

Flood Risk Assessment

Ballinahinch, Ashford, Co. Wicklow

M02169-01_DG02 | May 2024



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DOCUMENT CONTROL

DOCUMENT FILENAME	M02169-01_Dg02 Ballinahinch, Ashford, Co. Wicklow Fra Rev 2
DOCUMENT REFERENCE	M02169-01_DG02
TITLE	Flood Risk Assessment
CLIENT	Wicklow County Council
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REVISION HISTORY

Rev. Ref.	Date	Prep	Chk	App	Amendments	Reason for Issue
1	10/04/2024	PS	DKS	DKS	ORIGINAL	DRAFT FOR REVIEW
2	21/05/2024	PS	DKS	DKS	MINOR AMENDMENTS	ISSUED FOR INFORMATION

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Recipient	Revision					
	1	2	3	4	5	6
FILE	✓	✓				
CLIENT	✓	✓				

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1 INTRODUCTION

1.1 Terms of Reference

This Flood Risk Assessment (FRA) report was commissioned by Wicklow County Council to inform and support a planning application for the proposed development at Ballinahinch, Ashford, Co. Wicklow. The proposed development site is hereafter referred to as 'the site'.

1.2 Statement of Authority

This report / assessment has been prepared and reviewed by qualified professionals with appropriate experience in flood risk, drainage, wastewater, and hydraulic modelling studies. The key staff members involved in this project are as follows:

- Paul Singleton *BEng (Hons) MSc CEng MIEI* – Chartered Civil / Environmental Engineer specialising in flood risk assessment, drainage, and SuDS, and an industry-recognised professional having given training courses related to these fields in both Ireland and the UK.
- Kyle Somerville *BEng (Hons) CEng MIEI* – Associate / Senior Engineer specialising in flood risk assessment, flood modelling, drainage, and surface water management design.

1.3 Purpose

This assessment is intended to produce a detailed FRA to ensure that all relevant issues related to flooding are addressed. This Stage 3 FRA will assess the adequacy of existing information and present analysis undertaken to supplement existing data.

The assessment will determine potential sources of flooding at the site. It will also determine the suitability of the site for future development based on relevant flood risk management planning policy guidelines and propose appropriate design and mitigation measures, where appropriate, to be considered as part of the development proposal.

1.4 Approach to the Assessment

Consideration has been given to the sources and extent of fluvial flooding at the site, as well as flooding from overland flow and ponding of localised rainfall at the site.

The method of assessment applied complies with the Source-Pathway-Receptor model and provides a spatial assessment of flood risk to people, property, and the environment at the site. Existing runoff characteristics and the potential impact of the proposed development on pluvial (surface water) runoff are also considered.

For the purposes of this assessment, the primary stakeholders are the Office of Public Works (OPW) and Wicklow County Council (CC). OPW and Wicklow CC data is used to inform this assessment.

1.4.1 Hydraulic Model Status

The site and surrounding environs are included within the OPW CFRAM programme and maps of fluvial flooding produced as part of the study are included in and considered by this assessment.

Review of CFRAM model and associated maps, in conjunction with Wicklow CC, in the context of recorded flooding show a significant underestimation. The hydraulic models supporting the CFRAM are not known to be permitted to be made available to third parties under licence or otherwise for investigation or updating. Therefore, a Flood Study has been undertaken by McCloy Consulting.

The Flood Study (ref.: M02169-01_FL01) has sought to re-model the Vartry River using existing CFRAM survey information but simulate with new flow estimates to establish a revised flood baseline. As such topographic survey data used to produce flood models has been supplied to McCloy Consulting on behalf of Wicklow CC. The detailed site-specific model results summarised in this report are intended to supersede existing flood maps / data and are considered fit for purpose for this assessment.

1.4.2 Planning Guidelines

The requirements for FRAs are generally as set out in the OPW's 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities, Technical Appendix A' published by the OPW and Department of the Environment, Heritage and Local Government in November 2009 (hereafter referred to as the 'OPW Guidelines'). The OPW Guidelines are supplemented by 'Departmental Circular PL 2/2014', issued by the Department of Environment, Community and Local Government on 13th August 2014, which relates to the use of OPW flood mapping in assessing planning applications and provides clarifications of advice contained within the OPW Guidelines. Further guidance is also provided in the CIRIA Research Project 624 'Development and Flood Risk: Guidance for the Construction Industry'.

Planning Guidelines applicable to the site is implemented in the Wicklow County Development Plan 2022-2028, and specifically through the Strategic Flood Risk Assessment (SFRA) for the Wicklow County Development Plan.

The SFRA was prepared in accordance with the requirements of the 'Planning Guidelines' and adopts an identical flood zone standard to the national planning guidelines. Flood Zones are the extent of a design flood event that determines the suitability of development from a flood risk viewpoint and are defined in both the SFRA and Planning Guidelines as follows:

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 and 0.5% or 1 in 200 for coastal flooding).
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding).

The OPW Guidelines clarify that Flood Zones are to be used to determine the suitability of proposed developments and are to be derived from 'present day' hydrological estimates. The OPW Guidelines also state that Flood Zones are generated without the inclusion of climate change and that, in addition to flood zoning, developments should be designed to be resilient to the effects of climate change.

2 DEVELOPMENT AND SITE DETAILS

2.1 Site Location

Figure 2-1: Site Location



2.2 Existing Site Description

The existing site characteristics are as follows:

- The application site comprises undeveloped land adjacent to existing residential development.
- Access is via Ballinahinch Road at the north of the site.

It is noted that the site is split into a 'western section' and an 'eastern section'.

