

Stage 1 Strategic Flood Risk Assessment of the Draft Southern Environs Local Area Plan 2021 – 2027

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Forward/Strategic Planning



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1.0 Introduction - Flood Risk and the LAP Process

This is the Stage 1 Flood Risk Assessment for the review of the Southern Environs Local Area Plan 2011 – 2016 (as extended), and should be read in conjunction with the Draft Southern Environs Local Area Plan 2021 - 2027 and the Strategic Environmental Assessment (SEA) Environmental Report.

The Southern Environs is at particular risk from tidal flooding. The proximity of the estuary to the north bears witness to this. Another factor which complicates the flooding picture is the underlying limestone geology of much of the area. This results in the presence of natural drainage features including turloughs, which also have to be considered in the possible flood regime of the area. With the issue of tidal flooding, which may cause tributaries of the River Shannon to back up when they cannot drain to the main channel, and the underlying geology, the issue of potential flood risk in the Southern Environs is a complex one.

This process is designed to identify areas at risk of tidal or fluvial flooding, or where surface water might need to be managed.

2.0 Flood Risk Identification

The Technical Appendices of the Planning System and Flood Risk Management Guidelines (November 2009 p.9) identify the following sources of information:

- 1.** OPW Preliminary Flood Risk Assessment indicative fluvial flood maps;
- 2.** National Coastal Protection Strategy Study flood and coastal erosion risk maps;
- 3.** Predictive and historic flood maps and benefiting land maps;
- 4.** Predictive flood maps produced under CFRAM studies;
- 5.** River Basin Management Plan and reports;
- 6.** Indicative assessment of existing flood risk under Preliminary Flood Risk Assessment;
- 7.** Previous flood risk assessments and predictive flood maps;
- 8.** Advice from Office of Public Works;
- 9.** Internal consultation with Local Authority personnel, in particular Water Services engineers;
- 10.** Topographical maps - in particular LIDAR;
- 11.** Information on flood defence condition and performance;
- 12.** Alluvial deposition maps;
- 13.** Liable to flood markings on old 6-inch maps. In addition, these maps particularly the first edition, contain information on landscape features and infrastructure such as mills and weirs that can indicate hydrological features;

14. Local Libraries and newspaper reports;
15. Local consultation e.g. local groups;
16. Walkover surveys to assess potential sources of flooding and likely routes of flood waters and flood defences;
17. National, regional and local spatial plans and previous planning applications;
18. Previous planning applications during the lifetime of the Southern Environs Local Area Plan 2011-2017 (as extended).

Sources used:

1. OPW Preliminary Flood Risk Assessment indicative fluvial flood maps

These maps have been produced under the CFRAMS programme. These indicate that it is not fluvial, but coastal flooding which is the main issue to consider in the SELAP area. However, it does have localised implications, particularly in the area of the Barnakyle River - see Figure 1 below.



Figure 1: Taken from the LCCC planmap, this shows the extent of CFRAMs fluvial risk in the Southern Environs area.

2. National Coastal Protection Strategy Study flood and coastal maps

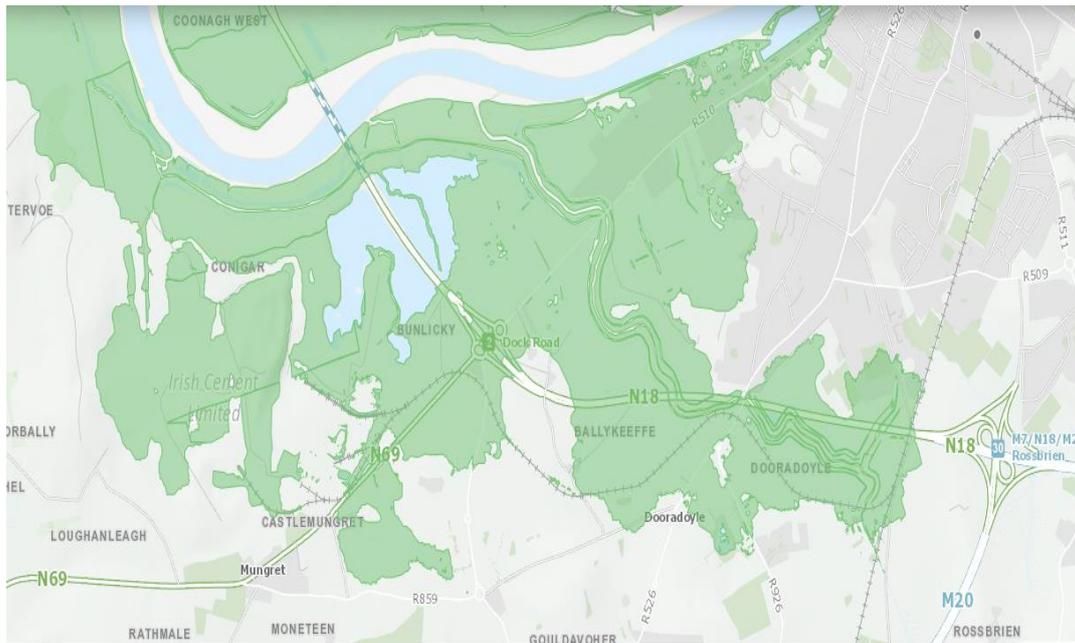


Figure 2: Taken from the National Coastal Protection Strategy Study website, this shows the possible extent of coastal flooding in the Southern Environs area.

