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LIGHTSOURCE RENEWABLE ENERGY LTD

Trench Farm Solar, Wrexham

Flood Consequence Assessment

June 2014

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DATE ISSUED: June 2014
JOB NUMBER: PE10328
REPORT NUMBER: RPT-002
CLIENT'S REFERENCE:

LIGHTSOURCE RENEWABLE ENERGY LTD

Trench Farm Solar, Wrexham

Flood Consequence Assessment**PREPARED BY:**

S Riley Associate Director

APPROVED BY:

P Evans Technical Director

Two handwritten signatures in blue ink. The top signature is for S Riley, and the bottom signature is for P Evans. Both are written over horizontal lines.

Document Record

Issue No.	Date	Details
1	25 June 2014	Draft for Client comment
2	26 June 2014	Final Version Issued

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ENERGY AND CLIMATE CHANGE
ENVIRONMENT AND SUSTAINABILITY
INFRASTRUCTURE AND UTILITIES
LAND AND PROPERTY
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WASTE RESOURCE MANAGEMENT

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APPENDICES

Appendix	Flood Maps
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DRAWINGS

Drawing No	Title	Scale
PE10328-001	Site Location Plan	1:50,000 (A4)
TCH_01	Proposed Layout	1: 5,000 (A3)

1 INTRODUCTION

1.1 Instructions

1.1.1 This flood consequence assessment report (FCA) has been prepared in accordance with instructions from Lightsource Renewable Energy Ltd.

1.1.2 The FCA is intended to support a planning application to be submitted to Wrexham County Borough Council.

1.2 Background Information

Flood Consequence Assessment

1.2.1 In 2004 the Welsh Assembly Government published Planning Policy Wales Technical Advice Note 15 (TAN15), which explains how flood risk should be taken into consideration during the planning and development process. Figure 1 of TAN15, reproduced below, defines the flood zones used within the Welsh Planning Policy and indicates the planning requirements for sites in each zone.

Figure 1: Flood Zones		
Description of Zone		Use within the precautionary framework
Considered to be at little or no risk of fluvial or tidal/ coastal flooding	A	Used to indicate that justification test is not applicable and no need to consider flood risk further
Areas known to have been flooded in the past evidenced by sedimentary deposits	B	Used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further
Based on the Environment Agency Extreme flood outline, equal to or greater than 0.1% chance of flooding (river, tidal or coastal),	C	Used to indicate that flooding issues should be considered as an integral part of decision making by the application of the justification test including assessment of consequences.

Areas of the floodplain which are developed and served by significant infrastructure, including flood defences	C1	Used to indicate that development can take place subject to application of justification test, including acceptability of consequences.
Areas within the floodplain without significant flood defence infrastructure	C2	Used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

- 1.2.2 The Welsh Assembly Government has produced Development Advice Maps (DAMs) to TAN15 specifications. These maps indicate the level of flood risk across Wales (i.e. Zones A, B, C, C1 and C2 as defined in TAN15).

Environment Agency Risk of Flooding from Surface Water Map

- 1.2.3 The Environment Agency (EA) *Risk of Flooding from Surface Water* map shows potential overland flow routes resulting from rainstorm events.

Wrexham County Borough Council Preliminary Flood Risk Assessment

- 1.2.4 A Preliminary Flood Risk Assessment (PFRA) is a high level screening exercise to identify areas where there is significant flood risk from local sources, namely Ordinary Watercourses, surface water runoff and groundwater. It does not directly consider flooding from main rivers or from sewers. PFRAs have been produced by Lead Local Flood Authorities (LLFAs) to fulfil statutory requirements in the Flood Risk Regulations 2009.
- 1.2.5 In this case, the LLFA is Wrexham County Borough Council and its Preliminary Assessment Report was published in June 2011.

1.3 Data Sources

- 1.3.1 The TAN15 Development Advice Map and the EA website *Risk of Flooding from Surface Water* map are attached at the Appendix.

2 SITE INFORMATION

2.1 Existing Site

- 2.1.1 The site is located south-east of Wrexham, about 0.5 km inside the Welsh border, as shown on Drawing No. PE10328-001 *Site Location Plan*. It lies between Knolton on the A528 to the south and Lightwood Green on the A539 to the north.
- 2.1.2 The site consists of four small fields containing a motocross type track and three larger arable fields, with a combined area of about 22 ha. The site is bordered by arable fields to the north and south, woodland to the west and a disused railway line to the east. Trench Farm, with its access from the A528 via Red Hall lane, lies to the south. A streamcourse with wooded banks crosses the site from east to west and there are several small ponds with vegetation around them scattered across the site.
- 2.1.3 The southern part of the site is located on gently sloping ground. These fields slope from an elevation of +75m AOD in the south to +60m AOD at the streamcourse in the north, a uniform gradient of 1 in 35. Further north of the streamcourse, the ground is fairly level.

