

**Ballyvatta 110kV Substation and Grid
Connection**

**Site Specific Flood Risk Assessment
242113-PUNCH-XX-XX-RP-C-001**

June 2024

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1 Introduction

1.1 Background

PUNCH Consulting Engineers were appointed by Tom Phillips + Associates (TPA) on behalf of the Applicant (Ballyvatta Solar Farm Limited), to carry out a Site-Specific Flood Risk Assessment (SSFRA) for the proposed 110kV substation development in Ballyvatta, Co. Cork.

The assessment is carried out in full compliance with the requirements of “The Planning System & Flood Risk Management Guidelines” published by the Department of the Environment, Heritage and Local Government in November 2009 and Cork County Council County Development Plan (CDP).

The proposed site layout is detailed in a series of planning drawings provided by the Applicant in the planning documentation.

1.2 Existing Site

The subject location is a greenfield site in Ballyvatta, Co. Cork. The substation site is situated at 578028 Easting and 578408 Northing to Irish Transverse Mercator (ITM) falling under the jurisdiction of Cork County Council, which is the local authority responsible for the area.

The proposed site is bounded by the existing 220kV substation and L6989 Ballynanelagh local road to the south, and greenfield sites to the north, east and west. Access to the site is provided via the L6989. The location of the site is shown in Figure 1-1.



Figure 1-1: Location of the Proposed development

1.3 Nature of the Proposed Development

The proposed development comprises the construction of a new 110kV substation and associated grid connection route and access road in Ballyvatta, Co. Cork. The proposed substation location is on a greenfield site currently used for agricultural purposes.

The total planning application area including the substation, grid connection route and access road is 5.35 hectares. The substation itself covers approximately 0.8692 hectares. The grid connection route is 1.09km in length.

The access road will be constructed along the eastern boundary of the existing 220kV substation for deliveries and maintenance. The proposed grid connection will follow the proposed site access road until it meets the L6989, where it will cross under the existing road and utilities (using horizontal directional drilling to the greenfield area to the south of the road and return to the L6989 where it will connect into the existing 220kV Substation.

An extract from the site layout is included in Figure 1-2.

