

Flood risk management plans 2021-2027: Strategic environmental assessment Environmental report: Appendices E – R

July 2021

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Flood risk management plans 2021-2027: Strategic environmental assessment

Environmental Report – Appendix E

Assessment for Highland and Argyll Local Plan District

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Appendix E - Highland and Argyll Local Plan District (LPD 1)

E.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood Risk Management Plans relevant to the Highland and Argyll Local Plan District (LPD).

This document:

- Provides an overview of the Highland and Argyll LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Highland and Argyll LPD. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Highland and Argyll LPD for which actions are recommended in the Flood Risk Management Plan;
- Describes the identified potential environmental effects of the types of actions proposed to manage flood risk in the Highland and Argyll LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

E.2. Flood risk within the Highland and Argyll LPD and recommended actions

E.2.1 Overview of the Highland and Argyll LPD

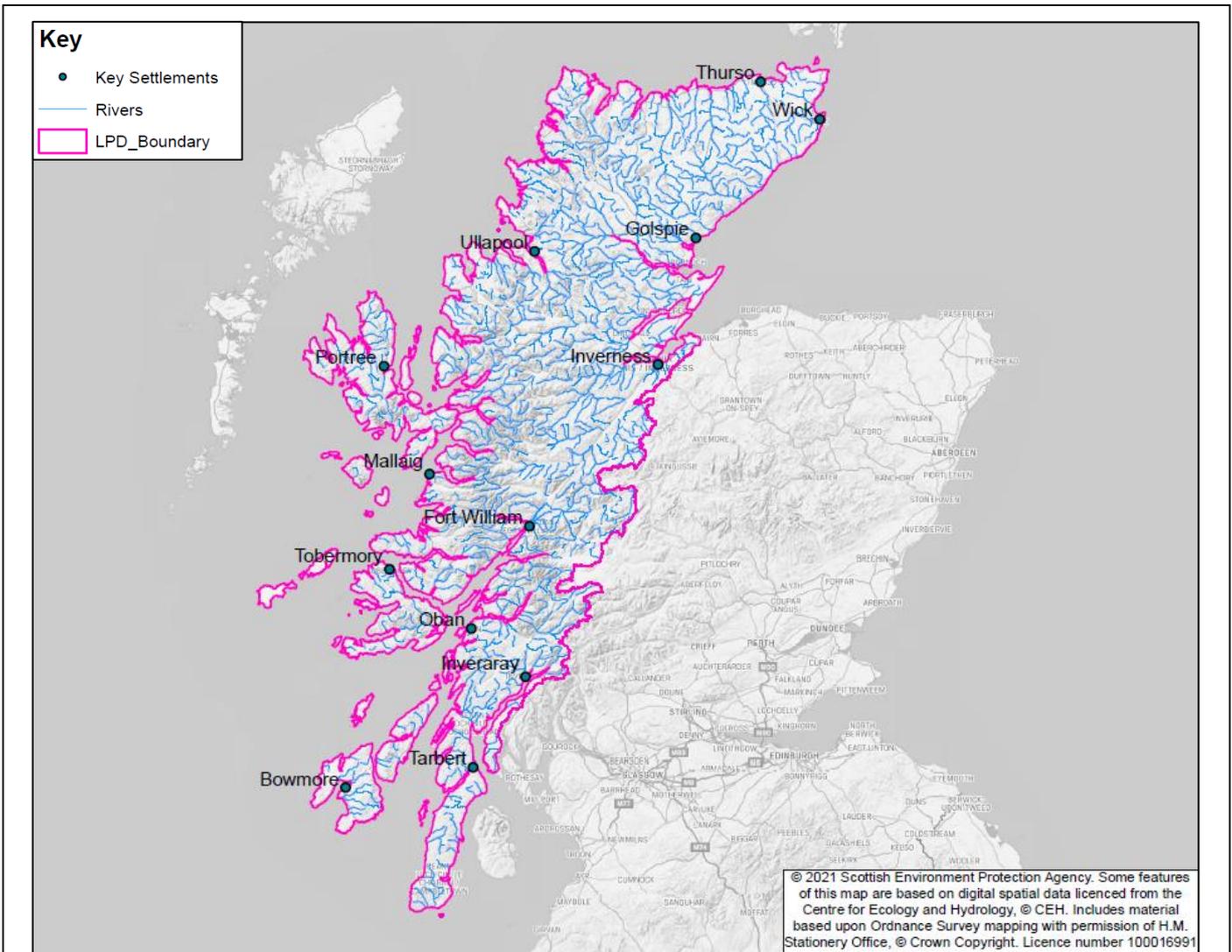


Figure E.1. Extent of the Highland and Argyll LPD, key water bodies and settlements.

The Highland and Argyll Local Plan District shown in Figure E.1 covers an area of around 29,000 km² and has a population of approximately 260,000 people. The area stretches from Campbeltown in the south-west to John o' Groats in the north and from Ardersier by the Moray Firth in the east to the Inner Hebrides in the west.

Much of the area is characterised by mountainous terrain with some low-lying land in the east around Inverness and the north-east around Wick and Thurso. The area is predominantly rural with the land cover being mainly heath, grassland, bog, coniferous woodland and some agricultural land. There are numerous large lochs in the area including Loch Ness and Loch Awe. Given the hilly nature of much of the area, rivers are abundant. The larger river systems are in the east and north-east including the River Ness, the River Beaully and the River Conon. The coastline is over 4,200 km in length and typically hard and often deeply indented with sea lochs, firths and occasional beaches. More extensive beach systems are found on parts of the north and east coast.

E.2.2 Flood risk within the Highland and Argyll LPD

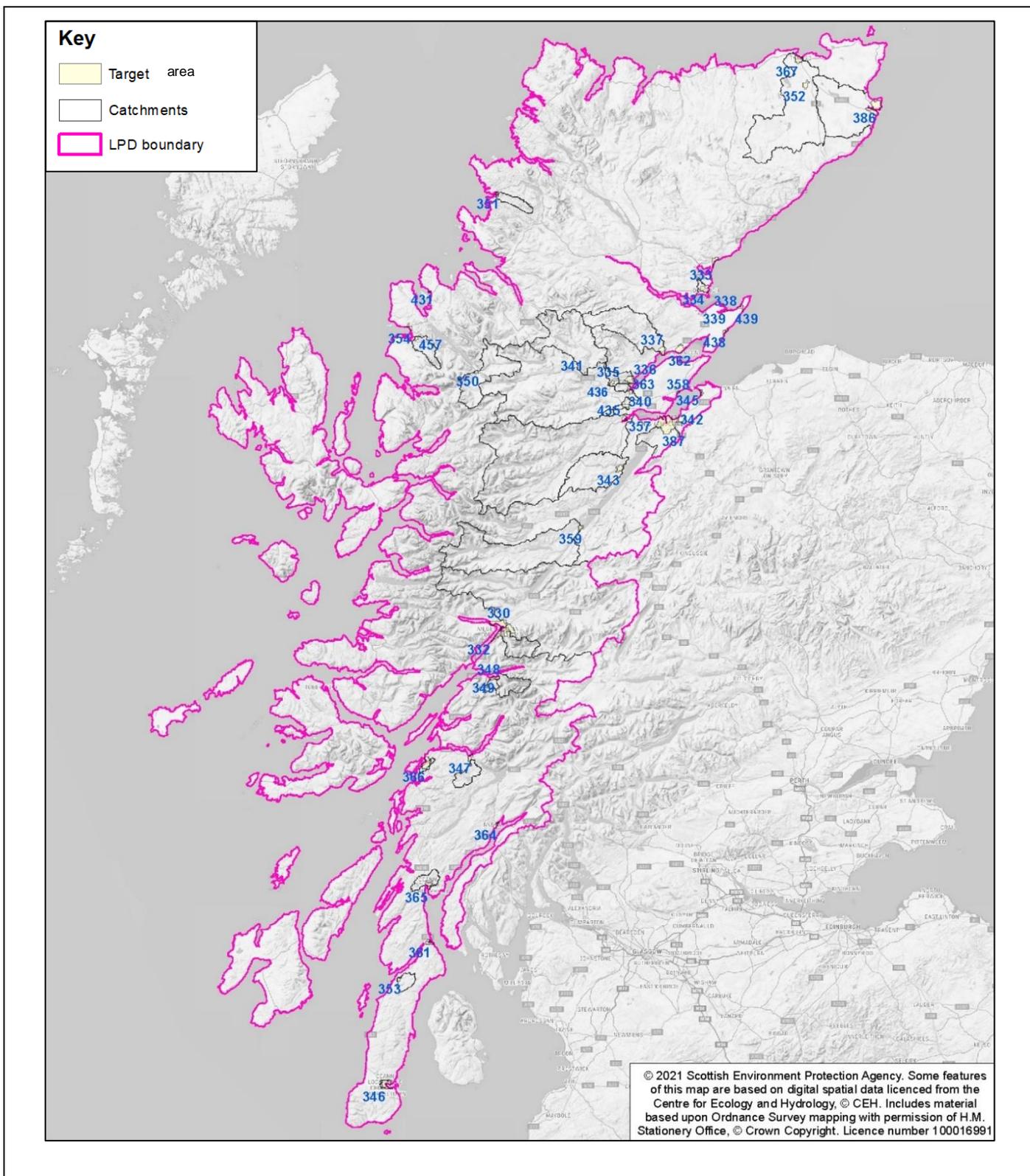


Figure E.2. Extent of the Highland and Argyll LPD and target areas at risk from flooding

There is river, surface water and coastal flood risk, with the main risk coming from river and coastal flooding. Currently it is estimated that there are 22,000 people and 15,000 homes and businesses at risk from flooding. This is estimated to increase to 34,000 people and 23,000 homes and businesses by the 2080s due to climate change. Annual cost of flooding is approximately £26 million. There is a significant risk from flooding to transport infrastructure in rural areas, including the islands, which could leave communities isolated for long periods of time or result in long diversions.

E.2.3 Recommended flood risk management actions within the Highland and Argyll LPD

Table E.2 sets out the sources of flood risk and types of local actions recommended within the Flood Risk Management Plan for target areas within the Highland and Argyll LPD, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section E.5 of this Appendix. Section 2.3 of the main Environmental Report lists any actions scoped out of the assessment, including schemes and works funded after the 2015 FRM Strategies and those part of other programmes and plans.

E.3 Highland and Argyll LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Highland and Argyll LPD across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland’s environment in the main Environmental Report. This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Highland and Argyll LPD provided in Section E.4 of this appendix.

Population and health and material assets

Key information relating to population and human health and material assets are presented in Section E.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding.

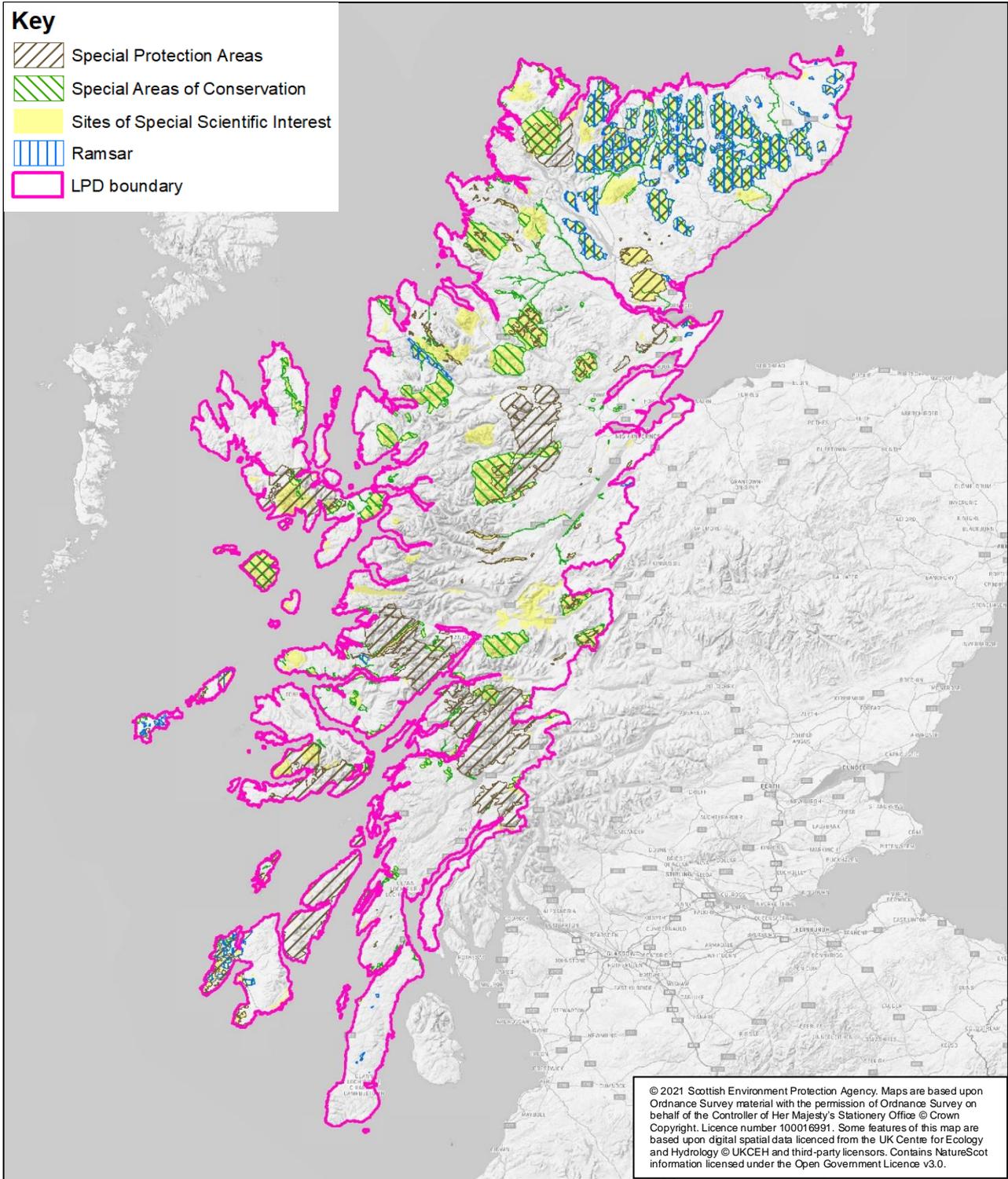
Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is varied across target areas with 73% of these settlements having good or limited access to greenspace. Some have no greenspace provision as urban greenspace designations are less common in rural communities

Biodiversity

Key

-  Special Protection Areas
-  Special Areas of Conservation
-  Sites of Special Scientific Interest
-  Ramsar
-  LPD boundary



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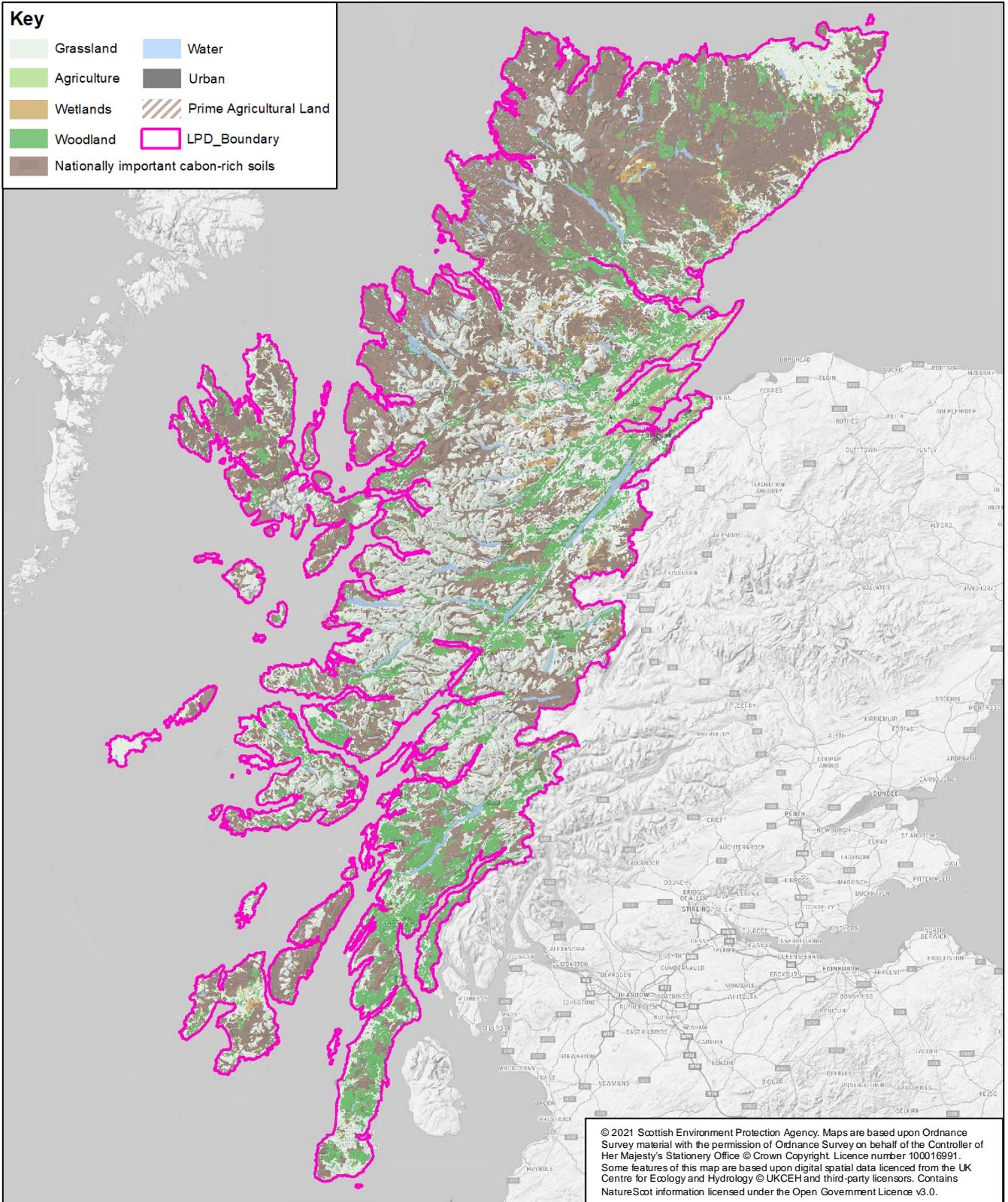
Summary facts for the Highland and Argyll LPD

Marine Protected Area (MPA)	11	<p>The vast and rural nature of Highland and Argyll means there is a great number of designated sites of international and national importance spread throughout the LPD. Although many of these designated sites are not located within target areas and their wider catchments or coastal areas, there are numerous sites designated for a range of habitats and species that could be affected by flood risk management actions. There are also numerous marine and coastal sites beyond the LPD boundary (not shown on plan) that could be impacted.</p>
Ramsar	16	
Special Areas of Conservation (SACs)	106	
Special Protection Areas (SPAs)	54	
Sites of Special Scientific Interest (SSSIs)	328	

Land cover (including soils)

Key

- | | | | |
|---|--|---|-------------------------|
|  | Grassland |  | Water |
|  | Agriculture |  | Urban |
|  | Wetlands |  | Prime Agricultural Land |
|  | Woodland |  | LPD_Boundary |
|  | Nationally important carbon-rich soils | | |



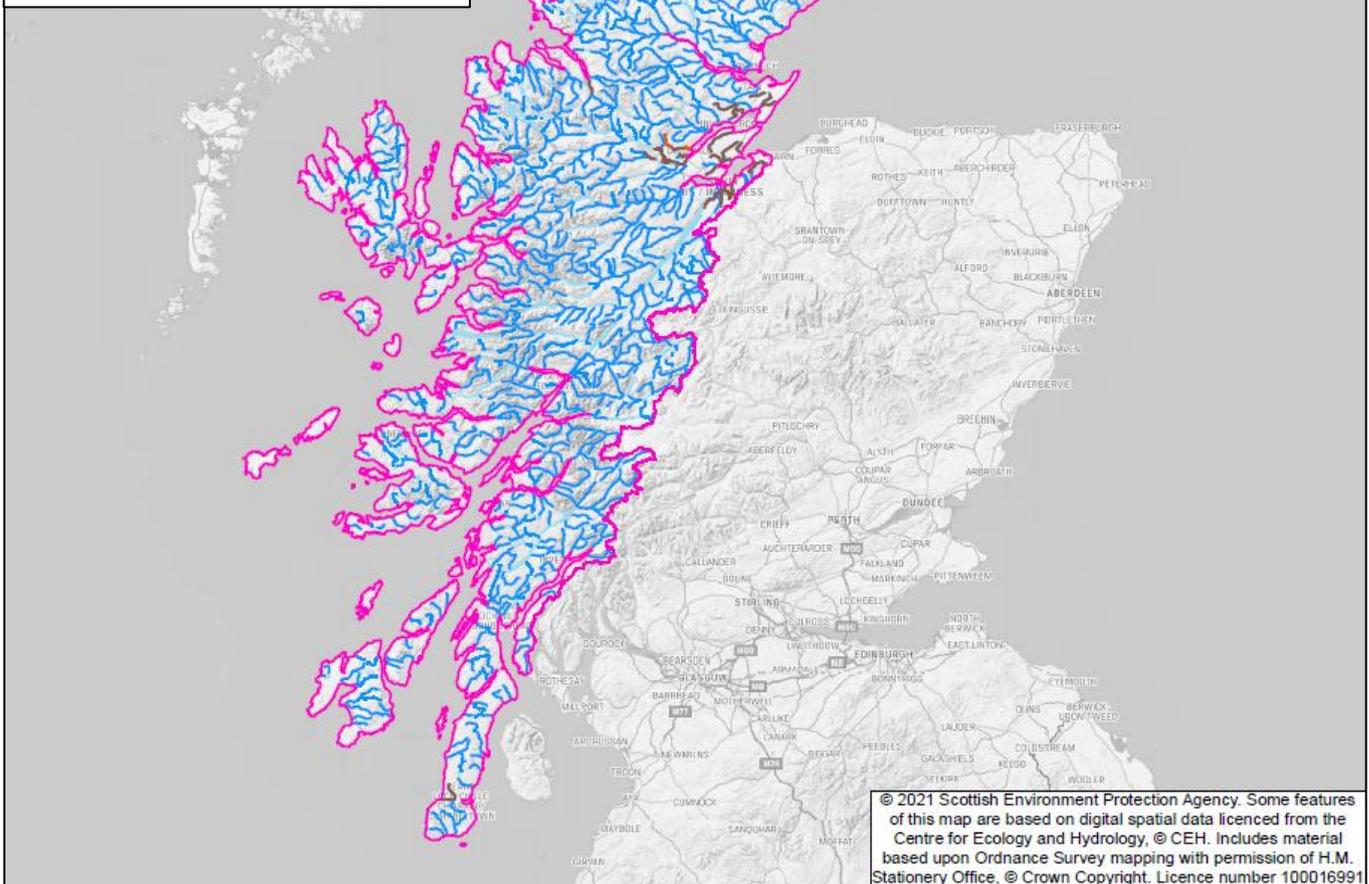
Summary facts for the Highland and Argyll LPD

The Highland and Argyll LPD contain vast areas of woodland, mountain habitat and peat bog. Large areas of carbon rich peat soils, which are associated with wetland and moorland, are especially prevalent in the north of the LPD. In a Scottish context, these are core areas for carbon storage in soil to help mitigate climate change. The LPD is predominately rural with Inverness being the largest urban settlement.

Water

Key

- River waterbodies failing for physical condition
- River waterbodies
- Loch waterbodies
- LPD boundary



Summary facts for the Highland and Argyll LPD

There are approximately 700 river water bodies and 161 lochs in this LPD, as classified under the Water Framework Directive (WFD). The LPD also contains much of Scotland's coastline and as such, a large number of coastal and transitional (estuarine) water bodies. Coastal areas at risk of erosion will be of particular concern when considering flood risk management actions.

There are a number of pressures on water bodies across the LPD that may hinder the achievement of their objectives as set out in the River Basin Management Plan. Notably, there

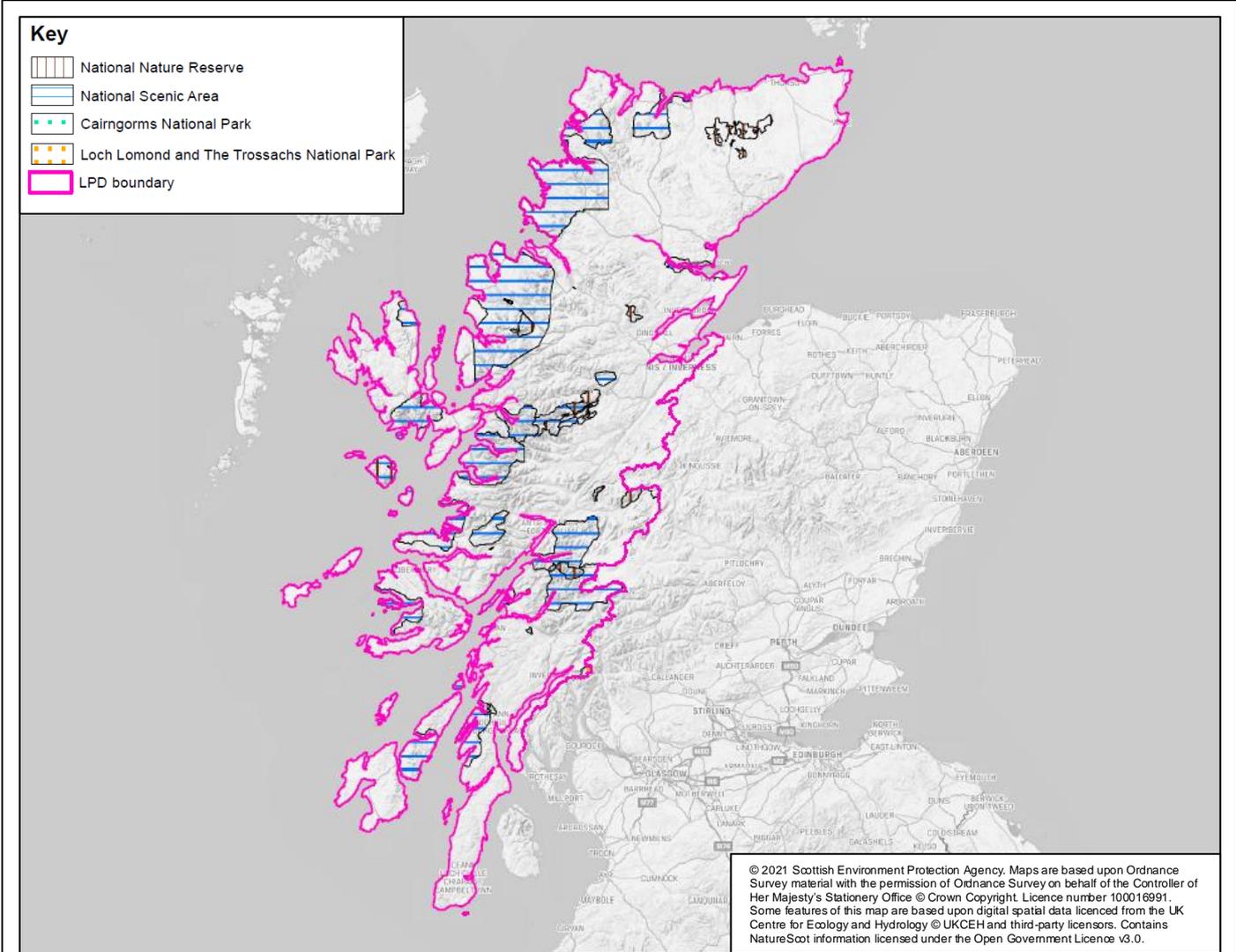
are 25 river water bodies that are failing to meet their WFD objectives because of their physical condition and that flood risk management actions, where relevant, should take into account. These are located mainly around the Moray and Cromarty Firths and in the north eastern corner of the LPD near Wick.

Cultural heritage

Summary facts for the Highland and Argyll LPD

Battlefields	7	The LPD is rich in historic sites. Many of these are scheduled ancient monuments and prehistoric sites. Some of these monuments are canals such as the Caledonian and Crinan Canals. Approximately 40% of listed buildings within the LPD are located within target areas at risk from flooding
Conservation Areas	48	
Garden and Designed Landscapes	55	
Scheduled Monuments	1881	
Listed Buildings	4804	

Landscape



Summary facts for the Highland and Argyll LPD

National Nature Reserve	19	Much of the landscape of the Highland and Argyll LPD is highly valued. There are numerous protected landscapes in the form of National Nature Reserves and National Scenic Areas. Small areas of two National Parks are located at the LPD boundary. There are large swathes of wild land across much of the LPD.
National Scenic Area	21	
National Park	2	

E.4. Key environmental constraints relevant to flood risk management for target areas within the Highland and Argyll LPD

Informed by the high-level baseline data presented in Section E.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table E.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms population and health and material assets and are not detailed in Table E.2.

Table E.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their

	objectives as a result of their physical condition.		2027 WFD objectives as a result of their physical condition
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table E.2 Target areas at risk from flooding, local actions and key constraints within the Highland and Argyll LPD.

Target areas with specific local actions	Reference number (Figure E.1)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Corpach and Caol	330	Coastal, river and Surface water	Y	Y	Y	Y	M	H	L	H	H
Fort William	332	Coastal, river and Surface water		Y	Y		H	H	L	H	H
Golspie	333	Coastal and Surface water		Y	Y	Y	H	L	L	M	H
Dornoch	334	River and Surface water			Y		H	H	L	H	H
Blairninich	335	River				Y	M	H	H	M	H
Dingwall	336	Coastal, river and Surface water	Y	Y	Y	Y	H	H	H	H	H
Alness	337	River		Y			H	H	L	M	L
Portmahomack	338	Coastal		Y	Y		H	L	L	H	L
Inver	339	Coastal		Y	Y		H	L	L	L	H

Target areas with specific local actions	Reference number (Figure E.1)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Conon Bridge	340	River and Surface water		Y	Y		H	H	H	M	H
Garve	341	River		Y	Y		M	H	L	L	H
Smithton and Culloden	342	Surface water	Y		Y		L	L	H	H	L
Drumnadrochit	343	River		Y	Y	Y	H	H	L	M	L
Ardersier	345	Coastal		Y	Y		M	L	H	H	L
Campbeltown	346	Coastal, river and Surface water	Y	Y	Y	Y	L	L	L	H	L
Taynuilt and Brochroy	347	Coastal and river			Y		M	H	L	H	H
Glencoe	348	Coastal, river and Surface water			Y		H	L	L	M	H
Ballachulish	349	Coastal, river and Surface water			Y		H	L	L	M	H

Target areas with specific local actions	Reference number (Figure E.1)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Lochinver	351	Coastal and river			Y		M	H	L	L	H
Halkirk	352	Surface water			Y		H	L	H	M	L
Clachan	353	River and Surface water		Y		Y	L	L	L	M	L
Beauly	357	River and Surface water		Y			H	M	L	H	H
Avoch	358	Coastal		Y	Y		H	L	H	H	L
Fort Augustus	359	River		Y	Y		M	H	L	H	H
Tarbert	361	Coastal and Surface water	Y	Y	Y	Y	H	L	L	H	L
Invergordon	362	Surface water		Y			H	L	H	M	L
Maryburgh	363	River and Surface water		Y	Y		H	H	H	M	L
Inveraray	364	Coastal			Y		H	L	L	H	L

Target areas with specific local actions	Reference number (Figure E.1)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Lochgilphead	365	Coastal, river and Surface water		Y	Y		M	L	L	H	H
Oban	366	Coastal, river and Surface water		Y	Y	Y	H	L	L	H	L
Thurso	367	Coastal and river			Y	Y	H	H	H	H	H
Wick	386	Coastal, river and Surface water		Y	Y		H	H	H	H	L
Inverness	387	Coastal, river and Surface water		Y	Y	Y	H	M	H	H	L
Aultbea	431	Coastal		Y	Y		H	L	L	L	H
Strathpeffer	436	Surface water			Y		L	L	L	H	L
Balintore	438	Coastal		Y	Y		H	L	L	M	L
Rockfield	439	Coastal		Y	Y		H	L	L	L	L

* Some schemes and works listed in this table are scoped out of the assessment in Section E.5.5. See Section 2.3 of the main Environmental Report for details

E.5. Environmental assessment of the recommended flood risk management actions within the Highland and Argyll LPD

E.5.1 Introduction

For the purposes of the SEA assessment the actions recommended in the Flood Risk Management Plan were categorised into four types as listed in Table E.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Highland and Argyll LPD, identifying potential effects and key recommendations.

E.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for five target areas within the Highland and Argyll LPD (refer to Table E.2 for details) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table E.2 for relevant target areas should be considered to inform any future planning and resilience actions or new flood studies that could arise from these actions.

E.5.3. Planning and resilience actions

Specific local planning and resilience actions are recommended for 26 target areas within the Highland and Argyll LPD (refer to Table E.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience

actions was carried out at a national scale using the SEA objectives and criteria presented in Section 4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting.

More specifically within the Highland and Argyll LPD, the constraints review undertaken and summarised in Table E.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

E.5.4. Flood studies

Flood studies are recommended for all but 5 target areas within the Highland and Argyll LPD, excluding Blairninich, Ainess, Clachan, Beaully and Invergordon (see Table E.2 for details). As we do not know whether the flood studies will, in future, lead to any physical actions, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The constraints review described in Section E.4 identifies potential constraints across all SEA topics in most target areas, notably in terms of biodiversity and cultural heritage. In particular, constraints were identified across all the SEA topics for the target areas of Dingwall and Thurso.

As the flood studies are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

E.5.5. Flood schemes and works design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for seven target areas during Cycle 2 (2022 – 2027), dependent on funding (see Table E.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table E.3, and the effects summarised at an LPD scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section E.4 and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known, – but note these can change as the schemes and works go through the design stage.
2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the main Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health and material assets as a result of reduced flood risk to homes, businesses and infrastructure; with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors and material assets. There are mixed effects on biodiversity and water. No significant adverse effects were identified. Further detail can be found in Table E.3.

As the design of these proposed actions are progressed by local authorities/ Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table E.3 – SEA significance assessment of flood schemes and works design and implementation

Target area and associated flood source	Likely action types	SEA significance assessment scores								
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape	
Clachan <i>River</i>	Storage, conveyance and control (weir removal) Property flood resilience	++	+	0	0	+	++	0	0	
Golspie <i>Coastal</i>	Coastal defences (raising existing defences)	++	0	0	0	+	++	0	0	
Inverness <i>River</i>	River defences Run off reduction Storage, conveyance and control River and floodplain restoration	++	-/+	-/+	0	+	++	0	0	
Oban	Storage, conveyance and control; Property flood resilience	++	-	0	0	+	++	0	0	

Target area and associated flood source	Likely action types	SEA significance assessment scores								
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape	
<i>River, coastal and surface water</i>	River and coastal defences									
Blairninich, Dingwall River	Storage, conveyance and control River defences River and floodplain restoration	++	-/+	-/+	0	+	++	-/+	0	
Thurso <i>River and coastal</i>	River and coastal defences	++	-	0	0	+	++	0	0	
Tarbert <i>Coastal</i>	Coastal defences	++	-	0	0	+	++	0	0	
Key findings										
1. Significant positive effects on population and human health due to reduced flood risk and increased wellbeing.										

Target area and associated flood source	Likely action types	SEA significance assessment scores									
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape		
		<p>2. Potential for negative effects on biodiversity due to coastal or river defences and storage, conveyance and control type actions, in particular where SPAs, SACs, Ramsar sites and/ or SSSIs are located within the target areas of Inverness, Oban, Blairninich, Dingwall, Thurso and Tarbert. However, potential for positive effects, in particular through river and floodplain restoration (Inverness, Blairninich and Dingwall), which may improve or create habitat, and weir removal in Clachan, which may improve fish passage.</p> <p>3. Potential mixed effects identified for water at Inverness, Blairninich and Dingwall. Potentially adverse effects from river defences as defences may interfere with river processes altering rates of erosion and deposition, which could also have impacts on water quality. However, opportunities for enhancement also exist through river defence actions by regulating water flow, reducing erosion and supporting of WFD objectives, balanced with the potential adverse effects of actions on the river environment. Neutral impacts on coastal morphology and coastal processes at Tarbert and Thurso. There is potential for adverse effects from coastal defences on coastal processes through altering rates of erosion and deposition, however, any effects are likely to be localised in nature and will be dependent on the location and design of actions.</p>									

Target area and associated flood source	Likely action types	SEA significance assessment scores									
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape		
		<p>4. No significant effects identified for soil.</p> <p>5. Potential for positive, potentially significant, effects on climatic factors due to improved resilience of properties and infrastructure to future climate change.</p> <p>6. Significant positive effects on material assets from the protection of property and infrastructure.</p> <p>7. Overall, no significant effects identified for cultural heritage. Potential for positive effects from the reduction in flood risk to heritage assets balanced with the potential for negative effects on the setting of historic buildings and structures, however effects are dependent on the location and design of actions. Mixed effects at Blairninich, Dingwall due to the extent and types of proposed actions.</p> <p>8. Overall neutral effect on landscape. Potential for negative effects if flood defences located in an area of high landscape value, however, effects are dependent on the location and design of actions.</p>									

Flood risk management plans 2021-2027: Strategic environmental assessment

Environmental Report – Appendix F

Assessment for Outer Hebrides Local Plan District

July 2021

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Appendix F - Outer Hebrides Local Plan District (LPD 2)

F.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood Risk Management Plans relevant to the Outer Hebrides Local Plan District (LPD). This document:

- Provides an overview of the Outer Hebrides LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
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- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Outer Hebrides LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

F.2. Flood risk within the Outer Hebrides LPD and recommended actions

F.2.1 Overview of the Outer Hebrides LPD

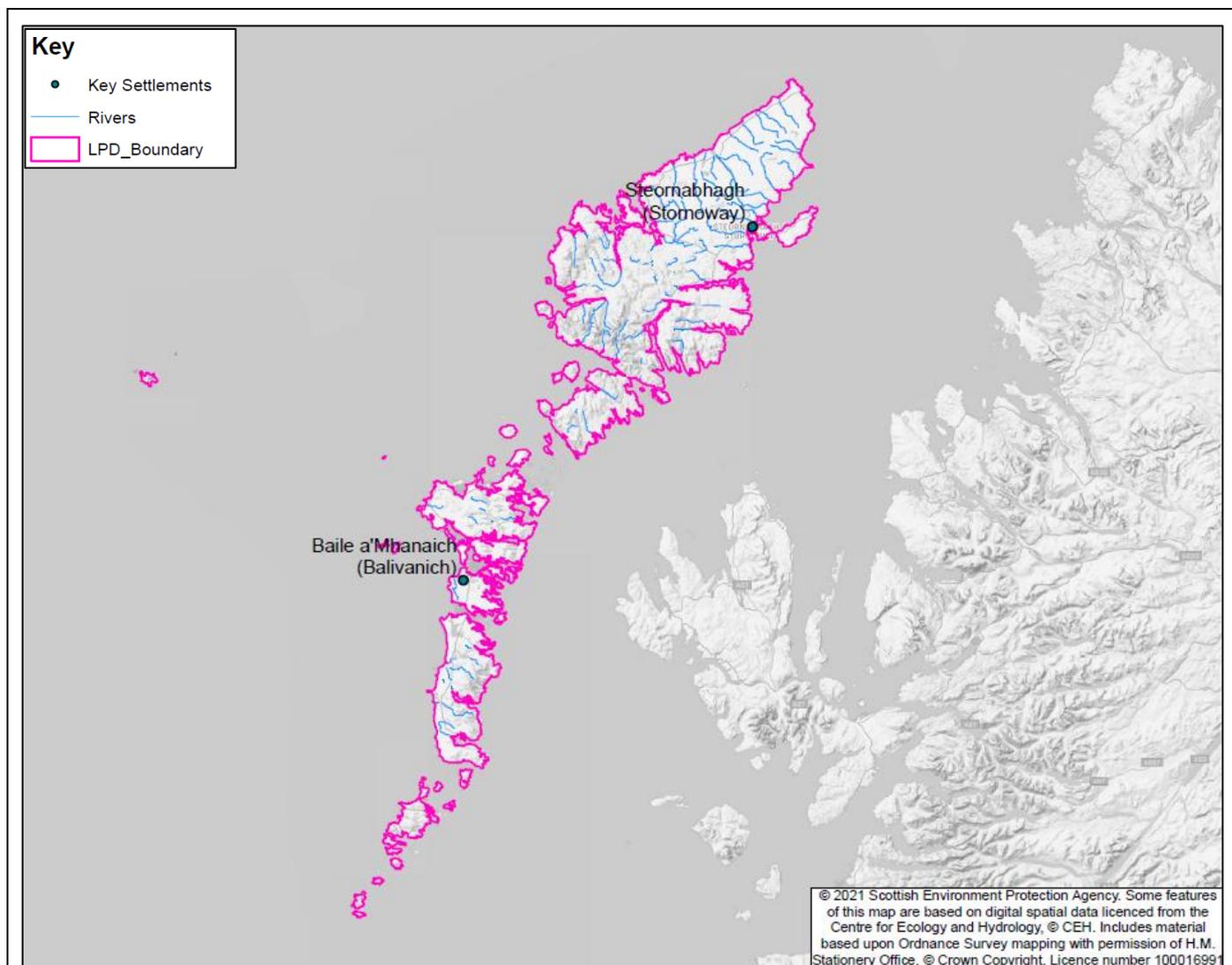


Figure F.1. Extent of the Outer Hebrides LPD, key water bodies and settlements.

The Outer Hebrides Local Plan District covers an area of around 3,100 km² and has a population of approximately 30,000 people. It includes all of the islands in the Outer Hebrides of which 14 are inhabited.

The islands are diverse, varying from mountainous terrain on Harris to flat, low-lying land on Benbecula. Land use is dominated by bog, heather grassland and smaller areas of agricultural

land. Of particular importance is machair grassland on the west coast which supports crofting and has a large amount of biodiversity unique to the north-western fringe of Europe. Inland lochs are widespread, often with complex water level management undertaken through a series of ditches and watercourse diversions. The coastline is 2,300 km in length and is highly variable from hard and deeply indented in the east to long stretches of sand beaches and dune systems on the west coast.

F.2.2 Flood risk within the Outer Hebrides LPD

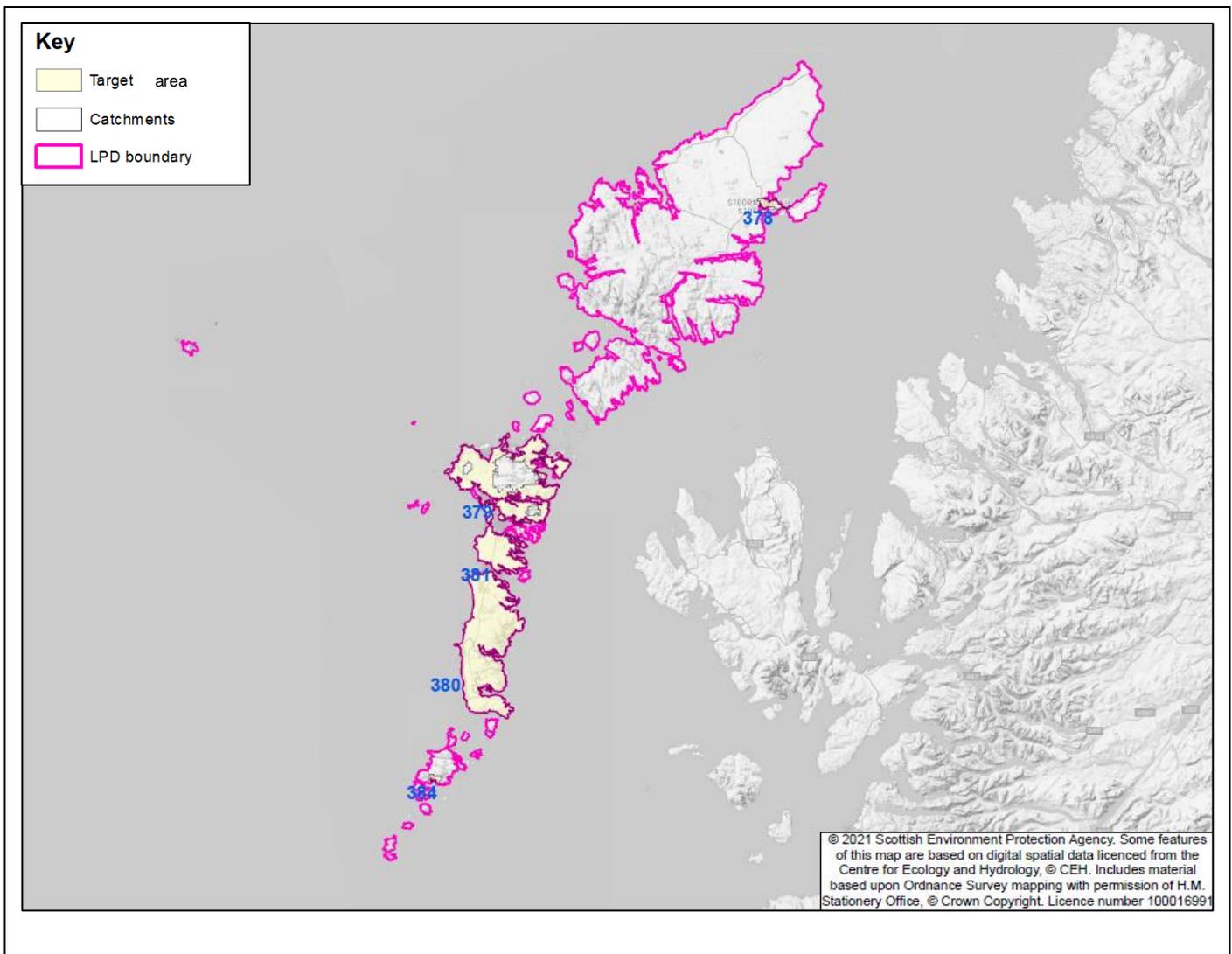


Figure F.2. Extent of the Outer Hebrides LPD and target areas at risk from flooding.

The main risk of flooding in Outer Hebrides is from coastal flooding. Of note is the tendency for flooding to persist for long periods of time in the Uists due to a combination of high ground water levels and difficulties in discharging water from the main drains to the sea. Erosion of the soft coastline and dunes is also of significance.

Currently it is estimated that there are 980 people and 820 homes and businesses at risk from flooding. This is estimated to increase to 1,500 people and 1,200 homes and businesses by the 2080s due to climate change. Annual cost of flooding is approximately £3.4 million. Note however that flooding from wave overtopping is not fully represented in the assessment of flood risk and the impact of coastal flooding may be underestimated. Flood and erosion risk to key transport routes is a concern in the Outer Hebrides with airports, inter-island causeways and main roads particularly vulnerable.

F.2.3 Recommended flood risk management actions within the Outer Hebrides LPD

Table F.2 sets out the sources of flood risk and types of actions recommended within the Flood Risk Management Plan for target areas within the Outer Hebrides LPD, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section F.5 of this Appendix. Section 3.2 of the Environmental Report lists those actions scoped out of the assessment.

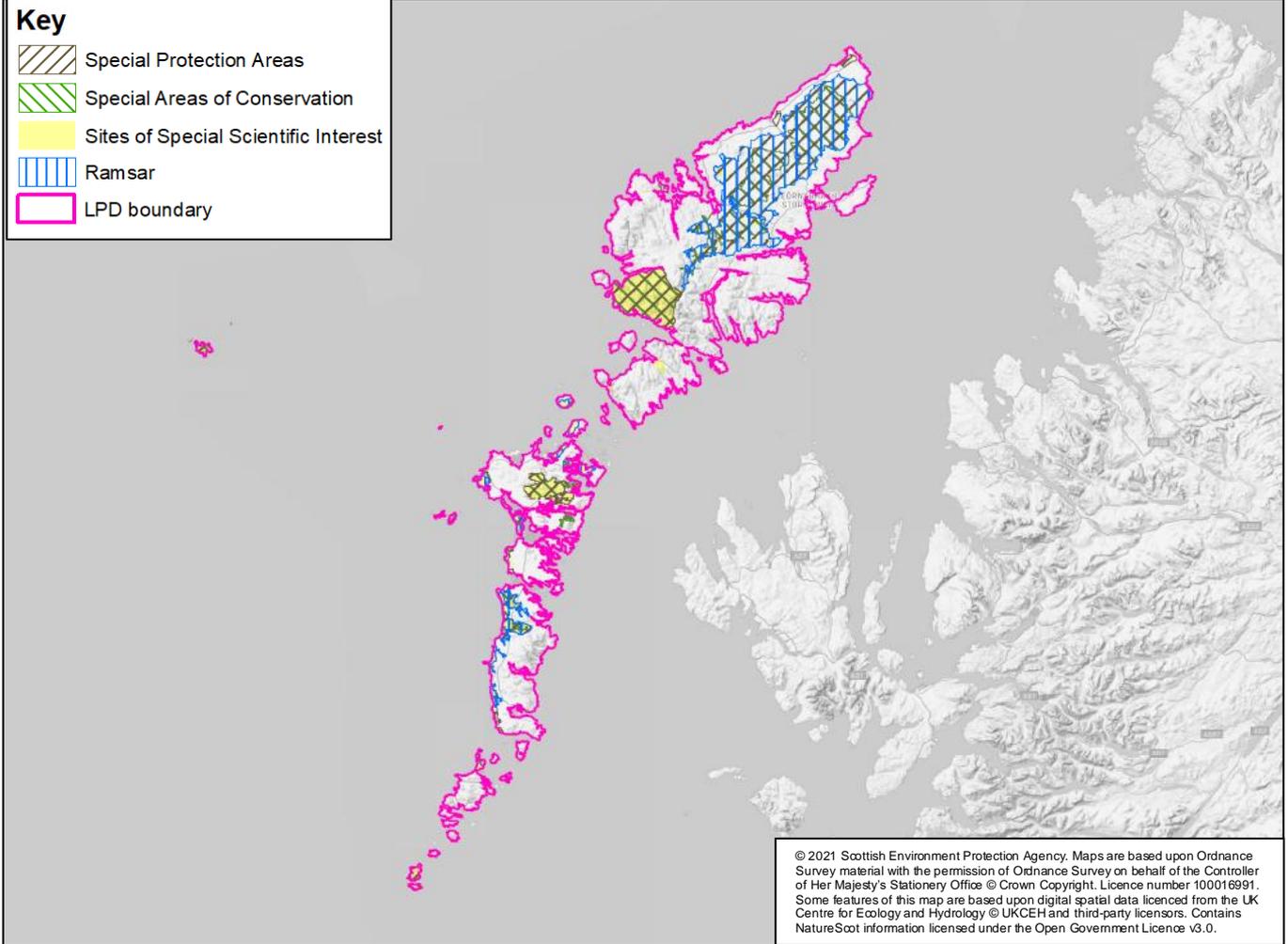
F.3 Outer Hebrides LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Outer Hebrides LPD across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland’s environment in the main Environmental Report. This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Outer Hebrides LPD provided in Section F.4 of this appendix.

Population and health and material assets

Key information relating to population and human health and material assets are presented in Section F.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding. Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated. Urban greenspace provision is limited across target areas with 60% of these settlements having no greenspace provision. This is likely because urban greenspace designations are less common in rural communities.

Biodiversity

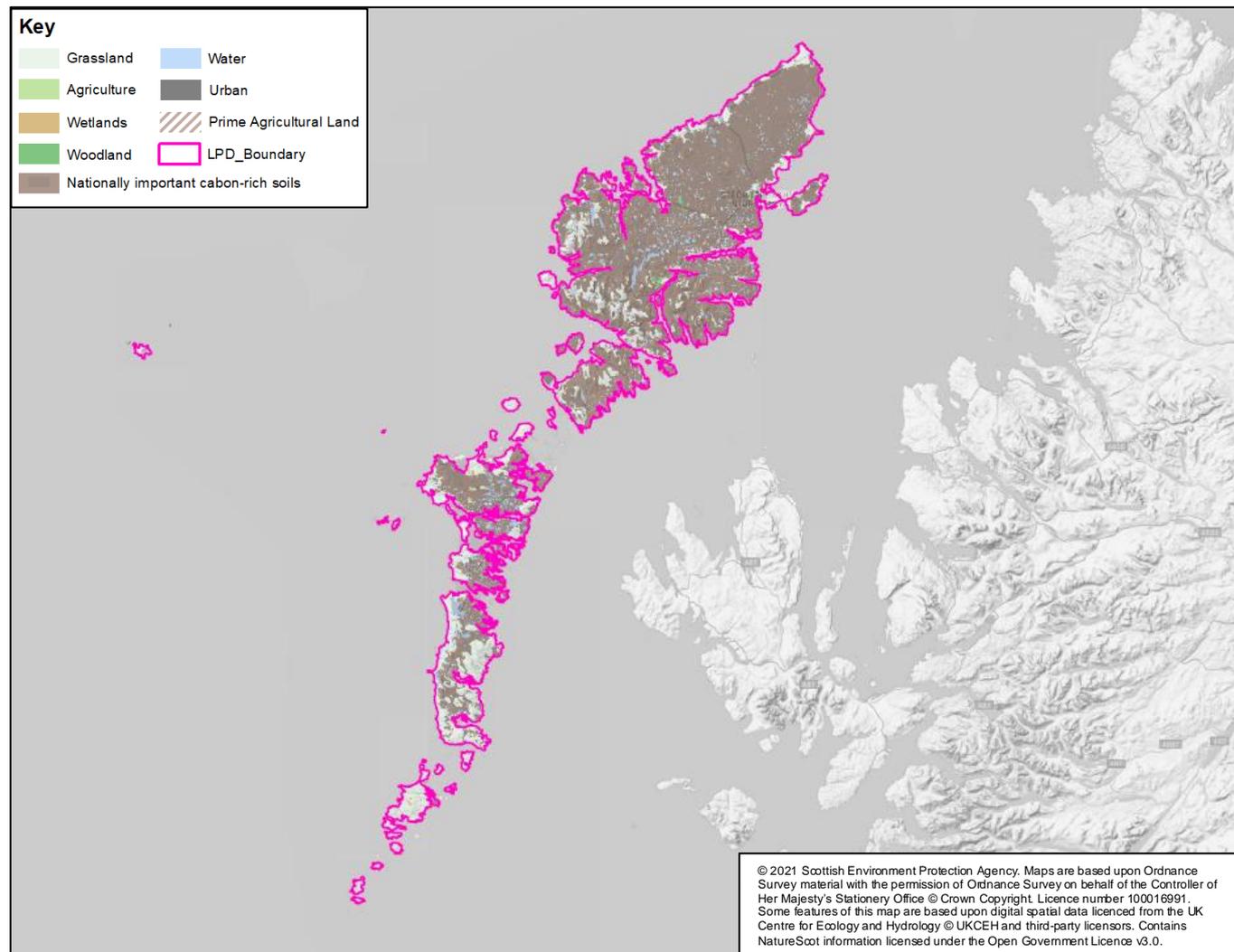


Summary facts for the Outer Hebrides LPD

Marine Protected Area (MPA)	1	There are numerous designated sites of international and national biodiversity importance within the LPD, which includes many of the target areas and their associated wider catchment or coastal areas. These sites encompass coastal ecosystems, freshwater lochs, wetlands, and semi-natural grassland (e.g. South Uist Machair, North Uist Machair,
Ramsar sites	4	
Special Areas of Conservation (SACs)	15	

Special Protection Areas (SPAs)	13	Tong Saltings, Loch Bee, Loch Hallan, Benbecula Lochs). A number of sites extend further inland, encompassing some upland heath (e.g. Loch Druidibeg). There are numerous
Sites of Special Scientific Interest (SSSIs)	42	marine and coastal sites beyond the LPD boundary (not shown on plan) that could be impacted, including a Marine Protected Area (Monach Isles) to the west of Benbecula / North Uist.

Land cover (including soils)



Summary facts for the Outer Hebrides LPD

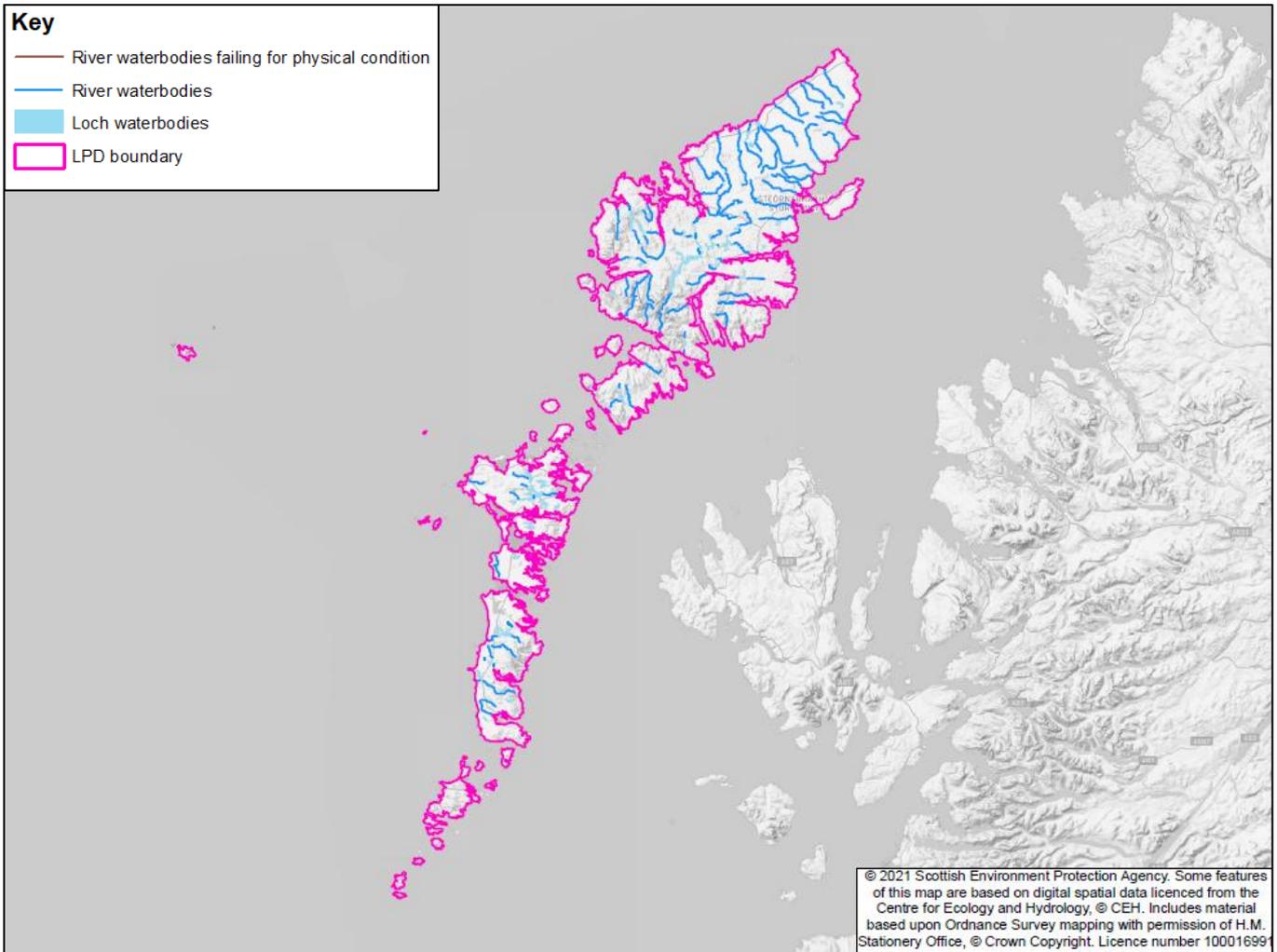
The predominant landcover in the Outer Hebrides is wetlands including large areas of nationally important carbon rich soils. Other land types in the Outer Hebrides are upland heath ecosystem and semi-natural grassland. The semi-natural grassland includes machair grassland, a rare and distinct type of coastal grassland that supports a huge diversity of wildlife. The coastal and marine habitats are a mix of hard rock and soft substrate (sand and dunes).

Farming is primarily rough grazing on semi natural grassland with some stretches of improved grazing along coastal areas. The farmland is used primarily for crofting activities, which produce sheep and cattle.

Water

Key

- River waterbodies failing for physical condition
- River waterbodies
- Loch waterbodies
- LPD boundary



Summary facts for the Outer Hebrides LPD

There are 42 river water bodies and 42 lochs in this LPD, as classified under the Water Framework Directive (WFD), and numerous coastal water bodies. There are a number of

pressures on river water bodies across the LPD that may hinder the achievement of their objectives as set out in the River Basin Management Plan, although there are no water bodies failing for physical condition within the LPD. Coastal areas at risk of erosion will also be of particular concern when considering flood risk management actions.

