



Client: Donegal County Council

Flood Risk Assessment Report

Proposed Social Housing Development, at Cois Abhainn, St Johnson, Co. Donegal

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BEng (Hons). MIEI

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Report Control



Document: Flood Risk Assessment Report

Project: Proposed Social Housing Development, at Cois Abhainn, St Johnson, Co. Donegal

Client: Donegal County Council

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2			
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1.0 INTRODUCTION

Donegal County Council Housing, Corporate & Culture Services team are seeking planning approval for Phase 3 consisting of residential dwellings. The site identified for the proposed development is located on the southern outskirts of Cois Abhainn, St. Johnston, Co. Donegal.

The site of the proposed scheme sits to the east of the existing social housing scheme, Cois Abhainn and will be the third phase of development. Donegal County Council intends to construct a Housing Development, with ancillary site works at Cois Abhainn (Phase 3), St. Johnston, Co. Donegal, in an aim to meeting the core objectives for housing as outlined in the Donegal County Development Plan 2018-2024 Table 2A.6: The Core Strategy Table.

A site-specific flood risk assessment has been requested as part of the planning application process. This flood risk assessment will assess the site in terms of the likelihood of flooding and resultant consequences, while assessing the potential, post development risks in regard to the design of mitigation and compensation measures.

The Flood Risk Assessment (FRA) will be completed in accordance with the Flood Risk Management Guidelines, DEHLG, 2009 (or as updated) including 'Surface Water Drainage Calculations.

2.0 THE SITE

The site identified for the proposed development is located on the southern outskirts of Cois Abhainn, St. Johnston, Co. Donegal. The site has a watercourse known as Swilly Burn_030 approximately 130m to the east of the proposed Eastern Boundary, flowing from South to East and converging with the River Foyle.

The site has an area of approximately 1.47 Hectares and details of the site location and boundaries are provided on Figures 1 and 2.

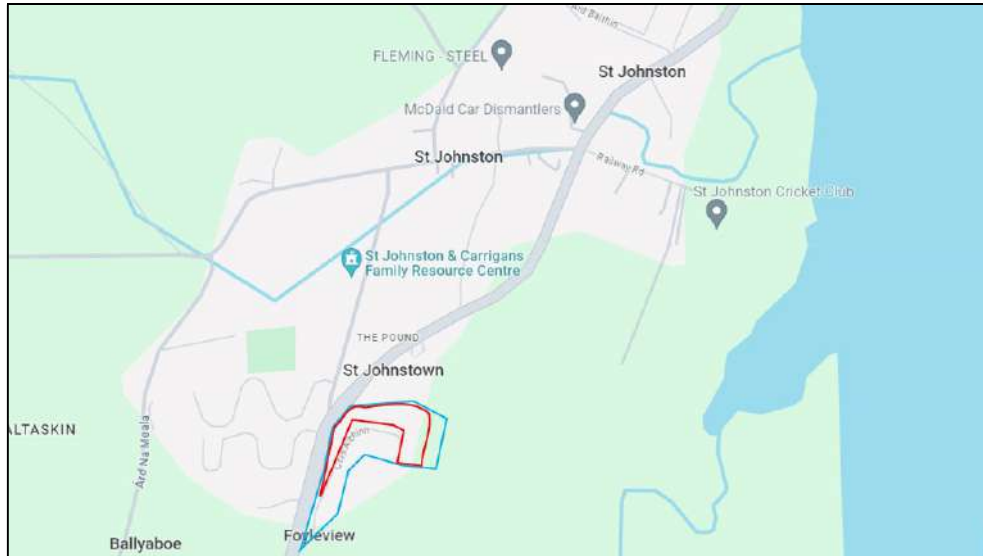


Figure 1: Site Location Map (Google Maps)



Figure 2: Site Boundary Map

2.1 Site Description

The site is accessed from the Derry Road (R236), through the existing Cois Abhainn development entrance. The site is bounded to the North and south by agriculture lands. The west of the site is bounded by the existing Cois Abhainn Phase 1 and 2 developments, and the Derry Road (R236). The east of the site is bounded by planted woodland, and agriculture lands. The east boundary is also bounded by a drainage channel which converges with the Swilly Burn_030.

The site is currently an undeveloped Greenfield site, utilised for agriculture purposes. Site Photos from a walk over survey can be found in Appendix A.

2.2 Watercourse

The site has a watercourse known as Swilly Burn_030 approximately 130m to the east of the proposed Eastern Boundary, flowing from South to East and converging with the River Foyle.



Figure 3: Watercourse Map

3.0 FLOOD IMPACT ASSESSMENT

3.1 Methodology

To facilitate the completion of the FRA, the following methodology was adopted:

- Firstly, background data in relation to the site and its locale, including topographical information, was collated, to gain a general appreciation of the topography of the site and its key features.
- Next a site visit/walk over survey was carried out.
- A desktop study was undertaken with respect to the flooding history of the site. This information is presented in the following sections of this report.
- Detailed design of storm drainage system including attenuation measures required was carried out for the proposed development.
- Flood risk will be evaluated, and conclusions drawn.
- Finally, the production of FRA in accordance with the requirements of the project objectives as defined by Donegal County Council will be completed.

3.2 Site Topographical Information

A topographical survey of the proposed development sites and surrounding lands was provided by Donegal County Council. This survey was to establish the general topography of the site, to enable assessment of potential flood zones and the current drainage layout to be developed. The Key site features include:

- The topographical survey indicates the site has a high peak within it centre and the remaining of the site falls away from this in all directions.
- The site highest level recorded of 8.62m.
- The lowest level recorded is 4.00m and is located along the Northeast boundary of the proposed site.

The Topographical Survey can be found in Appendix I.

3.3 Relevant planning policy

The relevant planning policy with respect to floodplain development is the County Donegal Development Plan 2018-2024, Chapter 5; where the core objectives are:

- F-O-1: To assess all development proposals in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities, November 2009, DoEHLG or any amendment to it.
- F-O-2: To adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction, and mitigation of flood risk.
- F-O-3: To ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management and to comply with Article 6 of the Habitats Directive and have regard to the relevant conservation objectives, qualifying interests, and threats to the integrity of Natura 2000 sites.

3.4 Previous Flooding of the Site

Investigation into the historic flooding of the site does not indicate that the proposed site or the lands immediately neighboring the proposed site are prone to flooding as illustrated on the relevant OPW National Flood Hazard Map reproduced in Figure 4. The flood maps do confirm extensive flooding to the lands further South, upstream of the proposed site south of the Fox Wood Housing development.

Examination of the OSI 25 Inch and 6 Inch maps do not identify areas 'Liable to Flood' on the proposed site or any of the neighboring sites. (Refer to Appendix D)

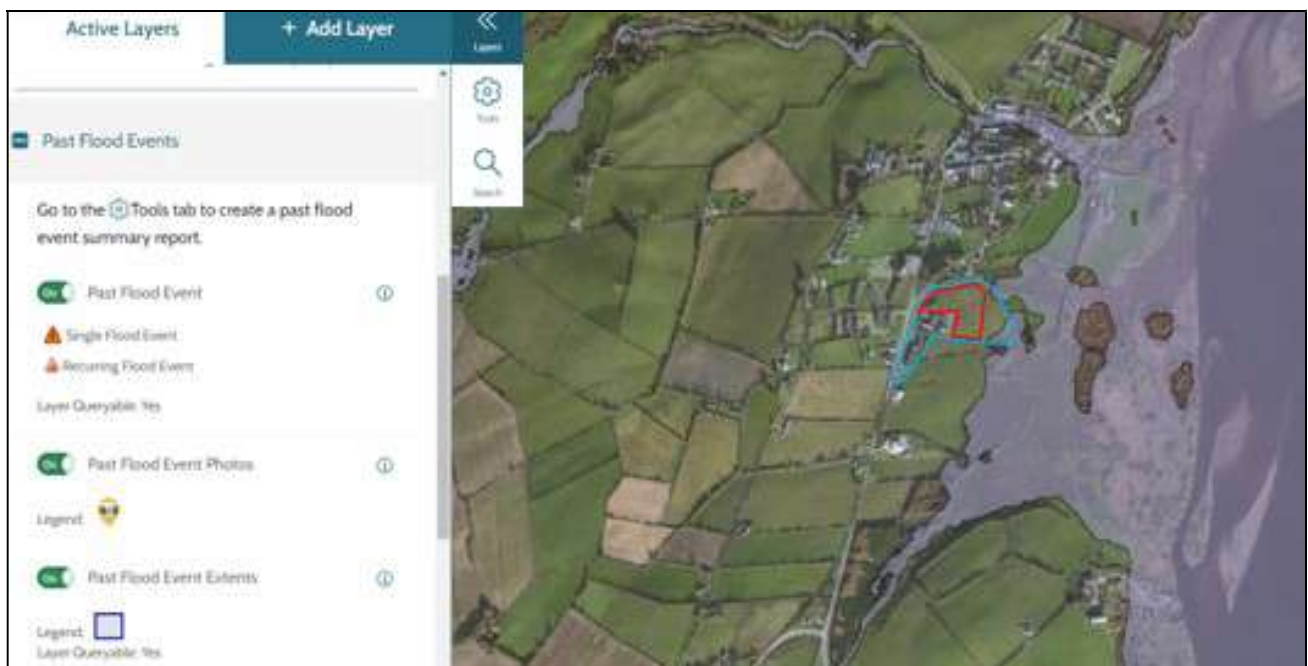


Figure 4: OPW Flood Maps- Past Flooding Event

3.5 National CFRAM Programme

The National CFRAM Programme has three principal milestones:

- Preliminary Flood Risk Assessment (Completed 2011)
- Preparation of Flood Maps (2013-2014)
- Preparation of Flood Risk Management Plans (2015)

Flood zones are geographical areas within which the likelihood of flooding is in a particular range, and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning.

A flood Zone A is defined as high probability of flooding, i.e.) more than 1% probability or 1 in 100 from rivers and more than 0.5% probability or 1 in 200 from coastal flooding. A flood Zone B is defined as moderate probability of flooding, i.e.) between 0.1% probability or 1 in 1,000 years and 1% or 1 in 100 years for river flooding and between 0.1% or 1 in 1,000 years and 0.5% or 1 in 200 for coastal flooding.

