Stage 1- Strategic Flood Risk Assessment for the

Draft Galway County Development Plan 2015-2021






Comhairle Chontae na Gaillimhe
Galway County Council

February 2014

STAGE 1 STRATEGIC FLOOD RISK ASSESSMENT

FOR THE

DRAFT
GALWAY COUNTY DEVELOPMENT PLAN
2015-2021

for: **Galway County Council**

County Buildings

Prospect Hill

Galway

by: **CAAS Ltd.**

2nd Floor, The Courtyard

25 Great Strand Street

Dublin 1

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Section 1 Introduction and Policy Background

1.1 Introduction and Terms of Reference

Galway County Council intends to review the Galway County Development Plan 2009-2015 and prepare and make a new County Development 2015-2021 under Sections 11 and 12 of the Planning and Development Acts 2000-2010. The Plan is required to undergo an appropriate level of Strategic Flood Risk Assessment (SFRA) and this document presents the findings of the Draft Stage 1 SFRA for the Plan.

The SFRA has been undertaken and prepared in accordance with 2009 *The Planning System and Flood Risk Management - Guidelines for Planning Authorities* Department of the Environment, Heritage and Local Government and Office of Public Works (OPW).

The purpose of this Stage 1 SFRA is to:

- Identify flooding or surface water management issues related to the County that may warrant further investigation at the appropriate plan level or at planning application level; and

- Suggest measures to be integrated into the County Development Plan that will contribute towards both flood risk management in the county and compliance with the Flood Risk Management Guidelines.

1.2 Consultation

As required by the Flood Risk Management Guidelines, the SFRA process is integrated into the Strategic Environmental Assessment (SEA) process that is being undertaken alongside the preparation of the County Development Plan.

The environmental authorities specified by the SEA Regulations were consulted during formal SEA scoping on issues including those related to both the SFRA and flooding early in the process.

The findings of the SFRA have been integrated into the SEA.

1.3 Current Conclusion

Although there are flooding issues in the county which have been identified as part of this assessment (see Section 2), Stage 2 SFRA for this plan is not necessary as the County Development Plan will not provide for any zoning.

A number of measures were recommended for integration into the County Development Plan (see Section 3) with regard to flood risk management. All recommendations have been integrated into the Draft Plan.

This Draft SFRA is a live document which will be updated to take account of submissions made during the public display of the Draft Plan as well as new information which is scheduled to be released by the OPW.

1.4 Flood Risk, Context and its Relevance as an Issue to the County Development Plan

1.4.1 Flood Risk

Flooding is an environmental phenomenon can pose a risk to human health as well as causing economic and social effects. Some of the effects of flooding are identified on Table 1.1 below.

Tangible Effects	**Intangible Human and Other Effects**
Damage to buildings (houses)	Loss of life
Damage to contents of buildings	Physical injury
Damage to new infrastructure e.g. roads	Increased stress
Loss of income	Physical and psychological trauma
Disruption of flow of employees to work causing knock on effects	Increase in flood related suicide
Enhanced rate of property deterioration and decay	Increase in ill health
Long term rot and damp	Homelessness
	Loss of uninsured possessions

Table 1.1 Potential effects that may occur as a result of flooding

Parts of County Galway are vulnerable to flooding and this vulnerability can be exacerbated by changes in both the occurrence of severe rainfall events and sea level rise and associated flooding. Local conditions such as low-lying lands and slow surface water drainage increase the risk of flooding. This risk can be increased by human actions including clearing of natural vegetation to make way for agriculture, draining/rehabilitation of bog and wetland areas, the development of settlements in the flood plains of rivers and on low lying or eroding coastlines as well as by changing weather patterns. Inadequately planned infrastructural development, culverting, forestry operations and urban development in the floodplain, for example, can also give rise to flooding hazards.

1.4.2 Context

Flood Risk must be seen in the context of both the long history of settlement in the county and in the context of existing and emerging policy and practice in relation to planning, development and flooding. The location and layout of the county's towns have generally evolved to avoid flood-prone areas. The direct impact of new urban development is generally not as significant a problem now as it was in the past because of the implementation of Sustainable Drainage Systems (SuDS) that aim to control run-off as close to its source as possible using a sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques. However vigilance is still needed at the planning and zoning stage to avoid flood risk, for example in less well understood urban fringe areas – hence the need for SFRAs of plans for various sectors and at various levels, including SFRAs for County Development Plans and Local Area Plans and Flood Risk Assessments for individual projects.

1.5 Flood Risk Management Policy

1.5.1 EU Floods Directive

European Directive 2007/60/EC on the assessment and management of flood risk aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU. The Directive requires Member States to:

- Carry out a preliminary assessment by December 2011 in order to identify the river basins and associated coastal areas where potential significant flood risk exists.
- Prepare flood hazard and risk maps for the identified areas by December 2013.
- Prepare flood risk management plans focused on prevention, protection and preparedness by December 2015. These plans are to include measures to reduce the probability of flooding and its potential consequences.

Implementation of the EU Floods Directive is required to be coordinated with the requirements of the EU Water Framework Directive and the current River Basin Management Plans.

1.5.2 National Flood Policy

Historically, flood risk management focused on land drainage for the benefit of agricultural improvement. With increasing urbanisation, the Arterial Drainage Act, 1945, was amended in 1995 to permit the OPW to implement localised flood relief schemes to provide flood protection for cities, towns and villages.

In line with changing national and international paradigms on how to manage flood risk most effectively and efficiently, a review of national flood policy was undertaken in 2003-2004. The review was undertaken by an Inter-Departmental Review Group, led by the Minister of State at the Department of Finance with special responsibility for the OPW. The Review Group prepared a report that was put to Government, and subsequently approved and published in September 2004 (Report of the Flood Policy Review Group, OPW, 2004).

The scope of the review included a review of the roles and responsibilities of the different bodies with responsibilities for managing flood risk, and to set a new policy for flood risk management in Ireland into the future. The adopted policy was accompanied by many specific recommendations, including:

- Focus on managing flood risk, rather than relying only flood protection measures aimed at reducing flooding;
- Taking a catchment-based approach to assess and manage risks within the whole-catchment context; and
- Being proactive in assessing and managing flood risks, including the preparation of flood maps and flood risk management plans.

1.5.3 National CFRAM Programme

The national Catchment Flood Risk Assessment and Management (CFRAM) programme commenced in Ireland in 2011. The CFRAM Programme is intended to deliver on core components of the National Flood Policy, adopted in 2004, and on the requirements of the EU Floods Directive. The Programme is being implemented through CFRAM studies which are being undertaken for each of the six river basin districts in Ireland. County Galway is located in both the Shannon International and the Western River Basin Districts. The national CFRAM Programme comprises three phases as follows:

- The Preliminary Flood Risk Assessment in 2011;
- The CFRAM Studies and parallel activities, from 2011 to 2015; and
- Implementation and Review from 2016 onwards.

The Programme provides for three main consultative stages as follows:

- PFRAs in 2011;
- Flood Hazard Mapping, in 2013; and
- Flood Risk Management Plans in 2015.

The OPW is the lead agency for flood risk management in Ireland. The coordination and implementation of Government policy on the management of flood risk in Ireland is part of its responsibility. The European Communities (Assessment and Management of Flood Risks) Regulations 2010 (S.I. No. 122) identifies the Commissioners of Public Works as the 'competent authority' with overall responsibility for implementation of the Floods Directive 2007/60/EC which includes requirements to prepare a preliminary assessment by 2011, flood risk mapping by 2013 and flood risk management plans by 2015. It is the principal agency involved in the preparation of Flood Risk Assessment and Management studies (FRAMs).

The PFRAs identified areas at risk of significant flooding and includes maps showing areas deemed to be at risk. The areas deemed to be at significant risk, where the flood risk that is of particular concern nationally, are identified as Areas for Further Assessment (AFAs) and more detailed assessment on the extent and degree of flood risk is currently being undertaken in these areas with the objective of producing Flood Hazard Mapping.

Should Flood Hazard Mapping be released by the OPW during the Plan preparation process then this SFRA will be updated to take account of this information.

1.5.4 Flood Risk Management Guidelines

1.5.4.1 Introduction

In 2009, the OPW and the then Department of the Environment and Local Government (DEHLG) published Guidelines on flood risk management for planning authorities entitled *The Planning System and Flood Risk Management - Guidelines for Planning Authorities*. The Guidelines introduce mechanisms for the incorporation of flood risk identification, assessment and management into the planning process. Implementation of the Guidelines is intended to be achieved through actions at the national, regional, local authority and site-specific levels. Planning authorities and An Bord Pleanála are required to have regard to the Guidelines in carrying out their functions under the Planning Acts.

The core objectives of the Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- 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.

1.5.4.2 Principles of Flood Risk Management

The key principles of flood risk management set out in the Flood Risk Management Guidelines are to:

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

The Guidelines follow the principle that development should not be permitted in flood risk areas, particularly floodplains, except where there are no alternative and appropriate sites available in lower risk areas that are consistent with 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. Most types of development would be considered inappropriate in areas which have the highest flood risk. Only water-compatible development such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation and essential transport infrastructure that cannot be located elsewhere would be considered appropriate in these areas.

1.5.4.3 Stages of SFRA

The Flood Risk Management Guidelines recommend a staged approach to flood risk assessment that covers both the likelihood of flooding and the potential consequences. The stages of appraisal and assessment are:

> **Stage 1 Flood risk identification** – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;
>
> **Stage 2 Initial flood risk assessment** – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding 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; and
>
> **Stage 3 Detailed flood risk assessment** – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

1.5.4.4 Flood Zones

Flood risk is an expression of the combination of the flood probability or likelihood and the magnitude of the potential consequences of the flood event. It is normally expressed in terms of the following relationship:

Flood risk = Likelihood of flooding x Consequences of flooding

Likelihood of flooding is normally defined as the percentage probability of a flood of a given magnitude or severity occurring or being exceeded in any given year. For example, a 1% Annual Exceedance Probability (AEP) indicates the severity of a flood that is expected to be exceeded on average once in 100 years, i.e. it has a 1 in 100 (1%) chance of occurring in any one year.

Consequences of flooding depend on the hazards associated with the flooding (e.g. depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality), and the vulnerability of people, property and the environment potentially affected by a flood (e.g. the age profile of the population, the type of development, presence and reliability of mitigation measures etc.).

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.

There are three types or levels of flood zones defined for the purposes of implementing the Flood Risk Management Guidelines:

Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);

Flood Zone B – where the probability of flooding from rivers and the sea is moderate (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); and

Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

1.6 Emerging Information

It is important to note that compliance with the requirements of the Flood Risk Management Guidelines is currently based on emerging and incomplete data as well as estimates of the locations and likelihood of flooding. The assessment and mapping of areas of flood risk, in particular, still awaits the publication of both Flood Hazard and Risk Maps for Areas for Further Assessment (AFAs) (currently estimated for 2014) and for Flood Risk Management Plans (estimated for 2015).

Available information in relation to flood risk - which is imperfect and incomplete - therefore may be substantially altered in light of future data and analysis.

Flood Hazard and Risk mapping will be integrated into this SFRA once finalised and available during the County Development Plan preparation process.

Future revisions of this SFRA, after adoption of the County Development Plan, will integrate other new and emerging data, including, when available, the information contained in the Flood Risk Management Plans.

1.7 Content of the Draft County Development Plan

The Draft Plan contains a Core Strategy and policies and objectives for various sectors including economic development, infrastructure, housing and environment, heritage and amenities and housing. These provisions are added to by the measures recommended by the SFRA.

The Plan does not provide for land use zoning within the county's settlements.

Section 2 Stage 1 SFRA - Flood Risk Identification

2.1 Introduction

This section identifies flooding or surface water management issues in the County that may warrant further investigation at the appropriate plan level or at planning application level. Identified for this purpose are:

- Available flood risk indicators; and
- The sources of flood risk zones which have been prepared as part of other Plan/SFRA processes.

2.2 Flood Risk Indicators

2.2.1 Historical Flood Risk Indicator Mapping

Indicators of flood risk that are based on historical flooding events are identified and described on Table 2.1 and Table 2.2 below.

Indicators included on Table 2.1 are mapped on a county level on Figure 2.1 and in Appendix I on a larger scale for ten zones within the County.

Indicators included on Table 2.2 have not been digitised for the entire County and are available to be prepared at the appropriate plan level or at planning application level as necessary.

Information Source	Description	Spatial Spread	Strategic Limitations
Recorded Flood Events from the OPW	A flood event is the occurrence of recorded flooding at a given location on a given date. The flood event is derived from different types of information (reports, photographs etc.).	County wide data (uneven), especially in settlements and along roads	This dataset only provides a spot location.
Recurring Flood Events	A flood event that has occurred more than once at a certain area is named a recurring flood event.	County wide data (uneven), especially in settlements and along roads	This dataset only provides a spot location.
OPW Flood Extent	A flood extent is an inundated area as recorded at a certain moment in time. This layer of information includes the following datasets: • The 'Extent of 1995 Flood Levels' identified on Map 0.1 in the following report: *An investigation of the Flooding Problems in the Gort - Ardrahan area of South Galway, Final Report* (OPW, 1997). This report - commonly referred to as the *South Galway Flood Study Report* - was commissioned by the OPW following flooding in South Galway. • 'Major Bodies of Flood Waters in 1995 Non-Exhaustive Mapping' identified on Drawing 4721/IT1/02 in the following report: *Review of South Galway Flood Study Report - Review of Recommendations on Key Arterial & Essential Access Routes, Planning Controls, Data Collection* (OPW, 2011).	Coverage provided mainly in the eastern part of County along River Shannon between Ballinasloe and Portumna and in the south of the County around Gort	Coverage limited
Estimated Flood Extent November 2009 (OPW/Tobin, 2010)	This estimated flood extent from the November 2009 event is taken from the OPW's *Study to Identify Practical Measures to Address Flooding on the Dunkellin River including the Aggard Stream* (OPW/Tobin, 2010).	Coverage provided the east of Kilcolgan (Dunkellin River including the Aggard Stream)	Coverage limited
Estimated Flood Extent November 2009 (Galway County Council/RPS, 2011)	This flood extent from the November 2009 event is taken from *Thomastown-Belclare, Treenbaun-Goldenpark, Kilshanvy-Kilconly (Co. Galway) Flood Risk Management Pre-Feasibility Study* (Galway County Council/RPS, 2011).	Coverage provided at areas west of Tuam and east of Headford	Coverage limited
Estimated Flood Extent (OPW/Ryan Hanley 2009-10)	This layer of information includes the following datasets: • *Clare Study to Identify Practical Measures to address Flooding at Carnmore/Cashla* (OPW, August 2010) (Figure 2.1, Page 4 'Extents of flooding at Carnmore Cashla & Extent of flooding on River') • *Study to Identify Practical Measures to address Flooding on the Clare River* (OPW, 2010) (Drawings 101-104)	Coverage provided along Clare River and in parts of Baile Chláir (Claregalway), Carnmore and Cashla	Coverage limited
Flood Time Water Body November 2009 (Satellite Imagery) (Flood Extent)	This dataset was extracted using remote sensing of satellite data taken during the November 2009 flood event given to the OPW by SERTIT, France.	County wide for the 2009 event (most flooding in east and south of the county)	Dataset notes 'limitations due to the scale, resolution, data and interpretation of the original source materials'.

