Renfrewshire Local Development Plan

Proposed Plan

Strategic Flood Risk Assessment (2019)

Background Paper 8

Renfrewshire Council

CONTENTS

Introduction

Background

1.1 In 2011, Renfrewshire Council was one of the first Local Planning Authorities to produce a Strategic flood Risk Assessment as part of the evidence base in preparing the Renfrewshire Local Development Plan.

1.2 The Renfrewshire Strategic Flood Risk Assessment set out the probability of flooding from all sources which was part of the overall assessment when preparing the Spatial Strategy and the identification and direction of development within Renfrewshire.

1.3 The Local Development Plan is a key document in supporting sustainable economic growth across Renfrewshire. The current Local Development Plan has been in place for four years. It is considered that the main components of the Council's strategy for development remain relevant and central to facilitating investment, directing development to existing built-up areas, creating sustainable mixed communities, high quality places and delivering sustainable economic growth across Renfrewshire.

1.4 The publication of the Renfrewshire Local Development Plan Proposed Plan is a key stage in the review of the Renfrewshire Local Development Plan and follows on from consultation on the Main Issues Report in 2017. The Spatial Strategy and Local Development Plan policy themes are largely unchanged from the adopted Renfrewshire Local Development Plan.

1.5 This Strategic Flood Risk Assessment will assess the potential impact that these changes and development opportunities have on flood risk.

Planning Context

1.6 The Renfrewshire Local Development Plan sets out Renfrewshire Council's Spatial Strategy to facilitate investment and guide the future use of land. The Renfrewshire Local Development Plan is a key document in supporting many policy areas and is essential for assisting in sustainable economic growth across the Renfrewshire area.

1.7 Renfrewshire Council is committed to providing an up to date policy framework in line with the requirements of new and emerging national, regional and local policy as well as Scottish Planning Policy, the National Planning Framework 3, Clydeplan's Strategic Development Plan, the Council Plan and Community Plan, the Renfrewshire Local Housing Strategy along with other relevant policy documents.

1.8 In line with the aspirations, vision and outcome measures of the Council's Community Plan and the Council Plan, the Local Development Plan Spatial Strategy focuses on place making and the development of previously used sites, concentrating on existing built-up areas and key redevelopment sites, aiming to facilitate sustainable development and a low carbon economy providing high quality new development in the right locations.

1.9 The Renfrewshire Local Development Plan Proposed Plan is structured around five themes:

- Economy,
- Centres,
- Infrastructure,
- Places and
- Environment

1.10 Updating the Strategic Flood Risk Assessment alongside the review of the Renfrewshire Local Development has assisted in the preparation of the Plan by aiming to avoid inappropriate development and directing development to the right locations.

Aims and objectives of the Strategic Flood Risk Assessment

1.13 The main aim of the Strategic Flood Risk Assessment is to inform the emerging Renfrewshire Local Development Plan by providing a strategic overview of flood risk in Renfrewshire. In undertaking this assessment alongside the preparation of the Plan, new development should be directed to areas with little or no flood risk, thereby ensuring that the overall risk of flooding is not increased.

1.14 This Strategic Flood Risk Assessment has assisted in informing the next Renfrewshire Local Development Plan by providing a strategic overview of flood risk in and around Renfrewshire. It has also fully informed the individual site assessments which are contained within Background Paper 2 as well as the Strategic Environmental Assessment by providing an evidence base that contains a proportionate level of detail and information.

1.15 In line with Scottish Planning Policy as well as the Flood Risk Management (Scotland) Act 2009, this Strategic Flood Risk Assessment identifies and details areas suitable for future development taking into consideration flood risk, identifying sustainable flood risk management mechanisms where appropriate along with sustainable drainage infrastructure that will require to be considered. The Strategic Flood Risk Assessment was undertaken using SEPA's Planning Guidance 'Strategic Flood Risk Assessment: SEPA Technical Guidance to Support Development Planning (2015).

1.16 The Strategic Flood Risk Assessment has been developed by building heavily upon existing knowledge with respect to flood risk and drainage in Renfrewshire.

1.17 Using the information and analysis gathered through national and local sources, this strategic overview of flood risk was undertaken to identify potential issues and considerations between development pressure or opportunities and flood risk now and through the lifetime of the Renfrewshire Local Development Plan.

1.18 This report should be read in conjunction with the Strategic Environmental Assessment Environmental Report for the Renfrewshire Local Development Plan Proposed Plan. Flood risk and the impact on the water environment, were an important part of the assessment that was undertaken.

1.19 This Strategic Flood Risk Assessment has followed Scottish Planning Policy and had regard to the flood maps prepared by SEPA. It also takes into account the Clyde and Loch Lomond Local Plan District Local Flood Risk Management Strategy (2015), the Local Flood Risk Management Plan for the Clyde and Loch Lomond District (June 2016) and the River Basin Management Plan for the Scotland River Basin District (2015).

Key Considerations

Flood Risk Management (Scotland) Act 2009

2.1 The Flood Risk Management (Scotland) Act 2009 was introduced to provide a more sustainable approach to flood risk management, suited to the needs of the 21st century and to the impact of climate change. It creates a more joined up and co-ordinated approach to managing flood risk at a national and local level in an integrated and sustainable way.

National Planning Framework 3

2.2 One of the National Developments in the Scottish Government's National Planning Framework 3, is the Metropolitan Glasgow Strategic Drainage Partnership. Renfrewshire Council assists in developing surface water management across the Glasgow and the Clyde Valley area. This exemplar of catchment-scale water planning and management, contributes to the implementation of the Flood Risk Management Act both nationally and locally.

2.3 In meeting the objective of avoiding deterioration of all water bodies, the partnership also aims to implement effective drainage systems across the Glasgow City Region area. The White Cart Flood Alleviation Scheme, which is a flood prevention scheme forming flood storage areas upstream, is a joint project which has particular relevance to Renfrewshire.

2.4 In line with National Planning Framework 3, Renfrewshire Local Development Plan Spatial Strategy aims to build resilience into Renfrewshire's places by locating development in the right places. The Plan will help create and enhance places by supporting development which will

enhance the water environment and water quality where possible, with an aim of positively managing drainage and flood risk.

Scottish Planning Policy

2.5 Scottish Planning Policy in line with Strategic Flood Risk Assessments should inform choices about the location of development and policies for flood risk management. This guidance forms the basis for this Strategic Flood Risk Assessment, where there is a presumption against development in areas of flood risk or where development would increase flood risk elsewhere.

National Marine Plan

2.6 The first Scottish National Marine Plan was published in 2015 and it sets out strategic policies for the sustainable development of Scotland's marine resources. A Report was published in 2018 which reviews the progress of the Marine Plan. The Scottish Ministers are currently considering the review report and whether or not to replace or amend the Plan.

2.7 The Clyde Marine Planning Partnership is responsible for producing the regional Marine Plan that will cover the Clyde Estuary. This Plan will assess the condition of the region, summarise the significant pressures and consequences of human activity, set relevant economic, social, marine ecosystem and climate change policies and keep under review the characteristics of the region. It is anticipated that pre-consultation of the draft of the Regional Marine Plan will take place between February and April 2019.

2.8 A project considering the evidence base of the known extent and associated risks of sea level rise and storm surges in the Firth of Clyde for habitats and communities around the river was recently completed. It is assisting in the production of the Regional Marine Plan.

Clyde and Loch Lomond Local Plan District Local Flood Risk Management Strategy and The Local Flood Risk Management Plan for the Clyde and Loch Lomond District

2.9 The Clyde and Loch Lomond Local Flood Risk Management Strategy (2016) sets out the short to long term ambition for flood risk management in the area.

2.10 The Local Flood Risk Management Plan for the Clyde and Loch Lomond District presents actions to avoid and reduce the risk of flooding, and prepare and protect communities within potentially vulnerable areas and across the Local Plan District. These actions include flood protection schemes or works; 24 flood protection studies; as well as flood warning schemes, surface water management plans, and natural flood management studies and works.

The River Basin Management Plan for the Scotland River Basin District

2.11 The River Basin Management Plan sets revised objectives for the 12 year period from 2015 to the end of 2027 and a strengthened programme of measures for achieving them in order to protect and improve the water environment of the Scotland river basin district.

2.12 The Renfrewshire Local Development Plan will continue to promote the principles and objectives set out in the River Basin Management Plan.

Clydeplan – Strategic Development Plan

2.13 Clydeplan sets out the vision for securing improvements to water and drainage capacity and water quality as well as reducing flood risk through the adoption of a precautionary approach for the Glasgow and Clyde Valley City Region. The vision and strategic objectives for water management are reflected in the Renfrewshire Local Development Plan.

Metropolitan Glasgow Strategic Drainage Partnership

2.14 The Flood Risk Management (Scotland) Act 2009 encourages a coordinated approach to share services and seek economies of scale when tackling flood risk management. A very good example of putting this coordinated partnership working into practice is through the Metropolitan Glasgow Strategic Drainage Partnership (MGSDP) which involves a number of agencies including several local authorities, SEPA, Scottish Water and Scottish Enterprise.

2.15 The Metropolitan Glasgow Strategic Drainage Partnership vision is to transform how the city region thinks about and manages rainfall to end uncontrolled flooding and improve water quality. The Metropolitan Glasgow Strategic Drainage Partnership hope to achieve this by integrated drainage plans and local surface water management plans delivering a range of integrated measures across the Metropolitan Glasgow area, which includes Renfrewshire.

2.16 It is hoped that this partnership will support organisations in fulfilling their obligations under the Flood Risk Management (Scotland) Act 2009 and adapting to a changing climate with a higher frequency of extreme events.

Climate Change

2.17 It is expected that flooding will become a greater issue in the future due to the impact of climate change.

2.18 Measures to reduce and mitigate the effects of climate change are central to Scottish legislation and regulations in relation to flooding and drainage. The implementation of sustainable water management techniques is important in working towards reduction, adaptation and mitigation of the impacts from climate change. This is supported by the policies and proposals in the Renfrewshire Local Development Plan.

Partnership Approach

2.19 Through the partnership approach of the Metropolitan Glasgow Strategic Drainage Partnership, being a member of Clyde and Loch Lomond Local Plan District along with the Clyde Area Advisory Group for River Basin Management, Renfrewshire Council aim to address cross boundary flooding issues.

Historical Flooding in Renfrewshire

3.1 Renfrewshire is an area of contrast with densely urbanised towns such as Paisley and Renfrew and large expanses of rural land to the south and west. The landscape is generally low lying, however, there are a number of higher areas such as the Renfrewshire Heights.

3.2 The River Clyde and its tributaries are essential to the character of the area. The River Clyde flows west from the City of Glasgow into Renfrewshire where it enters its final stages. As the river flows through Renfrewshire it widens to form the Clyde Estuary before reaching the Firth of Clyde beyond Erskine Bridge.

3.3 The principle watercourses in Renfrewshire are the River Clyde, River Cart and the River Gryfe these are shown on Figure 1 with the main water bodies.

3.4 A considerable amount of information is available with respect to flood risk within Renfrewshire including information relating to both historical flooding and the predicted extent of flooding under extreme weather conditions. The distribution of historical flood events is also shown on Figure 1.

3.5 Properties and infrastructure are at risk of flooding from a range of sources not only tidal and rivers but also surface water flooding, surcharging of the existing sewer system and blockages of culverts and gullies. Evidence of localised flooding of this nature has also been recorded and mapped to ensure there is a complete overview for Renfrewshire (see Figure 1).

