



**PROPOSED SOLAR ARRAY
AT THE A G PEARCE LTD
SITE, MIDDLE FARM,
CASTLE ROAD,
WORMEGAY, NORFOLK**

FLOOD RISK ASSESSMENT

NOVEMBER 2022

REPORT REF: 3088/RE/11-22/01

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CONTRACT

Evans Rivers and Coastal Ltd has been commissioned by A G Pearce Ltd to carry out a Flood Risk Assessment for a proposed solar array at the A G Pearce Ltd site, Middle Farm, Castle Road, Wormegay, Norfolk.

QUALITY ASSURANCE, ENVIRONMENT AND HEALTH AND SAFETY

Evans Rivers and Coastal Ltd operates a Quality Assurance, Environmental, and Health and Safety Policy.

This project comprises various stages including data collection; depth analysis; and reporting. Quality will be maintained throughout the project by producing specific methodologies for each work stage. Quality will also be maintained by providing specifications to third parties such as surveyors; initiating internal quality procedures including the validation of third party deliverables; creation of an audit trail to record any changes made; and document control using a database and correspondence log file system.

To adhere to the Environmental Policy, data will be obtained and issued in electronic format and alternatively by post. Paper use will also be minimised by communicating via email or telephone where possible. Documents and drawings will be transferred in electronic format where possible and all waste paper will be recycled. Meetings away from the office of Evans Rivers and Coastal Ltd will be minimised to prevent unnecessary travel, however for those meetings deemed essential, public transport will be used in preference to car journeys.

The project will follow the commitment and objectives outlined in the Health and Safety Policy operated by Evans Rivers and Coastal Ltd. All employees will be equipped with suitable personal protective equipment prior to any site visits and a risk assessment will be completed and checked before any site visit. Other factors which have been taken into consideration are the wider safety of the public whilst operating on site, and the importance of safety when working close to a water source and highway. Any designs resulting from this project and directly created by Evans Rivers and Coastal Ltd will also take into account safety measures within a "designers risk assessment".

Report carried out by:

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CONTENTS

CONTRACT	i
QUALITY ASSURANCE, ENVIRONMENT AND HEALTH AND SAFETY	i
DISCLAIMER	i
COPYRIGHT	i
CONTENTS	ii
1. INTRODUCTION	1
1.1 Project scope	1
2. DATA COLLECTION	2
3. SITE CHARACTERISTICS	3
3.1 Existing Site Characteristics and Location	3
3.2 Site Proposals	4
4. SOURCES OF FLOODING	5
4.1 Fluvial	5
4.2 Groundwater Flooding	5
4.3 Surface Water Flooding and Sewer Flooding	6
4.4 Reservoirs, Canals And Other Artificial Sources	7
4.5 Surface Water Drainage	7
5. CONCLUSIONS	8
6. BIBLIOGRAPHY	9
DRAWINGS	22_042910_0001_A
	22_042910_0003_A

1. INTRODUCTION

1.1 Project Scope

1.1.1 Evans Rivers and Coastal Ltd has been commissioned by A G Pearce Ltd to carry out a Flood Risk Assessment for a proposed solar array at the A G Pearce Ltd site, Middle Farm, Castle Road, Wormegay, Norfolk.

1.1.2 It is understood that this assessment will be submitted to the Local Planning Authority as part of a planning application. Specifically, this assessment intends to:

- a) Review any literature and guidance specific to this area such as the SFRA;
- b) Assess the flood risk from all sources to people and property and propose mitigation measures accordingly;
- c) Review existing evacuation and warning procedures for the area;
- d) Report findings and recommendations.

