.0	1.69
2.0	1.69
3.0	1.69
4.0	1.69
5.0	1.69
7.0	1.69
10.0	1.69
30.0	1.68
60.0	1.68
120.0	1.65
180.0	1.61
240.0	1.72
1295.0	1.50
1455.0	1.50
1625.0	1.48

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)

Max. depth (m)		0.00	0.00
Effective depth (m)	1.31	0.00	0.00
75% effective depth (m)	2.02	0.00	0.00
50% effective depth (m)	2.35	0.00	0.00
25% effective depth (m)	2.67	0.00	0.00
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.75	0.00	0.00
ap 50	4.818	0	0
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	**Insufficient fall in water to complete test**	
Soil infiltration rate (mm/hr)	**Insufficient fall in water to complete test**	

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0

Geo-Environmental	**Soakaway Test Results (after BRE Digest 365)**	**Geo-EnvironmentalServices Limited** Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Necton Greener Grid, Necton	**Job No. :** Motion	GE21178
Client :	**Date**	:	14/12/2022

Pit reference	**TP04a**		
Test reference	Test1	Test2	Test3
Pit depth (m)	0.72		
Pit width (m)	0.50		
Pit length (m)	1.90		
Depth to standing water (m)			

Test 1

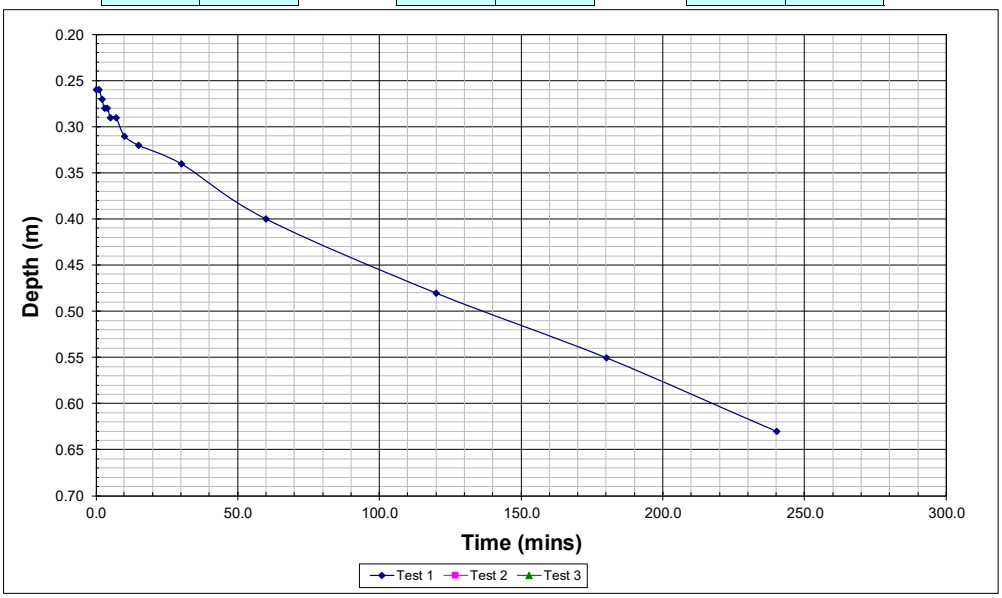
Time (min)	Depth (m)
0.0	0.26
1.0	0.26
2.0	0.27
3.0	0.28
4.0	0.28
5.0	0.29
7.0	0.29
10.0	0.31
15.0	0.32
30.0	0.34
60.0	0.40
120.0	0.48
180.0	0.55
240.0	0.63

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	0.72	0.00	0.00
Effective depth (m)	0.46	0.00	0.00
75% effective depth (m)	0.38	0.00	0.00
50% effective depth (m)	0.49	0.00	0.00
25% effective depth (m)	0.61	0.00	0.00
t75 (min)	49.00		
t50 (min)	130.00		
t25 (min)	225.00		
Vp 75-25	0.22	0.00	0.00
ap 50	2.054	0	0
tp 75-25	176.00	0.00	0.00

Soil infiltration rate (m/s)	**1.0E-05**		
Soil infiltration rate (mm/hr)	**3.63E+01**		

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0

Geo-Environmental	**Soakaway Test Results (after BRE Digest 365)**	**Geo-EnvironmentalServices Limited** Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Necton Greener Grid, Necton	**Job No. :** Motion	GE21178
Client :	**Date**	:	13/12/2022

Pit reference	**TP05**		
Test reference	Test1	Test2	Test3
Pit depth (m)	3.00		
Pit width (m)	0.50		
Pit length (m)	2.20		
Depth to standing water (m)			

Test 1

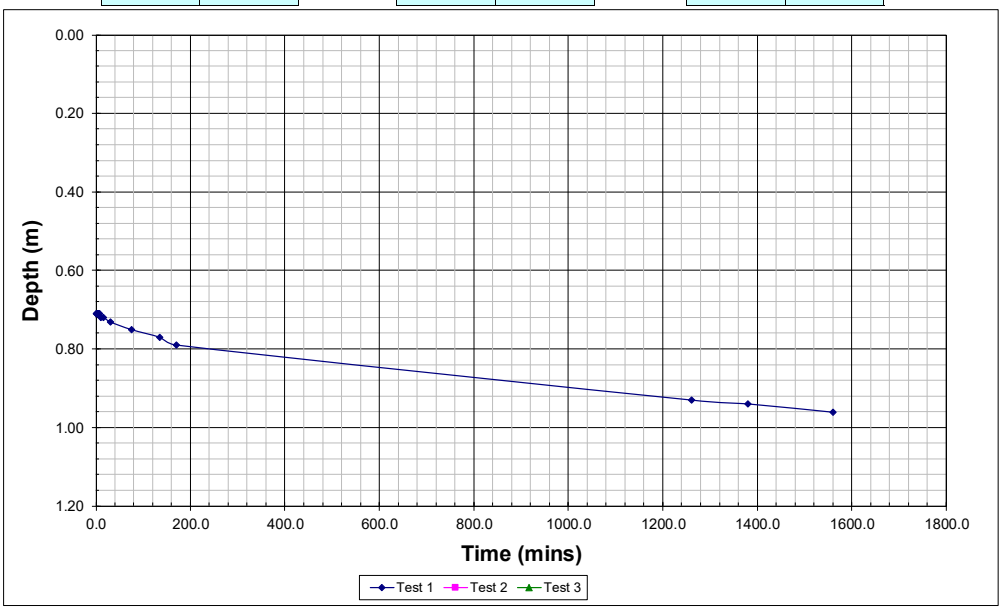
Time (min)	Depth (m)
0.0	0.71
1.0	0.71
2.0	0.71
3.0	0.71
4.0	0.71
5.0	0.71
7.0	0.71
10.0	0.72
15.0	0.72
30.0	0.73
75.0	0.75
135.0	0.77
170.0	0.79
1260.0	0.93
1380.0	0.94
1560.0	0.96

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	3.00	0.00	0.00
Effective depth (m)	2.29	0.00	0.00
75% effective depth (m)	1.28	0.00	0.00
50% effective depth (m)	1.86	0.00	0.00
25% effective depth (m)	2.43	0.00	0.00
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	1.26	0.00	0.00
ap 50	7.283	0	0
tp 75-25	0.00	0.00	0.00

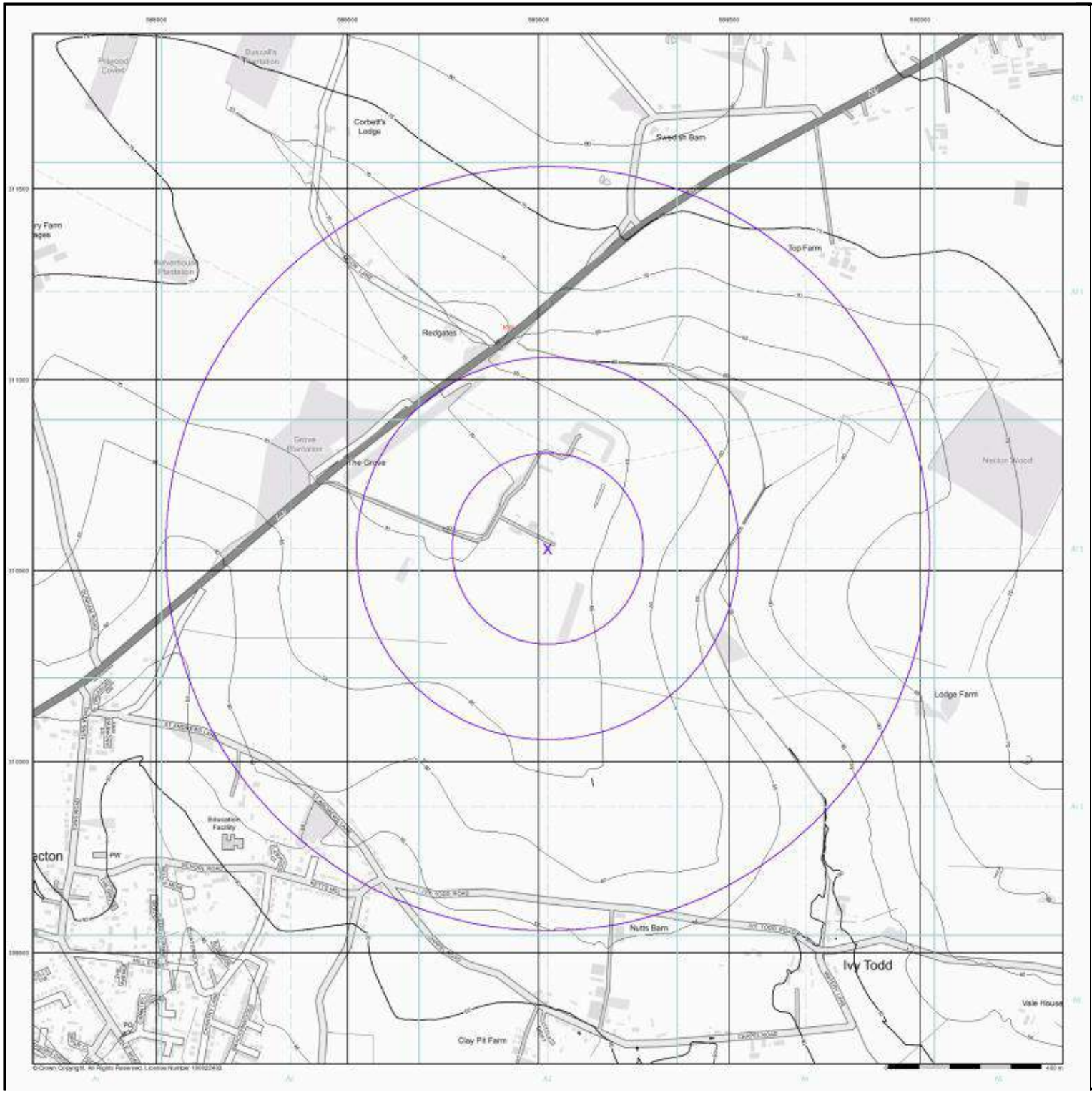
Soil infiltration rate (m/s)	**Insufficient fall in water to complete test**	
Soil infiltration rate (mm/hr)	**Insufficient fall in water to complete test**	

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0

Appendix E

Envirocheck Screening Report



motion

EA/NRW Flood Data Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

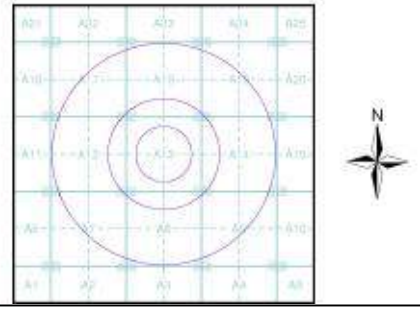
Flood Data

- 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

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height
- MLW Mean Low Water
- MHW Mean High Water

EA/NRW Flood Data Map - Slice A



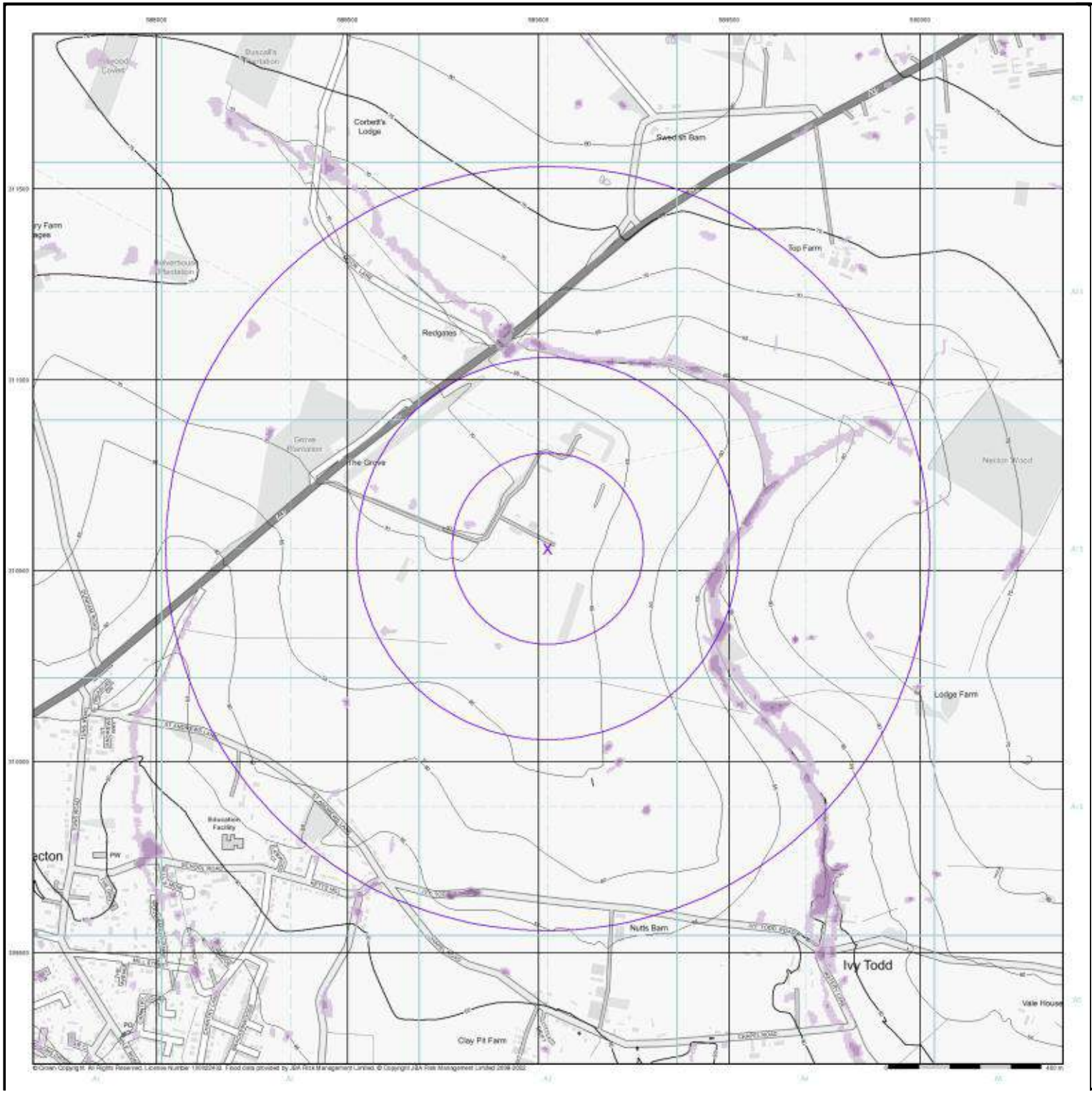
Order Details

Order Number:	305211268_1_1
Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Dudgeon Onshore Substation, Norwich Road, Necton, SWAFFHAM, PE37 8EG

