Strategic Flood Risk Assessment

SFRA Report

on Strandhill Mini-Plan – Variation No.1
of the Sligo County Development Plan 2011-2017

Prepared by

Sligo County Council
Development
PlanningUnit

7 October 2013

Contents

Sligo County Council, at its meeting on 7 October 2013, has made a variation to the Sligo County Development Plan 2011–2017 (CDP).

The Variation No. 1 consists of the incorporation of ***Strandhill Mini-Plan*** *as Chapter 44 in* ***Volume 2 Mini-Plans*** *of the CDP.*

The Mini-Plan consists of a written statement accompanied by a Zoning Map (Map 1), a Transport Objectives Map (Map 2), a Site-Specific Objectives Map (Map 3) and a Designations Map (Map 4). Where the written objectives refer to specific routes or locations, these are marked on one of the two Objectives Maps. The applicable Zoning Matrix is included in Volume 2 of the CDP.

The Strategic Flood Risk Assessment prepared in conjunction with the Draft Mini-Plan has not been modified, as none of the adopted amendments changed the context or the conclusion of the assessment.

1. The context for Strandhill Mini-Plan Flood Risk Assessment

Following on from the EU Directive 2007/60/EC on the assessment and management of flood risks (known as the Floods Directive), the Department of Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW) published *The Planning System and Flood Risk Management – Guidelines for Planning Authorities* in November 2009 (henceforth referred to as the Guidelines).

The Guidelines require planning authorities to introduce flood risk assessment as an integral and leading element of their development planning functions. This is achieved by ensuring that the various steps in the process of making a development plan are supported by a Strategic Flood Risk Assessment (SFRA). The Guidelines also specify that any variation to a development plan must also be subject to a flood risk assessment.

The preparation of the current CDP was supported by a SFRA (prepared by consultants CAAS), which analysed relevant data available in 2010 in order to identify flood risk management priorities for the County.

A scoring system was used to rank the County's settlements according to flood risk, position in the CDP's settlement hierarchy and the availability and status of recent flood studies in order to prioritise their potential need for detailed flood risk assessment and management studies. Of the settlements not covered by mini-plans, Strandhill was allocated the second lowest score in terms of prioritisation.

The Strandhill Mini-Plan is accompanied by a SFRA of the plan area, which should be read in conjunction with the SFRA prepared for the CDP.

It is important to note the limitations of flood risk assessment at a strategic level. The lack of detail and the broad-brush approach used in the preparation of OPW maps (on which this Report's Map 3 Flood Zones is based) makes them less suitable for use at project level. It is the responsibility of each applicant for planning permission to assess the flood risks associated with the development site (refer to the Disclaimer at the end of this Report) and to include appropriate flood mitigation measures, if necessary.

2. Relevant provisions of the Flood Risk Management Guidelines

The Guidelines set out a process of assessment for flood risk at all stages in development planning and the development management process.

The Guidelines give direction in relation to zoning lands for development in areas at risk of flooding. This is relevant to the Strandhill Mini-Plan.

Section 3 of the Guidelines outlines a sequential approach whereby new development is first and foremost directed towards land that is at low risk of flooding.

2.1 Sequential approach - principles

The three principles of the sequential approach to managing flood risk are as follows:

1. **Avoidance**: avoid development in areas at risk of flooding.
2. **Substitution**: if avoidance is not possible, consider another land use, less vulnerable to flooding.
3. **Mitigation**: when neither avoidance nor substitution can be achieved, consideration should be given to mitigation and management of risks.

Inappropriate types of development that would create unacceptable risks from flooding should not be planned for or permitted. Exceptions may be made following a *justification test*. This test must demonstrate both the planning need and the sustainable management of flood risk to an acceptable level.

2.2 Flood zones and land use vulnerability

The Guidelines define three flood zones – A, B and C – based on the probability of flooding, with zone A having the highest probability and zone C having the lowest probability.

The vulnerability of different land uses is also taken into consideration: these are divided into “highly vulnerable”, “less vulnerable” and “water-compatible”.