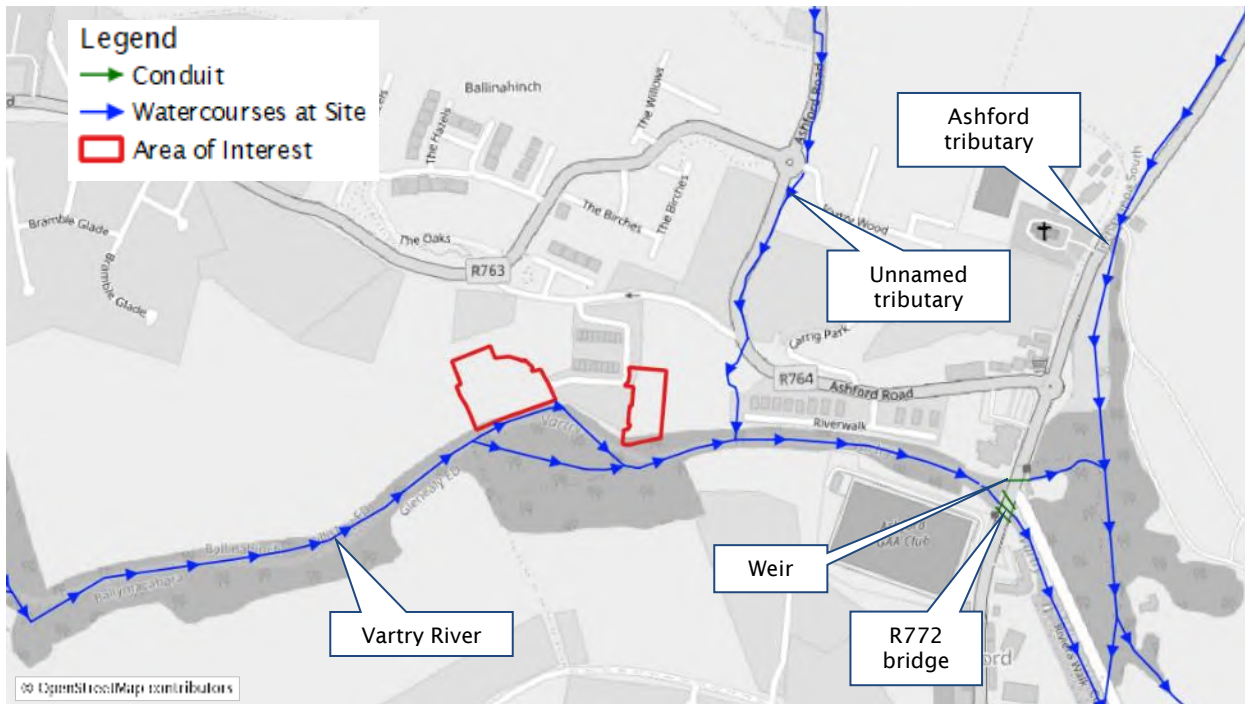
2.3 Affecting Waterbodies

The Vартry River borders the south of the site flowing from west to east. A secondary channel of the Vартry River has developed, this bypasses the bend at the site and re-joins the main channel downstream.

The main structures on the Vартry River comprise R772 road bridge and weir upstream of the bridge.

Two tributaries are noted to join the Vартry downstream of the site. These include an unnamed minor tributary upstream of Riverwalk and Ashford tributary joining the Vартry River downstream of Ashford R772 road bridge.

Figure 2-2: Affecting Watercourses



2.4 Development Proposals

The development proposals on which this assessment is based are as follows:

The Proposed Development will comprise 19 houses, in a mix of 1, 2 and 3 bed units (2no. 1 bed units, 15no. 2 bed units and 2no. 3 bed units), together with an access road, car parking, footpaths, landscaping, site works and services, and all associated ancillary development.

Drawings showing the current proposals are provided in Appendix A.

2.5 Vulnerability Classification

Based on the classification criteria outlined in the OPW Guidelines, the proposal comprises development with the vulnerability classification shown in Table 2-1 below.

Table 2-1: Vulnerability Classification

Part	Use	Classification
Built Development	Residential	Highly Vulnerable
Car Parking / Access Road	Local Transport Infrastructure	Less Vulnerable
Green Areas	Open Amenity Space	Water-Compatible Development

3 BACKGROUND INFORMATION REVIEW

As part of the data collection phase of this assessment, several available sources of information generally as set out in the OPW Guidelines were investigated to build an understanding of the potential risk of flooding to the site. The following review highlights the key findings of this background information.

3.1 Wicklow County Council

3.1.1 [Wicklow County Development Plan](#)

Chapter 14 of the Wicklow County Development Plan (CDP) 2022-2028 sets out the following relevant flood management objectives:

- **CPO 14.06:** To implement the OPW Guidelines.
- **CPO 14.08:** The zoning of land that has been identified as being at a high or moderate flood risk (Flood Zone A or B) shall be in accordance with the requirements of the OPW Guidelines.
- **CPO 14.09:** Applications for new developments or significant alterations / extension to existing developments in a flood risk area shall comply with the following:
 - Follow the sequential approach as set out in the OPW Guidelines;
 - An appropriately detailed flood risk / drainage impact assessment will be required with all planning applications, to ensure that the development itself is not at risk of flooding and the development does not increase the flood risk in the relevant catchment (both up and down stream of the application site), taking into account all sources of flooding;
 - Restrict the types of development permitted in Flood Zone A and Flood Zone B to that which are ‘appropriate’ to each flood zone;
 - Where a site has been subject to and satisfied the ‘Plan Making Justification Test’ development will only be permitted where a proposal complies with the ‘Justification Test for Development Management’;
 - Flood Risk Assessments shall be in accordance with the requirements set out in the OPW Guidelines and the SFRA.
- **CPO 14.10:** To prohibit development in river flood plains or other areas known to provide natural attenuation for floodwaters except where the development can clearly be justified with the OPW Guidelines ‘Justification Test’.

3.1.2 [Strategic Flood Risk Assessment for the Wicklow County Development Plan 2022-2028](#)

A SFRA was published to inform the Wicklow CDP 2022-2028. The SFRA sets out the planning guidelines applicable to the site and provides the following information relevant to the site:

- The Vartry River runs through Ashford from west to east, with a tributary joining the Vartry in the centre of town.
- A small part of the town centre zoning is within Flood Zone A and B, and the Justification Test has been applied and passed.
- The SFRA notes the site being subject to RN (residential) zoning which is classified as highly vulnerable and states that development within Flood Zone A and Flood Zone B for these lands requires a Justification Test.
- Reference is made to more specific discussion of flood risks in a Section on “Ashford Specific Objectives”.

3.1.2.1 [Ashford Specific Objectives](#)

The “Ashford Specific Objectives” section of the Wicklow County Development Plan 2022-2028 has been reviewed and contents relevant to this assessment summarised as follows:

- The River Vartry passes through the town from west to east.

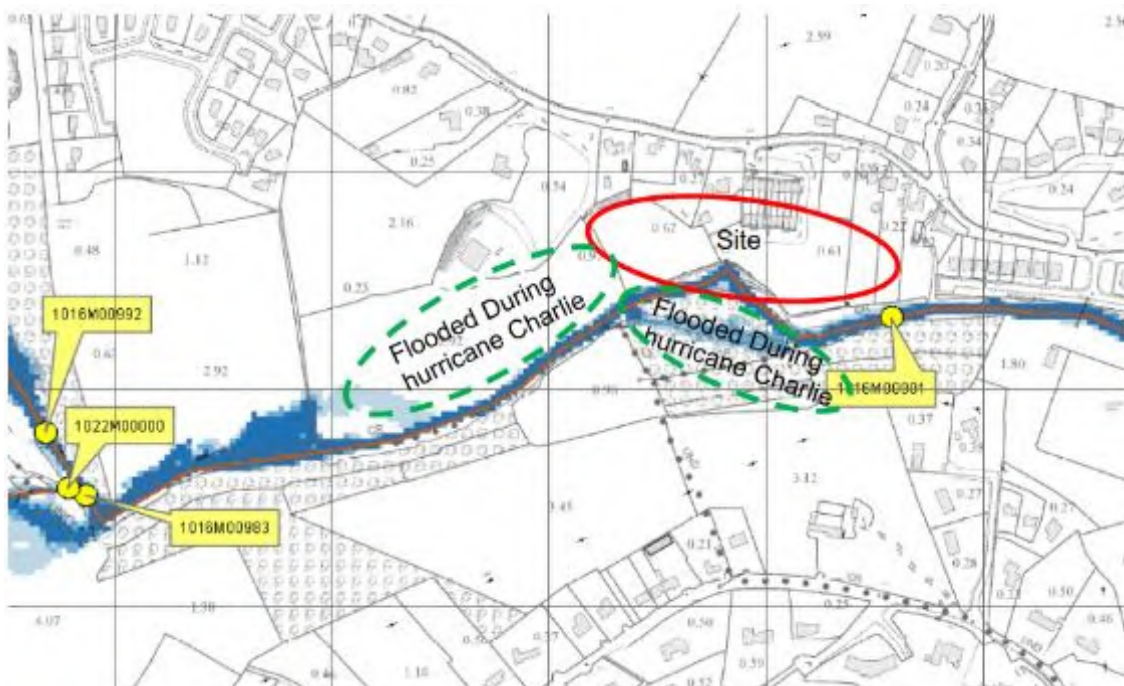
- The river forms a valley through the centre of the town, with higher lands surrounding the valley to the southwest, northwest, and northeast.
- The flow in the river is constrained further upstream by the Vartry Dam and rarely experiences serious flood events.
- Development strategies include “ensure that only appropriate land uses are provided on lands identified as being at risk of flooding”.
- Ashford Town Plan Indicative Flood Zones mapping, similarly to the OPW CFRAM map, shows minimal flooding of the site with slight encroachment of floodplain along the southern boundary.