2.2 Watercourses and Local Drainage

- 2.2.1 The nearest watercourse is located in the woodland to the west which picks up the flow from the streamcourse across the site and flows towards the north eventually joining the River Dee, a Main River, near Bangor-on-Dee.
- 2.2.2 The disused railway line to the east is located in cutting which fills up with surface water to form a lake.
- 2.2.3 There are at least six small ponds distributed around the site.

2.3 Geology

- 2.3.1 The geology comprises Till superficial deposits (Diamicton) overlying the Chester Pebble Beds Sandstone Formation.

2.4 Installation Proposals

- 2.4.1 It is proposed to install an array of solar PV panels with a generating capacity of 7.5 MW, as shown on Drawing No TCH_01 *Proposed Layout*. The array will be four panels high and arranged in rows.
- 2.4.2 There will be several small buildings and plant housings with impermeable roofs constructed on the site, as follows:

- Inverter Stations 6 No
- Field Transformers 3 No
- Client Side Substation 1 No
- Communications Building 1 No
- Storage Shed 1 No
- DNO substation 1 No
- DNO meter 1 No

- 2.4.3 The estimated total impermeable area of these structures is about 300 m² which constitutes 0.2% of the total site area of 22 ha.
- 2.4.4 Access will be gained via the existing track serving Trench Farm from Red Hall Lane at the southern boundary. There will be about 1 km of stone surfaced access tracks within the site, which, at nominally 3m wide, comprises a further 3,000 m² of impermeable area, equivalent to 1.3% of the total site area. The access roads will consist of permeable materials and pipe culverts will be installed below them where necessary to permit the passage of surface water.
- 2.4.5 The dimensions and spacing of the solar panels and their supporting structures are shown in the insets on Drawing No TCH_01 *Proposed Layout*. The panel assemblies will be 4m across and set at an angle of 20 degrees such that they occupy a horizontal width of 3.8m wide and set out in rows at 8.25m centres, i.e. with a 4.45m space between them. Consequently, the panels, will occupy about 50% of the site area.
- 2.4.6 Each row will consist of four individual lines of panels, separated horizontally by 25mm wide gaps through which rain water will be able to drain. This means that rainwater from the panels will run off at 1m intervals down the 4m slope length. The panels will be supported on metal posts driven into the ground without any form of concrete base.
- 2.4.7 The lower edge of the panels will be set at 0.6m above ground level making the upper edge 2.3m above ground level.
- 2.4.8 Along the boundaries and where there are ponds and a streamcourse crossing the site, the solar panels will be set back at least 8m from field edge vegetation. Additional stand-off space will be allowed where necessary.

2.4.9 Following commissioning of the project the land between and beneath the solar panels will be established with a thick sward of tussocky grass and used for grazing.

3 FLOODING INFORMATION

3.1 Flood History

- 3.1.1 The land where the panels will be located is situated on high land which is known not to flood.
- 3.1.2 The Wrexham County Borough Council Preliminary Assessment Report does not contain any records of flooding at the site.

3.2 Potential for Flooding

Fluvial Flooding

- 3.2.1 The site is located entirely within Flood Zone A on the TAN15 Development Advice Map and therefore is considered to be at little or no risk of fluvial flooding.

Flooding from Surface Water Runoff

- 3.2.2 The site comprises a series of fields which drain naturally by limited infiltration, transpiration and evaporation. Any surplus surface water runs off towards the streamcourses on the western boundary and across the site.
- 3.2.3 The EA *Risk of Flooding from Surface Water* map – see Appendix - shows a potential for overland flow near the streamcourses and along the old railway line.
- 3.2.4 The Wrexham County Borough Council Preliminary Assessment Report does not indicate any potential flooding at the site.
- 3.2.5 Although the proposed installation will introduce some impermeable roof and access road areas, these amount to only 3,300 m² which constitutes 1.5% of the total site area of 22 ha.

4 FLOOD RISK ASSESSMENT

4.1 Fluvial Flooding

- 4.1.1 The site is located entirely within Flood Zone A on the TAN15 Development Advice Map and therefore is considered to be at little or no risk of fluvial flooding. Consequently, a justification test is not applicable and there is no need to consider flood risk further.