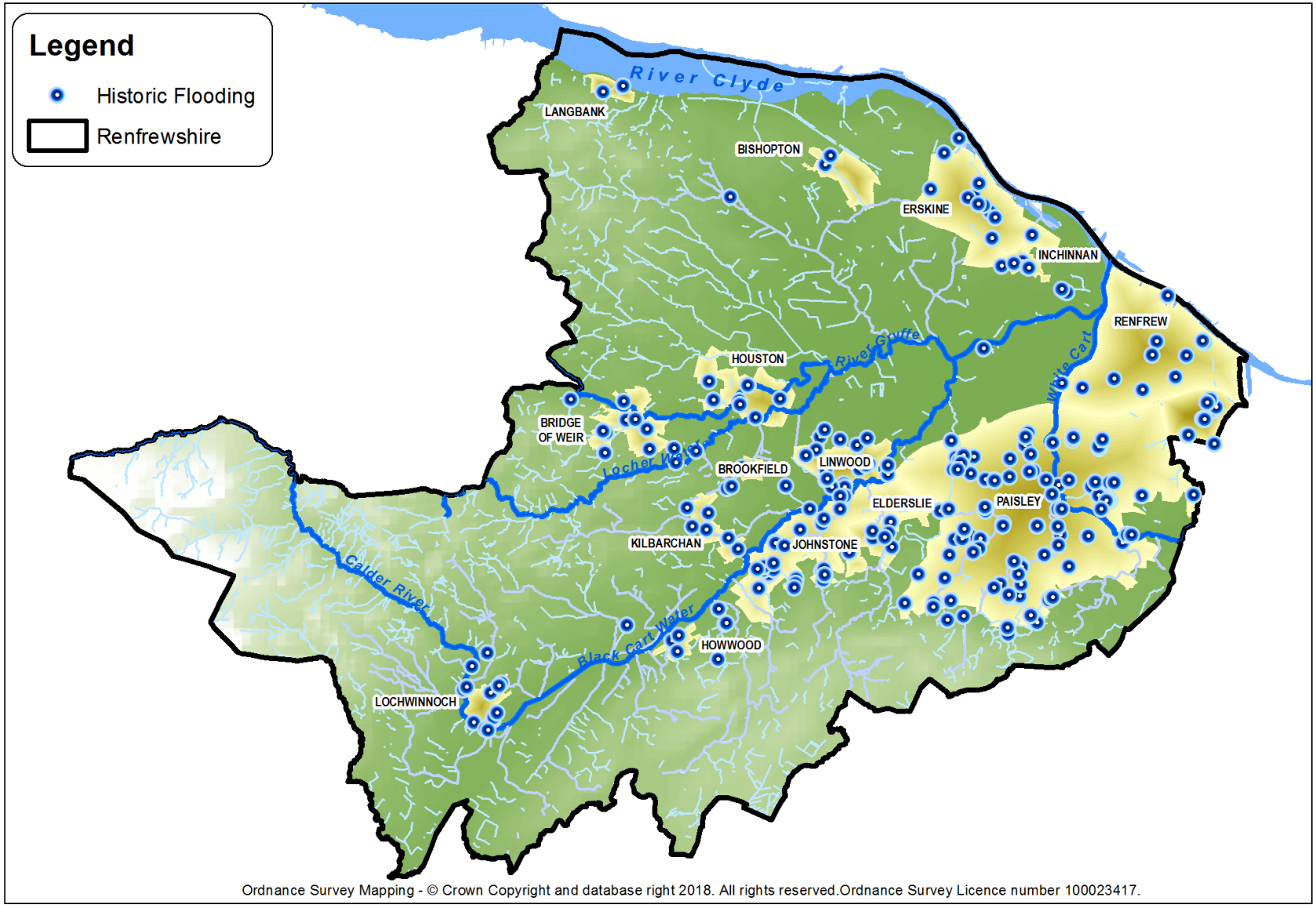


Figure 1: Renfrewshire's Topography and Historical Flood Events

3.6 Major flooding has taken place in Paisley, Johnstone and Houston in the recent past and the north of Renfrew has been subject to regular flooding from the River Clyde. Renfrewshire experienced major flood events in 1994, 1999 and more recently in December 2006.

3.7 Flood events in Renfrewshire are typically characterised by a complex interaction between intense rainfall events, watercourses exceeding peak flow capacities, surface water run-off from developed areas and a lack of capacity in the sewerage system and the tidal influence of the Clyde.

3.8 The key flooding issue in the urban area within Renfrewshire, as seen in December 2006, relates to the capacity in the sewerage system and local watercourses which is exacerbated by overland flow, where water becomes concentrated and flows across land after heavy or persistent rainfall.

3.9 The recording of flooding incidents forms the basis of the Flood Risk Management (Scotland) Act. Data on likely future flood risk, restrictive river structures, major future developments and existing flood defences along with resulting management measures are being undertaken through the Local Flood Risk Management Plan.

Flooding in Candren Road, Paisley 1994

Stockholm Crescent, Paisley (1994)

Sources of Flooding

Fluvial (River) Flooding

4.1 An overview of flooding from rivers in Renfrewshire is provided in Figure 2. The map is based on information held by the Council and SEPA.

4.2 It highlights the primary sources from fluvial flooding within Renfrewshire as being from the Calder in Lochwinnoch, the Black Cart, the Candren, Hawkhead and Espedair Burns in Paisley, the Kilbarchan Burn, the Gryfe at Crosslee, the Spateston, Auchengreoch, Floors and Peockland Burns in Johnstone, the Old Patrick Water and smaller water tributaries in Langbank.

Coastal (Tidal) Flooding

4.3 The River Clyde also results in flood risk to around 252 ground floor properties. However, this is from tidal surge rather than flow from the Clyde. The North Renfrew Flood Prevention Scheme addresses the tidal risk posed by the River Clyde and has reduced the number of ground floor properties at risk substantially. The embankment, which runs westward for 1km from Ferry Road, provides a barrier against direct flooding from the Clyde. The pumping station ensures that tidal surges on the Clyde do not cause the Mill Burn to overflow and flood local properties, protecting the area from a 1 in 200-year flood event. Figure 2 shows the extent of potential tidal flooding within Renfrewshire.

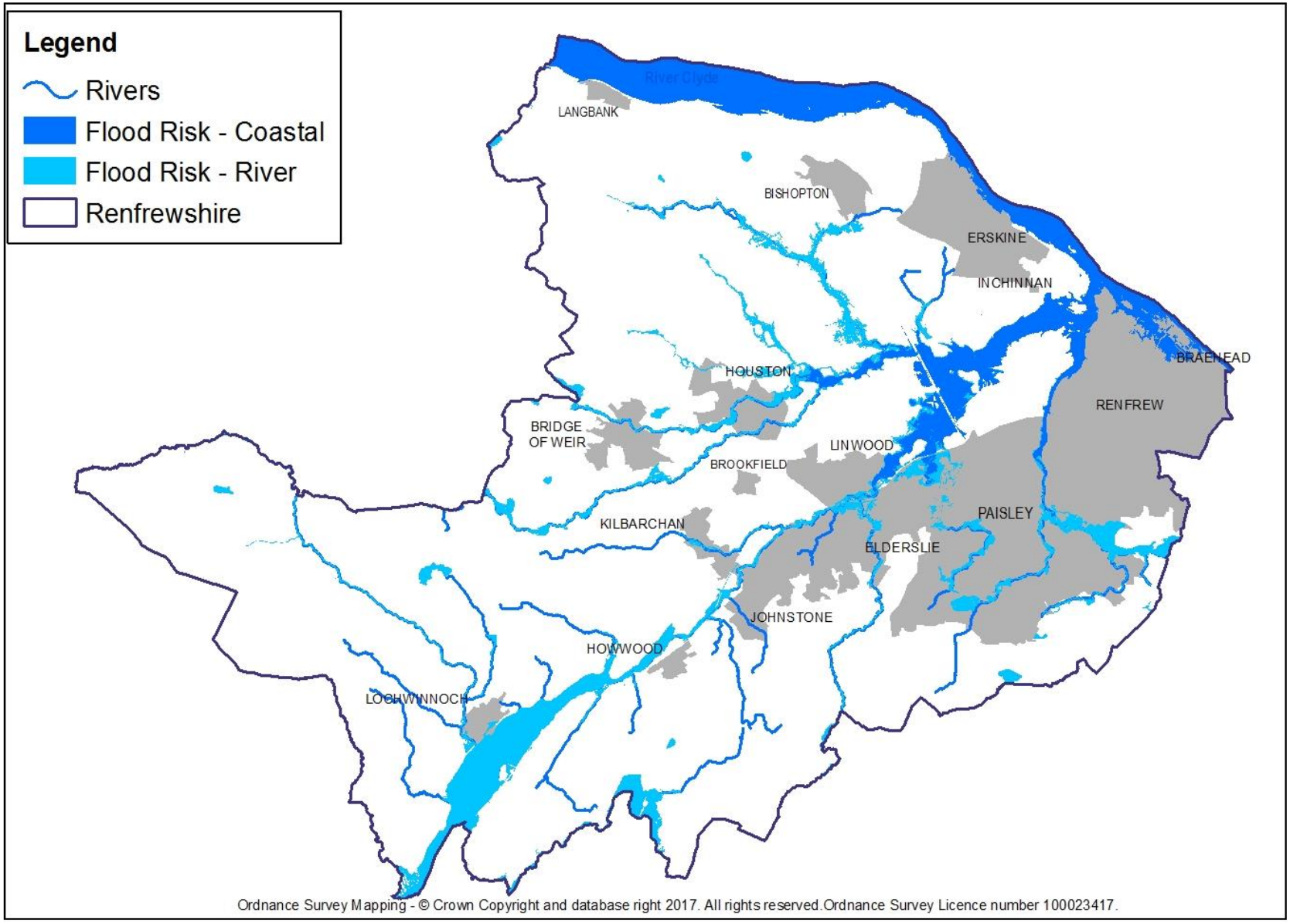


Figure 2: Fluvial (River) and Coastal Flooding

Pluvial and Overland (Surface) Flooding

4.4 Pluvial flooding, or flooding due to excess surface water, occurs after periods of intense and prolonged rainfall which saturate the land or drainage systems and excess water cannot drain away. Pluvial flooding is more likely to occur where the ground is naturally poorly drained or has been developed without the implementation of adequate drainage systems.

4.5 Figure 3 shows the distribution of areas at risk from surface water flooding in Renfrewshire.

Groundwater

4.6 Flooding due to rising groundwater is also likely to occur after periods of intense and prolonged rainfall, when the water table rises above normal levels.

4.7 Groundwater flooding is most likely to occur in low lying areas which are underlain by permeable rocks such as chalk, sandstone, or localised sands and gravels. Therefore, information on underlying geology may give an indication if a site is prone to groundwater flooding.

Sewers and drainage

4.8 Roadside drains, sewers and culverts can also be the cause of flood events if they fail, become blocked or are inundated with water that exceeds their capacity.

4.9 Many of the historic flood incident points shown on Figure 1 occurred as a result of blocked drains, gullies, culverts and other small watercourses. These occurred across Renfrewshire.

4.10 Flooding due to blocked drains is addressed by Roads Maintenance. There is also a regime for the inspection of open watercourses in place, and trash screens are inspected on a regular basis and before anticipated high level rainfall.