The map shows the area along the Ballinacurra Creek as being vulnerable to coastal flooding as is the area around the cement factory and Bunlicky Lake. Much of this area is zoned for industrial uses to reflect both the existing activities and because this use is regarded as “a less vulnerable” use (The Planning System and Flood Risk Management Guidelines, 2009, p.25).

3. Predictive and historic flood maps and benefiting land maps (flood maps.ie)

These maps were consulted, and together with discussions with the local OPW engineering staff, areas that are more likely to flood were identified. Benefiting lands i.e. lands that would benefit from drainage works for agricultural purposes, can be related to river flood plains. It has to be emphasised that this means the drainage and flood defence works are to facilitate agricultural development, and not other more vulnerable land uses. The benefitting lands occur along Ballinacurra Creek running northwards to the River Shannon and are also to the south, in the western portion of the land zoned for High Tech/Manufacturing use at the Raheen Business Park. In the case of the Ballinacurra Creek, additional open space has been included in this area of the zoning map. While in the case of the Raheen Business Park, a specific policy has been included for Site Specific Flood Risk Assessments and the use of the flood benefitting area for attenuation of development in the business park. It also shows the land to the northeast of the Crescent Shopping Centre as being within the flood benefitting area.

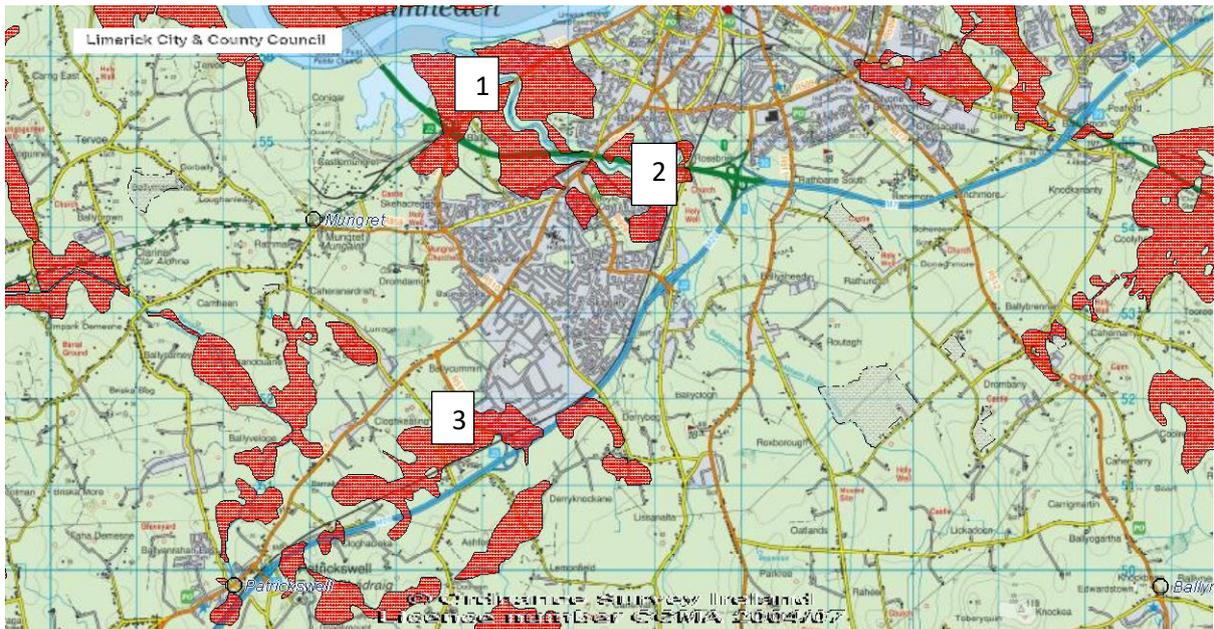


Figure 3: The red areas on the map are flood benefiting areas. 1 is the area close to Ballinacurra Creek, 2 is the land bank close to the Crescent Shopping Centre and 3 is the Raheen Business Park.