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



JBA 75 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

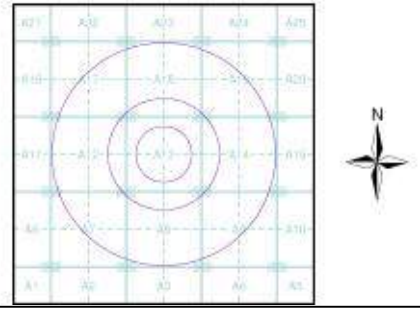
Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

Contours (height in metres)

Standard Contour
Master Contour
Spot Height
Mean Low Water
Mean High Water

JBA 75 Year Return Flood Map (Undefended) - Slice A



Order Details

Order Number:	305211268_1_1
Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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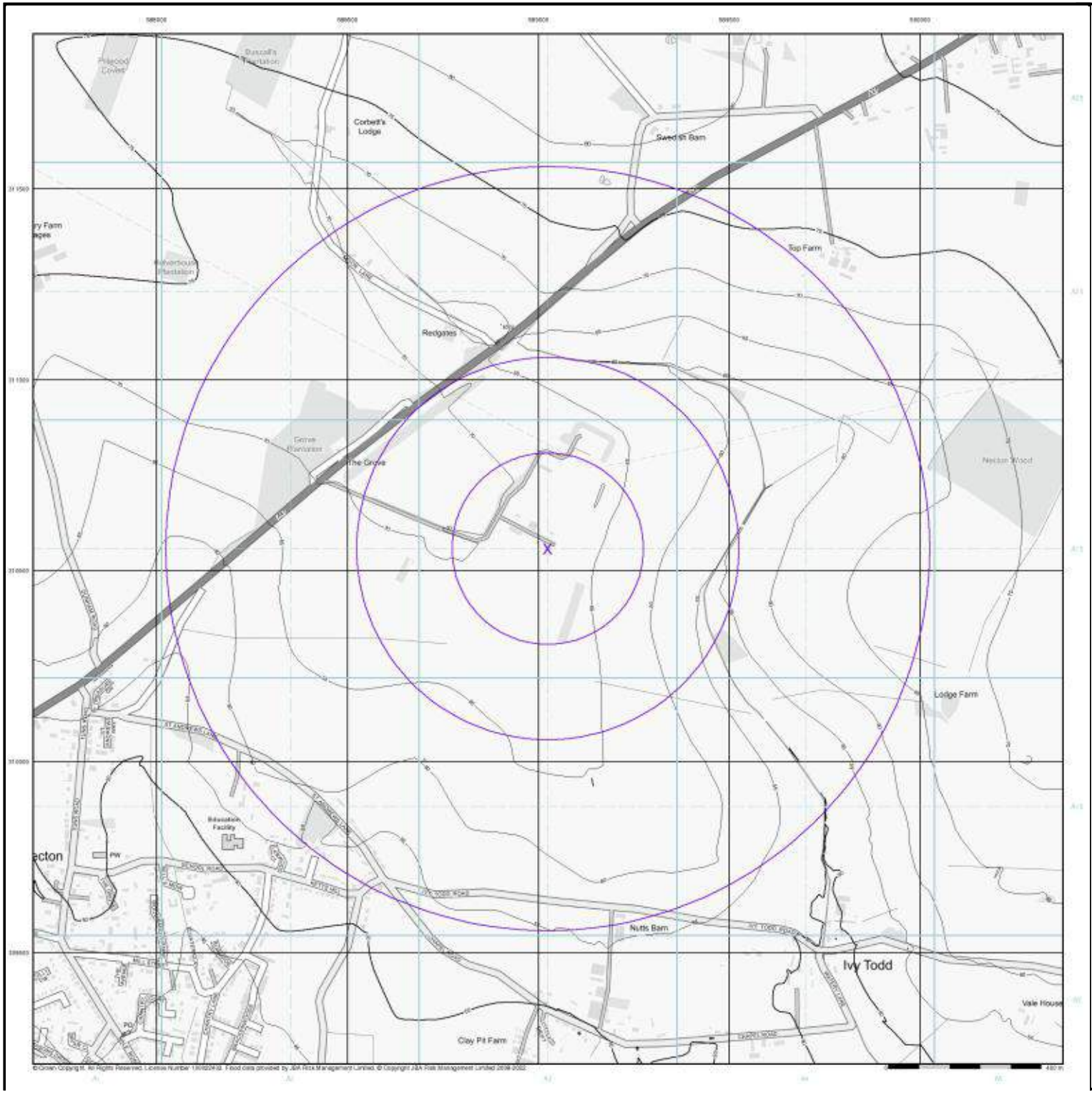


motion

JBA 100 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

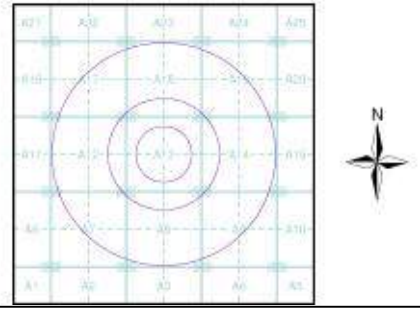
Modelled Flood Depth

Fluvial Depth	Coastal Depth
0.01m - 0.05m	0.01m - 0.05m
0.05m - 0.1m	0.05m - 0.1m
0.1m - 0.3m	0.1m - 0.3m
0.3m - 1m	0.3m - 1m
>1m	>1m

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

JBA 100 Year Return Flood Map (Undefended) - Slice A



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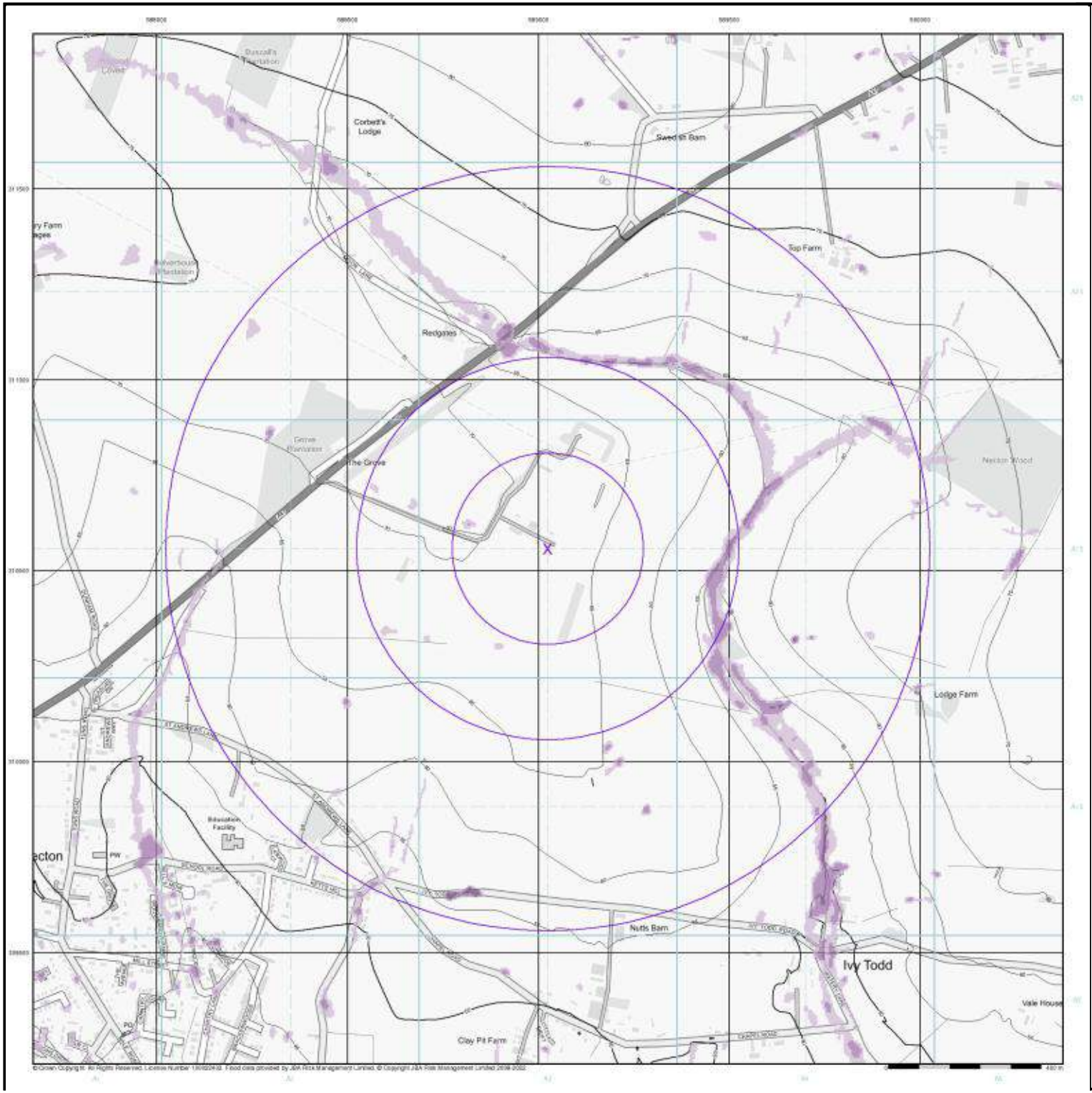


motion

JBA 200 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

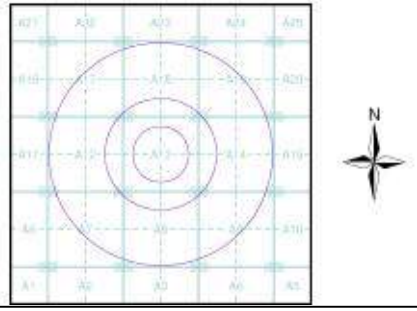
Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

Contours (height in metres)

Standard Contour
Master Contour
Spot Height
Mean Low Water
Mean High Water

JBA 200 Year Return Flood Map (Undefended) - Slice A



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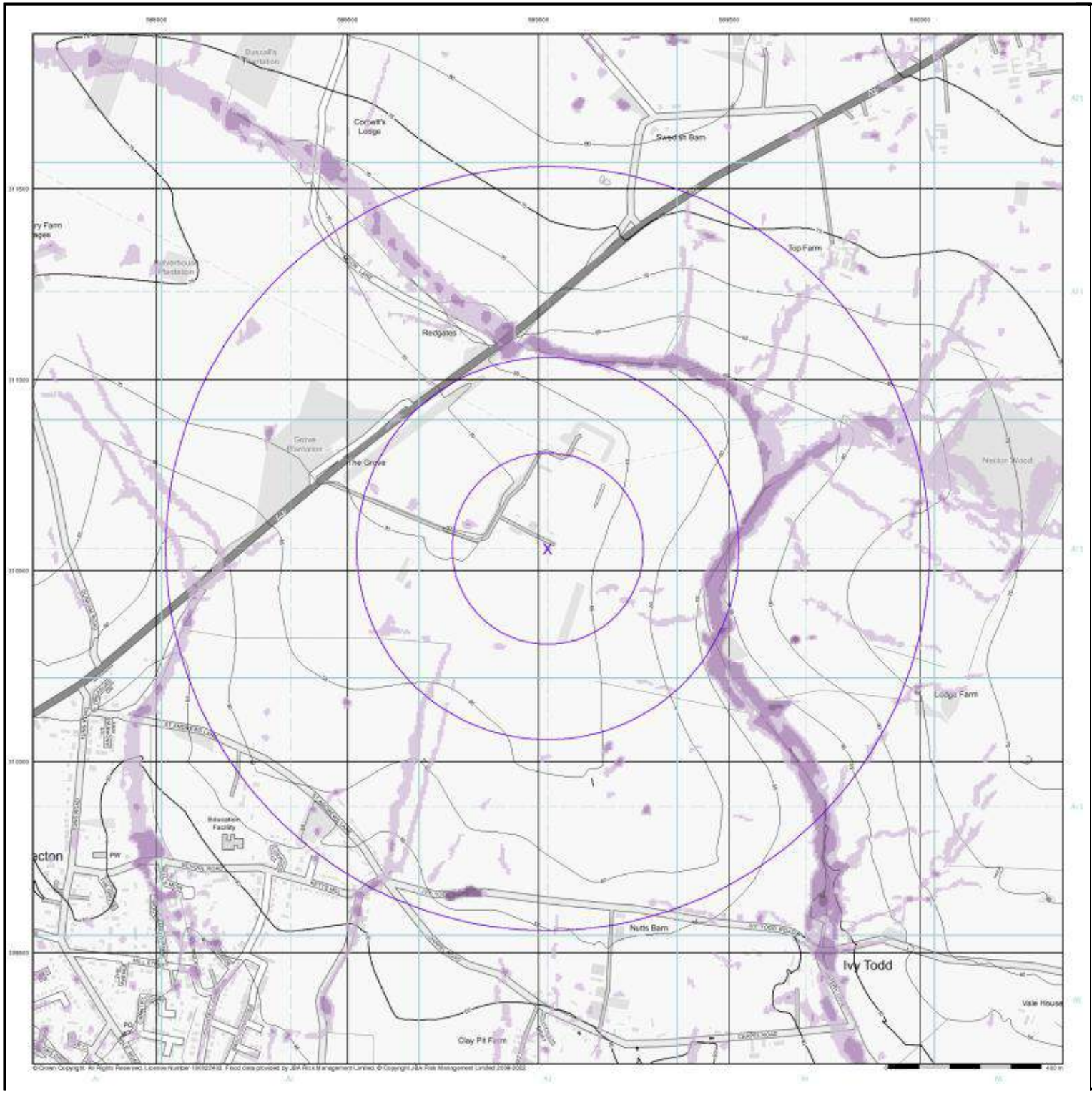


motion

JBA 1000 Year Return Flood Map (Undefended) (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

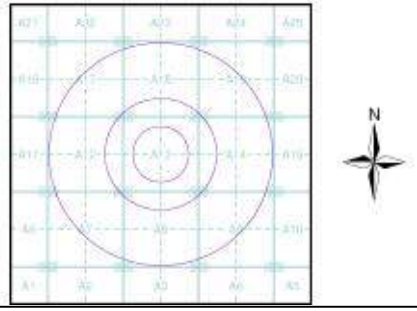
Modelled Flood Depth

Pluvial Depth	Fluvial Depth	Coastal Depth
0.1m	0.01m - 0.05m	0.01m - 0.05m
0.1m - 0.3m	0.05m - 0.1m	0.05m - 0.1m
0.3m - 1m	0.1m - 0.3m	0.1m - 0.3m
>1m	0.3m - 1m	0.3m - 1m
	>1m	>1m

Contours (height in metres)

