

Leahy Planning Ltd.

Mill Road House, Mill Road, Ennis, Co. Clare, V95 FH5N.

Tel No: 065-68 91254

Mobile: 087-795 8180

CRO No: 623263

Email address: info@leahyplanning.com Website: www.leahyplanning.com

Michael Leahy B.Arch., M.R.U.P., Dip Plng. & Env. Law, F.R.I.A.I., M.I.P.I., A.oU.

**Forward Planning Section
Clare County Council
New Road
Ennis
County Clare**

4th March 2022



Dear Sir/Madam,

Re: Submission in respect of proposed revisions to Clare County development plan as part of current public consultation process.

Ennis and environs area plan.

On behalf of my clients Messers Focus Capital Partners, of [REDACTED] [REDACTED] we wish to make the following submission in respect of the area of proposed residential zoning on their lands at Drehidnagower, Ennis.

Messrs Focus Capital Partners have recently completed a social housing development on their lands in this area. They have put in extensive roadworks in order to complete this development including the provision of a new roundabout, road widening and foot paths on Drumcliffe Road.

We attach below copy of the site layout of the development that they have constructed on their lands on foot of planning permission ref No 16/758. This map which is reproduced hereunder and is also contained as **Appendix 1** indicates the entirety of the site owned by my clients outlined in red.



Fig 1
 Site layout as granted under P16/758 and recently completed.

We also attach below extract from the proposed zoning for this area under the proposed revisions to the development plan which are at present at Public Consultation stage.



Fig 2.
 Zoning map from Proposed revisions to development plan, showing that portion of the site zoned as “existing residential” in Yellow.

We also attach herewith as **Appendix 2** study into the flood regime of the area carried out in 2016 by Hydro Environmental Ltd (Dr Tony Cawley author) and which was submitted with the above-mentioned planning application. This study identifies in detail the classification of flood risk areas (A, B and C) which take place on the site and in the surrounding area.

It seems clear that the findings of this report were used by the council in its delineation of the area which was excluded from residential zoning in the 2017 plan in that the area shown coming into the residentially zoned area which is indicated for open space zoning also coincides with the area shown in Dr Cawley's report as being within flood zone A.

This delineation has also been used in the current updated maps for the proposed revisions which now indicate the area being zoned as "*existing residential*" rather than "*residential*".

For purpose of further clarification we attach as **Appendix 3** an overlay map which indicates the area of land contained within the present zoned area overlain against the layout of the existing estate and which map also indicates the areas of land which are classified as flood zones A, B and C.

The purpose of this submission relates to the area of land immediately adjoining the existing estate distributor road which is indicated as being within flood zone C but is nevertheless excluded from the present zoning.

This section of land is marked "X" on the attached overlay map.

Indeed it would appear that the northern limit of the zoned land at the western section of the site has been determined, not by a consideration of the flood zoning but rather by the existence of an historic field boundary.

The purpose of this submission is to seek that the area on the western section of the site and to the north of the existing zoning line, but which is within flood zone C should be included within the zoned area.



We would also seek that the zoned area of the site outside of that which has already been developed would be zoned for *residential* as opposed to *existing residential* use. In this respect it should be noted that the existing developed site has made provision in accordance with the quantitative standards of the existing Development Plan for the provision of an adequate amount of open space to serve the development, and that the area to the west of the main distributor road within the estate is not needed as open space for that purpose.

While the existing zoned area to the west of the distributor road of the roundabout is insufficient in itself to justify an estate development, incorporation of the area of land marked X on the attached overlay map would enable such a development to take place. Access to the existing zoned area on the west of the site would have to be off the newly constructed roundabout which is not optimal while access to the extended area could be taken off the existing distributor road.

Any concerns which the council may have in regard to the flood regime and displacement of flood waters can easily be met within the overall landholding belonging to my clients in terms of provision of any required compensatory storage.

There are a number of specific planning gains which the proposed extension of zoning would provide:

The land proposed to be zoned, comprising, in combination with the existing small zoned area, some 0.28 hectares, comprises serviced land which can be accessed off an existing distributor road and without interfering in any way with the existing public road regime.

Similarly, services provided by the developer within the existing estate can easily be accessed by a development of the proposed zoned lands.

The land is very close to the existing centre of Ennis and is surrounded by residentially developed or zoned lands. As such the development of housing this area is entirely compatible with the surrounding pattern of development.

Being located within Flood zone C, the proposed rezoning places no pressure on existing floodplains or on the existing flood regime.

The proposed development is within a 10-minute walk of the town centre of Ennis and is entirely compatible with recently enunciated “10 minute town” strategy outlined in the strategic plan for Ennis to 2040. Further, the site is close to shopping, healthcare and educational facilities.

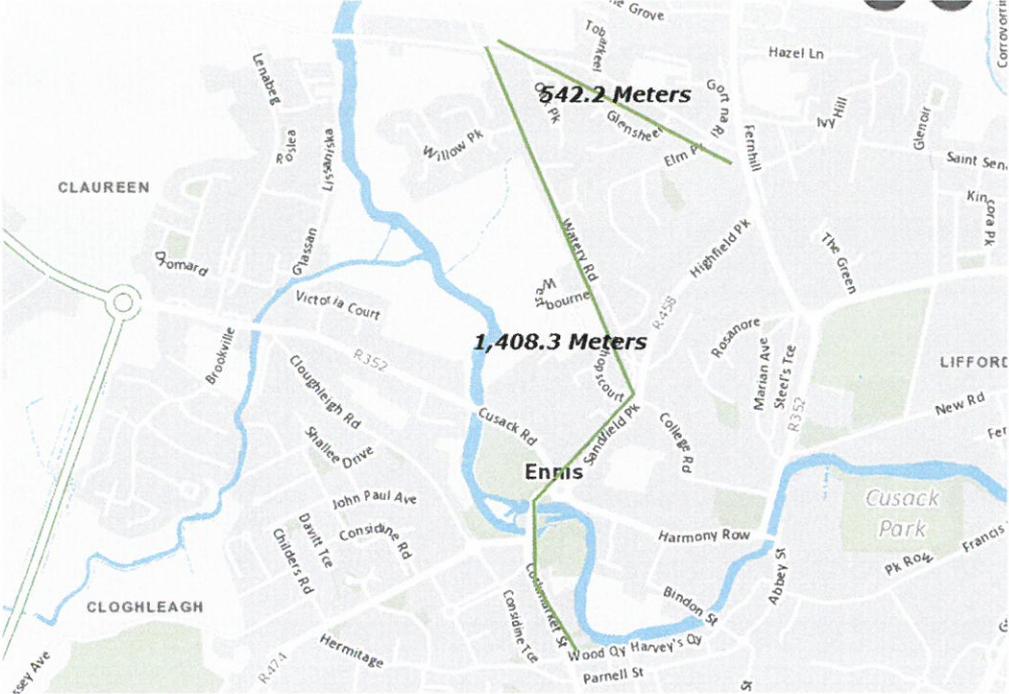


Fig 4.
Extract from Google maps showing distances from site to shopping facilities and to Town Centre.

The site would provide a logical extension of an existing estate which primarily consists of social housing. My clients would be happy to negotiate with the council on the provision of further social housing at this location or in any event to enable a substantial portion of it to be developed for social housing.

The situation of the site is that it does contain a number of mature trees and these provide an opportunity for integration into the existing estate. It is clear that these trees can be protected in any future development. There are two tree stands, the first forming part of what was a field boundary and the 2nd which contains a number of random tree-stands. The latter contains approximately 6 good quality trees which can be protected and around which an interesting design can be developed. A number of these trees were indicated as being “to

be preserved” in the NIS submitted with the 2016 planning application, and the proposed rezoning would not affect this intention.



Tree group containing circa six good trees.



Tree group along old boundary.

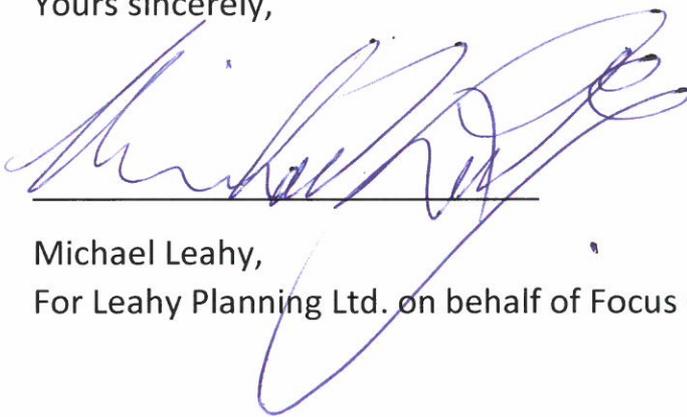
It is frequently the case that land which is identified as suitable for development by a planning authority and which is zoned for development may not come available for development within the lifespan of the development plan. There may be any number of reasons for this including title, services, or the particular set circumstances of the landowner. In the present case the proposal would make available a section of land which is available for immediate development,

and my clients are committed to ensure that it will be developed within the lifetime of the upcoming plan if the zoning as indicated above is effected.

We trust you will take this submission into account and should there be any item in the above which requires clarification please contact the undersigned.

Please acknowledge receipt of this submission and provide a submission reference number.