2.3 Zoning justification test

This test, explained in Section 4 of the Guidelines, has been designed to assess the appropriateness of developments that are being considered in areas of moderate or high flood risk. The test sets out three criteria which must all be met when zoning lands that are at moderate or high risk of flooding, for uses or developments which are vulnerable to flooding. These criteria are:

1. The settlement is targeted for growth under the National Spatial Strategy, Regional Planning Guidelines or certain statutory plan of guidelines.
2. The zoning is required to achieve the proper planning and sustainable development of the settlement.
3. A flood risk assessment carried out to an appropriate level of detail demonstrates that flood risk to the development can be adequately managed and there will be no adverse impacts elsewhere.

2.4 The flood risk assessment process

The Guidelines recommend that a staged approach is adopted when undertaking a Flood Risk Assessment, carrying out only such appraisal and or assessment as is needed for the purposes of decision-making at the relevant level.

Stage 1: Flood risk identification – This stage determines whether there are any flooding or surface water management issues related to a plan area or proposed development site that may warrant further investigation.

Stage 2: Initial flood risk assessment – If at Stage 1 a flood risk issue is deemed to exist, the assessment proceeds to Stage 2, which confirms the sources of flooding, appraises the adequacy of existing information and determines the extent of additional surveys and the degree of modelling that will be required. Stage 2 must be sufficiently detailed to allow the application of the sequential approach (described above under 2.1) within the flood risk zone.

Stage 3: Detailed risk assessment – Where Stages 1 and 2 indicate that an proposed for zoning or development may be subject to a significant flood risk, a Stage 3 Detailed Flood Risk Assessment must be undertaken. This involves a quantitative appraisal of the flood risk, of its potential impact elsewhere and of the effectiveness of any proposed mitigation measures. This generally requires the use of a hydraulic model across a wide enough area to appreciate the hydrological processes and their impacts.

3. Flood Risk Assessment of the Strandhill Mini-Plan area

The plan area comprises a peninsula surrounded by sea on three sides, to the north, south and west. To the east, the land rises along the slopes of Knocknarea, which gives a strong identity to the Strandhill landscape.

The defining physical characteristics of the area are its long and varied shoreline and its downwards sloping topography – towards the sea. There are no rivers or streams in the area. Accordingly, the main causes of flooding in Strandhill are coastal flooding and pluvial flooding.

Coastal flooding is caused by higher than normal sea levels, usually caused by storm surges, resulting in the sea overflowing onto the land. The magnitude of coastal flooding is influenced by three factors, which often work in combination: tide level, storm surges and wave action. Coastal erosion of both the foreshore and the shoreline is closely linked with coastal flooding; this has been evident in Strandhill in the recent past. The beach and 'big dune' area south of the Promenade were particularly affected by erosion in 2011 and 2012. Storms in 2011 caused extensive damage to a 70-m section of sand dune as well as damage to the end of the walkway to the south of the area.

Pluvial flooding occurs when the amount of rainfall exceeds the absorption capacity of the ground. This excess water flows over land, ponding in natural hollows and low-lying areas or behind obstructions. This occurs in Strandhill at several locations on the upper Main Road (the R292), due to excessive run-off from the slopes of Knocknarea. The lower part of the village does not seem to suffer from this type of flooding, on account of its downwards sloping topography and its largely sandy soil. which helps the infiltration of excess rain water.

This section of the Report provides an appraisal of available data and an assessment of the flood risk associated with the lands within the boundary of the Strandhill Mini-Plan, in accordance with the relevant provisions of the Guidelines.

3.1 Stage 1 - Flood risk identification

In this stage, it is necessary to identify locations with historic or possible flooding/surface water management issues within the plan area that may warrant further investigation.

The following sources of information were used to identify possible flood risk in the Strandhill Mini-Plan area: the Office of Public Works (OPW); six-inch Ordnance Survey maps; aerial photography; public consultation; Local Authority personnel; Preliminary Flood Risk Assessment (PFRA) maps; and Irish Coastal Protection Strategy Study (ICPSS) maps.