Standard Contour
Master Contour
Spot Height
Mean Low Water
Mean High Water

JBA 1000 Year Return Flood Map (Undefended) - Slice A



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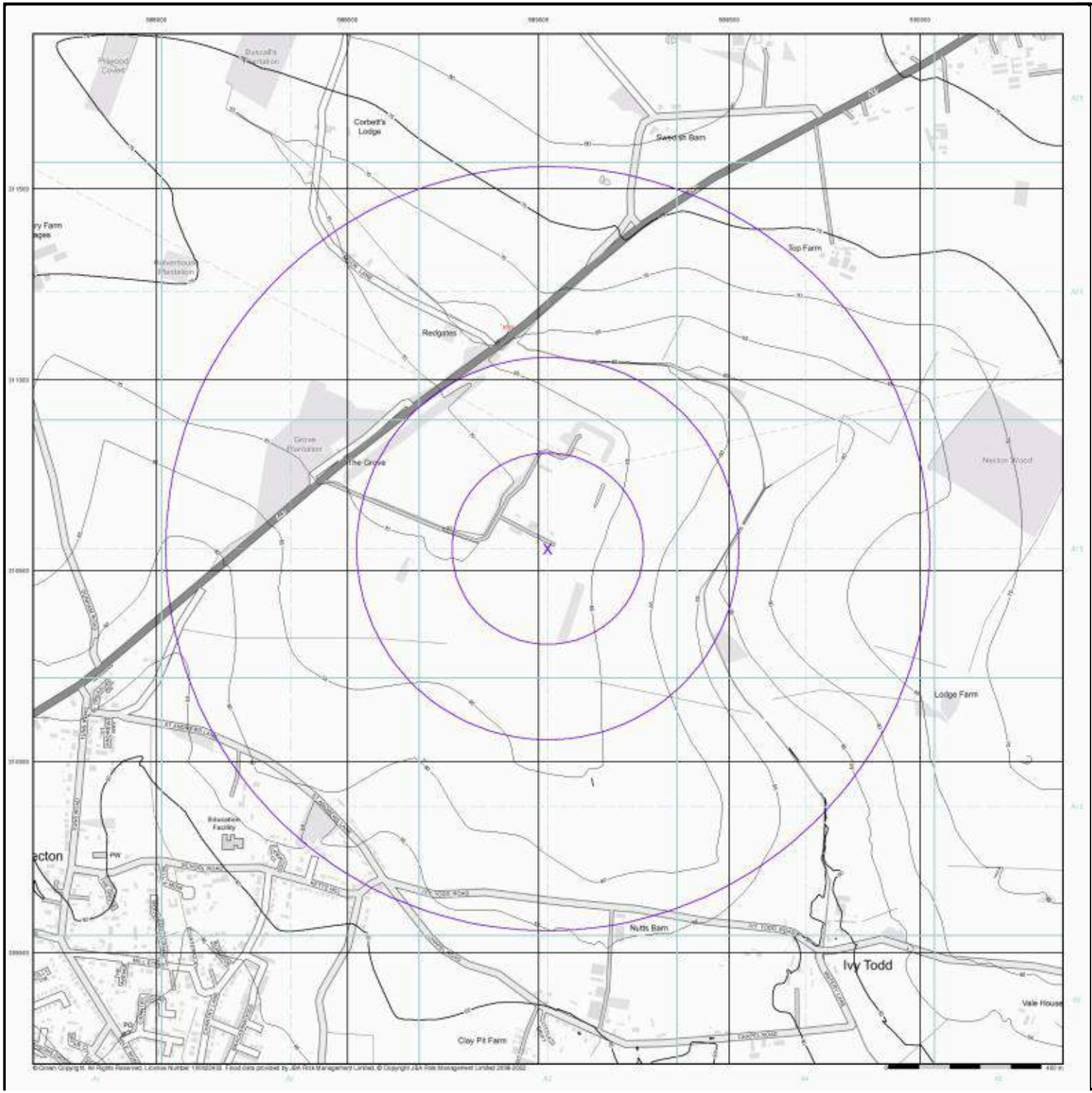


motion

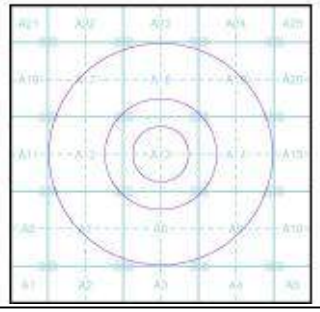
JBA Canal Failure Map (1:10,000)

General
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Flood Data
- Canal Failure
- Coverage

Contours (height in metres)
- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

JBA Canal Failure Flood Map - Slice A



Order Details

Order Number:	305211268_1_1
Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
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Site Details

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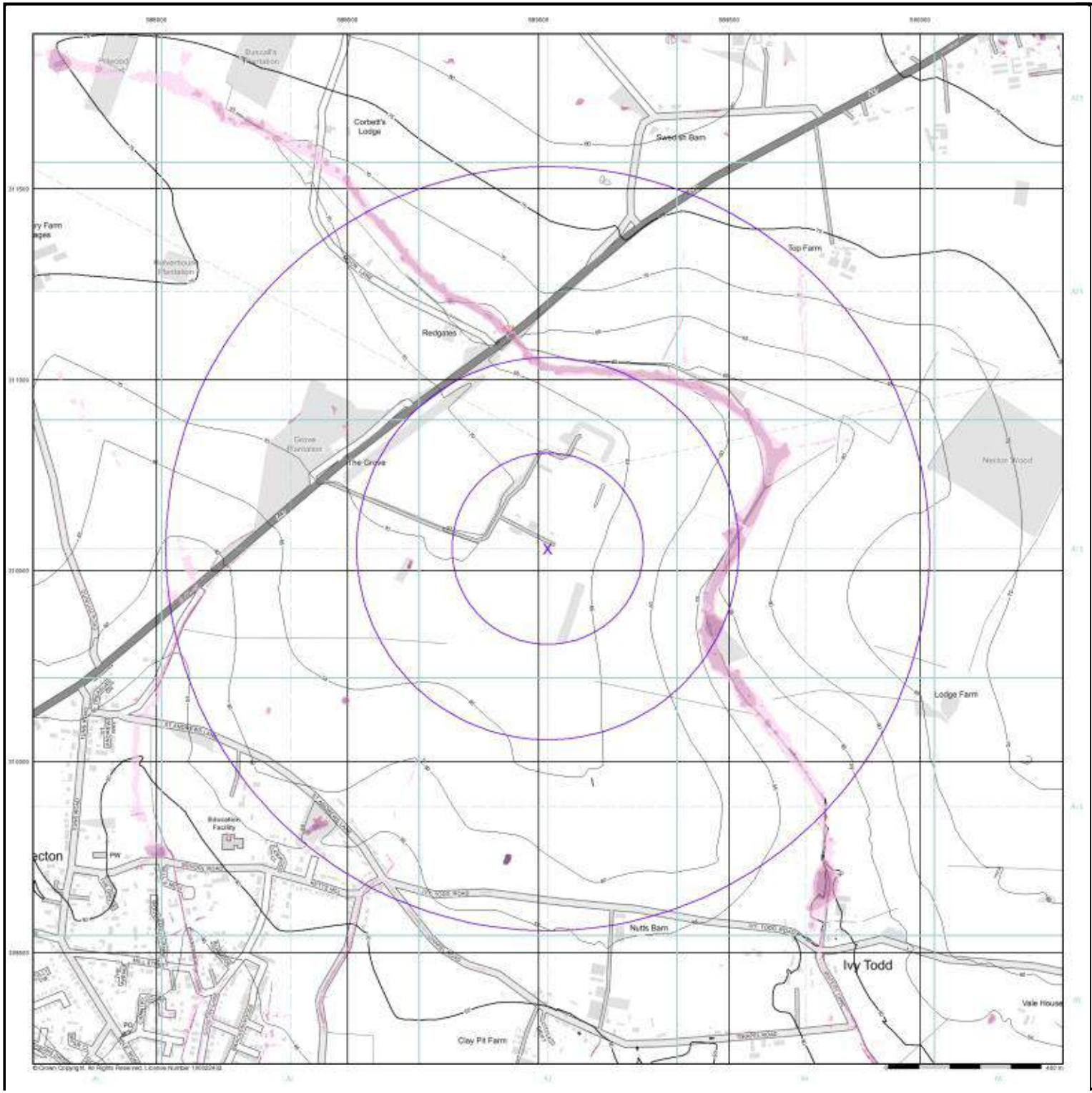


motion

EA/NRW Surface Water 30 Year Return Depth Map (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour | Mean Low Water (MLW)

Master Contour | Mean High Water (MHW)

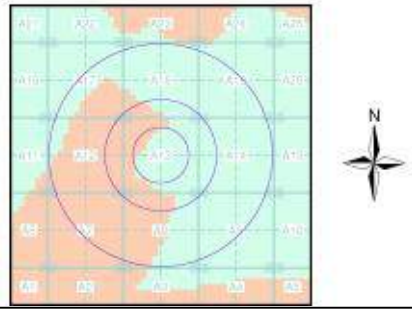
Spot Height

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



Order Details

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Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
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Site Details

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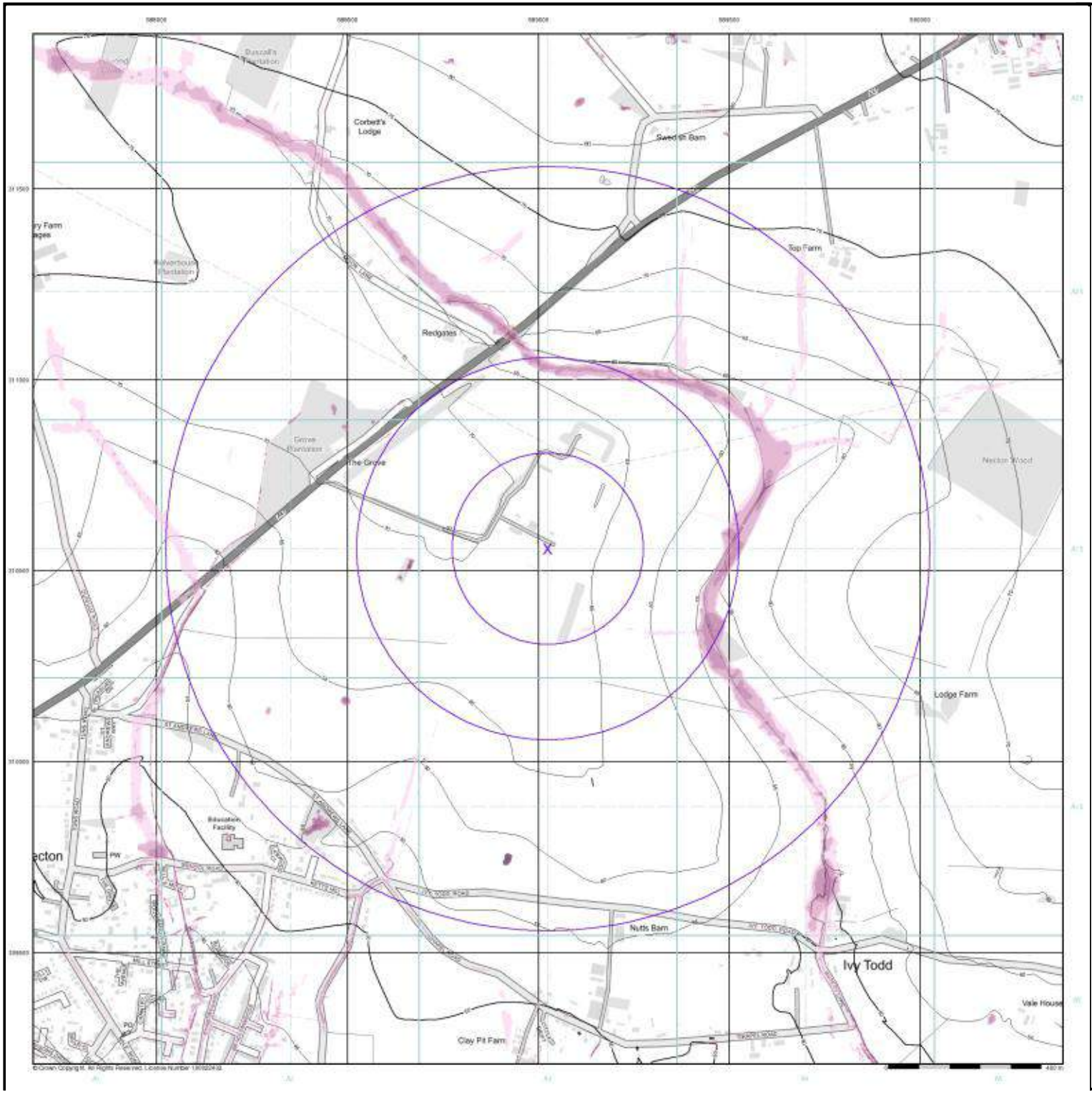


EA/NRW Surface Water 100 Year Return Depth Map

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

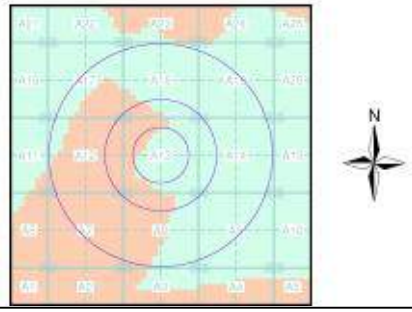
Standard Contour | Master Contour | Spot Height | MLW Mean Low Water | MHW Mean High Water