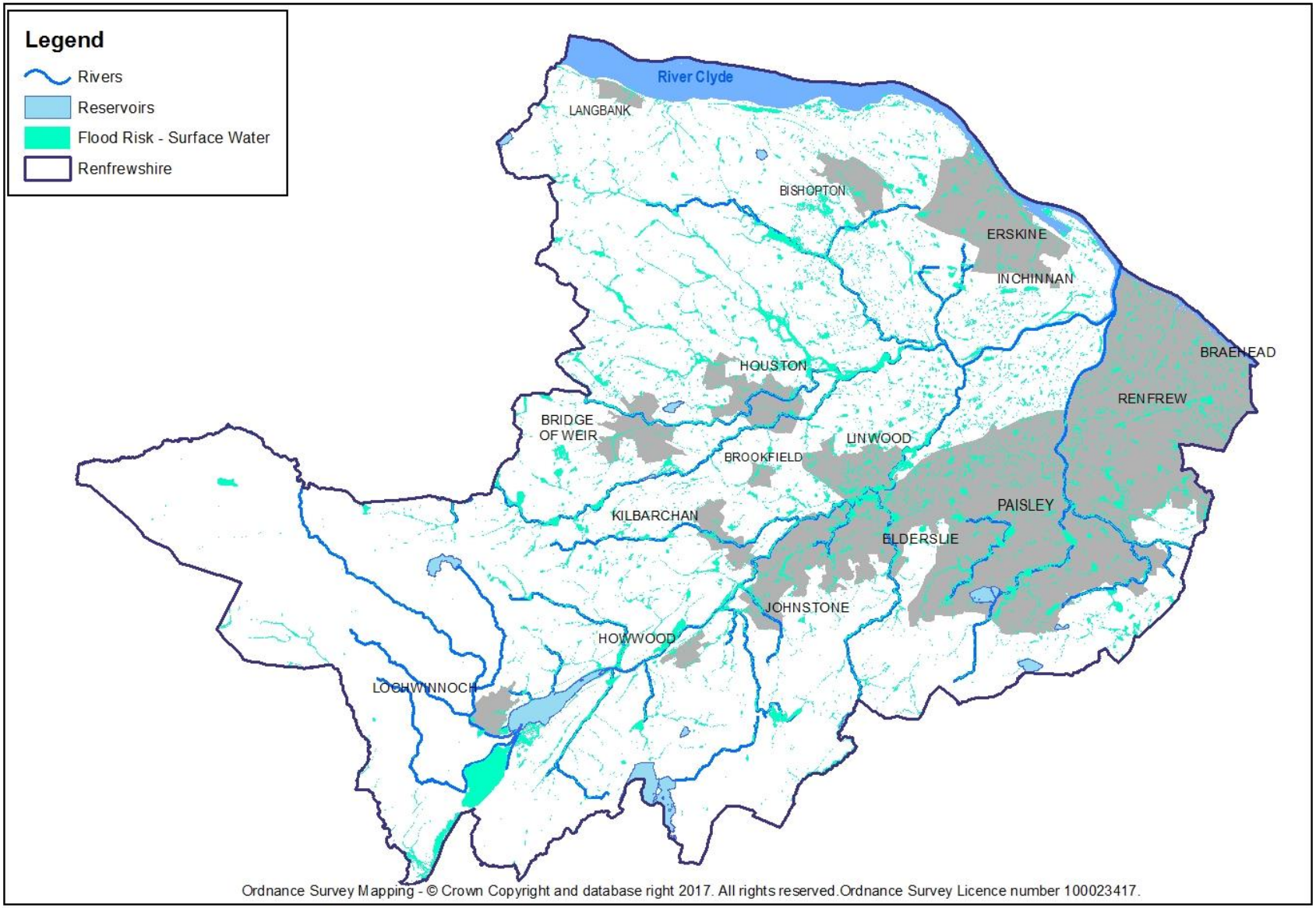


Figure 3: Flood Risk from Surface Water Flooding

Reservoirs

4.11 Renfrewshire has 13 large raised reservoirs. The distribution of these has been mapped on Figure 3. Table 1 provides more details about the size and capacity of the reservoirs.

Table 1: Reservoir Capacity

Reservoir	Max height of dam in metres	Reservoir Capacity ($m^{3)}$	Top Water Surface Area (sqm)
Barcraigs	18	5,533,000	730,000
Bowfield Dam	6.2	60,400	Not available
Elliston Weir	1.2	900,000	841,000
Glenburn (Paisley)	9.75	360,000	110,000
Houstonhead Dam	3.7	132,000	63,000
Kaim	8.5	480,200	167,000
Locher Dam	9.1	54,000	25,000
Moredun	5.6	25,500	22,600
Rowbank	12	2,250,000	320,000
Stanely (Large)	11	696,000	147,000
Stanely (Small)	9.5	184,000	28,000
Thornley	8	38,000	22,190
Whitemoss Dam	3.5	94,700	41,200

4.12 The Reservoir (Scotland) Act provides regulations for the construction, alteration and management of reservoirs capable of holding 10,000 cubic metres or more of water. The legislation requires recording the risk of flooding from reservoirs and facilitation of more environmental objectives relating to reservoirs and river basin management.

4.13 Under the legislation, reservoirs with a capacity of 10,000 cubic metres or more, are registered with the Scottish Environment Protection Agency and categorised under one of three categories, 'High', 'Medium' or 'Low' according to risk. A Scottish panel of engineers has been created to supervise and inspect reservoirs in consultation with the Institution of Civil Engineers (ICE).

4.14 Under the Reservoir Act there is an emphasis on ensuring that Scotland's reservoirs are structurally sound, properly monitored and well maintained. The proposals mean that people living close to reservoirs will be better protected as a result of a new proportionate inspection regime.

Flood Risk Management Infrastructure

5.1 Flood risk management measures implemented within Renfrewshire, have included major flood prevention schemes such as at North Renfrew, two major flood barriers at Collier Street, Johnstone and Crosslee, and one major storage scheme at Moredun/Stanely Reservoirs (Moredun stores 25,000 m3).

Espedair Burn, Paisley - Testing of flood storage scheme

5.2 Work commenced in 2008 to create a flood prevention scheme for the north of Renfrew in accordance with the Flood Prevention (Scotland) Act 1961. Phase 1 of the work involved the construction of flood embankments and retaining walls as well as the diversion of the Mill Burn culvert. The embankments have been created between the Scottish Water sewage pumping station off North Lodge Road and Meadowside Street/Neil Street.

Historic Flooding in North Renfrew – Renfrewshire Council

5.3 Phase 2 involved the dredging of 10,000 tonnes of sediment from the river's bed before the foundations were laid for the new pumping station. All three phases of this work are now complete. This action ensures that the waters of the Mill Burn can be discharged into the River Clyde for up to a 1 in 200 year tidal surge - decreasing flood risk from these sources.

5.4 The recent completion of the pumping station for Phase 3, means that a total of £10.3m has been invested by Renfrewshire Council to ensure that the area has a 1 in 200 year level of flood protection from the combined risks of Mill Burn flow and tidal surge from the River Clyde. This is particularly important to protect Renfrew Town Centre in addition to realising the significant development that is currently taking place to provide the sustainable transformation of North Renfrew.

5.5 The majority of mitigatory work for the Council and other responsible authorities will continue to be watercourse inspection and clearance and repair work, pump maintenance, flood defence scheme maintenance, promotion of sustainable development through co-ordinated work within Development Planning and Development Management and preparation of assessments and maps to inform post 2015 Flood Risk Management (Act) flood plans.

Construction of Phase 3 - North Renfrew Flood Prevention Scheme Pumping Station

Natural Flood Management

5.6 SEPA are developing mapping to identify areas where natural features can be altered or restored to assist in the management of flood risk. The mapping has been designed to be used at a catchment or strategic level and considered run-off reduction, floodplain storage, estuarine surge attenuation, sediment management and wave energy dissipation.

5.7 The Council will work with SEPA to identify any opportunities to use Natural flood Management techniques within Renfrewshire.

5.8 Johnstone South West is a residential led Community Growth Area. The Johnstone South West masterplan was underpinned by an outline surface water management strategy that considered a holistic approach to development and infrastructure requirements. The outline strategy was updated in 2017 which sets out detailed proposals for required infrastructure, supported by budget costs, anticipated land values and an approach to phasing.

5.9 A number of linked interventions across the Community Growth Area have been identified including the deculverting of watercourses, supported by the creation of swales, new woodland areas and storage ponds. The strategy identifies a range of green infrastructure interventions across the area which address flooding issues and enable delivery of the Johnstone South West Community Growth Area outlined in Table 2.

Culvert on the Spateston Burn, Johnstone South West

Table 2: Johnstone South West Community Growth Area

Johnstone South West Community Growth Area Green Infrastructure Interventions	
Short term	**Medium/Long Term**
Deculverting of Floors Burn and creation of a flood attenuation area on land immediately east of Spateston Centre (site of former community centre); Creation of flood attenuation area at Churchill Avenue, involving regrading of amenity grassland and creation of raised walkway.	Extending the scope of proposals at Tannahill Crescent. This involves re-profiling of existing open section of Floors Burn, deculverting an existing closed section, the creation of attenuation areas and planting of small areas of woodland.
Deculverting a section of Floors Burn within amenity open space adjacent to Tannahill Crescent, with the creation of attenuation areas and small scale woodland planting.	Creation of small 'check dams' at Floors Burn, a short distance east of Spateston Centre, to slow flows and provide small scale attenuation
Deculverting a section of the Floors Burn within the western extent of the former school site at Beith Road.	

Identification of the Functional Flood Plain

5.10 For planning purposes the functional flood plain is identified as the land that has a greater than 1 in 200 year annual probability of river or coastal flooding. Avoidance of flood risk and inappropriate development on the functional flood plain provides the most sustainable solution in terms of sustainable flood management.

Development Required For Potentially Vulnerable Areas

5.11 Scotland has been separated into 14 Local Plan Districts for flood risk management purposes. Renfrewshire lies within the Clyde and Loch Lomond Flood Plan District. These districts are based on river catchments and coastal areas which cross administrative and institutional boundaries. A Flood Risk Management Strategy has been prepared for each Local Plan District.

5.12 The Flood Risk Management Strategy has been prepared for each Local Flood Plan District which identifies where the risks of flooding and the benefits of investment are greatest. It describes the agreed collaborative approach for managing flooding within the area and the priority of actions required for this to be delivered.

5.13 The Clyde and Loch Lomond Flood Risk Management Plan (2016) has also been prepared as a supplement to the Flood Risk Management Strategy. The Flood Risk Management Plan provides the detailed actions required to reduce the impact of flooding within the Plan area.

5.14 For priority areas within each district (called Potentially Vulnerable Areas) there is a description of the causes and consequences of flooding; the agreed goals or objectives of local flood risk management; and the specific actions that will deliver these actions over the short to long term. Figure 4 shows the five Potentially Vulnerable Areas in Renfrewshire.

5.15 Actions specific to the Potentially Vulnerable Areas that are required to be progressed during the period 2016 – 2022 to reduce and manage flood risk are set out in the Clyde and Loch Lomond Local District Plan. The actions respond to objectives set out in the Flood Risk Management Strategy. Some of the actions are applicable across the Plan area. Table 3 below outlines the actions that Renfrewshire Council are responsible for, either alone or in partnership.