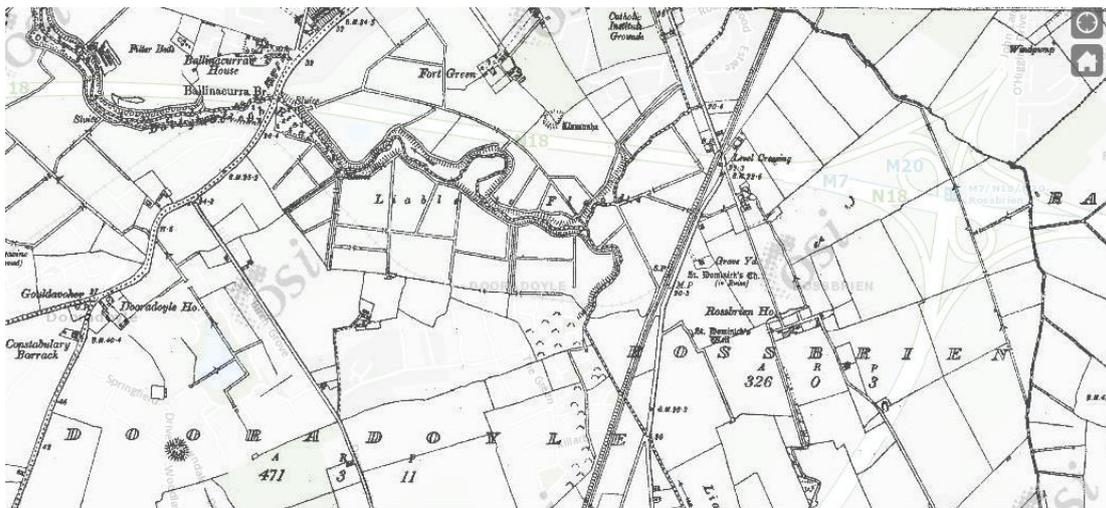


Figure 4: This map is taken from the OSI map viewer and shows the area to the rear of the Crescent Shopping Centre as being prone to flooding. Also of note are the regular drainage patterns which indicate lands which are subject to inundation and for which the drainage system was installed to shed water quickly.

Though the flood embankments were constructed after the map was prepared, the drainage pattern, the flood benefiting map and the vegetation all help to indicate the possible extent of flood waters should a breach occur.

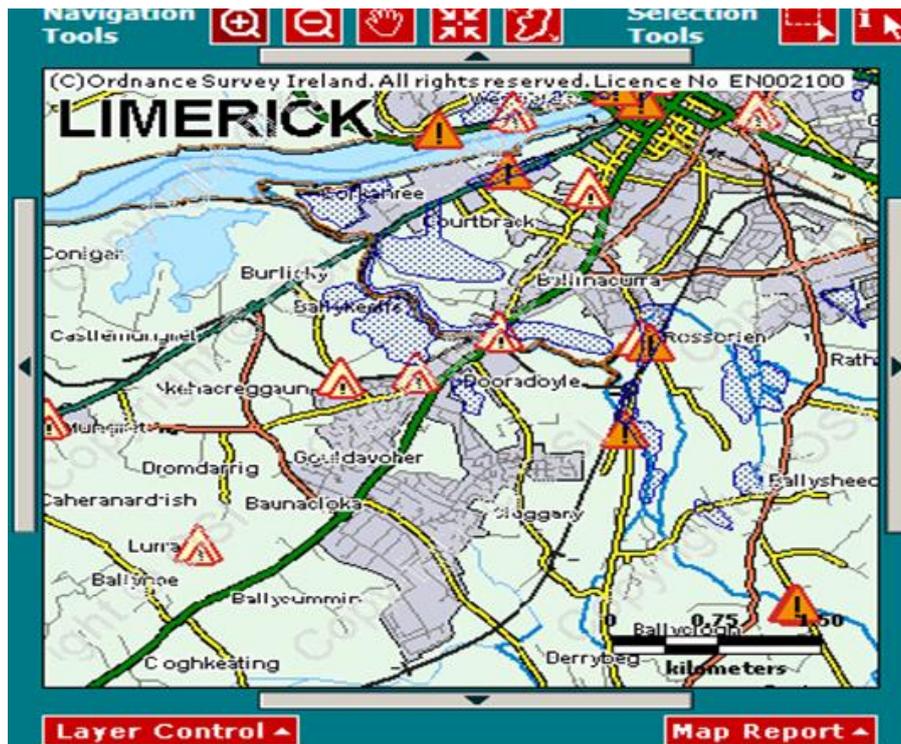


Figure 5: This screenshot is taken from the floodmaps.ie website and shows a series of flood events within the SELAP area.

4. Predictive flood maps produced under CFRAM studies

The CFRAM maps were used as part of the assessment process. The 1:1,000 year flood interval and the defended area maps were examined. The flood defence embankments are a feature of the Southern Environs. An extract from the combined map is shown below. The 1:1,000 zone is “where the probability of flooding from the rivers and sea is moderate (between 0.1% or 1 in 1,000 and 1% or 1:100 for river flooding and between 0.1% or 1 in 1,000 year and 0.5% or 1:200 for coastal flooding)... (DEHLG, 2009 p. 15). The picture in the Southern Environs is complicated by the fact that while coastal flooding is the main threat, the underlying geology of the area and the presence of two rivers, the Ballynacloogh River and the Barnakyle River have also to be considered.

