

# MAGHERALIN SOLAR FARM

## FLOOD RISK & DRAINAGE ASSESSMENT

IBE2136  
Magheralin Solar FRA  
F02  
August 2024

**Document status**

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
D01	Draft for review	D McGinnis	A Jackson	G Glasgow	Oct 2023
F01	Final	D McGinnis	A Jackson	G Glasgow	Oct 2023
F02	Updated Final	D McGinnis	A Jackson	G Glasgow	August 2024

**Approval for issue**

D McGinnis

20 August 2024

The report has been prepared for the exclusive use and benefit of our client and solely for the purpose for which it is provided. Unless otherwise agreed in writing by RPS Group Plc, any of its subsidiaries, or a related entity (collectively 'RPS') no part of this report should be reproduced, distributed or communicated to any third party. RPS does not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. The report does not account for any changes relating to the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report.

The report has been prepared using the information provided to RPS by its client, or others on behalf of its client. To the fullest extent permitted by law, RPS shall not be liable for any loss or damage suffered by the client arising from fraud, misrepresentation, withholding of information material relevant to the report or required by RPS, or other default relating to such information, whether on the client's part or that of the other information sources, unless such fraud, misrepresentation, withholding or such other default is evident to RPS without further enquiry. It is expressly stated that no independent verification of any documents or information supplied by the client or others on behalf of the client has been made. The report shall be used for general information only.

Prepared by:

Prepared for:

**RPS**

**Renewable Energy Systems Ltd.**

Diane McGinnis  
Senior Associate - Flood Risk Management

Rachel Buchanan  
Senior Development Project Manager

Elmwood House, 74 Boucher Road, Belfast, BT12 6RZ

T +44 28 90 667914  
E [diane.mcginis@rpsgroup.com](mailto:diane.mcginis@rpsgroup.com)

01923 299200  
[rachel.buchanan@res-group.com](mailto:rachel.buchanan@res-group.com)

## Contents

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
<b>2</b>	<b>OVERVIEW OF THE EXISTING SITE.....</b>	<b>3</b>
<b>3</b>	<b>PROPOSED DEVELOPMENT.....</b>	<b>7</b>
<b>4</b>	<b>POTENTIAL SOURCES OF FLOOD RISK.....</b>	<b>8</b>
4.1	River Flooding.....	8
4.1.1	Present day.....	8
4.1.2	Climate Change (2080).....	9
4.2	Potential for Coastal Flooding.....	10
4.3	Potential for Surface Water Flooding.....	11
4.3.1	Present day.....	11
4.3.2	Climate Change (2080).....	12
4.4	Potential for Flooding from Impounded Water Bodies.....	12
4.5	Historical Flooding.....	13
4.6	Summary of Flood Risk.....	14
<b>5</b>	<b>DRAINAGE ASSESSMENT .....</b>	<b>16</b>
<b>6</b>	<b>FLOOD MITIGATION MEASURES .....</b>	<b>20</b>
6.1	River Flooding.....	20
6.1.1	Solar Panel Arrays.....	20
6.1.2	Access Roads.....	22
6.1.3	Interconnection Cable.....	23
6.2	Surface Water Runoff.....	24
6.3	Watercourse Maintenance Requirements.....	26
<b>7</b>	<b>COMPLIANCE WITH PLANNING POLICY STATEMENT 15 .....</b>	<b>27</b>
7.1	Policy FLD1 Development in River and Coastal Floodplains.....	27
7.2	Policy FLD2 Protection of Flood Defence and Drainage Infrastructure.....	27
7.3	Policy FLD3 Development and Surface Water Flood Risk Outside Floodplains.....	28
7.4	Policy FLD4 Artificial Modification of Watercourses.....	29
7.5	Policy FLD5 Development in Proximity to Reservoirs.....	29
<b>8</b>	<b>CONCLUSION .....</b>	<b>30</b>

## Figures

Figure 1-1	Approximate location of site .....	1
Figure 1-2	Detailed location map.....	2
Figure 2-1	Aerial photo of site .....	4
Figure 2-2	Locations of designated watercourses.....	5
Figure 2-3	Locations of undesignated watercourses.....	6
Figure 4-1	Extract from River Floodplain map (Present day).....	9
Figure 4-2	Extract from River Floodplain map (Climate change).....	10
Figure 4-3	Extract from Surface Water Map (Present day).....	11
Figure 4-4	Extract from Surface Water Map (Climate change).....	12
Figure 4-5	Extract from Reservoir Flood Mapping .....	13
Figure 4-6	Historical flooding .....	14
Figure 5-1	Photo of solar panels (front elevation) .....	17
Figure 5-2	Photo of solar panels (underneath).....	17
Figure 6-1	Proposed layout and 1% AEP river floodplain (2080).....	21
Figure 6-2	Approximate locations of access tracks and flood depths (1% AEP, Present day).....	22
Figure 6-3	Approximate location of interconnection cable and flood extent (1% AEP, Present day) .....	23
Figure 6-4	Proposed layout and 0.5% AEP surface water floodplain (2080).....	25

## Tables

Table 4-1	Summary of flood risk .....	15
-----------	-----------------------------	----

## Appendices

Appendix A.....	Dfl Rivers response to planning
Appendix B.....	Site location
Appendix C.....	Proposed site layout
Appendix D.....	Dfl Rivers response on maintenance requirements

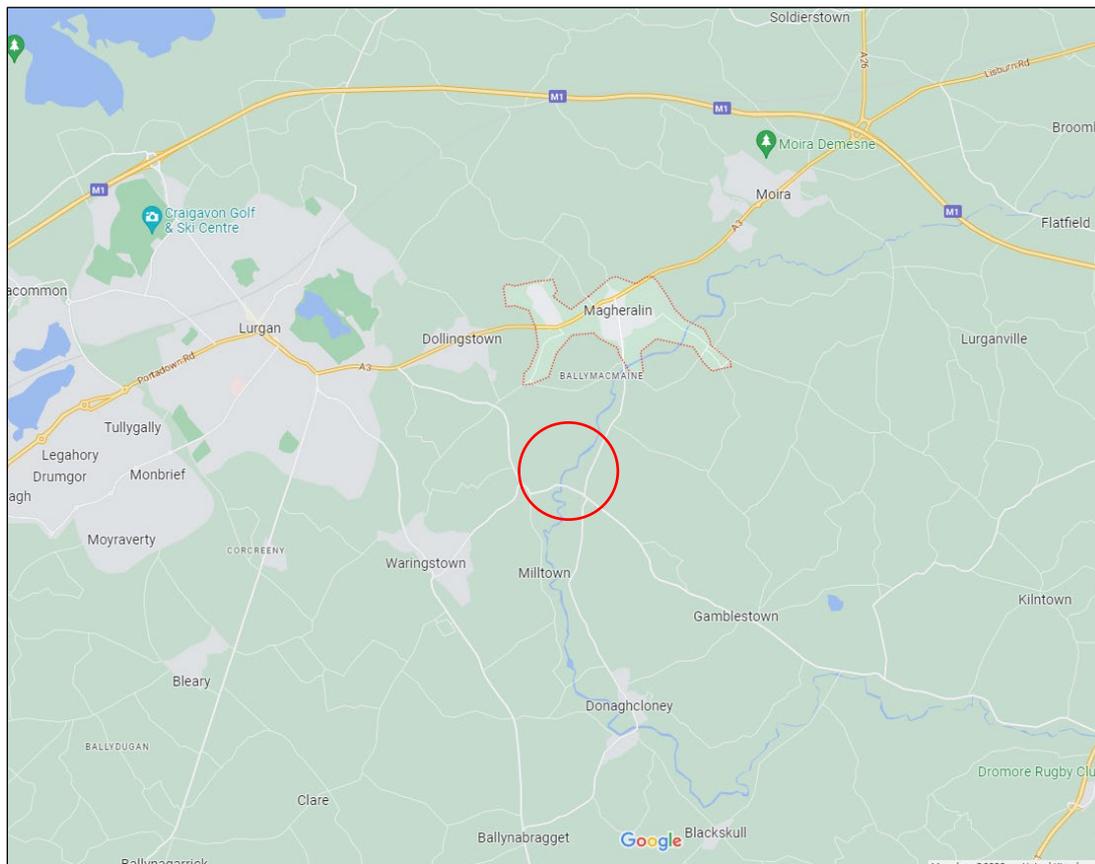
# 1 INTRODUCTION

RPS were commissioned by Renewable Energy Systems (RES) Ltd. (the Applicant) to prepare a Flood Risk & Drainage Assessment (FRA) as part of a planning application pack which seeks permission for the:

*“Installation and operation of a 29.9MW solar farm including photovoltaic panels, mounting frames, transformer/ inverter units, and on-site substation with associated ancillary development including security fencing, pole mounted CCTV, associated landscaping, internal access tracks, new site access, internal cabling and associated site works.” (The Proposed Development)*

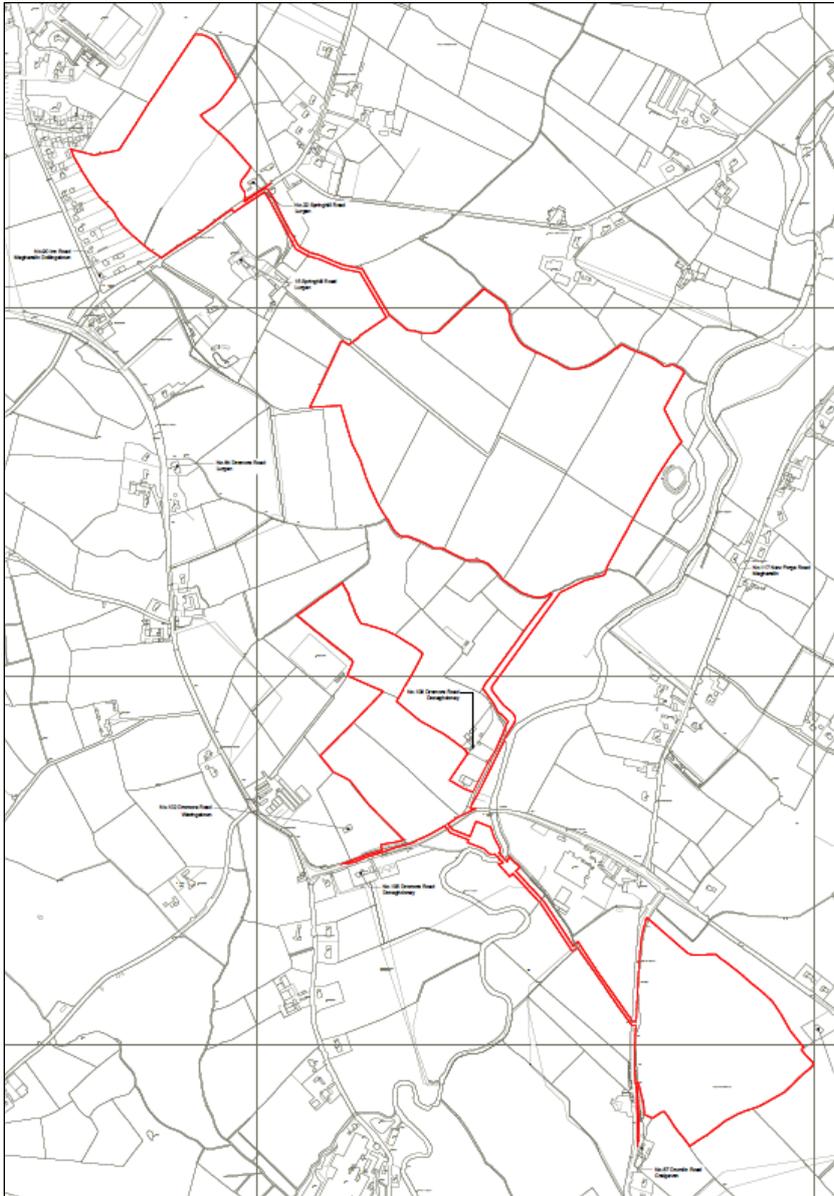
The FRA was prepared to meet the requirements of Planning Policy Statement 15 (PPS15) ‘Planning and Flood Risk’. The FRA was reviewed by DfI Rivers Directorate PAU and their response dated 3 May 2024 is shown in Appendix A. This updated version of the FRA has been prepared to address the comments.

The site is located south of Magheralin and south-east of Dollingstown. The approximate location of the site is shown in Figure 1-1. A detailed site location map is shown in Figure 1-2 and in Appendix B.