3.1.3 SSFRA for lands at Ballinahinch

A site-specific flood risk assessment (SSFRA) was carried out by JBA Consulting on behalf of Wicklow CC in 2016 for the site and surrounding area. As part of this Wicklow CC provided JBA Consulting with photographs and information from flood records for Hurricane Charlie. This has been reviewed extensively as part of the McCloy Flood Study with main points summarised as follows:

- Hurricane Charlie first appeared as a tropical storm off the coast of South Carolina on Friday 15th of August 1986. The storm moved over Wicklow and Dublin which endured the worst of the storm over the night of the 25th / 26th August.
- JBA interviewed a local engineer and it was his understanding that the area was very under developed compared to its current condition and there had been a changed hydromorphology. He remarked that the flooding in 1986 had been exacerbated due to a blockage to the road bridge at Ashford House from a section of wall blown into the river. He noted that the bridge has since been replaced with a higher clearance unit.
- JBA reviewed Met Eireann records and estimated the storm to generate flows between a 1% - 0.1% AEP.
- JBA analysed photographs from the event provided by Wicklow County Council and annotated the CFRAM mapping to show the areas that would likely have flooded during the storm (Figure 3-1).
- Photographs from Hurricane Charlie suggest that the CFRAM representation is not appropriate for the 1% or 0.1% events and show a significant underestimation in estimated flows.

Figure 3-1: Annotated extract from Eastern CFRAMS Flood Mapping (JBA Consulting, 2016)



3.2 Office of Public Works

3.2.1 Past Flood Events Mapping

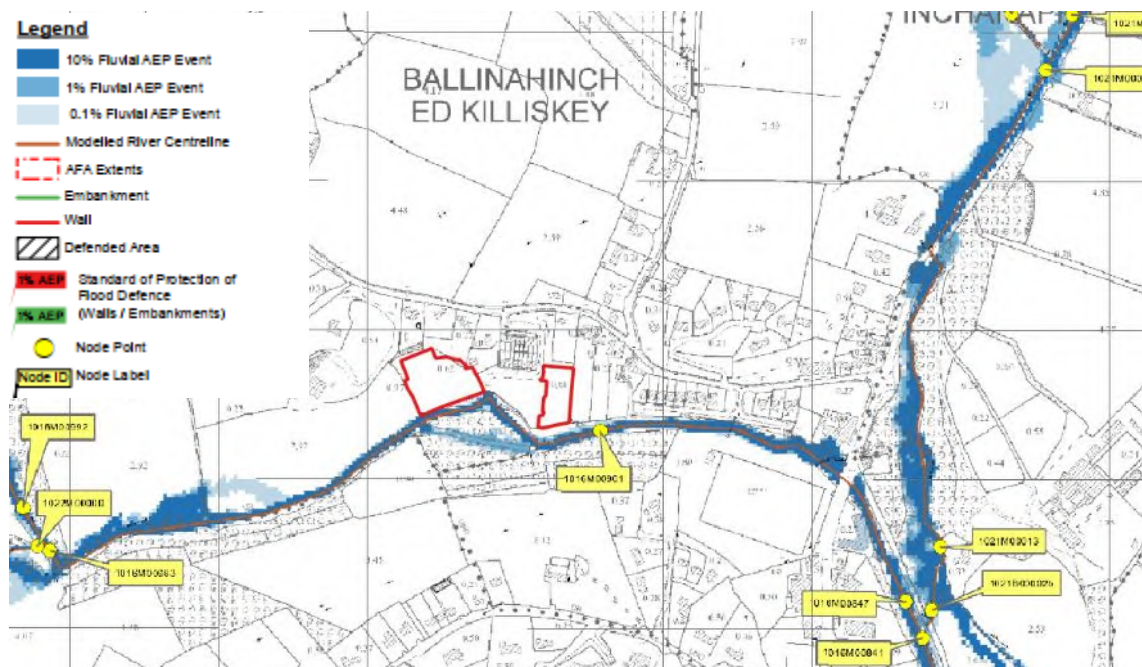
OPW 'Past Flood Event' mapping available through floodinfo.ie does not include any records of historic flooding in the vicinity of the site.

3.2.2 Catchment Flood Risk Assessment and Management

The main source of data to identify flood risk on the River Vartry system is the OPW Eastern Catchment Flood Risk Assessment and Management Study (Eastern CFRAM). The Eastern CFRAM study commenced in June 2011 and was concluded at the end of 2016.

CFRAM flood mapping indicates that the site may be affected by fluvial flooding in minor portions along the southern boundary, as shown in the extract in Figure 3-2. A copy of the CFRAM flood map from which this extract is taken is included in Appendix B.

Figure 3-2: CFRAM Fluvial Flood Map



3.3 Internet / Media Search

A media search within the site found no evidence of flooding other than that stated at Hurricane Charlie. The main change downstream of the site was noted to Ashford weir which was reported to have been badly damaged by Storm Frank in December 2015¹ and was in disrepair until the date of newspaper article (1st September 2018). The weir was observed in September 2021 and found to be partly instated.

3.4 Walkover Survey

A walkover survey was conducted by McCloy Consulting on 3rd September 2021 for purposes of site familiarity and to note structures along the watercourse.

¹ [Fundraising efforts to fix Ashford weir - Independent.ie](#) [accessed 20th October 2021]

4 ASSESSMENT OF FLOOD MECHANISMS

4.1 Initial Assessment

Development control procedures advise against inappropriate development in areas at risk of flooding and aim to avoid new development that increases flood risk elsewhere, in accordance with the OPW Guidelines.

The following assessment determines the flood hazards to life and property at the site in order to subsequently assess the site relative to the OPW Guidelines. Table 4-1 presents a screening assessment of the site for potential flooding mechanisms requiring further detailed assessment. It is based on the background information review and consultations.

Table 4-1: Possible Flooding Mechanisms

Source/Pathway		Significant?	Reason
Fluvial Flooding	Floodplain	Yes	OPW and Wicklow CC flood mapping indicates that the site may be affected by flooding from the Vartry River to the south.
	Culvert Blockage	No	As demonstrated in the McCloy Flood Study, blockage of culverts / crossings downstream have no impact on flooding at the site.
Surface Water Flooding	Pluvial Flooding	Possible	OPW flood data does not indicate that the site is predicted to be affected by pluvial flooding. There is existing development at a similar or higher elevation in the vicinity.
	Urban Drainage	No	No indication of urban drainage flooding or sewer incapacity was found in the initial evidence search.
	Surface Water Discharge	Possible	Any development has the potential to increase the impermeable area at a site and thereby cause an increase in the rate and volume of surface water runoff from the site.
Coastal		No	N/A
Groundwater		No	OPW / GSI flood mapping does not indicate that the site is predicted to be affected by groundwater flooding. Due to the site topography, there are no areas that would cause impoundment of groundwater.
Reservoirs / Canals / Artificial Sources		No	A screening assessment based on OSI mapping indicates that there are no impoundments or reservoirs in close proximity to the site or that drain towards the site.