4.2 Flooding from Surface Water Runoff

- 4.2.1 The site currently comprises about 22 ha of mainly arable land. The soil consists of Till superficial deposits (Diamicton) which has relatively low permeability and it is unlikely that rainfall will infiltrate to the ground in significant quantities. Therefore rainfall which is not absorbed by the topsoil and/or is taken up by the vegetation flows overland generally towards the streamcourses on the western boundary and across the site.
- 4.2.2 After development, a thick sward of tussocky grass will be grown over the entire site area, i.e. both beneath the panels (50% of the site area) and in the spaces between them (50% of the site area). This thick grass will retard runoff and promote water retention, transpiration and evaporation. It will be maintained in accordance with good soil husbandry practice and mown regularly or otherwise maintained by low intensity stock grazing. The ground will be inspected for damage at regular intervals with any eroded areas being repaired and temporarily protected until the grass becomes re-established.
- 4.2.3 As a result of the thick grass covering the whole site, the gradient of 1 in 35 is not regarded as significant from the point of exacerbating runoff.
- 4.2.4 All works will be designed in a way which will not impact upon the existing surface water drainage regime. Because the solar panels are supported on metal posts driven into the ground without any form of concrete base, they will not occupy any ground surface area and their presence will not affect the present character of the ground. Rain falling on the panels will run off onto the ground and disperse by a combination of infiltration, transpiration, evaporation and runoff, just as it does at present while falling directly onto the ground. Therefore, there will be no net increase in runoff reaching the site boundary.
- 4.2.5 Rainwater running off the panels will concentrate along four lines evenly spaced beneath the rows of panels. Any local erosion which might result from this trend will

be mitigated by the thick sward of tussocky grass and its regime of regular maintenance.

- 4.2.6 The proposed installation will introduce some impermeable roof areas amounting to about 300 m² which constitutes 0.2% of the total site area. The roof water from these structures will be led away via shallow swales to areas where it can disperse and infiltrate to the ground and not discharge to ditches or land drains, thereby not increasing the likelihood of flooding elsewhere.
- 4.2.7 There will also be some 3,000 m² of stone surfaced access roads introduced which constitutes 1.3% of the total site area. The use of permeable materials will minimise the runoff from these roads and pipe culverts will be installed below them so as not to impede natural flows. Any land drains disturbed during construction will be rerouted. Shallow swales will be formed alongside the roads and flows will be turned out to the adjacent land at regular intervals to mimic the natural land drainage. This is normal practice for similar developments in the open countryside where impacts will be minimal and considered suitable for use on this site.
- 4.2.8 No other engineered drainage features are proposed and it is considered unnecessary to install any on a precautionary basis. Should it prove difficult to satisfactorily execute the maintenance regime without positive drainage features, these can be installed where needed as part of the maintenance process.
- 4.2.9 Consequently, it is not considered that there will be any significant detrimental effect caused either within the site or to the surrounding area by future surface water runoff from the solar farm installation which will therefore be an appropriate land use with respect to the planning guidance in TAN15.

4.3 Boundary Access

- 4.3.1 Along the boundaries and where there are ponds and streamcourses, the solar panels will be set back at least 8m from the field edge vegetation.
- 4.3.2 Adequate space will be provided to allow for any potential overland surface water flow, particularly at the banks of the streamcourses.