**Figure 1-1 Approximate location of site**

**FLOOD RISK ASSESSMENT**



**Figure 1-2 Detailed location map**

## 2 OVERVIEW OF THE EXISTING SITE

The landholding upon which the development is proposed measures c. 64.43 hectares/ 159.23 acres. The site is made up of four land-parcels which are located south of Magheralin and southeast of Dollingstown. From north to south the lands comprise:

- Parcel 1 – Lands accessing onto Springhill Road, immediately northwest of No.22 Springhill Road, Lurgan and immediately to the rear and northeast of 66, 68 and 70-90 Inn Road, Dollingstown (c. 9.3 ha);
- Parcel 2 – Lands c.300m southeast of 15 Springhill Road, Lurgan, c.240m northwest of 117 New Forge Road, Magheralin, Lurgan, and c.400m east of 64 Dromore Road, Lurgan (c.33.3ha);
- Parcel 3 – Lands c 80m northeast of 102 Dromore Road, Waringstown, and immediately adjacent to and west of 108 Dromore Road (c.9.4ha); and
- Parcel 4 – Lands c.660m southeast of 105 Dromore Road, Donaghcloney and extending south/southeast to c.80m north/northeast of 67 Drumlin Road, Craigavon and c.70m to the rear and southwest of 119 Dromore Road, Donaghcloney. (c. 11.5 ha).

Parcels 2 and 3 will be connected via underground cables which will pass through agricultural fields utilising existing agricultural lanes where available. The northernmost land-parcel (Parcel 1) will be connected via an interconnection cable across Springhill Road and intervening agricultural lands and the second interconnection route proceeds northwards from the southern-most land parcel (Parcel 4) across Drumlin Road and through intervening agricultural lands. It is proposed to traverse the River Lagan via horizontal directional drill before crossing Dromore Road to the north, and entering Parcel 3 of the site. The purpose of the interconnecting cables is to transfer energy created from inverter stations to the on-site substation which is located in the centre of the site (Parcel 3). The interconnection cable areas comprise 0.93ha.

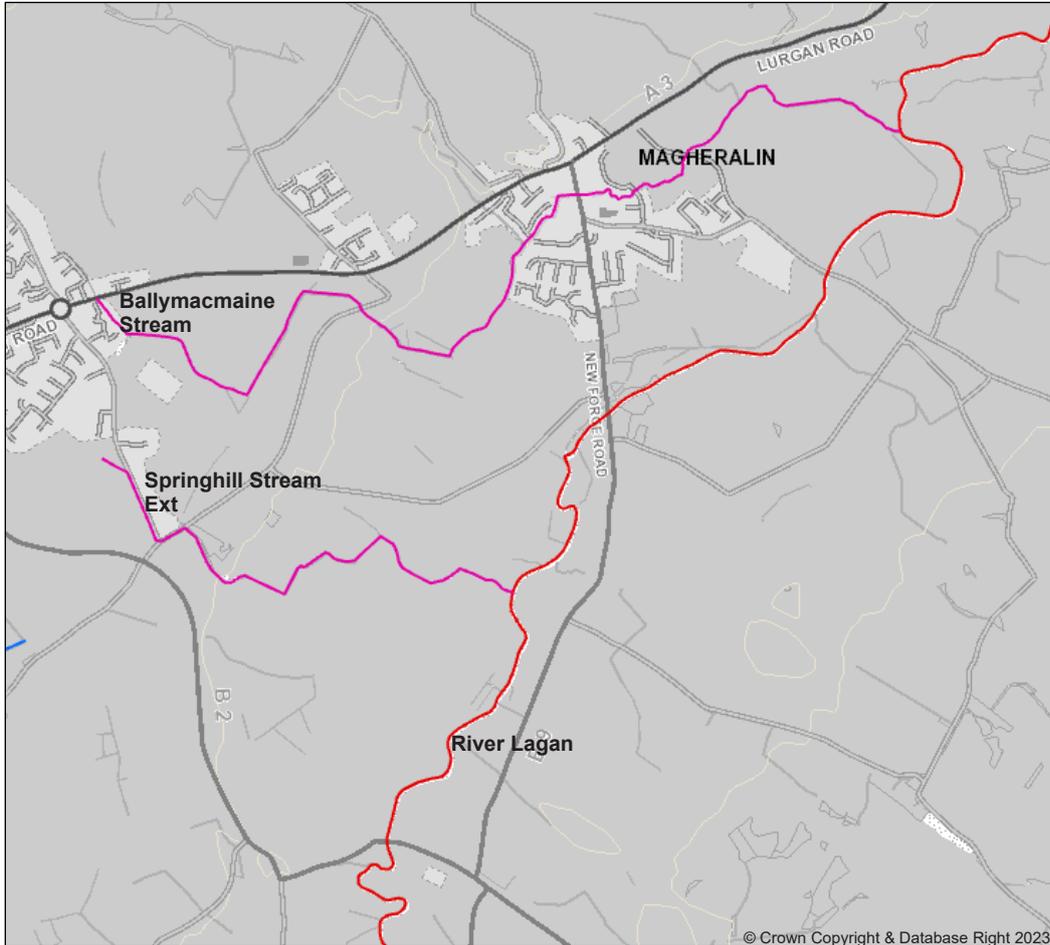
The lands are all currently greenfield. An aerial photo of the area is shown in Figure 2-1, which provides field numbers for ease of reference within this Report.



**Figure 2-1 Aerial photo of site**

There are some watercourses within the vicinity of the site that are designated under the Drainage (Northern Ireland) 1973, which means that DfI Rivers are responsible for their maintenance. The locations of the designated watercourses are shown in Figure 2-2. The River Lagan flows to the east of Parcels 2 and 3.

The Ballymacmaine Stream flows to the north of Parcel 1. The Springhill Stream Extension flows along the northern boundary of Parcel 2.



**Figure 2-2** Locations of designated watercourses

There are also a number of small undesignated watercourses and field drains within the site. The undesignated watercourses that were identified during site walkovers have been marked on Figure 2-3 as blue lines. The pink lines are the designated watercourses as shown in Figure 2-2. One of the undesignated watercourses flows along the southern boundary of Parcel 2, and along the northern boundary of Parcel 3.

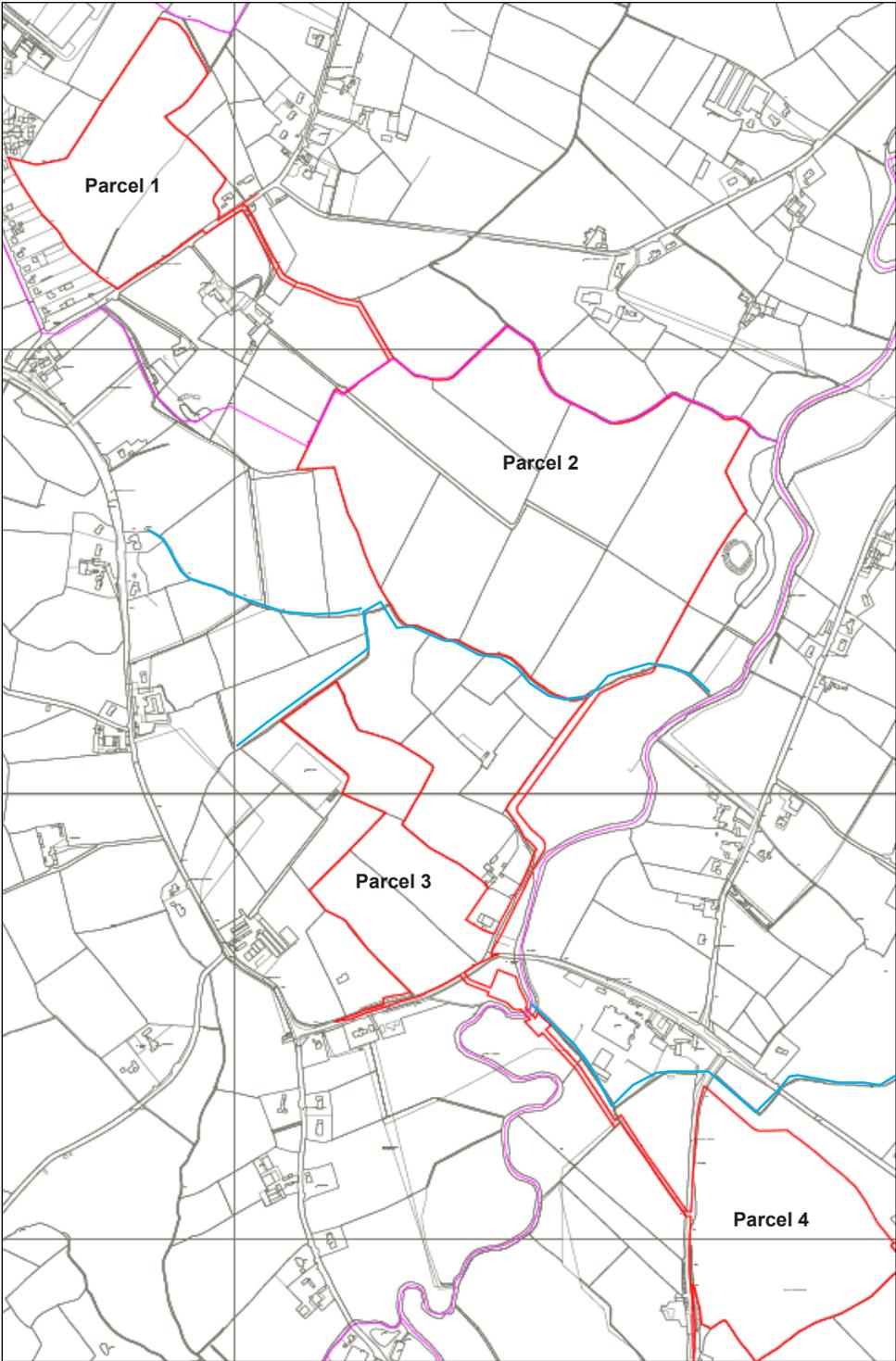


Figure 2-3 Locations of undesignated watercourses

### 3 PROPOSED DEVELOPMENT

The landholding upon which the development is proposed measures c. 64.43 hectares/ 159.23 acres. Panels will not be placed on this entire area. The proposed layout is shown in Appendix C.

The application is for the construction and operation of a solar farm with a proposed capacity not exceeding 29.9MW. The project components are listed below:

- Photovoltaic (PV) Solar Panels erected on steel/ aluminium frames set out in south-facing arrays;
- 1 No. Primary 33kV Sub-station typically measuring 10.34m x 5.7m x 6.45m and a solar control building 8.3m x 3.45m x 4m;
- 9 No. Inverter Substations typically comprises of an inverter measuring 5m x 3m x 2.5m and a transformer typically measuring 4m x 3m x 2.5m to be located across the site;
- Perimeter post and wire security fencing (2.4m high);
- A number of strategically located CCTV security cameras (3.5m high);
- New or upgraded access points onto Dromore Road (Centre), Drumlin Road (South), and Springhill Road (North);
- Associated internal service tracks;
- Internal and interconnecting underground cabling. Connecting cables run along the back of each panel to the end of every row where they connect to the main cables which in turn connect to inverter stations and primary on-site substation. Main cables will be undergrounded.

There are also two interconnection routes the purpose of which is to transfer the energy created from the on-site inverter stations to the on-site substation which is proposed in the centre of the site – Parcel 3.

One interconnection route extends from the northernmost land-parcel (Parcel 1) across Springhill Road and intervening agricultural lands, then along internal tracks within the Proposed Development until it reaches the substation.

The second interconnection route proceeds northwards from the southern-most land parcel (Parcel 4) across Drumlin Road and through intervening agricultural lands. It is proposed to traverse the River Lagan via horizontal directional drill before crossing Dromore Road to the north, and entering Parcel 3 of the site; and

- Temporary construction compounds.

