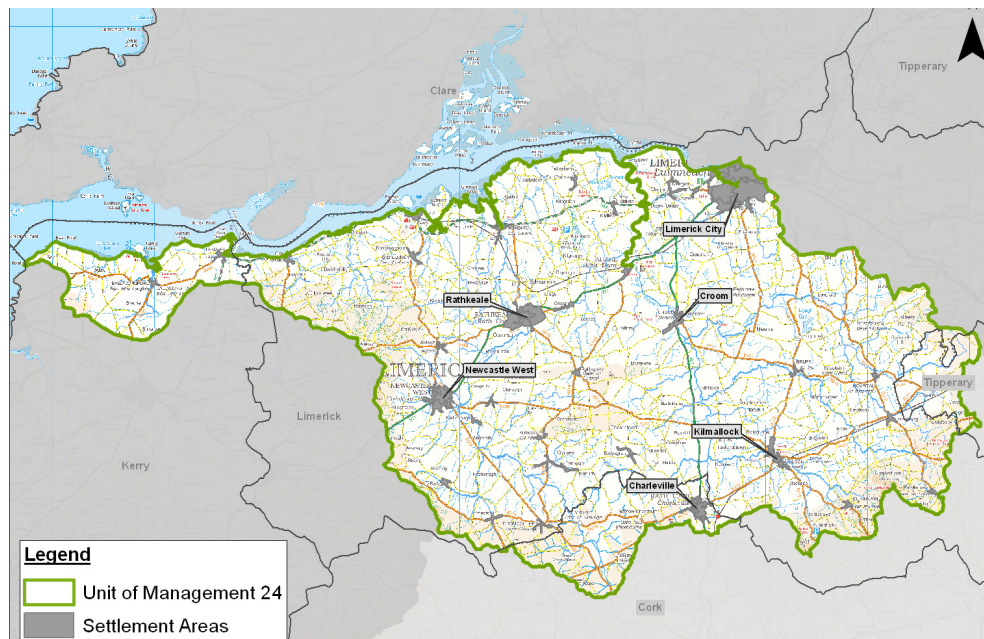


**SHANNON**  
**CFRAM**  
**STUDY**  
CATCHMENT FLOOD RISK  
ASSESSMENT AND MANAGEMENT







## Unit of Management 24: Shannon Estuary South - Flood History and Key Environmental Issues



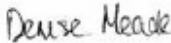

Strategic Environmental Assessment - Scoping  
Report [Consultation Draft] - Annex II


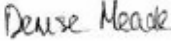
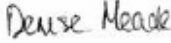



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## Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
1.1	Background	2
1.2	Consultation	3
<b>2</b>	<b>Unit of Management Characteristics and History of Flooding</b>	<b>4</b>
2.1	Unit of Management Characteristics	4
2.2	History of Flooding	6
<b>3</b>	<b>Key Environmental Issues in Unit of Management 24</b>	<b>10</b>
3.1	Introduction	10
3.2	Population and Human Health	11
3.3	Geology, Soils and Land Use	16
3.4	Water	24
3.5	Air and Climate	36
3.6	Biodiversity, Flora and Fauna	38
3.7	Fisheries, Aquaculture and Angling	45
3.8	Landscape and Visual Amenity	49
3.9	Material Assets (economic), Development and Infrastructure	51
3.10	Tourism and Recreation	54
3.11	Archaeology and Cultural Heritage	57
3.12	Conclusion	61
	<b>References</b>	<b>62</b>

# 1 Introduction

## 1.1 Background

As part of the Strategic Environmental Assessment (SEA) process, the Office of Public Works (OPW) invites you to give your views on the development and implementation of a series of Flood Risk Management Plans (FRMPs) in the Shannon River Basin District (RBD).

This Annex represents a key element of the SEA scoping process for the proposed FRMP for the **Shannon Estuary South Unit of Management (UoM 24)** by describing the existing and potential future characteristics of the Unit of Management, summarising the history of flooding associated with its coastline and river catchments, and identifying the key social and environmental issues relating to flooding and flood risk management specific to this Unit of Management. This Annex should be read in conjunction with the overarching Shannon River Basin District Environmental Scoping Report which documents all other elements relevant to this scoping process.

Your comments on the information outlined in this Annex, coupled with those on the overarching Shannon RBD Environmental Scoping Report, will assist the scoping of, and the consultation about, the environmental impacts of the Shannon Estuary South Unit of Management (UoM 24) FRMP by initiating the strategic environmental assessment scoping stage.

The preparation of the FRMP for Unit of Management 24 will consider the risk of flooding from the rivers, estuaries and coastal waters at various different spatial scales. The locations that are considered to be potentially at risk of flooding, and therefore been identified as Areas for Further Assessment (AFAs) or Individual Risk Receptors (IRRs), will be subject to more detailed consideration in the development of the FRMP for this Unit of Management given their history of flooding, or where such risk might arise through future development or other changes/pressures.

Flood maps indicating where flood risk from river, estuarine or coastal waters exists within AFAs or at IRRs, and along the watercourses connecting AFAs / IRRs will be produced for this Unit of Management.



## 1.2 Consultation

You have an important role to play in helping us identify all the key issues relating to flood risk management, and we are keen to hear what you think. Specific to **Unit of Management 24 (Shannon Estuary South)**, we welcome your comments on the key environmental issues.

It is important to note that the information in this Annex accounts for pre-scoping consultation already undertaken with key organisations, and the following sections present our current understanding of the Shannon Estuary South Unit of Management. The SEA baseline and framework will develop as the Study progresses, and will be further informed by views and knowledge of stakeholders and the wider public.

**You can send us your views by email or by post to the details below.**

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## 2 Unit of Management Characteristics and History of Flooding

### 2.1 Unit of Management Characteristics

The Shannon Estuary South Unit of Management (or UoM 24), shown in Figure 2.1 encompasses areas of four counties; Kerry, Limerick, Cork and Tipperary. It consists of fertile limestone plain, known as the ‘Golden Vale’ bounded to the north by the Shannon Estuary and on the west, south and east by the Mullaghareirk Mountains, Ballyhoura Mountains, Galty Mountains and Slieve Felim Mountains.



**Figure 2.1 - UoM 24 Shannon Estuary South Overview**

Unit of Management 24 is dominated by two main river catchments, the Deel and the Mague, which together cover 65% of the Unit of Management area. The coastline extends along the Shannon Estuary from Limerick City in the east to where it meets the Atlantic Ocean between Loop Head (on the north of the Shannon Estuary in County Clare) and Kerry Head (County Kerry), to the west of this Unit of Management.

The River Deel rises in the Mullaghareirk Mountains near Dromina. It flows roughly in a north-western direction through the mountains, where it is joined by numerous tributaries, including the Finglasha River and the Ahavarragh Stream which drain the lands upstream of Dromcolliher. Downstream of Newcastle West, the River Deel is joined by the Rivers Arra, Dooally and Daar, which drain the steep topography of the Knockanimpaha Mountains which bound the west of the catchment. Downstream of this confluence, the River Deel flows north-east, through agricultural plains. The river roughly follows the direction of the N21 towards and through the centre of Rathkeale. Flowing north from Rathkeale, the

Deel flows through Askeaton, and on to the Shannon Estuary. The total catchment area for the River Deel is 597 km<sup>2</sup>.

East of the Deel catchment, and bounded to the north by the River Blackwater catchment, lies the Maigue catchment. The River Maigue drains an area of approximately 806 km<sup>2</sup>, from its source in the Ballyhoura Mountains (County Cork) to where it enters the Shannon Estuary approximately 10 km north of Adare.

Rising north of Milford in north Cork, the River Maigue flows east to join the River Loobagh approximately 3 km north of Charleville, and then flows north through Bruree. Just downstream of Bruree, the Maigue is joined by the significant tributary of the Morningstar River, which drains a catchment area of approximately 132 km<sup>2</sup>. Continuing northwards, just upstream of Croom, the Maigue is joined by the third significant tributary of the River Camogue. From Croom, the River Maigue flows north-west towards Adare where the River Maigue becomes tidally influenced.

Part of the River Feale Catchment lies within the north east section of this Unit of Management. This area of the catchment consists of a number of ‘short’ rivers which discharge directly to the Shannon Estuary.

Arterial drainage schemes which are maintained by the OPW have historically been undertaken at various locations within the Maigue and Deel catchments for agricultural purposes.

**Spatial Scales of Assessment**

There are three Water Management Units (WMUs) within Unit of Management 24 (refer to Figure 2.2). These consist of the Feale, Deel/Shannon Estuary and Maigue WMUs. Only approximately one third of the area of the Feale WMU (the northern part which borders the Shannon Estuary) is included in Unit of Management 24, the remaining area (specifically the Feale catchment) extends into Unit of Management 23 (see Annex I).

Table 2.1 and Figure 2.2 illustrate the AFAs and IRRs identified for Unit of Management 24, all of which may be subject to changes as the CFRAM Study develops.

**Table 2.1: UoM 24 spatial scales of assessment**

County	WMU	AFA / IRR Name
<b>Areas for Further Assessment</b>		
Cork	Maigue	Charleville
Cork	Deel/Shannon Estuary	Milford
Kerry	Feale	Ballylongford
Limerick	Maigue	Adare
Limerick	Deel/Shannon Estuary	Askeaton
Limerick	Maigue	Clarina
Limerick	Maigue	Croom
Limerick	Deel/Shannon Estuary	Dromcolliher
Limerick	Feale	Foynes
Limerick	Maigue	Kilmallock
Limerick	Deel/Shannon Estuary	Newcastle West
Limerick	Deel/Shannon Estuary	Rathkeale
<b>Individual Risk Receptor</b>		
Kerry	Feale	Tarbert (Power Station)

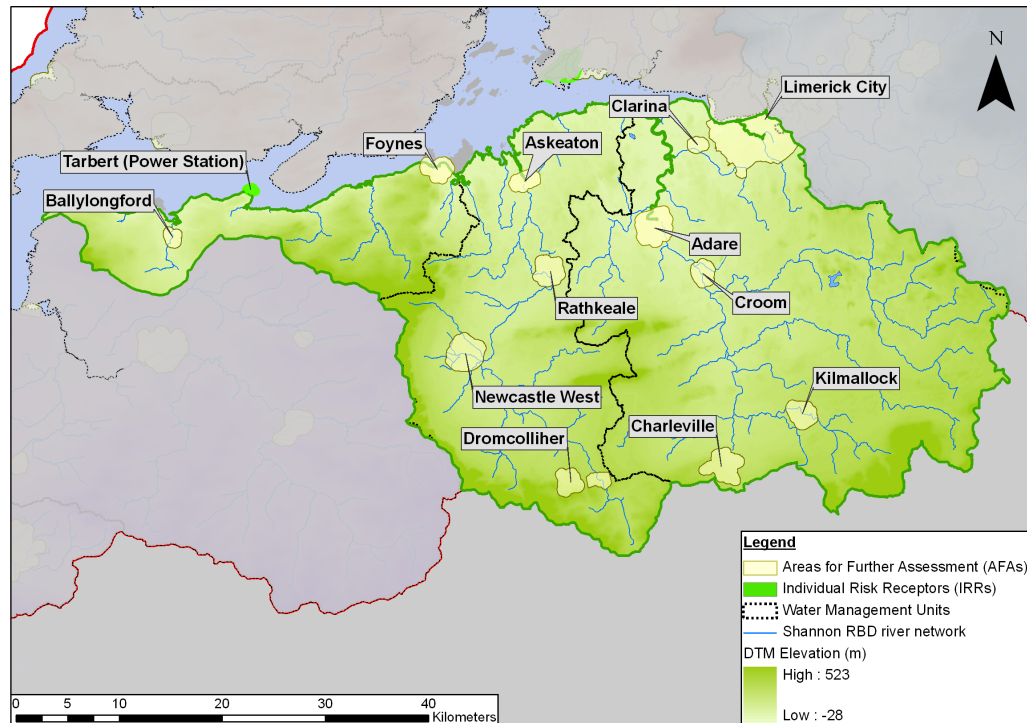


Figure 2.2 - UoM 24 Spatial Scales of Assessment

The full extent of the AFA defined for Limerick City lies within three Units of Management and includes all of the developed land within the contiguous urban area of Limerick, and all lands zoned for development in or adjacent to Limerick City (including areas that may be outside of the Limerick City Council jurisdictional boundary). For the purpose of this Study, this AFA will be assessed as part of Unit of Management 25-26 (Annex III). Any flood risk management options proposed for this AFA will therefore be documented within the FRMP for Unit of Management 25-26.

## 2.2 History of Flooding

Within Unit of Management 24, there are records of significant flooding that has occurred throughout the Feale, Deel/Shannon Estuary and Maigue WMUs from 1946 to 2008, affecting a number of towns and villages. The major cause of flooding, based on the available records, appears to be fluvial and tidal.

Tables 2.2 to 2.4 show the reported fluvial and tidal flood events for the AFAs and IRR currently identified within the Unit of Management 24 WMUs. This historical flooding information has been gathered using the OPW National Flood Hazard Mapping website ([www.floodmaps.ie](http://www.floodmaps.ie)), and the National Preliminary Flood Risk Assessment (PFRA) Report (August 2011) produced by the OPW. The 'known' main flood mechanism is not recorded for all flood events and is assumed for some records in the tables below (these are shown in *italics*).

**Table 2.2: Summary of historical flood events within the Feale WMU (for those catchments that fall within UoM 24)**

<b>FEALE WMU</b>		
<b>Flood Event</b>	<b>Main Flood Mechanism</b>	<b>Description of Flood Event</b>
<b>(a) Ballylongford</b>		
Jan 2004	Tidal	Gortnacooka Bridge area flooded.
Apr 2002	Tidal	Land Commission Embankment LIS02/2104 flooded.
Mar 2002	Tidal	Land Commission Embankment LIS02/1993 flooded.
Feb 2002	Tidal	Kerry STW, street & some 10 houses flooded.
Jan 2002	Tidal & rainfall runoff	At least 12 houses at Bridge St, R551, R522, LA water treatment plant flooded.
Dec 2001	Tidal	Land Commission Embankment LIS01/1584 flooded.
Aug 2001	Tidal	Carrig Island LIS01/769 flooded.
Oct 1961	Tidal	Streets at Ballylongford flooded.
Oct 1927	Tidal	A number of houses & streets flooded.
<b>(b) Foynes</b>		
Jan 2005	Fluvial	At least 4 residential & 2 commercial properties flooded. N69 affected.
Feb 2002	Tidal	Domestic & commercial properties, main street & N69 flooded. 20 properties flooded (PFRA).
Jan 2002	Fluvial	N69 & a number of premises flooded.
Feb 1995	Fluvial with tide locked	N69 flooded for days.
Jan 1995	Fluvial	Flooding in the Railway Road area.
Recurring	<i>Fluvial</i>	Morgan's House flooded (from PFRA).
<b>(c) Tarbert Power Station IRR</b>		
-	-	No recorded flooding

**Table 2.3: Summary of historical flood events within the Deel/Shannon Estuary WMU**

<b>DEEL/SHANNON ESTUARY WMU</b>		
<b>Flood Event</b>	<b>Main Flood Mechanism</b>	<b>Description of Flood Event</b>
<b>(a) Askeaton</b>		
Recurring	Fluvial	Deel overflowed and flooded factory car park and L1236 Road. No premises affected.
<b>(b) Dromcollsher</b>		
Aug 1997	Fluvial	Houses & roads flooded.
Jul 1997	Fluvial	Houses & roads flooded.
Jun 1995	Fluvial	Houses & church flooded.
Feb 1995	Fluvial	Roads flooded.
Jan 1995	Fluvial	Roads flooded.

<b>DEEL/SHANNON ESTUARY WMU</b>		
<b>Flood Event</b>	<b>Main Flood Mechanism</b>	<b>Description of Flood Event</b>
Dec 1994	Fluvial	Roads flooded.
Jan 1994	Fluvial	Roads flooded.
Dec 1993	Fluvial	Roads flooded.
Sep 1993	Fluvial	Roads flooded.
Jan 1993	Fluvial	Roads flooded.
Nov 1991	Fluvial	Roads flooded.
Dec 1990	Fluvial	Roads flooded.
Feb 1990	Fluvial	Roads flooded.
Jan 1989	Fluvial	Roads flooded.
Oct 1988	Fluvial	Houses at Pike St and roads flooded.
Feb 1988	Fluvial	Roads flooded.
Jan 1988	Fluvial	Roads flooded.
Aug 1986	Fluvial	Houses, church and roads flooded.
Jul 1986	Fluvial	Roads flooded.
Jan 1986	Fluvial	Roads flooded.
Jan 1984	Fluvial	House at Pike Street flooded.
<b>(c) Milford</b>		
-	-	No flooding details available.
<b>(d) Newcastle West</b>		
Aug 2008	Fluvial	143 residential, 87 commercial properties & roads flooded.
<b>(e) Rathkeale</b>		
1969	Fluvial	No flooding details available.
Dec 1968	Fluvial	No flooding details available.
Recurring	Fluvial	Graigue between Rathkeale & Ballingarry - land flooded on average once every 4/5 years. Area affected is between the R518 and L1213. Roads not flooded.
Recurring	Fluvial	Lands to east of L1219 at Knockaunavad (north west of Rathkeale) flooded every winter.

**Table 2.4: Summary of historical flood events within the Maigue WMU**

<b>MAIGUE WMU</b>		
<b>Flood Event</b>	<b>Main Flood Mechanism</b>	<b>Description of Flood Event</b>
<b>(a) Adare</b>		
Feb 2002	Fluvial & Tidal	Land & road near Adare Station flooded.
Jan 1999	Surface Runoff & Tidal	Station Road area affected by flooding.
Feb 1996	Tidal	N21 road flooded.
Jan 1995	Tidal	Land & road flooded.



<b>MAIGUE WMU</b>		
<b>Flood Event</b>	<b>Main Flood Mechanism</b>	<b>Description of Flood Event</b>
Dec 1973	Fluvial	No flooding details available.
Aug 1946	Fluvial	Agricultural land & roads flooded.
<b>(b) Charleville</b>		
Aug 1946	Fluvial	Houses & agricultural land flooded.
<b>(c) Clarina</b>		
Sep 1992	<i>Fluvial</i>	Fields flooded. The flood depth estimated to be 0.30m (1ft).
Recurring	Fluvial	Flooded a number of houses at Clarina Village.
Recurring	Tidal	No houses affected. Area flooded is over a length of 700 to 800m at toe of embankment.
<b>(d) Croom</b>		
Dec 1998	<i>Fluvial</i>	Houses flooded.
Aug 1997	<i>Fluvial</i>	Houses flooded.
Jan 1995	Tidal	Houses flooded.
Feb 1990	<i>Fluvial</i>	Houses flooded.
Aug 1986	Fluvial	Croom-Bruff Road (C1/31/4/2) & north of the road (C1/31/4) flooded.
Dec 1983	Fluvial	No flooding details available.
Dec 1973	Fluvial	No flooding details available.
Aug 1946	Fluvial	15 houses flooded. Banogue (Croom) Creamery was flooded.
Recurring	Fluvial	Caherass area of Croom affected by flooding.
<b>(e) Kilmallock</b>		
Aug 1946	Fluvial	Roads & one house flooded.

