Proposed Solar Farm – Carlton, Barnsley

Premier Foods Plc

Flood Risk Assessment

MA11724/FRA/R02

September 2023

Millward
consulting engineers

REVISION

Reference	Revision	Author	Date
MA11724-FRA-R01	Initial Issue	JMcK	29 August 2023
MA11724-FRA-R02	Initial Issue for Planning, surface water management plan section added, minor report reference amendments.	JMcK	01 September 2023

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I2010-000-01G Planning Drawing

I2010-000-02 Mounting Elevations

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Environment Agency Flood Map For Planning

1. INTRODUCTION

1.1 Millward have been commissioned to undertake a Flood Risk Assessment for the proposed Solar Farm development at the Premier Foods site in Carlton, Barnsley S71 3HF.

1.2 The development proposals are for a solar farm on land owned by the applicant (Premier Foods Plc). The overall site area is 2.8Ha as shown on the plan I2010-000-01G contained within Appendix A.

1.3 This FRA is undertaken in accordance with the National Planning Policy Framework (NPPF) and the flood risk information from the Environment Agency.

1.4 This FRA discusses and provides both a qualitative assessment and quantitative assessment for the development in terms of flood risk, future flood risk over the anticipated lifetime of the development and reference to the sequential and exception test using a precautionary and risk based approach. This report also includes a surface water management plan which is covered in Chapter 7.

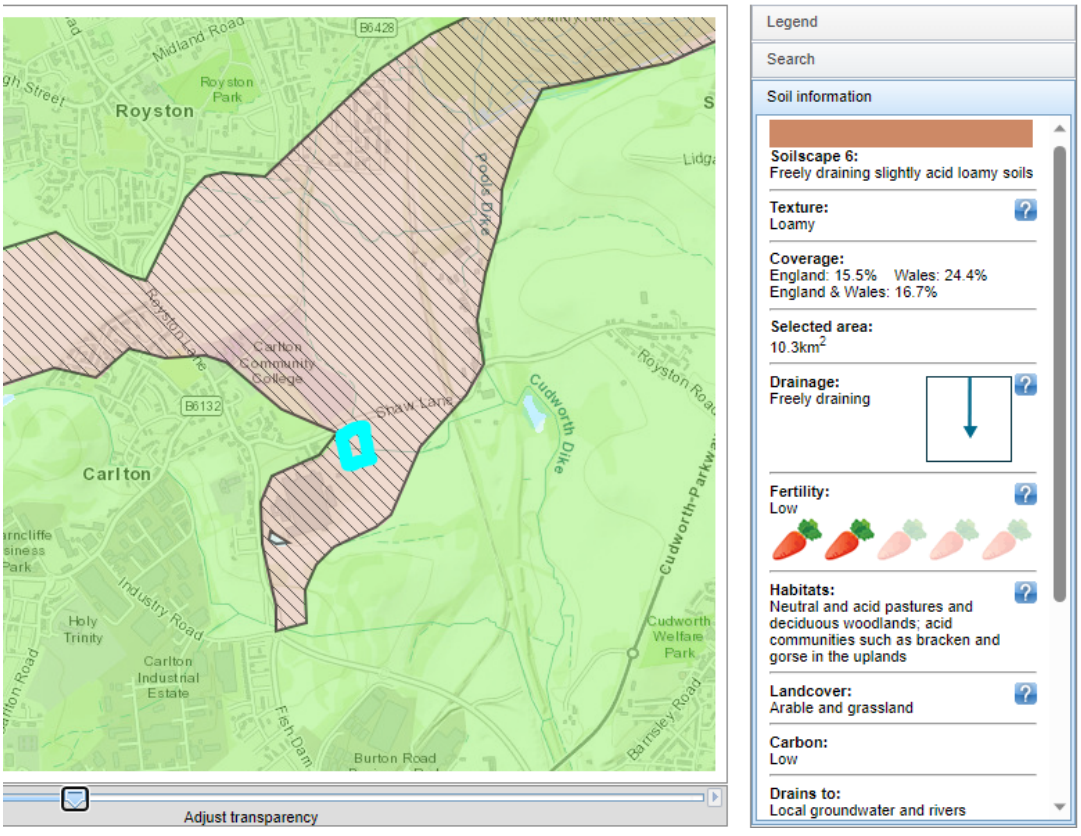
2 THE SITE

2.1 The site is located to the southern side of Shaw Lane, to the East of the existing Premier Foods factory. Access to the Solar Farm would be through the existing factory site. There is no proposed access from Shaw Lane.

2.2 Currently the site is Greenfield and therefore has no formal drainage.

2.3 The proposals include for installation of PV panels as per drawings I2010-000-01G and I2010-000-02 contained within Appendix A.

2.4 From soil maps the prevailing soil type within this area is Freely draining loamy soils for the area of the proposed solar farm.

