

Project

Residential Development at Newcastle South, Phase 1, Co. Dublin

Report Title

Site Specific Flood Risk Assessment

Client

Cairn Homes Properties Ltd.

INFRASTRUCTURE



DBFL CONSULTING ENGINEERS

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Author: Noel Gorman

Approved by: Dan Reilly

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Client
Architect
Planning Consultant
File

DBFL Consulting Engineers
Ormond House
Upper Ormond Quay
Dublin 7

Tel 01 4004000

Fax 01 4004050

Email info@dbfl.ie

Web www.dbfl.ie

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1.0 INTRODUCTION

1.1 Background

DBFL Consulting Engineers were commissioned by the applicant to prepare a Site-Specific Flood Risk Assessment (SSFRA) for a proposed residential development at Newcastle South and Ballynakelly, Co. Dublin.

1.2 Objectives

The objectives of this report are to inform the planning authority regarding flood risk for the potential development of the lands. The report will assess the site and development proposals in accordance the requirements of “*The Planning System and Flood Risk Management Guidelines for Planning Authorities*”.

The report will provide the following;

- The site’s flood zone category.
- Information to allow an informed decision of the planning application in the context of flood risk.
- Appropriate flood risk mitigation and management measures for any residual flood risk

1.3 Flood Risk Assessment Scope

This SSFRA relates only to the application site. This report uses information obtained from various sources, together with an assessment of flood risk for the existing land and proposed development. The report follows the requirements of ‘*The Planning System & Flood Risk Management – Guidelines for Planning Authorities*’, (referred to as the *Guidelines* for the remainder of this report).

1.4 Approach

Chapter 2 of this report considers ‘*The Planning System & Flood Risk Management – Guidelines for Planning Authorities*’ as they relate to the proposed application.

Flood risk identification is presented in Chapter 3 and initial flood risk assessment in Chapter 4. A more detailed assessment of specific flood risk and residual risk relating to the proposed development is presented in Chapter 5.

Conclusions and recommendations are presented in Chapter 6.

1.5 Existing Site

The subject site, of approximately 16 hectares (39.5 acres), is located to the south of the R120/Main Street at Newcastle Village. The site is bounded by residential developments of different densities to the east and north and bounded by greenfield

and single dwellings to the south and west. The St Finian's National School and Church is located to the north of the site.

The development lands form part of the South Dublin County Development Plan (2016-2022). The Main Development is zoned 'to provide for new residential communities in accordance with approved planning schemes' (RES-N) and 'to preserve and provide for open space and recreational amenities' (OS). The Balinnakelly Site is zoned RES-N. The two smaller developments to the south-east of the Main Development are zoned 'to protect and/or improve residential amenity' (RES).

The Main Development Site and the Balinnakelly Site are predominantly greenfield while some earthworks and site development works have been undertaken on the eastern area associated with the previously approved development. Existing boundaries within the site are predominantly hedgerows and fencing with some drainage ditches. The Balinnakelly Rise infill site is predominantly greenfield, while the Balinnakelly Edge infill site encloses an existing building intended for a change of use.



Figure 1.1 – Site Location.

The overall topography of the Site falls from south to north toward Newcastle Village as shown in Figure 1.2. A topographical survey of the Site is provided as a background to the road layout drawings 170024-2001 and 2002.



Figure 1.2 – Site Topography.

The subject site is within the Shinkeen Stream catchment, which is a tributary of the River Liffey. The River Liffey is approximately 2.2km to the northwest of the subject site. The coast is approximately 20km to the east of the site.

1.6 Proposed Development

The application site comprises of a main development site of approximately 15 hectares, to the south of Main Street, together with three infill sites which comprise of a 0.80ha site at Ballynakelly; a 0.18ha site at Ballynakelly Rise and a 0.05ha site at Ballynakelly Edge.

The proposed development comprises of 406 no. dwellings comprising 8 no. one-bed apartments; 20 no. two-bed apartments; 1 no. three-bed apartments; 48 no. two-bed apartments with 48 no. three bed duplex units above; 21 no. two-bed houses; 208 no. three-bed houses; and 52 no. four-bed houses.

In addition, the proposed development provides a childcare facility (518sqm) with capacity for in the order of 110 no. children to serve the needs of the proposed development and the wider community. The proposals also include 1 no. retail units

(total gross floor area 67.7sqm) at ground floor level within the Ballynakelly apartment block.

The proposed development also provides for the first phase of a new east-west link street, a continuation of Newcastle Boulevard, and a new north-south greenway linking the Main Street to the new public park. The proposed development facilitates a number of future potential pedestrian, cycle and vehicular links to existing and proposed adjoining developments. Access to the proposed development is via a new north-south link street, with a new entrance onto Main Street, and via the existing road network from Newcastle Boulevard to the east.

A primary school site (approximately 1.5ha) has been reserved at the south-east of the application site in accordance with the Newcastle LAP 2012. A new public park is proposed (approximately 2ha) together with a range of pocket parks and greenways to serve the proposed development and the wider Newcastle community.

The proposed development provides all associated and ancillary infrastructure, landscaping, boundary treatments and development works on a total site of approximately 16 hectares. The proposed development also provides for a temporary, single storey marketing suite and associated signage (including hoarding) during the construction phase of development only.

2.0 Planning System & Flood Risk Management Guidelines

2.1 General

“The Planning System and Flood Risk Management Guidelines for Planning Authorities”, November 2009 and its Technical Appendices outline the requirements for a site specific flood risk assessment.

Residential development is classified as “highly vulnerable development” according to Table 3.1 of the Guidelines. Table 3.2 of the Guidelines indicates that the Sequential Approach mechanism requires this type of development to be in Flood zone C i.e. outside the 1000 year flood extents. (It may also be compatible within flood zone categories A and B but a Justification Test for development management is then required to determine this.)

2.2 Flood Risk Assessment Stages

This site specific flood risk assessment will initially use existing flood risk information to determine the flood zone category of the Site i.e. to check if the Guidelines Sequential Approach has been applied, see Figure 2.1 below for details.