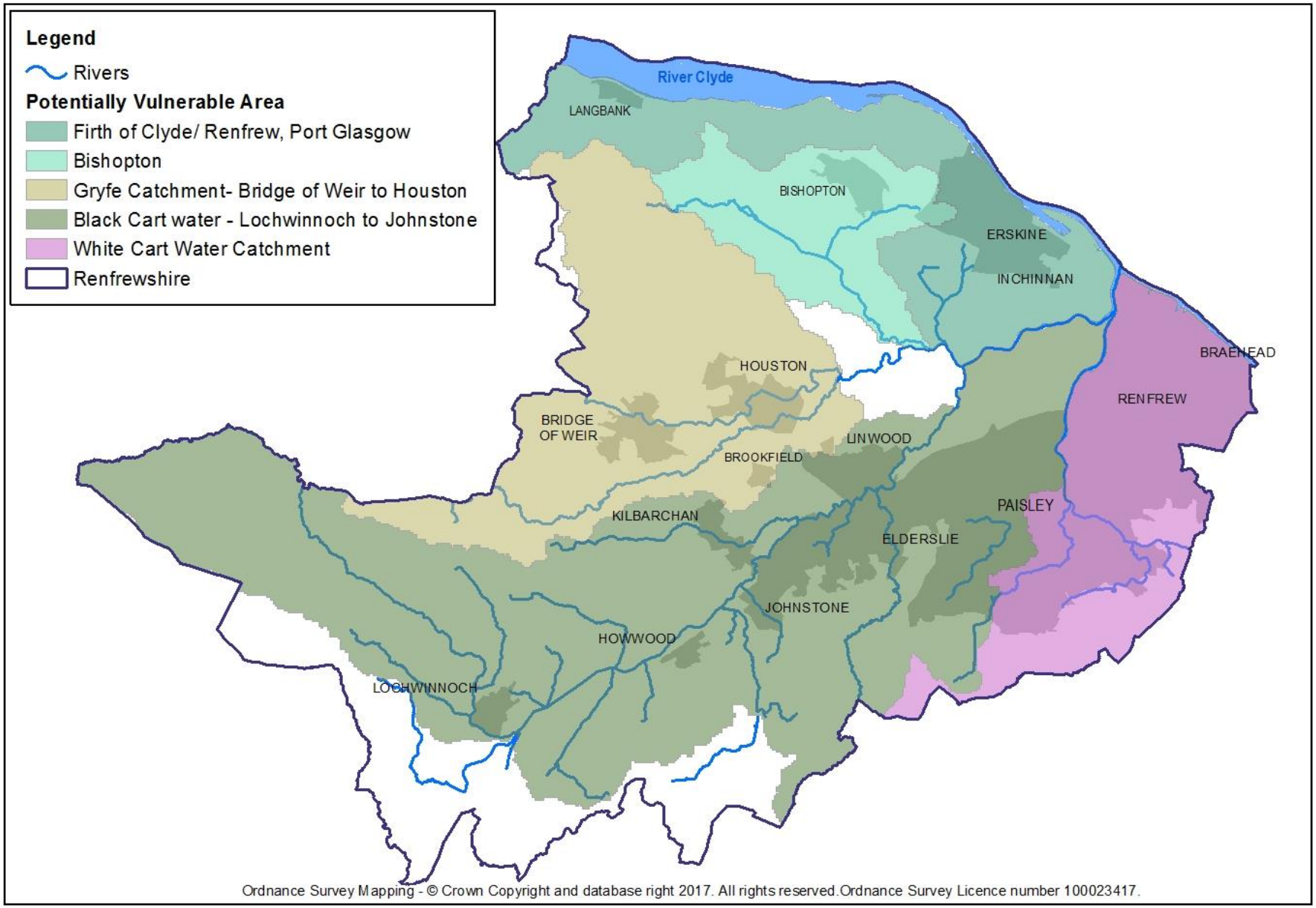


Figure 4: Renfrewshire's Potentially Vulnerable Areas

Table 3: Development Required for Potentially Vulnerable Areas

Potentially Vulnerable Area	Main River Catchment	Summary of Flood Impact	History of Flooding	Action by Council to Manage Flooding	Delivery Lead	Delivery Timescale
11/09 Firth of Clyde – Renfrew to Port Glasgow	**River Clyde** - The area has a risk of river, surface water and coastal flooding. The majority of issues are caused by surface water flooding.	Surface water flooding is the greatest risk. The northern boundary of the area fronts onto the River Clyde. Coastal flooding of transport routes, particularly the M8 and rail line can occur. River flooding is not extensive.	Surface water flooding occurred between November and December 2006 when flooding affected the A8 carriageway near Inchinnan. Erskine also experienced flooding.	1. Prepare and Implement Surface Water Management Plan 2. Prepare Integrated Catchment Study – Inchinnan 3. Maintenance of watercourses to reduce flood risk 4. Planning Policies Integral to the Renfrewshire Local Development Plan	Renfrewshire Council Renfrewshire Council and Scottish Water Inverclyde Council and Renfrewshire Council, asset / land managers Renfrewshire Council	2022-2027 2016-2021 Ongoing Ongoing

Potentially Vulnerable Area	Main River Catchment	Summary of Flood Impact	History of Flooding	Action by Council to Manage Flooding	Delivery Lead	Delivery Timescale
11/10 Bishopton	**River Gryfe** - The area has a risk of river, surface water and coastal flooding. The majority of issues are caused by surface water flooding.	Surface water flooding is the primary source of flood risk. River flooding from the Craigton and Dargavel Burns is also possible, although local measures are in place to reduce the risk.	Several reported incidents of flooding. Surface water flooding has been the main source of flooding in the Rossland area with records dating back to 1991. Surface water flooding in 2006 and 2008, caused sewerage problems and flooded the A8 carriageway	1. Prepare and Implement Surface Water Management Plan – Erskine 2. Prepare Integrated Catchment Study – Erskine 3. Maintenance to reduce overall flood risk 4. Planning Policies Integral to the Renfrewshire Local Development Plan	Renfrewshire Council Renfrewshire Council and Scottish Water Renfrewshire Council/land and asset managers. Renfrewshire Council	2022-2027 2016-2021 Ongoing Ongoing

Potentially Vulnerable Area	Main River Catchment	Summary of Flood Impact	History of Flooding	Action by Council to Manage Flooding	Delivery Lead	Delivery Timescale
11/11 Gryfe Catchment - Bridge of Weir to Houston	**River Gryfe** - The area has a risk of river and surface water flooding.	Most of the impacts are around Bridge of Weir, Crosslee, Houston and Quarriers Village. Some interaction between the river and surface water flooding near Quarriers Village. There is an existing flood protection scheme on the River Gryfe at Crosslee Park, Crosslee.	River flooding was recorded in the 19th century and more recently in peak river flows were exceeded in 1994 and 2006/7 causing flooding at Crosslee. Surface water flooding frequently reported affecting Crosslee and the A761 in Bridge of Weir.	1. Prepare and Implement Surface Water Management Plan – Johnstone and Kilbarchan 2. Prepare and Implement Surface Water Management Plan – Linwood 3. Prepare Integrated Catchment Study – Linwood 4. Maintenance to reduce overall flood risk 5. Planning Policies Integral to the Renfrewshire Local Development Plan	Renfrewshire Council Scottish Water and Renfrewshire Council Scottish Water and Renfrewshire Council Inverclyde Council and Renfrewshire Council, asset / land managers Renfrewshire Council	2016-2021 2022-2027 2022-2027 Ongoing Ongoing

Potentially Vulnerable Area	Main River Catchment	Summary of Flood Impact	History of Flooding	Action by Council to Manage Flooding	Delivery Lead	Delivery Timescale
11/12 Black Cart Water – Lochwinnoch to Johnstone	**Black Cart Water** - This area has a risk of river, surface water and coastal flooding	River flooding within the area is primarily from the Black Cart Water. Surface water flooding is primarily in the urban areas of Linwood and Johnstone. Interaction between sources of river and coastal flooding is predicted to occur in the lower reaches of the Black Cart Water.	A number of floods in this area have affected properties and transport routes. Major flooding in 1994 in Ferguslie Park from the Candren Burn and the Kintyre Avenue area of Linwood was inundated by another tributary of the Black Cart Water. Surface water flooding affected Low Barholm in 1998 and between 2004 and 2007, drainage	1. Prepare Flood Protection study - Candren Burn Catchment 2. Flood Protection Study – Johnstone 3. Flood Protection Study and Natural Flood Management Study – Lochwinnoch 4. Flood Protection Study and Natural Flood Management Study – Kilbarchan 5. Prepare and Implement Surface Water Management Plan – Johnstone and	Renfrewshire Council Renfrewshire Council Renfrewshire Council Renfrewshire Council Renfrewshire Council	2016-2021 2016-2021 2016-2021 2016-2021 2016-2021

Potentially Vulnerable Area	Main River Catchment	Summary of Flood Impact	History of Flooding	Action by Council to Manage Flooding	Delivery Lead	Delivery Timescale
			systems exceeded capacity causing flooding. River and surface water have affected properties and transport in Milliken Park, Johnstone Centre and Elderslie.	Kilbarchan 6. Prepare and Implement Surface Water Management Plan – Linwood 7. Prepare and Implement Surface Water Management Plan – Paisley 8. Maintenance to reduce overall flood risk and maintain Flood Protection Scheme – Johnstone 6. Planning Policies Integral to the Renfrewshire Local Development Plan	Scottish Water in partnership with Renfrewshire Council Renfrewshire Council Renfrewshire Council, asset /land managers Renfrewshire Council	2022-2027 2016-2021 Ongoing Ongoing

Potentially Vulnerable Area	Main River Catchment	Summary of Flood Impact	History of Flooding	Action by Council to Manage Flooding	Delivery Lead	Delivery Timescale
11/13 White Cart Water Catchment	**White Cart Water** -This area has a risk of river, surface water and coastal flooding	River flooding is primarily attributed to the White Cart Water and its tributaries which flows from east to west through the area. The White Cart Water Flood Protection Scheme has been developed to reduce the impact of flooding. Surface water flooding is potentially a risk in Paisley. There is a risk of coastal flooding attributed to the	There is a long history of flooding in this area with over 20 significant floods in the last 100 years. In 1994, Paisley, Penilee, Hillington and Renfrew all experienced major flooding from watercourses. Surface water flooding impacted the south of Paisley and the M8 near Hillington. Ferry Road, Renfrew has had a history of coastal flooding often exacerbated by heavy rainfall.	1. Flood protection scheme/works – North Renfrew 2. Flood Protection Study/Integrated Catchment Study – North of Thornley Reservoir 3. Flood Protection Study – Paisley (Hawkhead Burn) 4. Prepare and Implement Surface Water Plan/Study – Paisley 5. Maintenance to reduce overall flood risk and maintain Flood Protection Schemes –	Renfrewshire Council Renfrewshire Council/Scottish Water Renfrewshire Council Renfrewshire Council Renfrewshire Council	2016 – 2021 2022-2027 2022-2027 2016-2021 Ongoing

Potentially Vulnerable Area	Main River Catchment	Summary of Flood Impact	History of Flooding	Action by Council to Manage Flooding	Delivery Lead	Delivery Timescale
		tidal influence on the River Clyde along the northern boundary of the area where Renfrew may be affected.	16 incidents have been recorded since 1897.	Moredun and North Renfrew Flood Protection Scheme 6. Planning Policies Integral to the Renfrewshire Local Development Plan	Renfrewshire Council	Ongoing

Renfrewshire Local Development Plan Proposed Plan Policy Assessment

6.1 The Strategic Flood Risk Assessment which has been prepared alongside and informed the Proposed Renfrewshire Local Development Plan provides information on flood risk that has enabled the Council to understand existing and potential flood risk associated with the Spatial Strategy, policy framework and site allocations.