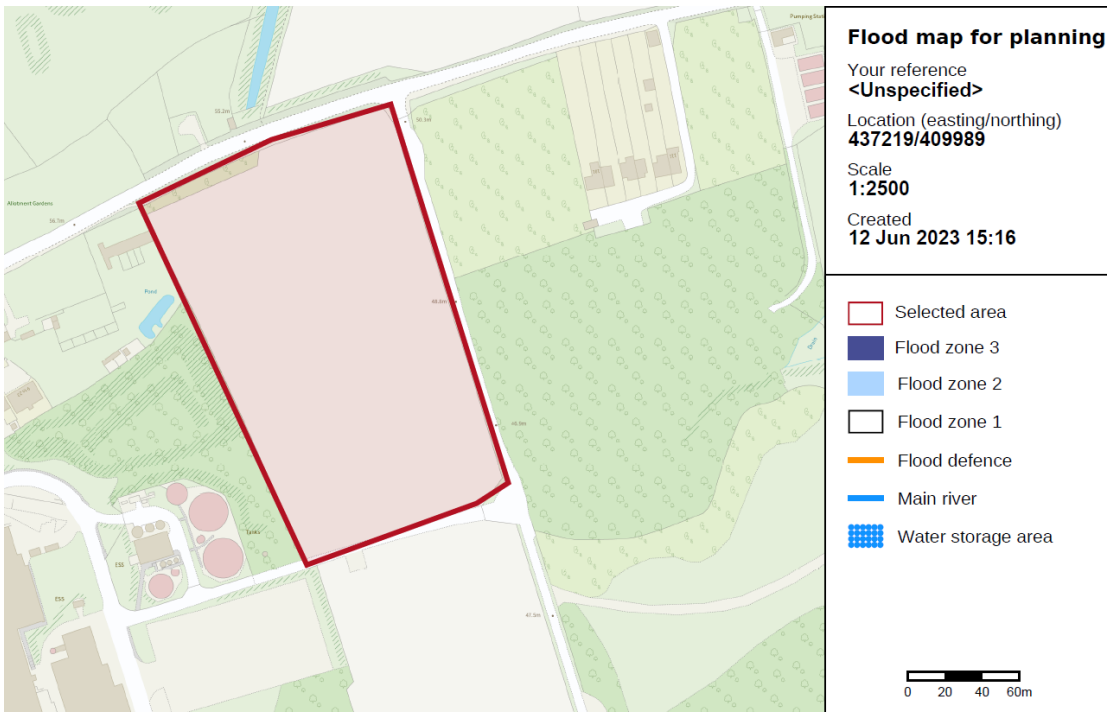


2.5 This suggests any rainfall run-off from the PV panels should discharge via natural infiltration.

3 CONSULTATIONS

3.1 Environment Agency

3.1.1 The Environment Agency national flood risk maps available on their web site have been interrogated firstly to define in terms of planning what flood zone the site is contained within.



3.1.2 The site is wholly contained within Flood Zone 1, which has less than 1 in 1000 chance of flooding in any one year and is considered to be a LOW risk of flooding. Flood Zone 1 is the lowest flood zone.

3.1.3 Further consultation with the Environment Agency is therefore not required.

4 SEQUENTIAL AND EXCEPTION TESTS

4.1 Sequential Test

4.1.1 The development site is within Flood Zone 1, which is the lowest designated Flood Zone. Therefore, sequentially, there are not any other site that are in a lower flood risk zone and the Sequential Test is not required.

4.2 Exception Test

4.2.1 As the development site is within Flood Zone 1, there is no requirement for the Exception Test to be applied.

5 PROPOSED DEVELOPMENT

Summary of proposals

5.1 The proposals include for installation of PV panels as per drawings I2010-000-01G and I2010-000-02 contained within Appendix A.

5.2 The panels are erected within the field area in rows across the fields, mounted on frames which are mounted via posts which are founded in the ground.