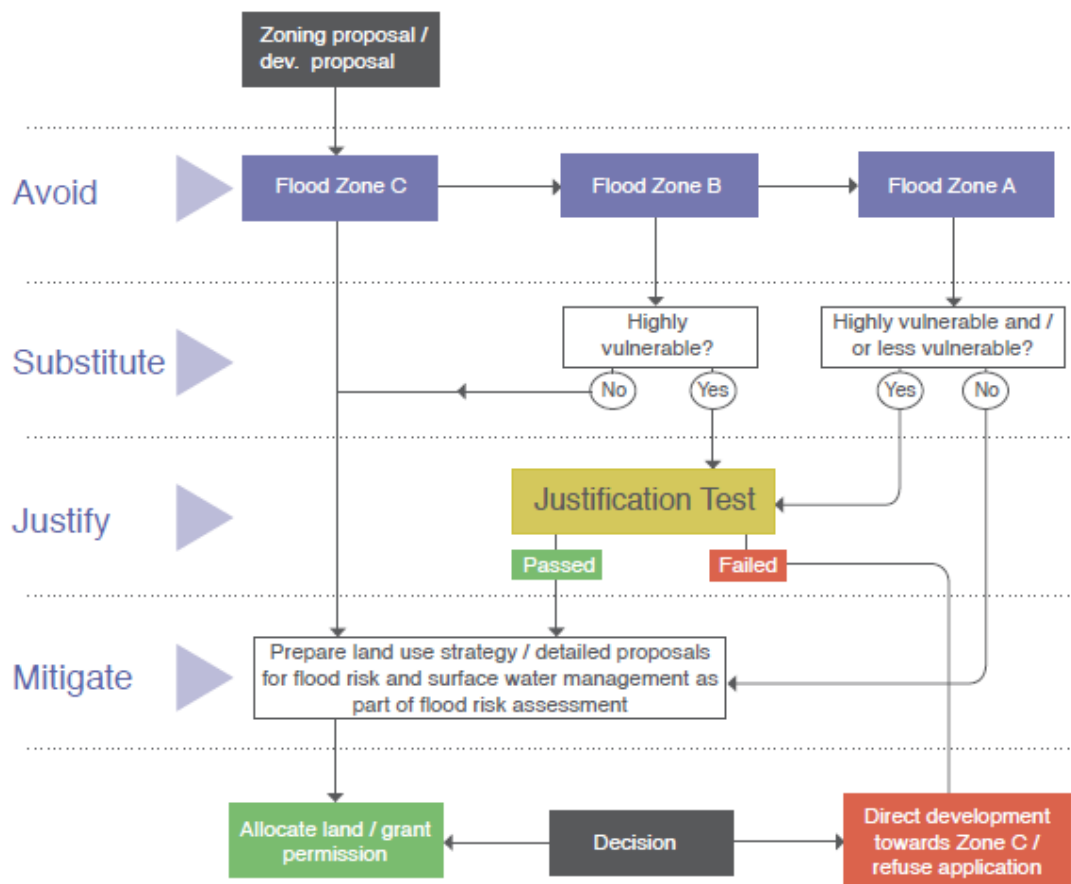


Figure 2.1 – Sequential Approach mechanism in the Planning Process

Flood risk is normally assessed by a flood risk identification stage followed by an initial flood risk assessment. A more detailed flood risk assessment stage then follows which includes an assessment of surface water management, flood risk and mitigation measures to be applied.

The following report sections outline the flood risk assessment stages for the proposed development which follow the requirements of the Guidelines' Technical Appendices.

3.0 Flood Risk Identification Stage

3.1 General

The initial flood risk identification stage uses existing information to identify and confirm whether there may be flooding or surface water management issues for the lands that may warrant further investigation.

3.2 Information Sources Consulted

Information sources consulted for the identification exercise are outlined in table 3.1 below.

Information Source	Comments
Predictive and historic flood maps, and Benefiting Lands Maps, such as those at http://www.floodmaps.ie ;	OPW www.floodmaps.ie website consulted.
Expert advice from OPW who may be able to provide reports containing the results of detailed modelling and flood-mapping studies, including critical drainage areas, and information on historic flood events, including flooding from all sources;	Historic flood hazard maps and info obtained from OPW's floodmaps.ie website
Predictive fluvial flood maps.	Draft PFRA flood extents map consulted.
Previous Strategic Flood Risk Assessments;	Eastern CFRAM Study.
Topographical maps, in particular digital elevation models produced by aerial survey or ground survey techniques;	OSI Maps consulted & Site topographic survey undertaken.
Information on flood defence condition and performance;	No flood defence information available.
Alluvial deposit maps of the Geological Survey of Ireland (which would allow the potential for the implementation of source control and infiltration techniques, groundwater and overland flood risk to be assessed). These maps, while not providing full coverage, can indicate areas that have flooded in the past (the source of the alluvium) and may be particularly useful at the early stages of the FRA process where no other information is available;	GSI maps consulted.
Walkover survey to assess potential sources of flooding, likely routes for flood waters and the site's key features, including flood defences; and	Walkover survey conducted.
National, regional & local spatial plans, such as the National Spatial Strategy, regional planning guidelines, development plans & local area plans provide key information on existing and potential future receptors.	South Dublin County Council Development Plan and Newcastle LAP consulted.

Local Information & Local Libraries	Local landowner consulted
'Liable to flood' markings on the old '6 Inch' maps;	Historic OSI maps consulted.

Table 3.1 - Information sources consulted

3.2.1 OPW Predictive, Historic & Benefiting Lands Maps & Flood Hazard Information

From consultation of the OPW website www.floodmaps.ie there were no OPW land commission schemes or benefitting lands zones within the development boundary (see Appendix B for website report).

The OPW floodmaps.ie report highlighted 9 previous flood events within 2.5km of the subject site, although none of these flood events were identified as having caused flooding within the subject development lands.

3.2.2 Previous Strategic Flood Risk Assessments & Predictive Flood Maps

As part of the EU Floods Directive, the OPW is undertaking a Catchment Flood Risk Assessment and Management (CFRAM) Study. An initial part of this Study was a national Preliminary Flood Risk Assessment (PFRA) to identify areas at risk of significant flooding. The PFRA report and maps are available at www.cfram.ie and identify areas deemed to be at risk of flooding (referred to as Areas for Further Assessment, or 'AFAs'), as they require more detailed assessment on the extent and degree of flood risk by the later CFRAM Studies.

The PFRA maps for Newcastle are reproduced in Appendix C. The flood extents maps show no risk of fluvial, coastal or pluvial flooding on the subject site up to the 1% AEP (Annual Exceedance Probability) event.

The Eastern Catchment Flood Risk Assessment and Management (CFRAM) study provides further assessment of areas identified in the PFRA for further investigation. The Rathcoole, Saggart & Baldonnel area was highlighted in the PFRA as a "Probable Area for Further Assessment" which includes the western area of the subject site.

The final CFRAM Fluvial Flood Extents Map, indicate that the subject site is in Flood Zone C and is not affected by fluvial flooding. The flood risk maps are reproduced in Appendix D.

3.2.3 Tidal Flood Maps

Tidal flooding is not relevant to the Site as Newcastle is approximately 20km from the coast and more than 90m above sea level.

3.2.4 Other Sources

Other information sources were consulted to determine if there was any additional flood risk to the subject site, these included;

- Topographical surveys of the area – no evidence based on topography.
- Flood defences Information – no flood defence information available.
- Soil data from EPA and GSI – subsoils identified as tills derived from limestones.
- Groundwater information from GSI – no karst features or gravels identified in the site. Groundwater vulnerability varies across the site from Low to High and the bedrock aquifer is a locally important bedrock aquifer.
- Site Investigation Report – No evidence of flooding within the development lands.
- Walkover survey – No evidence of flooding within the development lands.
- Development Plan & Local Area plan – lands are zoned for residential development.
- Newcastle Local Area Plan (LAP) 2012 includes a flood map which highlights flood zones within the LAP boundary. The subject site is outside the extents of the flood zones.
- This Site Specific Flood Risk Assessment concludes that the proposed residential development is appropriate for the site's flood zone category (Category C).
- Existing Local Authority Drainage Records – existing 150mm to 525mm diameter surface water sewers are located in Newcastle along the R120 to the North of the Subject Site.
- Local Information & Local Authority Consultation – no evidence of flood risk to lands.
- Historic Maps – no evidence of flooding or marsh areas within the Site.

From a review of the 'other sources' above there does not appear to be evidence of flood risk to the development lands.

