

FLOOD RISK ASSESSMENT

Site at
Mardyke Street,
Skibbereen,
Co. Cork.



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Revision History	Note	Date
1462_1/24	Document Issue	28 th February 2024

1. Introduction

Irish Hydrodata Limited (IHD) was commissioned by CroCon Engineers Ltd. to conduct a flood risk assessment for a site at Mardyke Street, Skibbereen (Figure 1.1). The assessment has been prepared to support a planning application.

The proposed developments comprise the construction of 8 residential apartments (Figure 1.2). The site is within the existing Skibbereen development boundary and is zoned Town Centre/Neighbourhood Centres¹.

The proposed development constitutes a ‘highly vulnerable development’ in accordance with Table 3.1 of the 2009 Ministerial Guidelines for Planning Authorities².

1.2 Site Survey

The site was surveyed by Daly Barry Associates Ltd. (Figure 1.3). Levels in the immediate surrounding area range from 3.7mOD (Malin) to 5.7mOD. The proposed finished floor level for the new building is 4.65m OD.

1.3 Potential Sources of Flood Risk

The Ilen river is tidally influenced at Skibbereen and potentially presents a combined fluvial/coastal flooding risk for this location. The Caol stream is the nearest significant watercourse, about 215m to the north-east of the site while the Ilen river is a little further away at 255m to the north-northeast.

The road centreline levels along Mardyke Street from the junction with Rossa Road in the south-east, towards the north-east, range from 5.0mOD down to 3.3mOD as per Figure 1.4. The levels along the section of the roadway adjacent to the site range from 4.5mOD to 4.0mOD.

¹ Cork County Council, *County Development Plan 2022*

² “*The Planning System and Flood Risk Management – Guidelines for Planning Authorities*” issued in November 2009 by DoEHLG

There are municipal services on Mardyke Street and a local pipe rupture or blockage could result in associated waters adjacent to the site.

1.4 Flood Risk Indicators

The site is located in close proximity to the Ilen river and the Caol stream both of which have a history of flooding.

The Cork County Council County Development Plan³ (CDP) mapping, Figure 1.5, indicates the site to be 50m from a Flood Zone A area and that the eastern tip of the site (about 50m²) lies in Zone B.

The OPW site www.floodmaps.ie shows numerous flooding events in the Skibbreen environs (Appendix A). Significant floods were recorded during the years 2009, 1986, 1983, 1974 and 1969. An OPW report on the 2009 flood includes a sketch map showing the estimated extent of the flood water inundation in the entire Skibbreen area during various events. An extract from this map is shown in Figure 1.6. An associated table, Figure 1.7, shows that 1969 flood water levels reached about 3.09mOD in the vicinity of the site (Townshend St).

An earlier historic report by MCOS Consulting Engineers for the 1986 flood event shows local flooding from smaller streams to the west as per Figure 1.8. The report notes: *'The streams draining catchment "A" shown on the map (Figure 1.9) flooded the railway cutting and flood waters discharged into Mardyke St. and Bridge St. The Mardyke St. culvert was surcharged, and severe flooding was caused on this street'*.

1.5 Skibbreen FRAMS

The OPW Skibbreen FRAMS investigated flooding in the immediate town area and proposed a series of flood defence works⁴.

³ Cork County Council *County Development Plan 2022*

⁴ River Ilen (Skibbreen) Flood Risk Assessment & Management Study, Hydraulic Report 2011

Consultants RPS developed detailed hydraulic models of the area, both fluvial and coastal. The models were calibrated against historic flood events and then used to predict water levels for various scenarios.

Predicted flood inundation in the vicinity of the site for various design events are shown in Figure 1.10⁵ with associated levels in Figure 1.11. The maximum 1:1000 year level is about 3.6m ODM.

An extensive flood defence plan has been implemented. This will protect most of the urban area with benefitting lands indicated in Figure 1.12. The design standard adopted for the scheme is the 0.5% AEP (1:200) event with provision for adaptability in the future to accommodate the potential effects of climate change.