3.1.1 Office of Public Works (OPW) - historical data

The OPW developed the www.floodmaps.ie website which contains mapped information concerning past flood flood events.

Several flood events within the Mini-Plan area are recorded on this website:

- flooding at Culleenamore, on the L-35053 – a low point in the road floods regularly;
- historical flooding (1988) on the Promenade due to overtopping from high seas (improved coastal defence has alleviated this);
- recurring event at Tully – in times of heavy rainfall, serious flooding occurs; an outfall piped drain to the sea is required (2003 report);
- flooding at Rinn on the L-7505 during high spring tides;
- road flooding on the R292 during high rainfall running down the slopes of Knocknarea – this area is just outside the defined plan limit at Cartron townland.

Four of the five listed flood events are considered recurring events; three events were located outside the development limit, in the Buffer Zone, and the fourth is located outside the Mini-Plan area. Therefore they are not considered to be a significant constraint on land use zoning inside the development limit. The one event located within the development limit, at the Promenade, is not described as recurring and has not been reported by the Area Engineer as being an ongoing issue.

3.1.2 Six-inch (1:10560) Ordnance Survey maps

Six-inch Ordnance Survey maps show areas which are marked "liable to floods". The exact areas are not delineated, but the markings give an indication of places which have undergone flooding in the past. The OS maps relevant for the Strandhill Mini-Plan area do not give any indication of flooding within or adjoining the proposed Mini-Plan boundary.

3.1.3 Aerial photography

Orthophotography from two sources – the Ordnance Survey (2005) and *Bing Maps* www.bing.com/maps (November 2011- March 2012) – does not give any indications of flooding events within the Plan area.

3.1.4 Public consultation

As part of the plan-making process, the Planning Authority conducted three stages of consultation and written submissions were invited from the public. Only submission received at pre-draft stage mentioned flooding as an issue. This submission described recurring flooding on the roads and lower land at Carrowdough, and on the road to Culleenamore Beach.

3.1.5 Local Authority personnel

The local Area Engineers consulted in relation to this FRA identified the following areas as problematic in terms of road flooding:

- flooding occurs regularly on the R292 and L-35053 at Carrowdough; this is caused by run-off from the slopes of Knocknarea mountain. The water needs to be diverted by inserting a large pipe under the R292 westwards towards the sea, where another road crossing (under the L-35053) is required to channel the water into the sea.
- flooding occurs at Cartron due to run-off from Knocknarea. Work is required in the townland of Rathcarrick to divert this water into the local drainage network. This location is just outside the Plan limit.

Both areas mentioned above are located outside the development limit, with the second one located outside the Plan limit. Therefore, neither of the flood events at these locations require further analysis or affects the land use zoning within the development limit.

3.1.6 Preliminary Flood Risk Assessment (PFRA) maps - August 2011

The Preliminary Flood Risk Assessment (PFRA), carried out in 2011, was a requirement of the EU Floods Directive.

The objective of the PFRA was to identify areas where the flood risk might be significant (referred to as Areas for Further Assessment, or AFAs). A more detailed assessment of AFAs is being undertaken through Catchment Flood Risk Assessment and Management (CFRAM) studies.

The Western CFRAM Flood Risk Review – Final Report (OPW, May 2012) presented the findings of the Western River Basin District Flood Risk Review (FRR), the primary data source for which was the Preliminary Flood Risk Assessment (PFRA). In total 28 sites (out of 75) in the Western River Basin District were recommended as AFAs that require further analysis under the National CFRAM Programme. Site Assessment Reports are under preparation for these areas.

Seven areas were identified as AFAs in County Sligo. Ballysadare and Environs – identified as a marginal AFA – was the closest to the Strandhill Mini-Plan limit. **The Knocknarea peninsula (which includes Strandhill) is not included in this AFA.**

The PFRA also produced a series of maps for the entire country indicating projected extent of flooding for a given probability based on different types of flooding. The methodology used to produce these flood maps was "broad-brush".