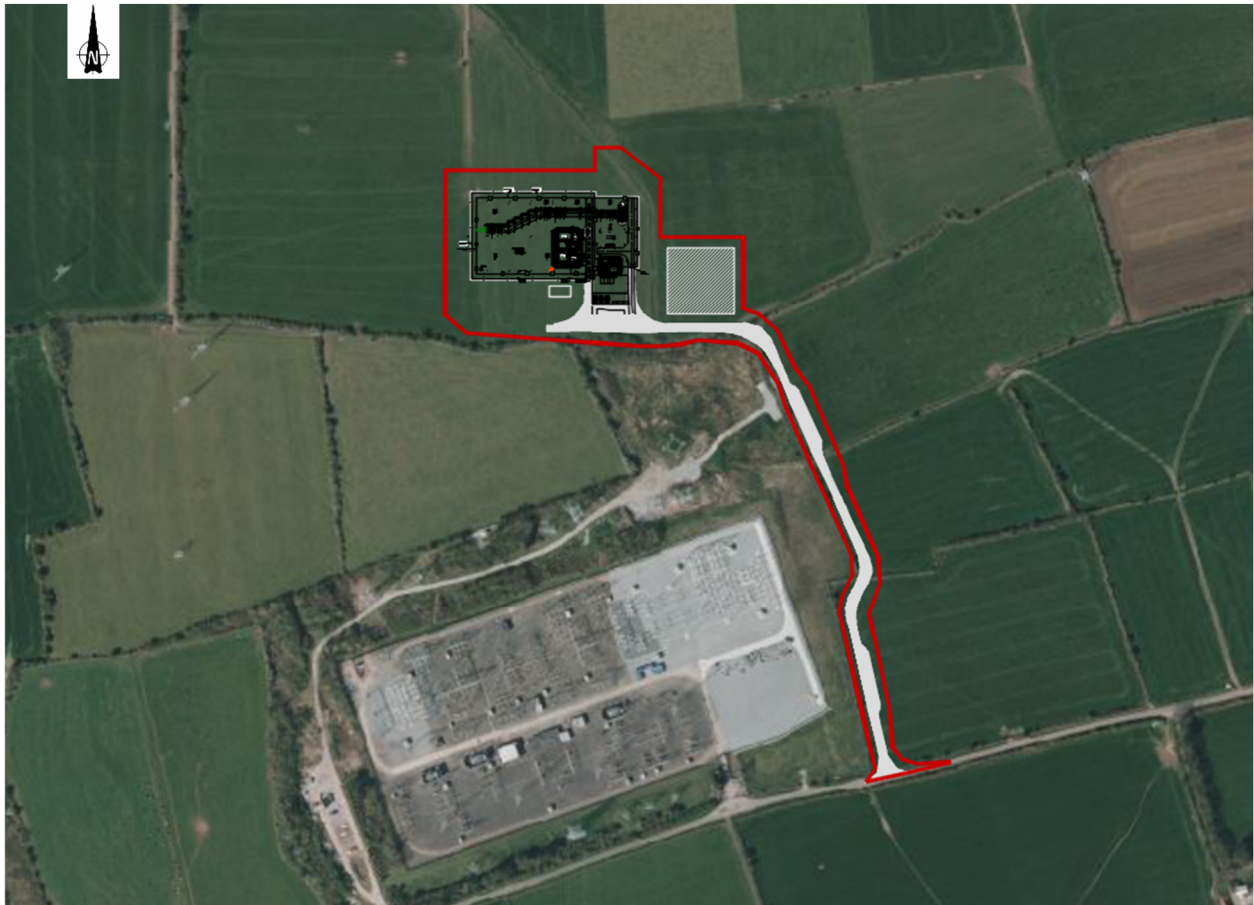


Figure 1-2: Proposed Site Layout

2 Relevant Guidance

2.1 The Planning System and Flood Risk Management Guidelines

In September 2008, “The Planning System and Flood Risk Management” Guidelines were published by the Department of the Environment, Heritage and Local Government in Draft Format. In November 2009, the adopted version of the document was published.

The Flood Risk Management Guidelines give guidance on flood risk and development. The guidelines recommend a precautionary approach when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a flood risk sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for river and coastal flooding. The guidelines include definitions of Flood Zones A, B and C, as noted in Table 2-1 below. It should be noted that these do not take into account the presence of flood defences, as there remain risks of overtopping and breach of the defences.

Table 2-1: Flood Zone Designation

Flood Zone	Type of Flooding	Annual Exceedance Probability (AEP)
Flood Zone A	Coastal	Less than a 1:200 (0.5% AEP) year event
	Fluvial	Less than a 1:100 (1% AEP) year event
Flood Zone B	Coastal	Greater than a 1:200 (0.5% AEP) and less than a 1:1000 (0.1% AEP) year event
	Fluvial	Greater than a 1:100 (1% AEP) and less than a 1:1000 (0.1% AEP) year event
Flood Zone C	Coastal	Greater than a 1:1000 (0.1% AEP) year event
	Fluvial	Greater than a 1:1000 (0.1% AEP) year event

Once a flood zone has been identified, the guidelines set out the different types of development appropriate to each zone. Exceptions to the restriction of development due to potential flood risks are provided for through the use of the **Justification Test**, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated. This recognises that there will be a need for future development in existing towns and urban centres that lie within flood risk zones, and that the avoidance of all future development in these areas would be unsustainable.

A three staged approach to undertaking an FRA is recommended:

Stage 1: Flood Risk Identification - Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment;

Stage 2: Initial Flood Risk Assessment - Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and possible mitigation measures;

Stage 3: Detailed Flood Risk Assessment - Assess flood risk issues in sufficient detail to provide quantitative appraisal of potential flood risk of the development, impacts of the flooding elsewhere and the effectiveness of any proposed mitigation measures.

This report addresses the requirements for Stage 1.

2.2 Cork County Development Plan 2022-2028

The Cork County Development Plan (CDP) 2022-2028 has the following objective in relation to the preparation of Flood Risk Assessments:

County Development Plan Objective WM 11-15: Flood Risk Assessments

To require flood risk assessments to be undertaken for all new developments within the County in accordance with The Planning System and Flood Risk Management - Guidelines for Planning Authorities (2009) and the requirements of DECLG Circular P12/2014 and the EU Floods Directive.

- For sites within Flood Zone A or B, a site-specific Flood Risk Assessment will be required.*
- For sites within Flood Zone C, an examination of all potential sources of flooding, and consideration of climate change (flood risk screening assessment), will be required. In limited circumstances where the 'Flood Risk Screening assessment' identifies potential sources of flood risk, a site-specific flood risk assessment may also be required.*
- All proposed development must consider the impact of surface water flood risks on drainage design through a Drainage Impact Assessment. The drainage design should ensure no increase in flood risk to the site, or the downstream catchment.*

A Strategic Flood Risk Assessment (SFRA) was prepared in 2022 to accompany the Cork CDP and states the following in relation to the preparation of an SSFRA.

- 5.2.3 *Assessment of flood risk is required in support of any planning application. The level of detail will vary depending on the risks identified and the proposed land use. As a minimum, all proposed development, including that in Flood Zone C, must consider the impact of surface water flood risks on drainage design. In addition, flood risk from sources other than fluvial and tidal should be reviewed. The assessment may be a qualitative appraisal of risks, including drainage design. Alternatively, the findings of the CFRAM, or other detailed study, may be drawn upon to inform finished floor levels. In other circumstances a detailed modelling study and flood risk assessment may need to be undertaken. Further details of each of these scenarios, including considerations for the flood risk assessment are provided in the following sections.*

2.3 Land Designation

The site is located within the Metropolitan Cork Strategic Planning Area and within a "Rural Area Under Strong Urban Influence" in the Cork CDP 2022-2028.

3 Flood Risk Identification

3.1 Existing Hydrological Environment

The existing hydrological environment is characterised primarily by the presence of the River Butlerstown. A Butlerstown_020 tributary flows in the north-south direction to the north of Knockraha village (approximately 1.3km from the northern boundary of the site). Two Butlerstown_030 tributaries flow in the north-south direction approximately 615m east and 675m west of the site. 2 no. bridges located along the L6989 span the Butlerstown_030 tributaries.