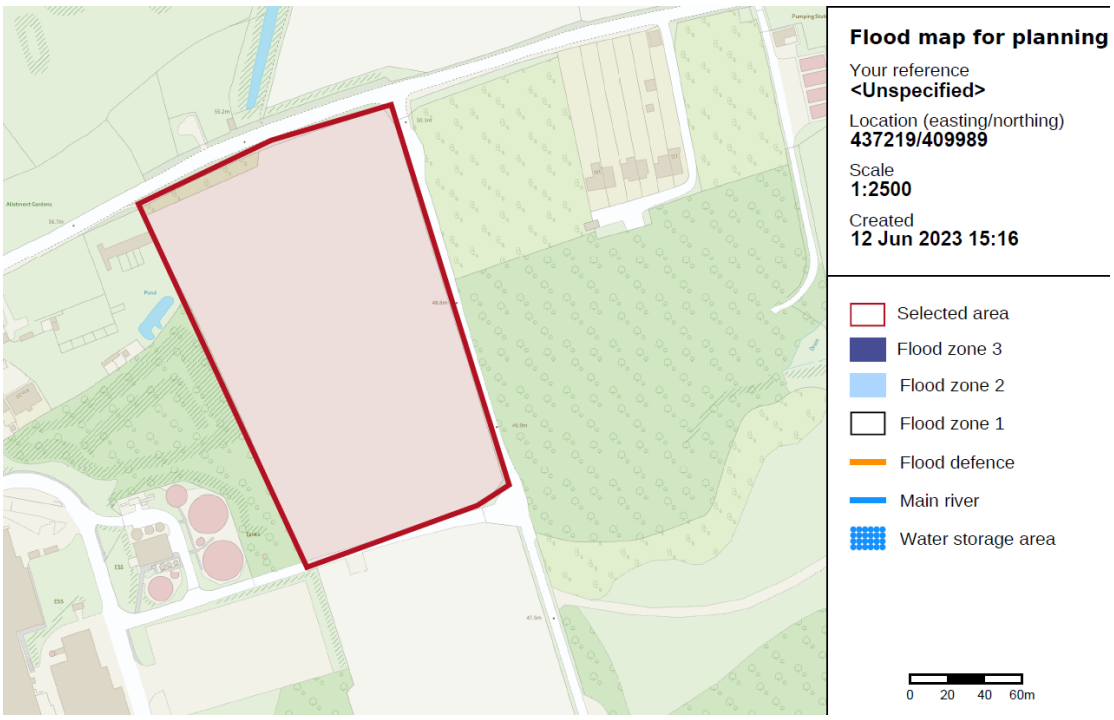
5.3 The PV panels are mounted at an angle of 20 degrees from the horizontal plain and are 3.5m apart between the rows. Each row of panels is separated by circa 3.5m to prevent inter panel shading. The panels are proposed to be mounted circa 800mm from the ground at the lower side and circa 2500mm from the ground on the higher side.

5.4 The substation area is located to the south western corner of the site boundary and access obtained directly from the bakery's existing entrance on Fish Dam Lane. The sub station will not be enclosed in a building, it will be exposed and contained within a secure compound bounded by 2.4m mesh weld fence.

6 FLOOD RISK

6.1 Flooding From Watercourses

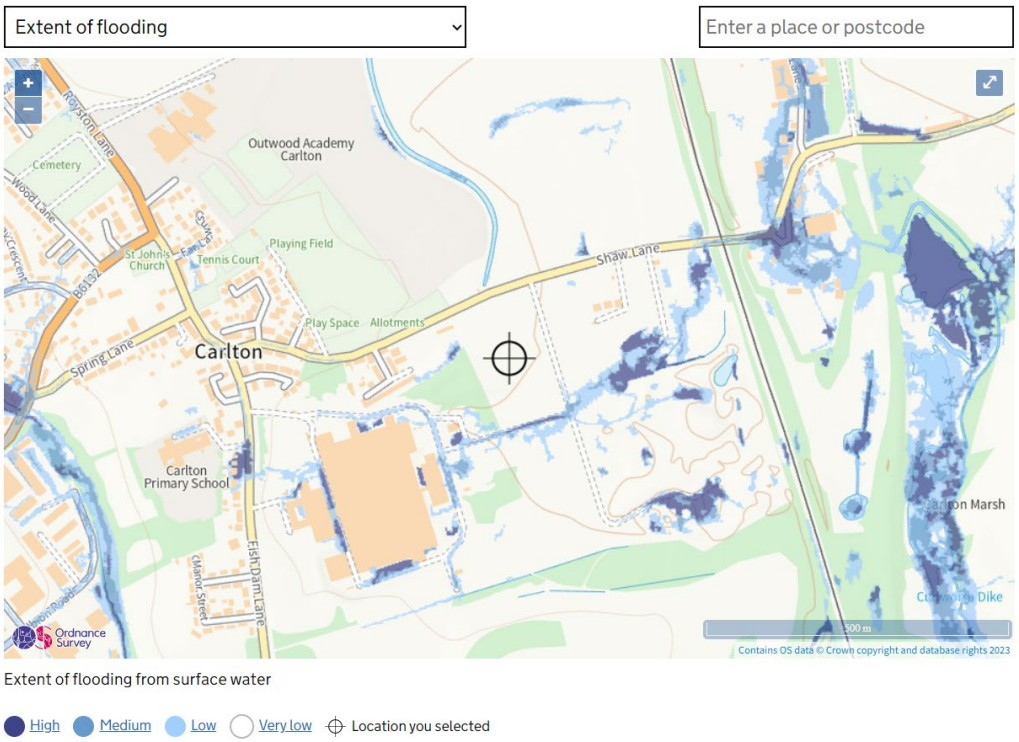
6.1.1 The development site is contained wholly within Flood Zone 1 which has less than a 1 in 1000 chance of flooding from Watercourses in any one year. It is formally classed as low.



6.1.2 Therefore, the risk of flooding from this source is **LOW**.

6.2 Flooding from Surface Water

6.2.1 The below mapping from the Environment Agency website shows the risk of flooding from surface water.



6.2.2 As can be seen there is a very small, constrained area to the southern boundary which is likely to be a field drain.