Yours sincerely,



Michael Leahy,
For Leahy Planning Ltd. on behalf of Focus Capital Partners Limited

APPENDIXES

Appendix 1: Layout as constructed under planning permission 16/758

Appendix 2: Report from Hydro Environmental Ltd. 2016 indicating flood zones

Appendix 3: Overlay map showing proposed additional zoned area

Appendix 1

Layout as constructed under planning permission 16/758

Appendix 2

Report from Hydro Environmental Ltd. 2016 indicating flood zones

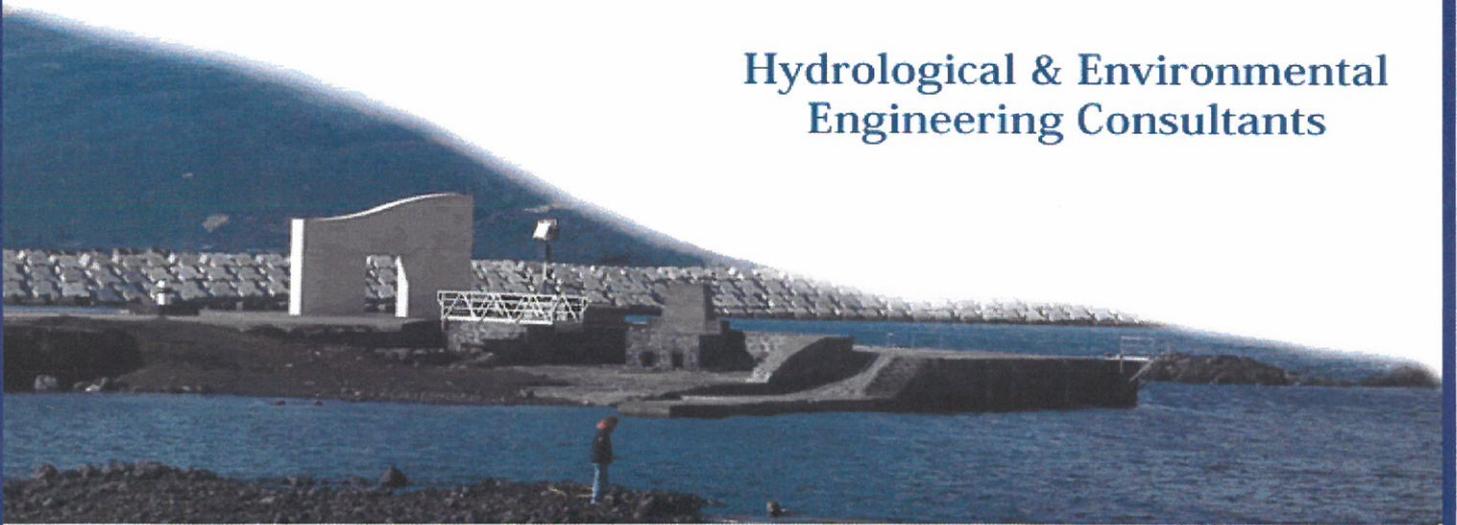


**Flood Risk Assessment
for Residential Housing Development
at Lifford, Gort Road, Ennis, Co. Clare**

**On behalf of
Michael Lynch Ltd.**

December 2016

**Hydrological & Environmental
Engineering Consultants**



Flood Risk Assessment for Residential Housing Development at Lifford, Gort Road, Ennis, Co. Clare



Job No.: 210201

Report No.: HEL210201v1.2

Prepared by: Anthony Cawley BE, M.EngSc, CEng MIEI

Date: 20th December 2016

© Hydro Environmental Ltd 2016

DISCLAIMER

This report has been prepared solely as a Flood Risk Assessment report for a residential development on Lynch Lands at Lifford, Ennis, Co. Clare. Hydro Environmental Ltd accept no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned.

Table of Contents

1. Background.....	1
2. Site Description.....	3
3. Description of Proposed Development.....	4
4. Catchment Hydrology.....	9
4.1 River Fergus.....	9
4.2 Historical Flooding.....	9
4.3 Ennis Flood Relief Scheme.....	11
5. Flood Risk for Proposed Residential Development.....	15
5.1 Introduction.....	15
5.2 Design Flood Level Prediction	15
5.3 Flood Risk Mapping	16
6. Planning Guidelines Concerning Flood Risk Management.....	19
6.1 Background.....	19
6.2 Site Specific Flood Risk Assessment	19
6.3 Decision Making Process.....	20
6.4 Flood Impact.....	23
6.5 Recommended Minimum Finish Level for Development.....	24
6.6 Residual Flood Risk.....	25
6.7 Justification Test for the Lifford Site	25
7. CONCLUSIONS.....	29

1. Background

Hydro Environmental Ltd. was appointed by Tony Bamford Planning Consultant on behalf of developer Seamus Lynch of Michael Lynch & Partners Ltd. to carry out a site specific Flood Risk Assessment of a proposed residential housing development at Lifford, Ennis.

A previous application on the site for development of a larger area of the site was made in August 2015 but this was refused by on Bord Pleanála on the grounds of Flooding and Flood Risk. This new application has been substantially scaled back so that the development is located principally on the higher Zone C lands. It should be noted that the layout was designed to ensure that all of the 61 residential units within the development are located in Flood Zone C (low probability of flooding).

The proposed site is adjacent to the River Fergus and parts of the site have historically flooded in the past. Consequently, as per the requirements of the Flood Risk Management Planning guidelines a stage three site specific flood risk assessment was carried out to assess and quantify the flood risk to the development and the potential impact of the proposed development on flooding.

The lands proposed for development have been zoned under the Ennis Town Development Plan 2009 - 2015 and have already undergone a strategic Flood Risk Assessment and a Strategic Environmental Assessment as part of the zoning process.

This study uses the latest available flood mapping information from the Draft OPW CFRAM study whose mapping went to Public consultation in 2015 and its flood risk management Plans in 2016 to inform the assessment in respect to the extent of flood risk zones on the site and the fluvial and combined return period design flood levels for the development. This assessment quantifies the flood risk to the site, makes recommendations as to safe finish floor levels for the residential units, assesses the potential flood impact of developing the lands on flood risk to adjacent lands and identifies where necessary any mitigation measures needed to minimise/prevent such impacts. A significant design measure is avoidance of the flood plain area in respect to the residential units and setting a safe minimum finish floor level.

Other sources of information that informed this FRA study included a relatively recent topographical site survey carried out by Land Surveys Ltd. in July 2015, the Nov 2005 development application and supporting documentation, preliminary Flood Risk Assessment by Hydro Environmental (2014) and the previous Flood Risk assessment (August 2015), the Ennis Flood Study (UCG 2001), the JBA preliminary Flood Risk Mapping (2009), OPW Floodmaps.ie, etc. These sources are:

- CFRAM – Catchment Flood Risk and Management Study by OPW and consultant Jacobs
- Site Survey by Land Survey's Ltd (July 2015)
- JBA strategic Flood Risk Assessment Study of Ennis Town and Environs (JBA 2009) for input to the Ennis Town Development Plan.
- Storm Drainage Design (Aug 2015) Coleman and Associates Consulting Engineers

Flood Risk Assessment Residential Development at Lifford, Ennis

- Floodmaps.ie
- Ennis Main Drainage and Flooding Study by Hydrology Dept. UCG (2001)
- Air Corps Aerial photos of flooding during Nov 2009 – Clare Co. Council
- Rack mark survey of Nov 2009 Flood Event near the Gort Road industrial estate by Hydro Environmental Ltd.
- Preliminary Flood Risk Assessment Screening Study for Phase 1 Residential Housing Development at Lifford, Gort Road, Ennis, Co. Clare by Hydro Environmental Ltd. Sept 2014.

It is noted in the Ennis Town Development Plan that all residential lands have been zoned having regard to the JBA strategic Flood Risk Assessment Study of Ennis Town and Environs (JBA, 2009) for input to the Ennis Town Development Plan (2008 to 2014). A Copy of the Flood Risk Map for the JBA sFRA study (October 2009) is presented in Figure 2 below. The more detailed and recent CFRAM Flood Risk Map and predicted flood levels is used to the JBA study to inform the location of the various flood zones on the proposed site.