1.1.3 This assessment is carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) dated 2021. Other documents which have been consulted include:

- DEFRA/EA document entitled *Framework and guidance for assessing and managing flood risk for new development Phase 2 (FD2320/TR2)*, 2005;
- Communities and Local Government 2007. *Improving the Flood Performance of New Buildings*. HMSO.
- DEFRA/EA document entitled *The flood risks to people methodology (FD2321/TR1)*, 2006;
- EA *Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose*, 2008;
- National Planning Practice Guidance – Flood Risk and Coastal Change.
- UK Government’s climate change allowances guidance.
- JBA Consulting *Level 1 King’s Lynn and West Norfolk Strategic Flood Risk Assessment (SFRA)* dated 2018.
- JBA Consulting *Level 2 King’s Lynn and West Norfolk Strategic Flood Risk Assessment (SFRA)* dated 2019.
- Norfolk County Council document entitled *Lead Local Flood Authority Statutory Consultee for Planning – Guidance Document* dated July 2022.
- Kings Lynn and West Norfolk *Surface Water Management Plan (SWMP)* dated 2010 and 2012.
- Norfolk County Council *Flood Investigation Report* dated 2015.

2. DATA COLLECTION

2.1 To assist with this report, the data collected included:

- Ordnance Survey 1:10,000 street view map (Evans Rivers and Coastal Ltd OS licence number 100049458).
- Filtered LIDAR data at 1m resolution.
- 1:250,000 *Soil Map of Eastern England* (Sheet 4) published by Cranfield University and Soil Survey of England and Wales 1983.
- 1:625,000 *Hydrogeological Map of England and Wales*, published in 1977 by the Institute of Geological Sciences (now the British Geological Survey).
- 1:125,000 *Hydrogeological Map of Northern East Anglia* published in 1976 by the Institute of Geological Sciences (now the British Geological Survey).
- British Geological Survey, *Online Geology of Britain Viewer*.

British Geological Society, *Groundwater Flooding Susceptibility Map* obtained via Promap.

3. SITE CHARACTERISTICS

3.1 Existing Site Characteristics and Location

3.1.1 The site is located at A G Pearce Ltd site, Middle Farm, Castle Road, Wormegay, Norfolk. The approximate Ordnance Survey (OS) grid reference for the site is 565998 311620 and the location of the site is shown on Figure 1 and Drawing Number 22_042910_0001_A.

