



Comhairle Chontae na Gaillimhe
Galway County Council

Galway County Council
Housing Development
Gort Uí Lochlainn & Coill Bhruchláin, Moycullen, Co. Galway
Flood Risk Assessment



Housing Development, Gort Uí Lochlainn & Coill Bhruchláin, Moycullen, Co. Galway

Flood Risk Assessment

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1 INTRODUCTION

TOBIN Consulting Engineers have been commissioned to provide engineering and environmental consultancy services for the proposed construction of 31 housing units at Gort Uí Lochlainn & Coill Bhruhláin, Mountain Road, Moycullen, Co. Galway (Figure 1.1 & Figure 1.2).

This preliminary Flood Risk Assessment (FRA) has been prepared in accordance with a Stage 2 Initial Flood Risk Assessment as defined by the guidelines produced by the Department of Environment, Heritage and Local Government (DoEHLG), *The Planning System and Flood Risk Management Guidelines for Planning Authorities, 2009* as follows:

“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 which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped.”

The proposed residential development is located along Baile Ard (L1320) just off of the N59 in Moycullen, Co. Galway (see Figure 1.1). The greenfield site is approximately 17.307ha in area. Existing ground elevations vary from 35.14mOD to 39mOD.

The aim of this FRA is to “appraise the adequacy of existing information” (extract from PSFRM Guidelines, see above) to identify the risk, if any, of flooding in relation to the proposed development.

Figure 1.1 – Site Location

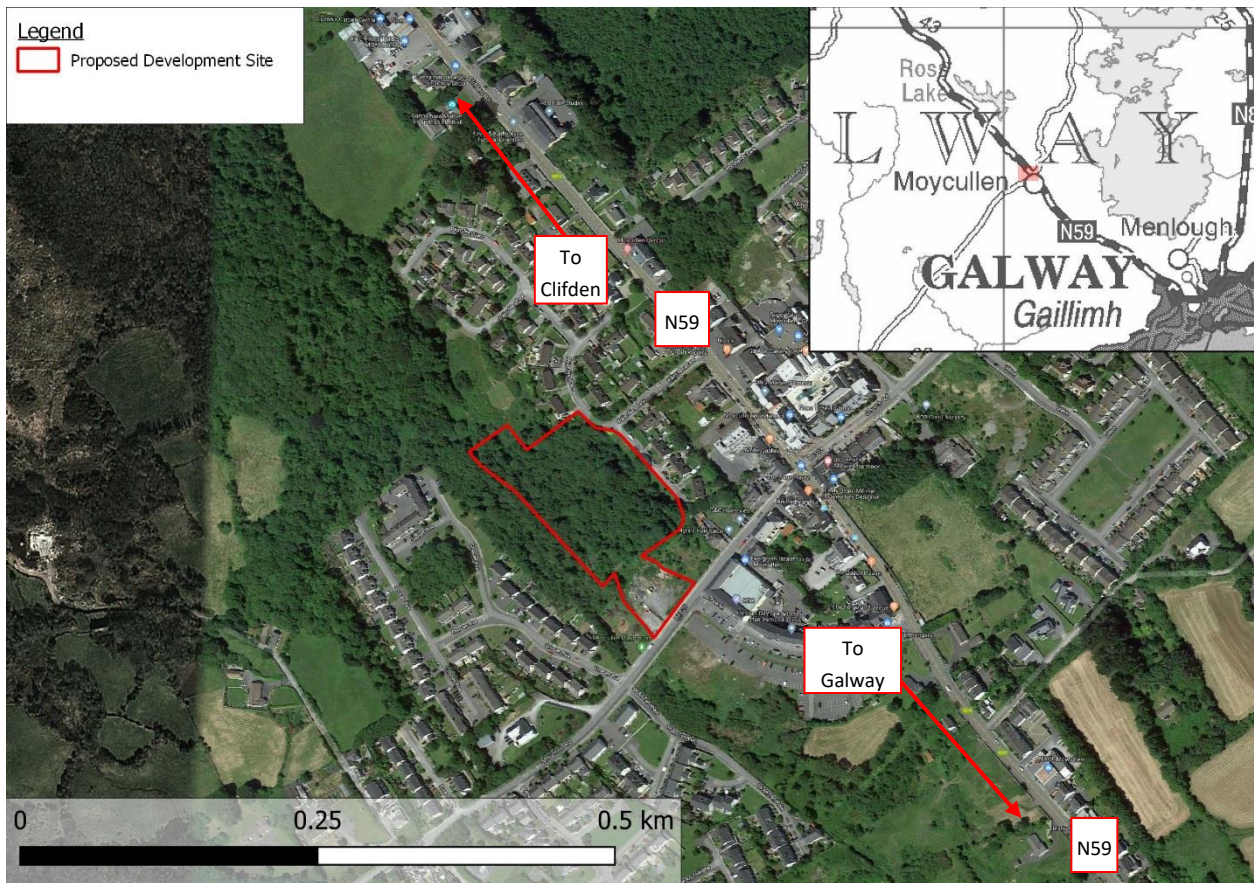


Figure 1.2 - Proposed Site Development Plan



2 HISTORICAL FLOODING & FLOOD MAPS

2.1 OPW FLOOD MAPS

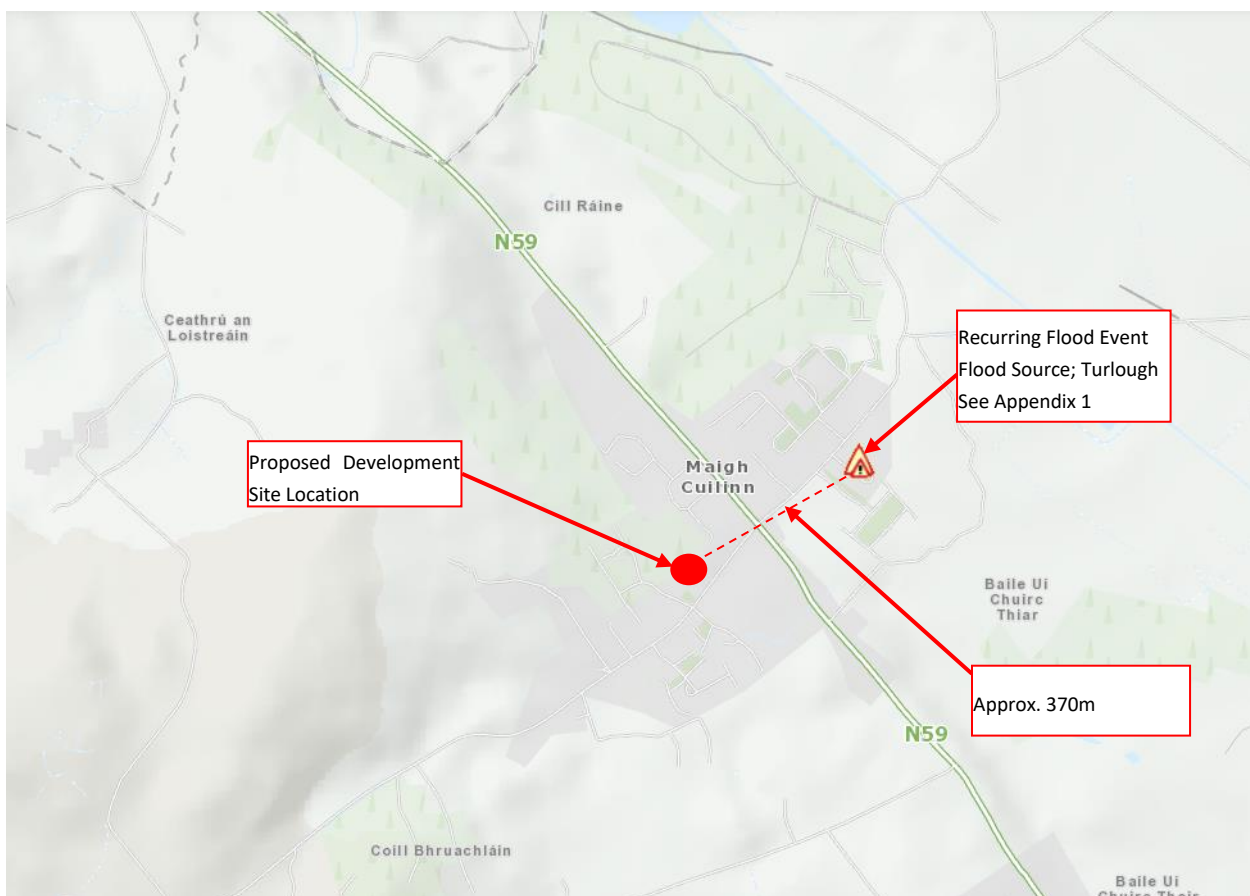
The OPW's online National Flood Hazard Mapping database¹ provides information on reported floods, in the form of reports, photos and newspaper articles.