Flooding mechanisms screened as being potentially significant are assessed further in the following sections. Mitigation of flood hazards, where required, is discussed in Section 5.2.

4.2 Pre-Development Fluvial Flooding (Existing Scenario)

4.2.1 Preamble

As stated previously, in consultation with Wicklow CC, due to the noted discrepancies between the OPW CFRAM maps and Ballinahinch SSFRA 2016 report, a location-specific detailed 1D-2D model has been developed for the area using InfoWorks ICM software (version 2021.5)

The model is based on hydrology estimates from best available techniques, and the modelling methodology is consistent with and exceeds the detailed CFRAM model standards. The model is intended to supersede existing models and is used to inform this assessment. Details on the modelling methodology are provided in the McCloy Flood Study provided under separate cover.

4.2.2 Flood Zoning / Existing Flood Risk (Present Day)

It has been determined that the 1% AEP (Flood Zone A) event causes slight flooding within the site along the western boundary of the 'western section'. For 0.1% AEP (Flood Zone B), approx. half of the 'western section' is shown to be flooded. The 'eastern section' of the site is not affected by flooding in either event. The main mechanism of flooding is driven by overtopping of left bank upstream of the site leading to progression of flows overland. For the 1% AEP, these are contained to the western site boundary due to a low bund that exists around the lands of interest leading to water returning to the Vartry River. For the 0.1% AEP, the overland flow pathway progresses onto the site via a low spot to the north of bund.

An extract from the existing scenario, present day Flood Zone Map is shown in Figure 4-1; the full Flood Zone Map is provided in Appendix C.

Figure 4-1: Flood Zone Map – Existing Scenario Present Day



Table 4-2 shows the modelled flood levels determined at model nodes located upstream of, adjacent to, and downstream of the site, as well as at a location adjacent to the site entrance.

Mitigation of flood risk will be achieved by siting the proposed development outside the 1% AEP and 0.1% AEP flood extents and ensuring proposed finished ground floor levels provide sufficient freeboard. Mitigation is discussed in Section 5.2.

Table 4-2: Modelled Flood Levels – Existing Scenario Present Day

Model Node ID	Node Location	1% AEP / Flood Zone A Water Level (mOD)	0.1% AEP / Flood Zone B Water Level (mOD)
105	Upstream extent of site (western section)	22.94	23.20
107	Adjacent to middle of site	22.42	22.81
109	Downstream extent of site (eastern section)	21.78	22.19

4.3 Post-Development Fluvial Flooding (Proposed Scenario)

4.3.1 Effect of Development (Present Day)

Proposals for the site have been developed on the basis of the Flood Zone Map provided in Appendix C, in line with the OPW Guidelines and Wicklow CC requirements.

To facilitate maximum benefit from lands zoned 'residential', proposed development has been partly sited in Flood Zone B in the western extent of the site. To ensure no increase in flood risk elsewhere, Flood Compensatory Storage (FCS) has been provided in the open green space in the south west of the site.

Figure 4-2 shows the proposed scenario flood map without the proposal drawing to facilitate comparison with the Flood Zone Map and includes the proposed FCS area. Figure 4-3 shows a closer scale proposed scenario flood map focused on the FCS and including the proposed development drawing, demonstrating that there is no proposed development within the floodplain.

Table 4-3 shows the modelled flood levels determined at model nodes located upstream of, adjacent to, and downstream of the site which shows no change to flood levels compared to the existing scenario. Therefore, the proposed development cannot and does not have any impact on flood risk elsewhere. Details relating to proposed mitigation, including the FCS, is discussed in Section 5.2.

Figure 4-2: Flood Extents Map – Proposed Scenario Present Day (without proposals)



Figure 4-3: Flood Extents Map – Proposed Scenario Present Day (with proposals)



Table 4-3: Modelled Flood Levels – Proposed Scenario Present Day

Model Node ID	Node Location	1% AEP Water Level (mOD)	0.1% AEP Water Level (mOD)
105	Upstream extent of site (western section)	22.94	23.20
107	Adjacent to middle of site	22.42	22.81
109	Downstream extent of site (eastern section)	21.78	22.19

4.3.2 [Effect of Climate Change](#)

The OPW Guidelines and the SFRA require site-specific FRAs to consider increased flood risk to proposed developments under climate change (CC) scenarios. OPW guidance suggests using a Mid-Range Future Scenario, which represents a 20% increase in flood flows and / or 0.5 m increase in mean sea level, where applicable.

An estimation of the effect of climate change on flooding at the site has been derived from the detailed site-specific hydraulic model by adding 20% to the present-day design flows. Table 4-4 shows the predicted post-development climate change flood levels at the site.

Allowance for climate change causes a maximum increase in flood level of 0.21 m compared to the present day 0.1% AEP scenario. Mitigation of the estimated effect of climate change will be achieved through selection of an appropriate freeboard and is discussed in Section 5.2.

Table 4-4: Modelled Flood Levels – Proposed Scenario Climate Change

Model Node ID	Node Location	1% AEP Water Level (mOD)	0.1% AEP Water Level (mOD)
105	Upstream extent of site (western section)	23.12	23.41
107	Adjacent to middle of site	22.67	23.11
109	Downstream extent of site (eastern section)	22.06	22.50

4.4 Pluvial (Surface Water) Flooding

4.4.1 [Surface Water Flooding onto the Site](#)

OPW and Wicklow CC flood mapping does not indicate that the site affected by pluvial flooding. No records of local drainage / sewer infrastructure have been provided as part of this assessment.

Lands to the south, east and west of the site are at a similar or lower elevation and would therefore not contribute to surface water flooding (from pluvial or urban drainage sources) at the site. Surface water originating from the north may be directed towards the site but would tend to follow lower lying, preferential flow paths towards the open watercourse to the south.

Therefore, the site is not considered to be at risk of pluvial flooding. Further mitigation of surface water / pluvial flooding to the site from the drainage system related to pipe blockage and exceedance is discussed in Section 5.2.

4.4.2 [Surface Water Flooding from the Site](#)

Any development has the potential to increase the impermeable area at a site and thereby cause an increase in the rate and volume of surface water runoff from the site. Pluvial flooding risk elsewhere may also be caused by blockage and exceedance of the surface water drainage network.

Mitigation of any change in impermeable area at the site and any residual risk of surface water flooding to the development will be achieved by means of an effective surface water drainage network and effective surface water management / maintenance. Mitigation is discussed in Section 5.2.

5 SUMMARY OF FINDINGS AND RECOMMENDATIONS

5.1 Summary of Findings

It has been determined through detailed site-specific hydraulic modelling that the site is affected by the 0.1% AEP and 1% AEP present day fluvial floodplains of the Vartry River. No other significant flood mechanisms are anticipated at the site.

The proposed development is classed as 'highly vulnerable' and, as such, considered inappropriate in Flood Zone B (no development is proposed in Flood Zone A). Therefore, a Justification Test (submitted under separate cover) has been carried out for the site, detailing reasoning for the exception to the restriction of development due to potential flood risk. Flood Compensatory Storage (FCS) has been provided to offset the displacement of flood water within Flood Zone B.