Figure 1.1 - Site location on Mardyke Street, Skibbereen

⁵ OPW Skibbereen FRAMS Drawing No MCW0626DG0206_B (2011)



Figure 1.2 - Proposed site layout

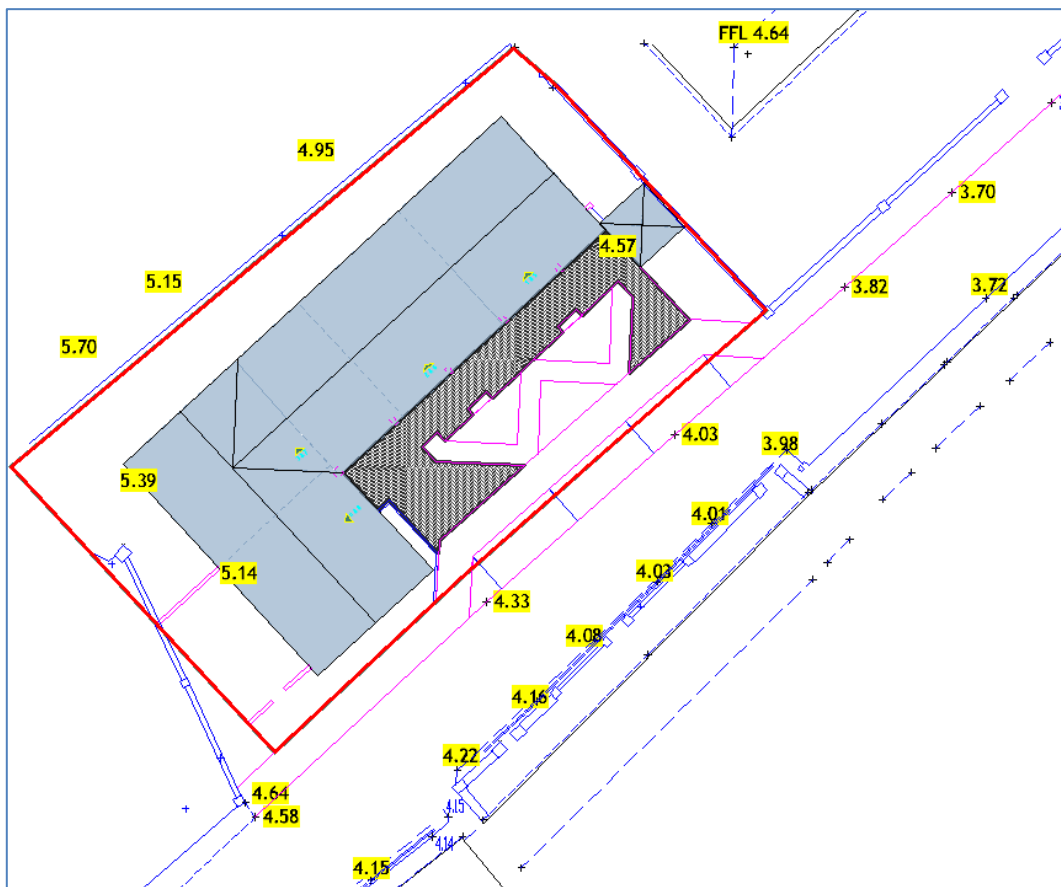


Figure 1.3 - Site levels (mOD Malin) [extract from Daly Barry drawing]

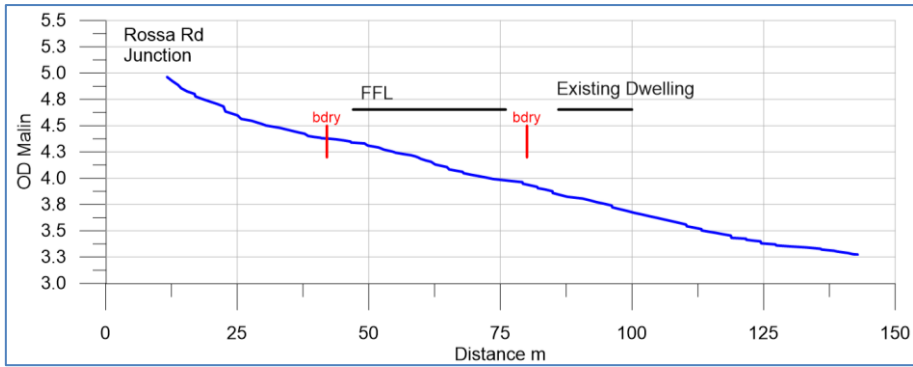


Figure 1.4 - Levels (mOD Malin) along Mardyke Street



Figure 1.5 - Site overlay on CDP 2022 map (Zone A light blue, Zone B magenta)