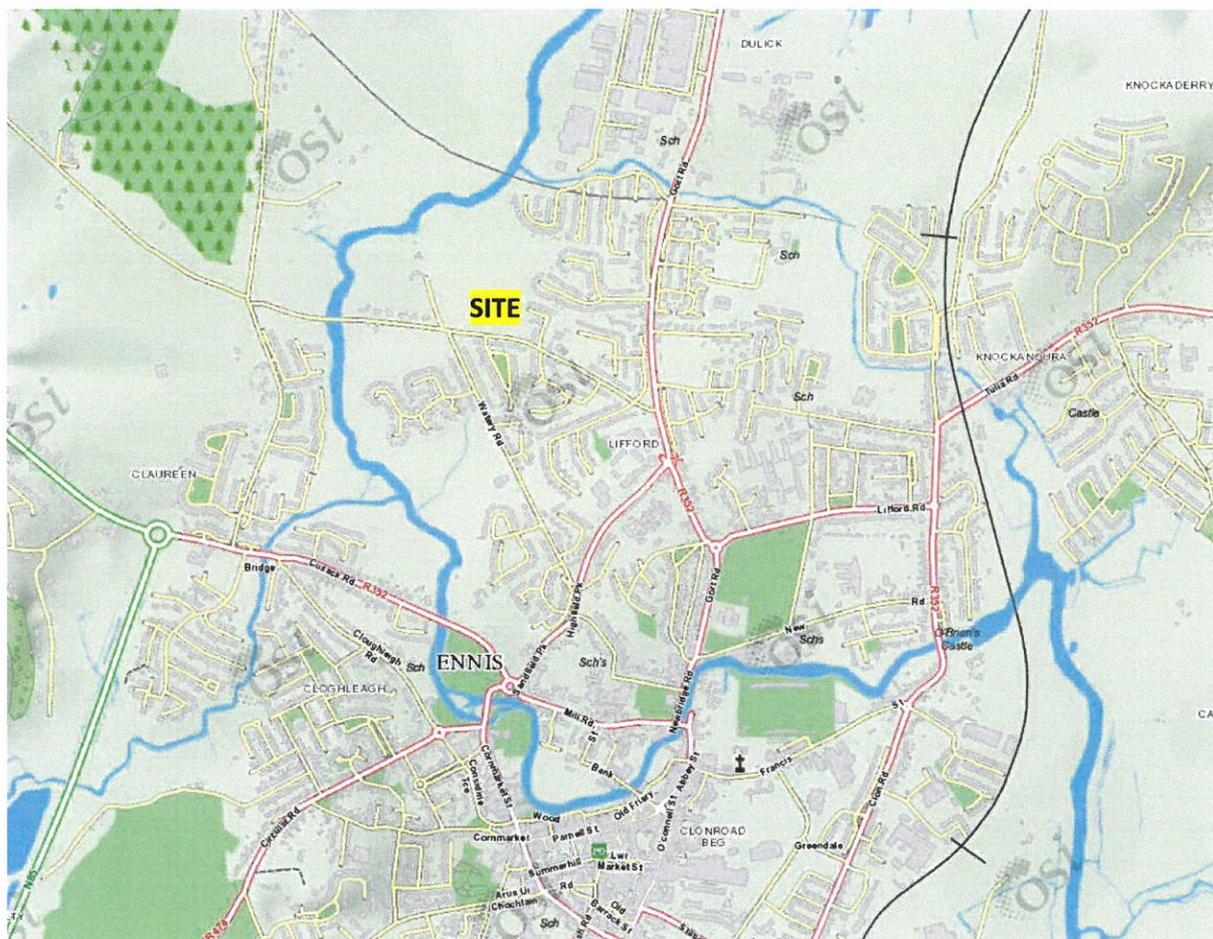


Figure 1 Site Location in Ennis

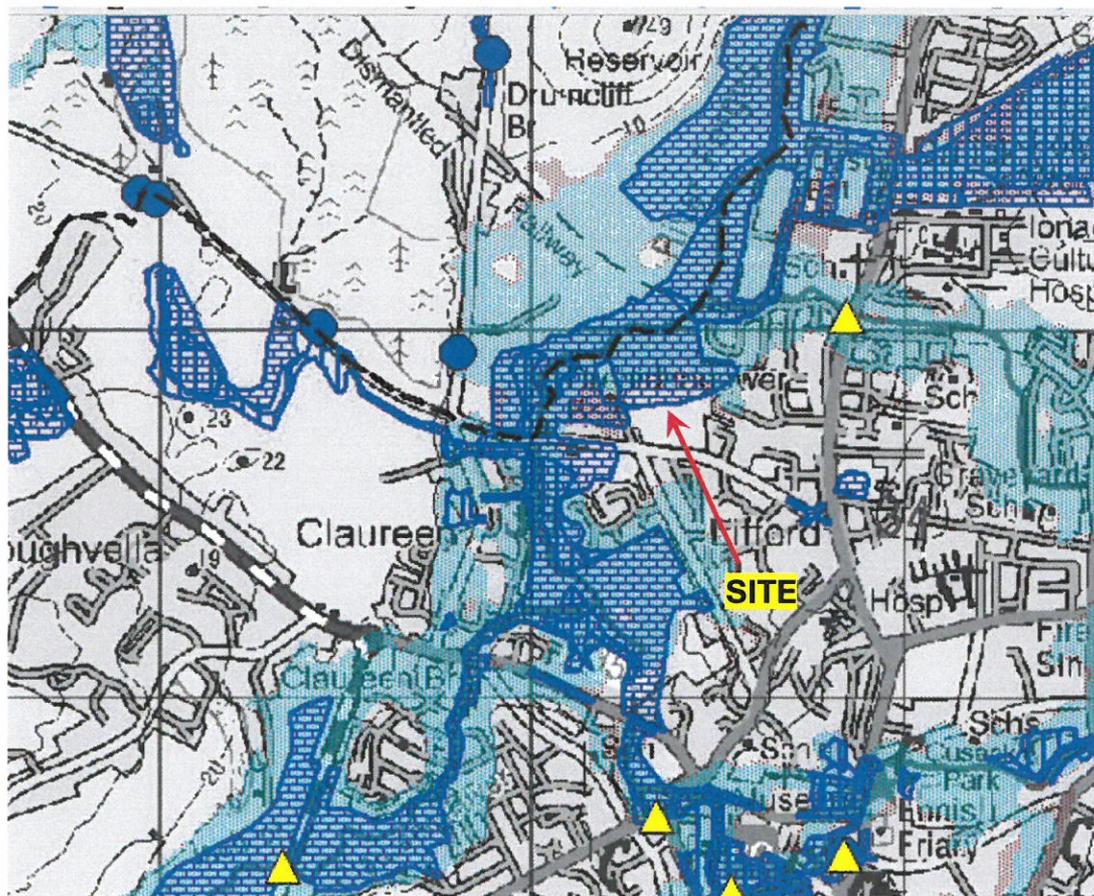


Figure 2 Flood mapping from JBA strategic FRA (October 2009) used in the Ennis Town Development Plan

2. Site Description

The site is located off the Drumcliff Road at Lifford and is adjacent to the River Fergus Floodplain. The overall Michael Lynch Lands at Lifford slightly exceed 8ha with the red line application boundary which includes the public road having an area of 2.92ha and which is confined principally to the higher ground in the zoned southern half of the site, away from the River and the active floodplain area. The residential area of the development is located in Flood Zone C (Low Flood Risk Zone suitable for development). Some slight encroachment of Flood Zones A and B occur in respect to portion of the entrance road and the provision of the SUDs (sustainable urban drainage system) for storm water treatment and disposal. This SUDs includes grassed swales and a lined and bunded water quality settlement pond for treatment of the surface water runoff prior to on-site disposal via a large stoned soakaway at the edge of the flood plain area, refer to layout plan in Figure 3.

The topographical survey of the site by Land Survey's Ltd (carried out in July 2015) shows the proposed residential development area to be generally elevated at typically from 6m O.D to 7.5m O.D, whereas to the north the ground falls to typically 5m making such lands vulnerable to regular winter flooding. This is evident from aerial photos of the Nov 2009 flood at the site (refer to Plates 6 and 7). The JBA sFRA(2009) flood mapping generally

agrees with this as does the recent and more accurate CFRAM draft flood inundation and flood risk maps, which are presented in Figures 7 and 8 of this report.

3. Description of Proposed Development

The proposed development is for 61 housing units of various types within a red line boundary area of 2.92ha. The proposed finish floor levels for the residential units within the development vary from a minimum of 7.05m up to 8.45m OD, but with the majority of units above 7.4 m O.D.

The red line boundary includes a section of the Drumcliff / Drehidnagower public road adjacent to the site to facilitate a roundabout and tie-ins, etc.. The residential development footprint area within the application site is approximately 2.1ha with a proposed hard paved area (roofs, road, paths and driveways) of 1.2ha. A SUDs system for surface water treatment and onsite discharge is proposed involving a 225m long grassed shallow swale that outfalls to a water quality settlement Pond of 160m³ permanent storage and a freeboard storage of 200m³ for final treatment prior to disposal to ground. These drainage facilities are located within a 0.45ha strip along the northwest and north edge of the development, refer to Figure 3. These facilities provide a degree of stormwater attenuation but chiefly water quality treatment prior to its discharge and will minimise the potential for pollution to the River Fergus and the local groundwater body. Treated surface water will be disposed of on-site via a large engineered soakaway system located to the southwest of the water quality pond. This avoids any direct discharge to the River Fergus or construction work in the Lower River Shannon SAC (002165). The SAC includes the Fergus River through Ennis town and continues to upstream of Ballyallia lakes.



Figure 3 Proposed Site Layout



Plate 1 View of Site from Drumcliff Road



Plate 2 Raised ground on Site along southwest boundary



Plate 3 River Fergus Channel near the Lynch Site looking upstream towards disused West Clare Railway line



Plate 4 River Fergus Channel near the Lynch Site looking downstream River banks at 4.25m OD



Plate 5 Low-lying active floodplain area adjacent to the Fergus Channel and well outside of the proposed development area and compensation Storage area.

4. Catchment Hydrology

4.1 River Fergus

The River Fergus flows through Ennis having a catchment area of 562km² to its gauging station at Ballycorey 2km upstream of the town centre. The Claureen River joins the River Fergus just upstream of the Lahinch Road (N84) in Ennis and 0.9km downstream of the subject site. The Fergus is a relatively damped catchment due to its karstic nature having a relatively slow response to rainfall, requiring prolonged, wet, antecedent winter conditions to exhaust catchment storage and generate the more serious flooding. The Claureen River is a much smaller and flashier catchment, having a relatively high runoff coefficient associated with its impermeable shale and mudstone bedrock geology and a catchment area of 55km². This river system often registers a flood pulse at Ennis prior to the Fergus peak flows arriving.

The River Fergus splits upstream of Ennis with the main channel that passes the subject site discharging the bulk of the flood flow down through the centre of Ennis Town. The other smaller branch of the River Fergus (referred to as the Fergus Minor) breaks away from the main channel immediately downstream of the Gort Road Industrial Estate and diverts Fergus flow southeast around the Town past Our Lady's Church and Corrovorrin Estate, rejoining the Fergus Lower (Lower tidally affected reach) downstream (south) of the Tulla Road. Approximately one fifth of the River Fergus flood flow during extreme events is estimated to discharge via the Fergus Minor (Cawley and Cunnane, 2001). Intermediate flows join the Fergus via karst springs at Drumcliff, Lough Girroga and Loughville Turlough flows.

4.2 Historical Flooding

In terms of flood flow events in the River Fergus at Ennis the following are the most notable events on record and ranked in terms of flow magnitude.

Rank	Date
1 st	November 2009
2 nd	December 2015
3 rd	December 1959
4 th	December 1999
5 th	February 1995

A column chart of the estimated annual maximum flows in the River Fergus at Ballycorey, Ennis presents the chronology of flooding over the past 62 years and the increased magnitudes and frequency of flooding that has occurred in the last two decades, which may or may not be linked to global warming and climate change effects (refer to Figure 4).

