

Cottam Solar Project

PEIR – Volume 2 Appendices to Chapter 10: Hydrology, Flood Risk and Drainage

Prepared by Delta-Simons
June 2022



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10.1 Flood Risk Screening Assessment: Cottam 1 North

Appendix B – Flood Risk Screening Assessment

Cottam 1 (North) – Cottam Solar Project

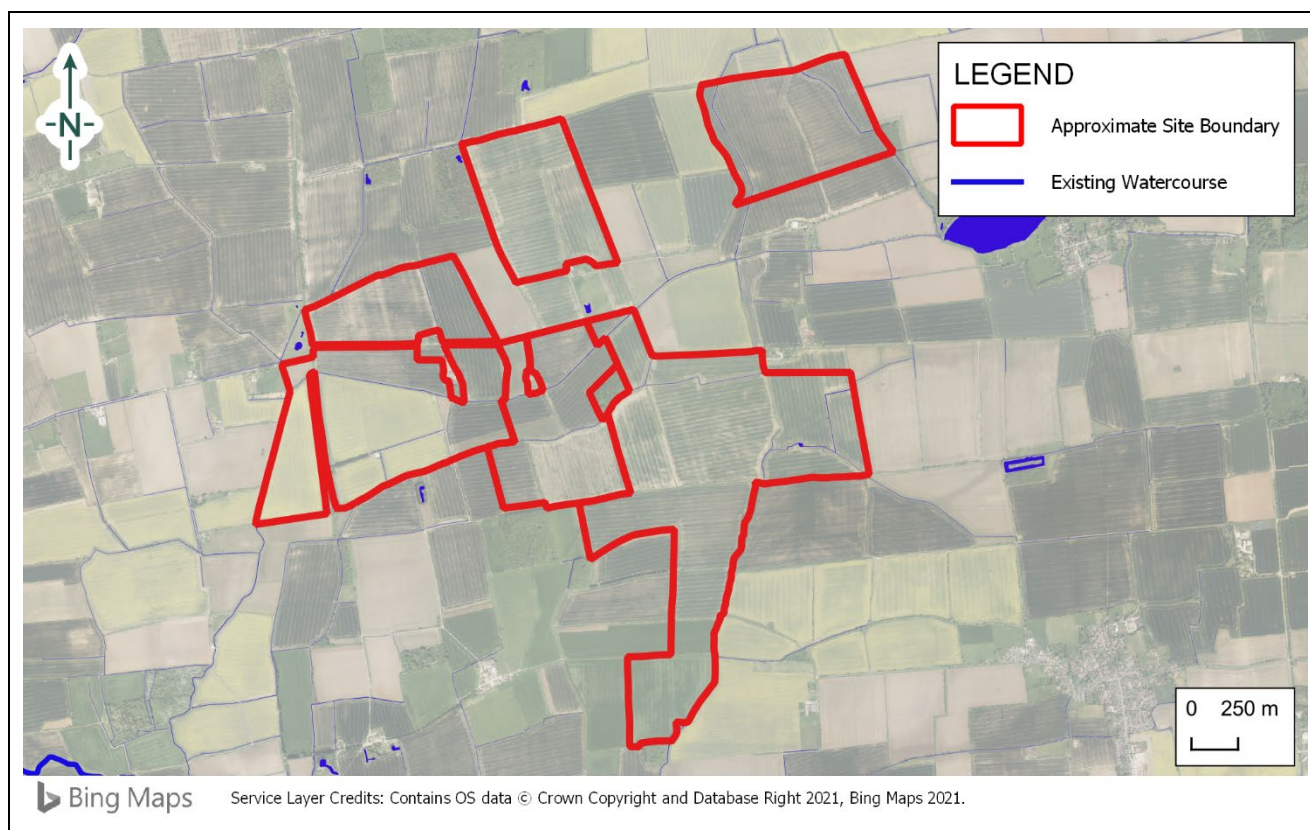
Presented to Island Green Power

Issued: April 2022

Delta-Simons Project No. 21-1088.01

1.0 Site Description

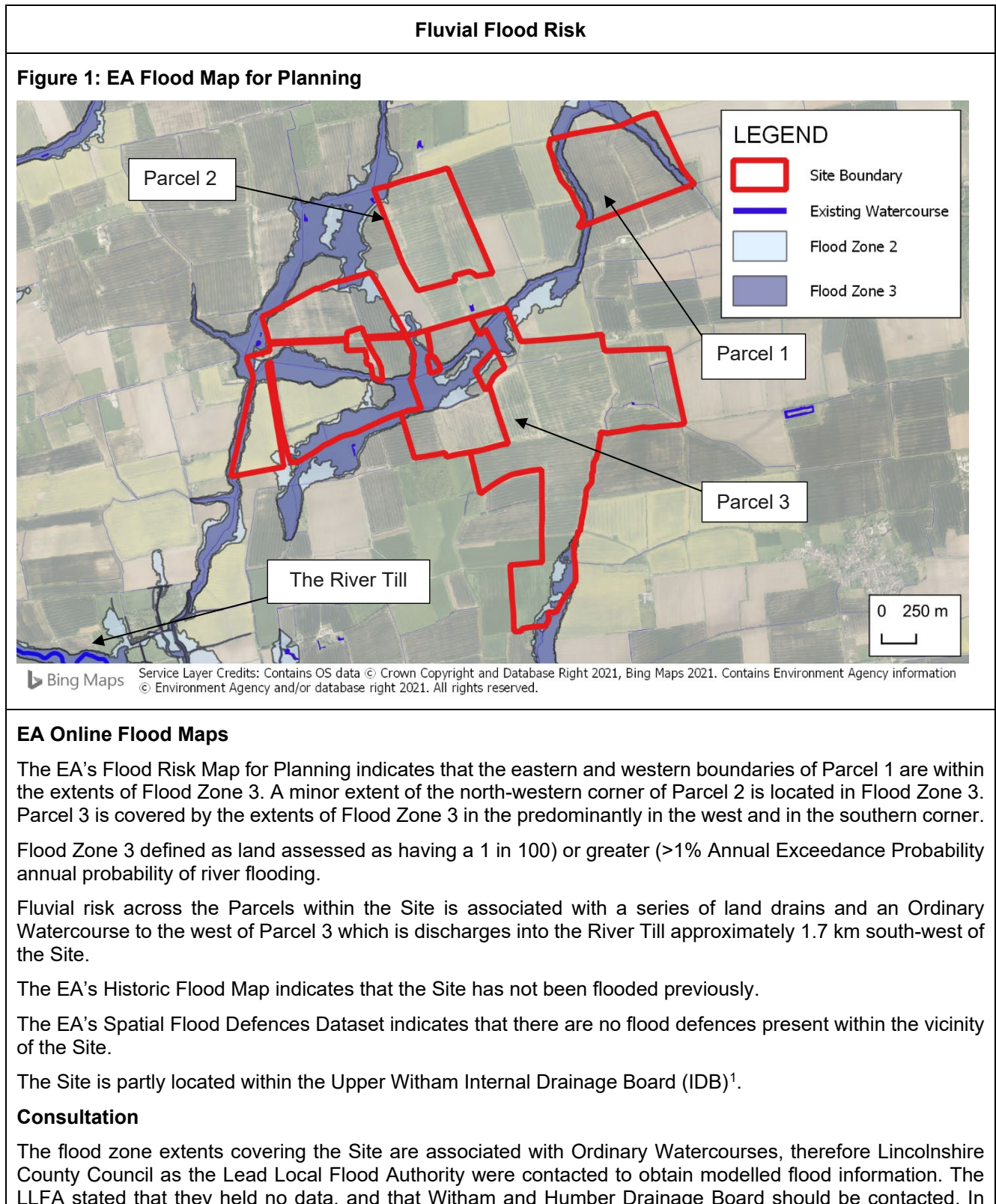
The aim of this section of the note is to outline key environmental information associated with the baseline environment.



Illustrative Site Layout Plan

Co-ordinates	Centred approximately at National Grid Reference 492273 , 384793	Area (approx.)	322 Ha
Site Location	The Site is located within a rural setting and comprises multiple parcels of agricultural fields, approximately 1.6 km north-west of the village of Ingham.		
Topography	<p>Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1 m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM).</p> <p>A review of LiDAR ground elevation data shows that the Site slopes from approximately 24 m AOD in the north-east to approximately 8 m AOD in the west.</p> <p>A LiDAR extract is included in Annex A.</p>		

2.0 Flood Risk Screening Assessment



¹ Internal Drainage Board Map : <https://www.ada.org.uk/idb-map>

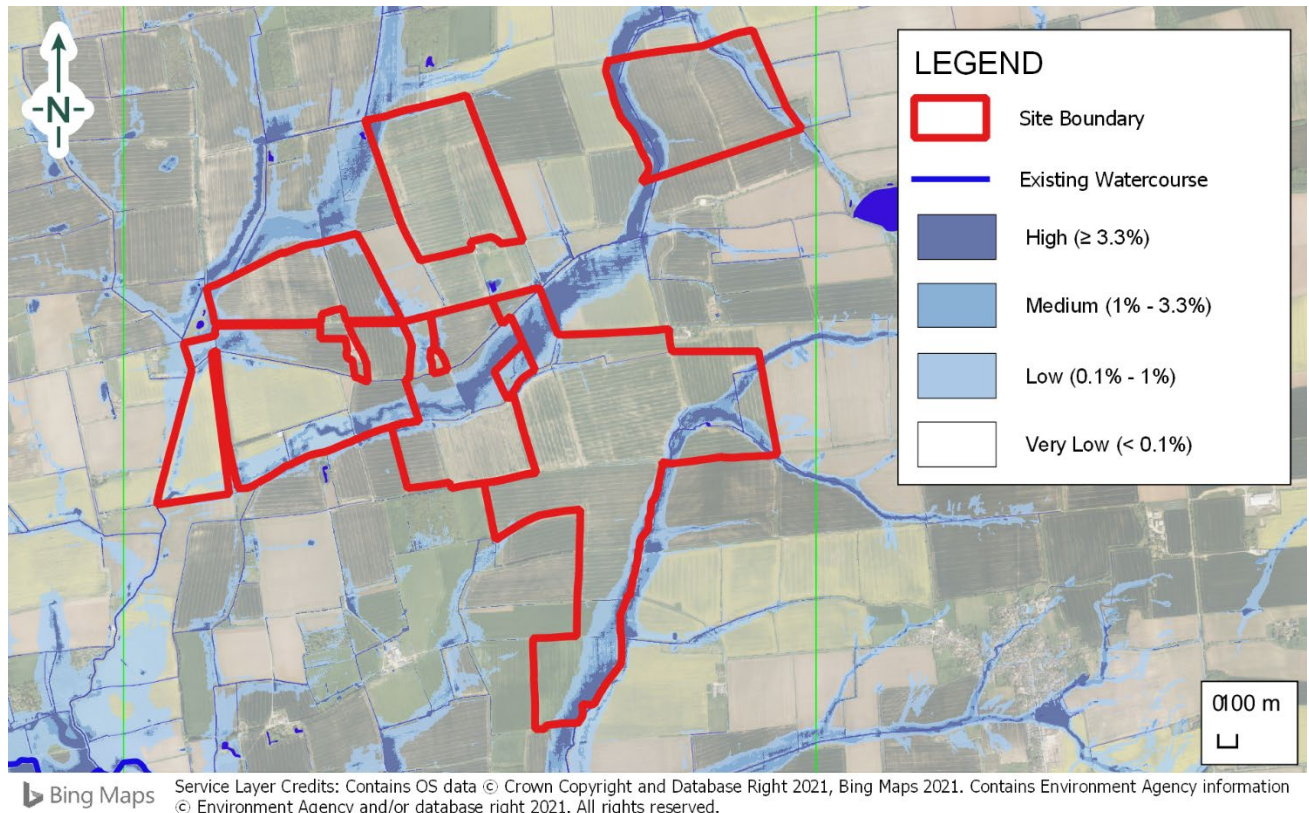
response to our enquiry, the Drainage Board stated, '*unfortunately this area of the district has not been modelled to date by the water management board*'.

In the absence of modelled flood data, the 0.1% annual probability surface water flood scenario can be used as a proxy for the 1% AEP + CC fluvial event. A map depicting flood depths associated with the 0.1% annual probability scenario is included as Annex E. No flooding with a depth greater than 0.9 m is present across any of the Site parcels. Flooding with a depth between 0.6 – 0.9 m is present along the western boundary of Parcel 1 and the north-western corner of parcel 2.

It should be noted that all the flood maps are indicative and do not accurately take into account the impacts of climate change.

Surface Water Risk

Figure 2: EA Long-Term Flood Risk Map (Surface Water)



EA Online Flood Maps

The EA's Long-Term Flood Risk Map indicates that Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the Site, predominantly within Parcels 1 and 3.

The surface water extents shown on the EA's Long-Term Flood Risk Map largely concur with the Flood outlines shown on the EA Flood Map for Planning associated with land drains and an Ordinary Watercourse which crosses the Site. Additional Surface Water Risk extents are shown along the eastern boundary of parcel 3 which emanates from flow paths running towards the Site from the east.

Surface water flooding is indicative and typically difficult to predict as it depends on localised heavy rainfall, localised topography and the adequacy of the local drainage network.

Summary of Flood Risk

Flood Risk Status

Green

Key Constraints

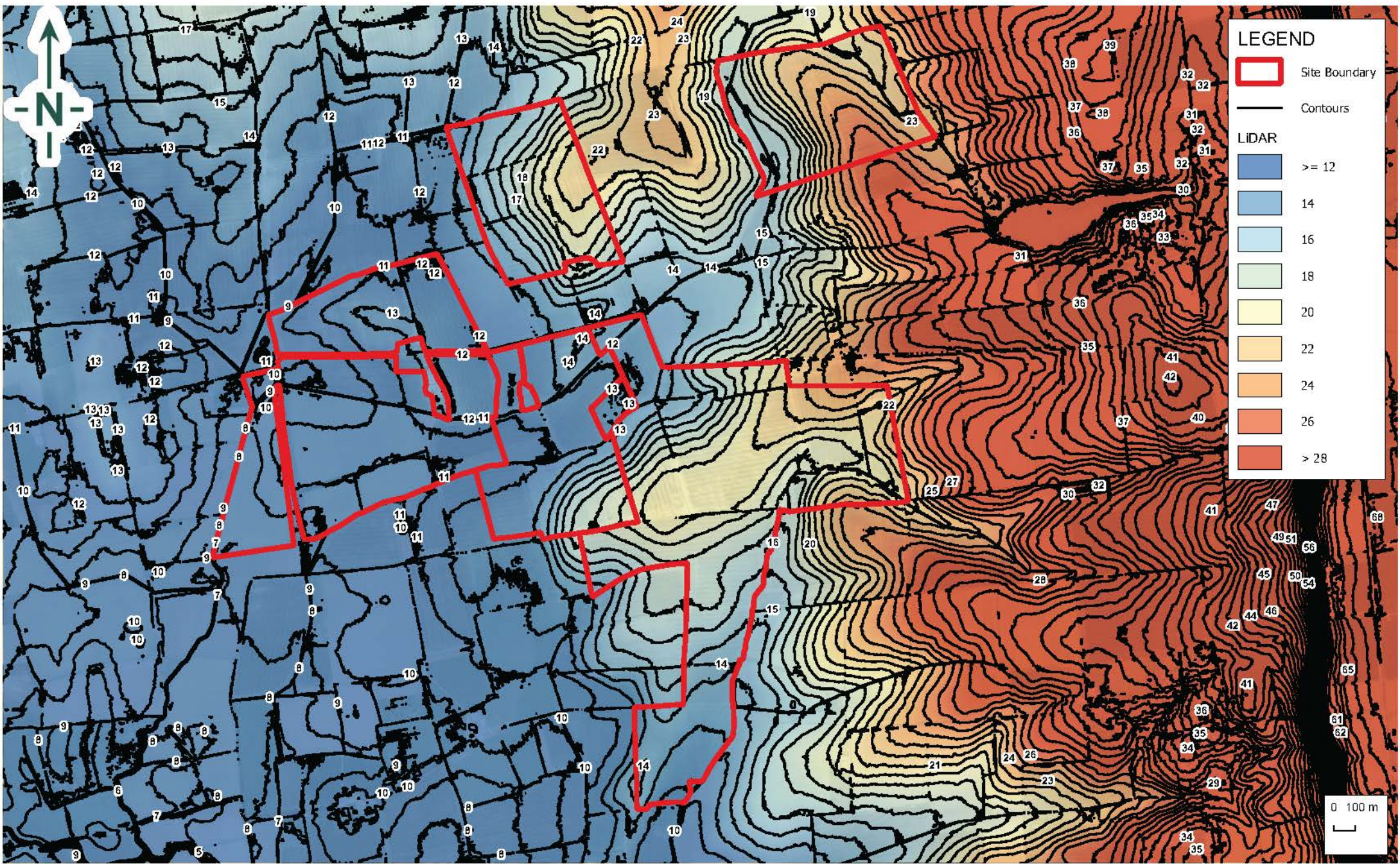
Fluvial and Surface Water Risk Flood Risk associated with land drains and Unnamed Ordinary Watercourse which flows through Parcels 1 and 3.

Next Steps

In order to fully inform the masterplanning and planning submission process the following works will be completed prior to completion of the Flood Risk Assessments:

- ▲ Consult Stakeholders where necessary regarding the acceptable depth of flooding for equipment to be placed within.

Annex A – LiDAR Plan



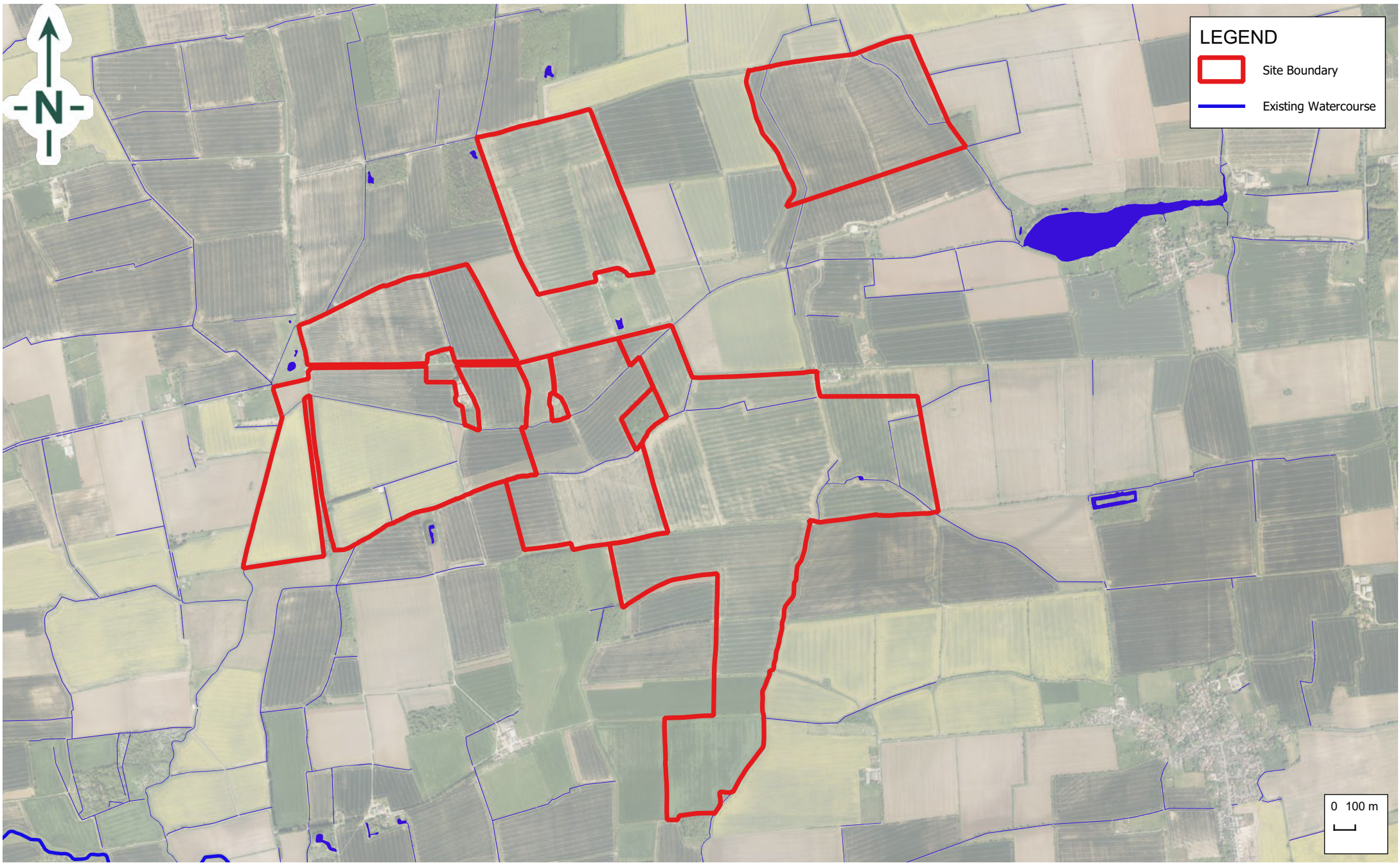
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TITLE:
 LiDAR pan
 Cottam 1 (N) - Cottam Solar Project

DRAWN BY: EB	SCALE (M): 1:23,000	PROJECT NO: 21-1088.01
CHECKED BY: JR	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

Annex B – Overview



LEGEND

- Site Boundary
- Existing Watercourse

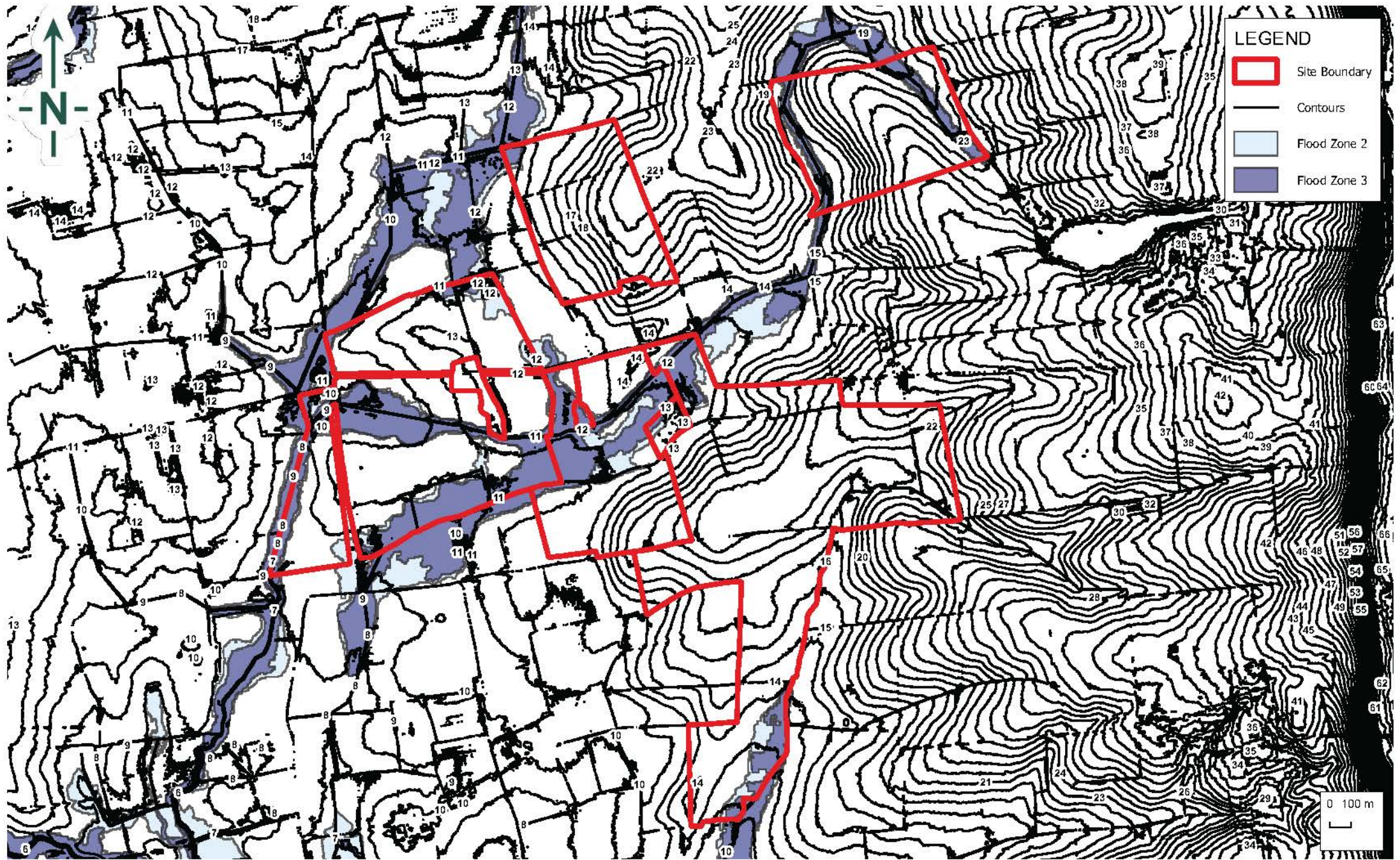
Site Plan Provided by Client



TITLE:
**Overview
Cottam 1 - North**

<small>DRAWN BY:</small> EB	<small>SCALE (@A4):</small> 1:23,000	<small>PROJECT NO:</small> 21-1088.01
<small>CHECKED BY:</small> JR	<small>REVISION:</small> -	<small>FIGURE NO:</small>
<small>DATE:</small> 17 January 2022		