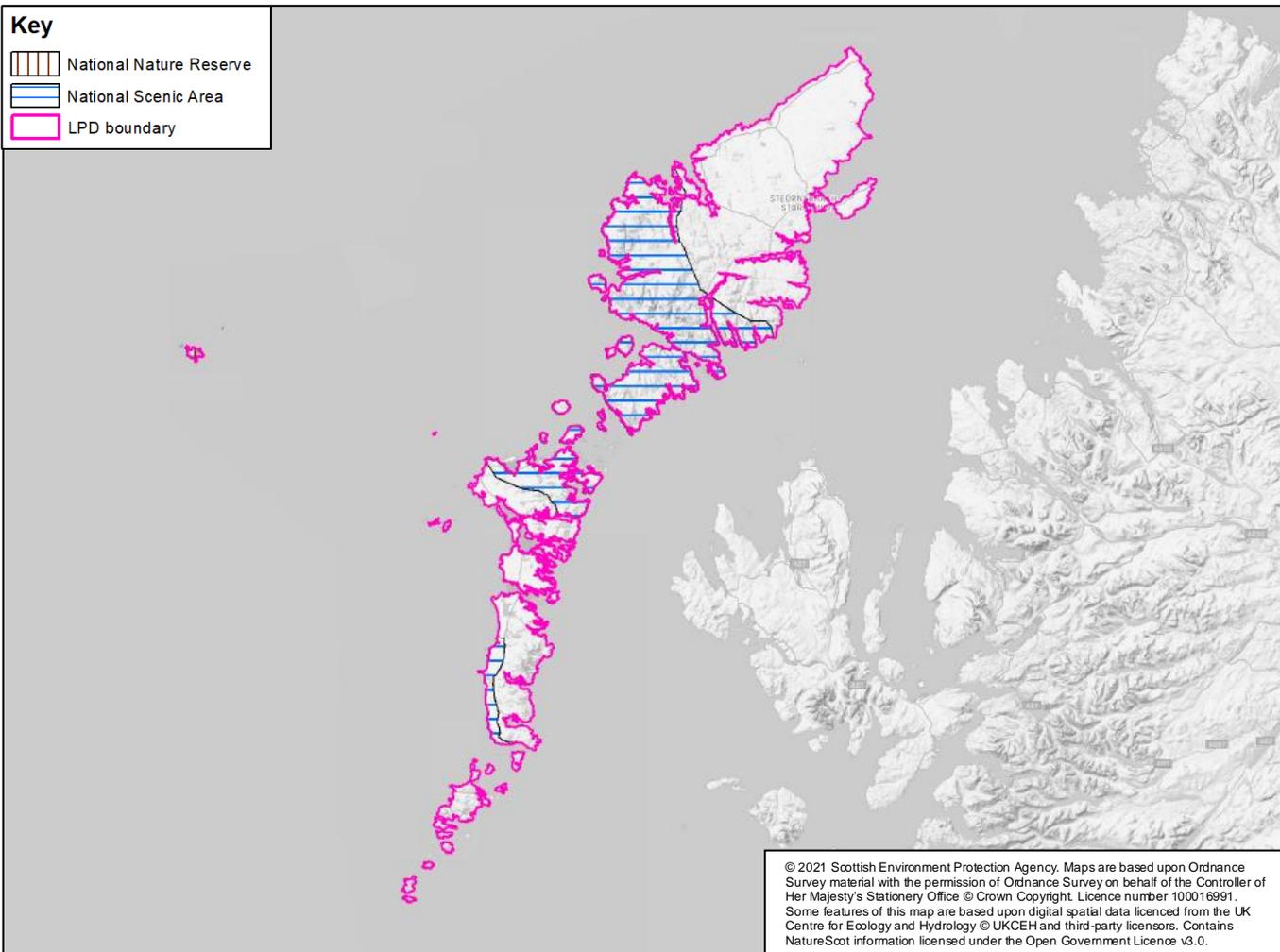
Cultural heritage

Summary facts for the Outer Hebrides LPD

Battlefields	4	The Outer Hebrides has hundreds of archaeological sites situated along the coast and the low-lying areas beyond. Some sites are at threat from coastal erosion. Approximately 60% of listed buildings and 38% of scheduled monuments within the LPD are located within target areas at risk from flooding.
Conservation Areas	1	
Garden and Designed Landscapes	208	
Scheduled Monuments	1	
Listed Buildings	323	

Landscape

Key	
	National Nature Reserve
	National Scenic Area
	LPD boundary



Summary facts for the Outer Hebrides LPD

National Nature Reserve	1	There are several important landscapes within the Outer Hebrides LPD. Protected landscapes include National Scenic Areas in southern Lewis / Harris/ North and along the eastern coast of South Uist. There are areas of wild land across the LPD including the South Uist hills and Harris – Uig hills in the north.
National Scenic Area	3	

F.4. Key environmental constraints relevant to flood risk management for target areas within the Outer Hebrides LPD

Informed by the high-level baseline data presented in Section F.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table F.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms population and health and material assets and are not detailed in Table F.2.

Table F.1. Constraints review sensitivity rating.

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	objectives as a result of their physical condition.		2027 WFD objectives as a result of their physical condition.
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table F.2. Target areas at risk from flooding, local actions and key constraints within the Outer Hebrides LPD target areas.

Target areas with specific local actions	Reference number (Figure F.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and Resilience	Flood Studies	Schemes and works at design /implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Stornoway	378	Coastal		Y	Y	Y	H	L	L	H	L
North Uist	379	Coastal/ River/ Surface water		Y	Y		H	H	L	M	H
South Uist	380	Coastal/ River/ Surface water		Y	Y	Y	H	H	L	H	H
Benbecula	381	Coastal/ River/ Surface water		Y	Y	Y	H	H	L	M	L
Castlebay / Bágħ a'Chaisteil	384	Surface water		Y	Y		L	L	L	M	L

* Some schemes and works listed in this table are scoped out of the assessment in Section F.5.5. See Section 2.3 of the main Environmental Report for details.

F.5. Environmental assessment of the recommended flood risk actions within the Outer Hebrides LPD

F.5.1 Introduction

For the purposes of the SEA assessment the actions recommended in the Flood Risk Management Plan were categorised into four types as listed in Table F.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Outer Hebrides LPD, identifying potential effects and key recommendations.

F.5.2. Data collection and mapping actions

Data collection and mapping actions are not recommended for any target areas (South Uist and Benbecula) within the Outer Hebrides LPD (refer to Table F.2 for details).

F.5.3. Planning and resilience actions

Planning and resilience actions are recommended for 5 target areas within the Outer Hebrides LPD (refer to Table F.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience actions was carried out at a national scale using the SEA objectives and criteria presented in Section 4.4 of the Environmental Report.

Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present,

however, consideration should be given to the design of property resilience measures to avoid any impacts on setting. In this LPD, there are also potential benefits to biodiversity, water and landscape through land use planning actions that seek to protect natural features that help to managing flooding.

More specifically within the Outer Hebrides LPD, the constraints review undertaken and summarised in Table F.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

F.5.4. Flood studies

Flood studies are recommended for 3 target areas within the Outer Hebrides LPD (see Table F.2 for details). As we do not know whether the flood studies will, in future, lead to physical actions, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

Key environmental constraints within most target areas in the Outer Hebrides LPD (refer to Table F.2) principally relate to biodiversity, soil and/or cultural heritage. Constraints have been identified for the target areas of North Uist and South Uist across almost all the SEA topics.

As the identified flood studies within this LPD are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

F.5.5. Flood schemes and works design and implementation in Cycle 2

In the Outer Hebrides LPD, there are no schemes and works for design / implementation that are scoped into the SEA.

Flood risk management plans 2021-2027: Strategic environmental assessment

Environmental Report – Appendix G

Assessment for Orkney Local Plan District

July 2021

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Scottish Environment Protection Agency
Angus Smith Building
6 Parklands Avenue
Eurocentral
Holytown
North Lanarkshire
ML1 4WQ

Appendix G - Orkney Local Plan District (LPD 3)

G.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood Risk Management Plans relevant to the Orkney Local Plan District (LPD). This document:

- Provides an overview of the Orkney LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Orkney LPD. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Orkney LPD for which actions are recommended in the Flood Risk Management Plan;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Orkney LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

G.2. Flood risk within the Orkney LPD and recommended actions

G.2.1 Overview of the Orkney LPD

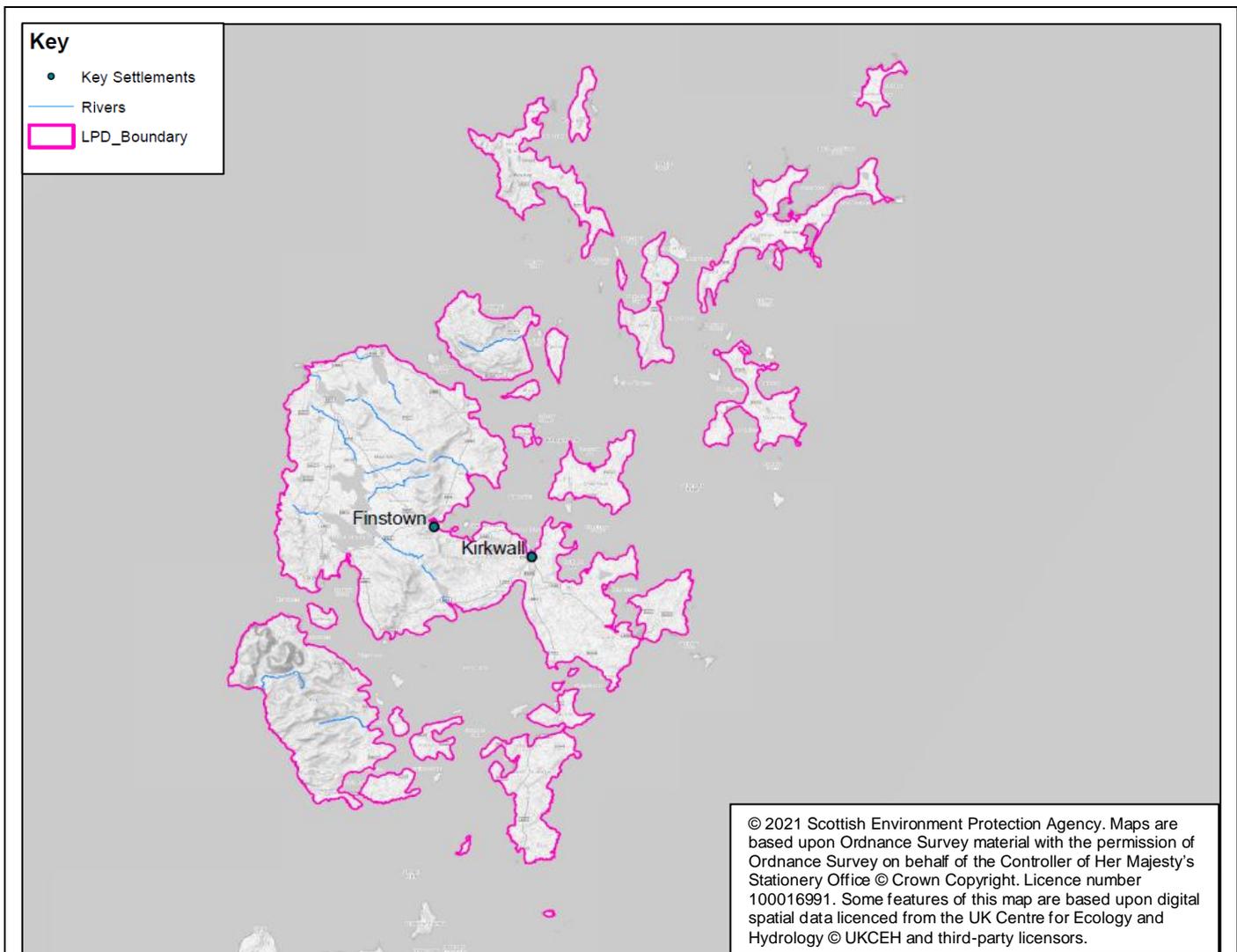


Figure G.1. Extent of the Orkney LPD, key water bodies and settlements.

The Orkney Local Plan District covers an area of around 1,000 km² and has a population of approximately 23,000 people. It includes all of the Orkney Islands, 20 of which are inhabited.

The majority of the islands comprise low-lying flat ground with hills on the Mainland, Rousay and Hoy. Land use is dominated by agricultural land (predominantly improved grassland) with heather and wetlands also significant. There are a number of large inland lochs in the area

including Loch of Harray and Loch of Stenness. The coastline has a total length of approximately 860 km, much of it soft and easy to erode.

G.2.2 Flood risk within the Orkney LPD

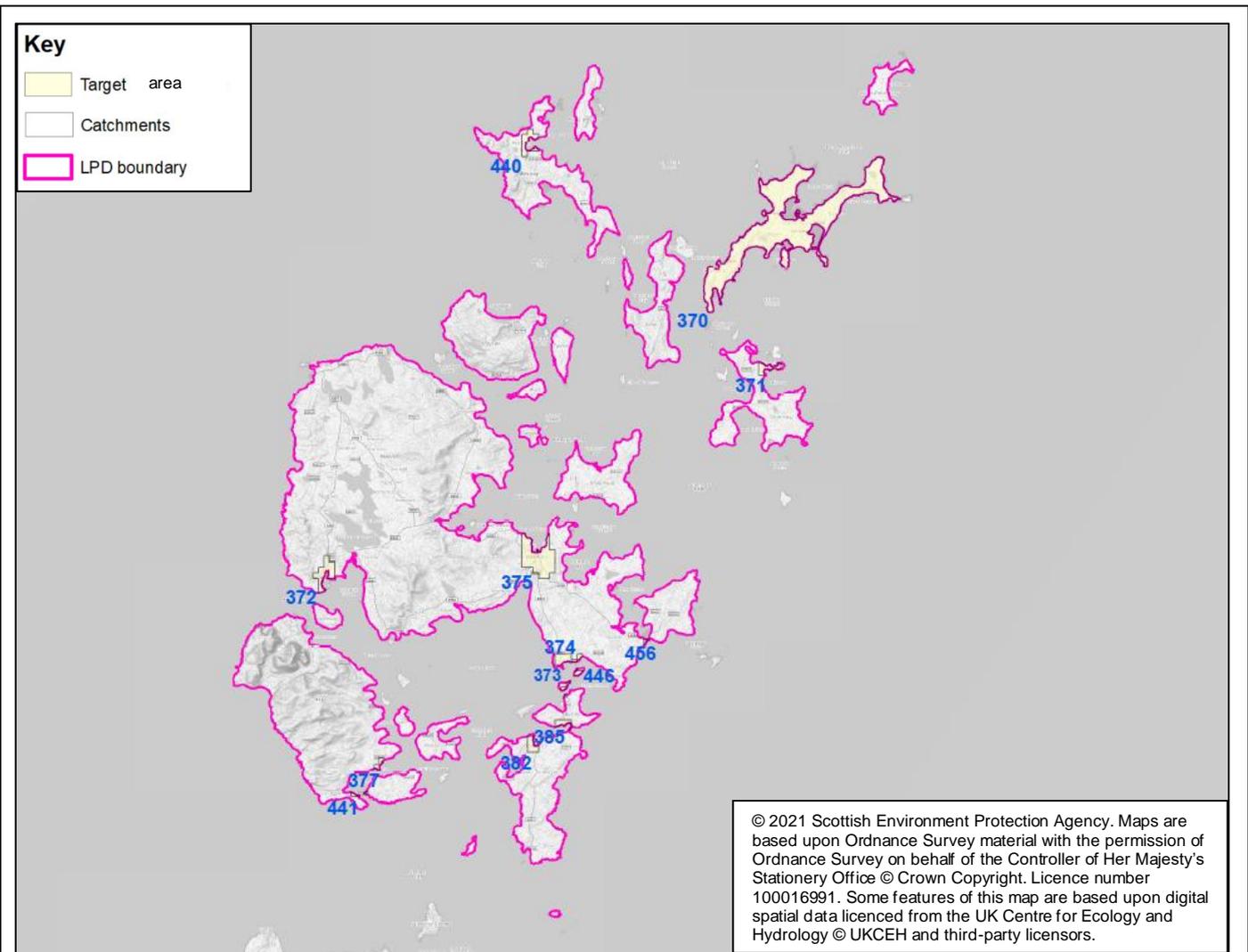


Figure G.2. Extent of the Orkney LPD and target areas at risk from flooding

The main risk of flooding in Orkney is from coastal flooding. Orkney has been affected by several floods, notably widespread coastal flooding in January 2005. Currently it is estimated that there are 2,300 people and 1,900 homes and businesses at risk from flooding. This is

estimated to increase to 2,700 people and 2,200 homes and businesses by the 2080s due to climate change. Annual cost of flooding is approximately £4.8 million. Note, however, that flooding from wave overtopping is not fully represented in the assessment of flood risk and the impact of coastal flooding may be underestimated.

G.2.3 Recommended flood risk management actions within the Orkney LPD

Table G.2 sets out the sources of flood risk and types of local actions recommended within the Flood Risk Management Plan for target areas within the Orkney LPD, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section G.5 of this Appendix. Section 2.3 of the main Environmental Report lists those actions scoped out of the assessment.

G.3 Orkney LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Orkney LPD across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland's environment in the main Environmental Report.

This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Orkney LPD provided in Section G.4 of this appendix.

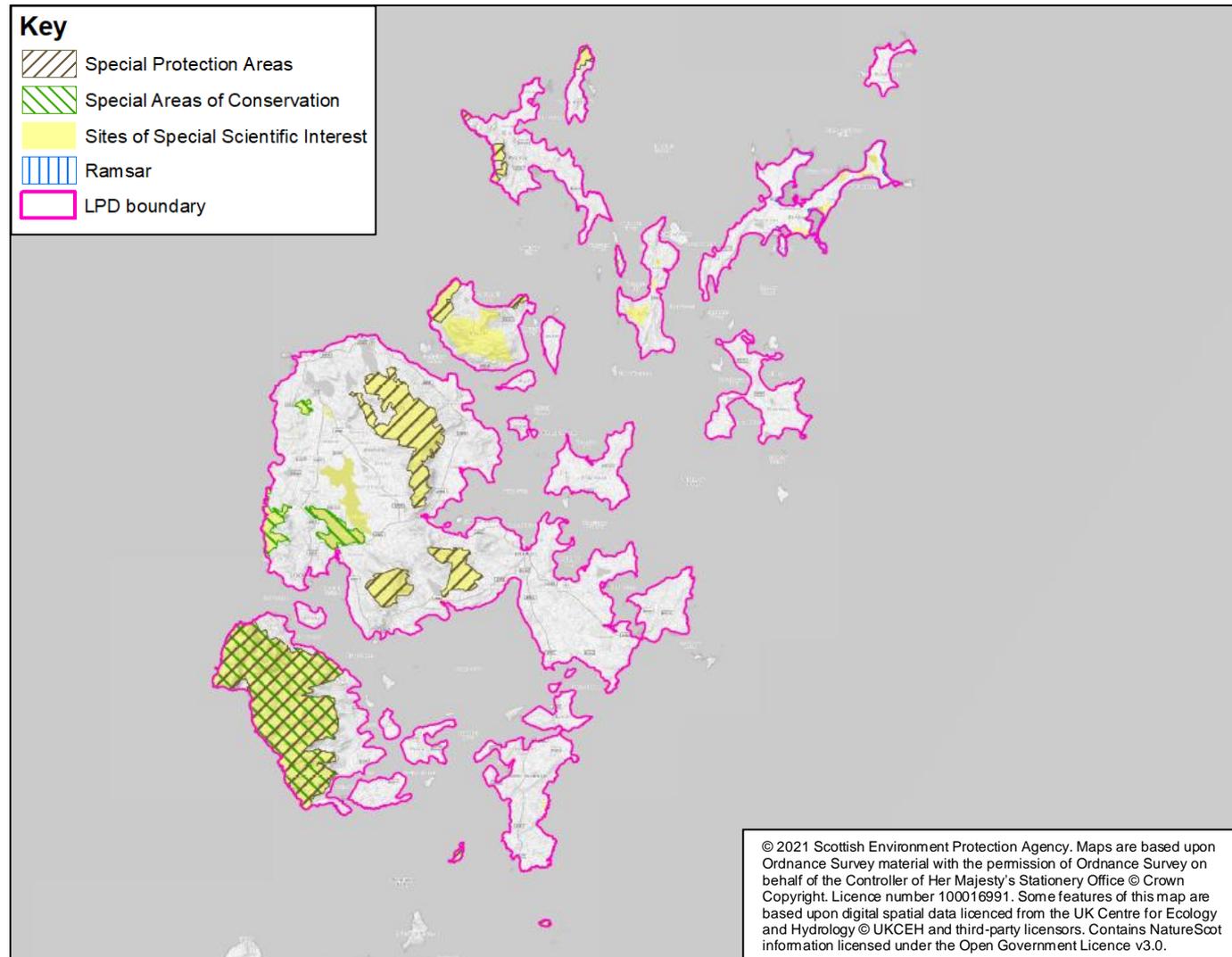
Population and health and material assets

Key information relating to population and human health and material assets are presented in Section G.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding.

Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is limited across target areas with over 80% of these settlements having no greenspace provision. This is likely because urban greenspace designations are less common in rural communities.

Biodiversity



Summary facts for the Orkney LPD

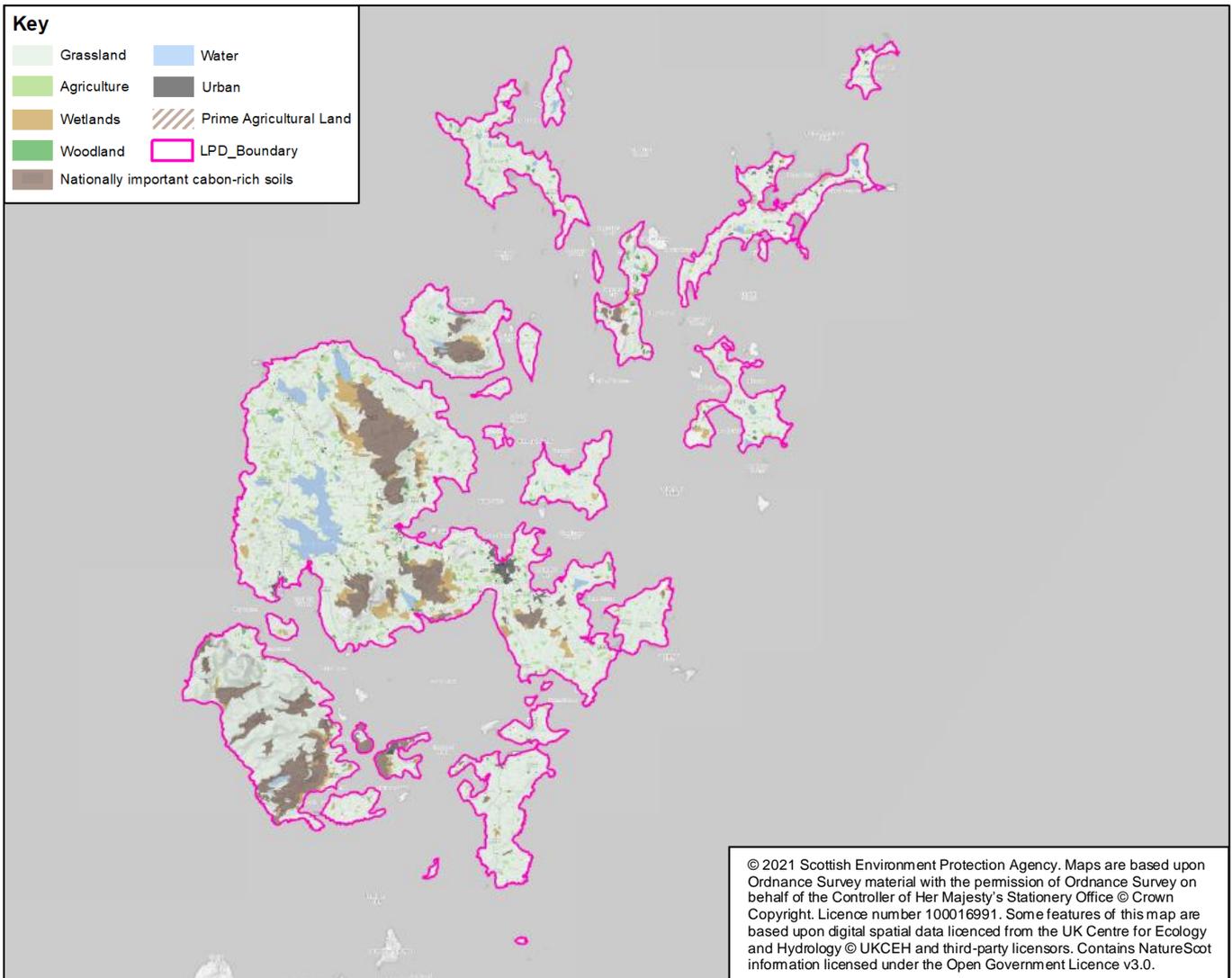
Marine Protected Area (MPA)	2	There are numerous designated sites of international and national biodiversity importance within the LPD, a limited number of which are located within the target areas or their wider catchments or
Ramsar site	1	
Special Areas of Conservation (SACs)	6	

Special Protection Areas (SPAs)	9	coastal areas. These include the coastal habitats and ecosystems of the East
Sites of Special Scientific Interest (SSSIs)	22	Sanday Coast SSSI, SAC, Ramsar and SPA. There are also a number of marine and coastal sites beyond the LPD boundary (not shown on plan) that could be impacted

Land cover (including soils)

Key

	Grassland		Water
	Agriculture		Urban
	Wetlands		Prime Agricultural Land
	Woodland		LPD_Boundary
	Nationally important carbon-rich soils		



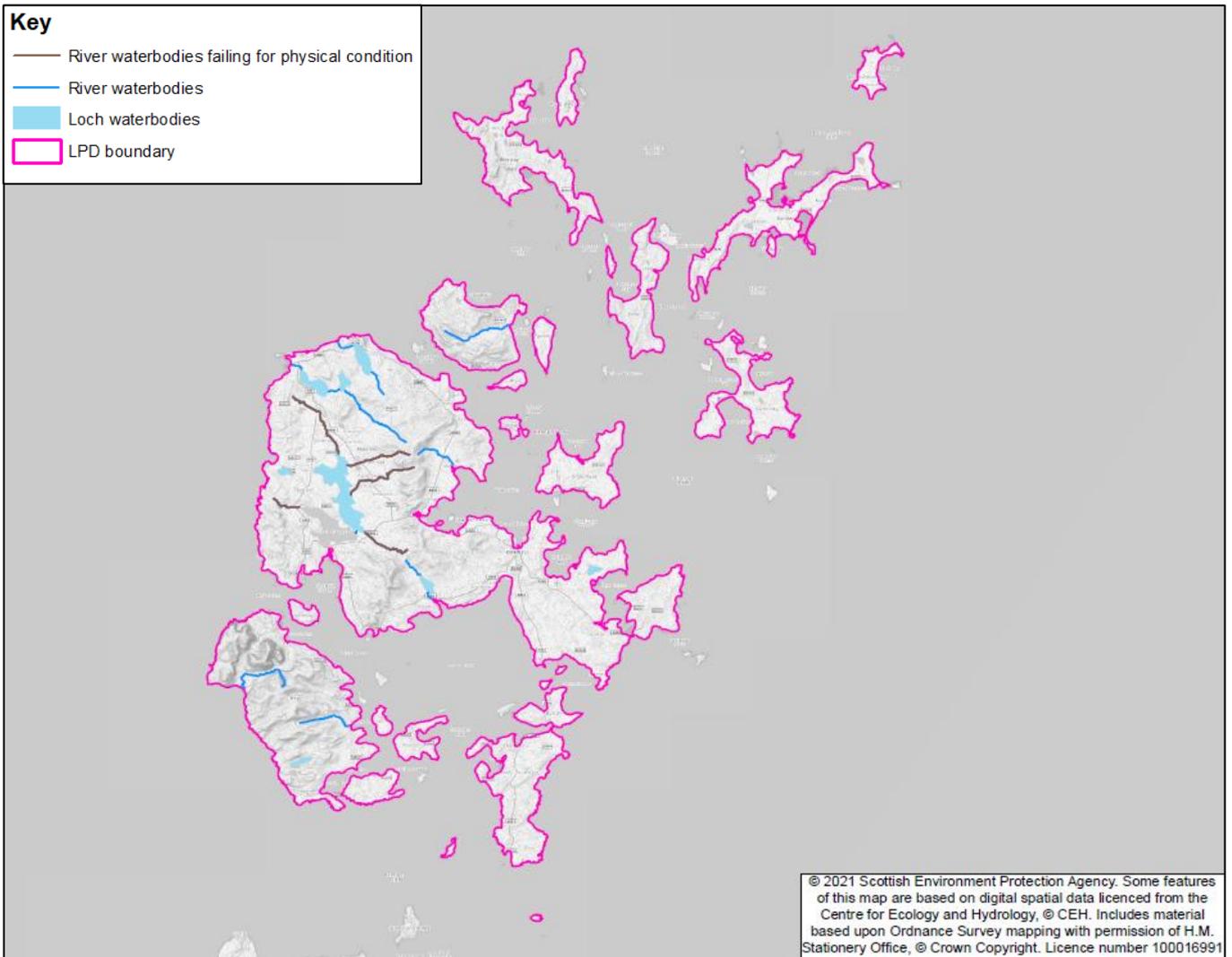
Summary facts for the Orkney LPD

The predominant land cover present is cultivated land and semi-natural grassland, with other areas of upland heath and wetlands including areas of carbon rich peatland. Orkney has small areas of fen, marsh and swamp land cover. Agriculture is mainly grassland based farming and rough grazing. There are no significant woodlands located in Orkney.

Water

Key

- River waterbodies failing for physical condition
- River waterbodies
- Loch waterbodies
- LPD boundary



Summary facts for the Orkney LPD

There are 17 river water bodies and 8 lochs in this LPD, as classified under the Water Framework Directive (WFD). There are also coastal and transitional (estuarine) water bodies such as the Scapa flow and the Westray Firth. Coastal areas at risk of erosion will be of particular concern when considering flood risk management actions.

There are a number of pressures on water bodies across the LPD that may hinder the achievement of their objectives as set out in the River Basin Management Plan. Notably there

are five water bodies failing for physical condition with the LPD, all of which are located on the mainland, and that flood risk management actions, where relevant, should take into account.

Cultural heritage

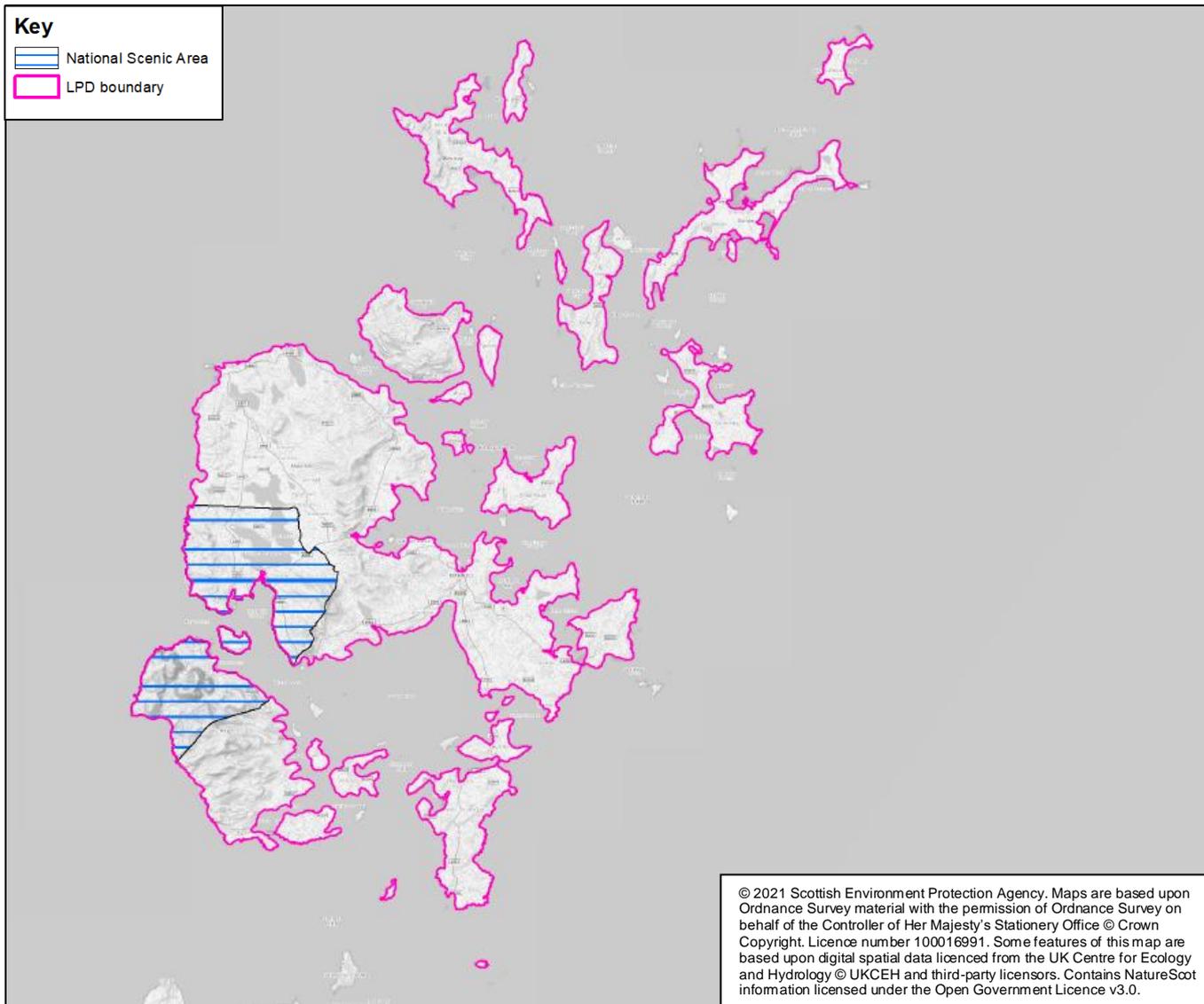
Summary facts for the Orkney LPD

Conservation Area	5	The LPD is rich in historic sites, including scheduled monuments and some gardens and designed landscapes. The Heart of Neolithic Orkney is a UNESCO World Heritage Site. Approximately 55% of listed buildings and 5% of scheduled monuments within the LPD are located within target areas at risk from flooding. Stromness target area is within the buffer zone of the World Heritage Site.
Garden and Designed Landscape	3	
Scheduled Monument	346	
World Heritage Site	1	
Listed Buildings	886	

Landscape

Key

-  National Scenic Area
-  LPD boundary



Summary facts for the Orkney LPD

National Scenic Area	1	Stromness target area is located within the Hoy and West Mainlands National Scenic Area. This stone-built settlement rises steeply out of the harbour and enhances the character of the area. Hoy also contains areas of wild land.
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G.4. Key environmental constraints relevant to flood risk management for target areas within the Orkney LPD

Informed by the high-level baseline data presented in Section G.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment or coastal area associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table G.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms population and health and material assets and are not detailed in Table G.2.

Table G.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	objectives as a result of their physical condition.		
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table G.2. Target areas at risk from flooding, local actions and key constraints within the Orkney LPD.

Target areas with specific local actions	Reference number (Figure G.1)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Sanday	370	Coastal		Y	Y		H	L	L	M	L
Whitehall	371	Coastal		Y	Y		M	L	L	L	L
Stromness	372	Coastal		Y	Y		M	L	L	H	H
St Mary's	373	Coastal			Y		H	L	L	M	L
Graemeshall	374	Coastal		Y	Y		M	L	L	M	L
Kirkwall	375	Coastal and Surface water	Y	Y	Y		H	L	L	H	L
Little Ayre	377	Coastal		Y	Y		H	L	L	L	L
St Margaret's Hope	382	Coastal		Y	Y		L	L	L	H	L

Target areas with specific local actions	Reference number (Figure G.1)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Burray Village	385	Coastal	Y	Y	Y		M	L	L	L	L
Pierowall	440	Coastal		Y	Y		H	L	L	M	L
The Ayre	441	Coastal		Y	Y		H	L	L	L	L
Churchill Barriers	446	Coastal		Y			H	L	L	M	L
A960 Deerness	456	Coastal			Y		H	L	L	L	L

* Some schemes and works listed in this table are scoped out of the assessment in Section 0.5.5. See Section 2.3 of the main Environmental Report for details.

G.5. Environmental assessment of the local flood risk management actions for the Orkney LPD

G.5.1. Introduction

For the purposes of the SEA assessment the actions recommended in the Flood Risk Management Plan were categorised into four types as listed in Table G.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Orkney LPD, identifying potential effects and key recommendations.

G.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for two target areas (Kirkwall and Burray Village) within the Orkney LPD where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects.

However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table G.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

G.5.3. Planning and resilience actions

Planning and resilience actions are recommended for all but three target areas within the Orkney LPD (refer to Table G.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience actions was

carried out at a national scale using the SEA objectives and criteria presented in Section 4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting.

More specifically within the Orkney LPD, the constraints review undertaken and summarised in Table G.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

G.5.4. Flood studies

Flood studies are recommended for all but one target areas within the Orkney LPD (see Table G.2 for details). As we do not know what further actions may result from the flood studies, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

Key environmental constraints within most target areas in the Orkney LPD (refer to Table G.2) principally relate to biodiversity and/or cultural heritage, reflecting the international importance of this LPD.

As the identified flood studies within this LPD are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed

to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

G.5.5. Flood schemes and works design and/or implementation stage for Cycle 2

In the Orkney LPD, there are no schemes and works for design / implementation that are scoped into the SEA.

Flood risk management plans 2021-2027: Strategic environmental assessment Environmental Report – Appendix H Assessment for Shetland Local Plan District July 2021

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Appendix H - Shetland Local Plan District (LPD 4)

H.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood Risk Management Plans relevant to the Shetland Local Plan District (LPD). This document:

- Provides an overview of the Shetland LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Shetland LPD. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Shetland LPD for which actions are recommended in the Flood Risk Management Plan;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Shetland LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

H.2. Flood risk within the Shetland LPD and recommended actions

H.2.1 Overview of the Shetland LPD

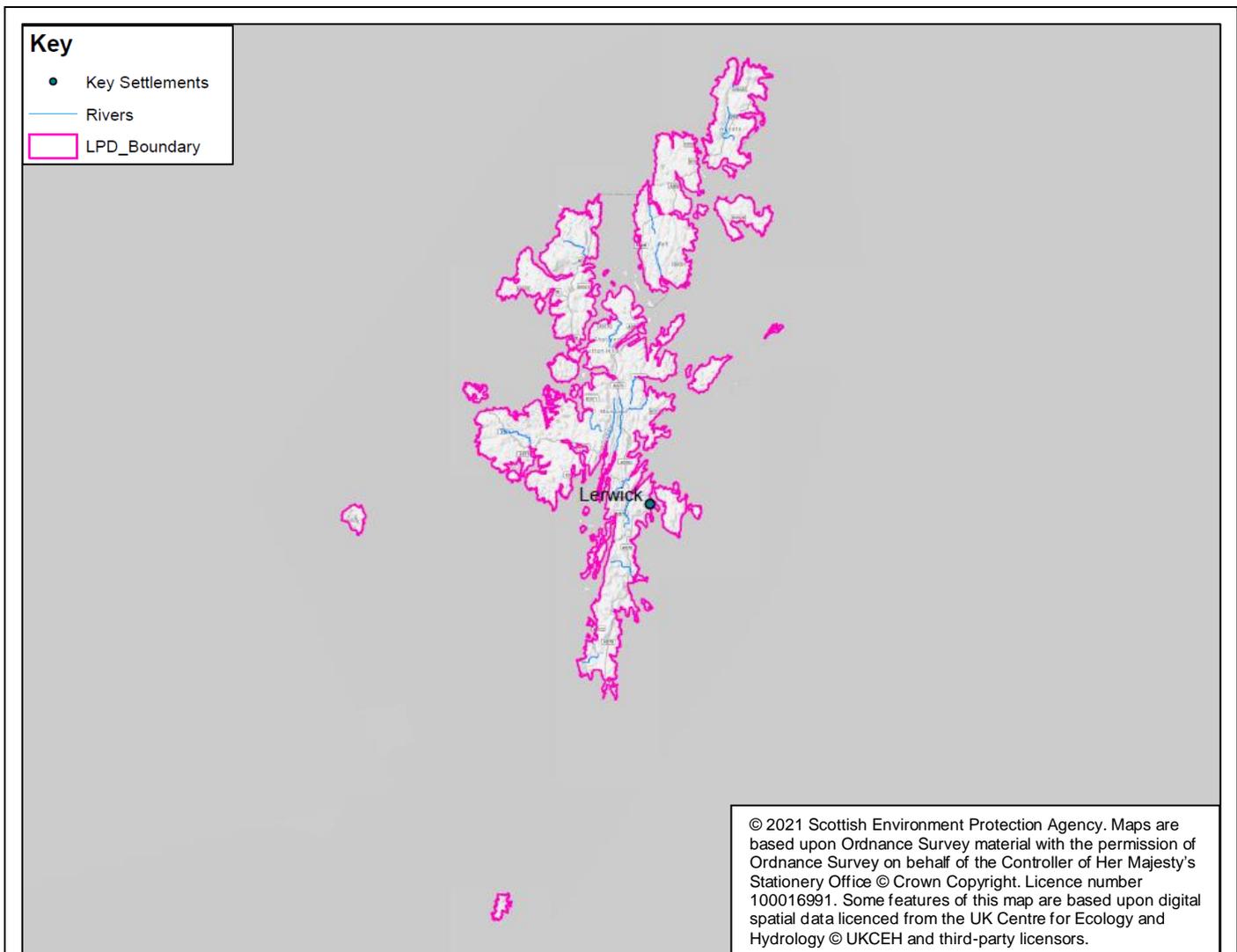


Figure H.1. Extent of the Shetland LPD, key water bodies and settlements.

The Shetland Local Plan District covers an area of around 1,500 km² and has a population of approximately 21,000 people. It includes all the islands from the Fair Isle in the south to Unst in the north. 16 of the islands are inhabited.

The islands are mainly gently sloping hills with areas of flat and lower lying ground present closer to the coast. Land use is bog and heather grassland, with some scattered agricultural

land in the south. There are a number of large inland lochs, including Loch of Spiggie. The coastline is approximately 2,700 km long and typically hard and rugged with deep inlets (voes) and occasional beaches.

H.2.2 Flood risk within the Shetland LPD

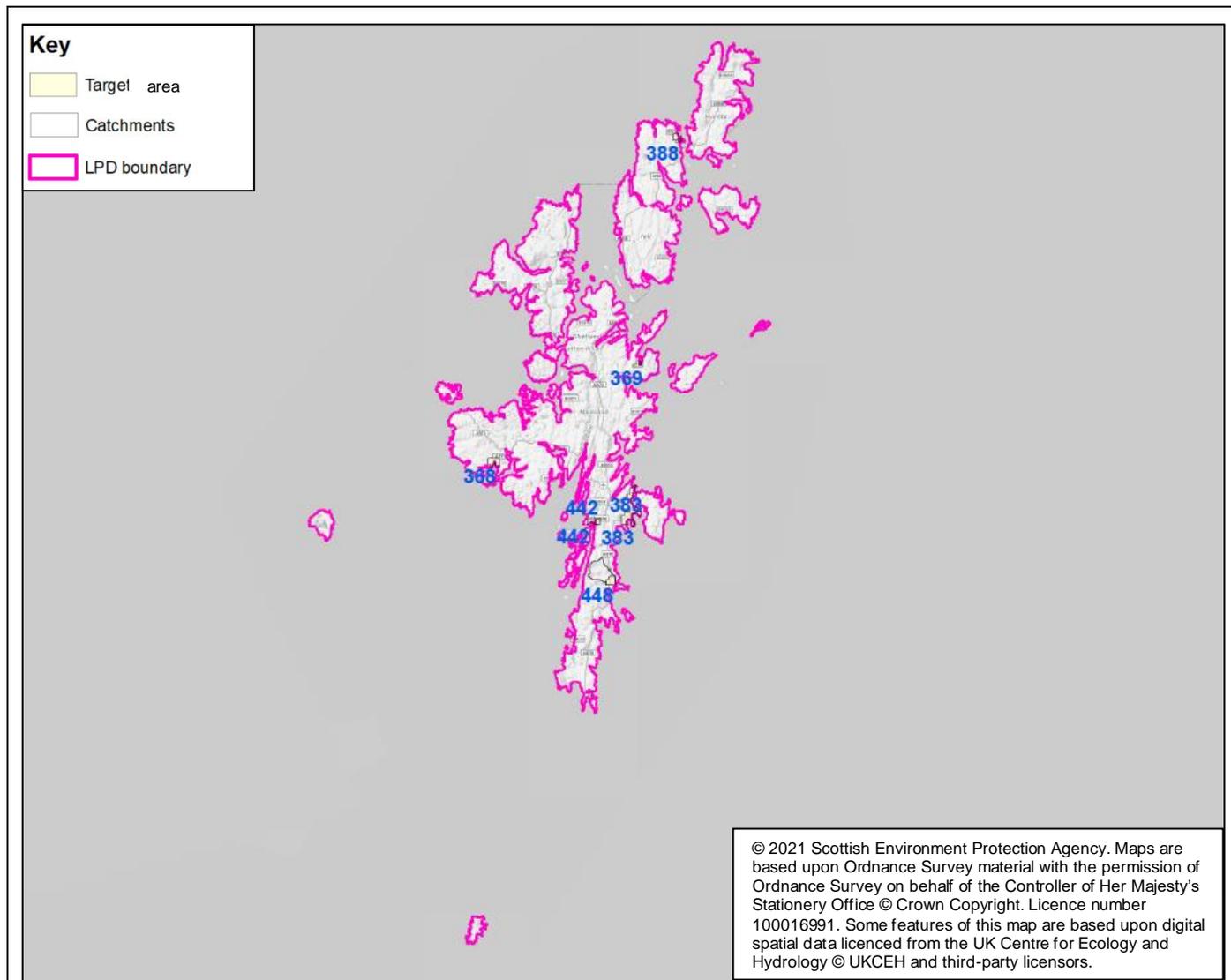


Figure H.2. Extent of the Shetland LPD and target areas at risk from flooding

The main risk of flooding in Shetland is from coastal flooding.

Currently it is estimated that there are 210 people and 230 homes and businesses at risk from flooding. This may increase to 300 people and 300 homes and businesses by the 2080s due to climate change. The annual cost of flooding is approximately £650,000. Note however that flooding from wave overtopping is not fully represented in the assessment of flood risk and the impact of coastal flooding may be underestimated.

H.2.3 Recommended flood risk management actions within the Shetland LPD

Table H.2 sets out the sources of flood risk and types of local actions recommended within the Flood Risk Management Plan for target areas within the Shetland LPD, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section H.5 of this Appendix. Section 2.3 of the main Environmental Report list any actions scoped out of the assessment.

H.3 Shetland LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Shetland LPD across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland's environment in the main Environmental Report.

This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Shetland LPD provided in Section H.4 of this appendix.

Population and health and material assets

Key information relating to population and human health and material assets are presented in Section H.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding.

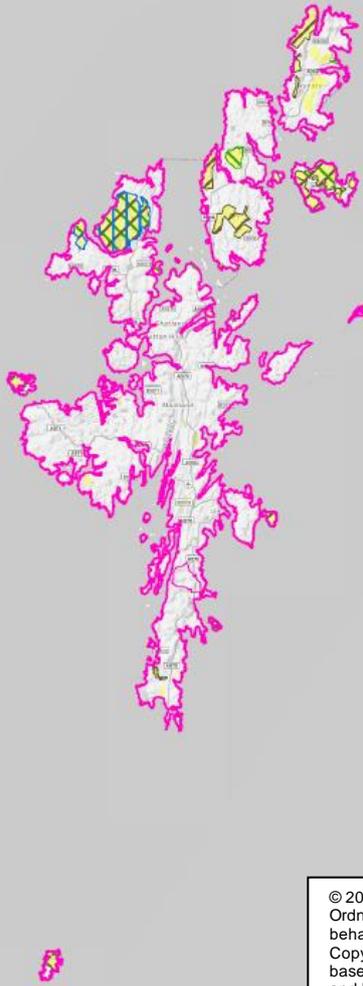
Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace designations are less common in rural communities, and provision is varied across target areas. One third of these communities have large areas of urban greenspace, and two thirds have no areas of designated greenspace.

Biodiversity

Key

-  Special Protection Areas
-  Special Areas of Conservation
-  Sites of Special Scientific Interest
-  Ramsar
-  LPD boundary



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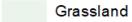
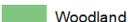
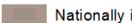
Summary facts for the Shetland LPD

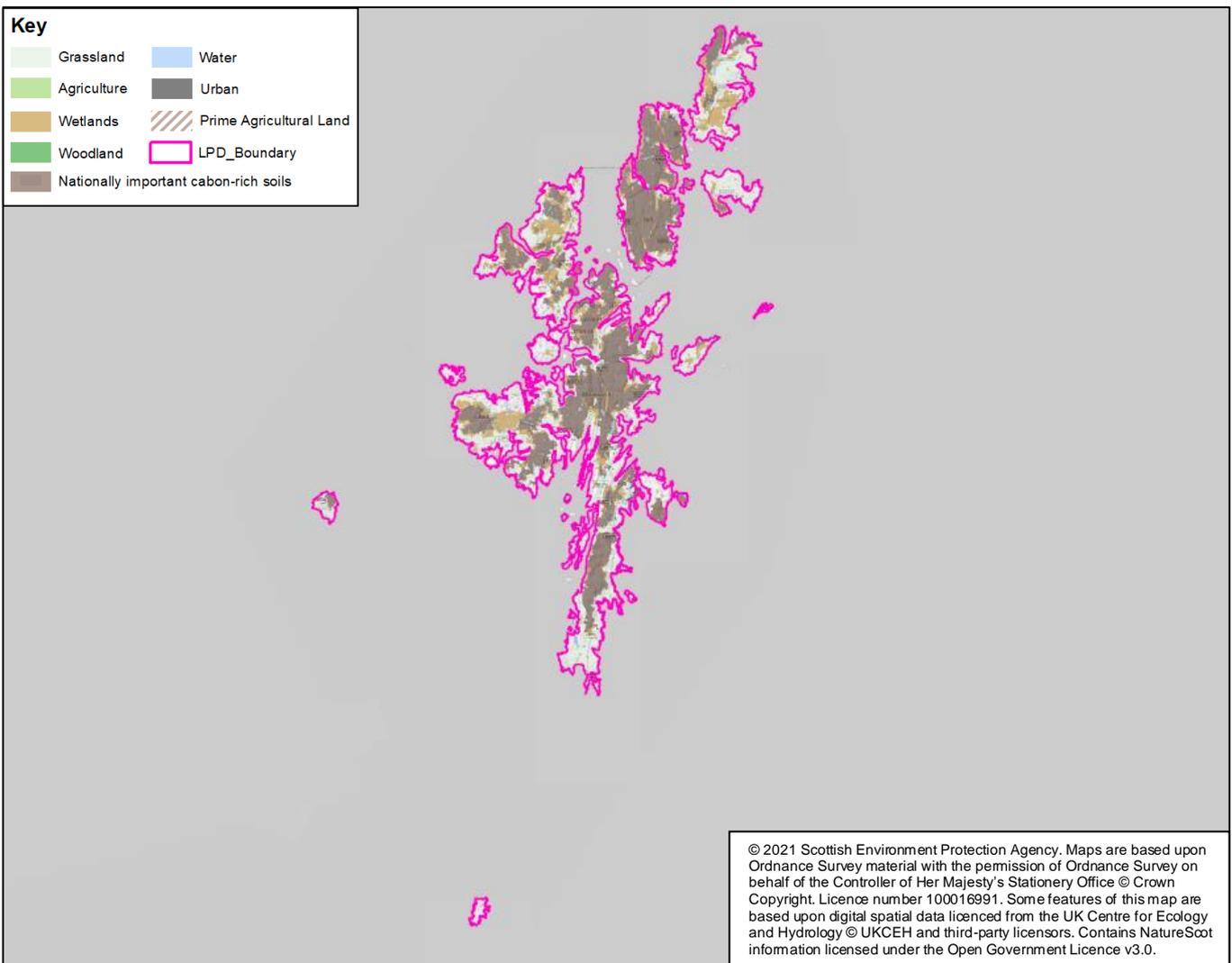
Marine Protected Area (MPA)	1	There are numerous designated sites of international and national biodiversity importance throughout the LPD, although the number of sites within target areas or their wider catchments or coastal areas
Ramsar sites	12	
Special Areas of Conservation (SACs)	11	

Special Protection Areas (SPAs)	47	are limited. Sites include the Lochs of Kirkigarth and Bardister SSSI within the
Sites of Special Scientific Interest (SSSIs)	1	Walls target area and the Burn of Aith SSSI in Cunningsburgh. There are also numerous marine and coastal sites beyond the LPD boundary (not shown on plan) that could be impacted.

Land cover (including soils)

Key

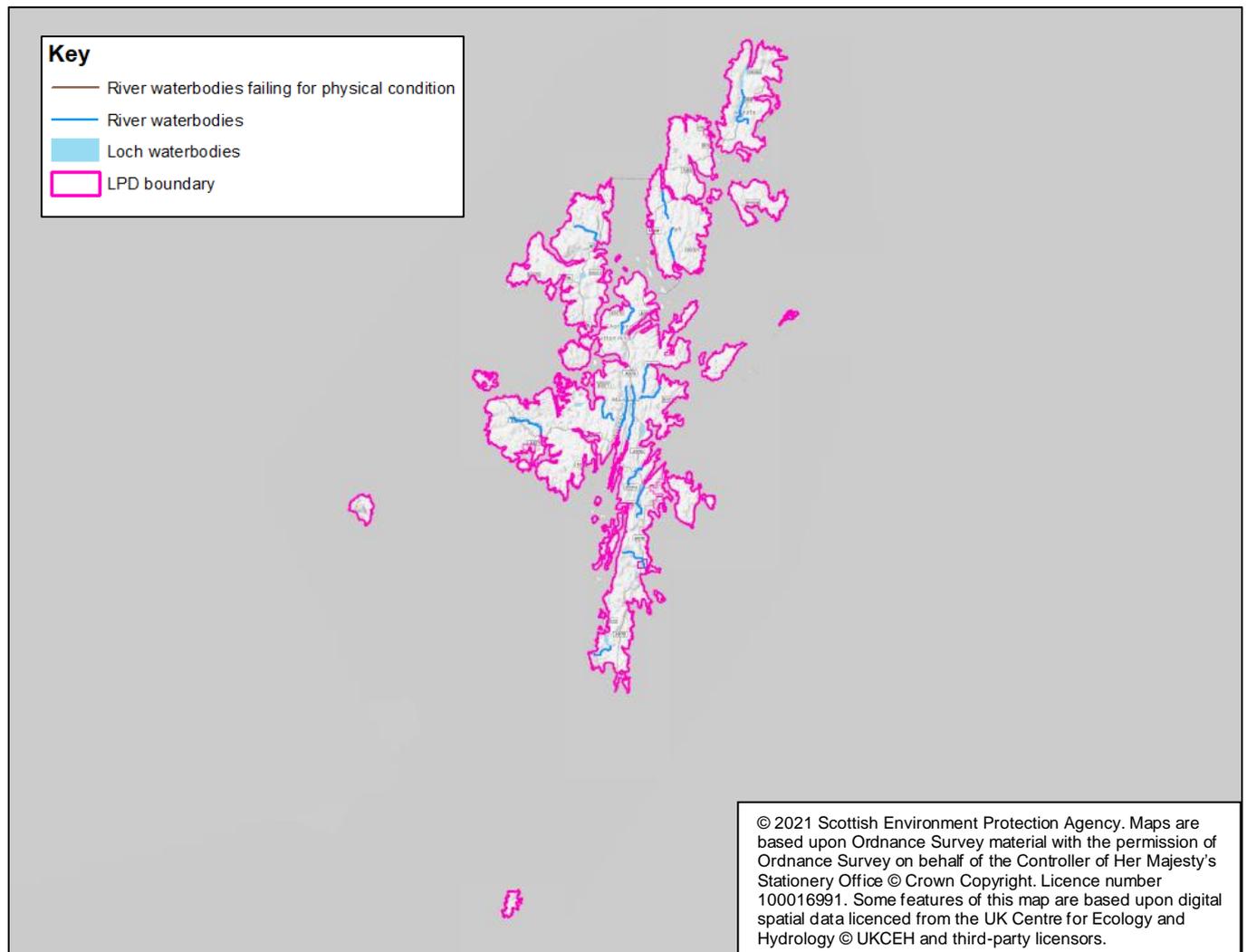
	Grassland		Water
	Agriculture		Urban
	Wetlands		Prime Agricultural Land
	Woodland		LPD_Boundary
	Nationally important carbon-rich soils		



Summary facts for the Shetland LPD

The predominant landcover in the Shetland Islands is peatland, including large areas of high value carbon rich peat. Rough grassland and heather grassland are also significant. The coastline is predominantly rocky in nature and is heavily embayed with many inlets, voes and bays.

Water



Summary facts for the Shetland LPD

There are 16 river water bodies and 5 lochs in this LPD, as classified under the Water Framework Directive (WFD). There are numerous coastal water bodies including the Yell Sound, Sullom Voe and Bressay Sound. Coastal areas at risk of erosion will be of particular concern when considering flood risk management actions. There are a number of pressures on water bodies across the LPD that may hinder the achievement of their objectives as set out in

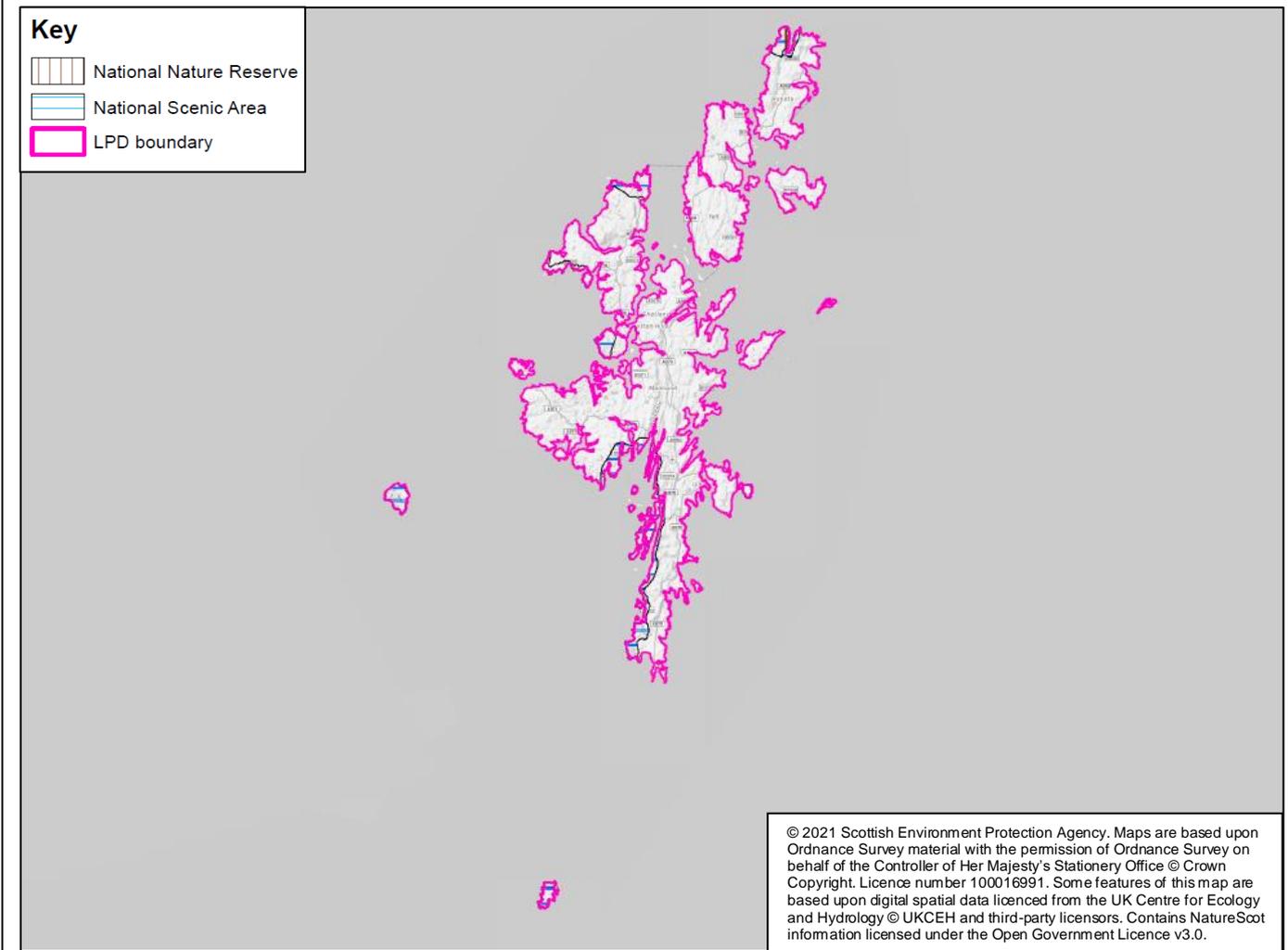
the River Basin Management Plan, although there are no water bodies failing for physical condition with the LPD.

Cultural heritage

Summary facts for the Shetland LPD

Conservation Area	3	There are numerous historic sites located through Shetland, including gardens and designed landscapes and scheduled monuments of various types. Approximately 30% of listed buildings and 3% of scheduled monuments fall with target areas and their wider catchments.
Garden and Designed Landscape	4	
Scheduled Monument	377	
Listed Buildings	493	

Landscape



Summary facts for the Shetland LPD

National Nature Reserve	2	The south west of the LPD, including Scalloway target area, is part of a National Scenic Area for the coastal landscape. The area provides a wide range of recreational opportunities as well as habitat for wildlife. There are also two National Nature Reserves in Shetland.
National Scenic Area	1	

H.4. Key environmental constraints relevant to flood risk management for target areas within the Shetland LPD

Informed by the high-level baseline data presented in Section H.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment or coastal area associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table H.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms population and health and material assets and are not detailed in Table H.2.

Table H.1. Constraints review sensitivity rating.

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	objectives as a result of their physical condition.		2027 WFD objectives as a result of their physical condition
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table H.2 Target areas at risk from flooding, local actions and key constraints within the Shetland LPD target areas.