Detailed modelling of the proposed scenario indicates that the FCS is effective. Modelling of climate change and culvert blockage scenarios indicates that freeboard to the proposed development exceeds the effects of climate change and culvert blockage.

5.2 Design Considerations

This section details design measures incorporated into the proposed development. These measures are to be further developed in any detailed design or variation post-determination of the planning application.

5.2.1 [Land Use](#)

The site is affected by Flood Zone A and Flood Zone B. The proposed development is partially located in Flood Zone B, but does not encroach into any part of the site in Flood Zone A. Therefore, a Justification Test (submitted under separate cover) has been carried out for the site, detailing reasoning for the exception to the restriction of development due to potential flood risk.

5.2.2 [Design Levels](#)

The OPW Guidelines and SFRA require freeboard to be applied to relevant design flood levels when setting finished floor levels (FFLs) and finished ground levels (FGLs). Generally, the industry standard / best practice freeboard of 500 mm is applied as a minimum requirement. Freeboard is applied to Flood Zone A for less vulnerable development (access roads, commercial units) and to Flood Zone B for highly vulnerable development (residential units, creche).

Therefore, required design levels are as follows:

- FFLs for highly vulnerable development should be **23.70 mOD** or above (500 mm above the Flood Zone B level at the upstream extent of the site).
- FGLs for less vulnerable development should be **23.44 mOD** or above (500 mm above the Flood Zone A level at the upstream extent of the site).

5.2.3 [Access Levels](#)

In line with best practice outlined in OPW Guidelines, access to and from the development should be within Flood Zone C (i.e., outside the 0.1% AEP risk from fluvial flooding).

All proposed access roads are located in Flood Zone C so safe access to and egress from the proposed development will be possible during an extreme flood event.

5.2.4 [Flood Compensatory Storage](#)

This assessment has identified that the proposed development displaces floodwater by being partly sited in Flood Zone B. Therefore, Flood Compensatory Storage (FCS) is required to ensure that there is no increase in flood level off-site. The principle of landscaping and providing Flood Compensatory Storage (FCS) to balance the displaced floodwater by re-profiling existing ground levels within the site boundary is established in Section 3.3.1 of Appendix B; Technical Appendices to The Planning System and Flood Risk Management - Guidelines for Planning Authorities.

FCS shall therefore be provided to compensate the displaced floodwater within Flood Zone B. The reprofiling design shall be provided on a volumetric basis in accordance with the guidance stated in CIRIA C624 Development and Flood Risk - Guidance for the Construction Industry as the OPW Guidelines clarify that level-for-level FCS is only required for floodplain lost in Flood Zone A.

Analysis undertaken as part of this assessment demonstrates that lowering of the existing ground profile in an area of proposed open, green space between the proposed development and watercourse will provide more than sufficient compensation for areas subject to infill. The areal extent of FCS is shown in Figure 4-3 and will be subject to landscaping consideration as part of detailed design (post-planning) with key design criteria as follows:

- Storage areas have direct connectivity to the floodplain and as such would adequately offset the proposed displacement.
- The invert level of the FCS area has been set at 23.0 mOD but should ensure a slight positive gradient towards the point of return to the watercourse.
- To ensure the area is available for amenity use, consideration is to be given to ensuring positive discharge from the FCS area into the watercourse, particularly where the existing sewer embankment along the watercourse sits higher than proposed ground levels.
- Consideration should be given to the potential for 'low flow channels' through the FCS area as part of detailed landscaping design to convey rainfall / surface water runoff during lower return periods.

5.2.5 [Drainage Design](#)

Surface water drainage design should be per the requirements of the Wicklow County Development Plan 2022-2028 and to the standards of the Wicklow County Council Water Services Department. The Wicklow County Development Plan states that it is an objective to incorporate and promote the use of SuDS.

SuDS components, including but not limited to green roofs, rain harvesting, permeable pavement, infiltration trenches, and soakaways, should be considered in relation to the nature and character of the site. The type of SuDS deemed suitable for the site will be subject to outline and detailed design. The SuDS design should demonstrate how water quantity and quality are dealt with as well as make provision for amenity and biodiversity, where practicable.

Surface water drainage systems should be maintained in line with best practice, manufacturers specification(s) and requirements outlined in Section 5.3.2. In the event of blockage or exceedance (in excess of the 1% AEP + CC design event), surface water will have an available overland flow path away from built development towards the lower lying Vartry River to the south.

Drainage design is to be carried out by others.

5.3 **Maintenance Requirements**

5.3.1 [Watercourse Maintenance](#)

The owner / occupier(s) of the site shall be required to include general watercourse maintenance which will reduce the risk of blockage at downstream culverts and maintain the capacity of the channels. The following measures are intended to inform any future maintenance programme for watercourses:

- Maintenance should consist of removal of any items within the channel that can impede its flow including (small) trees, excess vegetation etc.

- River banks should be due adequate attention which would normally consist of removal of brambles, bushes and stiff vegetation; these reduce flow capacity and can encourage collection of debris increasing the risk of blockages. Grass and nettles do not always need removing as they will lay flat during high flows.
- Weed growth should be removed from the centre of the channel as this will impede the flow and increase water levels upstream. Hand picking is best but cutting off under the water level is acceptable if it is done on an annual basis.
- Build-up of silt in watercourse channels should be removed and disposed of appropriately.

5.3.2 Drainage System Maintenance

The owner / occupier(s) will be responsible for the maintenance of site drainage systems. Where drainage assets have not been taken in charge, provision for the maintenance of these assets should be made as part of the overall site management plan. The detailed drainage layout for the site should ensure that key SuDS features requiring maintenance are situated in accessible locations.

Maintenance plans for drainage assets should, where applicable, include:

- Cyclical (min. annual) check of all surface water drainage features (in particular, clearing of debris)
- Cyclical (min. annual) visual inspection of any surface or underground features (blockages and obstructions should be removed by jetting as required)

5.4 Summary of Flood Risk and Mitigation

Table 5-1 summarises the mechanisms of flooding identified by this study and their associated hazards / consequence (per the OPW Guidelines) as well as proposed measures to mitigate the predicted risk.

Table 5-1: Summary of Risks and Mitigation

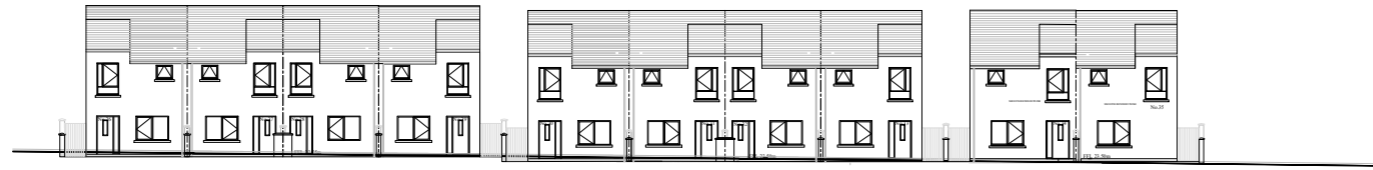
Identified Flood Mechanism	Consequence	Summary and Proposed Mitigation Measures
Fluvial Flooding	Risk to life and property	FFLs and FGLs at the site provide more than the required minimum freeboard to adjacent flood levels. All proposed development is located outside the proposed 0.1% AEP floodplain.
Effect of the Development	Increased risk to adjacent lands / property	Hydraulic modelling has demonstrated that FCS provided ensures no increase in flood levels elsewhere.
Effect of Climate Change	Risk to life and property	FFLs ensure a standard of protection exceeding the 0.1% AEP + CC flood levels.
Surface Water Flooding	Risk to property and risk to adjacent lands / property	On-site surface water flooding will be mitigated by a site drainage system compliant with local authority drainage standards. Off-site surface water effects will be mitigated by provision of SuDS to ensure no increase in the rate or volume of runoff of surface water from the site as a result of development.