## 4 POTENTIAL SOURCES OF FLOOD RISK

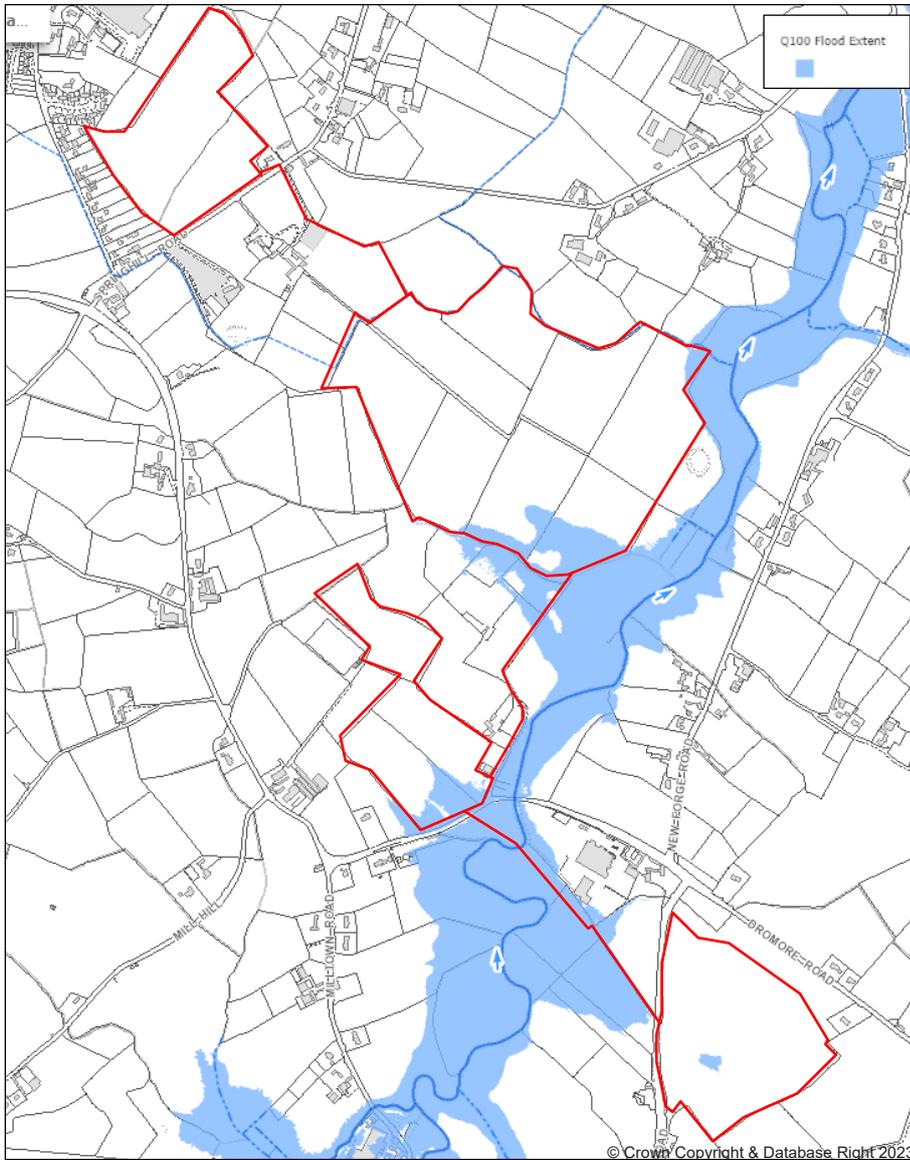
Planning Policy Statement 15 considers four main sources of flooding. Flooding from rivers occurs when the channel capacity is exceeded, and flood water overtops the banks. Coastal flooding occurs when inundation of land takes place due to a combination of high tides, wave action and storm surge. Surface water flooding occurs as a result of high intensity rainfall which can overwhelm drainage systems or cause water to collect in low lying areas. Flooding from impounded water bodies such as reservoirs and dams can arise as a result of overtopping or failure of the impounding structure which in turn may result in a sudden uncontrolled release of flood water into downstream areas. The potential for flooding has been based on the published maps available from Flood Map (NI).

DfI Water & Drainage Policy Division published 'Technical Flood Risk Guidance in relation to Allowances for Climate Change in Northern Ireland' in February 2019 which sets out the DfI Rivers approach to climate change in flood risk management. DfI have chosen the 2080s as a suitable epoch on which to base allowances for climate change for development planning and flood risk management purposes. DfI Rivers have now published Climate Change maps for the 2080 epoch on Flood Maps (NI). Both the present day and 2080 scenarios have been considered in this assessment where information is available.

### 4.1 River Flooding

#### 4.1.1 Present day

In line with the principles set out in Planning Policy Statement 15, a 1% AEP event should be considered when assessing the flood risk from rivers. Detailed flood maps are available for this area for the River Lagan. An extract from the present-day floodplain is shown in Figure 4-1 with the approximate site location marked on. The map indicates that there are areas of present-day fluvial floodplain of the River Lagan within the site (Fields numbers 1, 2, 3, 6, 7 and 8 as shown in Figure 2-1), and areas of floodplain are crossed by the routes for the access roads or cables. Note that the other watercourses are too small to be included in the flood maps as they do not show the floodplain for any watercourse where the catchment area is less than 3km<sup>2</sup>.



**Figure 4-1 Extract from River Floodplain map (Present day)**

### 4.1.2 Climate Change (2080)

An extract from the 2080 strategic flood map is shown in Figure 4-2 with the approximate site location marked on. Similar areas (Fields numbers 1, 2, 3, 6, 7 and 8) are predicted as a result of river flooding in the climate change scenario as in the present-day scenario. A small Section of Field 10 is also impacted in this scenario.

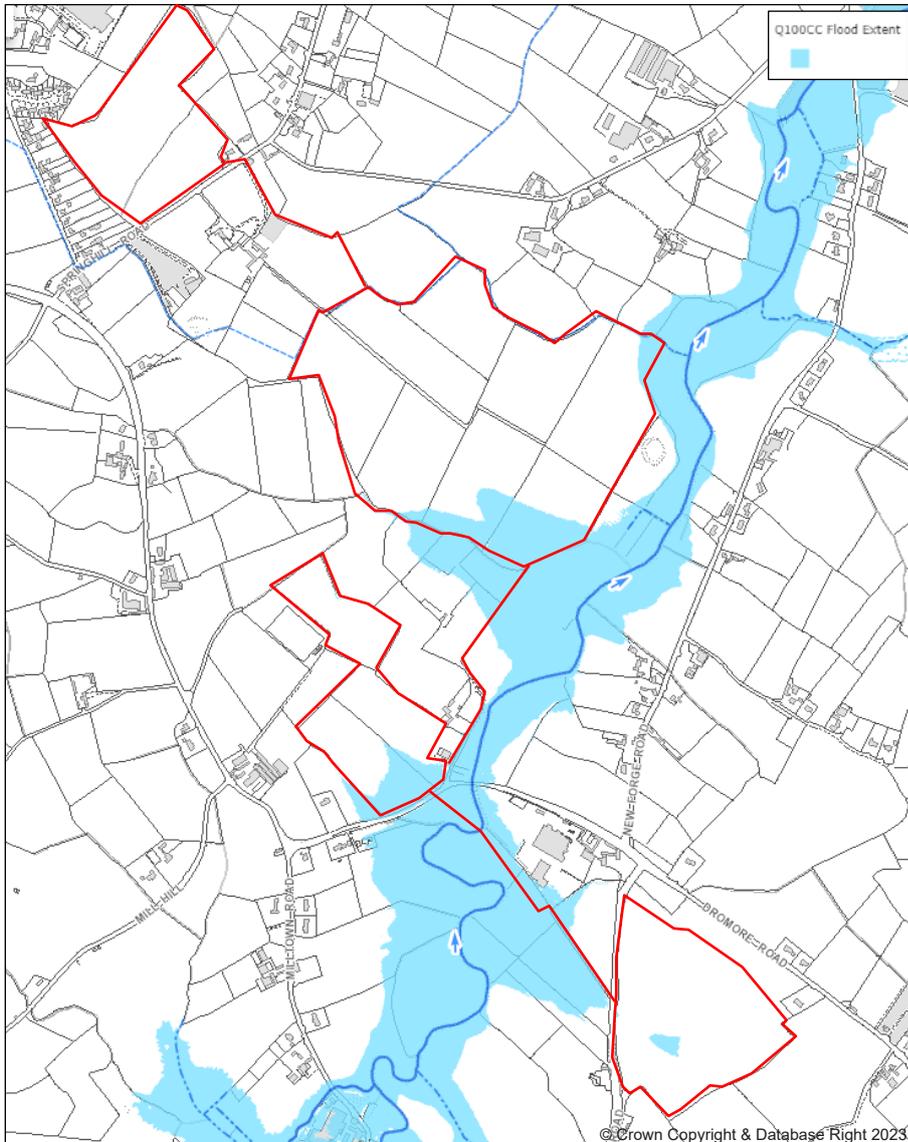


Figure 4-2 Extract from River Floodplain map (Climate change)

## 4.2 Potential for Coastal Flooding

In line with the principles set out in Planning Policy Statement 15, a 0.5% AEP event should be considered when assessing the flood risk from the sea. Due to its inland location, there is no risk of coastal flooding at the site.

### 4.3 Potential for Surface Water Flooding

#### 4.3.1 Present day

The present-day surface water flooding extents (0.5% AEP) are shown in Figure 4-3 with the approximate site location marked on. The map shows limited areas of present-day surface water floodplain within the site, mostly with depths of less than 0.3m (Field numbers 2, 6 and 12). There are two small areas with depths up to 1m (Field numbers 1 and 4).

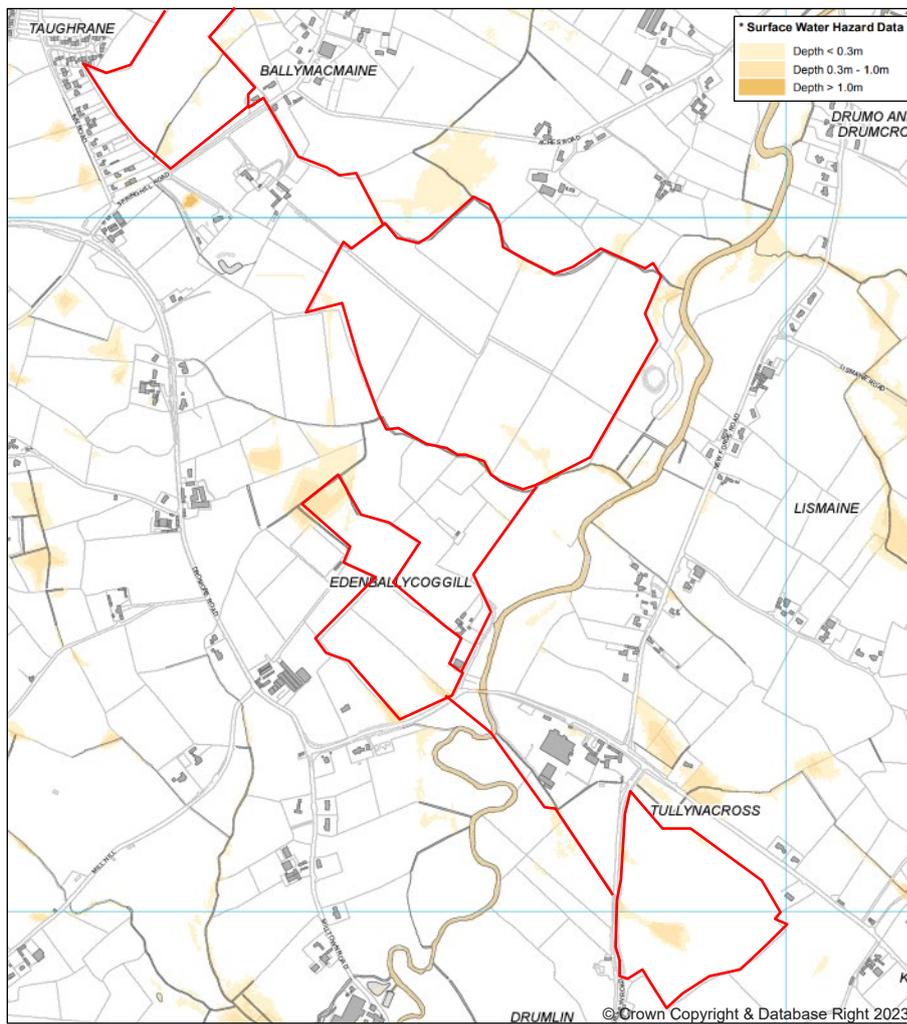


Figure 4-3 Extract from Surface Water Map (Present day)

### 4.3.2 Climate Change (2080)

The 2080 surface water flooding extents are shown in Figure 4-4. Similar areas are predicted as a result of surface water flooding in the climate change scenario as in the present-day scenario, with similar depths.