The site is not covered by any CFRAM flood maps, however the National Indicative Fluvial Mapping – Present day would indicate the proposed site falls outside both flood Zone A and B. See Figure 5 below:

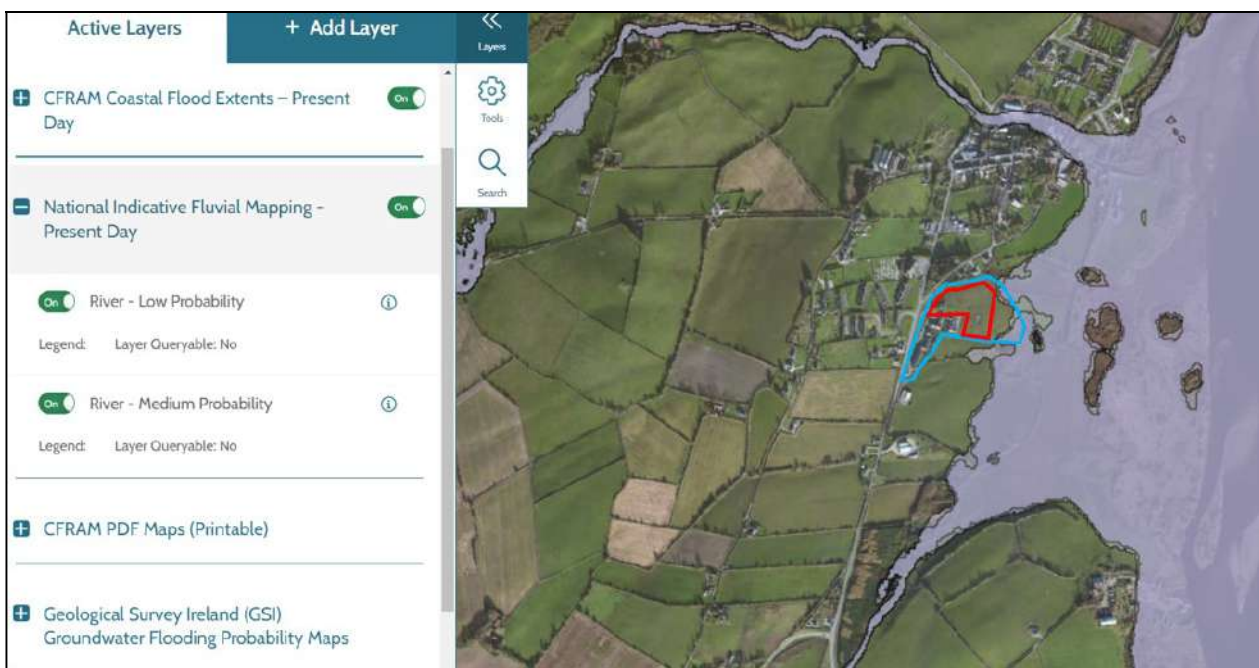


Figure 5: National Indicative Fluvial Mapping – Present day (Low + Medium Probability)

The River Foyle is covered by Northern Ireland Department for Infrastructure (DFI) Rivers division which indicates a Q100 level of 3.44m, 6.96km upstream (Lifford) and Q100 level of 2.21m, 15.5km downstream (Newbuilding, Derry). Through interpolation the site Q100 is estimated to be approximately 2.89m. (Refer to Appendix C for a full copy of the DFI Rivers maps).

3.6 Potential Archaeological Site

Examination of the OSI 25 Inch and 6 Inch maps do not identify anything of Archaeological interest on the proposed site. Refer to Appendix D for OSI maps.

3.7 Existing Site Drainage

The existing site is Greenfield in nature and typically open. The open grass areas have substantial coverage of the Common rush, also known as Soft Rush, (*Juncus effusus*), which indicates land drainage is poor or non-existent. The rainfall that currently falls on the site either flows towards the existing drainage ditches, or lower lying areas and ponds or percolates into the site's sub-soil.

3.8 Proposed Development

The proposed development of the site consists of 30 number residential units with associated site works to include an access road, car parking, footpaths, and landscaping. A full copy of the proposed development is contained within Appendix H.

As part of the proposed development, separate storm and foul networks will be constructed. The new storm sewer for the proposed development will discharge into the Swilly Burn_030 to the southeast boundary of the site. The proposed storm drainage system will incorporate a Hydro-brake and attenuation storage to limit the proposed site to the greenfield run-off rate to ensure there will be no increase in storm water discharge as a result of the proposed development.

The Foul sewer for the proposed development will be designed to connect to the existing foul network of Phase one and two before entering a pumping station to be pumped to the public sewer on the Derry Road.

An indicative storm drainage layout for the proposed development is contained within Appendix G of this report.

3.9 Flood Impact Evaluation

The OPW Flood Maps and reports do not record any flooding or re-occurring flooding at the proposed site. A review of the OPW Flood maps indicate the site is not covered by any generated CFRAM Flood Maps. The National Indicative Fluvial Mapping also indicates no fluvial flooding (1:100yr and 1:1000yr) to the proposed site.

3.10 Existing Site-Specific Flood Risks

This section of the report considers site specific flood risk factors which could potentially result in flooding incidents within the development. The site-specific flood risks are likely to result from the following three causes:

3.10.1 Flooding of watercourses

Blockages obstructing the Swilly Burn_030 east of the proposed site could constrict flow and cause localised flooding. It is essential that the landowners properly maintain all local water courses which they are responsible. As long as the water courses are properly maintained then the National Indicative Fluvial maps clearly show that the site will have no risk from fluvial flooding up to and including the 1:1000 yr. rainfall event.

The proposed development access road will run along the southern boundary and will be a buffer between the residential areas and the watercourse will reduce the probability of the flood risk to homes and careful consideration of Finished Floor Levels for the dwellings will result in a low flood risk from this source.

3.10.2 Overland flow from high ground surrounding the site.

Lands surrounding the proposed site generally fall from East to West. The proposed development will have longitudinal road gradient between 1:20 and 1:100 with crossfall gradients of 1:40 for footpaths and roads. The overland flow from high ground surrounding the site will not present a risk due the following reasons:

- Lands to the North, East and South are agriculture, with all rainwater being contained within their own individual drainage ditch networks. Any fall towards our site will be intercepted by an existing sheough on the dividing boundary.
- The west of the site is developed through Phase 1 and 2 of the proposed development and the Derry Road. All runoff and flow will be maintained and collected within the existing drainage networks.

In summary the lands surrounding of the proposed site are predominantly developed with access roads and associated storm sewers which will intercept the overland flow. There are no recorded flooding problems in the surrounding established developments, so the most likely source of flooding would be resulting from a failure of the storm water drainage system. Provided this system is maintained then the risk of flooding to the proposed development from this source is considered to be low.

3.10.3 Surcharged Storm water system

The third and final risk is pluvial flooding resulting from water escaping from the surcharged storm water network. The development proposes the discharge of water into the Swilly Burn_030. When the local watercourses are in flood then this water has the potential to back up within the storm water drainage system and cause flooding. However, an appropriately designed storm water drainage system should negate this risk. Careful consideration of the level of the outlet pipe combined with a well-designed storm water drainage system incorporating additional capacity / attenuation provision as appropriate, with ongoing maintenance should result in a low flood risk from this source.

The review of the site-specific flood risks determined a few sources and pathways for flooding to this site and each of these are considered to be minimal risk at present.

3.11 Justification Test

Where there are insufficient sites available to locate development outside flood risk areas, it may be necessary to meet the objectives of proper planning and sustainable development, for development to be sited within flood risk areas.

The Justification Test is an examination of such proposals against proper planning and sustainable development criteria and, if these are satisfied, against flood risk criteria to ensure that risks are reduced to an acceptable level and that flood risk is not increased elsewhere.

Determination if a Justification Test is required, the proposed developed is assessed using the following tables taken from the County Donegal Development Plan 2018-2024 (as varied).

County Donegal Development Plan 2018-2024

Table 5.4.1: Classification of Vulnerability for different types of development taken from Table 3.1 of The Planning System and Flood Risk Management - Guidelines for Planning Authorities (DoEHLG, 2009)

Vulnerability Class	Land Use and Types of Development which include
Water Compatible Development	Flood control infrastructure.
	Docks, marinas and wharves.
	Navigation facilities.
	Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
	Water based recreation and tourism (excluding sleeping accommodation).
	Lifeguard and coastguard stations.
Less Vulnerable Development	Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms, and; Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions.
	Land and buildings used for holiday or touring non-static holiday caravans and camping, subject to specific warning and excavation plans.
	Land and buildings used for agriculture and forestry.
	Waste treatment (except landfill and hazardous waste).
Highly Vulnerable Development	Mineral working and processing, and;
	Local transport infrastructure.
	Garda, ambulance, fire stations and command centres should be operational during flooding.
	Hospitals.
	Emergency access and egress points.
	Schools.
	Dwelling houses, student halls of residence and hostels.
	Residential care homes, children's homes and social services homes.
Caravans and mobile home parks.	
Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility, and;	
Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution in the event of flooding.	

Source - Planning System and Flood Risk Management Guidelines for Planning Authorities, November 2009 DoEHLG.

Table 5.4.2: Matrix of Vulnerability Versus Flood Zone as taken from Table 3.1 of The Planning System and Flood Risk Management - Guidelines for Planning Authorities (DoEHLG, 2009)

	Flood Zone A High Probability	Flood Zone B Moderate Probability	Flood Zone C Low Probability
Water Compatible Development	Development Appropriate	Development Appropriate	Development Appropriate
Less Vulnerable Development	Justification Test Required	Development Appropriate	Development Appropriate
Highly Vulnerable Development	Justification Test Required	Justification Test Required	Development Appropriate

Consideration of the proposed development with Table 5.4.1 above would confirm the Vulnerability Class as Highly Vulnerable Development (Dwelling Houses). Under further consideration of Table 5.4.2 the proposed development falls within Flood Zone C, therefore the development may be deemed appropriate and not subject to a Justification Test.

This development is considered integral to meeting the core objectives for housing as outlined in the Donegal County Development Plan 2018-2024 Table 2A.6: The Core Strategy Table.

4.0 DEVELOPMENT FEASIBILITY

4.1 Pre-development

Donegal County Council Housing, Corporate & Culture Services team are seeking planning approval for Phase 3 consisting of 30 no. residential dwellings. The site identified for the proposed development is located on the southern outskirts of Cois Abhainn, St. Johnston, Co. Donegal.

The site of the proposed scheme sits to the east of the existing social housing scheme, Cois Abhainn and will be the third phase of development. Donegal County Council intends to construct a Housing Development, with ancillary site works at Cois Abhainn (Phase 3), St. Johnston, Co. Donegal, in an aim to meeting the core objectives for housing as outlined in the Donegal County Development Plan 2018-2024 Table 2A.6: The Core Strategy Table.

The site is currently an undeveloped Greenfield site, utilised for agriculture purposes. Site Photos from a walk over survey can be found in Appendix A.

The proposed development has only partial affected areas covered by flood Zone A and B.

4.2 Post-development

The proposed development will consist of 30 new residential dwellings, access road, car parking, landscaping, and associated site works. A plan of the proposed development is contained within Appendix H.

Post development, the site will have an impermeable area of 0.51ha equating to approximately 33% of the proposed site. The developed site will collect the rainfall within dedicated Storm sewer network with a discharge manhole restricting flow to Greenfield run-off with the use of a flow control device. The storm will discharge into the Gleneely River via a Headwall set-up. The Greenfield run-off rate for the existing site has been calculated as 15.0 L/Sec. Attenuation of the rainfall events will be incorporated with the Storm Network using oversized Pipes and Manhole Rings. Limited Storm discharge to Greenfield runoff creates a theoretical Net balance to existing conditions versus future conditions with the impermeable area increased.