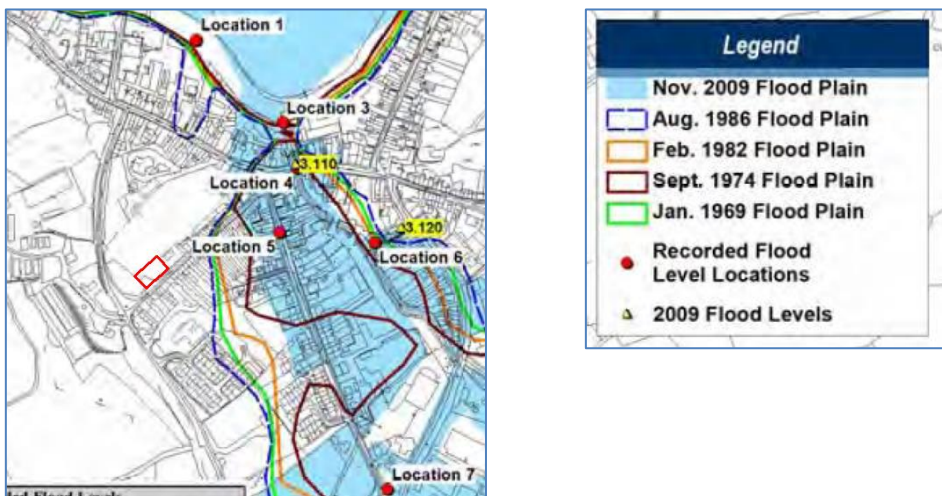


Figure 1.6 - Historic flood extent

Location No.	Location	Ground Level	Recorded Flood Levels						
			Dec-09	Nov-09	Aug-86	Feb-82	Oct-75	Sep-74	Jan-69
1	D/S of JFK Bridge	2.33			2.68	-	-	1.41	2.34
2	U/S of JFK Bridge	2.84			2.89	-	-	2.10	2.40
3	River Ilen / Caol Stream Junction	2.89	2.65	3.11	3.01	-	-	2.09	-
4	Main Street Bridge	2.59			2.99	2.66	2.52	2.41	2.69
5	Townshend Street	2.39			2.99	2.66	2.52	2.28	3.09
6	Market Street	2.69			3.13 - 3.19	2.65	2.49	-	2.99
7	Baltimore Road	2.45			3.09	2.68	2.19 - 2.39	-	2.89