The database does not provide any record of flood events occurring at the proposed development site (see Figure 2.1).

The proposed site is approximately 370m from a recurring flood event caused by a turlough. This flood report can be found in Appendix 1.

With existing ground elevations at the proposed development site of 35.0mOD or higher, the subject site is at least 18.0m above the ground elevations at the location of the recurring flood event (approximately 17.0mOD).

Figure 2.1 - Extract from National Flood Hazard Mapping database



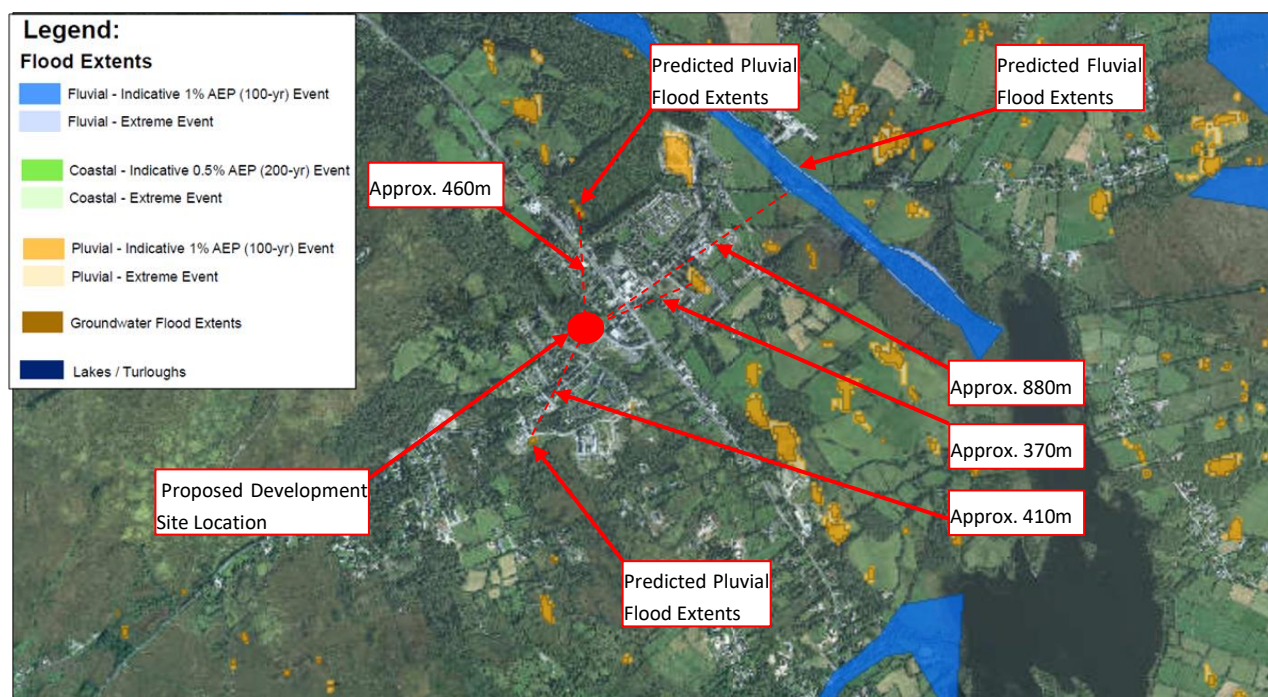
¹ www.floodmaps.ie

2.2 OPW PRLIMINARY FLOOD RISK ASSESSMENT (PFRA) MAPS

In 2009 the OPW produced a series of maps to assist in the development of a Preliminary Flood Risk Assessment (PFRA) throughout the country. These maps were produced from a number of sources. It should be noted that *“the flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location”*².

Figure 2.2 gives an overview of the indicative flood extents in the vicinity of the subject site.

Figure 2.2 - Indicative Flood Mapping from OPW PFRA Study



Fluvial Flood Risk

The predicted flood extents at the subject site are shown in Figure 2.2. It should be noted that these flood extents are for the current probability of flooding and specifically exclude any allowance for climate change.

The PFRA indicative flood mapping of the area does not identify any areas as being liable to fluvial (river) flooding in the vicinity of the proposed site. The indicative flood mapping shows the proposed site is located approximately 880m from the nearest fluvial flood extents (see Figure 2.2). With existing ground elevations of 35.0mOD or higher, the subject site is at least 26.0m above the estimated 1000 year flood level in the Ballycurke Lough Stream (9.0 mOD derived from the PFRA mapping).

Pluvial Flood Risk

Pluvial modelling was carried out by HR Wallingford in November 2010 as part of the PFRA study. The 100- and 1000-year flood extents were generated by analysing 1, 3, 6, and 24-hour rainfall events. The design storm rainfall was applied to the National Digital Terrain Model (DTM) with an allowance for infiltration based on the soil type in the area.

² The National Preliminary Flood Risk Assessment (PFRA) Overview Report, OPW (March 2012)

The DTM used for the PFRA study's flood plain mapping was generated from RADAR based technology in 2007 and is stated to have a 5m horizontal resolution (re-sampled to 10m resolution) and 0.01m vertical resolution, to a quoted vertical accuracy of 0.5m RMSE ³. The accompanying report to the PFRA notes that the process *"due to the scale of analysis, has not taken into account local drainage structures such as culverts through embankments or other local drainage that would not be resolved in the DTM at a national scale"*.

The PFRA pluvial flood maps were also adapted by the OPW to show only the extents where the flood depths were greater than 200mm (on the basis that depths lower than this would not cause significant damage given door-step levels above ground level) ⁴.

The analysis carried out by HR Wallingford as part of their PFRA study indicates that pluvial flooding (ponding of surface water) is not likely to occur within the proposed residential development site. The PFRA flood mapping indicates that the proposed site is located approximately 370m from the nearest pluvial flood extents (see Figure 2.2).

Groundwater Flood Risk

As part of the PFRA study indicative groundwater flood mapping was produced by Mott MacDonald Ltd. A model-based approach to generate groundwater flood extents was not possible due to the lack of available data. Therefore, the following methods were used:

- 1) *"The use of existing mapping of past groundwater flood events (e.g., from 1994/95, and late 2009), developed from ground-based observation, aerial photography or satellite imagery and the maximum extents observed";*
- 2) *"The delineation of flood extents around turloughs based on an assumed height of flooding of 4m above the base elevation of the turlough (the median of observed ranges) using the OPW's national DTM, with manual adjustment to ensure pragmatic extents";*
- 3) *"The use of records of past groundwater flood events to validate or adjust the flood extents derived using the other approaches".*

*"It should be noted that due to the absence of a model-based approach, only one set of flood extents were generated, with no specific event probability (although where observed flood data was used, these are likely to represent quite extreme events)."*⁵

The PFRA mapping did not indicate any sources of groundwater flooding in the vicinity of the proposed residential development site (see Figure 2.2).