Information Source	Description	Spatial Spread	Strategic Limitations
OPW Aerial Photos/Local Knowledge (Flood extent) November 2009	This dataset was digitised from OPW oblique aerial photos of the November 2009 flood event using local knowledge in Galway County Council.	Includes area affected by the 2009 flood event along the Clare River	Potential errors in digitising and in local knowledge
Alluvium Soils	Mineral alluvial soil mapping is indicative of recurrent or significant fluvial flooding at some point in the past and was generated by Teagasc with co-operation of the Forest Service, EPA and GSI. This project was completed May 2006.	Identified where alluvial soil occurs across the county	Drainage may have changed significantly since the laying down of these soils
Benefitting lands (OPW)	Benefitting lands mapping is a dataset identifying land that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land estimated or reported to be subject to flooding or poor drainage.	Coverage in East Galway, on lands close to the shores of Lough Corrib and in more localised locations in the west of the county	Identifies broad areas - low resolution for flood risk management
Drainage Districts (OPW)	This drainage scheme mapping dataset was prepared on behalf of the Drainage Districts (Local Authorities with statutory responsibility for maintenance under the Arterial Drainage Act, 1925). These maps identify land that might benefit from the implementation of Arterial (Major) Drainage Schemes and indicate areas of land subject to flooding or poor drainage.	Coverage in East Galway	Identifies large broad areas - very low resolution for flood risk management
Land Commission (OPW)	This dataset indicates areas of land defended to some degree against flooding that were formerly the responsibility of the Land Commission.	Little coverage e.g. Owendalulleegh River at Derreen	Coverage limited
Road Closures & Lengths November 2009	This datasets is from Galway County Council Roads Department and identifies the road closures and major roads closed during the November 2009 event. The road lengths (lines) which have been drawn are approximate and are compiled entirely of eye witness, anecdotal evidence mainly noted over the phone from area staff and members of the public i.e. no surveying was involved.	Coverage mainly in the east of the county	Potential errors in evidence and approximated closed roads lengths

Table 2.1 Historical Flood Risk Indicator Mapping I

Information Source	Description	Spatial Spread	Strategic Limitations
'Liable to flood' markings on the historic OSI '6 Inch' maps	The Ordnance Survey of Ireland (OSI) 6" mapping identifies broad areas as being *Liable to Floods.*	Areas identified at locations across the county	There are several limitations to the use of this mapping, such as the following: • The OSI maps simply show the text Liable to Floods without delineating the extent of these areas. For the purposes of these draft maps a GIS system has been used to indicate the likely potential extent of these areas. • As these maps were based on survey work carried out from 1833-1844 with many updated in the 1930s and 40s, they do not show or take any account of recent changes including changes in surface drainage, such as development in floodplains, road realignments or drainage works for forestry or agriculture. So there is significant potential that flood risk in some areas may have increased or reduced since they were prepared.
CAAS Extrapolation of Areas Liable to Floods digitised from 6'' OSI mapping[1]	Areas liable to floods were extrapolated by CAAS and digitised from the 6" OSI mapping. *Liable to floods* text was identified on the map sheets and then surrounding field boundaries were used in order to delineate the areas liable to flood. The extrapolated areas include (as identified by the 6" field boundaries): a. Any field which is beneath '*Liable to Floods'* words; b. All contiguous fields (whole fields are included) containing an Ozier/Reed/Marsh symbol (these are vegetation symbols included on the 6" maps which are indicative of wet/water logged soil).	Areas identified at locations across the county	Drainage may have changed significantly since the preparation of the OSI mapping.

Table 2.2 Historical Flood Risk Indicator Mapping II

[1] Note that in recent years, OSI produced a layer of data entitled 'Historic Flood Plains' was. Use was made of information on both the historic 6" maps and 25" OSI maps. Due to the absence of line work on the historic maps to indicate the boundary of flood areas, operators were required to create zones around *Liable to Floods* text and other historic mapping symbology to represent the extent of flooded areas. On the 6" data line work such as field boundaries was used to create the polygons. A number of inconsistencies and omissions were identified in this information. Some of the inconsistencies were identified as being a result of the absence of undertaking any edge matching of the map sheets. Due to the extent of inconsistencies and omissions, this dataset is not included in this report.

2.2.2 New Flood Risk Indicator Mapping from the OPW

In recent years, the OPW has published flood risk indicator data based on analysis and modelling (see Table 2.3).

The OPW are currently scheduled to publish new Flood Hazard and Risk Maps for Areas for Further Assessment (AFAs) in 2014. The OPW are also scheduled to prepare Flood Risk Management Plans focused on prevention, protection and preparedness by the end of 2015. The Flood Risk Management Plans will include measures to reduce the probability of flooding and its potential consequences.

Preliminary Flood Risk Assessment data described on Table 2.3 is mapped on a county level on Figure 2.2 and in Appendix II on a larger scale for ten zones within the County.

Information Source	Description	Spatial Spread	Strategic Limitations
OPW Preliminary Flood Risk Assessment Fluvial, Coastal, Groundwater and Pluvial flood maps	The OPW Preliminary Flood Risk Assessment mapping dataset has been arrived at by: • Reviewing records of floods that have happened in the past; • Undertaking analysis to determine which areas might flood in the future, and what the impacts might be; and • Extensive consultation with each local authorities and other Government departments and agencies. This assessment has considered all types of flooding, including that which can occur from rivers, the sea and estuaries, heavy rain, groundwater, the failure of infrastructure, and so on. It has also considered the impacts flooding can have on people, property, businesses, the environment and cultural assets. Further information on the purpose and development of the OPW PFRA Maps are available on www.cfram.ie.	County wide	The PFRA is only a preliminary assessment, based on available or readily derivable information. Analysis has been undertaken to identify areas prone to flooding, and the risks associated with such flooding, but this analysis is purely indicative and undertaken for the purpose of completing the draft PFRA. The mapping has been developed using simple and cost-effective methods and is based on broad-scale simple analysis and may not be accurate for a specific location/use.
National Coastal Protection Strategy Study flood and coastal erosion risk maps	The predicted flood extents which were produced under the Irish Coastal Protection Strategy Study (ICPSS) are based on analysis and modelling. The project included: • Analysis of historic recorded sea levels • Numerical modelling and statistical analysis of combined tide levels and storm surges to estimate extreme water levels along the national coastline for defined probabilities • Calculation of the extent of the predictive flooding, by comparing calculated extreme tide and surge waters levels along the coast with ground level based on a Digital Terrain Model (DTM). These indicative national coastal flood maps are included in the Draft PFRA Maps, provided in a separate volume, for the purposes of consultation on the PFRA.	County wide	The mapping in this study has been undertaken for strategic purposes. The maps should not be used to assess the flood hazard and risk associated with individual properties or point locations, or to replace a detailed local flood risk assessment. Local factors such as flood defence schemes, structures in or around river channels (e.g. bridges), buildings and other local influences, which might affect a coastal flood, have not been accounted for.
Emerging data from the Western and Shannon International CFRAM Studies	Emerging data from the Western and Shannon CFRAM Studies - such as that contained in the Flood Risk Reviews for certain settlements - may inform lower tier plans or planning applications. The Western and Shannon CFRAM Flood Risk Reviews were undertaken to help validate the findings of the PFRA, informing decisions on which sites will be taken forward as Areas for Further Assessment (AFAs) for a more detailed assessment within the CFRAM Programmes. There has been 14 AFAs identified for Galway County Council's administrative area as follows: Ahascragh, Athenry, Ballinasloe, Baile Chláir (Claregalway), Clifden, Corrofin, Gort, Kinvarra, Loughrea, Oranmore, Oughterard, Portumna, Roundstone and Tuam.	AFAs in particular	Various, depending on output.
	As previously noted, the OPW are currently scheduled to publish new Flood Hazard and Risk Maps for AFAs in 2014. Should Flood Hazard Mapping be released by the OPW during the Plan preparation process then this SFRA will be updated to take account of this information.	AFAs in particular	Not applicable (currently not available).

Table 2.3 New Flood Risk Indicators for the OPW

2.2.3 Other Existing Sources of Information

Other sources of information available to be considered at the appropriate plan level or at planning application level, alongside the mapped indicators identified above, include the following:

- Photography including Aerial Photography;
- Local Knowledge;
- Regional Planning Guidelines for the West Region and associated Regional Flood Risk Appraisal; and
- River Basin Management Plans and associated documents.

With regard to flood risk management infrastructure, the Council have completed flood defences to protect over 50 houses which were flooded in November 2009 in Derrymullen, Ballinasloe. Also planned is a flood defence wall around the Water Treatment Plant at Derrymullen which was also flooded in November 2009.

In addition to this flood defence/management infrastructure, there are two small coastal protection/defence structures on the west coast that mainly prevent road flooding.

2.3 Flood Risk Zones

SFRAs (available from www.galway.ie) have been undertaken for a number of lower tier land use plans with the administrative area of Galway County Council as part of plan-preparation processes which are separate to the County Development Plan preparation process.

These SFRAs have included the delineation of flood risk zones (for explanation of flood risk zones see Section 1.5.4.4).

SFRA has been undertaken for and has informed the review of the following Plans:

1. Athenry Local Area Plan 2012-2018;
2. Gort Local Area Plan 2013-2019;
3. Loughrea Local Area Plan 2012-2018;
4. Maigh Cuilinn (Moycullen) Local Area Plan 2012-2018; and
5. Oranmore Local Area Plan 2012-2018.

In addition, SFRA has been undertaken for and has informed Proposed Amendments to the following Plans:

6. Clifden Local Area Plan 2009-2015;
7. Bearna Local Area Plan 2007-2013 and as extended to 2017; and
8. Gaeltacht Local Area Plan 2008-2014 and as extended to 2018.

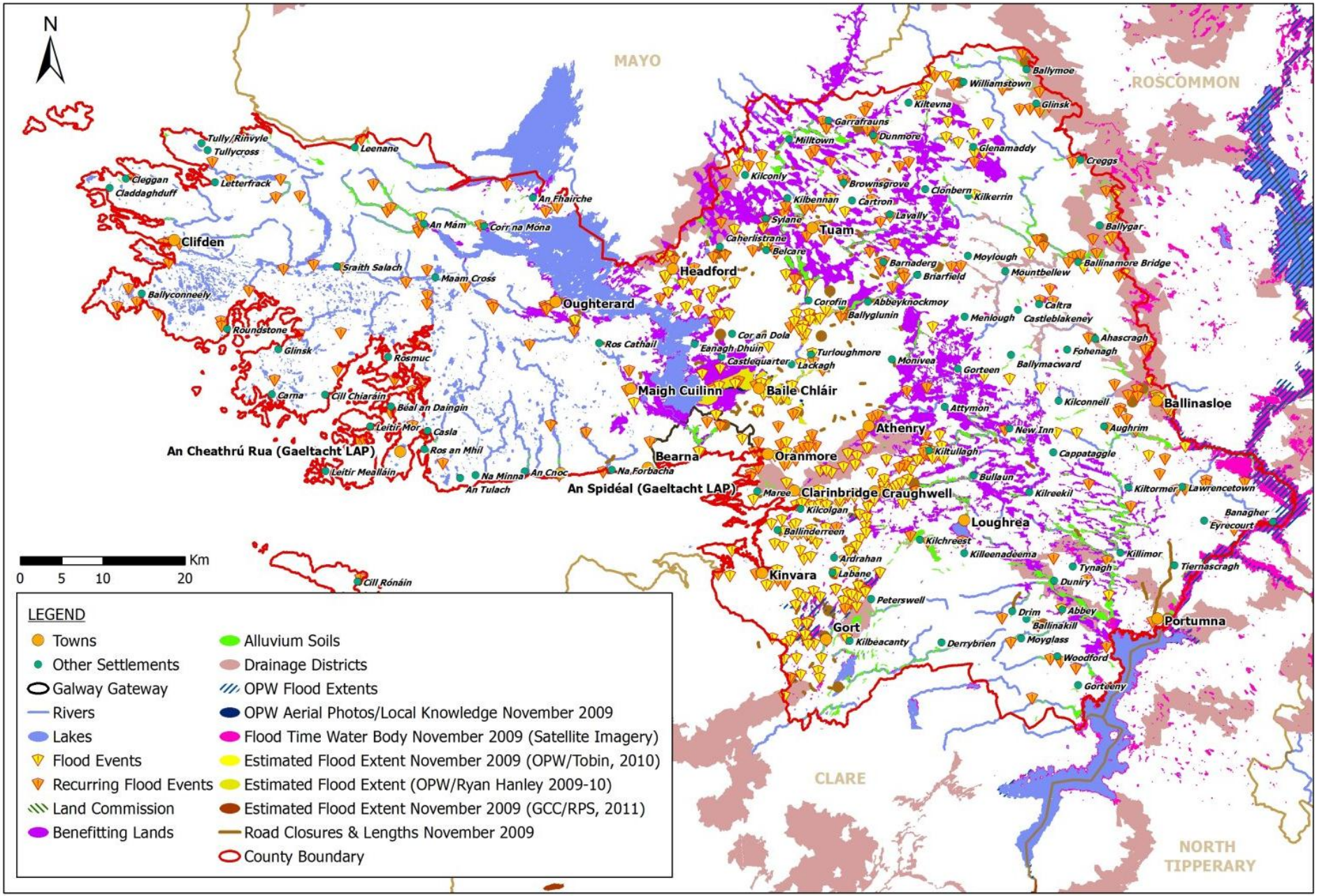

Figure 2.1 Occurrence of Available Historical Flood Risk Indicators in County Galway

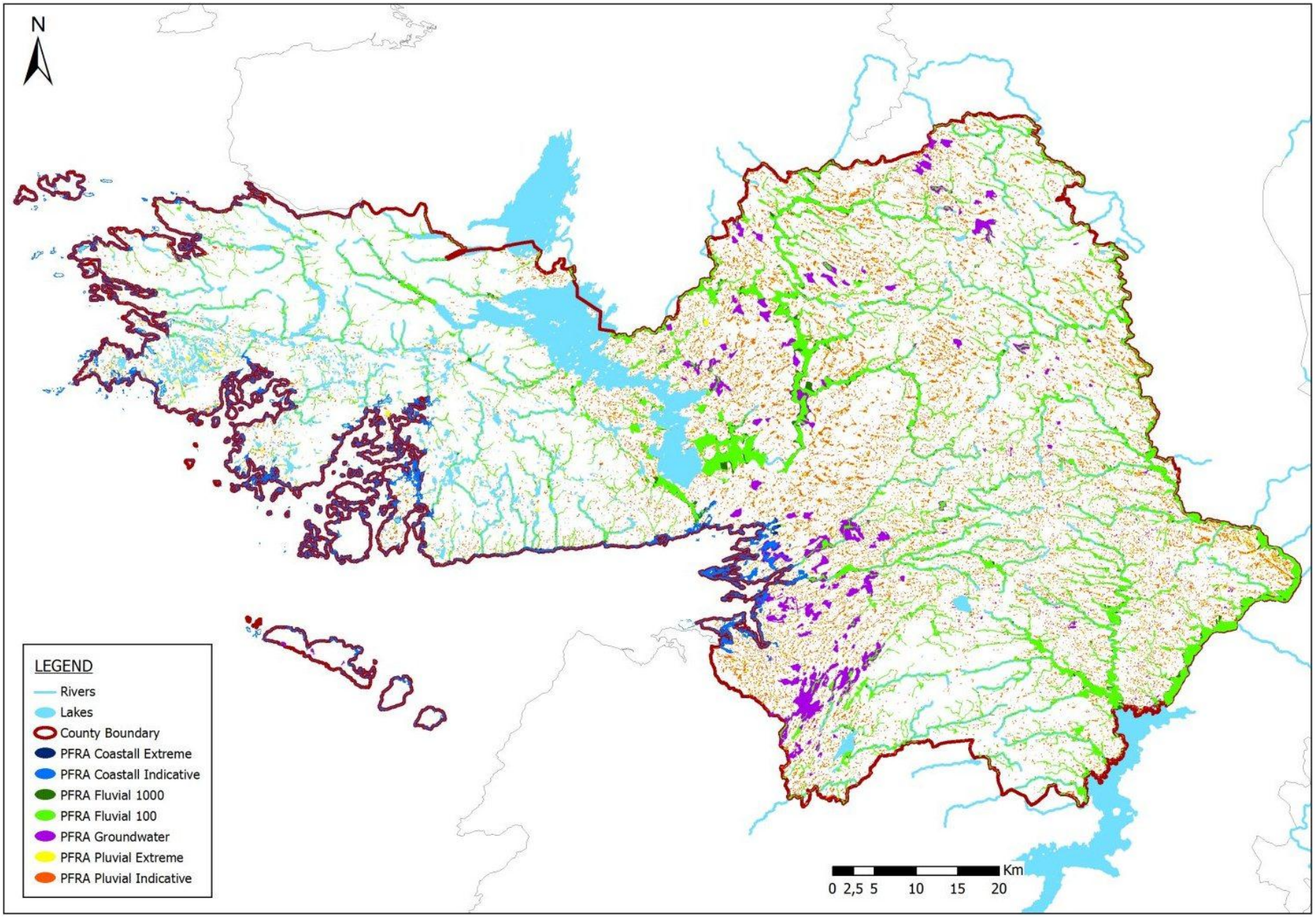

Figure 2.2 Occurrence of Preliminary Flood Risk Assessment Areas in County Galway

Section 3 Recommendations

This section suggests measures that have been integrated into the Galway County Development Plan 2015-2021. These measures will contribute towards both flood risk management in the county and compliance with the Flood Risk Management Guidelines.