4.4 Foul Sewerage

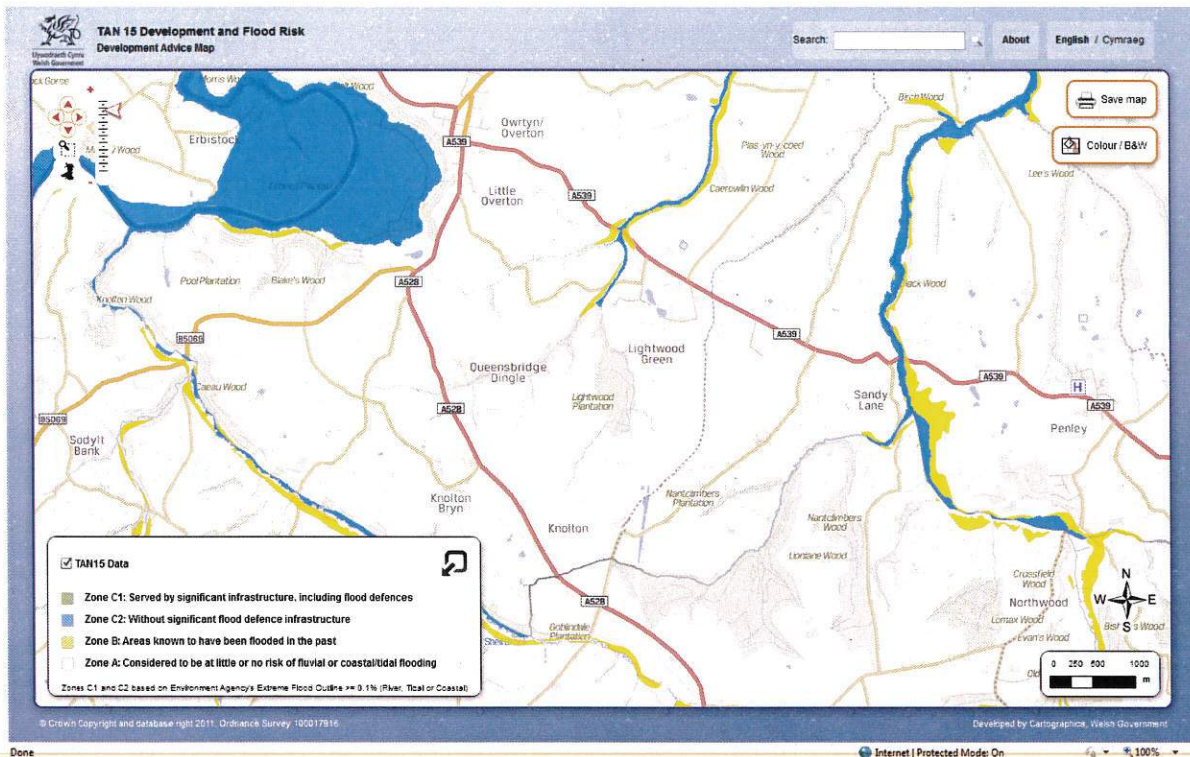
- 4.4.1 There will be no requirement for foul sewerage or sewage disposal at the site.

5 CONCLUSIONS

- 5.1.1 The site is entirely situated in Flood Zone A with no significant risk of fluvial flooding. The proposed renewable energy land use fully complies with the planning guidance.
- 5.1.2 As the panels will not create impermeable area and any risk of erosion due to concentration of runoff will be mitigated by the thick sward of tussocky grass and its maintenance regime, there will be no net increase in runoff reaching the site boundary. In this respect, the gradient of 1 in 35 is not regarded as significant.
- 5.1.3 The small increase in surface water runoff resulting from the substations and other roofs will be dealt with by dispersal to the surrounding land and not discharged to ditches or land drains, thereby not increasing the likelihood of flooding elsewhere.
- 5.1.4 Similarly, runoff from the stoned access roads will be reduced by the use of permeable materials and collected in shallow swales with regular turn out features to dissipate the flows across the site.
- 5.1.5 No other engineered drainage features will be necessary unless proven so by the maintenance regime, in which case they will be installed where needed.
- 5.1.6 Access around the boundaries and to the banks of the streamcourses will be maintained. Adequate space will be provided to allow for any potential overland surface water flow.
- 5.1.7 There will be no requirement for foul sewerage or sewage disposal at the site.
- 5.1.8 Overall, with regard to flood risk and drainage, the site is suitable for its proposed use as a solar farm.

A P P E N D I X

Flood Maps





Enter a postcode or place name:

Other topics for this area...

Risk of Flooding from Surface Water

[View other Interactive Maps](#)

Go

Risk of Flooding from Surface Water

Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

The shading on the map shows the risk of flooding from surface water in this particular area.