## 3 Key Environmental Issues in Unit of Management 24

### 3.1 Introduction

The following sections provide a preliminary discussion of the environmental baseline for Unit of Management 24.

Both the existing and potential future environmental characteristics of the Unit of Management are summarised. These characteristics can influence the risk and repercussions of flooding and can constrain or provide opportunities for the implementation of strategic flood risk management options.

On developing the scope of the SEA for the Shannon CFRAM Study, and following consultation with stakeholders, the key social and environmental issues relating to flooding and flood risk management within Unit of Management 24 have been identified, and these are documented in the following sections.

Potential interactions between the different aspects of the environment are outlined within Section 5 of the overarching Shannon RBD Environmental Scoping Report. These interactions will be further considered and documented during the later stages of the SEA process.

### 3.2 Population and Human Health

#### 3.2.1 Current Conditions

##### Population

The population of Ireland was over 4.2 million in 2006 and provisional numbers from the 2011 census indicate that population figures have increased by approximately 8.1% to 4.5 million. Ireland has experienced increasing population growth since 1961, however the past two years has seen a decrease in the demand for development, and increased unemployment within this Unit of Management as is the trend seen across the entire country.

The provisional 2011 census population figures currently available from the Central Statistics Office (CSO) do not segregate city populations from rural population, but these are due to be published in April 2012 and will be considered as appropriate in the following stages of the SEA. Settlement patterns within this Unit of Management are illustrated in Figure 3.2.1.



**Figure 3.2.1 - Settlement patterns within UoM 24**

Population figures reported in the 2006 census for the town boundaries of each AFA within this Unit of Management are outlined in Table 3.2.1. As noted in Section 2.1 above, Limerick City AFA will be assessed as part of Unit of Management 25-26, and therefore is not considered further within this report.

**Table 3.2.1: Population figures within the Areas for Further Assessment (source: CSO)**

Town (AFAs)	Population 2002	Population 2006
Adare	1,102	982
Askeaton	921	979
Charleville	2,685	2,984
Clarina	-	216
Croom	1,056	1,045
Dromcolliher	496	524
Foynes	491	606
Kilmallock	1,362	1,443
Milford	204	176
Newcastle West	4,017	5,098
Rathkeale	1,367	1,494

Many of the towns and villages within commuting distance from Limerick City have experienced a higher population growth in recent years e.g. Newcastle West (+1,081) and Rathkeale (+130).

Transport 21, the Government’s development programme for the network of national roads over the period 2006 to 2015 included the following developments of relevance to the population distribution within this Unit of Management:

- Atlantic Road Corridor from Letterkenny to Sligo, Galway, Limerick and Waterford. This will connect the National Spatial Strategy’s, 2002-2020 Gateway Cities;
- Improve the key national primary routes, N21 from Limerick to Tralee and N24 from Limerick to Waterford; and
- Targeted improvement of national secondary roads: the N69 along the Shannon Estuary from Limerick to Tralee.

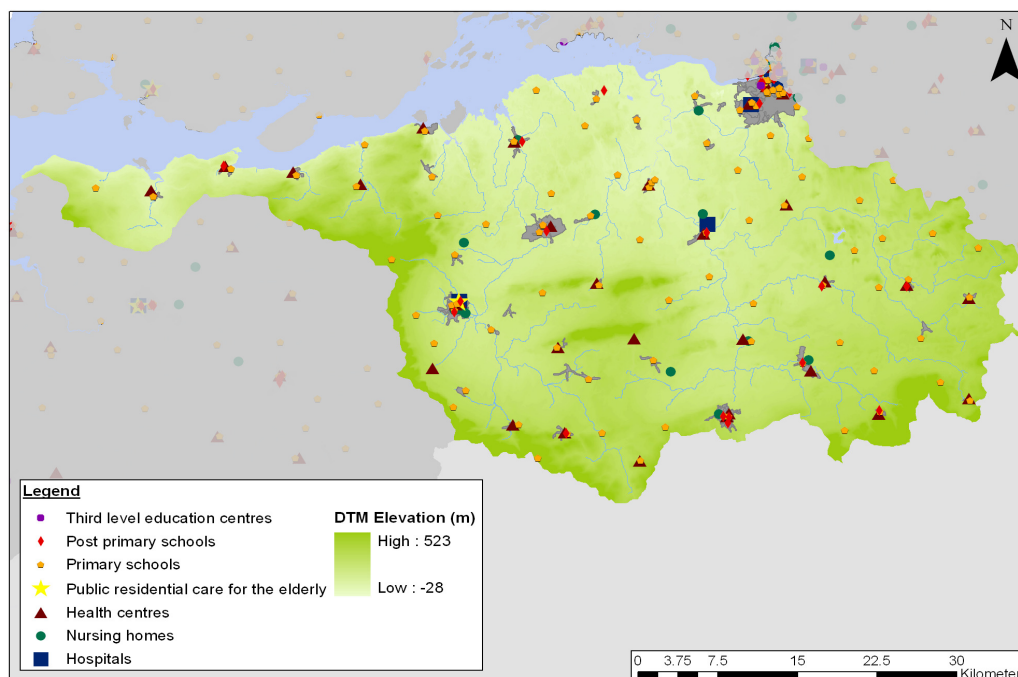
Transport 21 will be superseded by the new National Development Plan from 2012. However, the NDP reflects many of the road infrastructural proposals under Transport 21.

**Human Health**

Hospitals, health service centres, nursing homes and schools, as well as their ancillary services and roads, are recognised as vulnerable receptors to flooding. The distribution of these receptor groups throughout this Unit of Management is illustrated by Figure 3.2.2.

The major hospitals servicing this Unit of Management are regional hospitals located in Croom and Newcastle West. The regional hospital in Croom is located on low ground and is considered to be a principal receptor in this Unit of Management.

Details regarding the existing and future characteristics of this Unit of Management associated with pollution risks to human health are outlined in Section 3.4 of this Annex.



**Figure 3.2.2 - Critical human health receptors within UoM 24 (source: OPW, HSE)**

### 3.2.2 Future Trends

#### Housing and Economic Development Planning

The Planning and Development (Amendment) Act 2010 (and subsequently the Regional Planning Guidelines) includes new provisions for Development Plans, requiring the introduction of a ‘core strategy that shall show that the development objectives in the Development Plan are consistent, as far as practicable, with national and regional development objectives set out in the National Spatial Strategy and regional planning guidelines’. The Core Strategy of each plan must provide a transparent evidence-based rationale for the amount of land proposed to be zoned for residential and allied mixed-use zonings in the relevant Development Plan and associated compliance with relevant EU Directives. The implementation of core strategies (which is being monitored by the Mid-west and South West Regional Authorities for this Unit of Management) within the Development Plans is likely to result in de-zoning, re-zoning and phasing of development of lands.

Local Authorities with AFAs/IRRs within this Unit of Management, which include Limerick, Cork and Kerry County Councils, have incorporated Core Strategies into their Development Plans. Each Council are now required to integrate these Strategies into the relevant Local Area Plans. The implementation of these strategies may result in re-zoning or de-zoning of land within this Unit of Management, influencing population distribution and development. Core Strategies outlined in the Limerick (draft 2010 – 2016), Cork (2009 – 2015) and Kerry (2009 – 2015) County Development Plans emphasise the need for sustainable development and appropriately zoned land, in addition to a strong link to enforcement of planning regulations for sustainable development into the future. The strategies relevant to the AFAs will be examined further in the next stage of the SEA process. In addition,

**Annex II - Shannon Estuary South Unit of Management (UoM 24)**

consultation with relevant Regional Planning Authorities for this Unit of Management will continue.

There is a requirement for planning authorities to have regard to the Planning System and Flood Risk Management Guidelines (Department of Environmental Heritage and Local Government<sup>1</sup> and the OPW, 2009) in carrying out their functions under the Planning Acts. This is to ensure that ‘where relevant, flood risk is a key consideration in preparing Development Plans and Local Area Plans and in the assessment of planning applications’. These guidelines aim to help revise and strengthen planning policy on development and flood risk across Ireland, and will therefore have a significant influence on future population and development growth and distribution across the Unit of Management.

The preparation of a Strategic Integrated Framework Plan (SIFP) and its associated SEA and AA for the Shannon Estuary has recently commenced. This Plan aims to identify the nature and location of future development, economic growth and employment that can be sustainably accommodated within the estuary whilst ensuring that the habitat status of the Natura 2000 and other environmentally sensitive sites would not be reduced as a result of the impacts of such developments (for further information, refer to Section 3.9.2).

**Regional Planning Guidelines – Population Targets**

Population targets are outlined in the respective Regional Planning Guidelines to assist planning authorities to decide on the extent of land to be zoned for development (particularly residential development). Population targets indicate the minimum population numbers for these locations to be used in determining future development land requirements for the region, setting the context for city and county Development Plans and Local Area Plans. While zoning should have regard to these population targets, the Guidelines note that additional development may be permitted where there is a clear need. The targets outlined in Table 3.2.2 below provide an indication of future population distribution in this Unit of Management.

**Table 3.2.2: Population targets set out in the South West and Mid-West Regional Planning Guidelines for regions within UoM 24.**

Area / Region	2006 (Census)	2016	2022	Predicted Increase 2016-2022
Limerick County	124,265	147,081	157,065	9,984
Kerry County	139,835	165,470	174,378	8,908
Cork County	361,877	436,920	470,622	33,702

<sup>1</sup> Now the Department of the Environment, Community and Local Government.



**Box 3.2: Population and Human Health – Key strategic issues relating to flood risk management**

- Population and development growth will potentially increase the number of people at risk from flooding;
- Recent and emerging changes to planning and development regulations/guidance and their associated influences on the distribution of both existing and future population and development, can provide opportunities for the avoidance or mitigation of flood risk if appropriately enforced;
- Flooding can have significant social and socio-economic effects, such as increased stress and anxiety for individuals and communities as well as monetary impacts associated with ‘clean-up’ activities;
- Increased levels of resilience and resistance of infrastructure protecting or managing human health to flooding is important to support emergency planning and response e.g. hospitals, nursing homes, health care facilities, etc;
- Access to healthcare and emergency services should be maintained during flood events;
- Failure to protect or manage potential ‘at risk’ areas, can influence property insurance policies and may also restrict development potential;
- Publication of nationally / regionally consistent information relating to flood risk will help towards standardising planning, development and insurance policies;
- Good public access to information relating to flood risk can support ongoing community and business resilience, which in turn can provide opportunities for facilitating or enhancing the sustainability of flood risk management; and
- It is acknowledged that local authorities are legally required to undertake emergency planning and therefore this will not be proposed as a flood risk management option by the CFRAM Study. However, other aspects of strategic flood risk management can enhance business and community emergency planning and continuity frameworks, e.g. linking emergency planning frameworks with flood forecasting, to provide flood warning.

### 3.3 Geology, Soils and Land Use

#### 3.3.1 Existing Conditions

Underlying this Unit of Management is a sedimentary **geology** of shale, sandstone, siltstone and limestone, see Figure 3.3.1.

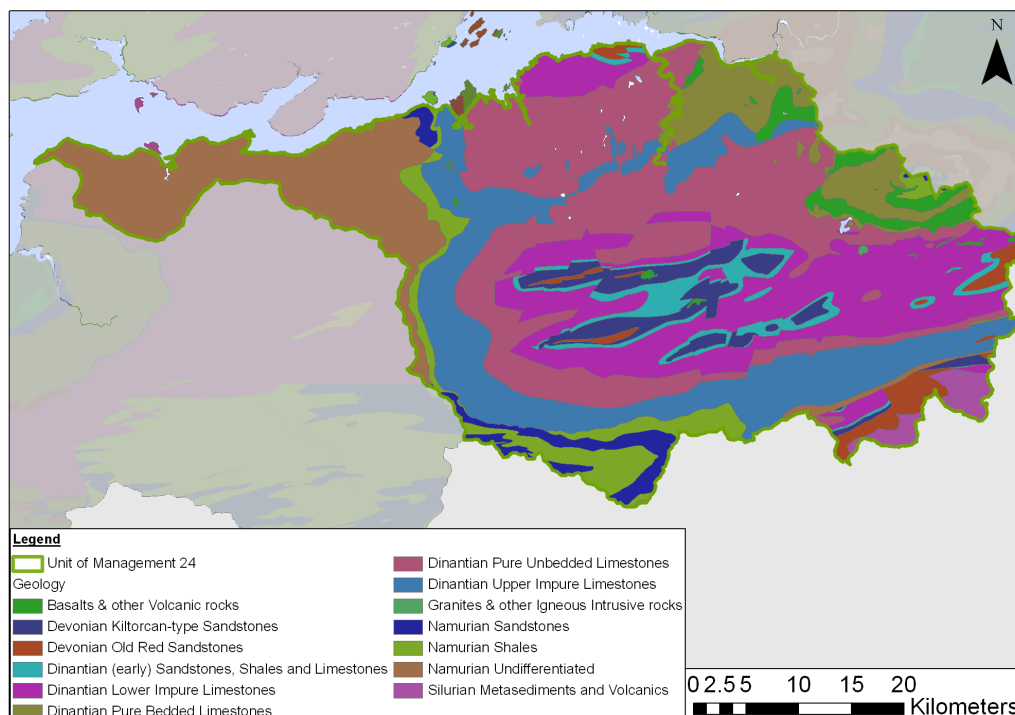


Figure 3.3.1 - Geology within UoM 24 (source: GSI)

As part of the Irish Geological Heritage (IGH) Programme, a partnership between Geological Survey of Ireland (GSI) and the National Parks and Wildlife Service (NPWS), the GSI have identified important geological and geomorphological sites which could be conserved as Natural Heritage Areas (NHAs). Until designation is confirmed, these sites are classified as Irish Geological Heritage Sites (IGHs). There are 22 IGHs classified within this Unit of Management (refer to Figure 3.3.2 and Table 3.3.1).

Annex II - Shannon Estuary South Unit of Management (UoM 24)

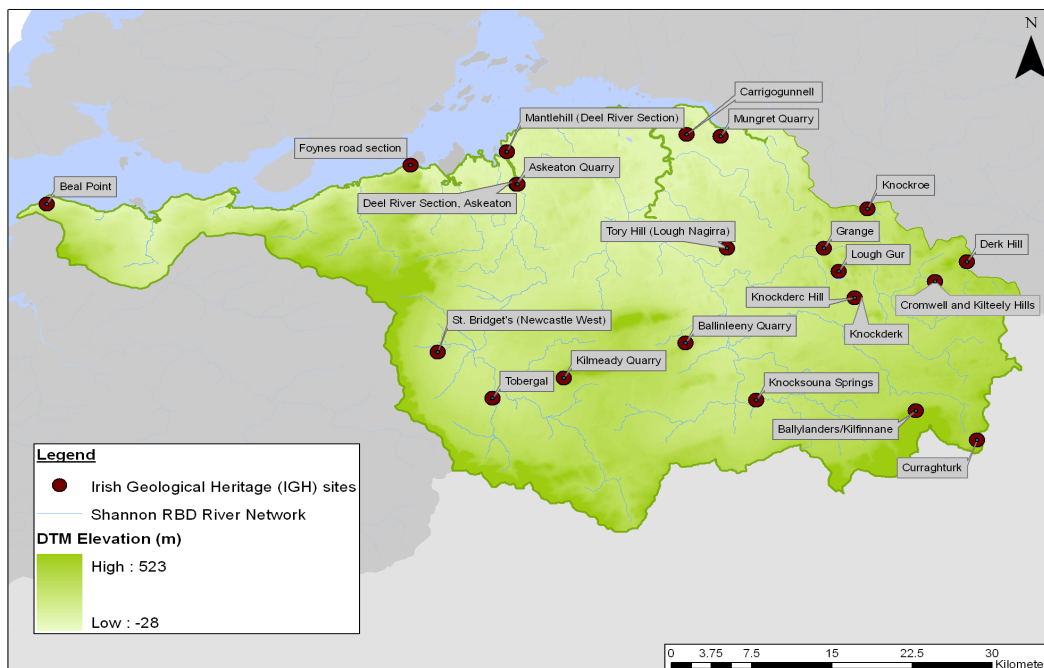


Figure 3.3.2 - Irish Geological Heritage Sites within UoM 24 (source: GSI)

Table 3.3.1: Description of the IGH within UoM 24

Site Name	Theme No(s).	Theme Type	Principal Characteristics
Beal Point	IGH9	Upper Carboniferous and Permian	Carboniferous Rocks Exposed
Askeaton Quarry	IGH3 IGH8	Carboniferous to Pliocene Palaeontology Lower Carboniferous	Carboniferous Lst. Waulsortian Quarry
Ballinleeny Quarry	IGH8	Lower Carboniferous	Mellon House Beds and Ringmoylan Shales
Ballylanders/Kilfinnane	IGH7	Quaternary	Moraine
Carrigounnell (Massey's Bridge - Newtown)	IGH8	Lower Carboniferous	Volcaniclastics Lava Flows
Cromwell and Killeely Hills	IGH11	Igneous Intrusions	Lavas and Varied Volcanic Rocks
Curraghturk	IGH7	Quaternary	Spillway
Deel River Section, Askeaton	IGH8	Lower Carboniferous	Waulsortian Mudbank
Derk Hill	IGH11	Igneous Intrusions	Volcanics
Foynes road section and inland outcrop	IGH8	Lower Carboniferous	Gull Island Formation
Grange	IGH8	Lower Carboniferous	Volcanics
Kilmeady Quarry	IGH3 IGH8	Carboniferous to Pliocene Palaeontology Quaternary	Ballyvergin Shale

Annex II - Shannon Estuary South Unit of Management (UoM 24)

Site Name	Theme No(s).	Theme Type	Principal Characteristics
Knockderc Hill	IGH11	Igneous Intrusions	Syenite
Knockroe	IGH8	Lower Carboniferous	Lava Tubes
Knocksouna Springs	IGH16	Hydrogeology (including warm springs)	Warm Spring
Lough Gur	IGH8	Lower Carboniferous	One of the Major Sites for Sub-Fossil Remains of the Giant Irish Deer
Mantlehill (Deel River Section)	IGH8	Lower Carboniferous	Waulsortian Mudbanks
Mungret Quarry	IGH8	Lower Carboniferous	Visean Shelf Lst. Quarry
St. Bridget's (Newcastle West)	IGH16	Hydrogeology (including warm springs)	Warm Spring
Tobergal	IGH16	Hydrogeology (including warm springs)	Warm Spring
Tory Hill (Lough Nagirra)	IGH7	Quaternary	Glacial Sediments
Knockderk	IGH8	Lower Carboniferous	Volcanic Plug

The **soils** are generally a mixture of gley, grey brown podzolics, and lithosols, soils with more acid brown podzolics and peaty gley soils to the west and south of the Unit of Management. The sub-soil consists of limestone till with shale's / sandstone till and cut-over peat to the western section of the Unit of Management. Figure 3.3.3 shows the type of sub-soils within this Unit of Management derived from the underlying geology.