In November 2009 it is estimated by the author that the peak flow in the River Fergus at Ballycorey hydrometric gauge was of the order of 78.5cumec, flood flow diverted down the Fergus minor was c. 10 to 12 cumec, the Claureen inflow contribution was c. 8 to 9cumec

**Flood Risk Assessment
Residential Development at Lifford, Ennis**

and the intermediate inflow contribution was c. 5 to 6cumeec suggesting a peak flow through the Town of c. 80 to 84cumeec.

In previous flood events of December 1999 and Feb 1995 a flow rate of c. 62cumeec through the town was estimated (Cawley and Cunnane, 2001) for both events.

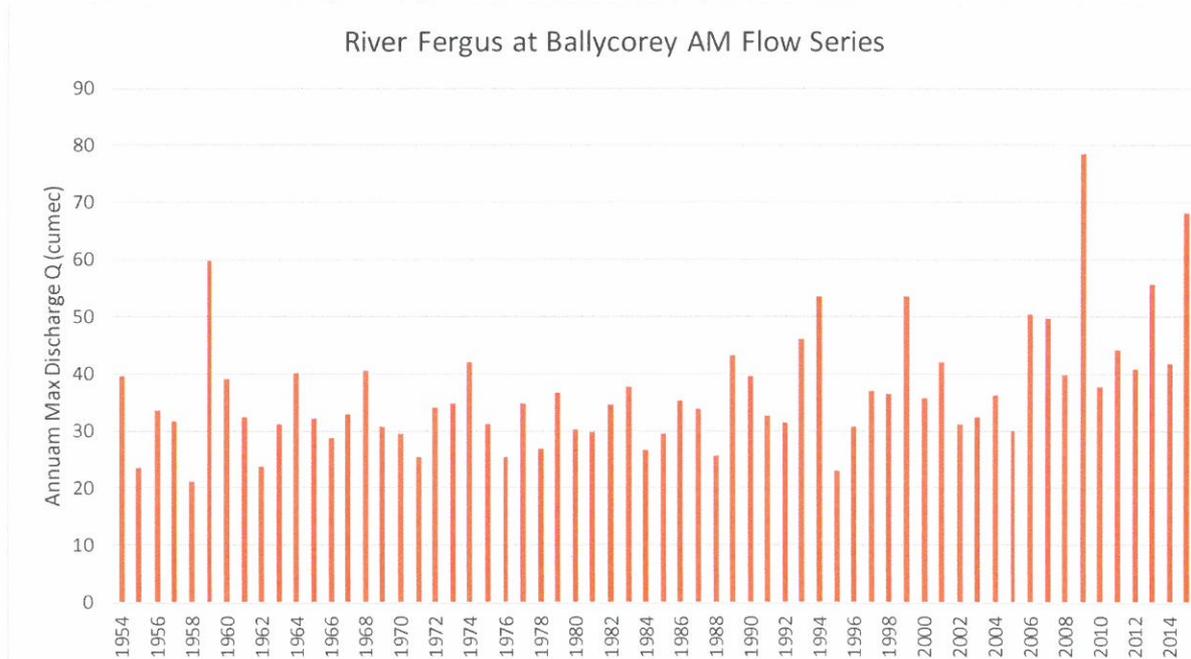


Figure 4 62years of recorded Annual Maximum Flows for River Fergus at Ballycorey, showing increased flooding over the past two decades

Recent December 2015 Flooding

The recent winter flooding in December 2015 was a significant event on the Fergus River at Ennis and is ranked an overall second based on the recorded record at the upstream Ballycorey gauge (27002). The recorded record dates back to 1954 (62years of annual maxima record). The Claureen Tributary which joins the Fergus upstream of Cusack Bridge on the Lahinch road saw historical high flood levels reached on the 4th December as a result of intense 12 / 24hour rainfall. An intense rainfall pulse on the 12th December on the Claureen also kicked in resulting in a peak level of 5.4m OD at Cusack Bridge gauge downstream of the Claureen confluence early on the 13th December and the Ballycorey gauge peaked latter that day. The estimated peak flow at Ballycorey on the 13th December 2015 was 68cumeec suggesting a return period of just under 50years.

Table 1 Return Period Predictions for the Ballycorey Gauge (27002) based on statistical analysis of 62years of annual maximum flows

Return Period T (years)	EV1 Yvariate =-ln(-ln(1-1/T))	Return Period Flow QT (cumeec)
25	3.199	61.4
50	3.902	69.4
100	4.600	77.4
1000	6.907	103.6

The above Table 1 suggests that both the 2009 and 2015 flood events were significant having estimated return periods of 45years and 110years respectively. These estimates of return period ignore climate change and assume the entire AM series is stationary in respect to time (from the same statistical population).

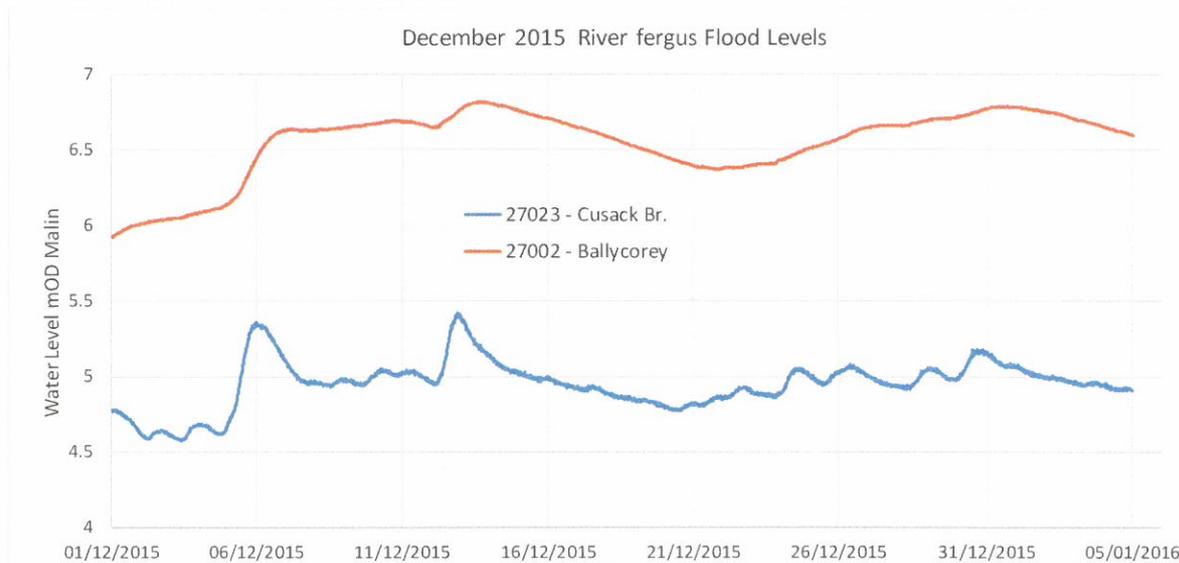


Figure 5 Recorded Flood levels on the Fergus in December 2016 (2nd highest flood record at Ballycorey)

4.3 Ennis Flood Relief Scheme

Ennis Town has in recent years seen serious flooding from the River Fergus with the 1995 and 1999 flood events prompting an OPW Flood Relief scheme for Ennis Town with the first phase completed (town centre area in 2009/2010) and the second phase River Fergus Lower (Ennis) Certified Drainage Scheme that was given Ministerial Approval in 2013 well underway. A further Clareabbey Phase is also proposed downstream of the Quin Road.

A minor works flood relief scheme was carried out to protect the Gort Road and the Gort Road industrial estate from flooding by Lough Girroga. This involved the construction of an overflow spillway and a large overflow culvert from Lough Girroga to the River Fergus in 2011/2012.

Relevant to the subject development site the Fior Uisce Flood Alleviation Scheme to protect the Aughanteeroe Housing Estate has been recently completed (end of 2015). These works form part of the River Fergus Lower (Ennis) Certified Drainage Scheme and involved constructing a 225m long flood embankment adjacent to the west and south boundaries of the Aughanteeroe Estate and was tied back into the existing Flood embankment that protects the estate to the north and east. This embankment varies in width from 7 to 12m and has a crest elevation of 6.8m OD.