The relevant maps for the Strandhill area indicate projections for coastal flooding (extreme, defined as 1 event in 1000 years, and indicative, defined as 1event in 200 years) and pluvial flooding (extreme, defined as 1 event in 1000 years, and indicative, defined as 1event in 100 years).

The report accompanying the said maps states that they may be used in the Stage I Flood Risk Assessment to identify areas where further assessment would be required if development is being considered within or adjacent to the flood extents shown on the maps. However, these maps are not meant to be used as the sole basis for determining Flood Zones nor for making decisions on planning applications.

Please refer to Map 1 (PFRA Map) at the end of this Report.

The PFRA map highlights areas in Strandhill which may be prone to coastal and/or pluvial flooding. The majority of these areas are located within the Buffer Zone of the Strandhill Mini-Plan. Many of the areas highlighted as being at risk of pluvial flooding are characterised by sandy soils, where the pooling of surface water is highly unlikely. Therefore these areas are not considered to be a significant constraint on appropriate land use in the area.

Ssome areas identified with a potential flooding risk are already developed, such as the Airport building, lands to the north and east of the Airport (including part of the existing runway), a portion of the existing business and enterprise centre and the northernmost section of *The Maples* housing estate (to the east of the Airport Road). As these areas are already developed, the risk of flooding should be managed by their occupants/operators.

Only one greenfield site identified on the map as having a potential risk for flooding is proposed for zoning – lands to the north of *The Maples* housing estate. Please see Section 3.2.2 below for further discussion of this area.

3.1.7 Irish Coastal Protection Strategy Study (ICPSS) for the North-West 2012

The OPW produced coastal flood maps for the west coast of Ireland in Phase 4 of the ICPSS. The study used a combination of historical and numerically modelled data to develop extreme still-water levels at a series of locations along the coastline. The maps were produced at a strategic level to provide an overview of coastal flood hazard and risk in Ireland.

Still-water levels were extrapolated over a computer model of the surface of the land (digital terrain model, DTM) to produce predictive flood extents for the 1-in-200-years event and the 1- in-1000-years event. The maps represent a scenario for the year 2100 and include allowances for projected future changes in climate and glacial isostatic adjustment, i.e. a mean sea level rise of +500 mm by 2100 and land movement of 0.1-0.5 mm per year.

These maps are not meant to be used to assess the flood hazard and risk associated with individual locations or to replace detailed local flood risk assessment. Local factors, such as flood defence schemes, have not been taken into account.

A more extensive inland area is shown to be affected by coastal flooding on the ICPSS maps than that shown on the PFRA maps. In particular, over half of the existing runway is shown to be at risk of flooding in this scenario.

Please refer to Map 2 (ICPSS Map) at the end of this Report.

3.2 Stage 2 – Initial flood risk assessment

If, following Stage 1 Flood Risk Identification, the planning authority considers that there is a potential flood risk issue, it should move on to Stage 2. The purpose of a Stage 2 assessment is to ensure that all relevant flood risk issues are assessed in relation to the decisions to be made and that the potential conflicts between flood risk and development are addressed to the appropriate level of detail.

3.2.1 Flood zones and land use zoning

Using the information available from the PFRA and the ICPSS maps, a Flood Zone Map has been compiled for the Mini-Plan area.

The map indicates that the land along the coastline is located in either flood zone A or B, representing high to moderate probability of flooding. Most of this land is within the designated Buffer Zone, where development of any kind is severely restricted, with the exception of parts of the Airport lands and runway, which are already developed. It is considered that an airport is a *less vulnerable development*, as per the Guidelines, and the flood risk can be adequately managed by the operators of the facility.

The remaining Mini-Plan area is located in flood zone C, where the probability of flooding is low.

Please refer to Map 3 (Flood zones map) at the end of this Report.

3.2.2 Assessment of flood risks in the Mini-Plan area

The areas susceptible to flooding in Strandhill have been highlighted in Section 3.1 of this report. The main risk is from pluvial and coastal flooding, both indicative and extreme categories, as shown on the PFRA maps.