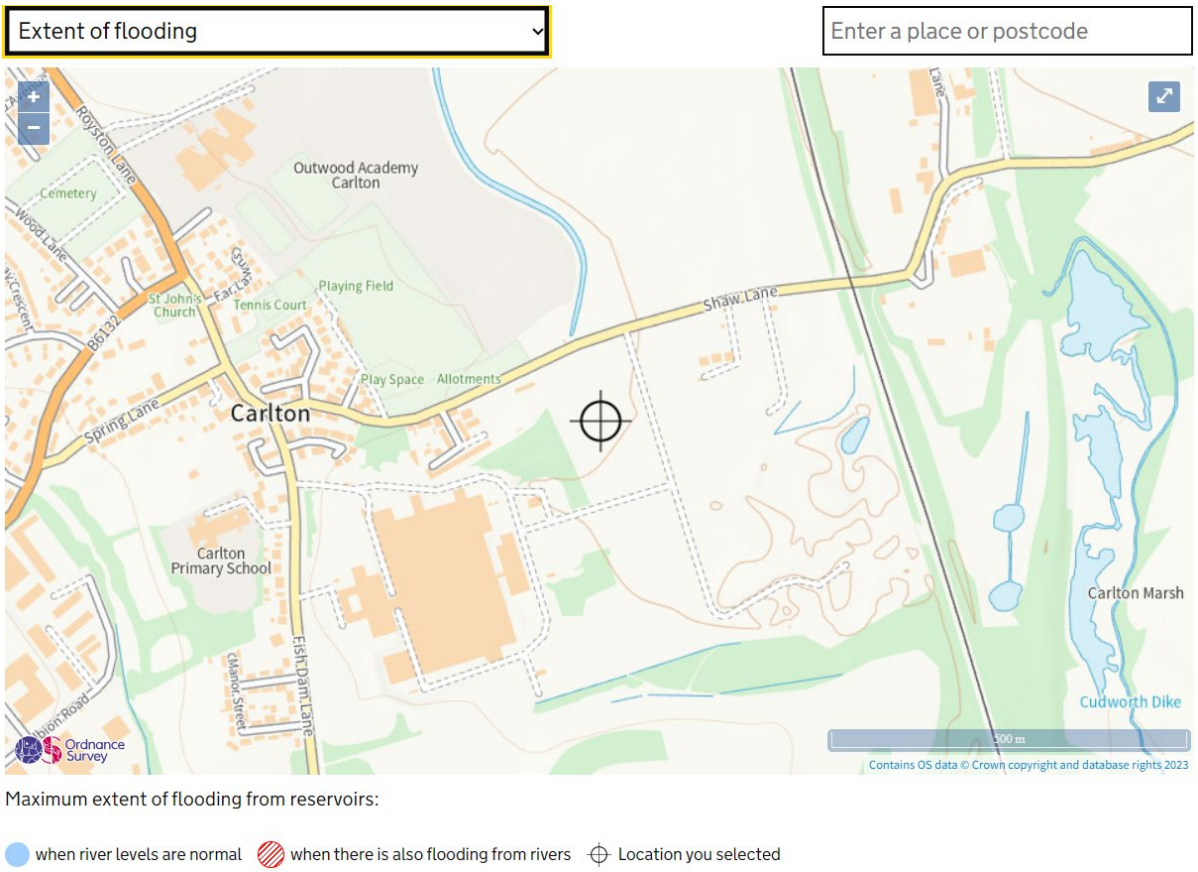
6.2.3 There is no anticipated flood risk from this source across the rest of the development area.

6.2.4 The substation area is located to the south western corner of the site which is close to the flood risk from this source. Chapter 7 outlines a recommended mitigation measure to remove any potential flood risk to the substation area from this source.

6.2.5 Overall, the residual risk of flooding from this source is considered **LOW**.

6.3 Flooding From Infrastructure Failure

6.3.1 The extract map below from the Environment Agency website confirms that the site is not within an area deemed at risk of reservoir flooding.