Flood Risk Assessment
Residential Development at Lifford, Ennis

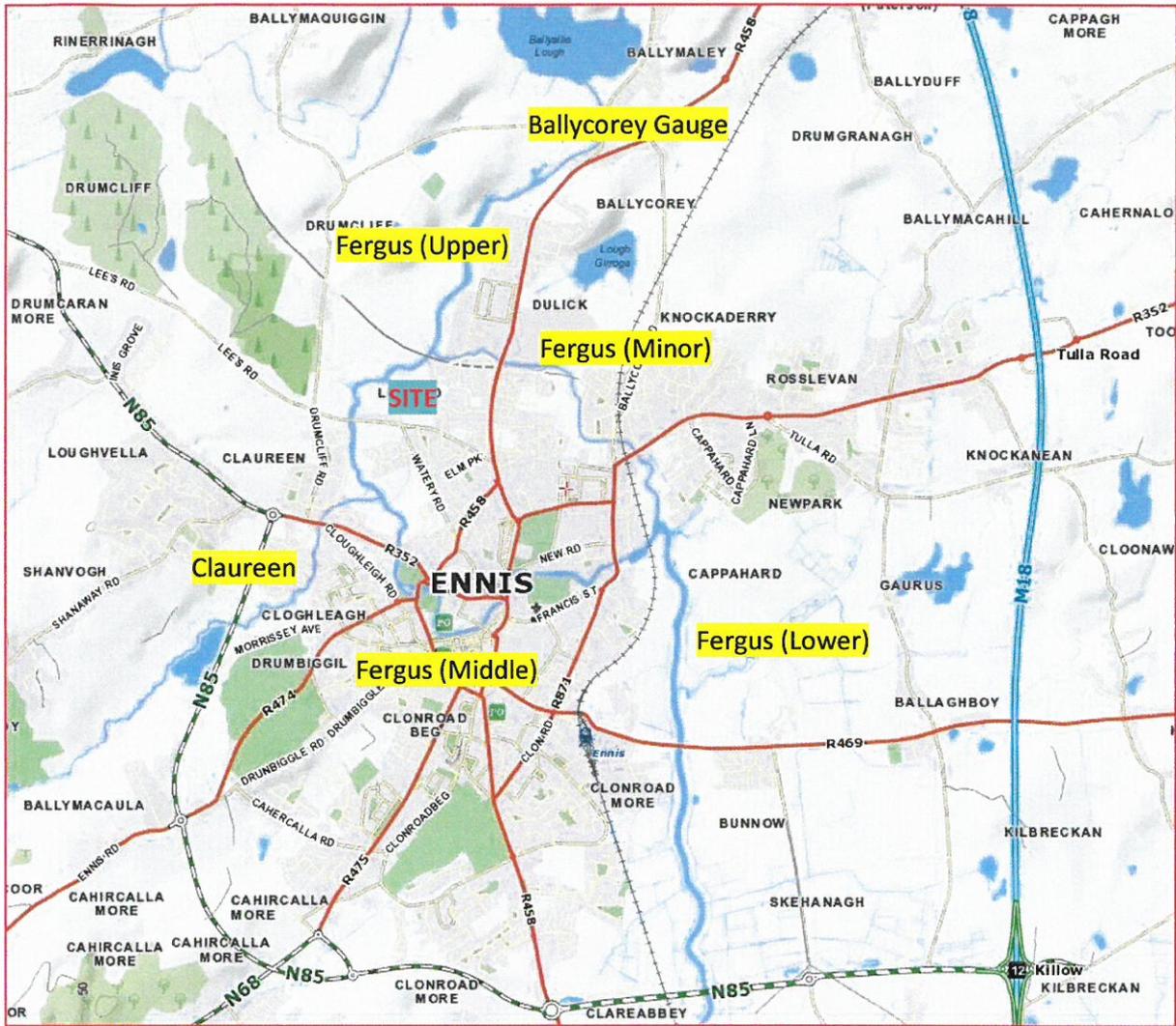


Figure 6 River Network Through Ennis



Plate 6 Aerial Photo of Flooding at the proposed site in November 2009



Plate 7 Aerial Photo of Flooding at the proposed site in November 2009

5. Flood Risk for Proposed Residential Development

5.1 Introduction

The source of flood risk to the proposed Lifford site is from fluvial flooding by the River Fergus. Groundwater, pluvial and coastal flooding do not pose a significant risk to the site as existing ground levels are sufficiently elevated not to be affected by the tides and karst groundwater features are not evident on the site. Historical Flooding in the Fergus near the site indicates that November 2009 was the worst flood event in living memory and approached the estimated 100year design flood magnitude. Aerial Photos of flooding on the site for November 2009 suggest that flood levels reached approximately 5.8m O.D.

Previous significant flood events in Ennis were December 1959, Jan/Feb 1995 and December 1999. In December 1999 peak flood levels in the upper River Fergus near Fergus Minor Diversion at the downstream end of the Gort Road Business Park had a peak flood level of 5.5m OD and 5.7m OD adjacent to the Auburn Lodge hotel (UCG, 2001).

5.2 Design Flood Level Prediction

5.2.1 Historical Flooding

The November 2009 peak flood flow in the River Fergus (gauged by the OPW at Ballycorey) had an estimated flood magnitude of 78.5m³/s. This represents a flood growth factor of c. 2.0 (twice the mean annual flood peak) and has an estimated return period of 110years based on statistical flood frequency analysis of 62years of recorded water level and flow data from the River Fergus gauge at Ballycorey (1km upstream of the Industrial Estate) (Cawley and Cunnane, 2010). The Flood Study report national growth curve suggests a return period based on a growth factor of 2 of slightly in excess of 100year return period, which agrees with the at-site statistical analysis. These estimates of return period are reasonably consistent with the range of return period estimates by Met Eireann of observed rainfalls during the 2009 Flood Event (Walsh, Met Eireann, 2010) and with the CFRAM study.

Peak flood levels surveyed from rack marks by Hydro Environmental Ltd. near the Gort Road Industrial estate reached 5.9 to 5.95m O.D. (refer to photo in Plate 8). Extrapolation of these flood rack levels downstream to the subject site, combined with the use of aerial photographs (refer to photos in Plates 6 and 7) and topographical survey information give an estimated peak flood level adjacent to the proposed development of 5.8 to 5.85m OD Malin for 2009 flood event.

5.2.2 Ennis Flood Study (2001) Predictions

The UCG / Hydro Environmental Ltd. HECRAS Hydraulic model of the Fergus developed for the Ennis Flood Study scheme (UCG 2001) gives a 100year flood level at the site of c. 6.1m OD, and a 1000year flood level of c. 6.56m OD. Flood level observations from the 2009 flood event of 5.8 to 5.85 mOD for a flood event estimated to exceed the 100year suggest that the UCG (2001) model predictions are likely to be overly conservative.

5.2.3 Draft CFRAM (2015/2016) Flood level Predictions

The recent CFRAM study for Ennis town carried out by the OPW presents flood inundation mapping for the 10, 100 and 1000year estimated flood events in the River Fergus, refer to Figures 5 and 6. Flood levels and flows at a number of hydraulic model node points are also presented on these flood maps for Ennis town which allow the flood level for the subject site to be extrapolated. Based on this information the 10year, 100year, 1000year flood levels for the subject site is estimated to be 5.45, 5.9 and 6.2m OD Malin respectively. The median (2year return period) flood level at the site is estimated to be 5.05m OD Malin.

5.3 Flood Risk Mapping

Based on the CFRAM Study the 100year flood level at the site is estimated to be 5.9m OD. Malin and the 1000year Flood level is 6.2m O.D. Malin. Note the 5.9m flood level agrees well with flood levels observed during the November 2009 flood event which statistically is considered from the Ballycorey gauge data to represent slightly in excess of the 100year flood event (refer to section 4.2 presented earlier). Using these flood levels and combining them with recent topographical survey of the site by Land Surveys Ltd. a flood risk map was generated for the site and is presented in Figure 9 at the end of the next section. This Flood Risk Zoning map shows the location of Zones A (high probability of Flooding with a probability greater than 1%), B (moderate probability of flooding with a probability of 0.1 to 1%) and C (Low probability of Flooding with a probability of less than 0.1%) on the site along with the proposed development footprint.



Plate 8 November 2009 flood event Rack Marks from River Fergus Surveyed by Hydro Environmental Ltd at 5.95mOD located upstream of Gort Road Industrial Estate and adjacent to Ard Caoin Housing Estate.

**Flood Risk Assessment
Residential Development at Lifford, Ennis**

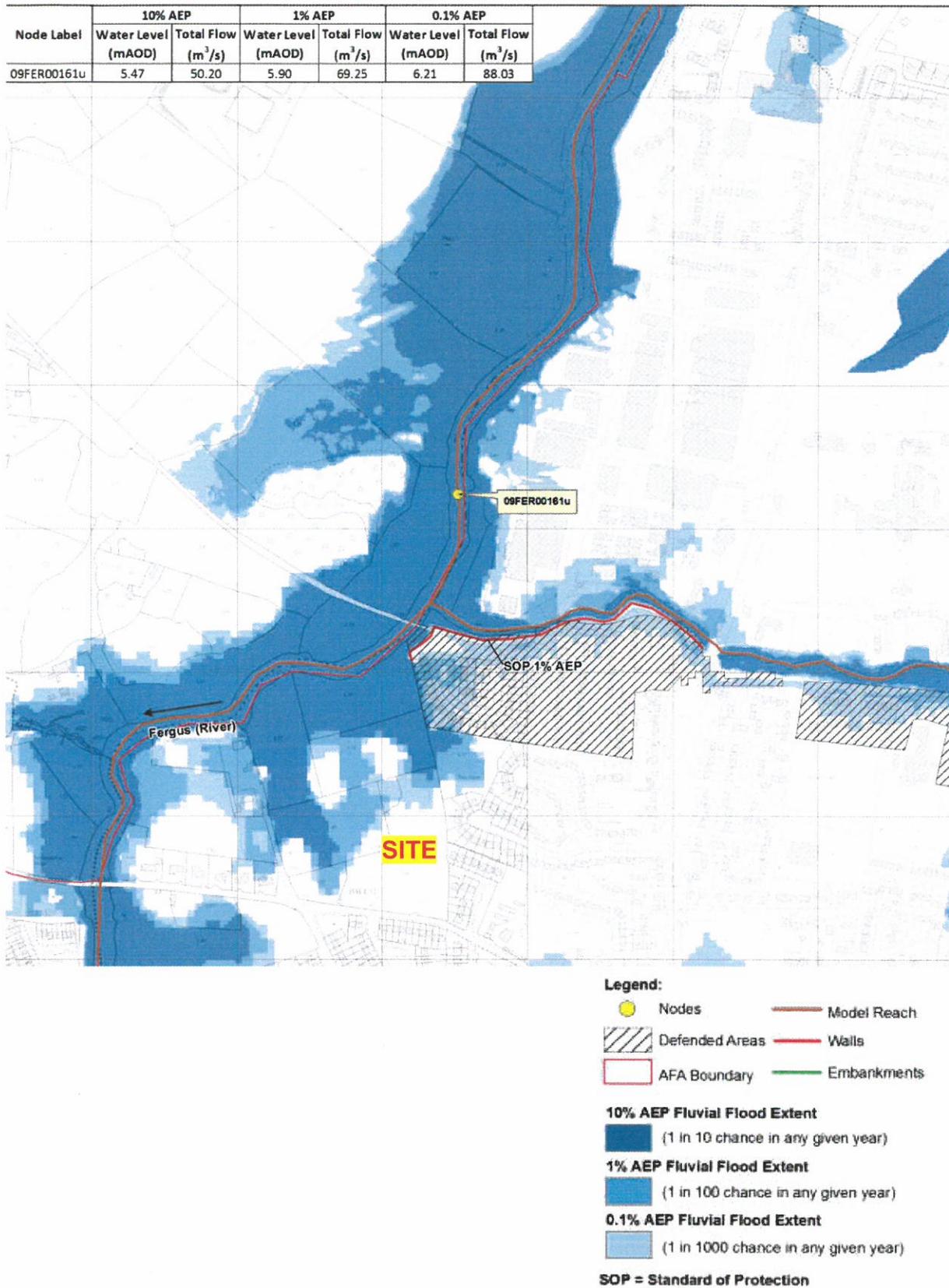


Figure 7 CFRAM Flood Zone Mapping Fergus Upper Ennis (Extracted from CFRAM map 2 of Ennis Town)