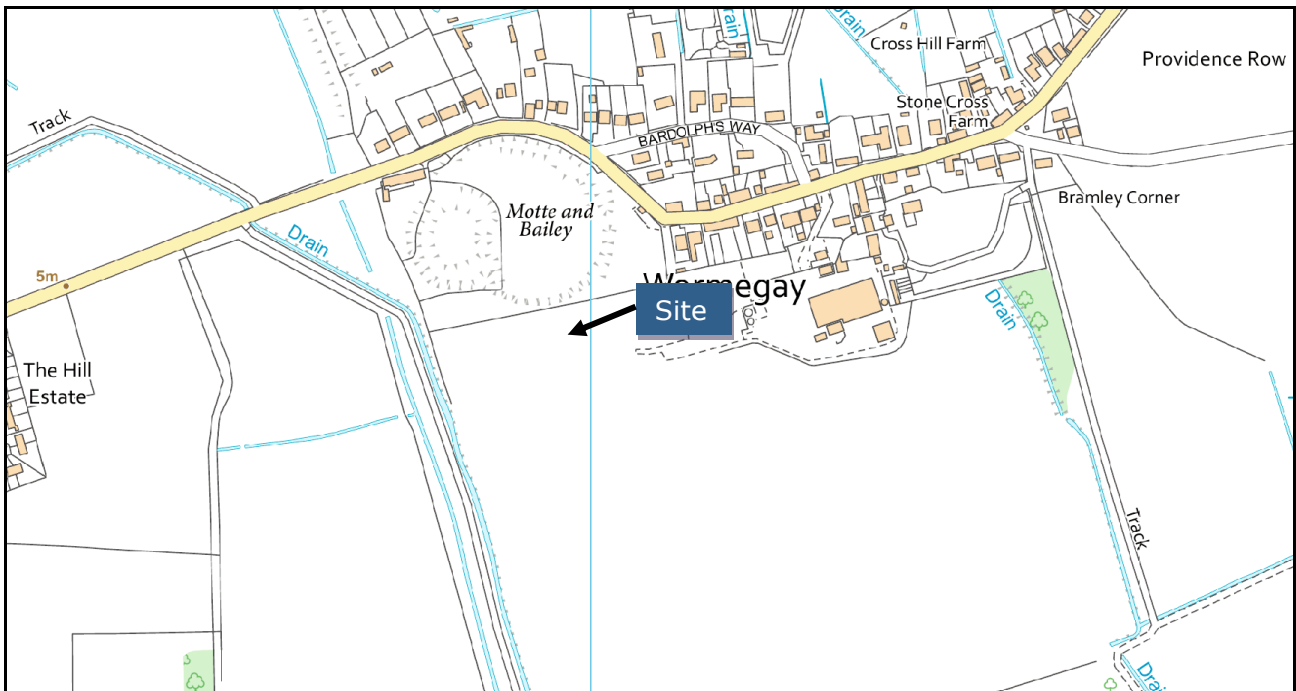


Figure 1: Site location plan (Source: Ordnance Survey)

- 3.1.2 The site comprises an area of grassland associated with the wider A G Pearce Ltd site. The site is accessed from Castle Road to the north of the site.
- 3.1.3 Filtered LIDAR data at 1m resolution has been obtained in order to determine and illustrate the topography across the site and surrounding area (Figure 2).
- 3.1.4 It can be seen that ground levels fall gently in a southerly direction.

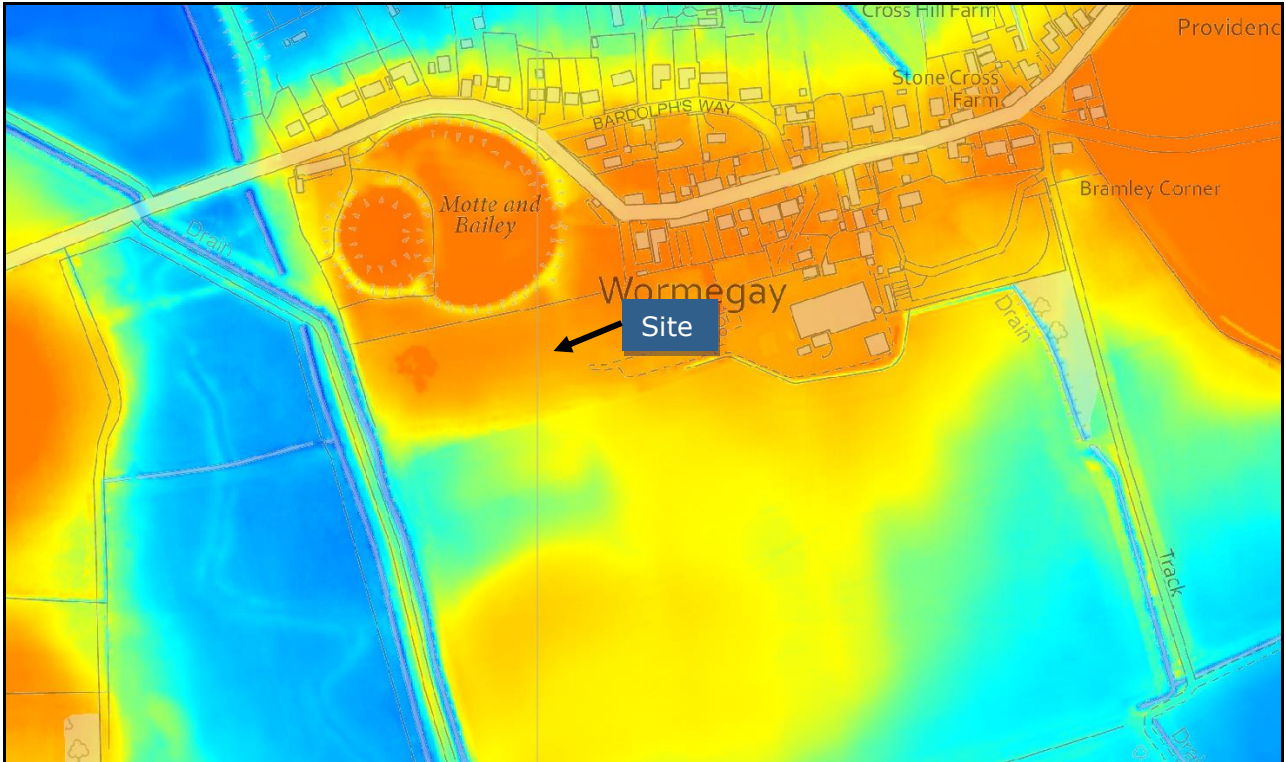


Figure 2: LIDAR survey data where higher ground is denoted as orange and yellow colours and lower areas denoted by blue and green colours