3.3 Source-Pathway-Receptor Model

A Source-Pathway-Receptor model was produced to summarize the possible sources of floodwater, the people and assets (receptors) that could be affected by potential flooding (with specific reference to the proposals) and the pathways by which flood water for a 0.1%AEP (Annual Exceedance Probability) and 1%AEP storms could reach the receptors, see table 3.1. It provides the probability and magnitude of the sources, the performance and response of pathways and the consequences to the receptors in the context of the LAP development proposals. These sources, pathways and receptors will be assessed further by the initial flood risk assessment stage.

Source	Pathway	Receptor	Likelihood	Consequence	Risk
Tidal	Tidal flooding from coast, 20km away, via Liffey River.		Remote		
Fluvial	Overbank existing streams and rivers to the south.	Future development including houses.	Low	Medium	Low
Surface Water Drainage (Pluvial)	Flooding from development's surcharging drainage systems	Future development including houses.	Possible	Medium	Moderate
Groundwater flooding	Rising GWL on the site		Remote		
Human or Mechanical Error (Pluvial)	New drainage network blocks	Areas of development draining to the surface water network	Possible	Medium	Moderate

Table 3.2 - Source-pathway-receptor analysis

4.0 Initial Flood Risk Assessment Stage

The only flood risks to the proposed residential development at the application site identified from Stage 1 are;

- A low risk of fluvial flood risk;
- Pluvial flood risk following development.

4.1 Initial Fluvial Flood Risk Assessment

The PFRA flood extents map identified no risk of fluvial flooding on the subject site up to the 1% AEP (Annual Exceedance Probability) event, (see PFRA maps in Appendix C).

The final CFRAM Fluvial Flood Extents Map, indicate that the subject site is in Flood Zone C and is not affected by fluvial flooding. The flood risk maps are reproduced in Appendix D.

4.2 Initial Pluvial Flood Risk Assessment

The Source-Pathway-Receptor model identified that there could be potential for pluvial flood risk within the LAP lands related to future drainage networks to serve the proposed development. These have potential to cause local flooding unless they are designed in accordance with the regulations e.g. GSDS and to take account of flood exceedance e.g. for storms return periods over 1%AEP.

The Source-Pathway-Receptor model also identified that the proper operation and maintenance of the drainage system is necessary to reduce the risk of human or mechanical error causing pluvial flood risk from blockages etc.

4.3 Flood Zone Category

Following assessment of the flood risks to the Site and available flood data it is considered that the Site is within Flood Zone Category C as defined by the Guidelines. The residential type of development proposed is therefore appropriate for this flood zone category. The Guidelines Sequential Approach is therefore met and the 'Avoid' principal achieved.

5.0 Detailed Flood Risk Assessment Stage

5.1 General

Since the type of development proposed is appropriate for the Flood zone category of the Site, the detailed flood risk assessment stage will only consider pluvial flood risk in relation to the following;

- Proposed Surface Water Management measures.
- Flood Exceedance.
- Impact of proposals on flood risk to adjacent areas.
- Effects of climate change.
- Sustainable Urban Structure.
- Residual risks.
- Effectiveness of any flood mitigation measures.

5.2 Surface Water Management

The proposed storm-water proposals and drainage design for the development is generally a standard gully and pipe-work collection system with an attenuated outfall and associated attenuation storage. Surface water swales will be provided where possible to convey run-off from roads and cycle ways. Refer to Appendix A for proposed drainage layout.

The proposed new development will increase the impermeable area and run-off volume when compared with the existing green-field site. The new drainage system has the following features;

- Discharged flows are reduced to equivalent green-field run-off rates in accordance with the GDSDS.
- Attenuation storage is provided; in accordance with the GDSDS.

5.2.1 Sustainable Urban Drainage System Proposals

The SUDS proposals for the development include;

- Three geo-cellular attenuation systems with shallow detention basins to provide storage (3064m³) and promote infiltration.
- Surface water swales to drain roads and cycle ways where possible.
- Permeable paving in all private driveways.

5.2.2 Surface Water Attenuation and Storage

Storm-water attenuation for the development has been sized in accordance with the requirements of the GSDSDS. Run-off rates from the proposed development to the public system are also attenuated to existing green-field run-off rates as per the GSDSDS.

The total surface water storage volume available is in the region of 3064m³ provided within the attenuation facilities. The total storage volume is based on the site's available outflow of 25.65 l/sec.

Details on the surface water drainage consultations between DBFL and South Dublin County Council Drainage department are detailed in Section 3.4 of the Infrastructure Design Report provided with the planning application documents.

5.3 Flood Exceedance

For storms greater than the 1%AEP pluvial event, the development's drainage network design will be exceeded and areas with low ground levels will begin to flood. Proposed road levels all fall towards the north towards the surface water drainage outfalls and existing ditches, see flood exceedance layout in Appendix E. This will ensure that the proposed residential units are protected from flooding when the drainage network may be exceeded.

Lowest house floor levels are set a minimum of 0.5m above the top water level in the corresponding attenuation facility in accordance with recommended minimum freeboards.

5.4 Impact on Adjacent Areas

Adjacent areas will not be impacted by the development for up to the 1%AEP flood event, however if larger storms >1%AEP exceed the capacity of the development's drainage system then overland flood routes may be directed towards the surface water drainage outfall to the north of the site.

5.5 Climate Change

The potential impact of climate change has been allowed for as follows;

- Pluvial flood risk - drainage system and attenuation storage design allow for a 10% increase in rainfall intensities, as recommended by the GSDSDS.

5.6 Sustainable Urban Structure

The development has been designed in accordance with the GSDSDS.

5.6.1 Access & egress during flood events

The access and egress arrangements for the main development site are via Newcastle Boulevard to the east and the R120 (Main Street) to the North. Based on relevant fluvial

flood levels from the CFRAMS, it is anticipated that for a 0.1% AEP flood event that the development can be safely accessed and exited through the proposed vehicular entrance.

5.7 Residual Risks

Remaining residual flood risks, following the detailed assessment include the following;

1. Pluvial flooding from the private drainage system related to a pipe blockage or from flood exceedance.
2. Pluvial flooding from the development's drainage system for storms in excess of the 100 year design capacity.

5.8 Mitigation Measures

Proposed mitigation measures to address residual flood risks are summarized below;

M1. Proposed drainage system to be maintained on a regular basis to reduce the risk of a blockage.

M2. In the event of storms exceeding the 100-year design capacity of the drainage system, then possible flood routing for overland flows towards the drainage outfalls to the north should not be blocked.

5.8.1 Effectiveness of Mitigation Measures

It is considered that the flood risk mitigation measures if implemented are sufficient to provide a suitable level of protection to the proposed development. A regularly maintained drainage system will ensure that it remains effective and in good working order should a large pluvial storm occur.

Should extreme pluvial flooding occur that is in excess of the development's drainage capacity i.e. probability less than 1%AEP, then overland flood routes to the drainage outfall could protect the development and houses with lower floor levels.

6.0 Conclusions

The Site Specific Flood Risk Assessment for the proposed development was undertaken in accordance with the requirements of the Planning System and Flood Risk Management Guidelines for Planning Authorities”, November 2009.

Following the flood risk assessment stages it was determined that the Site is within Flood Zone C as defined by the Guidelines.