Figure 1.7 - Historic flood water levels

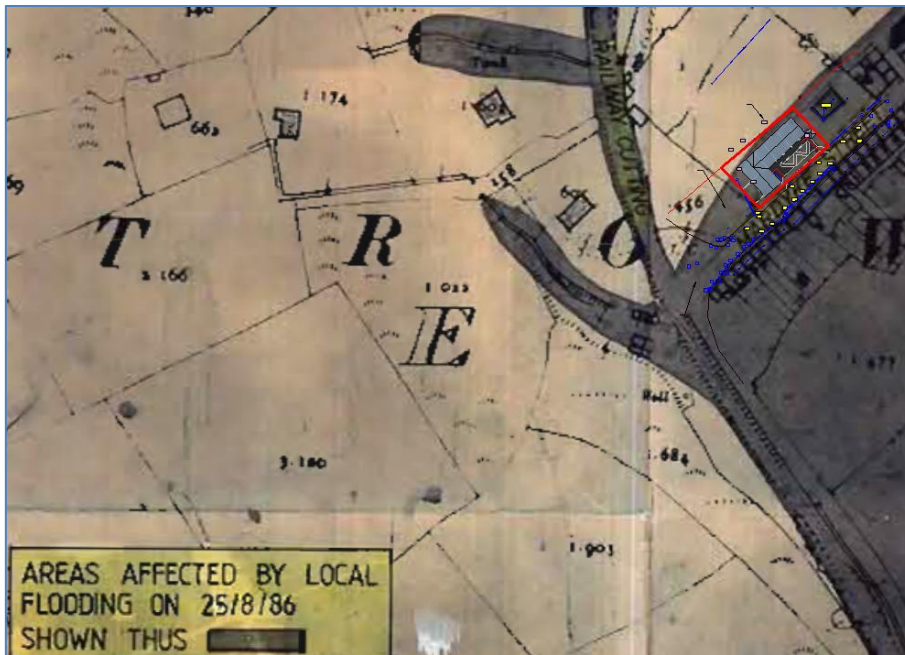


Figure 1.8 - Local flooding 1986 event, areas impacted

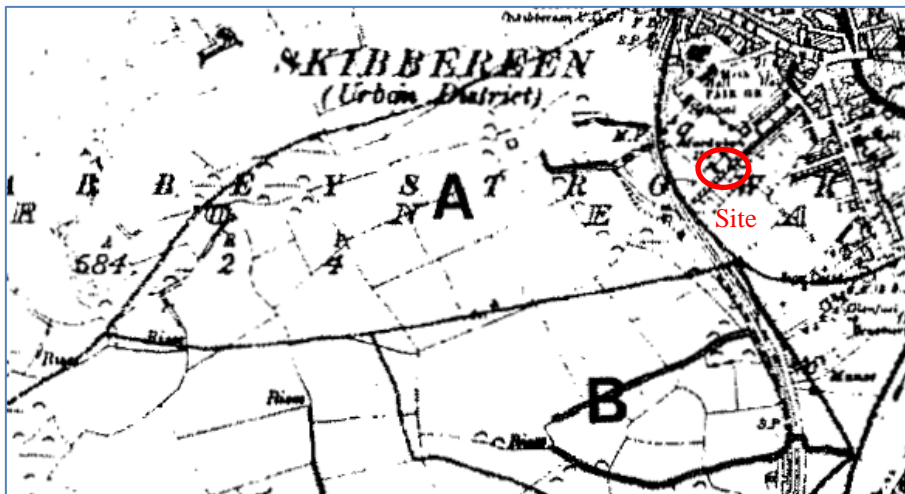


Figure 1.9 - Local flooding 1986 event, catchment

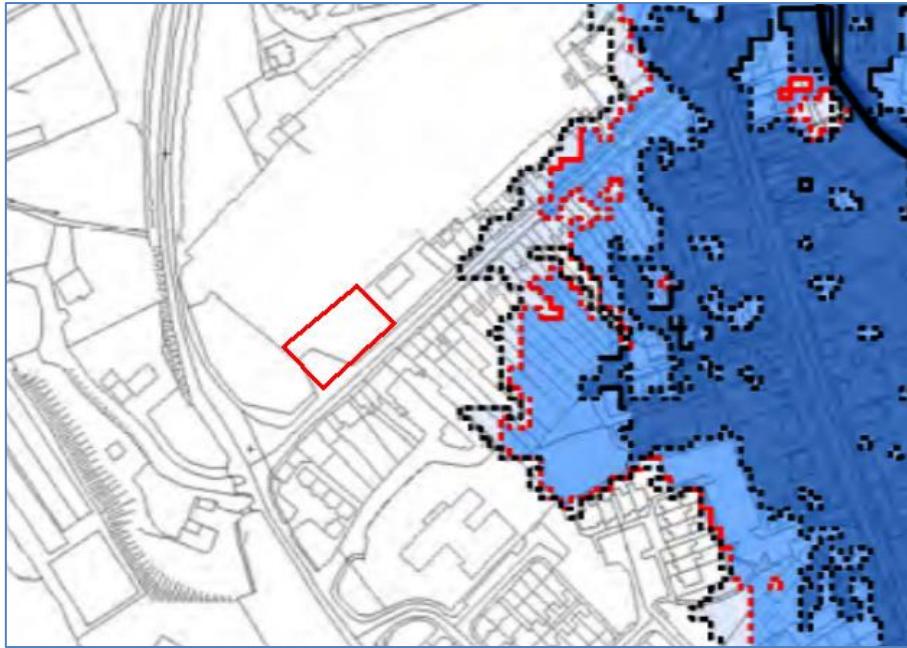


Figure 1.10 - Skibbereen FRAMS, 1:10 year, 1:100 year & 1:1000 year design events

HEP NODE_LABEL	10% AEP		1%AEP		0.1%AEP	
	Peak Water Level (mOD)	Peak Discharge (cumecs)	Peak Water Level (mOD)	Peak Discharge (cumecs)	Peak Water Level (mOD)	Peak Discharge (cumecs)
	Scen 4	Scen 4	Scen 10	Scen 10	Scen 14	Scen 14
ILEN_7918	2.864	149.517*	3.261	170.321*	3.525	183.316*
ILEN_9352	2.283	168.836	2.563	220.378	2.853	261.145
CAOL_2839	2.897	10.211*	3.289	17.442*	3.557	19.892*
ASSO_0	11.554	1.825	11.641	2.497	11.726	3.17
SHOW_1769	3.399	2.815*	3.721	4.016*	3.935	4.888*
GLEN_309	2.489	12.18*	2.98	25.297*	3.163	27.273*

* Note that the flows at these HEPs are representative of those contained within the main channel only.