No.	Title	Provision	Integrated through Plan measure
1	**Floods Directive, Regulations and CFRAMS**	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 FL1- Flood Risk Management Guidelines
2	**Catchment Planning**	The Council will actively work with the CFRAM Programme and catchment based Flood Planning Groups, especially in the east of the County where catchments go beyond the Council's administrative boundary, in the development and implementation of catchment-based strategies for the management of flood risk - including those relating to storage and conveyance.	Policy FL 2 – Catchment Planning
3	**Protection of water bodies etc. and buffers**	Protect water bodies and watercourses within the County from inappropriate development, including rivers, streams, associated undeveloped riparian strips, wetlands and natural floodplains. This will include protection buffers in riverine, wetland and coastal areas as appropriate.	Objective FL3 - Protection of Waterbodies and Watercourses
4	**Improvement and/or Restoration of Natural Flood Risk Management Functions**	Where resources are available and subject to compliance with the Habitats and Birds Directives, the Council will contribute towards the improvement and/or restoration of the natural flood risk management functions of flood plains.	Policy FL3 – Improvement and/or Restoration of Natural Flood Risk Management Functions
5	**Surface Water Drainage and SuDS**	Maintain and enhance, as appropriate, the existing surface water drainage system in the County. Ensure that new developments are adequately serviced with surface water drainage infrastructure and promote the use of Sustainable Drainage Systems in all new developments. Surface water runoff from development sites will be limited to pre-development levels and planning applications for new developments will be required to provide details of surface water drainage and Sustainable Drainage Systems proposals.	Objective FL2 – Surface Water Drainage and Sustainable Drainage Systems (SuDs)
6	**Principles of the FRM Guidelines**	The Council shall implement the key principles of flood risk management set out in the Flood Risk Management Guidelines as follow: • Avoid development that will be at risk of flooding or that will increase the flooding risk elsewhere, where possible; • Substitute less vulnerable uses, where avoidance is not possible; and • 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	Policy FL4 – Principles of the Flood Risk Management Guidelines

		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.	
7	**SFRA of lower tier plans**	Lower tier plans shall undertake SFRA (Strategic Flood Risk Assessment) in compliance with the Flood Risk Management Guidelines and in consultation with the OPW.	Policy FL5 – SFRA of Lower Tier Plans
8	**FRA for Planning Applications & CFRAMS**	Site-specific Flood Risk Assessment (FRA) is required for all planning applications in areas at risk of flooding, even for developments appropriate to the particular Flood Zone. The detail of these site-specific FRAs will depend on the level of risk and scale of development. A detailed site-specific FRA should quantify the risks, the effects of selected mitigation and the management of any residual risks. The Council shall have regard to the results of any CFRAM Studies in the assessment of planning applications.	Objective FL4 – Flood Risk Assessment for Planning Applications & CFRAMS
9	**SFRA/FRA & Climate Change**	SFRAs and site-specific FRAs shall provide information on the implications of climate change with regard to flood risk in relevant locations. The 2009 OPW Draft Guidance on 'Assessment of Potential Future Scenarios for Flood Risk Management' (or any superseding document) shall be consulted with to this effect.	Objective FL5 – SFRA/FRA & Climate Change
11	**FRA & Environmental Impact Assessment (EIA)**	Flood risk may constitute a significant environmental effect of a development proposal that in certain circumstances may trigger a sub-threshold EIS. FRA should therefore be an integral part of any EIA undertaken for projects within the County.	Objective FL6 – FRA & Environmental Impact Assessment (EIA)

Table 3.1 Recommended Flood Risk Management Policies/Objectives

Appendix I: Available Historical Flood Risk Indicator Mapping for 10 County Zones

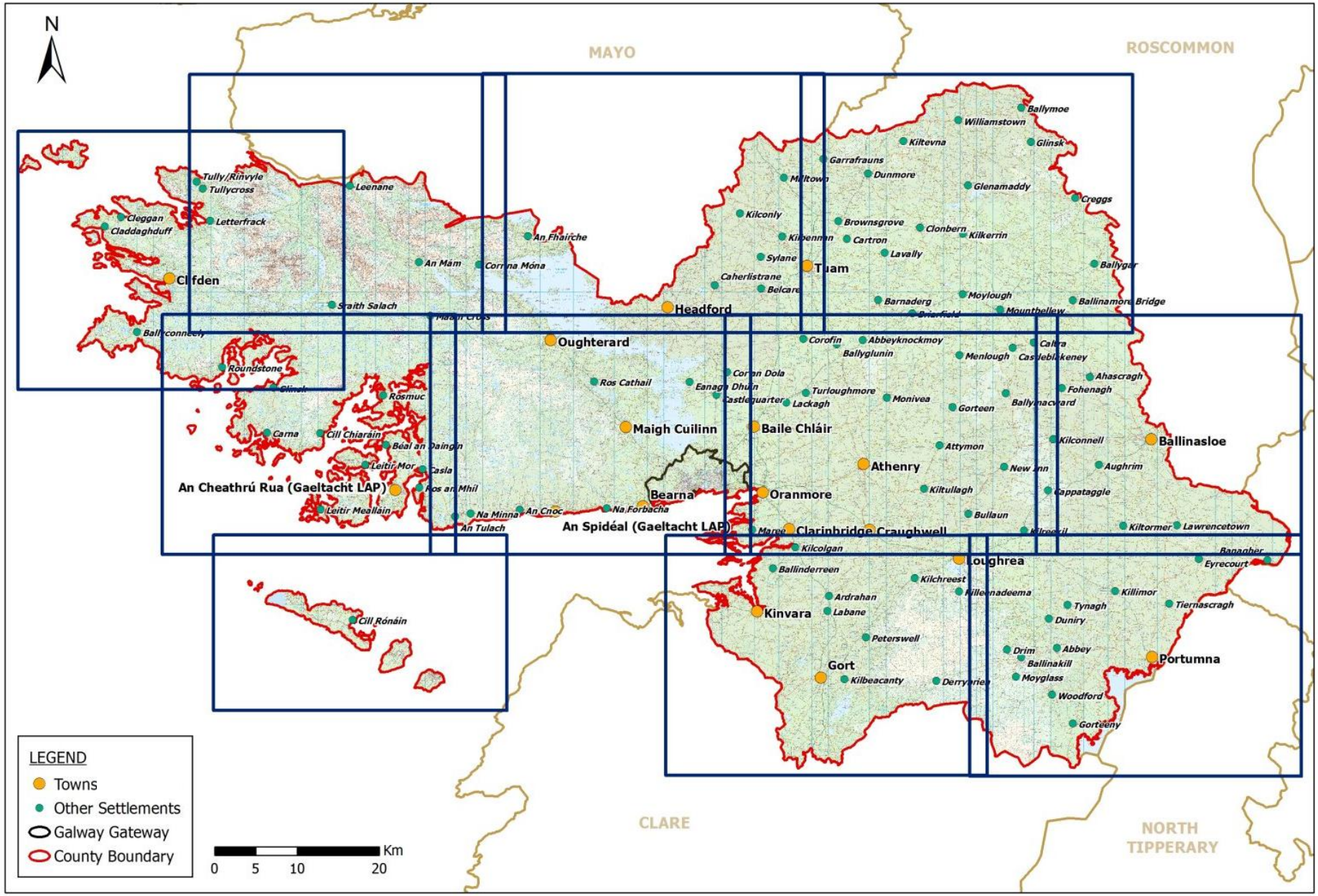

Figure AI.1 Zones Selected for Larger Scale Mapping of Available Historical Flood Risk Indicators