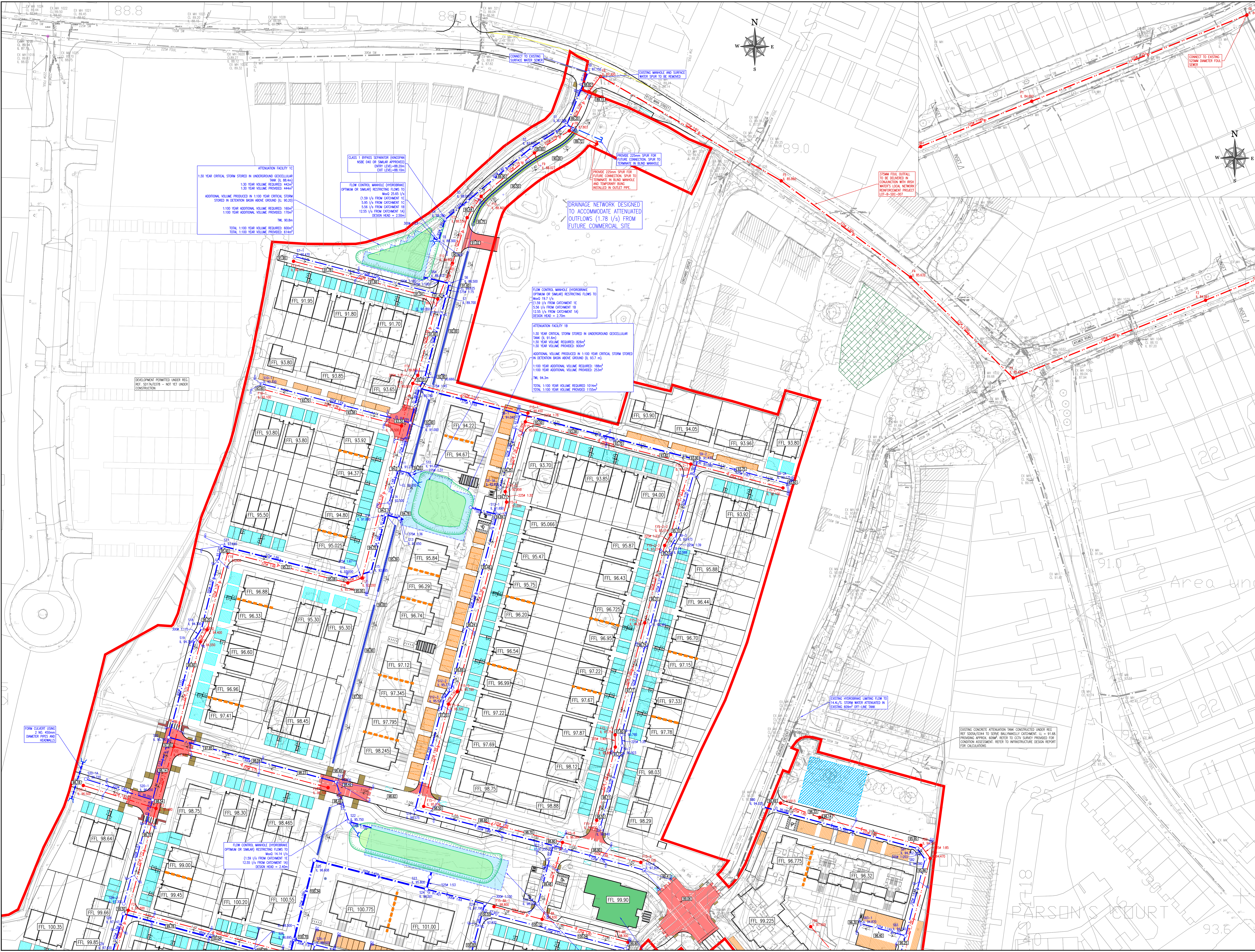
It is concluded that the;

- Residential development proposed is appropriate for the Site’s flood zone category.
- Planning System and Flood Risk Management Guidelines Sequential Approach is met and the ‘Avoid’ principal achieved.
- A Justification Test is not required as the site is in Flood Zone C.

The development was concluded as having a good level of flood protection up to the 100 year return event. For pluvial floods exceeding the 100 year capacity of the drainage system then proposed flood routing mitigation measures are recommended.

Appendix A

PROPOSED SCHEME LAYOUT



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NOTES:

1. ALL DRAWINGS TO BE CHECKED BY CONTRACTOR ON SITE AND ENGINEER INFORMED OF DISCREPANCIES BEFORE WORK COMMENCES
2. ALL LEVELS ARE IN METRES AND ARE RELATED TO ORDNANCE DATUM
3. CONTRACTOR SHALL SATISFY HIMSELF AS TO THE ACCURACY OF FINISHED LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORKS ON SITE
4. ALL FOUL SEWERS AND MANHOLES TO BE AS PER HIGH WATER STANDARD DETAILS AND FRESH WATER CODE OF PRACTICE FOR WASTEWATER
5. ALL SURFACE WATER SEWERS TO BE CLASS H CONCRETE TO ENDS 4 & 5 & 200K OR 400K TO ENDS 4 AS PER THE GRATED DRAIN REGIONAL CODE OF PRACTICE
6. NOTE THAT THE CONTRACTOR AND/OR ARCHITECT ARE RESPONSIBLE FOR CONNECTIONS INTO THE BUILDING
7. WHERE COVERS ARE LOCATED IN GRASS AREAS, THEY SHALL BE SURROUNDED BY A CONCRETE FINISH, 200MM ALI BOARD AND 100MM DEEP FORMED WITH C30/35 CONCRETE, 20MM AGGREGATE SIZE, BEDDED IN CLASS B8 MATERIAL

SERVICES LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED SURFACE WATER SEWER
- ROAD GULLY
- PROPOSED FILTER DRAIN WITH SURFACE WATER SINK
- PERMEABLE PAVING (PRIVATE)
- PERMEABLE PAVING (MANAGEMENT COMPANY)
- EXISTING SURFACE WATER SEWER
- PROPOSED FOUL SEWER
- EXISTING FOUL SEWER
- PROPOSED LEVELS
- EXISTING LEVELS
- FINISHED FLOOR LEVEL
- ROAD GRADIENT