Flood Risk Assessment
Residential Development at Lifford, Ennis

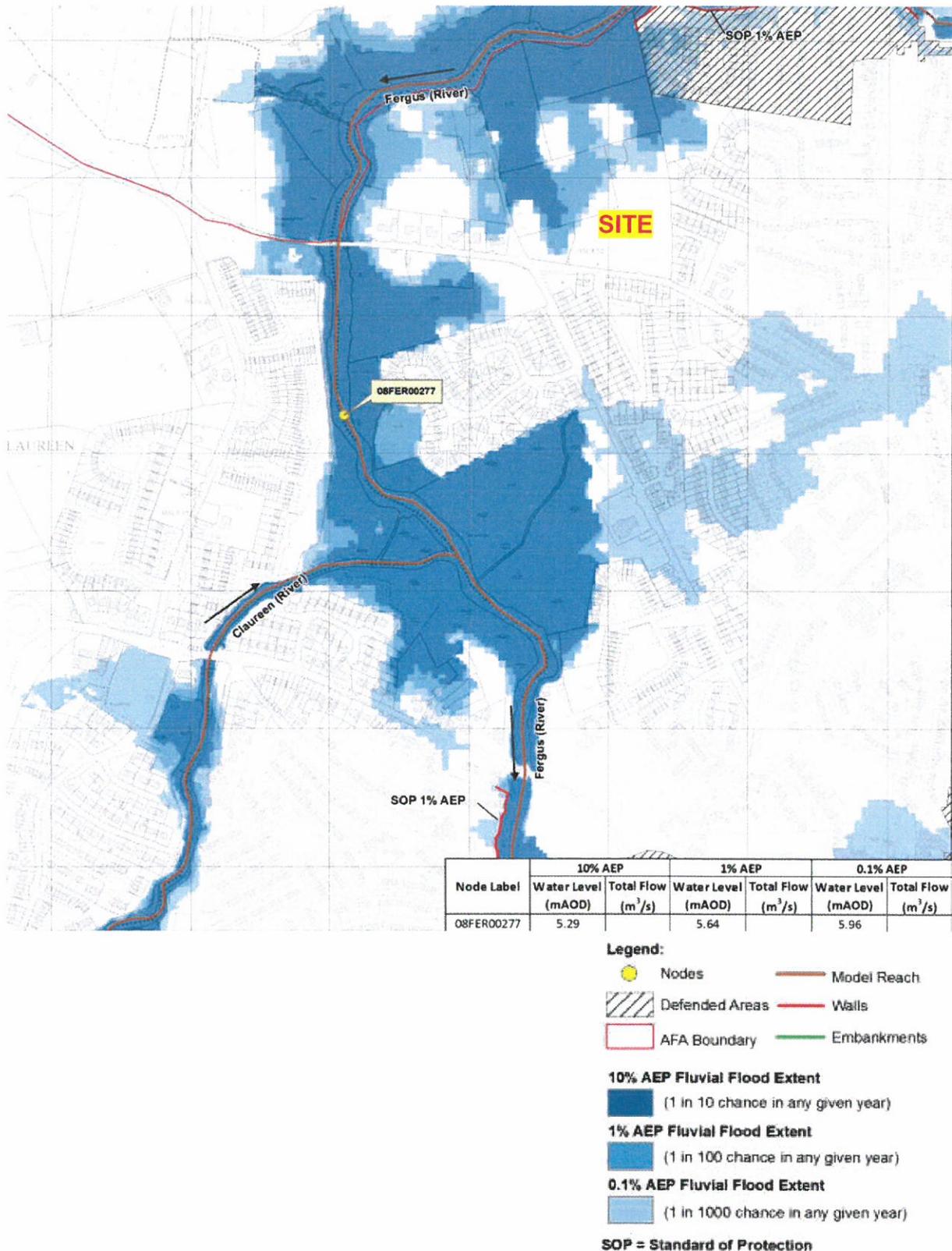


Figure 8 CFRAM Flood Zone Mapping Fergus Upper Ennis (Extracted from CFRAM map 3 of Ennis Town)

6. Planning Guidelines Concerning Flood Risk Management

6.1 Background

In September 2008 the OPW and DoEHLG jointly published for public consultation new draft Planning Guidelines on the Planning System and Flood Risk Management which are aimed at ensuring a more consistent, rigorous and systematic approach to fully incorporate flood risk assessment and management into the planning system. These Guidelines after consultation were finalised and published in November 2009.

The document sets out how to assess and manage flood risk potential and includes guidance on the preparation of flood risk assessments by developers.

The recommended stages of assessment are:

Screening Assessment – to identify whether there may be flooding or surface water management issues related to a plan area or proposed development site that may warrant further investigation;

Scoping assessment to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding and potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures

Appropriate risk assessment: to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

6.2 Site Specific Flood Risk Assessment

Mapping:

- A location map
- A Plan that shows existing site and proposed development(s)
- Identification of any structures which may influence the hydraulics.
- Flood Inundation map showing flood zone areas on the subject site / area

Surveys:

- Site levels related to Ordnance Datum
- Appropriate cross-section(s) showing finished etc. Or other relevant levels in respect to flooding.

Assessments:

- Consideration of flood zone in which the site falls and demonstration that development meets the vulnerability criteria set out in the Guidance
- Flood alleviation measures already in place
- Information about potential sources of flooding that may affect the site;
- The impact of flooding on a site.

Design Standards

- The FRA should generally be undertaken on the basis of a design event of the appropriate design standard:-
 - 100 year Fluvial Flood or 1% Annual Exceedance Probability (AEP) for River Flow
 - 200 year combined Return Period event or 0.5% AEP for tide affected sites

6.3 Decision Making Process

Management of flood hazard and potential risks in the planning system is based on

- 1 Sequential Approach
- 2 Justification Test

1. Sequential Approach

The aim of the sequential approach is to guide development away from areas at risk from flooding. The approach makes use of flood risk zones, ignoring presence of flood protection structures, and classifications of vulnerability of property to flooding.

ZONE	DEFINITION
Zone A High Probability – Highest risk of flooding	More than 1% probability of river flooding and more than 0.5% probability of tidal flooding. Development should be avoided and/or only considered through application of Justification test. Only water compatible development , such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation and essential transport infrastructure that cannot be located

**Flood Risk Assessment
Residential Development at Lifford, Ennis**

	elsewhere would be considered appropriate for this zone (i.e. not requiring application of Justification test).
Zone B Moderate Probability	Between 1 and 0.1% probability of river flooding or between 0.5 and 0.1% probability of coast flooding. Development should only be considered in this zone if adequate land or sites are not available in Zone C or if development in this zone would pass the Justification Test.
Zone C Low Probability	Less than 0.1% probability of river or coastal flooding. Development in this zone is appropriate from a flooding perspective.

2. Justification Test

Further sequentially-based decision making should be applied when undertaking the Justification Test for development that needs to be in flood risk areas for reasons of proper planning and sustainable development:

- 1 within Zone or site, development should be directed to areas of lower flood probability;
- 2 where impact of the development on adjacent lands is considered unacceptable the justification of the proposal or Zone should be reviewed
- 3 where the impacts are acceptable or manageable, appropriate mitigation measures within the site and if necessary elsewhere should be considered.

Application of the Justification Test in Development management.

Where a planning Authority is considering proposals for new development in areas at a high or moderate risk of flooding that include types of development that are vulnerable to flooding and that would generally be inappropriate, the planning authority must be satisfied that the development satisfies all of the criteria of the Justification Test as it applies to development management outlined in Box 5.1

**Box 5.1 Justification Test for development management
(to be submitted by the applicant)**

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
 - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
 - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
 - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
 - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

Assessment of major proposals for development in areas of flood risk pending implementation of these Guidelines

- 5.27 From a flood risk management perspective, proposals fitting into this category should be considered as though the land was not zoned for development. In such situations the applicant should be required, in consultation with the planning authority, to prepare an appropriate SFRA and to meet the criteria for the Justification Test as it applies to development plan preparation. The planning authority must then assess the proposal against the Justification Test as it applies to the development management process. Where the information is not sufficient to fully assess the issues involved, the development should not be approved on the basis of flood risk and / or on the grounds of prematurity prior to addressing flood risk as part of the normal review of the development plan for the area.

Assessment of minor proposals in areas of flood risk

- 5.28 Applications for minor development, such as small extensions to houses, and most changes of use of existing buildings and or extensions and additions to existing commercial and industrial enterprises, are unlikely to raise significant flooding issues, unless they obstruct important flow paths, introduce a significant additional number of people into flood risk areas or entail the storage of hazardous substances. Since such applications concern existing buildings, the sequential approach cannot be used to locate them in lower-risk areas and the Justification Test will not apply. However, a commensurate assessment of the risks of flooding should accompany such applications to demonstrate that they would not have adverse impacts or impede access to a watercourse, floodplain or flood protection and management facilities. These proposals should follow best practice in the management of health and safety for users and residents of the proposal.