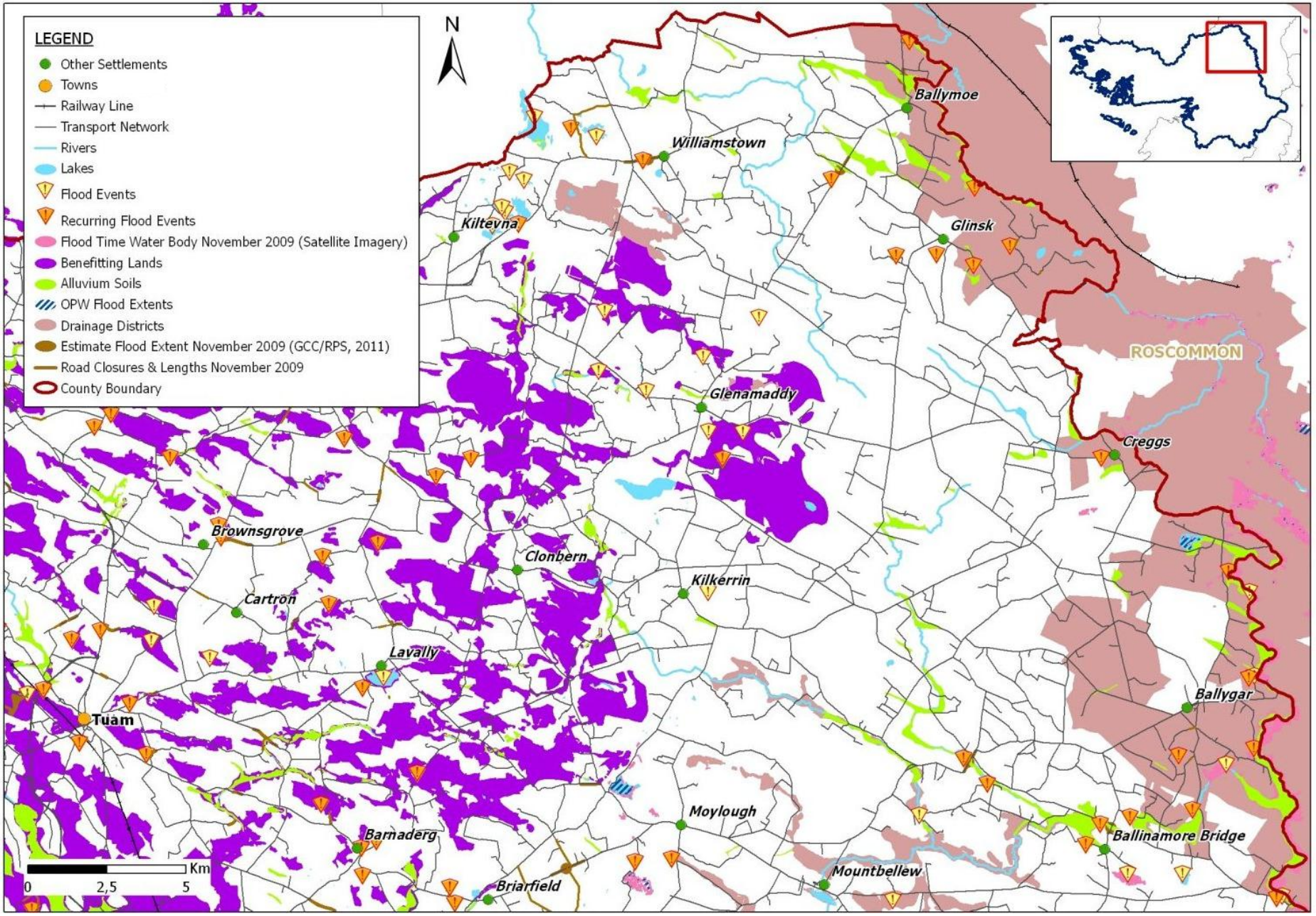

Figure AI.2 Available Historical Flood Risk Indicators - North East

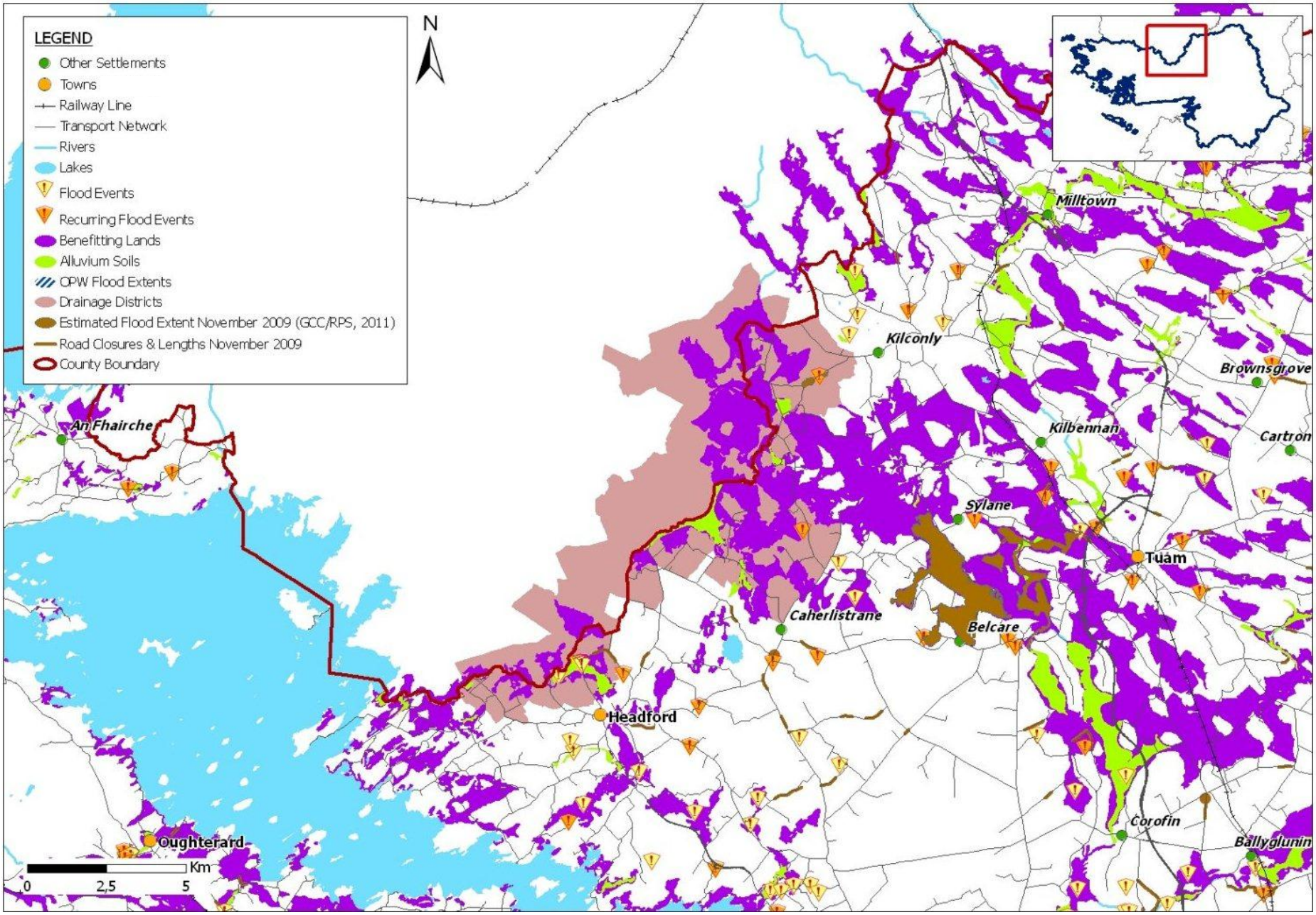

Figure AI.3 Available Historical Flood Risk Indicators - North Central East

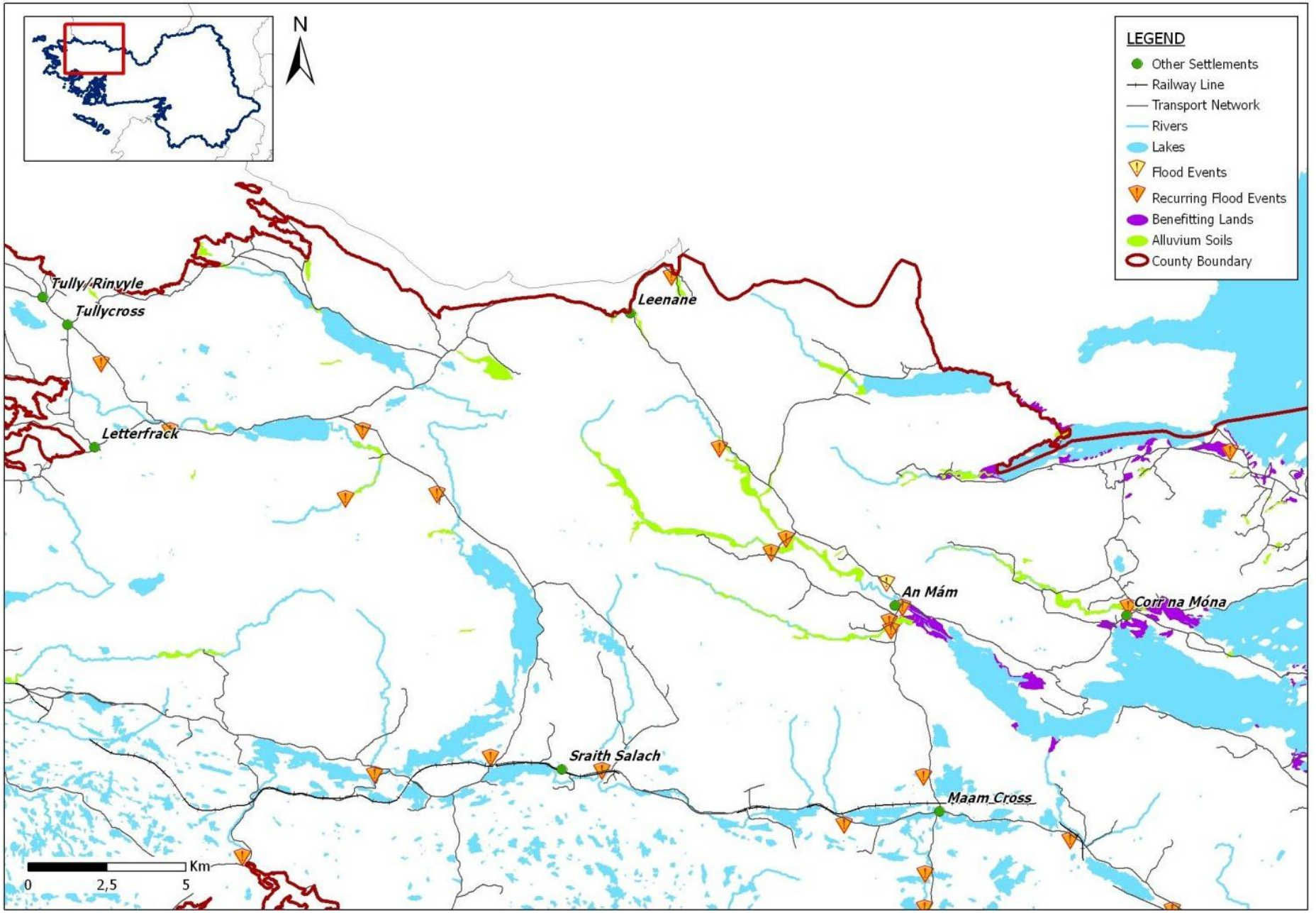

Figure AI.4 Available Historical Flood Risk Indicators - North Central West

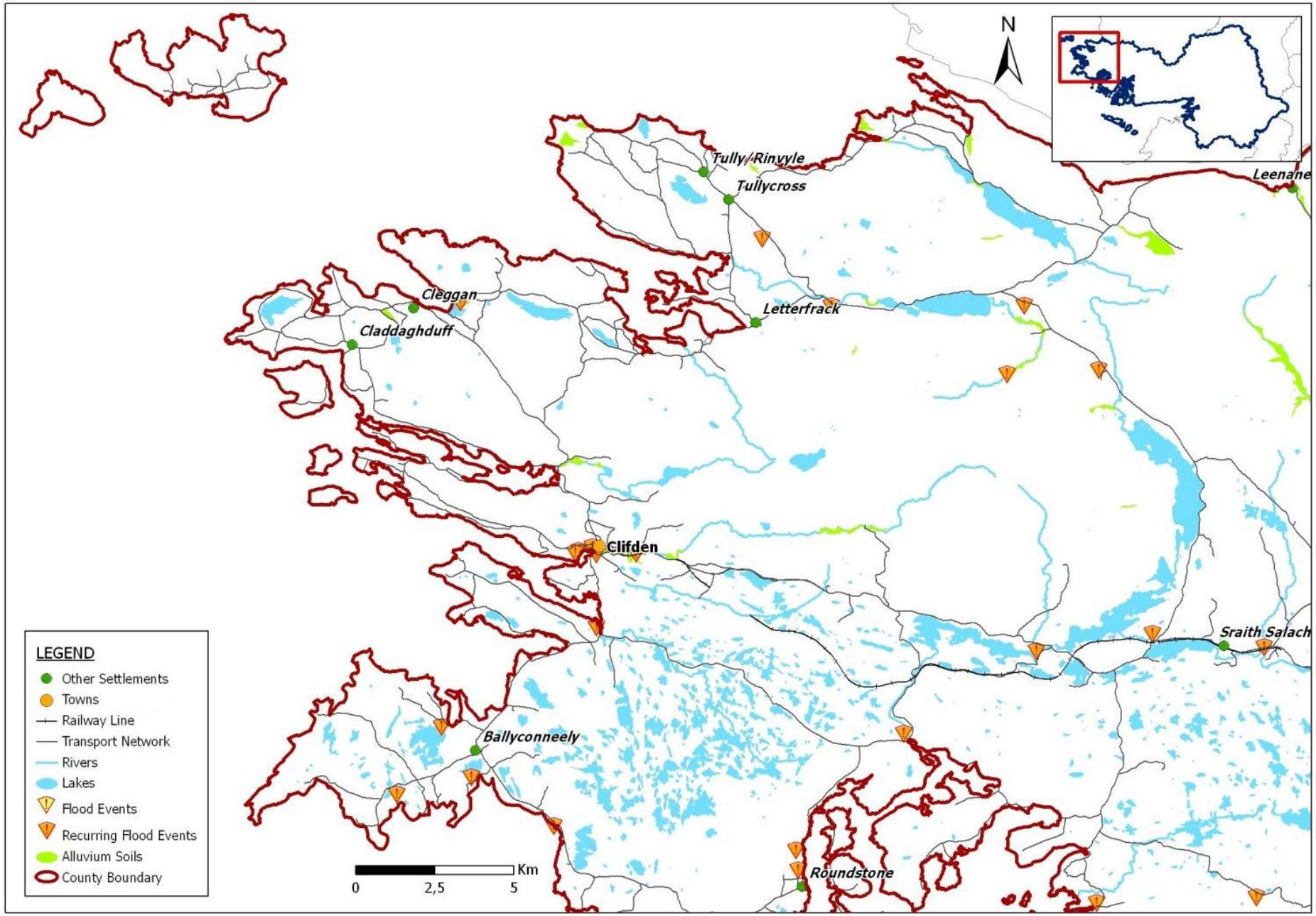

Figure AI.5 Available Historical Flood Risk Indicators - North West

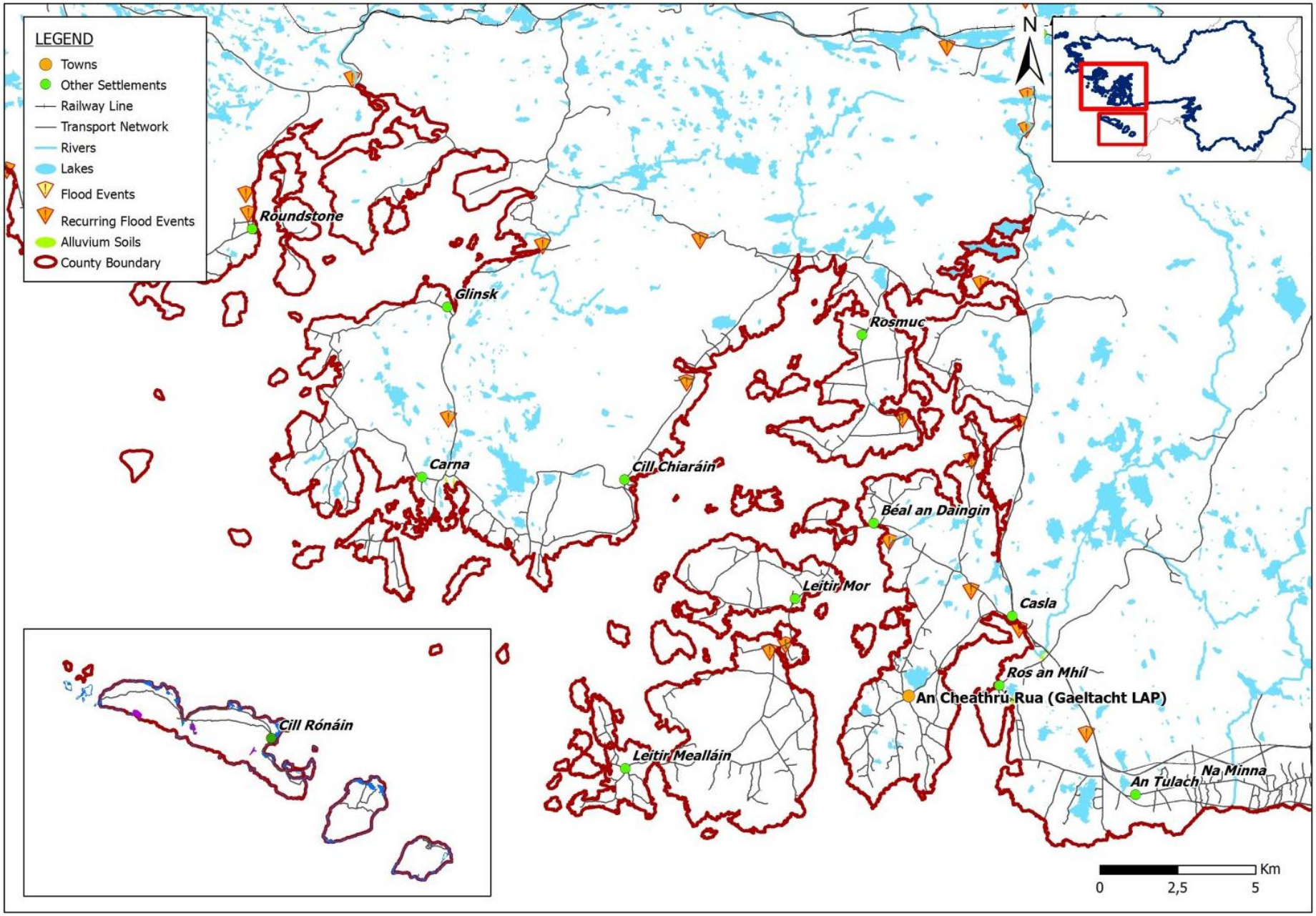

Figure AI.6 Available Historical Flood Risk Indicators - Central West (W)

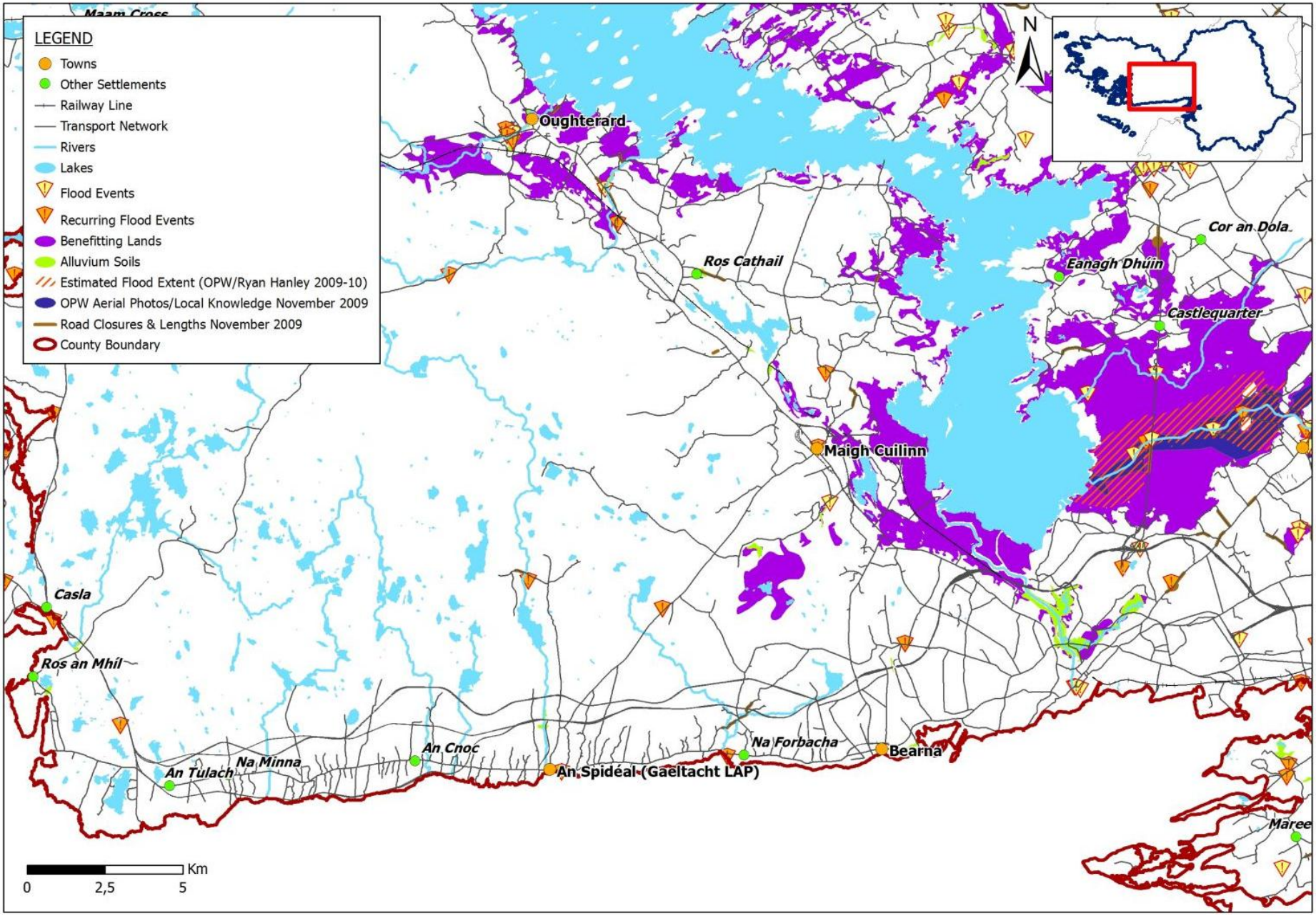

Figure AI.7 Available Historical Flood Risk Indicators - Central West (E)