DESIGNED	NOV 2010	NOV 2010	NOV 2010
CHECKED			
DATE			

PLANNING

DESIGNED	NOV 2010	NOV 2010	NOV 2010
CHECKED			
DATE			

DFL Consulting Engineers

LANDS AT NEWCASTLE, SOUTH DUBLIN

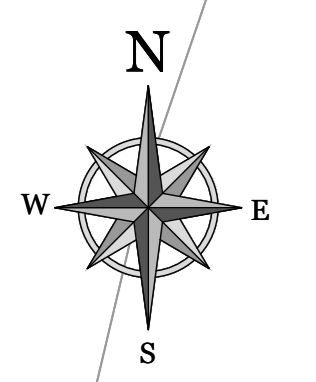
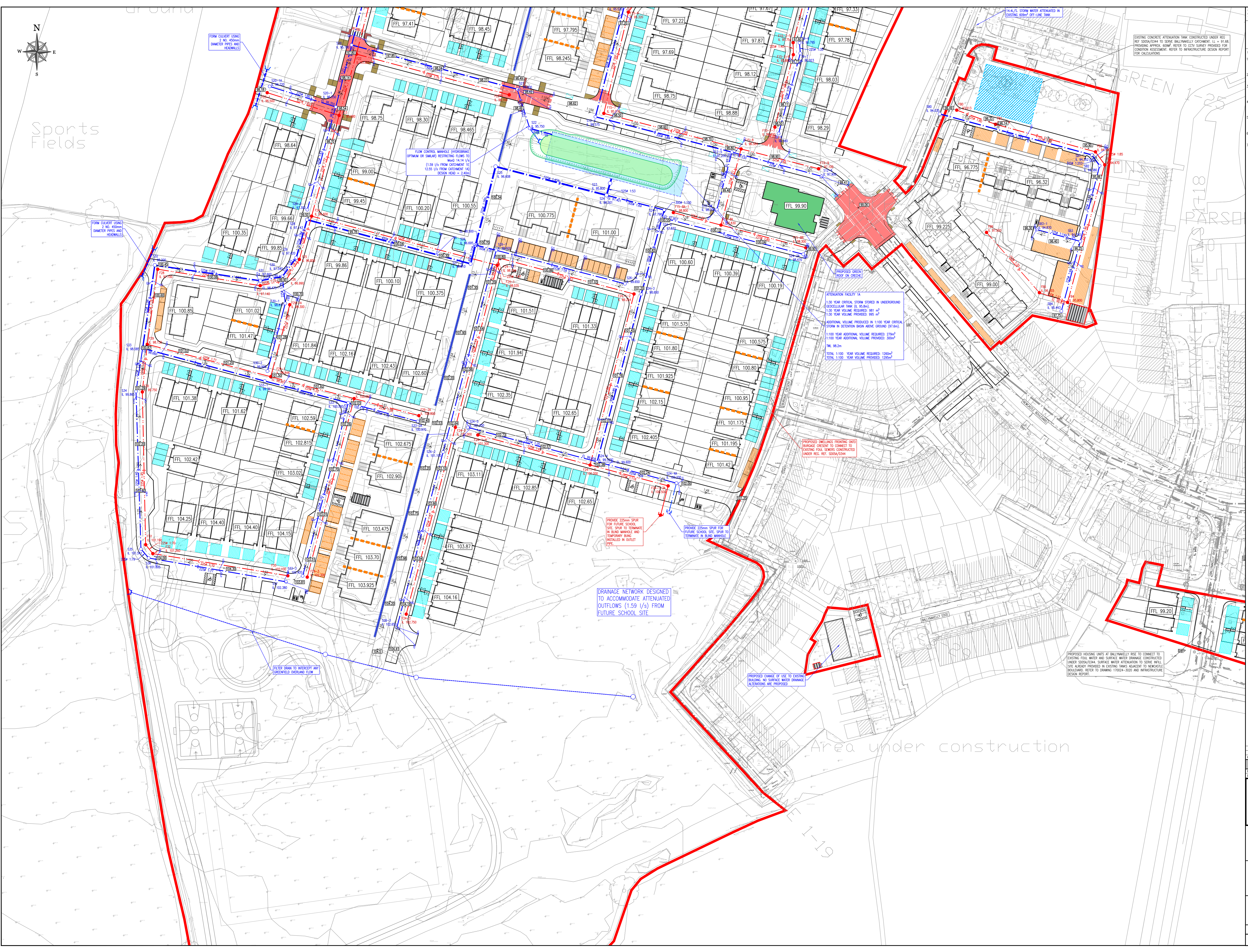
SITE SERVICES LAYOUT SHEET 1

ARCHITECT: MOLA

SCALE: 1:500 (B4)

FILE REF: 170024-3001

DRG NO: 170024-3001

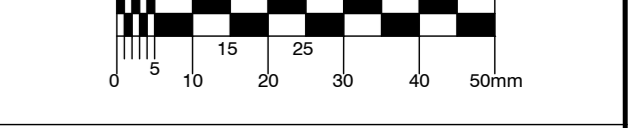


Sports Fields

BURKIN GREEN
VIEWS PARSE

Area under construction

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 - ALL FOLL SEMERS AND MANHOLES TO BE AS PER IRISH WATER STANDARD DETAILS AND IRISH WATER CODE OF PRACTICE FOR INSTALLATION.
 - ALL SURFACE WATER SEMERS TO BE CLASS H CONCRETE TO ENDS IN A 600x600 OR 400x400 TO ENDS IN AS PER THE GREATER IRLAND REGIONAL CODE OF PRACTICE.
 - NOTE THAT THE CONTRACTOR AND/OR ARCHITECT ARE RESPONSIBLE FOR CONNECTIONS INTO THE BUILDING.
 - WHERE COVERS ARE LOCATED IN GRASS AREAS, THEY SHALL BE SURROUNDED BY A CONCRETE CURB, 200MM ALL ROUND AND 100MM DEEP FORMED WITH C20/25 CONCRETE, 20MM AGGREGATE SIZE, BEDDED IN CLASS 8/8 MATERIAL.

- SERVICES LEGEND
- PROPOSED SITE BOUNDARY
 - PROPOSED SURFACE WATER SEMER
 - ROAD GULLY
 - PROPOSED FILTER DRAIN WITH SURFACE WATER DAILE
 - PERMEABLE PAVING (PRIVATE)
 - PERMEABLE PAVING (MANAGEMENT COMPANY)
 - EXISTING SURFACE WATER SEMER
 - EXISTING FOUL SEMER
 - EXISTING FOUL SEMER
 - PROPOSED LEVELS
 - EXISTING LEVELS
 - FINISHED FLOOR LEVEL
 - ROAD GRADIENT

FORM CULVERT LONG 2 NO. 450mm DIAMETER PIPES AND HEADWALLS

FORM CULVERT LONG 2 NO. 450mm DIAMETER PIPES AND HEADWALLS

FLOW CONTROL MANHOLE (HYDROLOGIC OPTION) OR SIMILAR RESTRICTING FLOW TO 1.59 l/s FROM CATCHMENT TO 12.55 l/s FROM CATCHMENT TO DESIGN HEAD = 2.40m

ATTENUATION FACILITY 1A
1.35 YEAR CRITICAL STORM STORED IN UNDERGROUND RECTANGULAR TANK (L: 26.8m)
1.35 YEAR VOLUME REQUIRED: 981 m³
1.35 YEAR VOLUME PROVIDED: 995 m³
ADDITIONAL VOLUME PRODUCED IN 1.100 YEAR CRITICAL STORM IN EXTENSION BRUN ABOVE GROUND (97.6m)
1.100 YEAR ADDITIONAL VOLUME REQUIRED: 271m³
1.100 YEAR ADDITIONAL VOLUME PROVIDED: 300m³
TM: 98.2m
TOTAL 1.100 YEAR VOLUME REQUIRED: 1250m³
TOTAL 1.100 YEAR VOLUME PROVIDED: 1295m³

PROPOSED DWELLINGS FRONTING ONTO (INDICATE OPENING TO CONNECT TO EXISTING FOUL SEMERS CONSTRUCTED UNDER REG. NO. 10064/04/4)