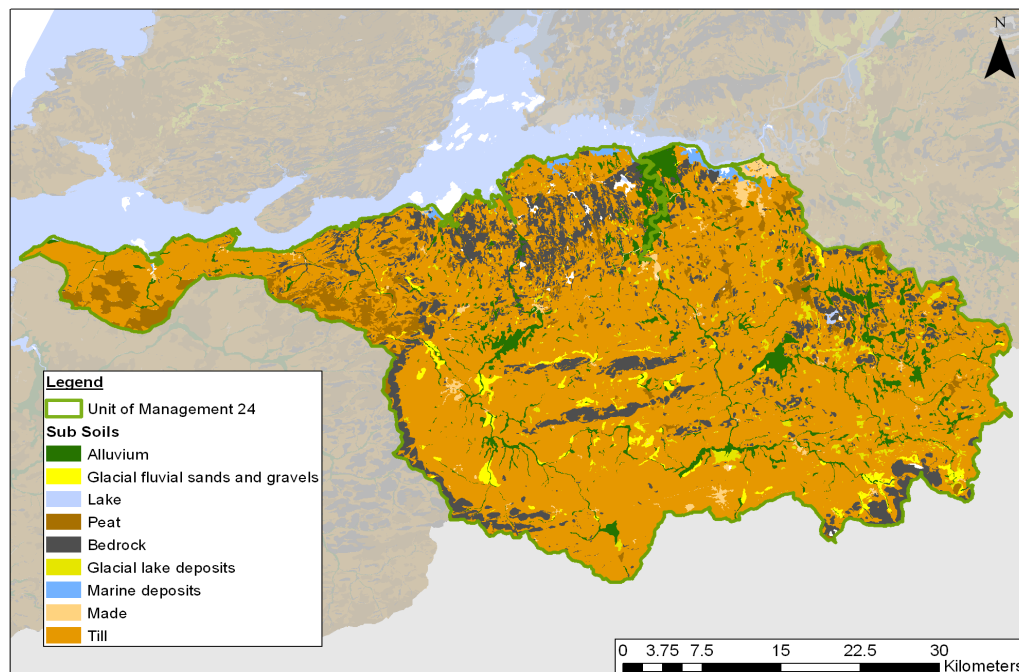
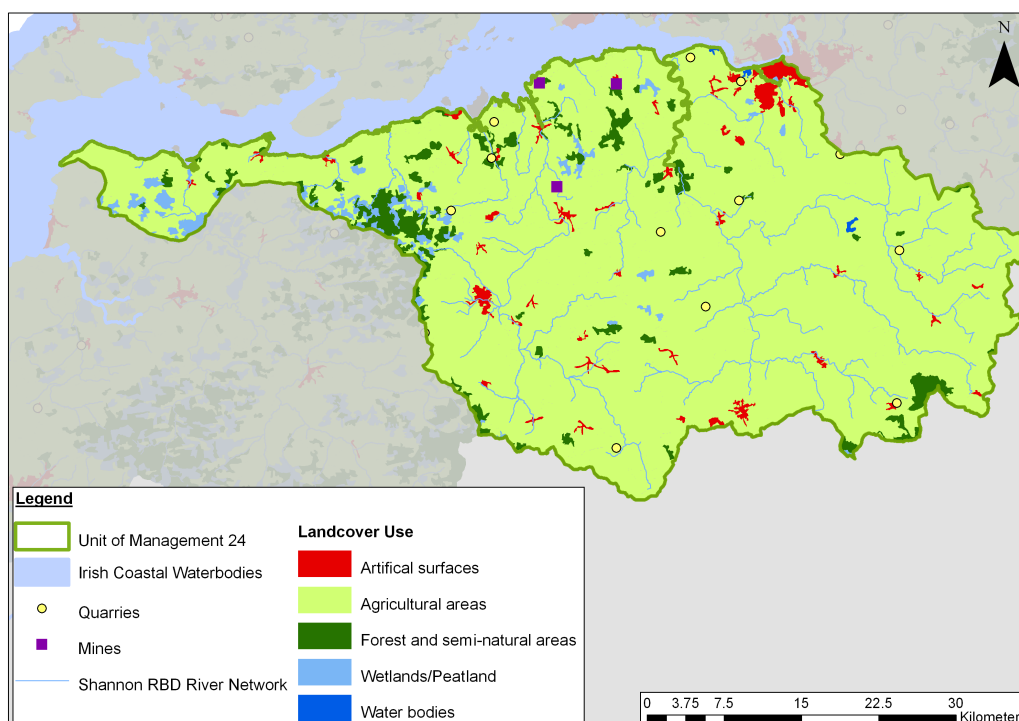


Figure 3.3.3 - Sub-soils within UoM 24 (source: Teagasc)

**Land use** recorded within this Unit of Management is shown on Figure 3.3.4. Based on data from Corine 2006, agriculture is the dominate land use within this Unit of Management, accounting for 92% of land area. Dairy herds with some beef, horse breeding, pig and poultry in certain areas are the main agricultural practices (Limerick Country Development Plan), and arable land is the dominant land cover type.



**Figure 3.3.4 - Land use within UoM 24 (source: EPA Corine land cover database 2006)**

The remaining land use types consist of forestry and semi-natural areas (4%), wetland, including peat bog (2%) and built land (2%). Peat bogs are more common on higher ground to the west of County Limerick and in North Kerry. Additionally there are twelve quarries and three mines identified within this Unit of Management.

The reform of the EU Common Agricultural Policy (CAP) provided the incentive for the formulation of the Rural Environment Protection Scheme (REPS). The overarching principle of the REPS was to reward farmers for undertaking farming practices in an environmentally friendly manner. The uptake of the REPS throughout Ireland is reported on a percentage uptake per county with the highest percentage uptake being 30-35%. Within County Limerick and County Cork, the uptake is 15-20%, and in County Kerry uptake is reported to be 30-35% (EPA Envision Mapper). The Forest Environmental Scheme (FEPS) which is an ‘add on’ to REPS, provided incentives to farmers within REPS to plant woodland with emphasis on environmental gain, rather than solely for economic gain. The percentage uptake of FEPS (forest as a % of county area) for this Unit of Management is 5-10% based on Co. Limerick figures (EPA).

In 2009 the REP Scheme ended, and 2014 will see the last of the REPS payments. In 2010, the Agri-Environmental Options Scheme (AEOS) was rolled out, which targets three environmental challenges; loss of biodiversity, improvement of water

Annex II - Shannon Estuary South Unit of Management (UoM 24)

quality and combating climate change. This scheme also runs for 5 years, and early REPS<sup>2</sup> farmers can avail of this scheme. In 2011/12 an AEOS<sup>2</sup> is being offered for a period of 5 years, or until CAP reform in 2013. The CAP 2013 reform is still in process, but ‘aims to maintain income stability for farmers, while farming with respect to environmental, food safety and animal welfare standards’.

Farms within this Unit of Management are required to comply with Ireland’s (second) Nitrates Action Programme which was given effect through a series of Regulations<sup>3</sup>. This includes the implementation of Fertilisation Plans. These Regulations support the protection of waters against pollution from agricultural sources, e.g. by phosphorus and nitrogen.

Figure 3.3.5 illustrates the recorded forestry cover in this Unit of Management which consists of mainly commercial plantation of conifers, owned by Collite. These tend to be located on poor soils of the uplands, harvested on a rotational period of 40 years (WRBD, 2008<sup>4</sup>). Forestry on the lowlands is dominated by small privately owned forest plots. All forestry operations are required to be carried out in compliance with the principles of Sustainable Forest Management (SFM), as outlined in the Code of Forest Practice<sup>5</sup> to promote sustainable forestry and to meet high environmental, economic and social standard.

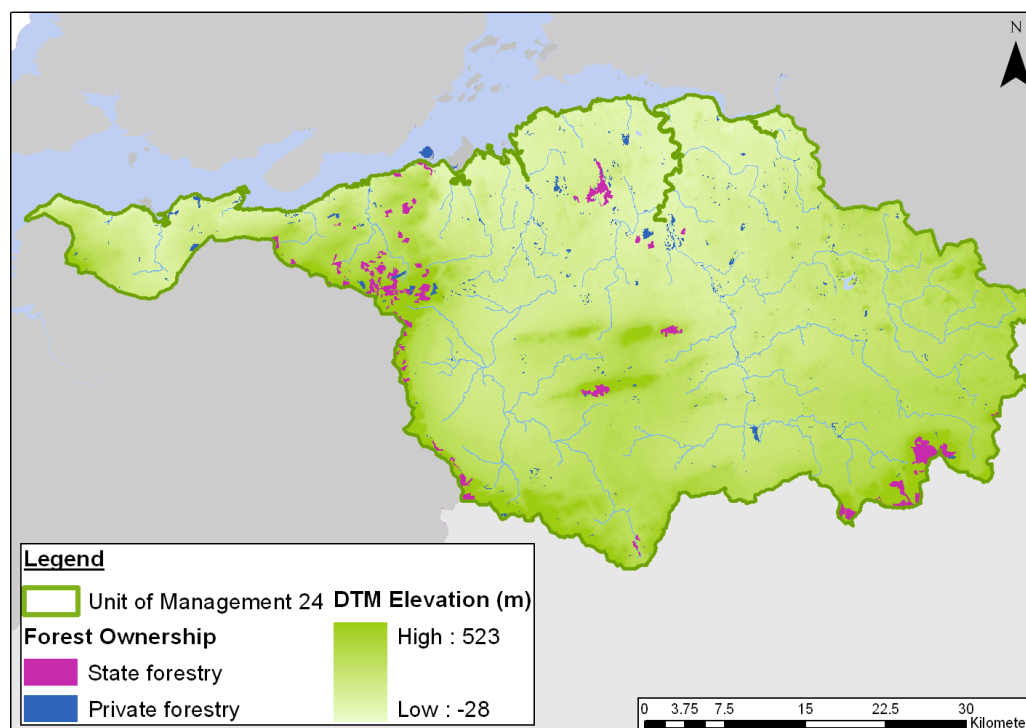


Figure 3.3.5 - Forest ownership within UoM 24 (source: Forest Service)

Previous flood relief programmes run by the OPW under the Arterial Drainage Acts 1945 and 1995, have shaped some the landscape within this Unit of Management. Originally implemented to protect agricultural land from flooding, this programme

<sup>2</sup> REPS1, REPS2 and REPS3

<sup>3</sup> The most recent being the European Communities (Good Agricultural Practice for the Protection of Waters) (Amendment) Regulations 2011.

<sup>4</sup> Western River Basin District (2008), Programme of Measures and Standards for Forest and Water

<sup>5</sup> Forestry Service (2000) Code of Best Forest Practice – Ireland.



**Annex II - Shannon Estuary South Unit of Management (UoM 24)**

was updated in 1995 to include urban areas. The OPW maintain all embankment, weirs and bridges that were constructed under this programme.

There are some small tracts of bog, concentrated largely to the west of this Unit of Management, which are predominately blanket bog. There are no Bord na Móna bogs present within this Unit of Management. However a potential issue raised at the stakeholder workshops, is that conventionally, peat harvesting of areas <50 hectares were not licensed, and therefore records of harvesting activities may not represent the full extent of activity at a particular bog.

The GSI have records of one landslide within this Unit of Management; a debris landslide at Ballyhahill, north of Newcastle West in 1997. This was a small scale landslide along the White River (also known as the Owvane River) (GSI, 2006<sup>6</sup>). Landslides can result in increased silt deposition in watercourses and reduce conveyance. As noted in Section 2.1 of the Environmental Scoping Report, the CFRAM Studies will not include the assessment of areas subject to natural erosion processes unless such processes are predicted to pose significant flood risk by eroding existing flood defence structures (natural or engineered).

Historical contamination of soils resulting from past and present land use may present significant pollutions risks. Data on the location of known contaminated sites is held by Local Authorities and continued consultation with the relevant Local Authorities during the next stages of this SEA will identify those most relevant to this Unit of Management.

There are approximately 21 landfills and two licensed waste transfer stations (at Ballykeefe Town and Luddenmore) within this Unit of Management (refer to Figure 3.4.6 in Section 3.4 of this report for the location of these facilities)..

Sites with concrete plants, desilting ponds, leachate lagoons, disused quarries, holding tanks under cattle houses (slurry tanks) may also be considered as potentially contaminated sites, and will be investigated further during the risk assessment of potential flood risk management options.

Onsite Waste Water Treatment Systems (OSWTS)<sup>7</sup> such as septic tanks can present pollution risks between surface and groundwater. OSWTS have been identified nationally as part of Ireland’s Water Framework Directive Programme of Measures Unsewered Wastewater Treatment Systems National Study (Western RBD) 2008. The EPA is in the process of mapping OSWTS, and this data will be made available to the CFRAM Study in the coming months.

Flooding has the potential to impact on the supply from water treatment plants (WTP). There are five water supply treatment plants within this Unit of Management, two of which are within the Deel WMU and three in the Maigne WMU. Further detail is provided in Section 3.4 of this report.

**3.3.2 Future trends**

The IGH sites referred to above are in the process of being reviewed by the NPWS to determine which sites shall be designated as NHAs, and therefore afforded statutory protection.

<sup>6</sup> Geological Survey Ireland Irish Landslides Working Group (2006) Landslides in Ireland.

<sup>7</sup> OSWTS are defined as areas not connected to sewerage systems and that discharge treated wastewater into the ground by percolation

## Annex II - Shannon Estuary South Unit of Management (UoM 24)

In 2006, the European Commission adopted a proposal for a Soil Framework Directive, to provide soil statutory protection and to recognise soil as an invaluable natural resource. This is likely to influence land cover and land use practices. As of early 2012, this Directive is still in the decision-making process within the European Council.

Into the future, agriculture land-use within this Unit of Management is likely to remain dominant; although the pattern and trends of this use will change to reflect the reform of the CAP in 2013 ('the CAP towards 2020'), compliance with the Nitrates Regulations (Ireland's Nitrates Action Programme is due to be reviewed for a third time in 2013) and abolishment of the EU Milk Quotas<sup>8</sup> in April 2015.

One objective of this CAP 2013 reform is to make agriculture competitive on the world market; similarly the abolishment of the EU Milk Quotas is likely to make the dairy industry more competitive in Ireland. This is in line with the Food Harvest Report 2020 recommendations, which aim to increase Irish agri-food export by 2020.

Coillte forests within this Unit of Management have individual management plans that are derived from the Coillte Forestry Services District Strategic Plan 2011-2015. This Unit of Management lies within the Lower Shannon District (S2) management plan area, for which both environmental and economic objectives are set for the management of the forests at local level for the next five years. Within this management plan, Coillte recognise forests as being an important resource in the role of moderating flooding at times of high rainfall. Water quality is also addressed as 'drainage and cultivation practices in Coillte forests are designed to minimise their impact on local water'. Water protection areas (buffer zones) are also being established in plantations at present.

The Government has made a commitment to increase the forest area to 17% of the total land area in Ireland by 2030<sup>9</sup>, which is likely to include areas within this Unit of Management. As referred to in Section 3.3.1, all new forestry is managed in line with the SFM principals, including a guideline of development of a buffer of natural riparian vegetation along rivers and streams (Forestry Service 2000).

The Forestry Service have produced a Geographical Information System (GIS) based Forest Inventory Planning System (FIPS) to act as an aid in the long term spatial planning of national forest, and to provide guidance to forestry grants. This data provides further detail to that provided by the CORINE database, such as tree species.

The EPA has published a series of Codes of Practice and Advice Notes, the implementation of which can influence geology, soils and land use in this Unit of Management. Those of relevance in this context are:

- Code of Practice for Wastewater Treatment and Disposal Systems Serving Single Houses (population equivalent < 10);
- The EPA Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites; and
- Advice Note No.6, Version 1; Restoring Public Water Supplies Affected by Flooding.

<sup>8</sup> S.I. No. 94/2000 — European Communities (Milk Quota) Regulations, 2000

<sup>9</sup> CAP Rural Development Division Rural Development Programme Ireland, 2007-2013.

**Box 3.3: Geology, Soils and Land Use – Key issues relating to flood risk management**

- Flooding and flood risk management measure/options can potentially adversely affect the productivity of agricultural land, and can lead to changes/abandonment of land use;
- Agricultural practices can have both negative and positive effects on flooding and flood risk management, for example:
  - Negative: reduction in soil infiltration rates and available soil water storage capacities, and increasing rapid runoff in the form of overland flow;
  - Positive: agricultural lands may help manage runoff and provide natural storage areas whilst also providing opportunities for biodiversity and potentially supporting agri-environmental schemes.
- Forestry-related land use practices (afforestation and deforestation) and associated land drainage schemes can influence the conveyance of water within the catchments;
- Changes of land use from agriculture to urban/semi-urban behind OPW arterial drainage scheme embankments (originally constructed to protect agricultural land) has increased flood risk in these areas; and
- Upland forestry practices can include significant drainage systems resulting in sudden water losses for the area.

### 3.4 Water

#### 3.4.1 Existing conditions

The EU Water Framework Directive (2000/60/EC) establishes a framework for the protection of both surface and ground waters. Transposing legislation outlines the water protection and water management measures required in Ireland to maintain high status of waters where it exists, prevent any deterioration in existing water status and achieve at least 'good' status for all waters by 2015. This is currently being achieved through the implementation of River Basin Management Plans (RBMPs). The Shannon RBMP 2009-2015 was adopted in June 2009 and includes Water Management Unit (WMU) Action Plans<sup>10</sup> and a programme of measures required to facilitate the achievement of the WFD objectives.