Only one of the areas that may be prone to flooding (pluvial), according to the PFRA maps, is a greenfield site zoned for the development of community facilities: **land to the north of *The Maples* housing estate**.

Information obtained from the Area Engineers does not corroborate the identified risk of flooding for this area. Local knowledge about the area indicates that the sandy nature of the land makes pluvial flooding highly unlikely. Therefore it is not considered necessary to proceed to the Justification Test in this case.

However, adopting a precautionary approach, it is considered advisable to insert a specific objective in the Mini-Plan concerning this site as follows:

- *Applications for developments on or adjacent to site CF1 (refer to the Objectives Map) shall be assessed in accordance with the Flood Risk Management Guidelines for Planning Authorities (DoEHLG & OPW, 2009) and may be required to be accompanied by a site-specific Flood Risk Assessment appropriate to the type and scale of the development being proposed.*

Several areas which are already developed were identified on the PFRA maps as being at possible risk of pluvial or coastal flooding, namely: **the Airport building / lands to the north of the Airport including part of the existing runway / the northern section of *The Maples* housing estate.** In cases such as these, the risk of flooding should be managed by the occupants/operators of the relevant areas or structures.

All other lands highlighted in Section 3.1 as being at possible risk of flooding are located within the **Buffer Zone.** The avoidance principle of the sequential approach has therefore been applied by designating these lands as Buffer Zone (i.e. not suitable for development other than for agriculture and certain limited uses as indicated in the Zoning Matrix of the CDP) .

3.3 Stage 3 - Detailed risk assessment

Having regard to the outcome of the assessment undertaken in Section 3.2 of this Report, it is considered that **the avoidance principle of the sequential approach has been applied in an appropriate manner and it is not necessary to proceed to Stage 3 in the case of the Strandhill Mini-Plan.**

4. Conclusion

The Strandhill Mini-Plan has been assessed in accordance with the *Flood Risk Management Guidelines for Planning Authorities (2009).*

The avoidance principle of the sequential approach has been applied in order to locate development away from areas at risk of flooding and to ensure that flood risk will not be increased elsewhere.

The zoning objective recommended for the one site identified as possibly being prone to flooding will ensure that development is only permitted if it is in accordance with the Guidelines.

This Flood Risk Assessment Report finds that the Mini-Plan does **not** require a Stage 3 Detailed Flood Risk Assessment.