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



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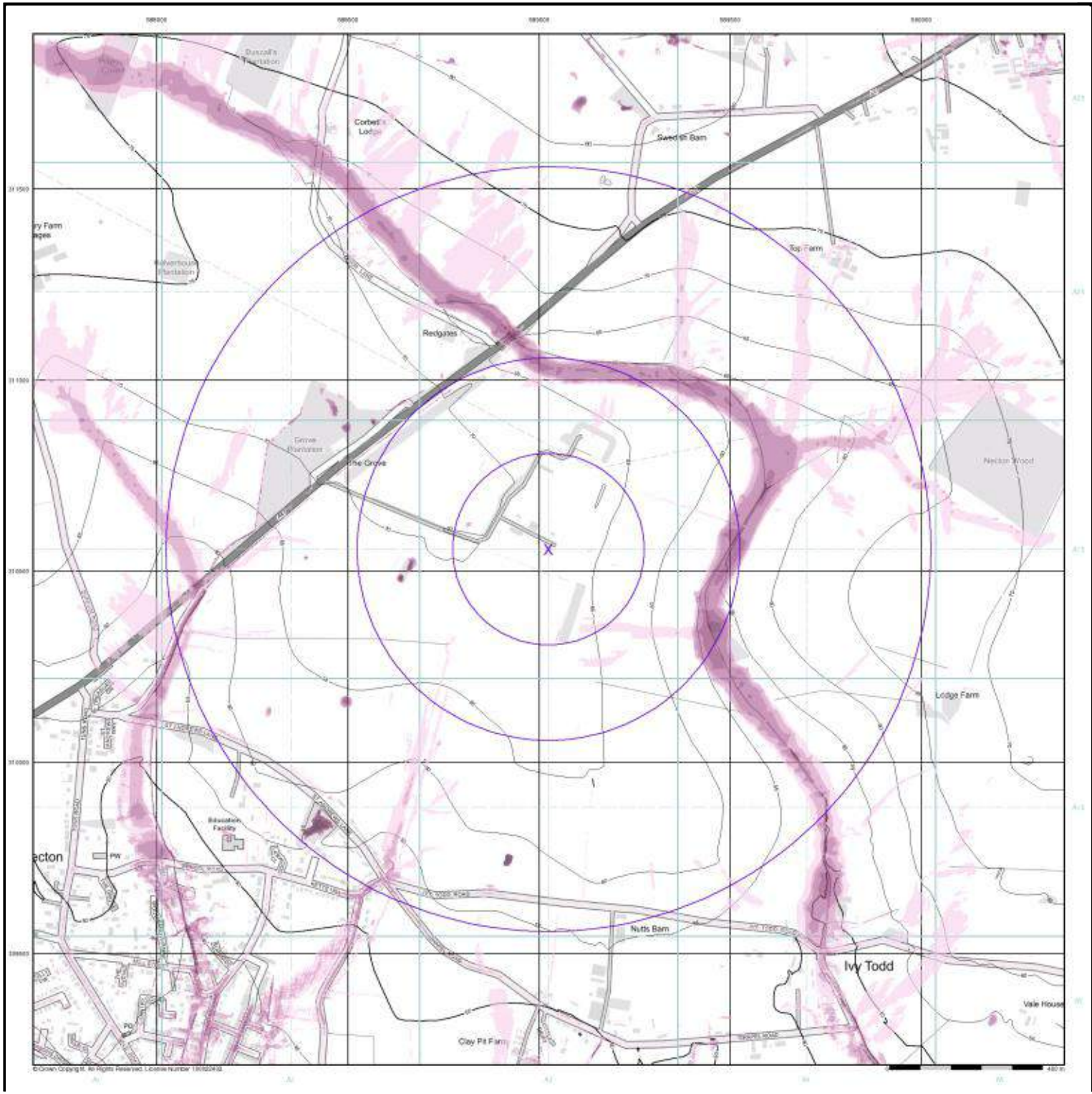


motion

EA/NRW Surface Water 1000 Year Return Depth Map (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Depth

- 0 - 0.15m
- 0.15 - 0.30m
- 0.30 - 0.60m
- 0.60 - 0.90m
- 0.90 - 1.20m
- > 1.20m

Contours (height in metres)

Standard Contour | Mean Low Water (MLW)

Master Contour | Mean High Water (MHW)

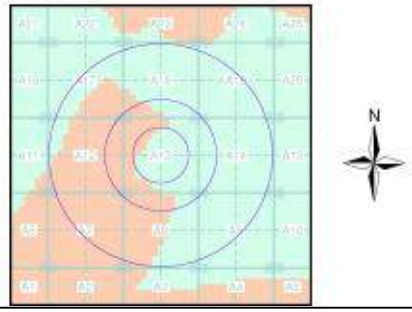
Spot Height

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



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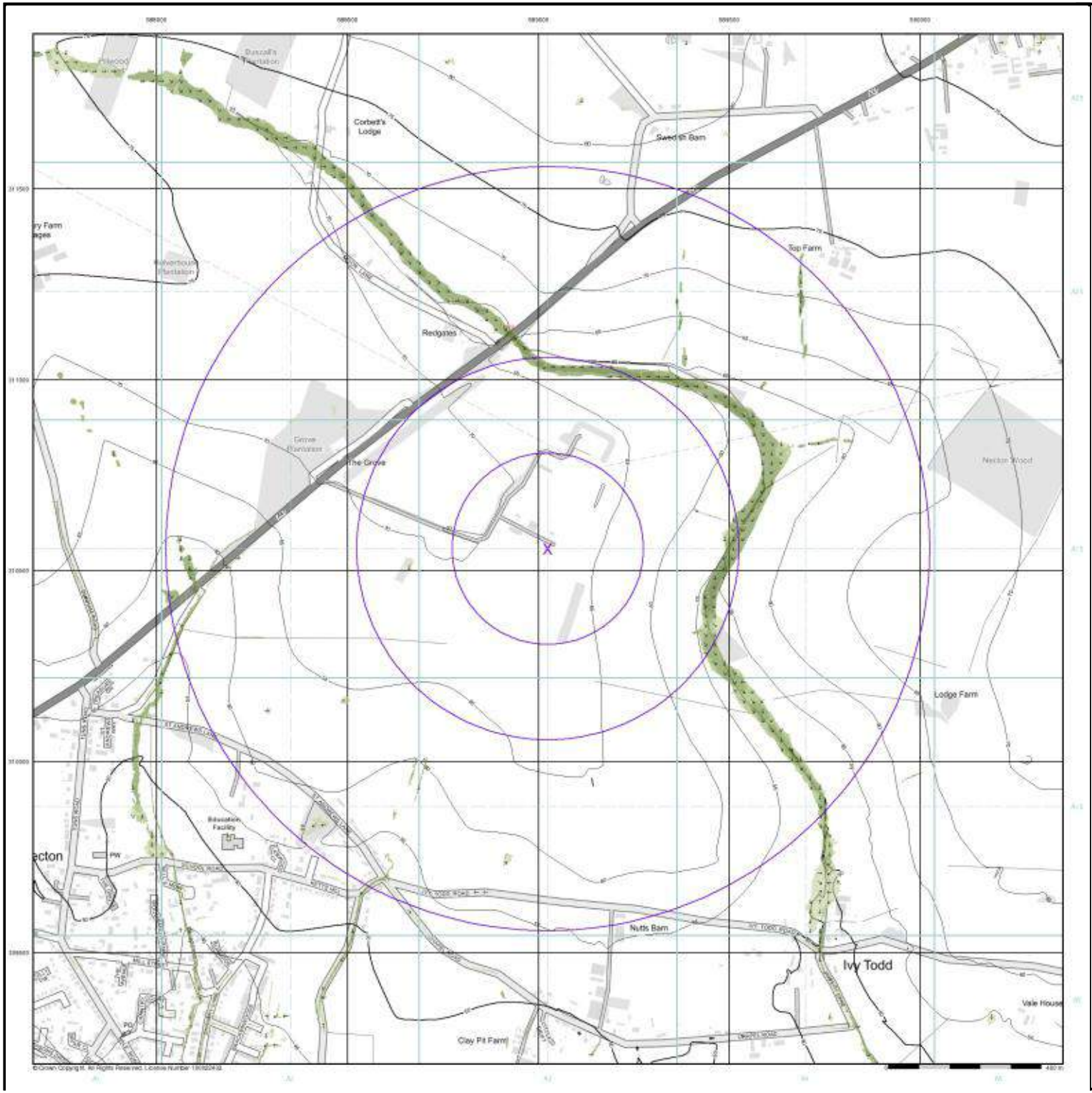


motion

EA/NRW Surface Water 30 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Velocity and Direction

0.00 - 0.25m/s
0.25 - 0.50m/s
0.50 - 1.00m/s
1.00 - 2.00m/s
> 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

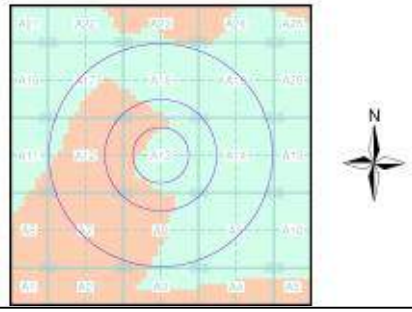
Standard Contour
Master Contour
Spot Height
MLW Mean Low Water
MHW Mean High Water

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



Order Details

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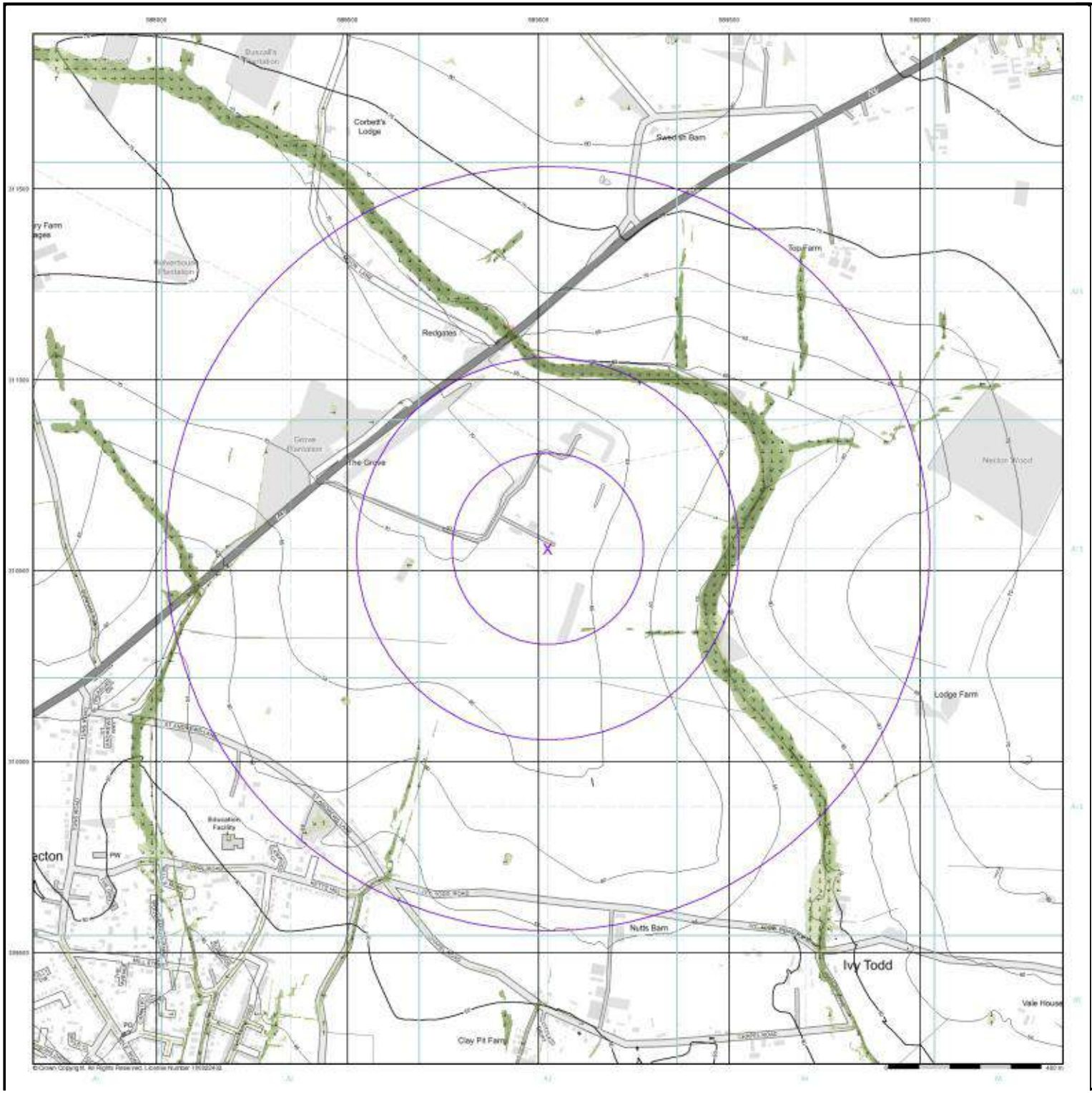


motion

EA/NRW Surface Water 100 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

Standard Contour | Master Contour | Spot Height

MLW Mean Low Water

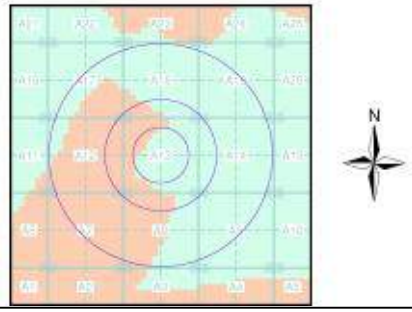
MHW Mean High Water

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



Order Details

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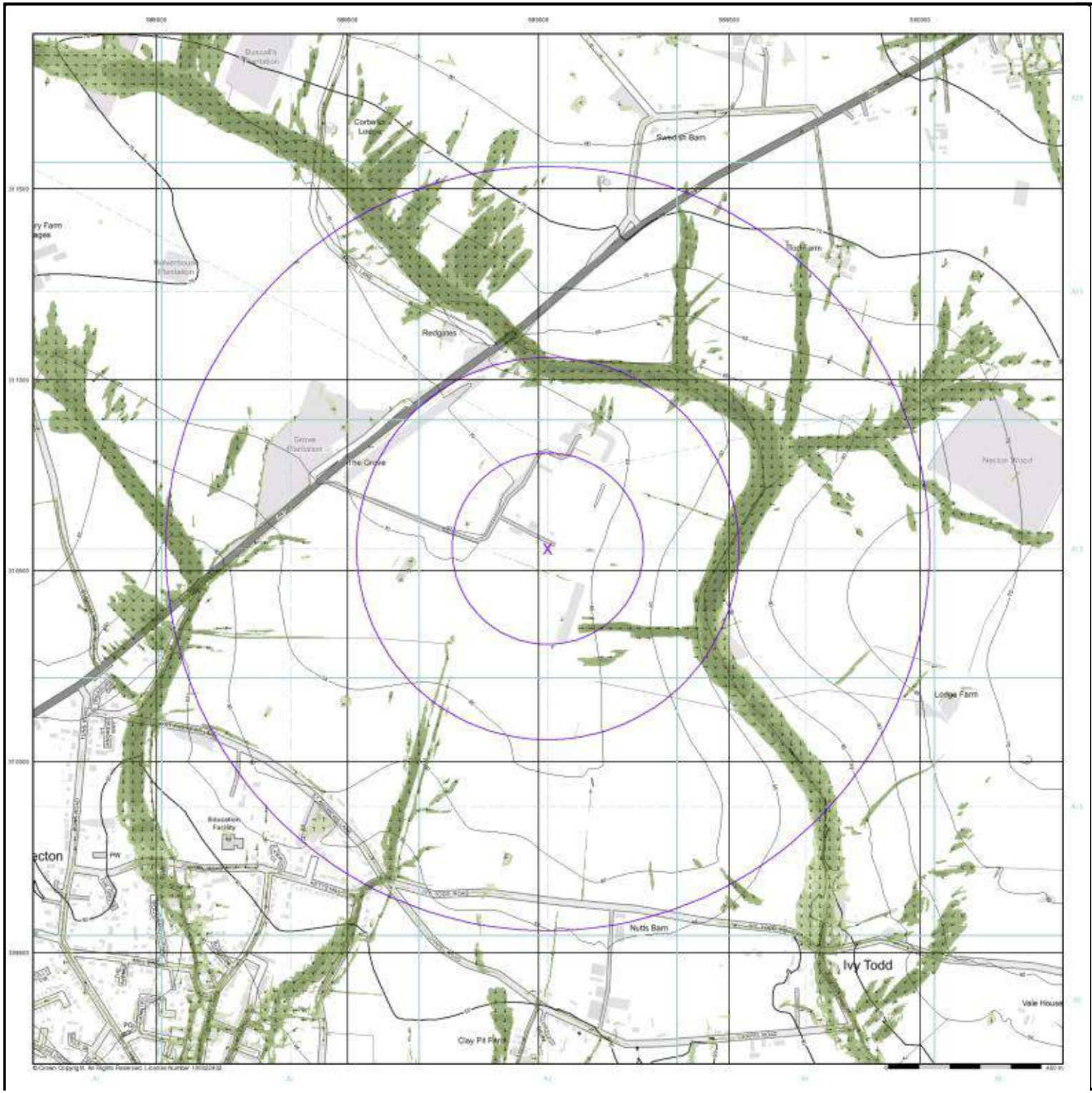


motion

EA/NRW Surface Water 1000 Year Return Velocity and Flow Direction Map (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Velocity and Direction