3.2 Site Proposals

- 3.2.1 It is the Client's intention to provide a private solar array which will serve the energy needs of the wider site. The solar panels will be raised above the ground surface.
- 3.2.2 The panels will be aligned east to west across the site and there will be sufficient spacing between the rows to facilitate access and to allow rainwater to disperse more evenly onto the ground surface.
- 3.2.3 The proposed layout can be seen on Drawing Number 22_042910_0003_A.
- 3.2.4 Paragraph: 066 Reference ID: 7-066-20140306 of the NPPG confirms that this type of development is classified as a 'essential infrastructure'.

4. SOURCES OF FLOODING

4.1 Fluvial

- 4.1.1 The Environment Agency’s Flood Zone Map (Figure 3) and 2017 SFRA map KL_62 shows that the site is located within the NPPF Flood Zone 1, ‘Low Probability’ which comprises land as having less than a 1 in 1000 year annual probability of fluvial or tidal flooding (i.e. an event more severe than the extreme 1 in 1000 year event). NPPF states that all uses of land are appropriate in this zone.

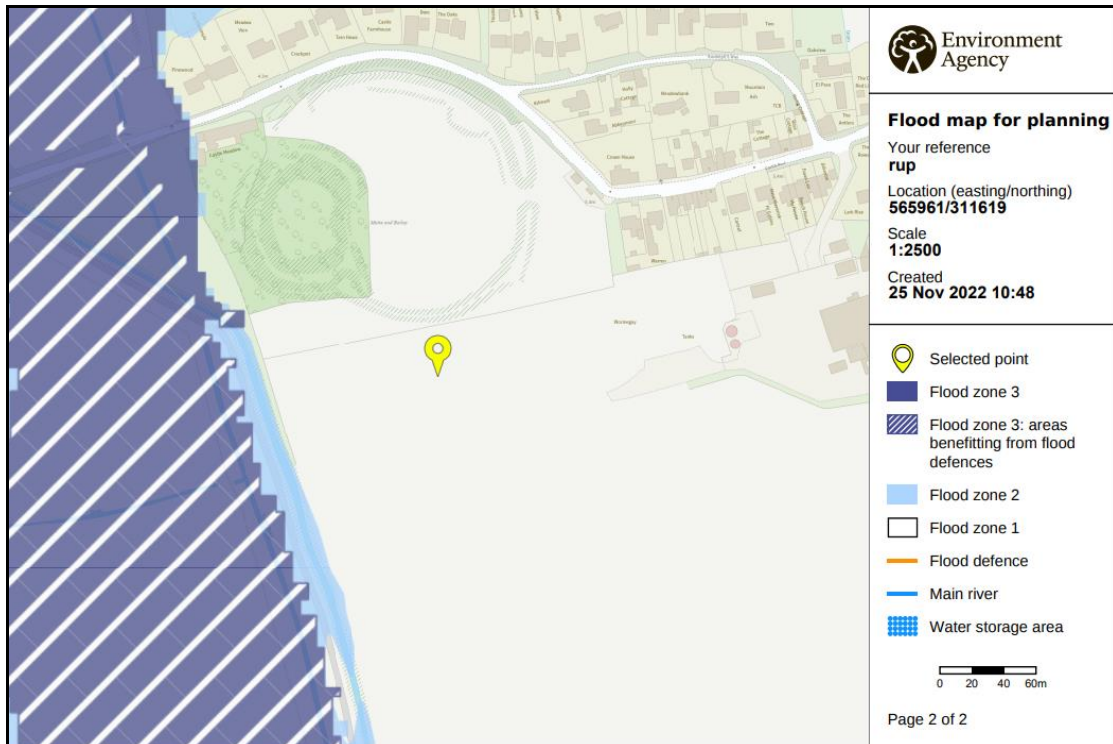


Figure 3: Environment Agency Flood Zone Map (Source: Environment Agency)