Annex C – EA Flood Map for Planning

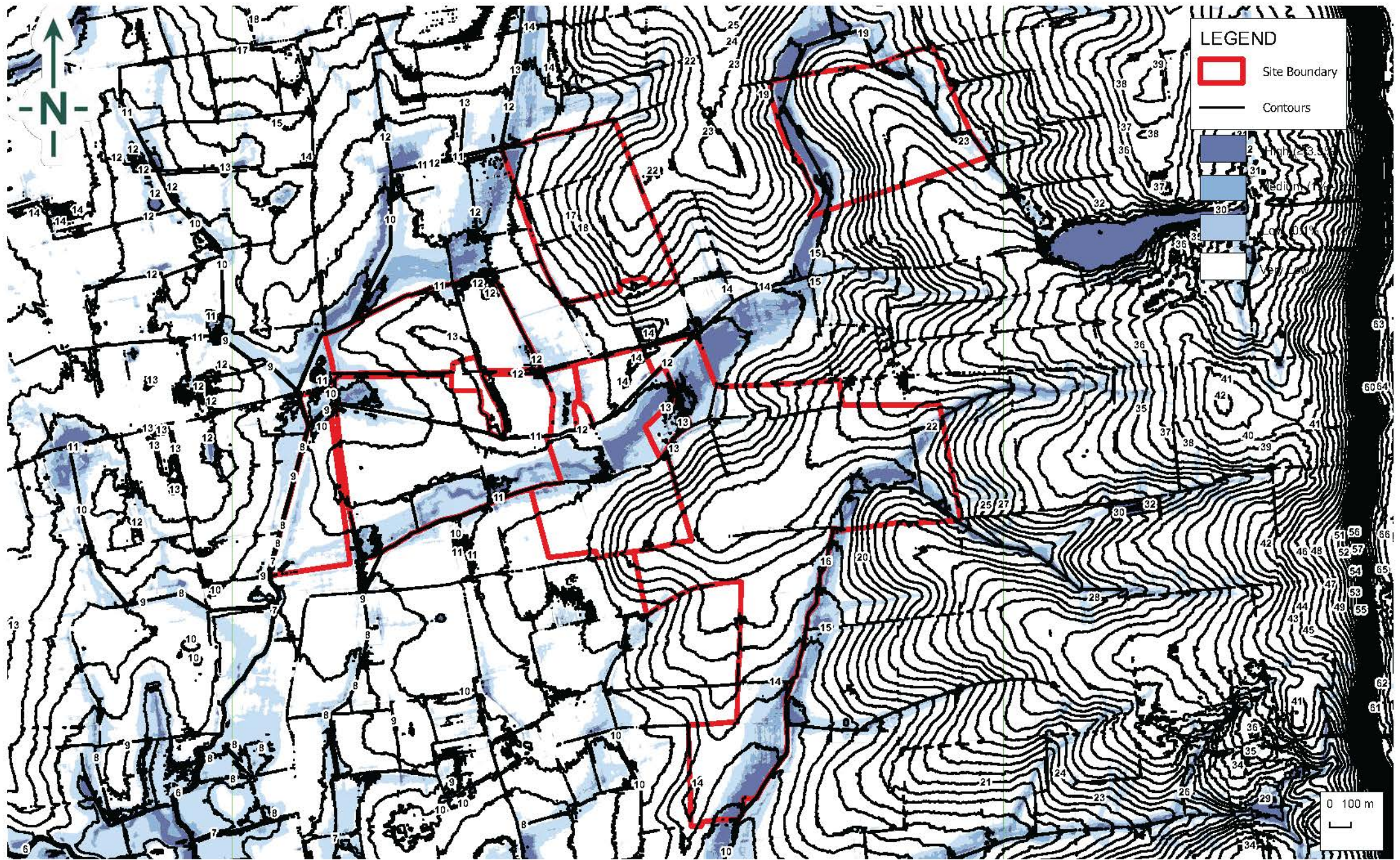


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TITLE:
EA Flood Map for Planning
Cottam 1 (N) - Cottam Solar Project

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CHECKED BY: DP	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

Annex D – EA Long Term Flood Risk Map (Surface Water)

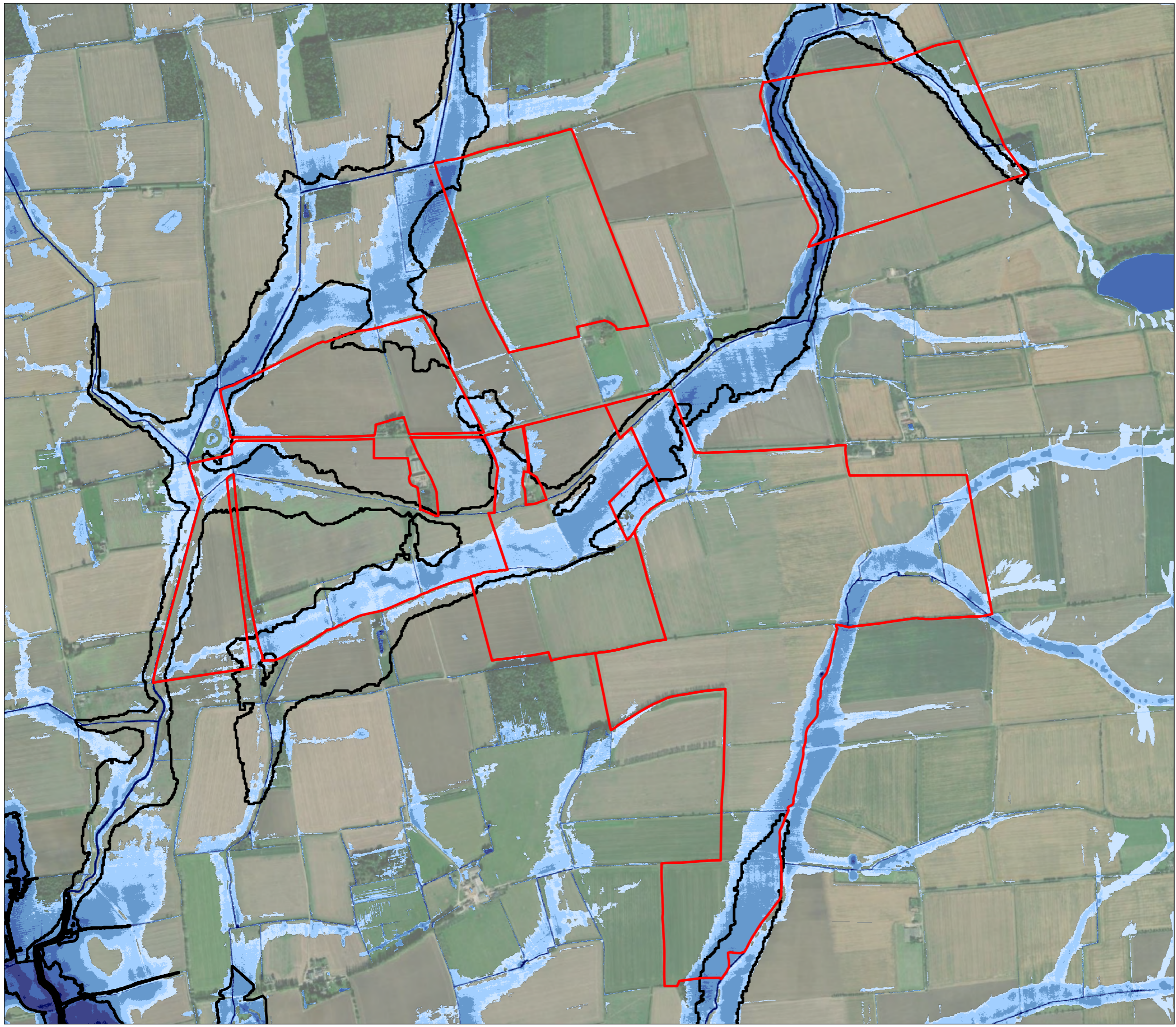


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TITLE:
EA Long Term Flood Risk Map (Surface Water)
Cottam 1 (N) - Cottam Solar Project

DRAWN BY: EB	SCALE (GRAPHIC): 1:23,000	PROJECT NO: 21-1088.01
CHECKED BY: JR	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

Annex E – Surface Water Proxy Map



Legend

- Cottam 1 North Boundary
- Flood Zone 2

Risk of Flooding from Surface Water (Depth 1 in 1000)

- Below 150mm
- 150-300mm
- 300-600mm
- 600-900mm
- 900-1200mm
- Over 1200mm

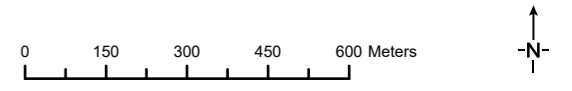
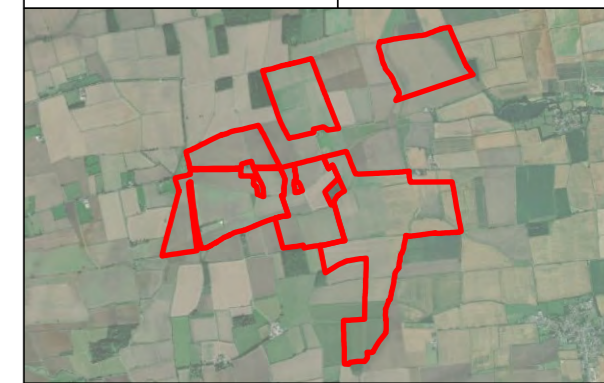


Figure		Flood Level	
Job		Cottam 1 North / Cottam 2	
Client		Island	
Figure No.	1	Revision	A
		Date	06/04/2022
Drawn	BB	Checked	EB
		Scale	1:14,000 @ A3
Job No.	21-1088.01		Central GR 491892E 384965N



DO NOT SCALE.
NOT FOR CONSTRUCTION.



C:\Users\Brewer\Delta_Simons\ENVIRONMENTAL\CONSOLIDATED\Project\21-1088.01_Cottam\Cottam2\1088.01_Cottam1088.01.dwg



10.2 Flood Risk Screening Assessment: Cottam 1 South

Appendix D – Flood Risk Screening Assessment

Cottam 1 (South) – Cottam Solar Project

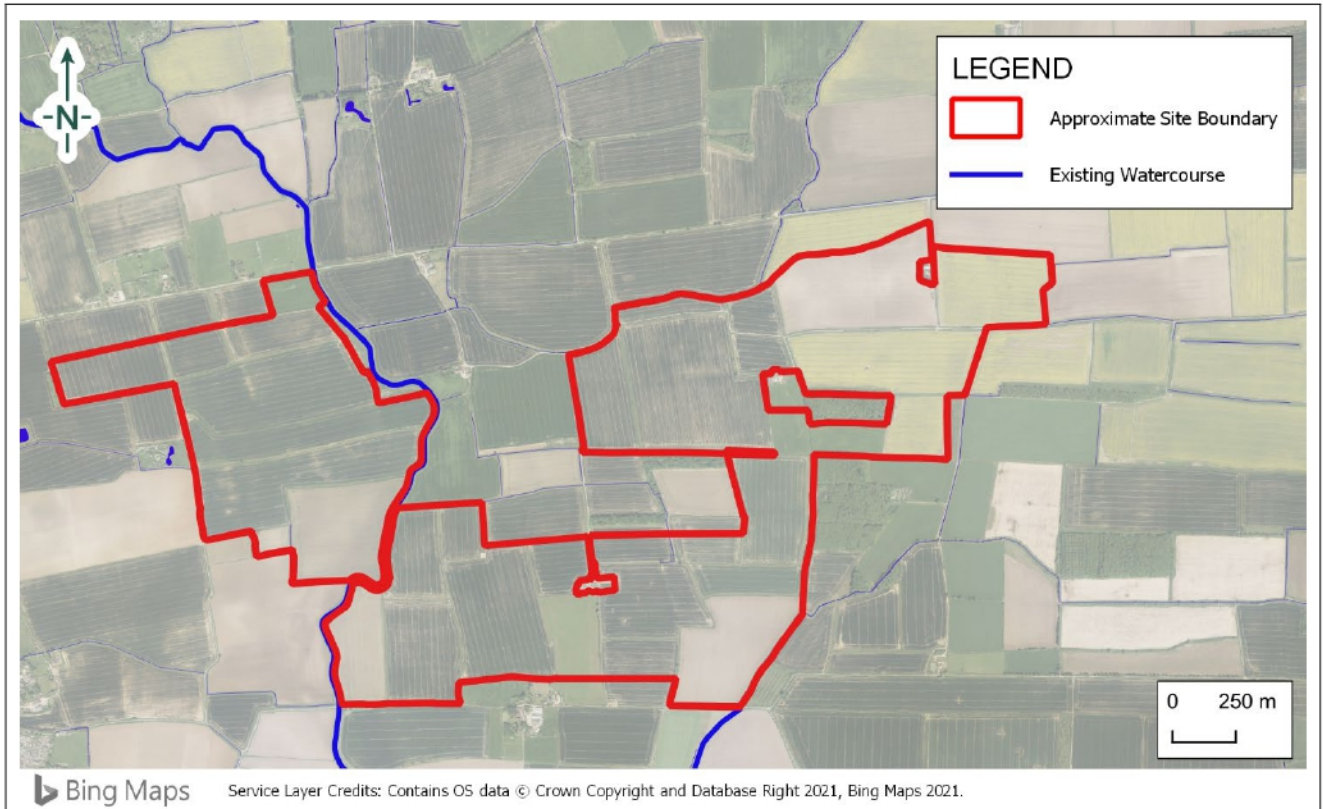
Presented to Island Green Power

Issued: April 2022

Delta-Simons Project No. 21-1088.01

1.0 Site Description

The aim of this section of the note is to outline key environmental information associated with the baseline environment.



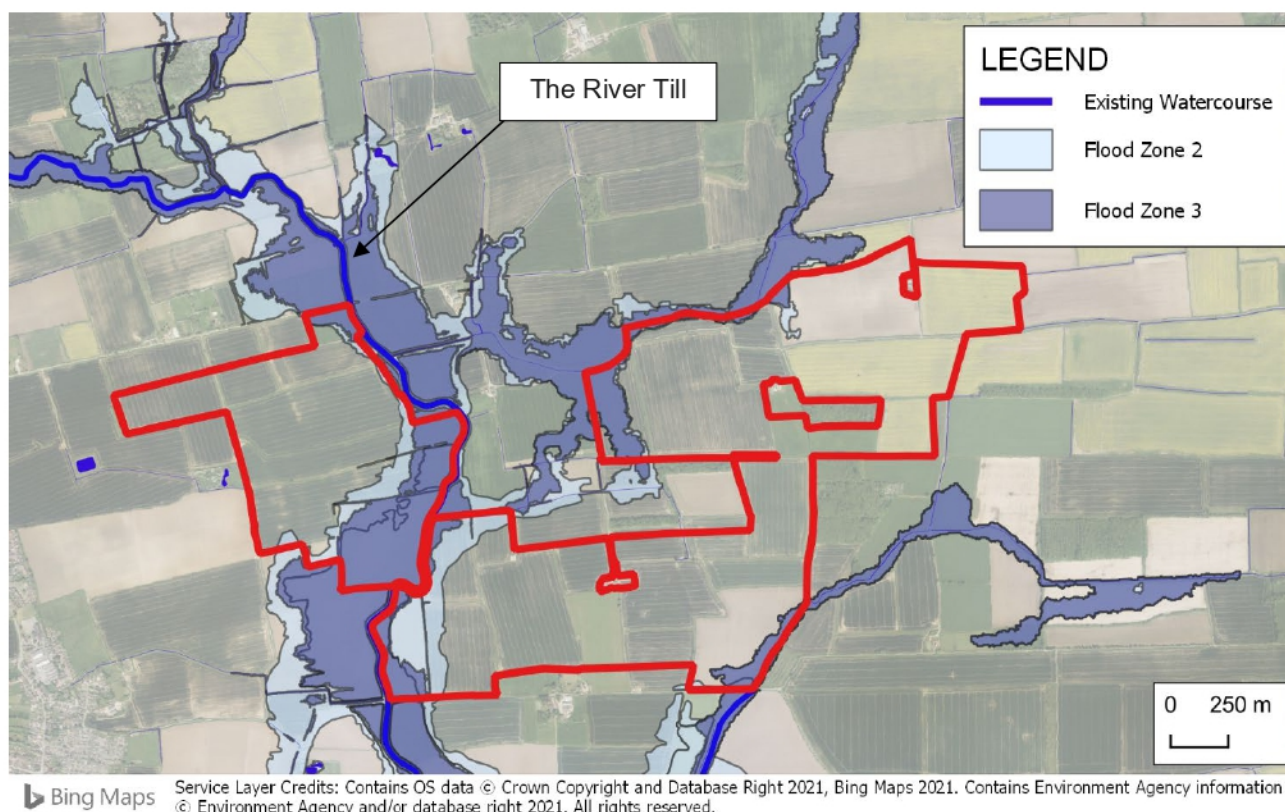
Illustrative Site Layout Plan

Co-ordinates	Centred approximately at National Grid Reference 491009 , 381236	Area (approx.)	321 Ha
Site Location	The Site is located within a rural setting and comprises multiple parcels of agricultural fields, approximately 4.4 km south-west of the village of Ingham and 2 km east of the village of Sturton-on-Stow.		
Topography	<p>Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1 m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM).</p> <p>A review of LiDAR ground elevation data shows that the Site slopes from approximately 13 m AOD in the east, west and southern peripheries to approximately 6 m AOD within the western extent which the River Till runs through.</p> <p>A LiDAR extract is included in Annex A.</p>		

2.0 Flood Risk Screening Assessment

Fluvial Flood Risk

Figure 1: EA Flood Map for Planning



EA Online Flood Maps

The EA's Flood Risk Map for Planning indicates that the northern, western and a minor portion of the south-eastern extent of the Site are within Flood Zone 3.

Flood Zone 3 defined as land assessed as having a 1 in 100) or greater (>1% Annual Exceedance Probability annual probability of river flooding).

Fluvial risk across the is associated with the River Till (Main River – responsibility of the EA to maintain) which flows southwards through the Site, the risk extends along some land drains in the north of the Site. The South Spinney/Beck Spinney is an Ordinary Watercourse (responsibility of the LLFA to maintain) and runs along the part of the south-eastern Site boundary.

The EA's Historic Flood Map (Annex E) indicates that the south-western corner has been historically flooded along the River Till. The dataset indicates that the flood occurred in November 2019 due to 'overtopping of defences'.

The EA's Spatial Flood Defences dataset indicates that formal EA Flood Defences are present along the length of the River Till that runs through the Site. The defences are shown as 'embankments' on the dataset which upon inspection of Google Streetview appear to be raised grassy banks. The Standard of Protection (SoP) of the defence is shown as up to the 1 in 10 year event. The upstream crest level of the defence is stated as 7.62 m AOD and the downstream crest level as 7.20 m AOD.

The Site is partly located within the Upper Witham Internal Drainage Board (IDB).

EA Product Data

The EA have provided depth grid data for the Defended 1% AEP + 20% Climate Change (CC) scenario and 0.1% AEP + 20% CC scenario taken from the Upper Witham Lincoln 2015 Model. The data has been visualised in Annexes F and G.

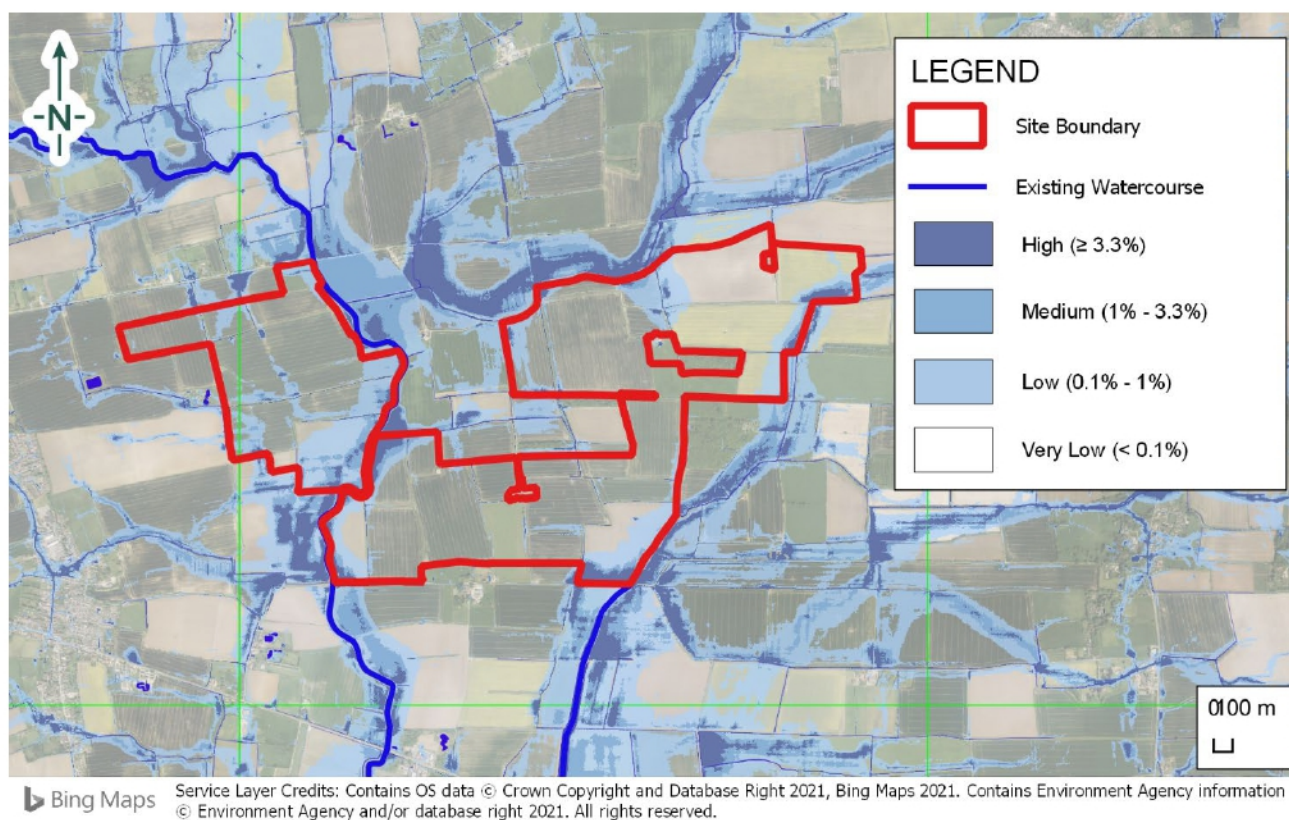
During the 1% AEP + CC scenario (Annex F), flows are shown to overtop the right bank of the River Till and cover a minor portion of the Site in the south. The vast majority of the on-Site flooding is shown to be below 0.6 m however there are some minor areas shown to hold depths above 0.9 m, therefore development should be avoided in such areas. It should be noted that there appears to be a modelling error in the south-west corner of the Site where a 'clear' zone of no flood risk is shown. On comparison to LiDAR data, the elevation levels of the land in the flood free zone are not raised above the surrounding land, therefore there is no indication that flows would not reach this area. It should be assumed that flows would also cover this portion of the Site.

During the 0.1% AEP + CC scenario (Annex G), the majority of the Site remains flood free however a greater proportion of the Site is shown to hold flooding with a depth greater than 0.9 m.

It should be noted that all the flood maps are indicative and do not accurately consider the impacts of climate change.

Surface Water Risk

Figure 2: EA Long-Term Flood Risk Map (Surface Water)



EA Online Flood Maps

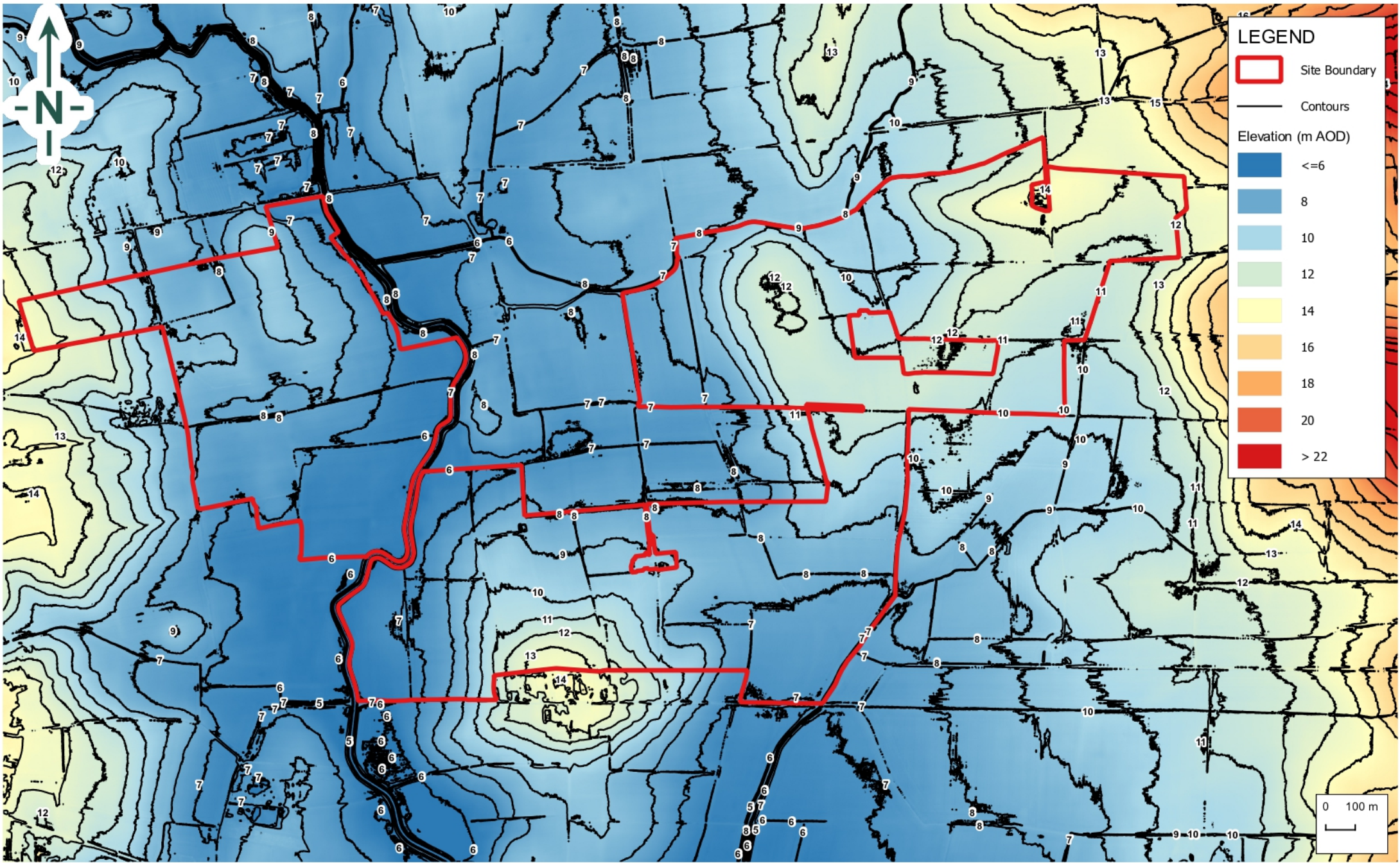
The EA's Long-Term Flood Risk Map indicates that Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the western and eastern extents of the Site.

The surface water extents shown on the EA Flood Map concur with the course of the watercourses that run through the west of the Site and along the eastern periphery.

Surface water flooding is indicative and typically difficult to predict as it depends on localised heavy rainfall, localised topography and the adequacy of the local drainage network.