- 0.00 - 0.25m/s
- 0.25 - 0.50m/s
- 0.50 - 1.00m/s
- 1.00 - 2.00m/s
- > 2.00m/s

Flow Direction at maximum velocity

Contours (height in metres)

Standard Contour | Master Contour | Spot Height

MLW Mean Low Water

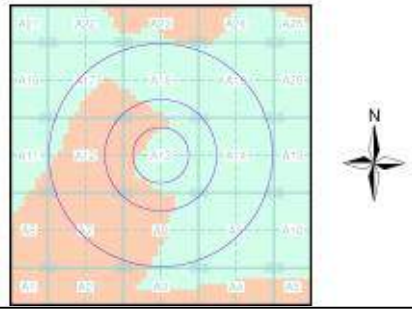
MHW Mean High Water

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



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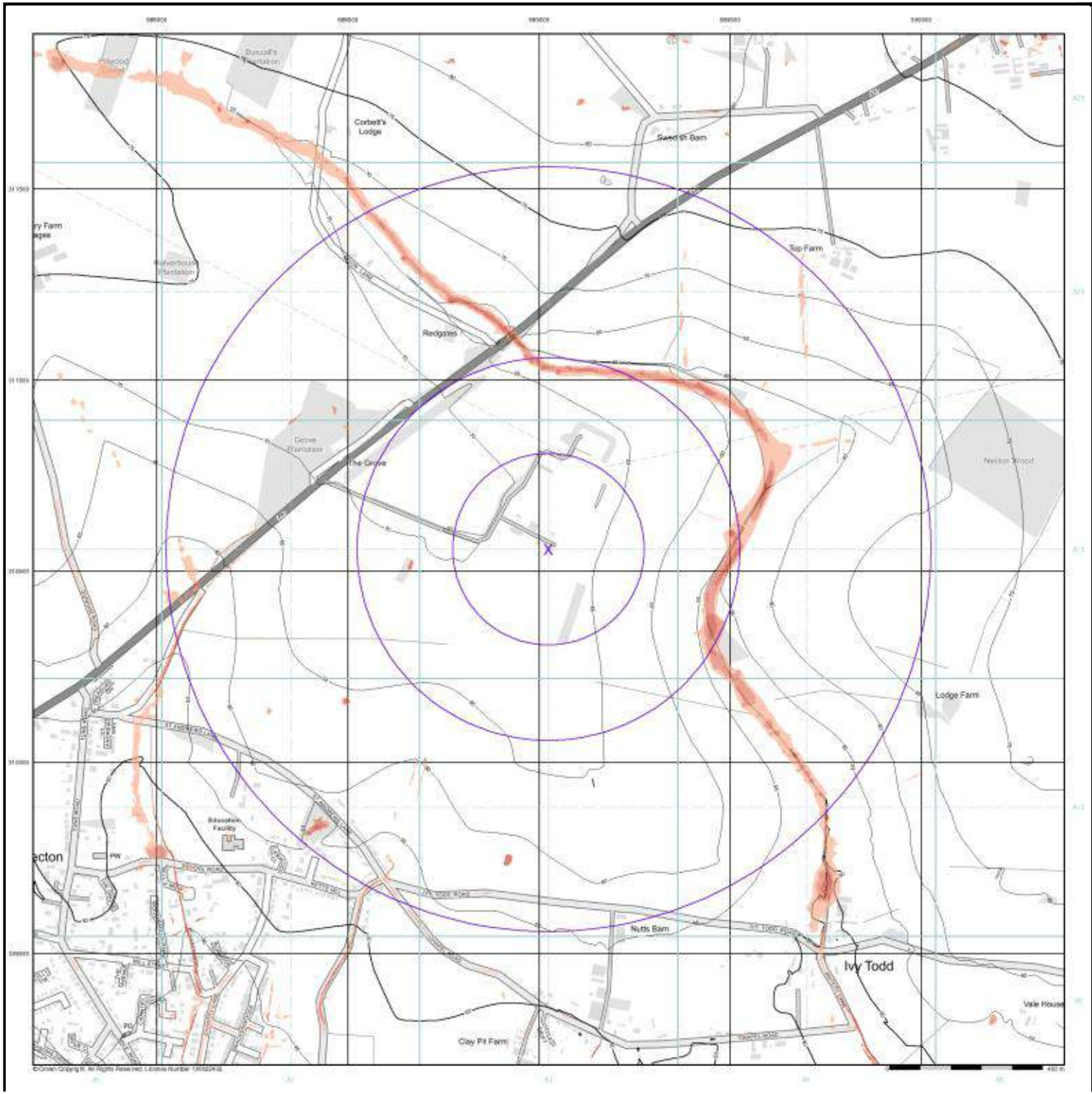


motion

EA/NRW Surface Water 30 Year Return Hazard Rating Map (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height

MLW Mean Low Water

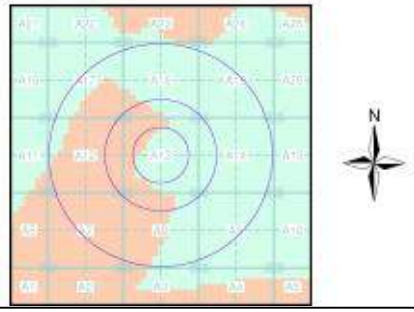
MHW Mean High Water

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



Order Details

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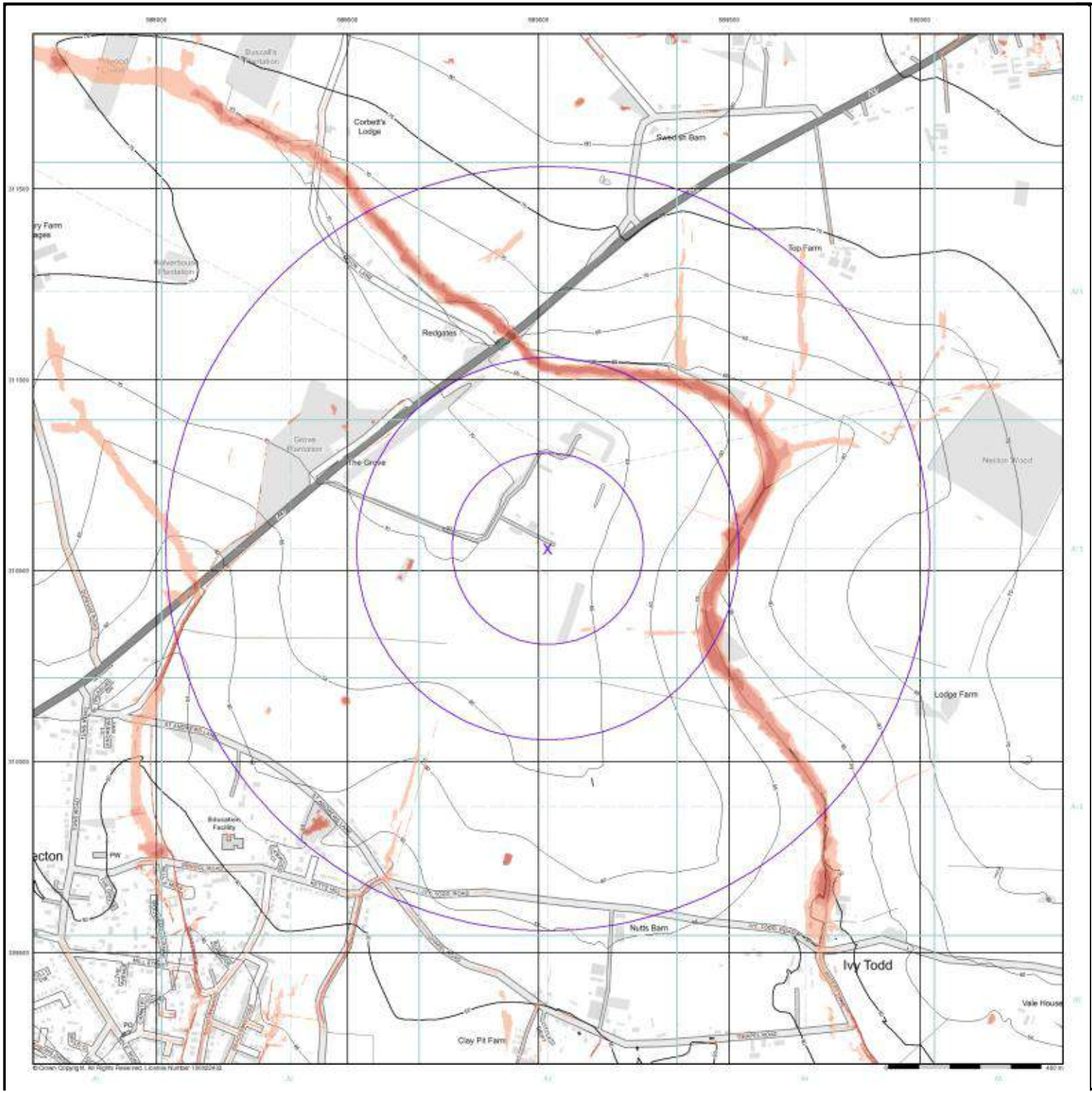


motion

EA/NRW Surface Water 100 Year Return Hazard Rating Map (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height

MLW Mean Low Water

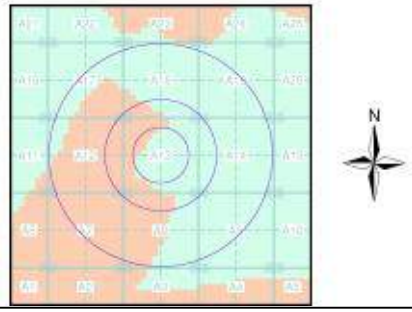
MHW Mean High Water

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



Order Details

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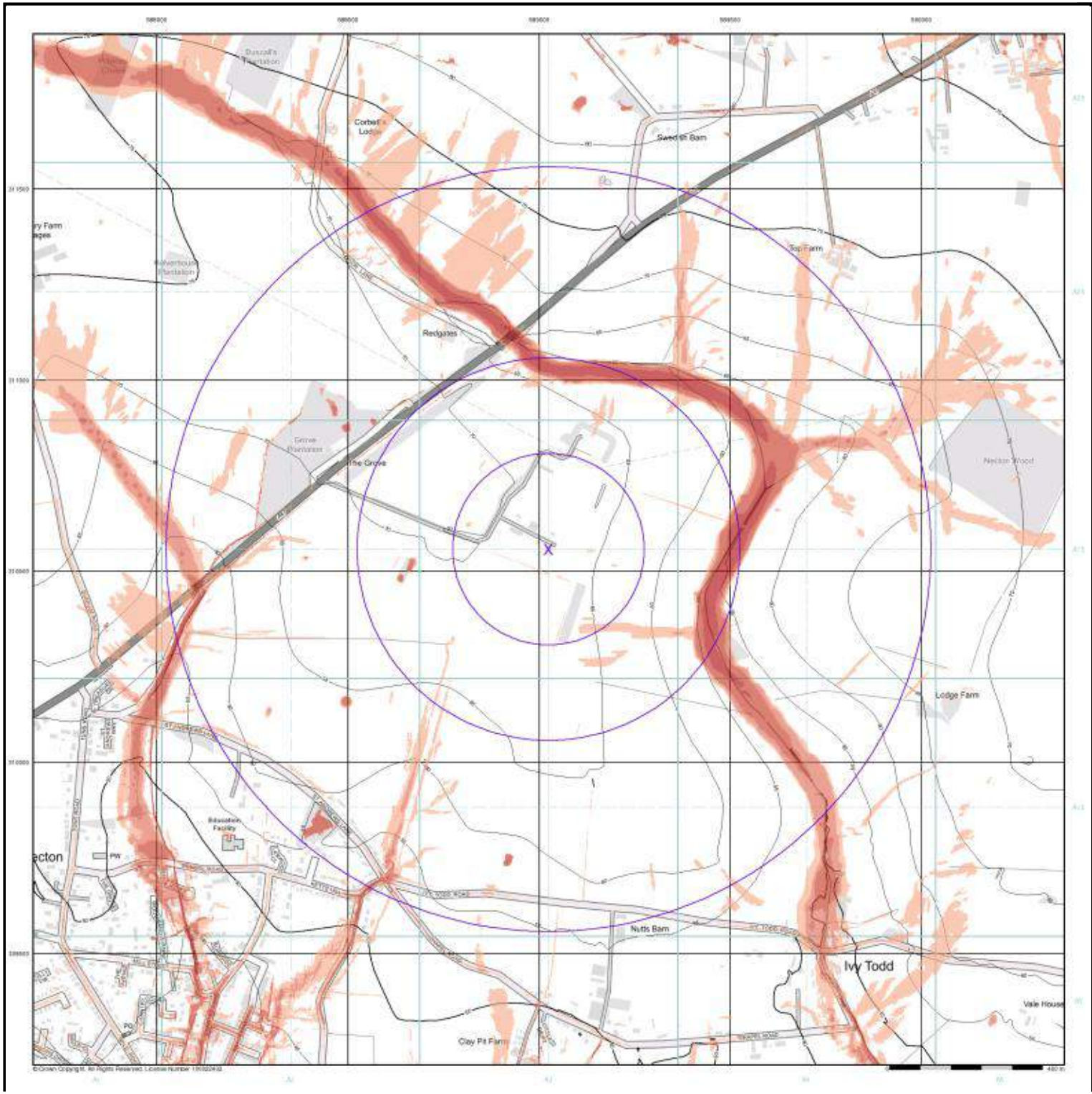
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Dudgeon Onshore Substation, Norwich Road, Necton, SWAFFHAM, PE37 8EG

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



EA/NRW Surface Water 1000 Year Return Hazard Rating Map (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point

Surface Water Hazard Rating

- Low (0.5 – 0.75)
- Moderate (0.75 – 1.25)
- Significant (1.25 – 2.0)
- Extreme (>2.0)

Contours (height in metres)

Standard Contour | Master Contour | Spot Height

Mean Low Water

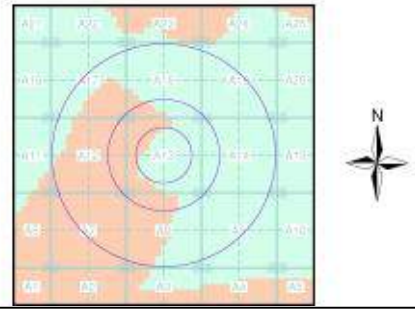
Mean High Water

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



Order Details

Order Number:	305211268_1_1
Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Dudgeon Onshore Substation, Norwich Road, Necton, SWAFFHAM, PE37 8EG