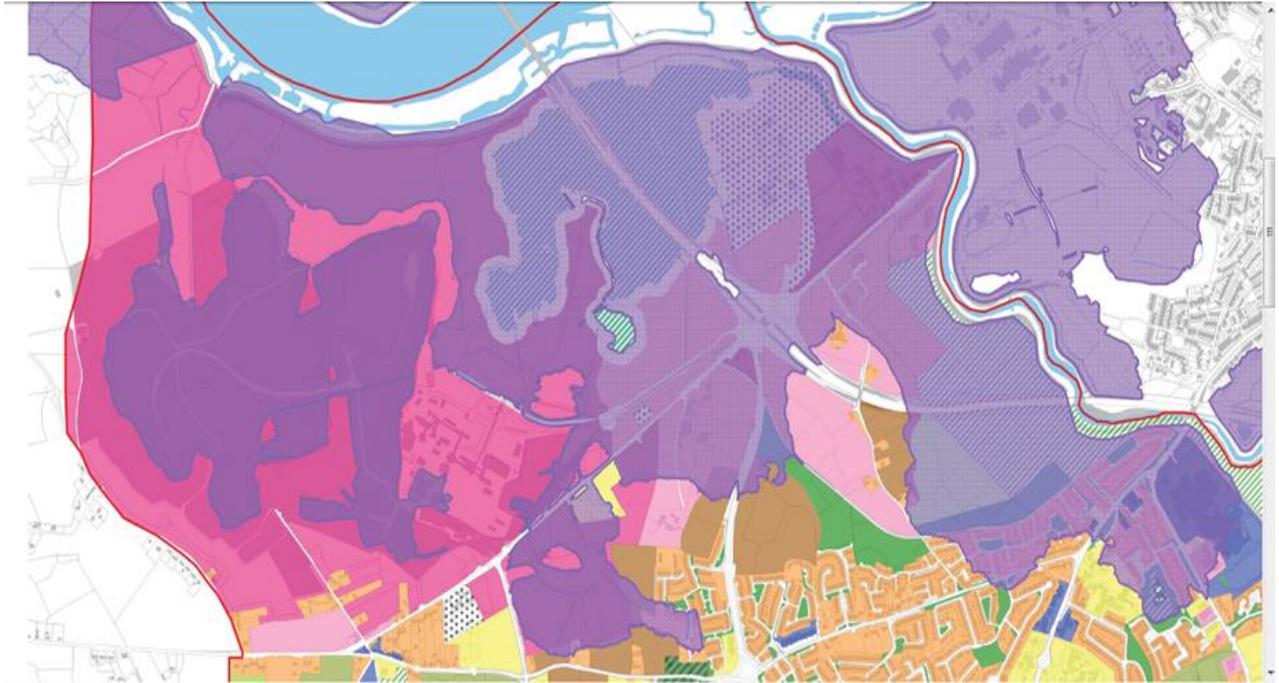


Figure 6: This is an extract from the maps based on the 1:1,000 and defended areas information taken from the CFRAM Mapping. The shaded areas indicate the 1:1,000 flooding patterns and the defended areas combined.

The Planning System and Flood Risk Management Guidance (2009, p. 16) state that “the presence of flood protection structures should be ignored in determining flood zones. This is because areas protected by flood defences still carry a residual risk of flooding from overtopping or breach of defences and the fact that there may be no guarantee that the defences will be maintained in perpetuity”. It is for this reason that areas protected by flood defences (the “defended areas”) are included in determining the zoning pattern.

5. River Basin Management Plan and reports

Insufficient information is available in the River Basin Management Plan 2018 – 2021 to inform plan contents in relation to flooding issues.

6. Indicative assessment of existing flood risk under Preliminary Flood Risk Assessment

Existing areas of flood risk are identified at the Dock Road, Ballynaclogh Bridge and the Rosbrien and Dooradoyle. These maps have been supplemented by the “predictive maps” from Floodinfo.ie, a website launched in 2018. In addition, the National Preliminary Flood Risk Overview Report, issued in 2012 and updated in 2019, identifies storm water issues in Fr. Russell Road and in Mungret as an annual event (PFRA Overview Report Appendix C), which indicates the complexity of flooding issues in the plan area.

7. Previous flood risk assessments

The flood reports for the nearby area of Limerick City provides insights into the wider flood regime of the area. It identifies five major historical flood events that included effects on the Southern Environs:

- December 1954: A fluvial flood event;
- September 1961: Coastal surge event which reached 4.2m AOD;

- December 1999: Coastal surge and high fluvial event which reached 4.1 m AOD;
- February 2002: High fluvial event measuring 4.27m AOD.
- February 2014: Highest event in Limerick caused by tidal surge.

8. OPW advice

The OPW have indicated that combined fluvial and tidal flooding will have to be taken into account in the plan area. The vulnerability of sluices will also have to be considered. The flood defences, which are earthen embankments, are intended to protect agricultural land and have no rock armouring or internal reinforcement. The existing earth embankments are complemented by the land drainage systems. Some of this drainage system has residual storage capacity but this is limited. This storage capacity is dependent on the tide. These drains require the tide to be out in order to empty, via sluices, to water courses such as the Shannon and Ballinacloough Rivers. The earthen embankments in some places have settled by up to 1m over the years. This is a reduction from the maximum design height which is 5.6m AOD. In some locations, due to reinforcement work, the embankments exceed this height. Some of the flood defences are in private and not OPW ownership, which is the case in the Irish Cement lands. Ballinacloough Bridge has been described as a possible weak point in the flood defences, as it is at a lower level than the embankments and could provide access for floodwaters.

A recent meeting with the OPW (2nd October 2020) in relation to the wider city and county flood risk issues, indicated the need for adequate SUDs and attenuation measures to ensure gradual runoff of surface water which might otherwise overload existing watercourses, and result in flooding downstream. The increasing intensity of rainfall events has made this more important than ever. This was an issue that was also raised in the preparation of the Limerick Climate Change Adaptation Strategy in 2019. As a response to this, a policy has been put in place in the Draft LAP in relation to the western most part of the land zoned as High Tech/ Manufacturing, requiring both a Site Specific Flood Risk Assessment and suitable attenuation. This would help to facilitate further development of the Raheen Business Park.