A drainage ditch noted during the site walkover, runs through the planning area indicated for the development. The drainage ditch will largely be respected and maintained outside the eastern boundary of the proposed substation. A section of the drainage ditch will be diverted away from the north-eastern corner of the substation. It will also be culverted for a short distance under the proposed access road. This culvert is not a consideration of the SSFRA and will be assessed as part of the detailed design of the internal drainage network.

The hydrological environment based on the EPA GIS database around the site is shown in Figure 3-1 below.

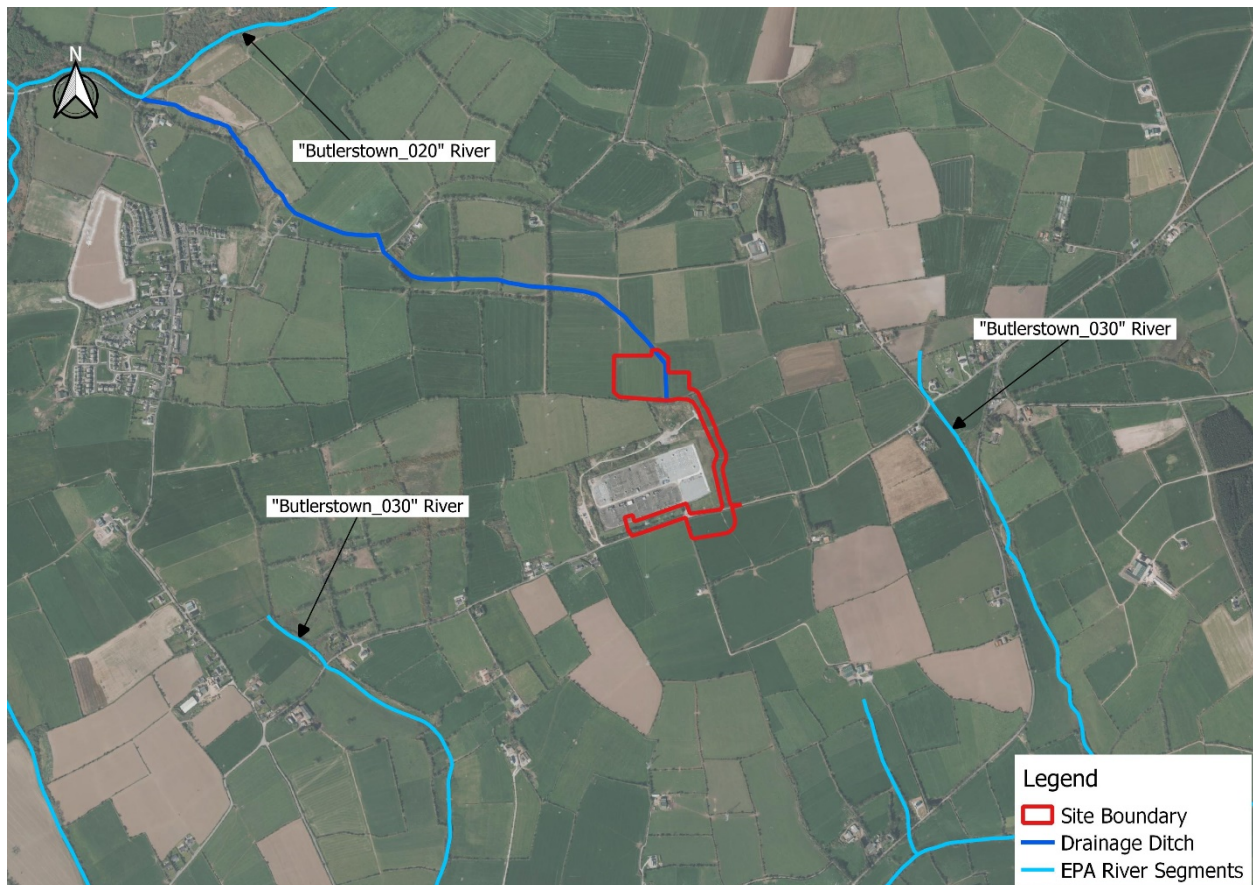


Figure 3-1: Hydrological environment around the site

3.2 Topographical Survey

A topographical survey of the site and its environs show the substation site as having a level ranging from 145-149mOD. The proposed finished ground level of the substation is 147.3mOD. Please refer to Figure 3-2 below for an extract of the topographical survey.



Figure 3-2: Extract from Topographical Survey

A review of the publicly available EPA contour data for the wider area shown in Figure 3-3, highlights that the Butlerstown_030 tributaries to the east and west of the site, flow southwards from their sources at starting elevations of approximately 145mOD and 95mOD respectively.