Foyle Consulting Engineers used Causeway Flow modelling software to design the Storm system utilising a flow control device with a restricted discharge of 15.0 l/s. Simulations for the 2-year, 30 year and 100-year return period events have been assessed, using Causeway Flow, with a 10% increase in rainfall as a result of climate change included with an additional 10% added to the impermeable drainage area to allow for urban creep. The indicative storm drainage layout for the site is contained within Appendix G of this report. The proposed development internal storm sewer design and construction will be completed to an adoptable standard.

The calculations in Appendix F confirm the proposed site storm drainage system, including the flow control and attenuation, is adequate to provide sufficient storage for the 1 in 100-year storm event plus the 10% climate change

allowance. Attenuation is provided in the form of oversized pipes and large diameter manholes creating a storage volume in excess of 128m³ within the road network.

Exceedance conditions result in above ground flood flow occurring either when the capacity of the drainage system is exceeded or where the rate of runoff exceeds the inlet capacity of the drain. Without good design, flood flow will follow default pathways leading to flooding of properties. It is possible to avoid this by setting proposed ground levels that will direct flood flows away from the proposed properties.

The analysis also demonstrates that, whilst the storm drainage system may become surcharged within 300mm of proposed manhole or road gully cover levels during the 1 in 100-year return period event, no out of system flooding will occur. To safeguard against potential pluvial flood risk to the development, final development levels and gradients will be re-profiled as necessary to remove any isolated low-lying areas and/or have appropriate surface water drainage infrastructure installed to remove any standing water. In addition, the finished floor levels of the proposed residential units should be located at least 150mm above adjacent ground levels. In the event that the proposed system becomes surcharged during a storm greater than the 1 in 100yr storm event then the storm water surface flow will be managed to ensure there is no risk of flooding to the proposed properties.

4.3 Post-development-Potential Archaeological Site

Examination of the OSI 25 Inch and 6 Inch maps do not identify anything of Archaeological interest on the proposed site, however, if during the construction process anything of Archaeological interest is discovered then the appropriate organisations should be informed.

4.4 Overland flow originating from the site and potentially affecting elsewhere.

The proposed development will increase the storm water runoff rate which has been used for the drainage design for the proposed development to ensure there is no increased risk of flooding on site or off site. There will be no increased risk due the following reasons:

- Proposed development levels selected to direct overland flow towards drainage networks.
- Finished Floor levels will be selected to be 150mm above surrounding ground levels.
- No formal drainage to back gardens, with drainage taking place via percolation through the soil to mimic the natural undeveloped drainage regime.
- The proposed development access roads and sewer network will be designed to intercept any overland flow and direct towards storm drainage system.
- The proposed development storm network system will be designed to include a flow control and attenuation for the 100-year return event.
- Any low-lying area will be re-profiled as part of the proposed development and the overland flow will be intercepted by the network of roads and associated storm drainage system. This will prevent surface water ponding within the proposed development site.

4.5 Foul Drainage

A foul sewer network will be constructed to an adoptable standard and will transfer foul flows from the constructed residential units to the existing foul network of Phase 1 and 2 before entering a pumping station to be pumped to the public sewer on the Derry Road.

5.0 Conclusion

Foyle Consulting Engineers have prepared this Flood Risk Assessment to be submitted in support of the Full Planning Application for the proposed development.

In summary:

- The proposed development site consists of 30 residential dwelling housing units with associated site works to include an access road, car parking, footpaths, and landscaping. Separate foul and storm drainage networks will service the development.
- The site is currently an undeveloped Greenfield site, utilised for agriculture purposes. Site Photos from a walk over survey can be found in Appendix A.
- The site identified for the proposed development is located on the southern outskirts of Cois Abhainn, St. Johnston, Co. Donegal.
- The site has a watercourse known as Swilly Burn_030 approximately 130m to the east of the proposed Eastern Boundary, flowing from South to East and converging with the River Foyle.
- The site has an area of approximately 1.50 Hectares.
- A review of the OPW Flood maps indicate the site is not covered by any generated CFRAM Flood Maps. However, the National Indicative Fluvial Mapping indicates minimal fluvial flooding (1:100yr and 1:1000yr) to the proposed site. The River Foyle is covered by Northern Irelands Department for Infrastructure (DFI) Rivers division.
- Post development, the site will have an impermeable area of 0.51ha equating to approximately 33% of the proposed site.
- It is proposed to limit the storm water discharge from the proposed developed site to that of the Greenfield Run-off. Foyle Consulting Engineers calculated a Greenfield run-off rate of 15.0/sec. Causeway Flow Design Report within Appendix F of this report prove that 1 in 100-year storm event will be contained within the proposed storm drainage system that includes a flow control and attenuation storage of approximately 128m³ and therefore is considered to be designed to exceedance.
- The post development storm water discharge rate will be limited by flow control and attenuation to the consented rate. The proposed attenuation measures will be sized up to and including the 100-year rainfall event (plus 10% climate change) and therefore no part of the site floods during a 1 in 100-year return period event. This proposal will be submitted to Donegal County Council for approval. An indicative storm sewer layout for the proposed development is contained within Appendix G of this report.
- As part of the proposed development, separate storm and foul networks will be constructed. The new storm sewer for the proposed development will discharge into the Swilly Burn_030 to the southeast boundary of the site. The proposed storm drainage system will incorporate a Hydro-brake and attenuation storage to limit the proposed site to the greenfield run-off rate to ensure there will be no increase in storm water discharge as a result of the proposed development.
- The Foul sewer for the proposed development will be designed to connect to the existing foul network of Phase 1 and 2 before entering a pumping station to be pumped to the public sewer on the Derry Road.

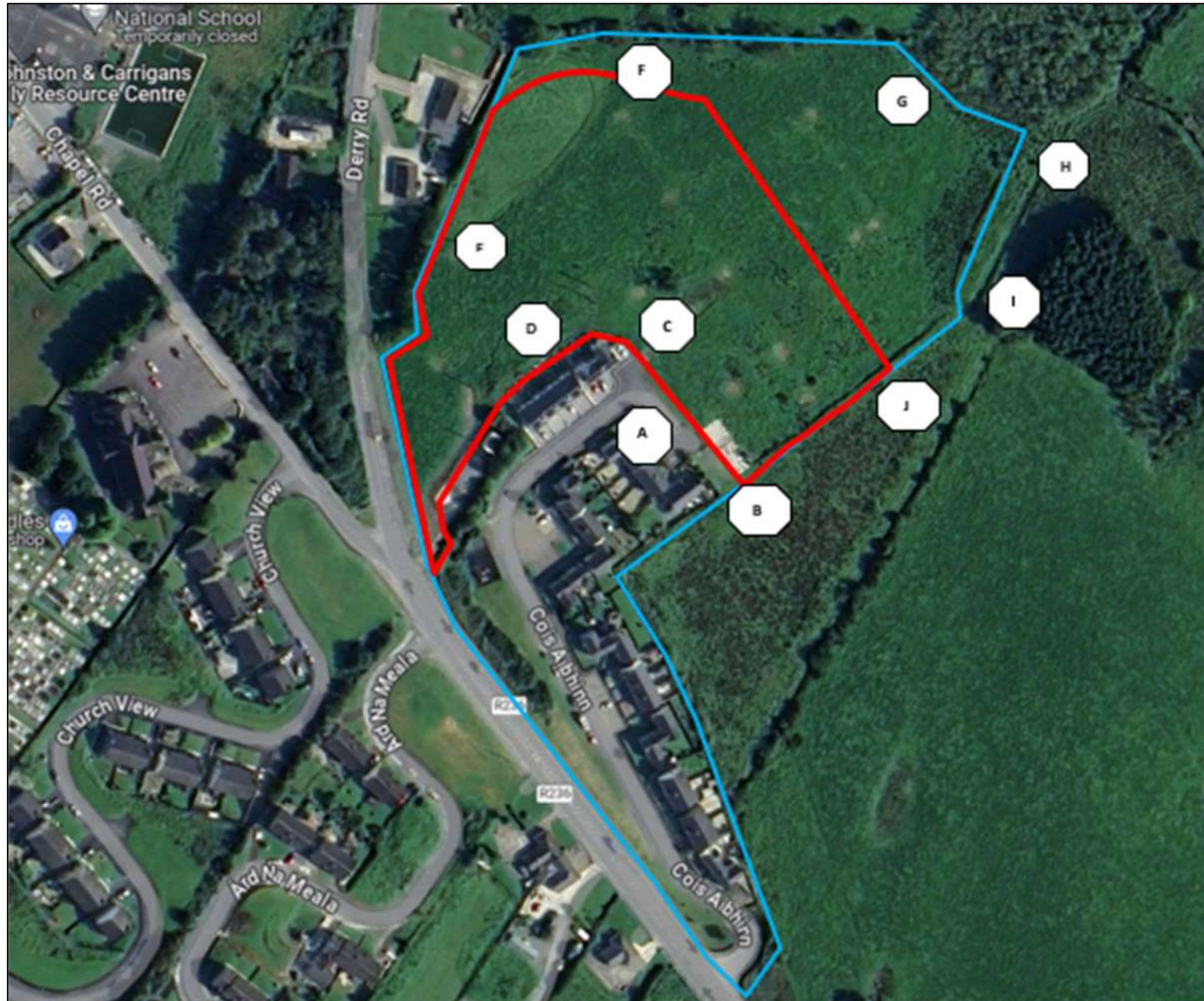
- To safeguard against potential pluvial flood risk to the development or neighbouring sites, final development levels and gradients will be re-profiled as necessary to remove any isolated low-lying areas and/or have appropriate surface water drainage infrastructure installed to remove any standing water. In addition, the finished floor levels of the proposed residential units should be located at least 150mm above adjacent ground levels. In the event that the proposed system becomes surcharged during a storm greater than the 1 in 100yr storm event then the storm water surface flow will be managed to ensure there is no risk of flooding to the proposed properties.
- The preliminary design has therefore shown that an exceedance surface water event can be dealt with without the need to revise the layout of the proposed development.
- Both the foul and storm sewer networks for the proposed development will be designed and constructed to an adoptable standard for Donegal County Council.
- The review of the site-specific flood risks: flooding of watercourses, overland flow from high ground surrounding the site and surcharged storm water systems determined few sources and pathways for flooding to this site and each of these are considered to be minimal risk at present.
- The proposed development will increase the storm water runoff rate. This increased storm water runoff rate has been used for the drainage design for the proposed development to ensure there is no increased risk of flooding on site or off site.
- This development is considered integral to meeting the core objectives for housing as outlined in the Donegal County Development Plan 2018-2024 Table 2A.6: The Core Strategy Table.

As it has been documented within this report there will be no increased flood risk to the proposed development and no adverse impacts to other developments or features of importance to nature conservation, archaeology, or the built heritage and therefore the proposed developed for this site should be considered acceptable.