DRAINAGE NETWORK DESIGNED TO ACCOMMODATE ATTENUATED OUTFLOWS (1.59 l/s) FROM FUTURE SCHOOL SITE

PROVIDE 225mm SPUR FOR FUTURE SCHOOL SITE SPUR TO TERMINATE IN SAND MANHOLE AND TEMPORARY SLAB INSTALLED IN OUTLET PIPE

PROVIDE 225mm SPUR FOR FUTURE SCHOOL SITE SPUR TO TERMINATE IN SAND MANHOLE

PROPOSED CHANGE OF USE TO EXISTING BUILDING. NO SURFACE WATER DRAINAGE ALTERATIONS ARE PROPOSED

PROPOSED HOUSING UNITS AT BALLINMULLY RISE TO CONNECT TO EXISTING FOUL WATER AND SURFACE WATER DRAINAGE CONSTRUCTED UNDER 50064/04/4 SURFACE WATER ATTENUATION TO SERVE WALL SITE ALREADY PROVIDED IN EXISTING TANKS ADJACENT TO NEWCASTLE BOLLINGERS. REFER TO DRAWING F10024-3020 AND INFRASTRUCTURE DESIGN REPORT

FILTER DRAIN TO INTERCEPT ANY GREENFIELD OVERLAND FLOW

DESIGNED	NO. 1	PREPARED	DATE	NOV 2010	CHECKED	DATE
DBPL	NOV 2010	DBPL	NOV 2010	DBPL	NOV 2010	DBPL

PLANNING

DBPL Consulting Engineers

PROJECT	LANDS AT NEWCASTLE, SOUTH DUBLIN
DRW TITLE	SITE SERVICES LAYOUT SHEET 2
ARCHITECT	MOLA
SCALE	1:500 (B4)
FILE REF.	170024-3001
DRW NO.	170024-3002

Appendix B

OPW FLOOD HAZARD WEBSITE REPORT

Summary Local Area Report

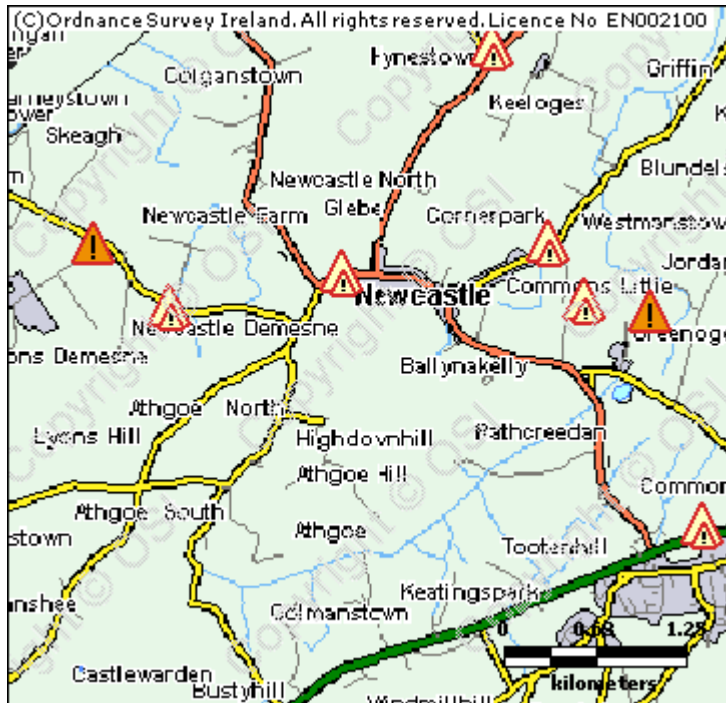
This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Dublin

NGR: N 999 281

This Flood Report has been downloaded from the Web site www.floodmaps.ie. The users should take account of the restrictions and limitations relating to the content and use of this Web site that are explained in the Disclaimer box when entering the site. It is a condition of use of the Web site that you accept the User Declaration and the Disclaimer.



Map Scale 1:51,962

Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained in the Glossary.

9 Results

	1. Lyons Demesne Access Nov 2000 County: Kildare	Start Date: 05/Nov/2000 Flood Quality Code:3
Additional Information: Reports (2) More Mapped Information		
	2. Flooding at Greenogue Business Park, Rathcoole, Co. Dublin on 24th Oct 2011 County: Dublin	Start Date: 24/Oct/2011 Flood Quality Code:2
Additional Information: Reports (1) More Mapped Information		
	3. Newcastle village Nov 2000 County: Dublin	Start Date: 05/Nov/2000 Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information		
	4. Aylmer Road Newcastle Nov 2000 County: Dublin	Start Date: 05/Nov/2000 Flood Quality Code:3
Additional Information: Reports (2) Press Archive (1) More Mapped Information		
	5. Peamount Road Recurring County: Dublin	Start Date: Flood Quality Code:4

Additional Information: Reports (1) Press Archive (1) More Mapped Information



6. Newcastle Greenoge Recurring

County: Dublin

Start Date:

Flood Quality Code:4

Additional Information: Reports (1) More Mapped Information



7. Lyons Road Recurring

County: Dublin

Start Date:

Flood Quality Code:4

Additional Information: Reports (1) More Mapped Information



8. Newcastle Glebe Dublin Recurring

County: Dublin

Start Date:

Flood Quality Code:4

Additional Information: Reports (1) More Mapped Information



9. Aylmer Road Newcastle recurring

County: Dublin

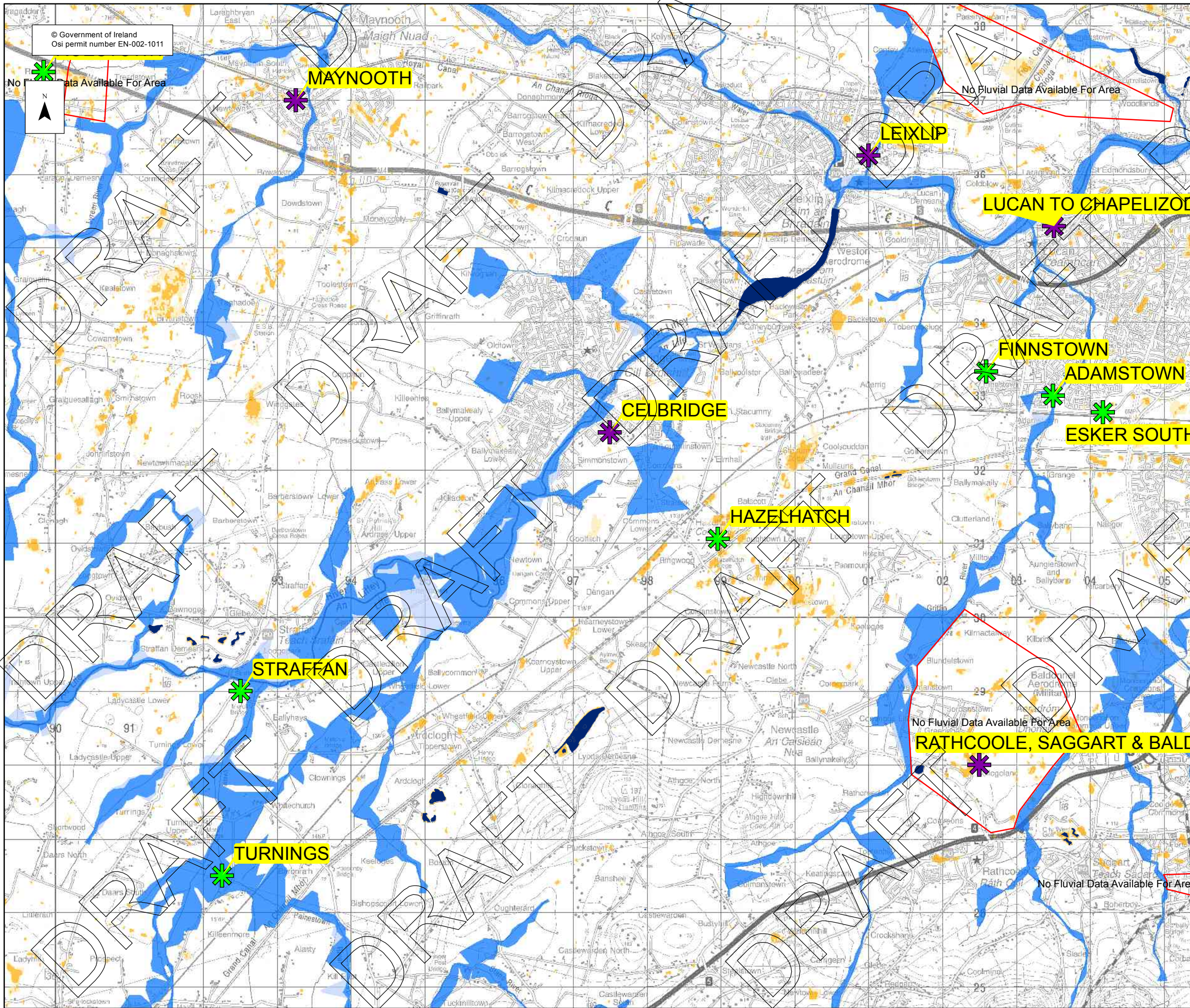
Start Date:

Flood Quality Code:4

Additional Information: Reports (1) Press Archive (1) More Mapped Information

Appendix C

PRELIMINARY FLOOD RISK ASSESSMENT (PFRA) MAP EXTRACT OPW



© Government of Ireland
 Osi permit number EN-002-1011

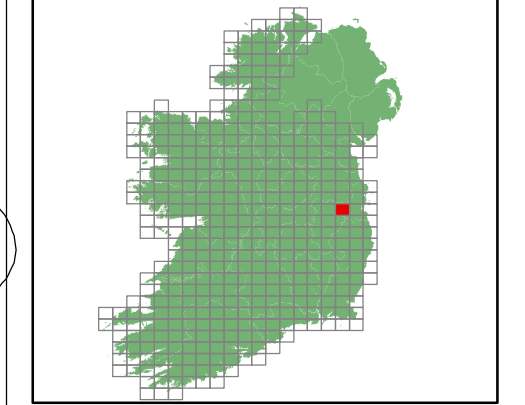


No Fluvial Data Available For Area

No Fluvial Data Available For Area

No Fluvial Data Available For Area

Location Plan :



Legend:

- Flood Extents**
- Fluvial - Indicative 1% AEP (100-yr) Event
 - Fluvial - Extreme Event
 - Coastal - Indicative 0.5% AEP (200-yr) Event
 - Coastal - Extreme Event
 - Pluvial - Indicative 1% AEP (100-yr) Event
 - Pluvial - Extreme Event
 - Groundwater Flood Extents
 - Lakes / Turloughs
- PFRA Outcomes**
- ✱ Probable Area for Further Assessment
 - ✱ Possible Area for Further Assessment

Important User Note:
 The flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location. Information on the purpose, development and limitations of these maps is available in the relevant reports (see www.cfram.ie). Users should seek professional advice if they intend to rely on the maps in any way.

If you believe that the maps are inaccurate in some way please forward full details by contacting the OPW (refer to PFRA Information leaflets or 'Have Your Say' on www.cfram.ie).

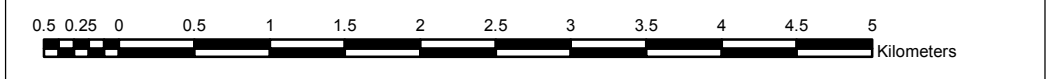
Office of Public Works
 Jonathon Swift Street
 Trim
 Co Meath
 Ireland



Project :
PRELIMINARY FLOOD RISK ASSESSMENT (PFRA)
 Map :
PFRA Indicative extents and outcomes - Draft for Consultation

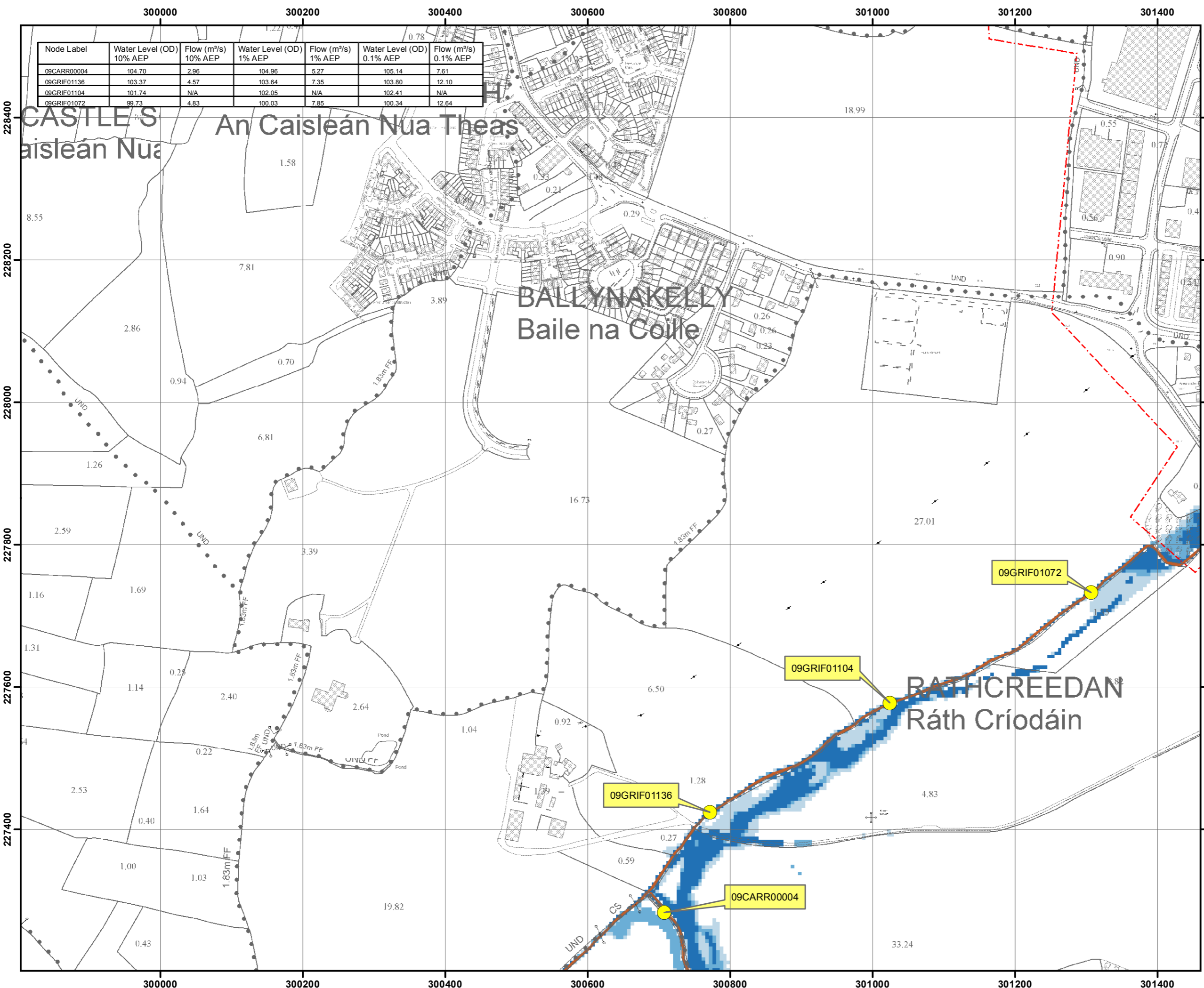
Figure By : PJW	Date : July 2011
Checked By : MA	Date : July 2011
Figure No. : 2019 / MAP / 237 / A	Revision : 0