³ National Pluvial Screening Project for Ireland (HR Wallingford, November 2012)

⁴ The National Preliminary Flood Risk Assessment (PFRA) Overview Report (OPW, March 2012)

⁵ The National Preliminary Flood Risk Assessment (PFRA) Overview Report (OPW, March 2012)

3 PLANNING & FLOOD RISK MANAGEMENT GUIDELINES

This section of the report considers the following plans and guidance documents:

- The Planning System and Flood Risk Management Guidelines (OPW & DOEHLG 2009)
- The Flood Risk Management Climate Change Adaptation Plan (OPW 2015)
- The Galway County Development Plan 2017-2023
- Maigh Cuilinn Local Area Plan 2013-2019

3.1 THE PLANNING SYSTEM & FLOOD RISK MANAGEMENT GUIDELINES

The '*The Planning System and Flood Risk Management*' (PSFRM) guidance document, published in 2009 by The Department of Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW), discuss flood risk in terms of three flood zones. It also identifies vulnerability classes for development in order to define what type of development is suitable within what flood zone and when the Justification Test should be applied.

The flood zones, vulnerability classes and requirement for the Justification Test are summarised in Table 1.

Table 1 Matrix of vulnerability versus flood zone to illustrate appropriate development and that are required to meet the Justification Test (Extract from the PSFRM Guidelines)

Flood Zone	Probability of Flooding (Return Period)	Recommendation based on Vulnerability of Development		
		Highly Vulnerable or Essential Infrastructure	Less Vulnerable	Water Compatible
A	High Probability (more frequent than 1% or 1 in 100-yr for river flooding or 0.5% or 1 in 200 for coastal flooding)	Justification Test	Justification Test	Appropriate
B	Moderate Probability (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding)	Justification Test	Appropriate	Appropriate
C	Low Probability (less frequent than 1 in 1000-yr)	Appropriate	Appropriate	Appropriate

The PSFRM Guidelines state that 'dwelling houses', such as the proposed development which is the subject of this flood risk assessment, are classified as "highly vulnerable" development in terms of their sensitivity to flooding. The proposed development has been assessed using the 1000-yr flood event.

3.2 THE FLOOD RISK MANAGEMENT CLIMATE CHANGE ADAPTION PLAN

The Flood Risk Management Climate Change Adaptation Plan (published May 2015) has been prepared under the remit of the National Climate Change Adaptation Framework. It sets out the policy on climate change adaptation of the Office of Public Works (OPW), the lead agency for flood risk management in Ireland, based on a current understanding of the potential consequences of climate change for flooding and flood risk in Ireland, and the adaptation actions to be implemented by the OPW and other responsible Departments and agencies in the flood risk management sector.

The document recommends two future flood risk scenarios for considering future implications of factors, including climate change, in relation to future flooding. The Mid-Range Future Scenario (MRFS) recommends a “likely” future scenario while the High-End Future Scenario (HEFS) represents a more “extreme” future scenario. Table 2 sets out the allowances for both scenarios.

Table 2 Allowances in Flood Parameters for the Mid-Range and High-End Future Scenarios

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+ 20%	+ 30%
Peak Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 500 mm	+ 1000 mm
Land Movement	- 0.5 mm / year ¹	- 0.5 mm / year ¹
Urbanisation	<i>No General Allowance – Review on Case-by-Case Basis</i>	<i>No General Allowance – Review on Case-by-Case Basis</i>
Forestation	- 1/6 Tp ²	- 1/3 Tp ² + 10% SPR ³

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)

Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

For the purpose of this flood risk assessment, we have assessed the proposed development against the Mid-Range Future Scenario as it represents a likely future scenario.

3.3 GALWAY COUNTY DEVELOPLEMT PLAN (2015-2021)

Chapter 8 of the 2015-2021 County Development Plan (CDP) deals with the area of flood risk.

The following are the key policies described in the CDP pertaining to flood risk:

Policy FL 1 *"It is the policy of Galway County Council to support, in co-operation with the OPW, the implementation of the EU Flood Risk Directive (2007/60/EC), the Flood Risk Regulations (SI No. 122 of 2010) and the DEHLG/OPW publication The Planning System and Flood Risk Management Guidelines (2009) (and any updated/superseding legislation or policy guidance). Galway County Council will also take account of the Shannon International and Western Catchment Flood Risk Assessment and Management Studies."*

Policy FL 4 *"The Council shall implement the key principles of flood risk management set out in the Flood Risk Management Guidelines as follows:*

- (a) Avoid development that will be at risk of flooding or that will increase the flooding risk elsewhere, where possible;*
- (b) Substitute less vulnerable uses, where avoidance is not possible; and*
- (c) Mitigate and manage the risk, where avoidance and substitution are not possible.*

Development should only be permitted in areas at risk of flooding when there are no alternative, reasonable sites available in areas at lower risk that also meet the objectives of proper planning and sustainable development.

Development in areas which have the highest flood risk should be avoided and/or only considered in exceptional circumstances (through a prescribed Justification Test) if adequate land or sites are not available in areas which have lower flood risk."

3.4 MAIGH CUILINN LOCAL AREA PLAN 2013-2019

The Maigh Cuilinn Local Area Plan takes due consideration of The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009, the flood risk mapping available from the PFRA and the recommendations emanating from the Strategic Flood Risk Assessment for County Galway.

Galway County Council has carried out a Strategic Flood Risk Assessment (SFRA) for County Galway, including a specific assessment for the Maigh Cuilinn Plan Area. As part of the SFRA, the historic flood risk areas have been identified and a number of local level assessments have also been carried out, including local knowledge of flood extents and site walkovers.

The SFRA generally confirms the flood extents identified in the OPW Preliminary Flood Risk Assessment mapping for Maigh Cuilinn. The Local Area Plan identifies Flood Zones in accordance with the Guidelines using data from the PFRA and SFRA (see Figure 3.1).

Section 3.6.2 Policies and Objectives of the Maigh Cuilinn Local Area Plan 2013-2019 deals with flood risk management and assessment.

Policy UI 2 *"It is the policy of Galway County Council to support, in co-operation with the OPW, the implementation of the EU Flood Risk Directive (2007/60/EC), the Flood Risk Regulations (SI No. 122 of 2010) and the DoEHLG/OPW publication The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 (or any updated/superseding legislation or policy*

guidance). Galway County Council will also take account of the OPW Catchment Flood Risk Management Plans (CFRAMs), Preliminary Flood Risk Assessment (PFRA) and the Strategic Flood Risk Assessment for County Galway 2012 and any recommendations and outputs arising from same that relate to or impact on the Plan Area"

Objective UI 8 - Flood Risk Management and Assessment

"Ensure the implementation of the DoEHLG/OPW publication The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 (or any updated/superseding document) in relation to flood risk management within the Plan Area. This will include the following:

- 1. Avoid, reduce and/or mitigate, as appropriate in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009, the risk of flooding within the flood risk.*
- 2. Development proposals in areas where there is an identified or potential risk of flooding or that could give rise to a risk of flooding elsewhere may be required to carry out a Site-Specific Flood Risk Assessment, and Justification Test where appropriate, in accordance with the provisions of The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009, (or any superseding document). Any flood risk assessment should include an assessment of the potential impacts of climate change, such as an increase in the extent or probability of flooding, and any associated measures necessary to address these impacts.*
- 3. Development that would be subject to an inappropriate risk of flooding or that would cause or exacerbate such a risk at other locations shall not normally be permitted*
- 4. Where certain measures proposed to mitigate or manage the risk of flooding associated with new developments are likely to result in significant effects to the environment or Natura 2000 sites downstream, such measures will undergo environmental assessment and Habitats Directive Assessment, as appropriate.*

Objective UI 9 - Flood Zones and Appropriate Land Uses (Refer to Map 3A/3B, Appendix 2)

Protect Flood Zone A and Flood Zone B from inappropriate development and direct developments/land uses into the appropriate Flood Zone in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009 (or any superseding document) and the guidance contained in DM Guidance UI 1- Flood Zones and Appropriate Land Uses. Where a development/land use is proposed that is inappropriate within the Flood Zone, then the development proposal will need to be accompanied by a Development Management Justification Test and Site-Specific Flood Risk Assessment in accordance with the criteria set out under with The Planning System and Flood Risk Management Guidelines for Planning Authorities 2009. In Flood Zone C, where the probability of flooding is low (less than 0.1%, Flood Zone C), the developer should satisfy him or herself that the probability of flooding is appropriate to the development being proposed.