Target areas with specific local actions	Reference number (Figure H.1)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Walls	368	Coastal			Y		H	L	L	M	L
Vidlin	369	Coastal			Y		M	L	L	L	L
Lerwick	383	Coastal / Surface water			Y		M	L	L	H	L
Cullivoe	388	Coastal		Y		Y	H	L	L	L	L
Scalloway	442	Coastal / Surface water			Y		L	L	L	H	H
Cunningsburgh	448	River				Y	M	H	L	L	M

* Some schemes and works listed in this table are scoped out of the assessment in Section H.5.5. See Section 2.3 of the main Environmental Report for details.

H.5. Environmental assessment of the recommended flood risk management actions within the Shetland LPD

H.5.1 Introduction

For the purposes of the SEA assessment the actions recommended in the Flood Risk Management Plan were categorised into four types as listed in Table H.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Shetland LPD, identifying potential effects and key recommendations.

H.5.2. Data collection and mapping actions

Data collection and mapping actions are not recommended for any target areas within the Shetland LPD (refer to Table H.2).

H.5.3. Planning and resilience actions

Specific planning and resilience actions are recommended for one target area (Cullivoe) within the Shetland LPD (refer to Table H.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience actions was carried out at a national scale using the SEA objectives and criteria presented in Section 4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural

heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting.

More specifically within the Shetland LPD, the constraints review undertaken and summarised in Table H.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

H.5.4. Flood studies

Flood studies are recommended for all target areas within the Shetland LPD (see Table H.2 for details). As we do not know what further actions may result from the flood studies, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The review described in Section H.4 (and Table H.2 therein) identifies that the environmental constraints within most target areas principally relate to biodiversity and/or cultural heritage. There are limited constraints relating to all target areas within the LPD.

As the identified flood studies within this LPD are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

H.5.5. Flood schemes and works at design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for one target area, dependent on funding (see to Table H.3 for details). The effects of the schemes

and works on the SEA objectives and criteria are presented in Table H.3, and the effects summarised at an LPD scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section H.4, and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known, – but note these can change as the schemes and works go through the design stage.
2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the main Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health and material assets as a result of reduced flood risk to infrastructure. No other significant benefits or significant adverse effects were identified. Further details can be found in Table H.3.

As the design of these proposed actions are progressed by the local authority, the actions should be subject to further environmental assessment. Actions should be designed to

sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table H.3 – SEA significance assessment of flood schemes and works design and implementation

Target area and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Cullivoe <i>Coastal</i>	Storage, conveyance and control (bridge replacement, road raising)	++	0	0	0	+	++	0	0
<p>Key findings</p> <ol style="list-style-type: none"> 1. Significant positive effects on population and human health due to reduced flood risk and increased wellbeing. 2. Neutral effects for biodiversity. Although there are high biodiversity constraints in the Cullivoe target area, the proposed types of works (road raising and bridge replacement) are no anticipated to have negative effects. 3. No significant effects identified for water. 4. No significant effects identified for soil. 5. Potential for positive effects on climatic factors due to improved resilience of properties and infrastructure to future climate change. 6. Significant positive effects on material assets from the protection of property and infrastructure. 7. No significant effects identified for cultural heritage. 8. No significant effects identified for landscape. 									

Flood risk management plan 2021-2027: Strategic Environmental Assessment

Environmental Report – Appendix I

Assessment for Findhorn, Nairn and Speyside Local Plan District

July 2021

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Appendix I Findhorn, Nairn and Speyside Local Plan District (LPD5)

I.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the flood risk management plan relevant to the Findhorn, Nairn and Speyside Local Plan District (LPD). This document:

- Provides an overview of the Findhorn, Nairn and Speyside Local Plan District, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Findhorn, Nairn and Speyside Local Plan District. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Findhorn, Nairn and Speyside Local Plan District for which actions are recommended in the flood risk management plan;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Findhorn, Nairn and Speyside Local Plan District, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

I.2. Flood risk within the Findhorn, Nairn and Speyside Local Plan District and recommended actions

I.2.1 Overview of the Findhorn, Nairn and Speyside Local Plan District

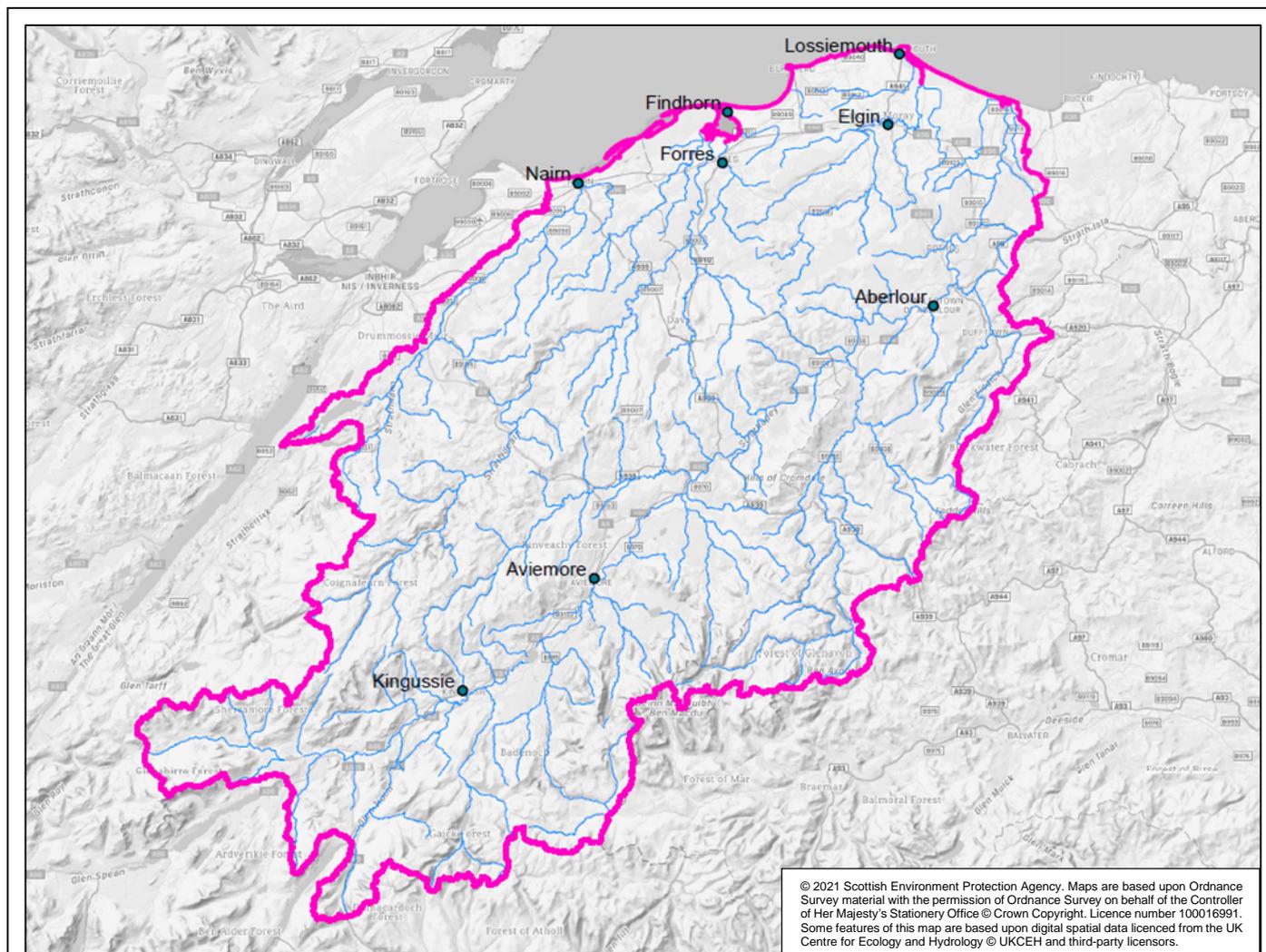


Figure I.1. Extent of the Findhorn, Nairn and Speyside Local Plan District, key water bodies and settlements.

The Findhorn, Nairn and Speyside Local Plan District Local Plan District shown on Figure I.1 covers an area of around 4,800 km² and has a population of approximately 100,000 people. It

includes the low-lying coastal areas around Nairn and Lossiemouth in the north and the steeper, more rugged landscape of the Cairngorms National Park in the south.

The area is largely rural with the main land cover including heather grassland, bog, coniferous woodland and agricultural land. The main rivers are the River Spey, the River Findhorn and the River Nairn. The coastline is approximately 70 km long and includes rocky shorelines and extensive beaches.

I.2.2 Flood risk within the Findhorn, Nairn and Speyside Local Plan District

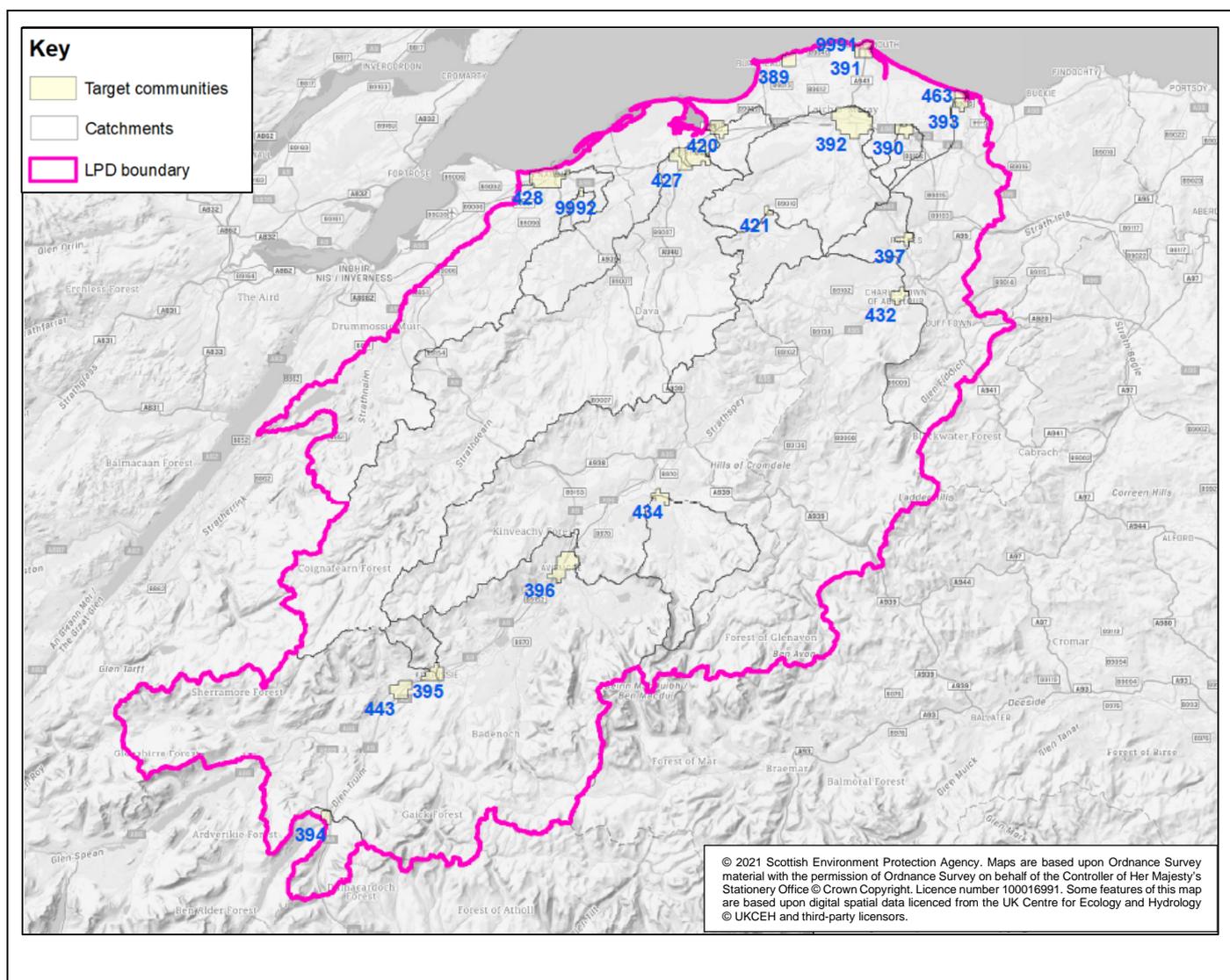


Figure I.3. Extent of the Findhorn, Nairn and Speyside Local Plan District and target areas at risk from flooding

There is river, surface water and coastal flood risk in the Local Plan District, with the main risk coming from river and surface water flooding. Currently it is estimated that there are 11,000 people and 7,300 homes and businesses at risk from flooding. This is estimated to increase to 15,000 people and 9,900 homes and businesses by the 2080s due to climate change. The annual cost of flooding is approximately £8.2 million. Note however that flooding from wave overtopping is not fully represented in the assessment of flood risk and the impact of coastal flooding may be underestimated.

I.2.3 Recommended flood risk management actions within the Findhorn, Nairn and Speyside Local Plan District

Table I.2 sets out the sources of flood risk and types of local actions recommended within the flood risk management plan for target areas within the Findhorn, Nairn and Speyside Local Plan District, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

I.3 Findhorn, Nairn and Speyside Local Plan District: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Findhorn, Nairn and Speyside Local Plan District across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main

Environmental Report. This information is limited to key receptors and constraints at an Local Plan District scale and supplements the fuller description of the current state of Scotland’s environment in the main Environmental Report.

This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Findhorn, Nairn and Speyside Local Plan District provided in Section I.4 of this appendix.

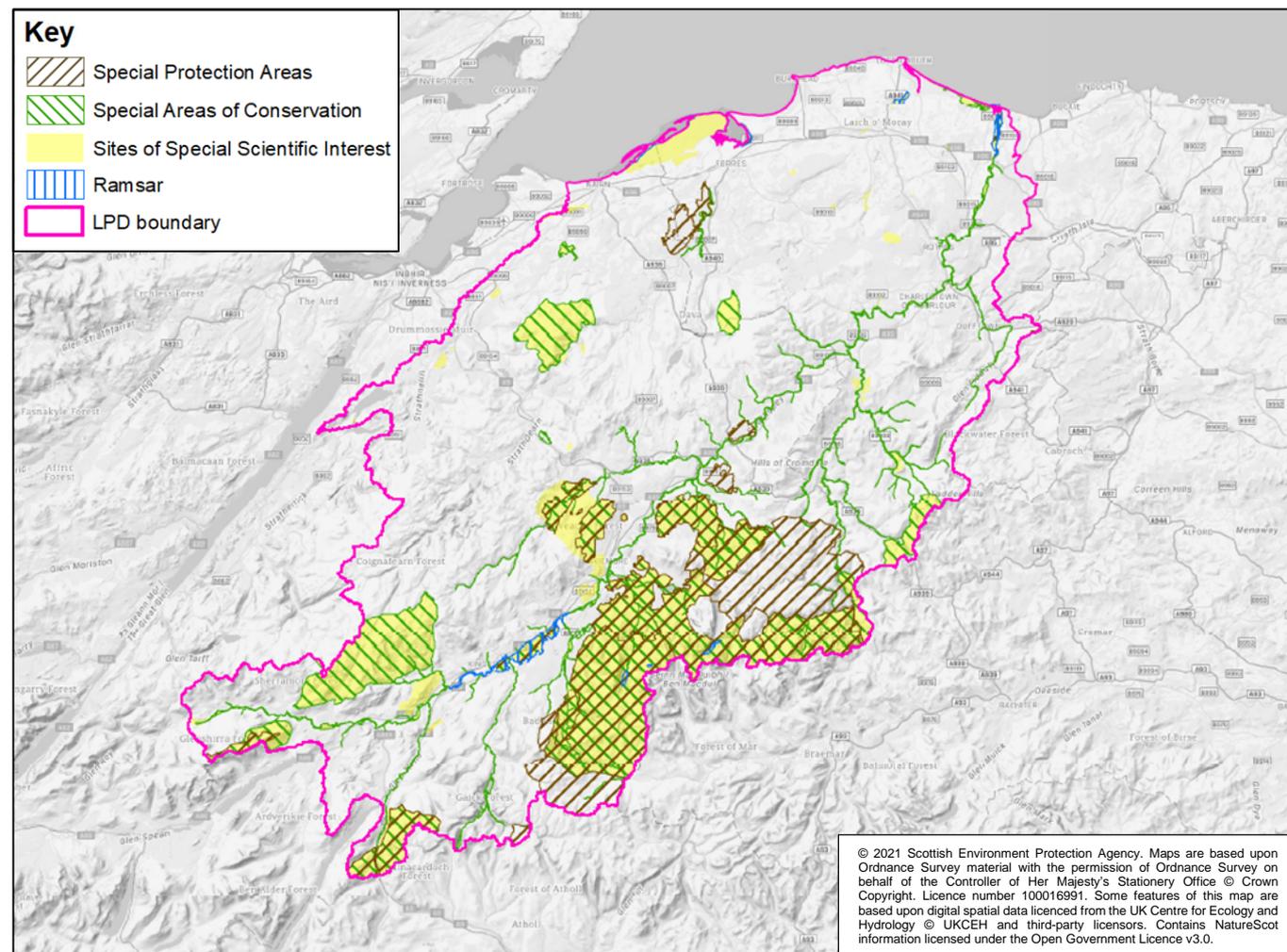
Population and health and material assets

Key information relating to population and human health and material assets are presented in Section I.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding.

Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated

Urban greenspace provision is generally good. For over 40% of target areas designated greenspace is the majority land cover and a further 50% at least some provision.

Biodiversity

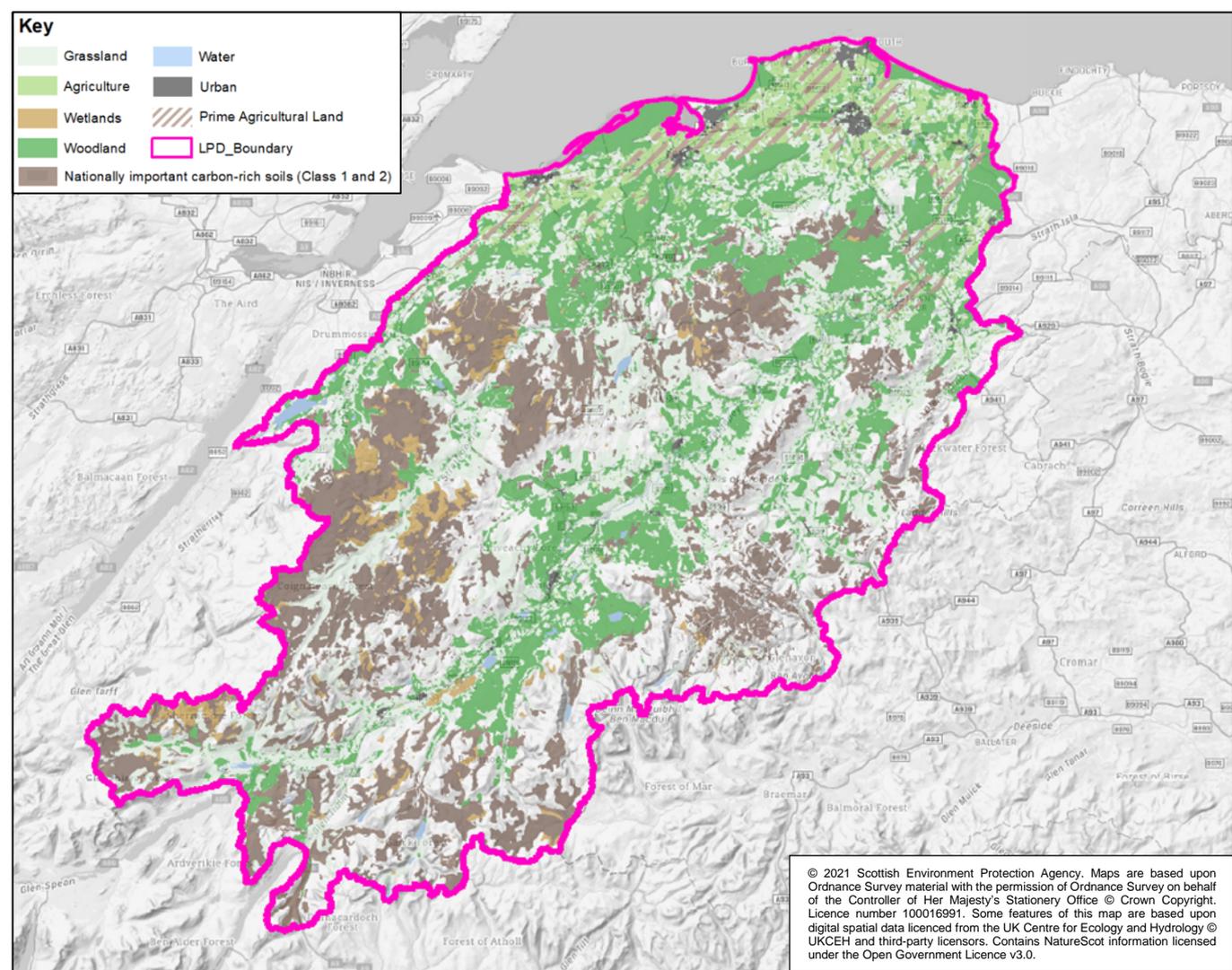


Summary facts for the Findhorn, Nairn and Speyside Local Plan District

Ramsar sites	4	There are numerous designated sites of international and national biodiversity importance within the Local Plan District, which include many of the target areas and their associated wider catchment or coastal areas. Designated sites are principally found in the upper catchment and contain large areas of upland heath, or a mix of woodland,
Special Areas of Conservation (SACs)	17	
Special Protection Areas (SPAs)	14	

<p>Sites of Special Scientific Interest (SSSIs)</p>	<p>41</p>	<p>upland heath, wetland and semi natural grassland. The River Spey and Lower River Spey are designated as SACs and SSSIs.</p> <p>Much of the coastline is designated as a SAC (Moray Firth, Spey Bay) and/or SPA (Moray and Nairn Coast SPA) and there are other marine and coastal sites beyond the Local Plan District boundary (not shown on plan) that could be impacted.</p>
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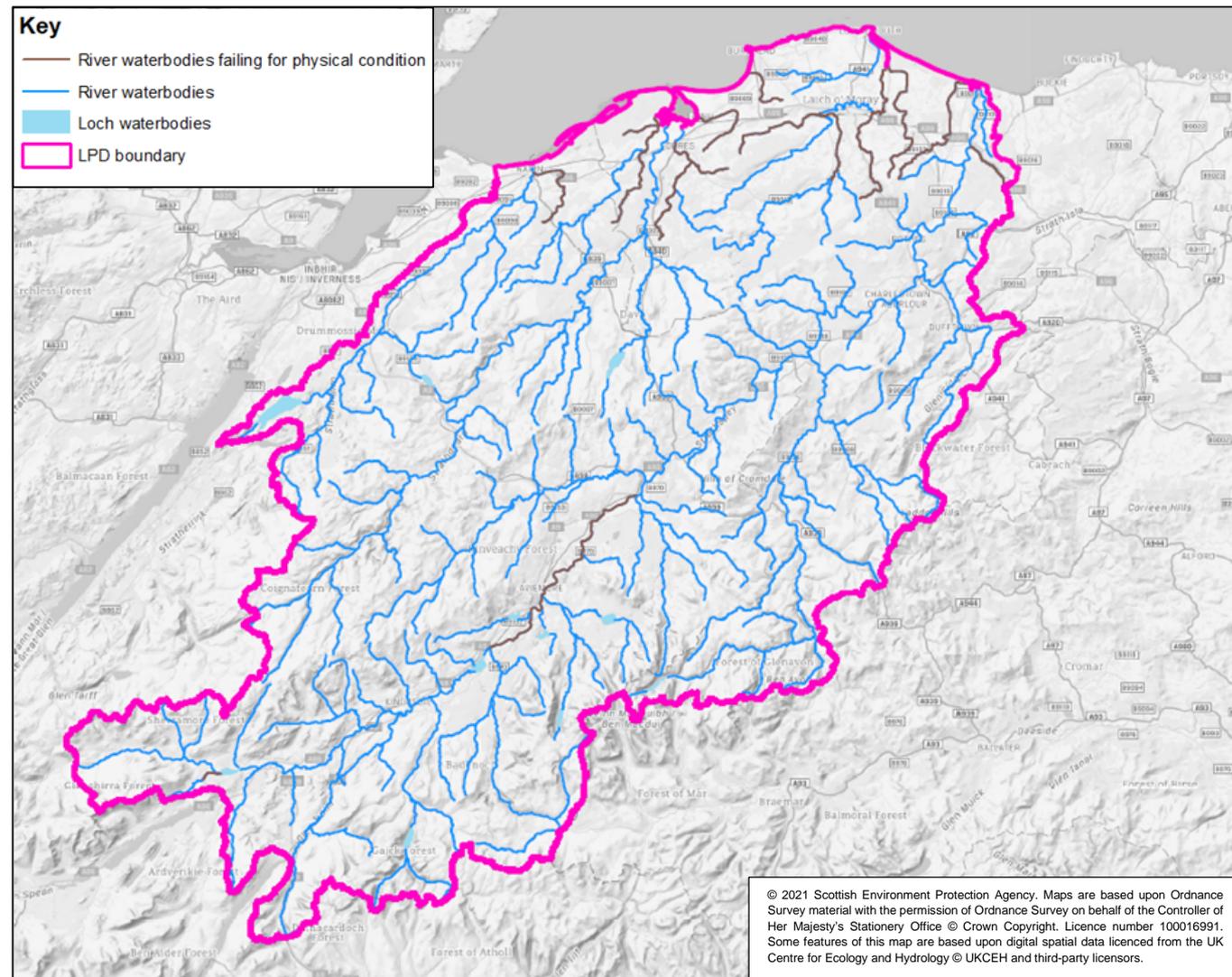
Land cover (including soils)



Summary facts for the Findhorn, Nairn and Speyside Local Plan District

The predominant landcover in Findhorn, Nairn and Speyside is upland heath. Findhorn, Nairn and Speyside is an important agricultural area. The upland areas contain predominantly rough grazing; alongside rivers and in the lower catchment, grassland-based farming is more common. There are smaller areas of arable farming in the fertile coastal plain. There is significant woodland cover throughout the catchment, with large areas of commercial forestry plantation.

Water



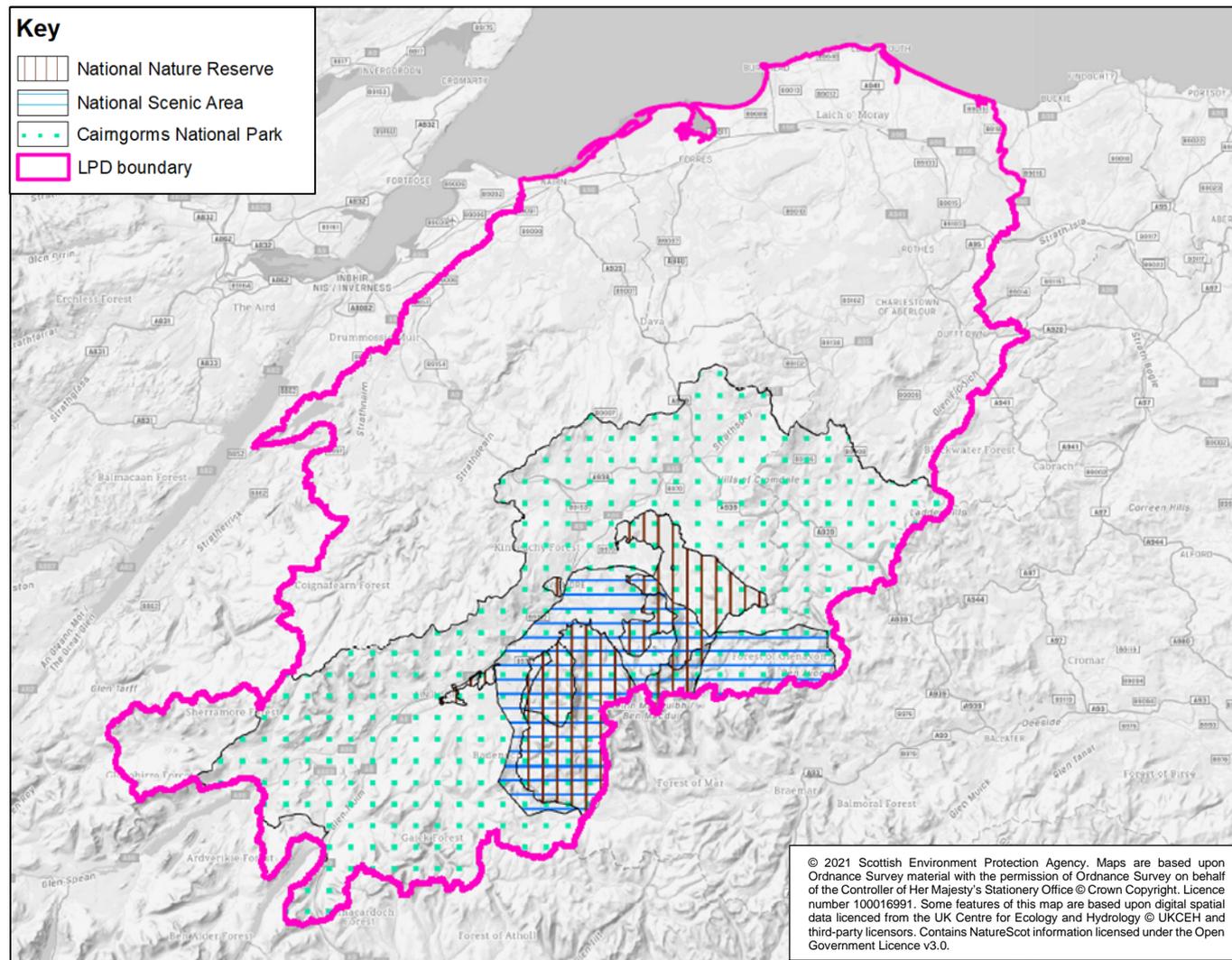
Summary facts for the Findhorn, Nairn and Speyside Local Plan District

There are approximately 135 river water bodies and 11 lochs in this Local Plan District, as classified under the Water Framework Directive (WFD), and coastal water bodies along the coastline from Nain to Kingston, Findhorn Bay and the Spey Estuary. There are a number of pressures on water bodies across the Local Plan District that may hinder the achievement of their objectives as set out in the River Basin Management Plan. Notably, there are 13 river water bodies failing to meet their WFD objectives because of their physical condition with the Local

Plan District, the majority of which are located in the northern coastal area of the Local Plan District.

Cultural heritage		
Summary facts for the Findhorn, Nairn and Speyside Local Plan District		
Battlefield	4	Cultural heritage designations are typically found in the populated areas to the north of the Local Plan District. Built heritage designations such as listed buildings are concentrated around the main towns including Elgin, Nairn and Forres. Approximately 45% of listed buildings within the Local Plan District are located within target areas at risk from flooding.
Conservation Area	14	
Garden and Designed Landscape	13	
Scheduled Monument	171	
Listed Buildings	1755	

Landscape



Summary facts for the Findhorn, Nairn and Speyside Local Plan District

National Nature Reserve	8	Much of the landscape of the Local Plan District is highly valued. There are protected landscapes in the form of National Nature Reserves, one National Scenic Area and the Cairngorms National Park, located in the upper catchments in the southern area of the Local Plan District. There are also large swathes of wild land in the upper catchments.
National Scenic Area	1	
National Park	1	

I.4. Key environmental constraints relevant to flood risk management for target areas within the Findhorn, Nairn and Speyside Local Plan District

Informed by the high-level baseline data presented in Section I.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment or coastal area associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table I.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms population and health and material assets and are not detailed in Table I.2.

Table I.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	WFD objectives as a result of their physical condition.		
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table I.2. Target areas at risk from flooding, local action and key constraints within Findhorn, Nairn and Speyside Local Plan District.

Target areas with specific local actions	Reference number (Figure I.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Hopeman	389	Surface Water	Y	Y			H	L	L	L	L
Lhanbryde	390	River			Y		M	H	H	L	L
Lossiemouth	391	Coastal/ Surface Water		Y	Y		H	L	L	M	L
Elgin	392	River / Surface Water		Y	Y	Y	M	M	H	H	L
Garmouth	393	Coastal/ River		Y	Y		H	H	H	H	H
Kingussie	395	River		Y	Y		H	H	L	M	H
Aviemore	396	River / Surface Water		Y	Y		H	H	H	M	H
Rothies	397	River / Surface Water		Y	Y	Y	H	M	L	M	L

Target areas with specific local actions	Reference number (Figure I.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Kinloss	420	Coastal/ River/ Surface Water	Y	Y	Y		H	H	H	M	L
Dallas	421	River		Y	Y		L	H	L	L	L
Forres	427	River / Surface Water		Y	Y		M	H	H	H	H
Nairn	428	Coastal/ River/ Surface Water		Y	Y		H	H	H	H	L
Aberlour	432	River / Surface Water		Y	Y		H	H	H	M	H
Nethy Bridge	434	River / Surface Water		Y	Y		H	L	L	L	H
Newtonmore	443	Surface Water		Y	Y		H	L	L	L	L
Kingston	463	Coastal	Y	Y	Y		H	L	H	H	L
Seatown, Lossiemouth	9991	Coastal		Y	Y	Y	M	L	L	M	L
Newmill (Nairn)	9992	River			Y		L	L	H	H	L

I.5. Environmental assessment of the local flood risk management actions for the Findhorn, Nairn and Speyside Local Plan District

I.5.1. Introduction

For the purposes of the SEA assessment the actions recommended in the flood risk management plan were categorised into four types as listed in Table I.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Findhorn, Nairn and Speyside Local Plan District, identifying potential effects and key recommendations.

I.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for three target areas within the Findhorn, Nairn and Speyside Local Plan District (refer to Table I.2 for details) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table I.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

I.5.3. Planning and resilience actions

Specific local planning and resilience actions are recommended for 16 target areas within the Findhorn, Nairn and Speyside Local Plan District (refer to Table I.2 for details). Consideration of the likely significant environmental effects of undertaking these types of

planning and resilience actions was carried out at a national scale using the SEA objectives and criteria presented in Section 4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting.

More specifically within the Findhorn, Nairn and Speyside Local Plan District, the constraints review undertaken and summarised in Table I.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

I.5.4. Flood studies

Flood studies are recommended for all target areas within the Findhorn, Nairn and Speyside Local Plan District, with the exception of Seatown and Lossiemouth (see Table I.2 for details). As we do not know what further actions may result from the flood studies, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The review described in Section O.4 identifies that there are environmental constraints present across all target areas across the Local Plan District. Constraints due to cultural heritage are found in most target areas; constraints due to biodiversity and water are also

common. The highest levels of constraint are identified in Garmouth, Aviemore, Forres, Nairn and Aberlour.

As the identified flood studies within this Local Plan District are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

I.5.5.Flood schemes and works design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for three target areas during Cycle 2 (2022 – 2027), dependent on funding (see Table I.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table I.3, and the effects summarised at an Local Plan District scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section I.4, and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known – but note these can change as the schemes and works go through the design stage.
2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health and material assets as a result of reduced flood risk to homes, businesses and infrastructure; with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors. Potential for negative effects on biodiversity due to coastal defences where a SAC is located within the coastal area near Seatown, Lossiemouth. No significant adverse effects on SEA objectives were identified. Further detail can be found in Table I.2.

As the design of these proposed actions are progressed by local authorities/ Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table I.3 – SEA significance assessment of flood schemes and works design and implementation*

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Seatown, Lossiemouth <i>Coastal</i>	Coastal defences	++	- / 0	0	0	+	++	0	0
Roths <i>Surface water</i>	Storage, conveyance and control	++	0	0	0	+	++	0	0
Elgin <i>Surface water</i>	Storage, conveyance and control	++	0	0	0	+	++	0	0
Key findings									
<ol style="list-style-type: none"> 1. Significant positive effects on population and human health due to reduced flood risk and increased wellbeing. 2. Potential for negative effects on biodiversity due to coastal defences, in particular where a SAC is located within the coastal area near Seatown, Lossiemouth. 									

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<p>3. No significant effects identified for water. Neutral impacts on coastal morphology and coastal processes at Lossiemouth. There is potential for adverse effects from coastal defences coastal processes through altering rates of erosion and deposition, however any effects are likely to be localised in nature and will be dependent on the location and design of actions. Potential to deliver positive effects through the regulation of the flow of water from storage, conveyance and control actions in the target areas of Elgin and Rothes.</p> <p>4. No significant effects identified for soil.</p> <p>5. Potential for positive effects on climatic factors due to improved resilience of properties and infrastructure to future climate change.</p> <p>6. Significant positive effects on material assets from the protection of property and infrastructure.</p> <p>7. No significant effects identified for cultural heritage. Potential for positive effects from the reduction in flood risk to heritage assets and potential for negative effects on the setting of historic buildings and structures, however, effects are dependent on the location and design of action.</p> <p>8. Neutral effect on landscape. Potential for negative effects if flood defences located in an area of high landscape value, however, effects are dependent on the location and design of action.</p>									

Flood risk management plans 2021-2027: Strategic Environmental Assessment

Environmental Report – Appendix J

Assessment for North East Local Plan District

July 2021

Every day SEPA works to protect and enhance Scotland's environment, helping communities and businesses thrive within the resources of our planet.

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If you wish to post your comments, please mark them for the attention of FRM consultation and send them to:

Scottish Environment Protection Agency
Angus Smith Building
6 Parklands Avenue
Eurocentral
Holytown
North Lanarkshire
ML1 4WQ

Appendix J - North East Local Plan District (LPD 6)

J.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood risk management plan relevant to the North East Local Plan District (LPD). This document:

- Provides an overview of the North East Local Plan District, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the North East Local Plan District. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the North East Local Plan District for which actions are recommended in the Flood Risk Management Strategy;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the North East Local Plan District, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

J.2. Flood risk within the North East Local Plan District and recommended actions

J.2.1 Overview of the North East Local Plan District

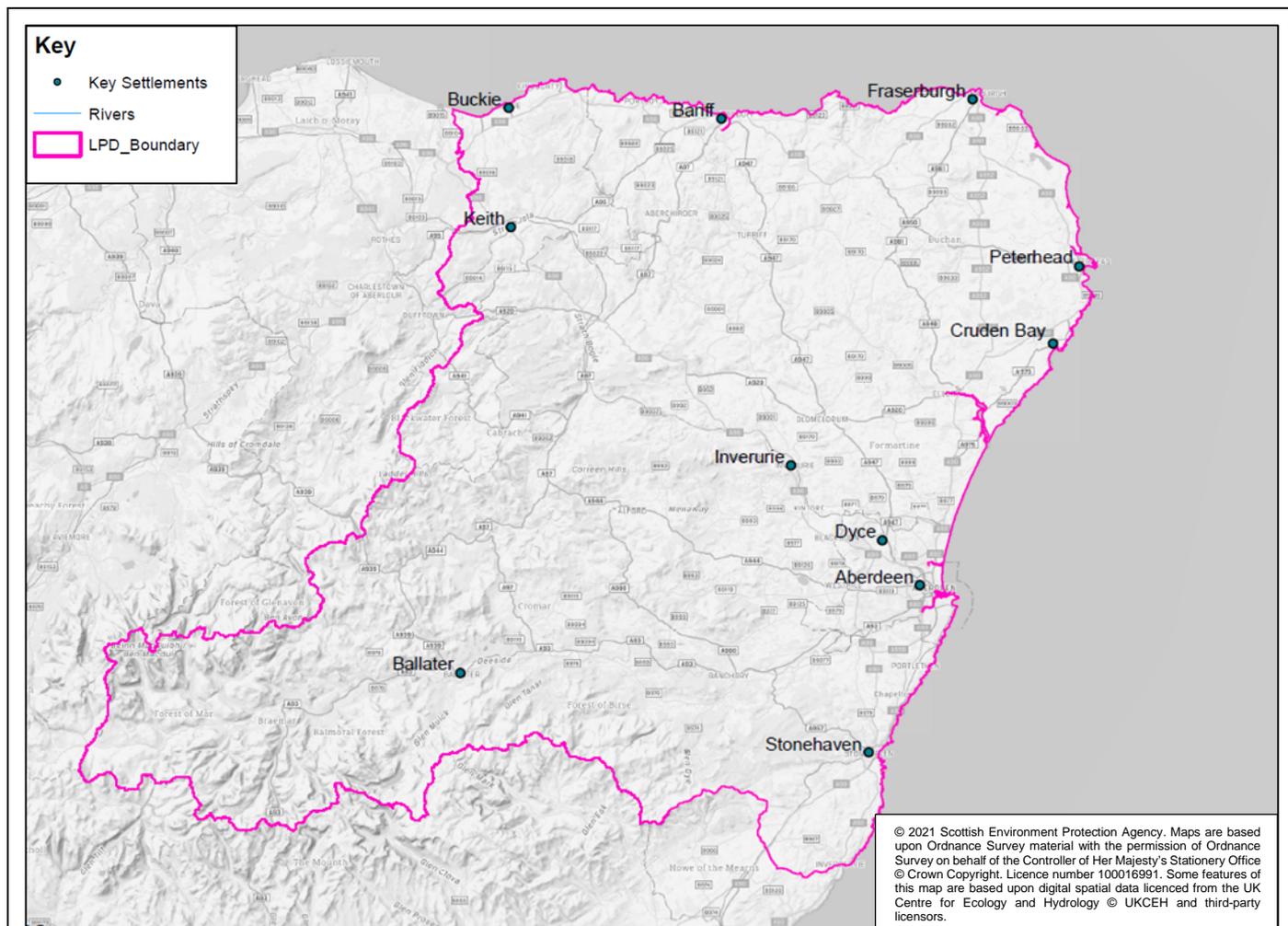


Figure J.1. Extent of the North East Local Plan District, key water bodies and settlements.

The North East Local Plan District covers an area of around 6,800 km² and has a population of approximately 500,000 people. It covers part of the north-east of Scotland from the central and eastern Grampians, north to the Outer Moray Firth and east to the Aberdeenshire coastline. It includes the bulk of the Cairngorms National Park.

Within the National Park, heather and montane habitats dominate. Elsewhere, land use is typically arable, horticultural farmland and improved grasslands. The main urban area is around Aberdeen City. The River Dee, River Don, River Deveron and the River Ythan are the main rivers in the area. There are a few large lochs in the area including Loch Muick, Loch of Strathbeg, Loch of Skene and Loch Kinord. The coastline is approximately 220 km in length with variable extents of beach and hard rock.

J.2.2 Flood risk within the North East Local Plan District

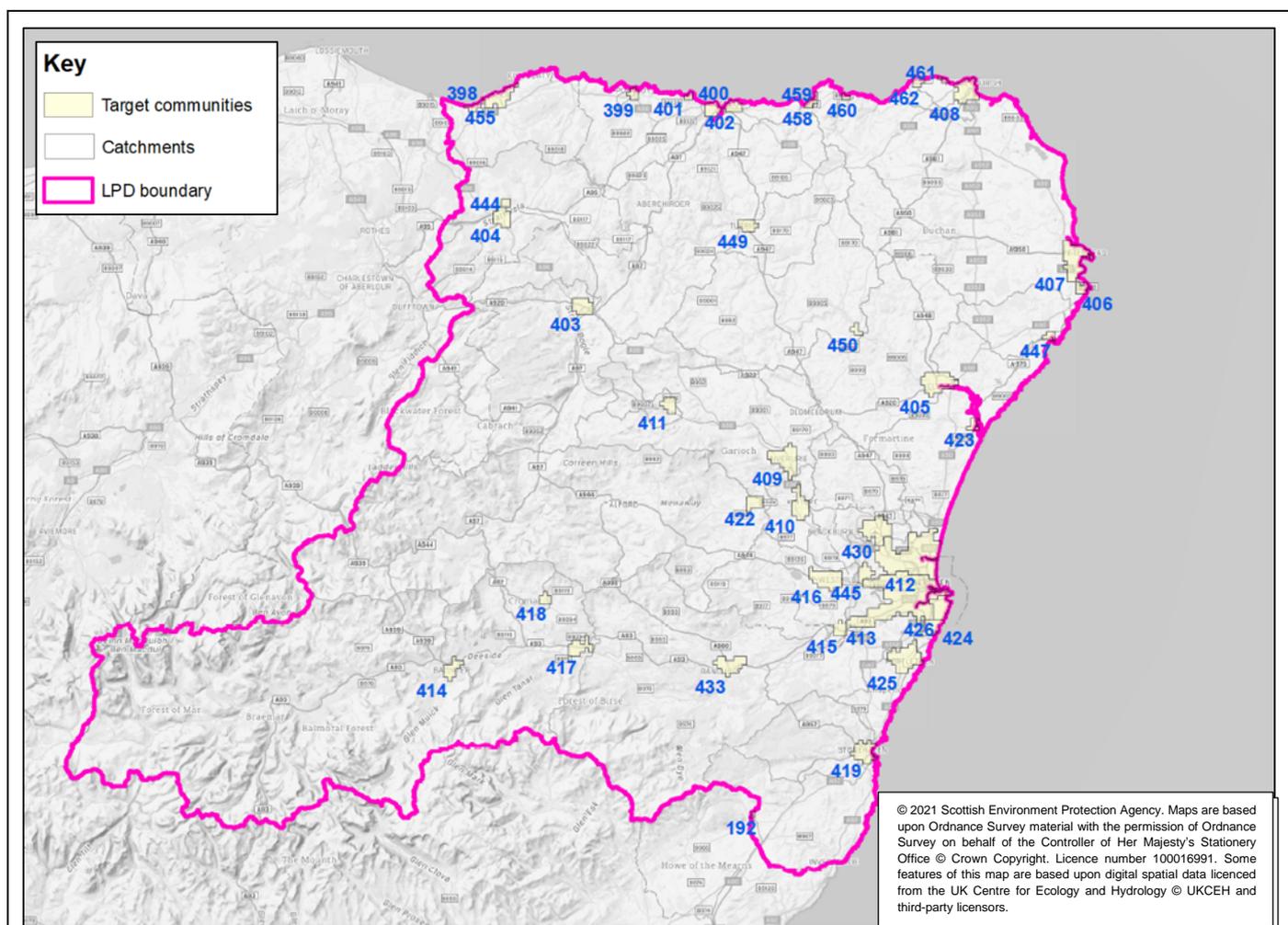


Figure J.2. Extent of the North East Local Plan District and target areas at risk from flooding

There is river, surface water and coastal flood risk in the Local Plan District, with the main risk coming from river and surface water flooding.

Currently it is estimated that there are 51,000 people and 30,000 homes and businesses at risk from flooding. This is estimated to increase to 64,000 people and 38,000 homes and businesses by the 2080s due to climate change. The annual cost of flooding is approximately £26 million. Note however that flooding from wave overtopping is not fully represented in the assessment of flood risk and the impact of coastal flooding may be underestimated.

J.2.3 Recommended flood risk management actions within the North East Local Plan District

Table J.2 sets out the sources of flood risk and types of local actions recommended within the flood risk management plan for target areas within the North East Local Plan District, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section J.5 of this Appendix. Section 2.3 of the main Environmental Report lists any actions scoped out of the assessment.

J.3 North East Local Plan District: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the North East Local Plan District across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report.

This information is limited to key receptors and constraints at a Local Plan District -scale and supplements the fuller description of the current state of Scotland’s environment in the main Environmental Report.

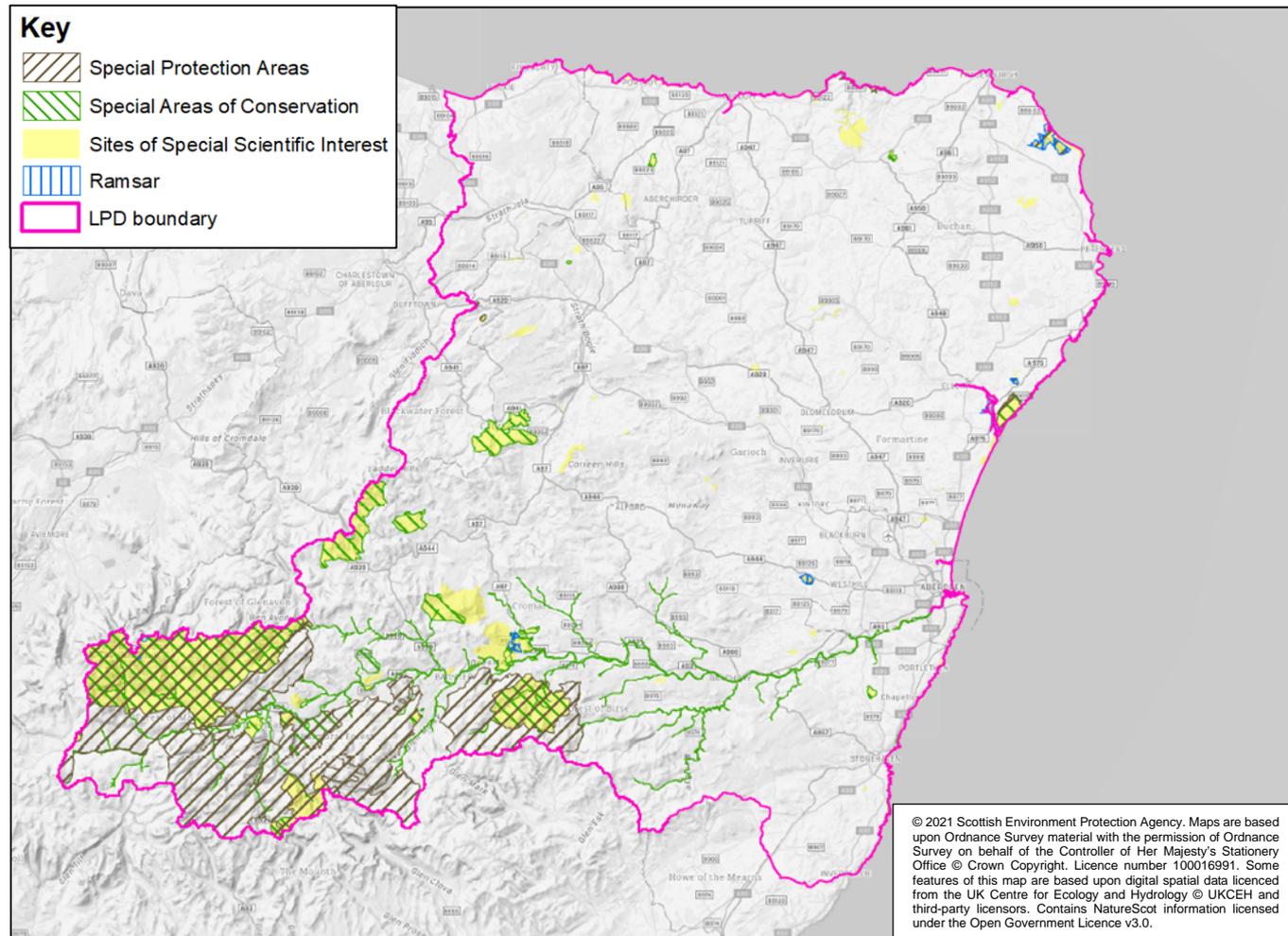
This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the North East Local Plan District provided in Section J.4 of this appendix.

Population and health and material assets

Key information relating to population and human health and material assets are presented in Section J.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding. Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is varied across the Local Plan District with 95% of target areas having at least some greenspace. For a quarter of target areas greenspace represents over 50% of total landcover indicating ample provision.

Biodiversity

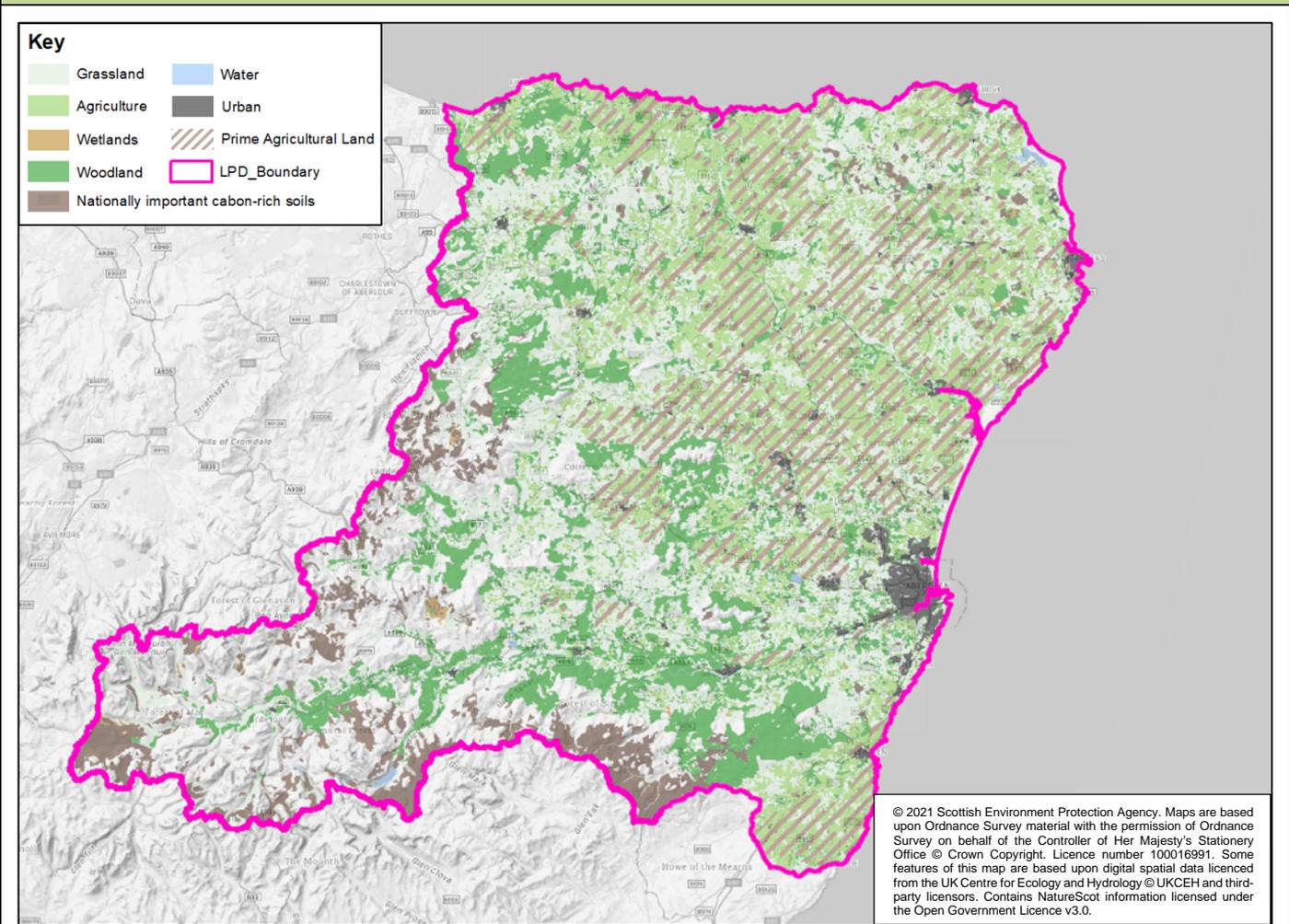


Summary facts for the North East Local Plan District

Ramsar site	5	The largest areas of designated sites are found in the upper catchment and contain large areas of upland heath, native woodland and wetlands (e.g. Cairngorms, Glen Tanar, Ladder Hills, Greenhills of Strathdon). The River Dee and its tributaries are designated as a SAC for Atlantic salmon, otters and freshwater pearl mussels. The coastal
Special Areas of Conservation (SACs)	21	
Special Protection Areas (SPAs)	14	

<p>Sites of Special Scientific Interest (SSSIs)</p>	<p>67</p>	<p>area of the Local Plan District includes SSSIs, SACs and the Southern Trench Marine Protected Area (not shown on plan).</p>
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Land cover (including soils)



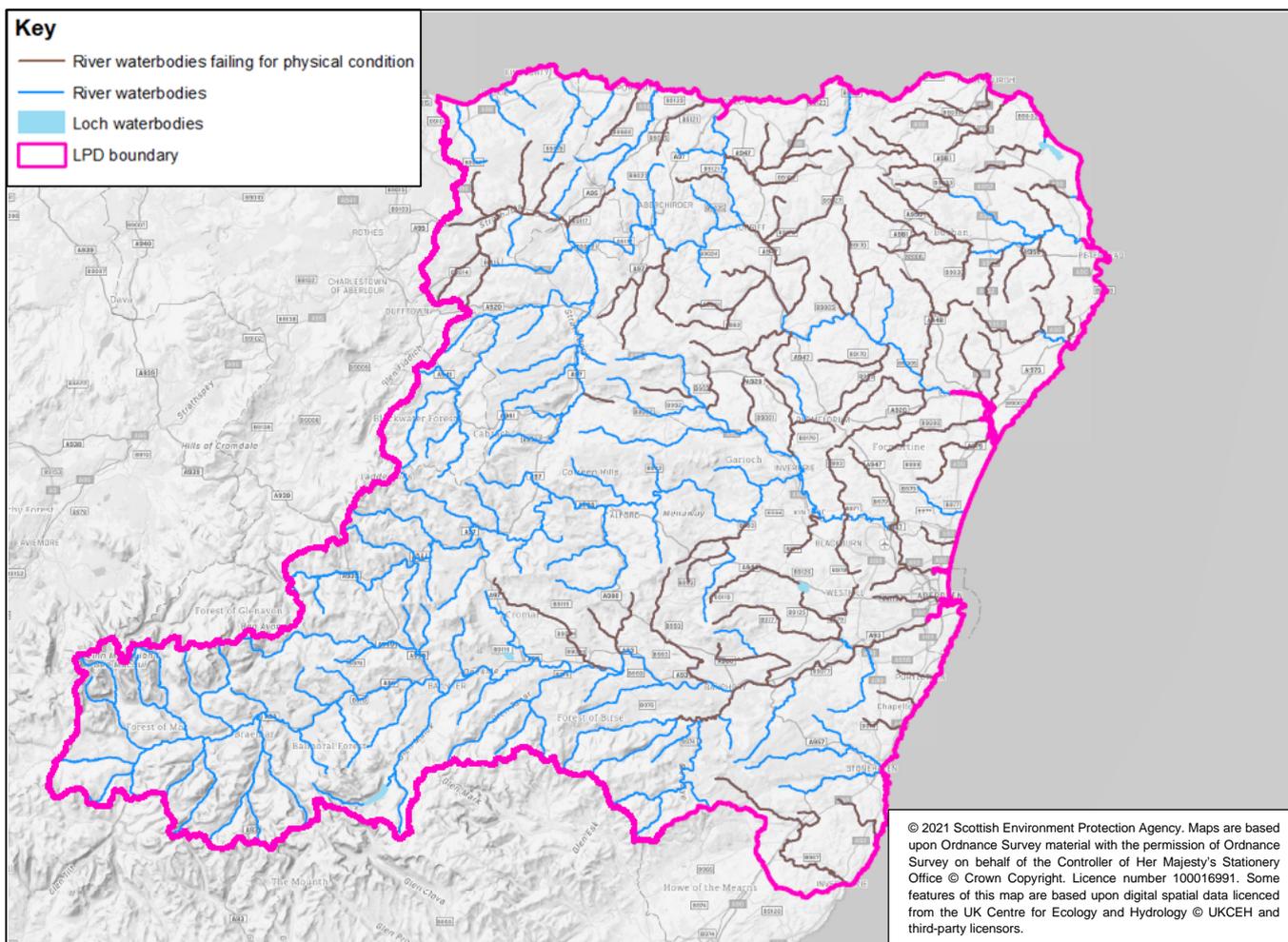
Summary facts for the North East Local Plan District

The predominant land cover in North East is cultivated land. The Local Plan District is an important agricultural area and contains prime agricultural land. It provides mix of rough grazing

and grassland-based farming in upper river catchments, and grassland-based farming in the lower catchments.

There is significant woodland cover throughout the catchment, with large areas of commercial forestry plantation. There are also smaller area of wetlands and peat particularly in the upper catchment. A significant area of urban and suburban landcover exists around Aberdeen.