- 4.1.2 The site is located within the East of the Ouse, Polver and Nar Internal Drainage Board (IDB) area. The nearest IDB controlled watercourse is the Castle Drain located close to the western frontage of the site. The 2017 SFRA map KL_62 also shows that this watercourse is designated an Ordinary Watercourse.
- 4.1.3 Information from the IDB’s *Policy Statement on Flood Protection and Water Level Management* indicates that the IDB maintains the drainage network and more specifically water levels through the operation and maintenance of its pumping stations. The IDB’s infrastructure, including its watercourses and pumping stations, is monitored by the IDB to ensure that their condition meet the standards of protection sought and improvement works are carried out where appropriate and necessary.

4.2 Groundwater Flooding

- 4.2.1 In order to assess the potential for groundwater flooding during higher return period rainfall events, the Jacobs/DEFRA report entitled *Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study*, published in May 2004, was consulted, together with the guidance offered within the document entitled *Groundwater flooding records collation, monitoring and risk assessment (ref HA5)*, commissioned by DEFRA and carried out by Jacobs in 2006.

Soil and Geology at the Site

4.2.2 It can be seen from the various soil and hydrogeological data, listed in Section 2, that the soils beneath the site comprise sand.

Groundwater Flooding Potential at the Site

4.2.3 There have been no recorded groundwater flood events across the area between 2000 and 2003, as indicated by the Jacobs study. Figure 6.3 of the SWMP shows that there have been no recorded incidents of groundwater flooding at the site.

4.2.4 The BGS Groundwater Flooding Susceptibility Map and 2017 SFRA map KL_62 indicate that there is a <25% susceptibility to groundwater flooding. Figure 4.3 of the SWMP indicates that there is a very low susceptibility to groundwater flooding.

4.2.5 Therefore, it is considered that the evidence suggests an overall low risk of groundwater flooding and the raised panels will reduce the risk to acceptable levels

4.3 Surface Water Flooding and Sewer Flooding

4.3.1 Surface water and sewer flooding across urban areas is often a result of high intensity storm events which exceed the capacity of the sewers thus causing them to surcharge and flood. Poorly maintained sewer networks and blockages can also exacerbate the potential for sewer flooding.

4.3.2 The Environment Agency’s Surface Water Flooding Map (Figure 4) indicates that across the site there is a very low surface water flooding risk (i.e. less than 1 in 1000 year chance).

4.3.3 Figure KL_62 of the 2017 SFRA shows that the site would not be affected during the climate change 1 in 100 year event.