9. Internal consultations with Council personnel

Discussions regarding drainage and flooding issues took place with engineers regarding the Southern Environs Draft Local Area Plan 2021 - 2027. They acted as intermediaries with the flooding consultants (JBA) who were appointed to carry out a flood risk assessment of the city area as a whole for the proposed Limerick Development Plan, which will follow the SELAP in 2022. They were also able to offer advice on specific areas within the SELAP.

10. Topographical maps LiDAR

A LiDAR survey had been carried out which indicates the limit of the maximum high tide level. This data has informed a predictive mapping tool previously used by the Local Authority. This has since been superseded by the CFRAMs, but is still useful in that it is still present on the Limerick City and County Council Plan Map system and is an additional source of information.

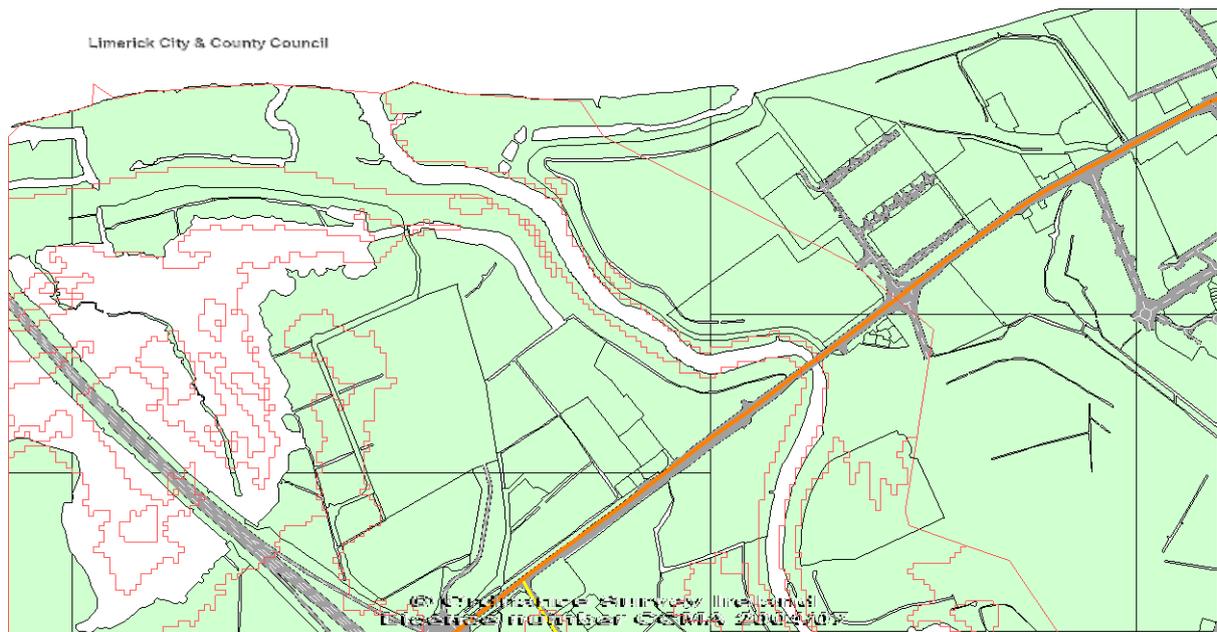


Figure 7: The red lines show the extent of LiDAR Flood Zone A mapping from the JBA predictive mapping tool.

11. Information on flood defences and condition

Part of the CFRAM mapping series indicates the presence of flood defences in the plan area. As indicated above these are earth banks and being under different ownerships have undergone different management and maintenance regimes. The quality of the embankments is variable as they have been subjected to widely differing maintenance regimes, and were intended to defend lands solely for agricultural purposes. This is a factor that has been raised in some of the Flood Risk Assessments which have accompanied planning applications – see 18 below. It is also worth noting that the Flood Risk Management Guidelines state that defences are to be disregarded when determining flood zones.

12. Alluvial deposition maps

Alluvial soils are those deposited by rivers. Their extent helps to indicate the extent of historic flood events. These maps have been allied to benefiting areas and historic maps (first and later editions of the six inch maps) showing areas prone to flooding indicate areas with higher risk of flooding. When these maps were consulted they were only minor indications of alluvial soils chiefly along the Barnakyle River and outside the plan area. Instead, what was found particularly along the Ballynaclough River, especially as it neared the River Shannon, were marine sediments which indicates an estuarine influence.