6.3.2 Therefore, the residual risk of flooding from this source is **LOW**.

6.4 Flooding From Groundwater

6.4.1 Reference to Soilscape online mapping indicates free draining soils within the area of the development.

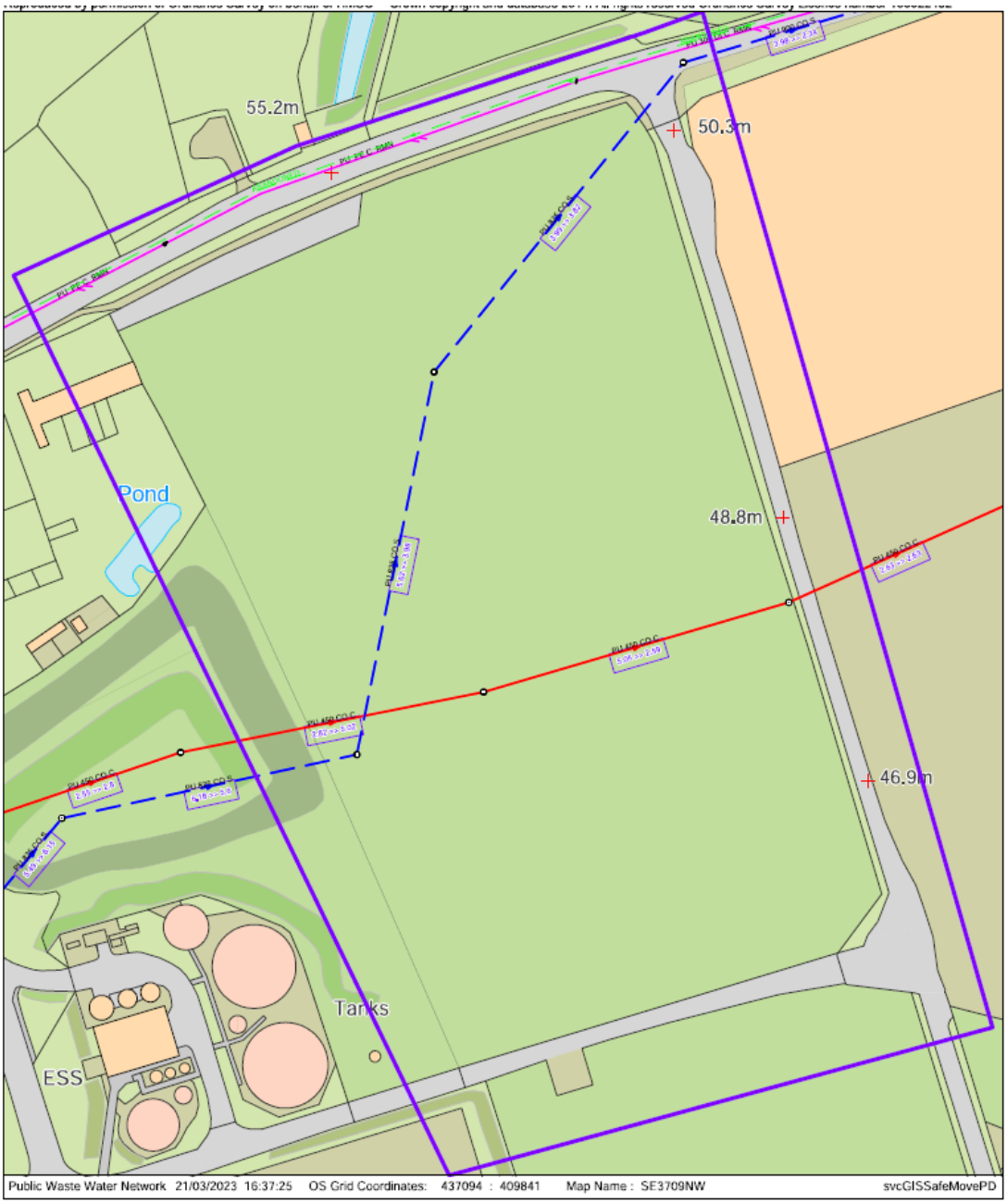
6.4.2 From the BGS boreholes mapping and records for boreholes within the general area of the site there is no records to suggest a high water table in this area.