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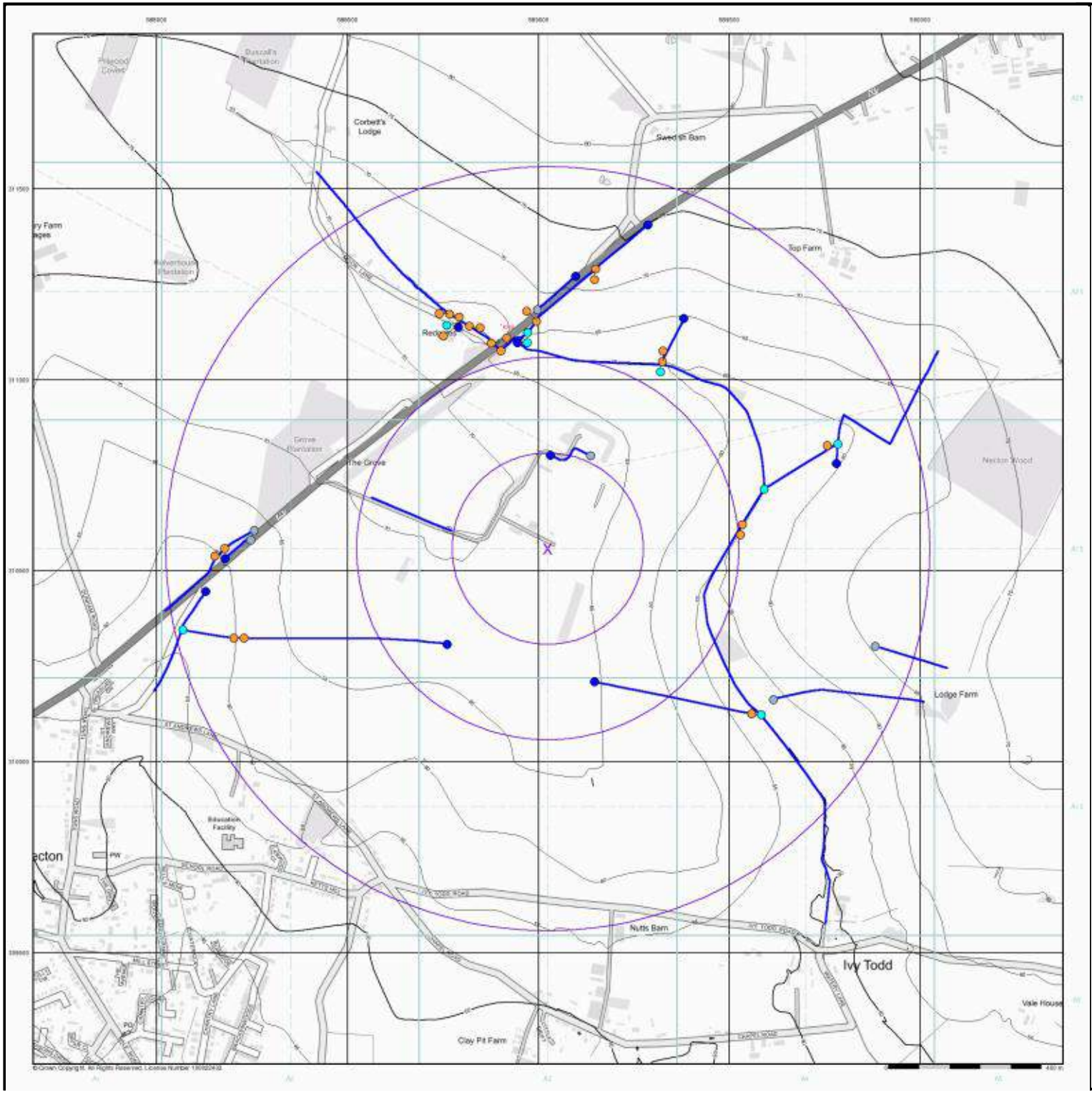


motion

OS Water Network Lines Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

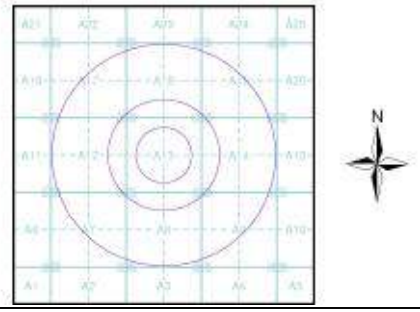
OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea
- Junction
- Outlet
- Pseudo
- Source
- Other

Contours (height in meters)

- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

OS Water Network Map - Slice A



Order Details

Order Number:	305211268_1_1
Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
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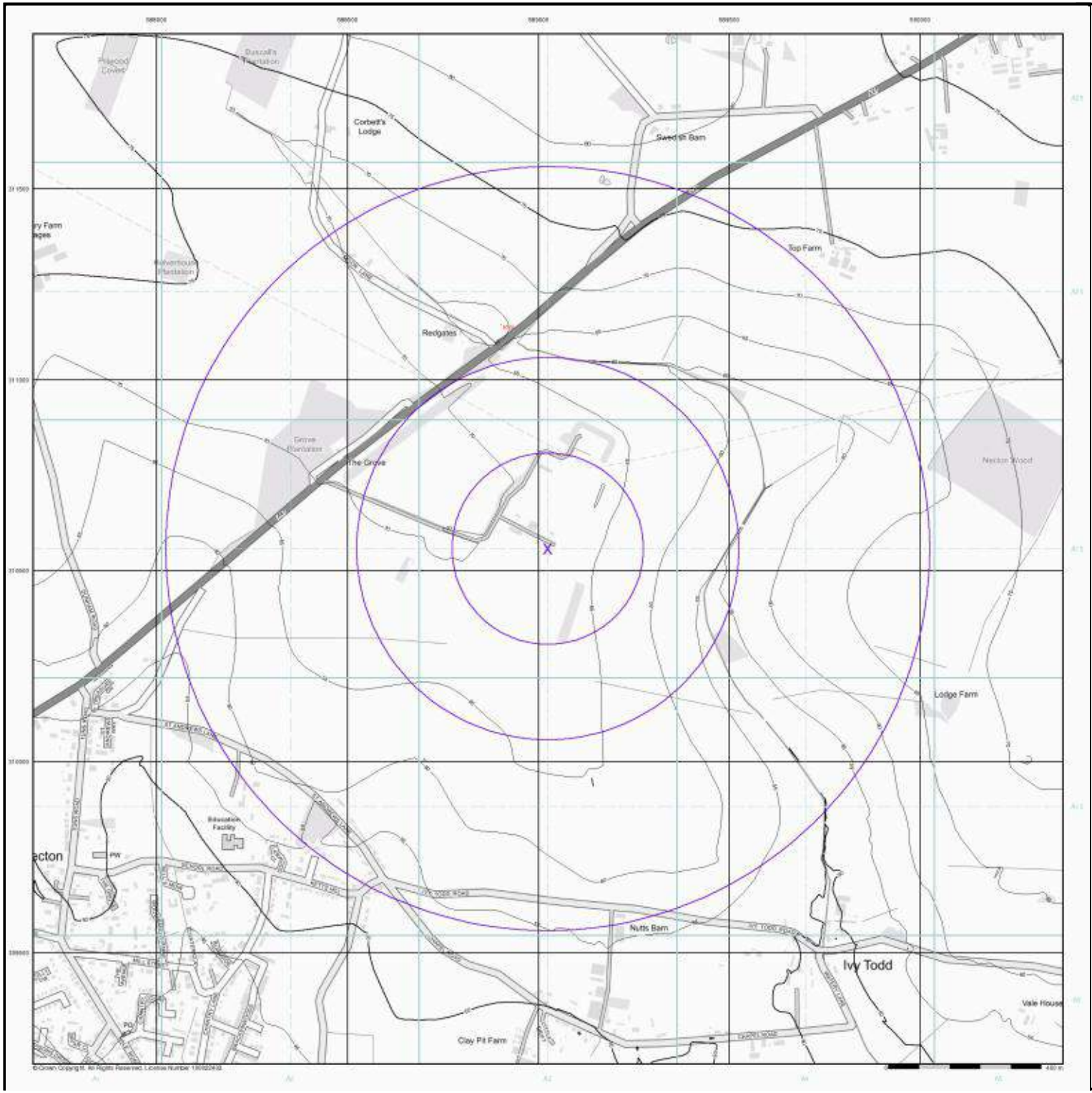


motion

EA/NRW Historic Flood Map (1:10,000)

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

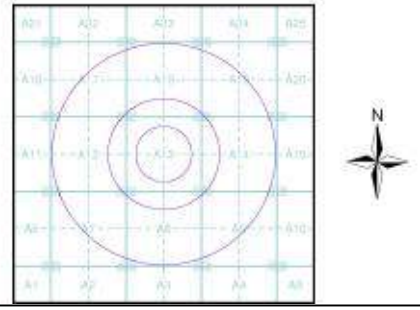
Historic Flood Events Data

- Channel Capacity Exceeded (no raised defences)
- Channel Capacity Exceeded /Surface Water
- Groundwater/High Water Table
- Local Drainage/Surface Water
- Mechanical Failure
- Obstruction/Blockage - Bridge
- Obstruction/Blockage - Channel
- Historical Flood Liabilities
- Obstruction/Blockage - Culvert
- Obstruction/Blockage - Debris Screen
- Operational Failure/ Breach of Defence
- Other
- Overtopping of Defences
- Surface Water
- Unknown

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

EA/NRW Historic Flood Map - Slice A



Order Details

Order Number:	305211268_1_1
Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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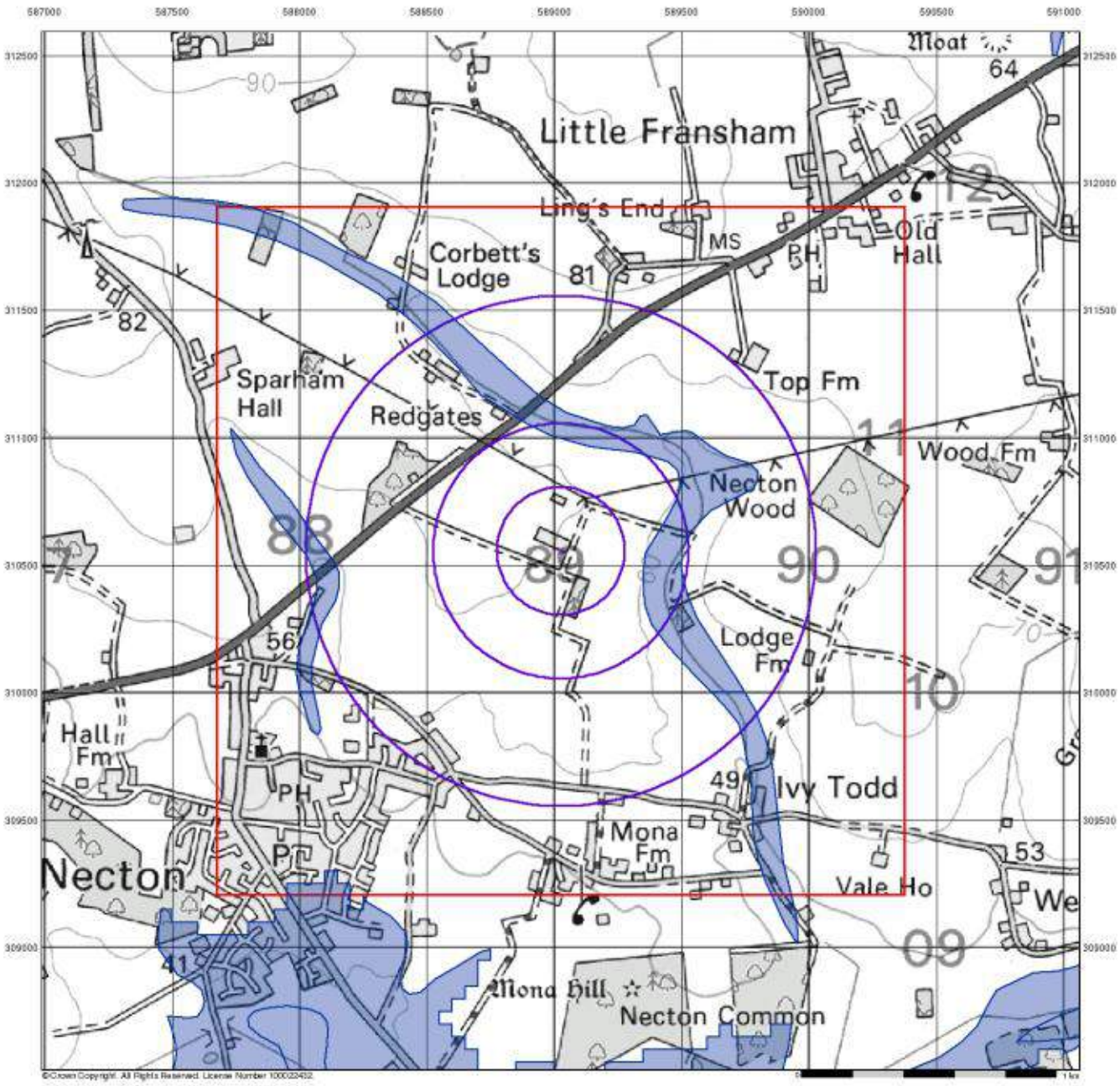


motion

BGS Flood Data (1:50,000)

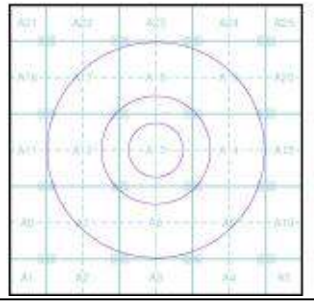
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