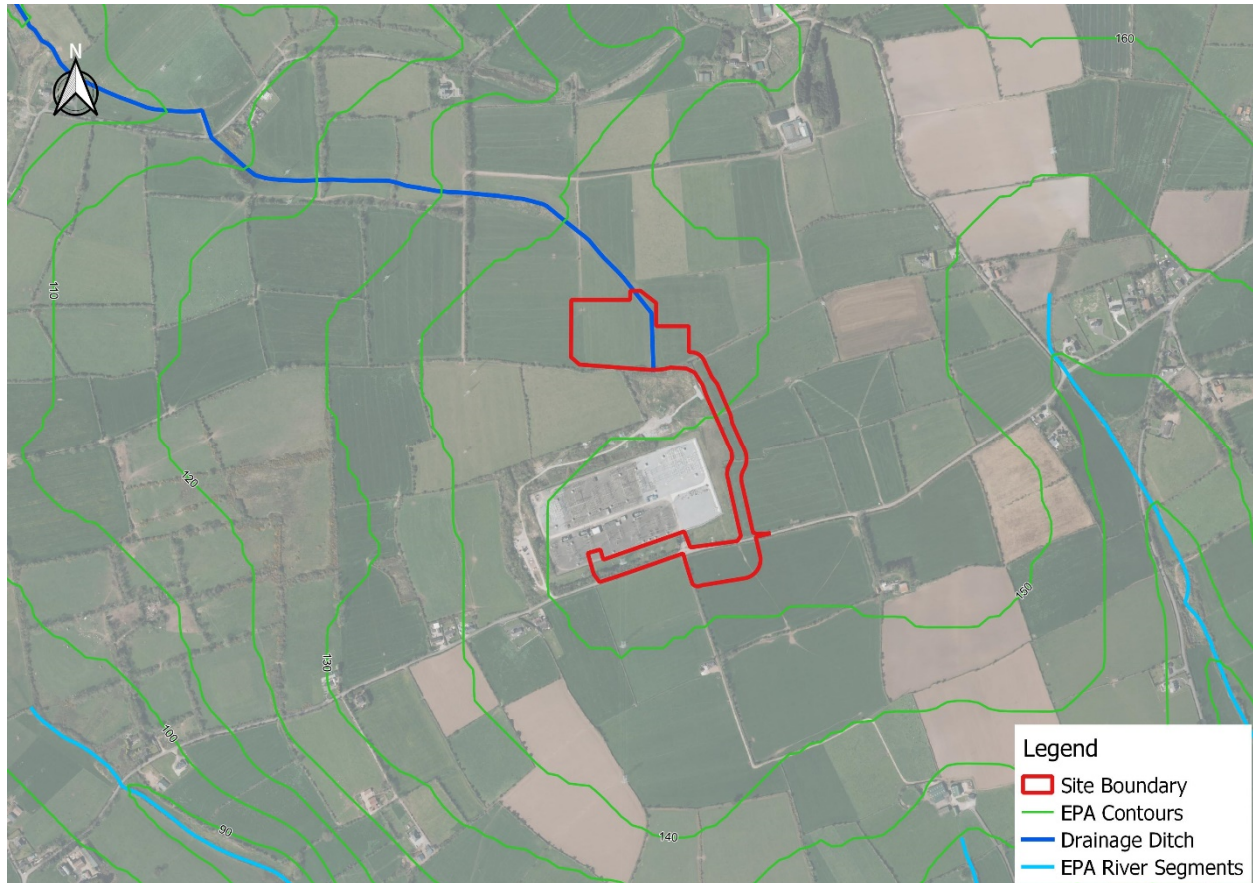


Figure 3-3: EPA Contour Data

3.3 Site Walkover

PUNCH Consulting Engineers conducted a site walkover at the subject location on the 15th March 2024 to assess the conditions and key features of the site, to establish any potential sources of flooding and to identify the likely routes of flood waters. Appendix A contains a selection of key images taken during the site visit.

The following was established from the site visit:

- a) The proposed substation site comprises thick grassland which is currently used for agriculture.
- b) A drainage ditch lines the northern, eastern and southern edges of the property.
- c) The drainage ditch along the southern boundary channels runoff from the higher lands to the south towards the drainage ditch to the east.
- d) The site is noticeably wet, particularly at the lower lying areas to the north and east adjacent to the drainage ditch.
- e) Rushes were observed within the site indicating that it is often marshy.
- f) Trees, hedging and dense undergrowth line the southern boundary forming a screen between the proposed site and the greenfield site and existing 220kV substation site to the south.
- g) The proposed access road will require approximately 30m of hedgerow removal.
- h) Pooling of water was evident at the proposed entrance off the L6989.
- i) Two Butlerstown River tributaries flow from north-south crossing under the L6989 at two different low points approximately 615m east and 675m west of the site.

The site observations have been shared with the design team to ensure that they are dealt with within the site works design.

3.4 Review of Historic Mapping

A review of the OSI Historical maps was carried out. Figure 3-4 shows an extract from the 25-inch historic mapping and the site is not identified as “liable to flood”.