Appendix A

SITE WALK OVER PHOTOGRAPHS

Site Walk Over – Photo Record



A – Phase 2 Turning Head before Proposed Phase 3



B - Current Watsse Water Pumping Station – To be upgraded as Part of Phase 3



C – Link Road connection Point





D – Phase 2 Northern Boundary adjacent to Proposed Phase 3







E – Proposed Phase 3 Northwest Boundary









F – Landownership North Boundary









G – Landownership Northeast Boundary





H – Landownership East Boundary











I – Landownership Southeast Boundary (Including Storm Discharge Location)









J - Landownership South Boundary











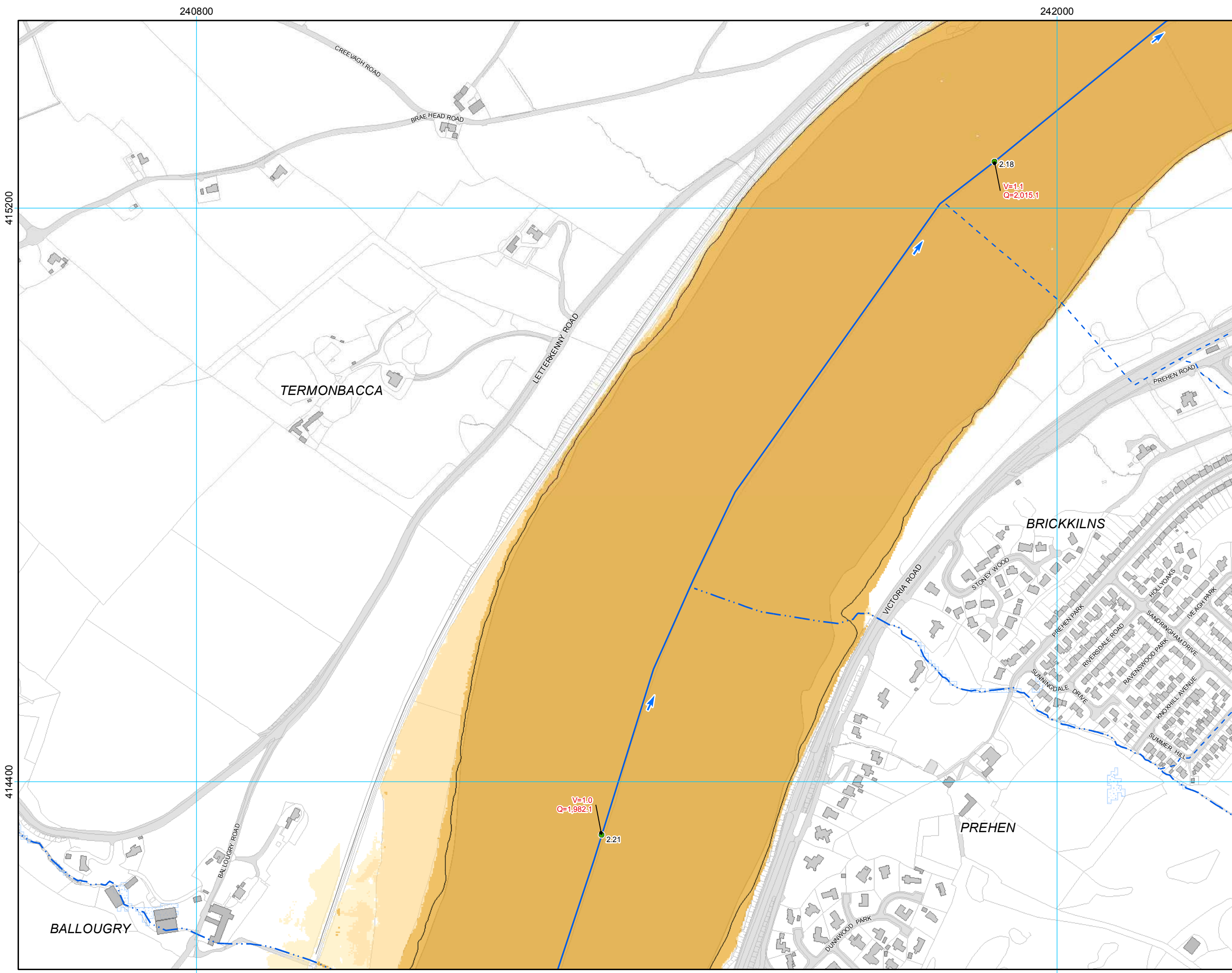
Appendix B

OPW FLOODING INFORMATION

(Not Used)

Appendix C

DFI Rivers Flood Maps



Flood Hazard Depth

Medium Probability

1% chance that a flood of this magnitude or greater will occur in any given year.

Map Type: FLOOD HAZARD
Source: RIVER
Epoch: PRESENT DAY

Scale 1:5,000 when plotted at A3

River Model Status

- Modelled in Detail
- - - Modelled Strategically
- - - - - Unmodelled
- Flow Direction

"Detailed" Hazard Data

- Depth < 0.3m
- Depth 0.3m - 1.0m
- Depth > 1.0m
- 12.23 River Level (m)
- V=1.2 Velocity (m/s)
- Q=3.4 Discharge (m3/s)

Flood Defence Structures

Standard of Protection (SoP)

- SoP < 50 yrs
- 50yrs <= SoP < 75 yrs
- 75yrs <= SoP < 100 yrs
- 100yrs <= SoP
- ✕ Areas protected from river flooding in a 1 in 100 year flood event.

"Indicative" Hazard Data

- **"Indicative" Floodplain (1 in 100yrs)

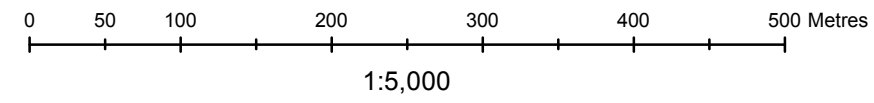
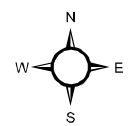
* Estimated using strategic flood models and therefore should only be used to identify general areas prone to flooding and not to determine the hazard to individual properties.

Coordinate System: Irish Grid.
 Coordinates in metres.
 Heights in metres above MSL Belfast.
 Users of this map should refer to the guidance and conditions of use available at the Rivers Agency website.

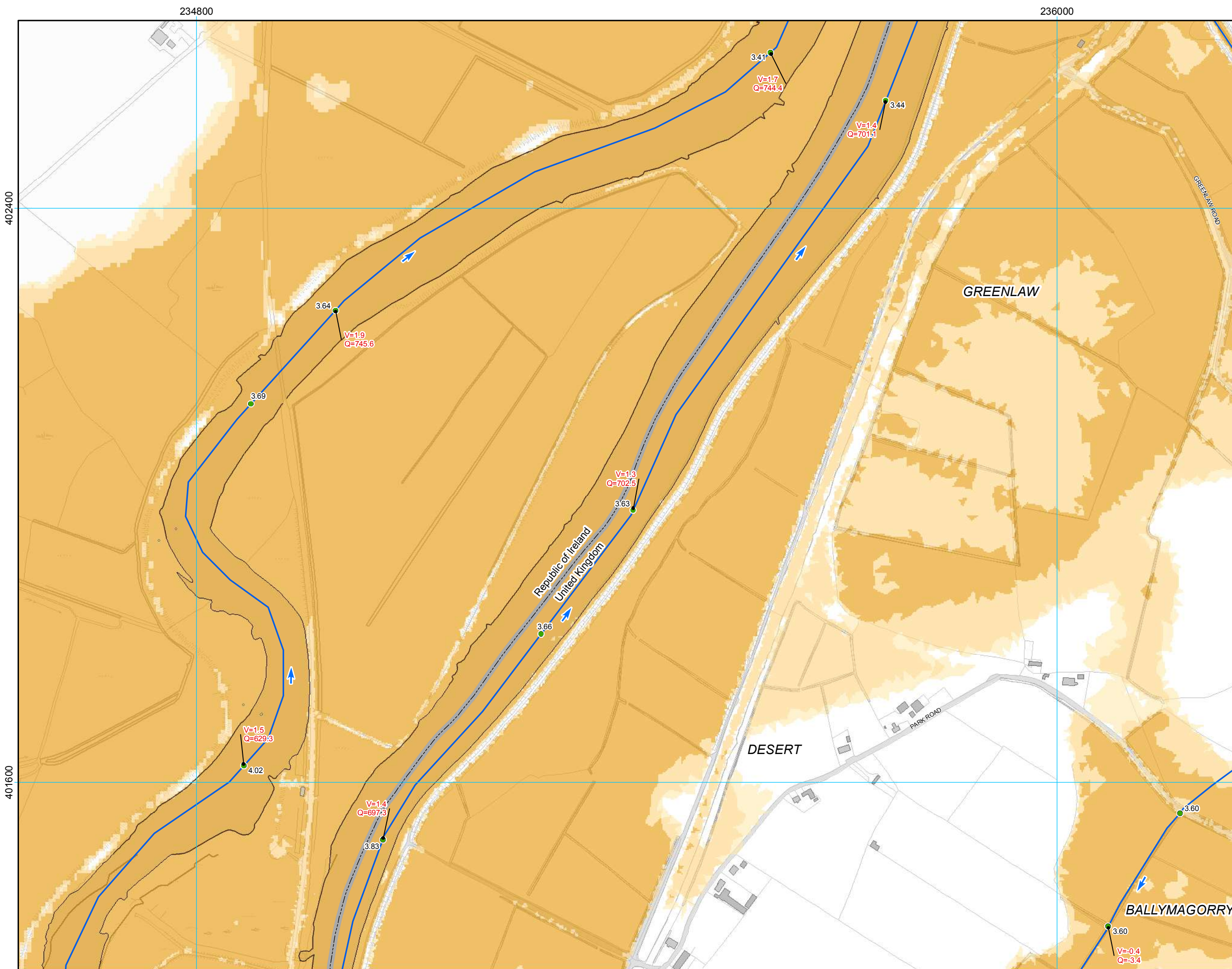


Map Sheet : 03611NW
Drawing Number : FDM_03611NW
Publication Date : 22 May 2014

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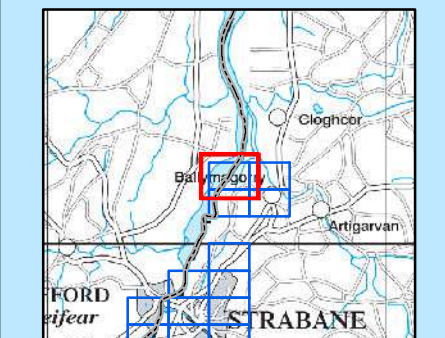
Compiled and published by Dept. of Agriculture & Rural Development, Rivers Agency, Hydebank, 4 Hospital Road, Belfast, Northern Ireland, BT8 8JP.



Flood Hazard Depth

Medium Probability
 1% chance that a flood of this magnitude or greater will occur in any given year.