Objective UI 11 – Specific Flood Risk Locations (Refer to Map 3A/3B, Appendix 2)

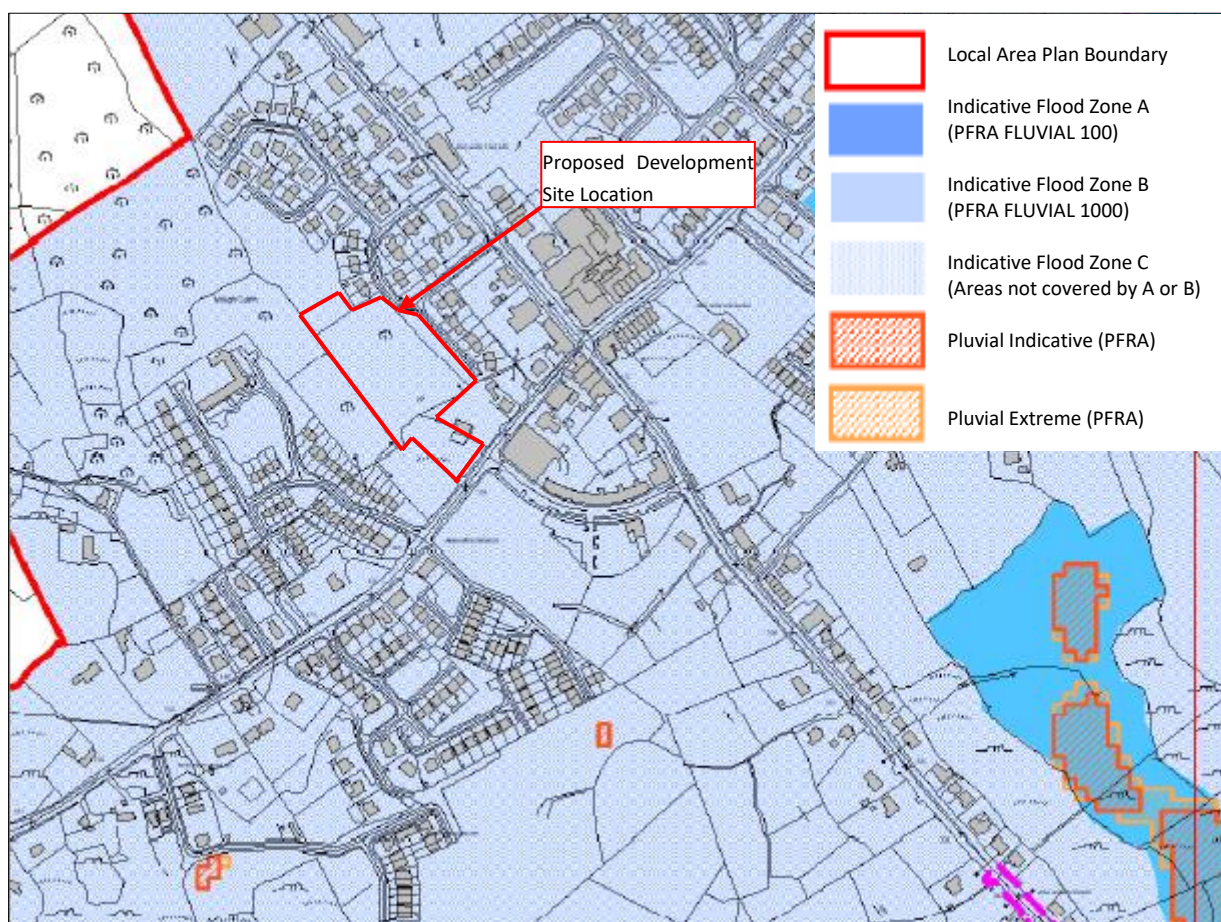
Planning applications on lands identified within pluvial PFRA areas outside of Indicative Flood Zone A on Map 3A/3B, shall be accompanied by a Site Specific Flood Risk Assessment that corresponds with that outlined under Chapter 5 "Flooding and Development Management" of The Planning System and Flood Risk Management Guidelines for Planning Authorities

2009). Such assessments shall be prepared by suitably qualified experts with hydrological experience and shall quantify the risks and effects of any necessary mitigation, together with the measures needed or proposed to manage residual risks.

Objective UI 12 – Lands Transected by Flood Zones

In the case of lands transacted by the outer boundary of Indicative Flood Zone A or B, where it can be demonstrated to the satisfaction of the Planning Authority that the outer boundary does not reflect local topographical and/or flood path conditions, the Planning Authority may consider the extension of a zone that outside of the indicative flood zone area into this area, to an extent that is generally less than the existing area, subject to the submission of a Site Specific Flood Risk Assessment and Justification Test as appropriate and the developer satisfying the Planning Authority and him or herself that the probability of flooding is appropriate to the development being proposed and will not increase flood risk elsewhere.⁶

Figure 3.1 – Extract from Maigh Cuilinn LAP 2013-2019, Map 3B Flood Risk Management Town Centre



Map 3A/3B - Flood Risk Management Town Centre, in the Maigh Cuilinn LAP 2013-2019 (Appendix 2) indicates that the proposed development site is in Flood Zone C, i.e. that there is less than a 0.1% probability of the site flooding.

⁶ Maigh Cuilinn Local Area Plan 2013-2019, Forward Planning, Galway County Council (April 2013)

4 APPRAISAL OF EXISTING DRAINAGE INFRASTRUCTURE

A topographical survey of the site and local drainage infrastructure was carried out by TOBIN in October 2020.

As shown in Figure 4-1, stormwater drainage infrastructure in Moycullen is comprised of sewers (shown in blue with diameters in mm) and open channels (highlighted green), discharging to a number of swallow holes (circled pink).

Based on anecdotal evidence, minor pluvial flooding occurs at a number of areas in the village, areas shaded yellow in sketch below. This includes minor ponding on the Mountain Road to the east of the subject site. This flooding is attributed to limited hydraulic capacity at this point in sewer network.

While Galway County Council have recently commissioned the design of sewer upgrades to address drainage problems in the area, this assessment only considers the current situation as the upgrades have not yet been defined.



Figure 4-1 Sketch showing local drainage infrastructure in vicinity of subject site

5 FLOOD RISK ASSESSMENT

Referring to Section 3.1 of this report, the proposed residential development is classified as “highly vulnerable” in terms of its sensitivity flooding. The PSFRM guidance document recommends that such developments be constructed in flood zones C, i.e. that there is less than a 0.1% probability of the site flooding. Accordingly, the proposed development has been assessed against a 1,000-year flood event (i.e. 0.1% Annual Exceedance Probability).

5.1 FLUVIAL FLOOD RISK

There are no rivers or streams evident in the vicinity of the existing site. There is an existing drainage channel running north to south on the west side of the proposed development site, which collects surface water runoff within the existing site and from the elevated adjoining land.

The existing drainage channel will be replaced with a culvert, providing surface water runoff from the elevated adjoining land a flow path through the site, discharging to an existing drainage channel approximately 160m south east of the proposed development.

Surface water generated onsite will be managed by a dedicated surface water management system and runoff will be limited to greenfield runoff rates in accordance with the SUDS design principals.