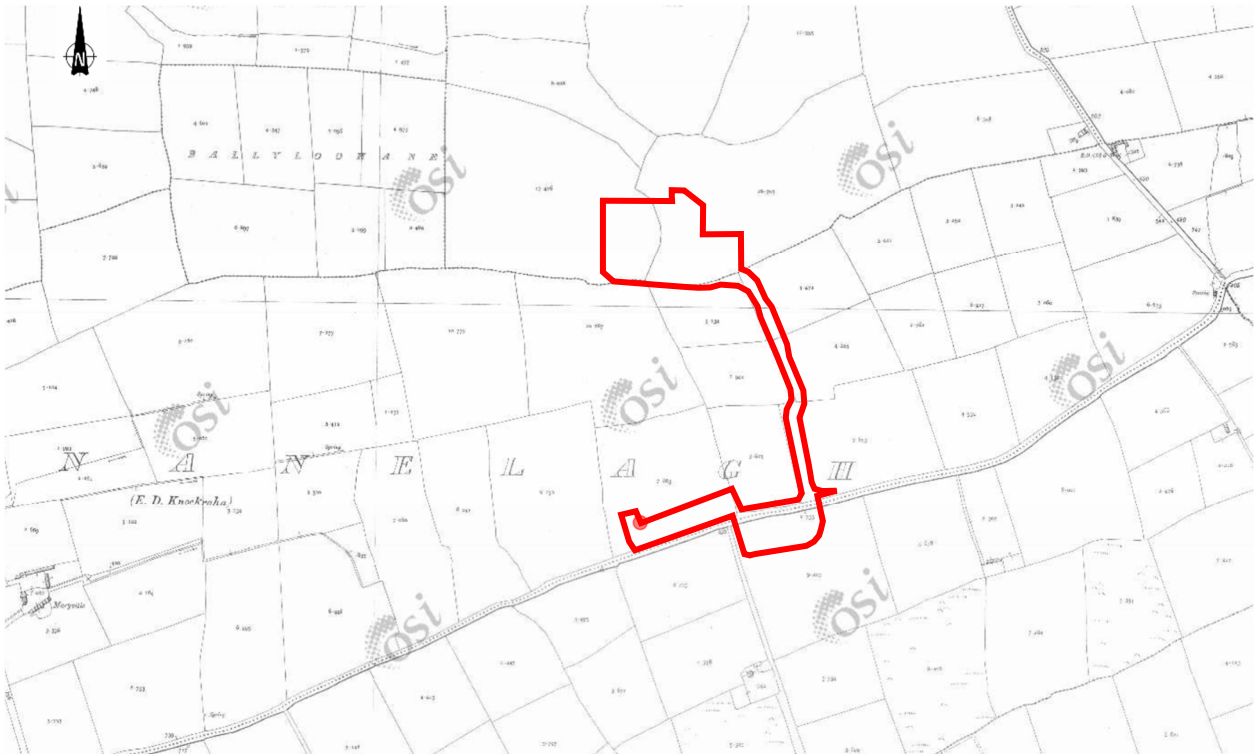


Figure 3-4: Extract from OSI historical 25-inch map

3.5 History of Flooding

The Office of Public Works (OPW) Flood Hazard Mapping website holds a record of historic flood events. A review of the database indicated that there have been no instances of flooding within 2.5km of the proposed site as shown in Figure 3-5. See Appendix B for the full report.

Please note that this is not a guaranteed record of all flood events.

Past Flood Event Local Area Summary Report



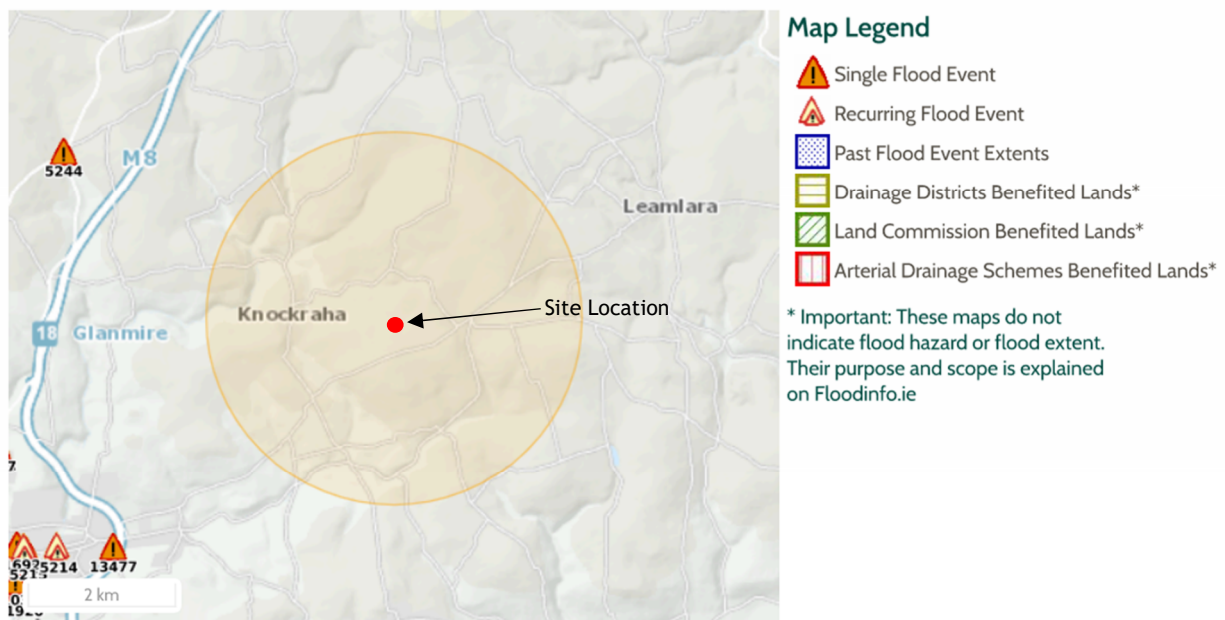
OPW

Oifig na
nOibreacha Poiblí
Office of Public Works

Report Produced: 2/4/2024 10:35

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "Website"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



0 Results

Name (Flood_ID)	Start Date	Event Location
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Figure 3-5: Extract from OPW Past Flood Event Local Area Summary Report
<http://www.floodmaps.ie/index.aspx?ReturnUrl=%2fView%2fDefault.aspx>

3.6 Site Geology

The geology of the site was reviewed using data from the Geological Survey of Ireland (available at www.gsi.ie). The soil type at the location of the proposed development as seen in Figure 3-6 comprises predominately of 'deep well drained mineral soil' with a section of the cable route to the south consisting of 'made ground'.