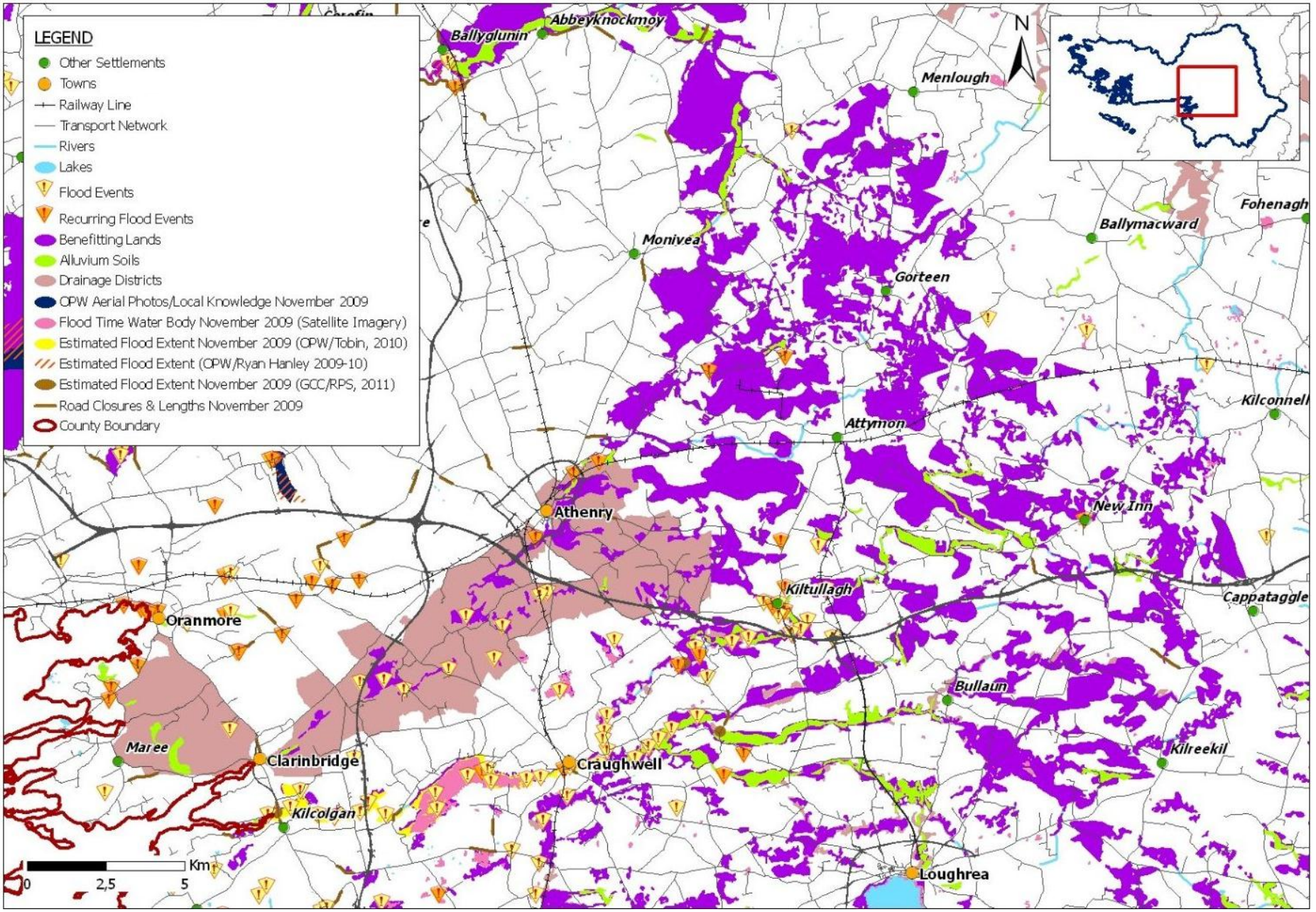

Figure AI.8 Available Historical Flood Risk Indicators - Central East (W) [version 1 with key on lhs]

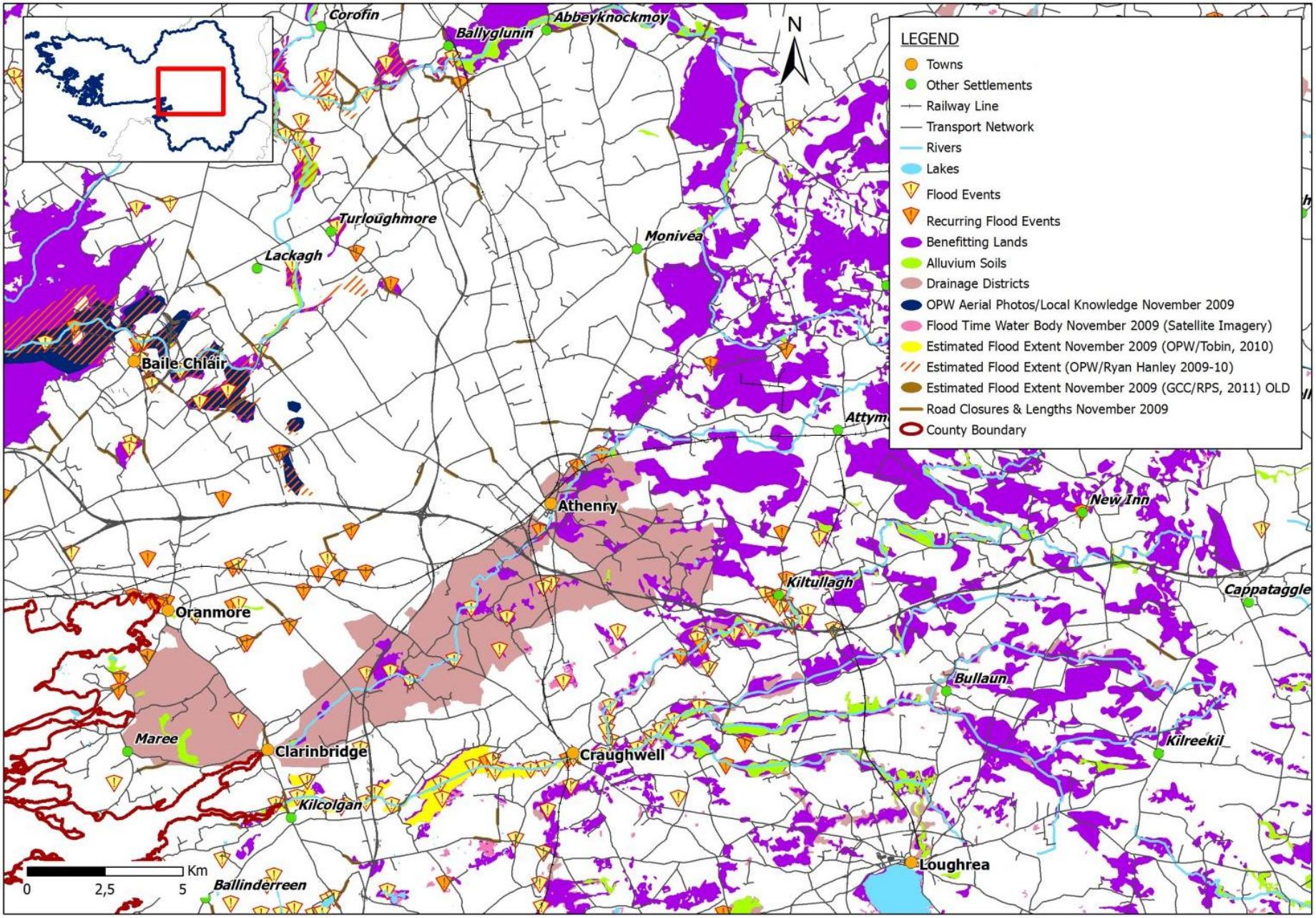

Figure AI.9 Available Historical Flood Risk Indicators - Central East (W) [version 2 with key on rhs]

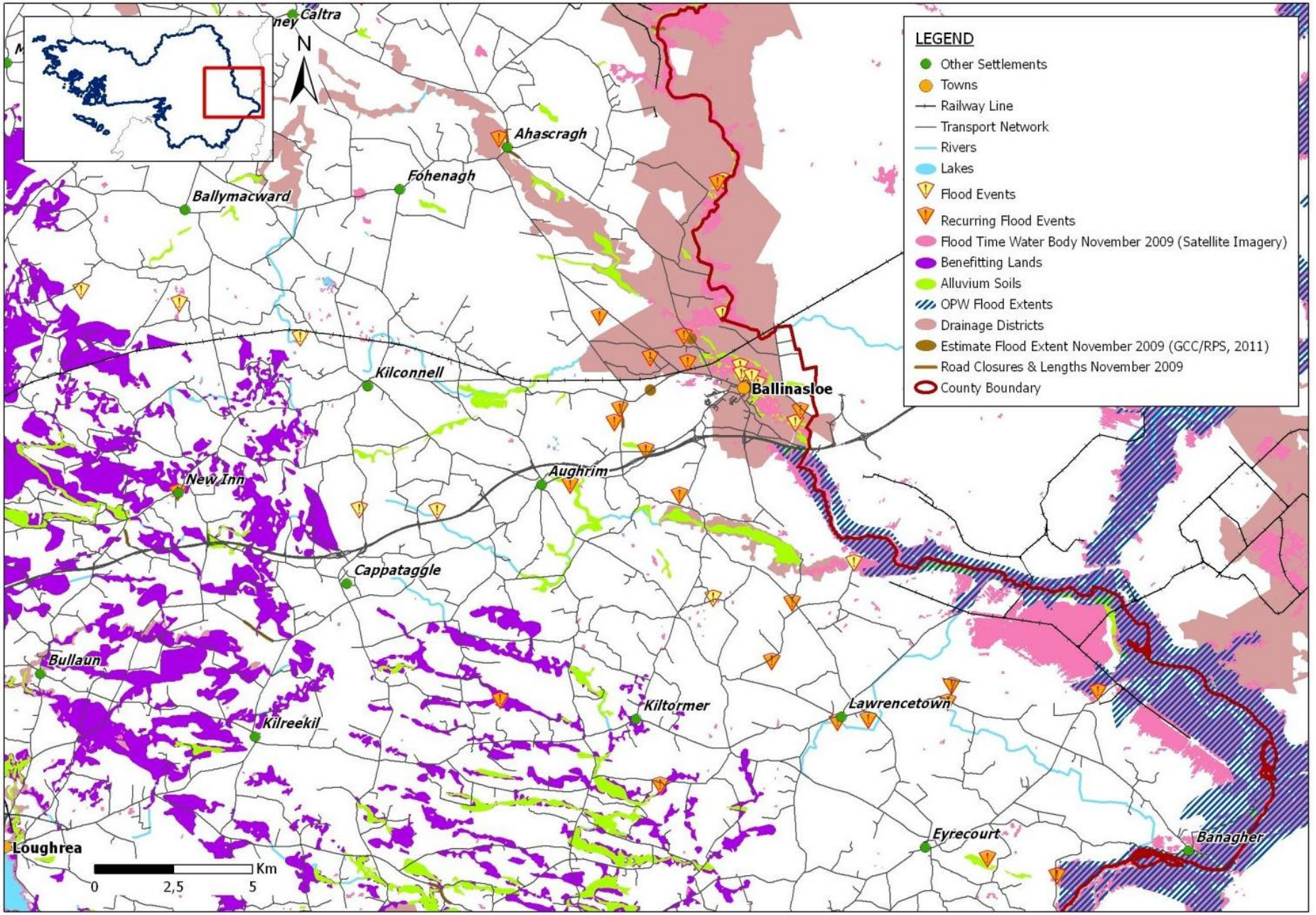

Figure AI.10 Available Historical Flood Risk Indicators - Central East (E)