6.4.3 The site is not within a groundwater source protection zone.

6.4.4 Overall, the risk of groundwater flooding at the site location is deemed to be **LOW**.

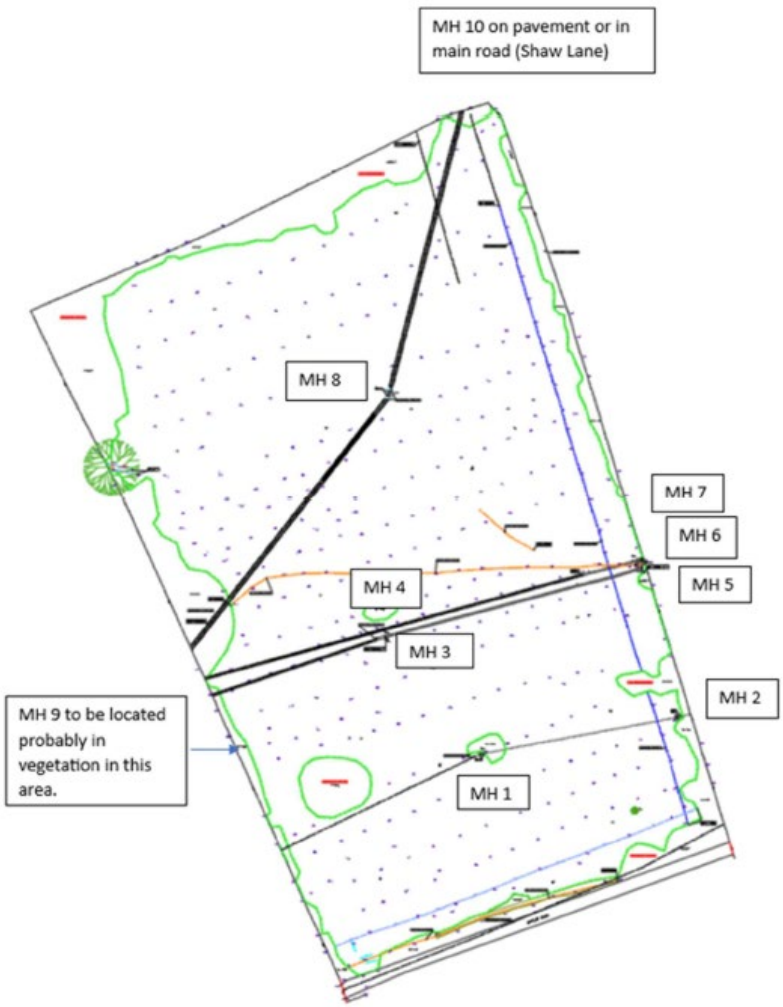
6.5 Flooding From Sewers

6.5.1 The site has existing sewers crossing the site. There is an 825mm diameter surface water sewer crossing the site as shown below at a depth below ground level of between 5.62m and 3.82m.



6.5.2 There is also a 450mm diameter combined sewer crossing the site, west to east with the depth of the sewer between 5.05m and 2.29m in depth.

6.5.3 There is also a private effluent pipe in use from the Premier Foods site to the west (MH1 and MH2 on the below plan extract).



Manhole 1 & 2 in use (Premier Foods effluent sewer)

Manhole 3 & 5 not in use

Manhole 4, 6 & 7 in use (Yorkshire Water sewer)

Manhole 8 in use (Yorkshire Water surface water drain)

6.5.4 If these sewers were to surcharge and flood, flows would be within the site. However, flows and depth of flooding would only be shallow. The equipment installed is circa 800mm high and therefore not at risk of flooding from this source.

6.5.5 The flow routes across the site are generally in a south easterly direction, so if these sewers were to flood the flows are away from the sub-station as the flows from the manholes would be in a south east direction.

6.5.6 Overall, the risk of sewer flooding at the site location is deemed to be **LOW**.

6.6 Off-Site Flood Risks – Development Impact

6.6.1 The development introduces solar panels as discussed in Chapter 5.

6.6.2 The introduction of these solar panels will not alter the existing topography of the site and will not ultimately change the existing drainage characteristics of the field even without any specific SuDS measures.

6.6.3 The introduction of the proposed solar panels in the field will lead to the interception of water before it hits the ground level. Circa 30-40% of the site area will be overlain by solar panels. Typical solar arrays have gaps between the smaller panels within each array which allows water that is intercepted to flow off the edges and through the gaps and onto the ground in multiple locations in each array. This, overall is not really creating an impact or concentration of water flow which is in any way significant as it allows the water to flow off and hit the ground pretty much at source.

6.6.4 The pitch of the solar panels also mean that the velocity of water is low and the water drips off the edge (rather than a sheet flow) onto the vegetated surface.

6.6.5 The vegetated ground below the arrays ensure that the risk of erosion from any of the run off from the arrays is minimal and with the soils freely draining, the risk of ponding is minimal also.

6.6.6 There are no access tracks or buildings proposed under this proposed scheme. Therefore, there are no new impermeable areas introduced that require any form of drainage mitigation.

7 MITIGATION MEASURES

7.1 Essential Mitigation Measures

7.1.1 As the site is within Flood Zone 1 and risk from other sources of flooding are low, then there are no essential mitigation measures to apply.

7.2 Recommended Mitigation Measures

7.2.1 As the sub-station compound is located to the south west corner of the site adjacent to a field ditch, the recommended mitigation measure is that the finished level of any substation equipment in this area be 150mm above the existing ground level.

7.3 Surface Water Management Plan

7.3.1 The proposed Solar Farm does not propose any impermeable roof areas, access roads or any other infrastructure that requires any proposed drainage infrastructure.

7.3.2 The panels, as discussed in Chapter 6 section 6.6 will not alter the existing topography of the field and will not ultimately change the existing drainage characteristics of the field even without any specific SuDS measures.

7.3.3 The panels essentially let water flow off without a concentration of water flow which is in any way significant as it allows the water to flow off and hit the ground pretty much at source.

7.3.4 The proposed surface water management plan for this site consists of the following measures;

- Post installation check of the site to ensue that existing vegetation coverage on the field has been maintained and any exposed areas of sub soil are suitable reinstated / seeded as required.

- Annual visual check to ensure that there are no instances of any exposed areas of subsoil with out grass / vegetation. Any areas to be reinstated / seeded as required.

8 CONCLUSIONS

8.1 This Flood Risk Assessment serves to review, assess and quantify (where applicable) the sources, or any potential flooding, the pathways of this flooding and potential receptors within the vicinity of the site.

8.2 The assessment of flood risk undertaken for this development confirms that the risk of flooding is **LOW** from all sources of flooding.

8.3 The recommended mitigation measures will provide further protection to the development and reduce any residual risk (however low) as far as practicable. It is recommended that compliance with the recommendations of this FRA are conditioned as part of any planning permission.