Figure 3-6: Geology of the surrounding area (source: Geological Survey of Ireland (www.gsi.ie))

3.7 Groundwater Flooding

Groundwater flooding occurs when the level of the water stored in the ground rises as a result of prolonged rainfall. A review of data from the Geological Survey of Ireland, does not indicate a groundwater flood risk to the site.

3.8 Pluvial Flooding

Pluvial flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high intensity rainfall.

The provision of a suitable surface water drainage system including SuDS measures for the proposed development on the site will mitigate against pluvial flood risk. The development of the site will not adversely affect pluvial flood levels or extents in the area.

3.8.1 Review of Existing Surface Water Infrastructure

A review of the surface water drainage network in the area was undertaken based on the Irish Water GIS database and site walkover. There is no surface water drainage infrastructure in the vicinity of the site.

3.9 Fluvial Flooding

Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain.

3.9.1 National Indicative Fluvial Mapping

The OPW published the National Indicative Fluvial Mapping (NIFM) in 2021, which are publicly available on <https://www.floodinfo.ie/map/floodmaps/>. The NIFM is a series of preliminary mapping or catchments greater than 5km² which are not covered in the OPW's Catchment Flood Risk and Management (CFRAM) programme. These maps are 'predictive' flood maps showing indicative areas predicted to be inundated during a theoretical fluvial flood event with an estimated probability of occurrence.

The National Indicative Fluvial Mapping shown in Figure 3-7 indicates that the site is outside the 1% and 0.1% Annual Exceedance Probability (AEP) NIFM flood extents.