Drawing Scale : 1:50,000 Plot Scale : 1:1 @ A3

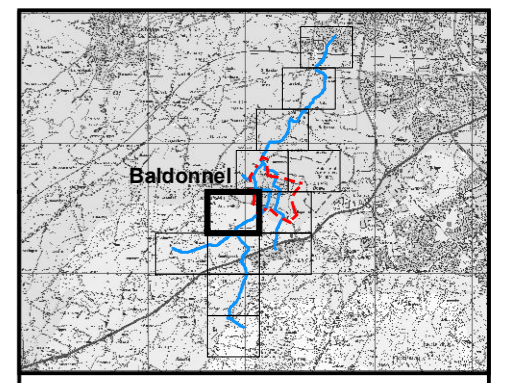


Appendix D

EASTERN CATHMENT FLOOD RISK ASSESSMENT (CFRAM) MAP



Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09CARR00004	104.70	2.96	104.96	5.27	105.14	7.61
09GRIF01136	103.37	4.57	103.64	7.35	103.80	12.10
09GRIF01104	101.74	N/A	102.05	N/A	102.41	N/A
09GRIF01072	99.73	4.83	100.03	7.85	100.34	12.64



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

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:
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The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
BT12 6RZ
Eireland@rpsgroup.com

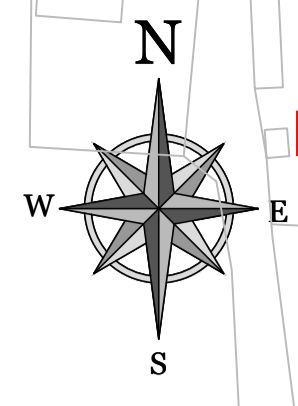
T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com

Map: Baldonnel Fluvial Flood Extents
Map Type: EXTENT
Source: FLUVIAL
Map Area: HPW
Scenario: CURRENT
Drawn By: C.C. Date: 21 July 2016
Checked By: D.I. Date: 21 July 2016
Approved By: G.G. Date: 21 July 2016
Drawing No.: E09BAL_EXFCD_F0_05
Map Series: Page 5 of 12
Drawing Scale: 1:5,000 @ A3



Appendix E

FLOOD EXCEEDANCE LAYOUT



Grave Yard

St. Finian's Church

Sports Ground

Sports fields

JTH

Sheas

89.0

86.4

89.6

91.0

92.5

93.6

118

18

10

10

29

25

10

10

Area under

Post Office

COURT

BURGAGE CRESCENT 1-25

BURGAGE GREEN 1-25

PARSONS COURT

118

18

10

10

29

25

10

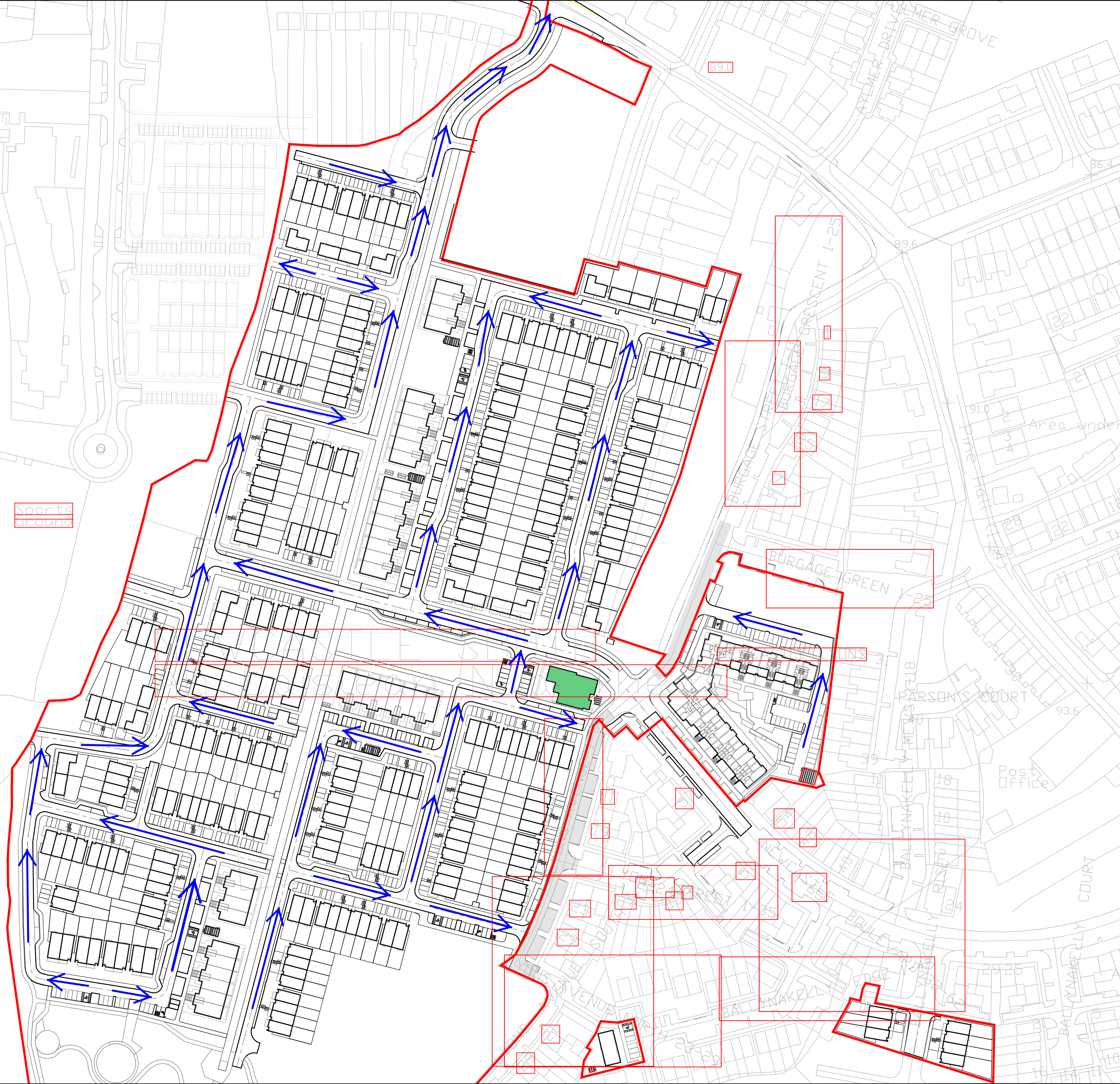
10

10

10

10

10



LYLMEY DRIVE
LYLMEY GROVE

BURGAGE CRESCENT 1-25

BURGAGE GREEN 1-25

PARSONS COURT

118

18

10

10

29

25

10

10

10

10

10

10

COURT