Figure 1.11 - Skibbereen FRAMS, design event water levels

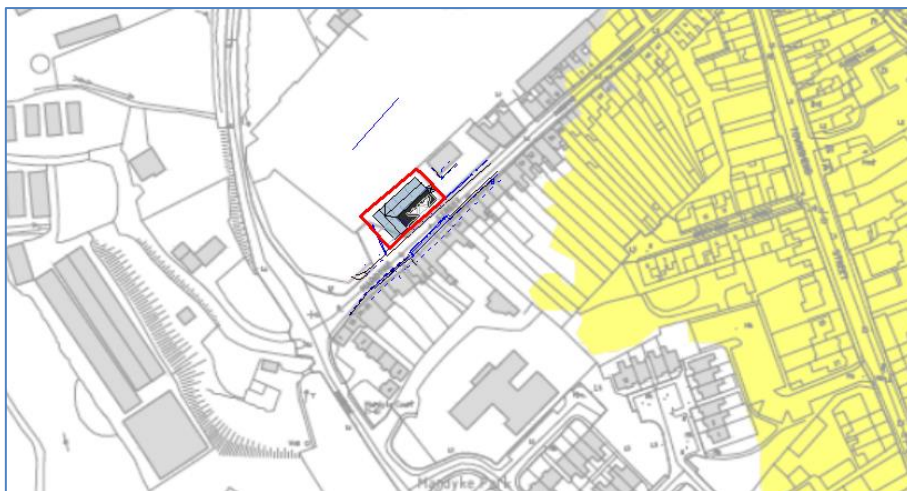


Figure 1.12 - Lands benefiting from FRS works (shaded yellow)

2. Flood Risk Assessment

2.1 Fluvial Flood Risk

The site is close to the Ilen river, the Caol stream and the Ilen estuary. Even though the town is now protected by a comprehensive flood relief scheme, for the purposes of the risk assessment, the defences are discounted in line with guidelines⁶. Potential flood risks primarily arise from:

- High water levels in the Ilen river.
- High coastal water levels extending up the estuary.
- A combination of both.

Detailed investigations of flooding in the Skibbereen area have been completed by RPS Consulting Engineers as part of the FRS. They examined 14no. combinations of river flood and estuary tidal levels. They concluded that extreme flooding in Skibbereen is primarily fluvial in nature⁷.

The RPS study provides predictions in the Ilen and Caol channel for the pre- and post-flood defence construction scenarios. An extract from the relevant section of their study results is shown in Figure 2.1. The associated channel centre line chainage locations are shown in Figure 2.2.

The predicted post defence construction 0.5%AEP (1:200 year) water level adjacent to the site (Caol stream chainage 7700-7750m) is 3.57mODM. The corresponding value on the Ilen (chainage 7900) is 3.50m OD. These predictions are based on current climate scenario.

2.2 Flood Risk from Estuary

Tidal levels are available for Baltimore and are expected to be representative of the tidal levels at Skibbereen. These levels are summarised in Table 2.1.

⁶ *The Planning System and Flood Risk Management – Guidelines for Planning Authorities* issued in November 2009 by DoEHLG – Section 2.25

⁷ RPS River Ilen FRAMS Hydraulic Analysis Report 2013

Tide Level	Return Period	Chart Datum CD	Malin Head Datum
Highest Astronomical Tide	HAT	3.8	1.7
Mean High Water Spring Tide	MHWS	3.5	1.4
Mean High Water Neap Tide	MHWN	2.9	0.8
Mean Sea Level	MSL	2.12	-0.02
Mean Low Water Neap	MLWN	1.4	-0.7
Mean Low Water Spring	MLWS	0.6	-1.5

Table 2.1 - Astronomical Tidal Levels at Baltimore

The HAT which occurs 5 or 6 times each year has a maximum level of 1.7mOD Malin. Therefore, the site will not be impacted during normal tidal events. More extreme water levels arise from a combination of astronomical tides and meteorological factors such as surges, strong winds, low pressure and high river flows.

The Irish Coastal Wave and Water Level Modelling Study (ICWWS) Phase 1 - 2018⁸ provides estimates of extreme water levels around the coast based on detailed numerical modelling. The nearest model node location, S14, is shown in Figure 2.3 with associated data in Figure 2.4. The ICWWS technical report states that water levels are expected to lie within +/- 150mm of predicted values.

Modelling conducted for the FRS showed a less than 0.1m increase in level from the open sea to Skibbereen during a coastal event. The predicted extreme water levels at S14 are thus reasonable indicators of associated coastal flood events in Skibbereen town.

The predicted current climate scenario 0.5%AEP event (flood defences discounted) water level is 2.42m OD increasing to 2.92m OD for the mid-range future event. The flood inundation impact of both the mid-range and high-end future climate 0.5%AEP events are shown in Figure 2.5. The high-end flood water levels reach 3.42m ODM which is 1.23m below the proposed FFL of 4.65m OD.

⁸ OPW RPS, Irish Coastal Wave and Water Level Modelling Study 2018 Phase 1 – Extreme Water Levels 23 October 2020

2.3 Other Potential Flood Risks

There are municipal water mains and drainage systems present on Mardyke Street. These pose a minor flood risk as a pipe rupture or blockage could potentially result in flowing water on the roadway adjacent to the site. There is no risk to the building itself as the finished floor level is above the street level.