Map Type: FLOOD HAZARD
Source: RIVER
Epoch: PRESENT DAY



Scale 1:5,000 when plotted at A3

River Model Status

- Modelled in Detail
- - - Modelled Strategically
- - - Unmodelled
- ← Flow Direction

"Detailed" Hazard Data

- Depth <math>< 0.3m</math>
- Depth $0.3m - 1.0m$
- Depth $> 1.0m$
- 12.23 River Level (m)
- $V=1.2$ Velocity (m/s)
- $Q=3.4$ Discharge (m³/s)

Flood Defence Structures
 Standard of Protection (SoP)

- SoP <math>< 50</math> yrs
- $50</math> yrs \leq SoP <math>< 75</math> yrs$
- $75</math> yrs \leq SoP <math>< 100</math> yrs$
- $100</math> yrs \leq SoP$
- ⊗ Areas protected from river flooding in a 1 in 100 year flood event.

"Indicative" Hazard Data

- ⊗ "Indicative" Floodplain (1 in 100yrs)

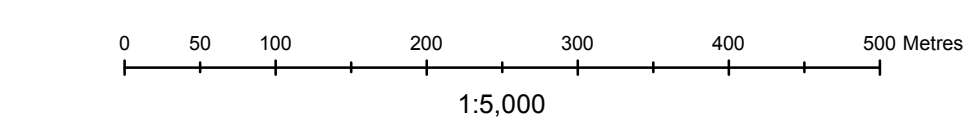
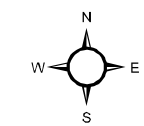
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Coordinate System: Irish Grid.
 Coordinates in metres.
 Heights in metres above MSL Belfast.
 Users of this map should refer to the guidance and conditions of use available at the Rivers Agency website.



Map Sheet : 05912NE
Drawing Number : FDM_05912NE
Publication Date : 27 May 2014

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 Compiled and published by Dept. of Agriculture & Rural Development, Rivers Agency, Hydebank, 4 Hospital Road, Belfast, Northern Ireland, BT8 8JP.

240800

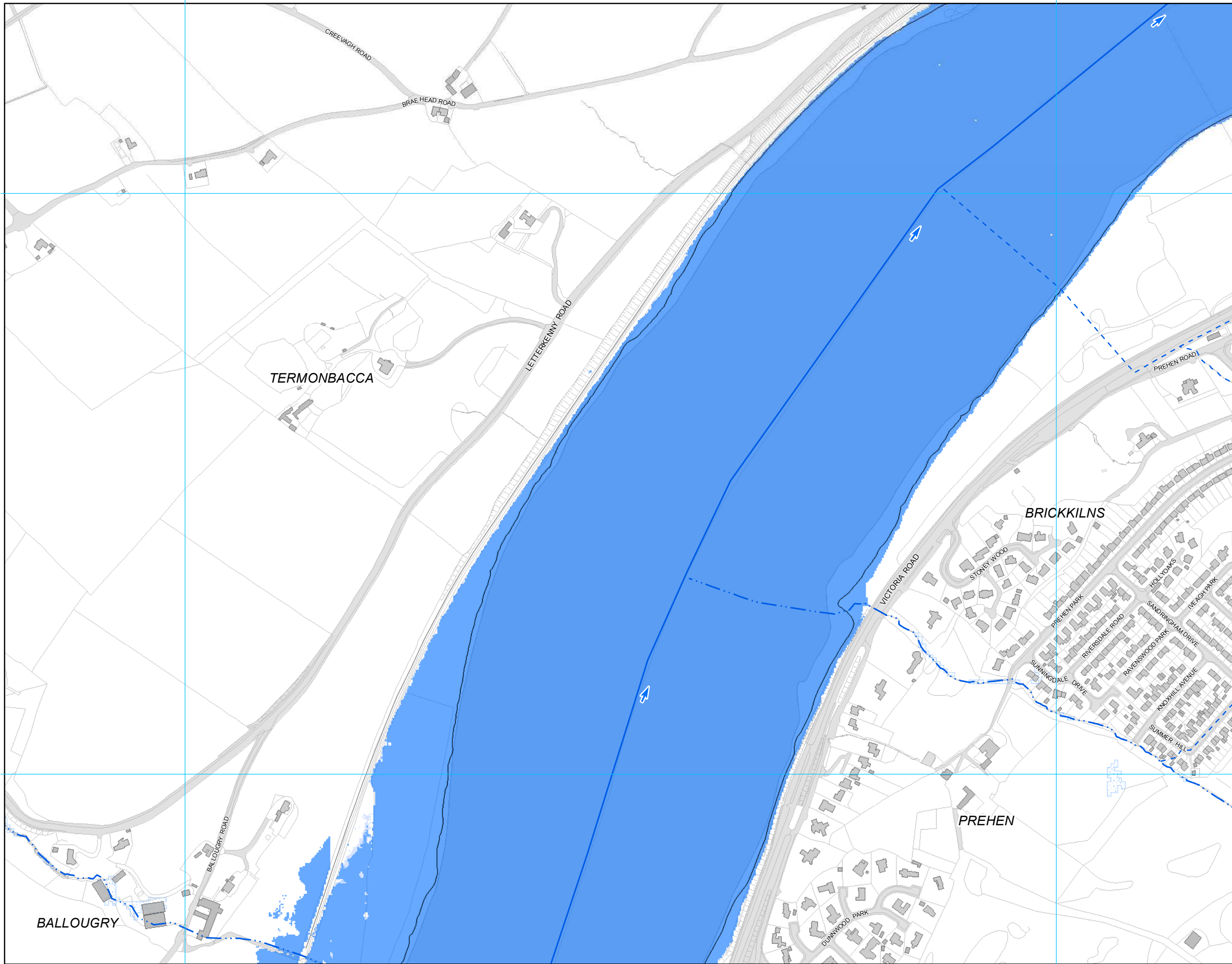
242000

415200

415200

414400

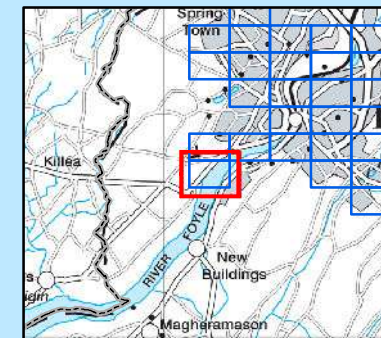
414400



Flood Hazard Extent

All Probabilities

Map Type: FLOOD HAZARD
 Source: RIVER
 Epoch: PRESENT DAY



Scale 1:5,000 when plotted at A3

River Model Status

- Modelled in Detail
- Modelled Strategically
- Unmodelled
- Flow Direction

"Detailed" Hazard Data

- 10% AEP Flood Extent (1 in 10 or greater chance in any given year)
- 1% AEP Flood Extent (1 in 100 or greater chance in any given year)
- 0.1% AEP Flood Extent (1 in 1000 or greater chance in any given year)

Flood Defence Structures

- Standard of Protection (SoP)
- SoP < 50 yrs
 - 50yrs <= SoP < 75 yrs
 - 75yrs <= SoP < 100 yrs
 - 100yrs <= SoP

"Indicative" Hazard Data

- **"Indicative" Floodplain (1 in 100yrs)

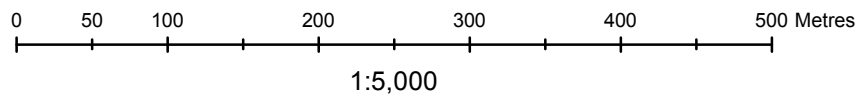
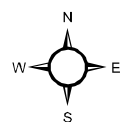
* Estimated using strategic flood models. Should be used only to identify general areas prone to flooding and not to determine the hazard to individual properties.

Coordinate System: Irish Grid.
 Coordinates in metres.
 Heights in metres above MSL Belfast.
 Users of this map should refer to the guidance and conditions of use available at the Rivers Agency website.



Map Sheet : 03611NW
 Drawing Number : FEA_03611NW
 Publication Date: 28 May 2014

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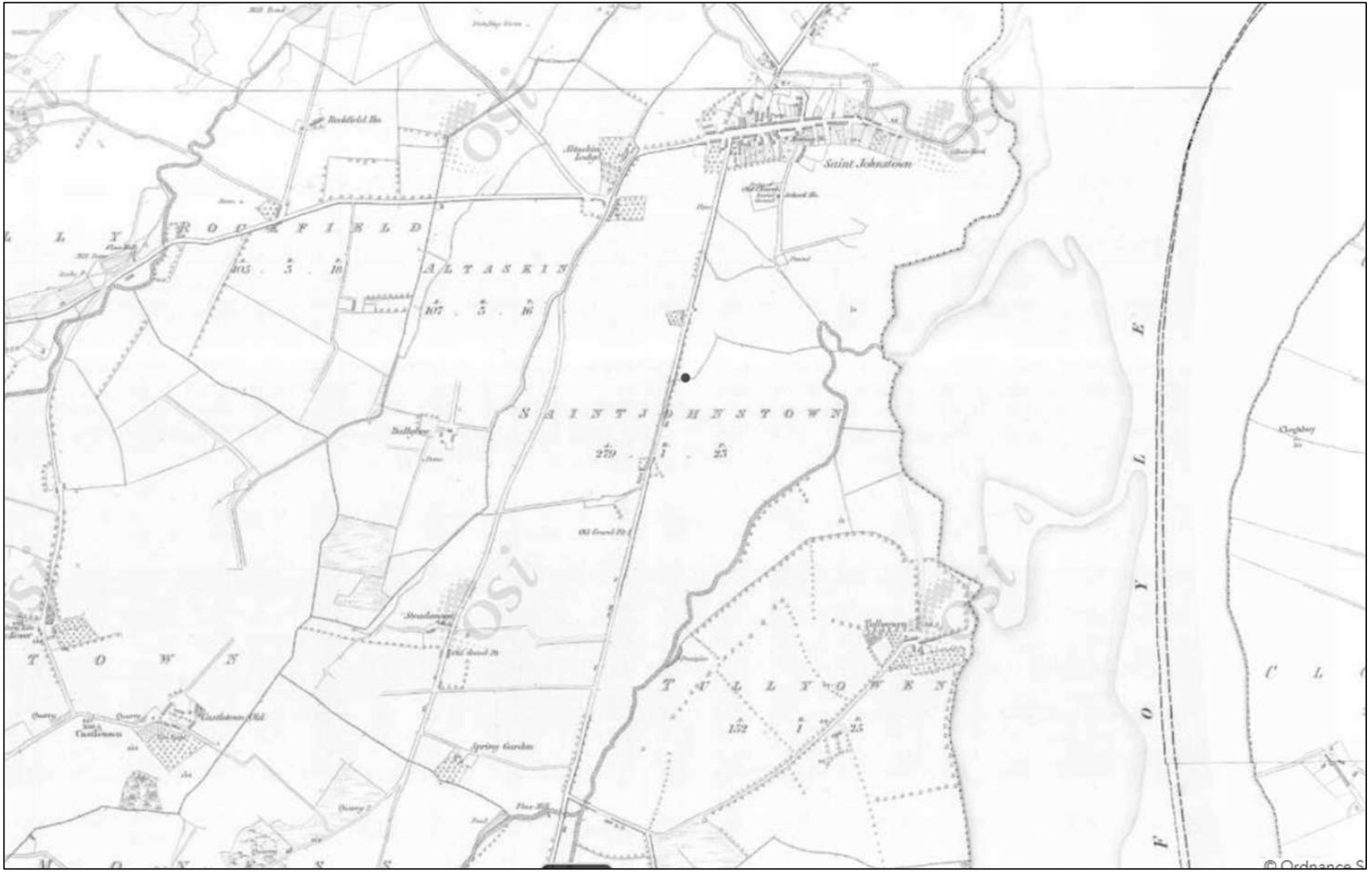
Compiled and published by Dept. of Agriculture & Rural Development, Rivers Agency, Hydebank, 4 Hospital Road, Belfast, Northern Ireland, BT8 8JP.