#### Surface Water

The surface water bodies within this Unit of Management are primarily associated with the River Maigue and the River Deel catchments, but also includes part of the Feale catchment and transitional (estuarine) and a coastal water bodies.

#### Rivers

The Maigue WMU Action Plan states that 35% of the rivers within its catchment are classified as good status with the remaining water bodies failing to achieve the WFD objectives. The Deel WMU Action Plan summarises that just 18% of its catchment rivers are classified as good status. The Feale WMU Action Plan states that 55% of the rivers within its catchment area are classified as good status, with the remaining water bodies failing to achieve the WFD objectives

As noted above, a small section of this Unit of Management falls under the Feale WMU Action Plan. Annex I (Tralee Bay – Feale Unit of Management (UoM 23)) of this Environmental Scoping Report provides further detail on the pressures and programmes of measure specific to this catchment.

The Maigue, Deel and Feale WMU Action Plans associate the following anthropogenic pressures/activities with the current failure of the surface water bodies to achieve the WFD objectives:

- Nutrient sources: Total Phosphorous predominantly from diffuse sources (agricultural, unsewered properties and waste water treatment plants (WWTPs));
- Point source pressures: such as WWTPs, integrated pollution and prevention control (IPPC) facility discharges, Section 4 discharges (trade or sewage effluent), waste facilities (Maigue only) and water treatment plants;
- Quarries and landfills;
- On site waste water treatment systems (OSWTS);
- Forestry (Feale only);
- Physical alterations (morphological pressures); and
- Abstractions.

<sup>10</sup> WFD Ireland Document Store - [http://www.wfdireland.ie/docs/1\\_River%20Basin%20Management%20Plans%202009%20-%202015/ShIRBD%20RBMP%202010/](http://www.wfdireland.ie/docs/1_River%20Basin%20Management%20Plans%202009%20-%202015/ShIRBD%20RBMP%202010/)

Each Action Plan outlines a programme of measures to be implemented in the catchment areas, and in some instances at a regional or national level. Those of relevance to flood risk assessment and management include:

- Point sources: WWTP upgrades, review of the current terms of discharge authorisations;
- Diffuse sources: inspection / enforcement of the Good Agricultural Practice Regulations and inspection programme of 'at risk' septic tanks; and
- Morphological pressures: Investigation of channelisation to establish if supplementary measures are required to address water quality issues associated with morphology. Channel enhancement measures to assist recovery from this pressure are to be considered.

Implementation of these measures is now progressing so as to achieve the WFD objectives and inform the next RBMPs (2015 – 2021). Some measures responding to the WFD requirements were implemented prior to the completion of the RBMPs, for example, the EPA are progressing with a revised WWTP licensing regime implemented under the Waste Water Discharge (Authorisation) Regulations 2007.

### **Transitional (estuarine) and Coastal Waters**

The Shannon RBD Transitional and Coastal Waters Action Programme reports that the 'Mouth of the Shannon' water body is classified as high status. The Upper Shannon Estuary, Shannon Airport Lagoon, Limerick Dock and Clonderlaw Bay transitional water bodies are reported to be at good status. The Maigue Estuary, Deel Estuary, Foynes Harbour, and Lower Shannon Estuary were classified as failing to achieve good status.

The Shannon RBD Transitional and Coastal Waters Action Programme associates the following anthropogenic pressures/activities with the current failure of the surface water bodies to achieve the WFD objectives:

- Land based pressures - point source such as WWTPs, IPPC licensed facilities, combined sewer and treatment plant overflows, Section 4 licensed discharges, and also diffuse sources such as nutrient inputs.
- Marine Pressures – Morphological alterations and aquaculture:
  - Maigue Estuary - Embankment;
  - Foynes Harbour – Hard defences and port activities; and
  - Aquaculture licence in the Lower Shannon Estuary.

The Shannon RBD Transitional and Coastal Waters Action Programme has outlined a programme of measures to be implemented in the catchment areas, and in some instances at a regional or national level. Those of relevance to flood risk assessment and management include:

- Morphology (Controls on Physical Modifications): The Action Programme notes that the DECLG are considering the introduction of new regulations to control physical modifications in surface waters which may involve an authorisation system where low risk activities may simply be registered and higher risk works would be subject to more detailed assessment and more prescriptive licences. Consultation with the DECLG has confirmed that they are currently in the process of reviewing water legislation on a number of

fronts, including controls on physical modifications however it may be some time before the regulation concerning controls on physical modifications are implemented;

- Implementation of the Shellfish Waters Pollution Reduction Programmes (there is one such programme relevant to this Unit of Management - West Shannon Ballylongford Pollution Reduction Programme (DECLG, 2010<sup>11</sup>)); and
- Full implementation of existing legislation including the Bathing Water Quality Regulations (including the development of Bathing Water Management Plans), Water Pollution Acts, Water Services Act, IPPC regulations, Urban Wastewater Treatment regulations, the Foreshore Acts and the Birds and Habitats Directives (particularly the Appropriate Assessment process).

In addition, the anthropogenic pressures/activities and proposed programme of measures outlined in the river WMU Action Plans discussed in earlier sections are also relevant to the transitional and coastal water bodies within this Unit of Management.

There are no significant lakes within this Unit of Management, and no specific pressures or measures have been identified in the Shannon RBMP.

**Overall Status**

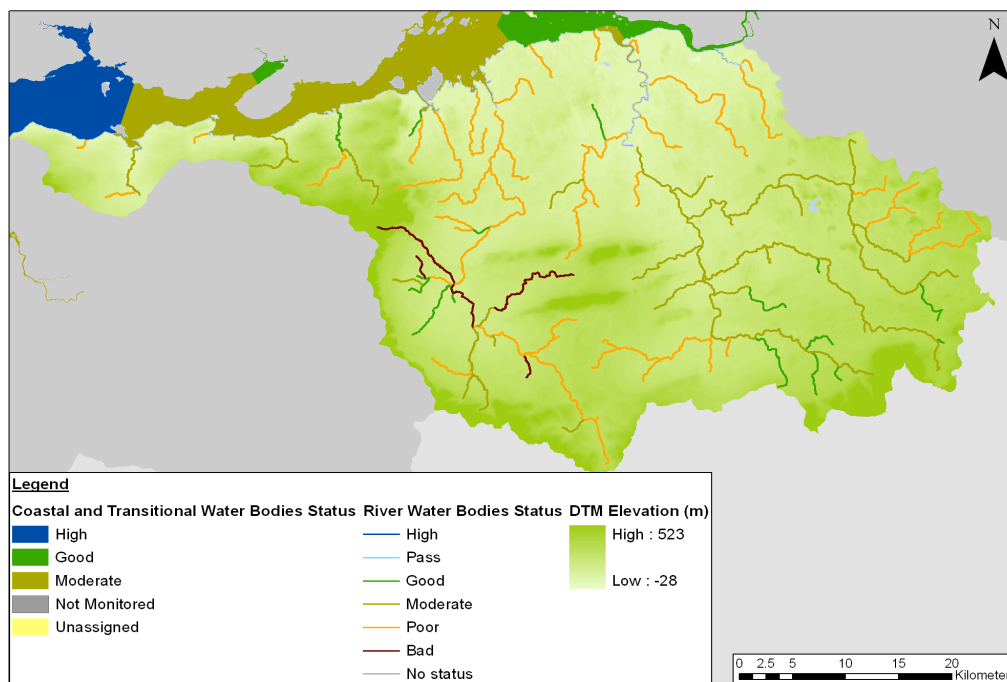
Figure 3.4.1 presents the current reported status of surface water bodies as provided by the EPA November 2011. A large portion of the Unit of Management rivers are failing to achieve good status (77%), with some stretches of the River Deel at bad status (5%). All water body classification results are currently being reviewed and updated with more recent monitoring data as part of the 2015–2021 river basin management cycle. These will be reviewed in consultation with the EPA as the SEA process developments.

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<sup>11</sup> Pollution Reduction Programmes, Characterisation Reports and Maps:  
<http://www.environ.ie/en/Environment/Water/WaterQuality/ShellfishWaterDirective/ShellfishWatersFinalCharacterisationReportsandPRPs/Clare-Kerry/>



Annex II - Shannon Estuary South Unit of Management (UoM 24)



**Figure 3.4.1 - Classification of surface water bodies under the WFD within UoM 24 (source: EPA)<sup>12</sup>**

As defined by the EPA, the Biotic Indices or Quality (Q) Values is ‘a biological water quality index based on the composition and abundance of macroinvertebrate communities e.g. mayflies, stone flies, shrimps, snails, bivalves etc. present in rivers, and their varying sensitivities to increasing levels of pollution’. There are 93 Q Value monitoring stations within this Unit of Management. The Q Values recorded at these stations are summarised in Table 3.4.1 below.

**Table 3.4.1: Q Value and equivalent WFD Status recorded at the EPA monitoring stations within UoM 24**

Q Value*	WFD Status	Pollution Status	Condition**	No. of UoM 24 Stations
Q5, Q4-5	High	Unpolluted	Satisfactory	0
Q4	Good	Unpolluted	Satisfactory	36
Q3-4	Moderate	Slightly polluted	Unsatisfactory	29
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory	26
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory	1

\* These values are based primarily on the relative proportions of pollution sensitive to tolerant macroinvertebrates (the young stages of insects primarily but also snails, worms, shrimps etc.) resident at a river site (EPA<sup>13</sup>).

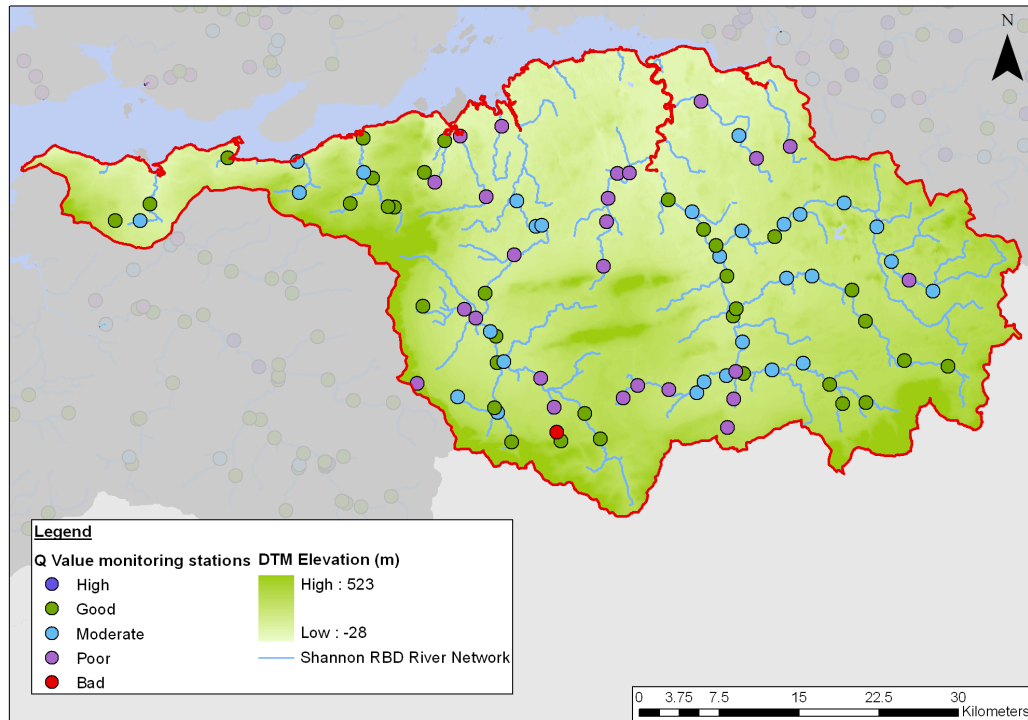
\*\* ‘Condition’ refers to the likelihood of interference with beneficial or potential beneficial uses (EPA).  
 Note: One station in this Unit of Management was ‘unclassified’.

<sup>12</sup> Water bodies classified as ‘pass’ are recorded as achieving good status, however prior to further monitoring, the confidence in the data is not at the adequate level to classify these as ‘good’ status.

<sup>13</sup> EPA (2007) River Quality Surveys: Biological (<http://www.epa.ie/qvalue/webusers/>)

**Annex II - Shannon Estuary South Unit of Management (UoM 24)**

Figure 3.4.2 presents the location of the EPA Q Values monitoring stations and the pollution status recorded at each station.

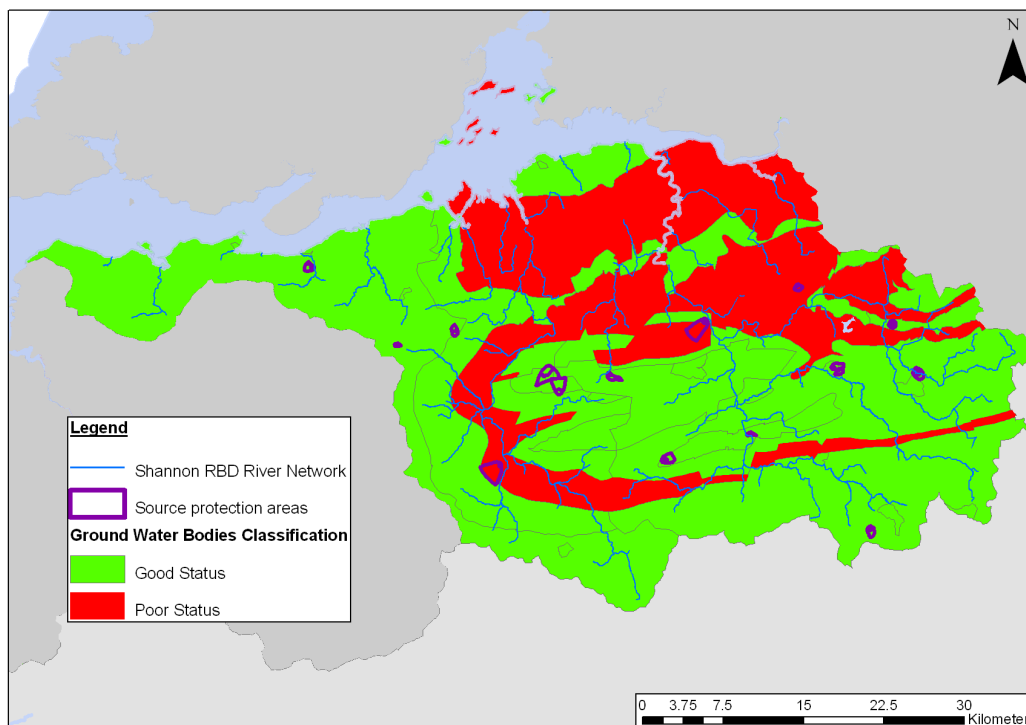


**Figure 3.4.2 - EPA Q Value Monitoring Stations within UoM 24 (source: EPA)**

**Groundwater**

The Shannon CFRAM Study is not assessing groundwater flood risk; however, the potential for groundwater flood risk to contribute to flood flows is recognised.

Groundwater status within this Unit of Management is classified predominately as good, however there are large areas classified as poor status. Figure 3.4.3 below presents the current status of groundwater bodies classified for the purpose of the WFD and areas of source protection for drinking water. Groundwater Protection Schemes are county-based projects that are undertaken jointly between the GSI and the respective Local Authorities. The aim of these schemes is to preserve the quality of groundwater, particularly for drinking water abstraction purposes. The Groundwater Protection Schemes within this Unit of Management shows 15 source protection areas all located within Co. Limerick.



**Figure 3.4.3 - Classification of groundwater bodies under the WFD and Source Protection Zones within UoM 24 (source: EPA)**

The Shannon RBD Groundwater Action Plan associates the following anthropogenic pressures/activities with the current failure of groundwater bodies to achieve the WFD objectives:

- Point source pressures: Existing landfills and old dump sites (illegal landfill sites), mines, contaminated land, and abstractions; and
- Diffuse source pressures: agriculture (nutrient loading), and OSWTS (septic tanks in areas of high or extreme vulnerability or systems located at unsuitable sites).

The Shannon RBD Groundwater Action Plan outlines a programme of measures to be implemented in the catchment areas as follows:

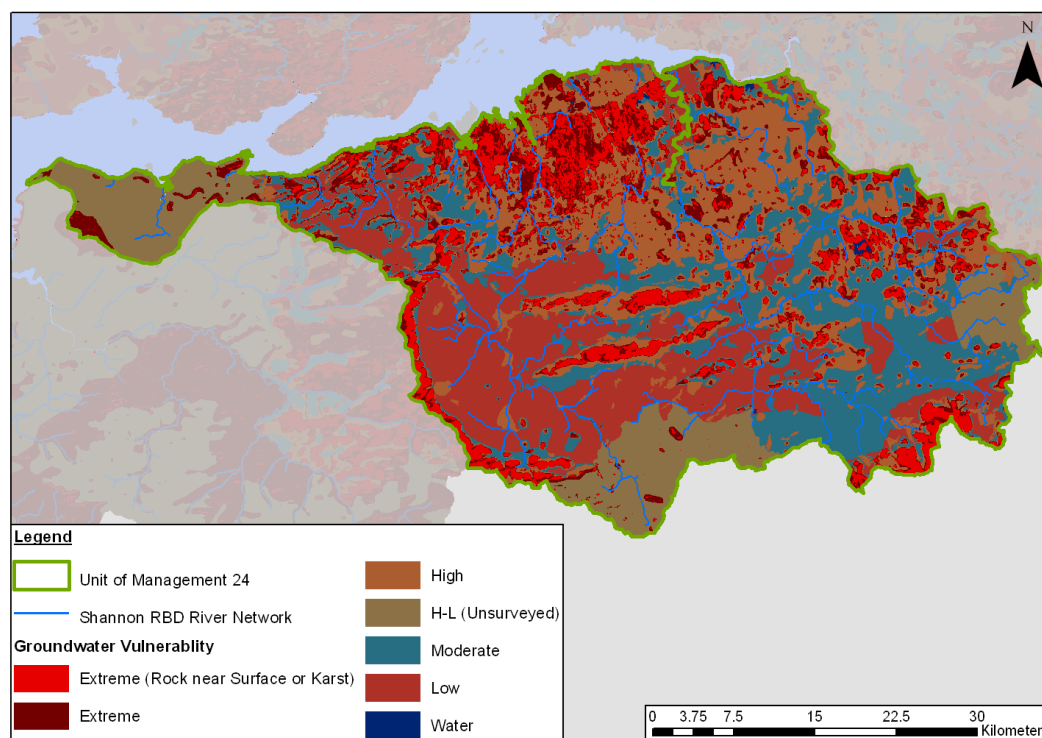
- Nitrate Action Plan – Implementation of the Nitrates Action Plan and Code of Good Agricultural Practices to reduce the level of pressure from diffuse nutrient sources;
- IPPC Licensing – Remediation of contaminated land at IPPC licensed sites; and
- OSWTS – Implement the EPA Code of Practice for Wastewater Treatment and Disposal Systems Serving Single Houses (population equivalent  $\leq 10$ )<sup>14</sup>.