Historic data describes flooding arising from the small local catchment to the west. The topography and road layout have changed in the intervening years and such flooding does not seem to be possible at the present time. However, should there be future terrain changes then something similar could happen with flood waters discharging along Mardyke Street without impacting the site.

The rear yard areas of the ground floor apartments adjoin the Aldi carpark and the unused site to the west, both of which are at a higher level. The yard areas are also enclosed so that there is potential for local pluvial flooding during extreme events with possible inflow to the apartments through the patio doors. The potential risk can be mitigated by:

- (1) Ensuring surrounding perimeter walls to the north and west are continuous and
- (2) Providing adequate drainage to each yard area with built in redundancy.

2.4 Residual & Long Term Flood Risk

Failure of the main Skibbereen FRS defence works could potentially lead to flood waters reaching the 0.5%AEP (1:200 year) level of 3.54mOD (Figure 2.1). This would amount to a very damaging event for the main town area. However, there will be no impact at the proposed site.

The longer-term risks associated with climate change are largely unknown. The FRS studies do not provide flood level predictions for future events. The ICWWS coastal water level predictions in Figure 2.4 show that the building will not be impacted even in the more extreme scenarios.

2.5 Site Access

Access to the site will be available to the west during extreme fluvial and coastal events which would otherwise make the town centre impassable.

2.6 Impact of Development

The proposed development will not impact on any nearby properties. Local runoff will be attenuated through various SuDS measures.

2.7 Development Justification

The proposed development primarily constitutes ‘highly vulnerable development’ as per Table 3.1 of the ministerial planning guidelines⁹. This type of development requires justification for Flood Zone Area A and B.

The site is some 50m from a Flood Zone A area as defined by the CDP 2022 flood mapping. The building itself and 94% of the site area are outside the flood Zone B as also defined by the CDP mapping.

The proposed FFL at 4.65m OD is more than 1m above the likely extreme flood water levels as identified by the OPW FRS and ICWWS studies. The lowest level on the site, in the eastern tip, is 3.9m OD which is 0.46m above the 1:200 year current climate flood level estimate.

Based on the items outlined above, the proposed development lies mostly in a flood Zone C area and meets the requirements of the ministerial guidelines as a justifiable development.

⁹ “The Planning System and Flood Risk Management – Guidelines for Planning Authorities” issued in November 2009 by DoEHLG

CHAINAGE	2550.000	2600.000	2650.000	2700.000	7800.000	7850.000	7900.000	7950.000	8000.000
2 Year Flood Event Max. Water Level (M.O.D.) Existing	2.546	2.545	2.545	2.549	2.627	2.670	2.567	2.567	2.575
2 Year Flood Event Max. Water Level (M.O.D.) Post Works	2.620	2.620	2.618	2.618	2.671	2.691	2.607	2.603	2.608
200 Year Flood Event Max. Water Level (M.O.D.) Existing	3.348	3.347	3.349	3.352	3.419	3.380	3.350	3.339	3.343
200 Year Flood Event Max. Water Level (M.O.D.) Post Works	3.540	3.540	3.537	3.529	3.578	3.537	3.496	3.469	3.458
	Caol Stream				Ilen River				