Appendix D

OSI 6 INCH MAP & OSI 25 INCH MAP



Irish Townland and Historical Map - MapGenie 25 Inch – ITM



Irish Townland and Historical Map -MapGenie 6 Inch First Edition Black

Appendix E

DONEGAL DEVELOPMENT PLAN 2018-2024



**Draft County Donegal
Development Plan
2018 - 2024**

**Dréacht Plean Forbartha
Contae Dhún na nGall
2018 - 2024**

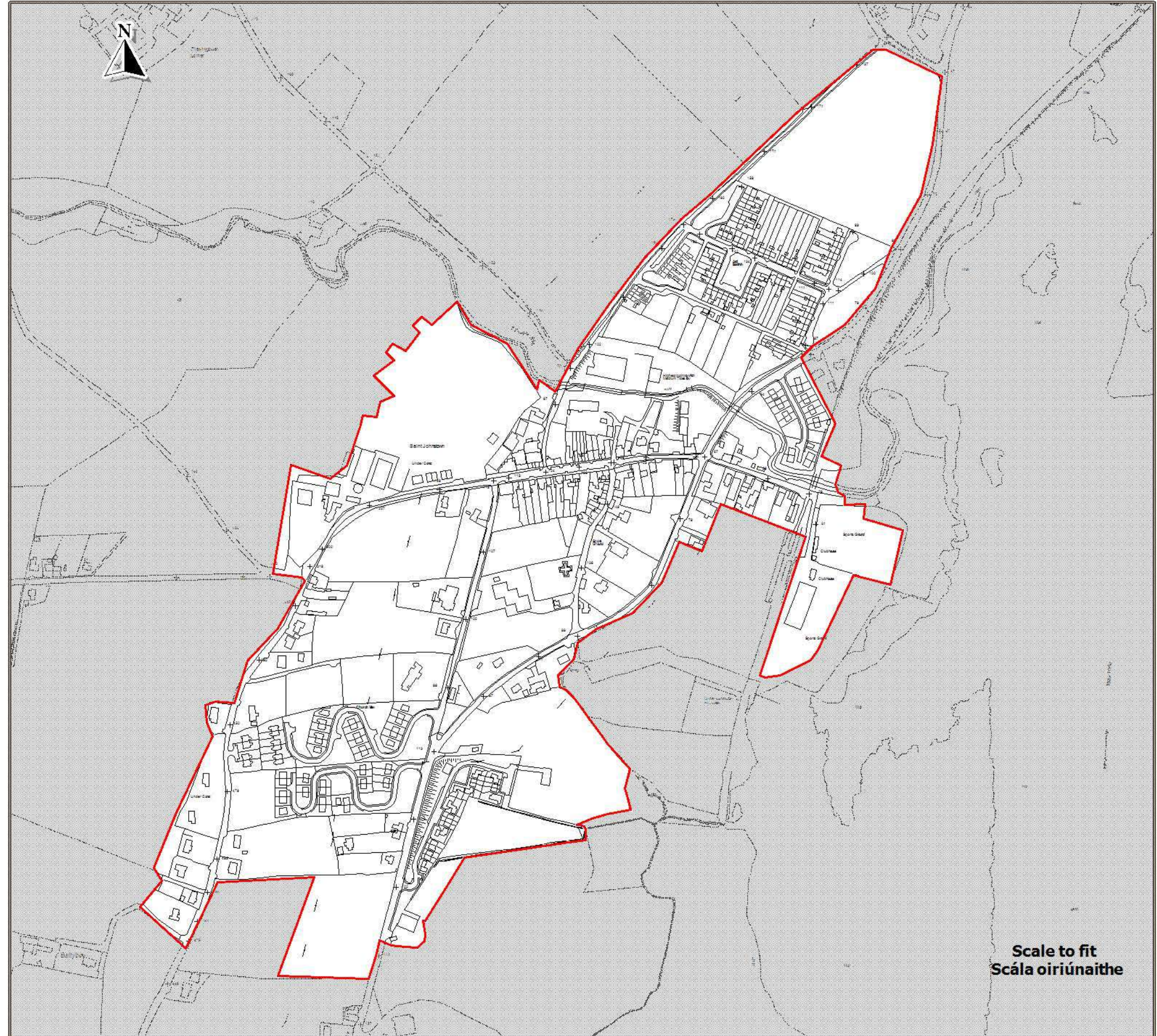
**Layer 3 - Map 15.59
Sraith 3 - Léarscáil 15.59**

**St. Johnston
Baile Suingean**

**Settlement Framework
Creatlach Lonnaíochta**



Settlement Boundary
Teorainn Lonnaíochta



**Scale to fit
Scála oiriúnaithe**

Source - Donegal County Council
Foinse - Comhairle Chontae Dhún na nGall

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Sonraí de chuid Shuirbhéireacht Ordnáis Éireann ama atáirgeadh faoi Uimhir Cheadúnais SOÉ 2018/02/CCMA Comhairle Contae Dhún na nGall. Má dhéantar é seo a atáirgeadh gan údarás, sáróidh sé cóipcheart Shuirbhéireacht Ordnáis Éireann agus Rialtas na hÉireann. Shuirbhéireacht Ordnáis Éireann, 2018. Comhairle Contae Dhún na nGall, 2018.

To be read in conjunction with relevant accompanying text contained in the front section of this appendix as well as other relevant objectives & policies of the CDP.
Le Léamh i gcomhar leis an téacs ábhartha tionlacain atá chun tosaigh sa chuid seo den aguisín chomh maith le cuspóirí agus beartaís ábhartha eile sa PFC.

Appendix F

CAUSEWAY FLOW DESIGN REPORT

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	40.625	0.600	6.800	6.000	0.800	50.8	150	5.48	50.0
1.001	S2	S4	35.289	0.600	6.000	5.500	0.500	70.6	225	5.86	50.0
2.000	S3	S4	34.319	0.600	4.400	4.114	0.286	120.0	300	5.40	50.0
1.002	S4	S6	66.523	0.600	4.114	3.470	0.644	103.3	900	6.22	49.0
4.001	S5	S6	16.415	0.600	3.630	3.470	0.160	102.6	900	5.09	50.0
1.005	S6	S7	46.426	0.600	3.470	3.000	0.470	98.8	900	6.46	48.2
1.006	S7	S8	56.958	0.600	3.000	1.200	1.800	31.6	300	6.80	47.2
1.005_1	S8	Headwall	5.367	0.600	1.200	1.150	0.050	107.3	300	6.86	47.0

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	634408.800	909444.300	8.200	1.400	1200		0	1.000	150
S2	634448.200	909434.400	7.450	1.450	1200		1	1.000	150
S3	634515.700	909417.400	5.600	1.200	1500		0	1.001	225
S4	634482.400	909425.700	7.000	2.886	2100		1	2.000	300
S5	634450.200	909365.200	5.730	2.100	2100		2	1.001	225
S6	634466.120	909361.200	5.570	2.100	2100		0	1.002	900
S7	634511.150	909349.900	5.350	2.350	2700		1	4.001	900
S8	634537.300	909299.300	2.300	1.100	1200		0	1.005	900
Headwall	634539.700	909294.500	2.200	1.050	1200		1	1.006	300
							0	1.006	300
							1	1.005_1	300
							1	1.005_1	300

Results for 2 year +10% CC +10% A Critical Storm Duration. Lowest mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	S1	10	6.898	0.098	19.4	0.2796	0.0000	OK
15 minute winter	S2	11	6.129	0.129	37.5	0.3525	0.0000	OK
15 minute winter	S3	10	4.483	0.083	17.6	0.2992	0.0000	OK
15 minute winter	S4	11	4.226	0.112	66.8	0.4525	0.0000	OK
60 minute winter	S5	45	3.834	0.204	21.5	0.7444	0.0000	OK
60 minute winter	S6	49	3.825	0.355	52.9	1.6017	0.0000	OK
60 minute winter	S7	47	3.846	0.846	53.8	4.8451	0.0000	SURCHARGED
15 minute summer	S8	11	1.284	0.084	15.0	0.0949	0.0000	OK
240 minute summer	Headwall	124	1.225	0.075	15.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	S1	1.000	S2	19.0	1.331	0.760	0.5741	
15 minute winter	S2	1.001	S4	36.8	1.600	0.594	0.8115	
15 minute winter	S3	2.000	S4	17.3	0.876	0.170	0.6794	
15 minute winter	S4	1.002	S6	67.3	1.385	0.034	6.1701	
60 minute winter	S5	4.001	S6	-20.0	-0.240	-0.010	2.7753	
60 minute winter	S6	1.005	S7	53.8	0.743	0.027	19.5237	
60 minute winter	S7	StormBrake™	S8	15.0				
15 minute summer	S8	1.005_1	Headwall	15.0	1.005	0.140	0.0802	36.9

Results for 30 year +10% CC +10% A Critical Storm Duration. Lowest mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	S1	12	7.429	0.629	35.7	1.7984	0.0000	SURCHARGED
15 minute winter	S2	11	6.194	0.194	60.8	0.5290	0.0000	OK
15 minute winter	S3	10	4.518	0.118	32.5	0.4254	0.0000	OK
60 minute winter	S4	59	4.465	0.351	69.5	1.4191	0.0000	OK
60 minute winter	S5	58	4.478	0.848	20.5	3.0951	0.0000	OK
60 minute winter	S6	58	4.472	1.002	106.5	4.5216	0.0000	SURCHARGED
60 minute winter	S7	52	4.478	1.478	83.5	8.4647	0.0000	SURCHARGED
30 minute summer	S8	15	1.284	0.084	15.0	0.0949	0.0000	OK
120 minute winter	Headwall	48	1.225	0.075	15.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	S1	1.000	S2	29.1	1.655	1.166	0.7152	
15 minute winter	S2	1.001	S4	60.7	1.734	0.979	1.3032	
15 minute winter	S3	2.000	S4	31.9	1.080	0.315	1.0150	
60 minute winter	S4	1.002	S6	69.3	1.192	0.035	28.6904	
60 minute winter	S5	4.001	S6	22.7	-0.176	0.012	10.2837	
60 minute winter	S6	1.005	S7	83.5	0.823	0.042	29.4236	
60 minute winter	S7	StormBrake™	S8	15.0				
30 minute summer	S8	1.005_1	Headwall	15.0	1.005	0.140	0.0802	92.4