6.2 Renfrewshire's Spatial Strategy remains focused on the promotion of sustainable economic growth by identifying opportunities for change and supporting investment which help to regenerate and enhance communities and places, providing high quality new development in appropriate locations.

6.3 The emerging Renfrewshire Local Development Plan will strengthen the focus on place making and the delivery of new homes across Renfrewshire to meet the housing needs. The priority remains the development of previously used sites, concentrating first on existing urban areas and key redevelopment sites, aiming to facilitate sustainable development and a low carbon economy.

6.4 Consideration is now given to the policies on a thematic basis that are likely to have the most significance in relation to the Strategic Flood Risk Assessment. Appendix 1 contains maps illustrating the Local Development Plan Proposed Plan Allocations alongside available Flood Risk data with the 1 in 200 coastal and fluvial data.

Delivering the Economy Strategy

6.5 The Economy Strategy directs economic investment to the right locations to assist the delivery of sustainable economic growth and ensure that all the communities can access the benefits of this growth. The economy policies are:

Policy E1 – Renfrewshire's Economic Investment Locations
Policy E2 – City Deal Investment Framework
Policy E3 – Transition Areas
Policy E4 – Tourism
Policy E5 – Glasgow Airport

Policy E1 Renfrewshire's Economic Investment Locations and E3 Transition Areas

6.6 Policy E1 Renfrewshire's Economic Investment Locations and Policy E3 Transition Areas aim to regenerate and make use of vacant land by supporting new development and sustainable economic growth.

6.7 The flood risk for each Economic Investment Area and Transition Area will need to be fully considered and assessed during the planning application process to define the developable area of each site. Table 4 below shows the different Economic Investment Locations and Transition Areas where appropriate mitigation will be required. Further information is provided in Appendix 2 and 3.

Table 4: Renfrewshire's Economic Investment Areas and Transition Areas – Coastal and Fluvial Flood Risk

Transition Area	Policy	Coastal 1 in 200 year	Fluvial 1 in 200 year	Extent of Flooding	Mitigation Required
Linwood	E1 Local Industrial Area	No	Yes	In Central area of the Economic Investment Area	FRA/ DIA required to define developable area and suitable mitigation
Westway	E1 – Strategic Economic Investment Area	Yes	No	Few meters at western edge - White cart	FRA/ DIA required to define developable area and suitable mitigation
Netherton Farm Area	E1 - Strategic Economic Investment Area	Yes	No	North East & East part of the site	FRA/ DIA required to define developable area and suitable mitigation
Erskine Riverfront	E3 - Transition Area	Yes	No	Eastern part of the site - bordering the Clyde	FRA/ DIA required to define developable area and suitable mitigation
Meadowside Street/ Blythswood Area, Renfrew	E3 - Transition Area	Yes	No	Northern part of the site	FRA/ DIA required to define developable area and suitable mitigation
North Johnstone	E3 - Transition Area	No	Yes	Small sections in centre and to North east & West	FRA/ DIA required to define developable area and suitable mitigation
Middleton Road, Linwood	E3 - Transition Area	No	Yes	Eastern edge	FRA/ DIA required to define developable area and suitable mitigation
Candren Area, Paisley	E3 - Transition Area	No	Yes	North & North West part of the site	FRA/ DIA required to define developable area and suitable mitigation
Paisley Town Centre North Area	E3 - Transition Area	Yes	Yes	Edges of White Cart that runs through centre of the site	FRA/ DIA required to define developable area and suitable mitigation
Underwood Road, Paisley	E3 - Transition Area	Yes	No	Edges of White Cart that runs west of the site	FRA/ DIA required to define developable area and suitable mitigation

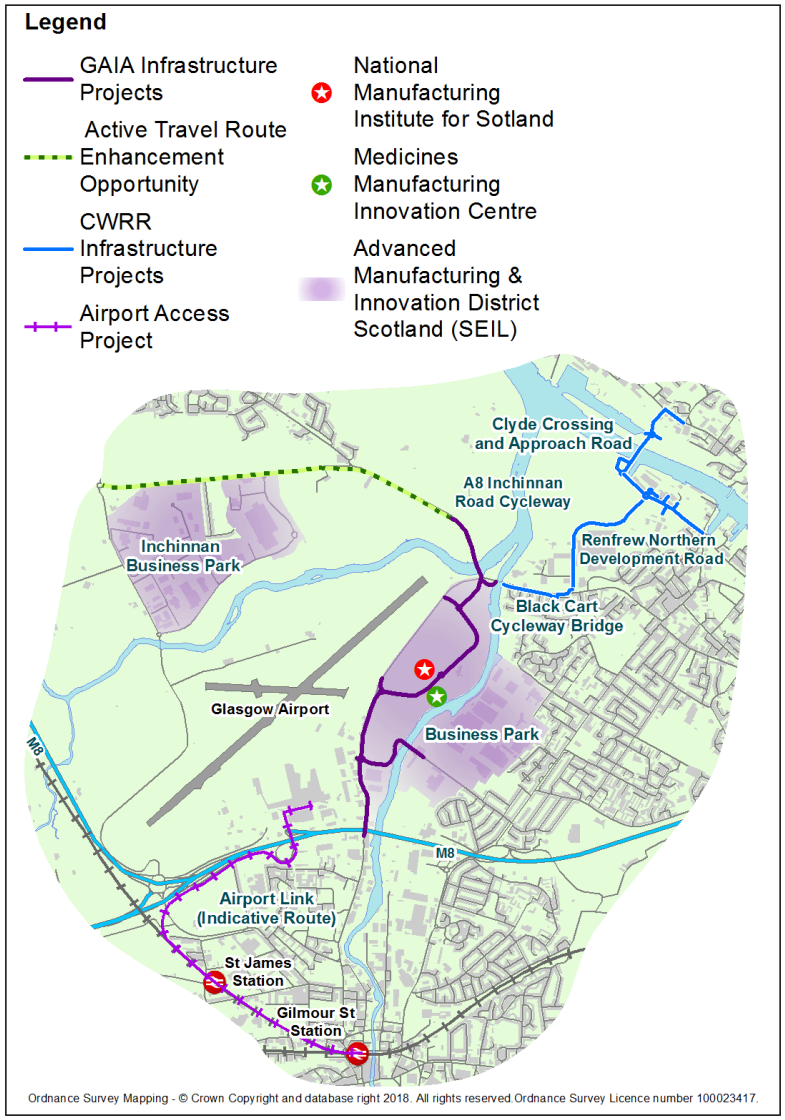


Figure 5: City Deal Projects

Policy E2 – City Deal Investment Framework

6.8 A major opportunity for the delivery of economic development in Renfrewshire will be the successful implementation of Renfrewshire's City Deal projects. Renfrewshire is to benefit from three of the biggest infrastructure investments; the Airport Access Project; the Clyde Waterfront and Renfrew Riverside project; and the Glasgow Airport Investment Area (GAIA). These projects are illustrated in figure 5.

6.9 An Environmental Impact Assessment (EIA) has been undertaken for the Clyde Waterfront and Renfrew Riverside and the Glasgow Airport Investment Area Projects. The findings are summarised below:

Clyde Waterfront and Renfrew Riverside Project

6.10 There are three key surface water bodies within the project area; the River Clyde and its tributaries, the White Cart Water and Black Cart Water. The water bodies are heavily modified and have poor ecological status; however, they have associated European-level habitat designations (Black Cart and Inner Clyde Special Protection Areas designated for birds) and support other protected species including Atlantic salmon, sea trout, river lamprey, European eel and otter. The engineered nature of the River Clyde means that flood risk is generally low, although it presents a tidal flood risk to a small number of industrial and commercial premises at the river edge. The EIA identifies that there is the potential for some temporary residual effects of the dredging, piling and excavation operations on water quality however the effects are identified as not significant overall on water quality. Residual effects on water quality, drainage, hydrology and flood risk are predicted to be not significant during both construction and operation of the Proposed Development.

Glasgow Airport Investment Area Project

6.11 The EIA identifies that there are two key water bodies within the study area; the White Cart Water and Black Cart Water, which join to become the River Cart before its confluence with the River Clyde. The water bodies are heavily modified and have poor ecological status; however they have associated European-level habitat designations (Black Cart and Inner Clyde Special Protection Areas designated for birds) and support other protected species including Atlantic salmon, sea trout, river lamprey, European eel and otter.

6.12 The River Cart (White Cart and Black Cart) is subject to river fluvial flooding, and to a greater extent tidal flood risk.

6.13 Following implementation of mitigation and compliance with policy and legislation within the design, the significance of residual effects is predicted to be not significant in the context of the EIA Regulations on water quality, drainage, hydrology and flood risk, during both construction and operation.

Glasgow Airport Access project

6.14 The Local Development Plan sets out a policy framework that protects the water environment and seeks to address flood risk. It is anticipated that the Glasgow Airport Access project will have no significant impact on the water environment.

6.15 Development stemming from City Deal should be in the most sustainable locations. If potential flood risks are identified, development could only take place once appropriate infrastructure is in place.

Policy E4 – Tourism

6.16 Any development associated with Policy E4 - Tourism of E5 – Glasgow Airport will be considered in relation to Policy I3 - Flooding and Drainage which will ensure development does not have an adverse impact on drainage infrastructure, increase the risk of flooding or result in the loss of land that has the potential to contribute to the management of flood risk.

Delivering the Centre Strategy

6.17 Renfrewshire's Centres form an important part of the areas distinct character and identity, acting as hubs for communities. Centres offer a range of uses and activities and support new economic investment opportunities across Renfrewshire. The Centre Policies are:

Policy C1 – Renfrewshire's Network of Centres
Policy C2 – Development out with Renfrewshire's Network of Centres

Policy C1 – Renfrewshire's Network of Centres

6.18 Policy C1 covers development within Renfrewshire's network of centres. Potential areas of flooding are located in a number Centres, primarily due to the adjacent Black Cart in Johnstone, the Clyde at Braehead and White Cart in Paisley. However new developments offer the opportunity to mitigate through Sustainable Urban Drainage. Development to minimise flood risk also provides the opportunity to enhance the water environment.

6.19 In areas affected by flood risk the developable extent of the site will be determined through a detailed flood risk assessment and environmental impact assessment where appropriate.

Policy C2 - Development out with Renfrewshire's Network of Centres

6.20 Policy C2 lists the criteria for development out with Renfrewshire's Network of Centres. The location of any proposal for development out with Renfrewshire's Network of Centres is unknown and therefore the exact impact on the water environment is therefore unknown. Policy 13 will ensure that development will not have an adverse impact on existing drainage infrastructure, increase the risk of flooding or result in the loss of land that has the potential to contribute to the management of flood risk.