BGS Geological Indicators of Flooding

- Coastal
- Inland
- Bodies of Water

BGS Flood Data Map - Slice A



Order Details

Order Number:	305211268_1_1
Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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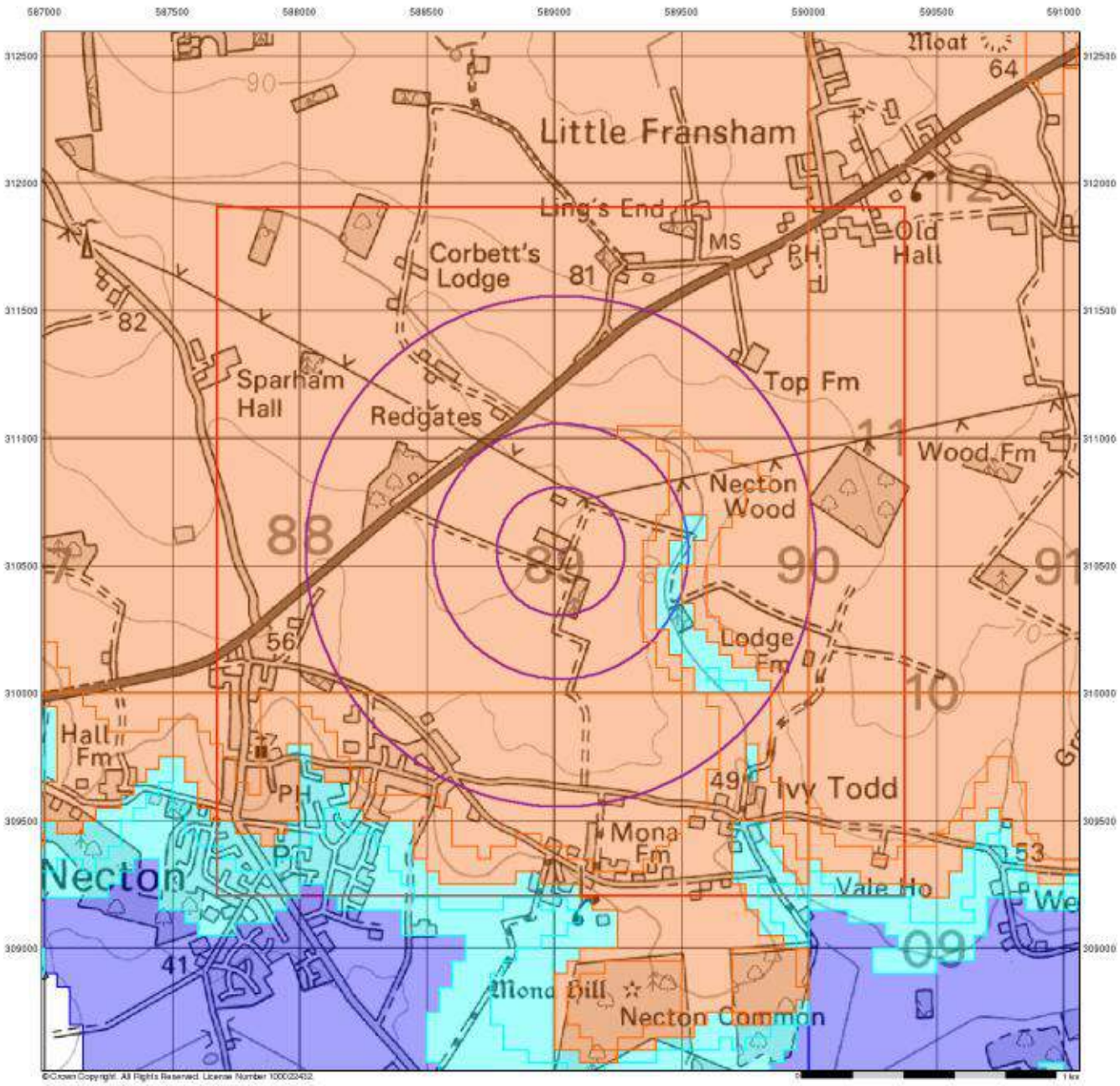


motion

BGS Flood Data (1:50,000)

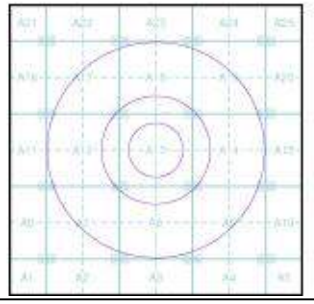
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

BGS Groundwater Flooding Susceptibility

- Potential for Groundwater Flooding to Occur at Surface
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Limited Potential for Groundwater Flooding to Occur

BGS Flood Data Map - Slice A



Order Details

Order Number:	305211268_1_1
Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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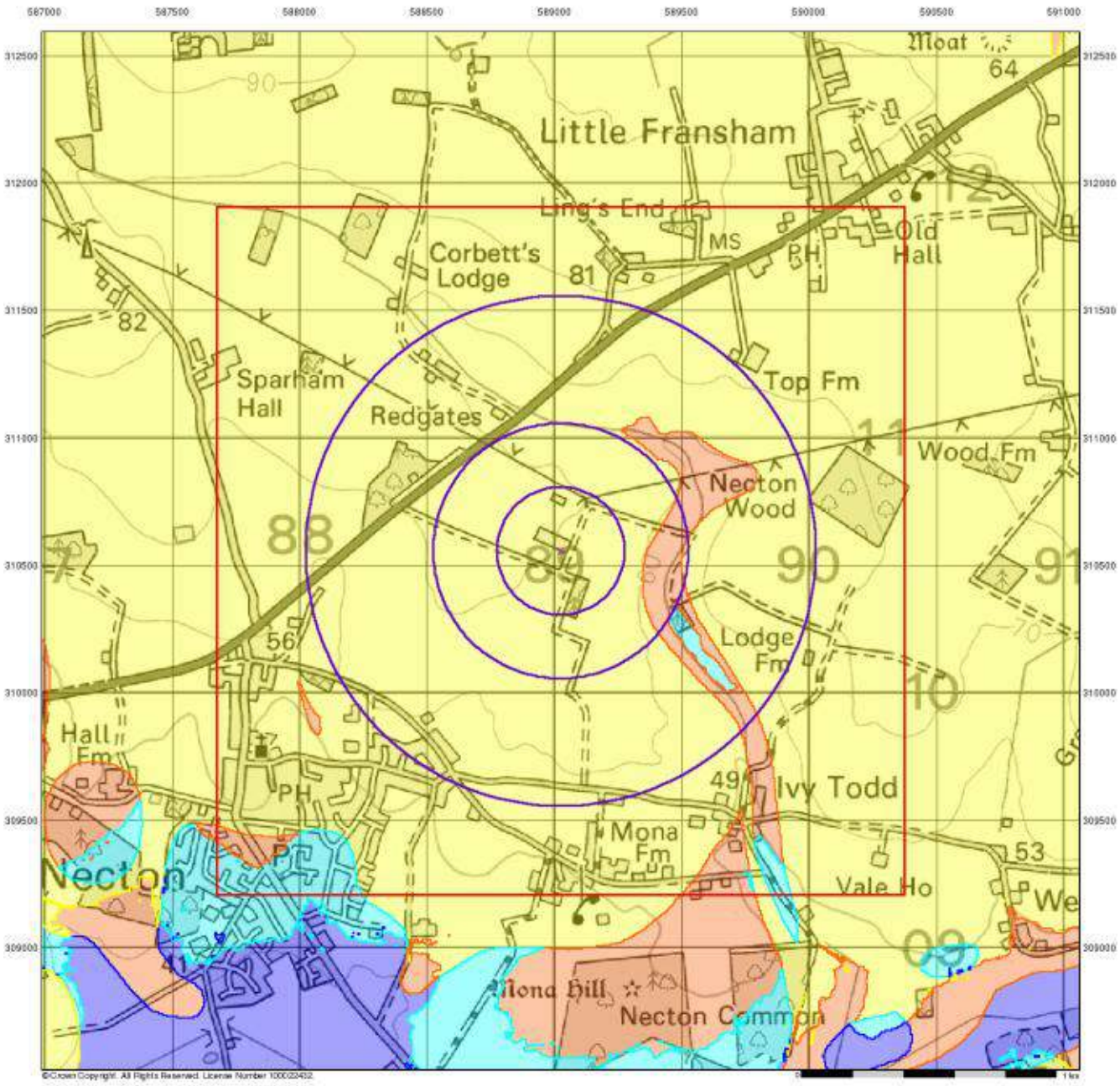
Web: www.envirocheck.co.uk



motion

GeoSmart Information Groundwater Flood Map (1:50,000)

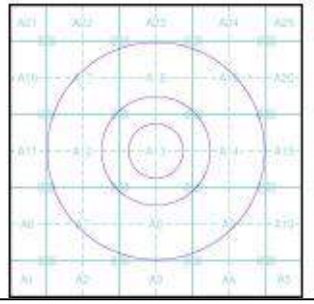
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice

GeoSmart Information Groundwater Flooding Risk

- High Risk
- Moderate Risk
- Low Risk
- Negligible Risk

GeoSmart Information Groundwater Flood Map - Slice A



Order Details

Order Number:	305211268_1_1
Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

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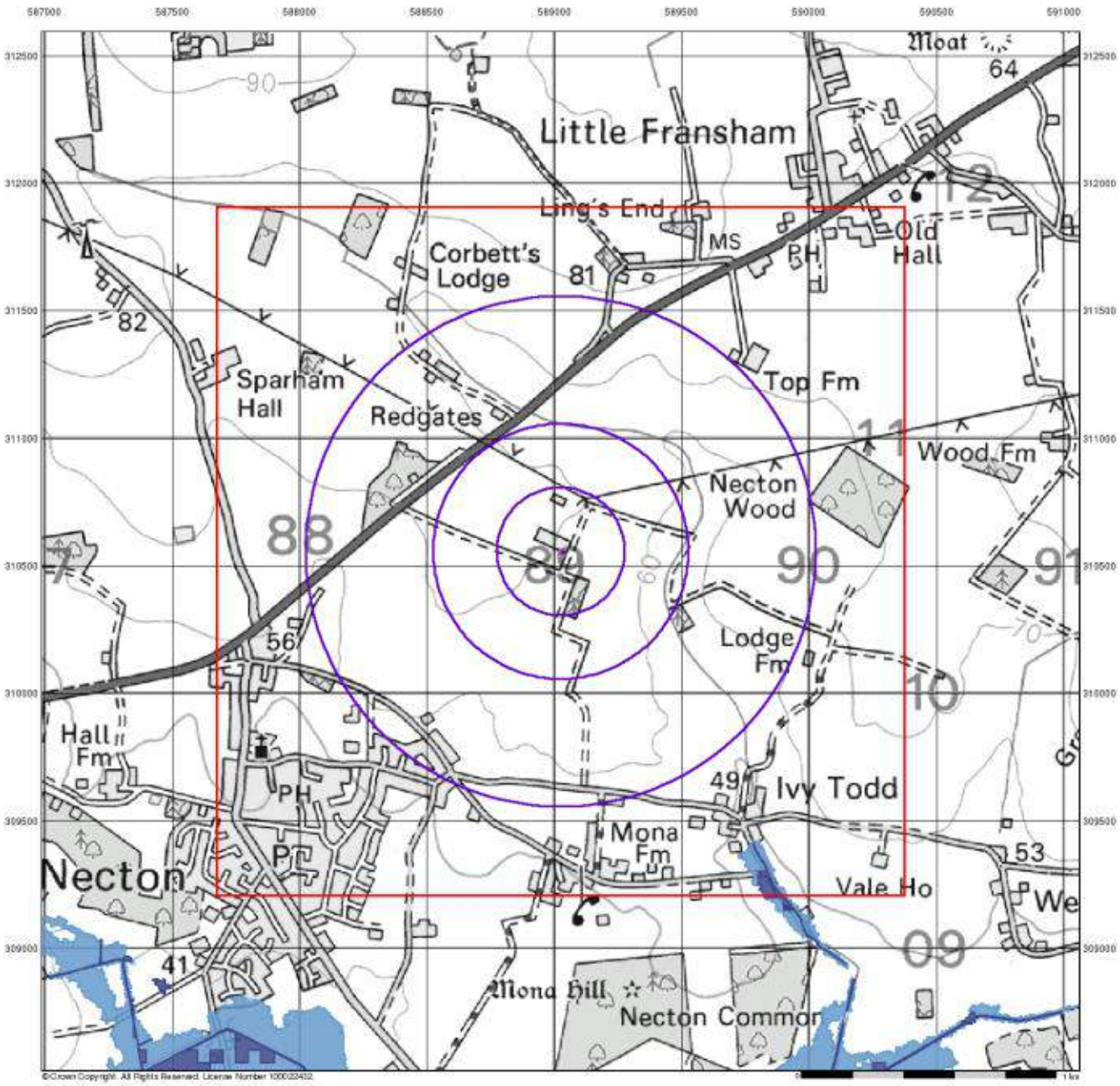


motion

EA/NRW RoFRS Data (1:50,000)

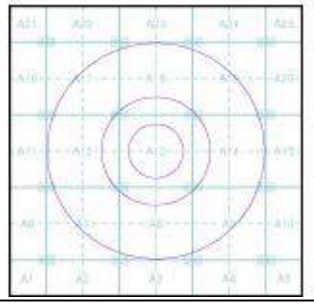
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Risk of Flooding from Rivers and Sea (RoFRS)

- High Risk
- Medium Risk
- Low Risk
- Very Low Risk

EA/NRW RoFRS Data Map - Slice A



Order Details

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Customer Ref:	1sunec 2208020
National Grid Reference:	589020, 310560
Slice:	A
Site Area (Ha):	0.01
Search Buffer (m):	1000

Site Details

Dudgeon Onshore Substation, Norwich Road, Necton, SWAFFHAM, PE37 8EG

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Appendix F

Anglian Water Asset Records

Date: 19/01/23 | Scale: 1:1250 | Map Centre: 589023,310687 | Data updated: 31/12/22 | Our Ref: 1061888 - 1 | Wastewater Plan A0

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2023 Ordnance Survey 100022432.This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer
Surface Sewer
Combined Sewer
Final Effluent
Rising Main*
Private Sewer*
Decommissioned Sewer*

Outfall*
Inlet*
Manhole*

Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station

*(Colour denotes effluent type)

vholdo@motion.co.uk
Necton

love every drop
anglianwater

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix G

UKSUDS Greenfield Runoff Calculations

Print | Close Report

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Vicki holdo
Site name:	Necton
Site location:	Necton

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	52.65894° N
Longitude:	0.79226° E
Reference:	887163853
Date:	Jan 09 2023 12:35

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 1

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	3	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.37	0.37

Hydrological characteristics	Default	Edited
SAAR (mm):	682	682
Hydrological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	2.45	2.45
Growth curve factor 100 years:	3.56	3.56
Growth curve factor 200 years:	4.21	4.21

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	2.79	2.79
1 in 1 year (l/s):	2.42	2.42
1 in 30 years (l/s):	6.83	6.83
1 in 100 year (l/s):	9.92	9.92
1 in 200 years (l/s):	11.73	11.73

Appendix H

EA Flood Map

Flood map for planning

Your reference	Location (easting/northing)	Created
necton	**588570/310438**	**20 Dec 2022 12:21**

Your selected location is in flood zone 1, an area with a low probability of flooding.