Results for 100 year +10% CC +10% A Critical Storm Duration. Lowest mass balance: 99.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	S1	12	8.128	1.328	46.4	3.7989	0.0000	FLOOD RISK
15 minute winter	S2	11	6.460	0.460	74.3	1.2536	0.0000	SURCHARGED
120 minute winter	S3	96	5.343	0.943	14.6	3.3948	0.0000	FLOOD RISK
120 minute winter	S4	100	5.334	1.220	57.1	4.9335	0.0000	SURCHARGED
120 minute winter	S5	96	5.342	1.712	18.5	6.2512	0.0000	SURCHARGED
120 minute winter	S6	96	5.341	1.871	84.8	8.4398	0.0000	FLOOD RISK
120 minute winter	S7	96	5.346	2.346	46.7	13.4314	0.0000	FLOOD RISK
120 minute winter	S8	98	1.287	0.087	15.9	0.0981	0.0000	OK
120 minute winter	Headwall	98	1.227	0.077	15.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	S1	1.000	S2	34.4	1.953	1.375	0.7152	
15 minute winter	S2	1.001	S4	71.5	1.797	1.153	1.3828	
120 minute winter	S3	2.000	S4	14.6	0.829	0.144	2.4167	
120 minute winter	S4	1.002	S6	57.1	1.060	0.029	42.1605	
120 minute winter	S5	4.001	S6	20.0	0.095	0.010	10.4034	
120 minute winter	S6	1.005	S7	46.7	0.743	0.023	29.4236	
120 minute winter	S7	StormBrake™	S8	15.9				
120 minute winter	S8	1.005_1	Headwall	15.9	1.020	0.148	0.0838	214.5

Appendix G

DRAINAGE DRAWINGS

DO NOT SCALE: ALL DIMENSIONS TO BE VERIFIED BY THE CONTRACTOR. ANY OMISSIONS OR ERRORS SHOULD BE REPORTED TO THE ENGINEER.

Legend

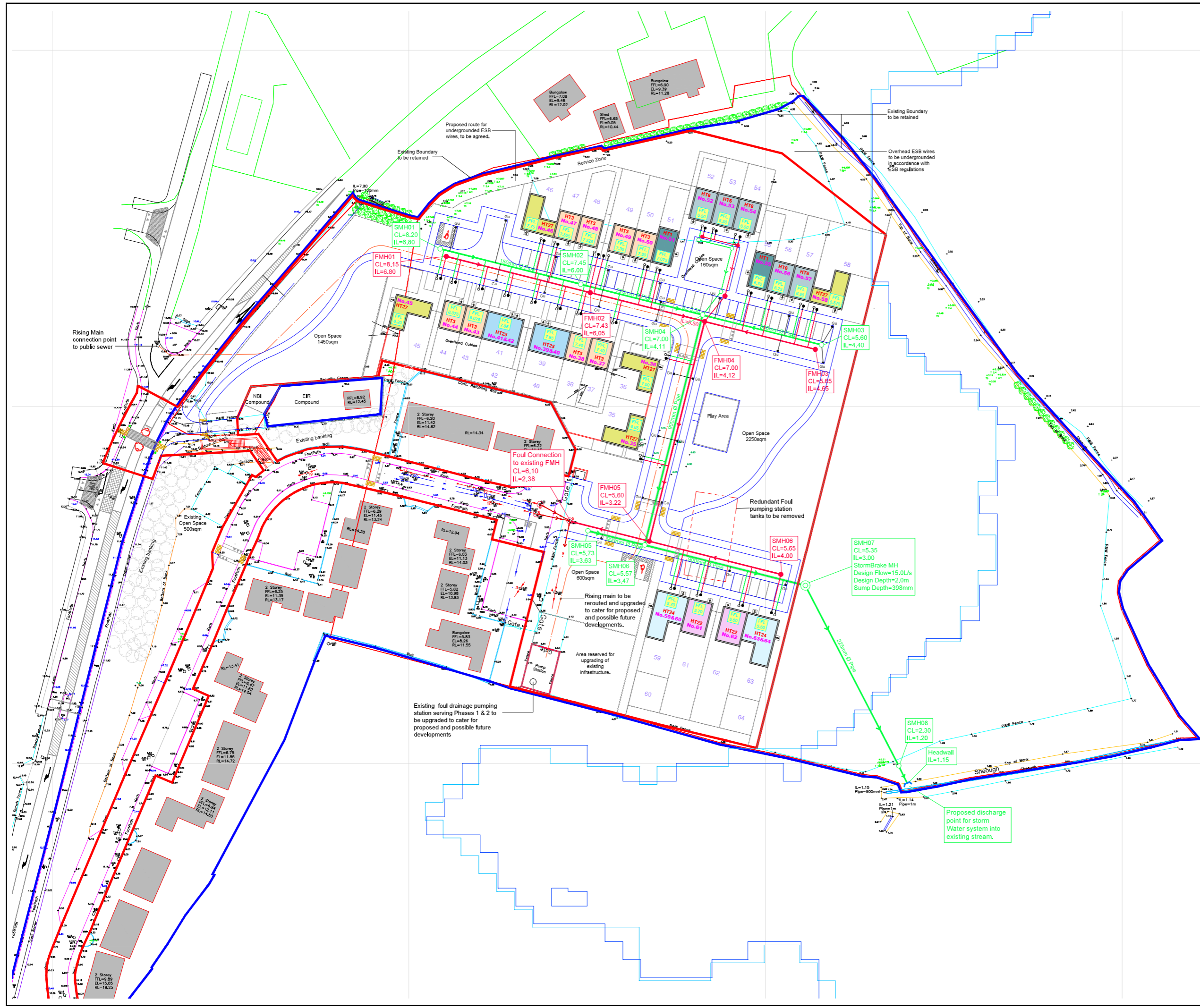
- Foul Sewer & MH - uPVC Pipe
- Storm Sewer & MH
- Storm Attenuation Pipe
- Existing Foul Sewer & MH
- Foul Lateral Pipes & IC 150mm @ 1:40 Fall
- Storm Lateral Pipes & IC 150mm @ 1:100 Fall
- Road Gully
- StormBrake Manhole Design Flow = 15.0L/s
Design Depth = 2.0m
Ref: FPM-SB1-02000-01500-1100
Sump Depth = Min. 398mm
Stormbrake MH by FP McCann or similar approved

Note:
The foul sewer shall comply with Section 3.13 of Wastewater code of Practice for pipe materials.
Separation distances from other services shall comply with drawing STD-WW-05 of Wastewater Standard Details.

Note:
The foul sewer shall comply with Section 3.8 of Wastewater Code of Practice, for 20 properties or less, a 150mm Ø gravity sewer pipe should be installed. A minimum 225mm Ø for 20 properties or more.

Note:
All drainage to comply with Wastewater Code of Practice & Wastewater Standard Details.

Note:
This drawing to be read in conjunction with current Architects layouts and details.



REV	DESCRIPTION	BY	CHK	APP	DATE

Donegal County Council

FOYLE CONSULTING ENGINEERS
HARBOUR OFFICE, PORT ROAD
LISAHALLY
L'DERRY, BT47 6FL

TEL: +44 (0)28 71865757
FAX: +44 (0)28 71861656
e-mail: admin@foylece.com

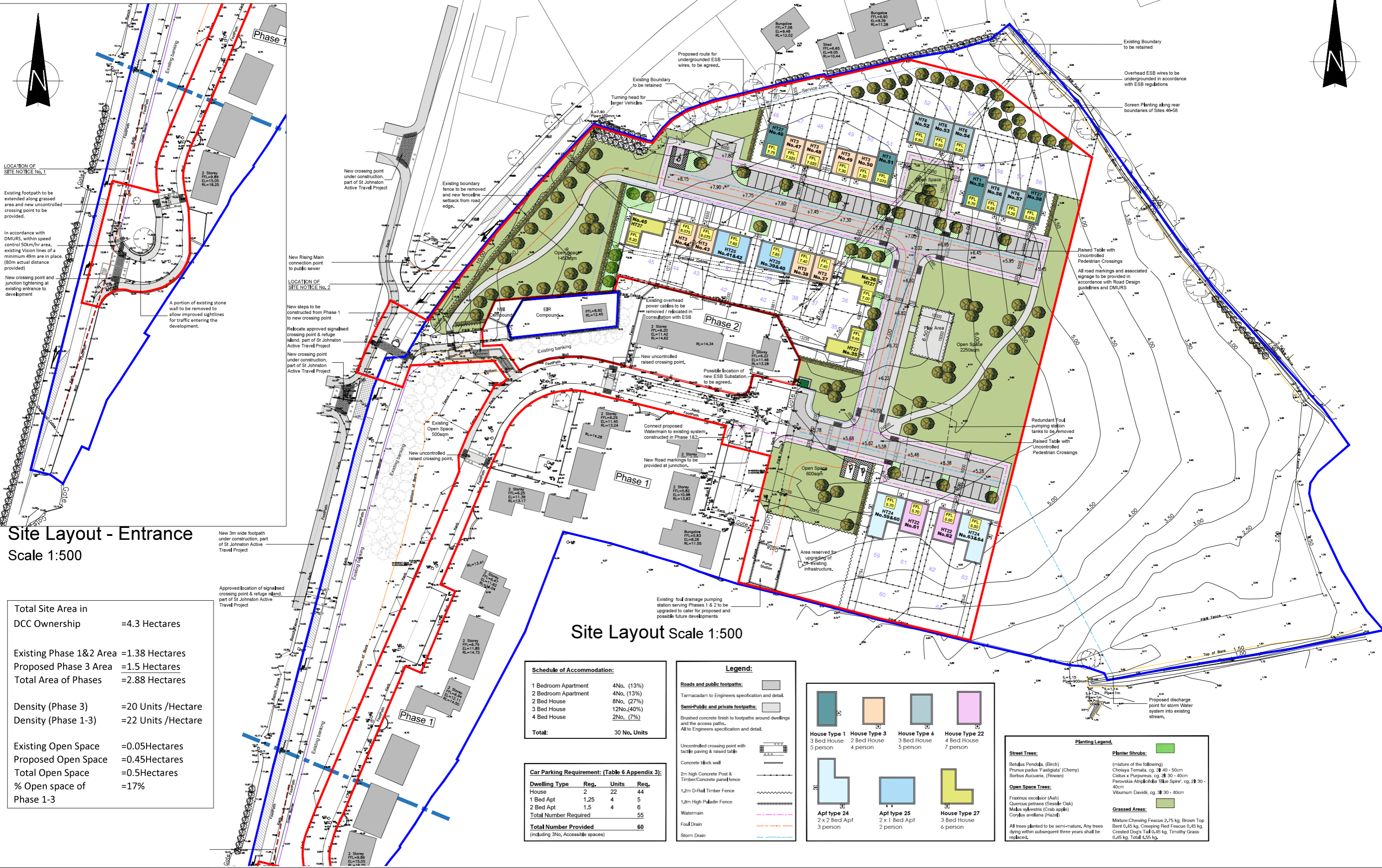
Project:
Housing Development at St. Johnston
Phase 3
Co. Donegal