Delivering the Infrastructure Strategy

6.21 The Infrastructure strategy ensures that people and places are well connected and investment in infrastructure is made in the right places to enable and support development opportunities and investment. The Infrastructure policies include:

Policy I1 – Connecting Places
Policy I2 – Freight
Policy I3 – Flooding and drainage
Policy 14 - Renewable and Low Carbon Energy Developments
Policy 15 – Waste Management

Policy I3 – Flooding and drainage

6.22 The Proposed Local Development Plan promotes the management of drainage and flooding in a sustainable manner by encouraging the use of landscapes, green spaces and networks, where appropriate, as mechanisms for control and storage of water. These control and prevention mechanisms can also enable the creation of blue and green corridors, ensuring protection as well as enhancement of biodiversity and the natural environment.

6.23 Adopting a precautionary approach to flooding and drainage can have a significant positive impact on the water environment. Developments offer the opportunity to protect and enhance the water environment and promote sustainable flood risk management.

Policy 15 – Waste Management

6.24 Policy I5 safeguards existing waste management infrastructure and facilities. Development proposals for waste management infrastructure and facilities on new or existing sites will require to meet and deliver the objectives of the zero waste plan. Any potential waste management infrastructure and facilities will be directed to Renfrewshire's Economic Investment Locations and Transition Areas. An assessment of these locations is undertaken in Appendix 2 and 3 and any development will require to demonstrate that it will not increase the risk of flooding or have a detrimental impact on the water environment.

6.25 Policy I1 – Connecting places ensures where possible that all development proposals have sufficient provision and accessibility to active travel and public transport. Policy I2 – Freight supports the movement of freight by alternative means to the road network. Policy I4 – Renewable and Low Carbon Energy Development supports development proposals which deliver increased energy efficiency and the recovery of energy that would otherwise be lost.

6.26 The Policy I2 also safeguards and supports Glasgow Airport, Linwood Burnbrae and Hillington Deanside Strategic Freight Transport Hubs in order to facilitate future investment in freight related activity and services at these locations. There is no flood risk at these locations.

6.27 These policies are unlikely to raise any issues with regards to flood risk, however, where appropriate new development will be considered in relation to Policy I3 – Flooding and Drainage.

Delivering the Places Strategy

6.28 The Places Strategy support the delivery of sustainable mixed communities with a focus on available brownfield land and previously used land to meet the majority of Renfrewshire's Housing Land Requirements. In particular there is an emphasis on the continued delivery of Renfrewshire's Community Growth Areas at Dargavel Village, Bishopton and Johnstone South West. The creation of strong communities and attractive places focusing on the regeneration and renewal of existing urban areas supports sustainable development and a low carbon economy. The Places Policies include:

Policy P1 – Renfrewshire's Places
Policy P2 – Housing Land Supply
Policy P3 – Housing Mix and Affordable Housing
Policy P4 – Sites for Gypsies/Travellers and Travelling Showpeople
Policy P5 – Green/Blue Network
Policy P6 – Open Space
Policy P7 – Dargavel Village

Policy P1 – Renfrewshire Places

6.29 Policy P1 supports a general presumption in favour of a continuance of the built form. New development proposals within these areas should make a positive contribution to the Place and be compatible and complementary to existing uses as set out by the New Development Supplementary Guidance and Renfrewshire's Places Design Guidance. Policy 13 will ensure that development will not have an adverse impact on flooding and drainage.

Policy P2 – Housing Land Supply

6.30 Renfrewshire's Housing Land Supply supports sustainable patterns of development, prioritising the redevelopment and regeneration of brownfield and previously used sites to help create sustainable mixed communities across Renfrewshire. The identification of sites for Renfrewshire's Housing Land Supply involves a flood risk based approach.

6.31 A number of sites within Renfrewshire's Housing Land Supply already have planning consent and have been fully assessed in relation to drainage, flood risk and water quality with any additional infrastructure or mitigation measures identified. Table 5 sets out a strategic flood risk assessment for new housing sites allocated for development in the Proposed Local Development Plan and Appendix 4 contains an assessment of all other sites within Renfrewshire's housing Land Supply which don't currently benefit from planning consent.

Table 5: New Housing Allocations

Site Name	Reference	Capacity	Coastal 1 in 200 year	Fluvial 1 in 200 year	Extent of Flooding	Mitigation Required
South of Woodend House, Houston Road	LDP2024	50	No	No	No flood risks.	Drainage Impact Assessment required.
West of Burnfoot Road, Lochwinnoch	LDP2032	130 - 150	No	Yes	Adjacent to the 1:200-year fluvial outline of the River Calder and a minor watercourse crosses and borders this site.	Flood Risk and Drainage Impact Assessment required to define developable area and to identify any mitigation and infrastructure required to support the development.
Golf Driving Range, Rannoch Road, Johnstone	LDP2057	75 units	No	No	Minor watercourse runs along western boundary	Water impact assessment and drainage impact assessment will be required
Beardmore Cottages, Inchinnan	LDP2094	Self-build plots 5-10 units	No	No	No flood risks.	Drainage Impact Assessment required.
Manse Crescent, Houston	LDP2095	Self-build plots 5-10 units	No	No	Issues with surface water ponding to northern section of the site.	Scottish Water Network Impact Assessment and Drainage Impact Assessment will be required.
Renfrew Golf Course	LDP2096	10	No	No	No flood risks.	Drainage Impact Assessment required.

Policy P3 - Housing Mix and Affordable Housing

6.32 Policy P3 - Housing Mix and Affordable Housing seeks to provide a mix of housing choices including affordable homes. This policy will help offer a wider range of housing options for all age groups and helps achieve more balanced communities. As the policy relates to the type/tenure of houses on a housing site, it will have no impact on the water environment.

Policy P4 - Sites for Gypsies/Travellers and Travelling Showpeople

6.33 Policy P4- Gypsies/Travellers and Travelling Showpeople provides a framework for the consideration of new small privately owned sites to accommodate Gypsies/Travellers and Travelling Show People, whether transit or permanent. Local Development Plan Policy I3 – Flooding and Drainage will ensure that any proposed development for a site for Gypsies/Travellers and Travelling Showpeople will avoid areas susceptible to flooding.

Policy P5 – Green/Blue Network and Policy P6 – Open Space

6.34 Policy P5 – Green Network and Policy P6 – Open Space protect Renfrewshire's Green Network and open space, both of which play an important role in Renfrewshire. Open space and the green network help deliver high quality places and the green network supports water and flood management, biodiversity and active travel. It is considered that these policies have a positive impact on the water environment.

Policy P7 – Dargavel Village

6.35 Policy P7 supports the continued delivery of Renfrewshire's Community Growth Area at Dargavel Village, Bishopton. During planning application process and development of the masterplan, a Flood Risk Assessment and Drainage Impact Assessment was conducted. Appropriate mitigation has been taken on board to deal with 1 in 200 year fluvial flooding from the Dargavel Burn.

Delivering the Environment Strategy

6.36 The Environment Strategy seeks to protect Renfrewshire's rich built heritage and natural environment. The policies also support sustainable patterns of development that contribute towards minimising carbon and greenhouse gas emission and facilitate adaption to the likely effects of climate change. The Environment Policies are:

Policy ENV 1 - Green Belt
Policy ENV 2 - Natural Heritage
Policy ENV 3 - Built and Cultural Heritage
Policy ENV 4 - The Water Environment
Policy ENV 5 - Air Quality
Policy ENV 6 - Natural Resources (Minerals and Soil)
Policy ENV 7 - Temporary Enhancement of Unused and Underused Land

6.37 By promoting good quality development in the right locations, the Proposed Renfrewshire Local Development Plan ensures that there is the conservation and enhancement of natural heritage, green spaces, landscape character, biodiversity as well as enhancement of recreational and access resources and active travel routes.

6.38 The integration of land and water resources is an important consideration for the Proposed Renfrewshire Local Development Plan to ensure development protects and where possible improves the water environment leading to better water quality and an enhancement of biodiversity.

Policy ENV 4 - The Water Environment

6.39 Policy ENV 4 ensures that there will be support for proposals which encourage protection of the existing water environment, improvements to the control and management of water and the enhancement of biodiversity, flora and fauna surrounding blue corridors. These measures to protect and enhance the water environment will require to be integrated in new development proposals, assisting in creating natural habitats as an asset to sustainable places.

Policy ENV 6 - Natural Resources (Minerals and Soil)

6.40 Proposals for mineral developments will be considered under ENV 6. Proposals for the winning and working of minerals will be considered under Policy ENV 6 and permitted, where appropriate, when related to existing workings or in exceptional cases, where resources of a particular type or quality are unavailable from a suitable

alternative source. Detailed consideration would be given to water levels, flows, quality, features, flood risk and biodiversity within the water environment and any proposals will also be considered in relation to other relevant Development Plan Policies including Policy I3 – Flooding and Drainage which will ensure that any proposed development will avoid areas susceptible to flooding.

Conclusions

7.1 A stage 1 strategic assessment of flood risk across Renfrewshire has been carried out to assist with the preparation of the Proposed Renfrewshire Local Development Plan. It has provided risk-based approach to the consideration of land for development.

7.2 The Renfrewshire Local Development Plan provides a framework for managing flood risk and drainage as well as protecting and enhancing water quality. This policy approach reflects the five overarching outcomes of 'Delivering Sustainable Flood Risk Management' as set out by the Scottish Government.

7.3 In recent years new guidance on Strategic Flood Risk Assessment has been issued and the Local Flood Risk Management Plan for the Clyde and Loch Lomond Local Plan District has also been finalised. Revised Flooding data has recently been provided by SEPA, which further improves our understanding of flood risk within Renfrewshire and potential interactions between this and land uses or development.