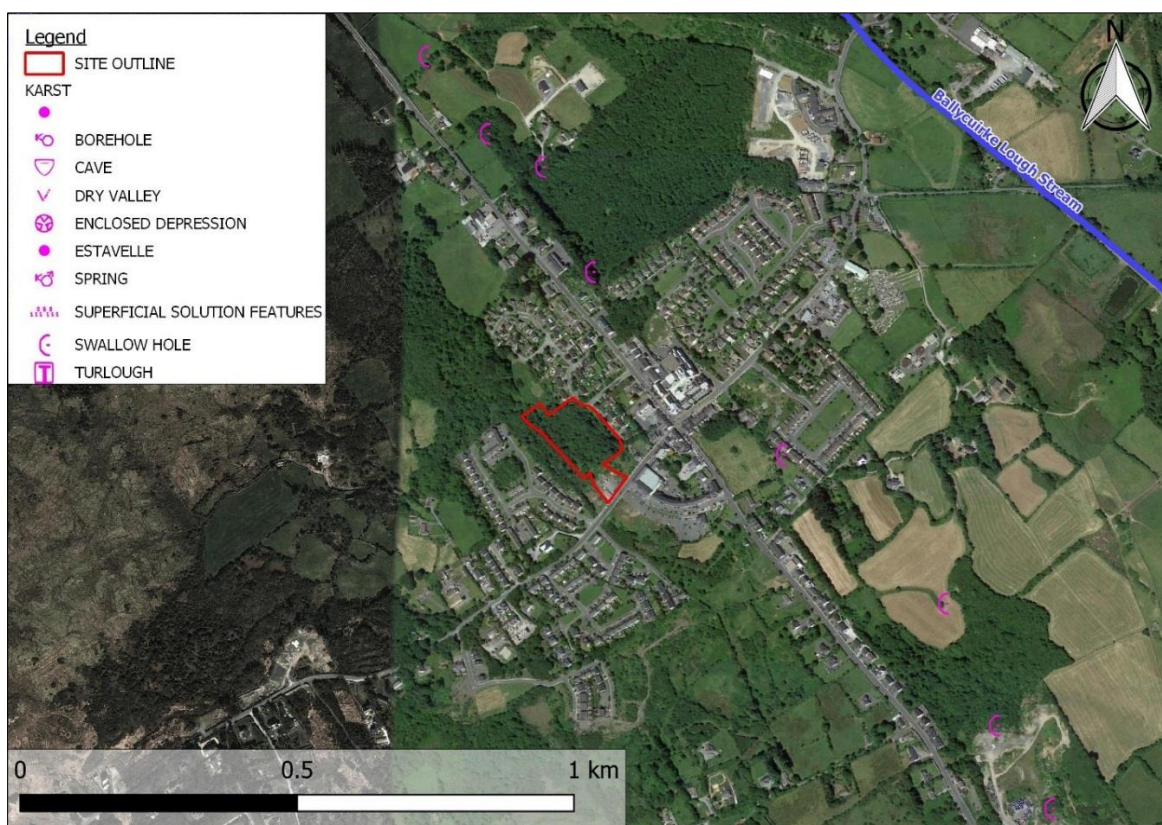
Based on the results of the PFRA (Figure 2.2) it is predicted that the subject site is not liable to fluvial (river) flooding during a 1000 year MRFS.

It is therefore estimated that the risk of fluvial flooding to the development is minimal.

5.2 GROUNDWATER FLOOD RISK

Based on a review of the PFRA study and GSI mapping of karst features in the area (Figure 5.1), there is no evidence to suggest groundwater flooding at the proposed development site.

Figure 5.1 - Karst features in vicinity of proposed site [GSI database]



5.3 PLUVIAL FLOOD RISK

Pluvial modelling and analysis carried out by HR Wallingford as part of their PFRA study indicates that pluvial flooding (ponding of surface water) is not likely to occur within the proposed residential development site (see Figure 2.2).

Site drainage and storm water storage will be provided to cater for surface water runoff, generated onsite, as part of a dedicated surface water management system. Surface water runoff from the site will be limited to greenfield runoff rates in accordance with the SUDS design principals.

The landscaping and topography of the developed site shall provide safe exceedance flow paths in the event of extreme flood events or in the case of a blockage of the drainage system, to minimise risks to people and property.

There is anecdotal evidence of pluvial flooding on the Mountain Road close to the site entrance (depths <0.3m) due to surcharging of the stormwater sewer network. The proposed site has not been impacted by this minor ponding. Notably, Galway County Council are currently progressing sewer upgrade works in the village with a view to alleviating pluvial flooding at this and other points in the village.

5.4 IMPACT OF THE DEVELOPMENT ELSEWHERE

The proposed residential development is located along Baile Ard (L1320) just off of the N59, Clifden Road in Moycullen, Co. Galway (see Figure 1.1). It is predicted that the proposed development is not at risk from flooding during the 1000-year mid-range future scenario (See Section 5.1). Therefore, the development will not affect floodplain storage or obstruct the flow path of any existing watercourses.

Surface water arising onsite will be managed by a dedicated storm water drainage system designed by TOBIN Consulting Engineers. The site drainage will include measures in accordance with the requirements of SUDS to limit runoff from the development to greenfield runoff rates.

Surface water runoff from the elevated adjoining lands will be culverted through the site and will outfall to an existing drainage channel approximately 160m south east of the proposed development. The land currently drains naturally to this point at greenfield rate, therefore the flows in the sewer network should not be impacted.

On this basis, it is predicted that the proposed development will not contribute towards flood risk elsewhere in the area.

5.5 THE JUSTIFICATION TEST

The Planning System and Flood Risk Management Guidelines set out guidance for the application of the Justification Test to assess the appropriateness of developments being proposed in areas of flood risk.

The proposed development is considered a “highly vulnerable development” in terms of its sensitivity to flooding. Such developments are considered appropriate for areas not liable to flooding during a 1000 year event.

Based on the results of this flood risk assessment, the proposed development is not liable to flooding during a 1000 year Mid Range Future Scenario. Therefore, the Justification Test does not need to be applied.

6 CONCLUSION

TOBIN Consulting Engineers were commissioned to provide engineering and environmental consultancy services for the proposed residential development in Moycullen, Co. Galway (Figure 1.1 & Figure 1.2).

The Flood Risk Assessment (FRA) undertook a review of:

- OPW Flood Hazard mapping
- OPW Preliminary Flood Risk Assessment (PFRA) Study
- The Planning System & Flood Risk Management (PSFRM) Guidelines
- Flood Risk Management Climate Change Adaptation Plan
- Galway County Development Plan (2015-2021);
- Maigh Cuilinn Local Area Plan 2013-2019;
- Stage 2 SFRA for the Maigh Cuilinn Local Area Plan 2013-2019;

With reference to the PSFRM guidelines, the proposed residential development is classified as a “highly vulnerable development” in terms of its sensitivity to flooding. Such developments are considered appropriate within Flood Zone C, i.e. in areas not liable to flooding during a 1-in-1000 year Mid-Range Future Scenario.

The outcome of the Flood Risk Assessment is summarised as follows:

Fluvial Flooding

Based on the results of the PFRA Study (Figure 1.1) it is predicted that the subject site is not liable to fluvial (river) flooding during a 1000 year MRFS.

It is therefore estimated that the risk of fluvial flooding to the development is minimal.

Groundwater Flooding

Based on a review of the PFRA study and GSI mapping of karst features in the area, there is no evidence to suggest groundwater flooding at the site. It is estimated that the risk of groundwater flooding to the proposed development is minimal.

Pluvial Flooding

Pluvial modelling and analysis carried out by HR Wallingford as part of their PFRA study indicates that pluvial flooding (ponding of surface water) is not likely to occur within the proposed residential development site (see Figure 2.2).

Surface water runoff from the site will be limited to greenfield runoff rates by a dedicated storm water management system. The landscaping and topography of the developed site shall provide safe exceedance flow paths in the event of extreme flood events or in the case of a blockage of the drainage system.

Surface water runoff from the elevated adjoining lands will flow through the site by culvert and discharge at greenfield rate to the existing drainage system to the south of the proposed development.

It is estimated that the risk of flooding the proposed development will be minimal, and it is predicted that the development will not increase the risk of flooding elsewhere.