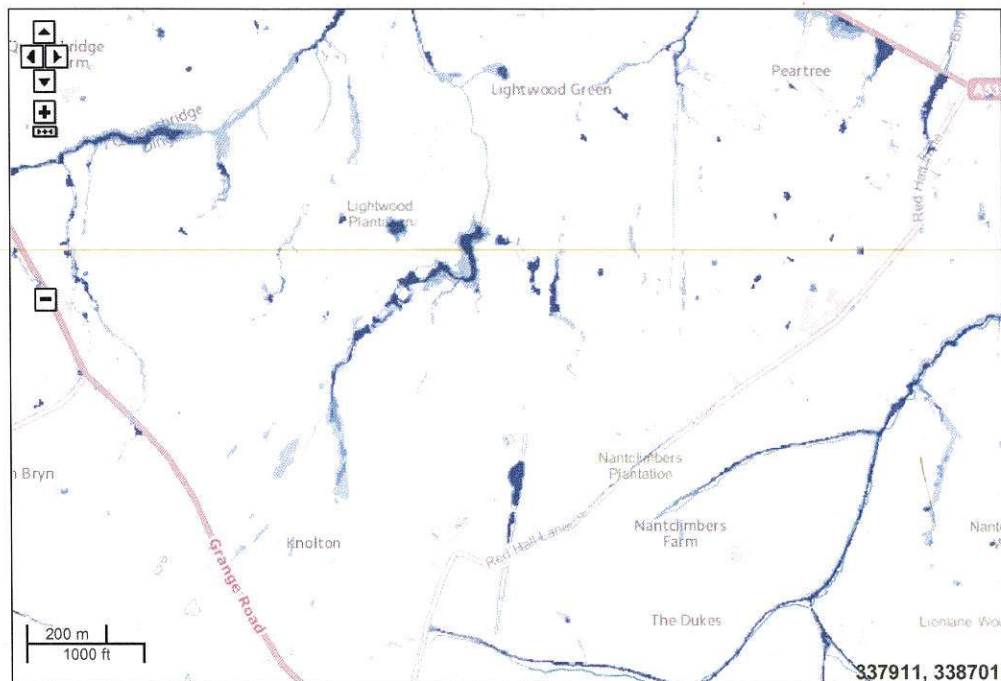
Click on the map for a more detailed explanation.

Map legend

- ☒ Risk of Flooding from Surface Water
- High
- Medium
- Low
- Very Low

Map of X: 338,574; Y: 339,580 at scale 1:10,000

[Data search](#)



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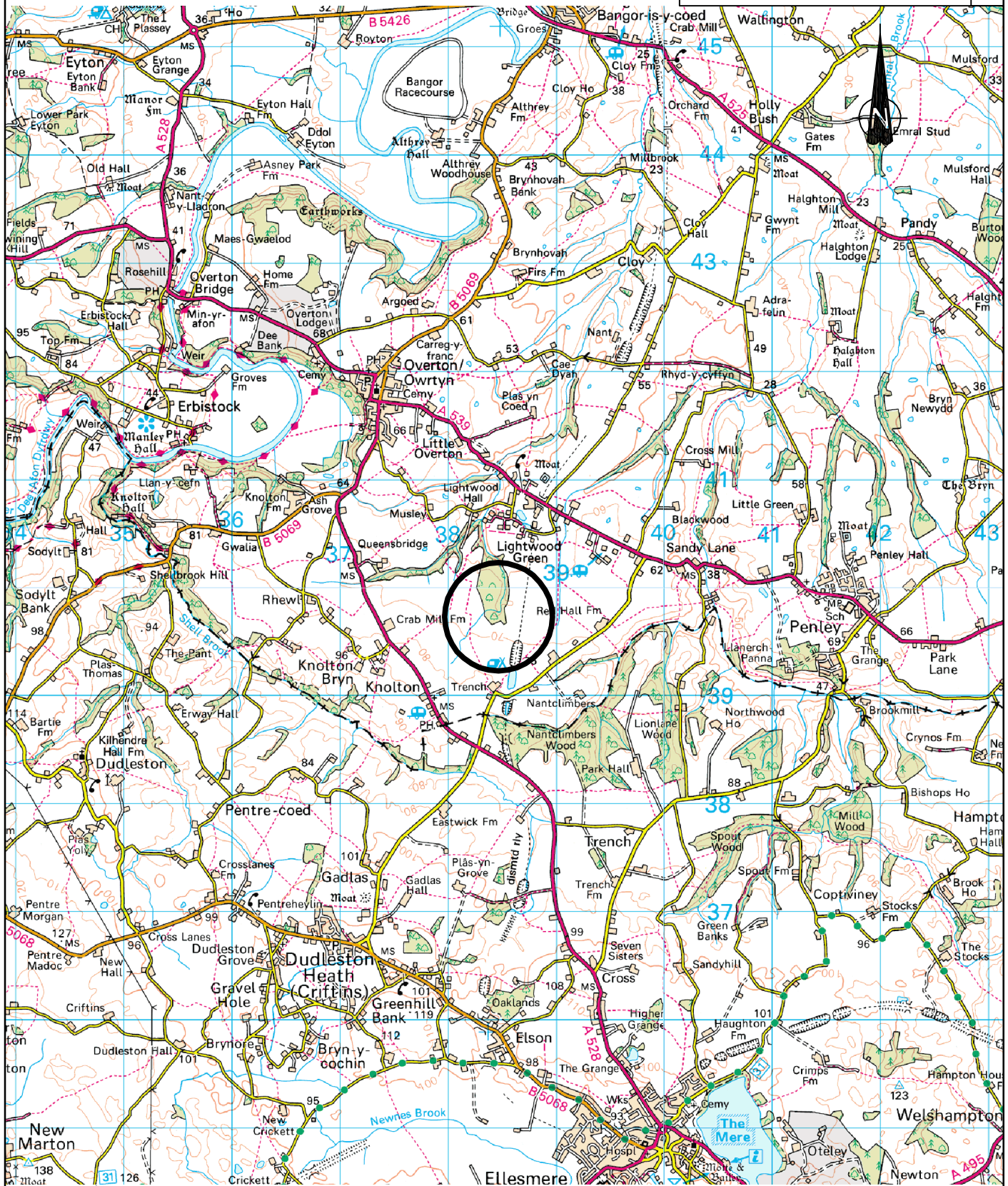
Author: The Environment Agency | enquiries@environment-agency.gov.uk