Water



Summary facts for the North East Local Plan District

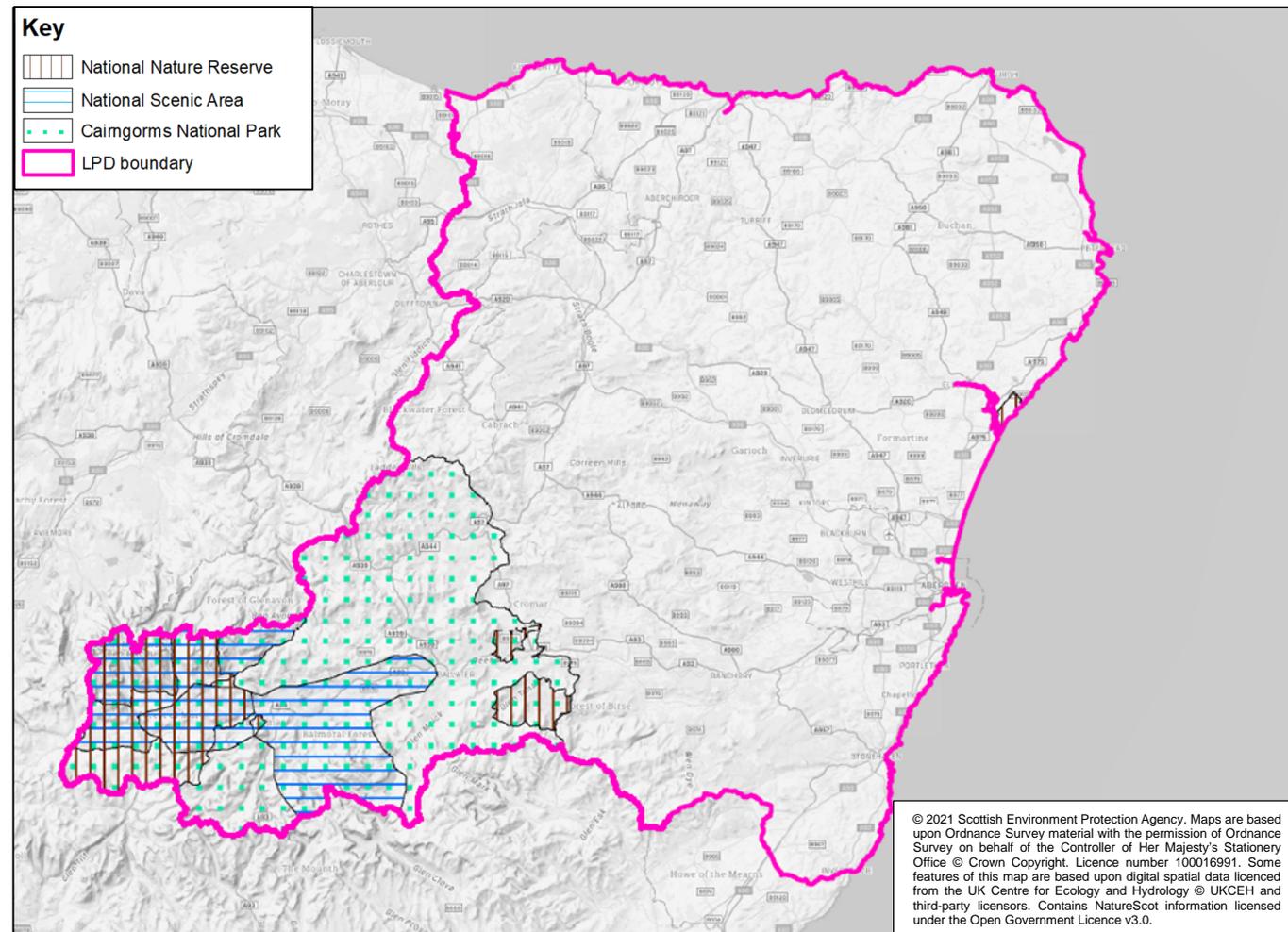
There are approximately 185 river water bodies and 4 lochs in this Local Plan District, as classified under the Water Framework Directive (WFD). The Local Plan District also continues multiple coastal water bodies including the Don Estuary and Cruden Bay. Coastal areas at risk of erosion will be of particular concern when considering flood risk management actions.

There are a number of pressures on water bodies across the Local Plan District that may hinder the achievement of their objectives as set out in the River Basin Management Plan. Notably, there are 66 river water bodies failing for physical condition within the Local Plan District. These are largely located in the east of the Local Plan District and include sections and tributaries of the River Dee SAC.

Summary facts for the North East Local Plan District

Battlefield	4	Cultural heritage designations are dispersed across much of the Local Plan District with areas of dense concentration particularly within and around Aberdeen.
Conservation Area	54	
Garden and Designed Landscape	33	
Scheduled Monument	572	Over 55% of listed buildings within the Local Plan District are located within target areas at risk from flooding.
Listed Buildings	6703	

Landscape



Summary facts for the North East Local Plan District

National Nature Reserve	8	There are protected landscapes in the upper catchment of the Dee: two National Scenic Areas and part of the Cairngorms National Park. There are eight National Nature Reserves within the Local Plan District. The upper Dee catchment and a small area of the upper Don catchment also contain areas of wild land.
National Scenic Area	2	
National Park	1	

J.4. Key environmental constraints relevant to flood risk management for target areas within the North East Local Plan District

Informed by the high-level baseline data presented in Section J.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table J.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms population and health and material assets and are not detailed in Table J.2.

Table J.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their 2027 WFD

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	WFD objectives as a result of their physical condition.		objectives as a result of their physical condition
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table J.2. Target areas at risk from flooding, local actions and key constraints within the North East Local Plan District.

Target areas with specific local actions	Reference number (Figure J.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Portgordon	398	Coastal / Surface water	Y	Y	Y		H	L	L	M	L
Portsoy	399	River/ Surface water		Y	Y		H	L	L	H	L
Banff	400	Coastal/ Fluvial		Y	Y		M	H	H	H	H
Whitehills	401	Coastal / Surface water		Y	Y		M	L	L	H	L
Macduff	402	Coastal / Surface water		Y	Y		M	L	L	H	L
Huntly	403	River/ Surface water		Y	Y		M	M	H	H	H
Keith	404	Surface water		Y	Y		L	L	H	H	L
Ellon	405	River/ Surface water	Y	Y	Y	Y	M	H	H	H	L
Boddam	406	Surface water	Y	Y	Y		H	L	L	H	L
Peterhead	407	Coastal / Surface water		Y	Y		H	L	L	H	L

Target areas with specific local actions	Reference number (Figure J.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Fraserburgh	408	Coastal/ Fluvial/ Surface water		Y	Y		H	H	H	H	L
Inverurie	409	River/ Surface water	Y	Y	Y	Y	M	H	H	H	H
Kintore	410	River/ Surface water		Y	Y		M	H	H	H	H
Insch	411	River/ Surface water		Y		Y	L	H	L	M	L
Bridge of Don	412	River/ Surface water	Y	Y	Y	Y	M	H	H	H	H
Aberdeen_Central	413	Coastal/ Fluvial/ Surface water		Y	Y	Y	H	M	H	H	H
Ballater	414	River/ Surface water		Y		Y	H	L	L	H	H
Peterculter	415	River/ Surface water	Y	Y	Y		H	L	H	M	L
Westhill	416	Surface water			Y		L	L	H	M	L
Aboyne	417	River/ Surface water			Y		H	M	H	H	H

Target areas with specific local actions	Reference number (Figure J.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Tarland	418	Fluvial			Y		H	L	H	M	H
Stonehaven	419	Coastal/ Fluvial/ Surface water		Y	Y	Y	H	M	L	H	L
Kemnay	422	River/ Surface water		Y	Y		M	M	H	M	H
Newburgh (Aberdeenshire)	423	Coastal		Y	Y		H	L	H	M	H
Cove Bay	424	Surface water			Y		H	L	L	H	L
Portlethen	425	River/ Surface water			Y		L	L	H	M	L
Nigg Bay	426	River/ Surface water			Y		L	L	L	H	L
Dyce	430	River/ Surface water			Y		M	H	H	L	H
Banchory	433	Surface water	Y	Y	Y		H	L	H	H	L
Newmill (Keith)	444	Surface water		Y			L	L	H	L	L

Target areas with specific local actions	Reference number (Figure J.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Kingswells (north)	445	Surface water			Y		L	L	H	M	L
Cruden Bay	447	River	Y	Y			H	H	H	H	L
Turriff	449	River/ Surface water		Y	Y		M	H	H	H	L
Buckie and Portessie	455	Coastal / Surface water		Y	Y	Y	M	L	L	H	L
Gardenstown	458	Coastal		Y	Y		H	L	L	H	L
Crovie	459	Coastal		Y	Y		H	L	L	H	L
Pennan	460	Coastal		Y	Y		H	L	L	H	L
Sandhaven	461	Coastal		Y	Y		H	L	L	M	L
Roseheart y	462	Coastal / Surface water		Y	Y		H	L	L	M	L

J.5. Environmental assessment of the local flood risk management actions for the North East Local Plan District

J.5.1. Introduction

For the purposes of the SEA assessment the actions recommended in the Flood Risk Management Strategy were categorised into four types as listed in Table J.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the North East Local Plan District, identifying potential effects and key recommendations.

J.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for eight target areas within the North East Local Plan District (refer to Table J.2 for details) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table J.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

J.5.3. Planning and resilience actions

Specific local planning and resilience actions are recommended for thirty-two target areas within the North East Local Plan District (refer to Table J.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience

actions was carried out at a national scale using the SEA objectives and criteria presented in Section 4.4. of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting.

More specifically within the North East Local Plan District, the constraints review undertaken and summarised in Table J.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

J.5.4. Flood studies

Flood studies are recommended for thirty-six target areas within the North East Local Plan District (see Table J.2 for details). As we do not know what further actions may result from the flood studies, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The review described in Section J.4 identifies that there are environmental constraints present across all target areas across the LPD. Constraints due to cultural heritage are found in most target areas; constraints due to biodiversity and water are also common. The most highly constrained target areas identified in the North East Local Plan District include

Fraserburgh, Bridge of Don, Inverurie, Kintore, Aberdeen Central, Banff, Aboyne and Cruden Bay.

As the identified flood studies within this Local Plan District are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

J.5.5. Flood schemes and works design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for seven target areas during Cycle 2 (2022 – 2027), dependent on funding (see Table J.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table J.3, and the effects summarised at an Local Plan District scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section J.4 and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known – but note these can change as the schemes and works go through the design stage.
2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health and material assets within the North East Local Plan District as a result of reduced flood risk to homes, businesses and infrastructure; with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors, and overall mixed effects on biodiversity and water. No significant adverse effects on SEA topics were identified. Further detail can be found in Table J.3.

As the design of these proposed actions are progressed by local authorities/ Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table J.3 – SEA significance assessment of flood schemes and work design and implementation*

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Aberdeen Central <i>(Merchant Quarter)</i> <i>Surface water</i>	SUDS Storage, conveyance and control	++	-/+	+	0	+	++	0	+
Ballater River	Property flood resilience River defences	++	-	0	0	+	++	0	0
Inverurie River	River defences	++	0	-/+	0	+	++	0	0

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Buckie and Portessie <i>Coastal</i>	Coastal defences	++	0	0	0	+	++	0	0
Buckie and Portessie <i>Surface water</i>	Storage, conveyance and control	++	0	0	0	+	++	0	0
Stonehaven <i>Coastal</i>	Coastal defences Coastal restoration Property flood resilience	++	-	0	0	+	++	0	0

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Bridge of Don <i>Surface water</i>	Storage, conveyance and control	++	-	0	0	+	+	0	0
Key findings									
<ol style="list-style-type: none"> 1. Significant positive effects on population and human health due to reduced flood risk and increased wellbeing. There may be opportunities to enhance access to greenspace at Aberdeen Central through SUDS actions. 2. Potential for negative effects on biodiversity due to coastal or river defences and storage, conveyance and control type actions in particular where SACs and/ or SSSIs are located within the target areas of Aberdeen Central, Ballater and Stonehaven. However, also potential for beneficial effects to freshwater and estuarine species through improvements to water quality by SUDS at Aberdeen Central. 3. Potential mixed effects identified for water at Aberdeen Central, and Inverurie. Opportunities for enhancement through river defence actions by regulating water flow and reducing erosion through and the supporting of WFD objectives, balanced with the potential adverse effects of actions on the river environment. Neutral impacts on coastal morphology and coastal processes at Aberdeen Central and Stonehaven. There is potential for effects from coastal defences and coastal restoration 									

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<p>actions on coastal processes through altering rates of erosion and deposition, however, any effects are likely to be localised in nature and will be dependent on the location and design of actions.</p> <ol style="list-style-type: none"> 4. No significant effects identified for soil. 5. Positive effects on climatic factors due to improved resilience of properties and infrastructure to future climate change. 6. Significant positive effects on material assets from the protection of property and infrastructure. 7. No significant effects identified for cultural heritage. Potential for positive effects from the reduction in flood risk to heritage assets balanced with potential for negative effects on the setting of historic buildings and structures, however, effects are dependent on the location and design of action. 8. Overall neutral effect on landscape. Potential for negative effects if flood defences located in an area of high landscape value, however, effects are dependent on the location and design of action. Potential for contribution to enhanced urban landscape through implementation of SUDS at Aberdeen Central, dependent on nature and design of activity. 									

Flood risk management plan 2021-2027: Strategic Environmental Assessment

Environmental Report – Appendix K

Assessment for Tay Estuary and Montrose Basin Local Plan District

July 2021

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Appendix K - Tay Estuary and Montrose Basin Local Plan District (LPD 7)

K.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood risk management plan relevant to the Tay Estuary and Montrose Basin Local Plan District (LPD). This document:

- Provides an overview of the Tay Estuary and Montrose Basin Local Plan District, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Tay Estuary and Montrose Basin Local Plan District. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Tay Estuary and Montrose Basin Local Plan District for which actions are recommended in the Flood risk management plan;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Tay Estuary and Montrose Basin Local Plan District, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

K.2. Flood risk within the Tay Estuary and Montrose Basin Local Plan District and recommended actions

K.2.1 Overview of the Tay Estuary and Montrose Basin Local Plan District

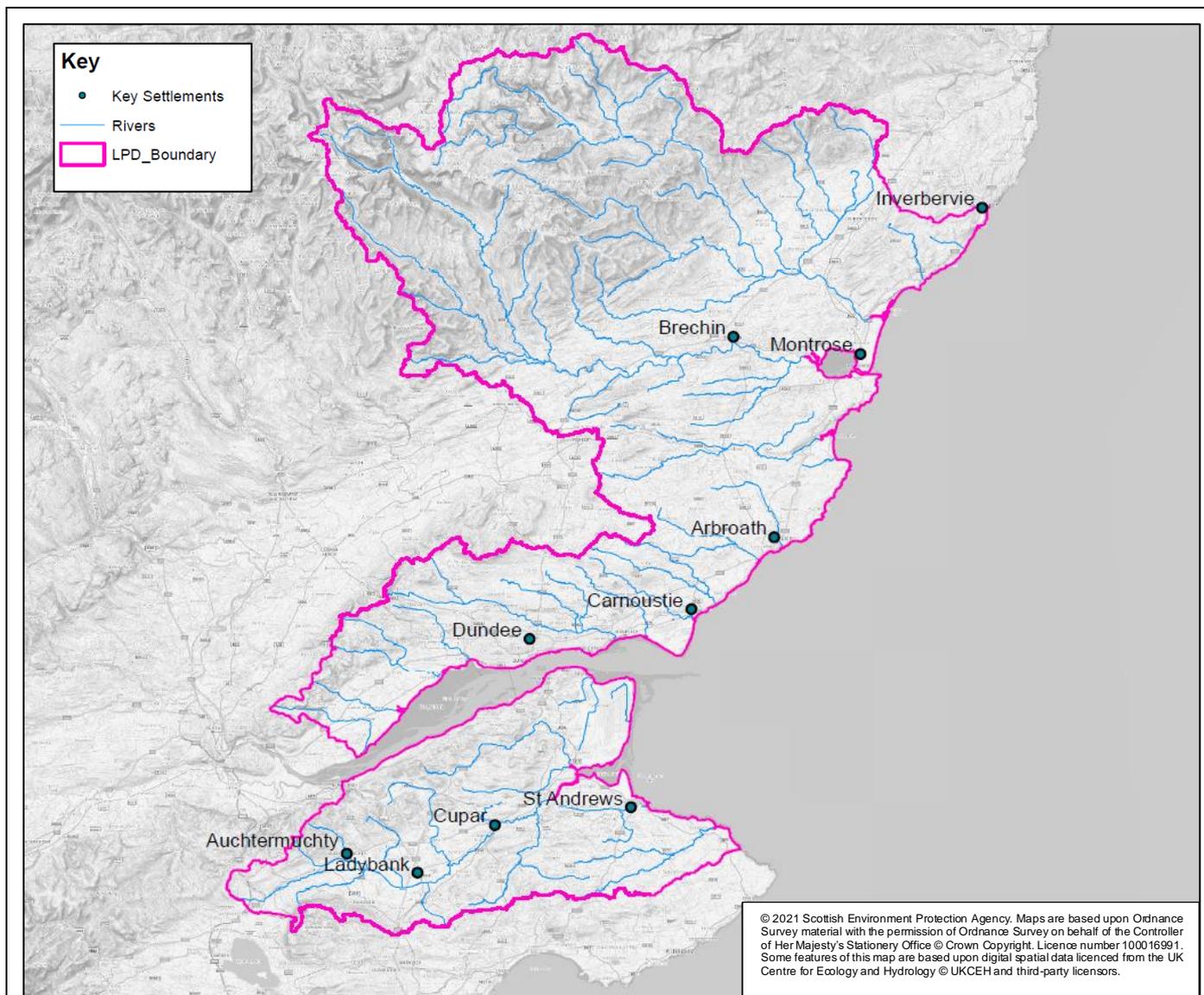


Figure K.1. Extent of the Tay Estuary and Montrose Basin Local Plan District, key water bodies and settlements.

The Tay Estuary and Montrose Basin Local Plan District covers around 2,700 km² and has a population of approximately 340,000 people. It covers part of the Cairngorms National Park and

the low-lying coastal areas to the north and south of the Firth of Tay. The Local Plan District includes a 230km stretch of coastline from Inverbervie to St Andrews, incorporating the Firth of Tay. It includes the urban areas of Arbroath, Brechin, Broughty Ferry, Dundee, Montrose and St Andrews.

There are urban and agricultural areas to the south, with forest, grassland and heather in the mountains to the north. There are a number of lochs and reservoirs in the area including the Loch of Forfar, Rescobie Loch, Monikie Reservoir and Crombie Reservoir. There are several major rivers, including the River North Esk, River South Esk and River Eden.

K.2.2 Flood risk within the Tay Estuary and Montrose Basin Local Plan District

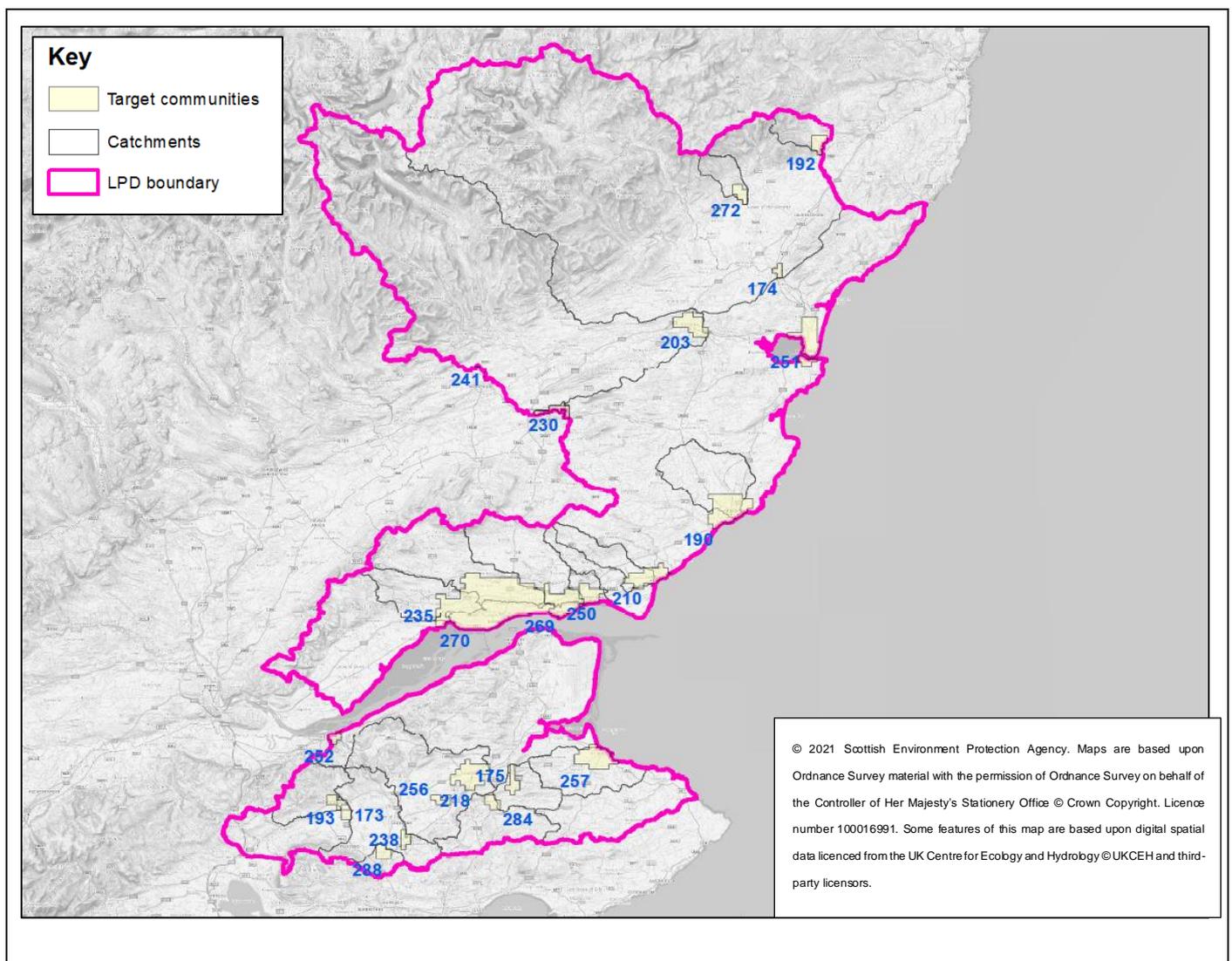


Figure K.2. Extent of the Tay Estuary and Montrose Basin Local Plan District and target areas at risk from flooding

There is river, coastal and surface water flood risk. Currently it is estimated that there are around 21,000 people and 14,000 homes and businesses at risk from flooding. This may increase to 29,000 people and 19,000 homes and businesses by the 2080s due to climate change. The expected annual cost of flooding over a long period of time is around £12.6 million.

K.2.3 Recommended flood risk management actions within the Tay Estuary and Montrose Basin Local Plan District

Table K.2 sets out the sources of flood risk and types of local actions recommended within the Flood risk management plan for target areas within the Tay Estuary and Montrose Basin Local Plan District, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section K.5 of this Appendix. Section 2.3 of the main Environmental Report lists any actions scoped out of the assessment.

K.3 Tay Estuary and Montrose Basin Local Plan District: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Tay Estuary and Montrose Basin Local Plan District in terms of the SEA topics, with the exception of climatic

factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at a Local Plan District -scale and supplements the fuller description of the current state of Scotland's environment in the main Environmental Report.

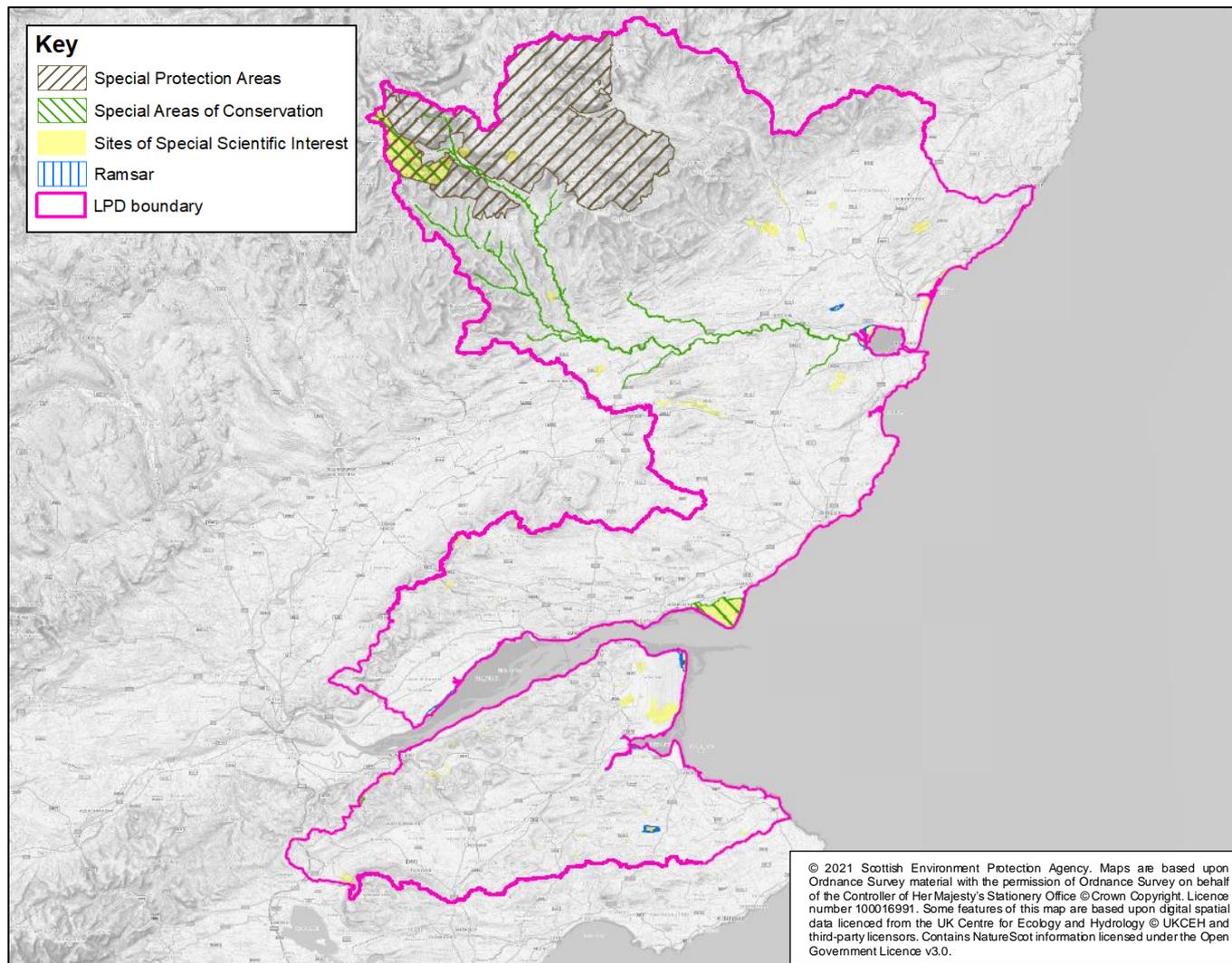
This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Tay Estuary and Montrose Basin Local Plan District provided in Section K.4 of this appendix.

Population and health and material assets

Key information relating to population and human health and material assets are presented in Section K.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding. Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is high across the Local Plan District with 85% of target areas having at least some greenspace. For over half of target areas, greenspace represents over 50% of total landcover indicating ample provision.

Biodiversity

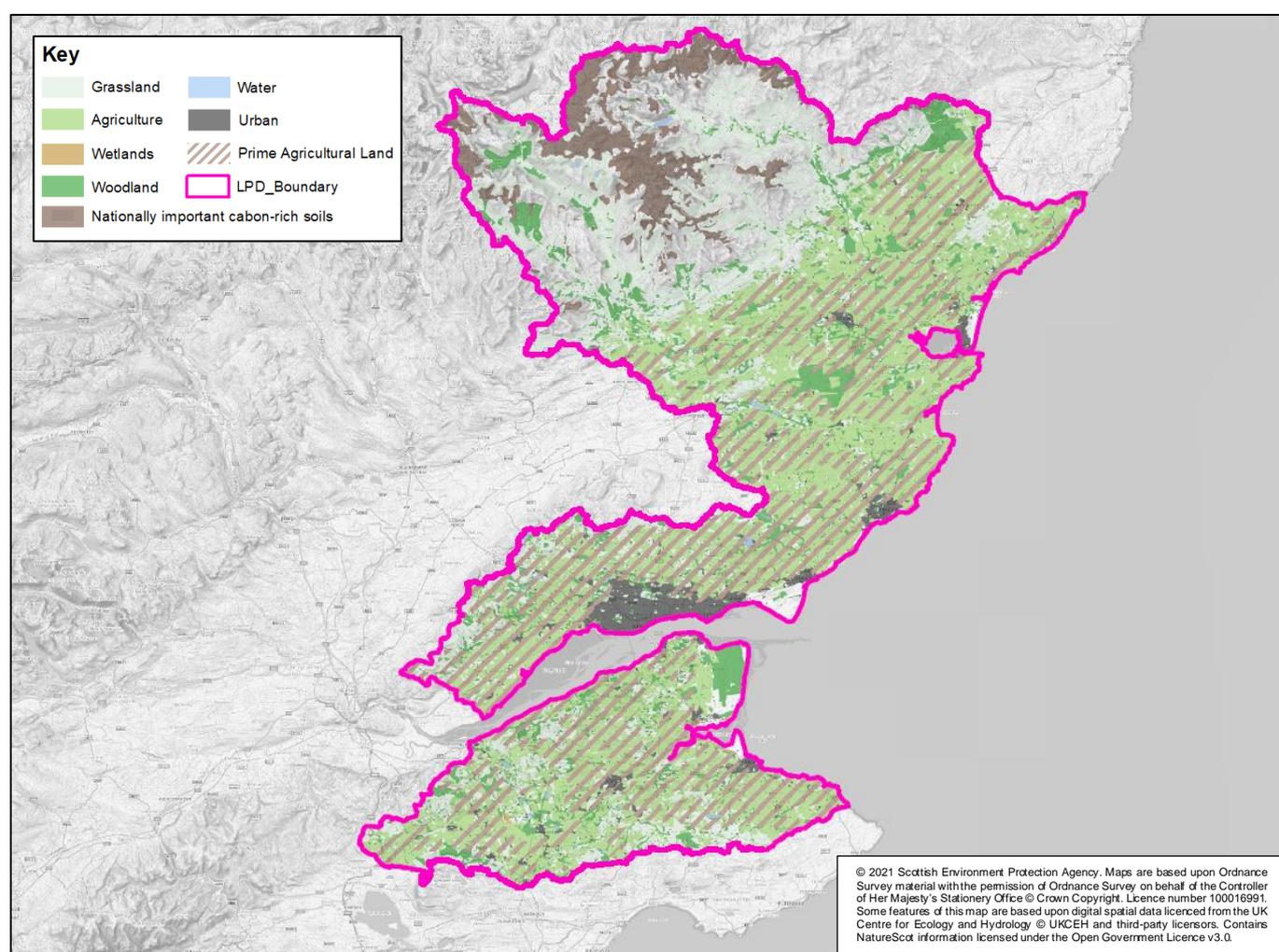


Summary facts for the Tay Estuary and Montrose Basin Local Plan District

Ramsar sites	3	There are numerous designated sites of international and national biodiversity importance within the Local Plan
Special Areas of Conservation (SACs)	5	District, which include many of the target areas and their associated wider catchment or coastal areas. Designated

Special Protection Areas (SPAs)	6	sites are principally found in the upper catchment, coastal areas (not shown on plan) and include the River South Esk SAC.
Sites of Special Scientific Interest (SSSIs)	60	

Land cover (including soils)



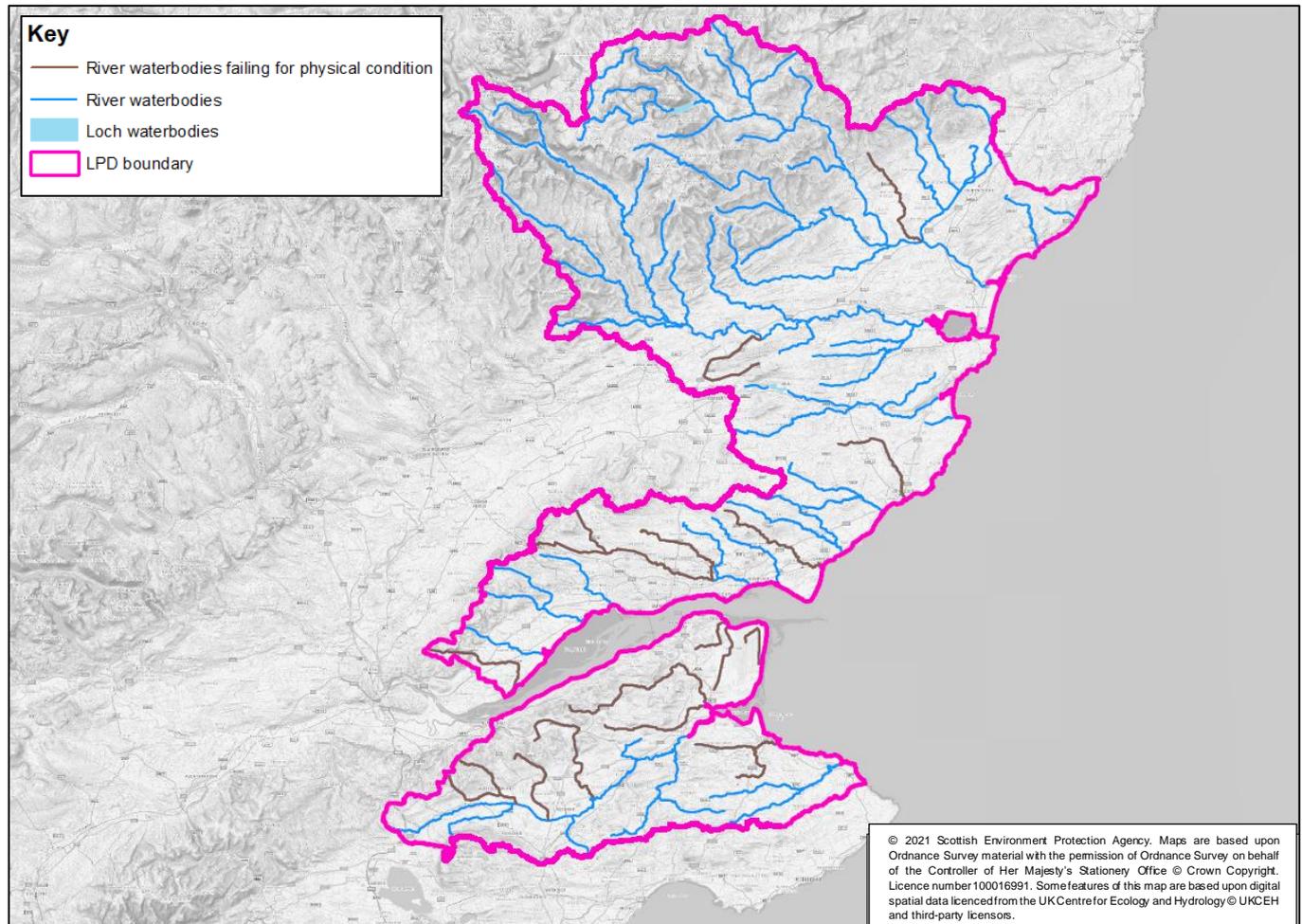
Summary facts for the Tay Estuary and Montrose Basin Local Plan District

The Tay Estuary and Montrose Basin is an important and productive agricultural area and contains a significant area of Scotland's horticultural land. There are large areas of prime agricultural land across much of the lowland areas of the Local Plan District from Inverbervie to south of the River Tay.

There is significant urban landcover with Dundee City and a number of large towns throughout the Local Plan District. There are some areas of peat and wetlands in the northern upper catchment.

Woodland areas are scattered across the Local Plan District including commercial forestry which is an important to the local economy. The forests tend to be numerous and small in area.

Water



Summary facts for the Tay Estuary and Montrose Basin Local Plan District

There are approximately 62 river water bodies and 2 lochs in this Local Plan District, as classified under the Water Framework Directive (WFD). The Local Plan District has a significant area of coastline and coastal and transitional water bodies include the Montrose Basin, Eden Estuary and the Upper and Lower Tay Estuaries. Coastal areas at risk of erosion will be of particular concern when considering flood risk management actions.

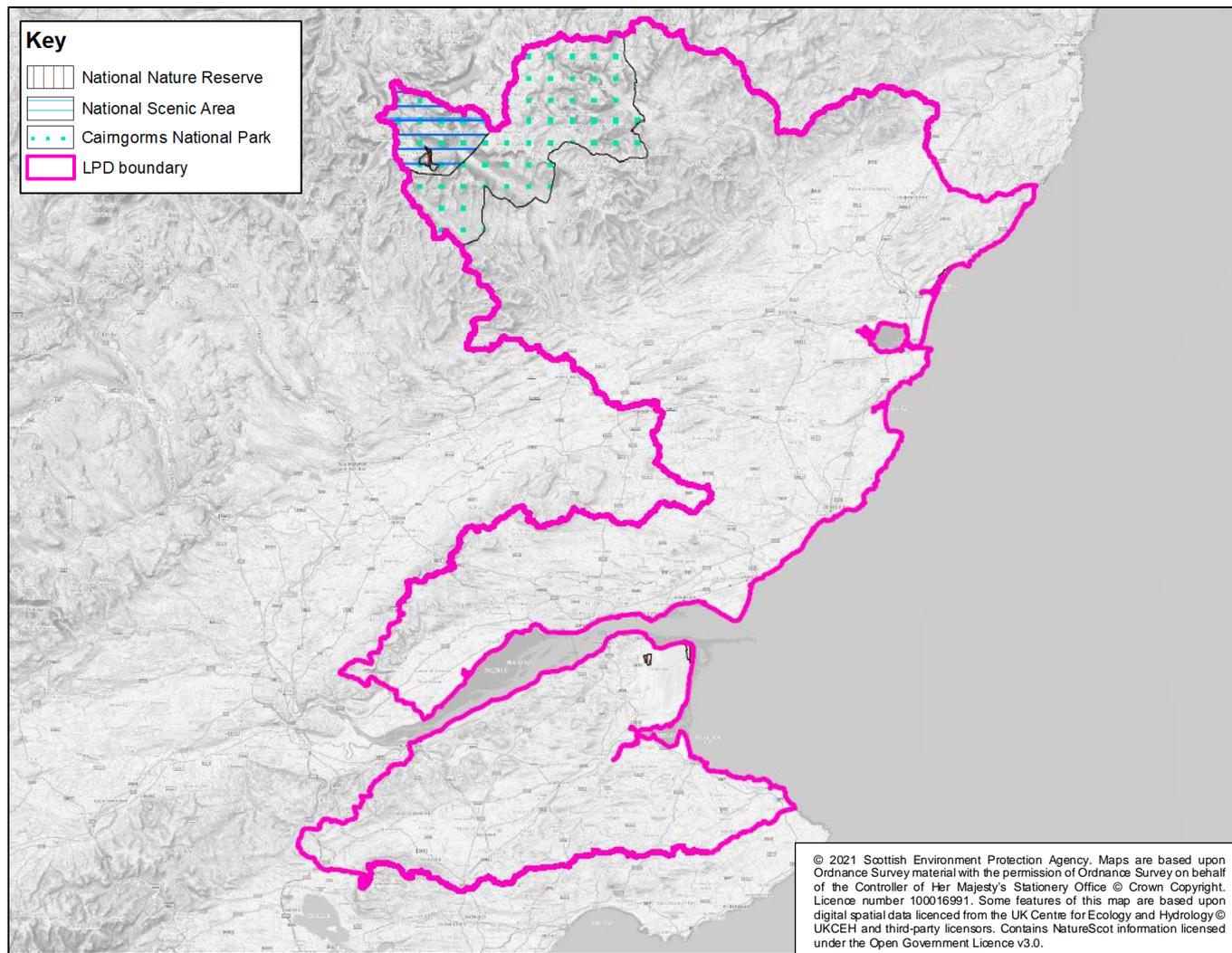
There are a number of pressures on water bodies across the Local Plan District that may hinder the achievement of their objectives as set out in the River Basin Management Plan. Notably, there

are 17 river water bodies mainly located in lowland areas to the south and east of the Local Plan District that are failing to meet their WFD objectives because of their physical condition and that flood risk management actions should take into account.

Summary facts for the Tay Estuary and Montrose Basin Local Plan District

Conservation Area	59	Cultural heritage designations are dispersed across much of the Local Plan District with clusters within and around Dundee, Brechin and settlements in the south. Over 55% of listed buildings within the Local Plan District are located within target areas at risk from flooding.
Garden and Designed Landscape	29	
Scheduled Monument	510	
Listed Buildings	5804	

Landscape



Summary facts for the Tay Estuary and Montrose Basin Local Plan District

National Nature Reserve	3	There are areas of valued landscape within the Tay Estuary and Montrose Basin Local Plan District Local Plan District, particularly in the upland areas. The Local Plan District contains the south eastern corner of Deeside and Lochnagar National Scenic Area, and the south eastern corner of the Cairngorms National Park. There are areas of wild land in the
National Scenic Area	1	
National Park	1	

		<p>upper catchments of the South Esk and North Esk. The areas of wild land overlap with the edge of the Cairngorms National Park. The upper catchment of the South Esk is also a National Scenic Area.</p>
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K.4. Key environmental constraints relevant to flood risk management for target areas within the Tay Estuary and Montrose Basin Local Plan District

Informed by the high-level baseline data presented in Section K.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table K.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms population and health and material assets and are not detailed in Table K.2.

Table K.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or	Small area of agricultural land and peatland. No large	Large area of agricultural land and/or peatland.

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	peatland, or none of either present.	areas of agricultural land or peatland present.	
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	objectives as a result of their physical condition.		
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and	Local landscape areas within target area and

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
		nature reserve/national scenic area within the wider catchment.	nature reserve and national scenic area within target area.

Table K.2 Target areas at risk from flooding, local actions and key constraints within the Tay Estuary and Montrose Basin Local Plan District target areas.

Target areas with specific local actions	Reference number (Figure K.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Dunshalt	173	River			Y		M	H	H	M	L
Marykirk	174	River		Y			M	H	H	M	H
Pitscottie and Kemback	175	River		Y	Y		M	H	L	M	L
Arbroath	190	Coastal/ River/ Surface water	Y	Y	Y	Y	M	H	H	H	L
Auchtermuchty	193	River		Y	Y		M	H	H	H	L
Brechin	203	River/ Surface water	Y	Y	Y		H	H	H	H	H
Carnoustie	210	Coastal/ River / Surface water		Y	Y	Y	M	H	H	H	L
Cupar	218	River/ Surface water		Y	Y		M	H	H	H	L
Invergowrie	235	River/ Surface water		Y	Y		H	H	L	H	L

Target areas with specific local actions	Reference number (Figure K.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Kingskettle and Kettlebridge	238	River		Y	Y		M	H	H	M	L
Monifieth	250	River/ Surface water		Y	Y	Y	H	H	L	M	L
Montrose and Ferryden	251	Coastal / Surface water		Y	Y	Y	H	L	L	H	L
Newburgh	252	Coastal		Y	Y		H	L	L	H	L
Springfield	256	Surface water		Y	Y		L	L	L	M	L
St Andrews	257	Coastal/ River / Surface water		Y	Y	Y	H	H	H	H	L
Broughty Ferry	269	Coastal/ River / Surface water		Y	Y	Y	H	H	H	H	L
Dundee	270	Coastal/ River/ Surface water		Y	Y	Y	H	H	H	H	L
Fettercairn	272	River			Y		L	H	L	H	L
Ceres	284	River	Y		Y		M	H	L	H	L
Freuchie	288	River		Y	Y		L	H	L	M	L

K.5. Environmental assessment of the flood risk management actions for the Tay Estuary and Montrose Basin Local Plan District

K.5.1. Introduction

For the purposes of the SEA assessment the actions recommended in the Flood risk management plan were categorised into four types as listed in Table K.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Tay Estuary and Montrose Basin Local Plan District, identifying potential effects and key recommendations.

K.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for three target areas within the Tay Estuary and Montrose Basin Local Plan District (refer to Table K.2 for details) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table K.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

K.5.3. Planning and resilience actions

Specific local planning and resilience actions are recommended for seventeen target areas within the Tay Estuary and Montrose Basin Local Plan District (refer to Table K.2 for details). Consideration of the likely significant environmental effects of undertaking these

types of planning and resilience actions was carried out at a national scale using the SEA objectives and criteria presented in Section 4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting. In this Local Plan District, there are also potential benefits to biodiversity, water and landscape through land use planning actions that seek to protect natural features that help to managing flooding.

More specifically within the Tay Estuary and Montrose Basin Local Plan District, the constraints review undertaken and summarised in Table K.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

K.5.4. Flood studies

Flood studies are recommended for nineteen target areas within the Tay Estuary and Montrose Basin Local Plan District (see Table K.2 for details). As we do not know what further actions may result from the flood studies, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The review described in Section K.4 identifies that there are environmental constraints present across all target areas across the LPD. Constraints due to cultural heritage are found in most target areas; constraints due to biodiversity and water are also common.

The principal constraints within the Local Plan District relate to biodiversity, soil, water and cultural heritage. The highest levels of constraint were identified in Brechin, St Andrews, Broughty Ferry and Dundee.

As the identified flood studies within this Local Plan District are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

K.5.5. Flood schemes and works design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for seven target areas during Cycle 2 (2022 – 2027) (see Table K.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table K.3, and the effects summarised at a Local Plan District scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section K.4 and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known – but note these can change as the schemes and works go through the design stage.

2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health within the Tay Estuary and Montrose Basin Local Plan District as a result of reduced flood risk to homes, businesses and infrastructure, with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors and material assets. There were overall mixed effects on biodiversity and water. No significant adverse effects on SEA topics were identified. Further detail can be found in Table K.3.

As the design of these proposed actions are progressed by local authorities/ Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table K.3 – SEA significance assessment of proposed schemes and works design and implementation

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Monifieth River and surface water (Monifieth Burn)	Storage, conveyance and control River defences River and floodplain restoration	++	-/+	-/+	0	+	++	0	0
Dundee Coastal	Coastal defences	++	-	-/+	0	+	++	0	0
Carnoustie River	River defences Storage, conveyance and control	++	-/+	-/+	0	+	++	0	0/+

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
	River and floodplain restoration								
Montrose and Ferryden <i>Coastal</i>	Coastal defences Coastal restoration	++	-/+	0	0	+	++	0	-/+
Dundee, Broughty Ferry and Monifieth <i>River (Dighty Water)</i>	Storage, conveyance and control Property flood resilience River defences	++	-	-/+	0	+	++	0	0

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape

Key findings for the Local Plan District

1. Significant positive effects on **population and human health** due to reduced flood risk and increased wellbeing.
2. Potential for negative effects on **biodiversity** due to coastal or river defences actions in particular as coastal habitats, Ramsar, SPAs, SACs and/ or SSSIs are located within the target areas or coastal areas of many of the target areas.
3. Potential mixed effects identified for **water** environment. Potentially adverse effects from coastal defences at Dundee, Montrose and Ferryden and Newburgh on coastal morphology as defences may interfere with coastal processes altering rates of erosion and deposition. Opportunities for enhancement through coastal and river defence actions by regulating water flow and reducing erosion through and the supporting of WFD objectives, balanced with the potential adverse effects of actions on the river environment
4. No significant effects identified for **soil**.
5. Positive effects on **climatic factors** due to improved resilience of properties and infrastructure to future climate change.
6. Significant positive effects on **material assets** from the protection of property and infrastructure.
7. No significant effects identified for **cultural heritage**. Potential for positive effects from the reduction in flood risk to heritage assets balanced with potential for negative effects on the setting of historic buildings and structures, however, effects would be dependent on the location and design of actions.

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<p>8. Overall neutral effect on landscape, with potential for negative effects if flood defences located in an area of high landscape value. Potential positive effects from natural flood management actions in the Carnoustie catchment and from coastal restoration at Montrose and Ferryden. Effects would be dependent on the location and design of actions.</p>									

Flood risk management plans 2021-2027: Strategic environmental assessment

Environmental Report – Appendix L

Assessment for Tay Local Plan District

July 2021

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North Lanarkshire
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Appendix L - Tay Local Plan District (LPD 8)

L.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood risk management plans relevant to the Tay LPD. This document:

- Provides an overview of the Tay LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Tay LPD. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Tay LPD for which actions are recommended in the Flood risk management plan;
- Describes the identified potential environmental effects of the types of actions proposed to manage flood risk in the Tay LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

L.2. Flood risk within the Tay LPD and recommended actions

L.2.1 Overview of the Tay LPD

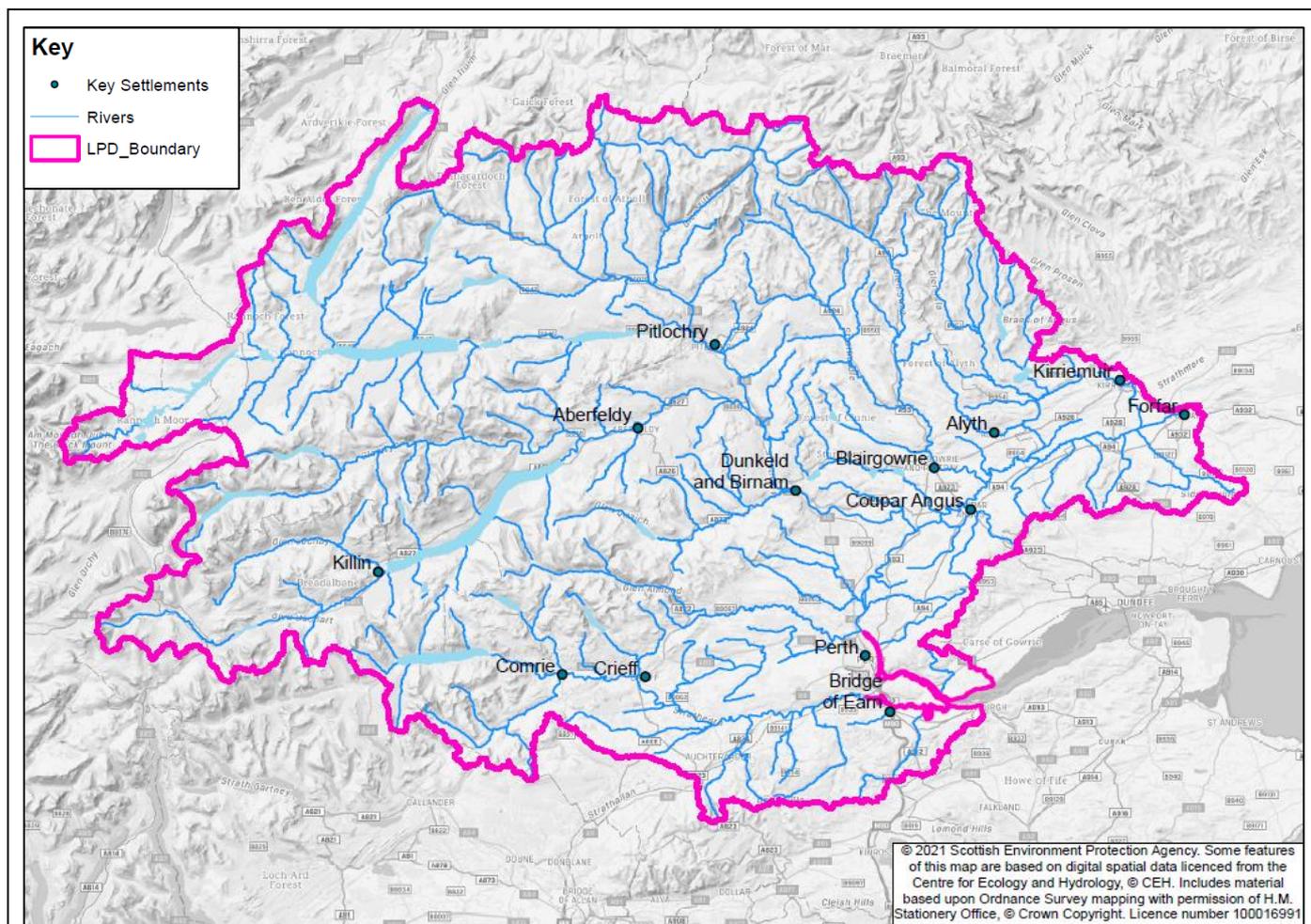


Figure L.1. Extent of the Tay LPD, key water bodies and settlements.

The Tay LPD shown on Figure L.1 covers around 6,100 km² and has a population of approximately 160,000 people. It spans from the southern part of the Cairngorms National Park all the way to the Firth of Tay. The LPD includes a 74 km stretch of the inner Firth of Tay coastline, where the River Tay and the River Earn meet. It includes the urban areas of Aberfeldy, Alyth, Blairgowrie, Comrie, Dunkeld, Forfar, Perth and Pitlochry.

There are urban and agricultural areas to the east and more rural, mountainous and forested areas to the west. There are many large lochs and reservoirs, including Loch Ericht, Loch Rannoch and Loch Tay. The main rivers are the Earn and Tay. The River Tay is Scotland's longest river at 190 km, and its main tributaries include the River Garry, River Tummel, River Lyon, River Braan, River Isla and River Almond.

L.2.2 Flood risk within the Tay LPD

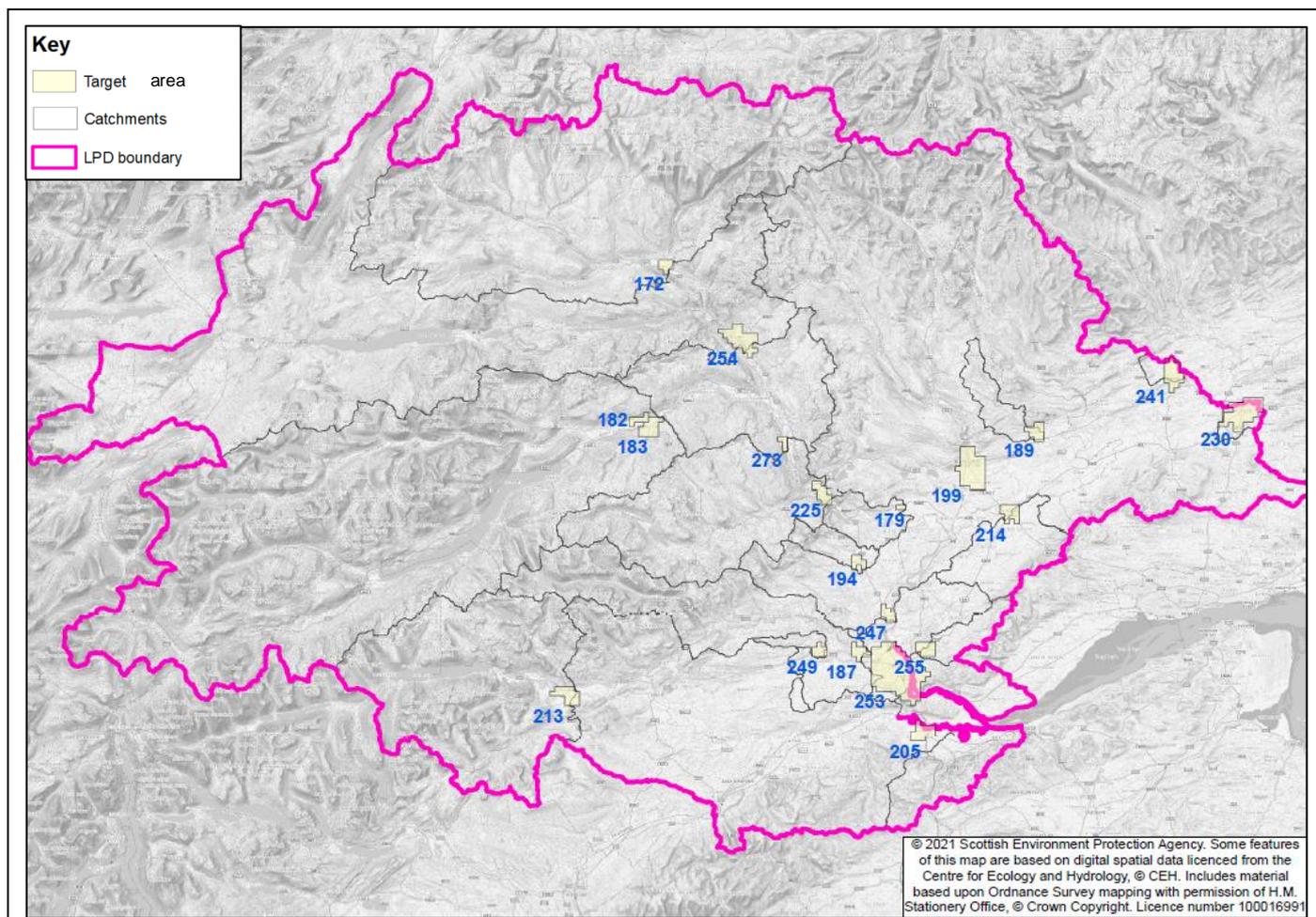


Figure L.2. Extent of the Tay LPD and target areas at risk from flooding

There is river, surface water and coastal flood risk within the Tay LPD. Currently it is estimated that there are around 13,000 people and 9,000 homes and businesses at risk from flooding, mainly within the target areas shown on Figure L.2. This may increase to 21,000 people and 13,000 homes and businesses by 2080s due to climate change. The expected annual cost of flooding over a long period of time is around £11.4 million. There are formal flood protection schemes within the LPD, including Perth, Almondbank, Bridge of Earn, Comrie, Kirriemuir and Weem.

L.2.3 Recommended flood risk management actions within the Tay LPD

Table L.2 sets out the sources of flood risk and types of local actions recommended within the Flood risk management plan for target areas within the Tay LPD, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section L.5 of this Appendix. Section 2.3 of the main Environmental Report lists any actions scoped out of the assessment.

L.3 Tay LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Tay LPD in terms of the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 4 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland’s environment in the main Environmental Report.

This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Tay LPD provided in Section L.4 of this appendix.

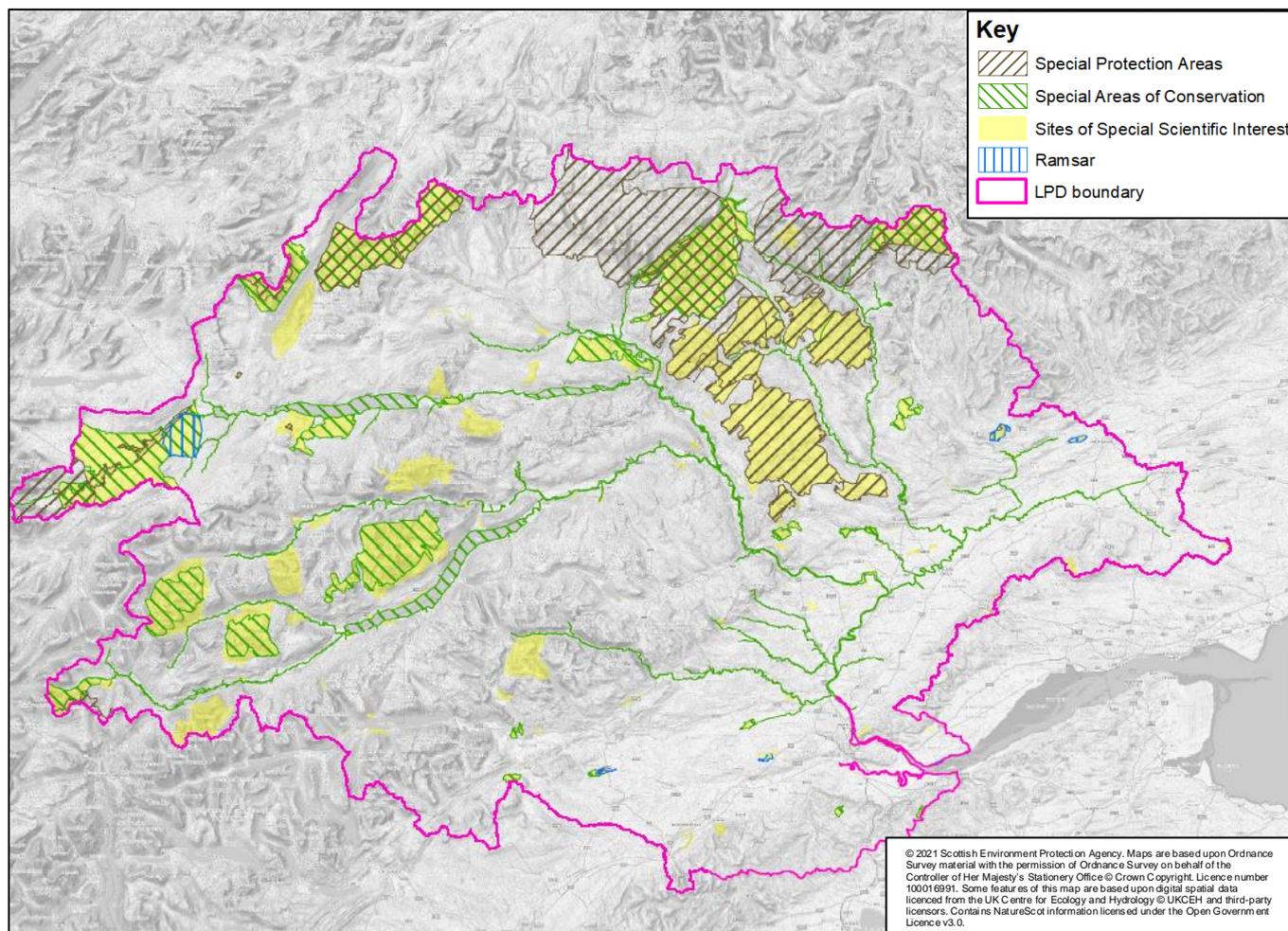
Population and health and material assets

Key information relating to population and human health and material assets are presented in Section L.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding.

Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is varied across target areas with 55% of these settlements having limited access to greenspace, while 15% have no greenspace provision. This could be as urban greenspace designations are less common in rural communities.