Appendix A

Site Drawings

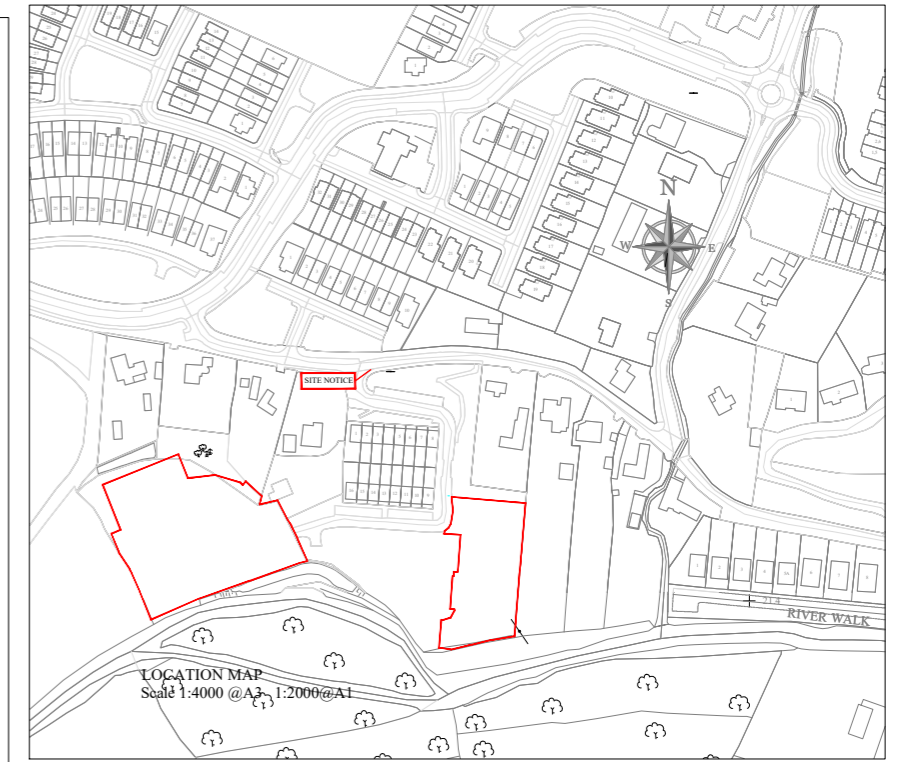


Contiguous Elevations Of Units No. 17 to No. 25

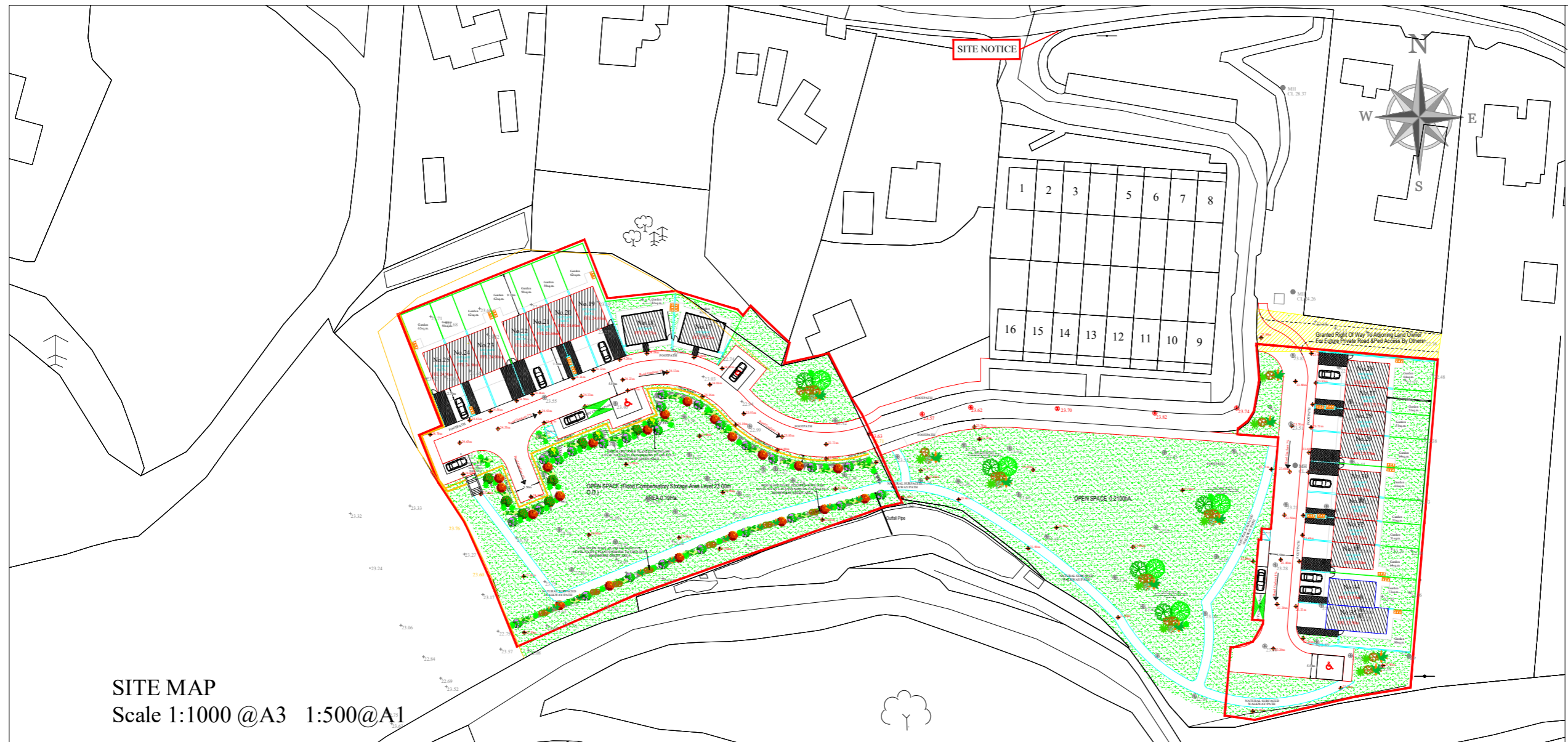


Contiguous Elevations Of Units No. 26 to No. 35

ELEVATIONS
Scale 1:200 @A3 1:400@A1



LOCATION MAP
Scale 1:4000 @A3 1:2000@A1



SITE MAP
Scale 1:1000 @A3 1:500@A1

EXISTING LEVELS
 23.57
 23.38

PROPOSED LEVELS
 23.00m
 225mm Retaining Wall (Height Vary)
 Blockwall (Height Vary)
 Concrete Post & Rail Fencing 2.10m High
 Metal Railing 1.0m High

Note:
 1. EV Recharging points to be provided for each dwelling provided with off street parking.
 2. No. EV recharging points to be provided as shown.
 Ducting infrastructure to be installed for every street parking space within the proposed development.