Summary of Flood Risk	
Flood Risk Status	Green
Key Constraints	
Fluvial and Surface Water Risk Flood Risk associated with The River Till (Main River), South Spinney/Beck Spinney (Ordinary Watercourse) and land drains.	
Next Steps	
In order to fully inform the masterplanning and planning submission process the following works will be completed prior to completion of the Flood Risk Assessments: <ul style="list-style-type: none">▲ Consult Stakeholders where necessary regarding the acceptable depth of flooding for equipment to placed within.	

Annex A – LiDAR Plan



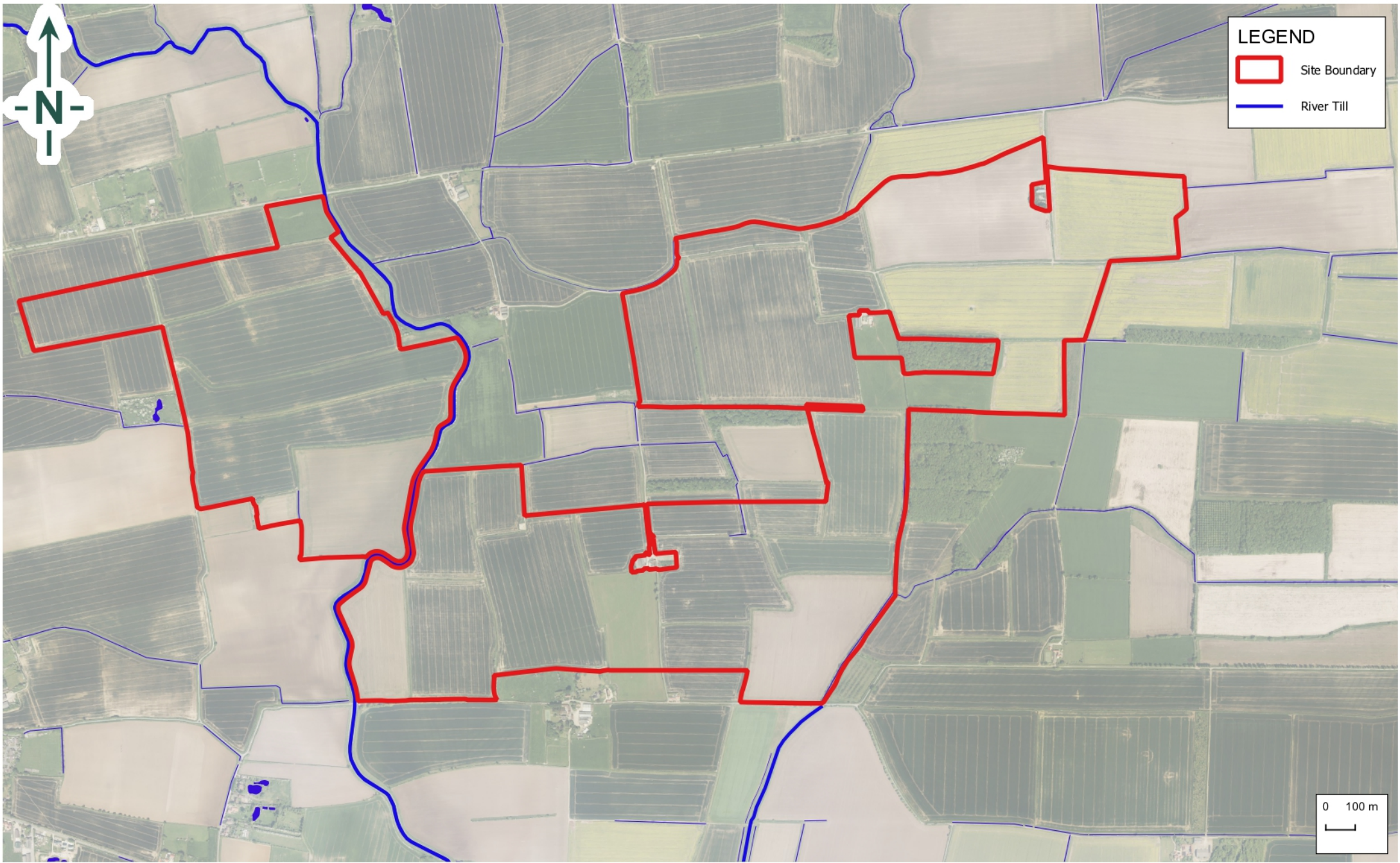
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TITLE:
 LiDAR pan
 Cottam 1 (S) - Cottam Solar Project

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CHECKED BY: JR	REVIS DN: -	FIGURE NO:
DATE: 17 January 2022		

Annex B – Overview



LEGEND

- Site Boundary
- River Till

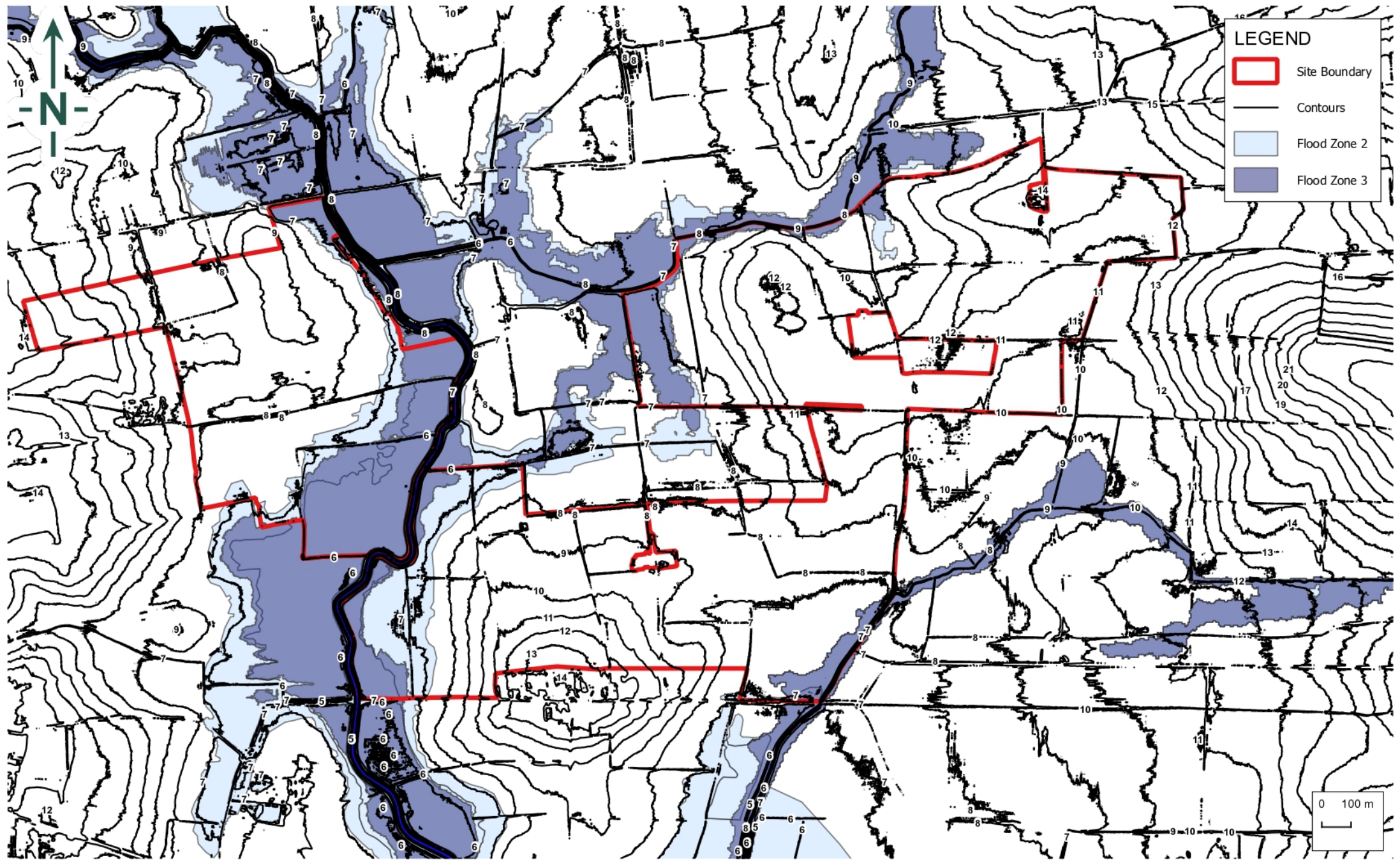
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TITLE:
Overview
 Cottam 1 (S) - Cottam Solar Project

DRAWN BY: EB	SCALE (@A4): 1:16,500	PROJECT NO: 21-1088.01
CHECKED BY: JR	REVIS DN: -	FIGURE NO:
DATE: 17 January 2022		

Annex C – EA Flood Map for Planning



LEGEND

- Site Boundary
- Contours
- Flood Zone 2
- Flood Zone 3

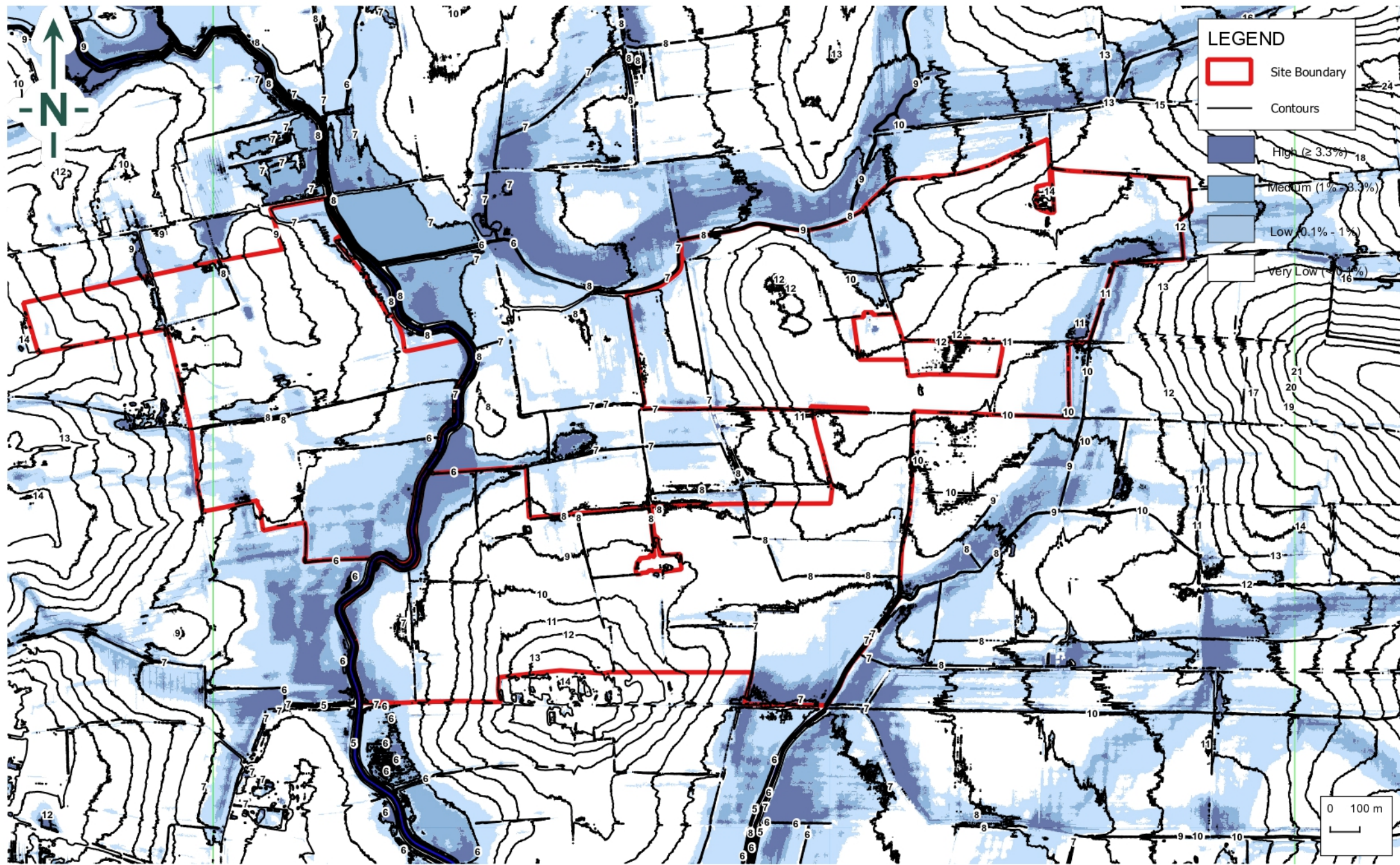
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TITLE:
 EA Flood Map for Planning
 Cottam 1 (S) - Cottam Solar Project

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CHECKED BY: JR	REVIS DN: -	FIGURE NO:
DATE: 17 January 2022		



Annex D – EA Long Term Flood Risk Map (Surface Water)

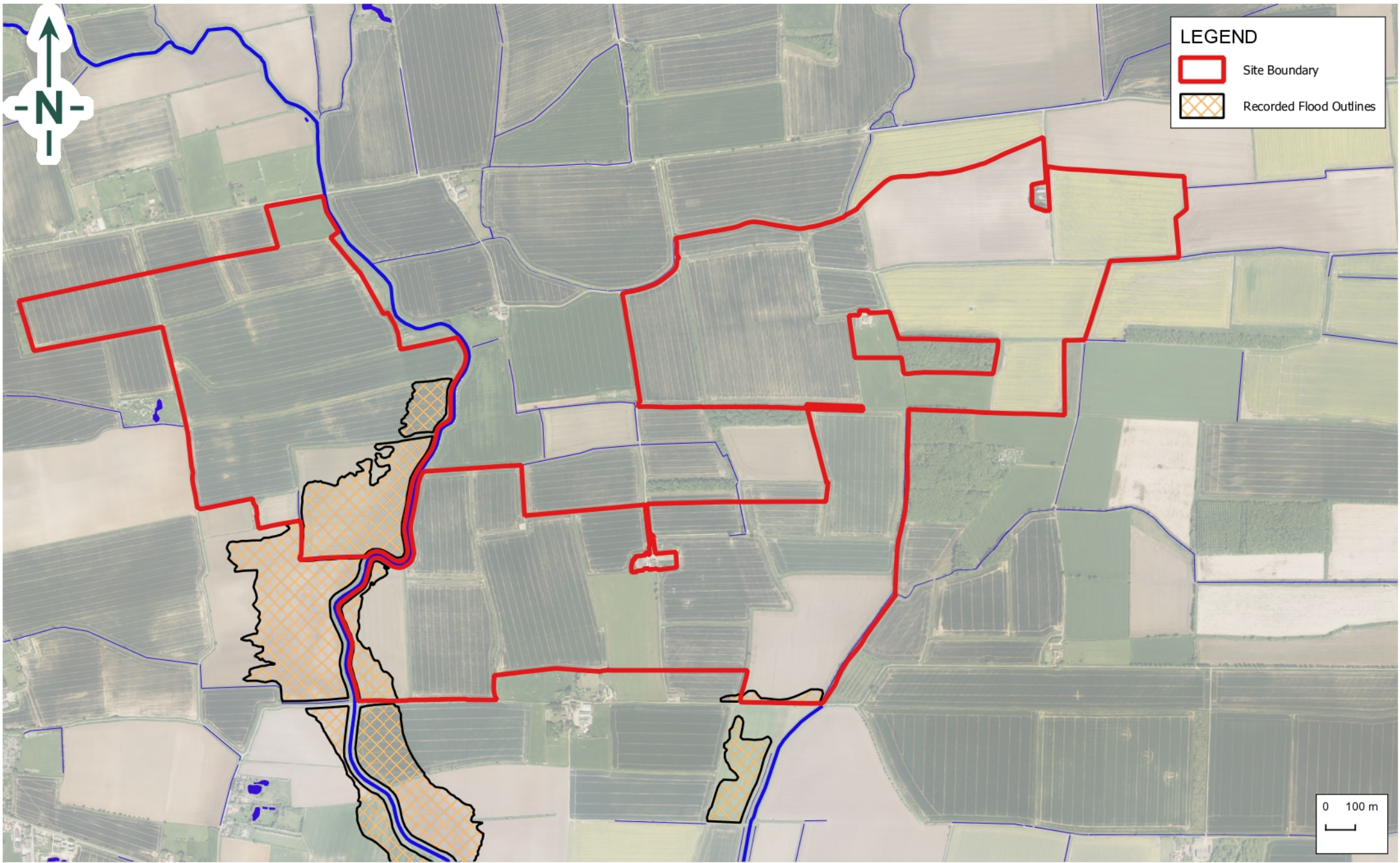


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TITLE:
 EA Long Term Flood Risk Map (Surface Water)
 Cottam 1 (S) - Cottam Solar Project

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CHECKED BY: JR	REVIS DN: -	FIGURE NO:
DATE: 17 January 2022		

Annex E – EA’s Historic Flood Map



LEGEND

- Site Boundary
- Recorded Flood Outlines

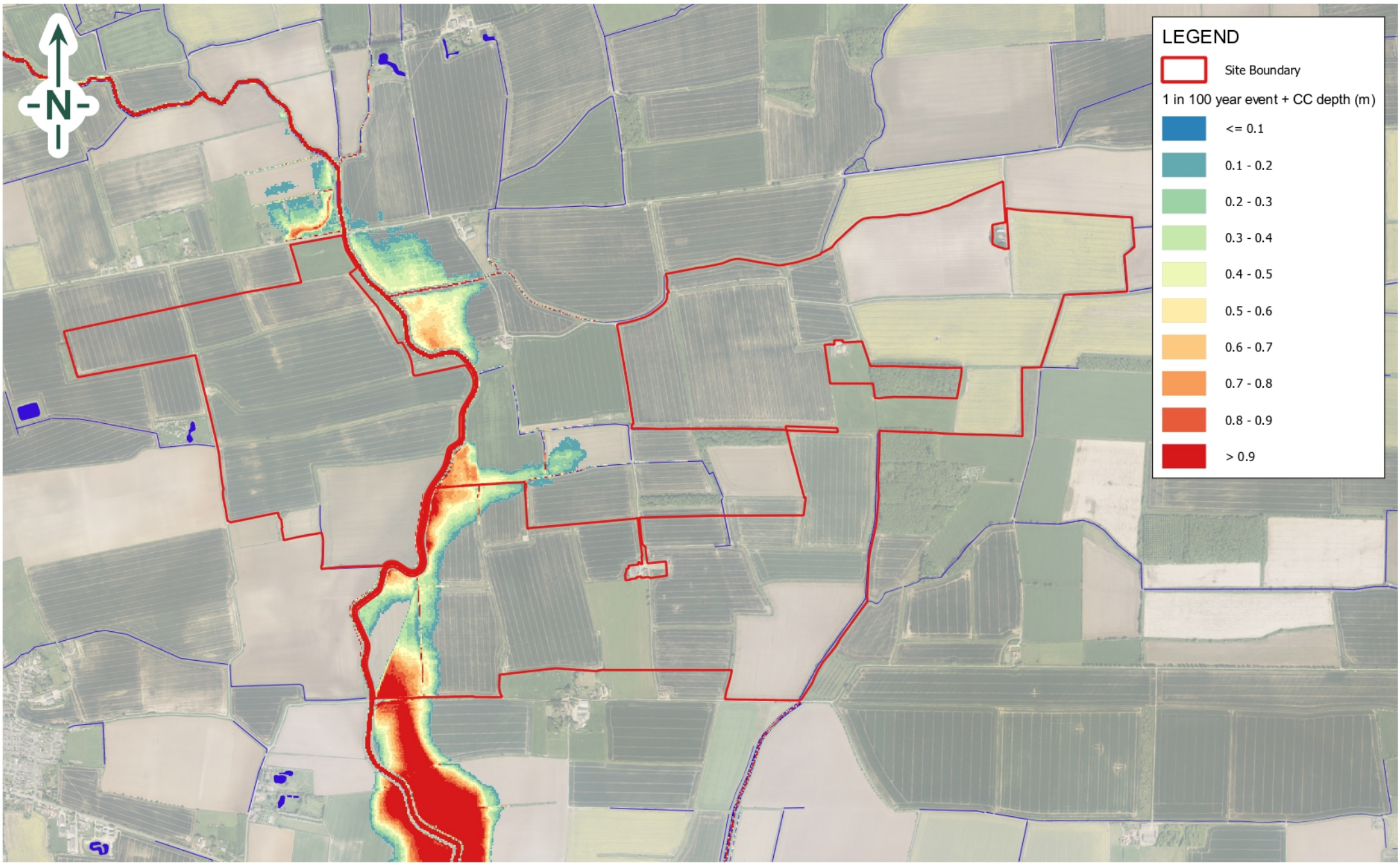
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TITLE:
Overview
 Cottam 1 (S) - Cottam Solar Project

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CHECKED BY: JR	REVIS DN: -	FIGURE NO:
DATE: 17 January 2022		

Annex F – 1% AEP + CC Event Depth Map



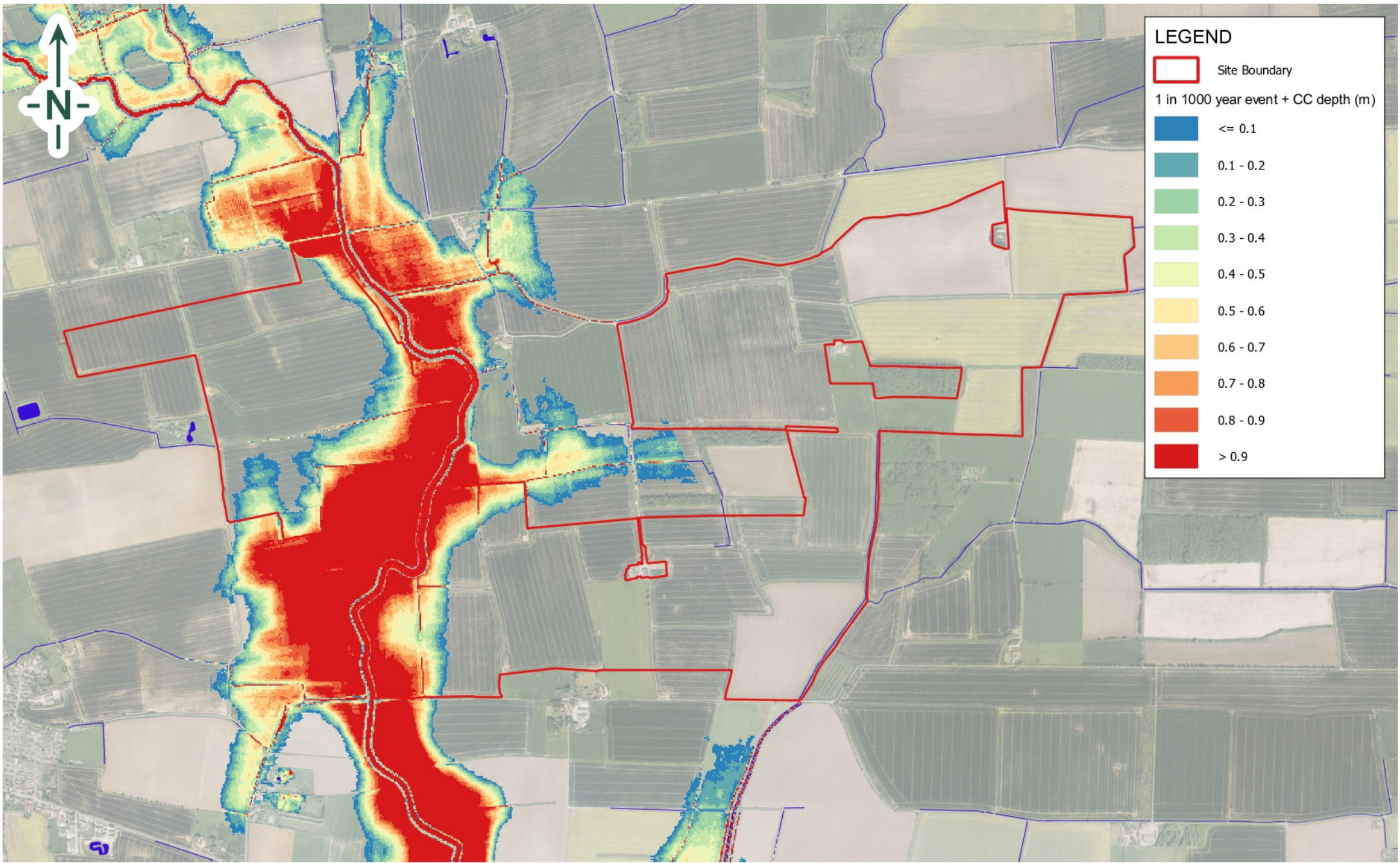
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TITLE:
 1% AEP + 20% CC Depth Grid Data
 Cottam 1 South

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CHECKED BY: JR	REVISION: -	
DATE: 05 April 2022		

Annex G – 0.1% AEP + CC Event Depth Map



LEGEND

Site Boundary

1 in 1000 year event + CC depth (m)

- <= 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- > 0.9

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TITLE:
0.1% AEP + 20% CC Depth Grid Data
Cottam 1 South

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CHECKED BY: JR	REVISION: -	
DATE: 05 April 2022		