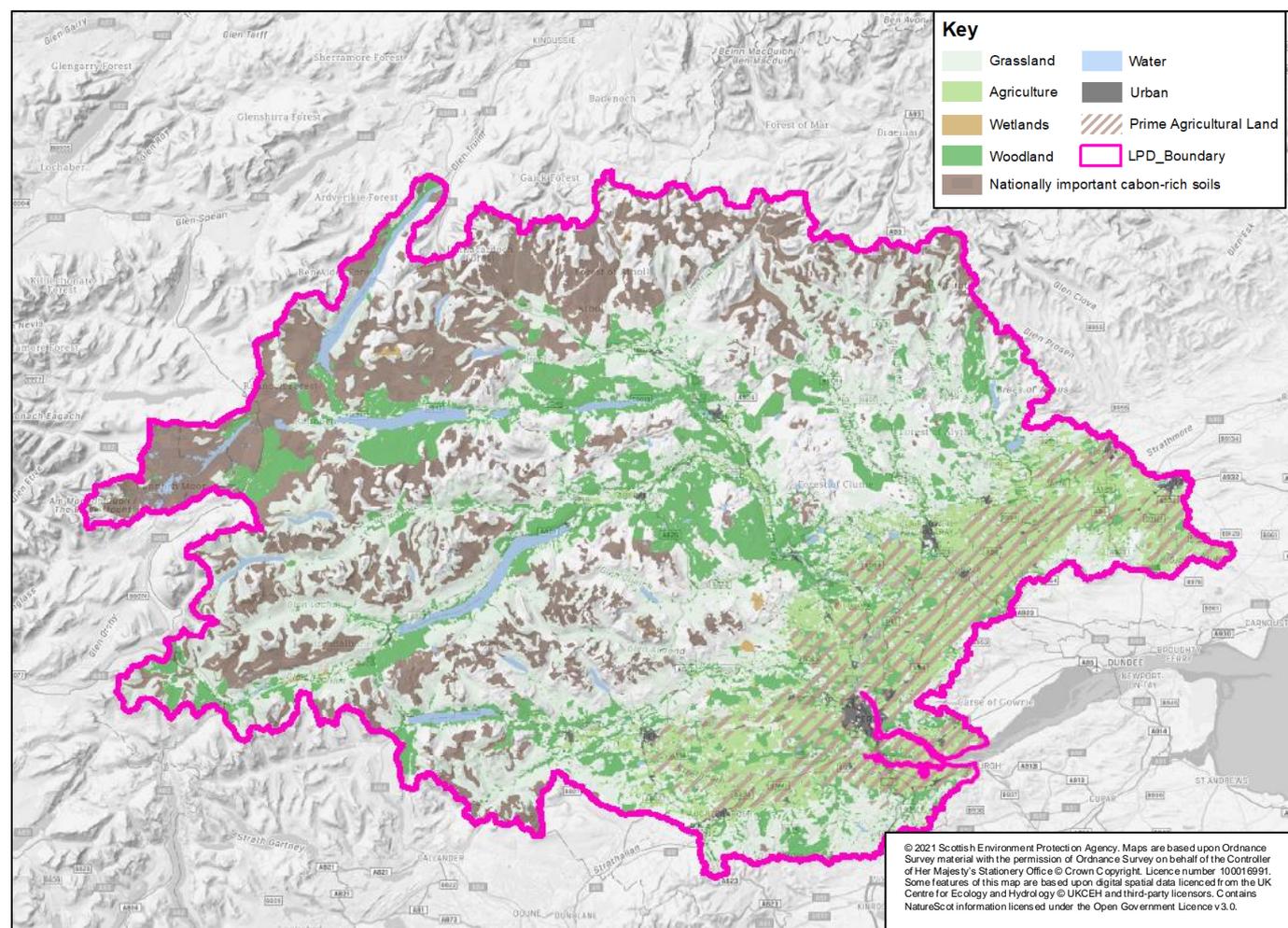
Biodiversity



Summary facts for the Tay LPD

Ramsar sites	5	There are a number of designated sites in the Tay LPD, most of which are located in the upper areas of the LPD. Notably, the River Tay that extends through the LPD is a SAC designated for lamprey species, Atlantic salmon, otter and lochs. Downstream of the LPD (not shown on plan) is the Firth of Tay and Eden Estuary SAC, SPA and Ramsar site.
Special Areas of Conservation (SAC)	23	
Special Protection Areas (SPA)	11	
Sites of Special Scientific Interest (SSSI)	113	

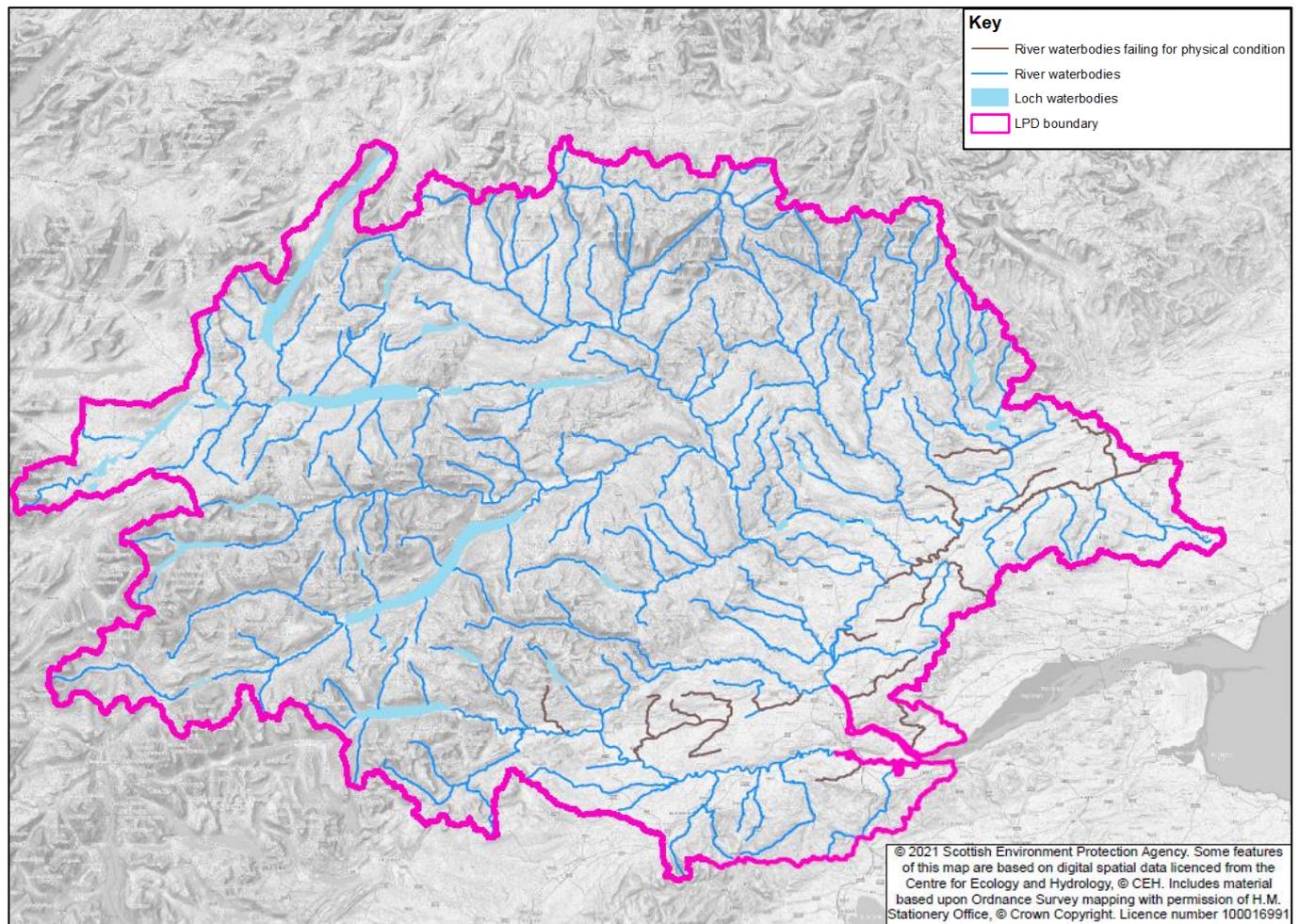
Land cover (including soils)



Summary facts for the Tay LPD

The Highland boundary fault cuts across the LPD dividing the landscape. To the west of the boundary fault the area is upland in nature, characterised by forestry, rough grassland, heather and montane habitat. There is extensive carbon rich peatland, Class 1 and 2, in this area particularly to the far north west of the LPD. East and south of the LPD are more lowland areas of agricultural land cover with urban and suburban areas. The LPD contains significant areas of prime agricultural land.

Water



Summary facts for the Tay LPD

There are approximately 200 river water bodies and 36 lochs in this LPD, as classified under the Water Framework Directive (WFD). Three percent of the area is freshwater: there are many lochs, and the River Tay itself is the Scotland's largest catchment and longest river. Many of the lochs and rivers in the River Tay catchment are managed to produce hydropower.

There are a number of pressures on water bodies across the Local Plan District that may hinder the achievement of their objectives as set out in the relevant River Basin Management Plans.

Notably, there are 17 river water bodies mainly located in lowland areas to the south and east of

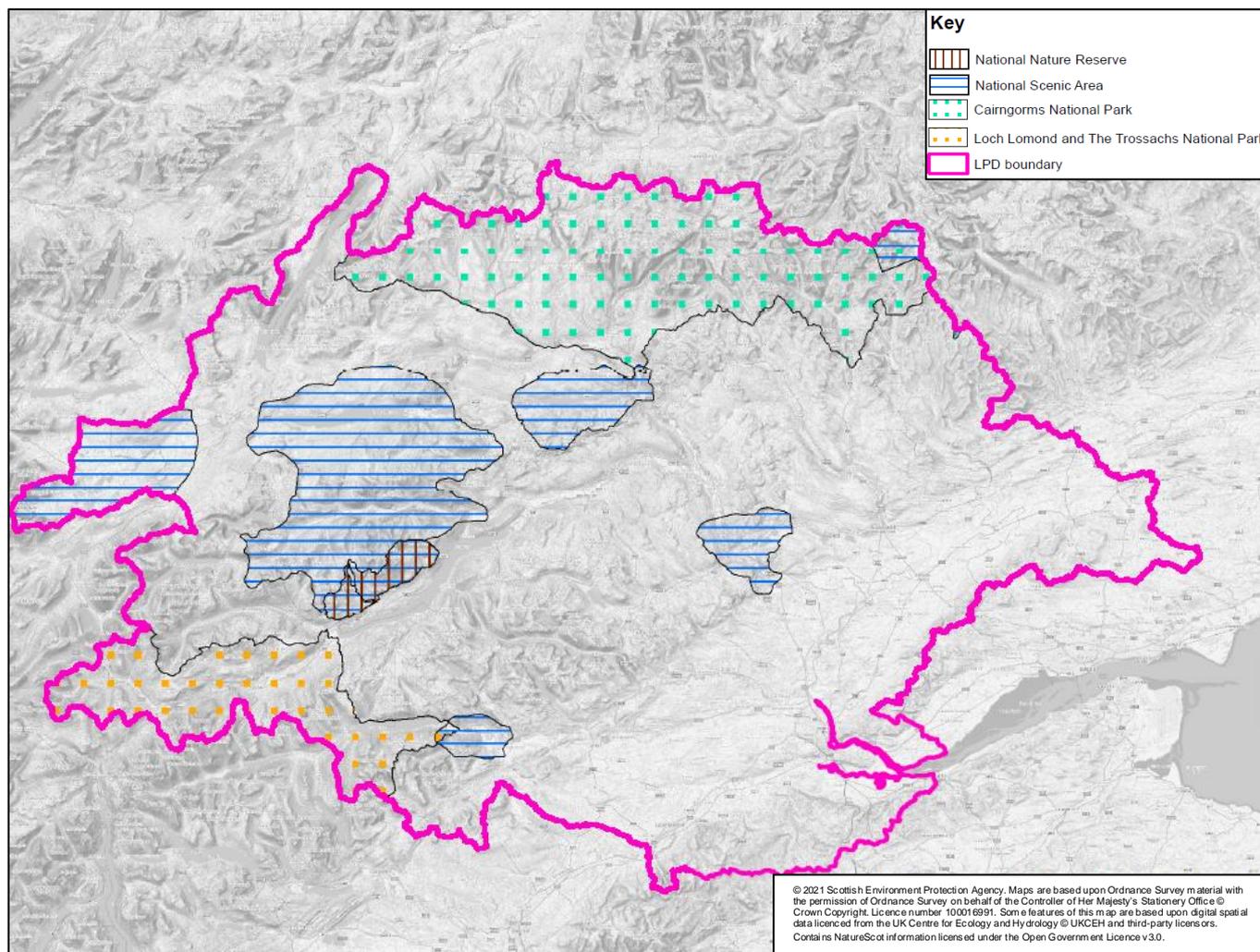
the LPD that are failing to meet their WFD objectives because of their physical condition and that flood risk management actions should take into account.

Cultural heritage

Summary facts for the Tay LPD

Battlefields	4	The LPD is rich in historic sites. Cultural heritage designations are typically found in the populated areas to the east and south of the LPD and are concentrated within and around the main towns including Blairgowrie, Crieff, Aberfeldy and Pitlochry. Over 40% of listed buildings within the LPD are located within target areas at risk from flooding.
Conservation Areas	30	
Garden and Designed Landscapes	35	
Scheduled Monuments	715	
Listed Buildings	3700	

Landscape



Summary facts for the Tay LPD

National Nature Reserve	2	Much of the landscape of the Tay LPD is highly valued, particularly in the upland areas. The LPD contains five National Scenic Areas (Loch Rannoch and Glen Lyon, Loch Tummel, River Earn, River Tay) and the western edge of Ben Nevis and Glen Coe National Scenic Area. The land along the northern border of the LPD is within the boundary of the Cairngorms National Park, while the south west falls
National Scenic Area	6	
National Park	2	

		<p>within Loch Lomond and the Trossachs National Park. There are large swathes of wild land in the western and northern areas of the LPD including: Ben Lawers, Lyon-Lochay, Breadalbane Schiehallion, Rannoch-Nevis, and Cairngorms.</p>
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L.4. Key environmental constraints relevant to flood risk management for target areas within the Tay LPD

Informed by the highlevel baseline data presented in Section L.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table L.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms population and health and material assets and are not detailed in Table L.2.

Table L.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Population and human health and material assets	Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is high across all target areas.		
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan		One or more river water bodies identified within 2015 RBMP within the catchment

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	(RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition.		that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table L.2. Target areas at risk from flooding, local actions and key constraints within the Tay LPD.

Target areas with specific local actions	Reference number (Figure L.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design/ implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Blair Atholl	172	River		Y	Y		H	H	L	H	H
Spittalfield	179	River		Y	Y		M	H	L	H	H
Weem	182	River		Y	Y		H	L	L	H	H
Aberfeldy	183	River/surface water		Y	Y	Y	H	L	L	H	H
Almondbank	187	River		Y	Y		H	H	H	H	L
Alyth	189	River		Y	Y		H	L	L	M	L
Bankfoot	194	River		Y			H	L	L	M	M
Blairgowrie and Rattray	199	Surface water		Y	Y		H	L	L	H	L
Bridge of Earn	205	River/surface water	Y	Y	Y		M	M	H	M	H
Comrie	213	River/surface water	Y	Y	Y	Y	H	L	L	H	H
Coupar Angus	214	River/surface water	Y	Y			H	H	H	H	L

Target areas with specific local actions	Reference number (Figure L.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design/implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Dunkeld and Birnam	225	River/surface water		Y	Y	Y	H	H	L	H	H
Forfar	230	River/surface water		Y	Y		L	H	H	H	L
Kirriemuir	241	River/surface water	Y	Y	Y	Y	M	H	H	H	L
Luncarty	247	River		Y	Y		H	M	H	M	H
Methven	249	River		Y	Y		L	H	H	H	L
Perth	253	River/surface water		Y	Y	Y	H	M	H	H	H
Pitlochry	254	River		Y		Y	H	H	L	H	H
Scone	255	River/surface water		Y	Y	Y	L	H	H	H	L
Dalguise	273	River		Y			H	H	L	M	H

* Some schemes and works listed in this table are scoped out of the assessment in Section 0.5.5. See Section 2.3 of the main Environmental Report for details

L.5. Environmental assessment of the recommended flood risk management actions within the Tay LPD

L.5.1 Introduction

For the purposes of the SEA assessment the actions recommended in the Flood risk management plan were categorised into four types as listed in Table L.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Tay LPD, identifying potential effects and key recommendations.

L.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for four target areas (Bridge of Earn, Comrie, coupar Angus and Kirrimuir) within the Tay LPD (refer to Table L.2 for details) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table L.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

L.5.3. Planning and resilience actions

Specific local planning and resilience actions are recommended for all target areas within the Tay LPD (refer to Table L.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience actions was

carried out at a national scale using the SEA objectives and criteria presented in Section 4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting. In this LPD, there are also potential benefits to biodiversity, water and landscape through land use planning actions that seek to protect natural features that help to managing flooding.

More specifically within the Tay LPD, the constraints review undertaken and summarised in Table L.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

L.5.4. Flood studies

Flood studies are recommended for 16 target areas within the Tay LPD (see Table L.2 for details). As we do not know what further actions may result from the flood studies, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The constraints review described in Section L.4 identified potential constraints across all SEA topics within the Tay LPD. Constraints due to biodiversity and cultural heritage are found in most target areas; constraints due to water and landscape are also common. The

most highly constrained target areas include Almondbank, Coupar Angus, Dunkeld and Birnam, Blair Athol, Perth and Pitlochry where constraints were identified across almost all the SEA topics.

As the flood studies are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

L.5.5. Flood schemes and works design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for four target areas during Cycle 2 (2022 – 2027), dependent on funding (see Table L.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table L.3, and the effects summarised at an LPD scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section L.4 and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known – but note these can change as the schemes and works go through the design stage.
2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++), through neutral (0), to significant adverse (--) as detailed in Appendix C of the Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health and material assets within the Tay LPD as a result of reduced flood risk to homes, businesses and infrastructure; with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors. Potential adverse effects on biodiversity were identified due to proposals for river defences and storage, conveyance and control type actions where SACs and SSSIs are located within the target areas of Aberfeldy, Pitlochry and Perth. Habitat creation at Pitlochry, however, can help to deliver benefits to biodiversity and water. No significant adverse effects on SEA topics were identified. Further detail can be found in Table L.3.

As the design of these proposed actions are progressed by local authorities/ Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table L.3. SEA significance assessment of flood schemes and works design and implementation*

Target area and associated flood source	Likely actions type	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Aberfeldy <i>River</i>	River defences Storage, conveyance and control	++	-	0	0	+	++	-/+	0
Kirriemuir <i>Surface water</i>	Property flood resilience Storage, conveyance and control (Kerb raising)	++	0	0	0	+	++	0	0
Pitlochry <i>River</i>	River defences Storage, conveyance and control River and floodplain restoration (in-stream wooded structures)	++	-/+	-/+	0	+	++	-/+	0
Perth <i>Surface water</i>	Storage, conveyance and control	++	-	0	0	+	++	0	0
Key findings									
<ol style="list-style-type: none"> 1. Significant positive effects on population and human health due to reduced flood risk and increased wellbeing. 2. Potential for negative effects on biodiversity due to river defences and storage, conveyance and control type actions - in particular where SACs and SSSIs, including the River Tay SAC, located within the target areas of Aberfeldy, Pitlochry and Perth. Conversely, habitat creation at Pitlochry can help to deliver benefits to biodiversity. 3. Potential mixed effects identified for water at Pitlochry with opportunities for enhancement through habitat creation and the supporting of WFD objectives, balanced with the potential adverse effects of actions on the river environment. Overall neutral effects at Perth from discharge of surface water into the Tay: the impacts on water quality are dependent on the design and operation of the channel. 4. No significant effects identified for soil. 5. Positive effects on climatic factors due to improved resilience of properties and infrastructure to future climate change. 6. Significant positive effects on material assets from the protection of property and infrastructure. 7. Overall, no significant effects identified for cultural heritage. Potential for positive effects from the reduction in flood risk to heritage assets balanced with potential negative effects on the setting of historic buildings and structures, however, effects are dependent on the location and design of actions. Mixed effects at Aberfeldy and Pitlochry due to the extent and types of proposed actions. 8. Overall neutral effect on landscape. Potential for negative effects within areas of high landscape value, however effects are dependent on the design and location of the actions. 									

Flood risk management plans 2021-2027: Strategic Environmental Assessment

Environmental Report – Appendix M

Assessment for Forth Local Plan District

July 2021

Every day SEPA works to protect and enhance Scotland's environment, helping communities and businesses thrive within the resources of our planet.

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Scottish Environment Protection Agency
Angus Smith Building
6 Parklands Avenue
Eurocentral
Holytown
North Lanarkshire
ML1 4WQ

Appendix M - Forth Local Plan District (LPD 9)

M.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood risk management plans relevant to the Forth Local Plan District (LPD). This document:

- Provides an overview of the Forth LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Forth LPD. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Forth LPD for which actions are recommended in the Flood risk management plan;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Forth LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

M.2. Flood risk within the Forth LPD and recommended actions

M.2.1 Overview of the Forth LPD

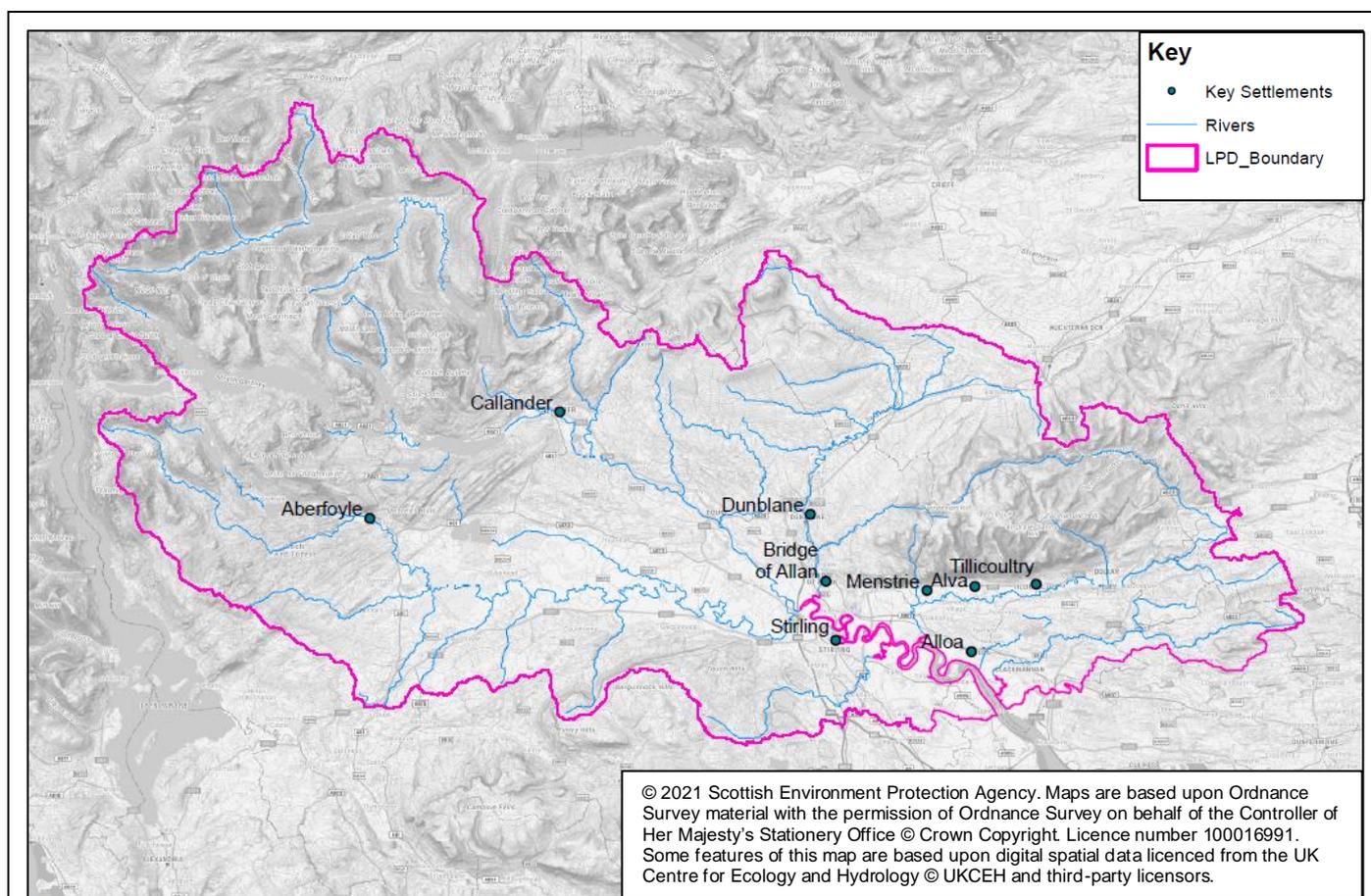


Figure M.1. Extent of the Forth LPD, key water bodies and settlements.

The Forth Local Plan District covers around 1,600 km² and has a population of approximately 130,000 people. It covers an area from the Loch Lomond and Trossachs National Park in the west to the inner Forth in the east. The west is more mountainous, with steeper slopes and valleys. The east includes several urban areas in the low-lying, flatter regions. These include Stirling, Alloa, Bridge of Allan, Dunblane, Alva, Menstrie and Tillicoultry. A short coastline of approximately 74 km lies to the east.

The area is largely rural with a mixture of agriculture, grasslands and woodlands. There are many lochs and reservoirs including Loch Katrine, Loch Venachar, Lake of Menteith, Loch Lubnaig Loch Voil and Gartmorn Reservoir. The largest river is the River Forth and its tributaries the River Teith and River Devon. There are smaller watercourses in the area that drain the Ochil Hills and flow into the River Devon.

M.2.2 Flood risk within the Forth LPD

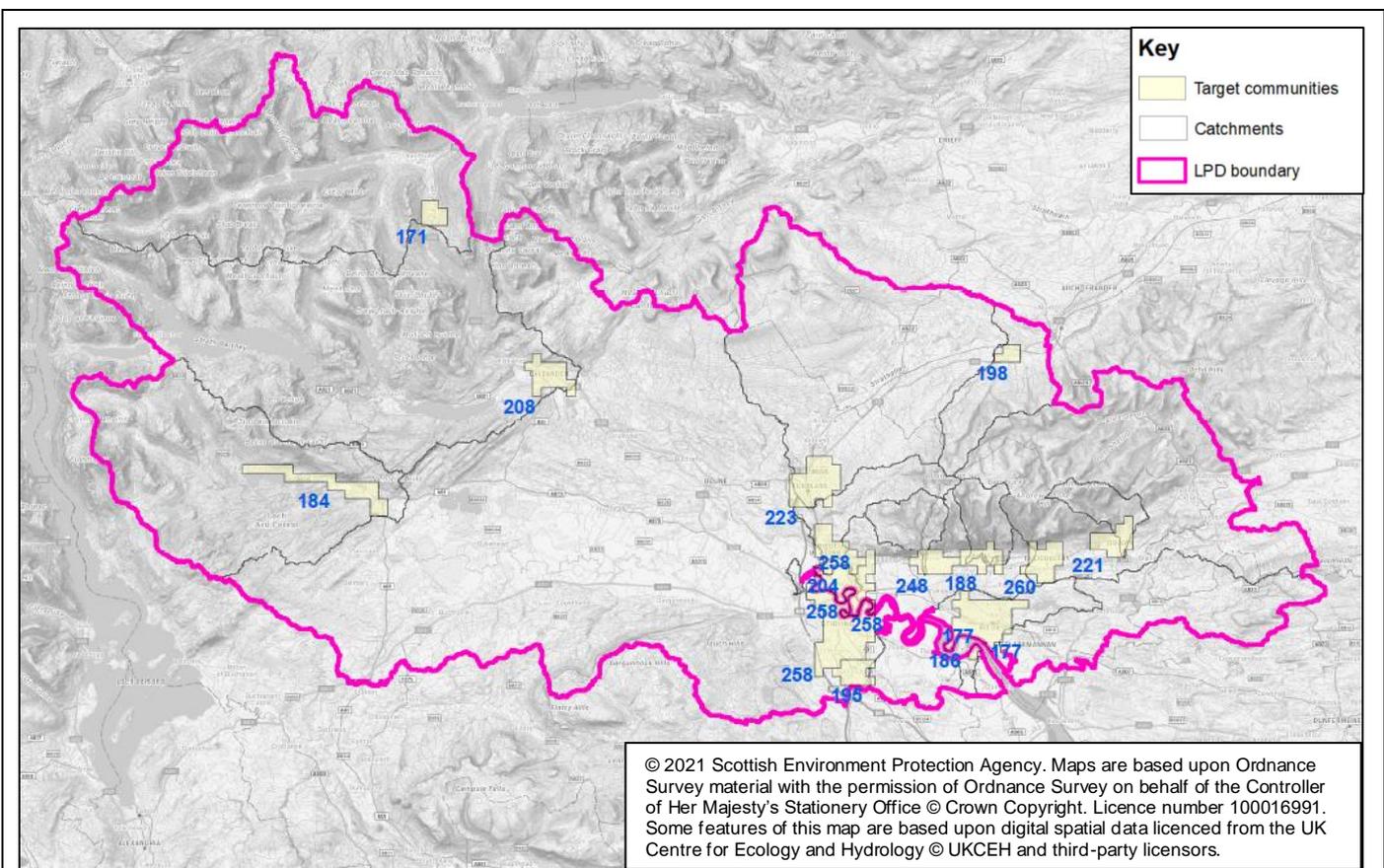


Figure M.2. Extent of the Forth LPD and target areas at risk from flooding

There is a river, surface water and coastal flood risk within the Local Plan District. Currently it is estimated that there are around 15,000 people at risk from flooding and over 8,000 homes and businesses. This may increase to 23,000 people and 13,000 homes and businesses by 2080s

due to climate change. The expected annual cost of flooding over a long period of time is around £6.6 million.

M.2.3 Recommended flood risk management actions within the Forth LPD

Table M.2 sets out the sources of flood risk and types of local actions recommended within the Flood risk management plan for target areas within the Forth LPD, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section M.5 of this Appendix. Section 2.3 of the main Environmental Report lists any actions scoped out of the assessment.

M.3 Forth LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Forth LPD across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland's environment in the main Environmental Report.

This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Forth LPD provided in Section M.4 of this appendix.

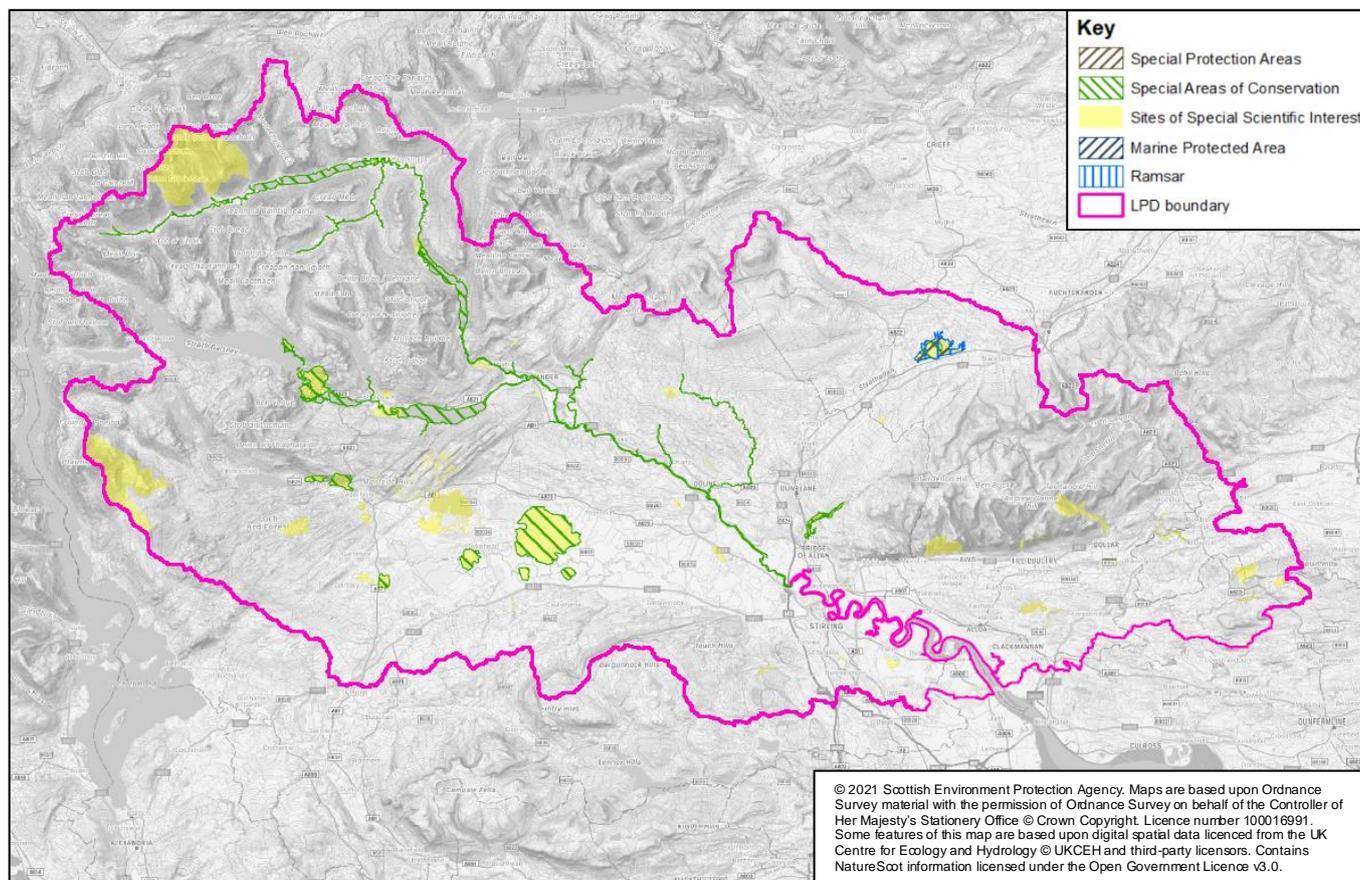
Population and health and material assets

Key information relating to population and human health and material assets are presented in Section M.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding.

Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is good across the LPD with 92% of target areas having at least some greenspace. For over 60% of target areas within this LPD greenspace accounts for over half of total landcover indicating ample provision.

Biodiversity

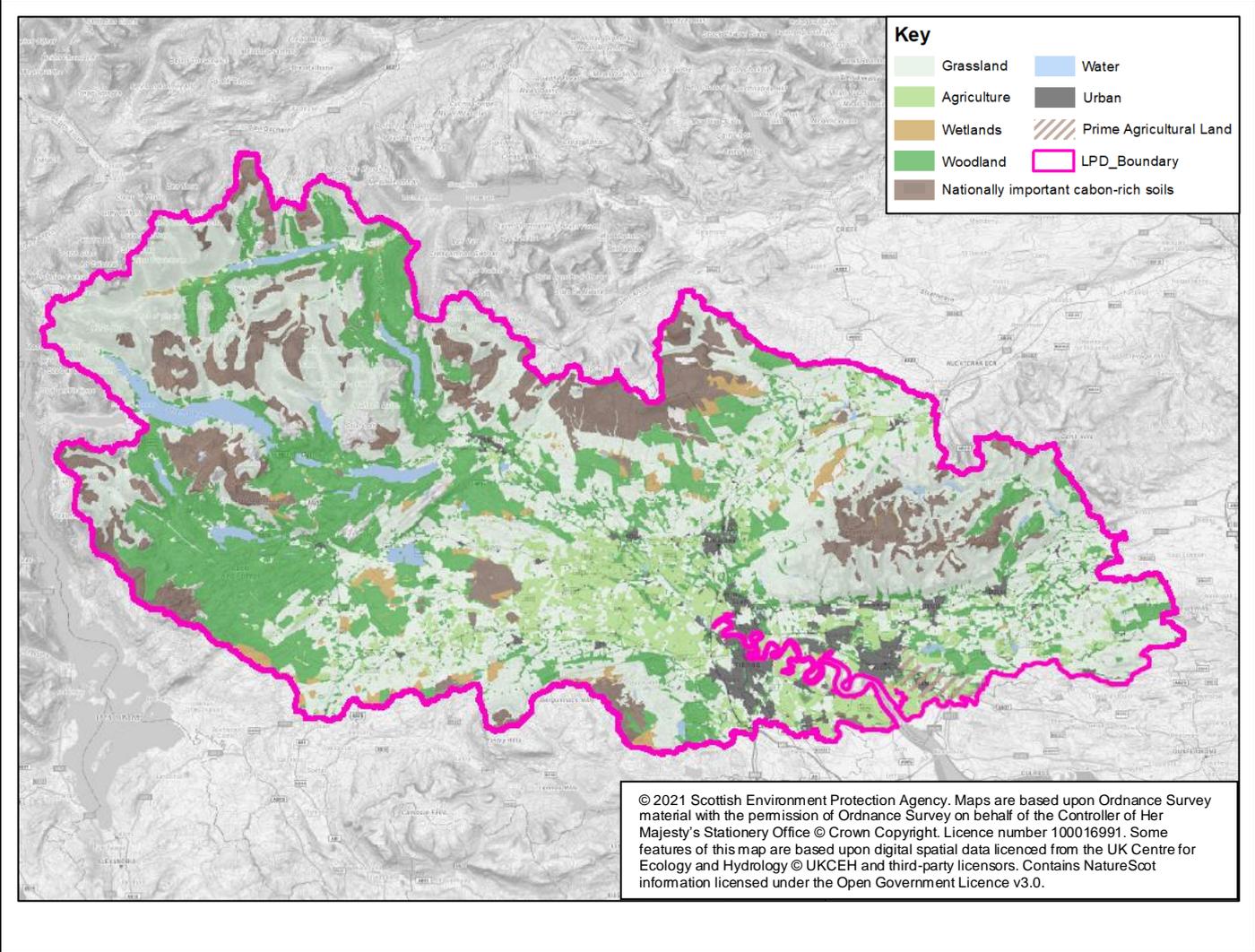


Summary facts for the Forth LPD

Ramsar site	2	There are numerous designated sites distributed across the Forth LPD. These include the River Teith
Special Areas of Conservation (SACs)	5	SAC which flows through much of the catchment; woodlands such as the Trossachs Woods SAC; Flanders Moss SAC and SSSI which contain one of the largest lowland raised bogs in Britain and one of the most intact bogs in Europe; and the Firth of Forth
Special Protection Areas (SPAs)	2	

<p>Sites of Special Scientific Interest (SSSIs)</p>	<p>47</p>	<p>SSSI and SPA downstream of the LPD (not shown on plan).</p>
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Land cover (including soils)

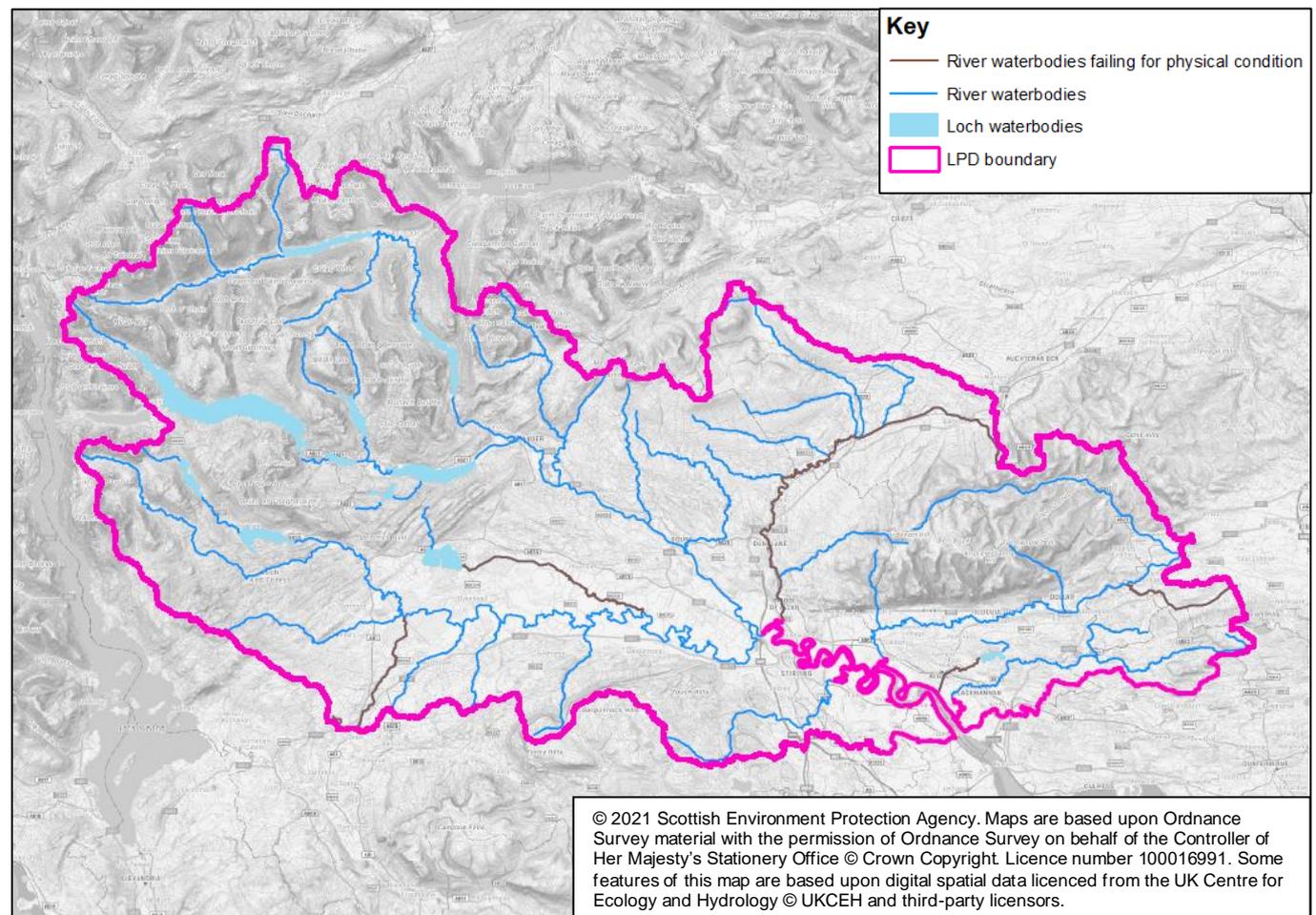


Summary facts for the Forth LPD

Land cover is varied within the LPD. The predominant landcover is natural grassland and cultivated land as well as large areas upland heath and conifer plantation. There are number of large-scale commercial forestry plantations located around the upland areas of Stirling and

towards the western part of Clackmannanshire. There are areas of carbon rich peatland in the upland areas of the LPD.

Water



Summary facts for the Forth LPD

There are approximately 50 river water bodies and 11 lochs in this LPD, as classified under the Water Framework Directive (WFD). The only coastal waterbody that interacts with the LPD is the upper Forth. There are a number of pressures on water bodies across the Local Plan District that may hinder the achievement of their objectives as set out in the relevant River Basin

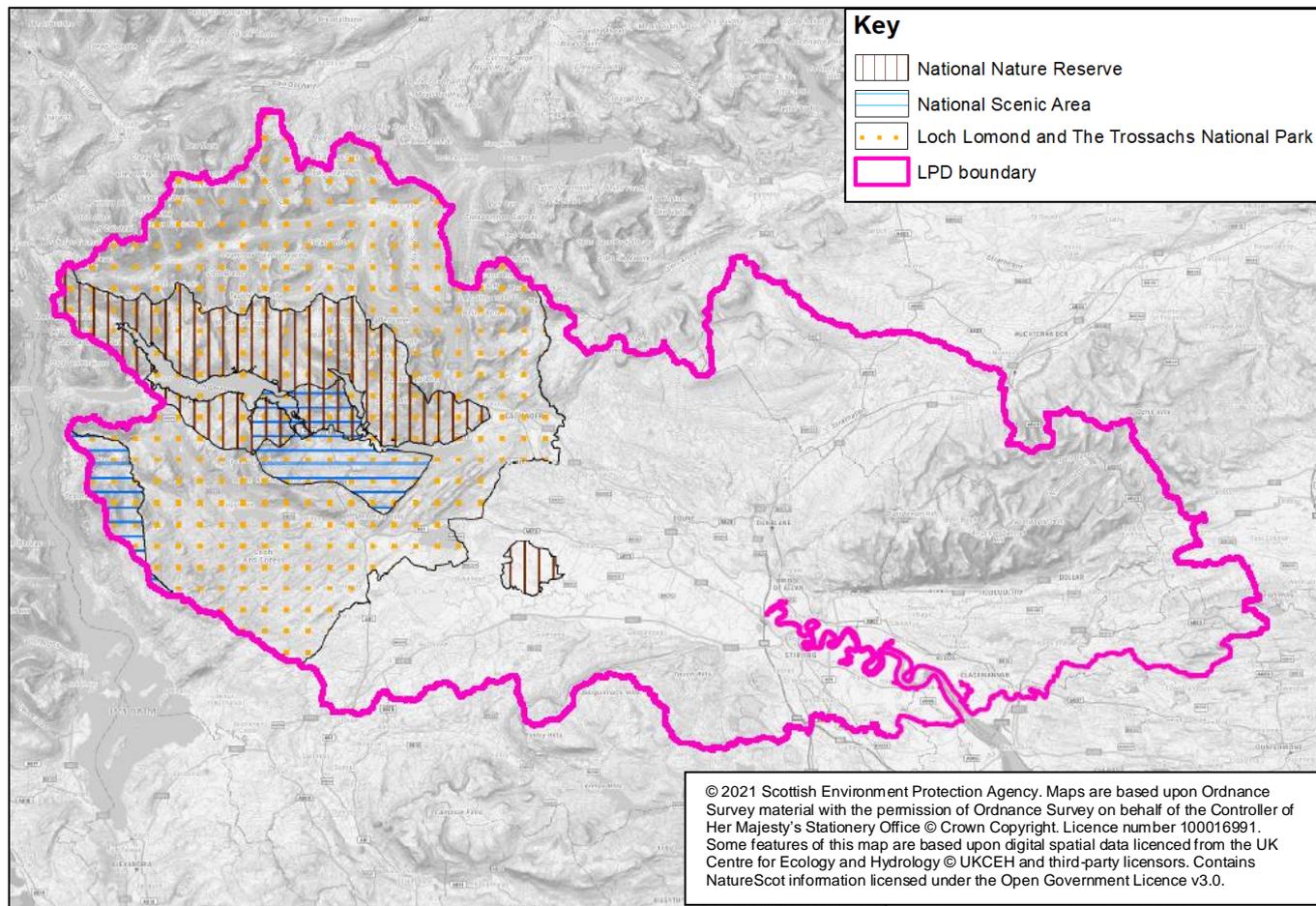
Management Plans. Notably, there are seven water bodies that are failing to meet their WFD objectives because of their physical condition and that flood risk management actions should take into account.

Cultural heritage

Summary facts for the Forth LPD

Battlefield	4	Cultural heritage designations are typically found in the populated areas to the east and south of the LPD. Built heritage designations such as listed buildings are concentrated around the main towns including Stirling, Alloa, Bridge of Allan and Dunblane Blairgowrie. Over 60% of listed buildings are located within target areas.
Conservation Area	34	
Garden and Designed Landscape	18	
Scheduled Monument	150	
Listed Buildings	2070	

Landscape



Summary facts for the Forth LPD

National Nature Reserve	2	There are areas of wild land in the upper catchments to the west in form of the Trossachs and Loch Lomond National Scenic Area and The Loch Lomond and Trossachs National Park. There is also an area of wild land around Ben More and Ben Ledi.
National Scenic Area	2	
National Park	1	

M.4. Key environmental constraints relevant to flood risk management for target areas within the Forth LPD

Informed by the high-level baseline data presented in Section M.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table M.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms population and health and material assets and are not detailed in Table M.2.

Table M.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Population and human health and material assets	Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is high across all target areas.		
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition.		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table M.2 Key constraints within the Forth LPD target areas

Target areas with specific local actions	Reference number (Figure M.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Strathyre	171	River / Surface water		Y	Y		H	L	L	M	H
South Alloa	177	Coastal/ River	Y	Y			H	L	L	H	L
Aberfoyle	184	River / Surface water		Y		Y	H	L	L	H	H
Alloa	186	River / Surface water		Y	Y		H	L	H	H	L
Alva	188	River / Surface water	Y	Y	Y		H	L	L	M	L
Bannockburn	195	Surface water	Y	Y	Y		H	L	L	H	L
Blackford	198	River		Y		Y	M	L	H	L	L
Bridge of Allan	204	River / Surface water		Y	Y	Y	H	L	H	H	L
Callander	208	River / Surface water		Y	Y	Y	H	L	L	H	H
Dollar	221	River / Surface water		Y	Y		H	L	L	H	L

Target areas with specific local actions	Reference number (Figure M.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Dunblane	223	River / Surface water		Y	Y	Y	M	L	H	H	L
Menstrie	248	River / Surface water		Y	Y		H	L	L	L	L
Stirling	258	Coastal/ River/ Surface water		Y	Y	Y	H	L	H	H	H
Tillicoultry	260	River / Surface water	Y	Y	Y	Y	M	L	H	H	L

M.5. Environmental assessment of the local flood risk management actions for the Forth LPD

M.5.1 Introduction

For the purposes of the SEA assessment the actions recommended in the Flood risk management plan were categorised into four types as listed in Table M.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Forth LPD, identifying potential effects and key recommendations.

M.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for 4 target areas within the Forth LPD (refer to Table M.2 for details) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table M.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

M.5.3. Planning and resilience actions

Specific local planning and resilience actions are recommended for 14 target areas within the Forth LPD (refer to Table M.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience actions was carried out at a national scale using the SEA objectives and criteria presented in Section

4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting. In this LPD, there are also potential benefits to biodiversity, water and landscape through land use planning actions that seek to protect natural features that help to managing flooding.

More specifically within the Forth LPD, the constraints review undertaken and summarised in Table M.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

M.5.4. Flood studies

Flood studies are recommended for 11 target areas, within the Forth LPD (see Table M.2 for details). As we do not know whether the flood studies will, in future, lead any physical actions, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The constraints review described in Section M.4 identifies potential constraints across all SEA topics within the target areas within the Forth LPD, except soil. Constraints due to biodiversity and cultural heritage are found in most target areas. The most highly constrained target area in the Forth LPD is Stirling, where constraints were identified across almost all the SEA topics.

As the flood studies are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

M.5.5. Flood schemes and works design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for three target areas during Cycle 2 (2022 – 2027), dependent on funding (see Table M.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table M.3, and the effects summarised at an LPD scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section M.4 and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known – but note these can change as the schemes and works go through the design stage.
2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health within the Forth LPD as a result of reduced flood risk to homes, businesses and infrastructure, with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors, material assets and landscape. Mixed effects were identified on biodiversity and water: natural flood management and other actions are proposed that may help to restore habitats and improve water quality; conversely, river defences and storage, conveyance and control actions could adversely affect natural processes. No significant adverse effects on SEA topics were identified. Further detail can be found in Table M.3.

As the design of these proposed actions are progressed by local authorities/ Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table M.3 – SEA significance assessment of proposed flood schemes and works design and implementation*

Target area and associated flood study	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Aberfoyle River	River defences Storage, conveyance and control River and floodplain restoration	++	-/+	+	+	+	++	0	0/+
Blackford River	River defences Storage, conveyance and control	++	-/+	-/+	0	+	++	0	0/+

Target area and associated flood study	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
	River and floodplain restoration								
Tillicoultry River	River defences Storage, conveyance and control (bridge and crossing removal)	++	0 / +	-/+	0	+	++	0	0
<p>Key findings</p> <ol style="list-style-type: none"> 1. Significant positive effects on population and human health due to reduced flood risk and increased wellbeing. 2. Mixed effects on biodiversity. Potential for negative effects on biodiversity due to river defences and storage, conveyance and control type actions in particular where SACs and/ or SSSIs are located within the target areas of Aberfoyle and Blackford. However, also potential for beneficial effects: habitat creation in the Aberfoyle and Blackford 									

Target area and associated flood study	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<p>catchments; storage, conveyance and control actions at Blackford; and through improving fish passage by removal of bridges and crossings in Tillicoultry.</p> <ol style="list-style-type: none"> 3. Potential mixed effects identified for water, including in Blackford and Tillicoultry where one or more waterbodies within the catchments are failing to meet their 2027 WFD objectives as a result of their physical condition. Habitat restoration in Aberfoyle and Blackford catchments can deliver benefits to water quality, flow and river morphology. Opportunities to improve regulation of water flow through defences and channel improvements and the supporting of WFD objectives, balanced with the potential adverse effects of these actions on the river environment. 4. Potential positive effects on soil in Aberfoyle due to catchment peatland restoration. 5. Positive effects on climatic factors due to improved resilience of properties and infrastructure to future climate change. 6. Significant positive effects on material assets from the protection of property and infrastructure. No significant effects identified for cultural heritage. Potential for positive effects from the reduction in flood risk to heritage assets balanced with potential for negative effects on the setting of historic buildings and structures, however, effects are dependent on the location and design of action 7. Overall neutral effect on landscape, with potential positive effects though habitat restoration in the Aberfoyle and Blackford catchments. There are also potential for negative effects if flood defences located in an area of high landscape value. The effects are dependent on the location and design of the action. 									

Flood risk management plans 2021-2027: Strategic environmental assessment

Environmental Report – Appendix N

Assessment for Forth Estuary Local Plan District

July 2021

Every day SEPA works to protect and enhance Scotland's environment, helping communities and businesses thrive within the resources of our planet.

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Scottish Environment Protection Agency
Angus Smith Building
6 Parklands Avenue
Eurocentral
Holytown
North Lanarkshire
ML1 4WQ

Appendix N - Forth Estuary Local Plan District (LPD 10)

N.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood risk management plans relevant to the Forth Estuary Local Plan District (LPD). This document:

- Provides an overview of the Forth Estuary LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Forth Estuary LPD. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Forth Estuary LPD for which actions are recommended in the Flood risk management plan;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Forth Estuary LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

N.2. Flood risk within the Forth Estuary LPD and recommended actions

N.2.1 Overview of the Forth Estuary LPD

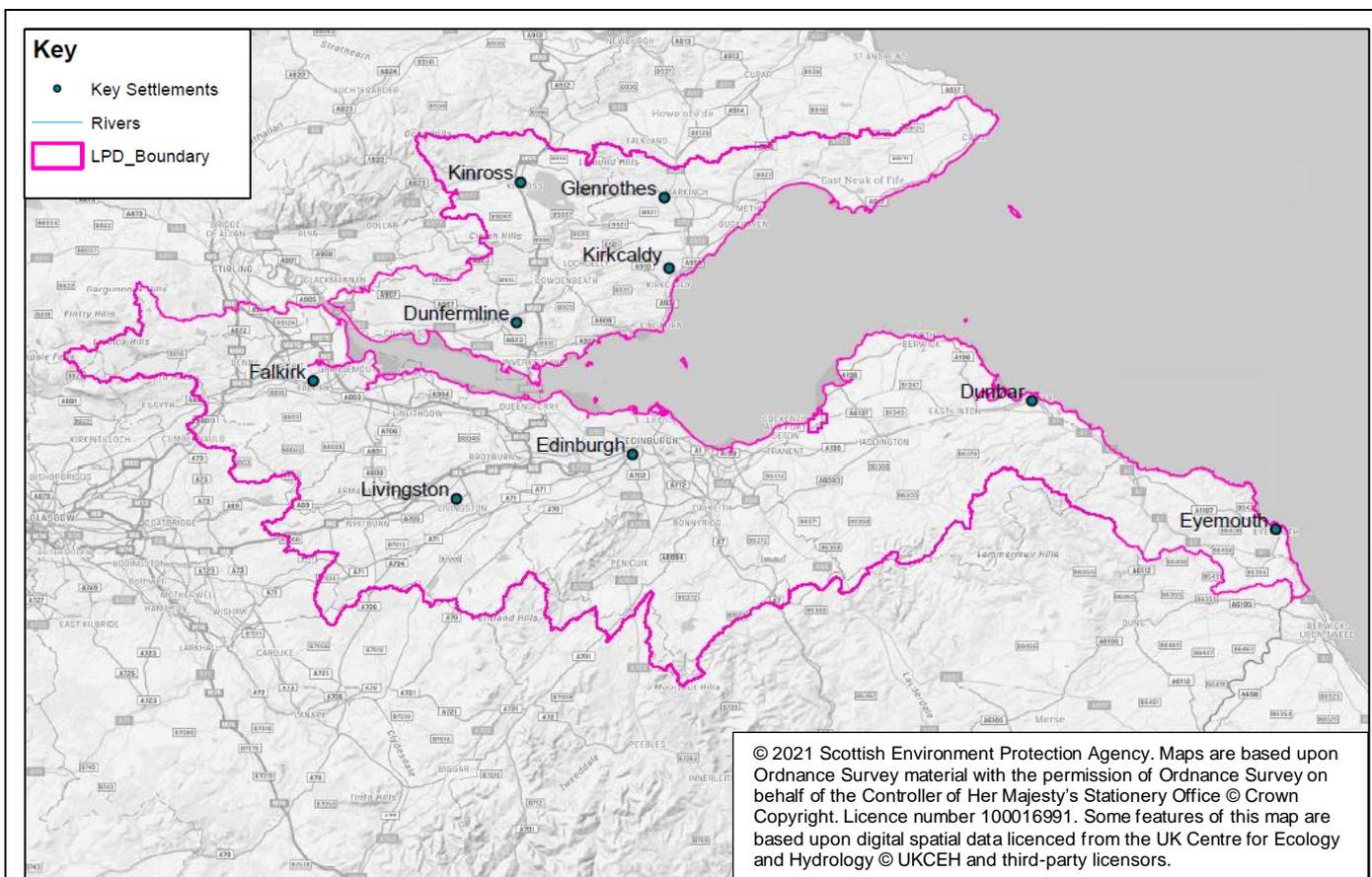


Figure N.1. Extent of the Forth Estuary LPD, key water bodies and settlements

The Forth Estuary LPD covers around 3,300 km² and has a population of approximately 1.4 million people. It spans an area north and south of the Forth Estuary which is mostly low-lying and urbanised, and includes part of Scotland's Central Belt. The LPD has 380 km of coastline that includes Fife Ness, the Firth of Forth and the Berwickshire coast. Urban areas include the City of Edinburgh, Dunbar, Dunfermline, Eyemouth, Falkirk, Glenrothes, Kinross, Kirkcaldy and Livingston.

There are large areas of agricultural land, with more natural grasslands and forest to the south and west. A number of lochs and reservoirs are present including Loch Leven and Loch Ore in

the north and the Carron Valley Reservoir in the west. Gladhouse Reservoir and the reservoirs of the Pentland Hills are in the south of the Local Plan District. The main rivers include the River Tyne, River Esk, Water of Leith, River Almond, River Leven and River Carron.

N.2.2 Flood risk within the Forth Estuary LPD

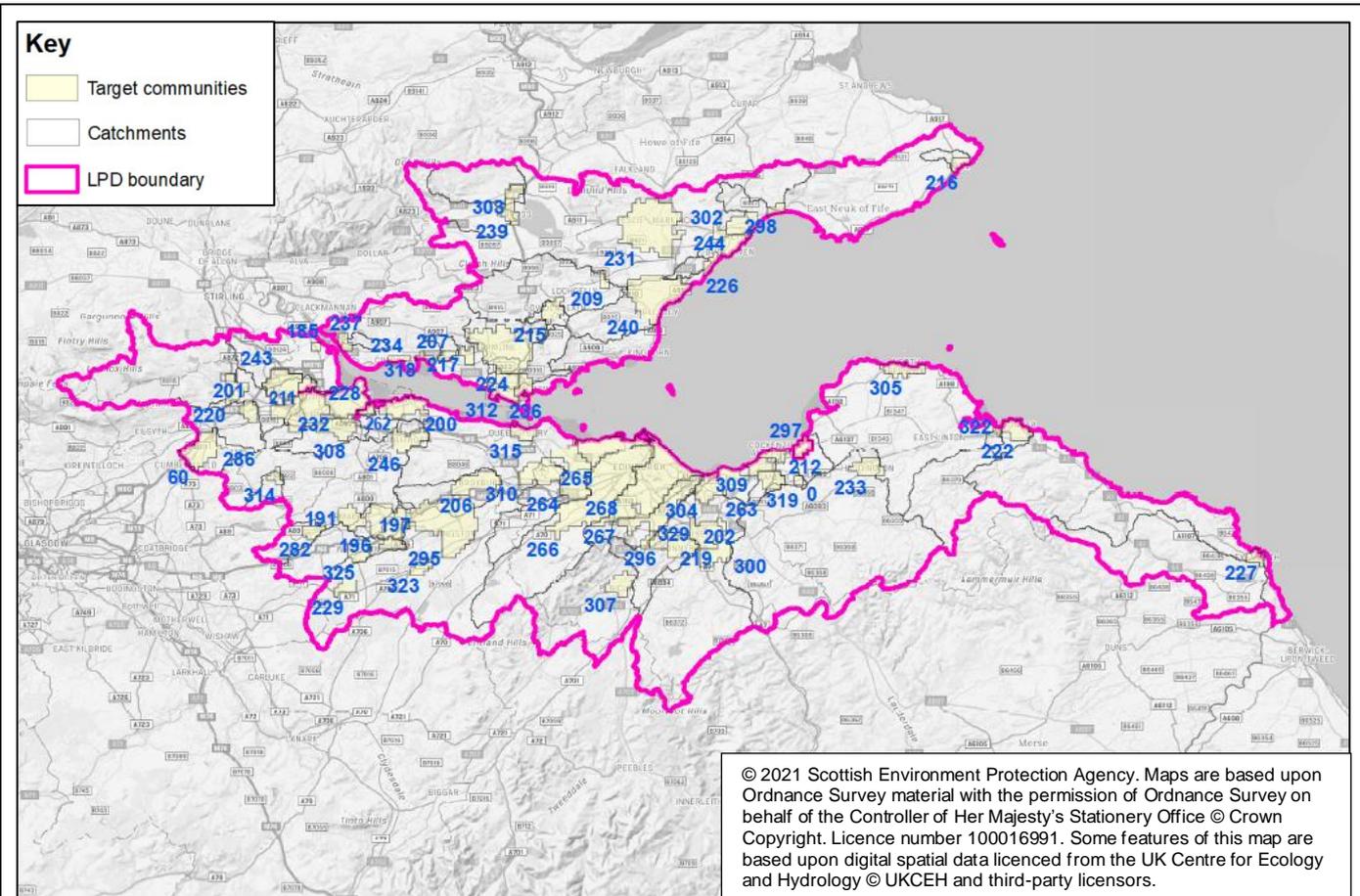


Figure N.3. Extent of the Forth Estuary LPD and target areas at risk from flooding

There is river, surface water and coastal flood risk. Currently it is estimated that there are around 115,000 people and 65,000 homes and businesses at risk from flooding. This may increase to 160,000 people and 89,000 homes and businesses by the 2080s due to climate change. The expected annual cost of flooding over a long period of time is around £44.4 million.