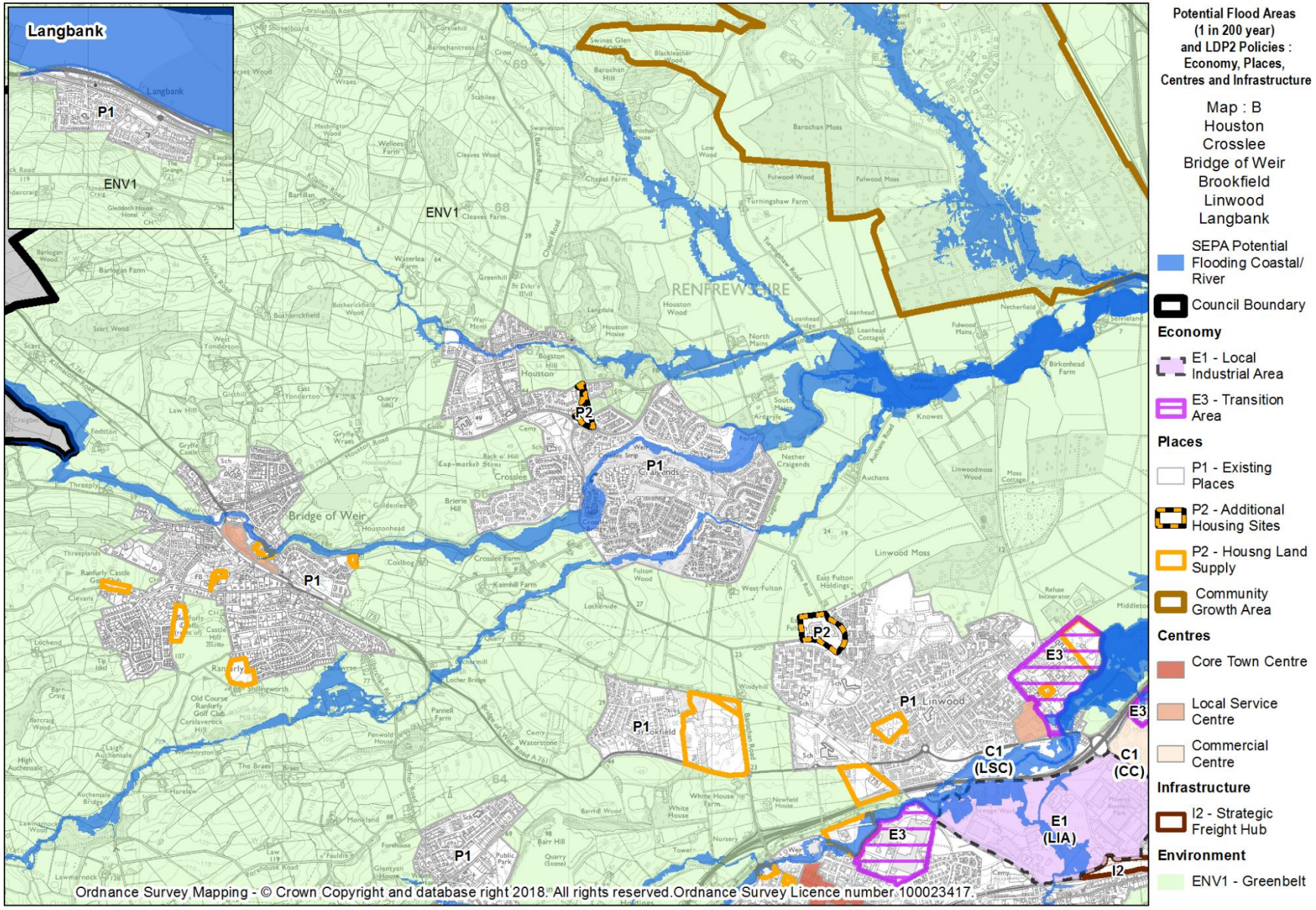
7.4 Through the Renfrewshire Local Development Plan and its Spatial Strategy, the Council is seeking to provide the most sustainable forms of development for the area where the risk of flooding is minimised over the lifetime of the development plan.

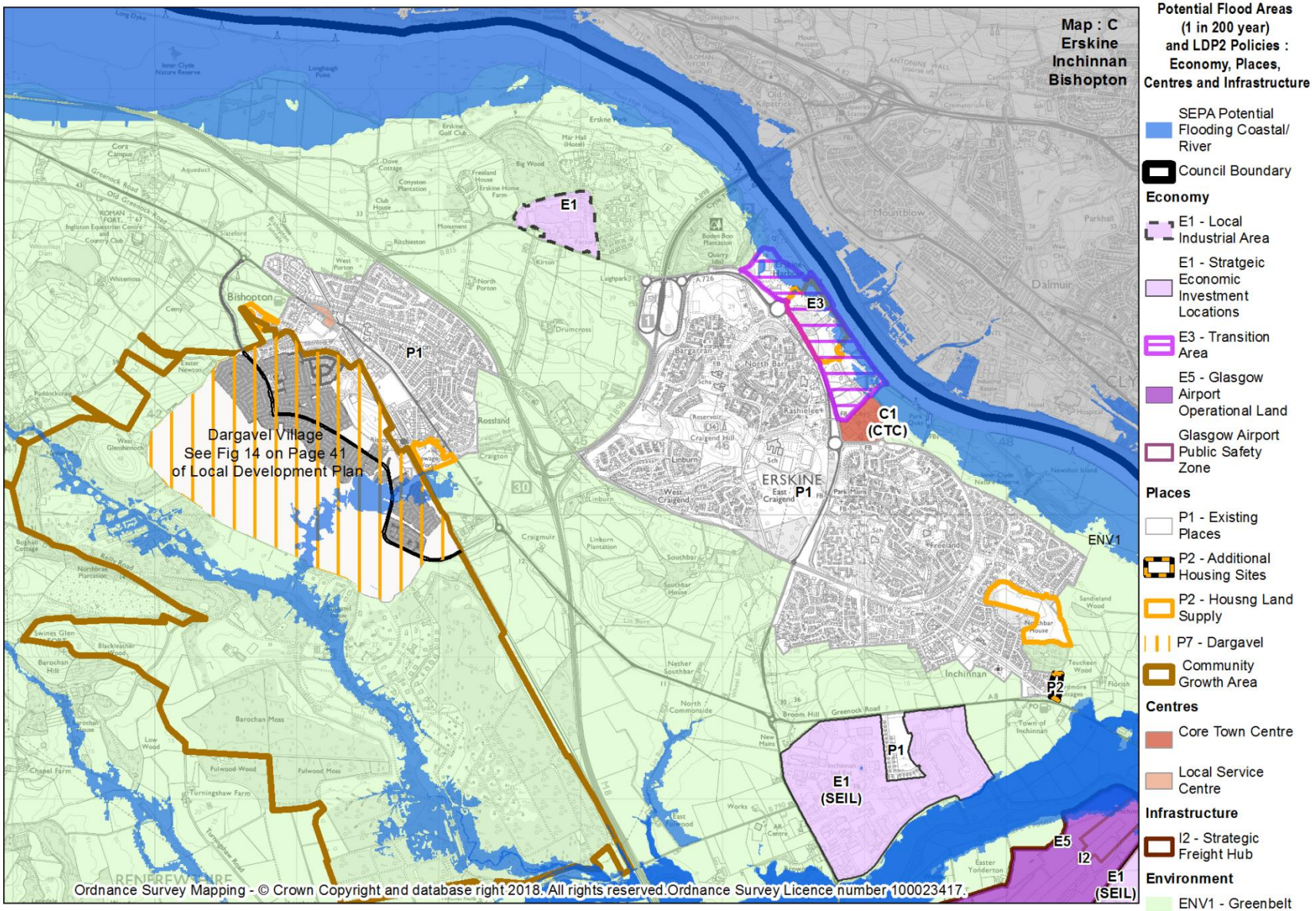
7.5 The assessment identifies where further investigation of flood risk and/or drainage including any appropriate mitigation will be required to deliver the spatial strategy of the local Development Plan.

7.6 Flood risk is one of many factors that influence the spatial planning process however it is necessary to maintain a balance between flood risk considerations and other considerations such as the integration of social, economic and environmental matters.

7.7 A careful balance must be sought in these instances and the Strategic Flood Risk Assessment aims to assist in the plan preparation process. It forms the basis for preparing appropriate policies for flood risk management for the Renfrewshire Local Development Plan and provides an evidence base upon which informed decisions can be made