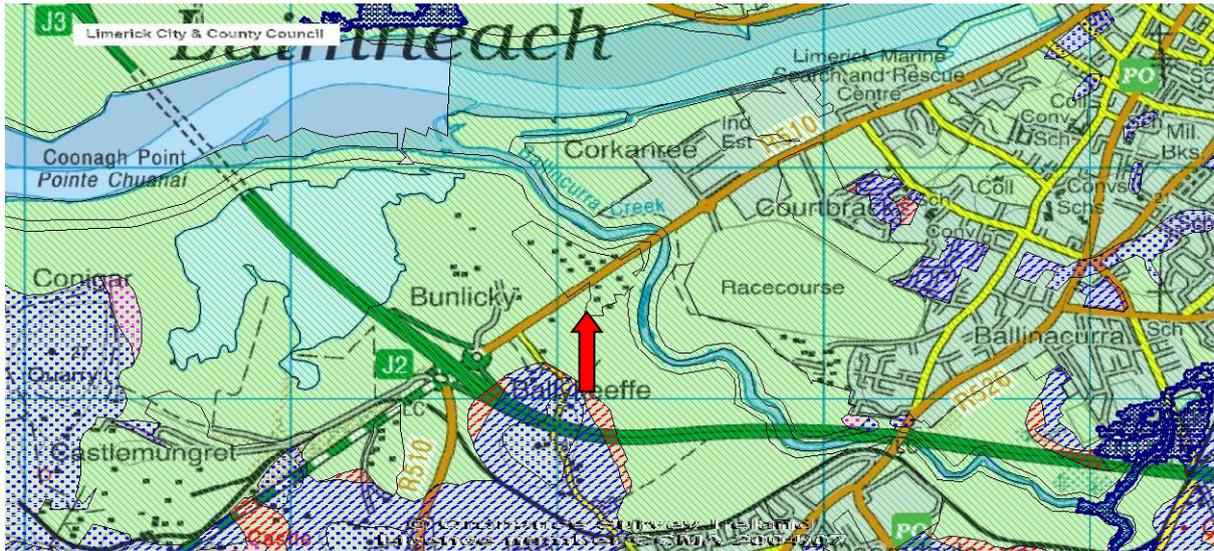


Figure 8: The red arrow indicates what is termed marine sediments and miscellaneous soils in this part of the plan area. It is likely, particularly in areas where there has been industrial activity over a long period of time that the underlying soils have been heavily modified.

13. Liable to flood markings on old 6-inch maps

Areas liable to flood are shown on the older first edition 6-inch maps and the editions dating from 1938. This area is immediately to the north east of the Crescent Shopping Centre. These maps are also useful in indicating historic drainage patterns which would have indicated potential for flooding or water logging or also past infrastructure which would have been used to manage water levels such as sluices.



Figure 9: This shows the historic drainage patterns in Gouldavoher and Dooradoyle. The red arrows indicate the presence of sluices.

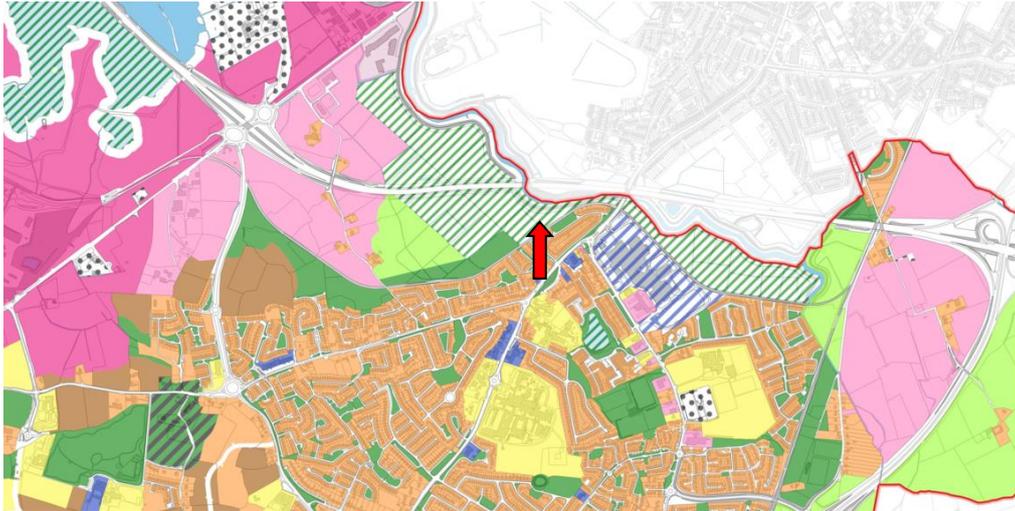


Figure 10: The same area today, the undeveloped areas are zoned as semi-natural open space.

14. Local libraries and reports

Flooding reports from the OPW website were consulted in the preparation of this assessment. These gave further details on the flood incidents outlined above.

15. Local consultation

Discussions with local groups indicated that flooding takes place in the Monteen Turlough to the rear of Mungret Church. This was further supported with photographs which indicate the extent and timings of some of the flood events, in particular in 2002 and 2009. These discussions indicate that both Monteen Turlough and Loughmore Common Turlough, may be linked as they both flood at the same time.

16. Walkover surveys

Walkover surveys were an important part of the groundwork associated with the draft plan. These informed the decisions taken in relation to the draft SELAP. Such surveys helped to indicate the extent of vegetation associated with wetter ground conditions such as yellow flag iris, *Juncus* spp. and creeping buttercup. Surveys also gave indications of surface ponding of water.

17. National, regional and local spatial plans

The Regional Flood Risk Assessment (RFRA) which accompanied the Regional Spatial and Economic Strategy for the Southern Region was, by its nature, a high level document. However, it did indicate that the main source “of flooding is mostly coastal”. It also indicated that the Dock Road was vulnerable to flooding. The OPW mentioned, in a submission, that the draft RFRA had not mentioned the earthen flood defence embankments. While not constructed to modern specifications these embankments are part of the flood control infrastructure.