10.3 Flood Risk Screening Assessment: Cottam 1 West

Appendix C – Flood Risk Screening Assessment

Cottam 1 (West) – Cottam Solar Project

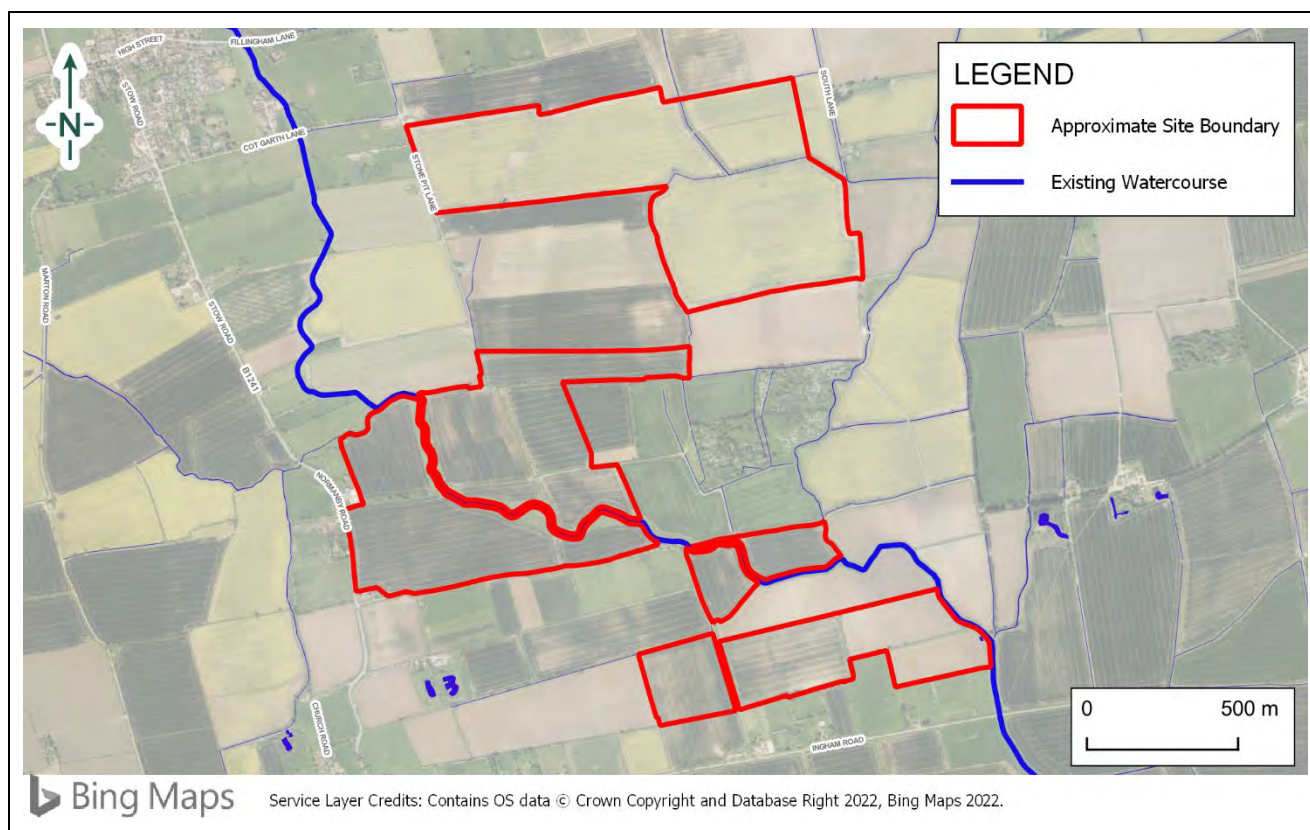
Presented to Island Green Power

Issued: April 2022

Delta-Simons Project No. 21-1088.01

1.0 Site Description

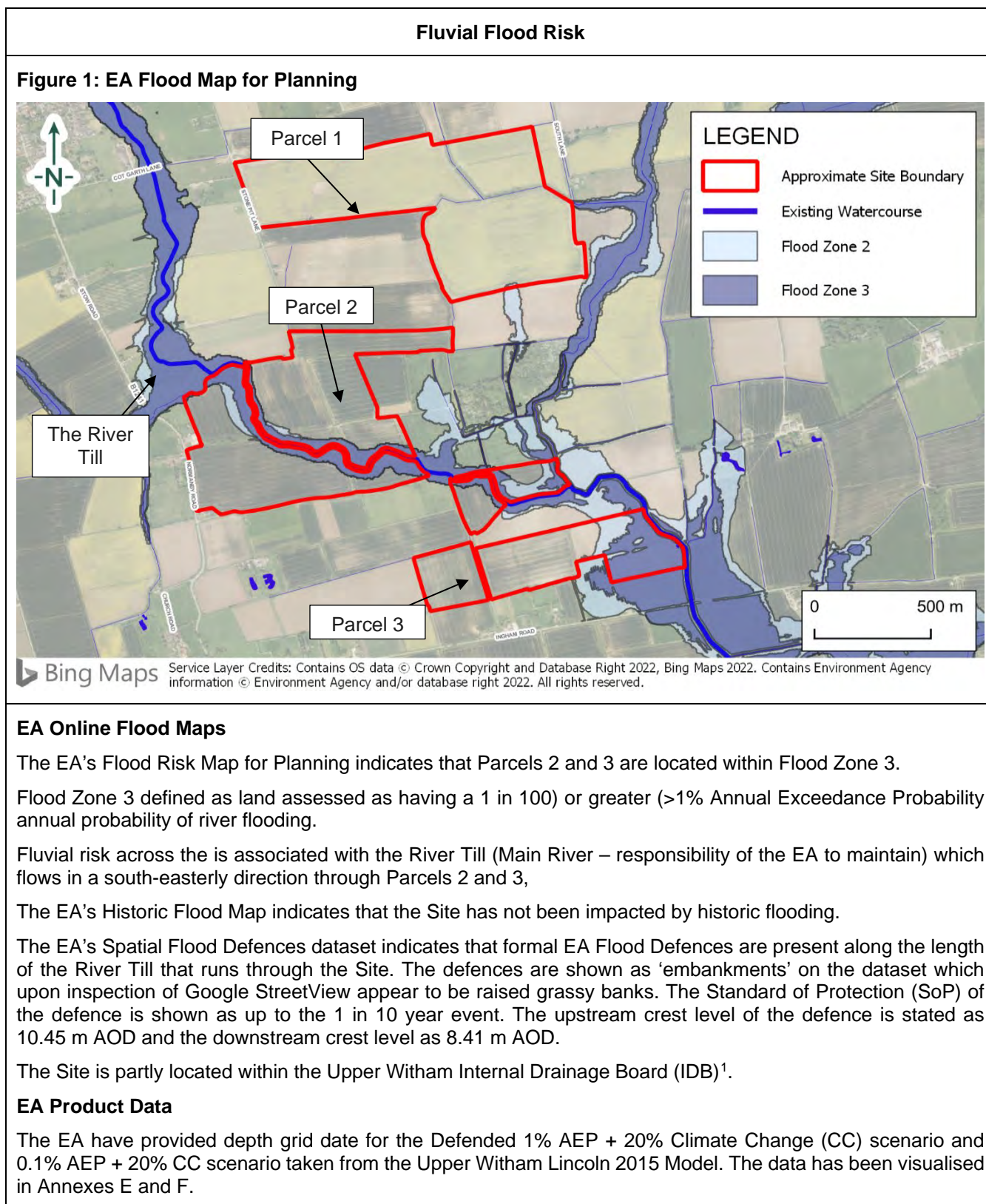
The aim of this section of the note is to outline key environmental information associated with the baseline environment.



Illustrative Site Layout Plan

Co-ordinates	Centred approximately at National Grid Reference 488996 , 383201	Area (approx.)	62 Ha
Site Location	The Site is located within a rural setting and comprises multiple parcels of agricultural fields, approximately 1.5 km north-east of the village of Stow.		
Topography	<p>Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1 m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM).</p> <p>A review of LiDAR ground elevation data shows that the Site slopes from approximately 15 m AOD in its eastern extent to approximately 7 m AOD in the south western corner.</p> <p>A LiDAR extract is included in Annex A.</p>		

2.0 Flood Risk Screening Assessment



¹ Internal Drainage Board Map: <https://www.ada.org.uk/idb-map/>

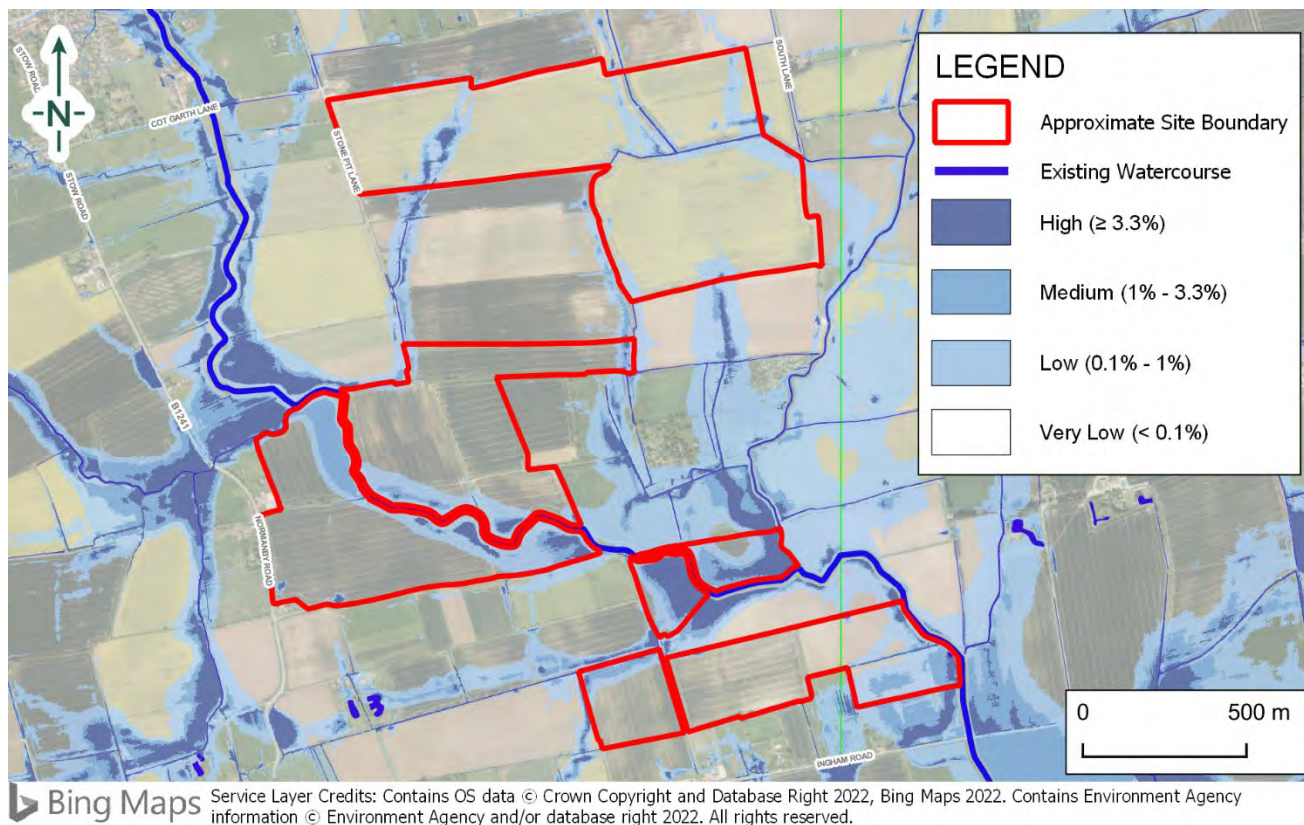
During the 1% AEP + CC scenario (Annex E), the vast majority of the Site is shown to remain flood free. A minor portion of flooding is shown to encroach the south-eastern corner of the Site however depths are shown to remain below 0.5 m.

During the 0.1% AEP + CC scenario (Annex F), a minor portion of Parcel 1 is encroached by flooding however the depths are shown to remain below 0.4 m. Flooding is shown on both side of the River Till within the centre of Parcel 2, with some areas indicated to have flooding reaching depths above 0.9 m. The majority of the northern Parcel 3 is shown to be flooded however the depths are shown to be below 0.7 across the entire parcel. The eastern extent of the southern Parcel 3 is shown to be impacted, with maximum flood depths above 0.9 m in the eastern area of the parcel that bounds the River Till.

It should be noted that all the flood maps are indicative and do not accurately take into account the impacts of climate change.

Surface Water Risk

Figure 2: EA Long-Term Flood Risk Map (Surface Water)



EA Online Flood Maps

The EA's Long-Term Flood Risk Map indicates that Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the Site.

Parcel 1 has High Risk areas associated with some land drains that cross the Parcel to the east and a topographical low point in the west. Parcels 2 and 3 have High Risk areas associated with the route of the River Till. There are multiple flow paths in the surrounding area that flow towards the Site.

Surface water flooding is indicative and typically difficult to predict as it depends on localised heavy rainfall, localised topography and the adequacy of the local drainage network.

Summary of Flood Risk

Flood Risk Status

Green

Key Constraints

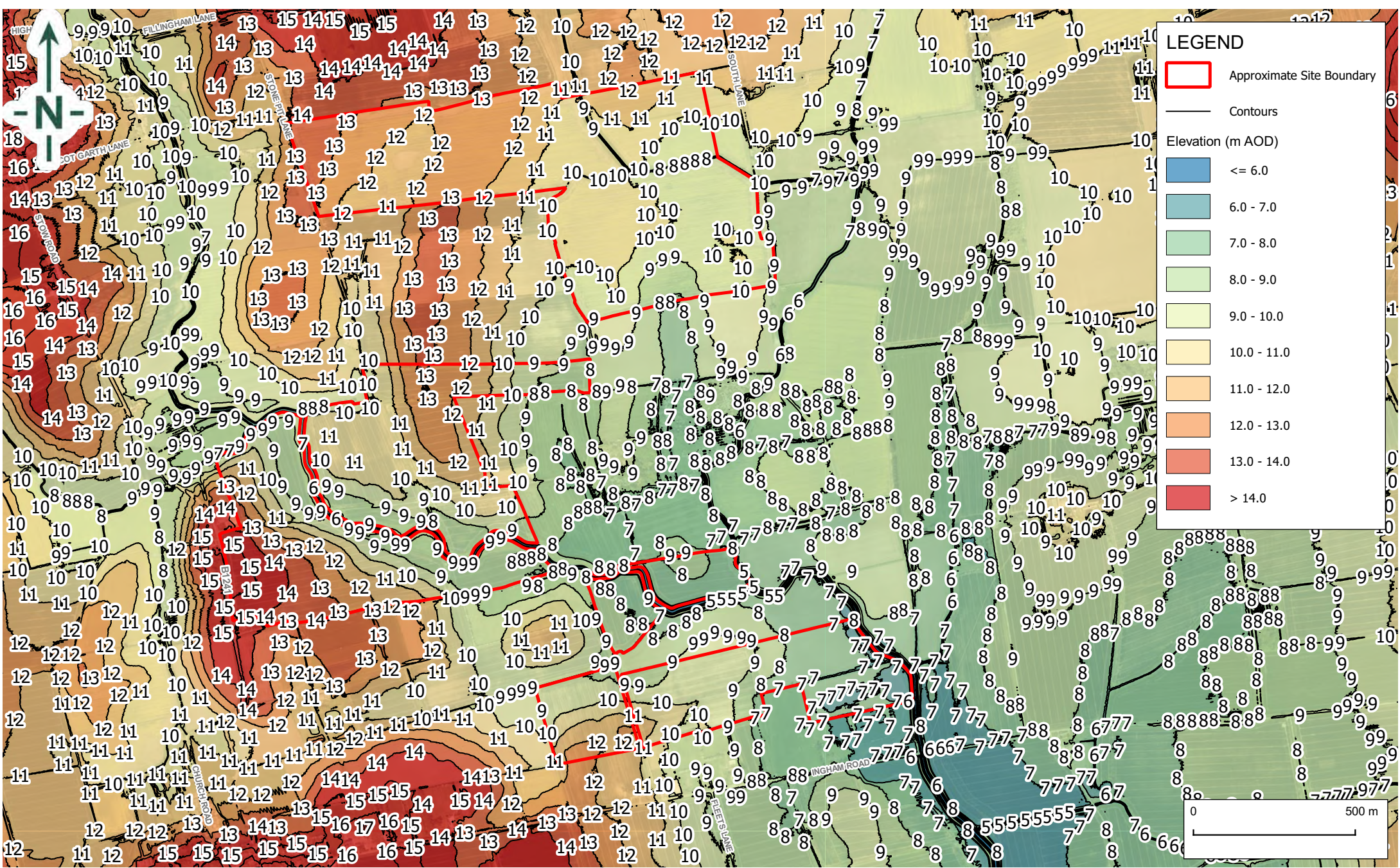
Fluvial Flood Risk associated with The River Till (Main River) and Surface Water Risk associated with land drains.

Next Steps

In order to fully inform the master planning and planning submission process the following works will be completed prior to completion of the Flood Risk Assessments:

- ▲ Consult Stakeholders where necessary regarding the acceptable depth of flooding for equipment to be placed within.

Annex A – LiDAR Plan



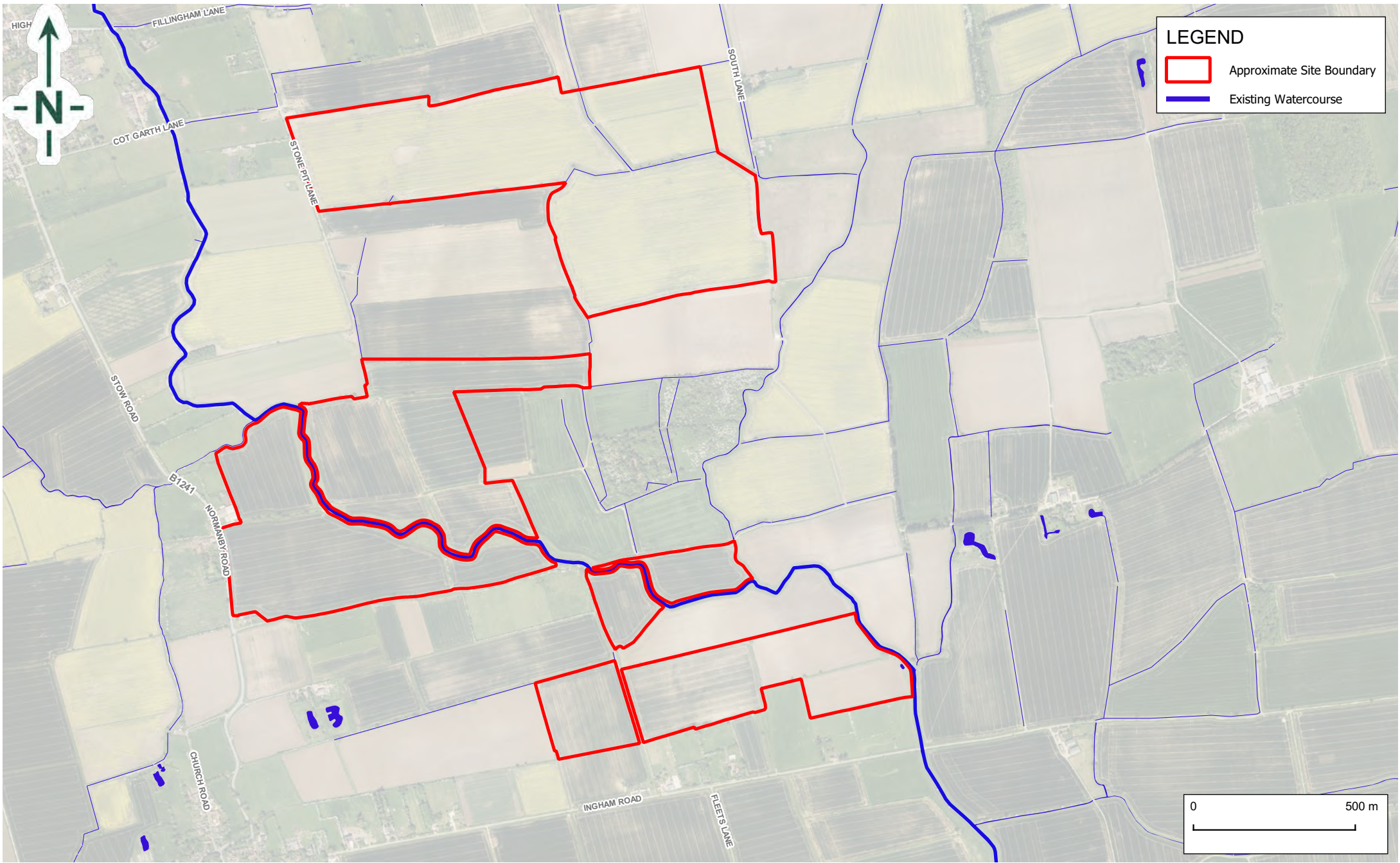
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TITLE:
 LiDAR Plan
 Cottam 1 - West

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DATE: 17 January 2022		

Annex B – Overview



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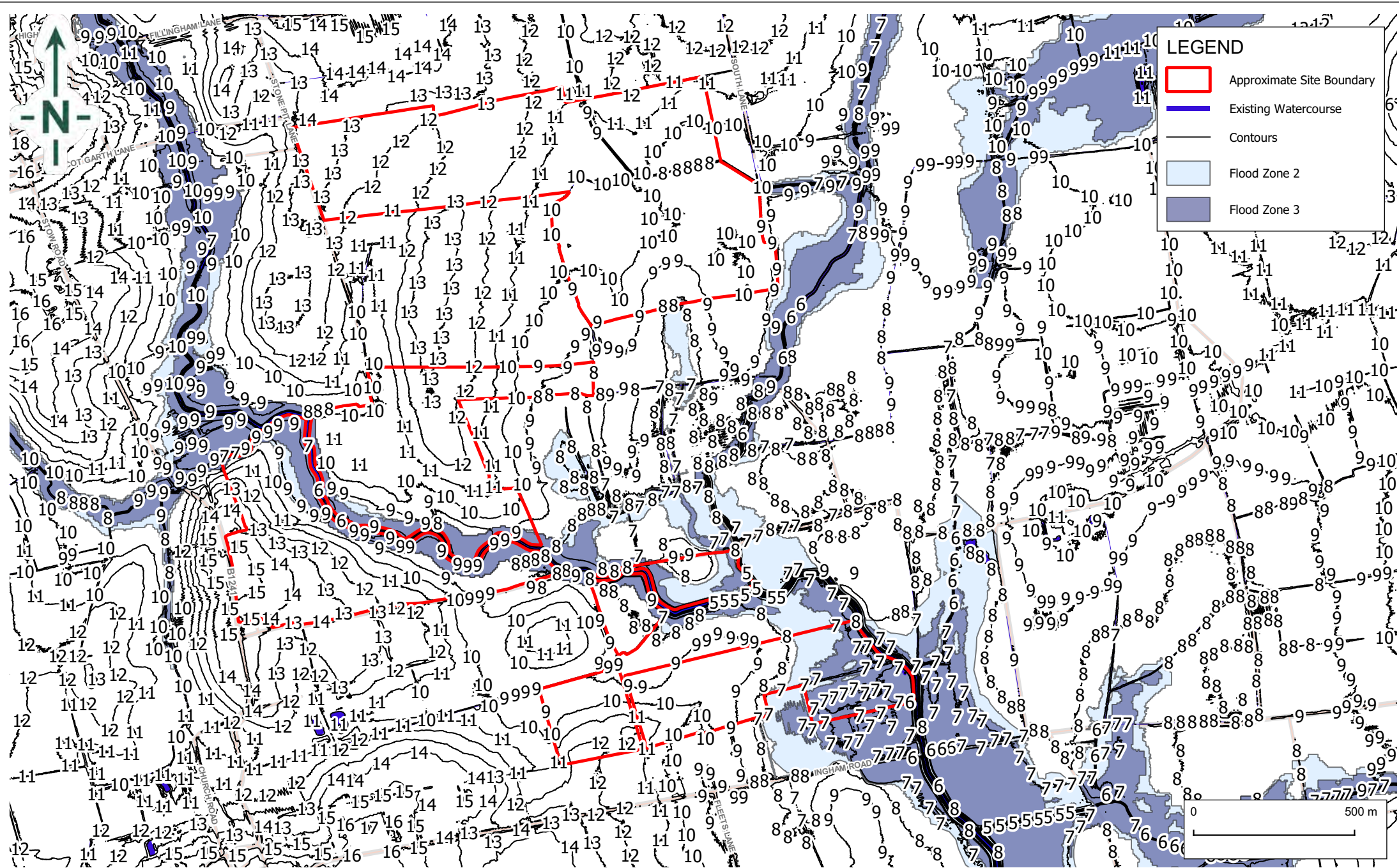


TITLE:
**Overview
 Cottam 1 - West**

DRAWN BY: EB	SCALE (@A4): 1:15,000
CHECKED BY: JR	REVISION: -
DATE: 17 January 2022	

PROJECT NO: 21-1088.01
APPENDIX:

Annex C – EA Flood Map for Planning



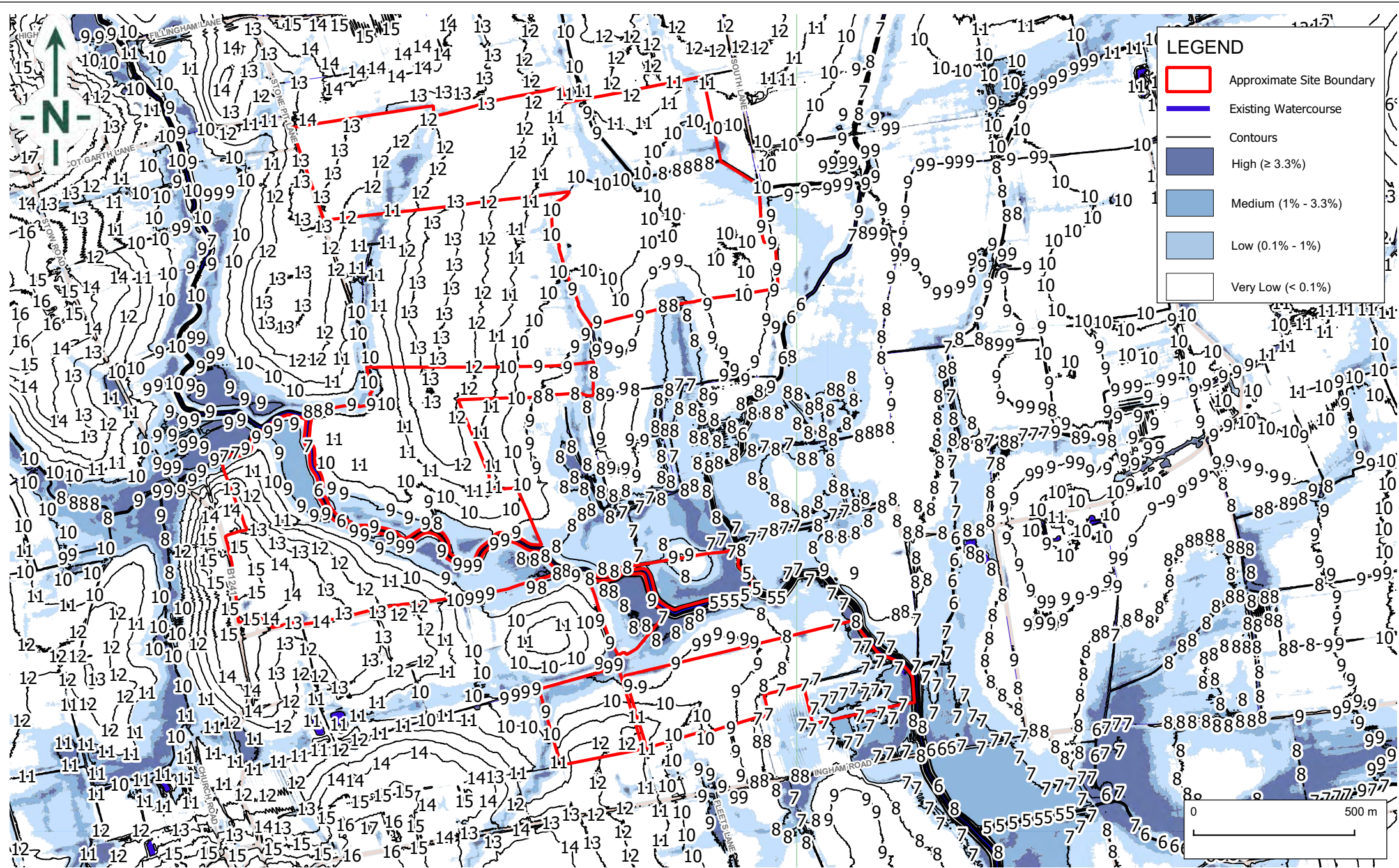
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TITLE:
EA Flood Map for Planning
Cottam 1 - West