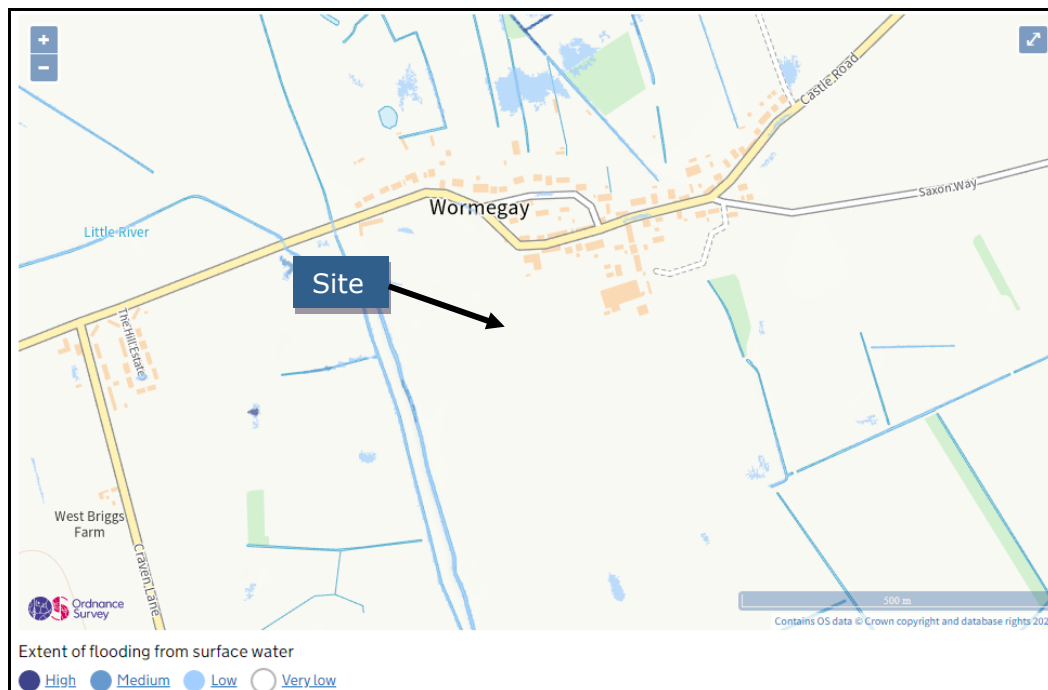


Figure 4: Environment Agency Surface Water Flooding Map (Source: Environment Agency, 2022)

4.4 Reservoirs, Canals And Other Artificial Sources

- 4.4.1 The failure of man-made infrastructure such as flood defences and other structures can result in unexpected flooding. Flooding from artificial sources such as reservoirs, canals and lakes can occur suddenly and without warning, leading to high depths and velocities of flood water which pose a safety risk to people and property.
- 4.4.2 The Environment Agency’s “Risk of flooding from reservoirs” map shows that the site is not at risk from reservoir flooding.

4.5 Surface Water Drainage

- 4.5.1 The solar panels are placed on a steel frame which is raised above the ground surface. The panels are aligned in rows which will allow rainwater to disperse more evenly onto the ground surface. Rainwater will simply fall onto the angled solar panel and runoff onto the ground surface below it and beneath it.
- 4.5.2 It is important to note that the hydrological characteristics reflect a rural regime and not an urban regime. Rainfall is somewhat allowed to follow its natural course and dissipate over these grassed areas similar to the existing “Greenfield” scenario. As the ground surface beneath and between the solar units will remain natural and undeveloped, surface water will be allowed to continue its natural, pre-development, runoff regime without increasing the on-site or off-site flood risk.
- 4.5.3 The nature and considerate design of the panels allows the area to replicate that of an open meadow scenario by allowing runoff to flow undisturbed beneath the panels. Therefore, the percentage impermeable area (PIMP) value is essentially zero.
- 4.5.4 Information from Norfolk County Council document entitled *Lead Local Flood Authority Statutory Consultee for Planning – Guidance Document* dated October 2022, states that grass or wildflower cover should be well-maintained across the site and reduce the risk of soil compaction by restricting vehicular movements.
- 4.5.5 In order to prevent channelisation across the site from runoff, the use of SUDS features such as buffers, swales and filter strips could be employed to help spread the water over a greater surface area. Additionally, maintaining vegetated areas in between the solar arrays reduces erosion and after construction the soil should be chisel ploughed, or similar, to mitigate soil compaction during construction.

5. CONCLUSIONS

- A review of the relevant guidance documents and various types of data collected at the site has enabled a full assessment of the flood risks to be quantified.
- The site is located within the Flood Zone 1 therefore all uses of land are appropriate in this zone.
- It is considered that there is a low risk of groundwater flooding and sewer flooding and a low risk of flooding other sources.
- There is a very low surface water flood risk.
- Safe access/egress can be achieved at all times.