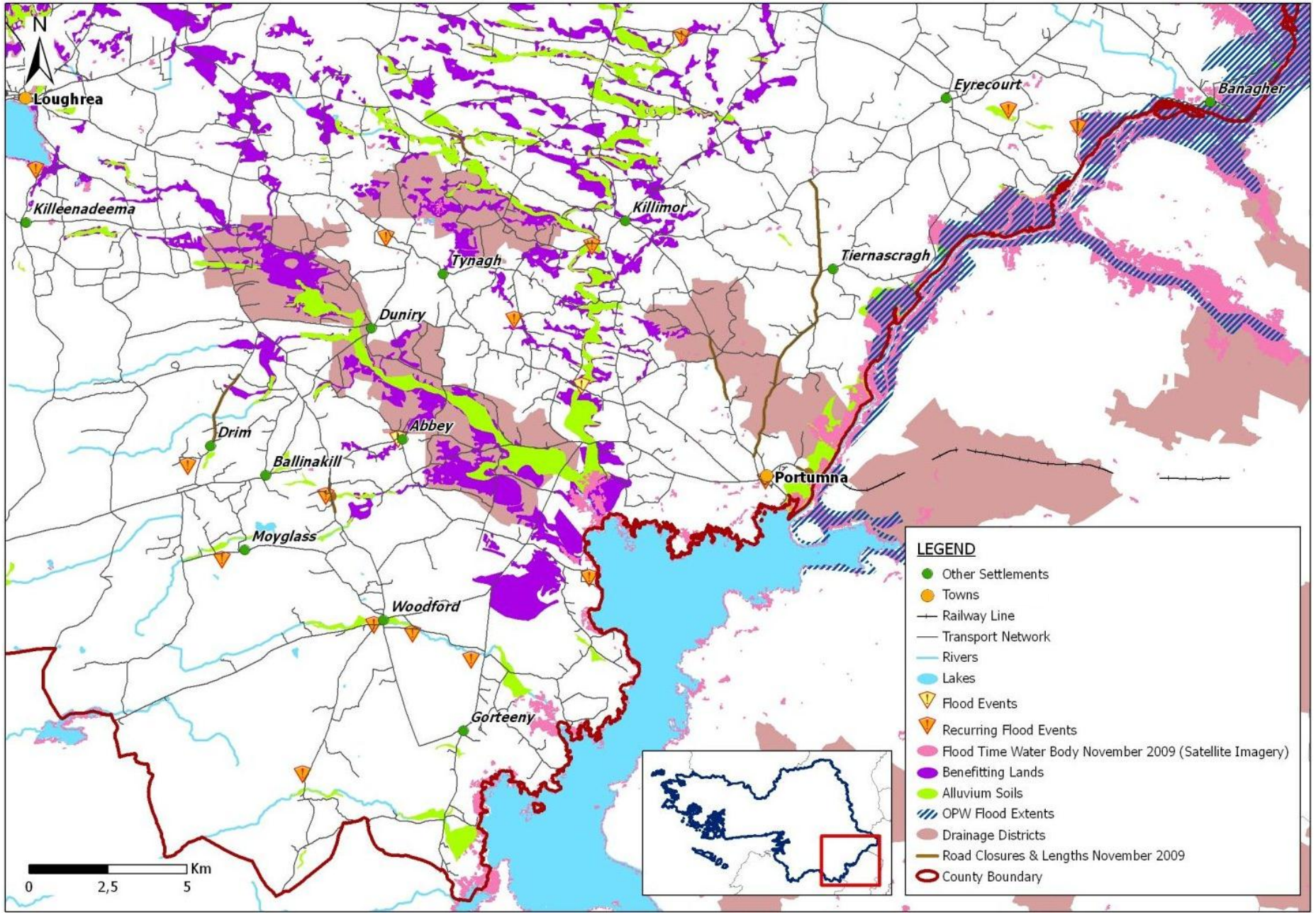

Figure AI.11 Available Historical Flood Risk Indicators - South East

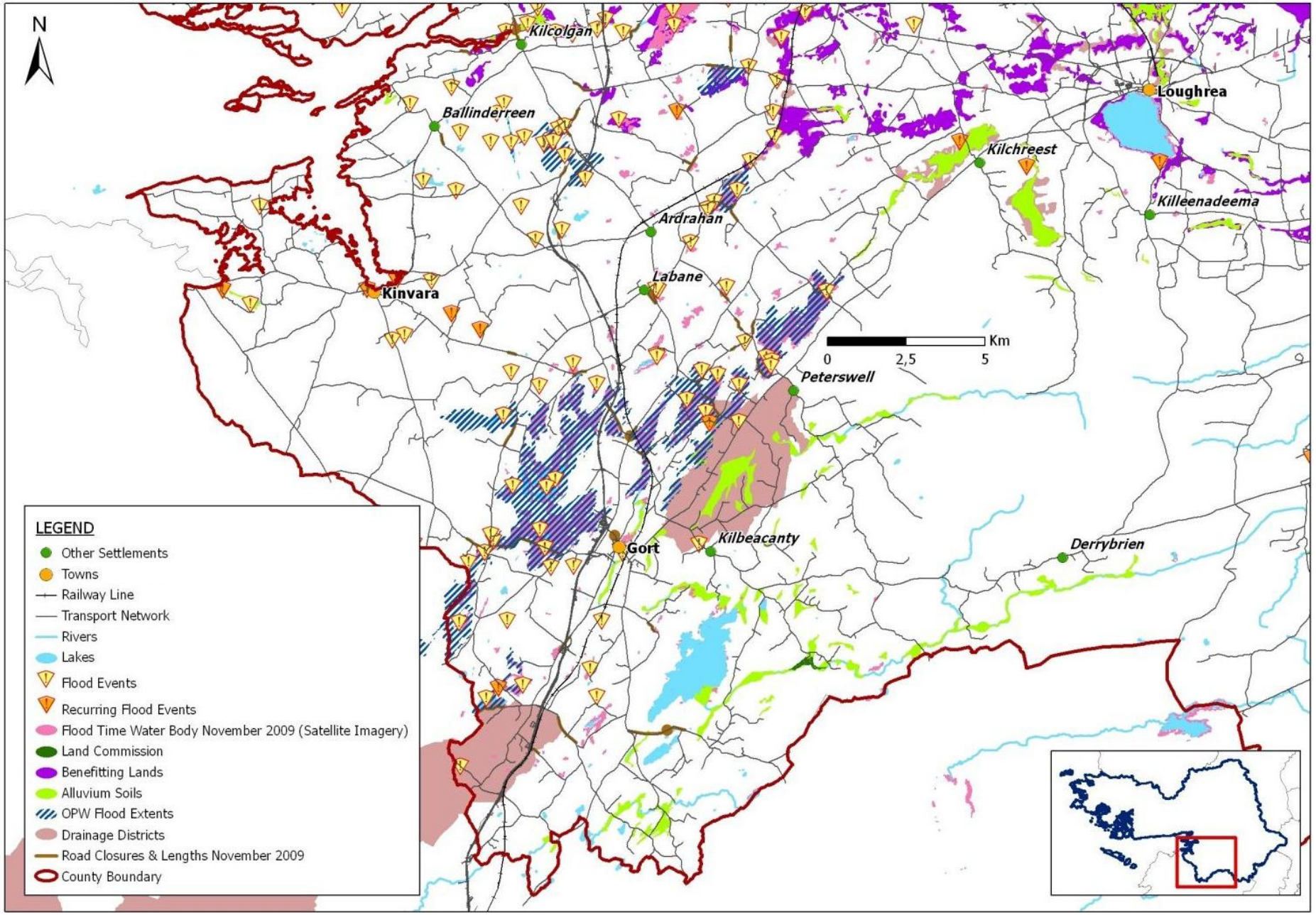

Figure AI.12 Available Historical Flood Risk Indicators - South West

Appendix II: Preliminary Flood Risk Assessment Mapping for 10 County Zones

It is reiterated that the Preliminary Flood Risk Assessment (PFRA) is only a preliminary assessment, based on available or readily derivable information. Analysis has been undertaken to identify areas prone to flooding, and the risks associated with such flooding, but this analysis is purely indicative and undertaken for the purpose of completing the draft PFRA. The mapping has been developed using simple and cost-effective methods and is based on broad-scale simple analysis and may not be accurate for a specific location/use.