REV.	DATE	DRN BY:	DESCRIPTION
REVISIONS:			

WICKLOW COUNTY COUNCIL

HOUSING CONSTRUCTION TEL: 0404 - 20100
 COUNTY BUILDINGS FAX: 0404 - 67792
 WICKLOW
 E-MAIL: cosec@wicklowcoco.ie www.wicklow.ie

JOB: Proposed Housing At Ballinahinch Park Ashford

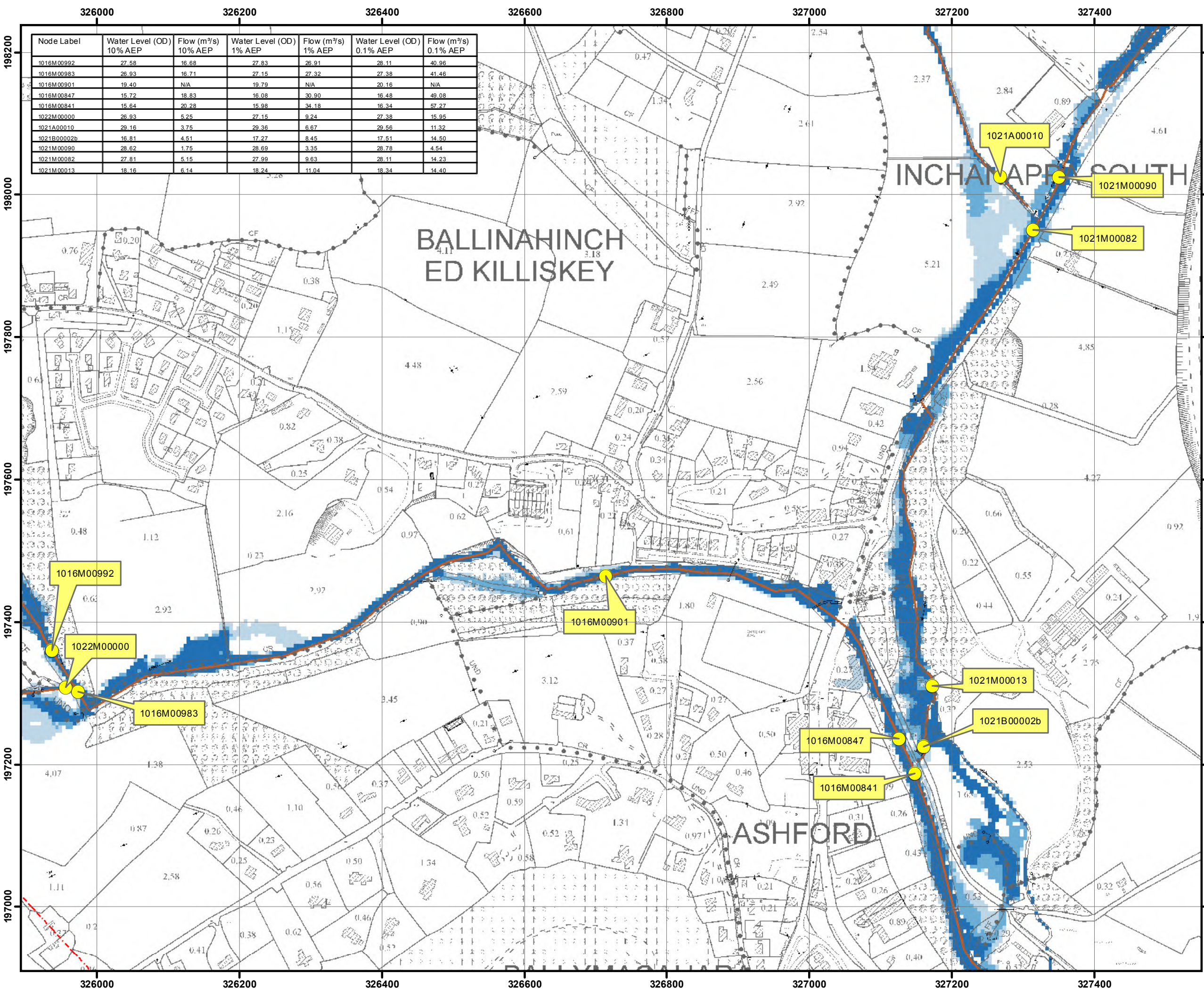
TITLE: Site Layout And Elevations

SCALE: As Shown Date: Feb 24
 DWG NO: BHA/179A/106 Drawn: EM
 SHEET SIZE: A1 Checked:
 STATUS: Part 8 REV:

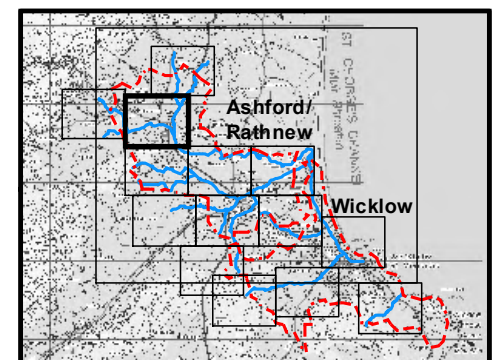
DO NOT SCALE - USE PROVIDED DIMENSION ONLY - ALL DIMENSIONS TO BE CHECKED ON SITE - ORIGINAL SIZE - A1

Appendix B

OPW Flood Mapping



Node Label	Water Level (OD) 10% AEP	Flow (m ³ /s) 10% AEP	Water Level (OD) 1% AEP	Flow (m ³ /s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m ³ /s) 0.1% AEP
1016M00992	27.58	16.68	27.83	26.91	28.11	40.96
1016M00983	26.93	16.71	27.15	27.32	27.38	41.46
1016M00901	19.40	N/A	19.79	N/A	20.16	N/A
1016M00847	15.72	18.83	16.08	30.90	16.48	49.08
1016M00841	15.64	20.28	15.98	34.18	16.34	57.27
1022M00000	26.93	5.25	27.15	9.24	27.38	15.95
1021A00010	29.16	3.75	29.36	6.67	29.56	11.32
1021B00002b	16.81	4.51	17.27	8.45	17.51	14.50
1021M00090	28.62	1.75	28.69	3.35	28.78	4.54
1021M00082	27.81	5.15	27.99	9.63	28.11	14.23
1021M00013	18.16	6.14	18.24	11.04	18.34	14.40



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

- Legend**
- 10% Fluvial AEP Event
 - 1% Fluvial AEP Event
 - 0.1% Fluvial AEP Event
 - Modelled River Centreline
 - AFA Extents
 - Embankment
 - Wall
 - Defended Area
 - 1% AEP Standard of Protection of Flood Defence (Walls / Embankments)
 - 1% AEP Standard of Protection of Flood Defence (Walls / Embankments)
 - Node Point
 - Node ID

FINAL

REV:	NOTE:	DATE:
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Map:	
Ashford/ Rathnew Fluvial Flood Extents	
Map Type: EXTENT	
Source: FLUVIAL	
Map Area: HPW	
Scenario: CURRENT	
Drawn By: C.C.	Date: 15 November 2017
Checked By: D.I.	Date: 15 November 2017
Approved By: S.P.	Date: 15 November 2017
Drawing No.:	
E10WIC_EXFCD_F2_02	
Map Series: Page 2 of 15	
Drawing Scale: 1:5,000 @A3	