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CHECKED BY: JR	REVISION: -	APPENDIX:
DATE: 17 January 2022		

Annex D – EA Long Term Flood Risk Map (Surface Water)



LEGEND

- Approximate Site Boundary
- Existing Watercourse
- Contours
- High ($\geq 3.3\%$)
- Medium (1% - 3.3%)
- Low (0.1% - 1%)
- Very Low ($< 0.1\%$)

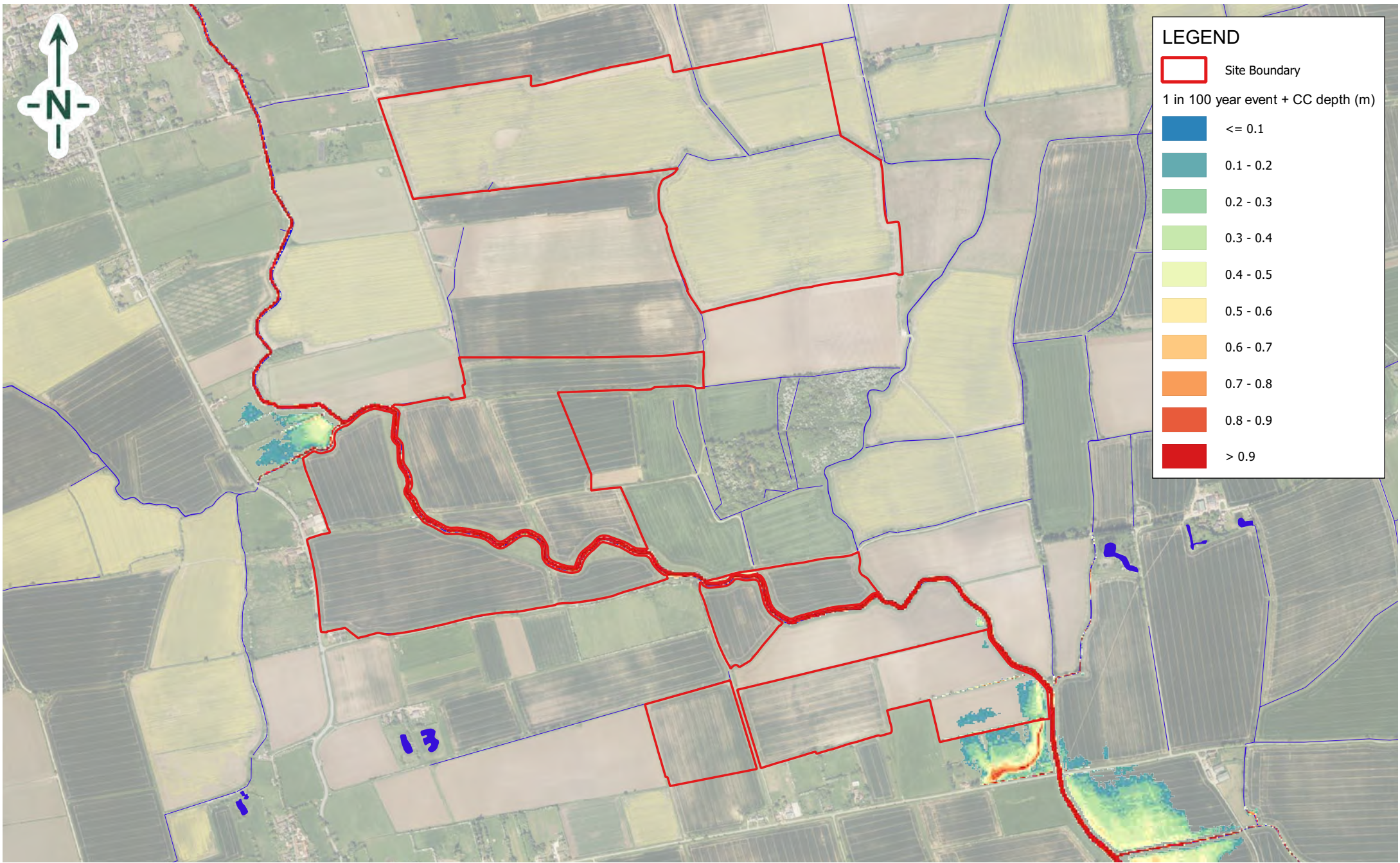
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TITLE:
EA Long Term Flood Risk Map (Surface Water)
Cottam 1 - West

DRAWN BY: EB	SCALE (@A4): 1:15,000	PROJECT NO: 21-1088.01
CHECKED BY: JR	REVISION: -	APPENDIX:
DATE: 17 January 2022		

Annex E – 1% AEP + CC Event Depth Map



LEGEND

Site Boundary

1 in 100 year event + CC depth (m)

- <= 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- > 0.9

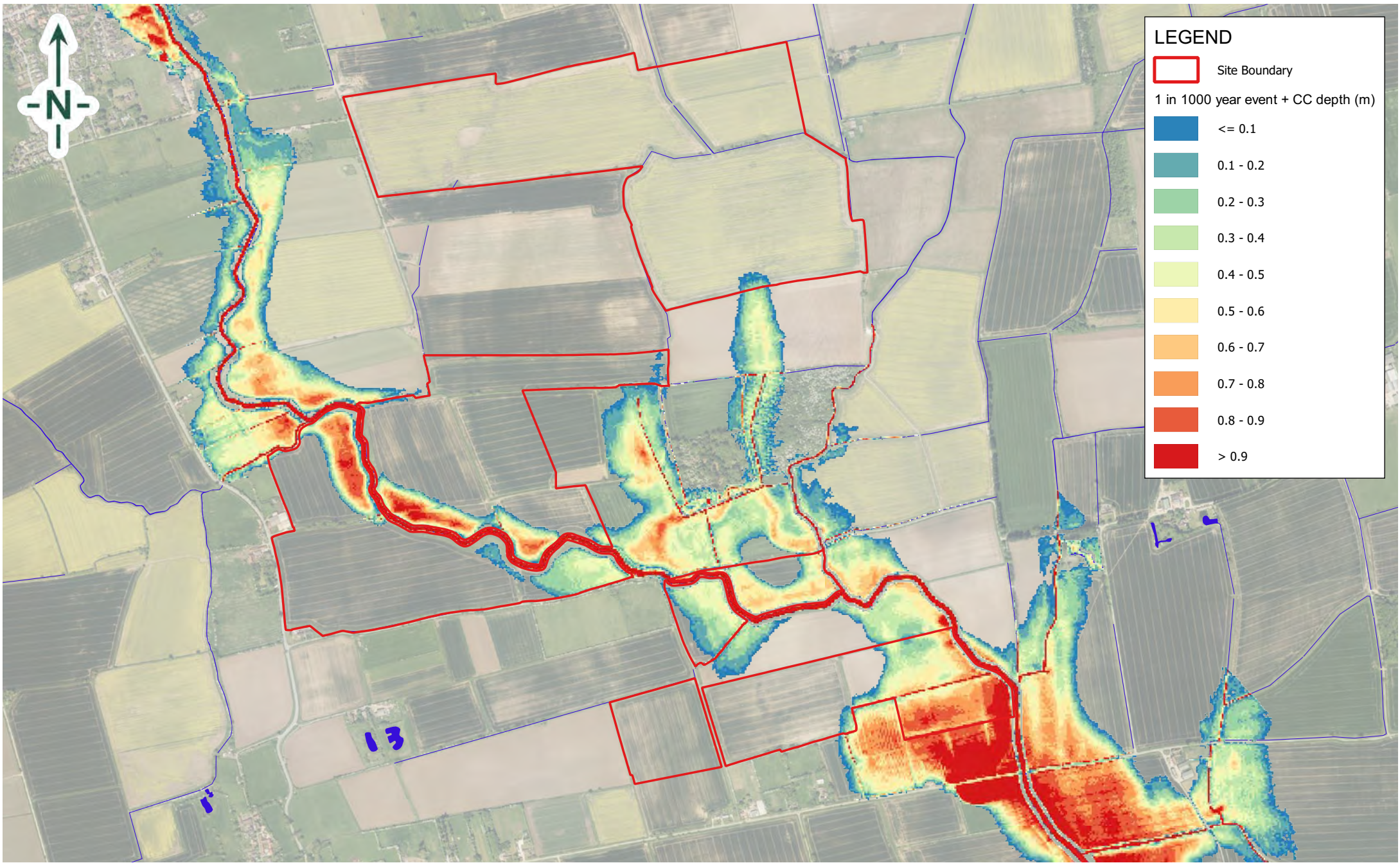
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TITLE:
1% AEP + 20% CC Depth Grid Data
Cottam 1 West

DRAWN BY: EB	SCALE (@A4): 1:14,000	PROJECT NO: 21-1088.01
CHECKED BY: JR	REVISION: -	
DATE: 05 April 2022		

Annex F – 0.1% AEP + CC Event Depth Map



LEGEND

Site Boundary

1 in 1000 year event + CC depth (m)

- <= 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- > 0.9

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TITLE:
0.1% AEP + 20% CC Depth Grid Data
Cottam 1 West

DRAWN BY: EB	SCALE (@A4): 1:14,000	PROJECT NO: 21-1088.01
CHECKED BY: JR	REVISION: -	
DATE: 05 April 2022		

10.4 Flood Risk Screening Assessment: Cottam 2

Appendix E – Flood Risk Screening Assessment

Cottam 2 – Cottam Solar Project

Presented to Island Green Power

Issued: April 2022

Delta-Simons Project No. 21-1088.01

1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited (“Delta-Simons”) was instructed by Island Green Power (the “Client”) to undertake a Flood Risk Screening Assessment (FRSA) of Cottam 2 (the Site).

1.2 Context & Purpose

On the Environment Agency (EA) Flood Map for Planning, the Site is shown to be encroached by Flood Zone 3 (High Probability), which is defined as land assessed as having greater than a 1 in 100 chance (>1%) of flooding from rivers in any given year.

The Client has therefore requested a Flood Risk Screening Assessment is prepared to assess the Site’s suitability for the proposed solar farm development.

1.3 Scope of Works

The scope of works has been as follows:

- ▲ Build a bespoke semi-automated model utilising GIS software, identifying the flood risks at each Site using EA flood datasets;
- ▲ Identify key constraints at the Site and apply Red, Amber, Green (RAG) status of Sites to be assessed further;
- ▲ Produce bespoke flood maps for each Site highlighting the flood extents, watercourses, surface water features and Site terrain / contours;
- ▲ Present findings for all Sites within FRSA Reports; and
- ▲ Utilise the screening to inform detailed proposals for the Flood Risk Assessments and Drainage Strategies

1.4 Sources of Information

The following sources of information have been reviewed and assessed:

- ▲ Environment Agency online Flood Maps¹;
- ▲ British Geological Society (BGS) Interactive Map²;
- ▲ MAGIC Interactive Map³;

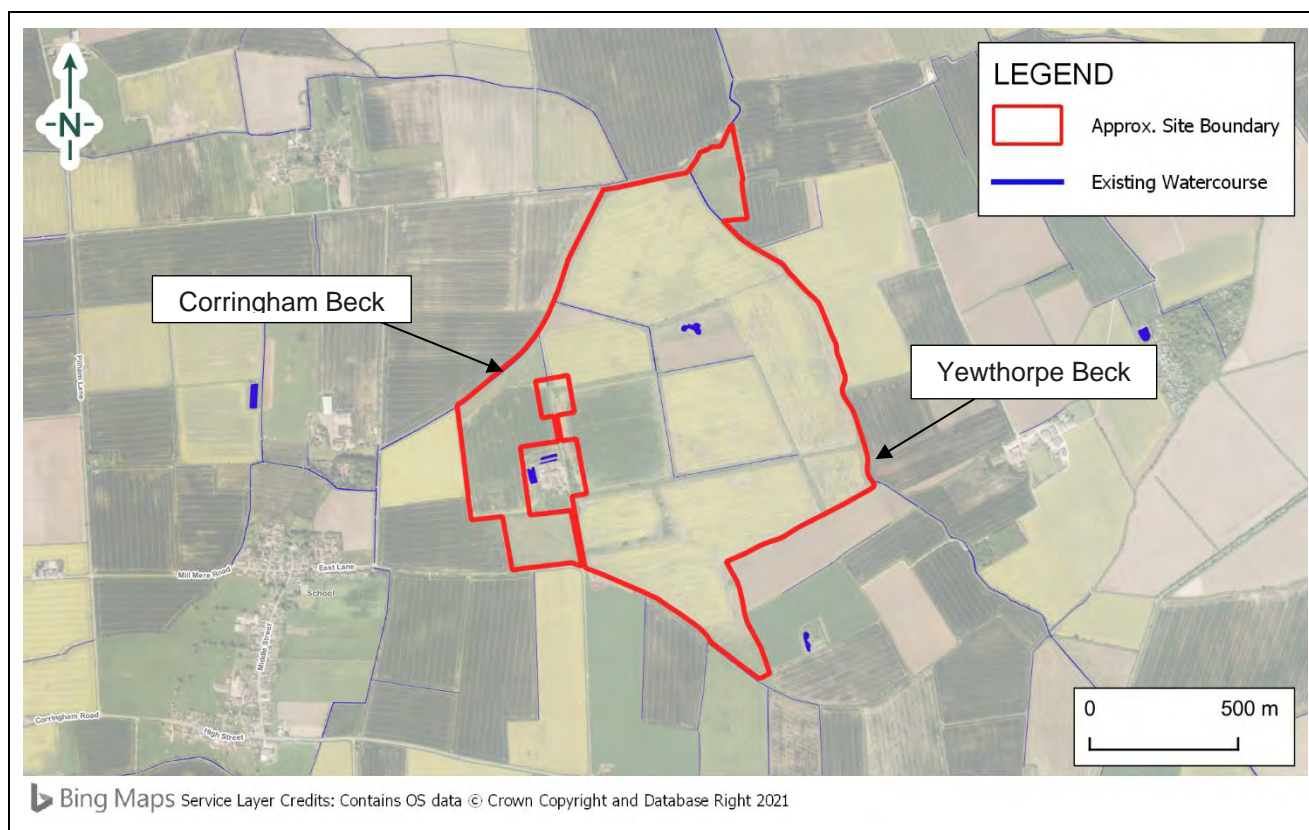
¹ <https://flood-map-for-planning.service.gov.uk/>

² <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

³ <http://www.magic.gov.uk/>

2.0 Site Description

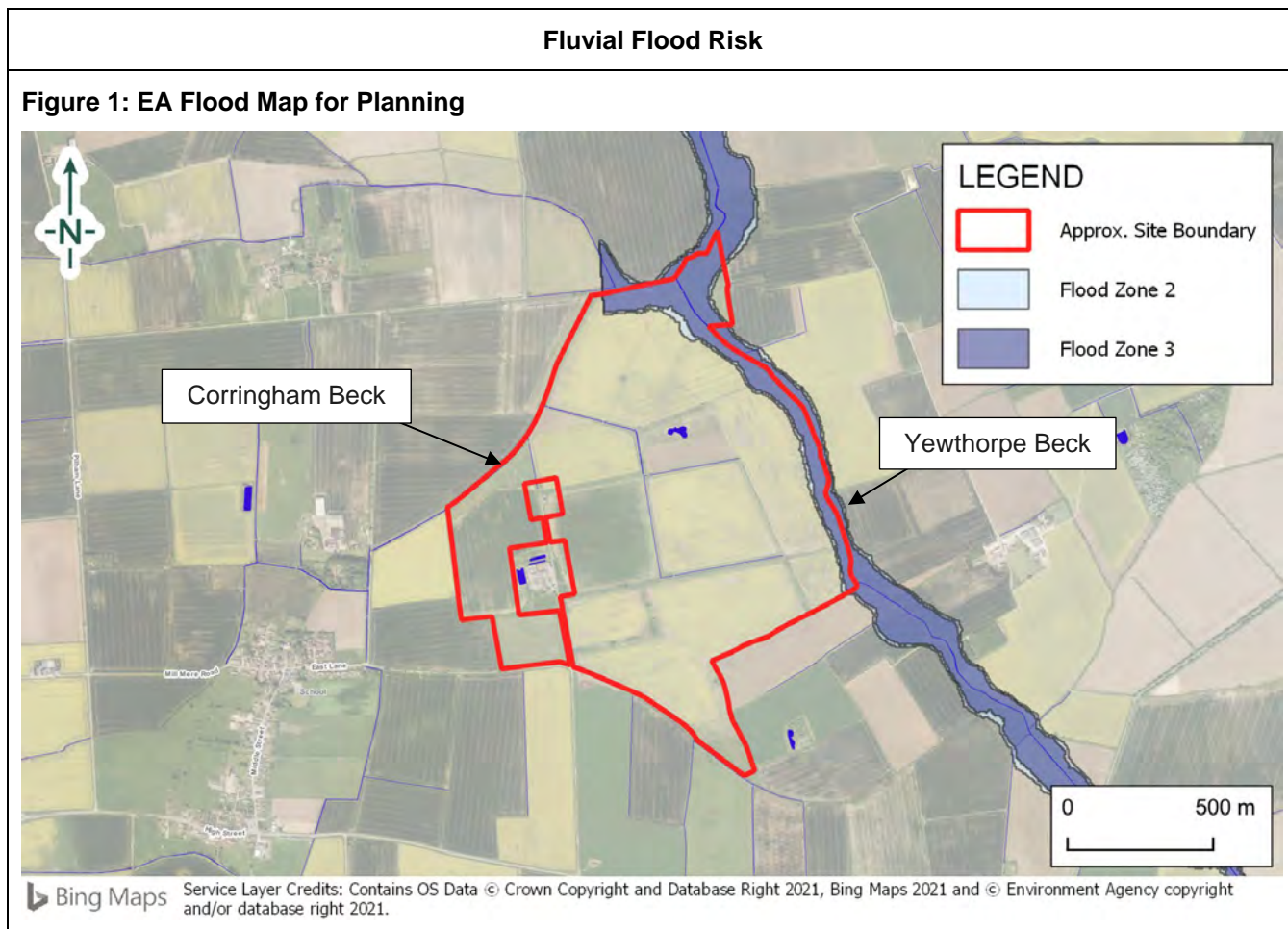
The aim of this section of the note is to outline key environmental information associated with the baseline environment.



Illustrative Site Layout Plan

Co-ordinates	Centred approximately at National Grid Reference 488333, 392155	Area (approx.)	132.69 Ha
Site Location	The Site is located within a rural setting and comprises multiple parcels of agricultural fields, approximately 500 m north-east of the village of Corringham.		
Topography	<p>Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1 m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM).</p> <p>A review of LiDAR ground elevation data shows that the Site slopes from approximately 16 - 18 m AOD in centre of the Site to approximately 13 - 16 m AOD in the east and west perimeters where the two watercourses are situated.</p> <p>A LiDAR extract is included in Annex B.</p>		

3.0 Flood Risk Screening Assessment



EA Online Flood Maps

The EA's Flood Risk Map for Planning indicates that the north and eastern boundary of the Site are enriched by Flood Zone 3. Flood Zone 3 defined as land assessed as having a 1 in 100) or greater (>1% Annual Exceedance Probability annual probability of river flooding). The remainder of the Site is of Low Risk in Flood Zone 1.

The flood risk area is associated with Yewthorpe Beck (Ordinary Watercourse – responsibility of the LLFA to maintain) that runs down the perimeter of the East of the Site. Therefore, fluvial flooding could occur if the Yewthorpe Beck overtopped or breached its banks during or following an extreme rainfall event.

The Site is not located within a Flood Warning Area or Flood Alert Area and has not previously flooded based on the EA's Historic Flood Map.

The EA's Spatial Flood Defences Dataset indicates that there are no flood defences present within the vicinity of the Site.

EA Consultation

The EA were consulted to obtain site-specific flood data for the Site. In their response, the EA stated '*we don't hold modelled data for Yawthorpe Beck since it is an ordinary watercourse*'. Lincolnshire County Council as the Lead Local Flood Authority and Scunthorpe and Gainsborough Water Management Board as the Internal Drainage Board were subsequently consulted, however neither authority held any flood data relating to the watercourse.

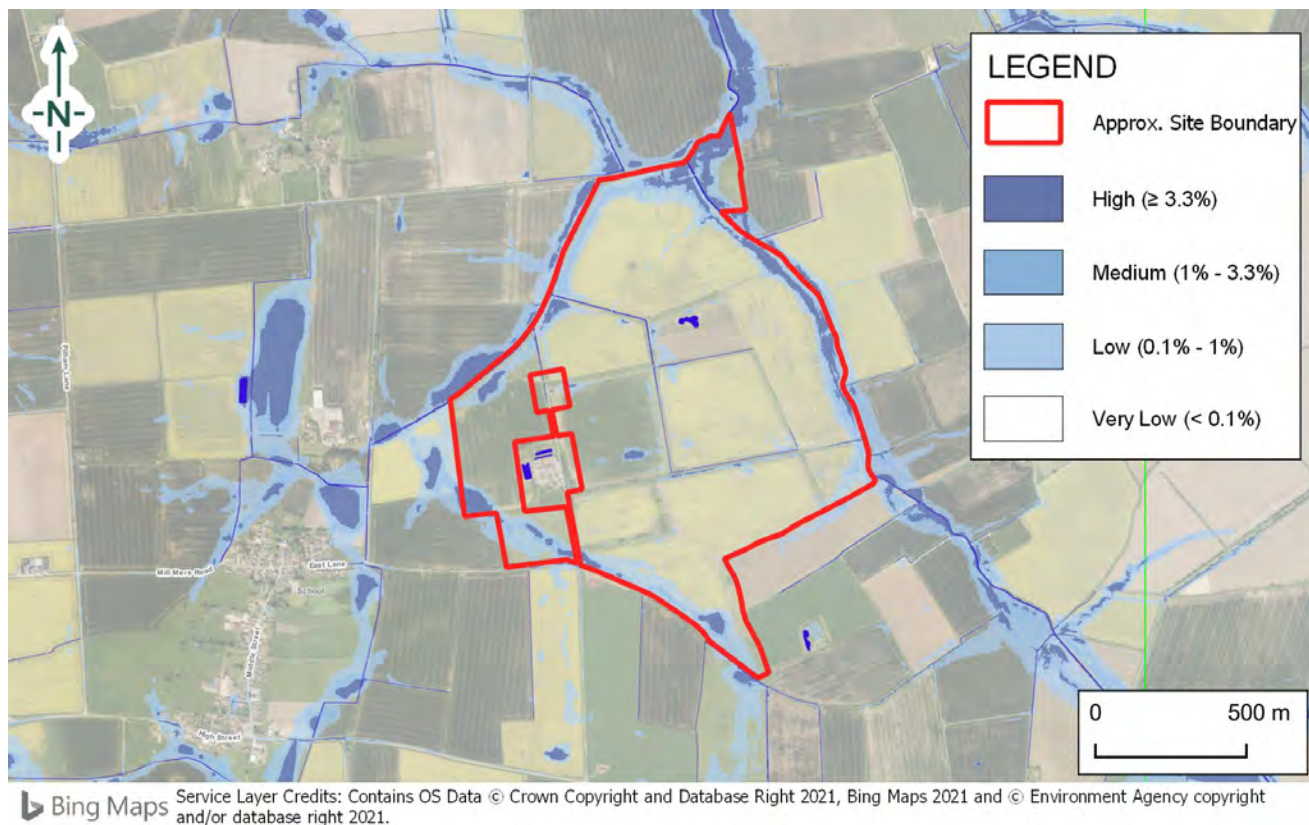
In the absence of modelled flood data, the 0.1% annual probability surface water flood scenario can be used as a proxy for the 1% AEP + CC fluvial event. A map depicting flood depths associated with the 0.1% annual

probability scenario is included as Annex F. The majority of the flooding along the eastern Site boundary is shown to be between 0.3 – 0.6 m. Two portions of flooding with depths between 0.6 – 0.9 m are shown in the north-eastern corner of the Site.

It should be noted that all the flood maps are indicative and does not consider the impacts of climate change.

Surface Water Risk

Figure 2: EA Long-Term Flood Risk Map (Surface Water)



EA Online Flood Maps

The EA's Long-Term Flood Risk Map indicates that Surface Water flooding with a High Risk (>3.3% Annual Probability) of occurrence is present across the boundaries of the Site, predominantly surrounding the north, east and west. The Site shows little surface water risk within the boundaries, aside from a small parcel within the centre of the site which is shown to be a Medium Risk (1% - 3.3%).

The surface water extents shown on the EA's Long-Term Flood Risk Map largely concur with the Flood outlines shown on the EA Flood Map for Planning associated with the Ordinary Watercourses that runs to the east and west of the Site; Yewthorpe Beck and Corringham Beck. The risk is not likely to impact the main extents of the Site, as the topography ranges from 16 – 18 m AOD within the Site's boundaries, as opposed to 13 – 16 m AOD where the watercourses are situated.

Surface water flooding is indicative and typically difficult to predict as it depends on localised heavy rainfall, localised topography and the adequacy of the local drainage network.

Summary of Flood Risk

Flood Risk Status

Green

Key Constraints

Fluvial and Surface Water Risk Flood Risk associated with Ordinary Watercourses Yewthorpe Beck and Corringham Beck which flow on the boundaries in the East and West of the Site.

Next Steps

In order to fully inform the masterplanning and planning submission process the following works will be completed prior to completion of the Flood Risk Assessments:

- ▲ Consult Stakeholders where necessary regarding the acceptable depth of flooding for equipment to be placed within.