N.2.3 Recommended flood risk management actions within the Forth Estuary LPD

Table N.2 sets out the sources of flood risk and types of actions recommended within the Flood risk management plan for target areas within the Forth Estuary LPD, based on the categories described in Section 2.3 of the main Environmental Report. All scoped in actions are the subject of the environmental assessment within Section N.5 of this Appendix. Section 2.3 of the main Environmental Report lists any actions scoped out of the assessment.

N.3 Forth Estuary LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Forth Estuary LPD across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland's environment in the main Environmental Report.

This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Forth Estuary LPD provided in Section N.4 of this appendix.

Population and health and material assets

Key information relating to population and human health and material assets are presented in Section N.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding.

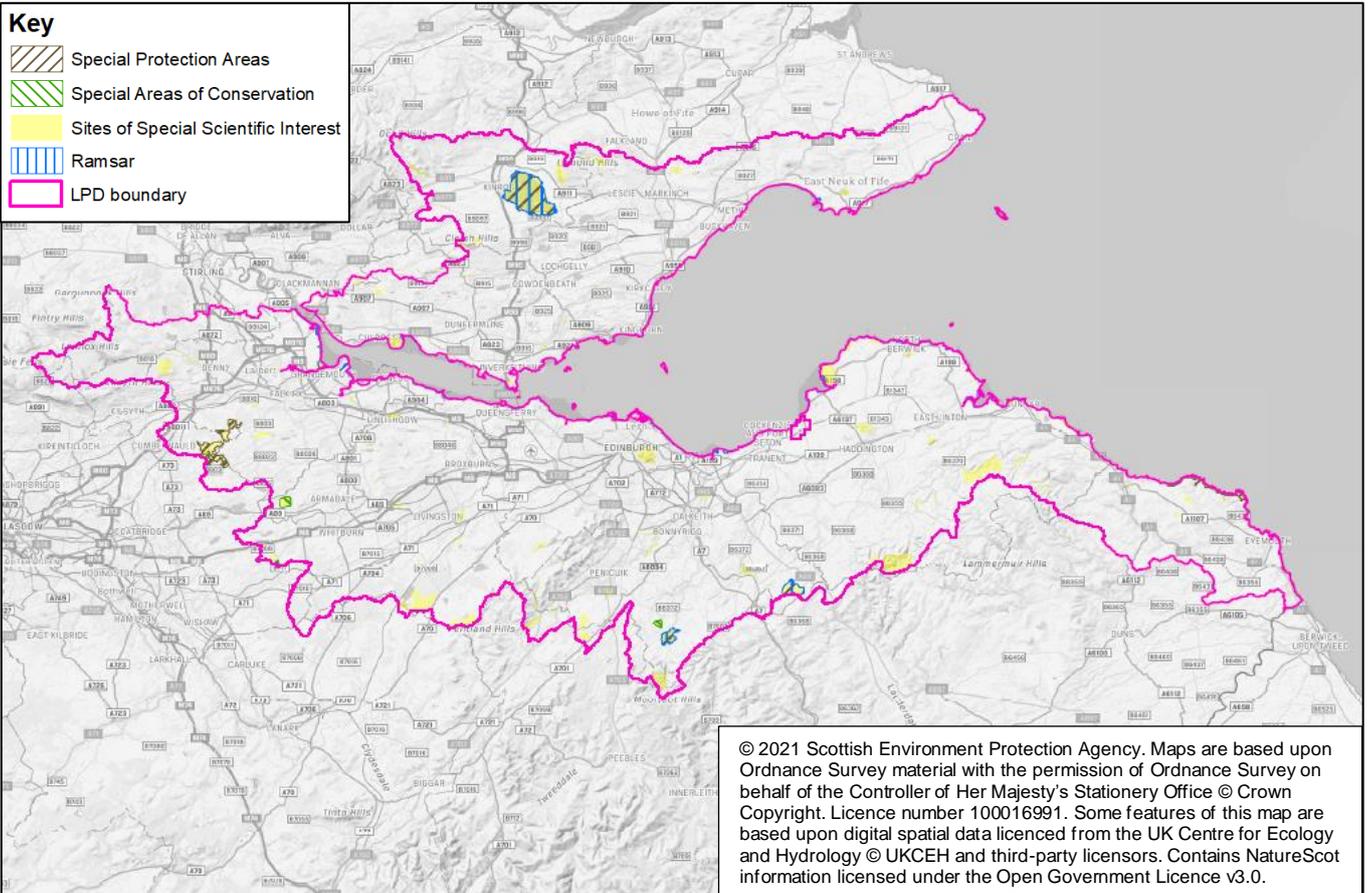
Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is good across the LPD with 100% of target areas having at least some greenspace. For over 60% of target areas within this LPD, greenspace accounts for over half of total landcover indicating ample provision.

Biodiversity

Key

-  Special Protection Areas
-  Special Areas of Conservation
-  Sites of Special Scientific Interest
-  Ramsar
-  LPD boundary

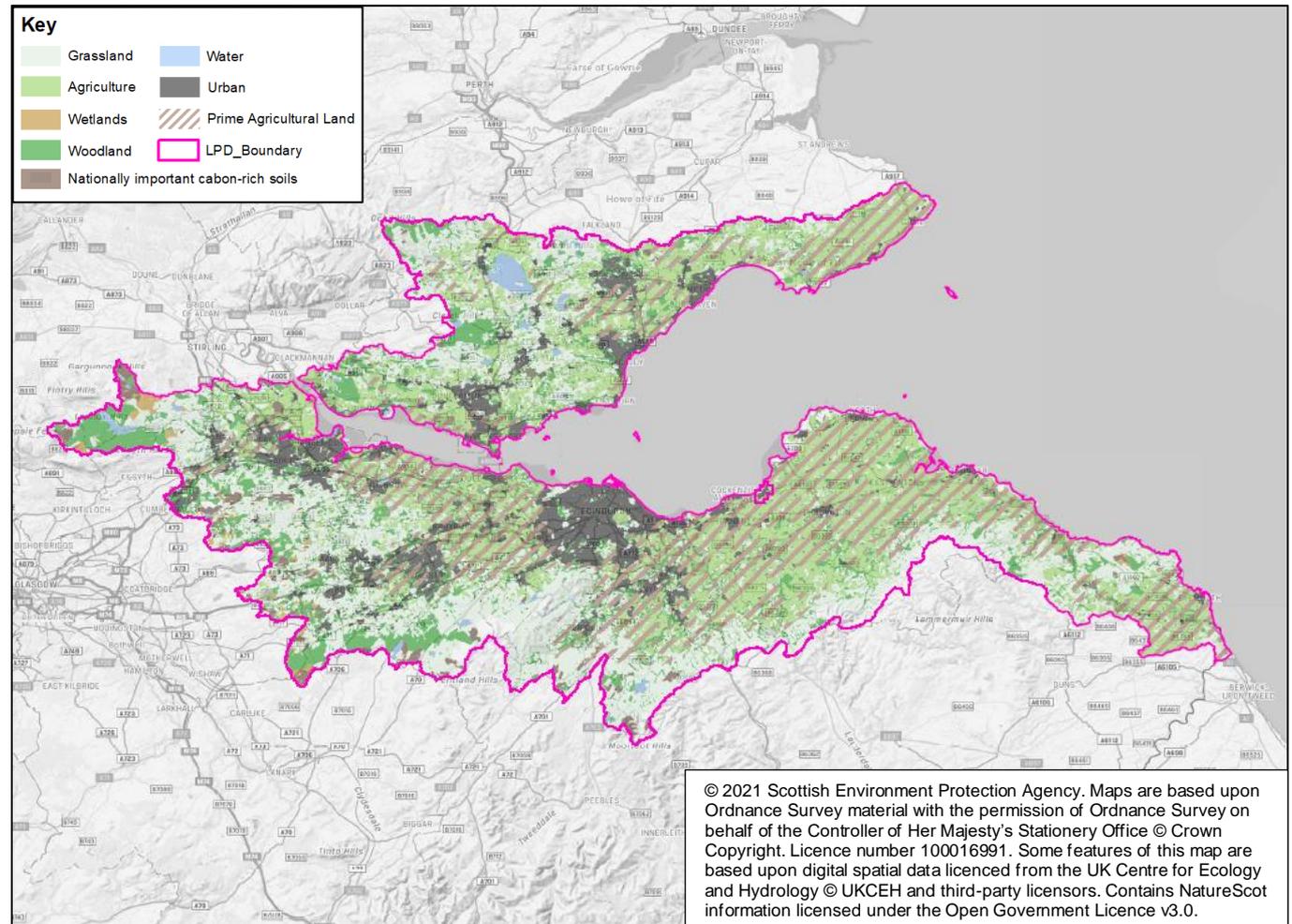


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Summary facts for the Forth Estuary LPD

Ramsar	4	There are numerous designated sites in the Forth Estuary LPD, dispersed throughout the wider catchments and coastal area. Notably, the Forth Islands and much of the Firth of Forth coastline is designated as SPAs and SSSI for birds and coastal habitats (not shown on plan).
Special Areas of Conservation (SACs)	8	
Special Protection Areas (SPAs)	8	
Sites of Special Scientific Interest (SSSIs)	92	

Land cover (including soils)

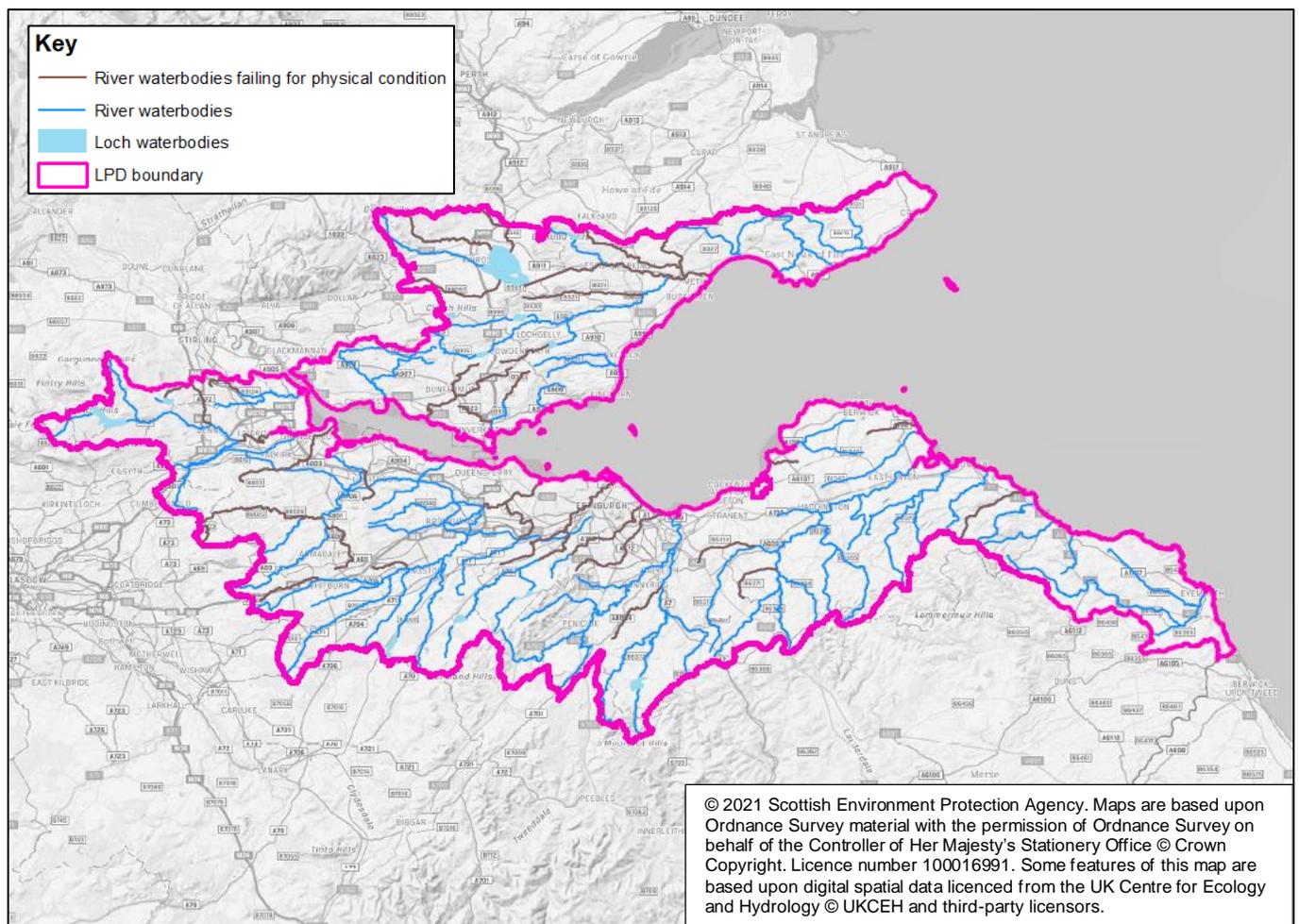


Summary facts for the Forth Estuary LPD

The predominant landcover is cultivated land and there are large areas of high-grade agricultural land across the LPD. The Forth Estuary is an important agricultural area used for cereals, other crops and horticulture, particularly in the south of the LPD. There are also large areas for grassland based farming and rough grazing in the upland areas.

The LPD has significant urban land cover including the City of Edinburgh, Scotland's capital. Coastal areas are variable; the natural substrate is mainly soft with sand dune systems, mud flats and saltmarsh present. There are also many hard-coastal protection structures present.

Water



Summary facts for the Forth Estuary LPD

There are approximately 100 river water bodies and 12 lochs in this LPD, as classified under the Water Framework Directive (WFD). Coastal waterbodies within the LPD include the Lower Forth Estuary and the coastal water bodies that form the Firth of Forth. Coastal areas at risk of erosion will be of particular concern when considering flood risk management actions.

There are a number of pressures on water bodies across the Local Plan District that may hinder the achievement of their objectives as set out in the relevant River Basin Management Plans.

Notably, there are 36 water bodies located throughout the LPD that are failing to meet their

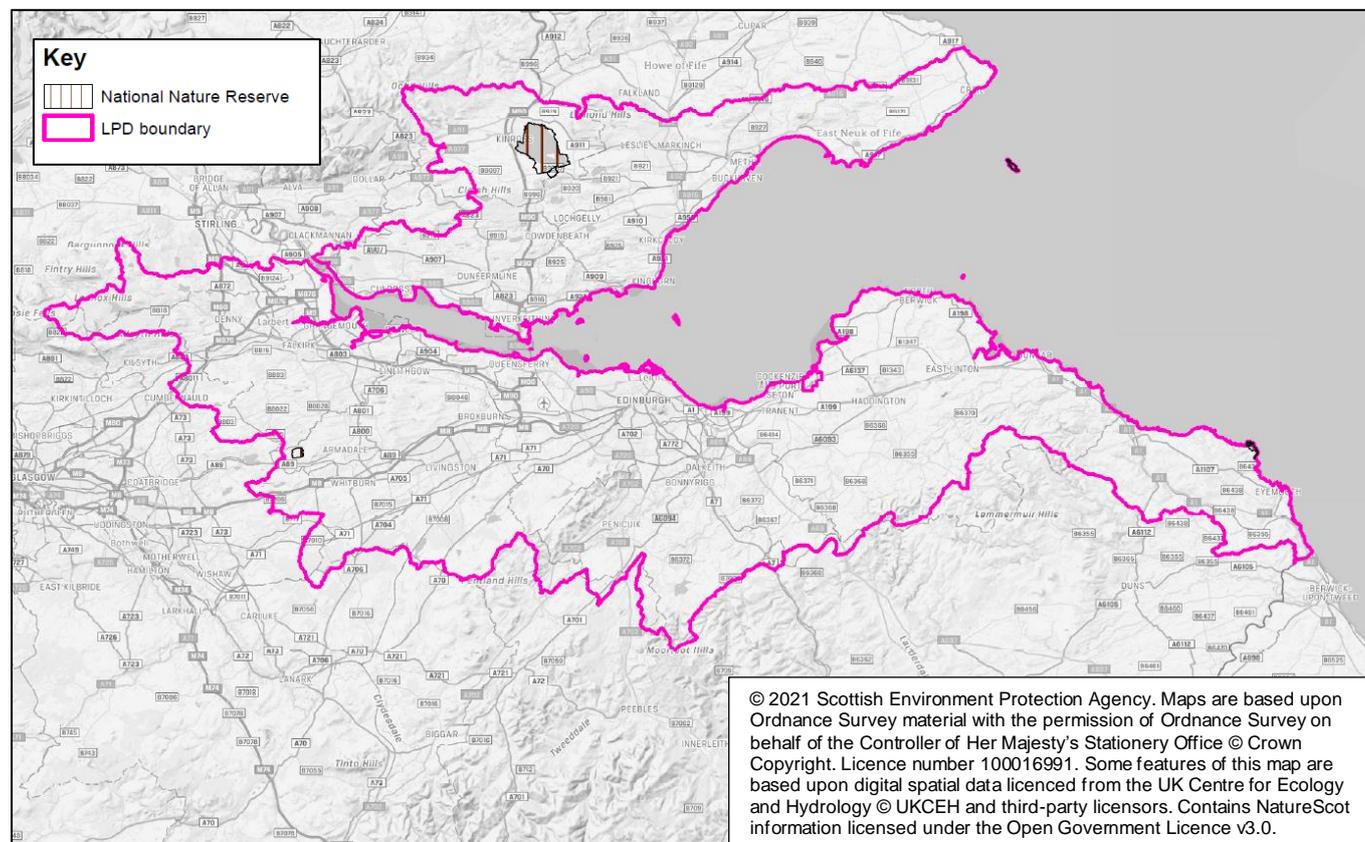
WFD objectives because of their physical condition and that flood risk management actions should take into account.

Cultural heritage

Summary facts for the Highland and Argyll LPD

Battlefield	12	<p>The area is rich in historic sites, including scheduled monuments, gardens and designed landscapes and two UNESCO World Heritage Sites in Edinburgh and the Antonine Wall.</p> <p>Cultural heritage designations are spread out across much of the LPD with areas of dense concentration, particularly within and around Edinburgh. Over 70% of listed buildings fall within target areas.</p>
Conservation Area	159	
Garden and Designed Landscape	83	
Scheduled Monument	748	
World Heritage Site	2	

Landscape



Summary facts for the Forth Estuary LPD

National Nature Reserve

4

There are some areas of valued landscape within the LPD in the form of four national nature reserves, located in discrete locations across the LPD.

N.4. Key environmental constraints relevant to flood risk management for target areas within the Forth Estuary LPD

Informed by the high-level baseline data presented in Section N.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table N.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms population and health and material assets and are not detailed in Table N.2.

Table N.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	objectives as a result of their physical condition.		
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table N.2. Target areas at risk from flooding, local actions and key constraints within the Forth Estuary LPD.

Target area areas with specific local actions	Reference number (Figure N.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Airth	185	Coastal		Y	Y		L	L	L	H	L
Armadale	191	Surface water	Y		Y		L	L	L	L	L
Bathgate	196	River / Surface water	Y		Y		H	L	H	M	L
Blackburn	197	River / Surface water			Y		M	M	H	L	L
Bo'ness	200	Coastal / Surface water	Y	Y	Y		H	L	L	H	L
Bonnybridge	201	River / Surface water		Y	Y		M	H	L	H	L
Bonnyrigg	202	River / Surface water	Y		Y		M	H	L	H	L
Broxburn	206	River / Surface water	Y		Y	Y	M	H	L	H	L
Cairneyhill	207	River / Surface water	Y	Y	Y		L	H	L	L	L
Cardenden and Auchterderran	209	River / Surface water	Y	Y	Y		M	M	H	L	L
Carron and Carronshore	211	Coastal/ River/ Surface water	Y	Y	Y	Y	M	M	H	L	L

Target area areas with specific local actions	Reference number (Figure N.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Cockenzie	212	Coastal/ River/ Surface water		Y	Y		H	H	L	H	L
Cowdenbeath	215	River / Surface water		Y	Y		H	L	H	M	L
Crail	216	River	Y				H	H	L	H	L
Crossford	217	Surface water		Y	Y		L	L	H	M	L
Dalkeith	219	River / Surface water			Y		L	L	L	H	L
Denny and Dunipace	220	River / Surface water		Y	Y		M	M	H	L	L
Dunbar	222	Coastal/ River/ Surface water		Y	Y		H	H	L	H	L
Dunfermline	224	River / Surface water		Y	Y		L	L	H	H	L
East Wemyss	226	Coastal/ River		Y	Y		H	H	L	H	L
Eyemouth	227	Coastal/ River		Y	Y		H	H	L	H	L
Falkirk	228	River / Surface water		Y	Y	Y	M	M	H	H	L
Fauldhouse	229	Surface water	Y		Y		L	L	L	L	L

Target area areas with specific local actions	Reference number (Figure N.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Glenrothes, Markinch and Kinglassie	231	Surface water		Y	Y		L	L	H	H	L
Grangemouth west	232	Coastal/ River/ Surface water		Y	Y	Y	H	M	H	H	L
Haddington	233	River / Surface water		Y	Y	Y	M	H	H	H	L
Culross	234	Coastal / Surface water		Y	Y	Y	H	L	L	H	L
Inverkeithing	236	Coastal/ River		Y	Y		H	H	H	H	L
Kincardine	237	Coastal/ River		Y	Y	Y	M	L	L	H	L
Kinross	239	River / Surface water	Y	Y	Y	Y	H	H	L	H	H
Kirkcaldy	240	Coastal/ River/ Surface water	Y	Y	Y		H	L	L	H	L
Larbert and Stenhousemuir	243	River / Surface water		Y	Y	Y	H	H	H	M	L
Leven	244	River / Surface water		Y	Y		H	H	H	H	H
Linlithgow	246	River / Surface water	Y		Y		H	M	H	H	H
Grangemouth east	262	Coastal/ River		Y	Y	Y	H	M	H	L	H

Target area areas with specific local actions	Reference number (Figure N.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Dalkeith (north east)	263	Surface water			Y		L	L	L	H	L
Edinburgh west	264	River / Surface water		Y	Y		H	H	H	H	L
Edinburgh north	265	Coastal / Surface water		Y	Y		H	L	H	H	L
Edinburgh Water of Leith	266	River / Surface water		Y	Y	Y	H	M	H	H	L
Edinburgh Braid Burn	267	Coastal/ River/ Surface water		Y	Y		H	L	H	H	L
Edinburgh Niddrie Burn and Burdiehouse	268	River / Surface water	Y	Y	Y		L	H	H	H	L
Blackridge	282	River / Surface water	Y		Y	Y	M	L	L	L	H
Cumbernauld East	286	River / Surface water			Y		M	M	L	H	L
Livingston and Mid Calder	295	Surface water	Y		Y	Y	H	L	H	H	L
Loanhead	296	Surface water			Y		L	L	L	H	L
Longniddry	297	Coastal/ River			Y		H	H	L	H	L

Target area areas with specific local actions	Reference number (Figure N.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Lower Largo and Lundin Links	298	Coastal/ River		Y	Y		H	H	L	H	L
Newtongrange	300	Surface water			Y		L	L	H	H	L
Methil and Buckhaven	302	Coastal / Surface water		Y	Y		H	L	H	H	L
Milnathort	303	River / Surface water		Y	Y	Y	M	L	H	M	H
Musselburgh	304	Coastal/ River/ Surface water		Y	Y	Y	H	H	H	H	L
North Berwick	305	Coastal		Y	Y		H	L	L	H	L
Penicuik	307	River / Surface water			Y		M	H	L	H	L
Polmont, Redding and Westquarter	308	River / Surface water		Y	Y		M	M	H	H	L
Prestonpans	309	Coastal / Surface water		Y	Y		H	L	L	H	L
Edinburgh Airport	310	River / Surface water		Y	Y		L	H	H	H	L
Rosyth	312	Surface water		Y	Y		H	L	H	H	L

Target area areas with specific local actions	Reference number (Figure N.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Slamannan	314	River / Surface water	Y	Y	Y		L	L	L	M	L
South Queensferry	315	Coastal	Y		Y		H	L	L	H	L
Torryburn	318	Coastal		Y	Y		H	L	L	H	L
Tranent	319	River / Surface water			Y		L	H	L	H	L
West Barns	322	Coastal / River		Y	Y		M	H	L	H	L
West Calder	323	Surface water			Y		L	L	L	M	L
Whitburn	325	River / Surface water	Y		Y		L	L	L	L	L
Straiton	329	Surface water			Y		L	L	L	L	L
Macmerry	31900	Surface water			Y		L	L	L	L	L

N.5. Environmental assessment of the local flood risk management actions for the Forth Estuary LPD

N.5.1 Introduction

For the purposes of the SEA assessment the actions recommended in the Flood risk management plan were categorised into four types as listed in Table N.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Forth Estuary LPD, identifying potential effects and key recommendations.

N.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for 19 target areas within the Forth Estuary LPD (refer to Table N.2 for details) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table N.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

N.5.3. Planning and resilience actions

Specific local planning and resilience actions are recommended for 44 target areas within the Forth Estuary LPD (refer to Table N.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience actions was carried out at a national scale using the SEA objectives and criteria presented in Section

4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting.

More specifically within the Forth Estuary LPD, the constraints review undertaken and summarised in Table N.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

N.5.4. Flood studies

Flood studies are recommended for all but three target areas within the Forth Estuary LPD (see Table N.2 for details). As we do not know what further actions may result from the flood studies, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The constraints review described in Section N.4 identified potential constraints across all SEA topics, albeit to a lesser degree for landscape, within the Forth Estuary LPD. The most highly constrained target areas identified in the Forth Estuary LPD include Inverkeithing, Kinross, Leven, Linlithgow, Edinburgh West and Musselburgh where constraints are identified across almost all the SEA topics.

As the flood studies are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

N.5.5. Flood schemes and works at design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for three target areas during Cycle 2 (2022 – 2027), dependent on funding (see Table N.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table N.3, and the effects summarised at an LPD scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section N.4 and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known – but note these can change as the schemes and works go through the design stage.
2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health and material assets within the Forth Estuary LPD as a result of reduced flood risk to homes, businesses and infrastructure; with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors. No significant adverse effects were identified, although potential negative effects on biodiversity were identified for two target areas due to the proximity of nationally/internationally important conservation sites. Further detail can be found in Table N.3.

As the design of these proposed actions are progressed by local authorities/ Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table N.3 – SEA significance assessment of schemes and works design and implementation*

Target area and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Culross <i>Coastal</i>	Coastal defences Storage, conveyance and control	++	-	-/0	0	+	++	0	0
Broxburn <i>River and surface water</i>	Storage, conveyance and control	++	0	0	0	+	++	0	0
Edinburgh Water of Leith <i>River</i>	River defences	++	-	-/+	0	+	++	0	0
Key findings									

Target area and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<ol style="list-style-type: none"> 1. Significant positive effects on population and human health due to reduced flood risk and increased wellbeing. 2. Potential for negative effects on biodiversity due to coastal and river defences and storage, conveyance and control type actions in particular where Ramsar sites, SPAs and SSSIs are located within the target areas or coastal areas of Culross and Edinburgh Water of Leith. 3. Mixed effects identified for the water environment. Potential for adverse effects at Culross from coastal defences on coastal morphology as defences may interfere with coastal processes altering rates of erosion and deposition. Mixed effect at Edinburgh Water of Leith from river defence actions, where one or more waterbodies within the catchments are failing to meet their 2027 WFD objectives as a result of their physical condition. Opportunities for enhancement through river defence actions by regulating water flow and reducing erosion through and the supporting of WFD objectives, balanced with the potential adverse effects of actions on the river environment. 4. No significant effects on soil. 5. Positive effects on climatic factors due to improved resilience of properties and infrastructure to future climate change. 6. Significant positive effects on material assets from the protection of property and infrastructure. 									

Target area and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<p>7. No significant effects identified for cultural heritage. Potential for positive effects from the reduction in flood risk to heritage assets balanced with potential negative effects on the setting of historic buildings and structures. Effects would be dependent on the location and design of actions.</p> <p>8. Overall neutral effect on landscape. No target areas contain nationally important landscape areas, but there are potential for negative effects if flood defences located in a local landscape area. Effects would be dependent on the location and design of actions.</p>									

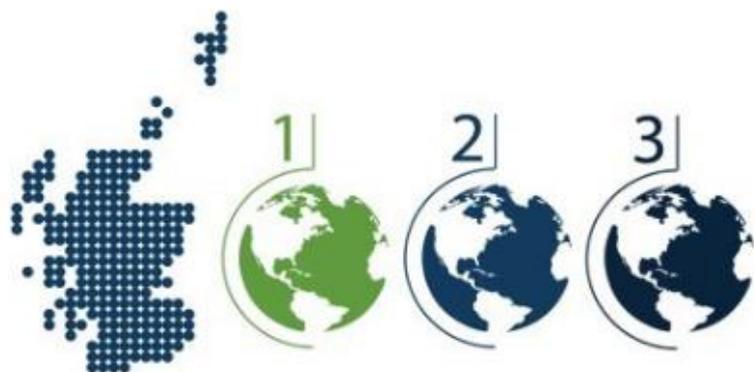
Flood Risk Management Plans 2021-2027: Strategic Environmental Assessment

Environmental Report – Appendix O

Assessment for Clyde and Loch Lomond Local Plan District

July 2021

Every day SEPA works to protect and enhance Scotland's environment, helping communities and businesses thrive within the resources of our planet.



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Scottish Environment Protection Agency
Angus Smith Building
6 Parklands Avenue
Eurocentral
Holytown
North Lanarkshire
ML1 4WQ

Appendix O - Clyde and Loch Lomond Local Plan District (LPD 11)

O.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood Risk Management Plans relevant to the Clyde and Loch Lomond Local Plan District (LPD). This document:

- Provides an overview of the Clyde and Loch Lomond LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Clyde and Loch Lomond LPD. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Clyde and Loch Lomond LPD for which actions are recommended in the Flood Risk Management Plan;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Clyde and Loch Lomond LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

O.2. Flood risk within the Clyde and Loch Lomond LPD and recommended actions

O.2.1 Overview of the Clyde and Loch Lomond LPD

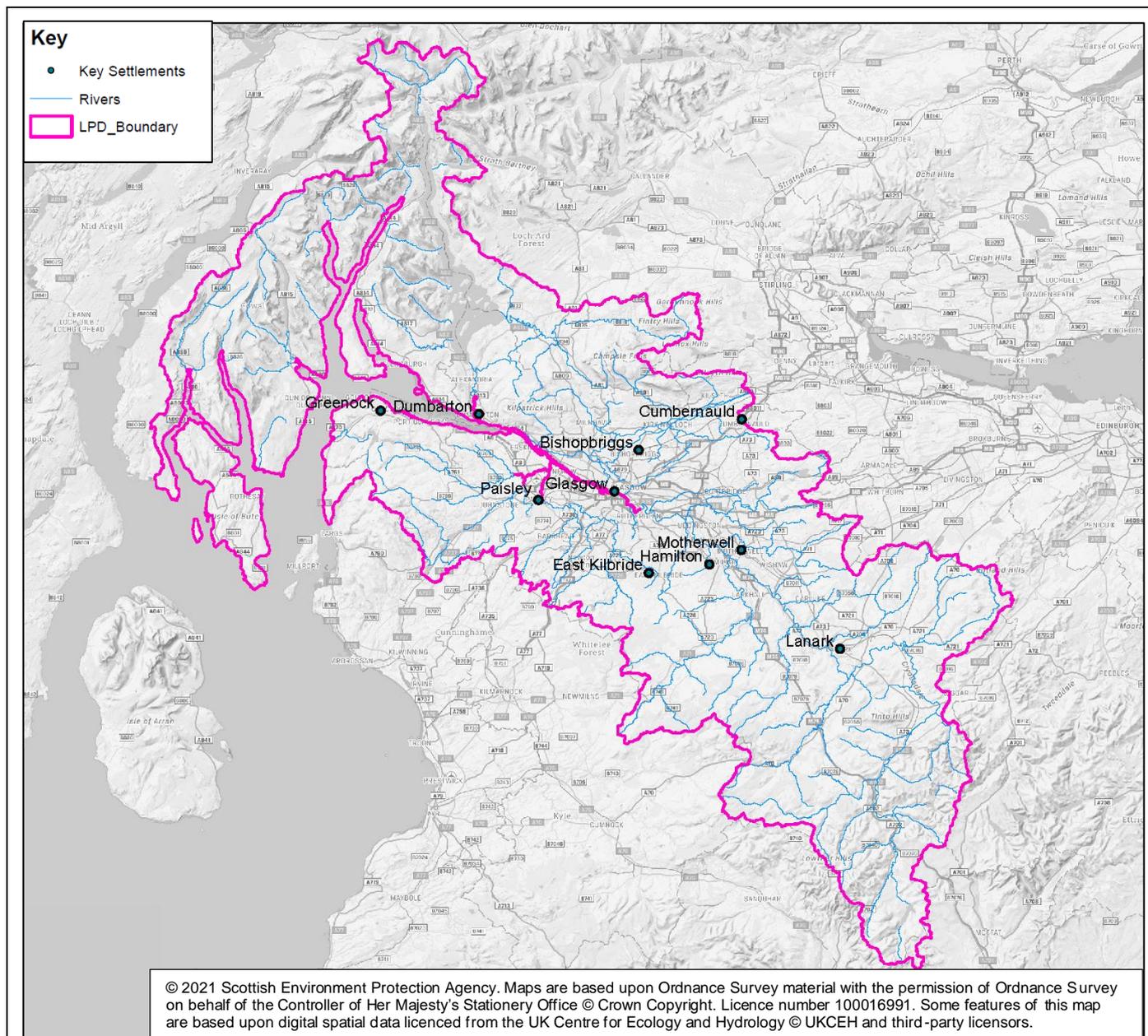


Figure O.1. Extent of the Clyde and Loch Lomond LPD, key water bodies and settlements.

The Clyde and Loch Lomond LPD covers an area of around 4,800 km² and has a population of approximately 1.9 million. It extends from Loch Lomond in the north to the Lowther Hills in the

south and includes part of Loch Lomond and the Trossachs National Park. The coastline is around 500 km long, from Ardlamont Point to Largs, encompassing the Firth of Clyde including the Isle of Bute. It includes the urban areas of Glasgow City, Dumbarton, East Kilbride, Motherwell, Paisley, Hamilton, Bishopbriggs and Greenock.

The area contains the River Clyde and its many tributaries and is heavily urbanised. However, outside of the urbanised areas the main land covers are agricultural grazing lands, coniferous and broadleaved woodland. There are many lochs and reservoirs in the area including Loch Lomond, Loch Eck, Loch Arklet and Daer Reservoir.

O.2.2 Flood risk within the Clyde and Loch Lomond LPD

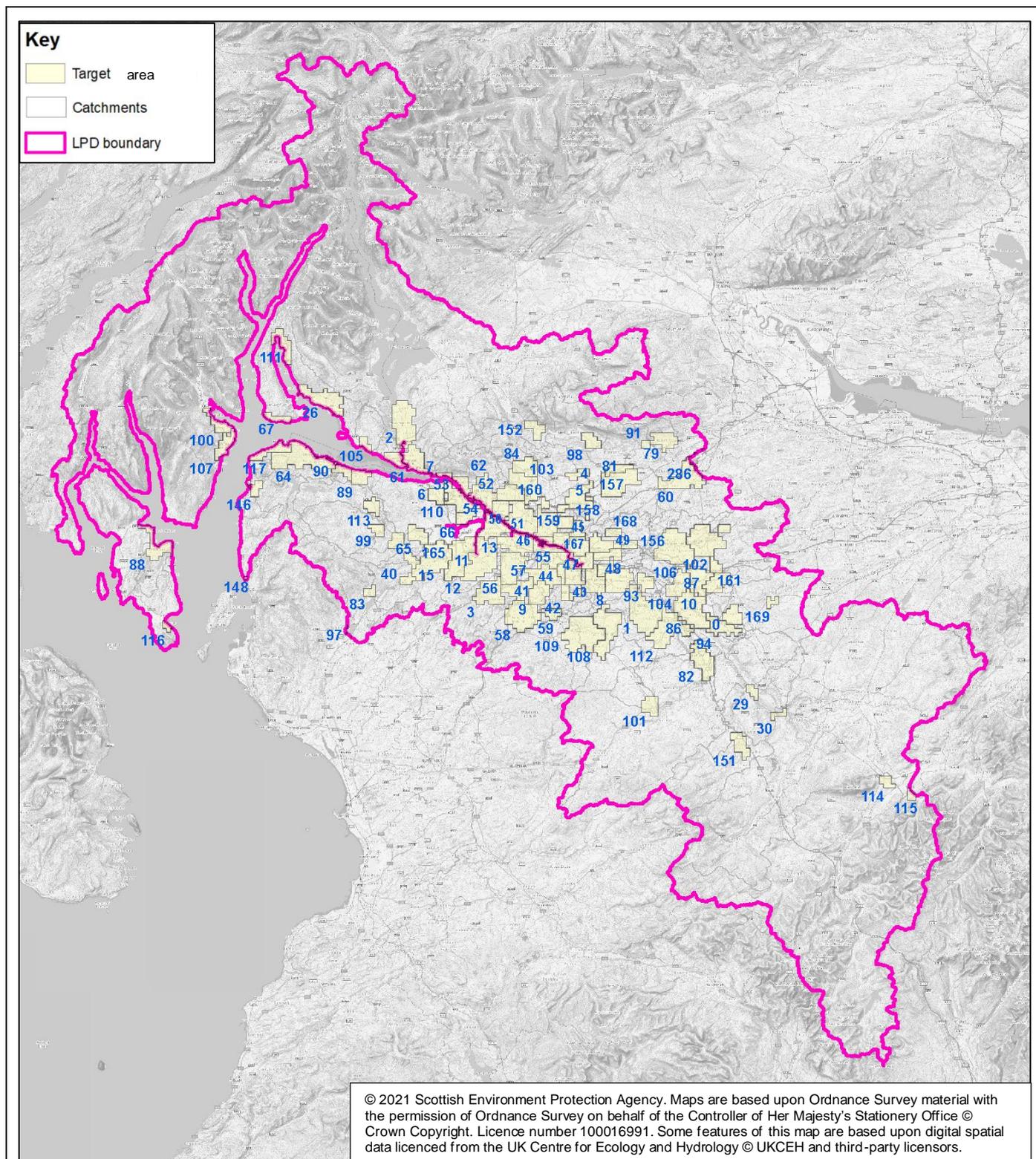


Figure O.2. Extent of the Clyde and Loch Lomond LPD and target areas at risk from flooding.

There is river, surface water and coastal flood risk in the Local Plan District, with the main risk coming from surface water flooding.

Currently it is estimated there are around 170,000 people and 98,000 homes and businesses at risk from flooding. This may increase to 220,000 people and 130,000 homes and businesses by 2080s due to climate change. The expected annual cost of flooding is around £70 million. Note however that flooding from wave overtopping is not fully represented in the assessment of flood risk and the impact of coastal flooding may be underestimated.

O.2.3 Local flood risk management actions within the Clyde & Loch Lomond LPD

Table O.2 sets out the sources of flood risk and types of local actions recommended within the Flood Risk Management Plan for target areas within the Clyde and Loch Lomond LPD, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section O.5 of this Appendix. Section 2.3 of the main Environmental Report lists any actions scoped out of the assessment.

O.3 Clyde and Loch Lomond LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Clyde and Loch Lomond LPD in terms of the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland’s environment in the main Environmental Report.

This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Clyde and Loch Lomond LPD provided in Section O.4 of this appendix.

Population and health and material assets

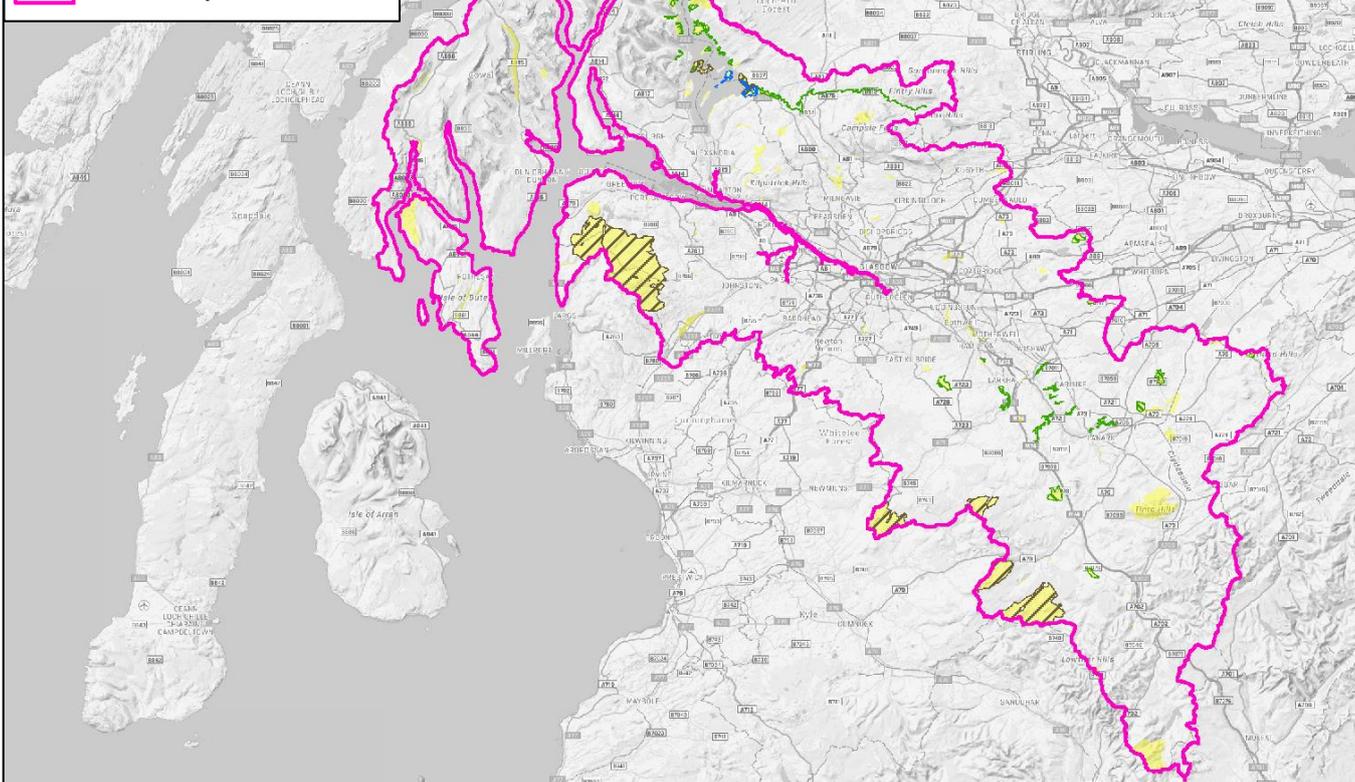
Key information relating to population and human health and material assets are presented in Section O.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding. Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is good across the LPD with 98% of target areas having at least some greenspace. For over 75% of target areas within this LPD greenspace accounts for over half of total landcover indicating ample provision.

Biodiversity

Key

	Special Protection Areas
	Special Areas of Conservation
	Sites of Special Scientific Interest
	Ramsar
	LPD boundary



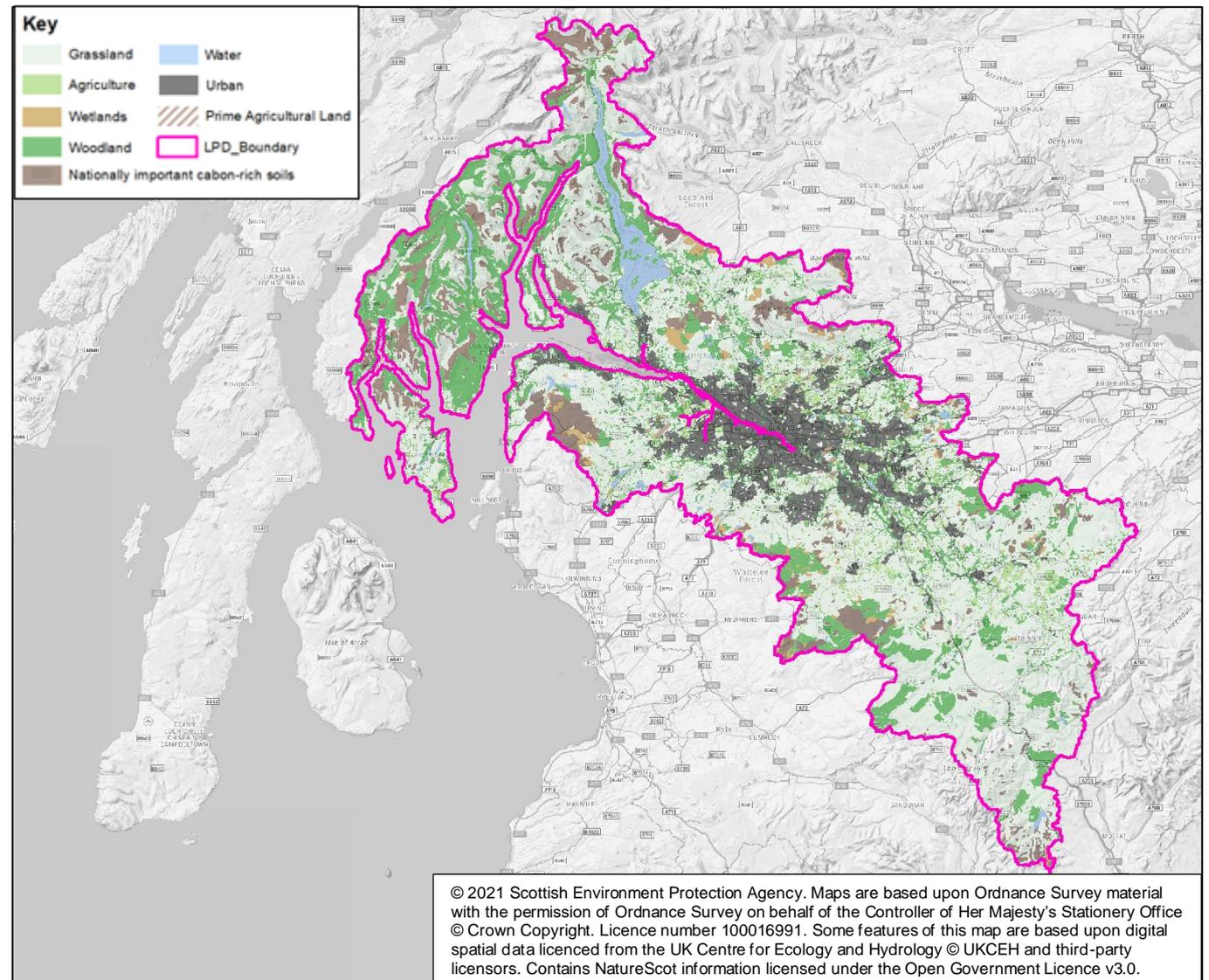
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Summary facts for the Clyde and Loch Lomond LPD

Marine Protected Areas (MPA)	1	There are numerous designated sites for biodiversity distributed across the Clyde and Loch Lomond LPD, with most located within the wider catchments or coastal areas
Ramsar	2	

Special Areas of Conservation (SACs)	13	of the target areas. Notably, these sites include the many protected sites within or adjacent to Loch Lomond containing native woodland, wetland and freshwater river and loch ecosystems; the complex of woodland gorges along the upstream River Clyde; large areas of upland moorland; and the estuarine and coastal habitats of the Inner Clyde (not shown on plan).
Special Protection Areas (SPAs)	7	
Sites of Special Scientific Interest (SSSIs)	106	

Land cover (including soils)

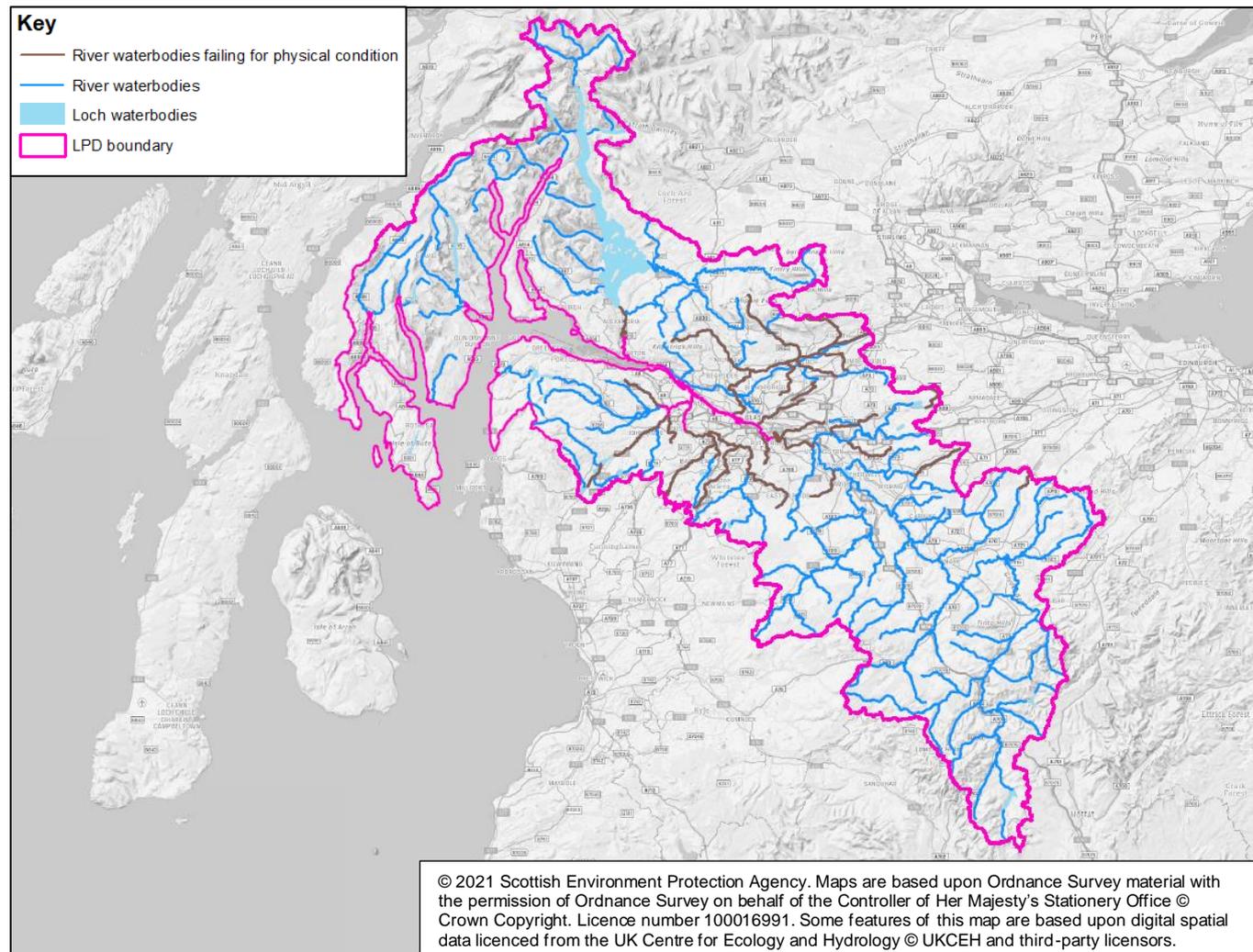


Summary facts for the Clyde and Loch Lomond LPD

The predominant landcover within the LPD is cultivated land and semi-natural grassland. Large areas of cultivated land (mainly improved grassland) are used mainly for grassland-based farming, with only small areas used for crops and cereals. Semi natural grasslands in the upper Clyde catchment and the Cowal peninsula are used for rough grazing. There are also areas of coniferous plantation woodland and native woodlands.

There is significant urban landcover including Glasgow and its surrounding towns and suburbs. The coastal and marine areas are made up predominantly of hard flood defences and shoreline reinforcements (particularly in the Inner Firth of Clyde) and rocky shoreline. There are also large intertidal mudflats, sandflats and saltmarsh in the Clyde estuary.

Water



Summary facts for the Clyde and Loch Lomond LPD

There are approximately 115 river water bodies and 20 lochs in this LPD, as classified under the Water Framework Directive (WFD). Coastal water bodies include the Firth of Clyde, the Clyde Estuary, Rothesay and several coastal lochs. Coastal areas at risk of erosion will be of particular concern when considering flood risk management actions.

There are a number of pressures on water bodies across the Local Plan District that may hinder the achievement of their objectives as set out in the River Basin Management Plans. Notably,

there are 23 river water bodies within the LPD, mainly located in and around the Greater Glasgow area, that are failing to meet their WFD objectives because of their physical condition and that flood risk management actions should take into account.

Cultural heritage

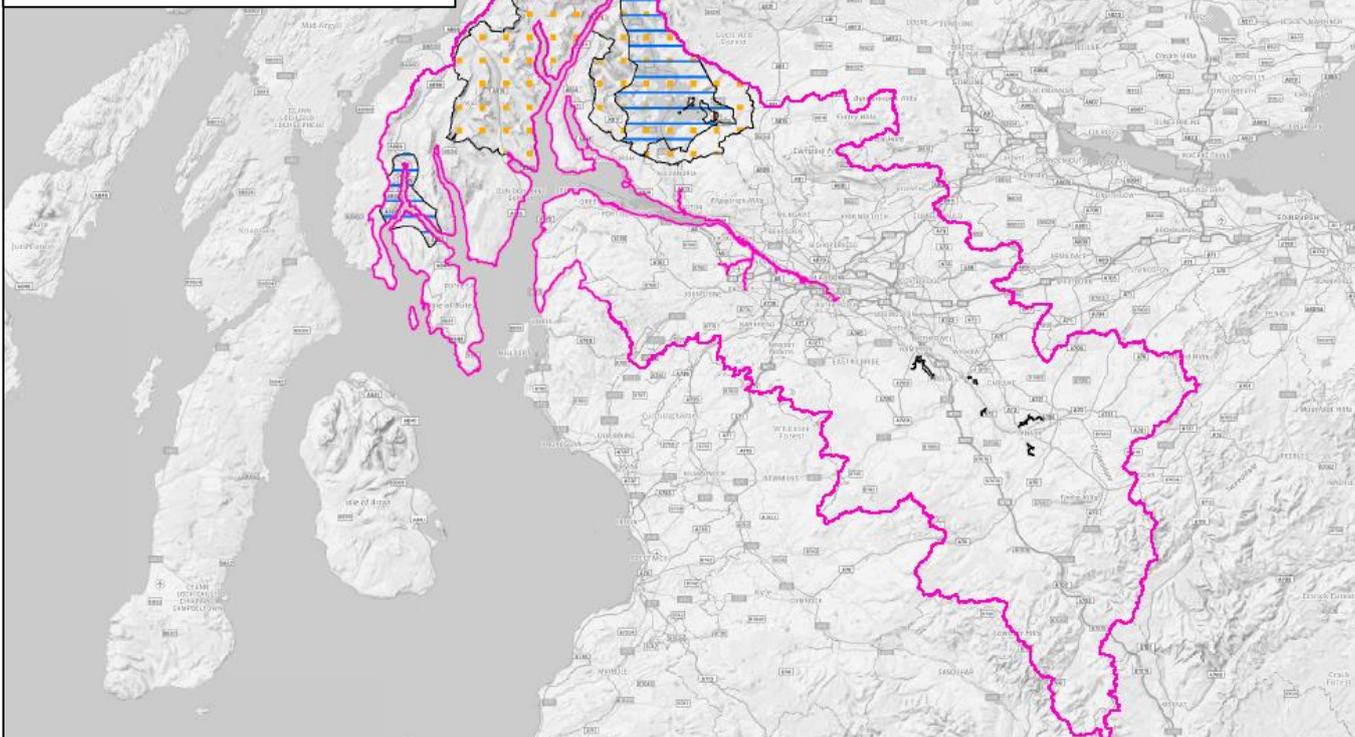
Summary facts for the Clyde and Loch Lomond LPD

Battlefield	5	The LPD is rich in historic sites, with designated assets dispersed across the LPD, although there is a denser concentration in the central belt areas, particularly within and around Glasgow. Over 75% of listed buildings within the LPD are located within target areas at risk from flooding. The LPD contains two UNESCO World Heritage Sites: the Antonine Walls which extends through the LPD to the south of Glasgow; and New Lanark in the south east.
Conservation Area	121	
Garden and Designed Landscape	29	
Scheduled Monument	439	
World Heritage Site	2	
Listed Buildings	18722	

Landscape

Key

-  National Nature Reserve
-  National Scenic Area
-  Loch Lomond and The Trossachs National Park
-  LPD boundary



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Summary facts for the Clyde and Loch Lomond LPD

National Nature Reserve	3	There are a number of areas of valued landscape, principally in the north of the LPD, including part of the Loch Lomond and Trossachs National Park and two National Scenic Areas.
National Scenic Area	2	
National Park	1	

Some of the upper catchments contain areas of wild land and there are two National Nature Reserves.

O.4. Key environmental constraints relevant to flood risk management for target areas within the Clyde and Loch Lomond LPD

Informed by the high-level baseline data presented in Section O.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment or coastal area associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table O.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms of population and health and material assets and are not detailed in Table O.2.

Table O.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition.		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition.
Cultural Heritage	No cultural heritage assets in target area area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table O.2 Target areas at risk from flooding, local actions and key constraints within the Clyde and Loch Lomond LPD target areas

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Hamilton west	1	River / Surface water	Y		Y		H	M	H	H	H
Vale of Leven	2	River / Surface water	Y	Y	Y	Y	M	L	H	H	H
Barrhead	3	River / Surface water	Y		Y		L	L	H	M	L
Bishopbriggs West	4	River / Surface water	Y	Y		Y	H	L	L	H	L
Bishopbriggs East	5	River / Surface water		Y		Y	L	H	L	L	L
Bishopton	6	River / Surface water	Y		Y		L	L	L	M	L
Bowling	7	Coastal / Surface water	Y		Y		H	L	L	M	L

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Giffnock and Merrylee	9	River / Surface water			Y		L	L	L	H	L
Holytown and New Stevenston	10	River / Surface water			Y		L	L	H	L	L
Johnstone and Linwood	11	River / Surface water	Y		Y		M	H	H	M	L
Paisley east	12	River / Surface water		Y	Y		M	L	H	H	L
Renfrew	13	Coastal / Surface water		Y	Y		M	L	L	M	L
Kilbarchan	15	River / Surface water			Y		L	L	L	H	L
Helensburgh	26	Coastal / Surface water	Y	Y	Y	Y	H	L	L	H	L

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Crossford (South Lanarkshire)	29	River / Surface water		Y	Y		H	L	H	M	H
Kirkfieldbank	30	River / Surface water			Y		H	L	H	H	H
Howwood	40	Surface water	Y				L	L	H	L	L
Cathcart & Shawlands	41	River / Surface water		Y	Y		M	L	H	H	L
Castlemilk west	42	Surface water		Y		Y	L	L	L	L	L
Kelvinside	46	River / Surface water		Y	Y		M	M	H	H	L
Glasgow east end	47	River / Surface water	Y		Y		L	L	H	H	L
Carntyne	49	River / Surface water		Y		Y	L	L	H	H	L

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Glasgow west end	50	Coastal/ River/ Surface water		Y	Y	Y	M	L	L	H	L
Yoker	51	Coastal/ River/ Surface water		Y	Y	Y	M	L	L	M	L
Drumchapel	52	River / Surface water		Y		Y	L	L	L	H	L
Old Kilpatrick	53	Coastal / Surface water	Y		Y		H	L	L	H	L
Clydebank	54	Coastal/ River/ Surface water			Y		H	L	L	H	L
Hillington and Cardonald	55	Surface water		Y		Y	L	L	L	H	L
Pollok	56	River / Surface water		Y	Y		M	L	H	H	L
Thornliebank	57	River / Surface water			Y		M	L	H	H	L

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Newton Mearns	58	River / Surface water		Y	Y		M	L	H	H	L
Busby	59	River / Surface water			Y		H	L	H	H	L
Cumbernauld	60	River / Surface water	Y		Y		M	L	H	M	L
Dumbarton	61	Coastal/ River/ Surface water		Y	Y	Y	H	L	H	H	H
Duntocher and Hardgate	62	River / Surface water			Y		L	L	L	M	L
Greenock	64	Coastal/ River/ Surface water	Y	Y	Y	Y	H	L	L	H	L
Houston	65	River / Surface water	Y		Y		M	H	L	H	L
Inchinnan	66	Surface water			Y		H	L	L	M	L
Kilcreggan	67	Surface water			Y	Y	L	L	L	H	L
Kilsyth	79	River / Surface water		Y	Y	Y	L	L	H	H	L

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Kirkintilloch South and Lenzie	81	River / Surface water			Y	Y	M	M	H	H	L
Larkhall	82	River / Surface water			Y		H	L	L	H	H
Lochwinnoch	83	River / Surface water			Y		H	H	H	H	L
Milngavie	84	River / Surface water		Y	Y	Y	H	L	H	H	L
Motherwell	86	River / Surface water	Y	Y	Y		H	L	H	H	H
Newarthill	87	River / Surface water			Y		L	L	H	L	L
Rothesay and Port Bannatyne	88	Coastal/ River/ Surface water		Y	Y		H	L	L	H	L
Port Glasgow east	89	Surface water		Y	Y	Y	H	L	L	H	L

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Port Glasgow west	90	Coastal/ River/ Surface water		Y	Y	Y	H	L	L	M	L
Queenzieburn	91	River / Surface water			Y		L	L	L	L	L
Uddingston	93	River / Surface water			Y		H	M	H	H	H
Wishaw South	94	River / Surface water			Y		L	L	L	M	L
Lennoxton	98	River / Surface water			Y		H	L	H	L	L
Quarrier's Village	99	River / Surface water		Y		Y	M	H	L	H	L
Sandbank	100	Coastal / Surface water	Y	Y	Y	Y	M	L	L	M	L
Strathaven	101	River / Surface water			Y		L	L	L	H	L
Airdrie	102	River / Surface water			Y		L	L	H	H	L
Bearsden	103	River / Surface water		Y	Y	Y	M	M	H	H	L
Bellshill	104	River / Surface water			Y		L	L	H	L	L

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Cardross	105	Coastal/ River/ Surface water			Y		H	L	L	H	H
Coatbridge	106	River / Surface water		Y	Y		M	M	H	H	L
Dunoon	107	River / Surface water		Y	Y	Y	L	L	L	H	L
East Kilbride east	108	River / Surface water	Y		Y		M	L	L	H	L
East Kilbride west	109	River / Surface water			Y		L	L	H	H	L
Erskine	110	Surface water			Y		H	L	L	M	L
Garelochhead	111	Coastal/ River/ Surface water			Y		M	L	L	M	L
Hamilton east	112	River / Surface water		Y	Y		H	L	H	H	H
Kilmacolm	113	River / Surface water		Y	Y	Y	H	L	L	H	L
Symington	114	River / Surface water	Y		Y		M	L	L	M	L

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Coulter	115	River / Surface water			Y		L	L	L	H	L
Kilchattan Bay	116	Coastal			Y		M	L	L	L	L
Gourock	117	Coastal / Surface water		Y	Y	Y	M	L	L	H	L
Inverkip	146	Coastal/ River/ Surface water			Y		M	H	L	H	L
Lesmahagow	151	River / Surface water			Y		M	L	L	H	L
Strathblane	152	River / Surface water	Y	Y	Y		M	L	L	H	L
Easterhouse south	156	River / Surface water			Y		L	H	H	L	L
Kirkintilloch north	157	River / Surface water		Y	Y		M	M	H	H	L
Possil Park	158	Surface water			Y		L	L	L	M	L
Milton	159	Surface water			Y		H	L	L	M	L

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Summerston	160	Surface water			Y		L	L	H	L	L
Chapelhall	161	Surface water			Y		L	L	L	L	L
Paisley west	165	River / Surface water		Y	Y		L	L	H	H	L
Springburn	167	Surface water			Y		L	L	H	M	L
Allanton	169	Ground water			Y		L	L	H	L	L
Barlanark	466	Surface water			Y		L	L	L	L	L
Plains	10300	Ground water	Y				L	L	L	L	L
Balornock	16702	Surface water			Y		L	L	L	L	L
Garthamlock	16800	Surface water			Y		L	L	L	L	L
Rutherglen	43001	River / Surface water			Y	Y	L	L	H	H	L
Polmadie	43002	River / Surface water		Y	Y	Y	L	L	H	M	L
Mount Florida	43003	River / Surface water				Y	L	L	L	H	L
Castlemilk east	43004	River / Surface water		Y		Y	L	L	H	L	L

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Plantation	44001	Coastal/ River/ Surface water		Y	Y		L	L	H	H	L
Pollokshields	44002	River / Surface water			Y		M	M	H	H	H
Glasgow centre West	45001	Coastal / Surface water		Y	Y		M	L	L	H	L
Glasgow centre East	45002	Surface water		Y	Y	Y	L	L	L	H	L
Dalmarnock	48001	River / Surface water		Y	Y		M	M	H	H	H
Tollcross	48002	River / Surface water		Y		Y	L	H	H	M	L
Bridge of Weir	65001	River / Surface water	Y				M	H	L	H	L
Carmyle	80001	River / Surface water		Y	Y		M	M	H	L	H
Cambuslang West	80002	Coastal/ River/ Surface water		Y	Y		M	M	H	H	H

Target areas with specific local actions	Reference number (Figure O.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Cambuslang East	80003	Coastal/ River/ Surface water		Y	Y		M	M	H	L	H
Torrance and Balmore	81001	River / Surface water			Y		M	M	H	H	L
Wishaw North	94001	River / Surface water			Y		M	L	H	M	L

* Some schemes and works listed in this table are scoped out of the assessment in Section 0.5.5. See Section 2.3 of the main Environmental Report for details.