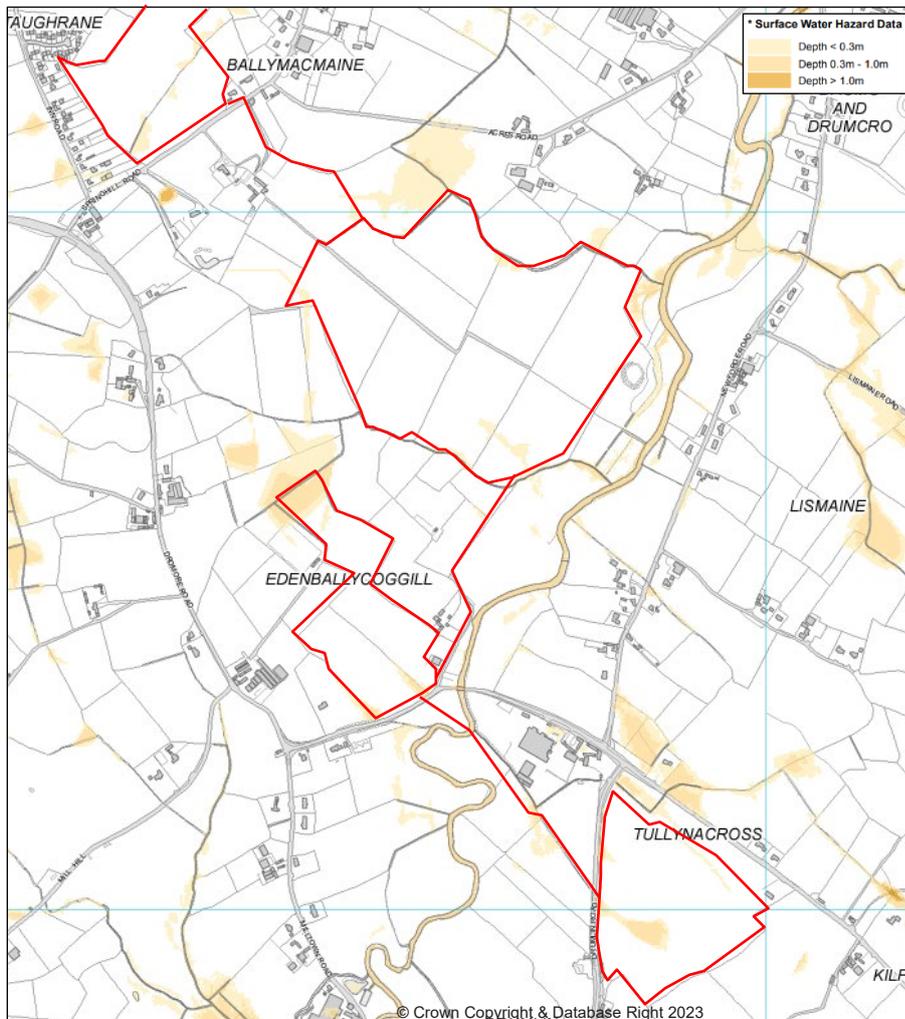


Figure 4-4 Extract from Surface Water Map (Climate change)

## 4.4 Potential for Flooding from Impounded Water Bodies

Magheralin Pond which is controlled reservoir is located to the east of the site. DfI Rivers' Reservoir Flood Mapping for Emergency Planning shows that the site is not affected by the potential inundation area of this reservoir. An extract from the reservoir flood map shown in Figure 4-5 with the approximate site location marked on.



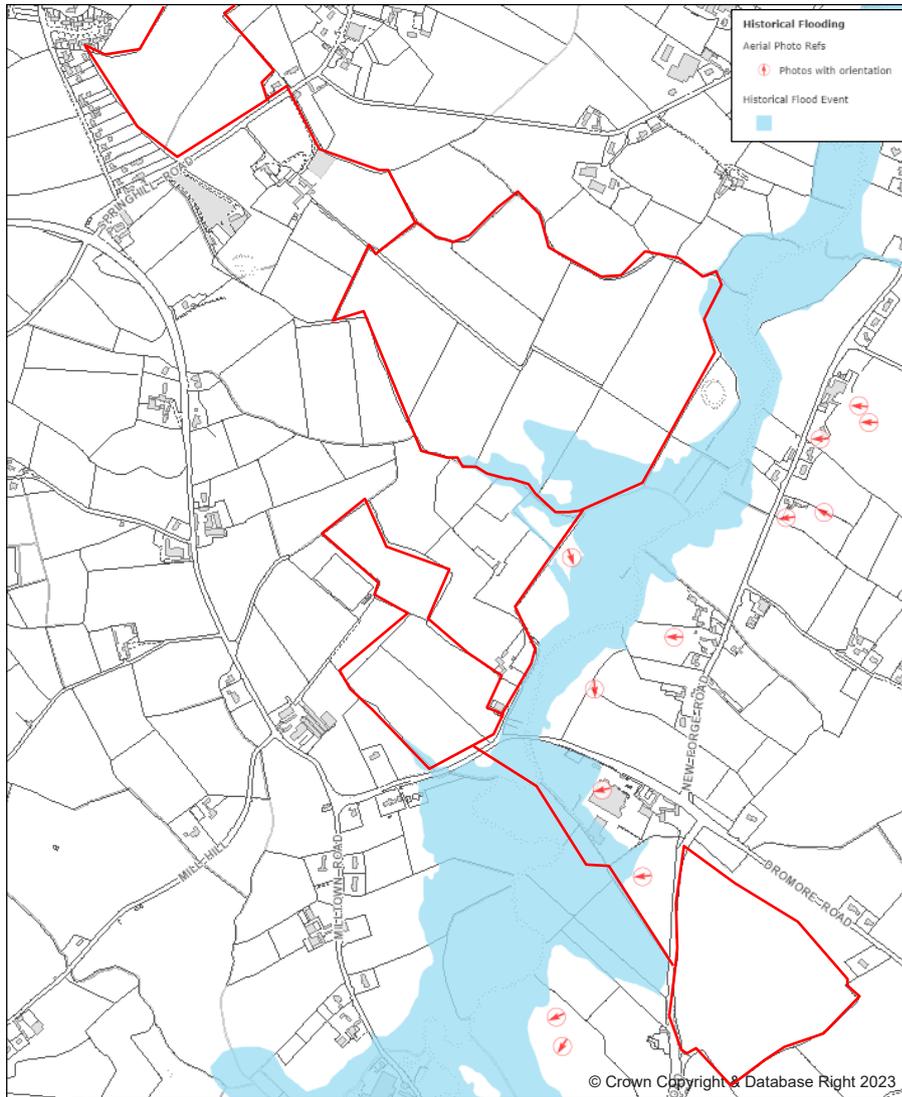


Figure 4-6 Historical flooding

## 4.6 Summary of Flood Risk

RPS has considered all possible sources of flooding (river, tidal, surface water and impounded water bodies) and the results of this are summarised in Table 4-1. The main flood risk to the site is river flooding from the River Lagan.

**Table 4-1 Summary of flood risk**

Source of flooding	Summary of flood risk
River	Flood Map (NI) indicates that there are areas of present-day and climate change fluvial floodplain of the River Lagan within the site, and areas of floodplain are crossed by the routes for the access roads or cables. Note that the other watercourses are too small to be included in the flood maps.
Coastal	Due to its inland location, there is no risk of coastal flooding at the site.
Surface water	Flood Map (NI) shows limited areas of present-day surface water floodplain within the site, mostly with depths of less than 1m. There are two small areas with depths greater than 1m.
Impounded water bodies	Reservoir Flood Mapping for Emergency Planning shows that the site is not affected by the inundation area of any controlled reservoir.

## 5 DRAINAGE ASSESSMENT

As the development is in excess of 1 ha, a Drainage Assessment is required to demonstrate that adequate measures will be put in place so as to effectively mitigate the surface water flood risk to the proposed development and from the development elsewhere. The risk from surface water flooding to and from the proposed solar farm is considered in Section 6.2. This section focuses on the potential for runoff from the proposed development.

The majority of the site currently consists of agricultural/ permeable ground which provides varying degrees of infiltration. The proposed development will not increase the rate of runoff from that currently as there are limited areas of hardstanding associated with the development.

There will be no re-grading of land or cut and fill to facilitate panel placement. Excavation is required to allow cable laying only together with the foundations for the inverter stations and on-site sub-station, and minor excavation for security fence posts and CCTV bases.

The solar panels will not form large impermeable surfaces. Installation of the panels will have minimal impact on the ground as the panel stanchions are small in cross-sectional area and spaced at a distance apart. The front bottom edge of the panels will be typically 0.7m above existing ground level and within a range of 500mm to 1.2m, depending on local topography. There is a minimum spacing of 2m between the arrays. In addition, there are spaces between each of the panels as they are affixed to the supporting structure, allowing rainwater to pass through the arrays and disperse evenly. These design features combine to ensure permeability within the solar panels, and runoff will be no greater for the developed site than it is for the pre-developed site. Rainfall will fall onto open ground as usual or run-off the panels through the gaps into the ground to be dispersed by the same routes that are currently in place. Photos of the panels from a recently constructed solar farm are shown in the Figures 5-1 and 5-2, where the spaces between the panels are clearly visible.



Figure 5-1 Photo of solar panels (front elevation)



Figure 5-2 Photo of solar panels (underneath)

The panels are being installed on the land as it is currently. When operational the site will support a dual renewable/ farming use and the overwhelming land area will remain agricultural. Therefore, there will be no changes made to existing ground levels or ground cover, and the existing surface runoff paths are unchanged. The existing vegetation beneath and around the solar panels will be retained. Grass cover helps reduce runoff and erosion by slowing movement of water in the affected area. Earth disturbance and grading activities will be minimised. This will therefore replicate the pre-development condition after the construction is finished. Figures 5-1 and 5-2 show how the grass has been retained at the recently constructed solar farm.

Any flows that do not infiltrate will drain to the existing drainage ditches within the site. The overall drainage regime for the site will not therefore be significantly altered as a result of the proposed development. Therefore, no additional drainage works are proposed as part of the development.

There is no other significant infrastructure being installed that will impact significantly on runoff. Access to the site is proposed via new or upgraded access points onto Dromore Road (Centre), Drumlin Road (South), and Springhill Road (North). The development will utilise existing agricultural lanes for servicing purposes in so far as is reasonably possible. Access will also be achievable during construction and operation via tractor or 4 x 4 vehicles around the periphery of existing fields where buffers to field boundaries are designed into development proposals. As such the extent of proposed new access tracks is minimised. Where new tracks are required, these will be permeable and of stone construction.

The substation and control building will sit atop a concrete foundation however the remainder of the compound will be permeable and of stone construction. The control and sub-station buildings will have gutters and downpipes, and rudimentary soakaways will be provided for each pipe (consisting of a stone pit).

The inverter stations will be accommodated in small modular cabin like buildings positioned throughout the site. The inverter stations are constructed atop concrete plinths. The small areas of roofs created by the inverter stations are insignificant compared to the size of the site, and any limited runoff will soak away naturally.

The cable trenches will be approximately 1m deep, depending on the detailed terrain. The first 150-300mm of trenches will be filled with sand. The remainder of the trenches will be backfilled with the existing topsoil which was previously removed to facilitate the cable laying. Vegetation soil turves will be laid beside the trench and used to reinstate the ground to original levels after the cables have been installed. The cable trenches will therefore not cause any additional surface water flow paths to develop.

## FLOOD RISK ASSESSMENT

---

It is not usual for water channels to form as a result of runoff from the panels, especially if the ground is vegetated. However, checks will be undertaken by staff visiting the site for maintenance visits at 6 monthly intervals. If necessary, erosion control methods will be used.

The overall drainage regime for the site will not be significantly altered as a result of the proposed development. Therefore, no additional drainage works are proposed as part of the development.

## 6 FLOOD MITIGATION MEASURES

### 6.1 River Flooding

#### 6.1.1 Solar Panel Arrays

The solar panel arrays have been revised so that they are not located within the floodplain of the River Lagan identified from Flood Map (NI). The proposed solar panel layout is shown in Figure 6-1 with the 1% AEP river floodplain marked on. To be conservative the 2080 floodplain has been used, although the operational lifespan of the project is 40 years. The proposed development will therefore not be at risk or increase the risk of river flooding elsewhere.

The flood maps do not show the floodplain of the other minor watercourses that flow through the site. A 5m buffer either side of any watercourse or ditch has been used in the siting of the panels, and this will allow for any potential floodplain to be avoided. This can be seen in Figure 6-1. The panels are typically 700mm and within a range of 500mm to 1.2m above ground level so will only be at risk of flooding if the depth exceeds this. Water levels of this depth are unlikely to occur given that the watercourses throughout the site are very small and are unlikely to have the flows to create this depth of flood.

The substation and inverter stations must avoid flooding and accordingly are located outside of the floodplains.