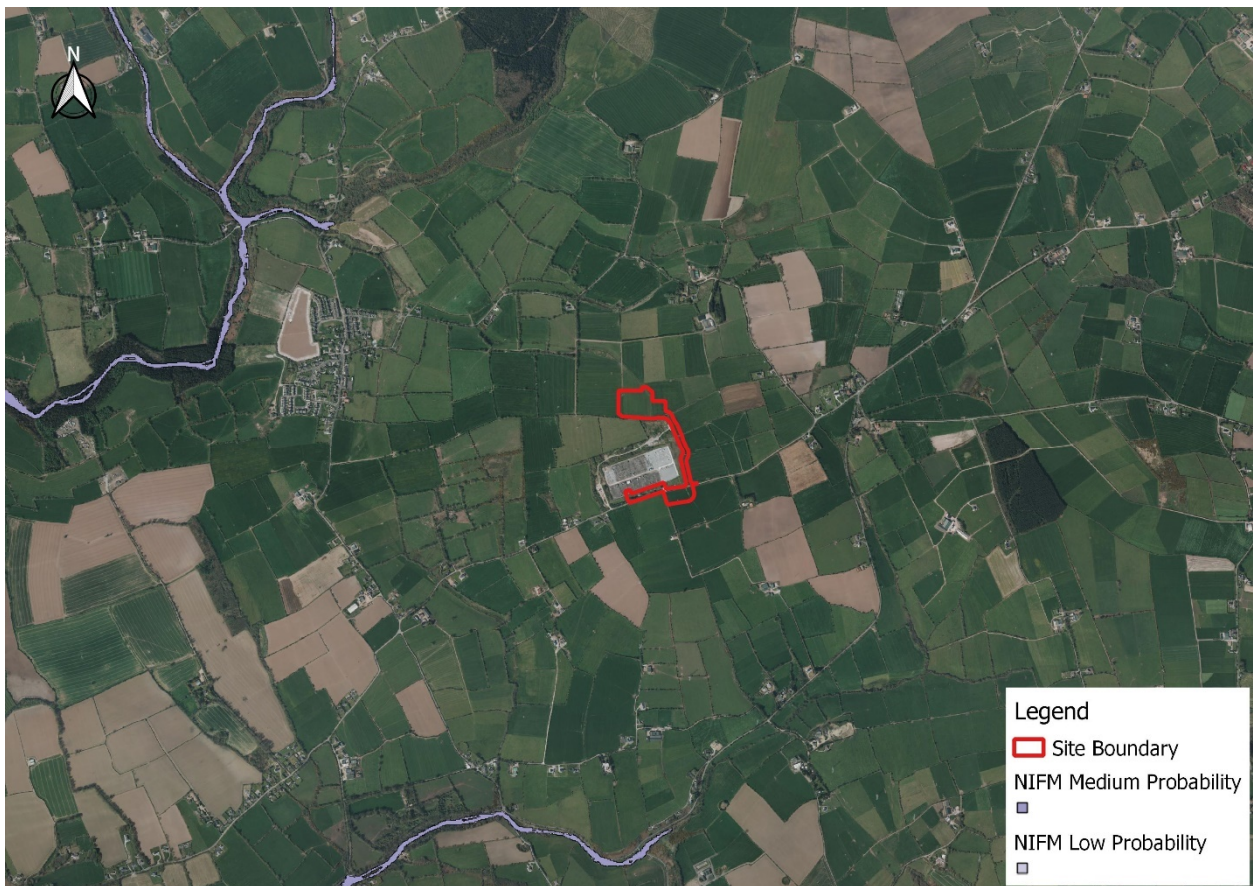


Figure 3-7: NIFM Flood Extent Mapping

3.10 Cork CDP 2022-2028 Strategic Flood Risk Assessment

Flood Zone mapping was prepared as part of the Cork CDP 2022-2028 SFRA. An extract of this is shown in Figure 3-8 below:



Figure 3-8: Cork CDP 2022-2028 Flood Zone Mapping

It can be seen from Figure 3-8 that the site is located outside of Cork CDP designated Flood Zones A and B.

3.11 Coastal Flooding

Coastal flooding results from sea levels which are higher than normal and result in sea water overflowing onto the land. Coastal flooding is influenced by the following three factors which often work in combination: high tide level, storm surges and wave action. Examination of CFRAMS coastal flood extent mapping and the National Coastal Flood Hazard Mapping (NCFHM) does not reveal any coastal flood risk to the site.

3.12 Estimate of Flood Zone

Following a review of the available flooding information outlined in the above sections, PUNCH Consulting Engineers have concluded that the site is located in Flood Zone C.

3.13 Sequential Approach

“The Planning System and Flood Risk Management” Guidelines published by the OPW set out a sequential approach to managing flood risk and to avoid development in areas that are at risk. A graphical representation of the Sequential Approach is included in the guidelines and is shown here as Figure 3-9.

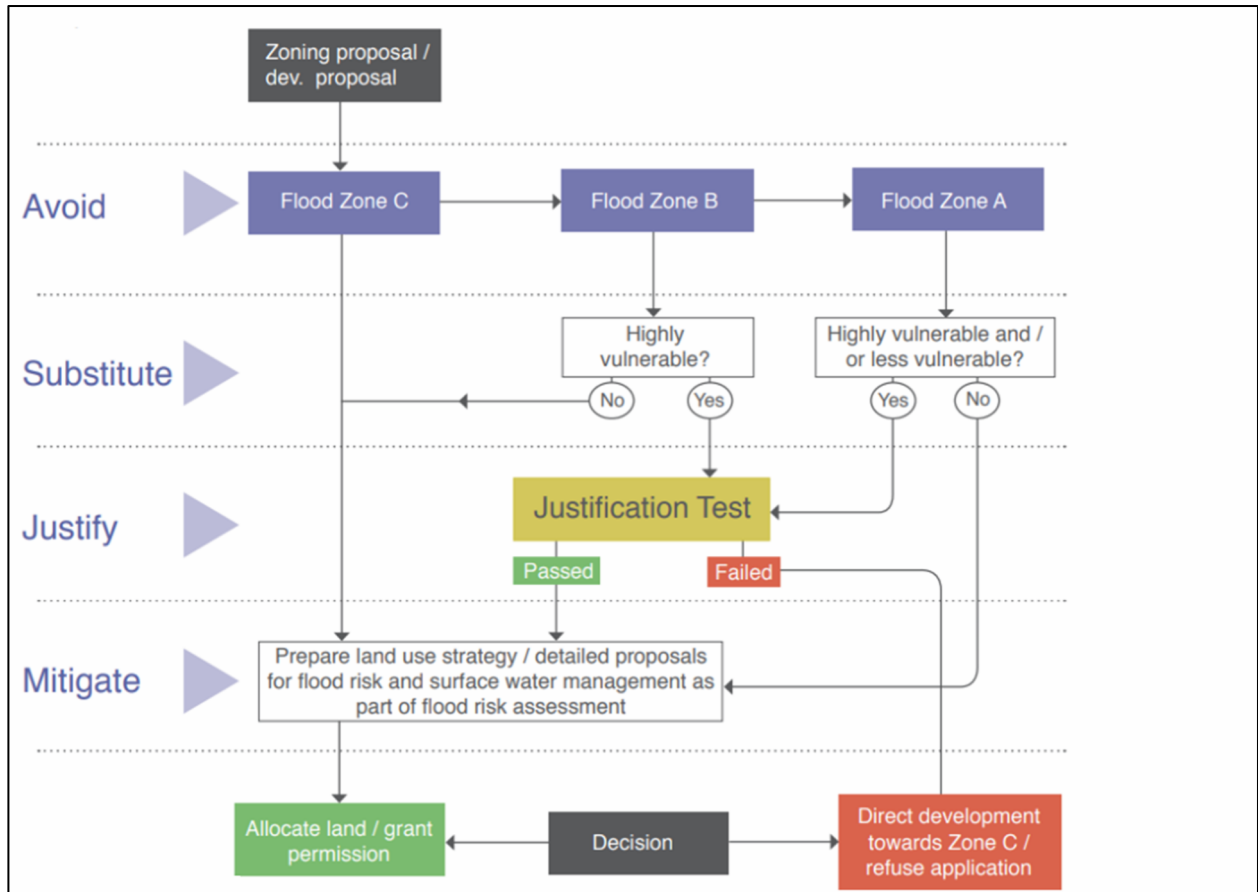


Figure 3-9: Graphical Representation of the Sequential Approach (The Planning System and Flood Risk Management” Guidelines 2009¹)

Given that the site is wholly located in Flood Zone C, the proposed development is deemed appropriate when examined using the sequential approach shown above. Surface water management for the proposed development will be dealt with as required under the CDP and will be addressed within a separate Engineering Report at detailed design stage.