6.4 Flood Impact

6.4.1 Loss of Flood Storage

It is clear from the flood risk mapping of the site presented in Figure 9 that the proposed development footprint slightly encroaches flood zones A and B for a total area of 0.36ha (0.19ha flood zone A and 0.17ha flood zone B) with a potential flood storage loss of 360m³ at the 100year flood level and 1200m³ at the 1000year flood level using the Land Survey Ltd. topographical July 2015 survey data for the site. This encroachment is principally by the proposed storm water treatment and disposal SUDs system. Such facilities would be considered suitable development within the higher flood risk zones being water tolerant and water compatible facilities.

The estimated 100year and 1000year flood flows of 69 and 88cumec in the River Fergus from the CFRAM study would almost instantly infill these respective flood storage volumes in 5 and 14 seconds, whereas the flood peak in the Fergus would prevail at an almost constant peak flow rate for a number of days and therefore the flood volume in the Fergus completely dwarfs the potential flood storage loss at the proposed development site. Consequently, the infill of the 0.36ha of Flood zone lands (A and B) by the development and the consequential loss in flood storage will not have any perceptible impact on flood levels either locally or within the greater River Fergus floodplain area and therefore will not impact on flood risk to the proposed site or to any adjacent lands and properties. The proposed developed area footprint does not encroach into the conveyance zone of the River Fergus Floodplain and thus upstream afflux caused by a reduction in the flood flow width and effective flow area will not occur.

6.4.2 Storm Discharge

The total impervious area for the site is estimated to be approximately 1.2ha. The following are storm discharge rates from the proposed impervious area of the site for the 100year storm event and at various durations (0.5 to 48hrs). The critical duration in respect to flooding in the River Fergus and coinciding with the fluvial flood peak is at least 24hour and greater. At these durations storm water attenuation is of little consequence in reducing site flows which in the undeveloped existing case would occur in any case.

Storm Duration hrs	100yr rainfall Depth (mm)	Average Runoff m3/sec
30min	26.8	0.179
1hr	33.1	0.11
3hr	46.3	0.051
6hr	57.2	0.032
12hr	70.8	0.02
24hr	87.0	0.012
48hr	103.3	0.007

Given the proximity of the site to the River Fergus Floodplain and the critical duration and period for flooding in the Fergus being a prolonged winter flood event, the natural Greenfield runoff rates and the potential storm runoff rates from the proposed development will be of similar magnitude and minor in respect to the Fergus Flood Flows and thus will not have any perceptible impact on flood flow rates and flood levels within the River Fergus either locally or remotely.

Given the very damped nature of the River Fergus flood hydrograph, slow to rise with extended duration of the flood peak it is considered more beneficial that the storm runoff from the site should not be detained through attenuation, but allowed enter directly in advance of the Fergus flood. Detaining the storm discharge through holding back the runoff volume in an attenuation pond/tank is likely to allow a greater opportunity for the storm flow to combine with the Fergus and Claureen flood peaks as opposed to getting it away earlier when channel capacity is available and the river has not peaked.

The storm water is to be collected and discharged to a 225m long grass swale that outfalls to a lined and bermed settlement pond system prior to it being discharged to ground via a large stoned soakaway system. This soakaway measures 30m long, 5m wide and 1.5m deep (4m O.D. invert of soakaway stone) with the existing ground level surrounding the soakaway at 5.4 to 5.5m OD. It is therefore expected to function as a soakaway for the majority of the year but during winter flood and high water table conditions it will act as a surface water discharge. At 5.4m OD inundation by the Fergus Floodwaters will have a frequency of 1 in 5years and under these cases it has been designed to act as a lateral surface flow spreader avoiding any potential for scouring of the adjoining low-lying ground. It is considered that this proposed storm water treatment and disposal method must closely represents the natural discharge situation on the site and avoids constructing a pipeline and outfall to the River Fergus and meets the core principals of SUDs.

6.5 Recommended Minimum Finish Level for Development

Using the more conservative Hydro Environmental Ltd. HECRAS Hydraulic model of the Fergus originally developed for the Ennis Flood Relief Scheme the predicted 100year flood level for the site is. 6.1m OD and the 100year+20%CC is 6.4 mOD.

Based on these predicted worst case flood levels it is recommended that the minimum finish Floor level for the Development be set no lower than a level of 6.9m OD which provides an acceptable standard of freeboard of 500mm over the 100year flood with climate change flood level from the Ennis UCG Flood Study model (conservative estimate) to cater for uncertainty.

The proposed lowest finish floor level within the development is 7.05m OD which exceeds the minimum recommended floor level of 6.9m O.D. and therefore the proposed development will have a suitably low flood risk.

The proposed road levels within the development all exceed the 100year with climate change flood levels of 6.4m OD.

6.6 Residual Flood Risk

The residual flood Risk to the development is assessed as minor as the roads and finish floor levels are located in Flood Zone C and not dependent on any flood protection with the lowest finish floor level at c. 7m OD which is 1.2m above the current 100year flood level prediction and provides a generous freeboard allowance to account for uncertainty and future climate change increases.

The only assets within the flood zone is a bunded and lined storm water pond and outfall which is considered water compatible development suitable within flood Zones A and B. The Storm water Pond is bunded and designed to function against the 100year with climate change flood event. Under worst case conditions potential pollution from failure of the storm water pond would not be considered an issue as storm water from residential estates are not very polluting and importantly the floodplain and the floodwaters provide an effective buffer and significant dilution protecting water quality in the Fergus SAC. It should also be noted that an oil and petrol interceptor is installed upstream of the Pond system.

The proposed development storm drainage system does not pose a residual flood risk threat to the development, as it would, in the event of serious blockage in the storm pipes or significant rain storm event beyond the design standard, naturally gravitate northwest towards the grassed swale, water quality pond and onwards to the adjoining low-lying Fergus floodplain lands. Under such worst case conditions potential pollution from the storm water discharge would not be considered an issue as the floodplain and the floodwaters provide an effective buffer and dilution protecting water quality in the Fergus SAC.

The only identifiable residual flood risk to the residential units within the development is from a catastrophic event involving the collapse of the Drehidnagower Bridge over the Fergus which is located downstream of the site, and for the collapse to cause a significant damming of the river and coinciding with river flood conditions. Such an event would potentially flood out the entire Gort Road and adjoining properties and estates and flood down the Fergus Minor into Corrovoran. Such an event is considered to represent a worst-case scenario event and considered to be of very low probability given the flood freeboard available at the Lifford site.

6.7 Justification Test for the Lifford Site

It is noted in the Ennis Town Development Plan that all residential lands have been zoned having regard to the JBA strategic Flood Risk Assessment Mapping of Ennis Town and Environs (JBA 2009). A Copy of the Flood Risk Map for the JBA sFRA study (October 2009) is presented earlier in Figure 3.

Flood Risk Assessment Residential Development at Lifford, Ennis

Within the proposed site area of the Lifford development the Flood Risk mapping and topographical model identifies that 0.19ha of the development is located within Flood Zone A and a further 0.17ha is in Flood Zone B. This slight encroachment is primarily associated with the sustainable Urban Drainage system (SUDs) that's comprises a grassed linear swale and a lined water quality settlement Pond along the northwest and north edge of the development. These ultimately discharge to an engineered soakaway that provides for groundwater infiltration during non-flood periods and acts as a lateral surface flow spreader during flood periods when the watertable is elevated and/or the lands are backwatered / inundated by the Fergus floodwaters. Such infrastructure is considered appropriate development within flood risk zones A and B as indicated in the flood risk management planning guidelines.

A small section of the estate road near the proposed entrance unavoidably encroaches these flood zones (A and B) for a road length of 36 and 45m respectively (0.033ha and 0.045ha footprint area). This is unavoidable as the entrance and proposed public road roundabout are fixed in location and design by the Local Authority. In any case the loss of flood storage by this section of road encroachment is miniscule in the context of Flooding in the River Fergus as detailed below. The road itself will be sufficiently elevated not to be at flood risk either currently or potentially in the future as a result of climate change.

The overall loss of flood storage by the proposed development within Flood Zone A (100year Flood level) is 360m³ and at the 1000year (flood zone B) is 1200m³. In terms of the magnitude of flood volumes passing in the Fergus River this potential loss of flood storage volume is miniscule and represents only 5seconds of the Fergus 100year peak flood flow and 14 seconds of the Fergus 1000year peak flood flow. It should be noted that peak flows in the Fergus during these extreme events last for a number of days and such flood volumes on the site would fill well in advance with the rising Fergus flood level and therefore have no attenuating influence when the prolonged flood peak in the Fergus arrives. Such a potential flood volume loss of 360m³ and 1200 m³ in respect to flood flows and flood levels in the Fergus will have absolutely no perceptible impact on flooding and flood risk.

Justification for this development in accordance to Box 5.1 of the Flood Risk Management Planning Guidelines (Nov 2009) p. 48 is outlined as follows:

- The proposed development lands have been zoned in the Ennis and Environs Local Area Plan (2008 – 2014) having regard to a strategic Flood Risk Assessment carried out by JBA in October 2009.
- The proposed development minimum Finish Floor levels of the residential units are set above 7.0m OD. which is 1.2m above the CFRAM predicted present day 100year flood level and therefore provides a generous freeboard allowance to account for uncertainty and future climate change flood level increases.
- None of the residential units within the proposed development encroach Flood Risk Zones A and B (High and moderate flood risk zones).