Drawing Title:
Drainage Layout

Scale @	Drawn	Date	Checked	Date
1:500	GMP	Jan 24	BML	Jan 24
Project No.	F2680	Drawing No.	01	Revision

Appendix H

PROPOSED SITE LAYOUT



Site Layout - Entrance
Scale 1:500

Total Site Area in DCC Ownership	=4.3 Hectares
Existing Phase 1&2 Area	=1.38 Hectares
Proposed Phase 3 Area	=1.5 Hectares
Total Area of Phases	=2.88 Hectares
Density (Phase 3)	=20 Units /Hectare
Density (Phase 1-3)	=22 Units /Hectare
Existing Open Space	=0.05Hectares
Proposed Open Space	=0.45Hectares
Total Open Space	=0.5Hectares
% Open space of Phase 1-3	=17%

Schedule of Accommodation:

1 Bedroom Apartment	4No. (13%)
2 Bedroom Apartment	4No. (13%)
2 Bed House	8No. (27%)
3 Bed House	12No.(40%)
4 Bed House	2No. (7%)
Total:	30 No. Units

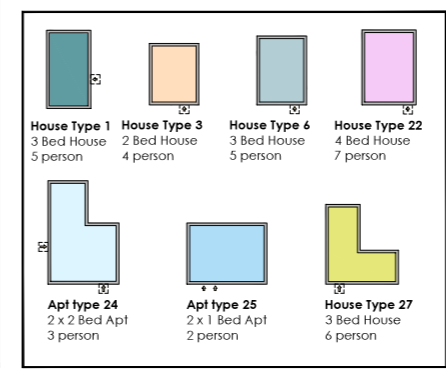
Car Parking Requirement: (Table 6 Appendix 3):

Dwelling Type	Req.	Units	Req.
House	2	22	44
1 Bed Apt	1.25	4	5
2 Bed Apt	1.5	4	6
Total Number Required			55
Total Number Provided			60

(including 3No. Accessible spaces)

Legend:

- Roads and public footpaths: Tarmac/adam to Engineers specification and detail.
- Semi-public and private footpaths: Brushed concrete finish to footpaths around dwellings and the access paths. All to Engineers specification and detail.
- Uncontrolled crossing point with tactile paving & raised table
- Concrete block wall
- 2m high Concrete Post & Timber/Concrete panel fence
- 1.2m D-Rail Timber Fence
- 1.8m High Palladin Fence
- Watermain
- Foul Drain
- Storm Drain



Planting Legend:

Street Trees: Betulus Pendula, (Birch), Prunus padus 'Fastigata' (Cherry), Sorbus Aucuparia, (Rowan)

Open Space Trees: Fraxinus excelsior (Ash), Quercus petraea (Sessile Oak), Malus sylvestris (Crab apple), Cornus avellana (Hazel)

Planter Shrubs: (mixture of the following) Choisya Terranta, c.g. 20 - 50cm; Cistus x Purpureus, c.g. 20 - 40cm; Perovskia Atropurpurea 'Blue Spire', c.g. 20 - 40cm; Viburnum Davidii, c.g. 30 - 40cm

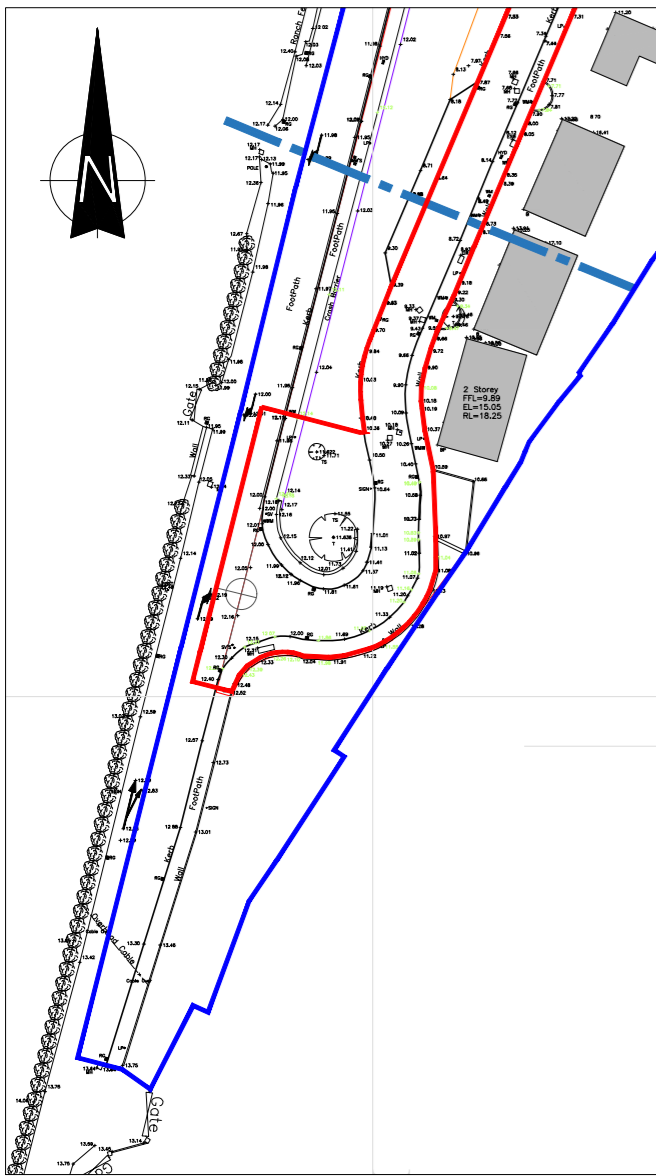
Grassed Areas: Mixture: Cheving Fescue 2,75 kg, Brown Top Bent 0,45 kg, Creeping Red Fescue 0,45 kg, Crested Dog's Tail 0,45 kg, Timothy Grass 0,45 kg. Total 4,55 kg.

REVISION	DATE	DESCRIPTION	BY
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-	-	-	-
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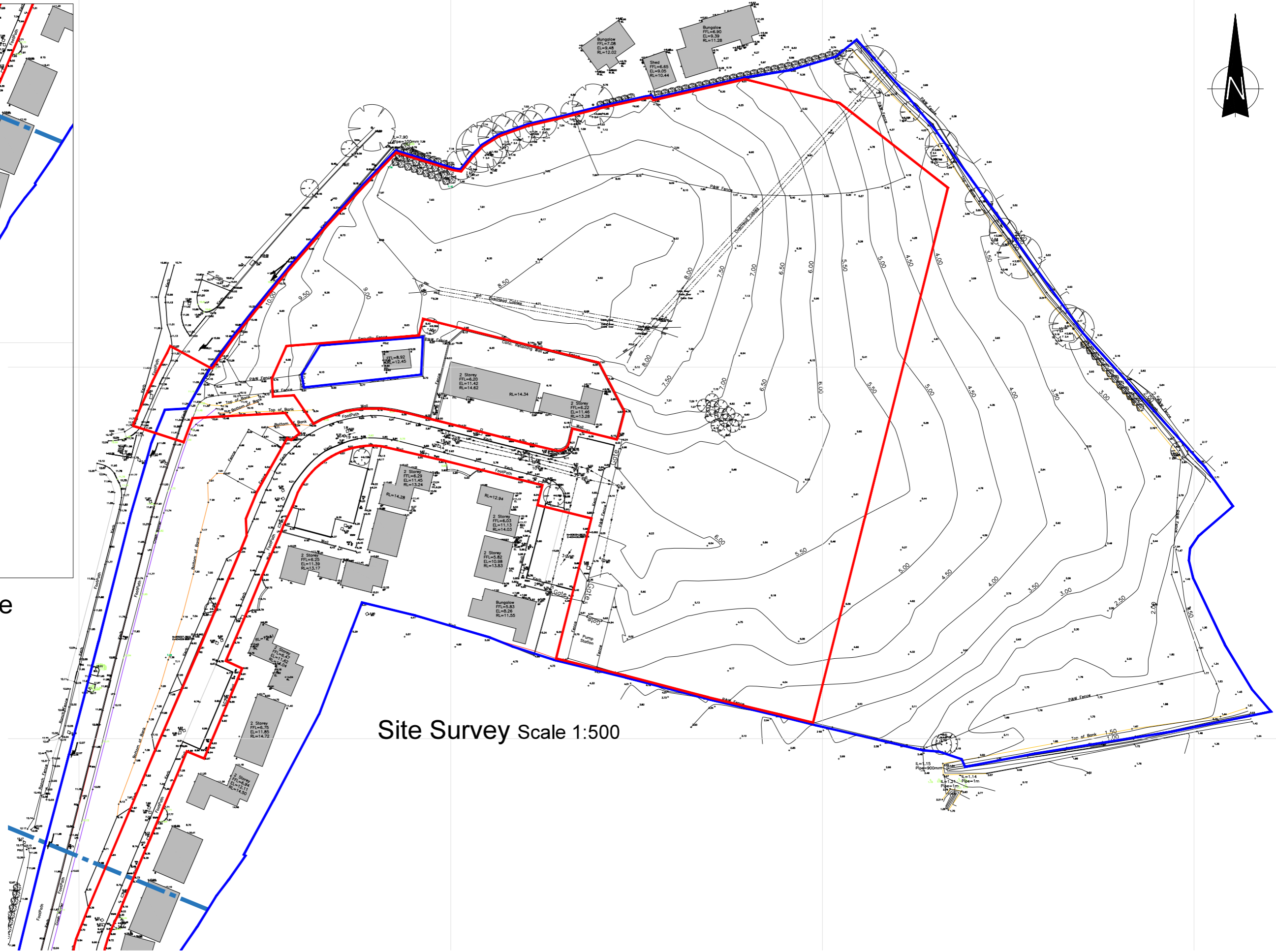
Do not scale this drawing. All dimensions in millimetres. Written dimensions to be checked on site. Electronic issue to be confirmed by paper copy only.

Appendix I

TOPOGRAPHICAL SURVEY



Site Survey - Entrance
Scale 1:500



Site Survey Scale 1:500

NOTES

REVISION	DATE	DESCRIPTION	BY
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REVISION	DATE	DESCRIPTION	BY
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DRAWING Site Survey.			
SCALE 1:500	DRAWN NMG	CHECKED CB	DATE Jan,24
PROJECT NO. HCS 0319	DRAWING NO. PL-002	REVISION -	

PROJECT NAME & LOCATION Cois Abhainn (Phase 3), St. Johnston, Co. Donegal	
DRAWING STATUS Part 8 Planning App.	

Do not scale this drawing. All dimensions in millimetres. Written dimensions to be checked on site.