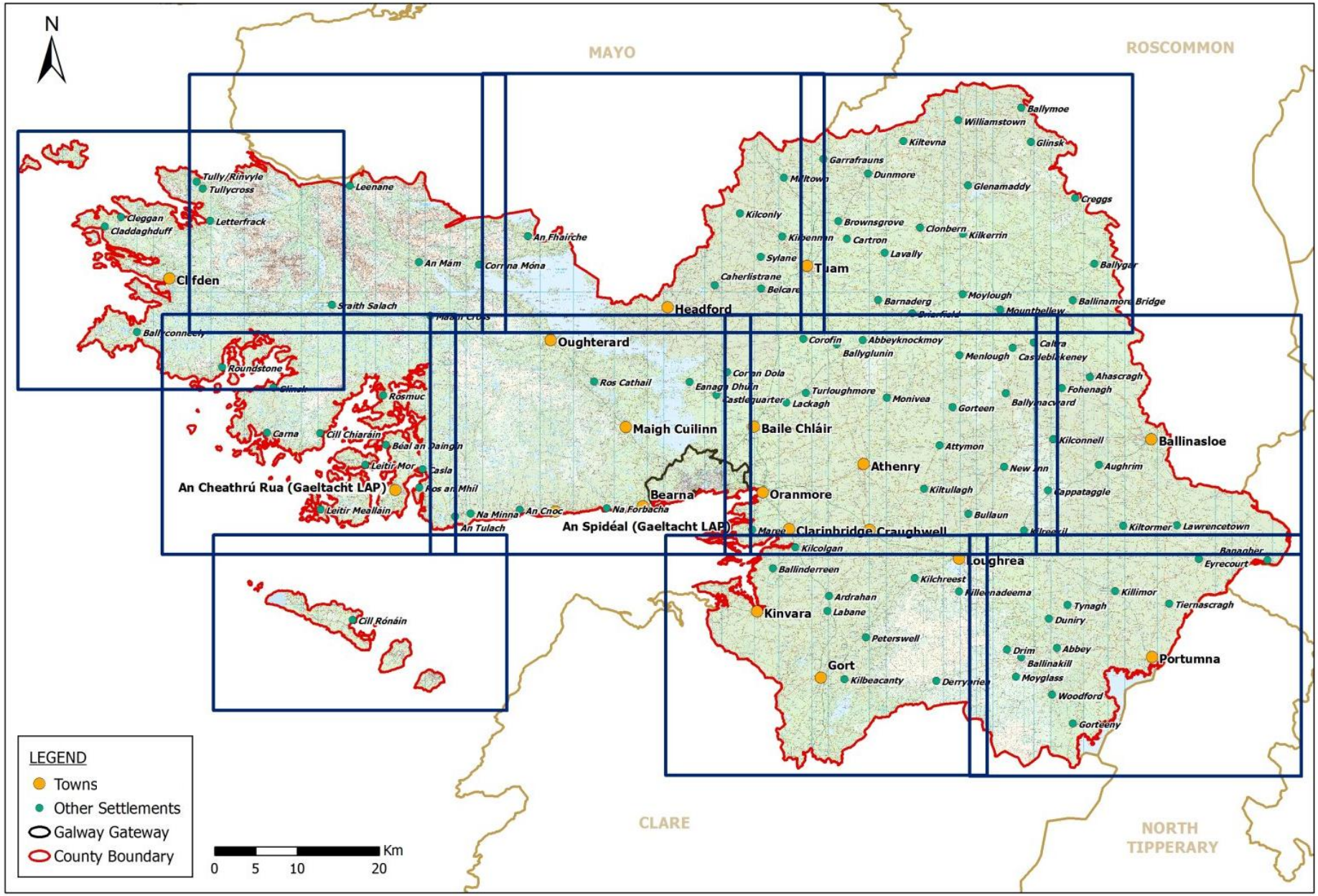

Figure AII.13 Zones Selected for Larger Scale Mapping of PFRA Areas

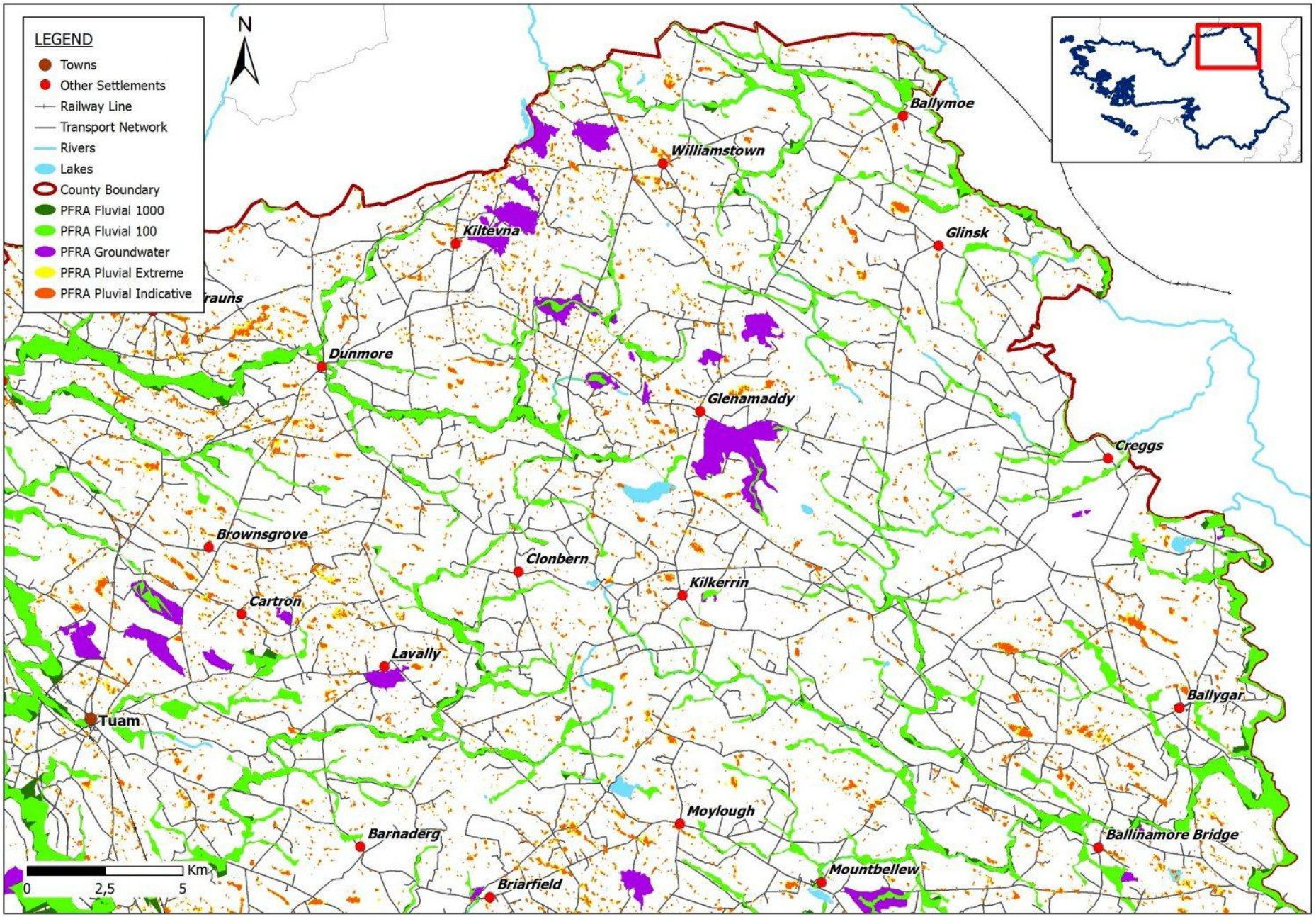

Figure AII.14 PFRA Flood Risk Areas - North East

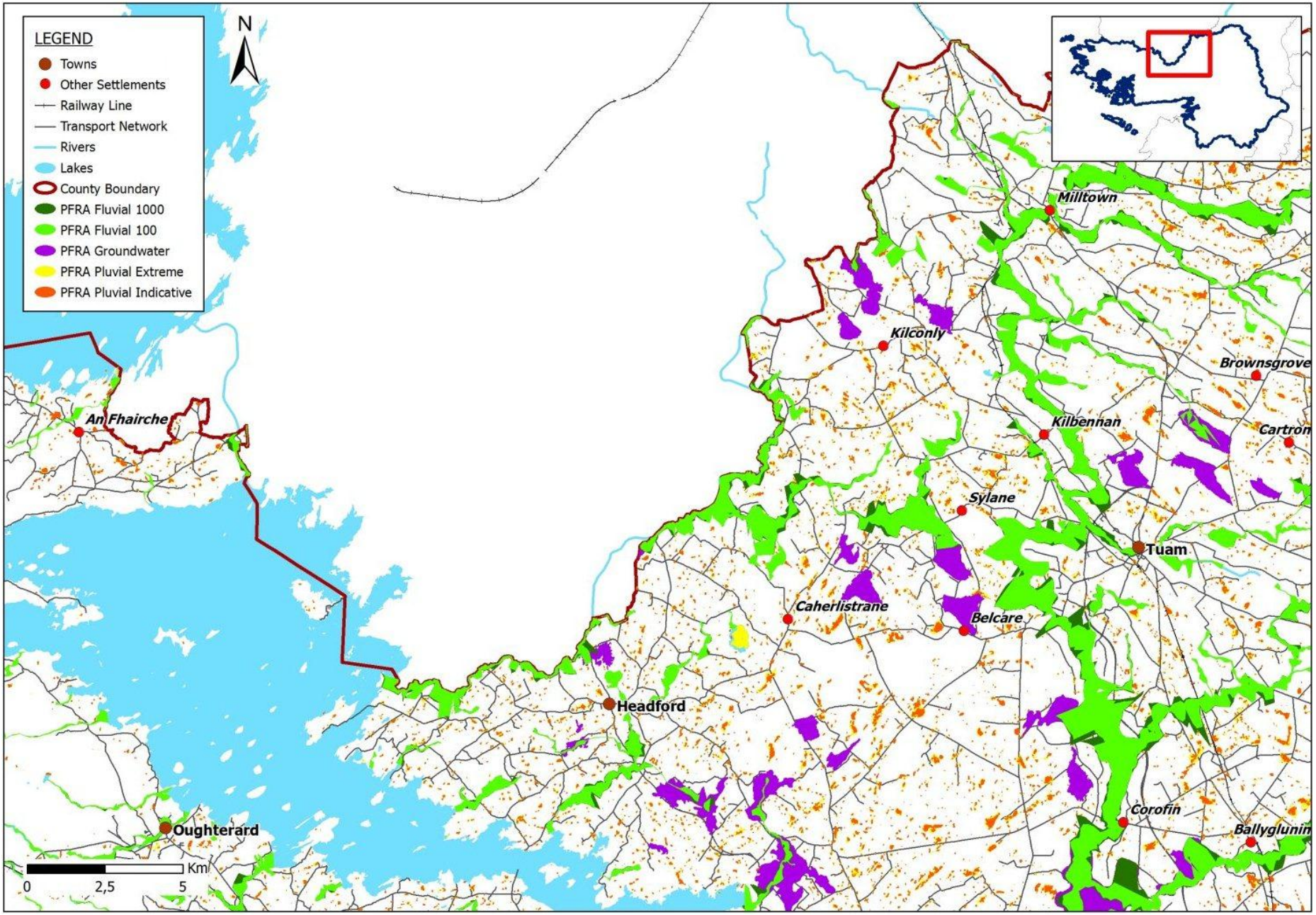

Figure AII.15 PFRA Flood Risk Areas - North Central East

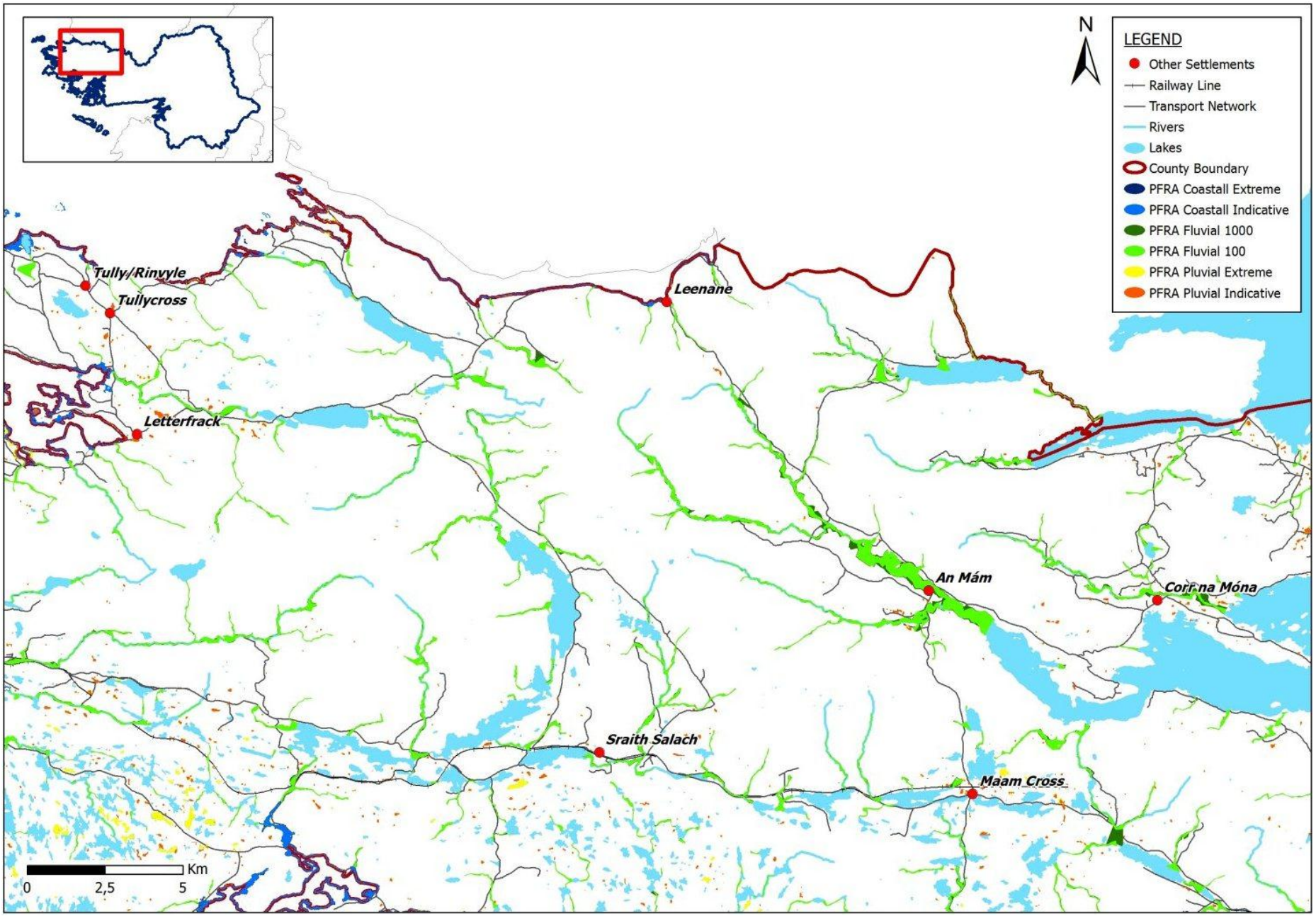

Figure AII.16 PFRA Flood Risk Areas - North Central West

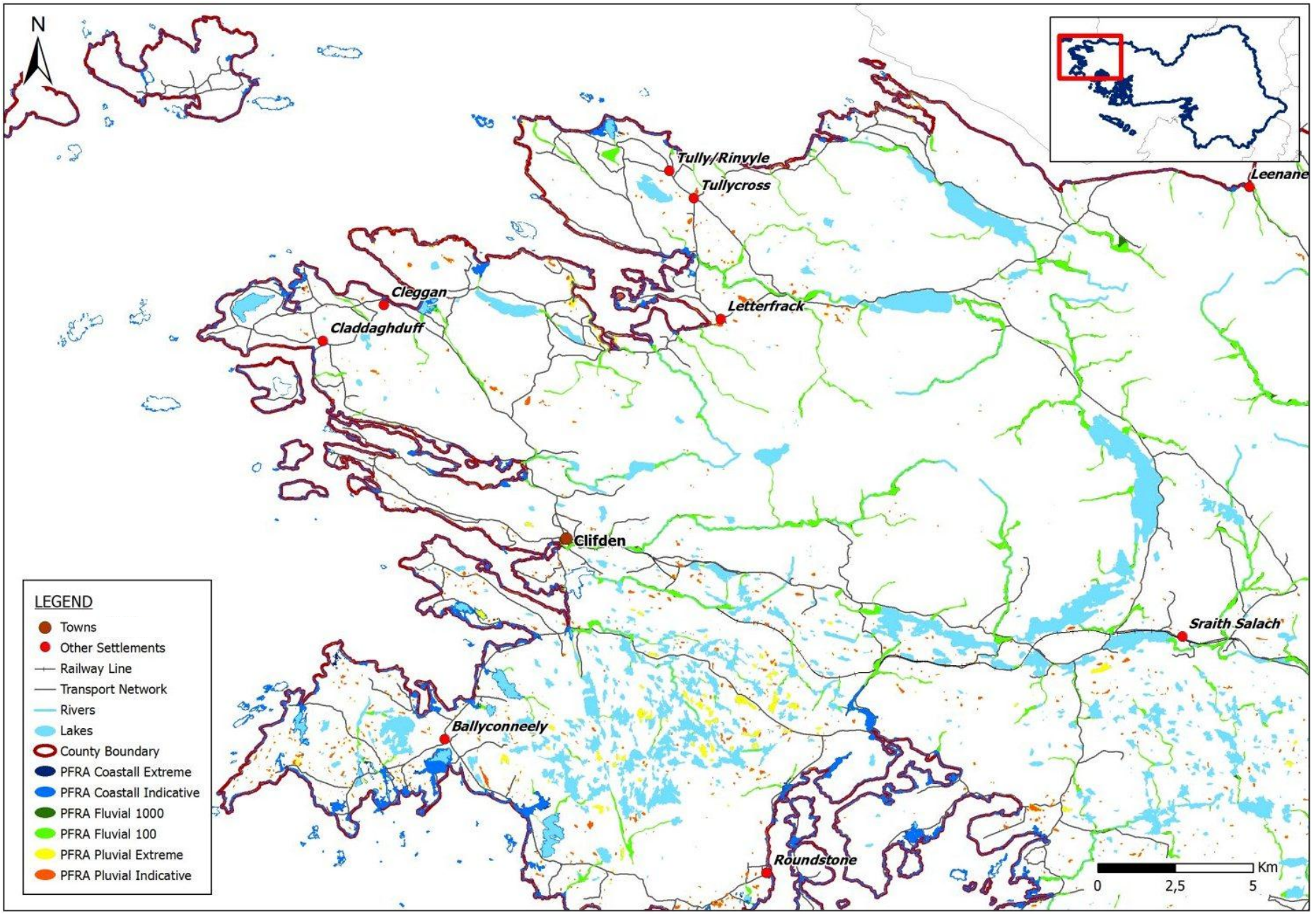

Figure AII.17 PFRA Flood Risk Areas - North West

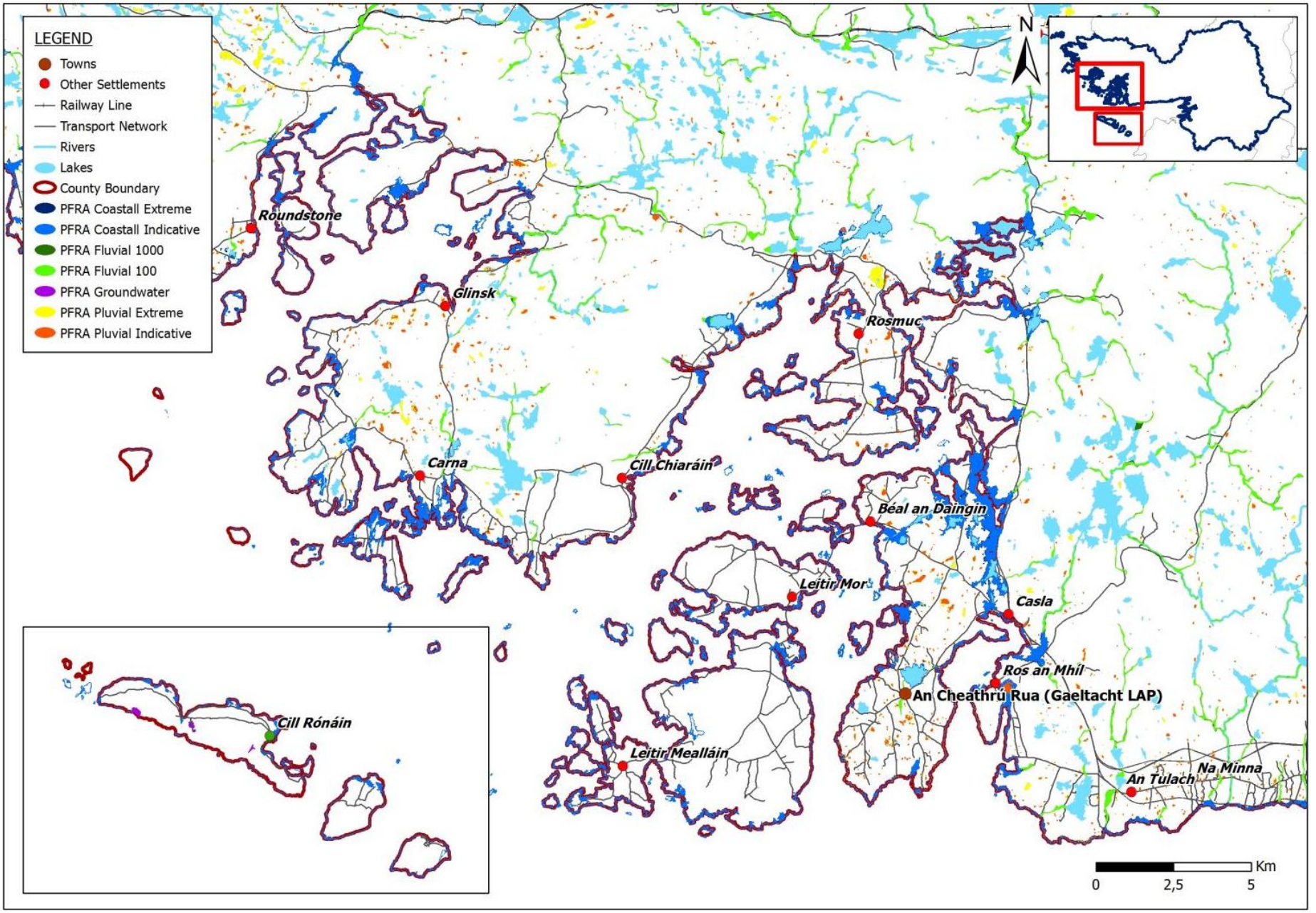

Figure AII.18 PFRA Flood Risk Areas - Central West (W)

Figure AII.19 PFRA Flood Risk Areas - Central West (E)

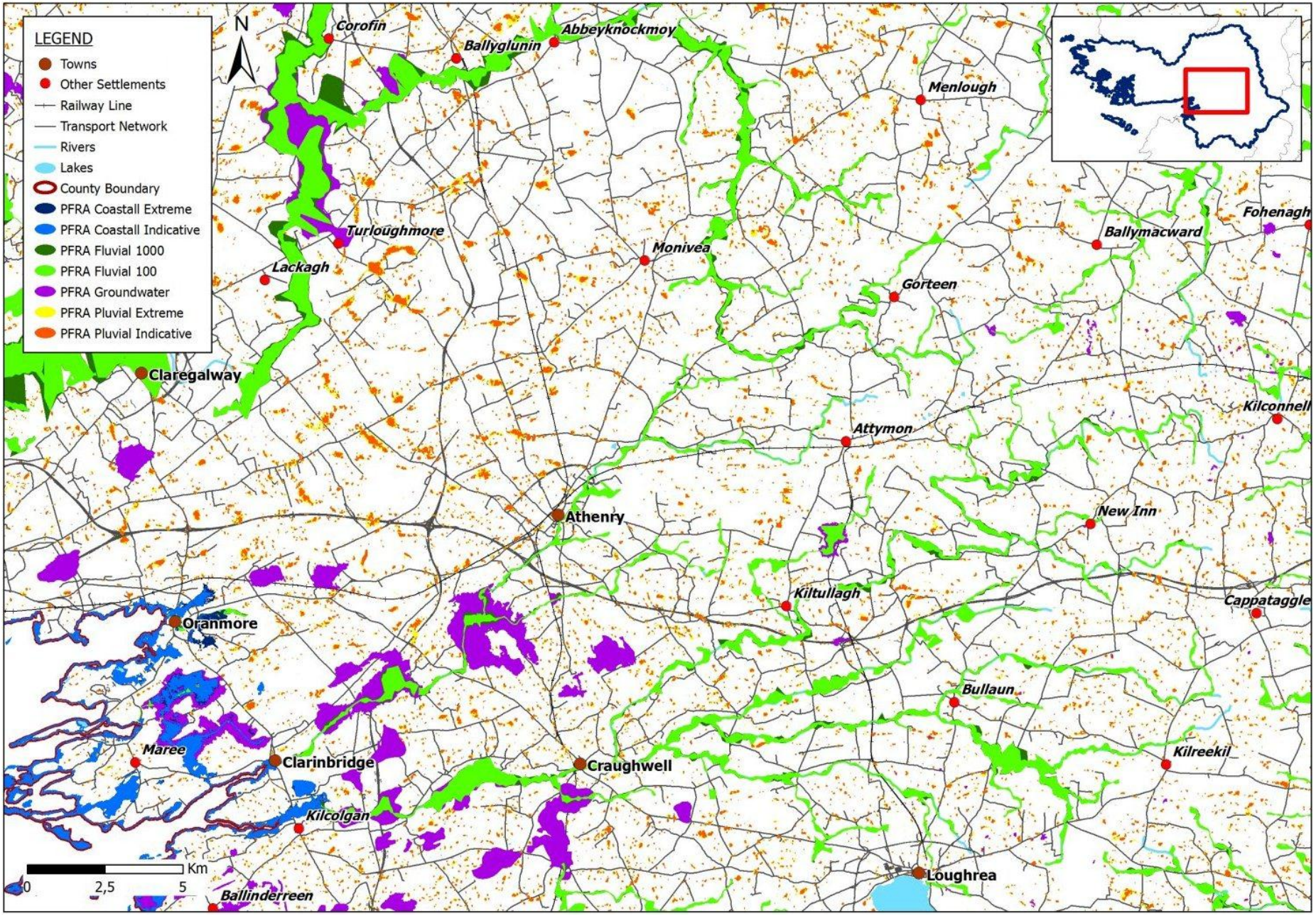

Figure AII.20 PFRA Flood Risk Areas - Central East (W) [version 1 with key on lhs]