Though not highlighted within the Shannon RBD Groundwater Action Plan it is also recognised that the EPA licensing regime for WWTPs is a programme that could aid in the achievement of the WFD objectives for groundwater bodies.

<sup>14</sup> EPA 2000 Guidance is now replaced by EPA (2009) Code of Practice for Wastewater Treatment and Disposal Systems Serving Single Houses.

All the groundwater bodies in this Unit of Management and within the Shannon RBD are designated as drinking water protected areas.

In terms of vulnerability (the likelihood of contamination if a contamination event occurs), there are also areas of extreme vulnerability within this Unit of Management, amounting to approximately 9% of the land area. In addition approximately 11% of the land area is identified as rock near surface or karst. These areas can be very vulnerable to infiltration and transportation of pollutants. Figure 3.4.4 illustrates the groundwater vulnerability within this Unit of Management.



**Figure 3.4.4 - Groundwater Vulnerability in UoM 24(source: GSI)**

The Shannon RBD Groundwater Action Plan identifies one groundwater-dependant terrestrial ecosystem (GWTE) located within this Unit of Management - Askeaton Fen complex (SAC 0022279). GWTEs are habitat/species that are dependent on groundwater to maintain the environmental supporting conditions required to sustain that habitat and/or species<sup>15</sup>.

**Registered Protected Areas**

In accordance with the WFD, a Register of Protected Areas has been compiled for the Shannon RBD. These areas are identified as those requiring special protection under existing national or European legislation:

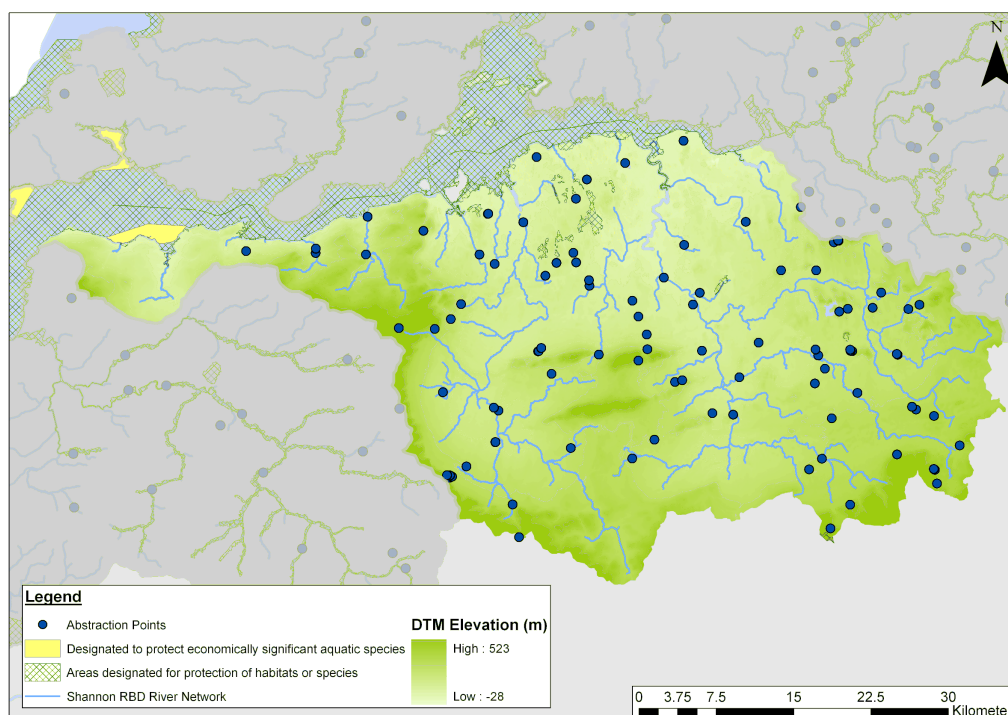
- Waters used for the abstraction of drinking water;

<sup>15</sup> EPA (2008). A Framework for the Assessment of Groundwater-Dependent Terrestrial Ecosystems under the Water Framework Directive.

**Annex II - Shannon Estuary South Unit of Management (UoM 24)**

- Areas designated to protect economically significant aquatic species - These are protected areas established under earlier EC directives aimed at protecting shellfish (79/923/EEC) and freshwater fish (78/659/EEC);
- Recreational waters (none of which are designated within Unit of Management 24);
- Nutrient Sensitive Areas (none of which are designated within Unit of Management 24); and
- Areas designated for the protection of habitats or species (refer to Section 3.6 for details).

The locations of the Registered Protected Sites currently recorded for this Unit of Management are illustrated in Figure 3.4.5.



**Figure 3.4.5 - Registered Protection Areas within UoM 24 (source: EPA)**

**Activities / Pressures**

Figure 3.4.6 illustrates the distribution of various activities within this Unit of Management which can both influence and be influenced by the quality of water. The majority of this data was collated for the purpose of the WFD (and reported within the RBMPs 2009-2015) and is currently being updated by the EPA and Local Authorities. Further information relating to these activities will be considered where relevant in the next stages of the SEA.

A total of 28 facilities within this Unit of Management currently hold IPPC licences. IPPC licences aim to prevent or reduce emissions to air, water and land, reduce waste and use energy/resources efficiently.

**Annex II - Shannon Estuary South Unit of Management (UoM 24)**

There are two waste transfer stations at Ballykeefe Town and Luddenmore, which are licensed by the EPA, and a total of 21 landfills are located within this Unit of Management (one of which is licensed by the EPA – Gortadroma).

Data supplied by the EPA indicated that there are 23 WWTPs within this Unit of Management.

The EPA report 'Focus on Urban Waste Water Discharges in Ireland (February 2012), includes a review of the operation of urban waste water treatment plants (UWWTPs) that are the subject of an EPA waste water discharge licence application. Within this Unit of Management, the status of these UWWTPs varies from pass, fail and undetermined.

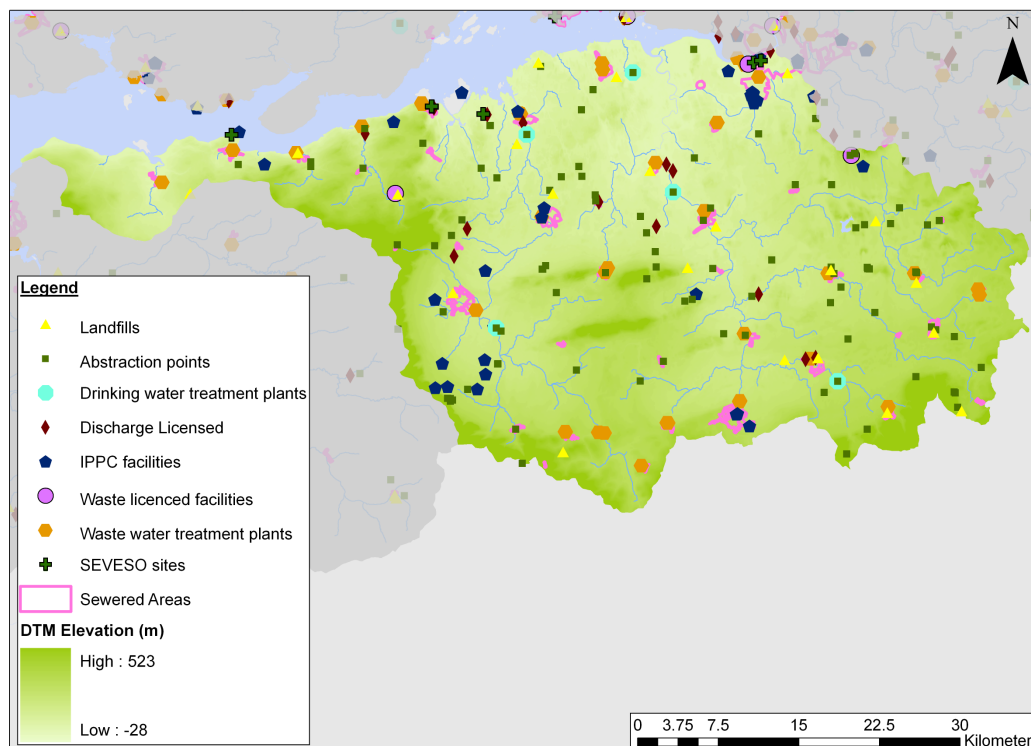
The majority of this Unit of Management is unsewered, with private sewerage systems/septic tanks installed. There are a number of sewered areas within this Unit of Management as indicated in Figure 3.4.6 including Charleville, Killmallock, Newcastle West, Rathkeale and Limerick City (which will be considered as part of Unit of Management 25-26)<sup>16</sup>.

Water Pollution Discharge Licences are issued under Section 4 of the Local Government (Water Pollution) Act 1977 as amended in 1990 and refer to the discharge of trade or sewage effluent to waters. There are 13 such discharges within this Unit of Management.

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<sup>16</sup> This does not include any sewerage network connected to a sewage treatment plant with less than 500 p.e. as this was the threshold for inclusion in WFD risk assessments.





**Figure 3.4.6 - Estimated locations of licensed abstractions (as of 2008), IPPC, waste licenced facilities, landfills, licenced discharges, wastewater and water treatment plants, SEVESO sites and sewered areas (source: EPA, GSI, HSE and Limerick / Kerry /Cork County Council)**

There are five water supply treatment plants within this Unit of Management, two of which are within the Deel WMU and three in the Mague WMU. Water supply treatment plants are most likely to be located on the banks of rivers, and the EPA has published guidance<sup>17</sup> on post-flooding checks for Local Authorities to implement at such plants.

The Control of Major Accident Hazards Involving Dangerous Substances Regulations, 2006 (SEVESO Regulations) deal with dangerous substances in industry, covering both industrial activities as well as the storage of dangerous chemicals. There are two tiers to the legislation; Lower Tier for smaller facilities using or storing hazard material, which requires a Major Accident Prevention Policy, general duties and notification to relevant authorities, and an Upper Tier for large facilities (requiring additional plans such as internal emergency plans and notifications to the public). Within this Unit of Management there are three facilities listed as SEVESO sites, two located at Foynes Port, Co. Limerick (Tier I and Tier II) and one in Askeaton, Co. Limerick (Tier I).

### Hydromorphology

The WFD requires that hydromorphological elements are considered when defining, maintaining and improving water status. There have been some physical (morphological) alterations to various water bodies within this Unit of Management

<sup>17</sup> Advice Note No.6, Version 1; Restoring Public Water Supplies Affected by Flooding, EPA (November, 2009)

to facilitate certain uses such as navigation, flood defence/protection schemes, agricultural drainage schemes, etc. In accordance with the WFD, some of these water bodies have been designated as Heavily Modified Water Bodies (HMWBs) or Artificial Water Bodies (AWBs) due to the presence/operation of such alterations.

- A HMWB is defined as ‘a body of surface water which as a result of physical alterations by human activity is substantially changed in character’; and
- An AWB is defined as ‘a body of surface water created by human activity’.

There are no AWBs present within this Unit of Management, but Foynes Harbour and Limerick Dock have been classed as HMWBs due to the presence of hard defences and port activities. As Limerick Dock is located within the Limerick City AFA, this will be considered further during the development of the FRMP for Unit of Management 25-26.

With regards hydromorphological elements, water bodies designated as HMWBs or AWBs must meet the objectives of maximum or good ecological potential. The Shannon RBMP reports that both Limerick Dock and Foynes Harbour are currently achieving good ecological potential and outlines measures required to protect this status.

### 3.4.2 Future trends

The implementation of the programme of measures identified to meet the requirements of the WFD for this Unit of Management and the wider Shannon RBD aim to drive improvements and maintenance of the water quality in the short term and provide a basis for the continued maintenance of good status in the future. The EPA are continuing to monitor the status of surface and ground water bodies, and work will soon commence on the Shannon RBMP for the 2016 – 2021 cycle.

Proposed future development must meet the requirements of the WFD and transposing regulations. Derogations relating to new physical modifications and new sustainable developments are provided for in this legislation<sup>18</sup>; however, strict conditions for the application of such exemption provisions apply and must be demonstrated if these are to be considered for future development.

Future physical alterations to water bodies within this Unit of Management are likely to include flood relief measures (modifications) and port expansion by the Port of Foynes.

<sup>18</sup> Articles 32 – 34 of S.I. No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations 2009

**Box 3.4: Water – Key strategic issues relating to flood risk management**

- Proposed future development must meet the requirements of the WFD and transposing regulations;
- There may be opportunities for flood risk management measures/options which can present both flood risk benefits and ensure the environmental objectives of the WFD are met;
- The WFD programmes of measures include the modification or maintenance / removal of obsolete structures, including flood defence structures and also requirements for enhancing river morphological development and flood storage. This can offer opportunities and constraints for flood risk management;
- Physical modifications of water bodies can affect natural sediment processes and biodiversity;
- FRMPs have the potential to help inform appropriate and sustainable planning / operation of water services, e.g. Water Safety Plans in accordance with EPA Guidance (Advice Note No. 8 Developing Drinking Water Safety Plans; EPA, 2011).

### 3.5 Air and Climate

**Air quality** in Ireland is of good quality, and remains among the best in Europe<sup>19</sup>. The EPA have established an air quality monitoring network throughout the country with one permanent station located within this Unit of Management, near Askeaton, at which the current air quality is described as ‘good’. This ongoing monitoring programme is a prerequisite of the transposed CAFE Directive<sup>20</sup>.

Air quality will not be influenced or affected by the recommendations of the strategic flood risk assessment and management study for this Unit of Management or by the wider Shannon CFRAMS Study. Any specific issues relating to air quality will be considered as part of the environmental impact assessment of any detailed projects arising from the Shannon Estuary South Unit of Management 24 FRMP. Therefore, air quality will not be considered further in the SEA process as air quality will not be affected by CFRAM process.

Future changes in **climate** and associated impacts on sea level, rainfall patterns/intensity and river flow will influence flooding frequency and extent in the future. The FRMPs will help Ireland adapt to some impacts of climate change. In addition to using best available data, policy and research documents will be referred to on considering these changes and determining the likely future influence of climate change on flood risk in this Unit of Management. The consideration of climatic factors in the development of the FRMPs will assist the Local Authorities in compliance with the Regional Planning Guidelines requirements to adopt sustainable flood risk strategies in areas likely to be at risk of flooding in the future in the context of climate change and changing weather patterns.

Stakeholder consultation undertaken to date has identified flood forecasting as a key aspect of flood risk assessment and management in Ireland. Rainfall prediction is a difficult factor to quantify (and is outside the scope of this Study); however, further development of elements of the OPW’s national pluvial flood risk screening study<sup>21</sup> is considered essential to develop the quality of flood warnings.

<sup>19</sup> Environmental Protection Agency (2010) Air Quality in Ireland Report.

<sup>20</sup> Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive, transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011).

<sup>21</sup> Office of Public Works (2010) Flood Risk Assessment and Management Programme National Pluvial Screening Project for Ireland. HR Wallingford Ltd.

**Box 3.5: Climate – Key strategic issues relating to flood risk management**

- Some flexibility and adaptability within the FRMPs is likely to be required to allow the FRMPs to adapt to unforeseen climate change and associated impacts;
- Flood risk management measures may provide opportunities of renewable energy through small-scale (or micro) hydropower, e.g. on tidal barrages or locks. However, these are considered as ‘bolt-on’ measures to be assessed/progressed at detailed project level; and
- Green infrastructure (such as networks of peatland, parks or drainage ditches) in the context of flood risk management can reduce, if not avoid, emissions from more engineering-based solutions.

### 3.6 Biodiversity, Flora and Fauna

#### 3.6.1 Existing conditions

This Unit of Management contains a variety of terrestrial, wetland, freshwater, estuarine and coastal habitats which support a range of species, some of which are of particular conservation concern. Associated with these habitats and species are a number of National and European designated nature conservation sites (Natura 2000 sites). Consideration of potential impacts on these sites needs to meet the requirements of the European Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC). Specific assessment of the potential impacts of the FRMPs on these sites will be documented separately as part of the Appropriate Assessment (AA) process (required by Article 6 of the Habitats Directive).

The designated European and National nature conservation sites present within this Unit of Management are illustrated in Figures 3.6.1 and 3.6.2 and described in Tables 3.6.1 and 3.6.2.

This Unit of Management contains eight sites designated under the EU Habitats and Birds Directive; six of which are candidate Special Areas of Conservation (cSACs), and two are designated as Special Protection Areas (SPAs).

There are three nationally designated National Heritage Areas (NHAs) which are protected under the Wildlife Act 1976 (as amended 2000), as well as 21 proposed Natural Heritage Sites (pNHAs) which were published on a non-statutory basis in 1995, but have yet to be statutorily proposed or designated. To date, the only sites to have received full NHA status are water dependant bog habitats, as reflected with the 3 designated NHA within this Unit of Management. Some pNHAs have been designated within Natura 2000 sites, and this affords them some statutory protection under the EU Habitat and Birds Directive. However, it is acknowledged that this may not be specific to the listed pNHA interests.

Many of the designated sites within this Unit of Management have water dependant and wetland habitats associated with them. The DECLG have published draft Guidance for Planning Authorities on Drainage and Reclamation of Wetlands for consultation which contains a listing of habitat types associated with wetlands. This Guidance will be consulted and specific habitat types associated with water dependant and wetland habitat will be detailed where relevant during the AA process.

Additionally Ireland's coastline, including the Shannon estuary, extending seawards, is designated as an OSPAR region. OSPAR is a Convention to protect marine environment of the North East Atlantic, Ireland has committed to establishing marine protected areas, however no legislation is currently used in Ireland to protect these sites. There are no Wildfowl Sanctuaries<sup>22</sup>, Statutory Nature Reserves<sup>23</sup> or RAMSAR<sup>24</sup> sites within this Unit of Management.

<sup>22</sup> Wildfowl Sanctuaries are areas that have been excluded from the 'Open Season Order' so that game birds can rest and feed.