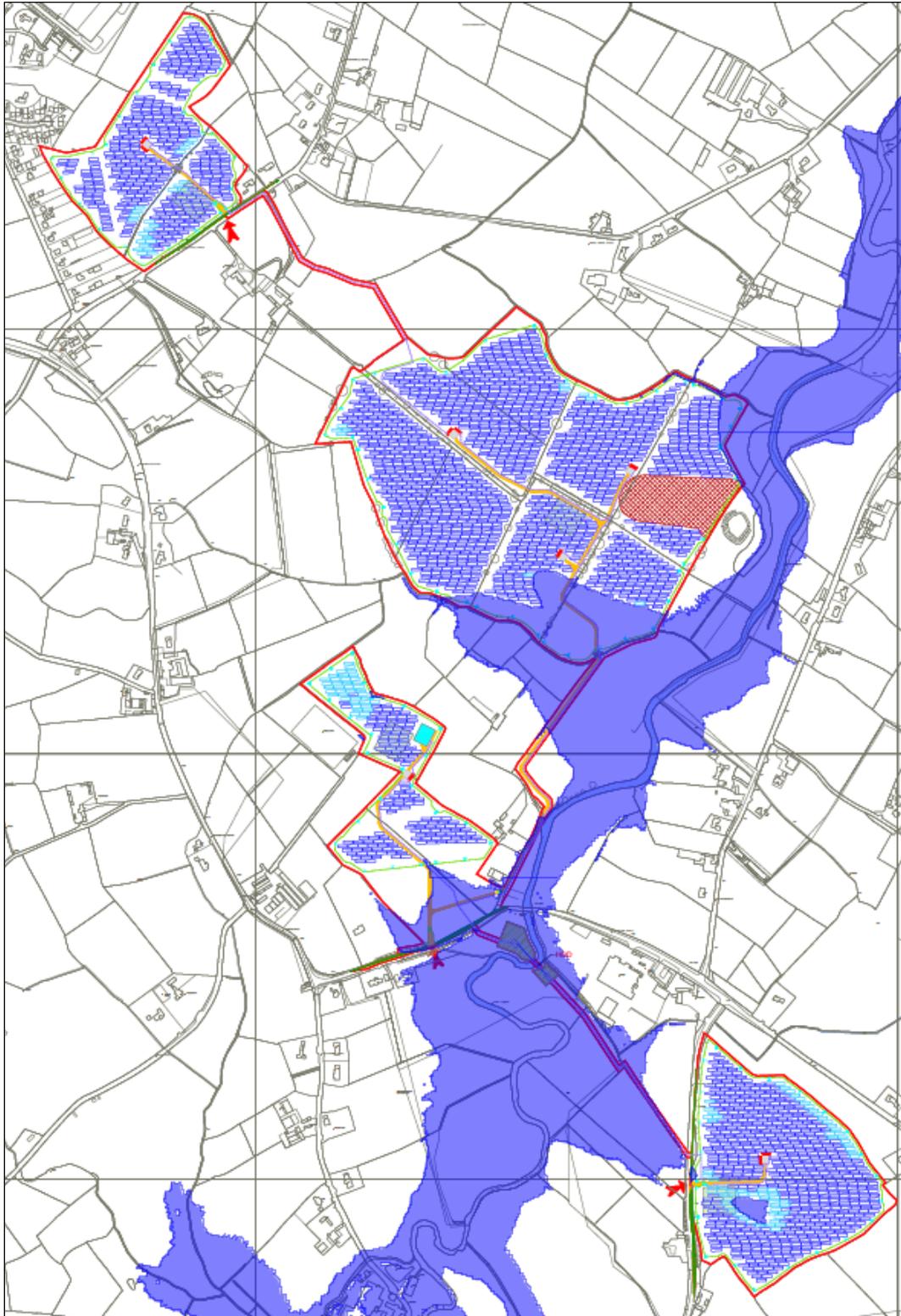


Figure 6-1 Proposed layout and 1% AEP river floodplain (2080)

### 6.1.2 Access Roads

A number of existing and new access tracks will be located within the floodplain. These will be constructed at existing ground levels and can be allowed to flood, so there is therefore no impact on the floodplain. The depths of flooding are generally less than 1m as shown in Figure 6-2 (approximate route of access road shown as dashed line). There are no permanent staff associated with the development but if emergency access is required alternative access/ egress is available if the access tracks are flooded. The access road will cross an undesignated watercourse to the south of Field 6 via a span bridge (location shown in Figure 6-2 as a cross). This will require a Schedule 6 application to the DfI Rivers Area Office, which will be made during the detailed design of the development.

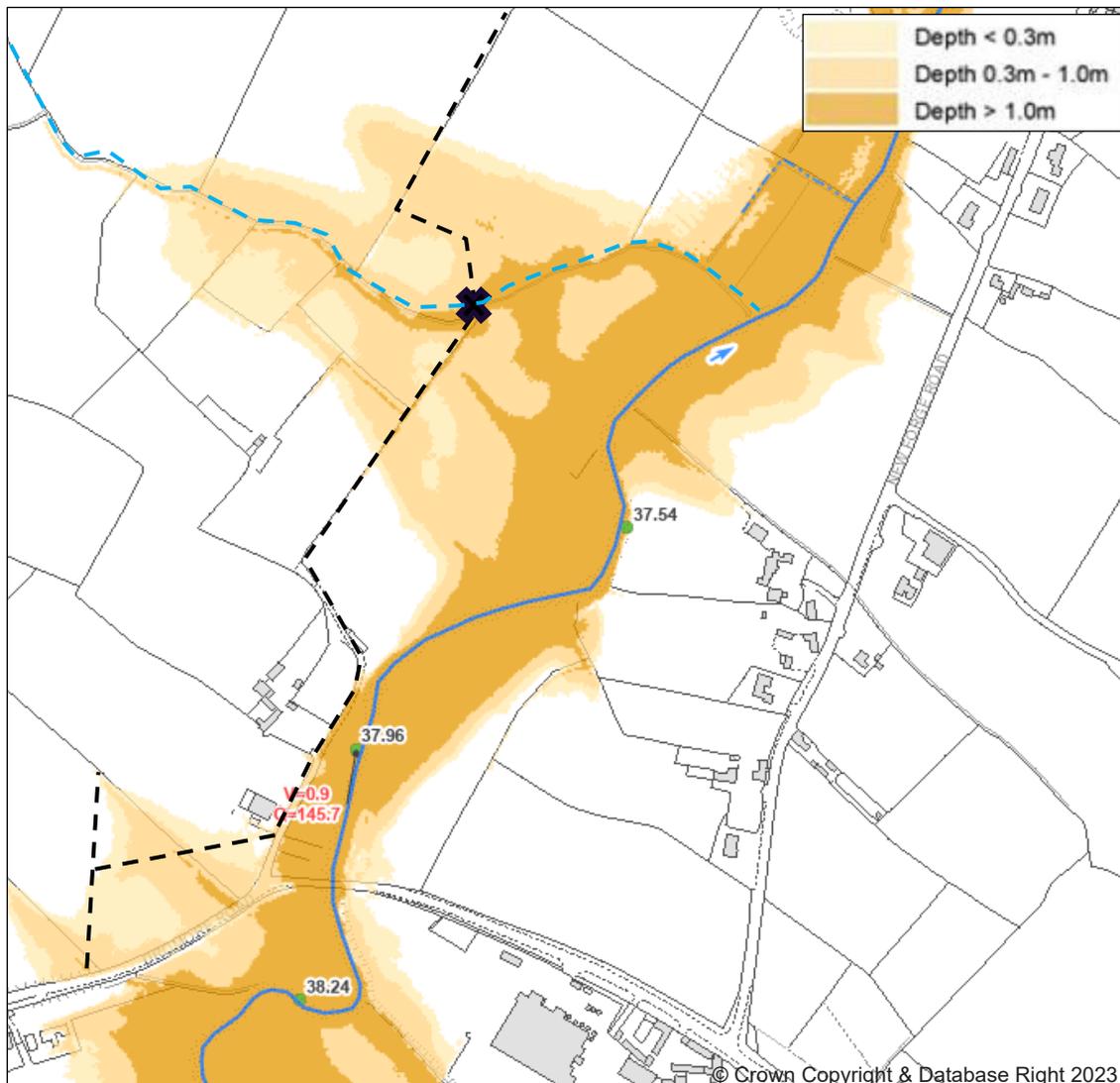


Figure 6-2 Approximate locations of access tracks and flood depths (1% AEP, Present day)

### 6.1.3 Interconnection Cable

An underground interconnection cable will be laid through the floodplain as shown in Figure 6-3 as a dashed red line. Special consideration will need to be given to the construction methodology to limit the impact. The crossing of the River Lagan will be undertaken by horizontal directional drilling. An Outline Construction Environmental Management Plan (OCEMP) is included as part of the planning pack, which sets out environmental management and mitigation techniques to help ensure there are no significant impacts on the environment during construction. It is a “live” document and will be further developed by the Contractor during the construction stage. Appendix H of the OCEMP provides an outline Horizontal Directional Drilling Methodology including best practice design and construction methodology. This confirms methods to protect from flood risk including temporary deposition of materials will be kept outside of any floodplain and the timing of proposed construction works during periods of dry weather when the risk of a flood event is minimal/negligible.

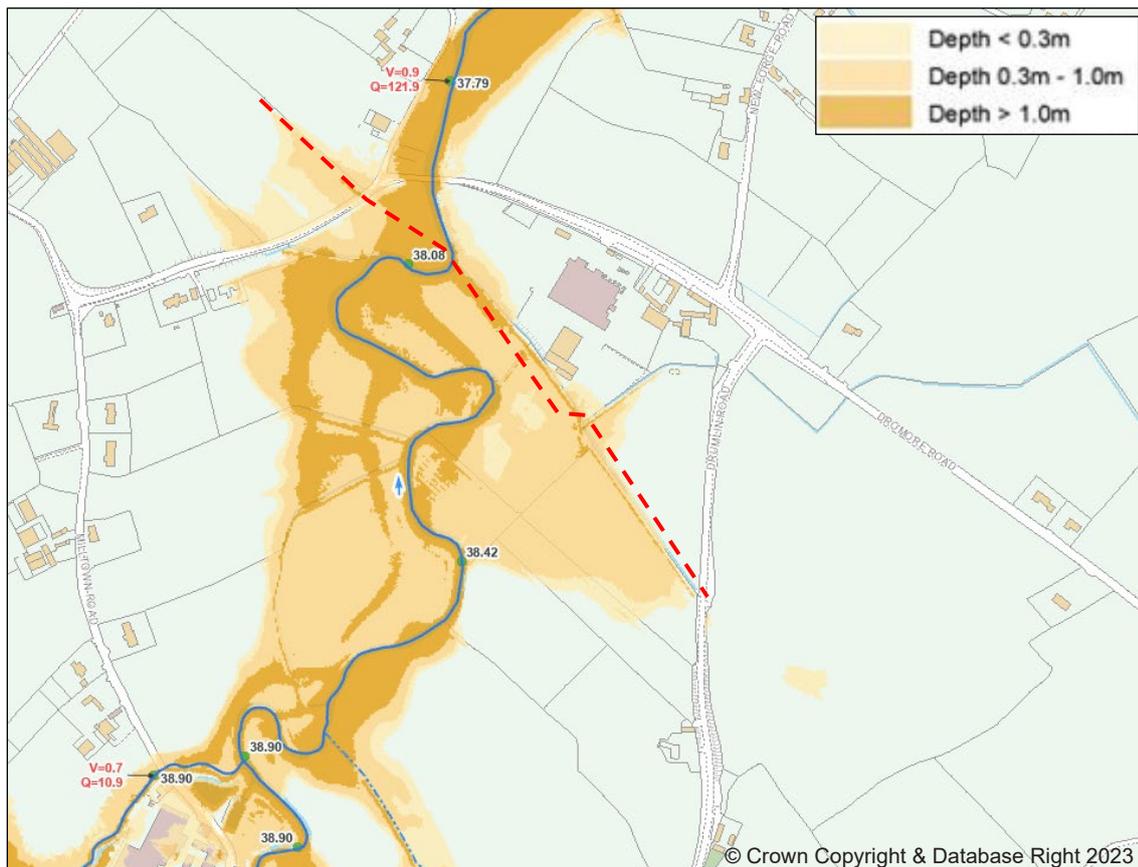


Figure 6-3 Approximate location of interconnection cable and flood extent (1% AEP, Present day)

## 6.2 Surface Water Runoff

Surface water flooding occurs when the ground is unable to absorb the rainwater, causing it to flow over the surface and fill depressions and low spots in the landscape where the local natural and engineered drainage systems are overwhelmed. Some areas of potential flooding from surface runoff have been identified within the site as shown in Figure 6-4, but they will not impact the proposed development as they are mostly of limited depths (less than 0.3m) and the panels will be typically 0.7m above existing ground level. There are some areas identified where the surface water flooding has depths of up to 1m, and in these areas the panels will be raised to 1.2m above ground level. The solar PV arrays to be raised are shown in light blue in the layout in Appendix B. No critical infrastructure such as the sub-station and inverter stations will be located in surface water flood risk areas.

Where the panels are located within the surface water floodplain, the impact on flood risk elsewhere is considered negligible since the footprint of the stanchions on the ground will be insignificant in relation to the floodplain area. The stanchions are small in cross-sectional area and spaced at a distance apart, with the total area of pile stanchions making up less than 0.2% of the total site area. The proposed development will therefore not increase the risk of surface water flooding elsewhere.