Figure 2.1 - Predicted water levels from Skibbereen FRS, pre and post FRS works

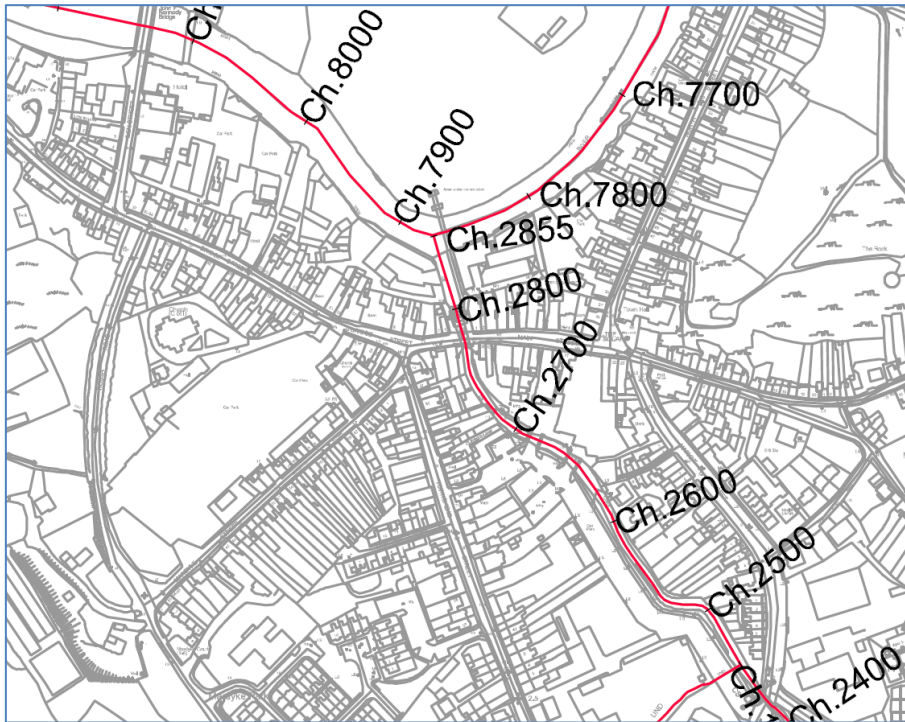


Figure 2.2 - FRS River model centreline chainages

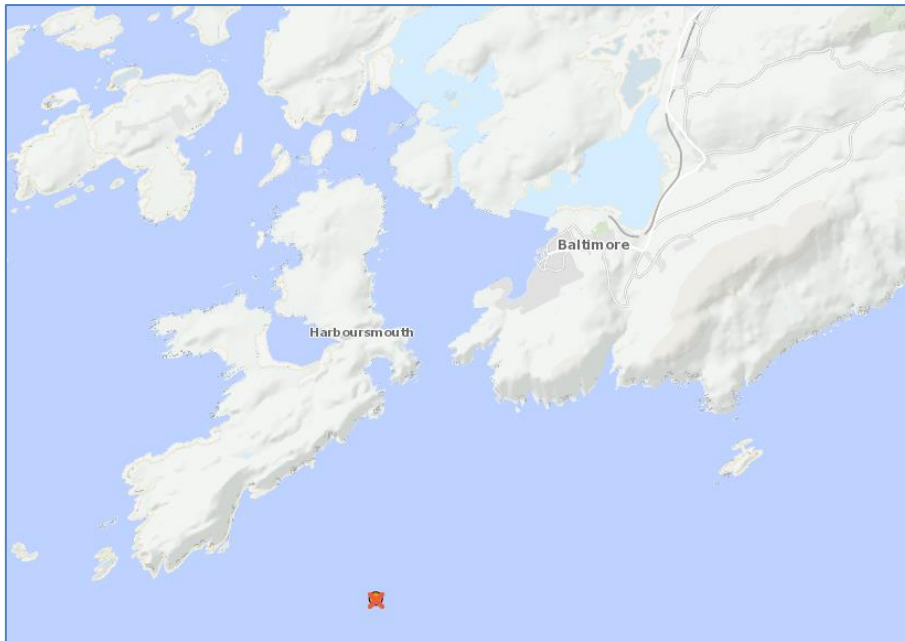


Figure 2.3 - Location of S14

South Point S14
Water Level (OD Malin OSGM15 in meters)

AEP	Scenario				
	Present Day	MRFS	HEFS	H+EFS	H++EFS
50%	1.97	2.47	2.97	3.47	3.97
20%	2.06	2.56	3.06	3.56	4.06
10%	2.13	2.63	3.13	3.63	4.13
5%	2.20	2.70	3.20	3.70	4.20
2%	2.29	2.79	3.29	3.79	4.29
1%	2.36	2.86	3.36	3.86	4.36
0.5%	2.42	2.92	3.42	3.92	4.42
0.1%	2.58	3.08	3.58	4.08	4.58

[View Irish Coastal Wave and Water Level Modelling Study 2018 Phase 1 Technical Report \(new tab\)](#)

Figure 2.4 - Extreme Water Level Estimates



Figure 2.5 - Inundation for Mid Range and High End future climate 0.5%AEP coastal event (flood defences discounted)

3. Closure

A detailed flooding assessment has been conducted for the site and the various risks assessed.

The site has been found to lie in a Flood Zone C area. The proposed finished floor level of the building is more than 1m above the extreme 1:200 year flood water levels identified by OPW in various studies.

There will be no impact on any adjoining properties or watercourses. It is considered to be 'justifiable' development in terms of the ministerial guidelines.



J.F. Walshe BE, MEngSc, C Eng, MIEI.