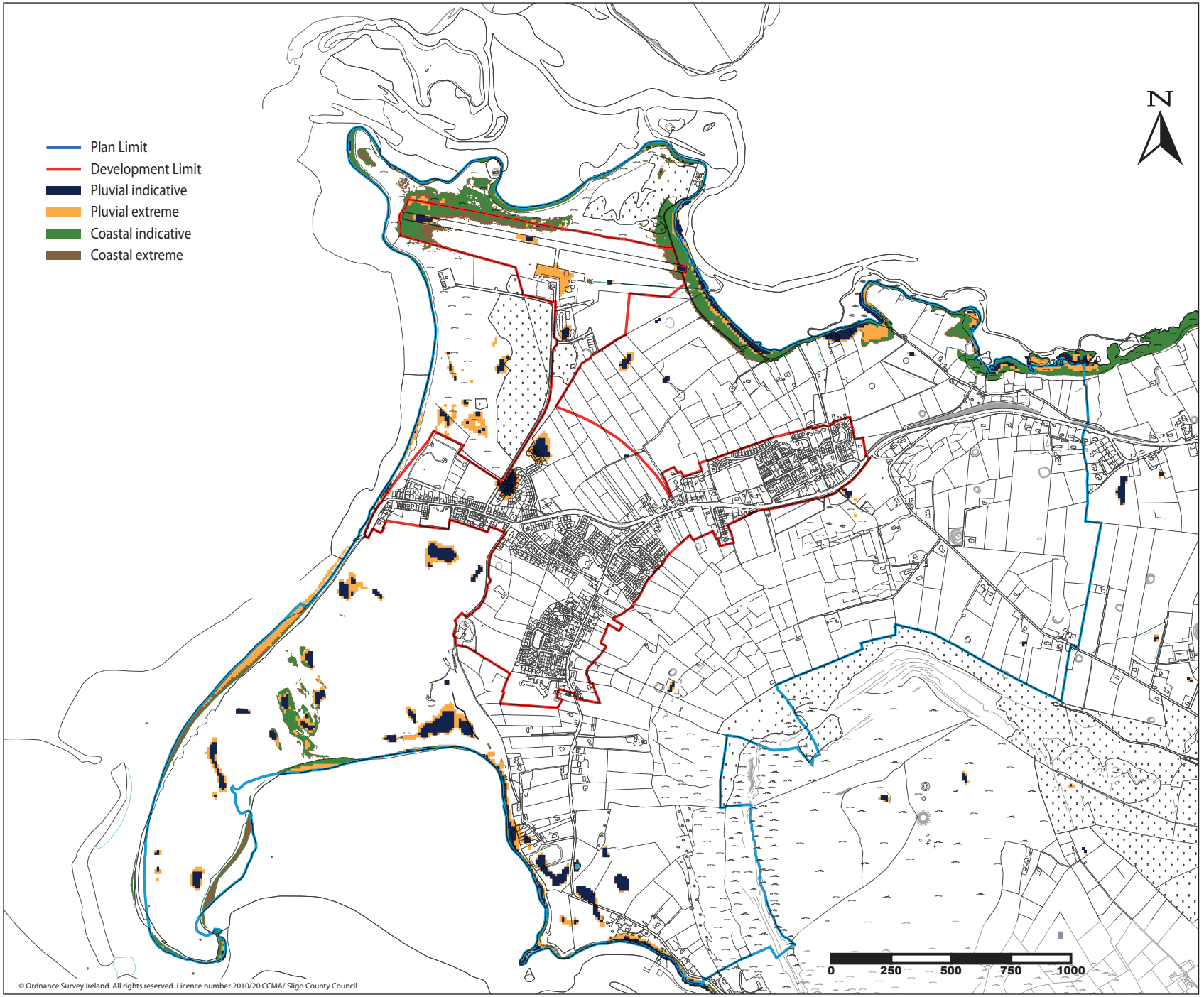
These recommendations have been incorporated into the preparation of the Strandhill Mini-Plan.

Disclaimer (as per CDP 2011-2017, p. 159)

It is important to note that compliance with the requirements of the *Guidelines on Flood Risk Management* and of the Floods Directive 2007/60/EC is a work in progress and is currently based on emerging and incomplete data, as well as estimates of the locations and likelihood of flooding.

Accordingly, all information in relation to flood risk is provided for general guidance only. It may be substantially altered in light of future data and analysis. As a result, all landowners and developers are advised that Sligo County Council and its agents can accept no responsibility for losses or damages arising due to assessments of the vulnerability to flooding of lands, uses and developments. Owners, users and developers are advised to take all reasonable measures to assess the vulnerability to flooding of lands in which they have an interest prior to making planning or development decisions.