FLOOD RISK ASSESSMENT

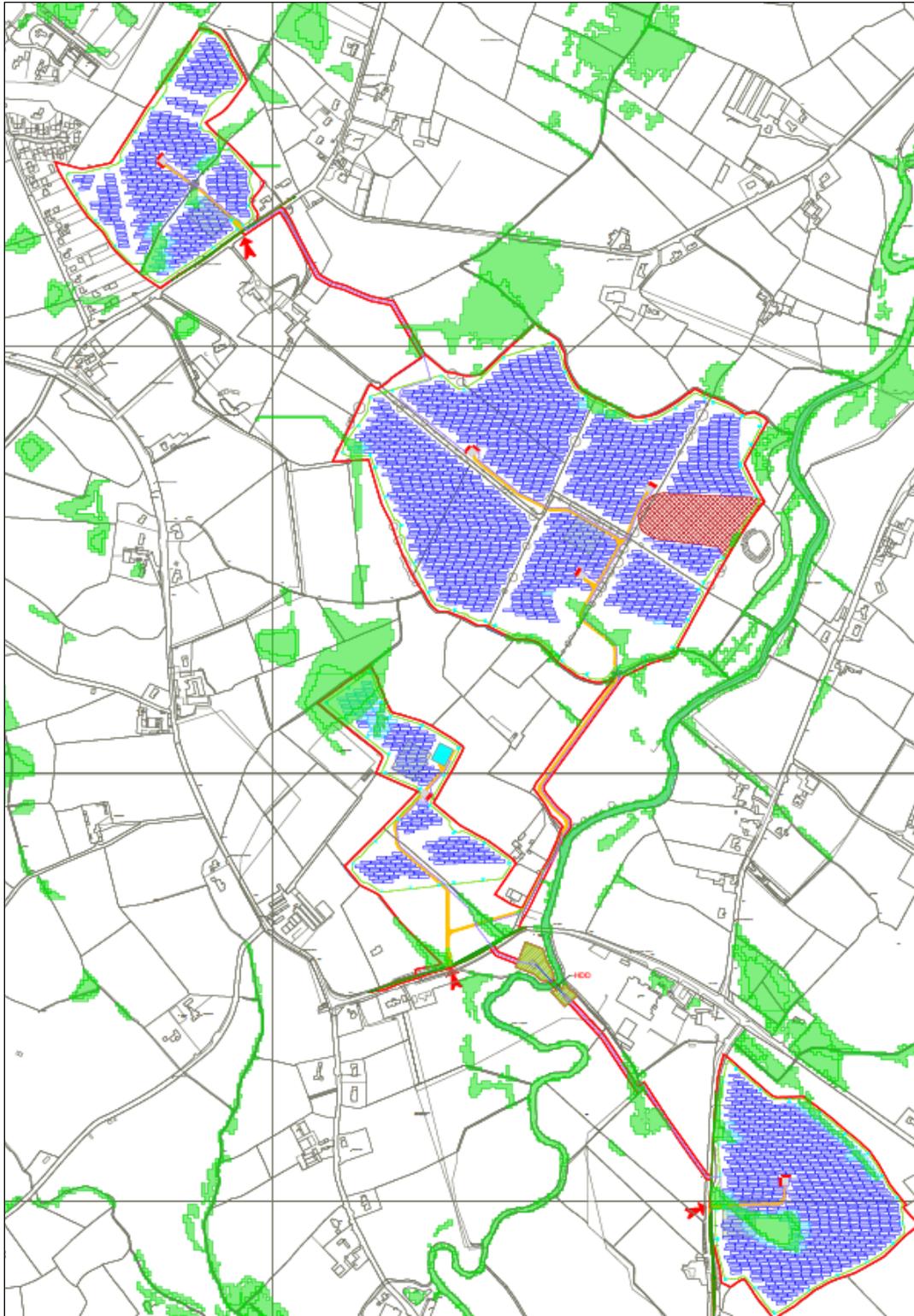


Figure 6-4 Proposed layout and 0.5% AEP surface water floodplain (2080)

As described in Section 5, the proposal will not significantly increase the rate of runoff from the current rates and no formal drainage systems are being installed. Therefore, no further mitigation measures are proposed.

The retention of the existing grass cover helps reduce runoff and erosion by slowing the movement of water. Earth disturbance and grading activities will be minimised. This will therefore replicate the pre-development condition after the construction is finished. Disturbance during construction will be minimal and grass will be retained. However, where construction activities have impacted on existing areas of vegetation, these areas will be chisel ploughed and re-seeded with agricultural grazing/ silage sward grass species. Chisel ploughing will reduce soil compaction on the site and promote growth; it has been proven to significantly increase infiltration rates thereby reducing runoff rates. Additionally, the planting provides high levels of natural attenuation which will serve to reduce the erosion and limit surface water flows across the site. The site will be actively managed to keep the soil in good condition during the operational phase and maintain the sward where possible.

It is not usual for water channels to form as a result of runoff from the panels, especially if the ground is vegetated. However, checks will be undertaken by staff visiting the site for maintenance visits at 6 monthly intervals. If necessary, erosion control methods will be used.

### **6.3 Watercourse Maintenance Requirements**

The application site is affected by both designated and undesignated watercourses. A 5m buffer has been applied to all watercourses and ditches to allow for a maintenance strip. This can be seen in the layout in Appendix C. These maintenance strips will be protected from all impediments (including tree planting, hedges, permanent fencing) or any future development. Access to and from the maintenance strips will be provided.

DfI Rivers Lisburn have stated that they are satisfied with the proposals for a 5m working strip and a copy of this is provided in Appendix D.

## **7 COMPLIANCE WITH PLANNING POLICY STATEMENT 15**

Revised Planning Policy Statement 15 (PPS15) 'Planning and Flood Risk' was published in September 2014. In line with the requirements of PPS15, RPS have considered all possible sources of flooding and have taken a conservative approach in establishing the flood risk to the site. The information provided in this FRA is compliant with the requirements of Annex D of the Revised PPS 15.

### **7.1 Policy FLD1 Development in River and Coastal Floodplains**

Under Policy FLD1, development will not be permitted within the 1% AEP fluvial floodplain unless the applicant can demonstrate that the proposal constitutes an exception to the policy.

The original layout had some panels located within the floodplain so the DfI Rivers comments in relation to Policy FLD1 referred to that. The solar panel arrays have been revised so that they are not located within the identified floodplain of the River Lagan (1% AEP plus climate change). The proposed development will therefore not be at risk or increase the risk of river flooding elsewhere. The flood maps do not show the floodplain of the other minor watercourses that flow through the site. A buffer of 5m has been used in the siting of the panels either side of any watercourse/ drain, and the panels will be above the ground by typically 700mm (within a range of 500mm to 1.2m). These measures will ensure that the risk of flooding to the panels is minimised. The substation and inverter stations must avoid flooding and are located on higher ground, outside of the floodplains. A number of the existing and new access tracks will be located within the floodplain. These will be constructed at existing ground levels and can be allowed to flood, so there is therefore no impact on the floodplain.

The solar farm development is compliant with the standards of Policy FLD1.

### **7.2 Policy FLD2 Protection of Flood Defence and Drainage Infrastructure**

Policy FLD2 states that development will not be permitted that would impede the operational effectiveness of flood defence and drainage infrastructure. There are no defences associated with the watercourses in the area. Where a new development is located beside a watercourse it is essential that an adjacent working strip is retained to facilitate future maintenance by DfI Rivers or another statutory undertaker or riparian landowner. DfI Rivers recommends that a minimum working strip of 5m is provided.

A working strip of 5m will be provided along all watercourses within the site, and nothing in connection with the development will be constructed within these strips. As requested in the DfI Rivers planning response, evidence from DfI Rivers Lisburn that they are satisfied with the proposals for a 5m working strip.

The solar farm development is compliant with the standards of Policy FLD2.

### **7.3 Policy FLD3 Development and Surface Water Flood Risk Outside Floodplains**

As the site is in excess of 1ha, a Drainage Assessment is required under Policy FLD3. This is presented in Section 5.

Some areas of potential flooding from surface runoff have been identified within the site, but they will not impact the proposed development as they are mostly of limited depths (less than 0.3m) and the panels will be typically 0.7m above existing ground level and within a range of 500mm to 1.2m. There are some areas identified where the surface water flooding has depths of up to 1m, and in these areas the panels will be raised to 1.2m above ground level. No critical infrastructure such as substation and inverter stations will be located in surface water flood risk areas. The proposed development will therefore not be at risk of surface water flooding.

Where the panels are located within the surface water floodplain, the impact on flood risk elsewhere is considered negligible since the footprint of the stanchions on the ground will be insignificant in relation to the floodplain area. The stanchions are small in cross-sectional area and spaced at a distance apart, with the total area of pile stanchions making up less than 0.2% of the total site area. The proposed development will therefore not increase the risk of surface water flooding elsewhere.

The solar panels will not form large impermeable surfaces. The arrays are arranged in well-spaced rows with open avenues in between. In addition, there are spaces between each of the panels as they are affixed to the supporting structure, allowing rainwater to pass through the arrays and disperse evenly. These design features combine to ensure permeability within the solar panels. Rainfall will fall onto open ground as usual or run-off the panels through the gaps into the ground to be dispersed by the same routes that are currently in place.

Owing to the retention of vegetation there will not be a measurably increased runoff as a result of installation of the panels. Any flows that do not infiltrate the ground will drain to the existing drainage ditches within the site. The overall drainage regime for the site will not therefore be significantly altered as a result of the proposed development. There will be no storm water drainage installed as part of the development, and no discharge consents are required.

There will be no increase in runoff rates or volumes from the site, and no changes to the upstream or downstream hydrology and flood risk as a result of the development.

The solar farm development is compliant with the standards of Policy FLD3.

## **7.4 Policy FLD4 Artificial Modification of Watercourses**

Policy FLD4 is concerned with the artificial modification of watercourses. The project will not alter any watercourses, although there will be a crossing of a small drain to the south of Field 6 via a span bridge. The crossing will require a Schedule 6 application to the DfI Rivers Area Office which will be made during the detailed design of the development.

The solar farm development is compliant with the standards of Policy FLD4.

## **7.5 Policy FLD5 Development in Proximity to Reservoirs**

DfI Rivers' Reservoir Flood Mapping for Emergency Planning shows that the site is not affected by the potential inundation area of any controlled reservoir.

Policy FLD5 does not apply.

## 8 CONCLUSION

This FRA has been prepared to show that the proposal complies with Planning Policy Statement 15 'Planning and Flood Risk' (PPS15). The main sources of flooding (coastal, river, surface water, and reservoirs) have been considered, based on published flood maps.

The solar panel arrays have been revised so that they are not located within the identified floodplain of the River Lagan (1% AEP plus climate change). The proposed development will therefore not be at risk or increase the risk of river flooding elsewhere. The flood map does not show flooding for the other minor watercourses which flow through the site. A buffer of 5m has been used in the siting of the panels either side of any watercourse/ drain, and the panels will be above the ground by typically 700mm (within a range of 500mm to 1.2m). These measures will ensure that the risk of flooding to the panels is minimised. The substation and inverter stations must avoid flooding and are located on higher ground, outside of the floodplains. A number of the existing and new access tracks will be located within the floodplain. These will be constructed at existing ground levels and can be allowed to flood, so there is therefore no impact on the floodplain. The proposed development will therefore not increase the risk of river flooding elsewhere. The solar farm development is compliant with PPS15 Policy FLD1.

Policy FLD2 of PPS15 states that development will not be permitted that would impede the operational effectiveness of flood defence and drainage infrastructure. There are no defences associated with the watercourses in the area. Where a new development is located beside a watercourse it is essential that an adjacent working strip is retained to facilitate future maintenance by DfI Rivers or another statutory undertaker or riparian landowner. A working strip of 5m will be provided along all watercourses and ditches within the site, and nothing in connection with the development will be constructed within these strips. DfI Rivers Lisburn have stated that they are satisfied with the proposals for a 5m working strip. The solar farm development is compliant with PPS15 Policy FLD2.

The flood map shows some areas of potential surface water flooding within the site, but these will not impact the proposed development. As has been shown, the proposals for the site will not increase the rate of discharge from the current pre-development surface water run-off rates, and no formal drainage systems will be installed. Disturbance during construction will be minimal and grass will be retained. However, where construction activities have impacted on existing areas of vegetation, these areas will be chisel ploughed and re-seeded with agricultural grazing/ silage sward grass species. The site will be actively managed to keep the soil in good condition during the operational phase and maintain the sward where possible. Checks will be undertaken by staff visiting the site for maintenance visits at 6 monthly intervals. There will be no increase in runoff rates or volumes from the site, and no changes to the upstream or downstream hydrology and flood risk as a result of the development. The solar farm development is compliant with PPS15 Policy FLD3.