O.5. Environmental assessment of the local flood risk management actions for the Clyde and Loch Lomond LPD

O.5.1. Introduction

For the purposes of the SEA assessment the actions recommended in the Flood Risk Management Plan were categorised into four types as listed in Table O.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Clyde and Loch Lomond LPD, identifying potential effects and key recommendations.

O.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for 21 target areas within the Clyde and Loch Lomond LPD (refer to Table O.2 for details) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table O.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

O.5.3. Planning and resilience actions

Specific local planning and resilience actions are recommended for 46 target areas within the Clyde and Loch Lomond LPD (refer to Table O.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience

actions was carried out at a national scale using the SEA objectives and criteria presented in Section 4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting.

More specifically within the Clyde and Loch Lomond LPD, the constraints review undertaken and summarised in Table O.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

E.5.4. Flood studies

Flood studies are recommended for all but 14 target areas within the Clyde and Loch Lomond LPD (refer to Table O.2 for details). As we do not know what further actions may result from the flood studies, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The review described in Section O.4 identifies that there are environmental constraints present across all target areas across the LPD. Constraints due to cultural heritage are found in most target areas; constraints due to biodiversity and water are also common. The highest levels of constraint were identified in Hamilton west, Kirkfieldbank, Dumbarton, Lochwinnoch, Motherwell, Uddingston and Hamilton east.

As the identified flood studies within this LPD are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

O.5.5. Flood schemes and works at design and/or implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for 22 target areas during Cycle 2 (2022 – 2027), dependent on funding (see Table O.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table O.3, and the effects summarised at an LPD scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section O.4 and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known – but note these can change as the schemes and works go through the design stage.
2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health within the Clyde and Loch Lomond LPD as a result of reduced flood risk to homes, businesses and infrastructure; with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors, material assets and water. No significant adverse effects in terms of the SEA objectives were identified, although a range of potential effects, both adverse and beneficial, were identified across numerous target areas. Further detail can be found in Table O.3.

As the design of these proposed actions are progressed by local authorities/ Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table O.3 – SEA significance assessment of proposed flood schemes and works design and implementation

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Bishopbriggs <i>Surface water</i>	SUDS Storage, conveyance and control Property flood resilience	++	- / +	+	0	+	++	0	0 / +
Dunoon <i>Surface water</i>	Storage, conveyance and control	++	0	0	0	+	++	0	0
Gourock <i>Coastal</i>	Coastal defences (raising existing)	++	0	0	0	+	++	0	0
Kilsyth <i>River</i>	Storage, conveyance and control	++	0	0	0	+	++	0	0
Port Glasgow West <i>River</i>	Storage, conveyance and control	++	-	0	0	+	++	0	0
Sandbank <i>Surface water</i>	Storage, conveyance and control	++	0	0	0	+	++	0	0
Vale of Leven and Dumbarton <i>River and surface water</i>	River defences Storage, conveyance and control Property flood resilience and relocation	++	-	- / +	0	+	++	0	- / 0
Yoker <i>River</i>	Storage conveyance and control River and floodplain restoration	++	+	+	0	+	++	0	+
Rutherglen, Polmadie, Tollcross, Mount Florida, Castlemilk East,	Preferred actions not yet known but likely to include: Storage,	++	- / +	0 / +	0	+	++	0	0 / +

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Castlemilk West, Glasgow Centre East, Glasgow West End, Drumchapel, Carntyne, Bearsden, Milngavie, and Hillington and Cardonald <i>Surface water</i>	conveyance or control; and/or SUDS								
Key findings for the LPD <ol style="list-style-type: none"> 1. Significant positive effects on population and human health due to reduced flood risk and increased wellbeing. There may be opportunities to enhance access to greenspace through SUDS actions at Bishopbriggs and at other surface water management target areas. 2. Potential for negative effects on biodiversity due to coastal or river defences and storage, conveyance and control type actions in particular where Ramsar sites, SPAs, SACs and/ or SSSIs are located within the target areas of Bishopbriggs, Port Glasgow West, Vale of Leven and Dumbarton. Potential for positive effects through river and floodplain restoration actions which may lead to habitat creation/improvement at Yoker. The type and scale of many surface water management measures in this LPD are not yet known, but there are potential negative effects from any storage, conveyance and control type actions in in Milngavie and Port Glasgow West due to proximity to Ramsar sites, SPAs, SACs and/ or SSSIs ; conversely, SUDS type actions (and any improvements to water quality) could deliver benefits to biodiversity. 3. Potential mixed effects identified for water at Vale of Leven and Dumbarton, where one or more waterbodies within the catchments are failing to meet their 2027 WFD objectives as a result of their physical condition. Opportunities for enhancement through river defence actions by regulating water flow and reducing erosion and the supporting of WFD objectives, balanced with the potential adverse effects of actions on the river environment. Potential for improvements to water quality at Bishopbriggs, and in the other surface water management target areas through the implementation of SUDS. River and floodplain restoration actions at Yoker may result in improvements from habitat creation/improvement. Neutral impacts on coastal morphology and coastal processes at Gourrock. There is potential for adverse effects from coastal defences on coastal processes through altering rates of erosion and deposition, however, any effects are likely to be localised in nature and will be dependent on the location and design of actions. 4. No significant effects identified for soil. 5. Positive effects on climatic factors due to improved resilience of properties and infrastructure to future climate change. 6. Significant positive effects on material assets from the protection of property and infrastructure. 7. No significant effects identified for cultural heritage. Potential for positive effects from the reduction in flood risk to heritage assets balanced with potential for negative effects on the setting of historic buildings and structures, however, effects are dependent on the design and location of the action. 									

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<p>8. Overall neutral effect on landscape. Potential for positive effects in Bishopbriggs and other surface water management target areas as landscape could be enhanced through implementation of SUDS, and at Yoker as landscape may be improved by river and floodplain restoration actions. Defences in Dumbarton and Vale of Leven have potential for negative effects where there are designated landscape areas. Effects are dependent on the design and location of the actions.</p>									

Flood risk management plans 2021-2027: strategic environmental assessment

Environmental Report – Appendix P

Assessment for Ayrshire Local Plan District

July 2021

Every day SEPA works to protect and enhance Scotland's environment, helping communities and businesses thrive within the resources of our planet.



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07747627671

If you wish to post your comments, please mark them for the attention of FRM consultation and send them to:

Scottish Environment Protection Agency
Angus Smith Building
6 Parklands Avenue
Eurocentral
Holytown
North Lanarkshire
ML1 4WQ

Appendix P – Ayrshire Local Plan District (LPD 12)

P.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood Risk Management Plans relevant to the Ayrshire Local Plan District (LPD). This document:

- Provides an overview of the Ayrshire LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Ayrshire LPD. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Ayrshire LPD for which actions are recommended in the Flood Risk Management Plan;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Ayrshire LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

P.2. Flood risk within the Ayrshire LPD and recommended actions

P.2.1 Overview of the Ayrshire LPD

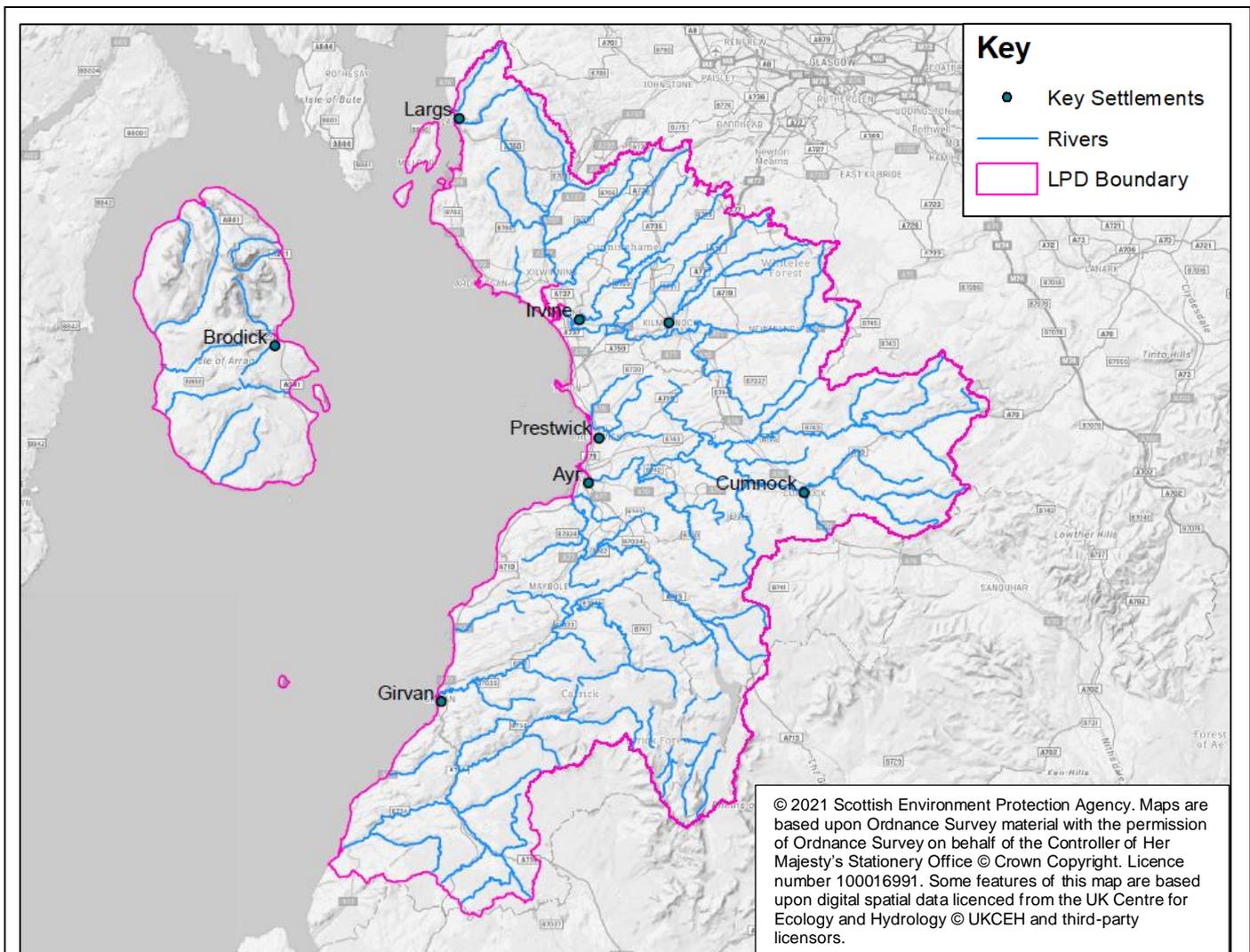


Figure P.1. Extent of the Ayrshire LPD, key water bodies and settlements.

The Ayrshire LPD covers around 3,100 km² and has a population of approximately 370,000 people. The coastline has a length of around 300 km from Largs in the north to Ballantrae in the south and includes the Isle of Arran and Great Cumbrae. Urban areas are mainly concentrated along the coast and include Kilmarnock, Irvine and Ayr.

The area is largely rural with the main land use being agricultural in the lower catchments whilst upland areas have large sections of woodland and heather grassland. There are seven lochs and reservoirs in the area including Loch Doon, Loch Bradan, Loch Riecawr and Loch Finlas. The main rivers are the Ayr, the Doon, the Garnock, the Girvan and the Irvine.

P.2.2 Flood risk within the Ayrshire LPD

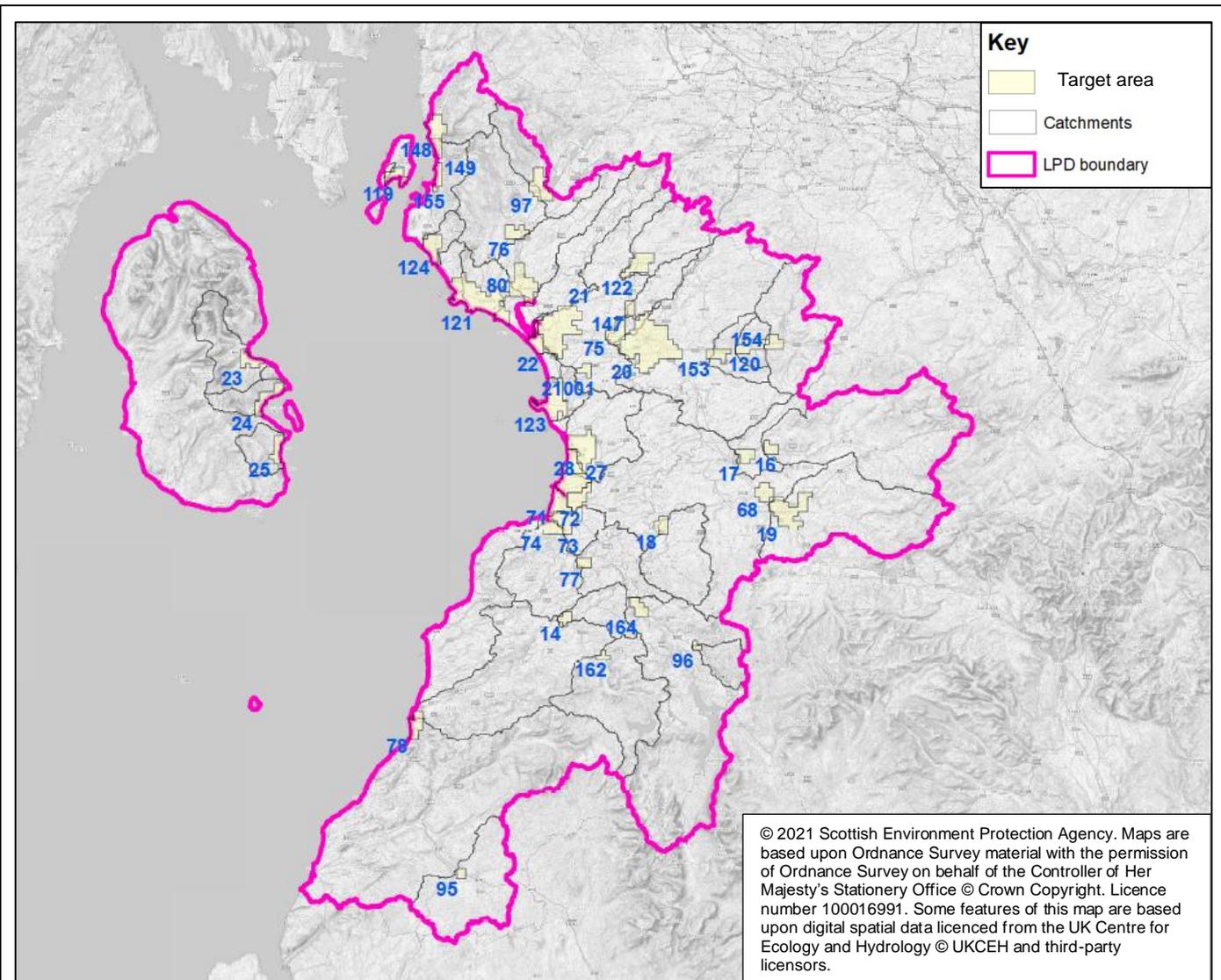


Figure P.2. Extent of the Ayrshire LPD and target areas at risk from flooding

There is river, surface water and coastal flood risk in the Ayrshire LPD. Currently it is estimated there are around 39,000 people and 23,000 homes and businesses at risk from flooding. This may increase to 47,000 people and 28,000 homes and businesses by 2080s due to climate change. The expected annual cost of flooding is around £18 million. Note however that flooding from wave overtopping is not fully represented in the assessment of flood risk and the impact of coastal flooding may be underestimated.

P.2.3 Recommended flood risk management actions within the Ayrshire LPD

Table P.2 sets out the sources of flood risk and types of local actions recommended within the Flood Risk Management Plan for target areas within the Ayrshire LPD, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section P.5 of this Appendix. Section 2.3 of the main Environmental Report lists those actions scoped out of the assessment.

P.3 Ayrshire LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Ayrshire LPD across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland’s environment in the main Environmental Report.

This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Ayrshire LPD provided in Section P.4 of this appendix.

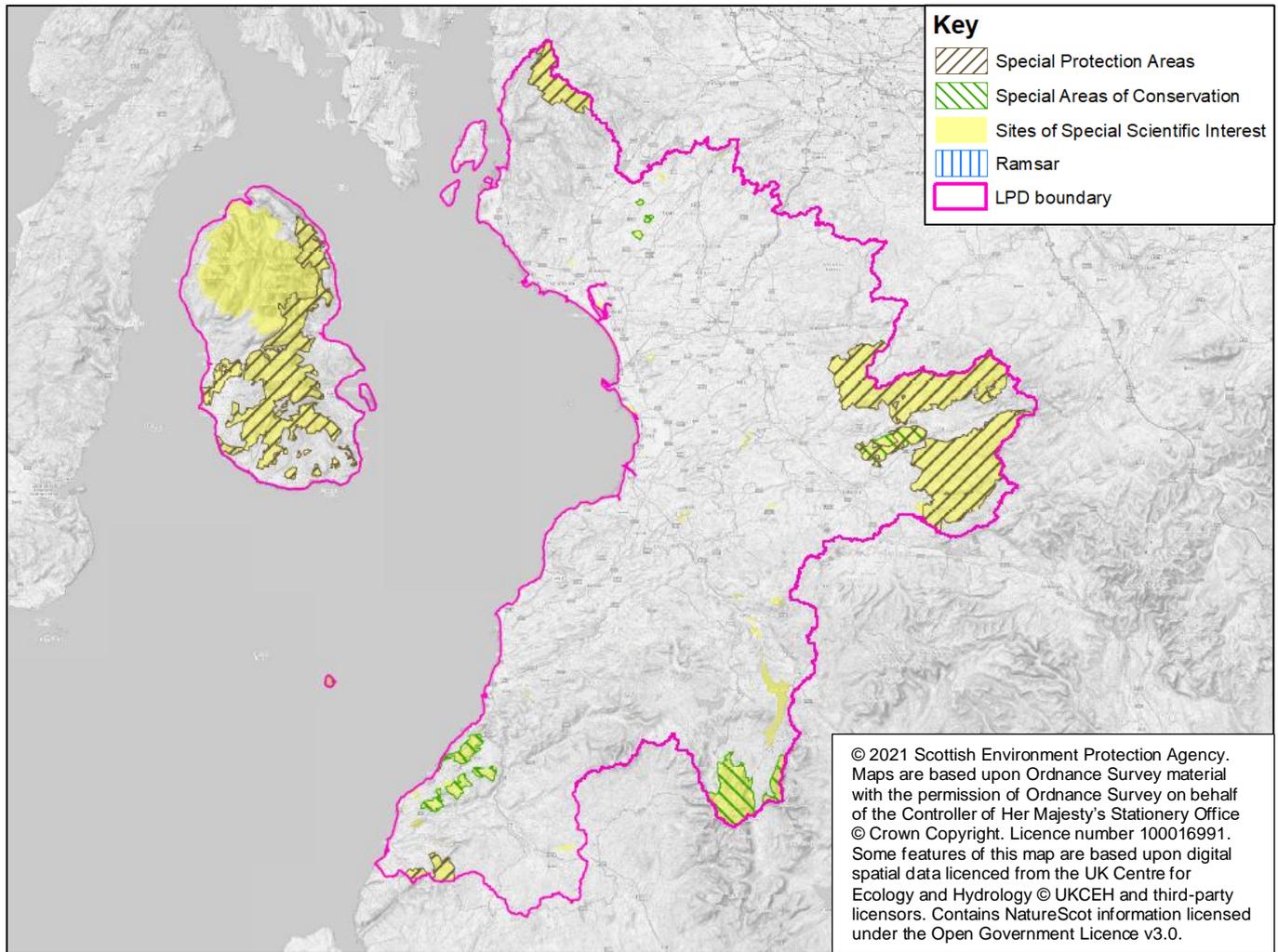
Population and health and material assets

Key information relating to population and human health and material assets are presented in Section P.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding.

Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is good across the LPD with 97% of target areas having at least some greenspace. For over 50% of target areas within this LPD greenspace accounts for over half of total landcover indicating ample provision.

Biodiversity

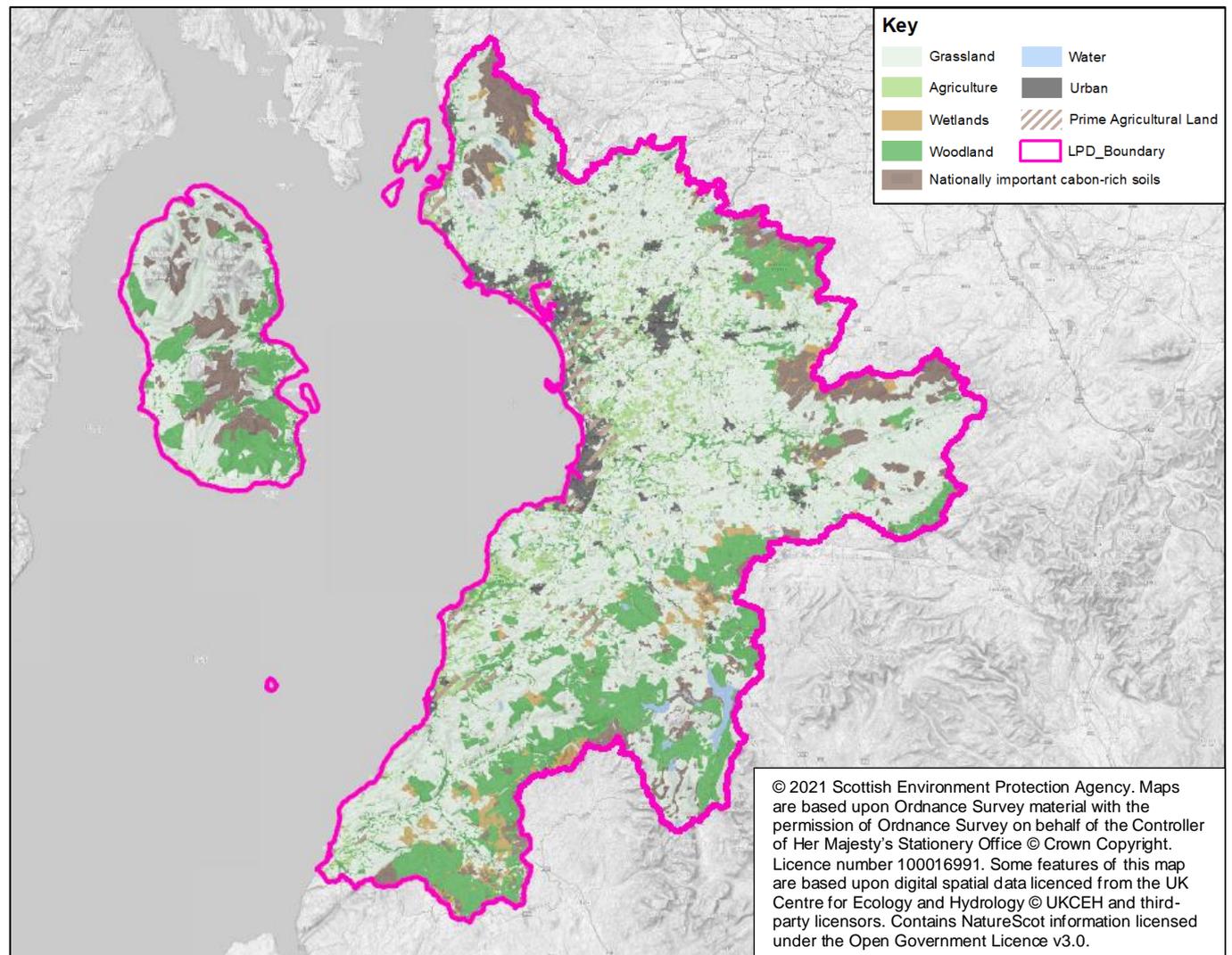


Summary facts for the Ayrshire LPD

Marine Protected Areas (MPA)	1	The largest areas of designated sites for biodiversity are found in the upper catchments that fringe the north east and south of the LPD, which contain large areas of blanket bog and upland heath and acid grasslands. In the lowland areas are small isolated wetlands and small woodland sites associated with steep sided valleys and gorges next to
Special Areas of Conservation (SACs)	6	

Special Protection Areas (SPAs)	5	rivers and lochs and along the coast are designated sites for coastal and intertidal habitats.
Sites of Special Scientific Interest (SSSIs)	46	Much of the Isle of Arran is protected for its biodiversity, including mountain, moorland and coastal habitats and associated species; with a Marine Protected Area around the southern coast (not shown on plan).

Land cover (including soils)



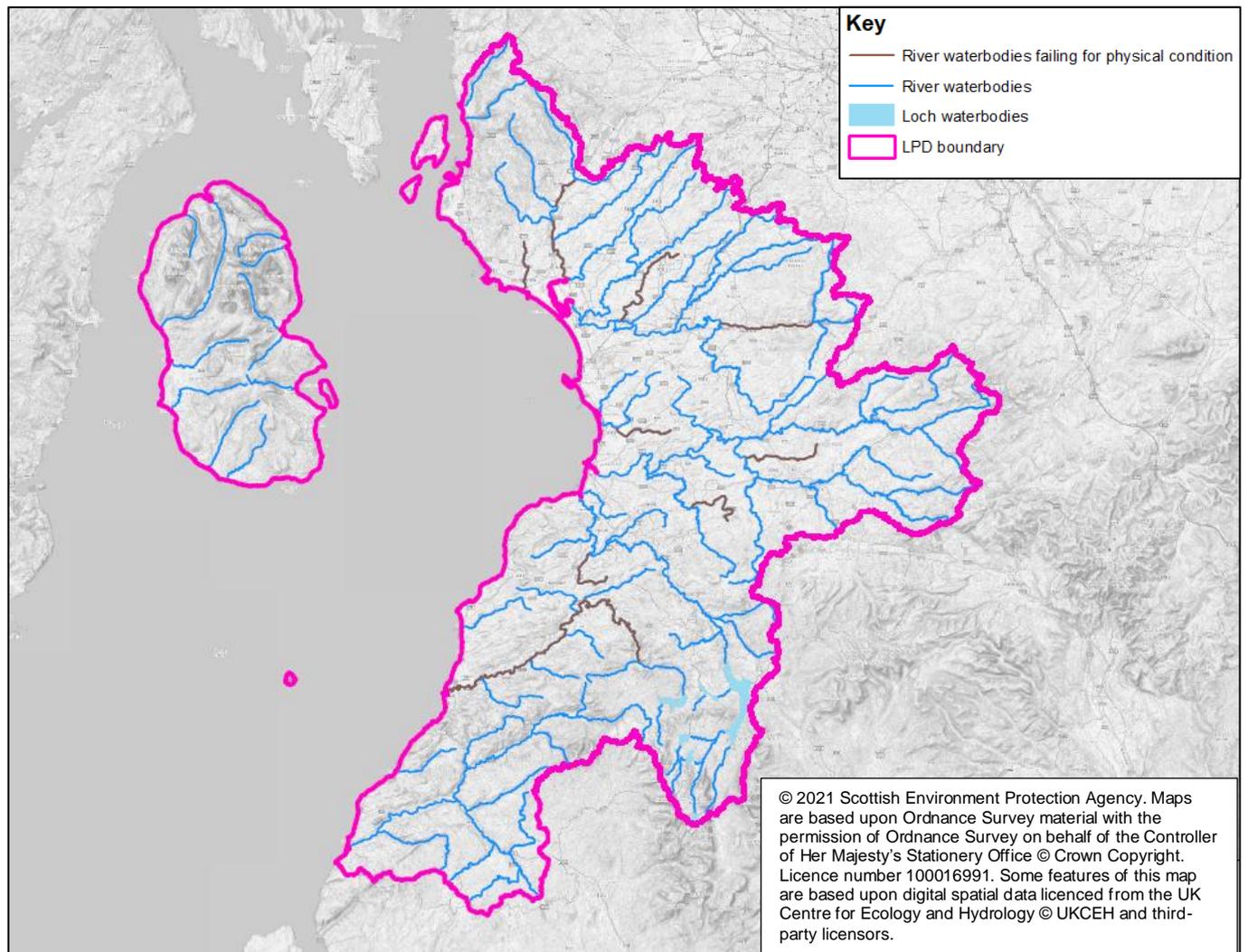
Summary facts for the Ayrshire LPD

The predominant land cover in Ayrshire is cultivated land; predominately agricultural producing dairy and beef. Upland grassland areas are used for lamb production and the more free-draining soils close to the coast are used for arable.

There are also significant upland areas which comprise plantation woodlands, blanket bogs, heaths and grasslands. Forestry is a significant activity in the Carrick Forest and Isle of Arran.

There are urban areas which are typically found along the river valleys and coast.

Water



Summary facts for the Ayrshire LPD

There are approximately 90 river water bodies and 7 lochs in this LPD, as classified under the Water Framework Directive (WFD). There are numerous coastal water bodies including Large Channel, Ayr Bay and Irvine Bay. Coastal areas at risk of erosion will be of particular concern when considering flood risk management actions.

There are a number of pressures on water bodies across the Local Plan District that may hinder the achievement of their objectives as set out in the River Basin Management Plan. Notably,

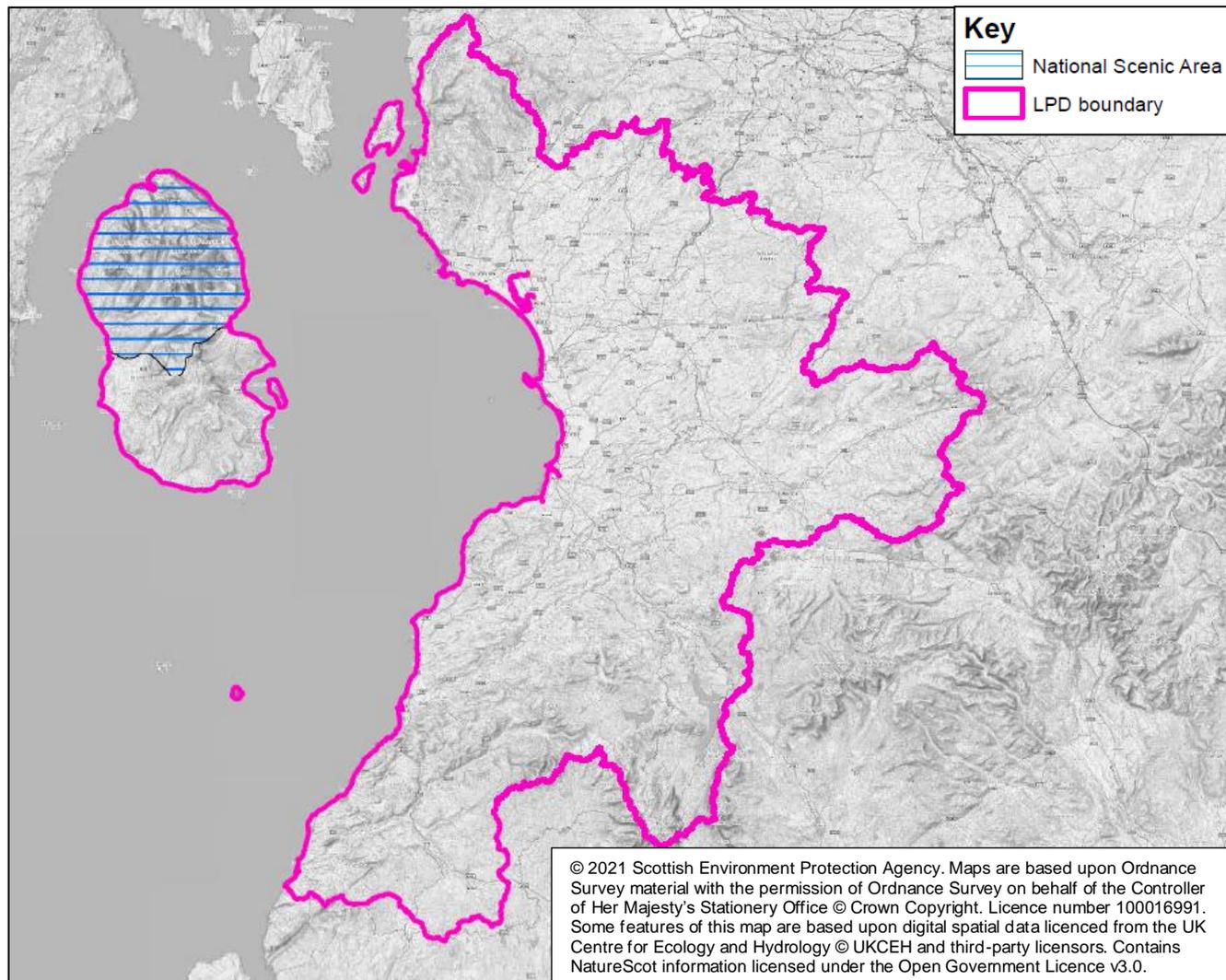
there are eight river water bodies dispersed throughout the LPD that are failing to meet their WFD objectives because of their physical condition and that flood risk management actions should take into account.

Cultural heritage

Summary facts for the Ayrshire LPD

Battlefield	2	Cultural heritage designations are distributed across much of the LPD but tend to be found more towards the north and the central areas. The area is known for its industrial heritage such as the iron industry in the Doon Valley. There is a key site at Girvan Mains which is a Roman camp, crop marks and enclosure. There are several castles with gardens. Over 65% of listed buildings within the LPD are located within target areas at risk from flooding.
Conservation Area	61	
Garden and Designed Landscape	20	
Scheduled Monument	198	
Listed Buildings	3142	

Landscape



Summary facts for the Ayrshire LPD

National Scenic Area	1	Landscape designations within the LPD are limited to the North Arran National Scenic Area covering the northern half of the Isle of Arran.
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P.4. Key environmental constraints relevant to flood risk management for target areas within the Ayrshire LPD

Informed by the high-level baseline data presented in Section P.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment or coastal area associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table P.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms of population and health and material assets and are not detailed in Table P.2.

Table P.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	objectives as a result of their physical condition.		2027 WFD objectives as a result of their physical condition
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table P.2 Target areas at risk from flooding, local actions and key constraints within the Ayrshire LPD target areas

Target areas with specific local actions	Reference number (Figure P.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementati on stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Kirkmichael	14	River / Surface water	Y		Y		L	L	L	H	L
Sorn	16	River / Surface water		Y	Y		M	H	L	H	L
Catrine	17	River / Surface water	Y	Y	Y		M	H	L	H	L
Drongan	18	River / Surface water	Y		Y		M	L	H	M	L
Cumnock	19	River / Surface water		Y	Y		M	L	L	H	L
Kilmarnock	20	River / Surface water	Y	Y	Y	Y	M	M	H	H	L
Irvine	21	Coastal/ River/ Surface water		Y	Y	Y	M	M	H	H	L
Irvine Coastal	22	Coastal/ River/ Surface water		Y	Y		H	M	H	H	L
Brodick	23	Coastal/ River/ Surface water		Y	Y	Y	H	L	L	H	H
Lamlash	24	Coastal/ River/ Surface water		Y	Y	Y	H	L	L	H	M

Target areas with specific local actions	Reference number (Figure P.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementati on stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Whiting Bay	25	Coastal/ River/ Surface water		Y	Y		H	L	L	M	L
Prestwick south	27	Coastal/ River/ Surface water		Y	Y	Y	M	H	L	H	L
Prestwick north	28	River / Surface water		Y	Y	Y	M	H	H	H	L
Auchinleck	68	Surface water			Y		L	L	H	H	L
Ayr	71	Coastal/ River/ Surface water		Y	Y		M	M	H	H	L
Ayr East	72	River / Surface water			Y	Y	M	M	H	L	L
Ayr South East	73	Coastal/ River/ Surface water		Y	Y	Y	M	L	L	H	L
Ayr Doon	74	Coastal/ River/ Surface water			Y	Y	M	M	H	H	L
Crosshouse	75	River / Surface water	Y		Y		L	L	L	L	L
Dalry	76	River / Surface water	Y	Y		Y	M	H	H	H	L
Dalrymple	77	River			Y		M	L	L	H	L

Target areas with specific local actions	Reference number (Figure P.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementati on stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Girvan	78	Coastal/ River/ Surface water		Y	Y	Y	M	M	H	H	L
Kilwinning and Dalgarven	80	River / Surface water		Y	Y		M	H	H	H	L
Barrhill	95	River / Surface water	Y		Y		M	L	L	L	L
Dalmellington	96	River / Surface water			Y		L	L	L	H	L
Kilbirnie	97	River / Surface water		Y	Y	Y	M	H	H	H	L
Millport	119	Coastal / Surface water		Y	Y	Y	H	L	L	H	L
Newmilns	120	River / Surface water		Y	Y	Y	M	L	H	H	L
Saltcoats and Stevenston	121	Coastal/ River/ Surface water		Y	Y		M	L	H	H	L
Stewarton	122	River / Surface water	Y	Y	Y		L	L	L	H	L
Troon	123	Coastal/ River/ Surface water		Y	Y		H	H	L	H	L
West Kilbride	124	Coastal/ River/ Surface water		Y	Y		M	L	L	H	L

Target areas with specific local actions	Reference number (Figure P.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementati on stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Kilmaurs	147	River / Surface water	Y		Y		L	L	L	H	L
Largs north	148	Coastal/ River/ Surface water	Y	Y	Y		M	H	L	M	L
Largs south	149	Coastal / Surface water		Y	Y		M	L	L	H	L
Galston	153	River / Surface water		Y	Y	Y	M	L	H	H	L
Darvel	154	River / Surface water		Y	Y	Y	M	L	H	H	L
Fairlie	155	Coastal / Surface water		Y	Y	Y	H	L	L	H	L
Straiton	162	River	Y		Y		L	M	H	H	L
Patna	164	River / Surface water			Y		M	L	L	L	L
Dundonald	21001	Surface water				Y	H	L	L	H	L

* Some schemes and works listed in this table are scoped out of the assessment in Section 0.5.5. See Section 2.3 of the main Environmental Report for details.

P.5. Environmental assessment of the local flood risk management actions for the Ayrshire LPD

P.5.1 Introduction

For the purposes of the SEA assessment the actions recommended in the Flood Risk Management Plan were categorised into four types as listed in Table P.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Ayrshire LPD, identifying potential effects and key recommendations.

P.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for 11 target areas within the Ayrshire LPD (refer to Table P.2 for details) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table P.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

P.5.3. Planning and resilience actions

Specific planning and resilience actions are recommended for 29 target areas within the Ayrshire LPD (refer to Table P.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience actions was

carried out at a national scale using the SEA objectives and criteria presented in Section 4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting.

More specifically within the Ayrshire LPD, the constraints review undertaken and summarised in Table P.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

P.5.4. Flood studies

Flood studies are recommended for most target areas, excluding Dalry, and Dundonald, within the Ayrshire LPD (refer to Table P.2 for details). As we do not know what further actions may result from the flood studies, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The constraints review described in Section P.4 identifies that there are environmental constraints present across all target areas across the LPD. Constraints due to cultural heritage and water are found in most target areas; constraints due to biodiversity and soil are also common. The highest levels of constraint were identified in Kilbirnie, Dalry, Prestwick north, and Kilwinning and Dalgarven.

As the identified flood studies within this LPD are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

P.5.5. Flood schemes and works design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for 15 target areas during Cycle 2 (2022 – 2027), dependent on funding (see Table P.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table P.3, and the effects summarised at an LPD scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section P.4 and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known – but note these can change as the schemes and works go through the design stage.
2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health and material assets within the Ayrshire LPD as a result of reduced flood risk to homes, businesses and infrastructure; with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors and material assets. No significant adverse effects in terms of the SEA objectives were identified. A range of potential effects, both beneficial and adverse, on biodiversity, water and landscape were identified across numerous target areas. In particular, there are national / international designated nature conservation sites that could be affected by river and coastal defences and by storage, conveyance and control actions in a number of target areas. Further detail can be found in Table P.3.

As the design of these proposed actions are progressed by local authorities/ Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table P.3 – SEA significance assessment of flood schemes and works design and implementation*

Target area and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Brodick <i>River and coastal</i>	Property flood resilience River / coastal defences	++	-	0	0	+	++	0	0
Lamlash <i>River and coastal</i>	Property flood resilience River / coastal defences	++	-	0	0	+	++	0	0
Fairlie <i>River</i>	Storage, conveyance and control (channel and culvert enlargement)	++	-/+	0	0	+	++	0	0

Target area and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Girvan <i>River and surface water</i>	Storage, conveyance and control River and floodplain restoration	++	- / +	- / +	0	+	++	0	0 / +
Darvel, Galston, Kilmarnock, Newmilns <i>River</i>	River defences Storage, conveyance and control	++	0	- / +	0	+	++	0	0
Irvine <i>River</i>	River defences	++	-	- / +	0	+	++	0	0

Target area and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Ayr, Ayr Doon Ayr East, Ayr South, Prestwick North, Prestwick South <i>Surface water</i>	Preferred actions not yet known but likely to include: Storage, conveyance or control, and/or SUDS	++	0 / +	0 / +	0	+	++	0	0 / +
Key findings <ol style="list-style-type: none"> 1. Significant positive effects on population and human health due to reduced flood risk and increased wellbeing. 2. Potential for negative effects on biodiversity due to coastal or river defences and storage, conveyance and control type actions in particular where SPA, SSSI, MPA and SACs are located within the target areas of Brodick, Lamlash, Fairlie, Girvan and Irvine. Potential for beneficial impacts at Girvan through river and floodplain restoration actions, and at Fairlie through culvert enlargements that could improve fish passage. The type and scale of many surface water management 									

Target area and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<p>measures in this LPD are not yet known, but there are potential benefits for biodiversity from SUDS type actions from habitat creation (and any improvements to water quality).</p> <p>3. Potential mixed effects identified for water at Girvan, Newmilns, Darvel, Kilmarnock and Irvine, where one or more waterbodies within the catchments are failing to meet their 2027 WFD objectives as a result of their physical condition. Potentially adverse effects from river defences and storage, conveyance and control actions as these may interfere with river processes altering rates of erosion and deposition. Potential for benefits at Girvan through naturalisation of watercourse from river and floodplain restoration actions. Opportunities for enhancement through actions by regulating water flow and reducing erosion and supporting of WFD objectives, balanced with the potential adverse effects of actions on the river environment. Potential improvements to water quality in surface water management target areas through any implementation of SUDS. Neutral impacts on coastal morphology and coastal processes at Lamlash and Brodick. There is potential for adverse effects from coastal defences on coastal processes through altering rates of erosion and deposition, however, any effects are likely to be localised in nature and will be dependent on the location and design of actions.</p> <p>4. No significant effects identified for soil.</p> <p>5. Positive effects on climatic factors due to improved resilience of properties and infrastructure to future climate change.</p> <p>6. Significant positive effects on material assets from the protection of property and infrastructure.</p>									

Target area and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
		<p>7. No significant effects identified for cultural heritage. Potential for positive effects from the reduction in flood risk to heritage assets balanced with potential for negative effects on the setting of historic buildings and structures, however, effects are dependent on the design and location of the action.</p> <p>8. No significant effects identified for landscape. There are no nationally important landscapes within the target areas. Potential for positive effects in surface water management target areas as landscape could be enhanced through implementation of SUDS, and at Girvan as landscape may be improved by river and floodplain restoration actions. Any effects would be dependent on the design and location of the action.</p>							

Flood risk management plans 2021-2027: Strategic environmental assessment

Environmental Report – Appendix Q

Assessment for Tweed Local Plan District

July 2021

Every day SEPA works to protect and enhance Scotland's environment, helping communities and businesses thrive within the resources of our planet.

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If you wish to post your comments, please mark them for the attention of FRM consultation and send them to:

Scottish Environment Protection Agency
Angus Smith Building
6 Parklands Avenue
Eurocentral
Holytown
North Lanarkshire
ML1 4WQ

Appendix Q - Tweed Local Plan District (LPD 13)

Q.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood Risk Management Plans relevant to the Tweed Local Plan District (LPD). This document:

- Provides an overview of the Tweed LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Tweed LPD. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Tweed LPD for which actions are recommended in the Flood Risk Management Plan;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Tweed LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

Q.2. Flood risk within the Tweed LPD and recommended actions

Q.2.1 Overview of the Tweed LPD

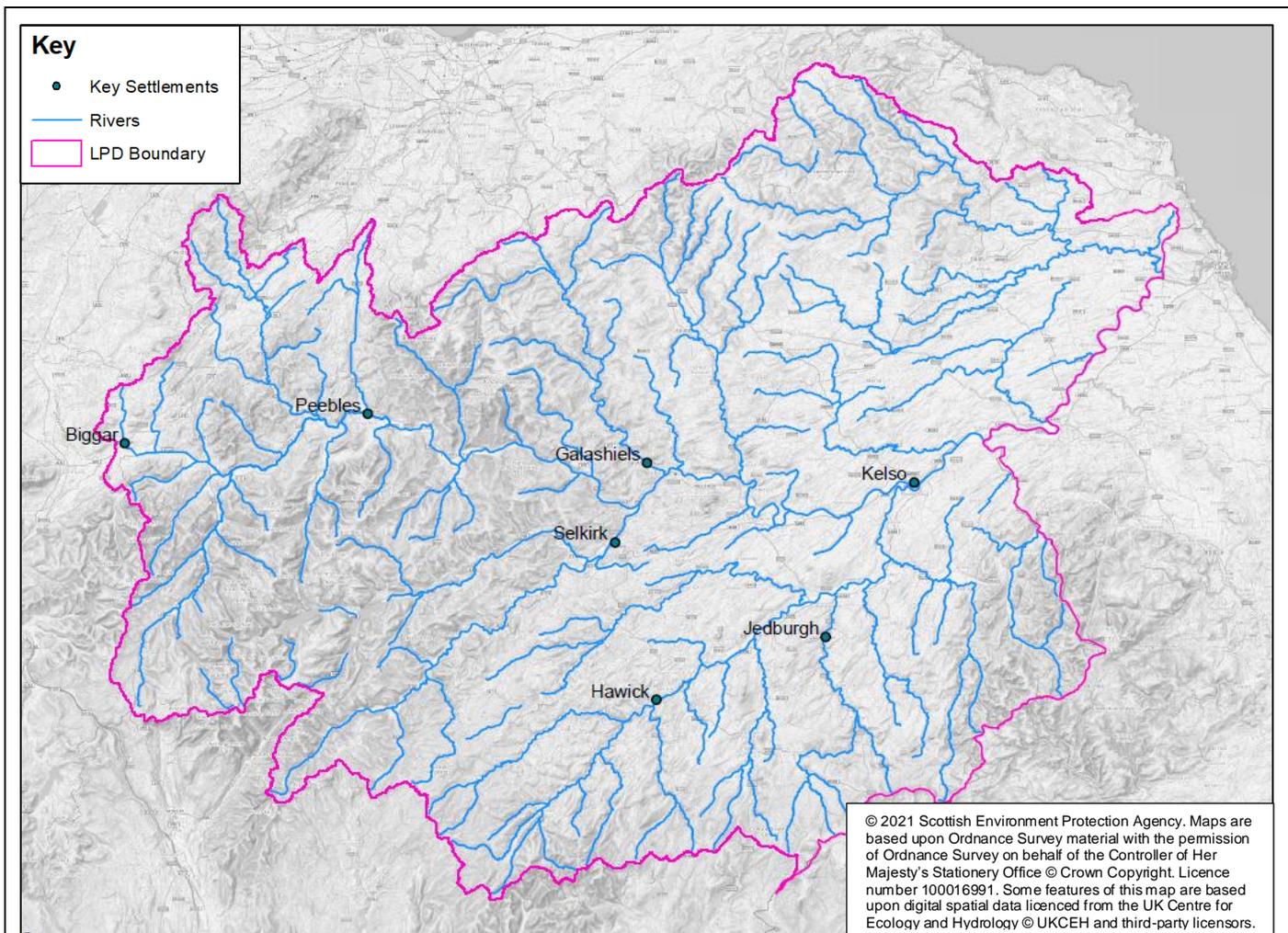


Figure Q.1. Extent of the Tweed LPD, key water bodies and settlements.

The Tweed LPD covers around 4,300 km² and has a population of approximately 120,000 people. It spans southeast Scotland covering the catchment of the River Tweed from the uplands in the west and north to the Scotland-England border in the south. It includes the urban areas of Biggar, Galashiels, Hawick, Jedburgh, Kelso, Peebles and Selkirk.

The area is largely rural with mostly grassland, coniferous woodland and heather to the north, south and west, and agricultural land to the east. There are a number of reservoirs in the area

including Fruid, Talla and Megget Reservoirs and St Mary's Loch in the Southern Uplands and the Whiteadder Reservoir in the Lammermuir hills. The River Tweed has many major tributaries including the River Teviot, Biggar Water, Ettrick Water, Gala Water, Jed Water and the Whiteadder Water.

Q.2.2 Flood risk within the Tweed LPD

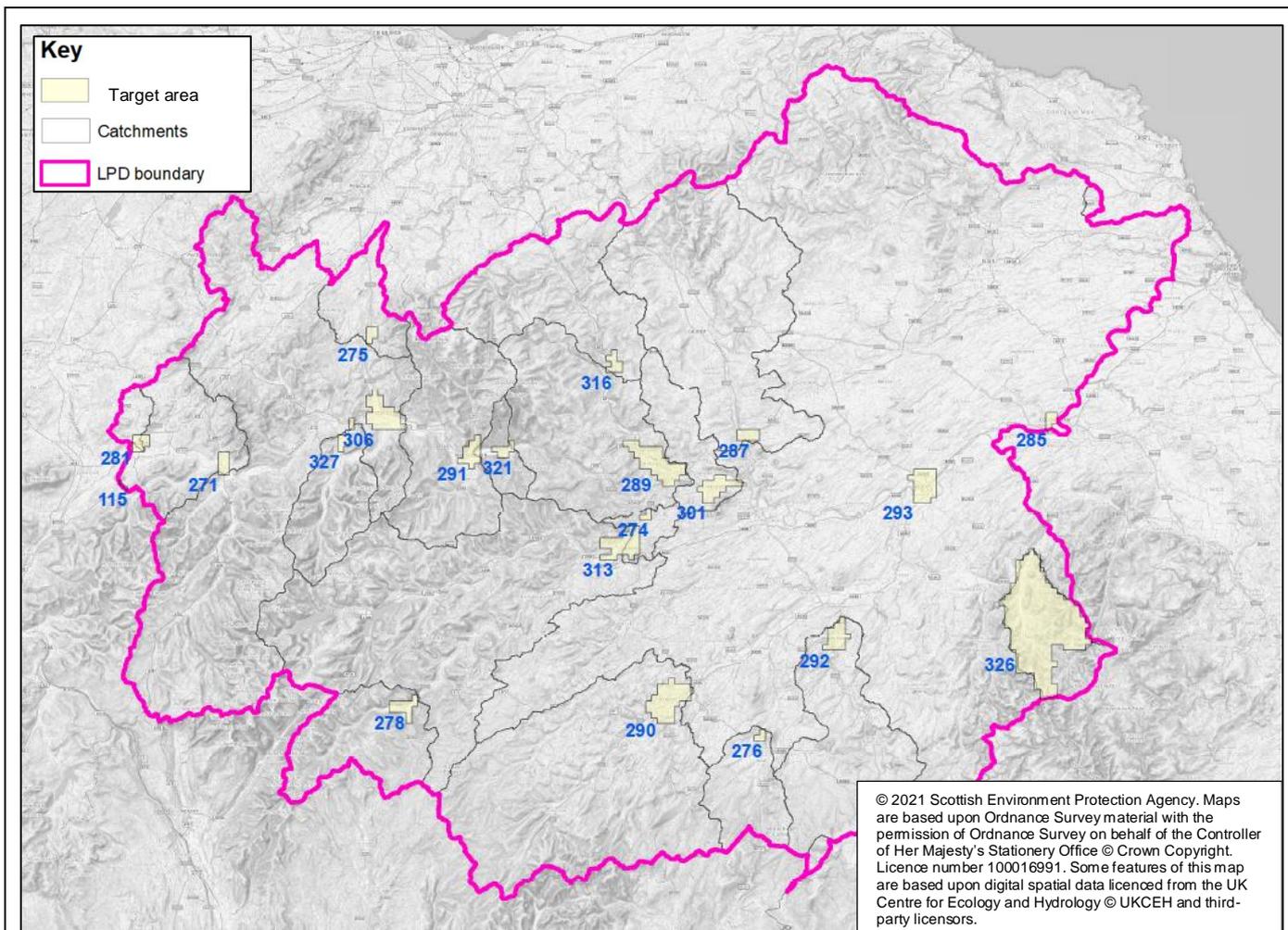


Figure Q.2. Extent of the Tweed LPD and target areas at risk from flooding

There is river and surface water flood risk, with a long history of significant river flooding.

Currently it is estimated that there are almost 14,000 people and almost 10,000 homes and

businesses at risk from flooding. This may increase to 16,000 people and around 11,000 homes and businesses by the 2080s due to climate change. The expected annual cost of flooding over a long period of time is around £11.6 million.

Three target areas have catchments that span the Scotland-England Border (Coldstream (Leet Water); Kelso (River Tweed); Bowmont Valley).

Local flood risk management planning is led by Scottish Borders Council, who is the lead authority. Other responsible authorities include SEPA, Scottish Water, Forest and Land Scotland, Scottish Forestry and two other local authorities (East Lothian and South Lanarkshire).

Q.2.3 Recommended flood risk management actions within the Tweed LPD

Table Q.2 sets out the sources of flood risk and types of local actions recommended within the Flood Risk Management Plan for target areas within the Tweed LPD, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section Q.5 of this Appendix. Section 2.3 of the main Environmental Report lists those actions scoped out of the assessment.

Q.3 Tweed LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Tweed LPD across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland’s environment in the main Environmental Report.

This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Tweed LPD provided in Section Q.4 of this appendix.

Population and health and material assets

Key information relating to population and human health and material assets are presented in Section Q.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding.

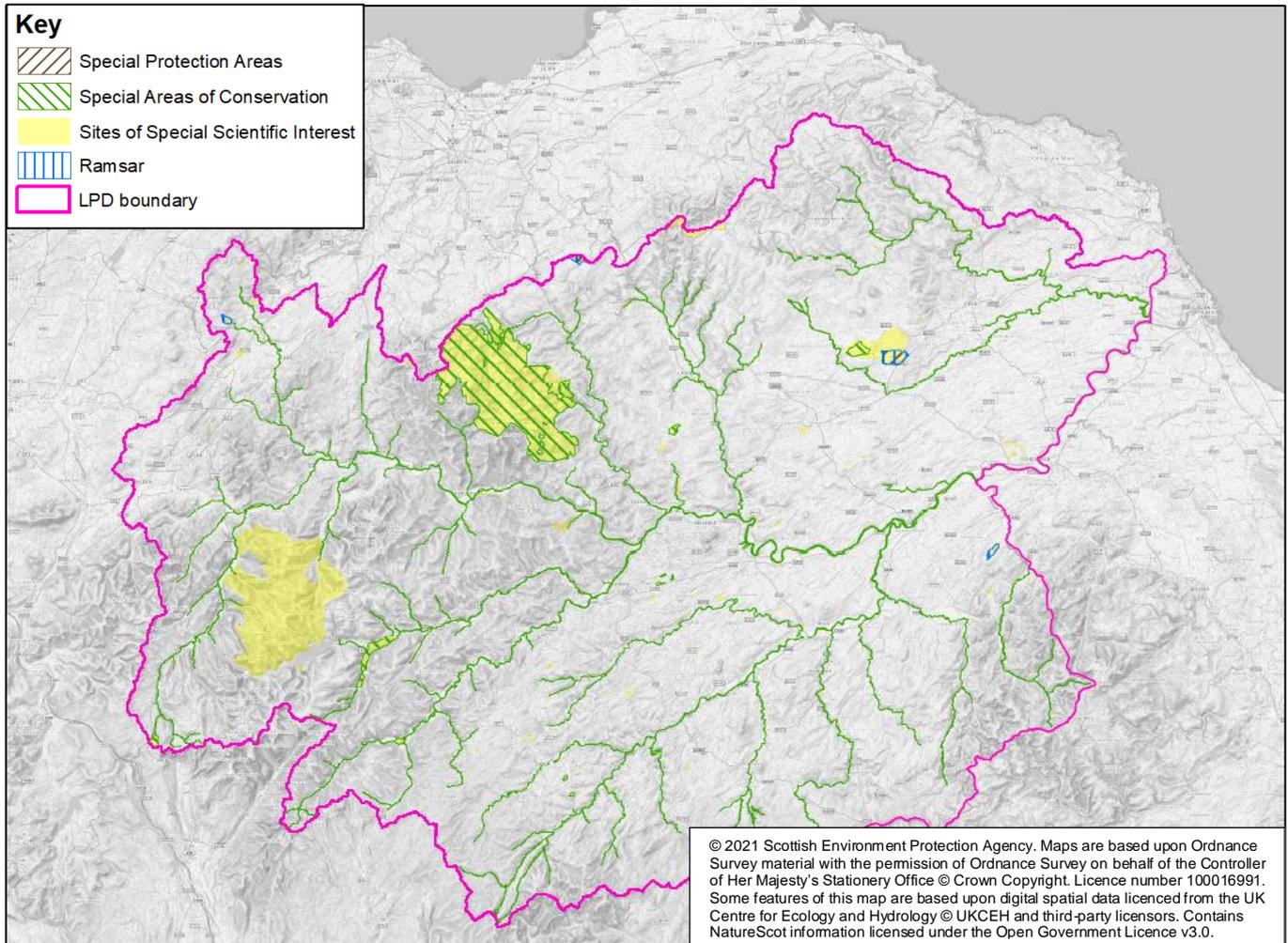
Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is generally good across the LPD with 80% of target areas having at least some greenspace. For 35% of target areas within this LPD greenspace accounts for over half of total landcover indicating ample provision.