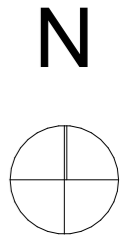
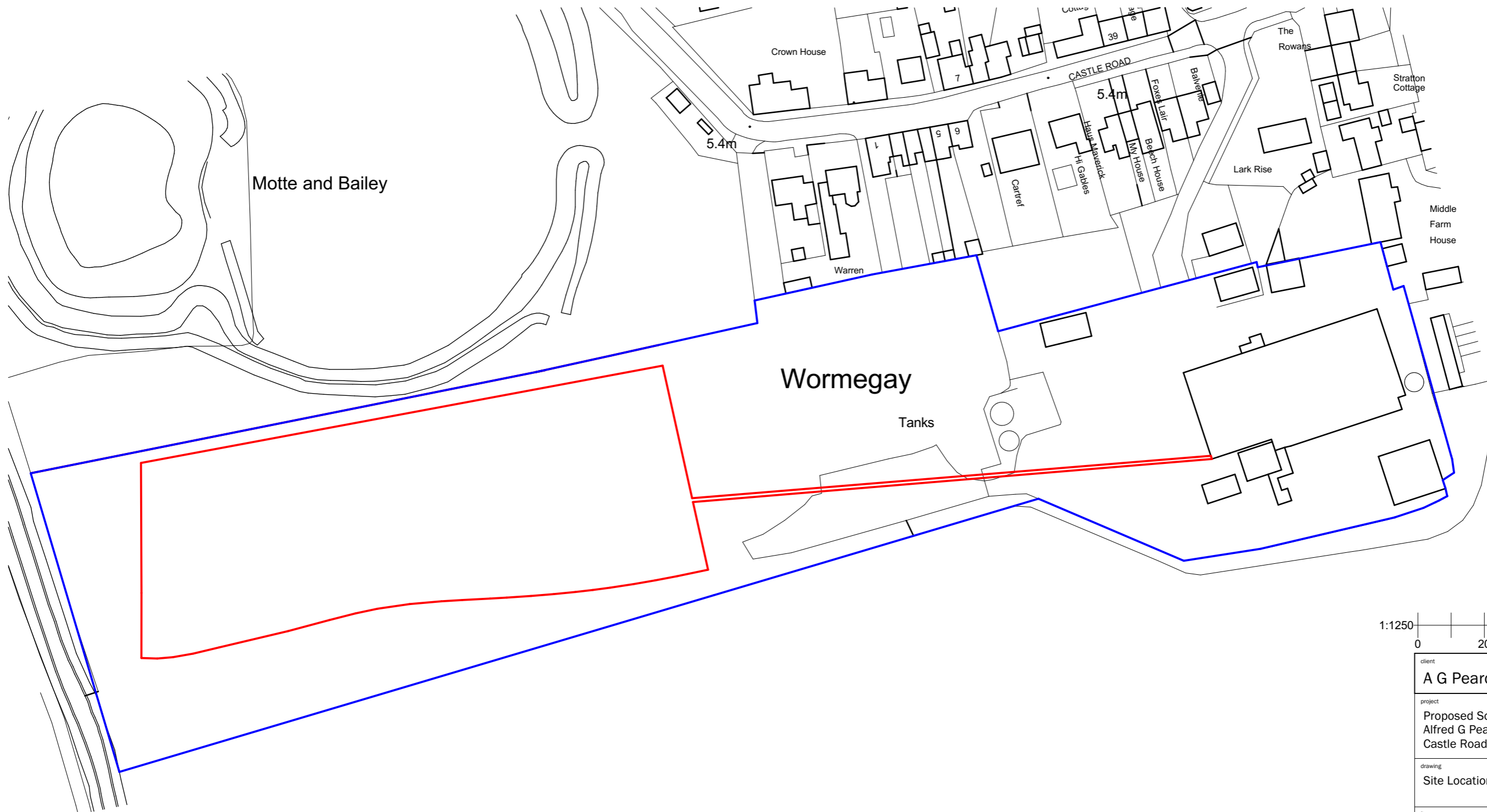
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DRAWINGS

Issue Status		Planning	
This drawing is copyright. Only figured dimensions to be worked to.			
Revision	Drawn	Check	Date
A	JDA	NDM	Nov 22



client	A G Pearce Ltd		
project	Proposed Solar Installation Alfred G Pearce Castle Road, Wormegay		
drawing	Site Location Plan		
date	June 2022	scale	1:1250 @ A3
drawn	KF	check	JDA