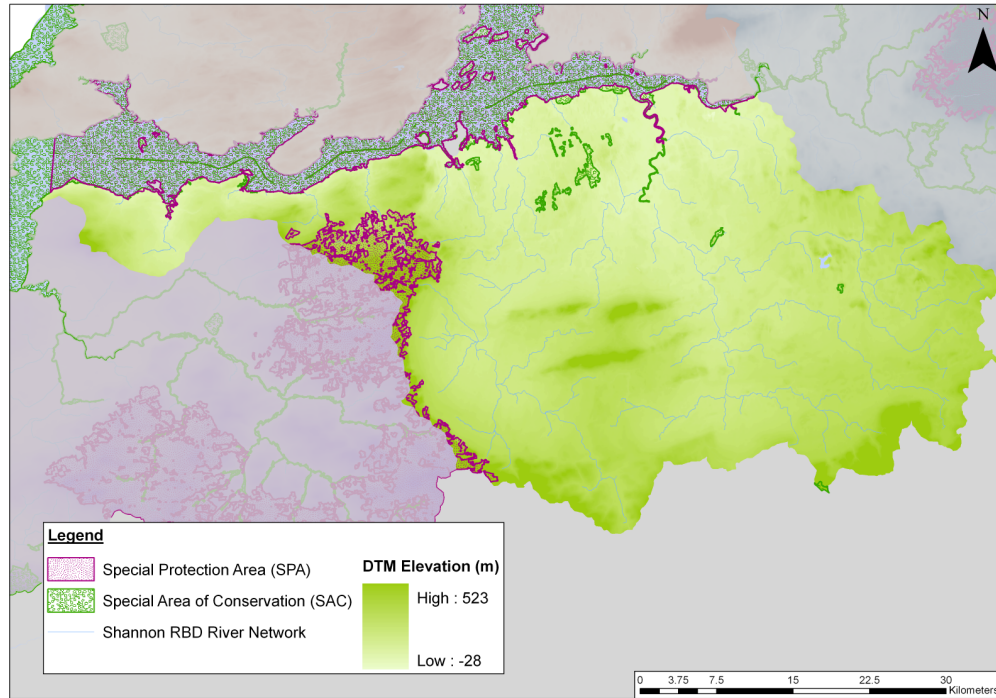
<sup>23</sup> Statutory Nature Reserve is an area of importance to wildlife, which is protected under Ministerial order.

<sup>24</sup> RAMSAR is the Convention on Wetlands, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources

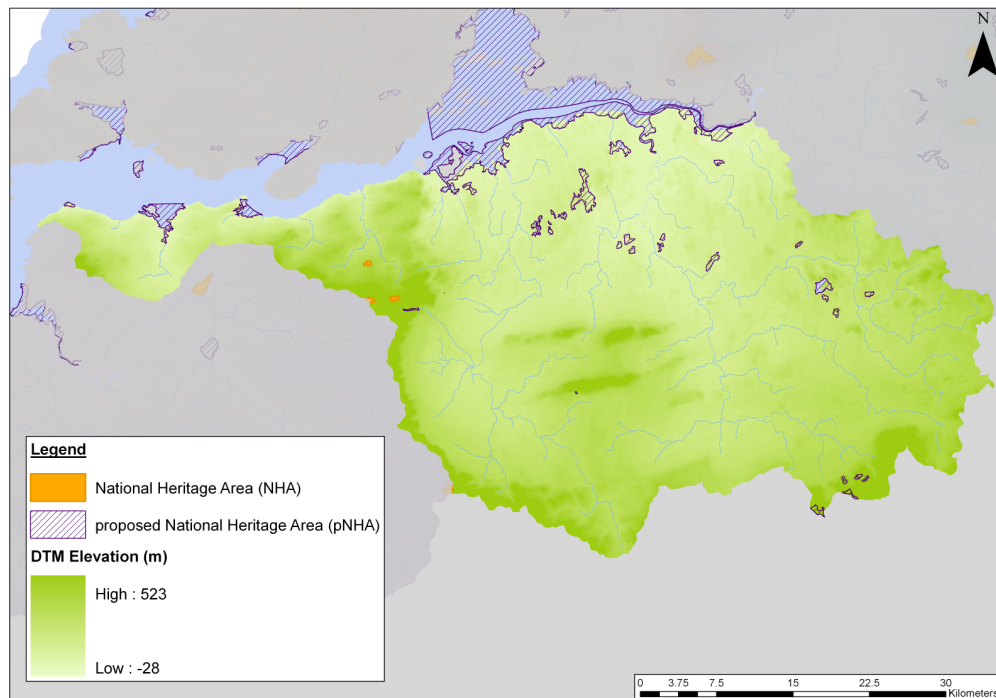


**Annex II - Shannon Estuary South Unit of Management (UoM 24)**

At the time of writing, generic conservation objectives have been established for all SACs and SPAs in this Unit of Management (detailed site-specific objectives are under development), and one Conservation Management Plan has been published; e.g. the Barrigone SAC (000432).



**Figure 3.6.1 - European designated nature conservation sites within UoM 24 (source: NPWS)**



**Figure 3.6.2 - Nationally designated nature conservation sites within UoM 24 (source: NPWS)**

**Table 3.6.1: European designated nature conservation sites within UoM 24 (Natura 2000 Sites)**

Name	Site Code	Special Feature <sup>25</sup>
<b>SACs</b>		
Lower River Shannon	002165	This site is of great ecological interest as it contains a high number of habitats and species listed on Annex I and II of the E.U. Habitats Directive, including the priority habitat lagoon, the only known resident population of Bottle-nosed Dolphin ( <i>Tursiops truncatus (tursio)</i> ) in Ireland and all three Irish lamprey species. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country.
Askeaton Fen Complex	002279	The value of this site is that it supports two fen types each of which exhibit many subtypes. <i>Cladium</i> fen is listed as an Annex I priority habitat under the E.U. Habitats Directive. These wetland habitats of fen, reedbeds, open water, marsh and wet grassland are also valuable in that they supply a refuge for fauna in an otherwise intensively managed countryside.
Glen Bog	001430	Glen Bog is a site of considerable conservation, including as it does, a fine example of mature and relatively undisturbed wet woodland, a habitat that is listed with priority status on Annex I of the E.U. Habitats Directive; Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> ).
Barrigone	000432	The site consists of an area of species rich calcareous grassland and scrub. Hairy Violet ( <i>Viola hirta</i> ) and various orchid species are found on the site as is the Marsh Fritillary ( <i>Eupydryas Aurinia</i> ), a species listed on Annex II of the Habitats Directive. The presence of these rare species of plant and invertebrate highlight the sites importance.
Curraghchase Woods	000174	The site consists of mixed woodland and a series of wetlands. The site also contains a hibernation site of the Lesser Horseshoe Bat ( <i>Rhinolophus hipposideros</i> ), a species listed on Annex II of the EU Habitats Directive. The combination of a secure hibernation site and suitable foraging habitat, and the presence of over 60 individuals making this an internationally important site for the Lesser Horseshoe Bat.
Tory Hill	000439	The site is an isolated limestone hill of geomorphological interest set amongst a region of volcanic intrusions. The site is of conservation significance for the diversity of habitats found on it and particularly for the presence of good examples of orchid rich calcareous grassland, areas of alkaline fen and calcareous fen, which are all habitats listed in Annex I of the EU Habitats Directive.
<b>SPAs</b>		
River Shannon and River Fergus Estuaries SPA	004077	This site forms the largest estuarine complex in Ireland. It is the most important coastal wetland site in the country and supports a population of over wintering wildfowl which is of international importance. It also supports internationally important numbers of three bird species, i.e. Dunlin, ( <i>Calidris alpina</i> ), Black-tailed Godwit ( <i>Limosa limosa</i> ) and Redshank ( <i>Tringa sp.</i> ). In addition three species listed on Annex I of the EU Birds Directive i.e. Whooper Swan ( <i>Cygnus cygnus</i> ), Golden Plover ( <i>Pluvialis apricaria</i> ) and Bar-tailed Godwit ( <i>Limosa lapponica</i> ) occur regularly on the site.
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	004161	The site is of special conservation interest for Hen Harrier ( <i>Circus cyaneus</i> ), supporting the largest concentration of the species in the country.

<sup>25</sup> This information is extracted from the site synopsis (SS) documents (NPWS, SS publication dates vary for each site).

**Table 3.6.2: Nationally designated nature conservation sites within UoM 24**

Name	Site Code	Special Feature <sup>26</sup>
<b>NHA</b>		
Moyreen Bog	002361	The site consists of an area of lowland blanket bog. It supports a wide range of lowland blanket bog species including a number of species of international importance. Blanket bog habitat is a globally scarce resource and comprises less than 3% of the world's peatlands.
Lough Gay Bog	002454	Site of considerable conservation value containing upland blanket bog.
Carrigkerry Bogs	002399	Site of high conservation value consisting of upland blanket bog with characteristic features and notable species of flora and fauna.
<b>pNHA</b>		
Curraghchase Woods	000174	No site synopsis available for this pNHA (see SAC 000174)
Adare Woodlands	000429	This site is of significant conservation value for the stands of broad-leaved woodland and associated flora and fauna that it supports.
Ardagh Church, Newcastlewest (Disused)	000430	Designated for the presence of Natterer's Bats ( <i>Myotis nattereri</i> ). This bat site is located in the loft of the derelict church outside Ardagh, Co. Limerick.
Barrigone	000432	No site synopsis available for this pNHA (see SAC 000432)
Inner Shannon Estuary - South Shore	435	No site synopsis available for this pNHA (see SAC 002165 and SPA 004077)
Herbertstown Fen	000436	This is a large wet fen of good botanical and ecological interest situated in Co. Limerick. It is also of interest to birds as it provides the only semi-natural refuge in this area of intensively managed agricultural land.
Lough Gur	000437	The open water and wetlands support a great variety, and important numbers of waterbirds. Notably there are Nationally important numbers of Shoveler ( <i>Anas clypeata</i> ) (av. max. 140), Tufted Duck ( <i>Aythya fuligula</i> ) (av. max. 328) and Coot ( <i>Flucia atra</i> ) (av. max. 776). Other species present in important numbers include Cormorant ( <i>Phalacrocorax carbo</i> ), Mute Swan ( <i>Cygnus olor</i> ), Whooper Swan ( <i>Cygnus cygnus</i> ), Wigeon ( <i>Anas penelope</i> ), Teal ( <i>Anas crecca</i> ), Gadwall ( <i>Anas strepera</i> ), Mallard ( <i>Anas platyrhynchos</i> ), Pochard ( <i>Aythya farina</i> ), Lapwing ( <i>Venellus venellus</i> ) and Curlew ( <i>Numenius arquata</i> ).
Loughmore Common Turlough	000438	Turloughs are a rare habitat in Europe, and in Ireland are under threat from agricultural intensification. Although affected by drainage, Loughmore is an unusual example of this habitat type. Due to the site's southerly location, its shallowness, its proximity to the sea and some calcium enrichment, the flora of Loughmore includes some unique elements, which enhance the conservation value of this turlough.
Tory Hill	000439	No site synopsis available for this pNHA (see SAC 000439)
Dromore & Bleach Loughs	001030	This site host lake, and fen species-rich scrub habitats.
Ballymorrishen Marsh	001425	No site synopsis available for this pNHA (see SAC 002279)
Ballinvirick Marsh	001427	No site synopsis available for this pNHA (see SAC 002279)
Cappagh Fen	001429	No site synopsis available for this pNHA (see SAC 002279)
Glen Bog	001430	No site synopsis available for this pNHA (see SAC 001430)

<sup>26</sup> This information is extracted from the site synopsis documents (NPWS, various dates).

Annex II - Shannon Estuary South Unit of Management (UoM 24)

Name	Site Code	Special Feature <sup>26</sup>
Glenastar Wood	001431	This is a small dense deciduous wood situated approximately 3km west of Ardagh in Co. Limerick. Sessile Oak ( <i>Quercus petraea</i> ) forms the main canopy species at the western side, and Downy Birch ( <i>Betula pubescens</i> ) becomes more important at the eastern end. The habitat is a rare one in the country as a whole. This site is particularly unique in its setting in this deep V-shaped valley. This site is not only of botanical value but also is of significant faunal interest as it represents one of a few remaining wildlife habitats in the region
Gorteennamrock	001433	No site synopsis available for this pNHA see SAC 002279
Heathfield Wood	001434	Although planted in origin, and composed predominantly of non-native species, this small woodland contains few coniferous trees, and has been allowed to generate a more natural secondary shrub cover.
Skoolhill	001996	The outstanding value of this site is as the only known location in Ireland of the grass Various-leaved Fescue ( <i>Festuca heterophylla</i> ).
Ballyroe Hill & Mortlestown Hill	002089	Habitats include upland grassland/gorse ( <i>Ulex spp.</i> ) scrub and heath/blanket bog.
Tarbert Bay	001386	No site synopsis available for this pNHA see SAC 002165
Beal Point	001335	No site synopsis available for this pNHA see SAC 002165

The principal designated nature conservation areas in this Unit of Management, the ‘Lower River Shannon’ cSAC and the ‘River Shannon and River Fergus Estuaries’ SPA extend upstream in the River Maigue and River Deel. The River Maigue and River Deel support a range of important freshwater species including the Annex II species, Brook, Sea and River Lamprey and Atlantic Salmon. These two Natura 2000 sites are among the most important in the country, both for their large area and diverse range of habitats and species, some of conservation concern. Further information relating to fish population and diversity is outlined in Section 3.7.

The River Shannon and River Fergus Estuaries SPA, support three Annex I species in addition to supporting internationally important numbers of wintering wildfowl. However, feedback received during stakeholder consultation identified that undesignated areas within this Unit of Management can also provide roosting habitat for these protected species such as sea and lake shores and some undesignated bogs within the Unit of Management.

The Lower River Shannon SAC is designated for the presence of Freshwater Pearl Mussels (Annex II species) however, no records were identified for the Freshwater Pearl Mussels (Annex II species) for the water courses within this Unit of Management<sup>27</sup>.

Actions for Biodiversity, Irelands National Biodiversity Plan 2011 -2016, recognises the role natural floodplains play in flood water retention, in addition to seeing possible biodiversity gain from wetland and/or flood plain retention or restoration in Flood Risk Management Plans. A target of this plan is “optimised benefits for biodiversity in Flood Risk Management Planning”<sup>28</sup>

Adhering to first National Diversity Plan (NBP) Limerick, Cork and Kerry Development Plans highlight hedgerows, rivers, streams, lakes as well as associated riparian zones, canals, coastal and freshwater wetlands as being of particular biodiversity value, inside or outside of protected areas. These features

<sup>27</sup> <http://maps.biodiversityireland.ie/#/Map>

<sup>28</sup> DAHG (2001), Action for Biodiversity 2011-2016, Ireland’s National Biodiversity Plan.

can also act as important ecological corridors as outlined in Article 10 of the Habitats Directive which refers to 'stepping stones and corridors' of wildlife areas which make the Natura 2000 network a coherent ecological network.

The introduction or spread of invasive species can have a significant negative effect on wildlife and habitats (as well as the economy), and the significance of this is reflected in Ireland's second National Biodiversity Plan (2011 – 2016) and recent EC (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). Giant Hogweed (*Heracleum mantegazzianum*) has become naturalised particularly along river banks within this Unit of Management, posing a risk to human health and the environment. Other terrestrial alien species found within this Unit of Management, include Giant Rhubarb (*Gunnera tinctoria*), Himalayan Balsam (*Impatiens glandulifera*), Japanese Knotweed (*Fallopia japonica*) and Rhododendron (*Rhododendron ponticum*), all which have a negative effect on native species.

### 3.6.2 Future trends

Increasing land-use change such as urbanisation, afforestation and its associated management and changing agricultural practices are likely to continue to pose risks to the quality and distribution of aquatic and terrestrial habitats and species, both within and outside protected sites. However, the continued implementation of measures required to achieve the WFD objectives is likely to benefit protected sites and the wider aquatic environment. In addition, the Conservation Management Plans and conservation objectives which are currently being developed by the NPWS for all Natura 2000 sites, as well as other management plans for declining species (e.g. Species Management Plans) will help protect and enhance biodiversity. It should be noted that the development of these Conservation Management Plans and site specific conservation objectives are unlikely to be developed for all of Natura 2000 site in this Unit of Management, but the NPWS will continue to be consulted in this context as a stakeholder of this CFRAM Study.

Agri-environmental schemes, such as REPS and AEOS, with individual environmental farm plans, will continue to influence farming practices to become more environmentally friendly and sustainable (refer to Section 3.3.1).

In addition to existing guidelines and legislation on Environmental Impact Assessment (EIA), in September 2011, the revision of the Planning and Development Regulations prompted Draft Guidance for Planning Authorities on Drainage and Reclamation of Wetlands, which sets new provisions for the control of drainage and/or reclamation of wetlands providing thresholds to trigger requirements for mandatory EIA. Of relevance to the FRMPs, is the threshold of 2ha for reclamation and/or drainage of wetland on agricultural land.

The EPA's report on alien invasive species in Irish water bodies<sup>29</sup> and the continuing development of the Biological Data Centre National Invasive Species Database will aid in the documentation of the distribution of invasive species in Ireland. These reports and datasets will go towards preparing Ireland for the forthcoming European legislation on halting the spread of invasive species.

<sup>29</sup> EPA (2011) Alien Invasive Species in Irish Water Bodies. Synthesis Report for the STRIVE-funded project: 2007-W-MS-2-S1



**Box 3.6: Biodiversity – Key strategic issues relating to flood risk management**

- Coastal squeeze associated with construction and maintenances of coastal flood defences maybe result in habitat loss;
- Requirement for ecological protection can pose restrictions on existing/future maintenance of flood defences;
- Floodplains have an important role for biodiversity, as they help remove nutrients, provide wetted habitats as well as acting as key aspects in many species' food chain. Currently, the spatial definition of floodplains is unclear, exacerbated by development, farming practices and drainage schemes;
- Wetlands may provide some level of natural flood protection (green infrastructure);
- Flood risk management options may affect winter flooding, which can be essential for some protected bird species;
- Consideration of potential impacts on Natura 2000 sites and protected species outside these designated sites will be required;
- Consideration of non-designated biodiversity features e.g. habitats along watercourses and coastal areas, and locally important habitats and species;
- Flood measures can contribute to habitat fragmentation and impact on ecological corridors / networks e.g. riparian habitat and wetted areas;
- Flood storage options can enhance both biodiversity and recreational/tourism value of an area;
- Activities associated with the implementation of flood risk management plans should not result in the spreading or introduction of invasive species;
- Changes to flood regimes may adversely affect water quality resulting in changes in the balance of aquatic ecosystems and eutrophication of water bodies; and
- Flood risk management measures can pose barriers to fish migration. The maintenance and retention of bridges, bridge sills and fish passes is important to fish passage.