18. Previous planning applications

In relation to previous planning permissions one application in the area for housing, commercial units, crèche and associated site works (planning reference 99/1301) in Ballykeefe, was refused by An Bord Pleanála in June 2007 because of “the potential of the development being affected by flooding in the

future". The reason for refusal further cited location on the floodplain and inadequate consideration of climate change.

A later application in the Ballykeefe area (08/68) was refused by the Council. Reports from water services were concerned about proposals to deal with runoff water storage. Further concerns were raised about the nature of the flood defence embankments which were intended for the protection of agricultural lands and not urban development.

An application (13/487) for an above ground gas installation by An Bord Gais at Bunlicky, Mungret, stated that the design level of their installation was 4.7m OD which was above what was considered the 200 year flood level. However, this was based on an assessment of the flood embankment walls, which were deemed to be 5.05m high. A report from water services indicated that this is not the case throughout its entire length, and mentioned the fact that the defences were intended for agricultural lands only.

An application for a ten-year permission was received from Valcroft Limited (16/642) for a waste transfer facility on the Dock Road. The Flood Risk Assessment which accompanied this application found that the risk to the development from flooding was mostly tidal.

An application (16/678) was received for construction of a storage shed and retention of eight office porta-cabins. The development was located in Skehacreggaun, Mungret. Permission for this development was granted. In terms of flooding, the flood risk assessment concluded "the main risk to this development would be a storm surge in the estuary coinciding with high spring tides and high levels in the Shannon".

3.0 Justification Test in determining the zoning pattern to be employed

Limerick is one of the cities that has been identified in the National Planning Framework as being the subject of a Metropolitan Area Strategic Plan, which emphasises the Metropolitan area's national importance. This is echoed in the Regional Spatial and Economic Strategy for the Southern Region, which mentions that the Limerick Shannon Metropolitan Area is "a key economic driver for the region and Ireland". This is the backdrop to the zoning pattern presented in the draft SELAP.

The zoning pattern is designed to facilitate development and in the case of the Bunlicky WWTP comprises "significant previously developed" lands (Flooding Guidelines p. 37 Justification Test for Development Plans). This area has been zoned "utility" to reflect current usage. The WWTP is also "essential in achieving sustainable urban growth" in that it provides the treatment capacity for sewage for the City and its environs. In terms of suitable alternative lands for the location of the WWTP choice is constrained by: a) its existence in this location; b) the need to ensure that it is separated from residential developments and; c) the need to ensure adequate outflow for treated emissions – in this case the Shannon River.

In the case of "existing undeveloped zoned areas at risk of flooding" (Flood Risk Management Guidelines p. 40) such as the lands to the rear of the Crescent Shopping Centre, it was decided to retain the zoning as semi-natural open space. This area was identified as benefiting lands and because they were indicated as liable to flood, both on first and later editions of six inch maps (see Figures 2 and 3), this indicated that flood risk was a factor. This was borne out by the CFRAMS maps. Here too, the nature of the flood defences are intended to protect agricultural land and not more sensitive development proposals. In addition to being a buffer in the event of flooding, it makes a contribution to the area of semi-natural open space in the plan area. Large areas of the undeveloped lands lay within Flood Zones A and B. The main risk would be from tidal flooding and it was noted that parts of the defending embankment had degraded. The conclusion was that development would be premature pending the construction of the Limerick Flood Relief Scheme.

A similar approach was taken with lands currently in agricultural use in the Ballykeefe area. Rezoning to residential and employment uses was requested. However, the site lay behind flood defences and is at risk of flooding. A proposal to provide flood defences was discounted as it would protect only the subject lands and not what the likely flooded area or flood cell would be. In addition, being an outlying location and being undeveloped, it is considered that the justification test would not apply. A full list of zoning responses to flooding is included in Table 1 in section 4 below.

The Dock Road - The zoning pattern on the Dock Road in the draft plan consists of Industrial, Enterprise and Employment or Utilities zonings in areas that are subject to flood risk. The Justification Test for Development Plans (Guidelines p. 37) considers that the uses must be "essential to facilitate regeneration and or expansion of the centre of the urban settlement". In this case, much of the activity along the Dock Road is long established and is a source of employment and comprises a continuation of employment related uses extending from the city. In the case of the Irish Cement factory, the use has been established over a period of almost 100 years. This is the second aspect of the justification

test which considers if an area “comprises significant previously developed...lands”. With respect to the Dock Road and Irish Cement this is the case with decades of use to support the zoning.

The next factor to consider is whether or not the area is “within or adjoining the core” ...of a designated urban settlement. The designation of the Limerick and Shannon MASP in the NPF has been noted and in the proposed Limerick Development Plan, both the city and environs plans will combine. Already the SELAP abuts the city plan and the Dock Road leads from the city through the plan area to Mungret. With the proposed Limerick Development Plan, this relationship will be reinforced. The further development of this area will help consolidate this long established area of economic activity which will ensure adequate redevelopment of brownfield sites and compact growth as the justification test demands.

In terms of other suitable lands as mentioned in the justification test, it should be noted that the uses here reflect existing land uses and it is not the development of greenfield sites that are in question. It should also be noted that buildings used for “retail, leisure, commercial, industrial and non-residential institutions” are regarded as “less vulnerable development” in terms of the justification test” (Guidelines, p. 25). These are the uses that the building stock in the Dock Road is put to and the uses that the zoning matrix allows.