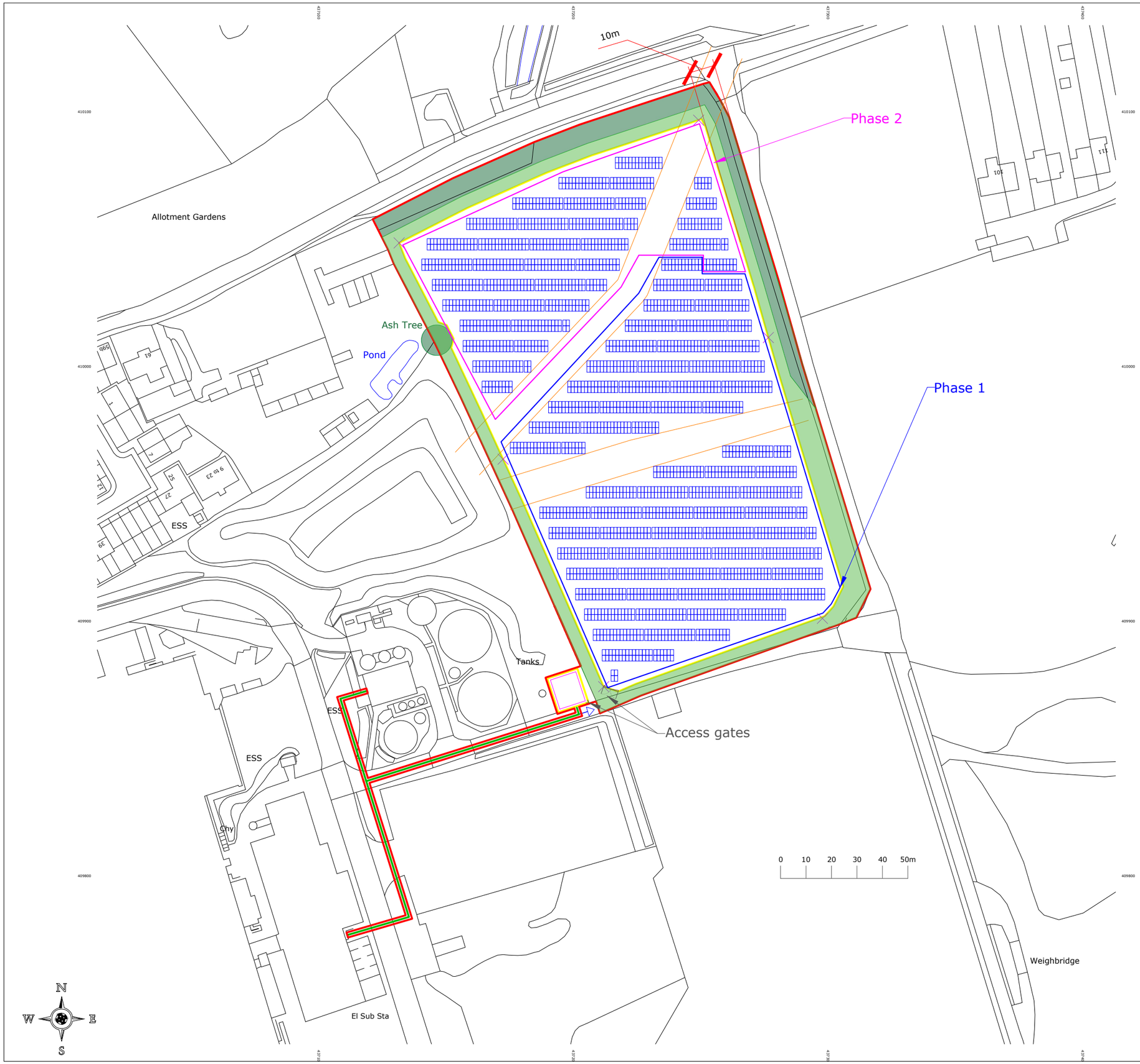
8.4 The proposed surface water management plan in Chapter 7 section 7.3 confirms the requirements to ensure that there is no detrimental effect on the current hydrogeological function of the site area due to the proposed solar farm.

8.5 This assessment concludes that the site is suitable for the Solar Farm proposal without unacceptable risk of flooding from all sources to the site itself and elsewhere, as long as the recommended mitigation measures are implemented. The development would cause only negligible effects on the existing greenfield nature of the site.

Appendix A – Drawings

I2010-000-01G Planning Drawing

I2010-000-02 Mounting Elevations



DRAWING LEGEND

1. System Details
   - 1.1. Installed Power: 1992.58 kWp
   - 1.2. Installed Modules: 2974
   - 1.3. Module Power: 670Wp each
   - 1.4. Module Inclination: 20°
   - 1.5. Mounting System: Hi-tech

PV Modules: STP670S-D66/Wmh
Power: 670Wp
Dimensions: 2384x1303x35mm

Landscape screening / biodiversity enhancement zone

H2A - Hedgerow (priority habitat)

Application Site Boundary

2.4m Mesh weld fencing in colour: moss green

Substation area (transformer enclosed within 2.4m green mesh weld fencing with single access gate)