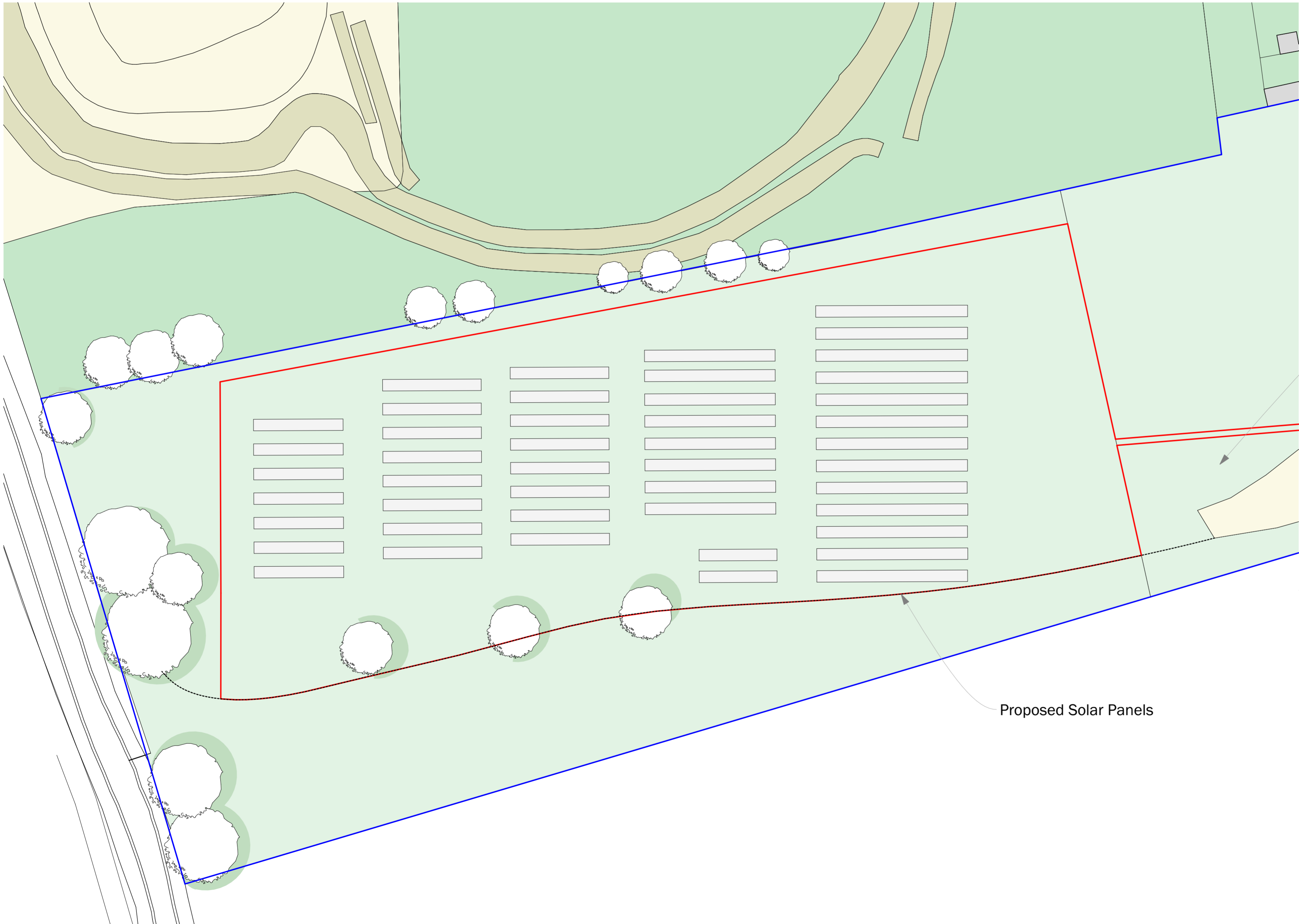
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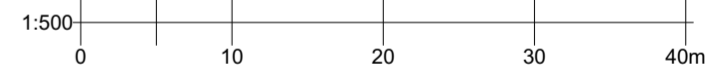
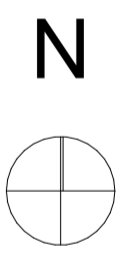
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A	JDA	NDM	Nov 22	



AG Pearce Ltd

Proposed Solar Panels



client		
A G Pearce Ltd		
project		
Proposed Solar Installation Alfred G Pearce Castle Road, Wormegay		
drawing		
Proposed Site Plan		
date	JUNE 2022	scale
drawn	KF	check
		JDA
		1:500
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Indicative Site Plan

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