- The only encroachment of Flood Risk Zones A and B is by the proposed storm water treatment and disposal system which is acceptable development within such flood zones and by a small section of the internal estate road near the entrance. This section of the internal road is influenced by the location of the proposed Public Road Roundabout whose design and location have been set by Clare Co. Council as the most suitable location.
- The finish floor levels and road levels are sufficiently elevated as to be considered not at risk of flooding currently and in the foreseeable future with sufficient freeboard allowance included to adequately include for uncertainty and climate change.
- The loss of flood storage as a result of raising lands within flood zones A and B is negligible in comparison to the flood volumes passing in the Fergus adjacent to the site and the loss of such will have absolutely no perceptible impact on flood levels and flood flows both locally and within the River Fergus.
- The proposed development does not encroach or interfere with the Flood Conveyance zone of the Fergus floodplain.
- A suitable SUDs system has been proposed for the collection, treatment and disposal of storm water to ground onsite and thereby avoid any direct discharge outfall to the River Fergus.
- The proposed development will not interfere with the recently constructed Fíor Uisce Flood Relief Scheme Flood embankment that protects properties at Aughentee Row Housing Estate. Access to this flood embankment is not impaired or interfered with by the proposed development.
- The residual flood Risk to the development is assessed as minor as the roads and finish floor levels are located in Flood Zone C and not dependent on any flood protection with the lowest finish floor level at c. 7m OD which is 1.2m above the current 100year flood level prediction and provides a generous freeboard allowance to account for uncertainty and future climate change increases.



Figure 9 Flood Risk Map of proposed Development Site with layout included for reference

7. CONCLUSIONS

A review of historical flooding for Ennis shows that the November 2009 flood event was an extreme event with statistical analysis of both rainfall and river flow records indicating a return period in excess of 100years. This event produced a flood level at the site of c. 5.8 - 5.85m O.D. Malin. During the December 1999 flood event a peak flood level at the site of 5.4m OD. is estimated.

The 100year flood contour for the site using the Draft CFRAM study is 5.9m OD and the 1000year flood level is 6.2m O.D. A Flood Risk Zoning map (refer to Figure 9) for the proposed site using these flood levels was produced in accordance with the Flood Risk Management Planning Guidelines. This mapping shows that the development footprint encroaches 0.36 ha of high and moderate Flood Risk Zones (0.19 ha of Flood Zone A and 0.17ha of Flood Zone B). This will result in a potential small loss in flood storage of 360 and 1,200m³ at the 100year and 1000year flood events. At the 100year and 1000year peak flow rates in the Fergus this flood volume loss would be almost instantly be filled in 5 and 14seconds respectively.

The recommended Finish Floor level for the development is 6.9m OD. Malin which provides a freeboard of 500mm over the design flood level of 6.4m OD (UCG 2001). A 500mm freeboard is considered to be a suitable design safety factor for uncertainty in the hydrological prediction.

Justification for this development in accordance to Box 5.1 of the Flood Risk Management Planning Guidelines (Nov 2009) p. 48 is outlined as follows:

- The proposed Development lands have been zoned in the Ennis and Environs Local Area Plan (2008 – 2014) having regard to a strategic Flood Risk Assessment carried out by JBA in October 2009.
- The proposed development minimum Finish Floor levels of the residential units are set above 7.0m OD. which is 1.2m above the CFRAM predicted present day 100year flood level and therefore provides a generous freeboard allowance to account for uncertainty and future climate change flood level increases.
- None of the residential units within the proposed development encroach Flood Risk Zones A and B (High and moderate flood risk zones).
- The only encroachment of Flood Risk Zones A and B is by the proposed storm water treatment and disposal system which is acceptable development within such flood zones and by a small section of the estate access road. The estate access road is influenced by the proposed Public Road Roundabout whose design and location have been set by Clare Co. Council.

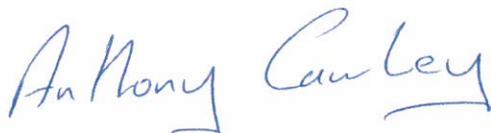
Flood Risk Assessment Residential Development at Lifford, Ennis

- The finish floor levels and road levels are sufficiently elevated as to be considered as not at risk of flooding currently and in the foreseeable future with sufficient freeboard allowance included to adequately include for uncertainty and climate change.
- The loss of flood storage as a result of raising lands within flood zones A and B is negligible in comparison to the flood volumes passing in the Fergus adjacent to the site and the loss of such will have absolutely no perceptible impact on flood levels and flood flows both locally and within the River Fergus.
- The proposed development does not encroach or interfere with the Flood Conveyance zone of the Fergus floodplain.
- A suitable SUDs system has been proposed for the collection, treatment and disposal of storm water to ground onsite and thereby avoid any direct discharge outfall to the River Fergus.
- The proposed development will not interfere with the recently constructed Fíor Uisce Flood Relief Scheme Flood embankment that protects properties at Aughentee Row housing estate. Access to this flood embankment is not impaired or interfered with by the proposed development.

Residual Flood Risk

The residual flood Risk to the development is assessed as minor as the roads and finish floor levels are located in Flood Zone C and not dependent on any flood protection with the lowest finish floor level at c. 7m OD which is 1.2m above the current 100year flood level prediction and provides a generous freeboard allowance to account for uncertainty and future climate change increases.

The only assets within the flood zone is a bunded and lined storm water pond and outfall which is considered water compatible development suitable within flood Zones A and B. The Stormwater Pond is bunded and designed to function against the 100year with climate change flood event. Under worst case conditions potential pollution from failure of the storm water pond would not be considered an issue as storm water from residential estates are not very polluting and importantly the floodplain and the floodwaters provide an effective buffer and significant dilution protecting water quality in the Fergus SAC. It should also be noted that an oil and petrol interceptor is installed upstream of the Pond system.

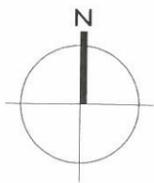


Anthony Cawley B.E. M.Eng.SC. (Hydrology), C.Eng M.I.E.I.
Consulting Hydrologist
Hydro Environmental Ltd.

20 December 2016

Appendix 3

Overlay map showing proposed additional zoned area



Flood Zone C

Flood Zone A

Pine Grove

Flood Zone C

Flood Zone A

Boundaries between Zones.

Flood Zone C

Flood Zone A

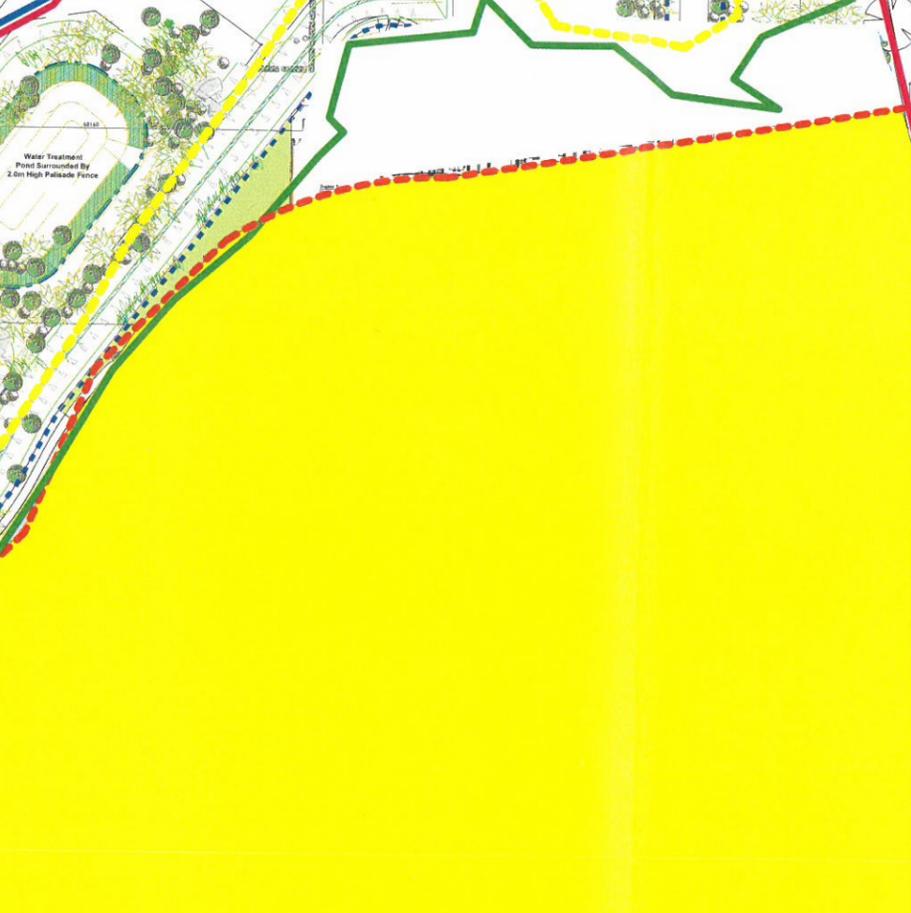
"X"

Zoning Line

Location of Site Notice 1

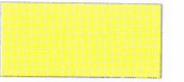
Location of Site Notice 2

Location of Site Notice 3



Legend.

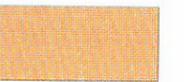
Area zoned as "Existing Residential in draft Ennis & Environs Development Plan.



Zoning Line



Area which this submission seeks to be included in zoned area.



Boundary Flood Zone A to Flood Zone B.



Boundary Flood Zone B to Flood Zone C.



Site Outline.



REVISIONS

RevID	Drawn	Checked	Issue Date	Revised By	Status	Approved by	Purpose of Issue

Status Scales @ A1

1:500
1:1000 @ A3

Project No.

Originator

Leahy Planning Ltd.
Mill Road House, Mill Road,
Ennis, Co. Clare, Ireland
richard@leahyplanning.com

Project

Proposed estate extension
Drehidagower
Housing

Client

Focus Capital

Layout Title

Overlay map

Leahy Planning Ltd.
Planning Architects

Drawing Number		Project		Originator		Level		Type		Date		Number		Rev.	
#Proj-	ML	-	-	-	-	-	-	-	-	-	-	-	-	-	-