Appendix 1 – Flood Event Report

Maigh Cuilinn Historical Flood Event Report

MINUTES OF MEETING

Reference: P4D403A – F310 – 015 – 004-008 Page 1 of 3

Project No.: P4D403A

Project Title: OPW Flood Hazard Mapping – Phase 1

Purpose of Meeting: Galway County Council – Oral Report – Area Engineer – Oughterard

Participating: Electoral/Area Engineers Galway County Council
Supervisor Galway County Council
Search Manager ESBI

Venue: Oughterard

Date of Meeting: 31/05/05

Copies to:

Compiled by: Search Manager ESBI

Status Draft

Approved for ESBI:

Approved for Galway County Council

Date:

Meeting with Area Engineer for Oughterard 31/05/05

The Electoral and Area Engineers and their supervisor outlined 26 areas that are or were prone to flooding. These are: -

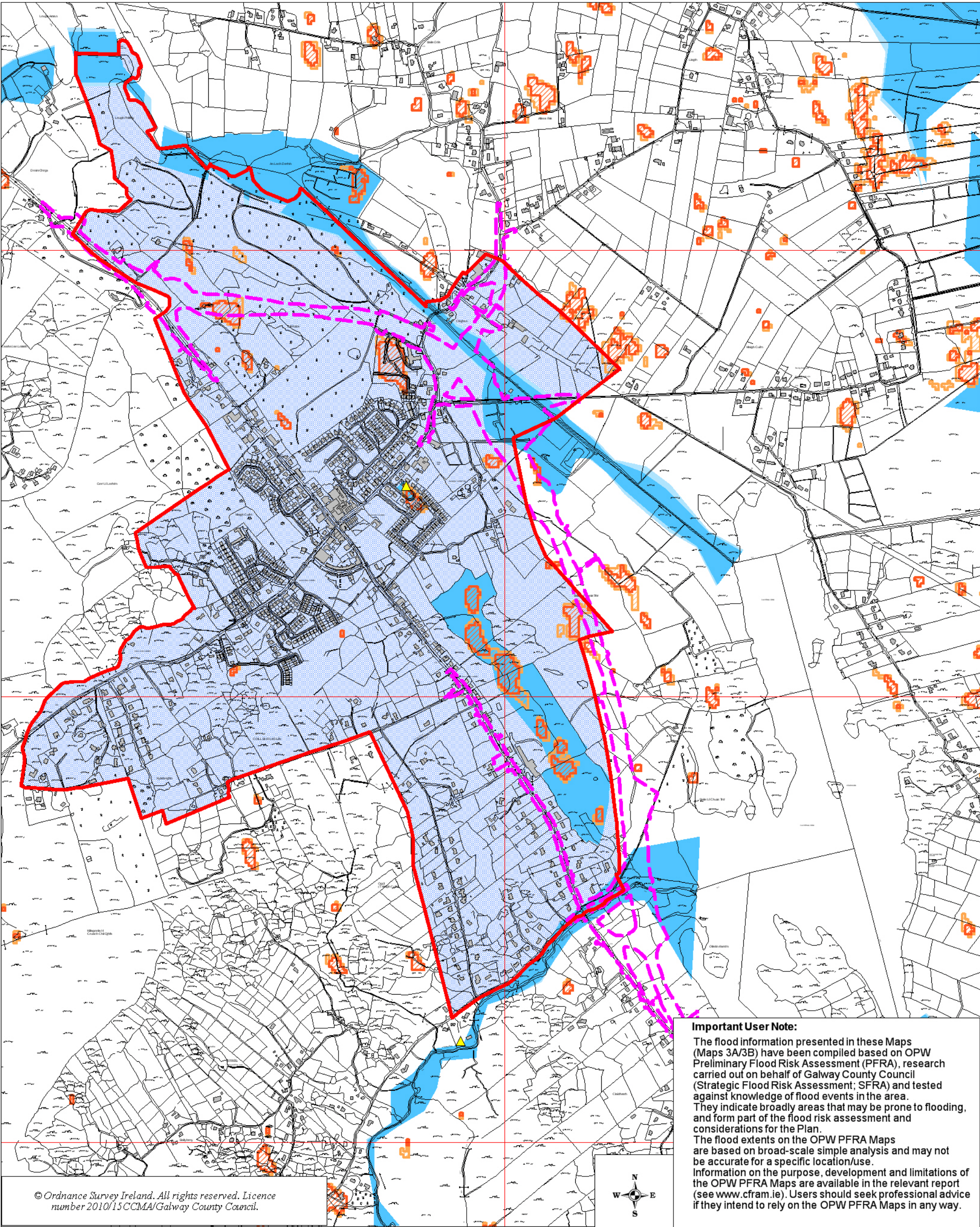
- OA1. Boliska. – River Owenboliska and lake overflows its banks every year after heavy rain. Road is liable to flood
Flood Id = 2036
- OA2. Spiddal – Area floods from a combination of high tides and strong winds every year. Road is liable to flood also a basement of a pub.
Flood Id = 2037
- OA3. Ballynahown – Area floods from a combination of extreme high tides and strong winds. Not every year. Road is liable to flood and properties can be affected.
Flood Id = 2038
- OA4. Uillinn, Moycullen – Turlough floods every year after heavy rain. Recent development has taken place in the area and has exacerbated the issue. Properties have affected in the recent development.
Flood Id = 2039
- OA5. Knock– Stream overflows its banks every year after heavy rain. Road is liable to flood.
Flood Id = 2040
- OA6. Ballynahallia – Low lying land floods every year after heavy rain. Road is liable to flood.
Flood Id = 2041
- OA7. Drimnahoon – Low lying land floods every year after heavy rain. Road is liable to flood after extreme rainfall approximately every 5 years.
Flood Id = 2042
- OA8. Oughterard 1 – Low lying land floods every year after heavy rain. Extreme flood approximately 3 years ago
Flood Id = 2043
- OA9. Oughterard 2 – Stream overflows its banks approximately every 2 years after extremely heavy rain. Recent development has taken place in the area and has exacerbated the issue.
Flood Id = 2044
- OA10. Oughterard 3 – Owenriff river overflows its banks every approximately every 3 years after extremely heavy rain. Last significant flood occurred in 1999 and properties were affected.
Flood Id = 2045
- OA11. Luggakeeraun – Low lying land floods every year after heavy rain. Road is liable to flood.
Flood Id = 2046
- OA12. Leam 1 – Owenriff river and lake overflows its banks every approximately every 3 years after extremely heavy rain. The road is liable to flood though not very often.
Flood Id = 2047
- OA13. Leam2 – Owenriff river and lake overflows its banks every approximately every 3 years after extremely heavy rain. The road is liable to flood though not very often.
Flood Id = 2048
- OA14. Bunnakill – Low lying land floods every year after heavy rain. Road is liable to flood.
Flood Id = 2049
- OA15. Shannagrena– Lake level rises every year after heavy rain. Road is liable to flood.
Flood Id = 2050
- OA16. Teernakill 1 – Low lying land floods every year after heavy rain. Road is liable to flood.
Flood Id = 2051
- OA17. Teernakill 2 – Bealanabrack river overflows its bank after heavy rain every year. Road is liable to flood.
Flood Id = 2052
- OA18. Breenaun 1 – Joyce's river overflows its bank after heavy rain every year. Road is liable to flood.
Flood Id = 2053

- OA19. Breenaun 2 – Bealanabrack river overflows its bank after heavy rain every year.
Road is liable to flood.
Flood Id = 2054
- OA20. Griggins – Low lying land floods every year after heavy rain. Road is liable to flood.
Flood Id = 2055
- OA21. Cornamona – Low lying land floods every year after heavy rain. Road is liable to flood after extreme rainfall but road level has been raised.
Flood Id = 2056
- OA22. Carrowbaun – River overflows its bank after heavy rain every year. Road is not liable to flood.
Flood Id = 2057
- OA23. Pigeon Hole at Sawmills – Low lying land floods every year after heavy rain. Road is liable to flood.
Flood Id = 2058
- OA24. Cappaghnagapple– Low lying land floods approximately every 2 years after heavy rain. Council has undertaken remedial work and has alleviated some of the flooding
Flood Id = 2059
- OA25. Teernakill Bridge – Stream overflows its bank after heavy rain every year. Road is liable to flood occasionally.
Flood Id = 2060