## FLOOD RISK ASSESSMENT

---

Policy FLD4 of PPS15 is concerned with the artificial modification of watercourses. The project will not alter any watercourses, although there will be a crossing of a small drain to the south of Field 6 via a span bridge. The crossing will require a Schedule 6 application to the DfI Rivers Area Office which will be made during the detailed design of the development. The solar farm development is compliant with the standards of Policy FLD4.

DfI Rivers' Reservoir Flood Mapping for Emergency Planning shows that the site is not affected by the potential inundation area of any controlled reservoir. Therefore, Policy FLD5 does not apply.

It is the opinion of RPS that the development is at a low risk of flooding, and the development will not increase flooding elsewhere. In accordance with PPS15, this FRA has demonstrated that:

- a) All sources of flood risk to and from the Proposed Development have been identified; and
- b) There are adequate measures to manage and mitigate any increase in flood risk arising from the development.

## Appendix A

### Dfl Rivers response to planning

Armagh City/Banbridge/Craigavon Borough Council  
Bridgewater House Planning Office  
23A Castlewellan Road  
Banbridge  
BT32 4AX

DfI Rivers Directorate Planning  
Advisory Unit  
44 Seagoe Industrial Estate  
CRAIGAVON  
Co. Armagh  
BT63 5QE  
Tel: 028 3839 9102

Your Ref: LA08/2024/0259/F  
Our Ref: IN1-24-1048

3<sup>rd</sup> May 2024

**Re: Planning Management DfI - Devt. Management - Planning Applications - Armagh City, Banbridge & C'avon BC - Installation and operation of a 29.9MW solar farm including photovoltaic panels, mounting frames, transformer / inverter units, and on-site substation with associated ancillary development including security fencing, pole mounted CCTV - Lands located south of Magheralin and southeast of Dollingstown. From north to south lands comprise: - Parcel 1 – Lands accessing onto Springhill Road, immediately northwest of No.22 Springhill Road, Lurgan and immediately to the rear and northeast of 66, 68 and 70-90 Inn Road, Dollingstown - LA08/2024/0259/F**

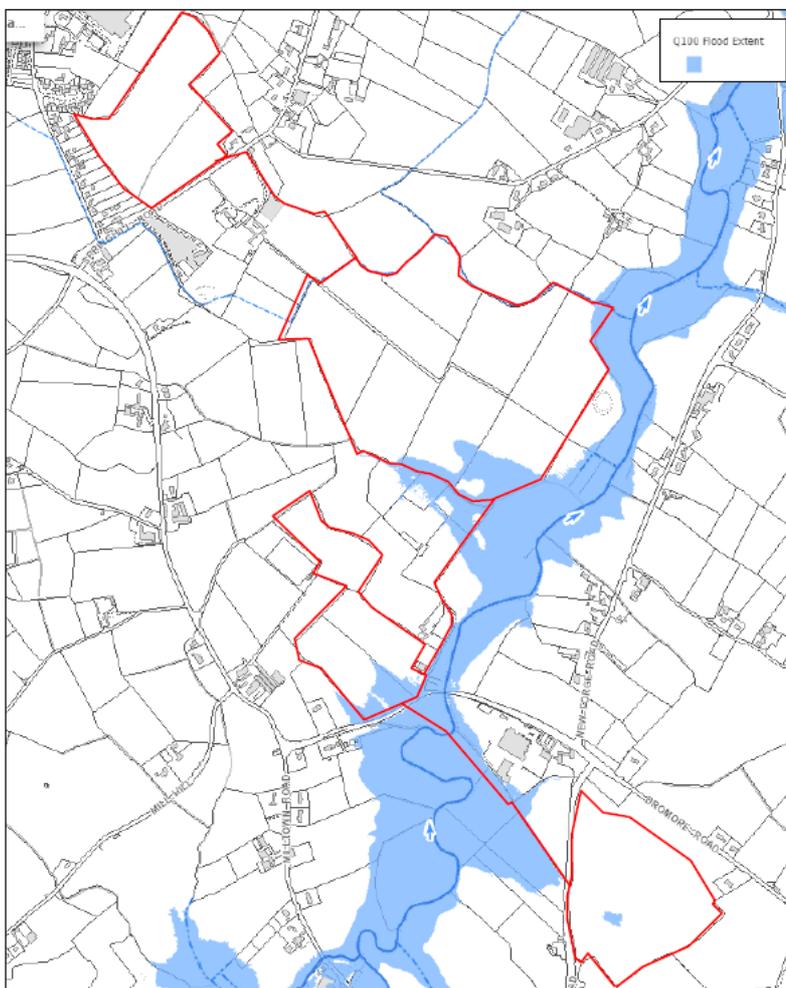
In response to your consultation dated 17th April 2024, with reason for consultation given as “*Please see Flood Risk and Drainage Assessment*”, Rivers Directorate comments in accordance with the SPPS and PPS 15 are as follows.

**FLD1 - Development in Fluvial Floodplains** – Flood Maps (NI) indicate that portions of the site are affected by floodplain (see Q100 flood map below).

In accordance with policy development will not be permitted within the 1 in 100-year fluvial floodplain unless the Planning Authority deems it to be an ‘exception’ or of overriding regional or sub-regional importance, as defined in policy FLD1. Where the principle of development is accepted by the Planning Authority, the applicant is required by policy to submit a flood risk assessment (FRA).

A Flood Risk Assessment has been submitted and only applies if the applicant convinces the Planning Authority that the proposed development meets an exception for development in the flood plain that is listed in the policy. This is a matter for the Planning Authority. If the Planning Authority deem the application an exception for development in the floodplain, Section E6 of the policy recommends adding a freeboard to the predicted 100-year flood level for the underside of the solar panels. Rivers Directorate recommend a 600mm freeboard. The supports for the solar panels should be designed as flood friendly to avoid the accumulation of flood wrack.

Due to their small catchment sizes, some watercourses present have not been modelled by Rivers Directorate and hence have no associated 1 in 100 year fluvial floodplain shown on Flood Maps (NI). However, this does not mean that there is no associated flood risk with these watercourses. Rivers Directorate advises that it remains the applicant's responsibility to appoint a competent professional to assess any associated flood risk and to mitigate the risk to the development and any impacts beyond the site.



predicted 100-year floodplain

**FLD2 - Protection of Flood Defence and Drainage Infrastructure** –the application site is affected by numerous undesignated watercourses. The applicant should provide plans clearly illustrating the location of all undesignated watercourses in and bounding the application site and demonstrate how they are going to be maintained to meet the obligations of Schedule 5 of the Drainage (Northern Ireland) Order 1973 and Planning Policy Statement 15.

Rivers Directorate requires that the maintenance strips shown on site layout drawings be included in any Planning Decision Notice to enable enforcement of the provision of the maintenance strips. Rivers Directorate requests that the maintenance strips are protected from impediments (including tree planting, hedges, permanent fencing), land raising or any future development by way of a planning condition. Access to and from the maintenance strips should be always available.

The application site is also affected by designated open watercourses and therefore this section of the policy applies.

Under 6.32 of the policy a 5m to 10m level maintenance strip is required. The applicant should provide written evidence that the relevant local Rivers Directorate area office\* has been contacted to establish their maintenance needs. Following consultation with the local Rivers Directorate area office the maintenance strips should then be marked up on plan and cross-sectional drawings indicating width and clear access and egress points as agreed for scrutiny by Rivers Directorate Planning Advisory Unit who will advise the Planning Authority accordingly. Access to and from the maintenance strips should be always provided.

When approved, the maintenance strips should then be protected from impediments (including tree planting, hedges, permanent fencing, sheds etc.), land raising or future unapproved development by way of a planning condition.

\*Rivers Directorate Lisburn

Ravarnet House,

Blaris Industrial Estate,

Altona Rd,

Lisburn BT27 5QB

**FLD3 - Development and Surface Water** –this section of the policy applies in line with bullet points 2 and 3 of the policy. The Drainage Assessment implies that there will be no dedicated drainage system provided and that storm water run-off from the solar panels and other buildings will be allowed to soakaway in the underlying ground. The efficiency of this depends on the permeability of the underlying soils which is not an area of expertise for Rivers Directorate.

**FLD4 - Artificial Modification of watercourses** –there is indication in the conclusions to alter a watercourse. Planning permission is required in accordance with planning policy if it is proposed to alter any watercourses.

Under FLD 4 of Planning Policy Statement 15, artificial modification of a watercourse is normally not permitted unless it is necessary to provide access to a development site or for engineering reasons. This is a matter for Planning NI.

Any alteration of a watercourse approved by Planning Service will also be subject to approval from Rivers Directorate under Schedule 6 of the Drainage Order 1973. These two approvals do not go hand in hand (refer to paragraph 6.46 of the policy).

**FLD5- Development in Proximity to Reservoirs**--This part of the policy is not applicable.

### **Flood risk in the climate change scenario**

Rivers Directorate advises the planning authority that, based on the most up to date modelling information on predicted flood risk available to the Department, the climate change flood maps (see map below), indicate portions of the site lie within the 1 in 100-year climate change fluvial floodplain.

DfI Rivers considers that in accordance with the precautionary approach, that part of the development proposal, is at risk of potential flooding in the climate change scenario and, unless the planning authority considers it appropriate to apply the 'Exceptions' principle contained within FLD 1, that the proposal would be incompatible with the overall aim and thrust of regional strategic planning policy in relation to flood risk, i.e. to prevent future development that may be at risk from flooding or that may increase the risk of flooding elsewhere. The planning authority is advised to consider this as a material consideration.

The Planning Authority should be aware that the Department for Infrastructure updated its 'Technical Flood Risk Guidance in relation to Allowances for Climate Change in Northern Ireland' on 25th February 2019. The Guidance and associated documentation can be accessed or downloaded via the Department for Infrastructure's web page as follows: <https://www.infrastructure-ni.gov.uk/publications/technical-flood-risk-guidance-relation-allowances-climate-change-northern-ireland>.

The latest flood maps for rivers, sea and surface water for the present day and climate change (2080 year) epoch modelling scenarios, as per the above-mentioned technical guidance, are available to view on the Department's Flood Maps (NI) viewer at <https://www.infrastructure-ni.gov.uk/topics/rivers-and-flooding/flood-maps-ni>.



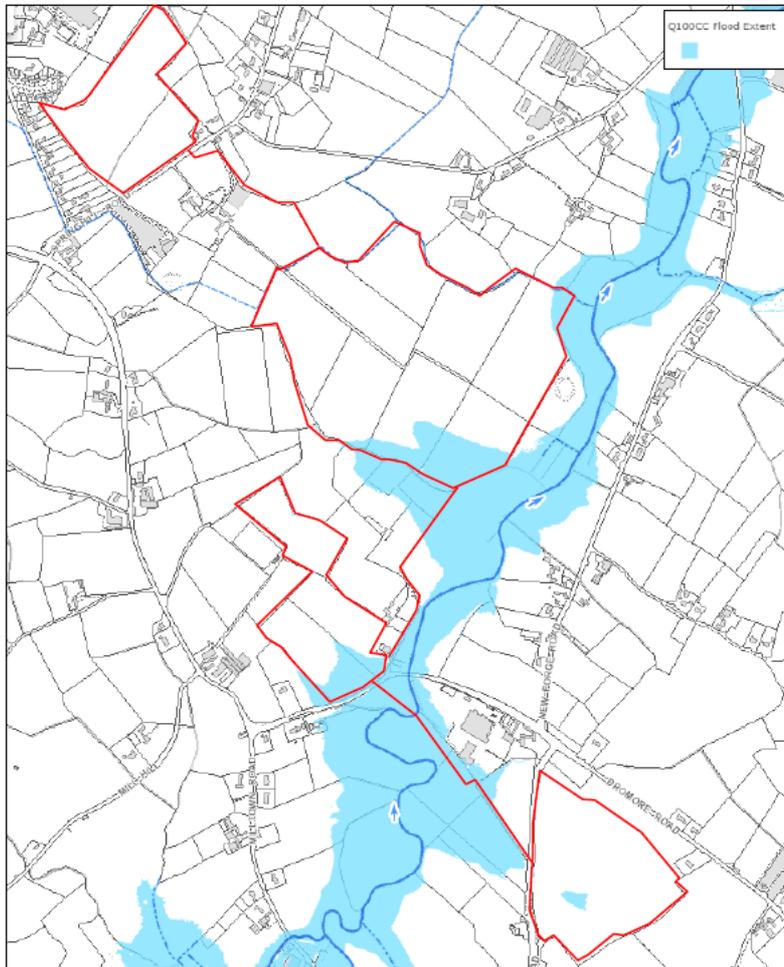
Department for

**Infrastructure**

An Roinn

**Bonneagair**

[www.infrastructure-ni.gov.uk](http://www.infrastructure-ni.gov.uk)



Predicted 100-year floodplain with climate change

**Under the terms of Schedule 6 of the Drainage (Northern Ireland) Order 1973 the applicant must submit to Rivers Directorate, for its consent for any proposal to carry out works which might affect a watercourse such as bridging, culverting, diversion, building adjacent to or discharge of storm water etc. Failure to obtain such consent prior to carrying out such proposals is an offence under the aforementioned Order which may lead to prosecution or statutory action as provided for.**

*Please note that use of any map provided, and/or flood levels referenced above, is subject to the Terms and Conditions of Flood Maps (NI) and the associated guidance available at the Department for Infrastructure's website [Flood Maps NI | Department for Infrastructure \(infrastructure-ni.gov.uk\)](http://www.infrastructure-ni.gov.uk)*

## **PLANNING INFORMATIVES**

In addition to the foregoing points the Agency would recommend that planning informatives as set out below should be included in any planning decision.