### 3.7 Fisheries, Aquaculture and Angling

#### 3.7.1 Existing conditions

##### Fisheries

Fish are an important indicator species of water quality. Within this Unit of Management the main rivers support, and are capable of supporting salmonid species such as the salmon and brown trout. Four watercourses within this Unit of Management were monitored / surveyed to help determine the draft fish ecological status for the purpose of the WFD, the results of which are outlined in Table 3.7.1.

**Table 3.7.1 – WFD fish monitoring / survey results recorded for UoM 24<sup>30</sup>**

Water body	Draft Fish Ecological Status	Species Present
<b>Rivers</b>		
River Maigue <i>Castleroberts Bridge</i> (24M010900)	Moderate	Brown trout; European eel; Lamprey; Minnow; Salmon; Stone loach
River Deel <i>Bridge near Balliniska</i> (24D020400)	Moderate	Brown trout; European eel; Gudgeon; Minnow; spined stickleback; Stone loach
Owvane River (or White River) <i>Bridge u/s (SE of) Loghill</i> (24O020200)	Good	Brown trout; European eel; Flounder; Salmon; spined stickleback
<b>Transitional (estuarine)</b>		
Lower Shannon Estuary	Good	Ballan wrasse; Black goby; Cod; Common goby; Common sole; Conger eel; Corkwing wrasse; Cuckoo wrasse; Dab; Dragonet sp.; European eel; European seabass; spined stickleback; bearded rockling; Flounder; Greater pipefish; Gunnel (Butterfish); Lesser spotted dogfish; Nilsson's pipefish; Plaice; Pogge; Pollack; Poor cod; Sand goby; Sand smelt; Short-spined sea scorpion; Snake pipefish; Sprat; Thick-lipped grey mullet; Three-spined stickleback; Two-spotted goby

Over the last decade, attempts have been made to restore salmon stocks in the River Deel by introducing 200,000 fry per annum<sup>31</sup>.

Although the Maigue and Deel rivers both support salmonid species including Atlantic Salmon, they are not designated as Salmonid Rivers under the European Communities (Quality of Salmonid Waters) Regulations, 1988.

In 2012 the Standing Scientific Committee (SSC) of the IFI published their assessment of salmonid rivers throughout Ireland and advised that the Maigue and

<sup>30</sup> Inland Fisheries Ireland <http://www.ifigis.ie/WFDFishMap/>

<sup>31</sup> Inland Fisheries Ireland (Shannon Regional Fisheries Board) Game Angling Guide - River Deel & Lakes, Co Limerick. <http://www.shannon-fishery-board.ie/guides/game/river-deel.htm>

**Annex II - Shannon Estuary South Unit of Management (UoM 24)**

Deel rivers should be included in the rivers ‘closed’ to salmon and sea trout fishing as they were not achieving a surplus above their calculated conservation limit. These have since legally been closed under the Conservation of Salmon and Sea Trout (Closed Rivers) Bye-Law No. C.S. 309, 2011.

The IFI operate a fish stock management programme with the aim of restoring fish populations in those fisheries which have been affected by pollution, fish kills and other problems. IFI fish farms operate commercially and sell fish to clubs and private fisheries. There are no IFI fish farms within this Unit of Management.

There is currently no commercial eel fishing in this Unit of Management. In 2008 the Department of Communications, Energy and Natural Resources (DCENR) published their National Eel Stock Recovery Plan which contained the following objectives:

- An immediate cessation of the commercial eel fishery and closure of the market;
- Mitigation of the impact of hydropower, including a comprehensive silver eel trap and transport plan;
- Ensuring upstream migration of juvenile eel at barriers; and
- The improvement of water quality in eel habitats.

Prior to this cessation of commercial eel fishing, an Eel Management Plan was established for the Shannon RBD and included areas on the Maigne and Deel where eel fishing took place.

The IFI provides mapped locations of easy access angling points for boats and family access to support recreation and tourism in the area, but there are currently no such sites mapped for this Unit of Management<sup>32</sup>.

A series of shore angling maps were developed by the IFI in the 1980's including one for the Shannon Estuary illustrating the angling “hot spots”. An extract of this map illustrating the location of shore angling spots within Unit of Management is presented in Figure 3.7.1 and includes:

- Beal Point (No.5);
- Littor Strand (No.6);
- Carrig Island (West) (No.7);
- Carrig Island (East) (No.8);
- Carrig Island (South East) (No.9);
- Saleen Quay (No.10);
- Back Of The Hill (No.11);
- Tarbert Pier (No.12);
- Glin Pier (No.13);
- Kiltteery Pier (No.14);
- Foynes (No.15); and
- Foynes Piers (No.16).

<sup>32</sup> Inland Fisheries Ireland <http://www.ifigis.ie/AccessibleAnglingMap/>

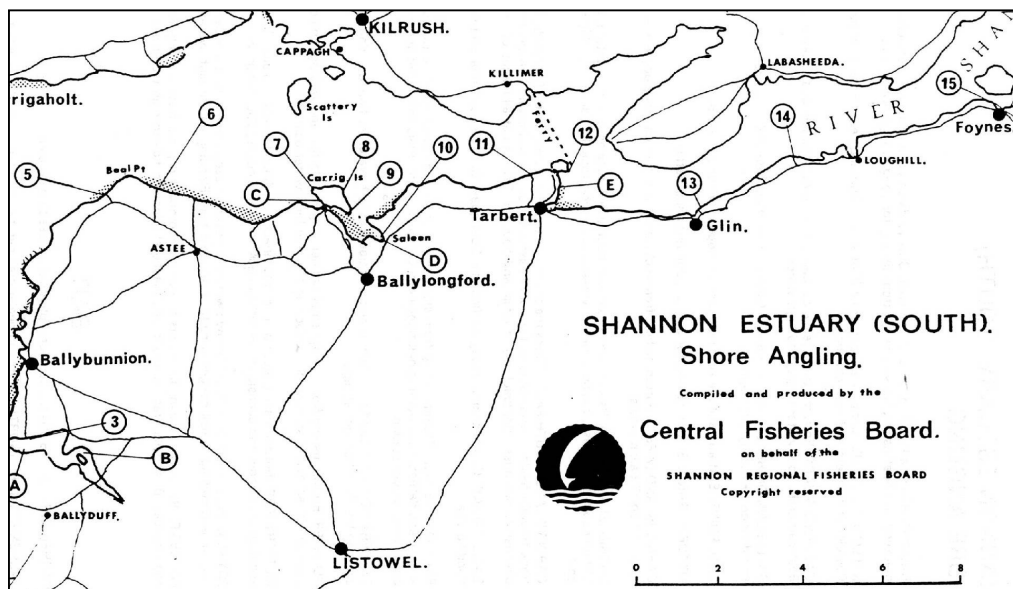


Figure 3.7.1 – Shore Angling Locations within UoM 24 (source: IFI)

There is one designated shellfish area within this Unit of Management<sup>33</sup>; the West Shannon Ballylongford designated shellfish area (8.6km<sup>2</sup>). The area extends from Knockfinglas Point around Carrig Island and encompassing part of Bunaclogga Bay and the principal river in its catchment is the Ballyline River at Ballylongford. The bulk of the shellfish production in the western Shannon estuary comprising bag and trestle cultured Pacific Oysters. In accordance with Article 5 of the Shellfish Directive (2006/113/EC) and Section 6 of the S.I. No. 268 of 2006, the DECLG has established a Pollution Reduction Programme (PRP) for this shellfish designated area in order to protect and improve water quality in this area. This has identified that there are currently no key or secondary pressures associated with the Ballylongford designated shellfish area. This PRP includes a number of measures required for the conservation of these areas.

There are large areas within the Shannon Estuary used for the aquaculture. Two of the most significant stretches for oyster are the area of the estuary between Foynes to Tarbert and the northern section of the estuary between Kilrush and Doonaha (the latter being of more relevance to Unit of Management 27-28).

### 3.7.2 Future trends

The implementation of the WFD programme of measures in addition to ongoing programmes and studies such as the Shellfish Pollution Reduction Programme and the National Salmon Monitoring Programme will positively influence the quality of the aquatic environment, and this will in turn improve the quality of aquatic resources for angling, aquaculture and commercial fisheries. These measures are also likely to have indirect beneficial impacts on recreation and tourism.

The IFI are currently in the process of undertaking their Atlantic Aquatic Resource Conservation (AARC) project. The aim of AARC is to increase the understanding of the factors causing salmon population to decline in the River Shannon and how they

<sup>33</sup> Designated under the EC (Quality of Shellfish Waters) Regulations S.I. No. 268 of 2006 and S.I. No 55 of 2009

**Annex II - Shannon Estuary South Unit of Management (UoM 24)**

might be addressed by using new developments from the study of restoration ecology. This project outlines a number of objectives including:

- Identify and relieve access issues; and
- Assess locations for re-establishment of populations.

The final AARC project report is due to be published in the last quarter of 2012 and any potential interaction with the FRMP will be further investigated at the next stage of the SEA process.

The closure of the Maigne and Deel rivers to salmon fishing may in the future result in fisheries / conservation management plans for these watercourses as this closure reflects their failure to achieve a surplus stock above their calculated conservation limit, and they now require efforts to rebuild the salmon stocks.

**Box 3.7: Fisheries, Aquaculture and Angling – Key strategic issues relating to flood risk management**

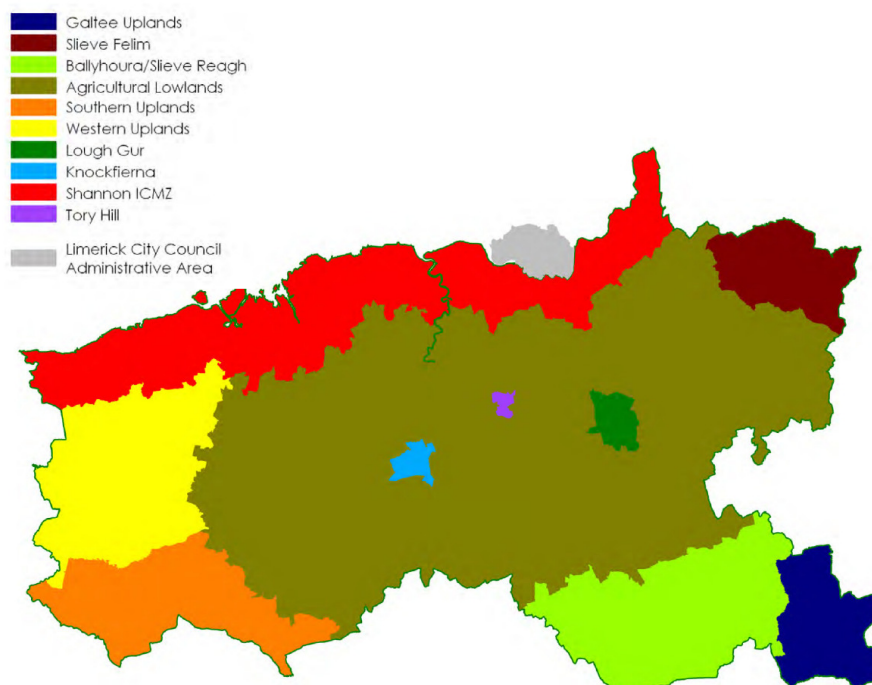
- Flooding and flood risk management measures can result in changes to morphological features and associated habitat supporting fisheries;
- Flooding may result in the introduction of pollutants and/or nutrient loads to waters supporting fisheries;
- Waterside access and variety of water depths are important features for anglers;
- Flood risk management options may present the potential for enhancement opportunities for commercial fisheries, aquaculture and/or angling, but can also pose restrictions to the current operation and/or expansion of these activities; and
- Sea level rise can adversely impact on fishing harbours and their local communities.

### 3.8 Landscape and Visual Amenity

#### 3.8.1 Existing conditions

The landscape within this Unit of Management is dominated by agricultural lowlands, with forestry on hill slopes or boggy / heath uplands dominating the south and west areas. The River Deel and River Maigue catchments drain the agricultural lowlands, and together with the undulating hills and the Shannon Estuary to the north, it gives rise to a diverse landscape. The importance of the landscape and visual amenity has intrinsic value in addition to natural beauty, which is a resource used both by residents and visitors, and important in terms of recreation and tourism.

In accordance with the Planning and Development Act 2010 requires all Local Authorities to identify Landscape Character Areas (LCA) within their Development Plans to ensure that defining features are protected and managed. There is no national classification system for LCAs as these are geographically specific and have their own distinctive character based on its location and surrounding environment. Limerick and Cork County Councils have defined LCAs in their County Development Plan and Draft Landscape Strategy respectively. Kerry County Council has yet to formally document LCAs. Figure 3.8.1 illustrates those LCAs defined for Limerick County.



**Figure 3.8.1 - Landscape character areas within Limerick only (source: Limerick County Development Plan)**

Local Authorities have also incorporated landscape designation into their Development Plans in the form of views, prospects, landscape conservation areas and scenic routes. Similarly to LCAs, there is no national standardised approach for designating these landscape features/sites.

Data relating to the various landscape designations is being collated in consultation with Local Authorities, and these sites/features will be considered further during the next stages of the SEA process.

The National Scenic Landscapes Map drafted by Bord Fáilte in 1994 identifies one in draft national scenic landscapes within this Unit of Management, the Galtee – Ballyhoura landscape.

**3.8.2 Future Trends**

In September 2011 the DAHG published a strategic issues paper for consultation on ‘A National Landscape Strategy for Ireland’. This is in line with Ireland’s ratification of the European Landscape Convention (2000). One main aim of this strategy is the sustainable management of change affecting landscape, and is relevant to both terrestrial and aquatic environments.

As part of the Heritage Council 2010 report Proposals for Ireland’s Landscapes they recommended the introduction of a Landscape Ireland Act. This has been included as an objective in the recent Heritage Council Strategic Plan 2012-2016.

The existing landscape is not expected to change significantly in the immediate future. Landscape protection has been recognised in the county Development Plans, but as noted above, the classification for areas of scenic landscapes, scenic routes, views and prospects etc differ between counties. Relating to this, Fáilte Ireland has produced a feasibility study<sup>34</sup> which provides a framework for the development of a national landscape map for the whole country.

**Box 3.8: Landscape and Visual Amenity - Key strategic issues relating to flood risk management**

- Flood risk management options can have positive and negative effects on visual amenity;
- Development pressures around lakeshore and floodplains can deteriorate landscape;
- Future planning restrictions on development within areas at risk from flooding such as river valleys, estuaries and coastlines could help to protect the landscape character as well as the and view within and from, such important landscapes:
- Failure to protect or manage flood risk areas may lead to short-term or medium-term harm to landscape and visual amenity of areas surround flood risk centre (e.g. abandonment of buildings); and
- Flood risk management can provide opportunities to enhance landscape and visual amenity by restoring more natural river forms and links between watercourses and their flood plains. Opportunities for reed-bed / wetland retention and/or enhancement can be considered.

<sup>34</sup> Fáilte Ireland Scenic Landscape Feasibility Study 2007



### **3.9 Material Assets (economic), Development and Infrastructure**

#### **3.9.1 Existing Conditions**

Industry associated with urban areas in this Unit of Management is predominately involved in food processing such as dairy and beef, many of these industries are located in close proximity to rivers.

There is one motorway (M20) and three national road networks within this Unit of Management, all of which branch from Limerick City: the N21 passing through Adare travelling west to Newcastle West, the N20 which passes through Croom and then south onto Charleville, and the N69 to Tarbert. Many of the existing roads, including the national roads, are located close to and along river valleys, and have a history of flooding (refer to Section 2.2). Significant improvements have been made to the road network in the past decade and some planned development is proposed to continue. However some planned road schemes have been suspended at present, e.g. N21 Abbeyfeale to Adare.

A section of the Dublin to Cork railway line lies to the south of this Unit of Management, crossing the Loobagh River at Kilmallock, with a stop at Charleville. There is also a remnant industrial railway line that runs from Limerick City to Foynes Port. Although this line is not in use, it still remains intact (including its crossings of the Maigue River and estuary southeast of Foynes Harbour).

There are no navigation canals within this Unit of Management.

Section 3.4 of this Annex details the number of important infrastructure types such as wastewater and water treatment plants.

Shannon Foynes Port Company (which includes Foynes, Tarbert and Aughinish ports) has statutory jurisdiction over all marine activities in a 500 km<sup>2</sup> area on the Shannon Estuary. The Shannon Foynes Port Master Plan 'vision to 2041' is currently being compiled, and has proposed some key areas for growth in this Unit of Management which include infrastructure such as road and rail connections.

Endesa Ireland currently own and operate the heavy fuel oil power station at Tarbert and have plans for expanding and improving efficiency of this plant. An alumina refinery has operated on Aughinish Island (east of Foynes) since 1983, exporting alumina to aluminium smelters.

The generation of renewable energy has been increasing over the past ten years, with a growth in the number of wind farms arising around the country. There are 11 wind farms currently operational within or in close proximity this Unit of Management<sup>35</sup>.

Within this Unit of Management, agriculture has an important role to play in the region's economy and is acknowledged as a material asset. Also, like much of the Shannon Estuary, this Unit of Management has many quality scenic landscapes and offers great opportunities for recreation and tourism (including ecotourism).

<sup>35</sup> Irish Wind Energy Association: <http://www.iwea.com/index.cfm/page/windfarmsinireland>

### 3.9.2 Future trends

County Development Plans present economic development policies which respond to the economic downturn and recognise the importance of taking advantage of emerging and likely future trends and economic opportunities.

There are up to 34 prospecting mining licences in this Unit of Management which are granted by the DCENR. Mining prospects within this Unit of Management are generally concentrated on base metals, barytes, silver, gold and to a lesser extent platinum group metals.

The preparation of a Strategic Integrated Framework Plan (SIFP) for the Shannon Estuary has recently commenced (incorporating jurisdictions of Clare, Kerry and Limerick County Councils, Shannon Foynes Port Company and Shannon Development). The reported aim is to identify the nature and location of future sustainable development, economic growth and employment within the Shannon Estuary whilst ensuring the habitat status of Natura 2000 and other environmentally sensitive sites would not be reduced as a result of the short-term or long-term impact of developments. The following are examples of the developments that may be considered by this plan and initiated within or adjacent to this Unit of Management:

- Port functions;
- Shipment;
- Aquaculture/mariculture;
- Leisure;
- Industry;
- Energy generation;
- Aviation;
- Agriculture.

As noted above, Shannon Foynes Port Company Master Plan is in preparation, outlining potential further growth, challenges and issues that the port face. As part of the Master Plan, Shannon Foynes Port Company intends to encourage the reuse of existing rail line to Limerick and improve road networks from Foynes. Iarnród Éireann and Limerick Council support the protection of the Foynes railway line for future possible re-use (Limerick Development Plan).