Last updated: 19 June 2014

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DRAWINGS

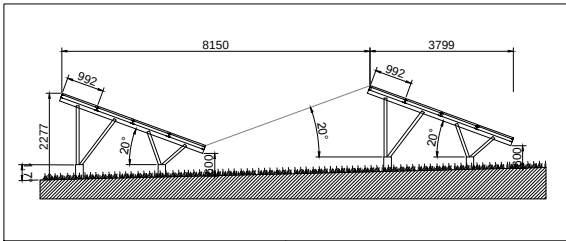


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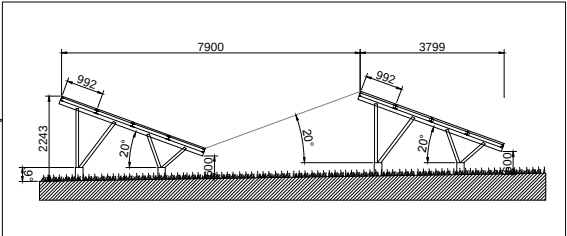
CLIENT LIGHTSOURCE RENEWABLE ENERGY LTD		DRG No. PE10328-001	SCALE 1:50000 @ A4	DATE 19/06/14
PROJECT TRENCH FARM SOLAR		DRAWN BY DP	CHECKED BY JSE	APPROVED BY SR
DRAWING TITLE SITE LOCATION PLAN		 your earth our world		

Trench Farm Wrexham_Proposed_Layout_Rev 3

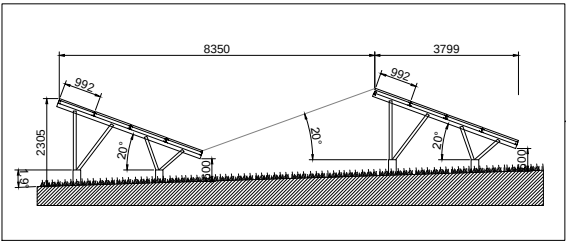
Area 213,314 m2 (52.71 acres)



Scale 1:200



Scale 1:200



Scale 1:200

	Site Boundary
	Site Access
	Security Fence
	Field Boundary
	Module Table 11 x 4
	Module Table 22 x 4
	Field Transformer
	Inverter Station
	DNO Substation
	Client Side Substation
	Communications Building
	Site Transformer (Aux)
	DNO Meter
	Storage Shed
	Access Road
	Compound Area
	Overhead Line
	Tree
	Access Gates
	CCTV
	Temporary Access Road

Revisions:			
3	30/06/14	Topo added	DA
2	06/06/14	Fields changed	DA
Rev	Date	Comments	Dwn Chkd

DA	XX	XX	03.06.14
DRAWN	CHECKED	APPROVED	DATE

PROJECT NAME & ADDRESS:
Location: Trench Farm Wrexham
Postcode: LL13 0NA
XX.XXdegrees
XX.XXdegrees

NOTES:
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-
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Paper Size:	Scale:	Sheet:
A3	1:5000@A3	1

CAPACITY:
7.50 MWp

DRAWING TITLE:
Trench Farm Wrexham_Proposed_Layout_Rev 3

DRAWING NUMBER: TCH_01_Rev 3	STATUS: Preliminary
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