Biodiversity

Key

-  Special Protection Areas
-  Special Areas of Conservation
-  Sites of Special Scientific Interest
-  Ramsar
-  LPD boundary

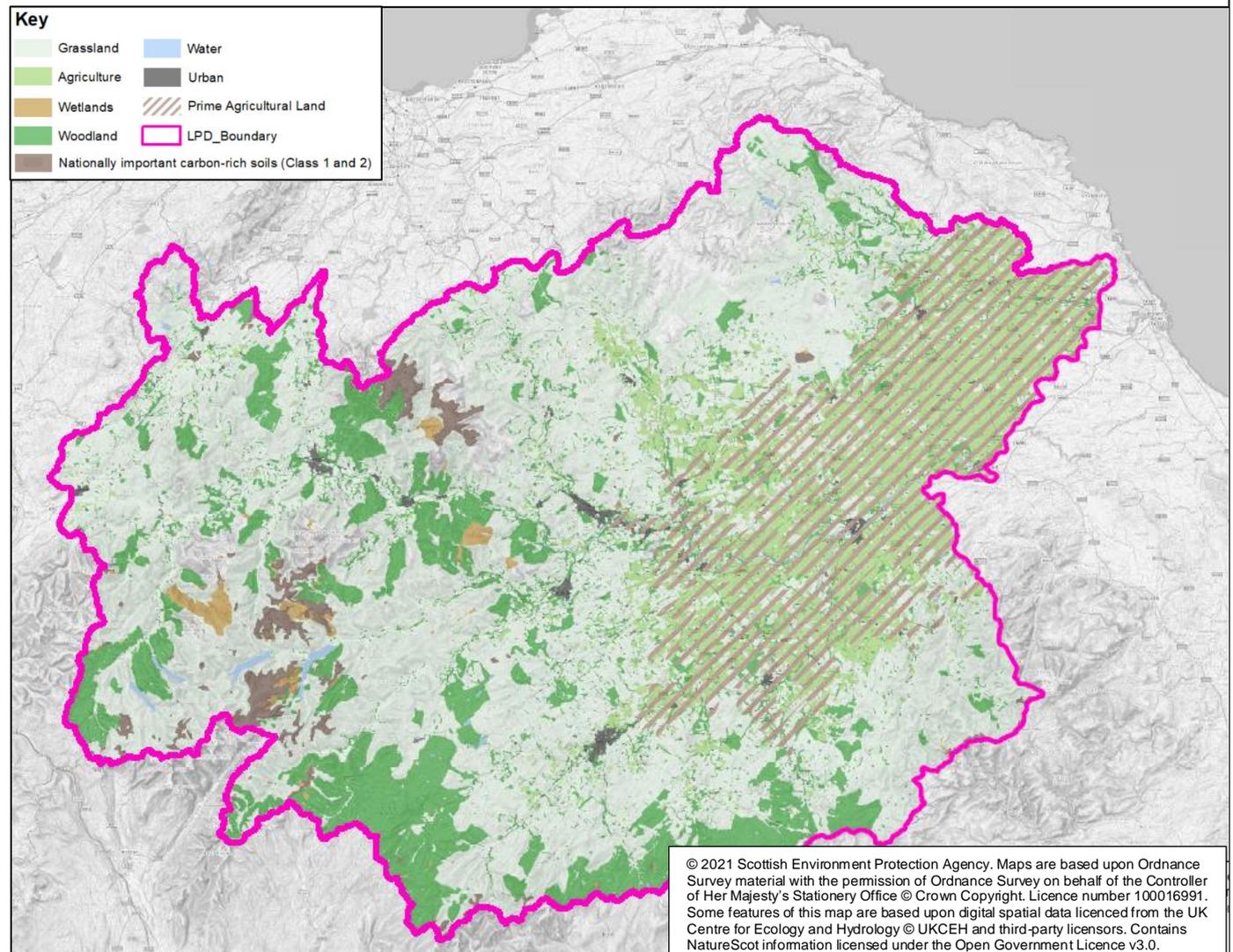


Summary facts for the Tweed LPD

Ramsar site	4	The main stem of the river Tweed and its major tributaries are designated as a SAC (for Atlantic salmon, otter, lamprey and water crowfoot) and a SSSI. The catchment of the Tweed also
Special Areas of Conservation (SACs)	7	

Special Protection Areas (SPAs)	4	drains to the Berwick and North Northumberland Coast SAC (not located within this LPD).
Sites of Special Scientific Interest (SSSIs)	73	The LPD also includes a range of other designated sites including the extensive Moorfoot Hills and Tweedsmuir Hills in the upper catchment that contain large areas of upland heath as well as wetlands and semi-natural grassland.

Land cover (including soils)

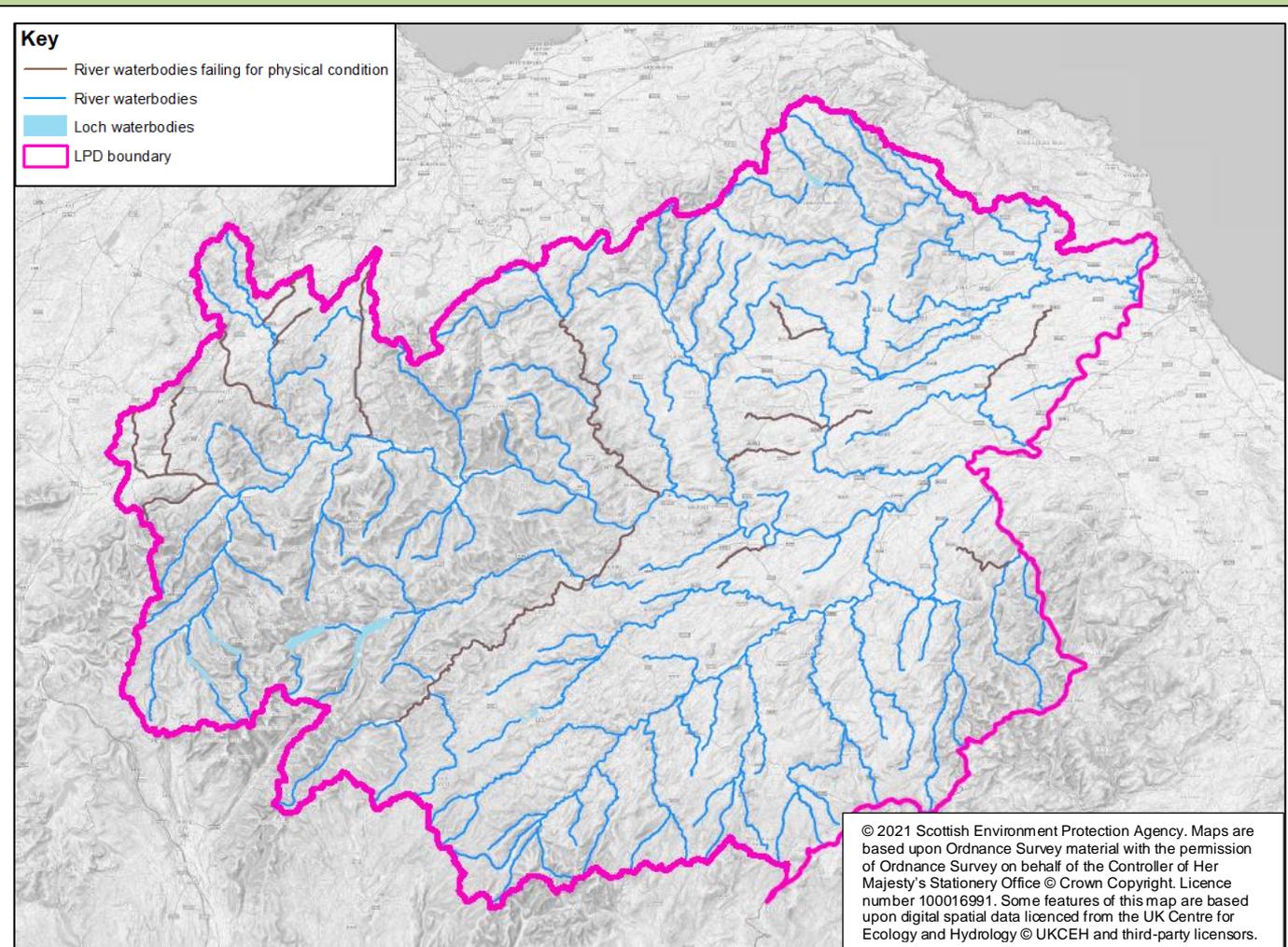


Summary facts for the Tweed LPD

The predominant land cover in the Tweed LPD is cultivated land making it an important agricultural area. The upland areas, predominantly in the west of the LPD, contain rough grazing. Further down the catchment, grassland farming is more common. The lowland areas of Tweed in the east of the LPD contain large areas prime agricultural land and are used for arable farming.

Other common land cover types include semi natural grassland, conifer plantation and upland heath. There is significant woodland cover in the upper catchment, with large areas of commercial forestry plantation.

Water



Summary facts for the Tweed LPD

There are approximately 139 river water bodies and six lochs in this LPD, as classified under the Water Framework Directive (WFD). There are a number of pressures on water bodies across the Local Plan District that may hinder the achievement of their objectives as set out in the River

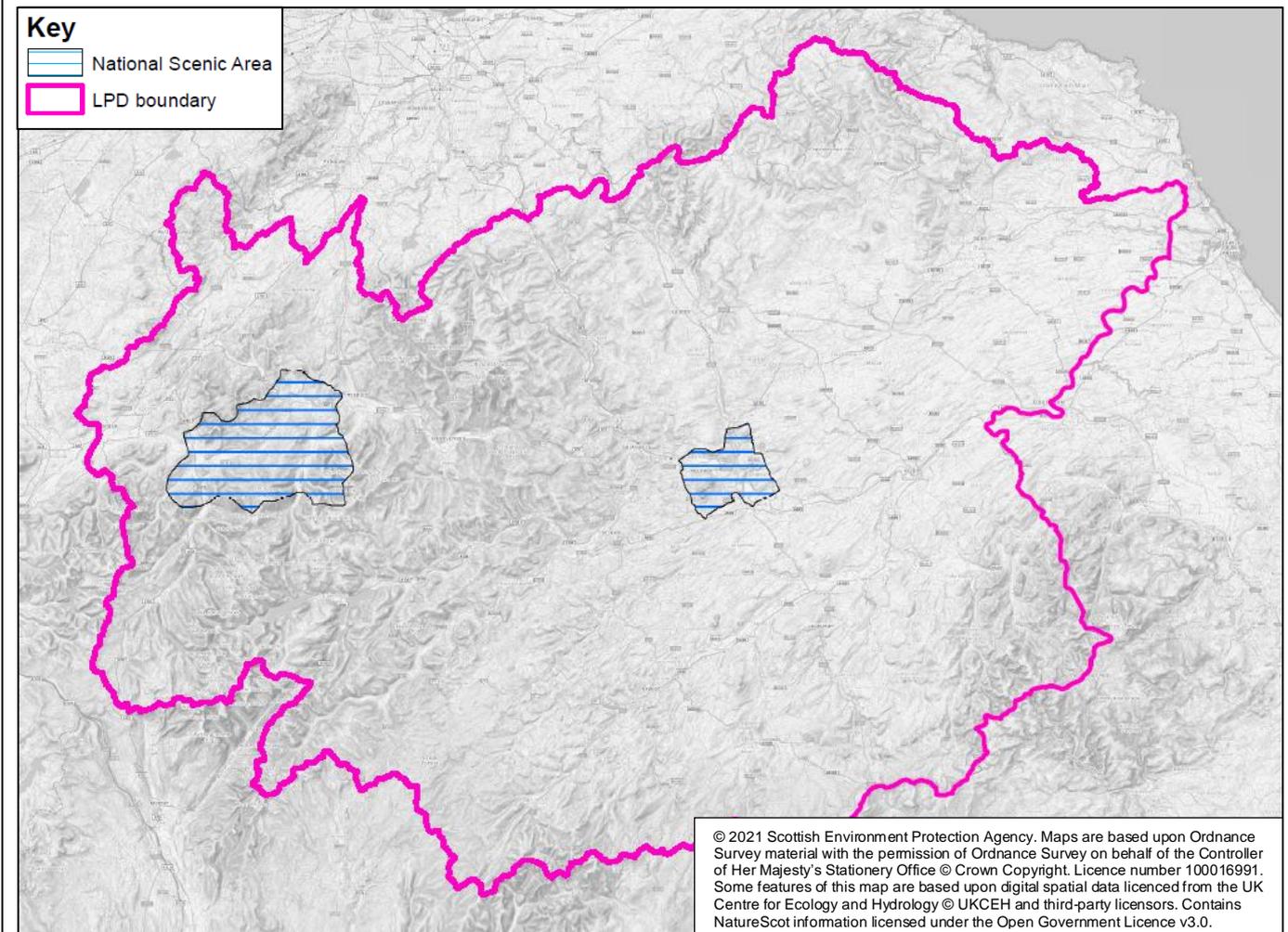
Basin Management Plan. Notably, there are 8 river water bodies that are failing to meet their WFD objectives because of their physical condition, including the Etrick Water and the Gala Water which are both major tributaries to the Tweed. Any relevant flood risk management actions should take these into account.

Cultural heritage

Summary facts for the Tweed LPD

Battlefield	4	Cultural heritage designations are dispersed across much of the LPD with areas of dense concentrations around the towns and villages. Over 40% of listed buildings within the LPD are located within target areas at risk from flooding.
Conservation Area	30	
Garden and Designed Landscape	35	
Scheduled Monument	715	
Listed Buildings	3671	

Landscape



Summary facts for the Tweed LPD

National Scenic Area	2	There are two protected landscapes in the Tweed LPD: Upper Tweeddale and Eildon and Leaderfoot National Scenic Areas. Wild land exists at Talla Hart fell in the headlands of the catchment.
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Q.4. Key environmental constraints relevant to flood risk management for target areas within the Tweed LPD

Informed by the high-level baseline data presented in Section Q.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table Q.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms of population and health and material assets and are not detailed in Table Q.2.

Table Q.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
	objectives as a result of their physical condition.		2027 WFD objectives as a result of their physical condition
Cultural Heritage	No cultural heritage assets in target area.	Battlefield and/or conservation area and/or garden and designed landscape within wider catchment. Listed buildings and scheduled monuments within target area.	Battlefield and/or conservation area and/or garden and designed landscape within target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within target area.	Local landscape area within target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within target area and nature reserve and national scenic area within target area.

Table Q.2 Target areas at risk from flooding, local actions and key constraints within the Tweed LPD target areas.

Target area areas with specific local actions	Reference number (Figure Q.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Broughton	271	River / Surface water		Y	Y	Y	H	L	H	M	H
Lindean	274	River / Surface water		Y	Y	Y	H	L	H	L	L
Eddleston	275	River / Surface water		Y	Y		H	L	H	H	L
Bonchester Bridge	276	River / Surface water	Y	Y	Y		H	L	L	L	L
Upper Ettrick	278	River / Surface water		Y	Y		H	L	H	L	L
Biggar	281	River / Surface water			Y		L	L	H	H	L
Coldstream	285	Coastal/ River/ Surface water		Y	Y		H	L	L	H	L
Earlston	287	Coastal/ River/ Surface water		Y			H	L	H	H	L
Galashiels	289	Coastal/ River/ Surface water		Y	Y		H	M	H	H	M
Hawick	290	Coastal/ River/ Surface water	Y	Y	Y	Y	H	L	L	H	L

Target area areas with specific local actions	Reference number (Figure Q.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Innerleithen	291	Coastal/ River/ Surface water		Y	Y		H	M	H	H	M
Jedburgh	292	River / Surface water		Y	Y		H	H	L	H	L
Kelso	293	River		Y	Y		H	L	L	H	L
Melrose	301	River		Y	Y		H	M	H	H	H
Peebles	306	River		Y		Y	H	M	H	H	H
Selkirk	313	River		Y			H	L	H	H	L
Stow	316	River / Surface water		Y	Y		H	L	H	H	L
Walkerburn	321	Surface water		Y	Y		H	M	H	M	M
Bowmont Valley	326	River	Y	Y	Y		H	M	L	M	L
Manor Valley	327	River / Surface water		Y			H	L	L	M	H

* Some schemes and works listed in this table are scoped out of the assessment in Section 0.5.5. See Section 2.3 of the main Environmental Report for details

Q.5. Environmental assessment of the flood risk management actions for the Tweed LPD

Q.5.1 Introduction

For the purposes of the SEA assessment the actions recommended in the Flood Risk Management Plan were categorised into four types as listed in Table Q.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Tweed LPD, identifying potential effects and key recommendations.

Q.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for three target areas (Bonchester Bridge, Hawick and Bowmont Valley) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table Q.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

Q.5.3. Planning and resilience actions

Specific local planning and resilience actions are recommended for 19 target areas within the Tweed LPD (refer to Table Q.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience actions was carried out at a national scale using the SEA objectives and criteria presented in Section

4.4 of the Environmental Report. Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting.

More specifically within the Tweed LPD, the constraints review undertaken and summarised in Table Q.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

Q.5.4. Flood studies

Flood studies are recommended for 16 target areas within the Tweed LPD (see Table Q.2 for details). As we do not know whether the flood studies will, in future, lead to any physical actions, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The review described in Section Q.4 identifies that there are environmental constraints present across all target areas across the LPD. Constraints due to biodiversity, cultural heritage and water are found in most target areas. The highest levels of constraint were identified in Melrose and Peebles.

There are flood studies proposed in the three target areas with catchments that span the Scotland-England border. Due to the proximity to the border, any actions that arise as a result of the Bowmont Valley or Coldstream flood studies could have impacts in England.

The remaining target areas, Kelso, is a substantial distance from the border and no cross-border impacts are anticipated.

As the identified flood studies within this LPD are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible (including, where relevant, any cross-border impacts).

Q.5.5. Flood schemes and works at design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for three target areas during Cycle 2 (2022 – 2027), dependent on funding (see Table Q.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table Q.3, and the effects summarised at an LPD scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section Q.4 and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known, – but note these can change as the schemes and works go through the design stage.
2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health and material assets within the Tweed LPD as a result of reduced flood risk to homes, businesses and infrastructure; with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors. No significant adverse effects in terms of the SEA objectives were identified, although a range of potential effects, both adverse and beneficial, were identified across the target areas of Hawick, Peebles and Lindean. Further detail can be found in Table Q.3.

As the design of these proposed actions are progressed by local authorities/ Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table Q.3 – SEA significance assessment of proposed flood schemes and works design and implementation*

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Hawick (Crowbyres and Whitlaw) <i>River</i>	River defences	++	-	0	0	+	++	0	0
Lindean <i>River</i>	River defences Property flood resilience	++	-	-/+	0	+	++	0	0
Peebles <i>River</i>	Storage, conveyance and control River defences	++	-/+	-/+	0	+	++	-/+	-/0
Key findings									

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<ol style="list-style-type: none"> 1. Significant positive effects on population and human health due to reduced flood risk and increased wellbeing. 2. Potential for negative effects on biodiversity due to river defences and storage, conveyance and control type actions as SSSIs and SACs are located within the target areas of Hawick, Lindean and Peebles. Potential beneficial effects through habitat creation from the proposed storage area within the target area of Peebles. 3. Potential mixed effects identified for water at Lindean and Peebles (where one or more waterbodies within the catchments are failing to meet their 2027 WFD objectives as a result of their physical condition), and also at Hawick. Potentially adverse effects from river defences and from storage, conveyance and control actions as these may interfere with river processes altering rates of erosion and deposition. Opportunities for enhancement through actions by regulating water flow and reducing erosion and the supporting of WFD objectives, balanced with the potential adverse effects of actions on the river environment. 4. No significant effects identified for soil. 5. Positive effects on climatic factors due to improved resilience of properties and infrastructure to future climate change. 6. Significant positive effects on material assets from the protection of property and infrastructure. 7. Overall, no significant effects identified for cultural heritage. Positive effects from the reduction in flood risk to heritage assets balanced with negative effects on the setting of historic buildings and structures. Effects will typically be dependent 									

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<p>on location and design of actions. Potential for mixed effects within the target area of Peebles, due to the extent of actions proposed.</p> <p>8. Overall, no significant effects identified for landscape. Potential for negative effects within the target area of Peebles, due to the extent of river defences proposed and presence of high value landscape designations. Effects however, will be dependent on location and design of actions.</p>									

Flood risk management plans 2021-2027: Strategic environmental assessment

Environmental Report – Appendix R

Assessment for the Solway Local Plan District

July 2021

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Scottish Environment Protection Agency
Angus Smith Building
6 Parklands Avenue
Eurocentral
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North Lanarkshire
ML1 4WQ

Appendix R - Solway Local Plan District (LPD 14)

R.1. Introduction

This appendix presents the specific aspects of the Strategic Environmental Assessment (SEA) of the Flood Risk Management Plans relevant to the Solway Local Plan District (LPD). This document:

- Provides an overview of the Solway LPD, sources and areas at risk from flooding and the target areas where flood risk actions are recommended;
- Provides a high-level constraints-based environmental summary for the Solway LPD. This information supplements the description of the current state of Scotland's environment in Section 3 of the main Environmental Report;
- Identifies potential environmental constraints relating to target areas at risk from flooding within the Solway LPD for which actions are recommended in the Flood Risk Management Plan;
- Describes the identified potential significant environmental effects of the types of actions proposed to manage flood risk in the Solway LPD, recommending potential mitigation and further assessment where appropriate, and where possible identifying opportunities for environmental enhancements.

R.2. Flood risk within the Solway LPD and recommended actions

R.2.1 Overview of the Solway LPD

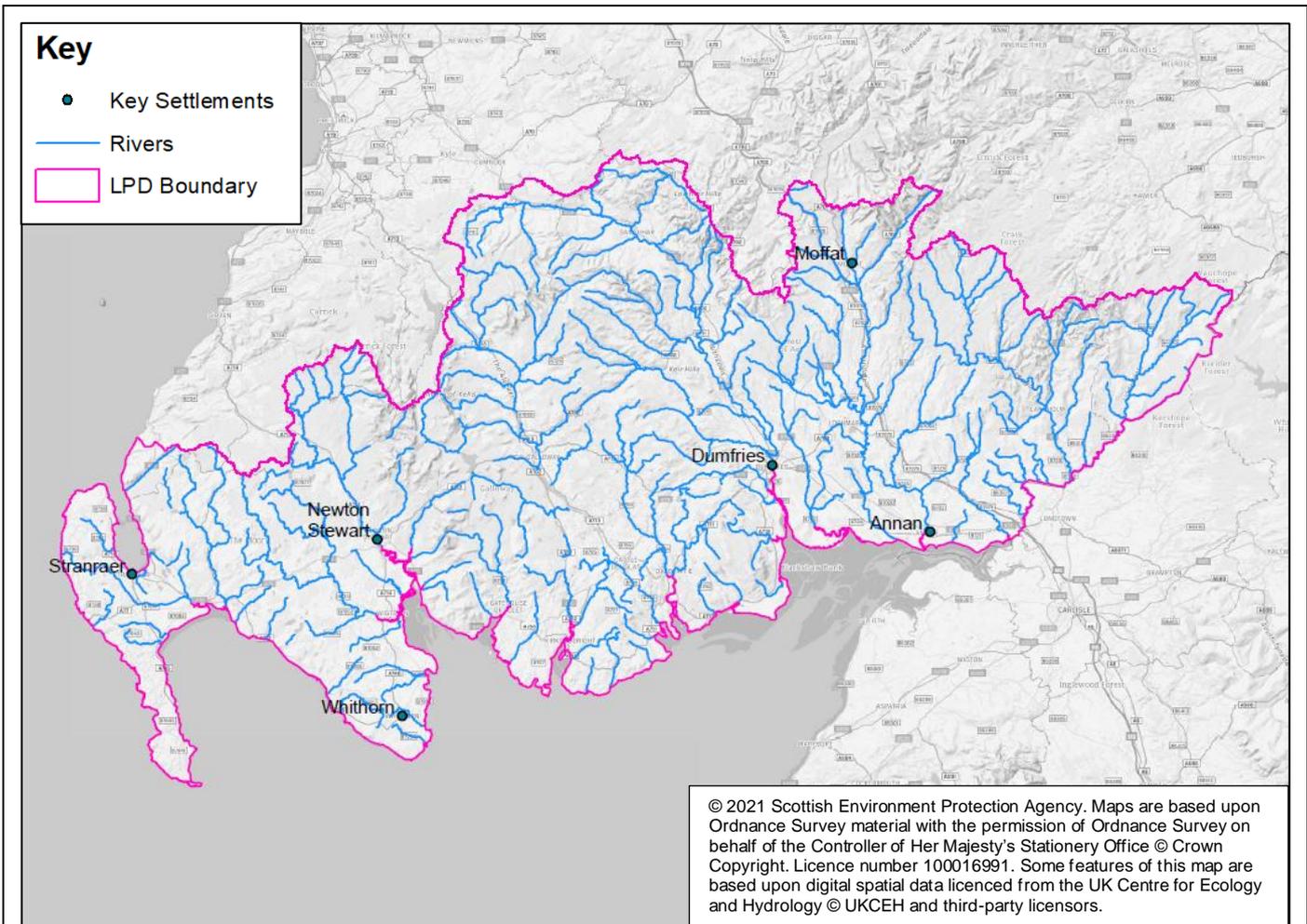


Figure R.1. Extent of the Solway LPD, key water bodies and settlements.

The Solway LPD covers an area of around 7,000 km² and has a population of approximately 160,000. It covers a large area of the south west of Scotland, extending from Drunmore and Portpatrick in the west, to beyond Langholm and Newcastleton in the east. The coastline has a length of around 625 km from Downan Point to Gretna, with many bays including Wigtown Bay and Luce Bay. It includes the urban areas of Dumfries, Stranraer and Annan.

The area is largely rural with the main land cover of woodland and agricultural land. There are many lochs and reservoirs in the area including Loch Ken, Clatteringshaws Loch, Loch Grannoch, Loch Dee and Castle Loch. The main rivers are the Nith, the Esk, the Annan, the Cree and the Dee (Galloway).

R.2.2 Flood risk within the Solway LPD

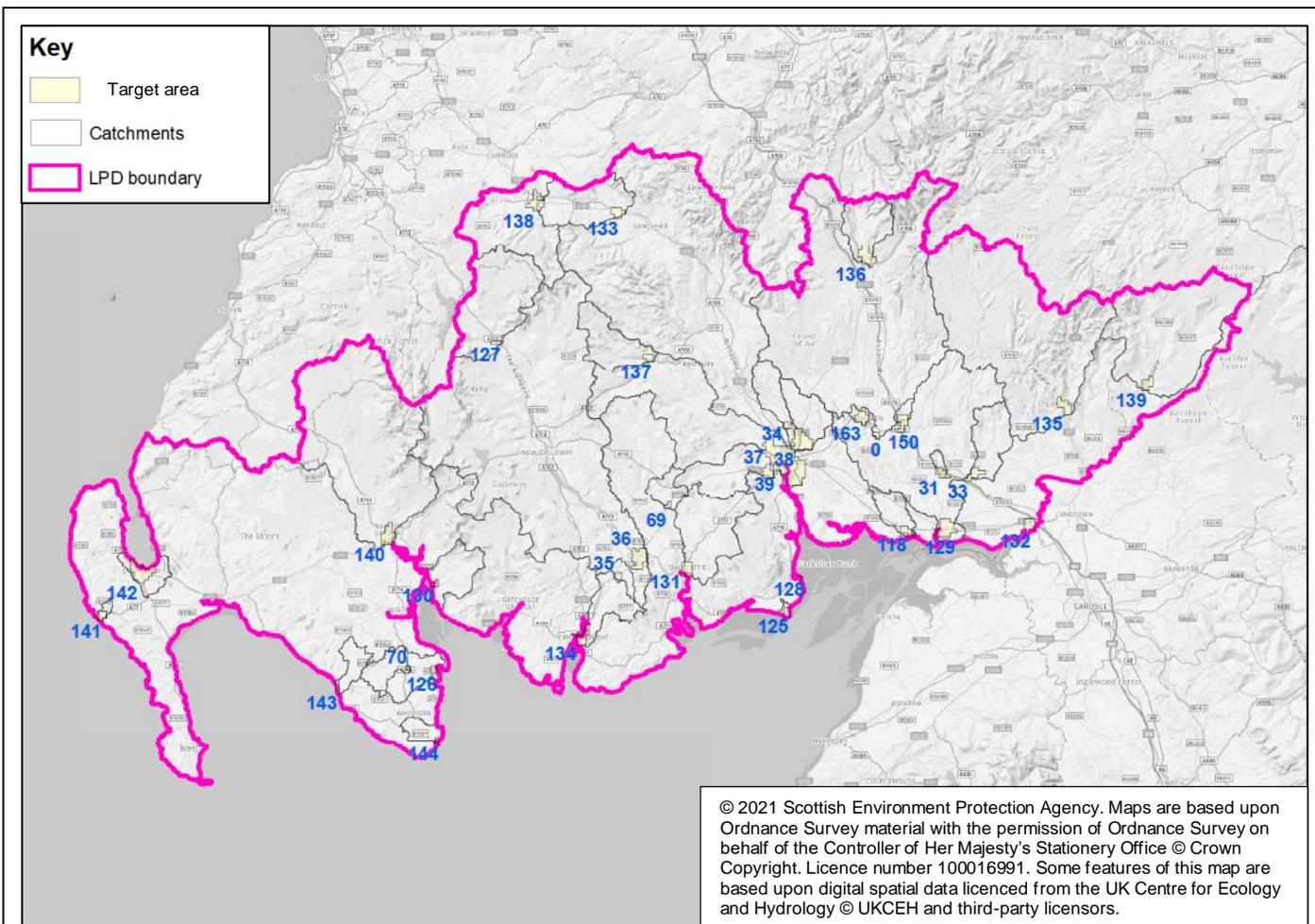


Figure R.2. Extent of the Solway LPD and target areas at risk from flooding

There is river, surface water and coastal flood risk in the LPD. Currently it is estimated there are around 16,000 people and 10,000 homes and businesses at risk from flooding. This may

increase to 20,000 people and 13,000 homes and businesses by 2080s due to climate change.

The expected annual cost of flooding is around £15 million. Note however that flooding from wave overtopping is not fully represented in the assessment of flood risk and the impact of coastal flooding may be underestimated.

Two target areas have catchments that span the Scotland-England border: Newcastleton and Langholm, both in the River Esk catchment. In addition, there are several target areas along the coast of the Solway Firth, which also spans the border.

R.2.3 Recommended flood risk management actions within the Solway LPD

Table R.2 sets out the sources of flood risk and types of local actions recommended within the Flood Risk Management Plan for target areas within the Solway LPD, based on the categories described in Section 2.3 of the main Environmental Report. The table does not include actions that apply to the whole Local Plan District, which are assessed in the main Environmental Report.

All scoped in actions are the subject of the environmental assessment within Section R.5 of this Appendix. Section 2.3 of the main Environmental Report lists any actions scoped out of the assessment.

R.3 Solway LPD: Key environmental constraints

This section provides a high-level constraints-based environmental summary for the Solway LPD across the SEA topics, with the exception of climatic factors which has been considered at the national scale and is presented in Section 3 of the main Environmental Report. This information is limited to key receptors and constraints at an LPD-scale and supplements the fuller description of the current state of Scotland's environment in the main Environmental Report.

This summary provides the background to the assessment of key environmental constraints relevant to flood risk management for target areas within the Solway LPD provided in Section R.4 of this appendix.

Population and health and material assets

Key information relating to population and human health and material assets are presented in Section R.2 of this appendix. These cover population numbers, key settlements and receptors, including homes, businesses, community facilities and key infrastructure, at risk from flooding.

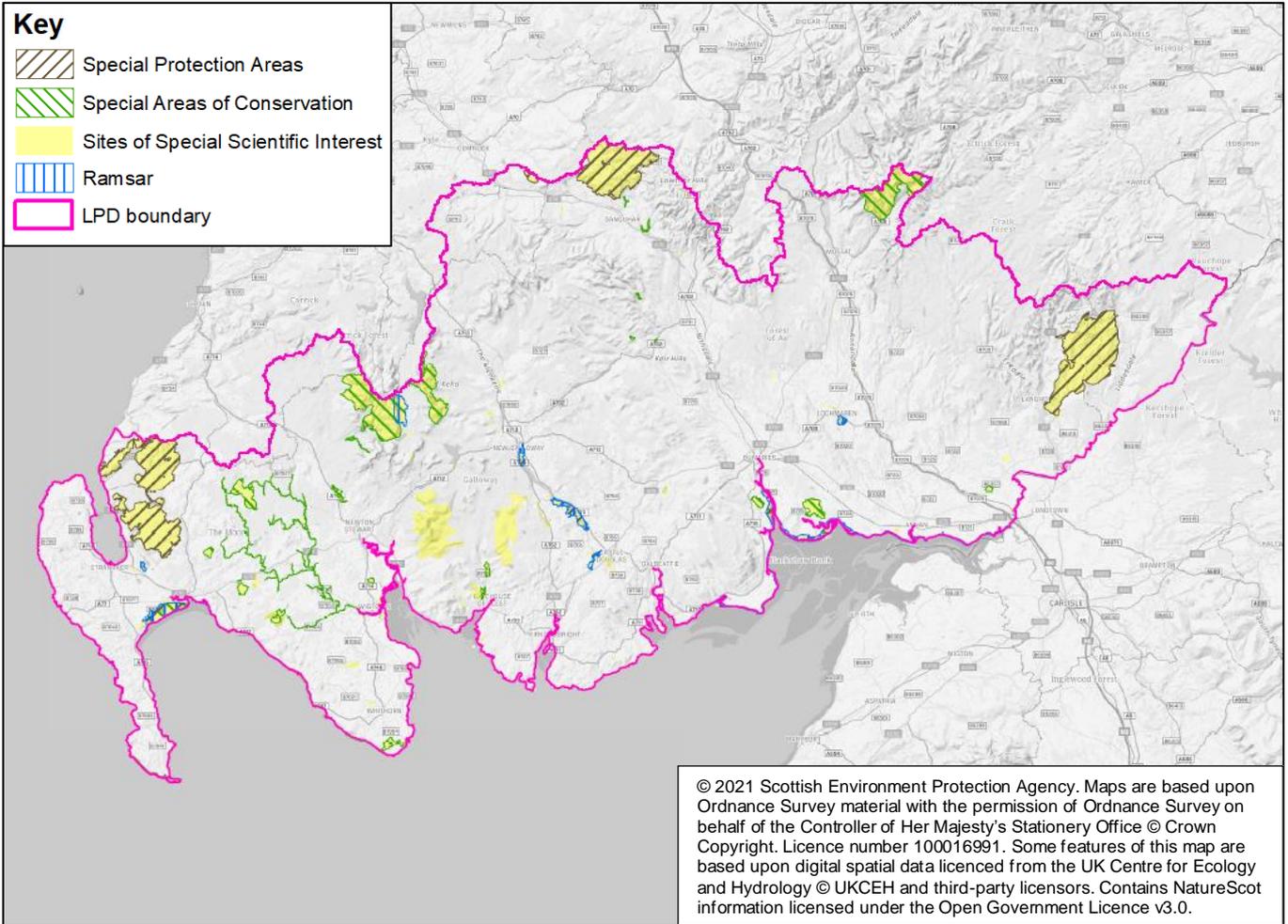
Flooding has negative impacts on human health and these impacts may be greater for disadvantaged people and communities, such as those that are vulnerable or isolated.

Urban greenspace provision is varied across the LPD, with roughly two thirds of target areas having at least some greenspace. For 20% of target areas, greenspace accounts for over half of total land cover indicating ample provision. Those communities with no designated greenspace are likely to be rural communities where greenspace designations are less common.

Biodiversity

Key

-  Special Protection Areas
-  Special Areas of Conservation
-  Sites of Special Scientific Interest
-  Ramsar
-  LPD boundary



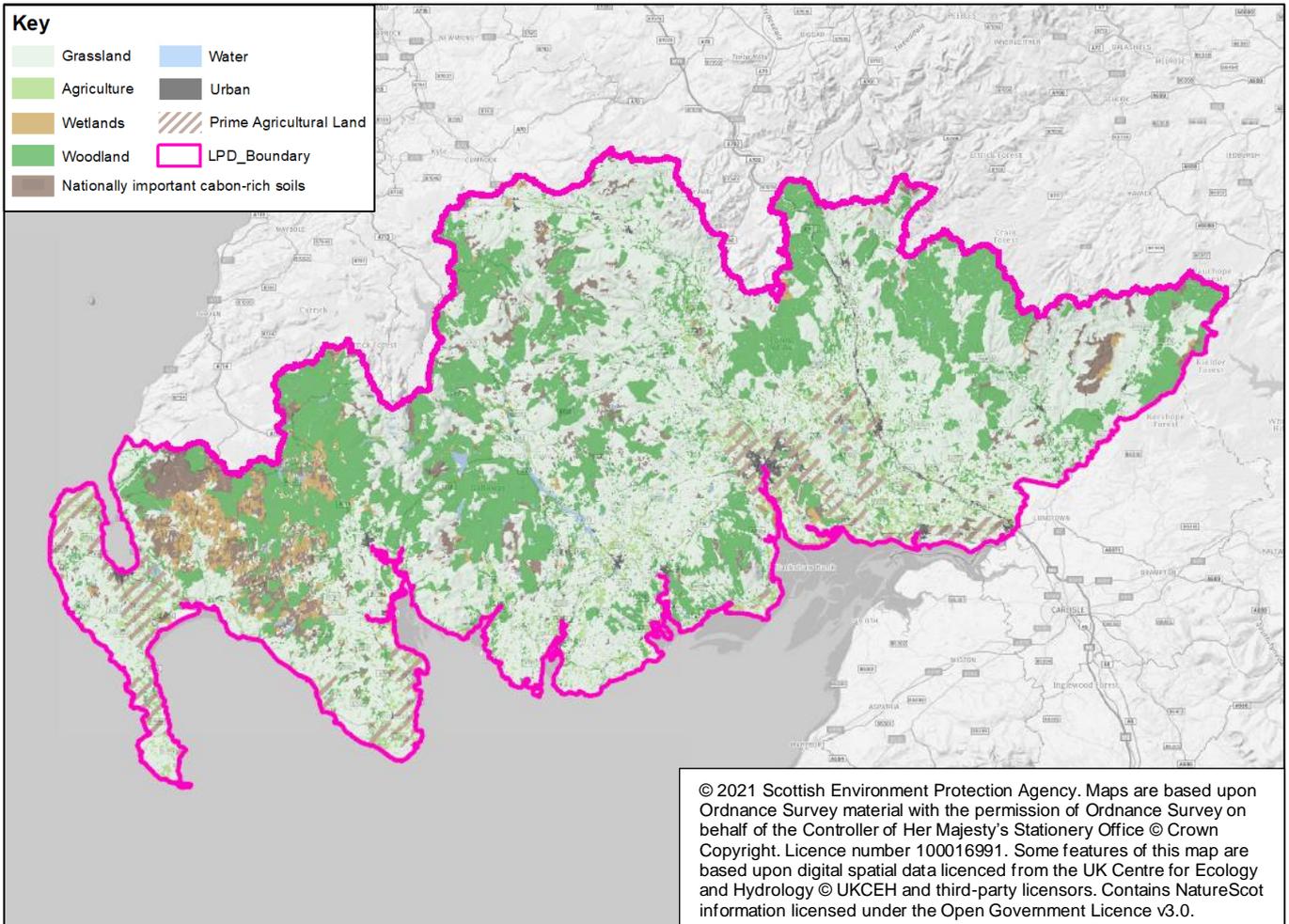
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Summary facts for the Solway LPD

Marine Protected Area (MPA)	1	There are numerous designated sites for biodiversity distributed across the Solway LPD, including moorland in the upland areas, lochs and areas of blanket bogs and associated species. Adjoining the LPD, most of the coastline on both the Scottish and
Ramsar site	5	

Special Areas of Conservation (SACs)	18	English banks and the waters of the Solway Firth and Luce Bay are designated for their coastal and marine habitats and associated species (not shown on plan).
Special Protection Areas (SPAs)	7	
Sites of Special Scientific Interest (SSSIs)	78	

Land cover (including soils)



Summary facts for the Solway LPD

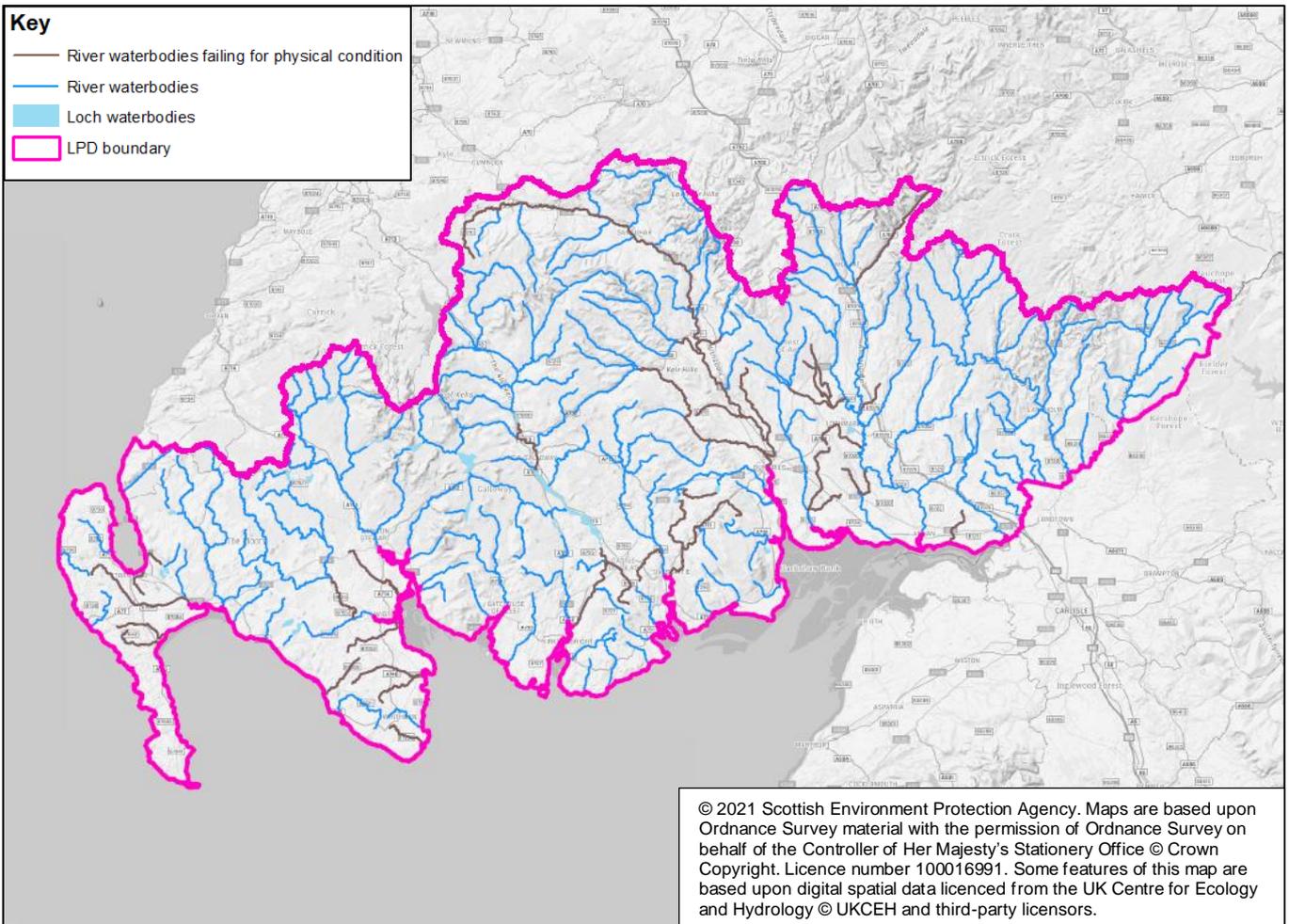
Land cover within the LPD is varied with large areas of cultivated land as well as woodland and conifer plantations. Cultivated land is generally located in the south, including significant areas of prime agricultural land, with forestry generally located in the north of the LPD. Woodland cover throughout the LPD includes large areas of commercial forestry.

Within the coastal areas there are a variety of habitats, including large areas of saltmarsh and large sand dune systems. Urban landcover is limited with the largest area being the town of Dumfries.

Water

Key

- River waterbodies failing for physical condition
- River waterbodies
- Loch waterbodies
- LPD boundary



Summary facts for the Solway LPD

There are approximately 206 river water bodies and 19 lochs in this LPD, as classified under the Water Framework Directive (WFD). There are numerous coastal waterbodies including the Solway Firth, Auchenacairn Bay, Luce Bay and the Cree Estuary. Coastal areas at risk of erosion will be of particular concern when considering flood risk management actions.

There are a number of pressures on water bodies across the LPD that may hinder the achievement of their objectives as set out in the River Basin Management Plan. Notably, there are 35 river water bodies that are failing to meet their WFD objectives because of their physical

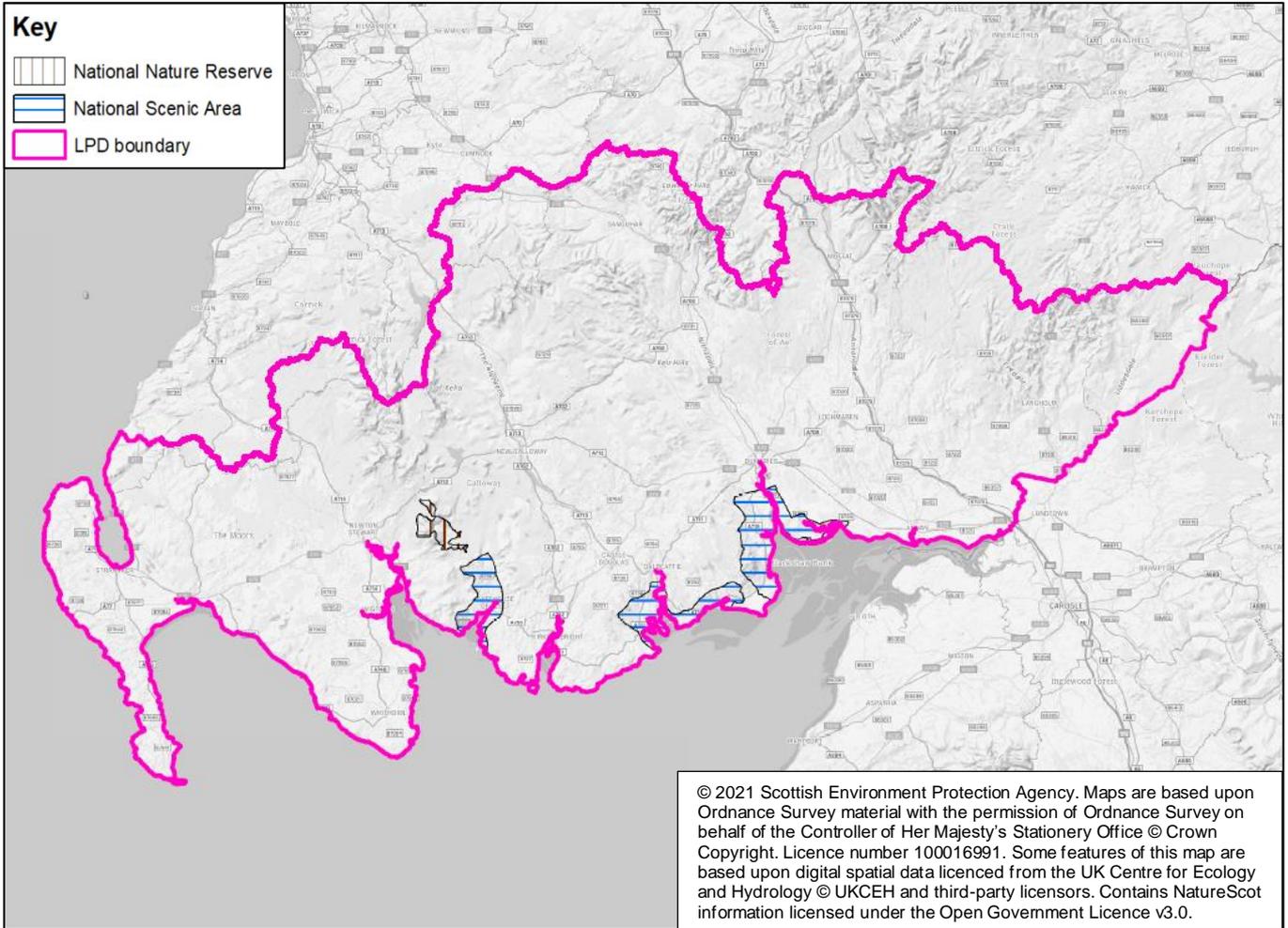
condition and that flood risk management actions should take into account. These are located predominately in the south and east of the LPD, in more populous areas such as Dumfries and Newton Stewart.

Cultural heritage

Summary facts for the Solway LPD

Battlefield	1	Cultural heritage designations are dispersed across the LPD; with concentrations in towns and villages and including castles and stately homes such as Drumlanrig Castle and the Threave Estate. Approximately 40% of listed buildings within the LPD are located within target areas at risk from flooding.
Conservation Area	37	
Garden and Designed Landscape	18	
Scheduled Monument	1025	
Listed Buildings	4206	

Landscape



Summary facts for the Solway LPD

National Nature Reserve	2	Landscape designations are primarily located in the coastal areas of the LPD, including three National Scenic Areas (Nith Estuary, Fleet Valley, East Stewartry Coast) and two National Nature Reserves. On the English coast of the Solway Firth is the Solway Coast Area of Outstanding Natural Beauty. There are two areas of wild land: Tall-Hart Fell and Merrick.
National Scenic Area	3	

R.4. Key environmental constraints relevant to flood risk management for target areas within the Solway LPD

Informed by the high-level baseline data presented in Section R.3, this section identifies key environmental constraints within each target area or, where more appropriate, the wider catchment associated with the source of flood risk in each community. The intention for this review is to signpost key environmental issues that will need to be taken into consideration as flood risk management actions are developed and delivered. It also provides insight into where further environmental studies may be required.

The constraint sensitivity for each target area has been determined as high, medium or low using the criteria defined in Table R.1 for each topic. Target areas have been selected based on risk of flooding to homes and businesses or infrastructure, with associated impacts on human health. Therefore, for the purpose of this assessment, sensitivity is assumed to be high across all relevant target areas in terms of population and health and material assets and are not detailed in Table R.2.

Table R.1. Constraints review sensitivity rating

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
Biodiversity	No national or internationally designated site for nature conservation within target area or wider catchment/coastal area.	No nationally or internationally designated sites for nature conservation within target area, but within wider catchment and/or coastal area.	Nationally or internationally designated site within target area.
Soil	Small area of either agricultural land or peatland, or none of either present.	Small area of agricultural land and peatland. No large areas of agricultural land or peatland present.	Large area of agricultural land and/or peatland.
Water	No river water bodies identified within 2015 River Basin Management Plan (RBMP) within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition.		One or more river water bodies identified within 2015 RBMP within the catchment that are failing (in 2018) to meet their 2027 WFD objectives as a result of their physical condition
Cultural Heritage	No cultural heritage assets in Target area area.	Battlefield and/or conservation area and/or garden and designed landscape	Battlefield and/or conservation area and/or garden and designed landscape

SEA topic	Sensitivity rating		
	Low (L)	Medium (M)	High (H)
		within wider catchment. Listed buildings and scheduled monuments within target area.	within Target area. Several listed buildings and scheduled monuments within target area.
Landscape	Local landscape area within Target area.	Local landscape area within Target area and nature reserve/national scenic area within the wider catchment.	Local landscape areas within Target area and nature reserve and national scenic area within target area.

Table R.2 Target areas at risk from flooding, local actions and key constraints within the within the Solway LPD

Target area areas with specific local actions	Reference number (Figure R.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Ecclefechan	31	River / Surface water	Y				L	L	L	M	L
Eaglesfield	33	River / Surface water			Y		L	L	L	M	L
Kirkton	34	River / Surface water	Y				L	L	H	H	L
Bridge of Dee	35	River / Surface water	Y				H	L	H	L	M
Cargenbridge	37	River / Surface water	Y	Y			L	H	H	L	L
Locharbriggs	38	Coastal/ River/ Surface water	Y				M	M	H	L	L
Dumfries	39	Coastal/ River/ Surface water		Y	Y	Y	M	M	H	H	M
Springholm	69	Coastal/ River/ Surface water	Y				L	L	L	L	L
Sorbie	70	Coastal/ River/ Surface water	Y				M	M	H	L	L

Target area areas with specific local actions	Reference number (Figure R.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Powfoot and Cummertrees	118	Coastal/ River/ Surface water		Y	Y		H	H	L	M	L
Southernness	125	Coastal/ River/ Surface water		Y	Y		H	H	H	L	L
Garlieston	126	River / Surface water		Y	Y		M	H	H	H	L
Carsphairn	127	Surface water				Y	M	L	L	L	L
Carsethorn	128	Coastal/ River/ Surface water		Y	Y		H	L	L	L	H
Annan	129	River / Surface water	Y	Y	Y		H	M	H	H	L
Creetown	130	Coastal/ River/ Surface water		Y	Y		H	L	L	H	M
Dalbeattie	131	Coastal/ River/ Surface water		Y	Y	Y	M	L	H	M	M
Gretna	132	River / Surface water	Y	Y	Y		H	L	L	H	L
Kirkconnel	133	River / Surface water		Y		Y	M	L	H	L	L
Kirkcudbright	134	River		Y	Y		M	L	H	H	H

Target area areas with specific local actions	Reference number (Figure R.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Langholm	135	Coastal/ River/ Surface water		Y		Y	M	L	L	H	L
Moffat	136	River / Surface water			Y	Y	M	L	L	H	L
Moniaive	137	River / Surface water				Y	L	L	L	H	L
New Cumnock	138	River / Surface water				Y	M	L	H	L	L
Newcastleton	139	River / Surface water		Y		Y	M	L	L	H	L
Newton Stewart	140	Coastal / Surface water		Y		Y	H	L	L	H	L
Portpatrick	141	River / Surface water		Y	Y		L	L	L	H	L
Stranraer	142	Coastal/ River/ Surface water		Y	Y		M	H	H	H	L
Port William	143	River / Surface water		Y	Y		H	H	H	H	L
Isle of Whithorn	144	Coastal/ River/ Surface water		Y	Y		H	H	H	H	L

Target area areas with specific local actions	Reference number (Figure R.2)	Flood source	Local actions				Constraint topics				
			Data collection	Planning and resilience	Flood Studies	Schemes and works at design / implementation stage*	Biodiversity	Soil	Water	Cultural heritage	Landscape
Lockerbie	150	Coastal/ River/ Surface water	Y				L	H	L	M	L
Lochmaben	163	River / Surface water	Y				H	H	H	H	L
Heck and Greenhill	16310	Coastal/ River/ Surface water	Y	Y			M	M	H	L	L

* Some schemes and works listed in this table are scoped out of the assessment in Section 0.5.5. See Section 2.3 of the main Environmental Report for details

R.5. Environmental assessment of the local flood risk management actions for the Solway LPD

R.5.1 Introduction

For the purposes of the SEA assessment the actions recommended in the Flood Risk Management Plan were categorised into four types as listed in Table R.2. The type of action then determines the appropriate level of assessment as described in Section 2.3 of the Environmental Report. This section provides a summary of the environmental assessment of these action types within the Solway LPD, identifying potential effects and key recommendations.

R.5.2. Data collection and mapping actions

Data collection and mapping actions are recommended for 12 target areas within the Solway LPD (refer to Table R.2 for details) where a better understanding of flood risk is needed to identify any further studies and to support planning and resilience actions. These types of actions are considered unlikely to result in significant environmental effects. However, improved data and flood mapping enables better planning decisions; and helps the public to understand the risk to their communities and to take action to protect themselves. The environmental constraints identified in Table R.2 for relevant target areas should be considered alongside these actions and inform any future flood studies that could arise.

R.5.3. Planning and resilience actions

Specific local planning and resilience actions are recommended for 201 target areas within the Solway LPD (refer to Table R.2 for details). Consideration of the likely significant environmental effects of undertaking these types of planning and resilience actions was

carried out at a national scale using the SEA objectives and criteria presented in Section 4.4 of the Environmental Report.

Given that the focus of these actions is to reduce flood risk to people and properties, significant positive effects were identified for both population and human health and material assets. Positive effects were also identified for climatic factors where actions could help respond to sea level rise and increased rainfall. Positive effects are anticipated on cultural heritage where flood risk is reduced to cultural heritage assets, where present, however, consideration should be given to the design of property resilience measures to avoid any impacts on setting.

More specifically within the Solway LPD, the constraints review undertaken and summarised in Table R.2 should help to inform the implementation of such actions, identifying any issues that may need to be addressed through sensitive design and mitigation.

R.5.4. Flood studies

Flood studies are recommended for 16 target areas within the Solway LPD (see Table R.2 for details). As we do not know what further actions may result from the flood studies, the approach to the assessment has been to consider key environmental sensitivities within the affected target areas and associated catchments. This seeks to highlight where there could be potential environmental effects in the future depending on the type of actions that arise from the studies.

The constraints review described in Section R.4 identifies that there are environmental constraints present across all target areas across the LPD. Constraints due to biodiversity and cultural heritage are found in most target areas; constraints due to soil and water are

also common. The highest levels of constraint were identified in Port William, Isle of Whithorn and Lochmaben.

The Shoreline Management Plan, proposed for Gretna and several other coastal target areas, could lead to potential cross-border impacts in future depending on the type and location of any actions that arise. There are high constraints for biodiversity along the Solway coast (including the Solway Firth SAC and SPA) and concerns over the susceptibility of the coast to erosion.

As the identified flood studies within this LPD are developed by local authorities/Scottish Water, these should be subject to further environmental assessment with actions designed to sensitively respond to the constraints identified and opportunities for environmental enhancement identified where possible.

R.5.5. Flood schemes and works design / implementation stage in Cycle 2

The potential design and implementation of flood schemes and works is proposed for three target areas during Cycle 2 (2021 – 2027) dependent on funding (See Table R.3 for details). The effects of the schemes and works on the SEA objectives and criteria are presented in Table R.3, and the effects summarised at an LPD scale in the accompanying text.

About the assessment

The potential effects of the schemes and works were assessed based on (1) the constraints identified in Section R.4 and (2) the types of actions that comprise the schemes or works (see Chapter 4 of the Environmental Report for more detail).

Caveats:

1. The assessment is based on the most likely types of actions, where known – but note these can change as the schemes and works go through the design stage.

2. The assessment seeks to provide an overview of potential effects. Given limitations of the high-level approach, the assessment does not seek to contradict or override more specific local studies. Any assessments based on more specific information would supersede those presented within this report.

The criteria used to determine the significance of effects range from significant beneficial (++) , through neutral (0), to significant adverse (--) as detailed in Appendix C of the Environmental Report.

Key findings

Significant beneficial effects were identified in terms of population and health and material assets within the Solway LPD as a result of reduced flood risk to homes, businesses and infrastructure; with benefits in terms of wellbeing. Positive effects were also identified in terms of climatic factors. No significant adverse effects in terms of the SEA objectives were identified. Mixed effects on the water environment were identified: there are potential adverse and beneficial impacts on natural processes, depending on the type and location of actions. The proposed flood scheme at Newcastleton is not anticipated to have any cross-border impacts. Further detail can be found in Table R.3.

As the design of these proposed actions are progressed by local authorities / Scottish Water, the actions should be subject to further environmental assessment. Actions should be designed to sensitively respond to the constraints identified, mitigate any identified adverse effects and seek opportunities for environmental enhancement where possible.

Table R.3 – SEA significance assessment of schemes and works design and implementation*

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
Carsphairn River	River defences	++	0	0	0	+	++	0	0
Kirkconnel River	Property flood resilience	++	0	0	0	+	++	0	0
Newcastleton River and surface water	River defences Storage, conveyance and control/ River and floodplain restoration Property flood resilience	++	0	0/+	0	+	++	0	0

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape

Key findings

1. Significant positive effects on **population and human health** due to reduced flood risk and increased wellbeing.
2. No significant effects on **biodiversity**. Potential for negative effects from habitat loss from river defences or storage, conveyance and control actions and potential beneficial effects from river and floodplain restoration actions. However, no designated sites are located within the Target area and any effects are dependent on location and design of the actions.
3. Overall, no significant effects on the **water** environment. No waterbodies within the catchment for Newcastleton or Carsphairn are failing to meet their 2027 WFD objectives as a result of their physical condition. Potential for beneficial effects of restoration at Newcastleton due to potential for positive effects on water quality and morphological improvements. Opportunities for enhancement through actions by regulating water flow and reducing erosion and the supporting of WFD objectives, balanced with the potential adverse effects of actions on the river environment.
4. No significant effects identified for **soil**.
5. Positive effects on **climatic factors** due to improved resilience of properties and infrastructure to future climate change.
6. Significant positive effects on **material assets** from the protection of property and infrastructure.
7. Overall, no significant effects identified for **cultural heritage**. Positive effects from the reduction in flood risk to heritage assets balanced with potential for negative effects on the setting of historic buildings and structures. Effects will typically be dependent on location and design of actions.

Target areas and associated flood source	Likely action types	SEA significance assessment scores							
		Population and human health	Biodiversity	Water	Soil	Climatic factors	Material assets	Cultural heritage	Landscape
<p>8. Overall, no significant effects identified for landscape. There are no nationally important landscape areas within the Carsphairn or Newcastleton target areas or wider catchment. Any potential negative effects on local landscape areas will be dependent on location and design of actions.</p>									