Map 1
Preliminary Flood Risk Assessment

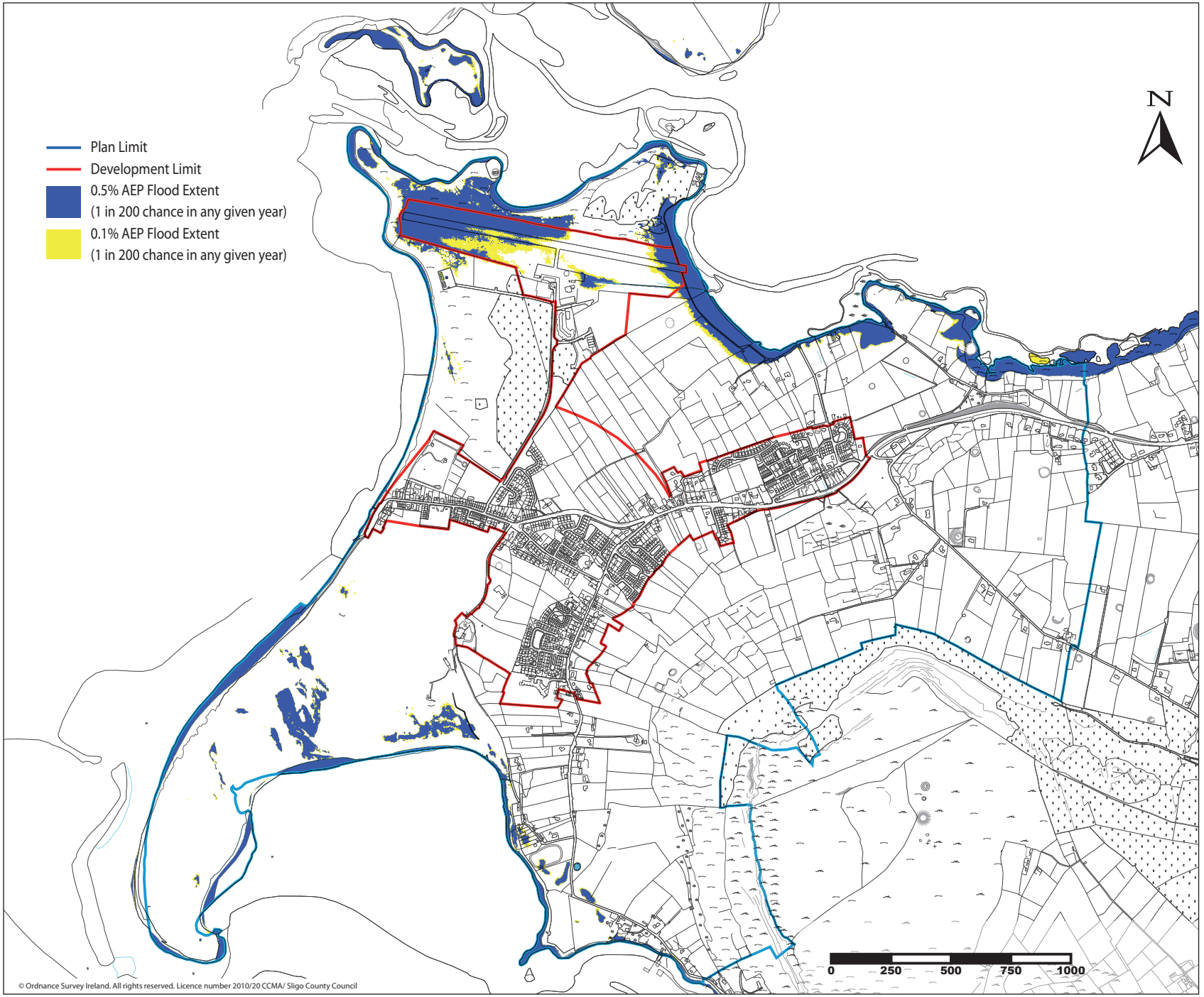


Source: PFRA indicative extents and outcomes map - draft for consultation (OPW, July 2011)

Important user note
(as inserted on the OPW map):

"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 limitation of these maps is available in the relevant reports (see www.cfram.ie). Users should seek professional advice if they intend to rely on these maps in any way."