Appendix 2 – Flood Mapping

Maigh Cuilinn LAP Maps 3A-3B - Flood Risk Management





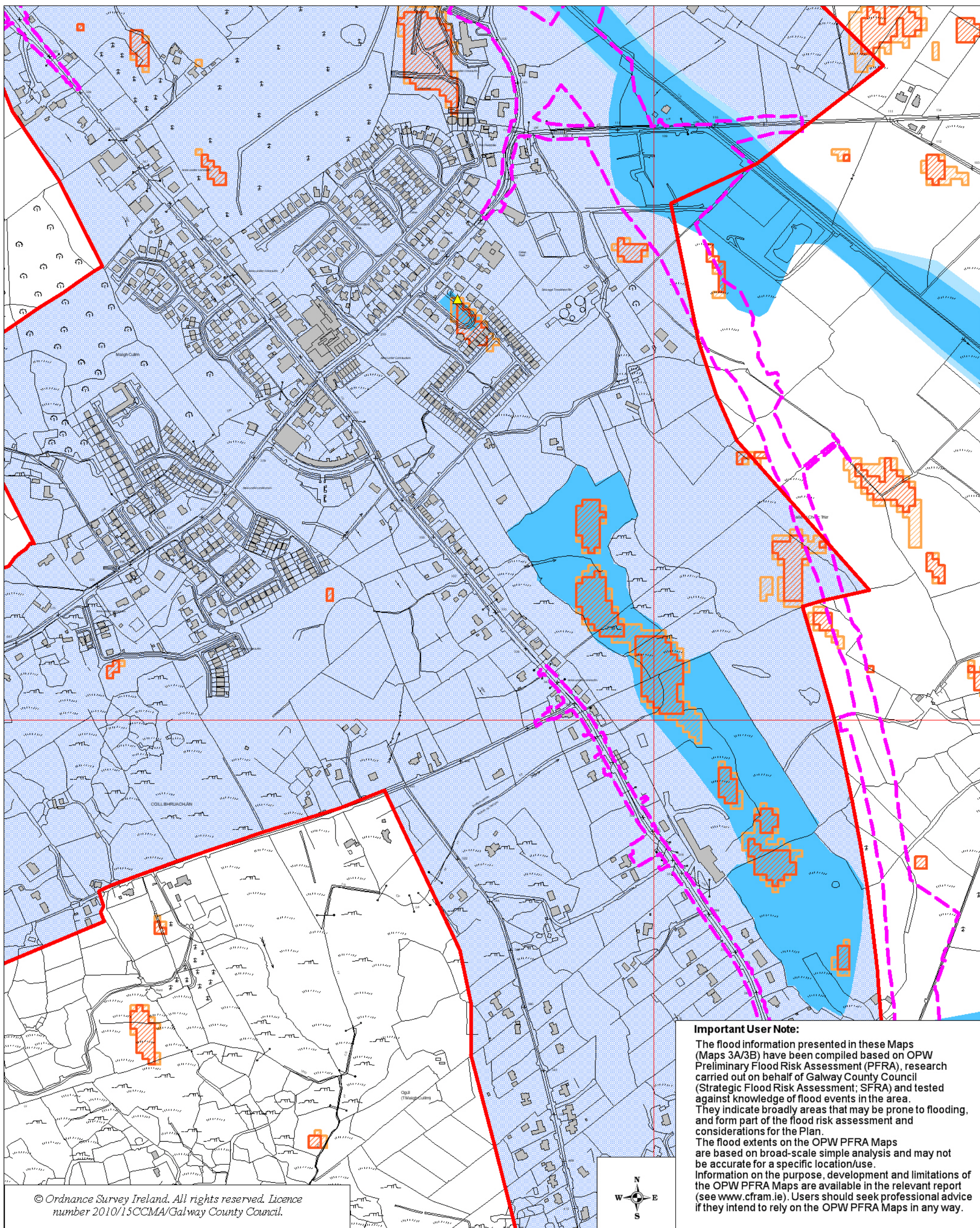
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Important User Note:
The flood information presented in these Maps (Maps 3A/3B) have been compiled based on OPW Preliminary Flood Risk Assessment (PFRA), research carried out on behalf of Galway County Council (Strategic Flood Risk Assessment; SFRA) and tested against knowledge of flood events in the area. They indicate broadly areas that may be prone to flooding, and form part of the flood risk assessment and considerations for the Plan.
The flood extents on the OPW PFRA Maps are based on broad-scale simple analysis and may not be accurate for a specific location/use. Information on the purpose, development and limitations of the OPW PFRA Maps are available in the relevant report (see www.cfram.ie). Users should seek professional advice if they intend to rely on the OPW PFRA Maps in any way.

- | | | | |
|--|---|--|------------------------------------|
| | Local Area Plan Boundary | | Recorded / Historical Flood Events |
| | Indicative Flood Zone A (PFRA Fluvial 100) | | Rivers / Streams / Canal |
| | Indicative Flood Zone B (PFRA Fluvial 1000) | | Indicative By Pass Corridor |
| | Indicative Flood Zone C (Areas not covered by A or B) | | |
| | Pluvial Indicative (PFRA) | | |
| | Pluvial Extreme (PFRA) | | |

**MAIGH CUILINN LAP
MAP 3A - FLOOD RISK MANAGEMENT**

NOTE:
This map should be read in conjunction with Maps 1A/1B Land Use Zoning; Maps 2A/2B Specific Objectives and the policies, objectives and guidelines outlined with Section 2 and Section 3 of the plan, including those in relation to flood risk management and assessment.



- | | | | |
|--|---|---|------------------------------------|
|  | Local Area Plan Boundary |  | Recorded / Historical Flood Events |
|  | Indicative Flood Zone A (PFRA Fluvial 100) |  | Rivers / Streams / Canal |
|  | Indicative Flood Zone B (PFRA Fluvial 1000) |  | Indicative By Pass Corridor |
|  | Indicative Flood Zone C (Areas not covered by A or B) | | |
|  | Pluvial Indicative (PFRA) | | |
|  | Pluvial Extreme (PFRA) | | |

**MAIGH CUILINN LAP 2012
 MAP 3B - FLOOD RISK MANAGEMENT
 - TOWN CENTRE -**

NOTE:
 This map should be read in conjunction with Maps 1A/1B Land Use Zoning; Maps 2A/2B Specific Objectives and the policies, objectives and guidelines outlined with Section 2 and Section 3 of the plan, including those in relation to flood risk management and assessment.

Appendix 3 – Drawings

Topographical Survey

Proposed site draiange

STORM DRAINAGE:

- ALL UNDERGROUND STORM PIPEWORK TO BE TWINWALL HIGH DENSITY POLYETHYLENE PIPE MANUFACTURED FROM 100% RECYCLED PLASTIC. PIPEWORK TO BE BBA AND ISO 9001-2008 APPROVED.
- THE PROPOSED STORM WATER NETWORK FOR THE SITE SHALL BE PROVIDED AS INDICATED ON THIS DRAWING. ALL PROPOSED STORM SEWERS SHALL BE LAID AND PROTECTED IN TRENCHES AS SET OUT ON THE STANDARD PIPE BEDDING DETAILS DRAWING PROVIDED WITH THIS PACKAGE.
- ALL MANHOLE COVERS TO BE IN ACCORDANCE WITH BS EN 124. MANHOLE COVERS IN FOOTWAYS ARE TO BE PROVIDED WITH NON-SLIP COVERS AND THOSE WITHIN TACTILE PAVING AREAS ARE TO BE PROVIDED WITH RECESSED COVERS FOR PAVING.
- ALL STORM ACCESS JUNCTIONS TO BE WAVIN 110MM uPVC ACCESS JUNCTIONS WITH COVERS TO IS 424:1990 OR SIMILAR APPROVED.
- STORM MANHOLES TO BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARD MANHOLE DETAILS PROVIDED WITH THIS PACKAGE

WATERMAIN:

- WATERMAIN INFRASTRUCTURE TO BE CONSTRUCTED IN ACCORDANCE WITH IRISH WATER SPECIFICATION IW-CDS-5020-03
- WATER MAIN HOUSE CONNECTIONS TO COMPLY WITH SECTION 3.7 & 3.15.3 OF THE WATER CODE OF PRACTICE AND STD-W-26 STANDARD DETAIL
- AIR VALVES AND HYDRANTS TO COMPLY WITH 3.18 OF THE CODE OF PRACTICE
- PIPE MATERIAL SHALL BE HDPE OR MDPE IN ACCORDANCE WITH SECTION 3.9 AND SHALL COMPLY WITH SECTION 3.9 OF THE IRISH WATER CODE OF PRACTICE.
- THRUST BLOCKS TO WATERMAINS AS PER IW STANDARDS DETAIL STD - W - 28