Appendix C

Site-Specific Flood Maps

726300

726400

726500

726600

726700

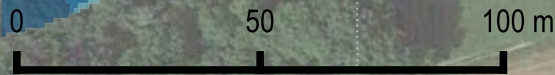


697700




697600

697500

697400



LEGEND

-  SITE BOUNDARY
-  FLOOD ZONE A (1% AEP)
-  FLOOD ZONE B (0.1% AEP)

- NOTES**
1. ALL LEVELS INDICATED ARE TO ORDANCE DATUM MALIN
 2. FLOOD EXTENTS WITHIN THE APPLICATION BOUNDARY ARE PLOTTED ON GROUND BASED TOPOGRAPHIC SURVEY.
 3. FLOOD EXTENTS OUTWITH THE APPLICATION BOUNDARY ARE PLOTTED ON A COMBINATION OF GROUND BASED SURVEY AND BEST AVAILABLE HEIGHT DATA AND AS SUCH ARE NOT SUITABLE TO INFORM FLOOD RISK ON ANY ADJACENT SITE.
 4. ALL GRID COORDINATES IS TO IRISH TRANSVERSE MERCATOR



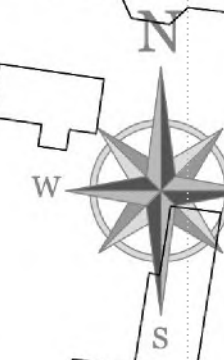
Mossley Mill,
Lower Ground (West),
Carnmoney Road North,
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E: info@mcclloyconsulting.com
W: www.mcclloyconsulting.com

PROJECT BALLINAHINCH, ASHFORD, CO. WICKLOW	
MAP TYPE FLOOD ZONE MAP	
SOURCE FLUVIAL	FLOOD EVENT 1% AEP / 0.1% AEP

HYDROLOGY SCENARIO PRESENT DAY	GEOMETRY SCENARIO PRESENT DAY
FIGURE NUMBER M02169-01_FIG_FL01	

SCALE AS SHOWN	ORIGINAL SIZE A3
DRAWN BY DL	APPROVED BY DKS
REVISION 3	DATE 11/04/2024

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MODEL OVERVIEW

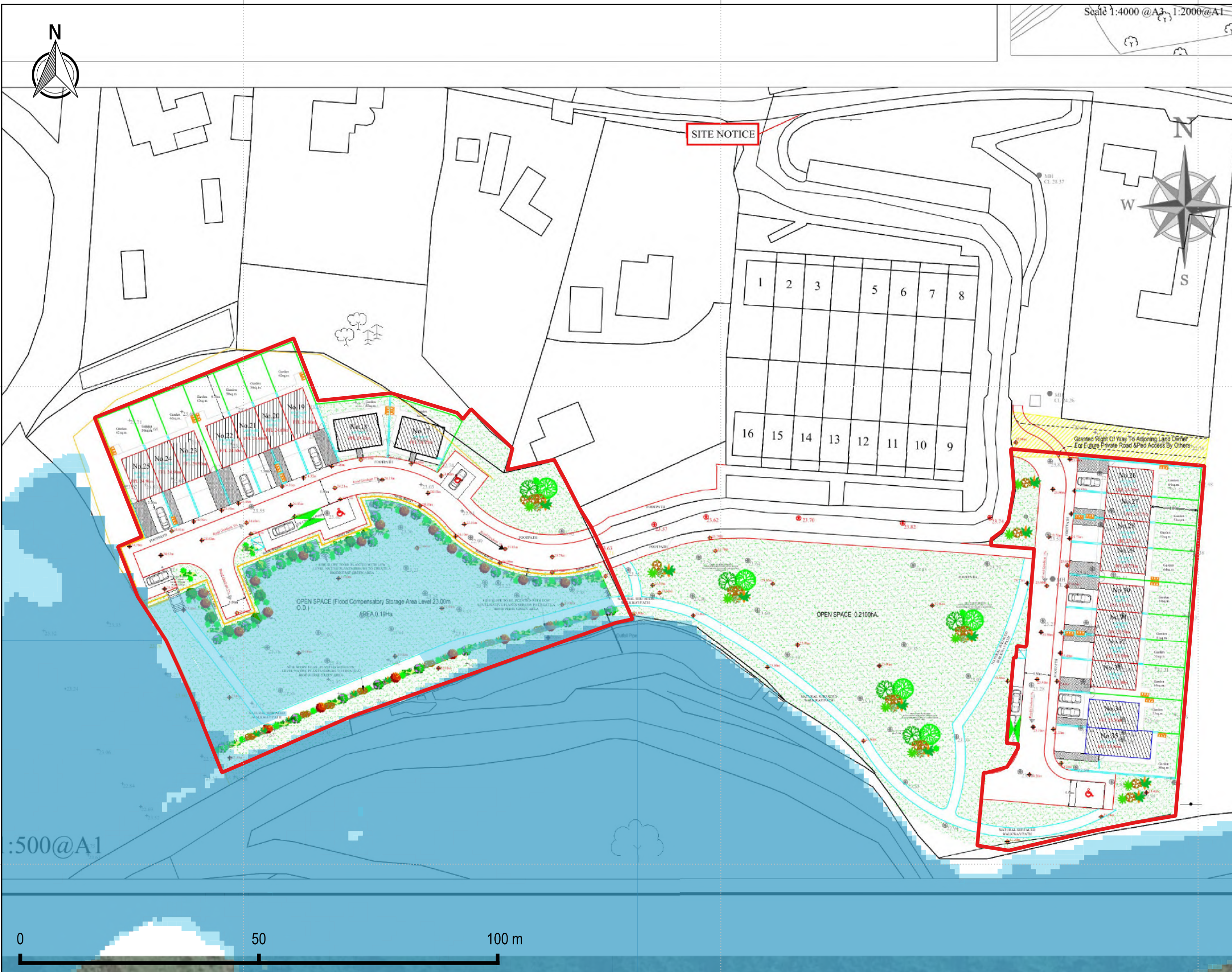



LEGEND

- SITE BOUNDARY
- 1% AEP Flood Extent
- 0.1% AEP Flood Extent

NOTES

1. ALL LEVELS INDICATED ARE TO ORDANCE DATUM MALIN
2. FLOOD EXTENTS WITHIN THE APPLICATION BOUNDARY ARE PLOTTED ON GROUND BASED TOPOGRAPHIC SURVEY.
3. FLOOD EXTENTS OUTWITH THE APPLICATION BOUNDARY ARE PLOTTED ON A COMBINATION OF GROUND BASED SURVEY AND BEST AVAILABLE HEIGHT DATA AND AS SUCH ARE NOT SUITABLE TO INFORM FLOOD RISK ON ANY ADJACENT SITE.
4. ALL GRID COORDINATES IS TO IRISH TRANSVERSE MERCATOR

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PROJECT BALLINAHINCH, ASHFORD, CO. WICKLOW	
MAP TYPE FLOOD EXTENTS MAP	
SOURCE FLUVIAL	FLOOD EVENT 1% AEP / 0.1% AEP

HYDROLOGY SCENARIO PRESENT DAY	GEOMETRY SCENARIO PROPOSED
FIGURE NUMBER M02169-01_FIG_FL50	

SCALE AS SHOWN	ORIGINAL SIZE A3
DRAWN BY AS	APPROVED BY DKS
REVISION 2	DATE 21/05/2024

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