Existing secure access retained

Double leaf gate - 2 x 3m wide green mesh gates with green frame

6m high CCTV poles

Easement zone due to pipes

Cable Routes

Rev	Description	Dwn	Chck	Date
G	Revised gate position	SA	JP	06/09/2023
F	Orange MH omitted	CR	FB	29/08/2023
E	Phase 2 boundary amended	FB	CR	24/08/2023
D	Changed type of fence	SA	CR	22/08/2023
C	Hatched green area redone	SA	CR	16/08/2023
B	Revised layout with easement zones	SA	CR	14/08/2023
A	Revised Biodiversity boundary	SA	CR	20/06/2023

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Project Number: I2010

Project Name: Premier Foods

Drawing By: Sara Abdel Ahad

Scale: 1:1500 @ A3

Checked By: Cathy Ross

Date: 15/06/2023

Drawing Name: Planning PV layout

Drawing No: I2010-000-01

Rev: G

Appendix B – Consultations

Environment Agency Flood Map For Planning

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**437219/409989**	**12 Jun 2023 15:16**

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)

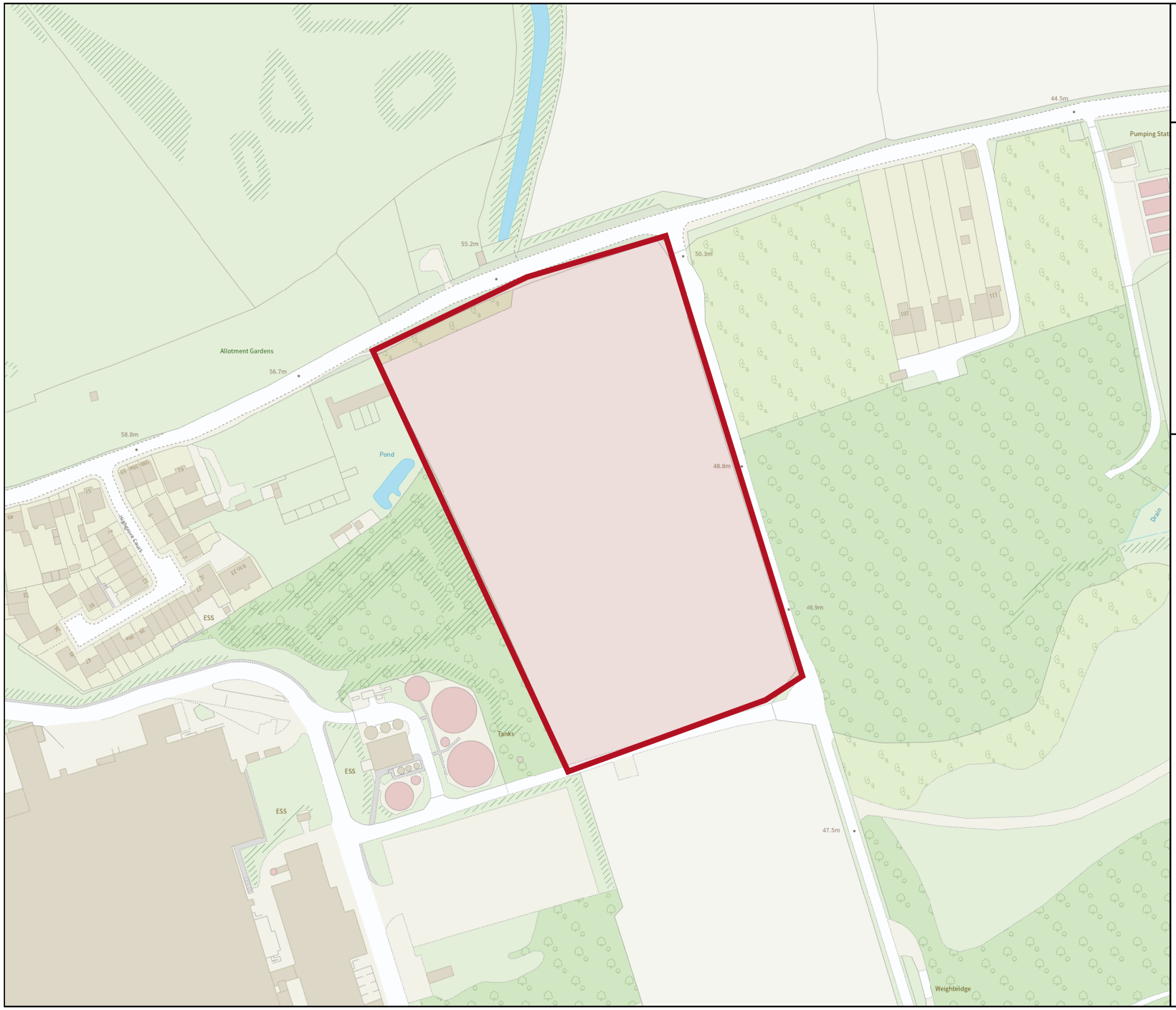
Notes

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.

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Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
437219/409989

Scale
1:2500

Created
12 Jun 2023 15:16

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

0 20 40 60m

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