Annex A – Limitations

Limitations

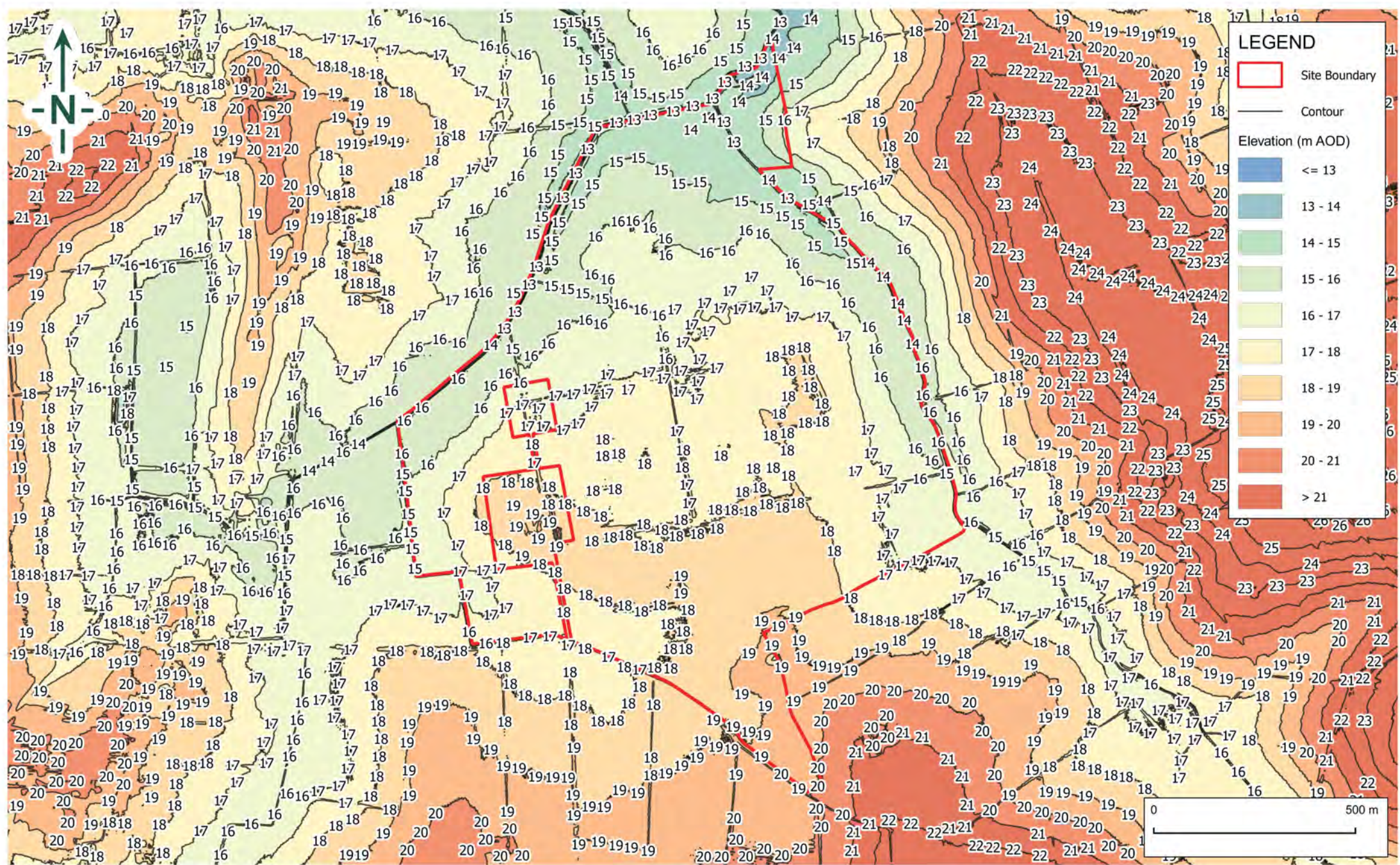
The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

The EA Climate Change Guidance was updated in 2016, therefore it is possible that the data shown on the EA Flood Map for Planning and the EA Long-Term Map does not consider the implications of climate change. For Sites on the periphery of defended areas and or in close proximity to Flood Zone 3, further work may be required to determine the flood risk more accurately.

Annex B – LiDAR Plan



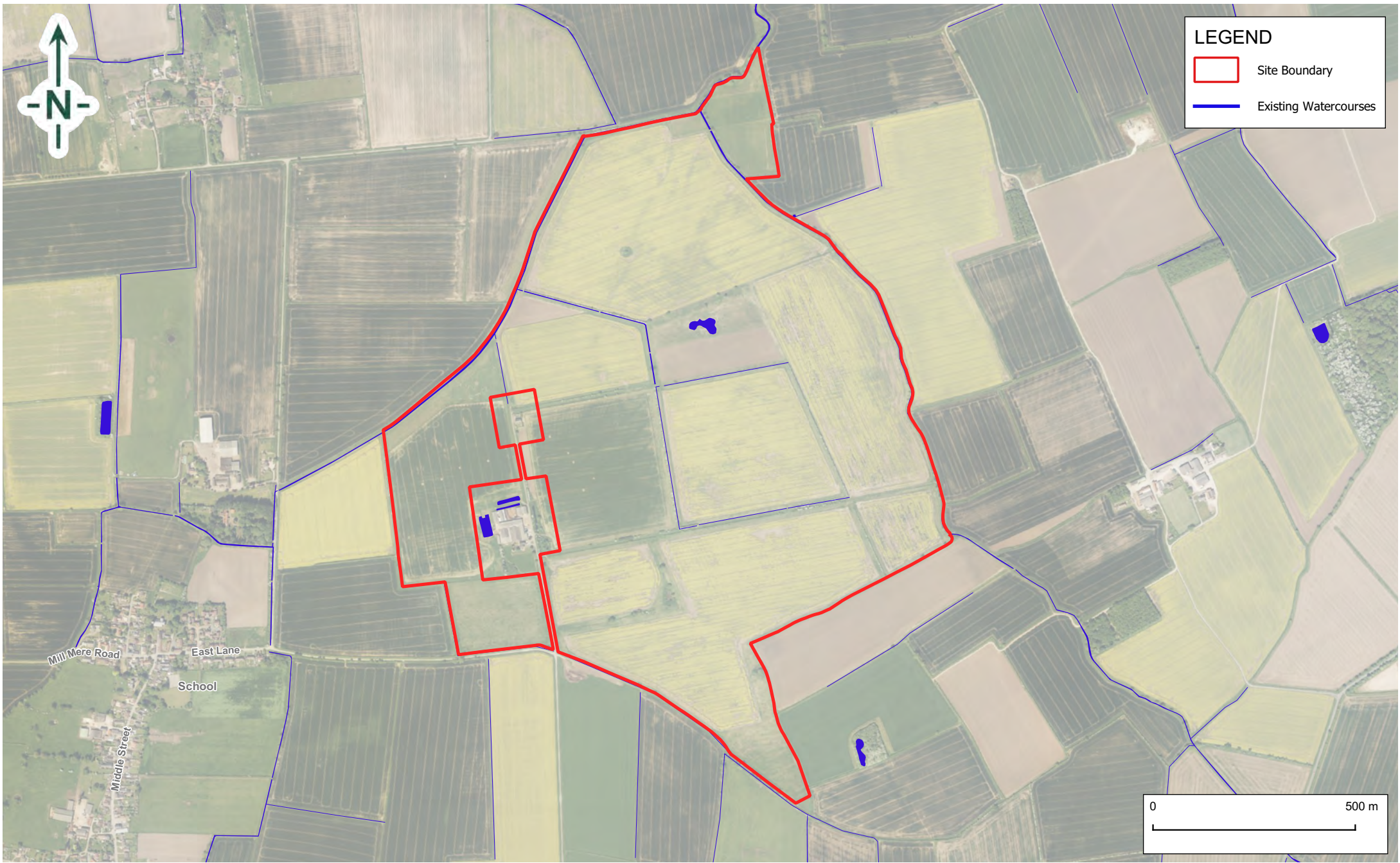
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TITLE:
 LiDAR Plan
 Cottam 2 - Cottam Solar Project

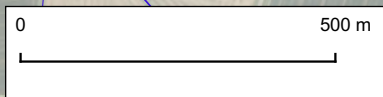
DRAWN BY: EB	SCALE (@A4): 1:12,000	PROJECT NO: 21-1088.01
CHECKED BY: JR	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

Annex C – Overview



LEGEND

- Site Boundary
- Existing Watercourses



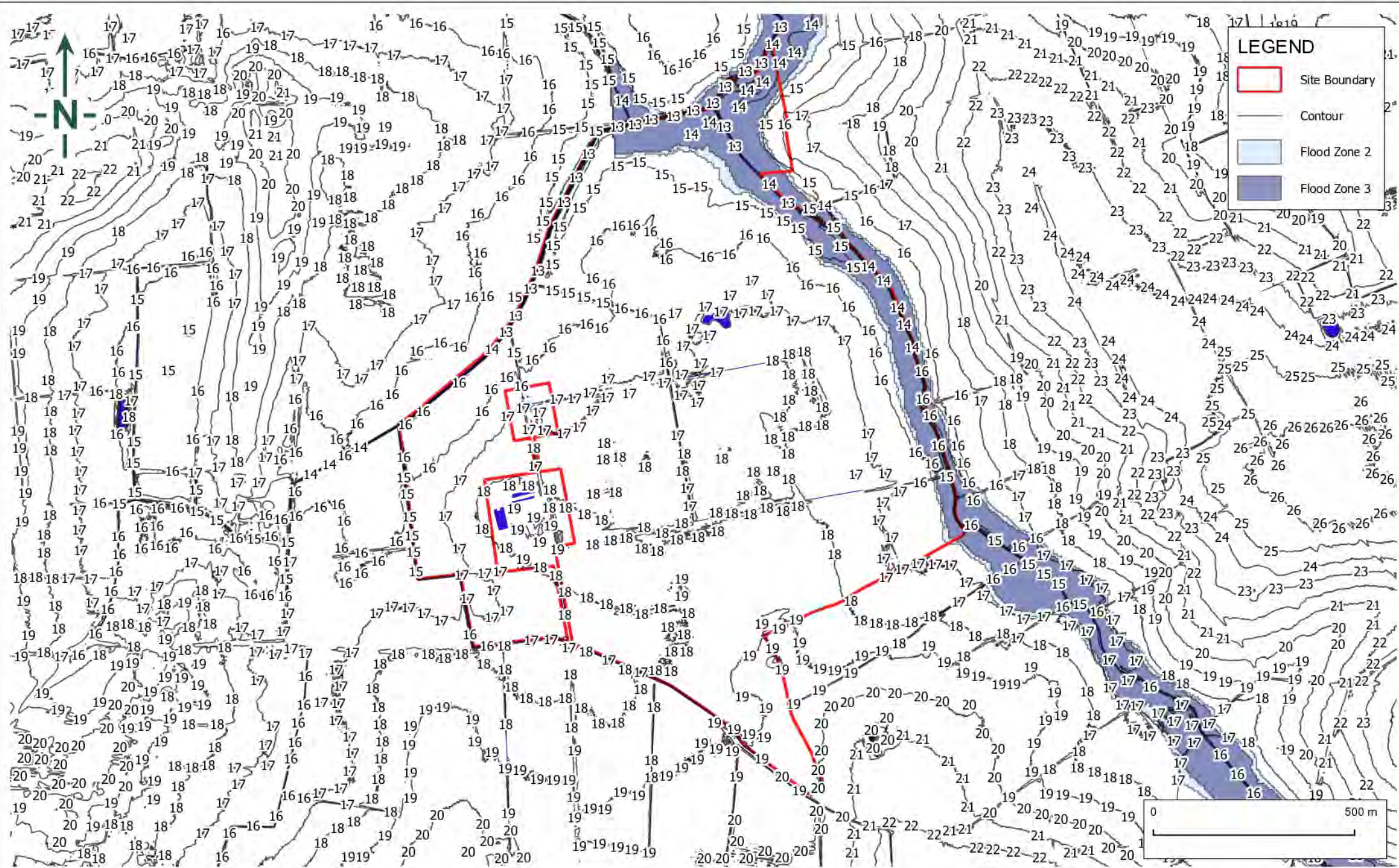
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TITLE:
Overview
Cottam 2 - Cottam Solar Project

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CHECKED BY: JR	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

Annex D – EA Flood Map for Planning



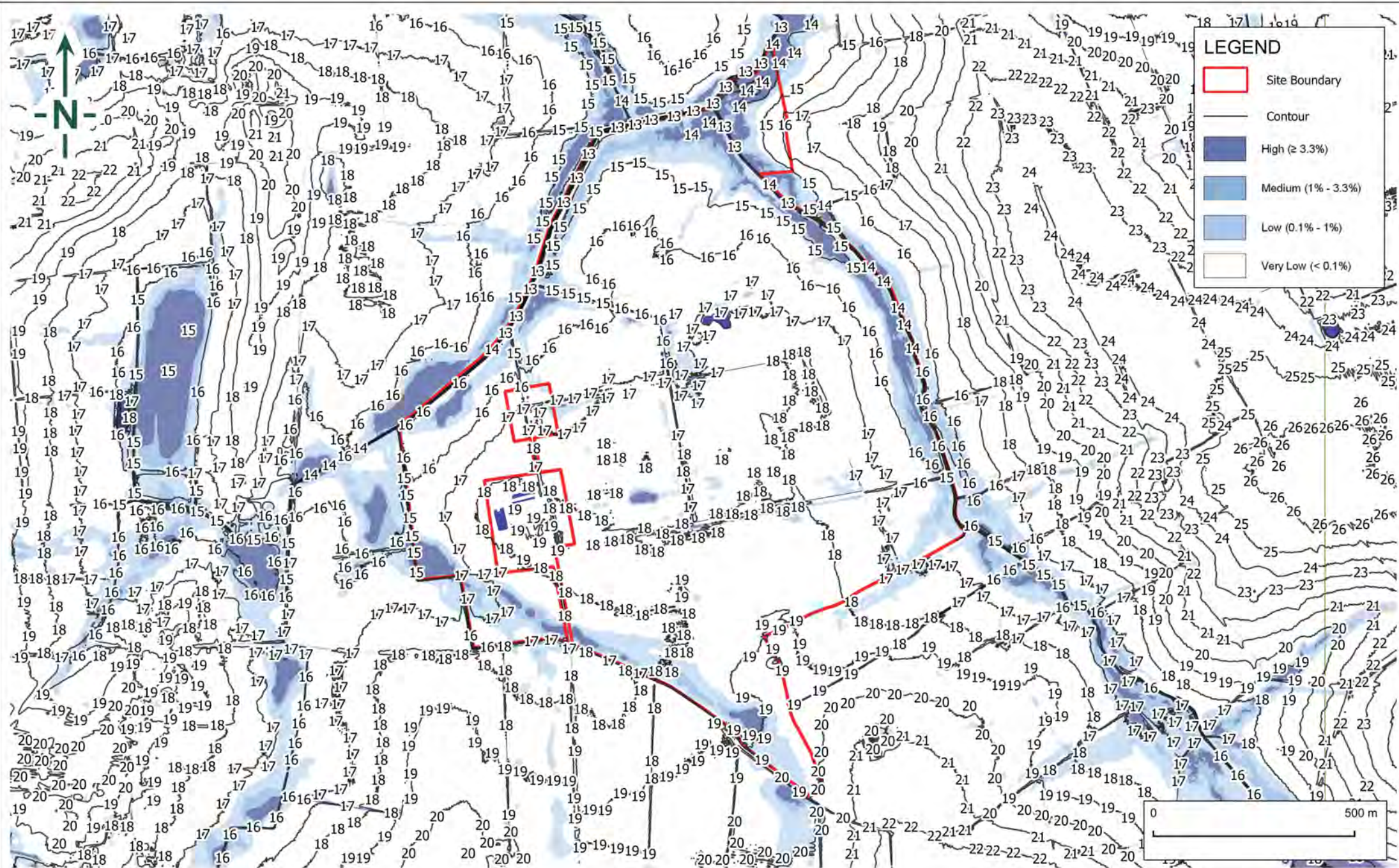
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TITLE:
EA Flood Map for Planning
Cottam 2 - Cottam Solar Project

DRAWN BY: EB	SCALE (@A1): 1:12,000	PROJECT NO: 21-1088.01
CHECKED BY: JR	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

Annex E – EA Long Term Flood Risk Map (Surface Water)



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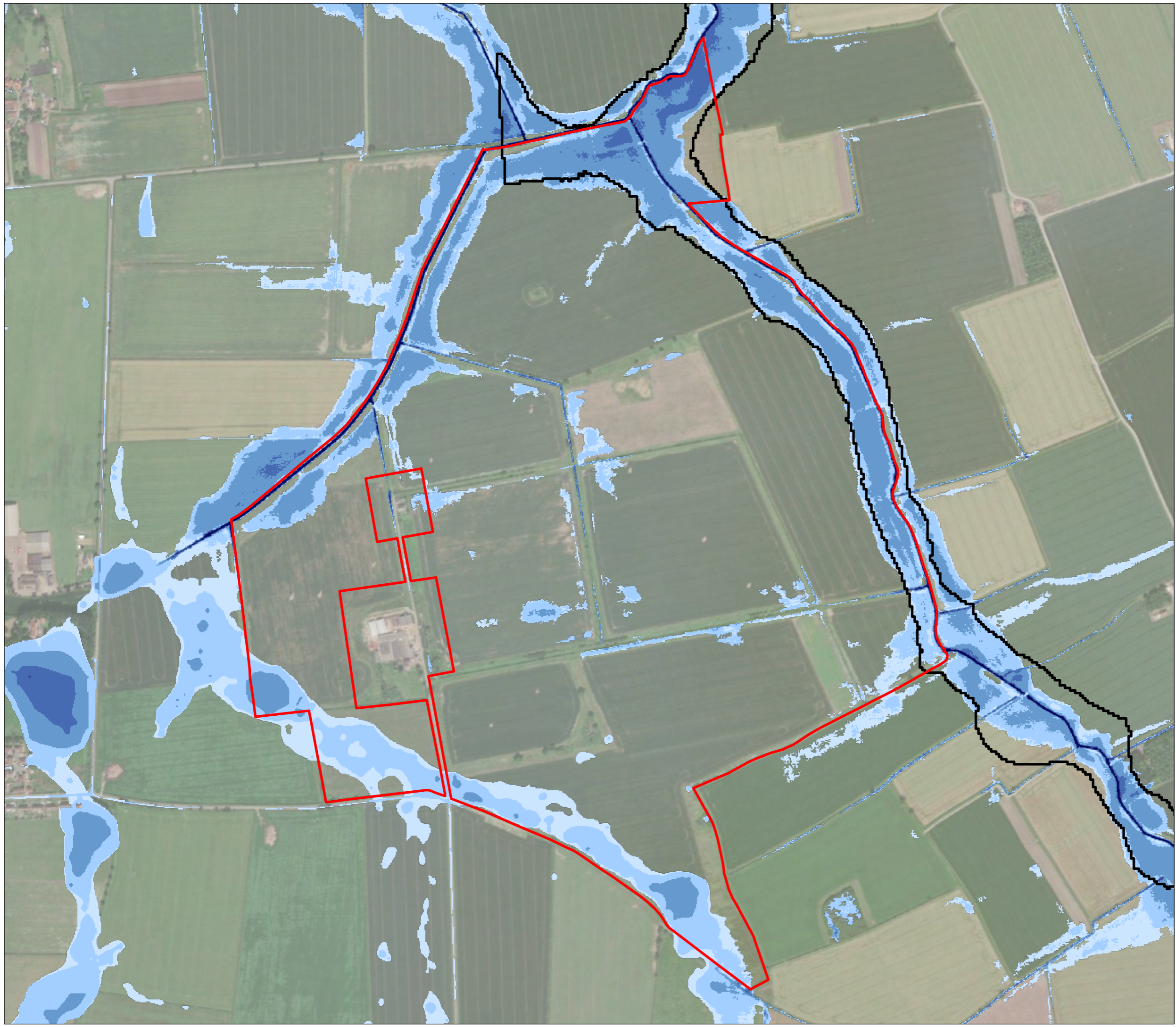


TITLE:
Risk of Flooding from Surface Water
Cottam 2 - Cottam Solar Project

DRAWN BY: EB	SCALE (@A4): 1:12,000	PROJECT NO: 21-1088.01
CHECKED BY: JR	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

FIGURE NO:

Annex F – 0.1% Annual Probability Surface Water Flood Event Proxy Map



- Legend**
- Cottam 2 Boundary
 - Flood Zone 2
- Risk of Flooding from Surface Water (Depth 1 in 1000)
- Below 150mm
 - 150-300mm
 - 300-600mm
 - 600-900mm
 - 900-1200mm
 - Over 1200mm



Figure		Flood Level	
Job		Cottam 1 North / Cottam 2	
Client		Island	
Figure No.	1	Revision	A
		Date	06/04/2022
Drawn	BB	Checked	EB
		Scale	1:7,000 @ A3
Job No.	21-1088.01		Central GR
			488401E 392147N



10.5 Flood Risk Screening Assessment: Cottam 3

Appendix F – Flood Risk Screening Assessment

Cottam 3 – Cottam Solar Project

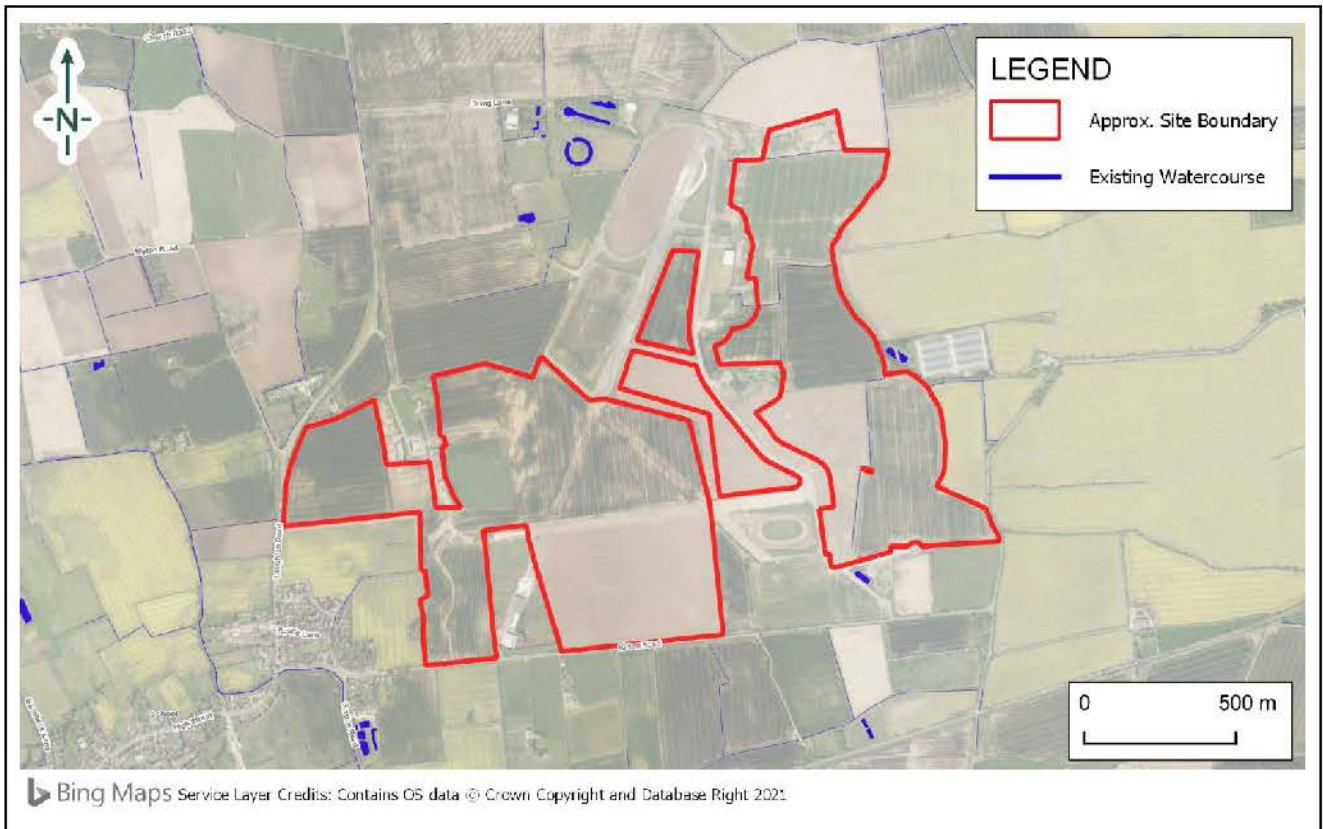
Presented to Island Green Power

Issued: January 2022

Delta-Simons Project No. 21-1088.01

1.0 Site Description

The aim of this section of the note is to outline key environmental information associated with the baseline environment.