FOUL DRAINAGE:

- THE PROPOSED FOUL SEWER NETWORK FOR THE SITE SHALL BE PROVIDED AS INDICATED ON THIS DRAWING. ALL PROPOSED FOUL SEWERS SHALL BE LAID AND PROTECTED IN TRENCHES AS SET OUT IN IW STANDARD DETAIL STD - WW - 07
- ALL MANHOLE COVERS TO BE IN ACCORDANCE WITH BS EN 124. MANHOLE COVERS IN FOOTWAYS ARE TO BE PROVIDED WITH NON-SLIP COVERS AND THOSE WITHIN TACTILE PAVING AREAS ARE TO BE PROVIDED WITH RECESSED COVERS FOR PAVING.
- INDIVIDUAL WASTEWATER CONNECTION TO EACH DWELLING WILL BE AS PER STANDARD DETAIL STD-WW-02.
- THE INSPECTION CHAMBER WILL BE IN COMPLIANCE WITH STD-WW-03 AND STD-WW-13 AND WILL BE LOCATED WITHIN 1M OF EACH SITE BOUNDARY.
- PIPE MATERIALS SHALL COMPLY WITH SECTION 3.13. OF THE CODE OF PRACTICE.
- PIPE MATERIALS WILL BE THERMOPLASTIC STRUCTURED WALL PIPES FOR THE MAIN SEWERS AS PER SECTION 3.13.2 OF THE CODE OF PRACTICE AND UNPLASTICISED PVC FOR THE CONNECTIONS AS PER SECTION 3.13.3 OF THE CODE OF PRACTICE.
- FOUL MANHOLES TO BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARD MANHOLE DETAILS PROVIDED WITH THIS PACKAGE
- SEPARATION DISTANCES FROM FOUL SEWERS TO STRUCTURES AND OTHER UTILITIES WILL COMPLY WITH SECTION 3.5 OF THE CODE OF PRACTICE.
- FOUL CONNECTIONS TO BE LAID AT 1:40 WHERE NO WC IS CONNECTED AND 1:80 ONCE WC IS CONNECTED OR HAS BEEN PICKED UP. AS PER IRISH WATER CODE OF PRACTICE - WASTEWATER - IW-CDS-5030-03.
- ALL SERVICES TO BE BROUGHT OUT THROUGH TOE OF RAFT FOUNDATION WHERE POSSIBLE.

WATER MAINS LEGEND:

EXISTING WATER SUPPLY

PROPOSED PE100 SDR17
WATER SUPPLY PIPE - Ø AS SHOWN

H

PROPOSED HYDRANT

M

PROPOSED BULK METER

SV

PROPOSED SLUICE VALVE

AV

PROPOSED AIR VALVE

SC

PROPOSED 25mm DIA. MDPE SERVICE
CONNECTION & BOUNDARY BOX INCL. STOP
COCK (METER NOT REQUIRED, PROVISION
TO BE MADE FOR FUTURE INSTALLATION)

STORM SEWER LEGEND:

PR STORM S1
G.L. 14.33
I.L. 11.2

DETAILS

PROPOSED STORM SEWER AND
MANHOLE
(TYPE J IF NOT SPECIFIED)

AJ

PROPOSED STORM AJs (AS REQUIRED)
BY WAVIN OR EQUIVALENT APPROVED
WITH RISER, CONNECTORS, COVERS,
FITTINGS ETC AS REQUIRED FOR
SPECIFIC CONNECTIONS INCLUDING
AND 1000mm MANHOLE CONNECTION

G/S

GULLY AND 1000mm uPVC CONNECTION

S/A

ROOF RUNOFF SOAKAWAY ALL
SOAKAWAYS TO BE DESIGNED IN
ACCORDANCE WITH BRE DIGEST
365:2016)

FOUL SEWER LEGEND:

PR FOUL F1
G.L. 14.33
I.L. 10.5

DETAILS

PROPOSED FOUL SEWER AND MANHOLE
(TYPE J IF NOT SPECIFIED)

AJ

PROPOSED FOUL AJs
(AS REQUIRED) BY WAVIN OR EQUIVALENT
APPROVED WITH RISER, CONNECTORS,
COVERS, FITTINGS ETC AS REQUIRED FOR
SPECIFIC CONNECTIONS WITH 1000
MANHOLE CONNECTION

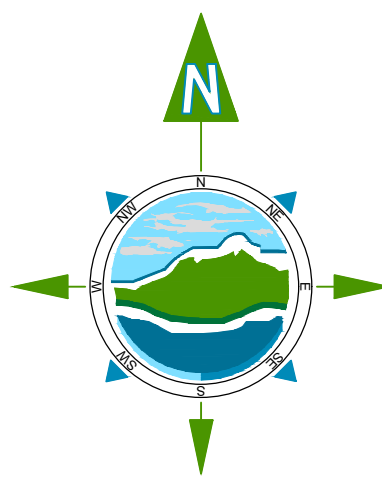
EX FOUL F2
G.L. 14.33
I.L. 10.5

DETAILS

EXISTING FOUL SEWER AND MANHOLE TO
BE RETAINED

GENERAL:

SITE BOUNDARY



SOAKAWAY NOTES

PROPOSED ATTENUATION TANK TO PROVIDE A MINIMUM OF 710m³ STORAGE CAPACITY. DIMS: 27m x 18m x 1.5m. TANK TO CONSIST OF STORMTECH CHAMBERS OR SIMILAR APPROVED. THE SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED RECOMMENDATIONS, AND THE WORK CARRIED OUT AS INDICATED ON THIS DRAWING AND IN ACCORDANCE WITH RECOGNISED GOOD PRACTICE. THE UNITS SHALL BE INSTALLED WITH ALL NECESSARY, RODDING ACCESS AND ACCESSORIES AS REQUIRED FOR THE SCHEME. THE UNITS SHALL ALLOW FOR FREE ACCESS FOR CCTV / JETTING EQUIPMENT.

PETROL INTERCEPTOR NOTES

PROPOSED PETROL INTERCEPTOR. KRARGESTER NSBE015 CLASS 1 BYPASS SEPARATOR OR SIMILAR APPROVED. REFER TO CIVIL SPECIFICATION FOR FURTHER DETAILS. UNIT TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION AND WITH ALL NECESSARY ACCESSORIES AS REQUIRED FOR THE SCHEME.

MANHOLE COVERS

TO BE IN ACCORDANCE WITH BE EN 124-15 MANHOLE COVERS IN FOOTWAYS ARE TO BE PROVIDED WITH NON-SLIP COVERS AND THOSE WITHIN TACTILE PAVING AREAS ARE TO BE PROVIDED WITH RECESSED COVERS FOR PAVING.

PIPEWORK

PIPEWORK TO BE IN ACCORDANCE WITH THE RELEVANT IRISH WATER STANDARDS.

BOUNDARY BOX

BOUNDARY BOX TO BE PROVIDED IN ACCORDANCE WITH APPENDIX A - SPECIFICATION FOR BOUNDARY BOX AND FITTINGS OF IRISH WATER CODE OF PRACTICE FOR WATER INFRASTRUCTURE. METER NOT REQUIRED, PROVISION TO BE MADE FOR FUTURE INSTALLATION.

REFER TO CIVIL SPECIFICATION FOR FURTHER DETAILS ON THE PROPOSED ELEMENTS OF THE STORM AND FOUL SYSTEM.

NOTES:

- FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
- ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
- ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
- THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
- ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
P1	12.05.2021	Issue for Planning	SB	MG

Client:



Project:

Housing Development
Moycullen, Co. Galway

Title:

Proposed Services
Layout and Details

Scale @ A1:

1:500

Prepared by:

SB

Checked:

MG

Date:

January 2020

Project Director:

Michael McDonnell

Drawing Status:

Planning

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Drawing No.: 10578-2100 P1

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