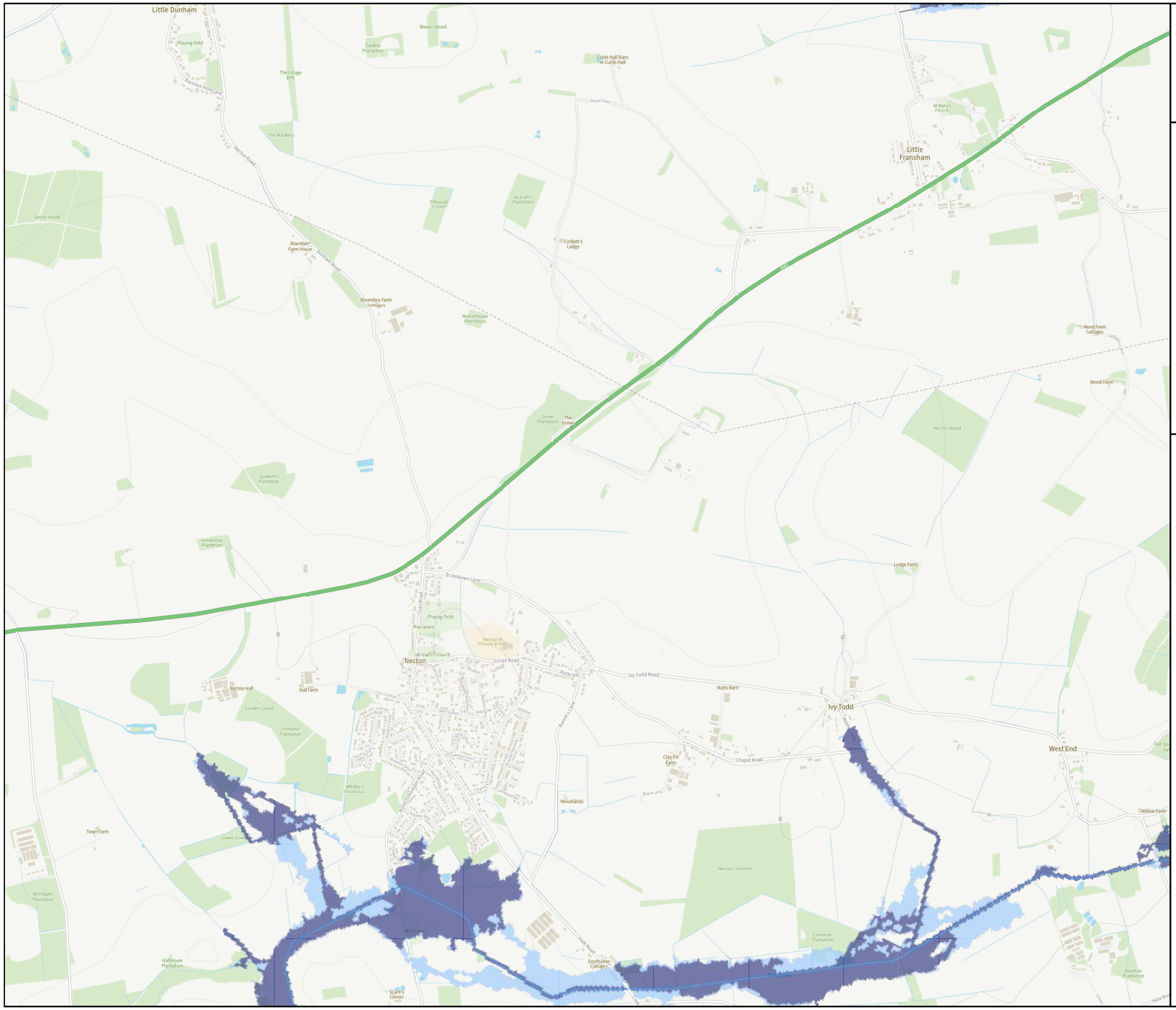
You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
necton

Location (easting/northing)
588570/310438

Scale
1:25000

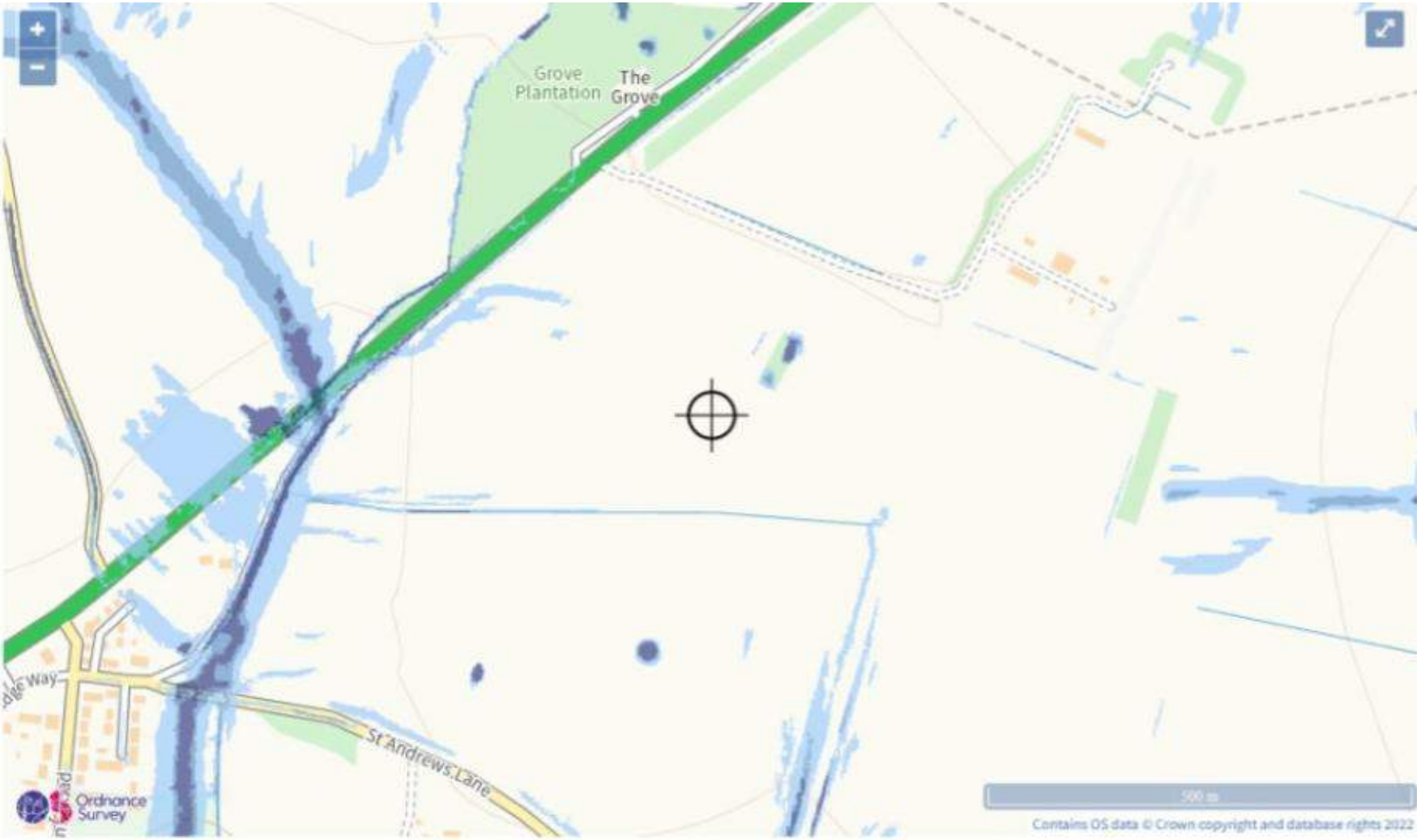
Created
20 Dec 2022 12:21

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 200 400 600m

Appendix I

EA Surface Water Flood Map



Extent of flooding from surface water

High Medium Low Very low Location you selected

Appendix J

MicroDrainage Model Results

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.500	Add Flow / Climate Change (%)	0
Ratio R	0.404	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	20.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.855	4-8	0.977

Total Area Contributing (ha) = 1.832

Total Pipe Volume (m³) = 23.481

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1.000	70.100	1.475	Open Manhole	1350	1.000	68.625	375				
1.001	69.100	1.275	Open Manhole	1350	1.001	67.825	375	1.000	67.825	375	
1.002	69.100	1.475	Open Manhole	1350	1.002	67.625	375	1.001	67.625	375	
6	69.100	1.675	Open Manhole	1500		OUTFALL		1.002	67.425	375	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1.000	588816.071	310407.206	588816.071	310407.206	Required	
1.001	588926.527	310367.600	588926.527	310367.600	Required	
1.002	588963.967	310380.607	588963.967	310380.607	Required	
6	589015.586	310359.894			No Entry	

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002	6	69.100	67.425	0.000	1500	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.500	Storm Duration (mins)	30
Ratio R	0.404		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 1.002, DS/PN: 1.002, Volume (m³): 6.3

Unit Reference	MD-SFP-0091-5200-2000-5200
Design Head (m)	2.000
Design Flow (l/s)	5.2
Flush-Flo™	Calculated
Objective	Future Proof
Application	Surface
Sump Available	Yes
Diameter (mm)	91
Invert Level (m)	67.625
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	5.2	Kick-Flo®	0.814	3.4
Flush-Flo™	0.378	4.4	Mean Flow over Head Range	-	4.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	1.200	4.1	3.000	6.3	7.000	9.3
0.200	4.1	1.400	4.4	3.500	6.7	7.500	9.7
0.300	4.4	1.600	4.7	4.000	7.2	8.000	10.0
0.400	4.4	1.800	4.9	4.500	7.6	8.500	10.3
0.500	4.4	2.000	5.2	5.000	8.0	9.000	10.5
0.600	4.2	2.200	5.4	5.500	8.3	9.500	10.8
0.800	3.5	2.400	5.7	6.000	8.7		
1.000	3.8	2.600	5.9	6.500	9.0		

Storage Structures for Storm

Infiltration Blanket Manhole: 1.000, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Diameter/Width (m)	95.0
Safety Factor	2.0	Length (m)	105.0
Porosity	0.30	Cap Volume Depth (m)	0.300
Invert Level (m)	68.625		

Infiltration Blanket Manhole: 1.001, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Diameter/Width (m)	95.0
Safety Factor	2.0	Length (m)	105.0
Porosity	0.30	Cap Volume Depth (m)	0.300
Invert Level (m)	68.825		

Tank or Pond Manhole: 1.002, DS/PN: 1.002

Invert Level (m) 67.625

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	582.0	1.000	582.0	1.010	0.0

Manhole Headloss for Storm

PN	US/MH Name	US/MH Headloss
1.000	1.000	0.500
1.001	1.001	0.500
1.002	1.002	0.500

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.400	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1.000	480 Winter	1	+0%					68.665
1.001	1.001	15 Winter	1	+0%	30/15 Summer				68.075
1.002	1.002	960 Winter	1	+0%	30/30 Summer				67.918

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Level Status	Level Exceeded
1.000	1.000	-0.335	0.000	0.03		470	4.0	OK	
1.001	1.001	-0.125	0.000	0.77		6	99.7	OK	
1.002	1.002	-0.082	0.000	0.04			4.4	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.400	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1.000	1440 Winter	30	+40%					68.782
1.001	1.001	15 Winter	30	+40%	30/15 Summer				68.828
1.002	1.002	960 Winter	30	+40%	30/30 Summer				68.799

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1.000	-0.218	0.000	0.10		1029	15.2	OK	
1.001	1.001	0.628	0.000	2.06		4	264.9	FLOOD RISK	
1.002	1.002	0.799	0.000	0.04			4.4	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 3 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.400	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

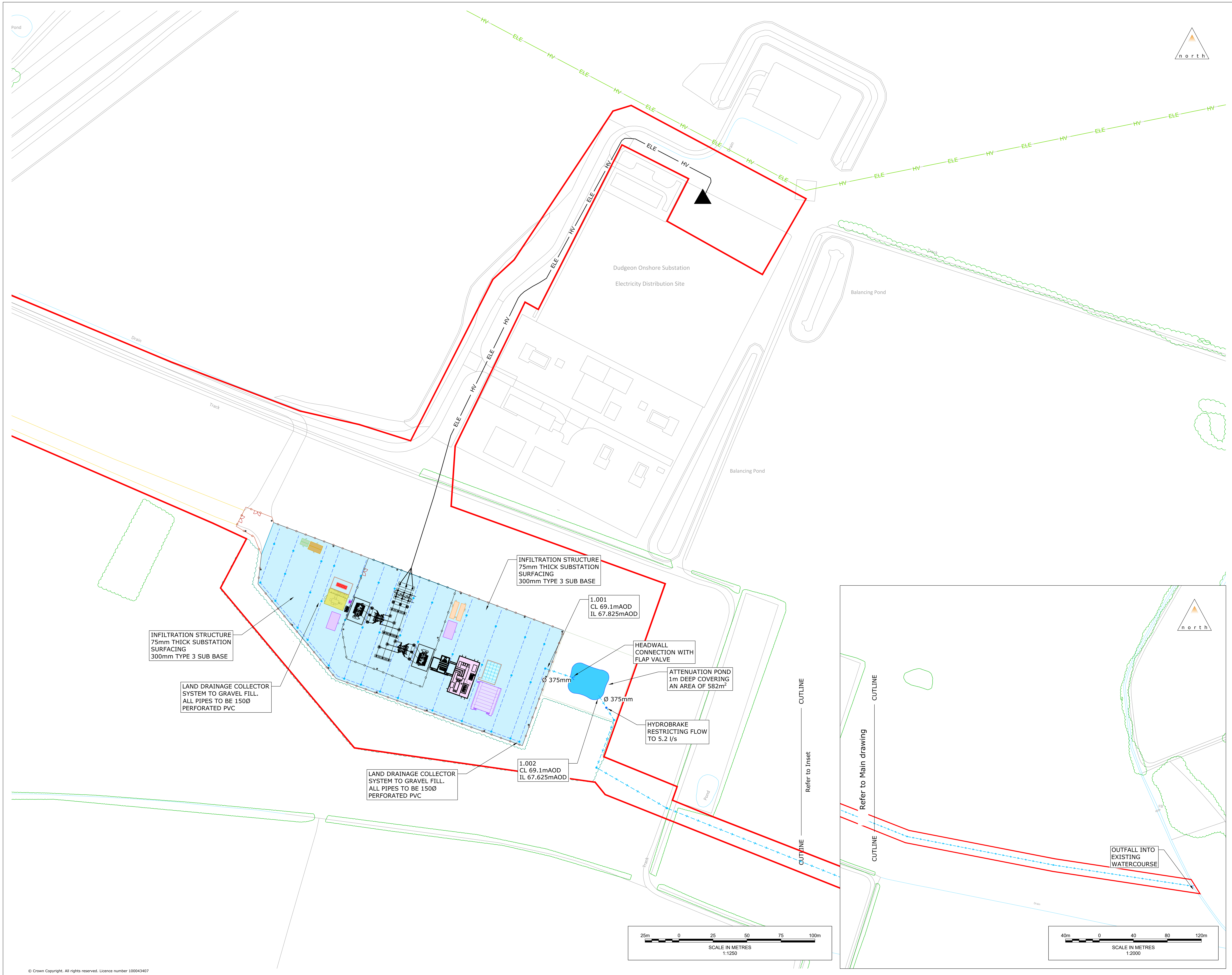
Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1.000	1440 Winter	100	+45%					68.873
1.001	1.001	1440 Winter	100	+45%	30/15 Summer				68.872
1.002	1.002	240 Winter	100	+45%	30/30 Summer				68.987

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1.000	-0.127	0.000	0.12		2106	18.9	OK	
1.001	1.001	0.672	0.000	0.34		617	43.6	FLOOD RISK	
1.002	1.002	0.987	0.000	0.04			4.4	FLOOD RISK	

Appendix K

Proposed Drainage Strategy



Notes

1. All levels and dimensions are to be checked on site before any work commences. All dimensions are in metres unless stated otherwise.
2. This drawing has been based upon survey information supplied by Others and Motion cannot guarantee the accuracy of the data provided.
3. Any discrepancies should be reported to the architect and/or engineer immediately, so that clarification can be sought prior to the commencement of works.
4. This drawing should be read in conjunction with all other relevant architect and engineering details, drawings and specification.

Legend

- Surface Water Gravity Pipe
- Land drainage collector system
- New Surface Water Manhole
- Hydrobrake
- Attenuation pond
- Infiltration Structure
- Headwall

Revision Notes:		Drn	Chk	App	Date
B	Revised Drainage	ST	VBH	NJ	11/07/2023
A	First Issue	ST	VBH	NJ	05/05/2023

Drawing Status:
DRAFT
NOT FOR CONSTRUCTION

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Client: Statkraft UK

Project: Necton Greener Grid Park

Title: Drainage Strategy

Scale: 1:1250 | Size: A1 | Project No: 2208020

Drawing: 2208020-0500-01 | Revision: B