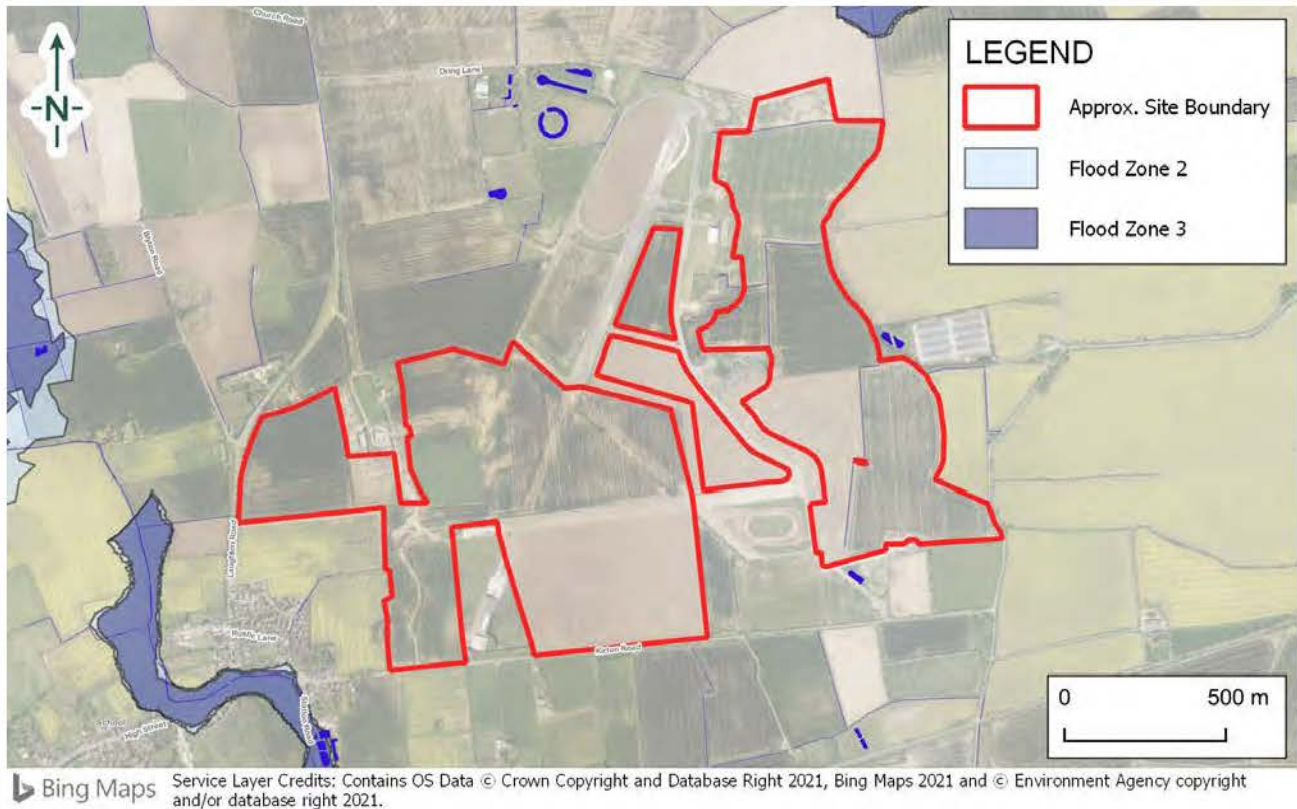
Illustrative Site Layout Plan

Co-ordinates	Centred approximately at National Grid Reference 487400, 396200.	Area (approx.)	172 Ha
Site Location	The Site is located within a rural setting and comprises multiple agricultural fields, approximately 1.8 km north-west of the village of Blyton.		
Topography	<p>Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1 m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM).</p> <p>A review of LiDAR ground elevation data shows that the Site is generally flat, ranging in elevation from approximately 20 to 25 m AOD.</p> <p>A LiDAR extract is included in Annex A.</p>		

2.0 Flood Risk Screening Assessment

Fluvial Flood Risk

Figure 1: EA Flood Map for Planning



EA Online Flood Maps

The EA's Flood Risk Map for Planning indicates that the Site is wholly situated within Flood Zone 1 (Low Probability). Flood Zone 1 defined as land assessed as having a less than 1 in 1000 (<0.1% Annual Exceedance Probability, AEP) chance of river flooding.

A portion of Laughton Highland Drain is located approximately 250 m west of the western extremity of the Site and contains an area within Flood Zone 3. This does not pose any flood risk to the Site.

The EA's Historic Flood Map indicates that the Site has not been flooded previously.

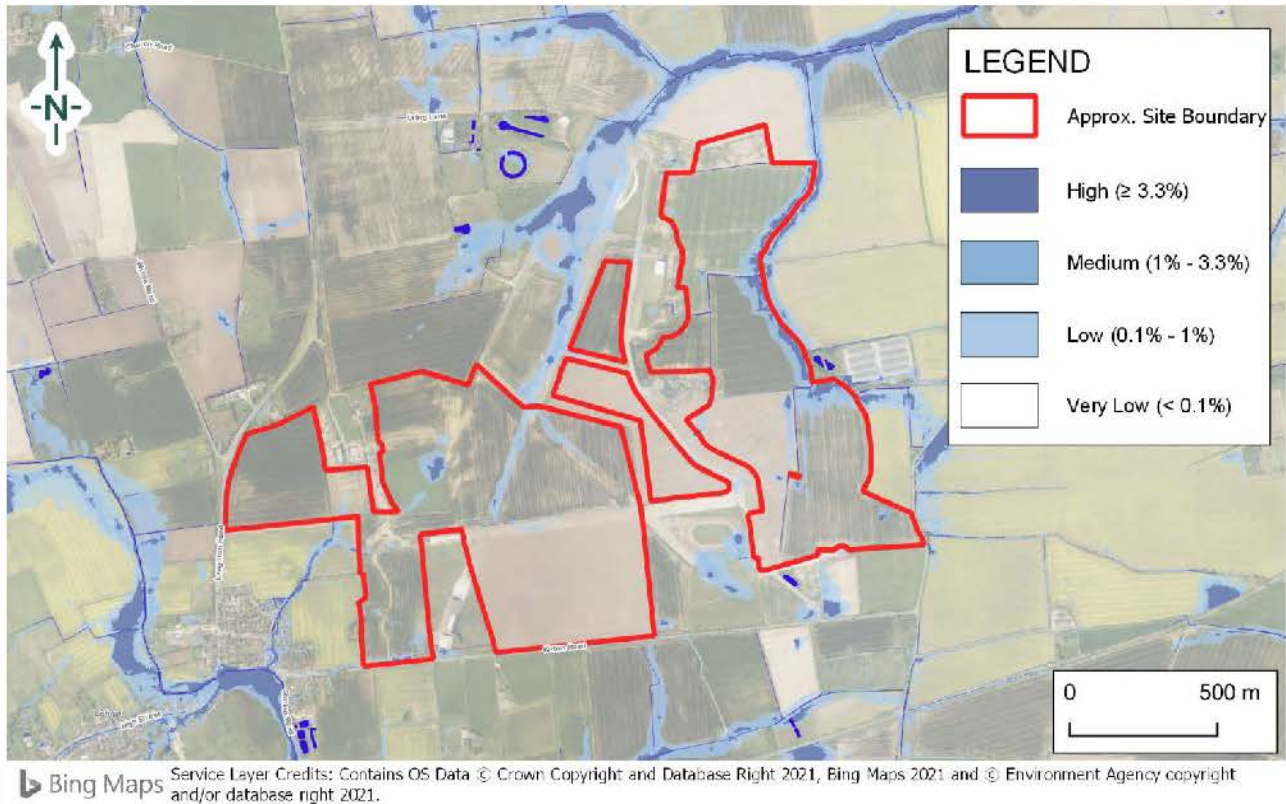
The EA's Spatial Flood Defences Dataset indicates that there are no flood defences present within the vicinity of the Site.

The Site is not located within an Internal Drainage Board (IDB), however numerous land drains are present in the area.

It should be noted that all the flood maps are indicative and do not accurately take into account the impacts of climate change.

Surface Water Risk

Figure 2: EA Long-Term Flood Risk Map (Surface Water)



EA Online Flood Maps

The EA's Long-Term Flood Risk Map indicates that the majority of the Site is at Very Low to Low (<0.1 - 1%) risk of Surface Water flooding. Isolated areas of the Site are at Medium to High Risk (1 - 3.3% Annual Probability), notably on the north-eastern boundary of the Site for approximately 1 km. This forms a Surface Water flow path, running along the boundary and away from the Site northwards. Other isolated areas of Medium to High Risk on the Site are associated with minor topographic depressions which infill during rainfall events.

Surface water flooding is indicative and typically difficult to predict as it depends on localised heavy rainfall, localised topography and the adequacy of the local drainage network.

Summary of Flood Risk

Flood Risk Status

Green

Key Constraints

None.

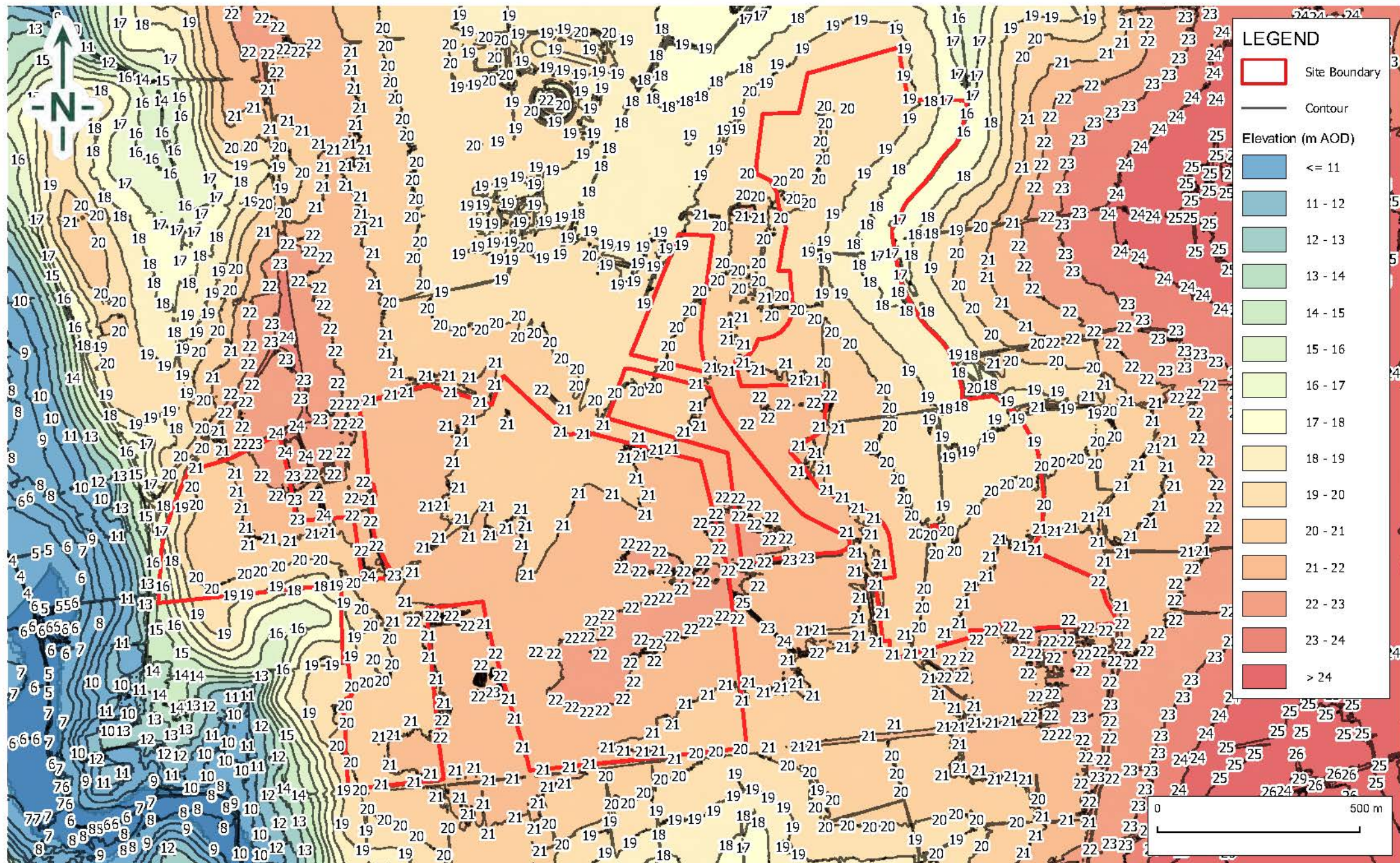
Next Steps

In order to fully inform the masterplanning and planning submission process the following works will be completed prior to completion of the Flood Risk Assessments:

- ▲ Obtain available EA flood data for the nearby land drains;

- ▲ Determine Flood Depths / Levels and velocities where possible, based on the available information;
- ▲ Consult Stakeholders where necessary regarding the acceptable depth of flooding for equipment to place within.

Annex A – LiDAR Plan



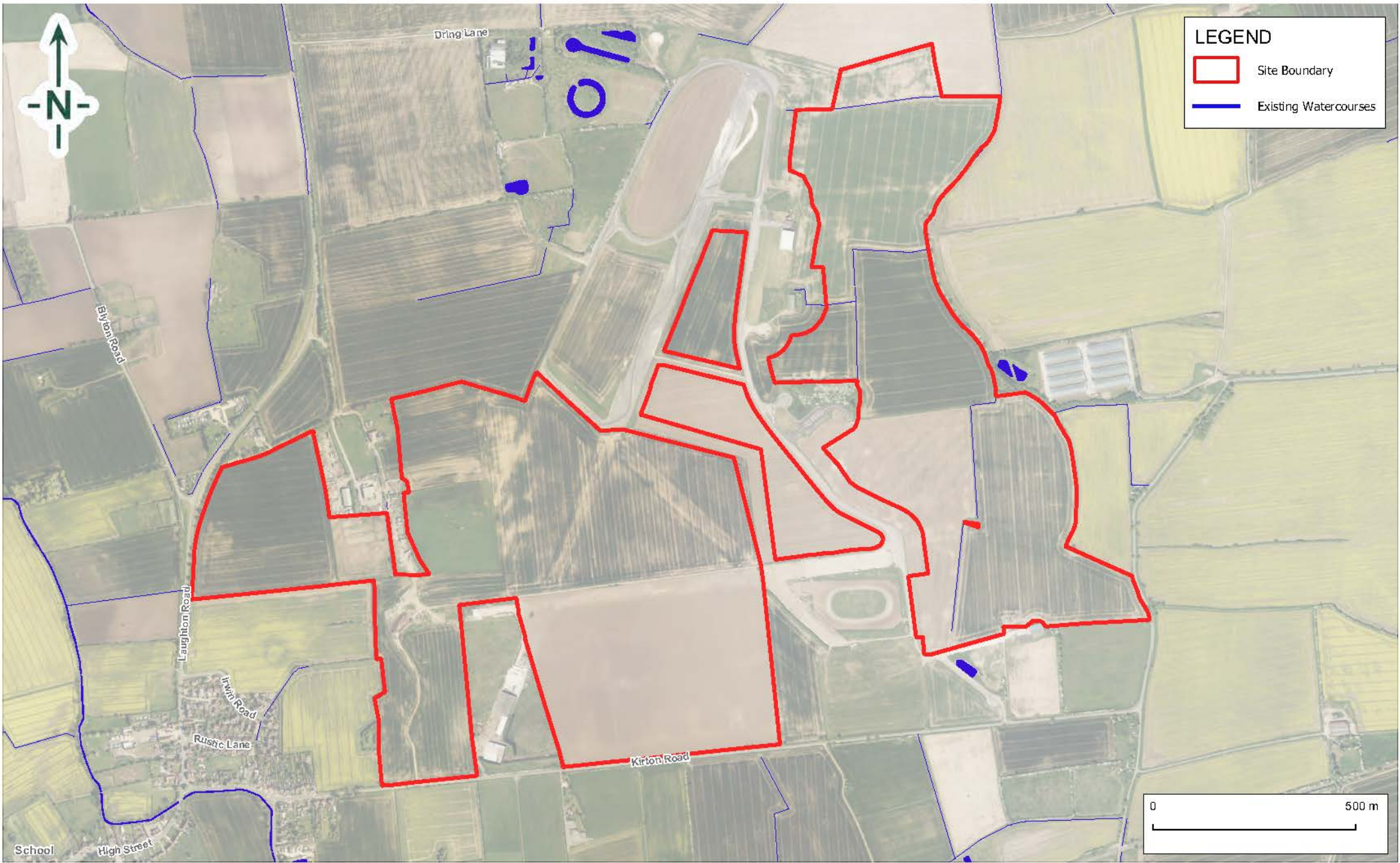
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TITLE:

LiDAR Plan
Cottam 3 - Cottam Solar Project

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CHECKED BY: JR	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

Annex B – Overview



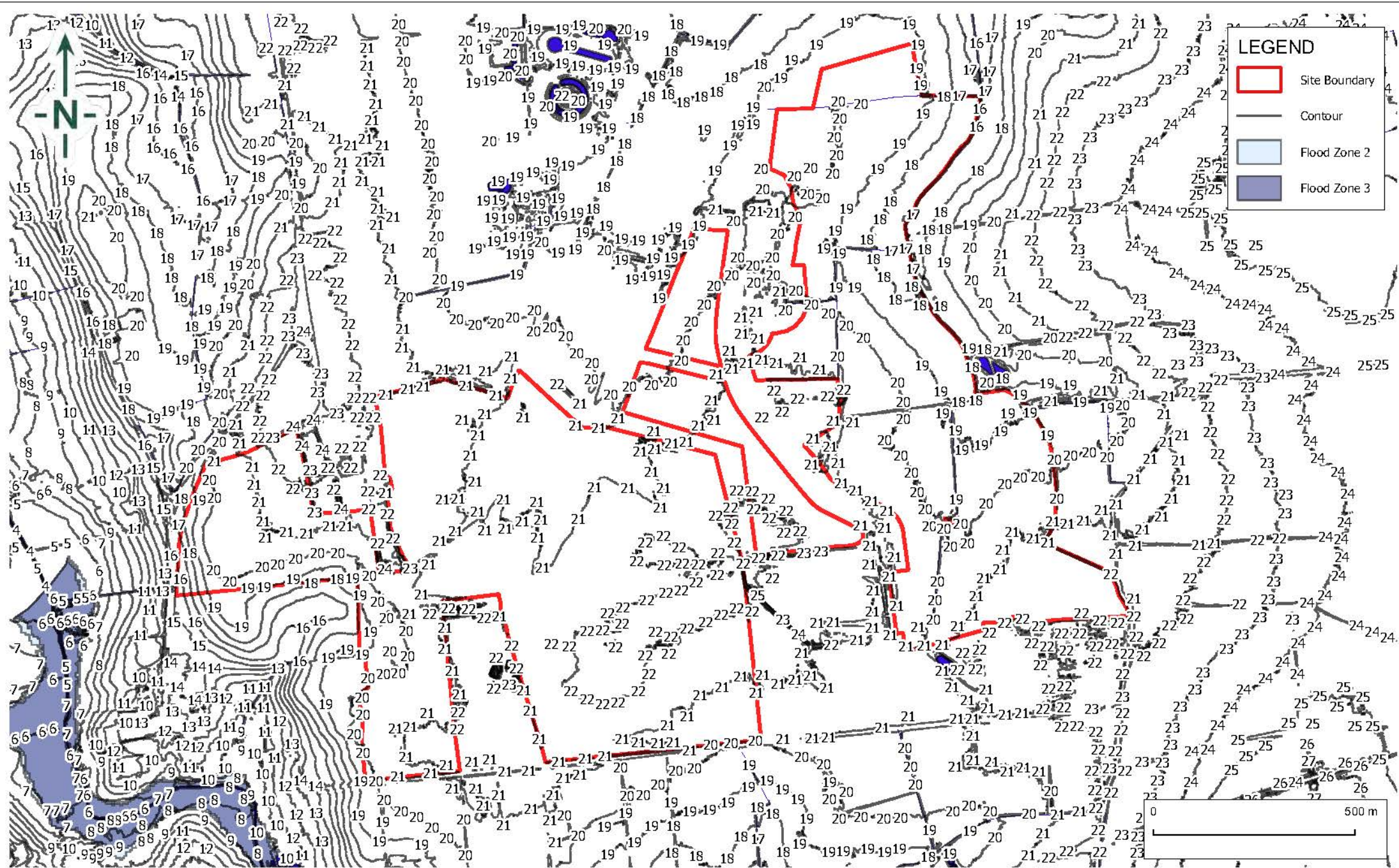
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TITLE:
Overview
 Cottam 3 - Cottam Solar Project

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CHECKED BY: JR	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

Annex C – EA Flood Map for Planning



LEGEND

- Site Boundary
- Contour
- Flood Zone 2
- Flood Zone 3

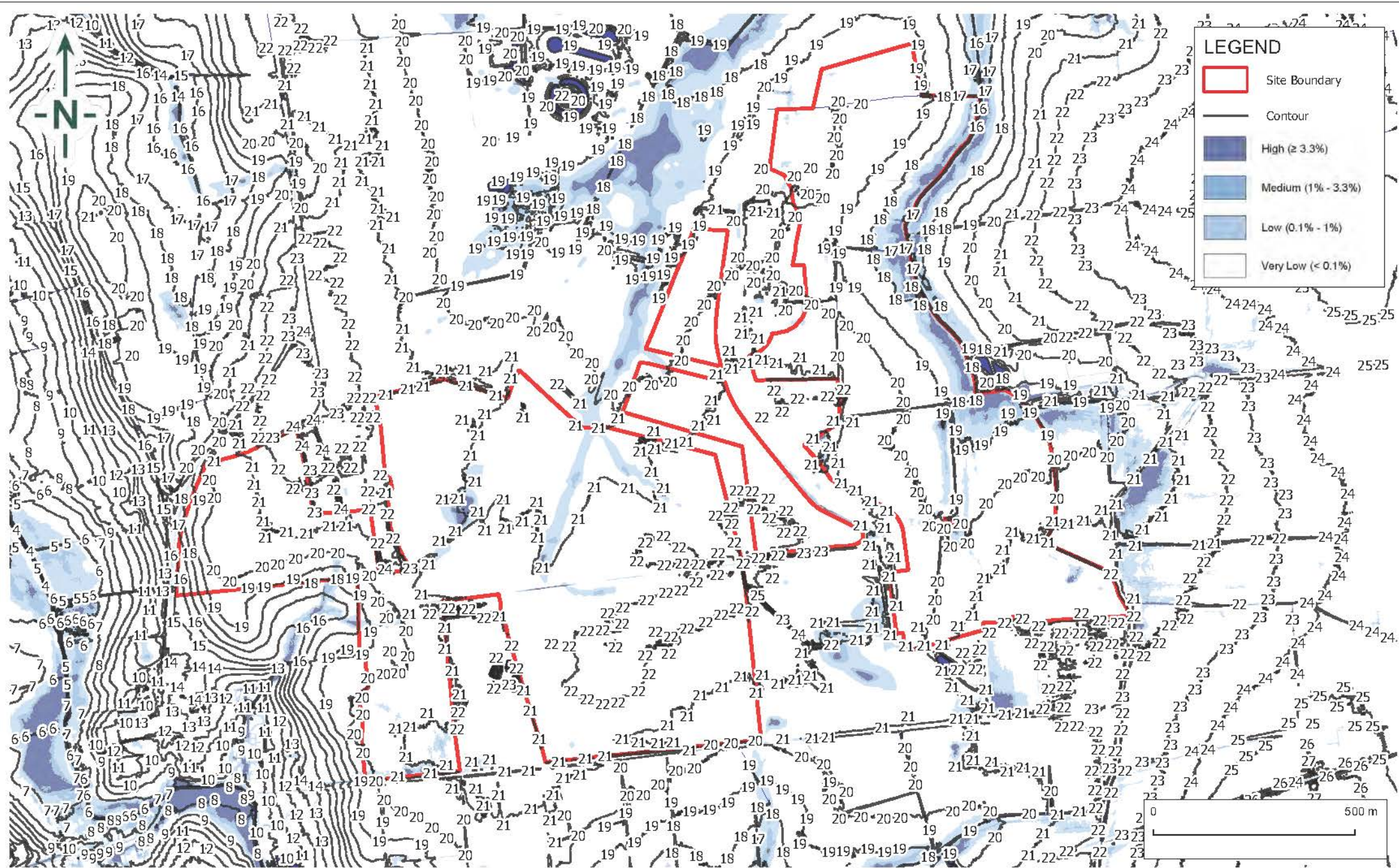
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TITLE:
EA Flood Map for Planning
Cottam 3 - Cottam Solar Project

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CHECKED BY: JR	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

Annex D – EA Long Term Flood Risk Map (Surface Water)



LEGEND

- Site Boundary
- Contour
- High (≥ 3.3%)
- Medium (1% - 3.3%)
- Low (0.1% - 1%)
- Very Low (< 0.1%)

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TITLE:
Risk of Flooding from Surface Water
Cottam 3 - Cottam Solar Project

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CHECKED BY: JR	REVISION: -	FIGURE NO:
DATE: 17 January 2022		

10.6 Flood Risk Screening Assessment: Cottam 3B

Appendix G – Flood Risk Screening Assessment

Cottam 3b – Cottam Solar Project

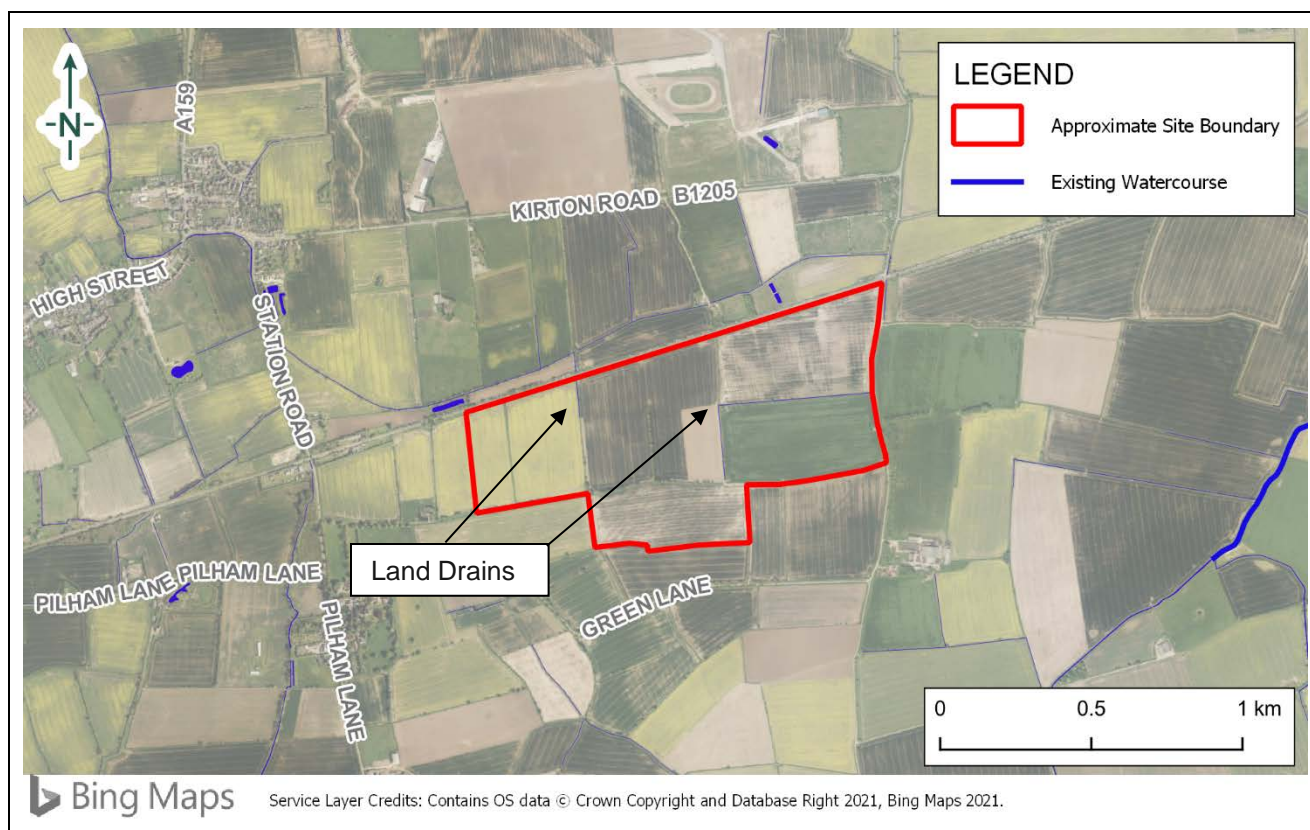
Presented to Island Green Power

Issued: January 2022

Delta-Simons Project No. 21-1088.01

1.0 Site Description

The aim of this section of the note is to outline key environmental information associated with the baseline environment.