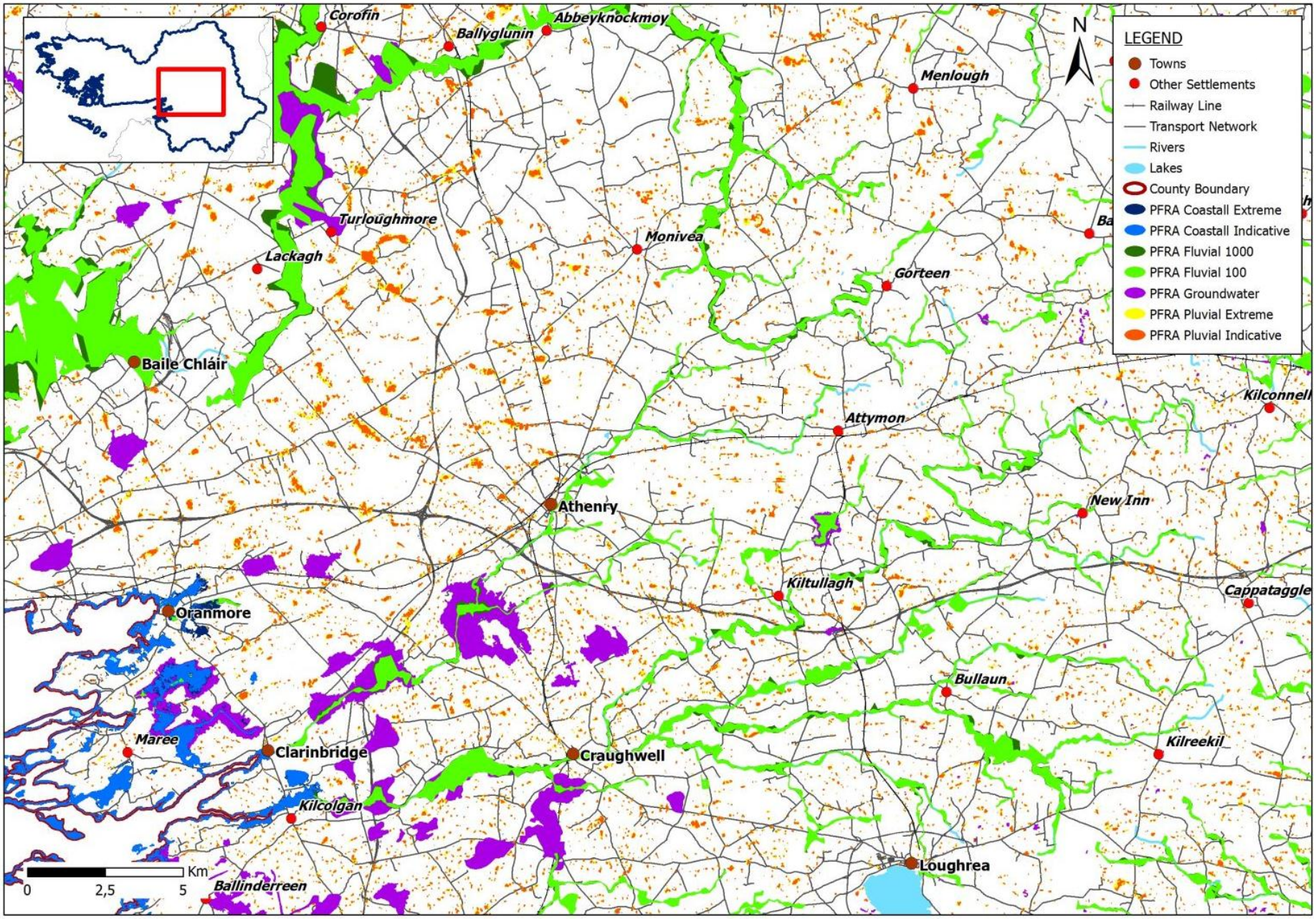

Figure AII.21 PFRA Flood Risk Areas - Central East (W) [version 2 with key on rhs]

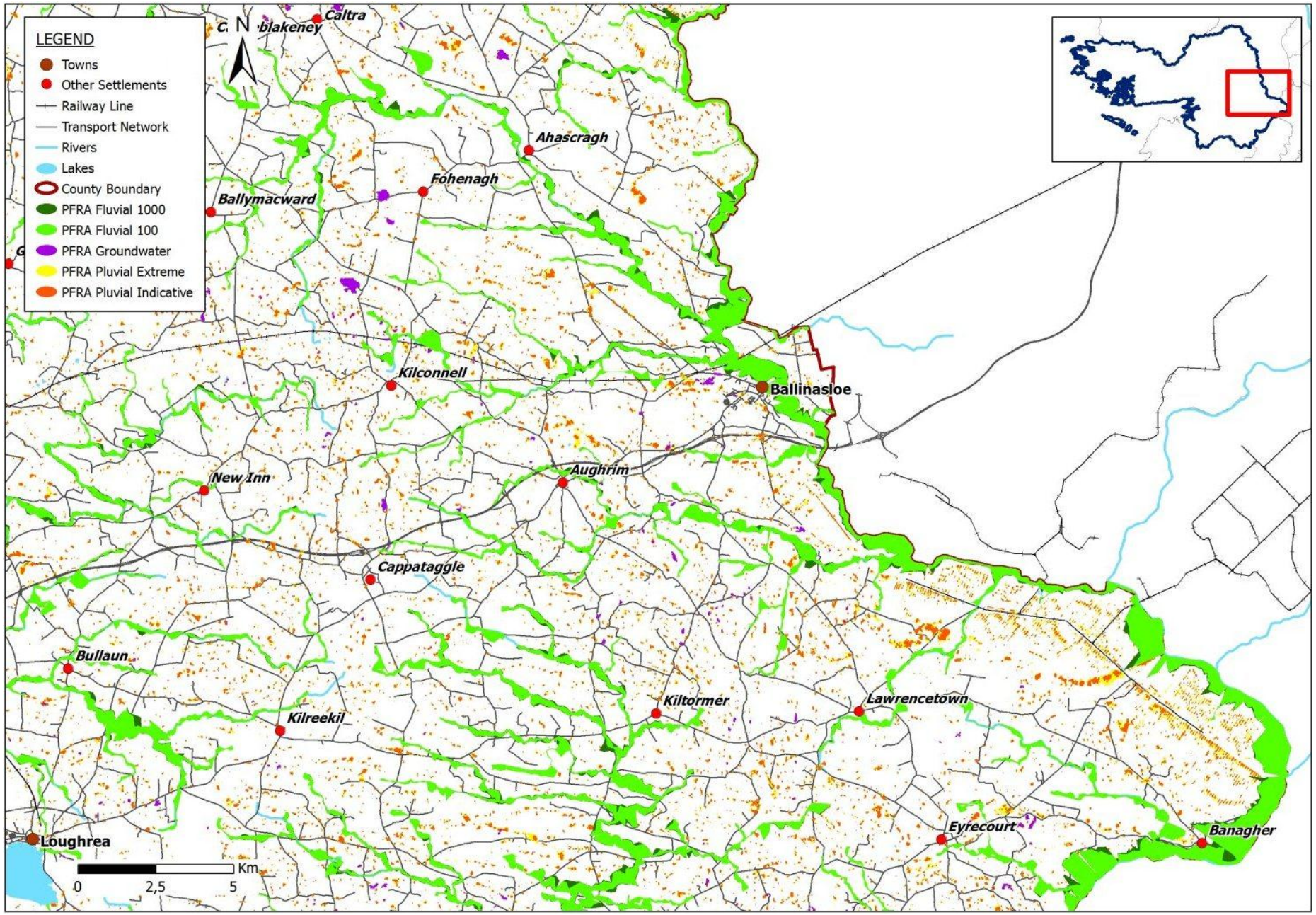

Figure AII.22 PFRA Flood Risk Areas - Central East (E)

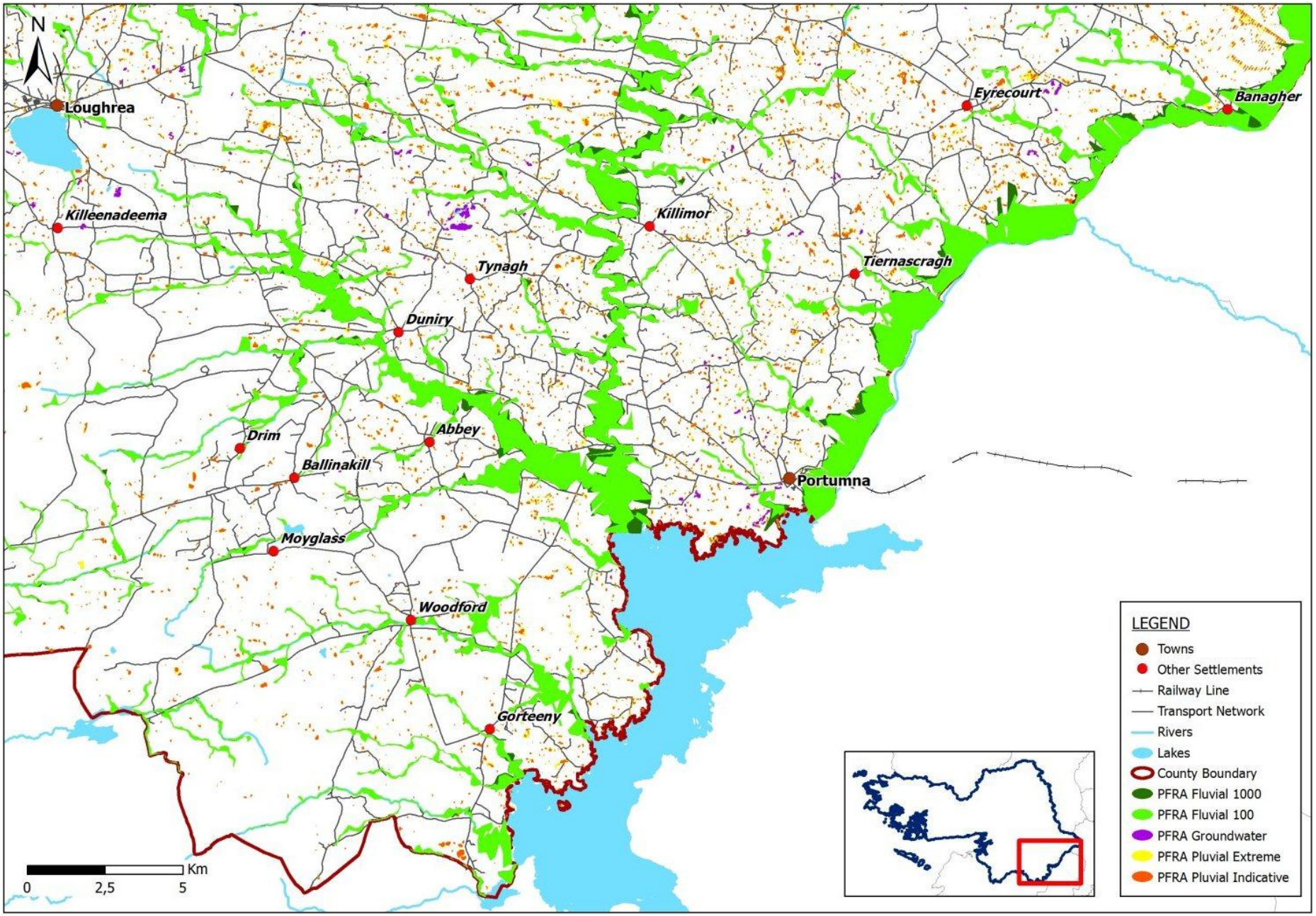

Figure AII.23 PFRA Flood Risk Areas - South East

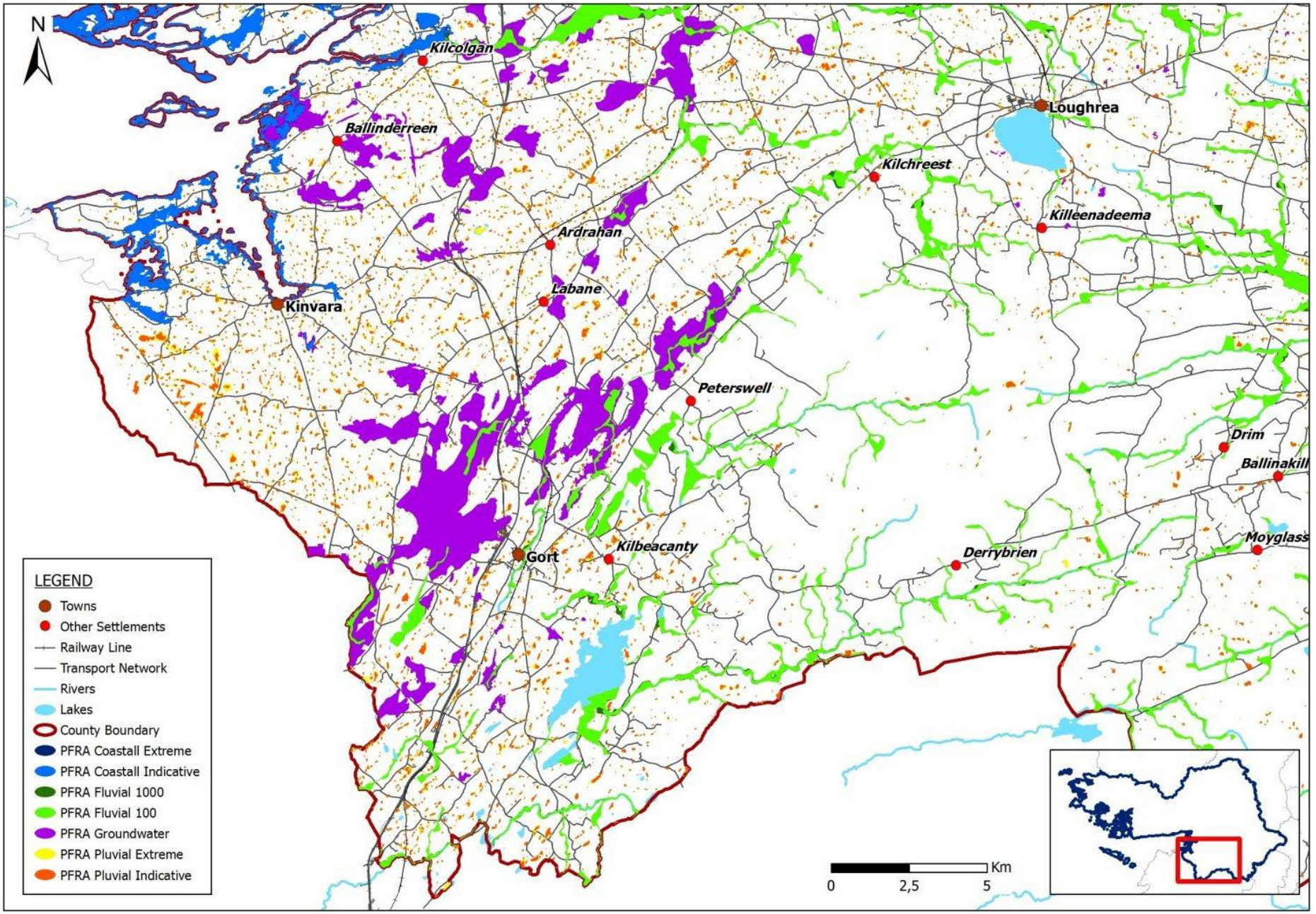

Figure AII.24 PFRA Flood Risk Areas - South West