**Informative Numbers E01, E02, E03, E06, E10, E11.**

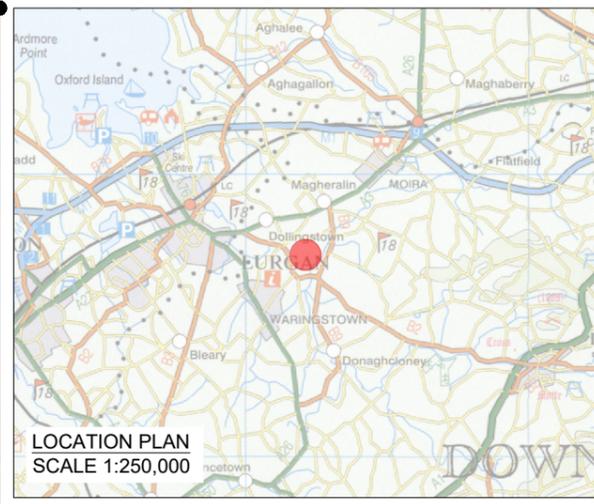
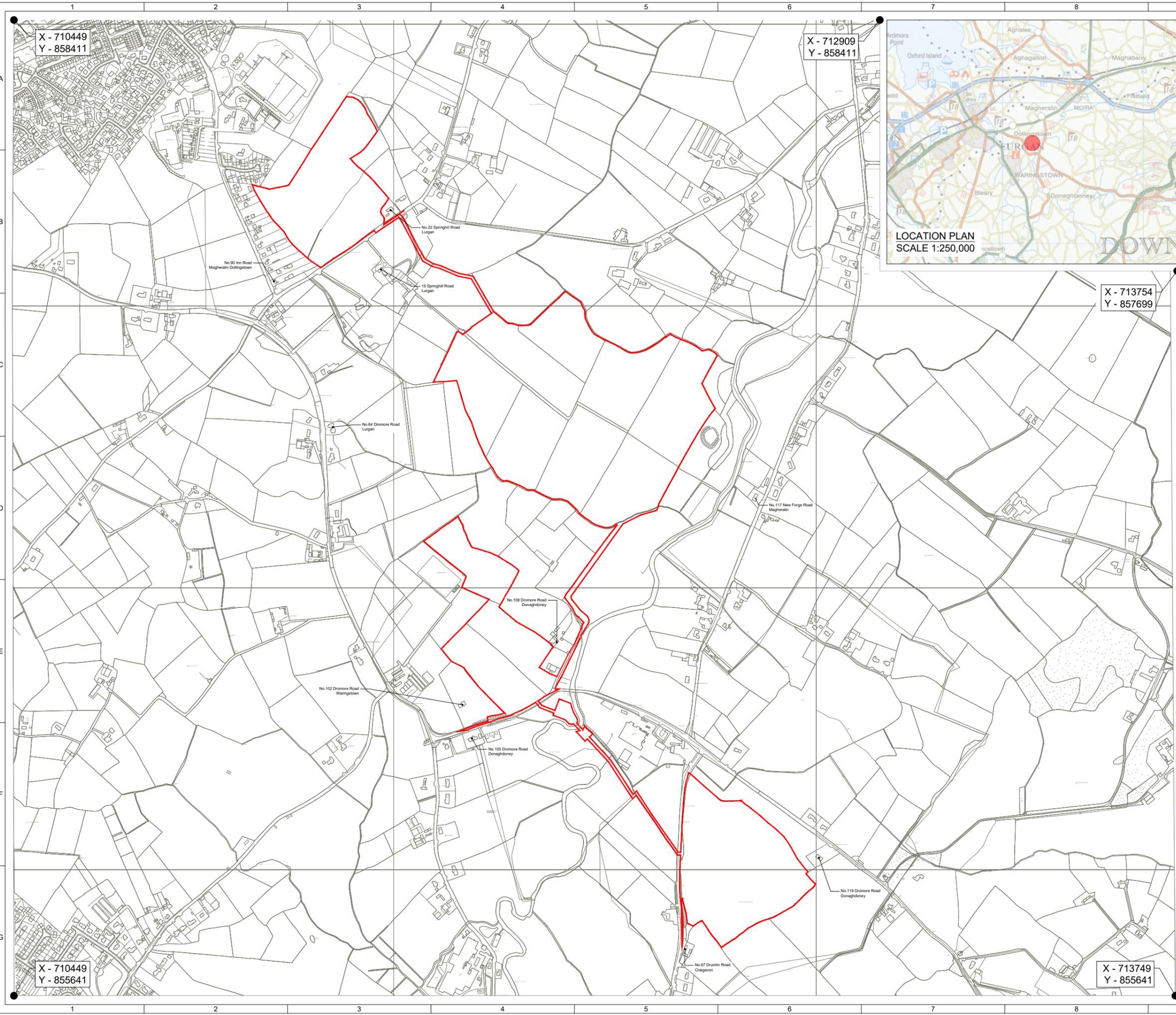
If you require any additional information or clarification, please contact me at the above address quoting the reference number.

A Bell

**Rivers Directorate Planning Advisory Unit**

## Appendix B

### Site location



THE LAND & PROPERTY SERVICES INTELLECTUAL PROPERTY IS CROWN COPYRIGHT AND IS REPRODUCED WITH THE PERMISSION OF LAND & PROPERTY SERVICES UNDER DELEGATED AUTHORITY FROM THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE, © CROWN COPYRIGHT AND DATABASE RIGHT 2023 LICENCE NO. 242.

**KEY:**  
 **SITE BOUNDARY**  
 (OUTSIDE EDGE OF LINE DENOTES BOUNDARY)

**Produced by:** Francesco Ghergo  
**Renewable Energy Systems Ltd**  
 Registered Office: Beaufort Court,  
 Egg Farm Lane, Kings Langley,  
 Hertfordshire WD4 8LR



SITE LOCATION - NOT TO SCALE



ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES
4	FG	RB	EB	2023-10-27	Minor amends (background map, addresses labels)
3	FG	RB	EB	2023-10-25	Site boundary update (cable route)
2	FG	RB	EB	2023-09-08	Site boundary update
1	FG	RB	EB	2023-01-18	First Issue

PURPOSE		COORDINATES	
PERMITTING		IRENET95 ITM	
SCALE	DATUM	N/A	
1:10,000 @A3			
LAYOUT DRAWING	T-LAYOUT NO		N/A
N/A			

PROJECT TITLE  
**MAGHERALIN**

DRAWING TITLE  
**FIGURE 1  
 SITE LOCATION PLAN**

RES DRAWING NUMBER	REV
05215-RES-LAY-DR-PT-002	4

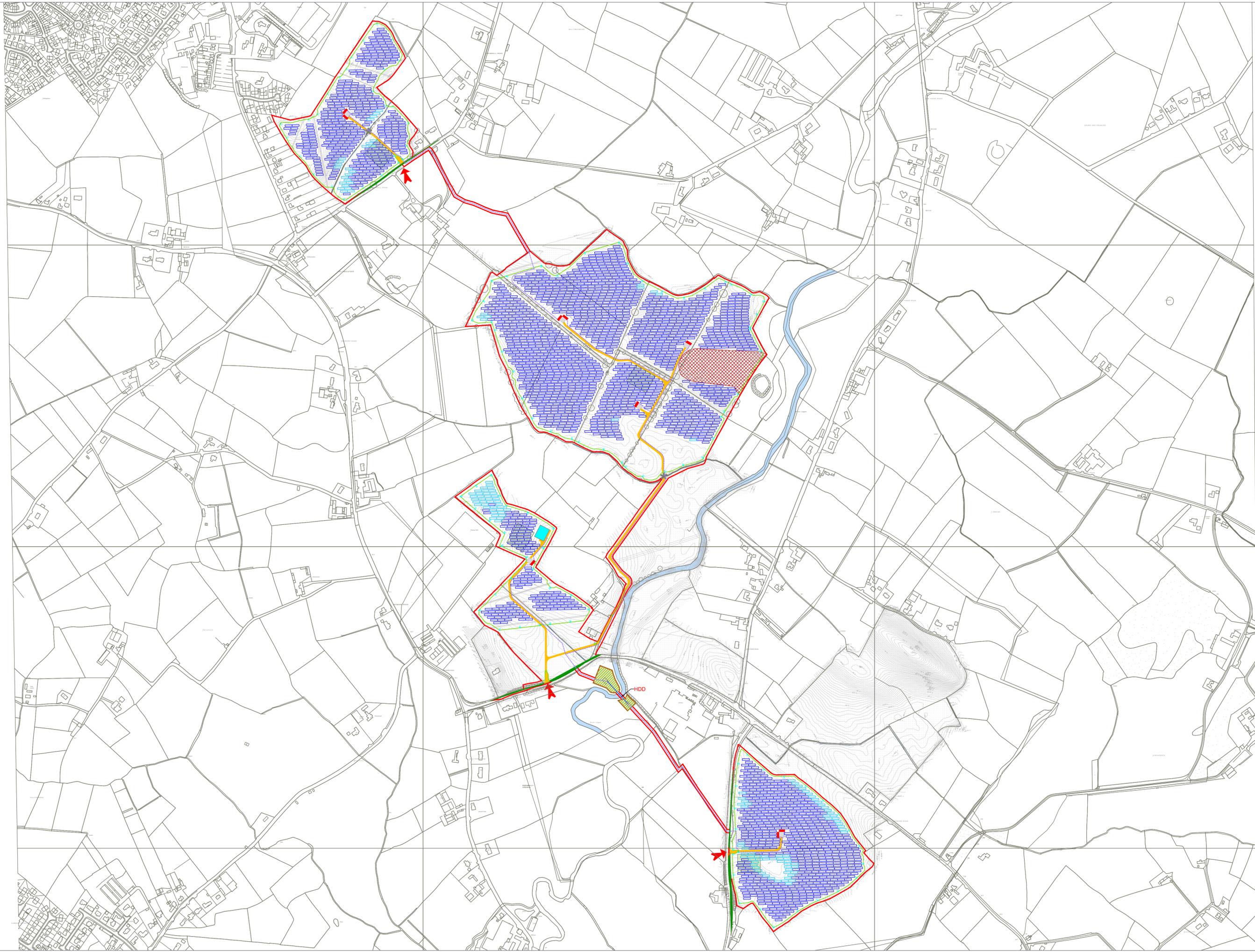
THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LIMITED AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION



BEAUFORT COURT,  
 EGG FARM LANE,  
 KINGS LANGLEY,  
 HERTS WD4 8LR, UK  
 TEL +44 (0) 1923 299200  
 WWW.RES-GROUP.COM

## **Appendix C**

### **Proposed site layout**



## Appendix D

### DfI Rivers response on maintenance requirements

**DfI Rivers Lisburn**

Diane McGinnis  
[Diane.mcginni@rps.tetrattech.com](mailto:Diane.mcginni@rps.tetrattech.com)

Our reference: IN1-24-12154

Dear Madam

**RE: SOLAR FARM AT MAGHERALIN.**

Thank you for your correspondence referring to the above. From a drainage aspect my comments are as follows.

The watercourses in question are known to us as the Ballymacmaine Stream (U3413), Springhill Stream (U3907), Springhill Stream Extension (U3907Ext) and the Lagan (178). These watercourses are designated under the terms of the Drainage (Northern Ireland) Order 1973.

DfI Rivers are satisfied with your proposals of a 5m working strip adjacent to the watercourse as per your email dated 24<sup>th</sup> June 2024.

Please quote above reference number in any future correspondence.

Yours faithfully



Emily Johnston  
Engineering Section



Department for

**Infrastructure**

An Roinn

**Bonneagair**

[www.infrastructure-ni.gov.uk](http://www.infrastructure-ni.gov.uk)

Ravarnet House  
36 Altona Road  
Lisburn  
BT27 5QB  
Tel: 028 9260 6100

5<sup>th</sup> July 2024