Map 2
Irish Coastal Protection Strategy

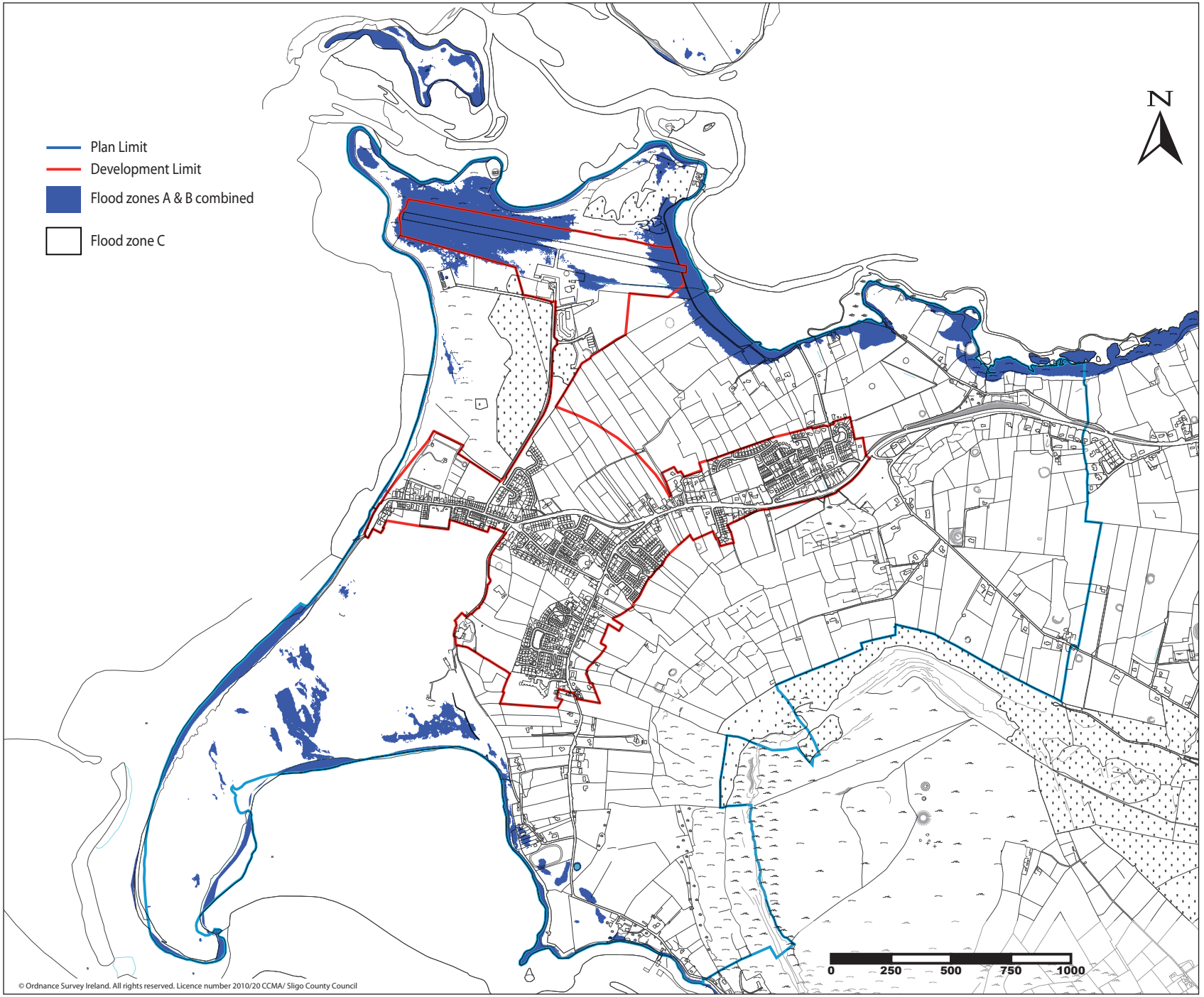


Source: Irish Coastal Protection Strategy Study - Phase V - North-West Coast Flood Extent Map (OPW, May 2012)

Important user note
(as inserted on the OPW map):

"Users of these maps should refer to the detailed description of their derivation, limitations in accuracy and guidance and conditions of use provided at the front of this bound volume. If this map does not form part of a bound volume, it should not be used for any purpose."

Map 3
Flood zones A, B and C



Compiled from the ICPSS map (Map 2)

Important user note:

Users of this map should refer to the OPW's Irish Coastal Protection Strategy Study (ICPSS) and note the detailed description of the derivation, limitations in accuracy and guidance and conditions of use.