4.0 Zoning Responses to Flood Risk

A number of sites were re-zoned as a result of flooding considerations. These are listed below. In some situations additional factors other than flooding, such as excessive noise arising from road traffic for example, were also a factor in the decision.

Table 1 Zoning Responses to Flood Risk

Submission No.	Former Zoning	Proposed Zoning	Comments
1	Enterprise/Employment	Utilities	This is a less vulnerable land use than enterprise and employment and reflects the existing use of the site.
C8	Enterprise/ Employment and Residential	Enterprise/ Employment and open space	Less vulnerable land use than residential with open space element on Flood Zone A
6	Residential	Enterprise and Employment	Less vulnerable uses and in the case of agriculture reflects existing land use.
C1	Agriculture and Semi Natural Open Space	Agriculture and Semi Natural Open Space. Increase in agricultural area	Reflects existing land usage and is less vulnerable.
13	Enterprise/ Employment	High Tech/ Manufacturing.	The zoning in this location includes a policy for site specific

			FRA for proposals in the low-lying area, with requirements for SUDS and suitable attenuation.
17	Residential	Agriculture	Agriculture is the least vulnerable zoning
19	Existing residential	Open Space/ Recreation	Open space is an acceptable land use in flood vulnerable areas

Note: See Figure 11 below for locations of the above submissions.

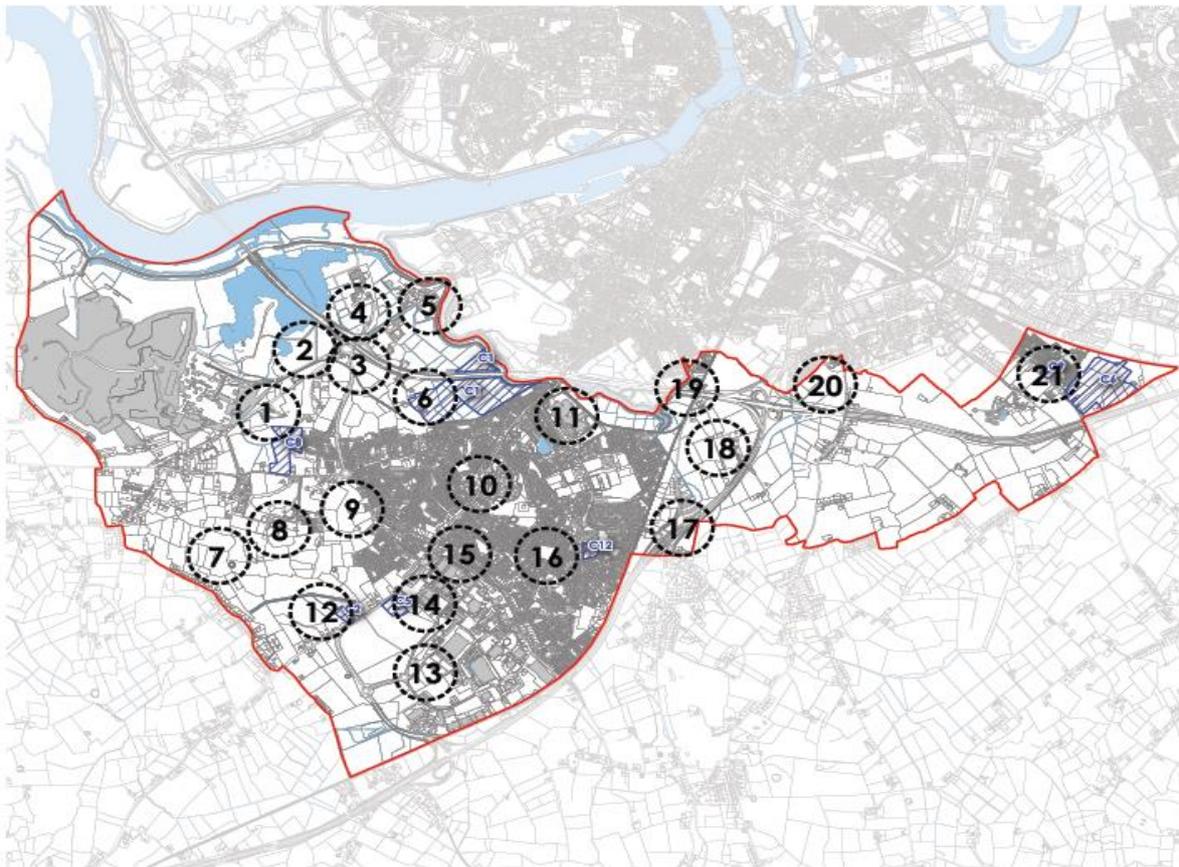


Figure 11: Showing all of the submissions numbered including the locations of submissions 6, 17, 18 and 19, which have flood related constraints.

4.0 Conclusions

Based on the Planning System and Flood Risk Management Guidelines, field work and the receipt of site specific reports, it has been decided to alter zoning on the sites identified in Table 1 above. At this point in the plan making process and based on current information, it was considered the best course of action in order to avoid flood risk, particularly to vulnerable forms of development. This was

based on considerations of flooding vulnerability, existing land uses and the nature of the flood defences in the Southern Environs area.