Permission has been granted for extending Tarbert Power Station's facility for power generation (including a new Combined Cycle Gas Turbine generating station), and construction of Phase 1 is due to commence by the end of 2012. It is anticipated that Phase 2 of the construction will commence in 2016.

Shannon LNG is proposing to construct a liquefied natural gas (LNG) re-gasification terminal on a land bank (104 hectares) between Tarbert and Ballylongford. The Shannon LNG has been granted a licence subject to specific conditions and is currently acquiring necessary permits. However, the draft Shannon Foynes Port Company Master Plan reports that construction is not expected to commence in the near future.

The National Roads Authority (NRA) reports that planned road upgrades and infrastructure for this region are in the 'planning' stage. However, in November 2011, the Irish Government suspended large scale infrastructure spending. It is

unknown at this stage if this suspension will significantly affect this Unit of Management.

There are a number of national strategies and plan in place for Irelands energy needs with specific plans developed regarding renewable energy. One of the most recent is the government publication of the DECNR Offshore Renewable Energy Development Plan (public consultation, 2010). EirGrid have undertaken a number of studies on the development of electricity grid in Ireland including GRID 25, EirGrid's strategy for the development of Ireland's transmission grid. This strategy proposes to support economic growth and provide the infrastructure to enable Ireland to realise its renewable potential and achieve the challenging 2020 target of having 40% of our electricity generated from renewable sources. This strategy includes proposals for projects to be developed within this Unit of Management.

The Sustainable Energy Authority Ireland (SEAI) Strategic Plan 2010-2015 promotes renewable energy both on a large commercial scale and as micro-generation. In addition County Development Plans have outlined potential wind energy development areas which will be further detailed as required in the next stage of the SEA process.

County Kerry intend to vary its current County Development Plan to include a Renewable Energy Strategy.

The Government has recently proposed reforms of the water sector which include the establishment of a State-led utility and a water metering programme (private wells will remain un-levied). This will inevitably influence the prospects for and management of water-related infrastructure.

**Box 3.9: Development, Infrastructure and Material Assets – Key strategic issues relating to flood risk management**

- Vulnerability of material assets to existing and future flood risk can result in adverse effects to human health, economy safety, water status etc;
- Future development including ancillary infrastructure such as access bridges can offer opportunities and constraints for flood risk management; and
- Construction of renewable energy options including those outside flood plains e.g. wind farms can influence changes to morphology and run-off characteristics of a catchment.

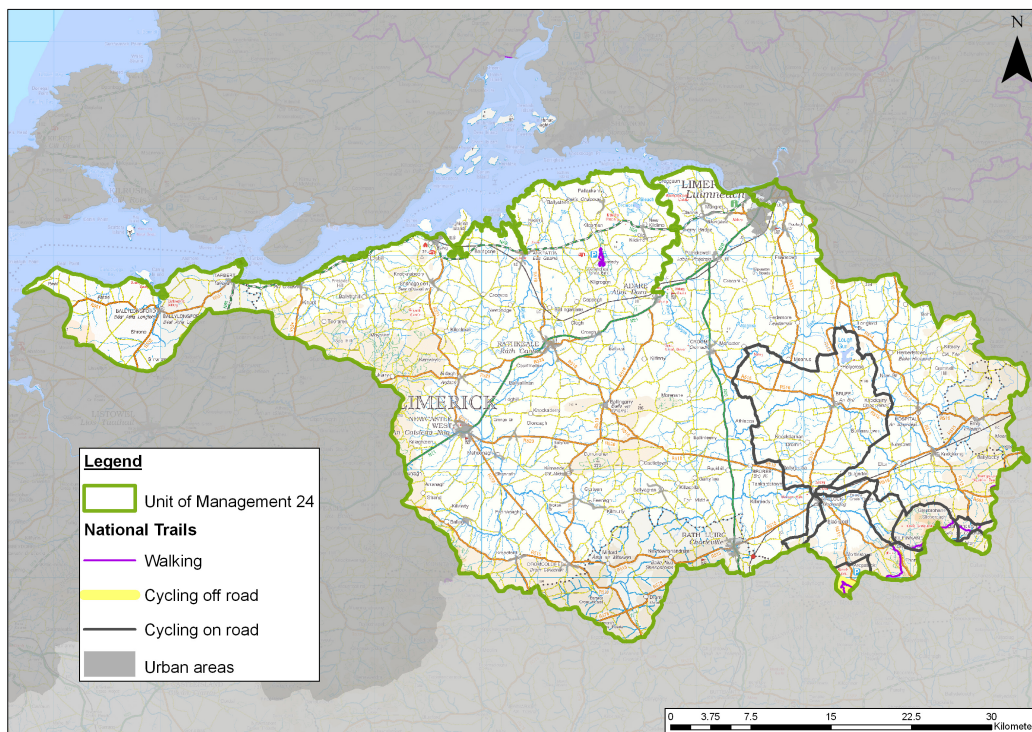
### 3.10 Tourism and Recreation

#### 3.10.1 Existing conditions

The Limerick County Development Plan (2010 – 2016) reports that tourism in this region has important untapped potential, and commits to facilitating measures ‘to improve the tourism product of Limerick County in tandem with the Shannon Development, the Shannon Regional Tourism Board, Fáilte Ireland and local development agencies’. Kerry supports an established inventory of tourism infrastructure, and it is reported that 15% of the county’s workforce are employed in this sector.

The natural heritage in this Unit of Management are characterised by a range of scenic landscapes which offer tourism and recreational opportunities such as walking, cycling, and driving routes, as well as water-based activities such as fishing and boating.

The National Trails Office promotes the use of recreational trails in Ireland. Those defined for this Unit of Management are illustrated in Figure 3.10.1.



**Figure 3.10.1 - National Trails within UoM 24 (source: National Trails Office)**

The regional economic development agency, Shannon Development, also promotes trails suitable for walking, cycling horse riding, canoeing, surfing, driving etc within the Shannon Region<sup>36</sup>, and the County Development Plans detail the infrastructure, facilities and amenities in respect of tourism and recreation. Those of relevance to this Unit of Management include the following:

<sup>36</sup> <http://www.shannonregiontrails.ie/>

Walking Routes:

- The Ballyhoura Way - 90km way-marked trail;
- Aughinish Alumina Nature Trail;
- Great Southern Trail – 85km trail beginning in Newcastle West along the now closed Limerick to Tralee Railway line;
- Mullaghareirk Mountain Trails – 8 looped walks around Broadford and Ashford; and
- Paradise Hill Loop – at Anglesborough.

Cycling Routes:

- The Ballyhoura Cycle Routes and Killmallock Hub.

Scenic Drives:

- Estuary Drive - A scenic drive along the N69 from Limerick City to North Kerry; and
- Golden Vale Drive - A scenic driving route across Limerick.

Many of the above routes and trails are located adjacent to water courses.

Cultural Heritage sites in this Unit of Management also support heritage-related tourism and recreation. This is discussed further in Section 3.11 of this Annex, but some specific features include Killmallock Walled Town, for which a Public Realm Plan has been developed and also Lough Gur and its associated Heritage Centre.

Cruising and boating are important recreational and tourism activities on the Shannon River but are limited within this Unit of Management. Fishing resources, including angling is discussed in Section 3.7 of this Annex.

**3.10.2 Future trends**

The National Development Plan 2007 – 2013 (NDP) outlines the Government’s Policy to significantly increase revenue from overseas and domestic tourism and achieve a wider distribution of tourists within this period. This NDP policy is supported by policies and objectives in County Development Plans.

Walking and cycling trials will continue to be developed with the Unit of Management with many of these located adjacent to watercourses.

A Limerick & Clare Joint Sports and Physical Recreation Strategy currently being developed will result in a set of goals and objectives for the provision and utilisation of sporting and physical recreation facilities in the area which relate to sustainable development including linkages to smarter travel options.

Complimenting the roles of Fáilte Ireland and Tourism Ireland to market and promote Irish tourism, Shannon Development commit to initiating and supporting tourism development as a ‘key element in the achievement of overall economic growth throughout the Shannon region’<sup>37</sup>. ‘Ireland’s Shannon Region Tourism Plan

<sup>37</sup> <http://www.shannondevelopment.ie/Tourism/>

Summary 2011' outlines a set of key targets which are likely influence tourism in the coming years throughout this Unit of Management.

**Box 3.10: Tourism and Recreation – Key strategic issues relating to flood risk management**

- Flood risk management options could contribute to the protection of existing tourist attractions and facilities currently at risk from flooding as well as providing opportunities to enhance/create related activities;
- Flooding may restrict, or reduce the quality of resources important for recreation and/or tourism;
- Flood risk management options may affect angling facilities, boating activities and/or associated resources;
- Flood storage options can potentially provide opportunities for enhancing/creating recreational areas; and
- Access to waterways is an important issue to consider e.g. access to rivers for anglers.



### 3.11 Archaeology and Cultural Heritage

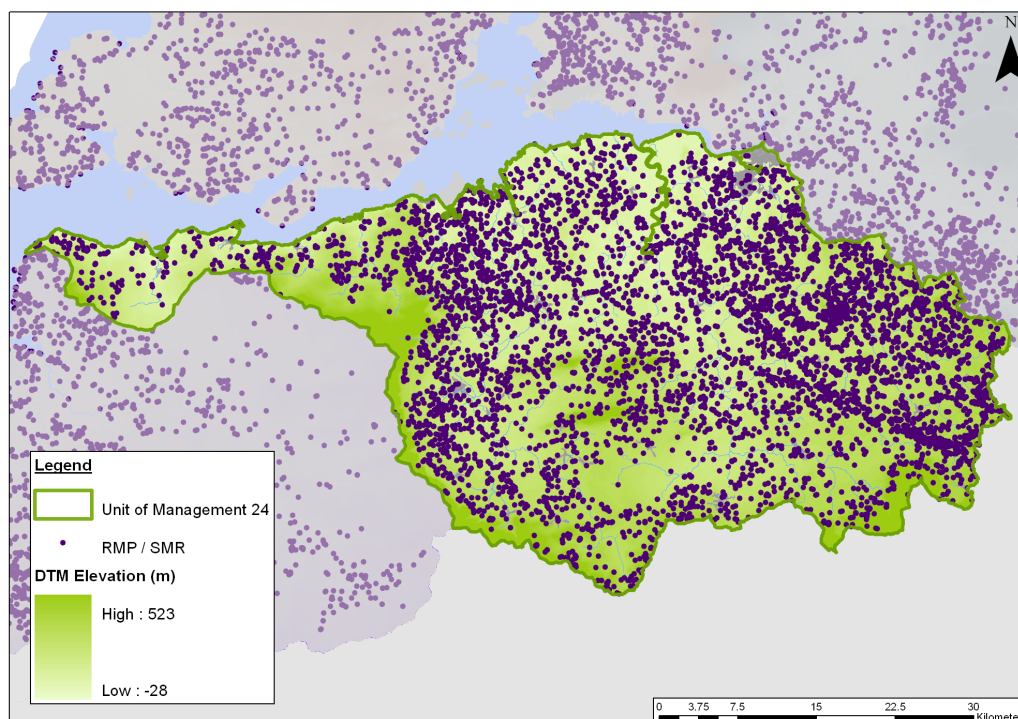
#### 3.11.1 Existing Conditions

Archaeological sites are legally protected by the provisions of the National Monuments Acts, the National Cultural Institutions Act 1997 and the Planning and Development Acts. The National Record of Monument & Places (RMP) (formerly the Sites and Monuments Record (SMR)) is a statutory list of all known archaeological monuments provided for in the National Monuments Acts. There are over 6,400 archaeological, architectural and cultural heritage sites within this Unit of Management, recorded in the RMP. The records contain details of the site, including location, description and unique identification number. Many of the sites are located adjacent to watercourses, with some present within the watercourses. This Unit of Management contains a wide range of monuments types including:

- Burial Grounds;
- Cairns;
- Castles;
- Cathedrals & Churches;
- Crannogs;
- Fulacht Fia;
- Hilltop Enclosures;
- Kilns;
- Ogham Stones;
- Ringforts;
- Round Towers; and
- Town Defences.

The locations of the known archaeological, architectural and cultural heritage sites within this Unit of Management are presented in Figure 3.11.1.

As some monuments and structures are located within and close to watercourses, the Underwater Archaeology Unit records and the Register of Battle sites held by the DAHG will be consulted to establish any zones of potential archaeological importance in the next stages of the SEA.



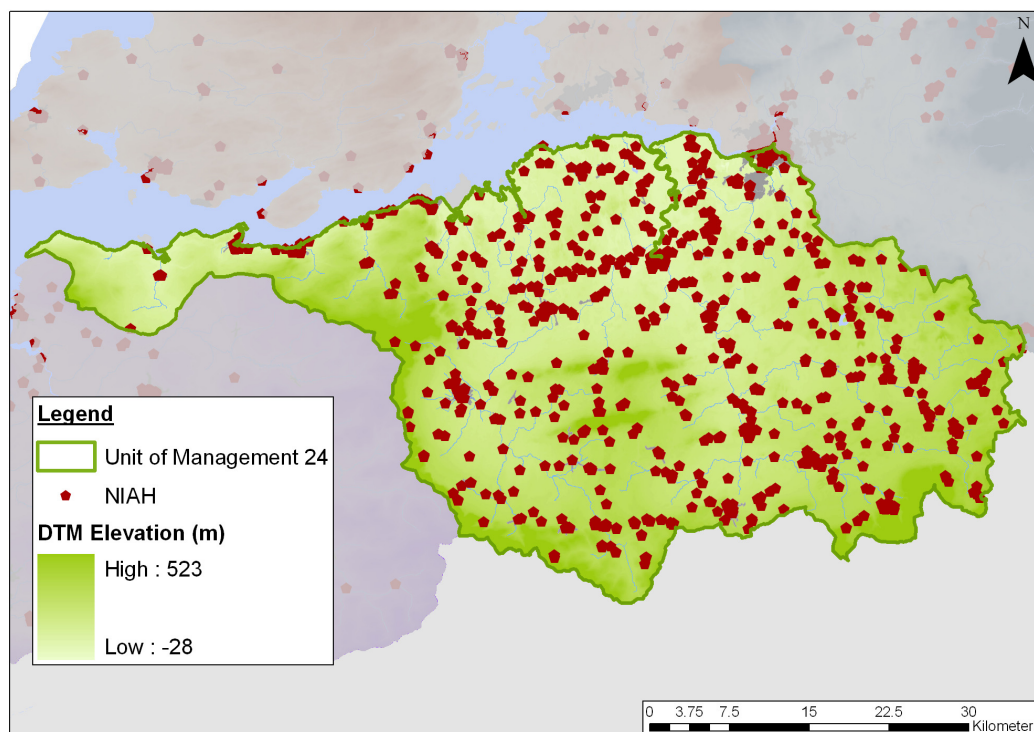
**Figure 3.11.1 - Record of Monuments and Places / Sites and Monuments Record within UoM 24 (source: National Monuments Service)**

The National Inventory of Architectural Heritage (NIAH) was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. The purpose of the NIAH is to identify, record, and evaluate the post-1700 heritage of Ireland. There are over 1600 listings on the NIAH within this Unit of Management.

Architectural Conservation Areas (ACAs) are designated under Section 81 of the Planning & Development Act 2000-2010 (as amended) for the protection of areas for their special characteristics and distinctive features. There are a number of ACAs within this Unit of Management and these are detailed in the County and Local Area Development Plans (some of which are pending designation). Consultation with the relevant Local Authorities will continue during the next stage of SEA process to obtain further details of these ACAs.

The Planning & Development Act 2000 introduced legislation and methods for protecting the Architectural Heritage and introduced the Record of Protected Structures (RPS). There are approximately 1700 Protected Structures recorded in this Unit of Management. These are listed in the County Development Plans, but are not available as yet in digital map format. Following consultation with the DAHG, it is acknowledged that the register of protected structures documented these Plans may not represent all Ministerial recommended sites/structures (which are included in the NIAH).

The locations of NIAH sites recorded within this Unit of Management are presented in Figure 3.11.2.



**Figure 3.11.2 - National Inventory of Architectural Heritage within UoM 24 (source: NMS)**

There are no designated UNESCO World Heritage Sites or ‘tentative list’ sites within this Unit of Management. However, in 2009 Limerick County Council submitted an application to include Lough Gur on the tentative list of potential World Heritage sites and an Environmental Management Plan has been developed for this site.

The draft Preliminary Flood Risk Assessment report (OPW, 2011) presented a methodology for classifying the vulnerability of National Monuments from flooding in Ireland. The report classifies each monument type with a ‘vulnerability’ rating (low to extreme) based on the monuments importance and the potential damage that could occur due to flooding. This rating will inform the SEA process for the FRMPs with regards to archaeological monuments and sites.

**3.11.2 Future trends**

The archaeological, architectural and cultural heritage of this Unit of Management is a finite resource, and protection of this resource from flooding and flood risk management related development will continue to be required. There also remains the possibility for the presence of unknown, undesignated archaeological and architectural remains to be discovered within this Unit of Management during any future developments.

Linking with the climatic factors discussed in Section 3.5 of this Annex, the Heritage Council and Fáilte Ireland commissioned a review of research carried out in relation to the potential impacts of climate change on Ireland’s maritime and inland

waterways heritage<sup>38</sup>. River and coastal flooding exacerbated by climate changes are reported to present serious consequences for heritage (and socio-economic activity).

**Box 3.11: Archaeology and Cultural Heritage – Key strategic issues relating to flood risk management**

- Some structures are located within and adjacent to water courses. These can act as a hydraulic restriction within a watercourse and/or constrain flood risk management at a location;
- Existing management plans may require bridges to be repaired/maintained using traditional methods/materials and therefore restrict options for flood risk management;
- Flood risk management options can be constrained by the need to protect the character of areas of existing archaeological and architectural value e.g. ACAs, Protected Structures, National Monuments and RMPs;
- Flood risk management options can potentially reduce the risk from flooding to existing archaeological and architectural features;
- The development of flood risk management options will need to consider the potential for unknown archaeological discoveries, above and below water level (and across flood plains).

<sup>38</sup> Heritage Council and Fáilte Ireland (2009). Climate Change, Heritage and Tourism: Implications for Ireland's Coast and Inland Waterways.

### 3.12 Conclusion

This scoping exercise has identified that impacts on air quality can be scoped out of the SEA for the Shannon CFRAM Study, as it will not influence or be affected by the recommendations of this study. All of the remaining topics including climate are relevant to the next stage of the SEA and Unit of Management 24.

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