Appendix A - OPW Flood Maps report

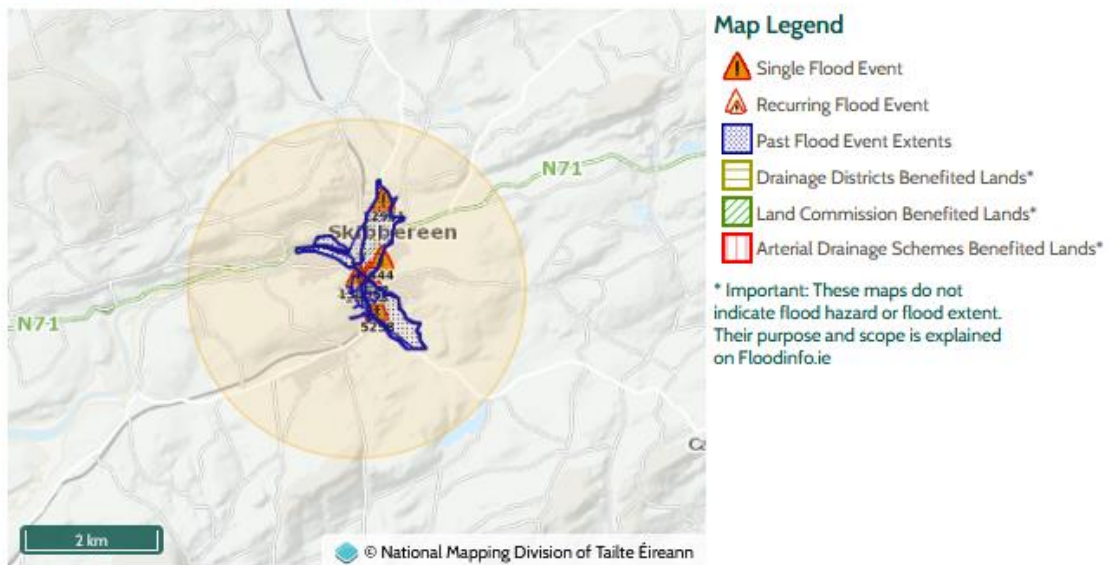
Past Flood Event Local Area Summary Report



Report Produced: 28/2/2024 10:34

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.



16 Results

Name (Flood_ID)	Start Date	Event Location
1. Ilen Skibbereen Sept 1974 (ID-441) Additional Information: Reports (6) Press Archive (0)	11/09/1974	Area
2. Ilen Skibbereen Jan 1969 (ID-440) Additional Information: Reports (6) Press Archive (4)	19/01/1969	Area
3. Ilen Skibbereen 6 August 1986 (ID-446) Additional Information: Reports (5) Press Archive (2)	04/08/1986	Area
4. Flooding at Skibereen on 03/02/2014 (ID-13096) Additional Information: Reports (0) Press Archive (0)	03/02/2014	Approximate Point
5. Ilen Skibbereen February 1982 (ID-443) Additional Information: Reports (6) Press Archive (0)	20/02/1982	Area
Skibbereen Nov 2000 (ID-5258) Additional Information: Reports (1) Press Archive (1)	05/11/2000	Approximate Point

	Name (Flood_ID)	Start Date	Event Location
7.	 Ilen Skibbereen 25 August 1986 (ID-491) Additional Information: Reports (2) Press Archive (0)	24/08/1986	Exact Point
8.	 Flooding at Skibereen on 30/12/2015 (ID-13508) Additional Information: Reports (0) Press Archive (0)	30/12/2015	Approximate Point
9.	 Ilen Skibbereen December 1982 (ID-444) Additional Information: Reports (2) Press Archive (0)	07/12/1982	Approximate Point
10.	 Ilen Skibbereen Oct 1975 (ID-442) Additional Information: Reports (6) Press Archive (0)	21/10/1975	Approximate Point
11.	 Ilen Skibbereen Jan 1983 (ID-445) Additional Information: Reports (1) Press Archive (0)	31/01/1983	Approximate Point
12.	 Skibbereen Flooding 19th November 2009 (ID-10785) Additional Information: Reports (2) Press Archive (0)	19/11/2009	Approximate Point
13.	 Skibbereen, Co.Cork 31st December 2009 (ID-11081) Additional Information: Reports (1) Press Archive (0)	31/12/2009	Approximate Point
14.	 Flooding at Skibbereen on 19/08/2020 (ID-13730) Additional Information: Reports (0) Press Archive (0)	19/08/2020	Approximate Point
15.	 Flooding at Skibereen on 05/12/2015 (ID-13345) Additional Information: Reports (0) Press Archive (0)	05/12/2015	Approximate Point
16.	 Flooding at Skibereen on 25/10/2013 (ID-12951) Additional Information: Reports (0) Press Archive (0)	25/10/2013	Approximate Point