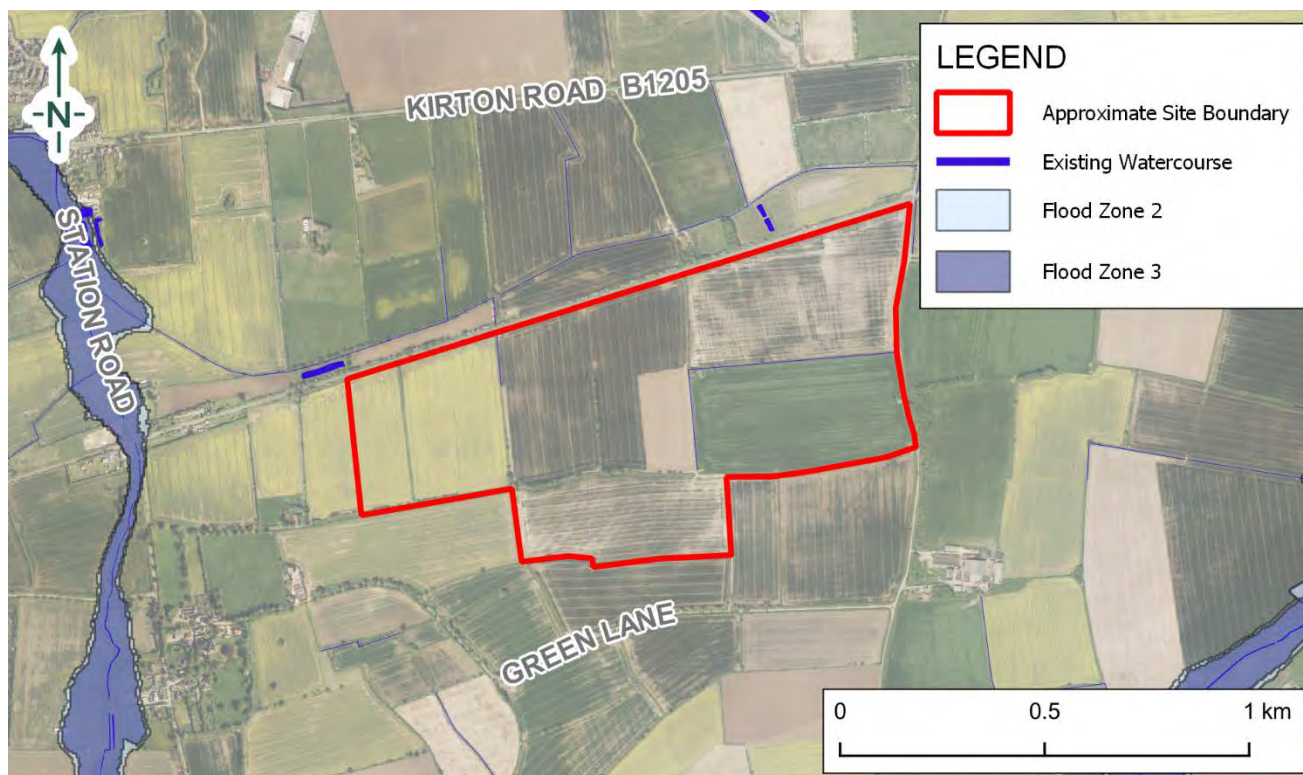
Illustrative Site Layout Plan

Co-ordinates	Centred approximately at National Grid Reference 487330, 394490.	Area (approx.)	72.89 Ha
Site Location	The Site is located approximately 500 m north-east of Pilham, Lincolnshire, 6.5 km north-east of Gainsborough railway station and 7.15 km south-west of Kirton Lindsey railway station.		
Topography	<p>Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1 m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM).</p> <p>A review of LiDAR ground elevation data shows that the Site slopes from approximately 25 m AOD in the south-east to approximately 15 m AOD in the north-west.</p> <p>A LiDAR extract is included in Annex A.</p>		

2.0 Flood Risk Screening Assessment

Fluvial Flood Risk

Figure 1: EA Flood Map for Planning



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EA Online Flood Maps

The nearest watercourse are the two land drainage ditches located within the Site, located within the northern and eastern extents. There are also land drains along the northern and eastern periphery. Other watercourses in the area include an Ordinary Watercourse approximately 90 m north of the Site which flows east to west.

The EA's Flood Risk Map for Planning indicates that the entirety of the Site is located within Flood Zone 1 (Low Probability). Flood Zone 1 is defined as having a less than 1 in 1000 annual probability of fluvial or tidal flooding (<0.1% Annual Exceedance Probability (AEP)).

The EA's Historic Flood Map indicates that the Site has not been flooded previously.

The EA's Spatial Flood Defences Dataset indicates that there are no flood defences present within the vicinity of the Site.

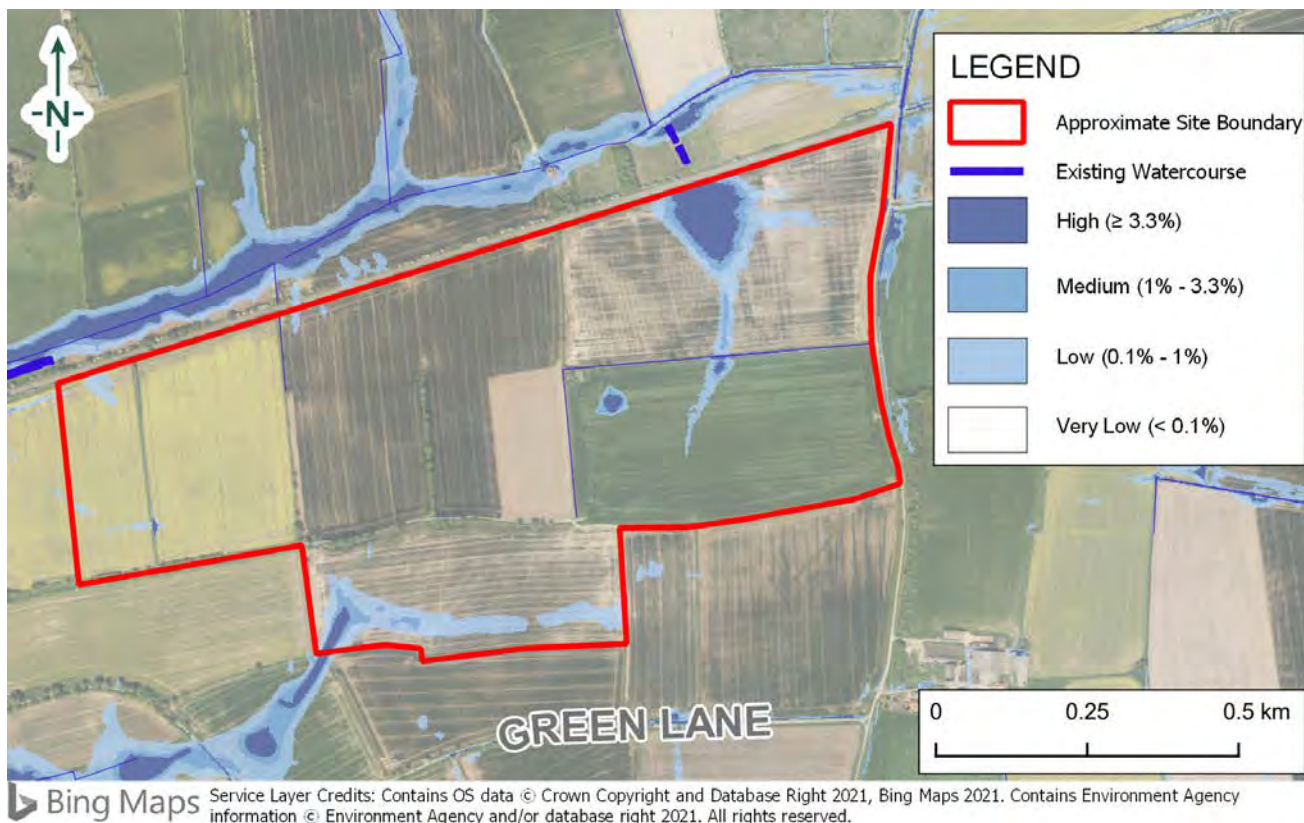
The Site is not located within an Internal Drainage Board (IDB)¹.

It should be noted that all the flood maps are indicative and do not accurately take into account the impacts of climate change.

¹ Internal Drainage Board Map : <https://www.ada.org.uk/idb-map>

Surface Water Risk

Figure 2: EA Long-Term Flood Risk Map (Surface Water)



EA Online Flood Maps

The EA 'Flood Risk from Surface Water' map indicates that the Site is largely at Very Low risk (<0.1% annual probability) of surface water flooding. However, there are some small areas throughout the Site which are at Low to High risk (0.1 - ≥ 3.3% annual probability) of surface water flooding; these areas are generally confined to the north-east and south-western extents.

Flood depths are expected to remain below 300 mm during the High and Medium Risk scenarios in all areas excluding the north-eastern extents of the Site, which is expected to reach depths between 300 and 900 mm and appears to be as a result of ponding behind the railway which forms the northern boundary of the Site.

Surface water flooding is indicative and typically difficult to predict as it depends on localised heavy rainfall, localised topography and the adequacy of the local drainage network.

Summary of Flood Risk

Flood Risk Status	Green
-------------------	-------

Key Constraints

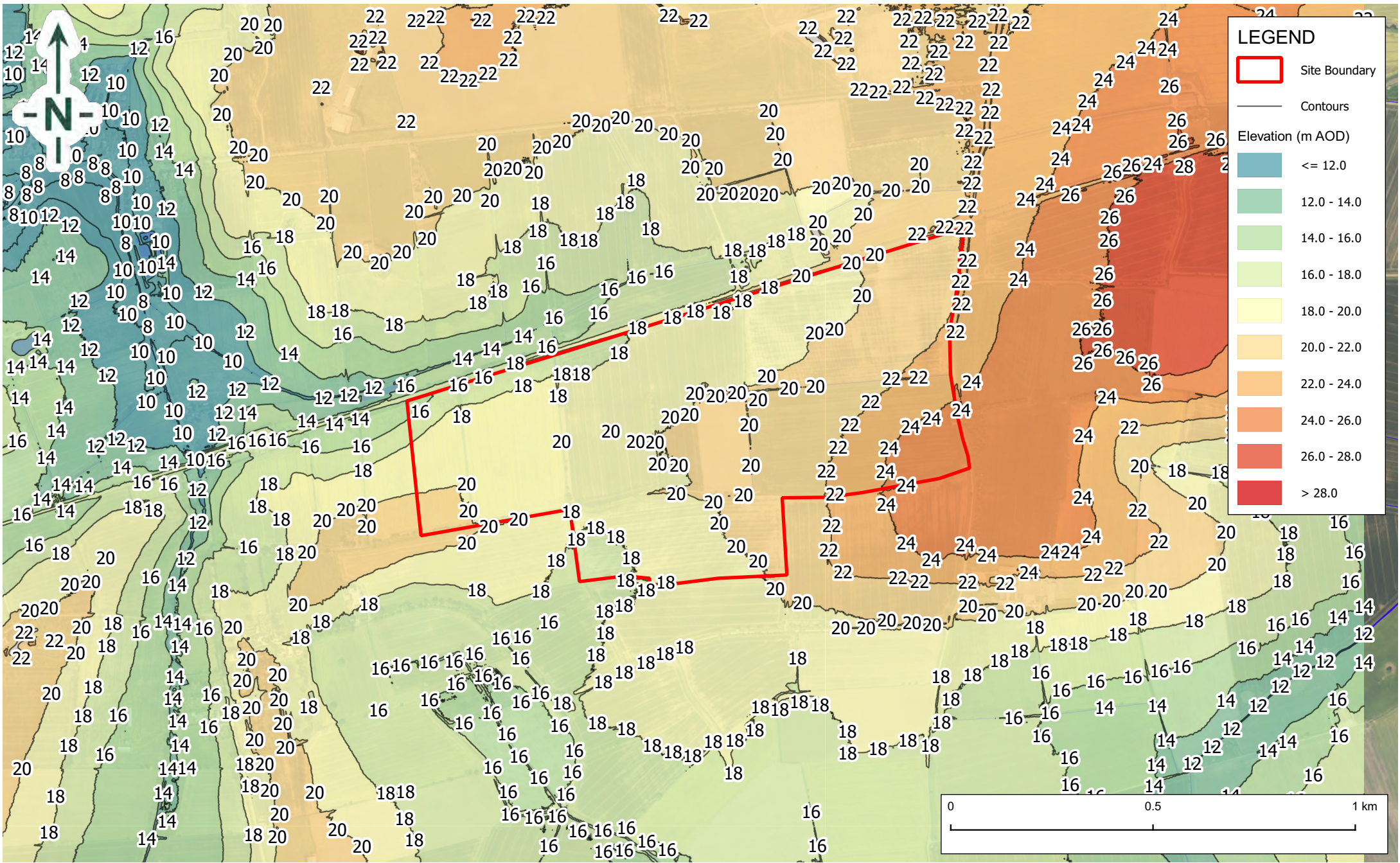
Surface water risk to the north-east and south-western extents.

Next Steps

In order to fully inform the masterplanning and planning submission process the following works will be completed prior to completion of the Flood Risk Assessments:

- ▲ Obtain available EA flood data for the land drains;
- ▲ Determine Flood Depths / Levels and velocities where possible, based on the available information;
- ▲ Consult Stakeholders where necessary regarding the acceptable depth of flooding for equipment to be placed within.

Annex A – LiDAR Plan



LEGEND

- Site Boundary
- Contours

Elevation (m AOD)

- <= 12.0
- 12.0 - 14.0
- 14.0 - 16.0
- 16.0 - 18.0
- 18.0 - 20.0
- 20.0 - 22.0
- 22.0 - 24.0
- 24.0 - 26.0
- 26.0 - 28.0
- > 28.0

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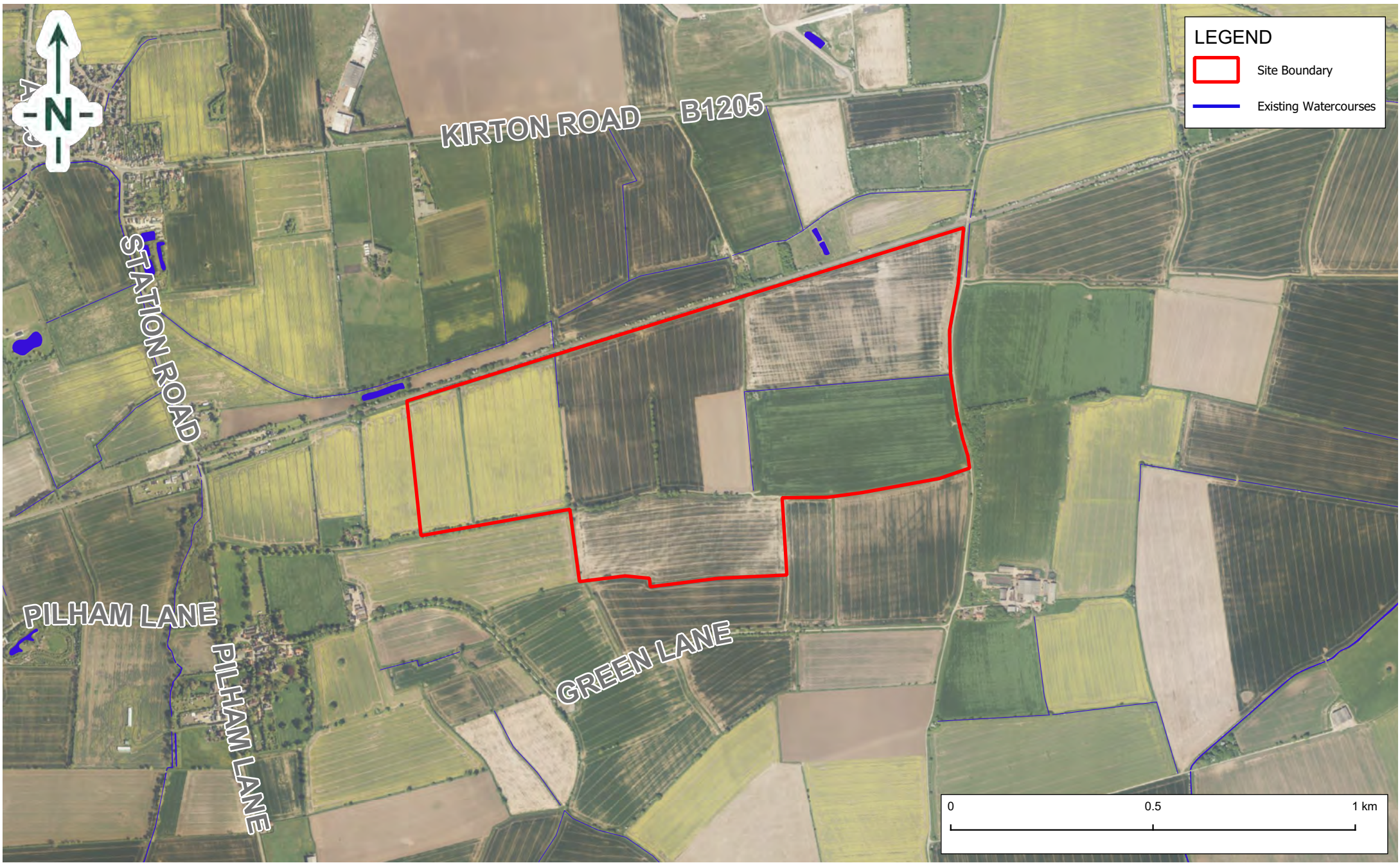


TITLE:
LiDAR Plan
 Cottam 3b – Cottam Solar Project

DRAWN BY: LA	SCALE (@A4): 1:12,000
CHECKED BY: JR	REVISION: -
DATE: 19 January 2022	

PROJECT NO:
21-1088.01

Annex B – Overview



LEGEND

- Site Boundary
- Existing Watercourses

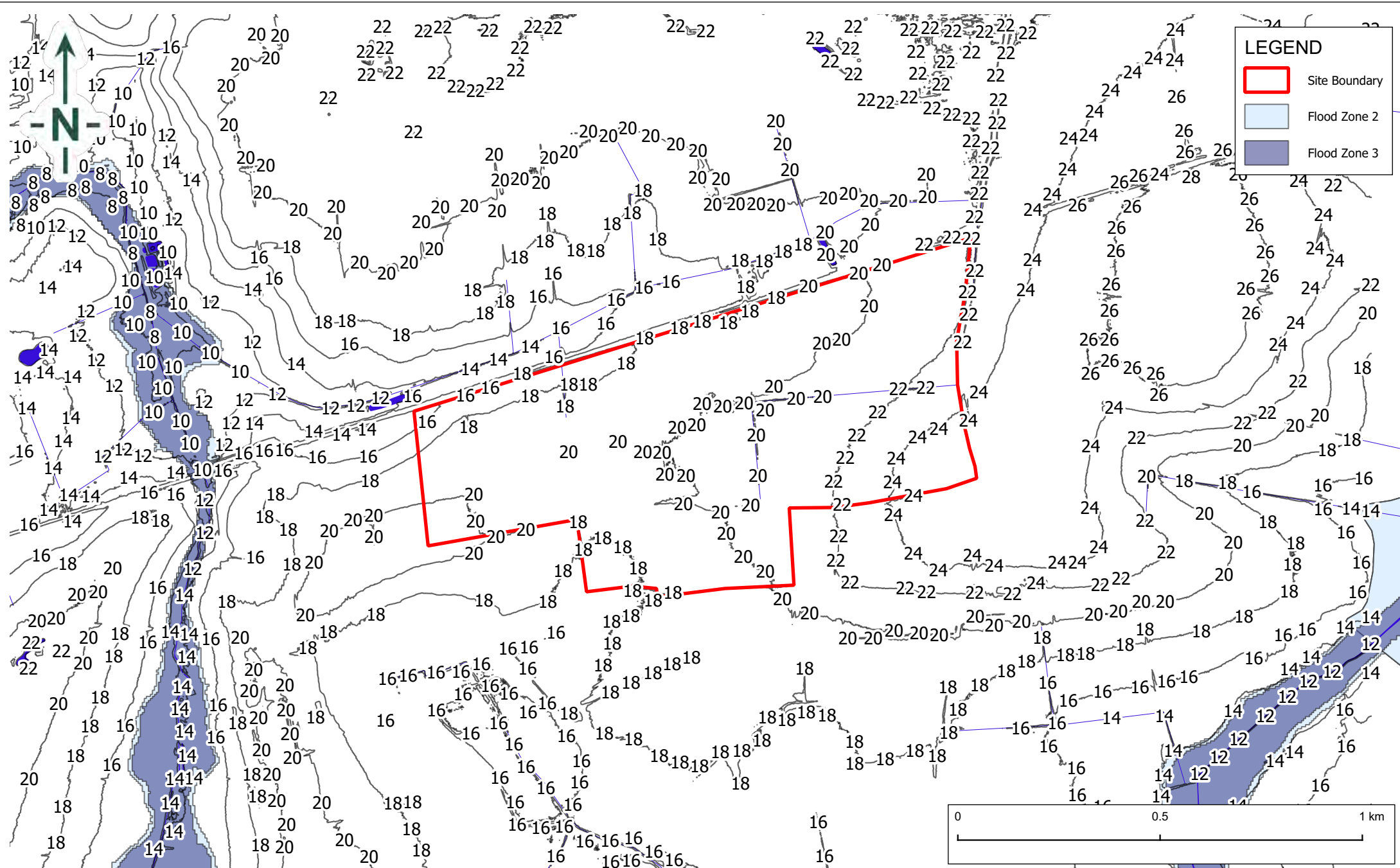
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Annex C – EA Flood Map for Planning



LEGEND

- Site Boundary
- Flood Zone 2
- Flood Zone 3

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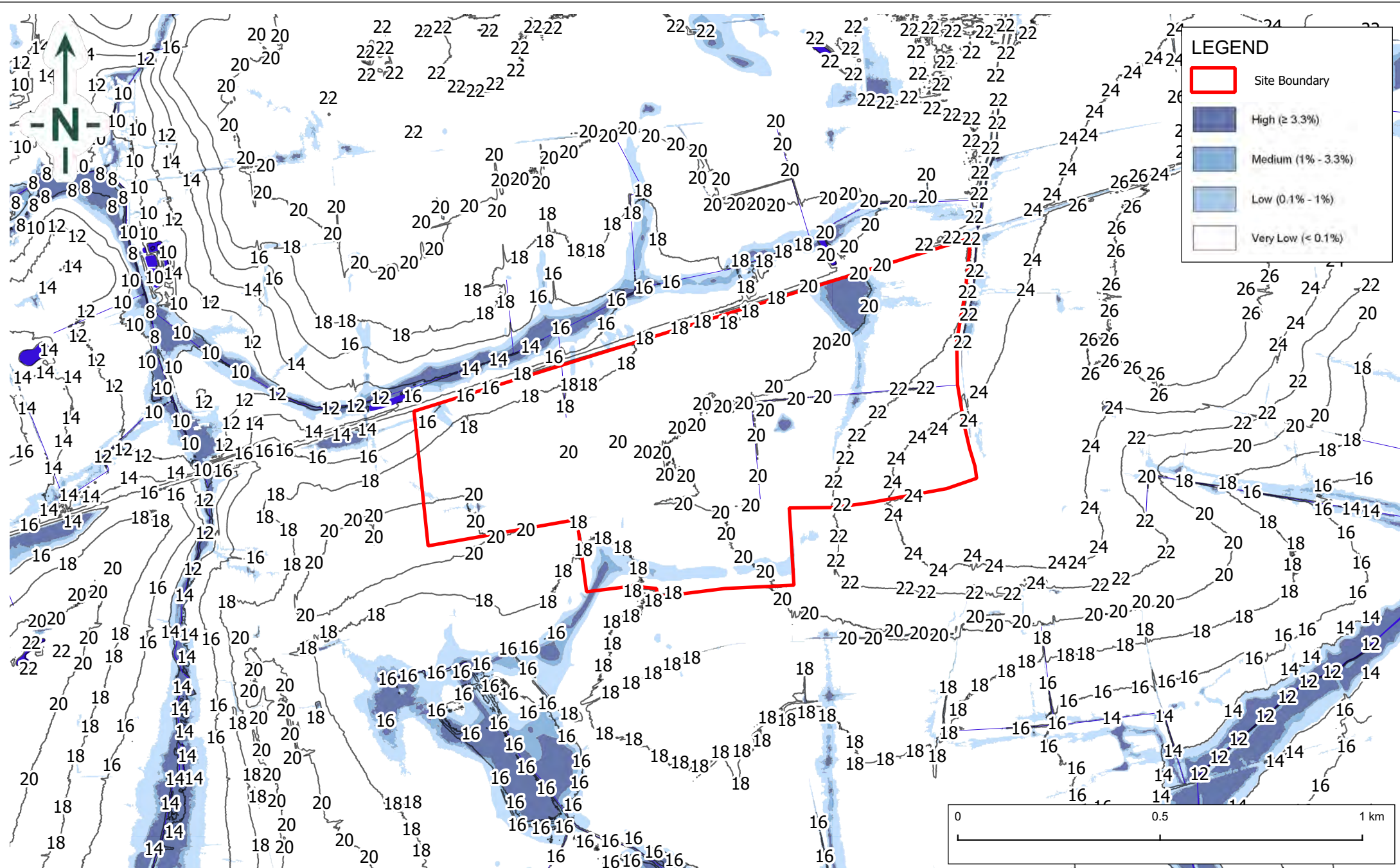


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EA Flood Map for Planning
Cottam 3b – Cottam Solar Project

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Annex D – EA Long Term Flood Risk Map (Surface Water)



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TITLE:
Risk of Flooding from Surface Water
Cottam 3b – Cottam Solar Project

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CHECKED BY: JR	REVISION: -
DATE: 19 January 2022	

PROJECT NO: 21-1088.01