¹ The Planning System and Flood Risk Management Guidelines [68fb690f-3c30-4649-a788-1b5129b3b610.pdf](https://www.gov.ie/publications/68fb690f-3c30-4649-a788-1b5129b3b610.pdf) (www.gov.ie)

4 Conclusions

PUNCH Consulting Engineers were appointed by Tom Phillips + Associates on behalf of the Applicant Ballyvatta Solar Farm Limited, to carry out a Site-Specific Flood Risk Assessment for the proposed 110kV substation development in Ballyvatta, Co. Cork.

This Site-Specific Flood Risk Assessment has been carried out in accordance with *“The Planning System & Flood Risk Management Guidelines”* published by the Department of the Environment, Heritage and Local Government in November 2009 and the Cork County Development Plan 2022-2028.

National Indicative Flood Mapping (NIFM) and the Cork CDP 2022-2028 Flood Zone mapping were consulted to assess the appropriate Flood Zone for the site. It was determined that the site is currently located in Flood Zone C. The proposed development is therefore considered to be at low risk of flooding and is deemed appropriate for the site.

The proposed development is at a low risk of flooding and is deemed appropriate provided the residual risk of pluvial flooding is addressed by on site surface water drainage.

Appendix A Site Visit Images



Image 1: View looking east at proposed entrance



Image 2: View looking west at proposed entrance



Image 3: Pooling of water visible at proposed entrance for access road



Image 4: Drainage ditch along eastern boundary of proposed substation site



Image 5: Drainage ditch along northern boundary of proposed substation site



Image 6: View of proposed substation site looking south from northern boundary



Image 7: View of proposed substation site looking north from southern boundary



Image 8: Drainage ditch along southern boundary of proposed substation site



Image 9: Proposed cable route location along the L6989 to the south of the existing 220kV substation site



Image 10: Existing bridge along the L6989 spanning the Butlerstown River tributary (approximately 615m east of the proposed site)



Image 11: View of Butlerstown River tributary (approximately 615m east of the proposed site)



Image 12: Existing bridge along the L6989 spanning the Butlerstown River tributary (approximately 675m west of the proposed site)



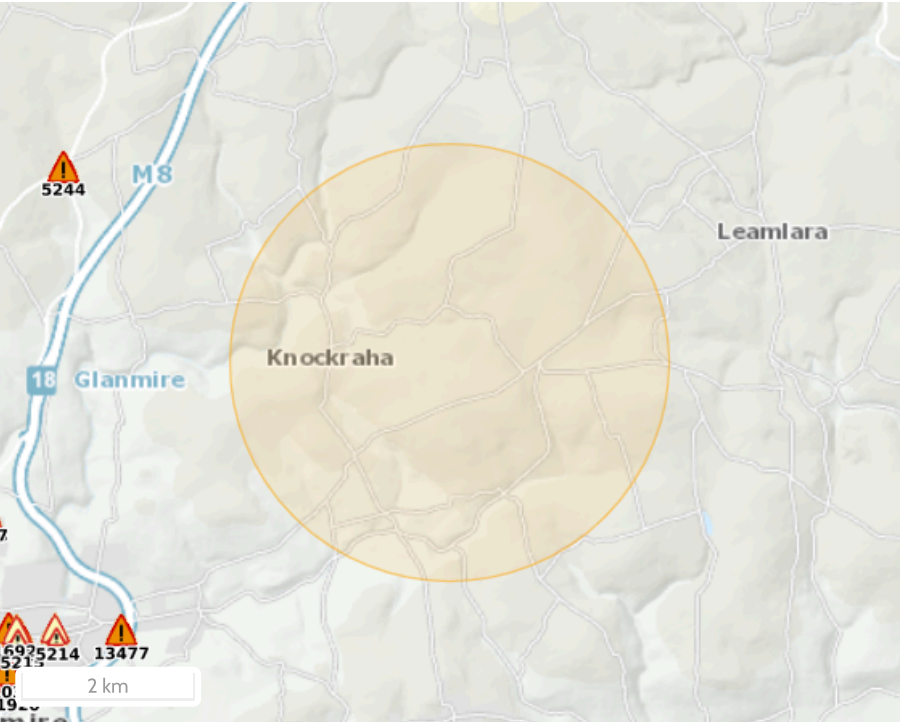
Image 13: View of Butlerstown River tributary (approximately 675m west of the proposed site)

Appendix B OPW Historic Flood Events Record

Report Produced: 2/4/2024 10:35

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Map Legend

-  Single Flood Event
-  Recurring Flood Event
-  Past Flood Event Extents
-  Drainage Districts Benefited Lands*
-  Land Commission Benefited Lands*
-  Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

0 Results

Name (Flood_ID)	Start Date	Event Location
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