Appendix 1: Allocations in the Proposed Plan Proposal Maps and Flooding Data

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Potential Flood Areas
(1 in 200 year)
and LDP2 Policies :
Economy, Places,
Centres and Infrastructure
SEPA Potential Flooding Coastal/ River
Council Boundary
Economy
E1 - Local Industrial Area
E1 - Stratgeic Economic Investment Locations
E3 - Transition Area
E5 - Glasgow Airport Operational Land
Glasgow Airport Public Safety Zone
Places
P1 - Existing Places
P2 - Additional Housing Sites
P2 - Housng Land Supply
P7 - Dargavel
Community Growth Area
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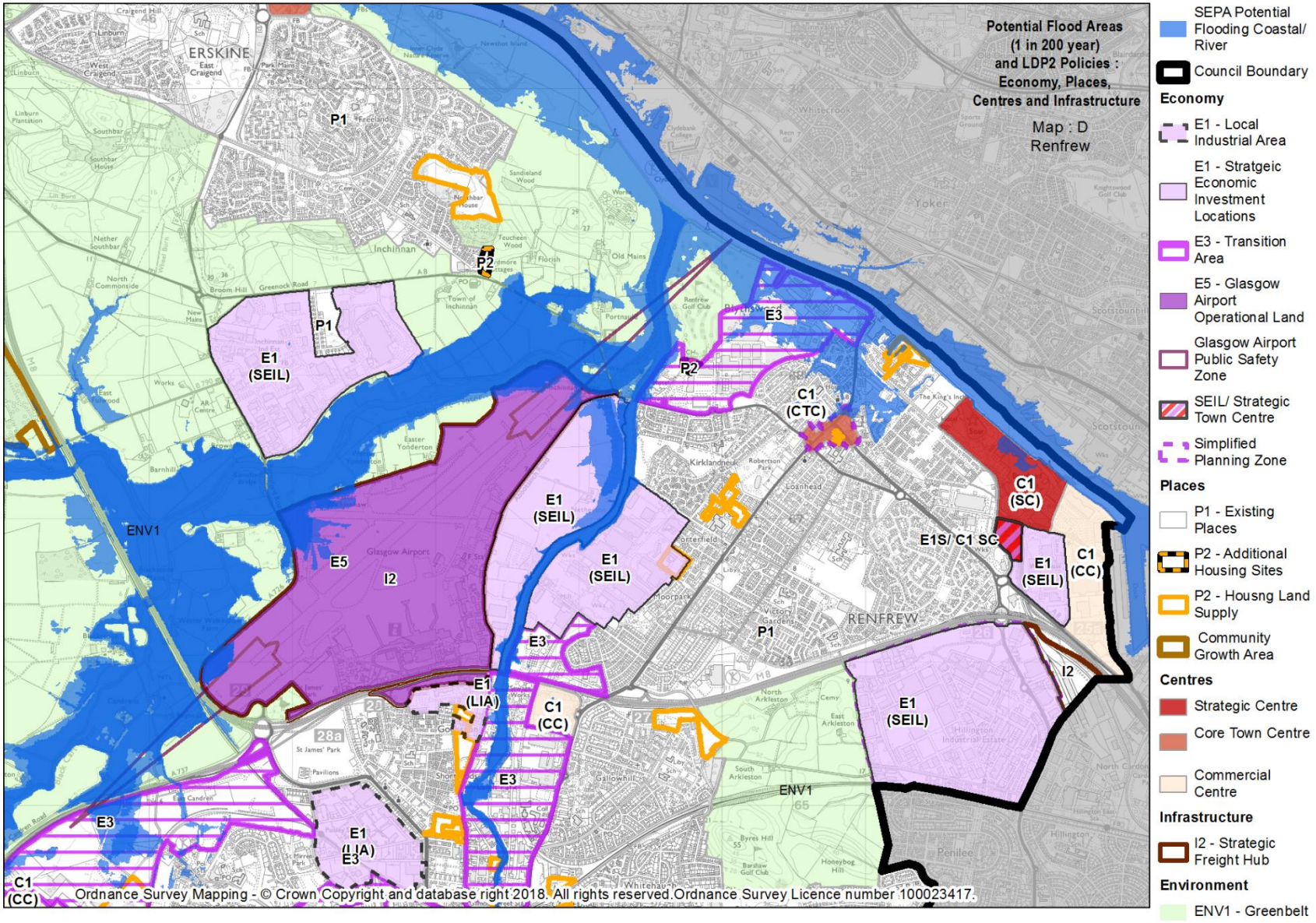
Core Town Centre
Local Service Centre
Infrastructure
I2 - Strategic Freight Hub
Environment
ENV1 - Greenbelt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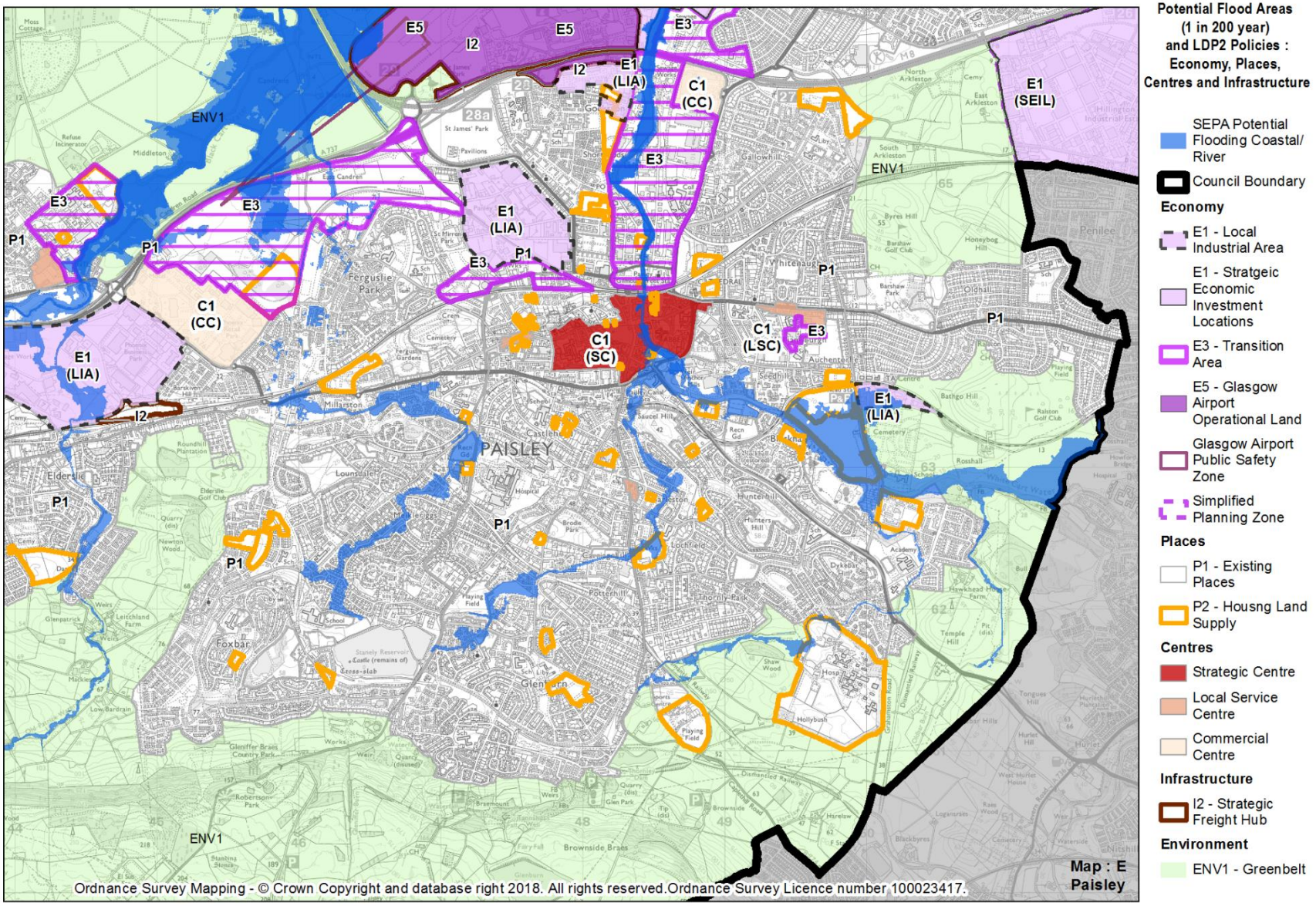
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PAISLEY
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Map : E Paisley
Ordnance Survey Mapping - © Crown Copyright and database right 2018. All rights reserved.Ordnance Survey Licence number 100023417.
Potential Flood Areas (1 in 200 year) and LDP2 Policies : Economy, Places, Centres and Infrastructure
SEPA Potential Flooding Coastal/ River
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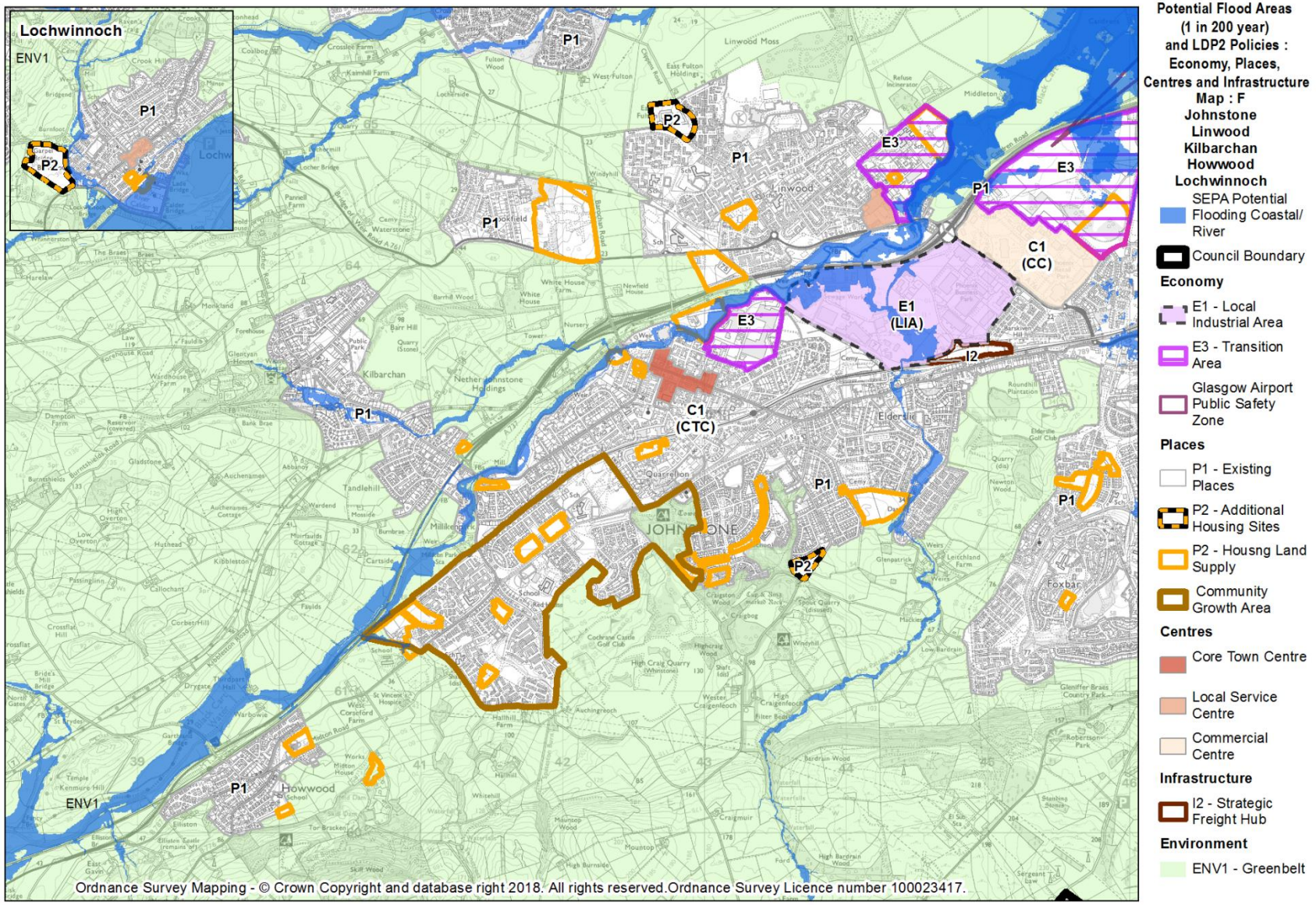
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Appendix 2 - Flood Risk at Renfrewshire's Economic Investment Locations

Address	Coastal 1 in 200 year	Fluvial 1 in 200 year	Flooding Comment
Inchinnan Business Park, Inchinnan	No	No	No flood risk issues identified on site.
Westway Business Park, Porterfield Road, Renfrew	Yes	No	Planning consent is in place to deliver the masterplan for Westway. This identifies any mitigation/infrastructure required to address flood risk. Potential flood risk to the centre of the site with a 1 in 200 year coastal flooding risk due to the nearby White Cart Water to the North of the business park. A Flood Risk Assessment and Drainage Impact Assessment will be required to be submitted alongside the planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Advanced Manufacturing and Innovation District Scotland, Netherton Farm, Glasgow Airport	Yes	No	Potential flood risk with a 1 in 200 year coastal flooding risk due to the nearby White Cart Water. A Flood Risk Assessment and Drainage Impact Assessment will be required to be submitted alongside the planning application where the developable area of the affected and any infrastructure/mitigation will be determined.
Hillington Business Park, Hillington	No	No	No flood risk issues identified on site.
Burnbrae, Linwood	No	Yes	Potential flood risk with a 1 in 200 year fluvial flooding due to the nearby Black Cart Water. A Flood Risk Assessment and Drainage Impact Assessment will be required to be submitted alongside the planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Land to north east of Phoenix Commercial Centre, Linwood	No	No	No flood risk issues identified on site.
Murray Street, Paisley	No	No	No flood risk issues identified on site.

Appendix 3 - Flood Risk Assessment of Transition Areas

Address	Coastal 1 in 200 year	Fluvial 1 in 200 year	Flooding Comment
Erskine Riverfront	Yes	No	Potential flooding to the eastern part of the site which is at risk of a 1 in 200 year coastal flooding due to the River Clyde which borders the site. A Flood Risk Assessment and a Drainage Impact Assessment will be required to be submitted alongside any planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Candren Area, Paisley	No	Yes	The North and North West of the site is at risk of 1 in 200 year fluvial flooding due to the nearby Black Cart Water. A Flood Risk Assessment and Drainage Impact Assessment will be required to be submitted alongside a planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
North Johnstone	No	Yes	The site is at risk of 1 in 200 year fluvial flooding in small sections of the centre, North East and West due to the nearby Black Cart Water. A Flood Risk Assessment and a Drainage Impact Assessment will be required to be submitted alongside a planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Paisley East End	Yes	No	There is the potential for 1 in 200 year coastal flooding on the edge of the White Cart Water that runs through the West of the site. A Flood Risk Assessment and a Drainage Impact Assessment will be required to be submitted alongside a planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Middleton Road, Linwood	No	Yes	Potential flood risk in relation to 1 in 200 year fluvial flooding in the centre of the site with the Black Cart Water flowing through the transition area. A Flood Risk Assessment and a Drainage Impact Assessment will be required to be submitted alongside a planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.

Address	Coastal 1 in 200 year	Fluvial 1 in 200 year	Flooding Comment
Meadowside Street/ Blythswood Area, Renfrew	Yes	No	There is a flooding risk with a 1 in 200 year coastal flooding from the River Clyde in the Northern section of the site. A Flood Risk Assessment and a Drainage Impact Assessment will be required to be submitted alongside a planning application where the affected sites and any infrastructure/mitigation will be determined.
Paisley Town Centre North	No	Yes	Potential flood risk with 1 in 200 year fluvial flooding with the banks of the White Cart Water running through the centre of the site. A flood Risk Assessment and a Drainage Impact Assessment will be required to be submitted alongside a planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Underwood Road, Paisley	No	No	No flood risk issues identified on site.

Appendix 4 - Housing Land Audit – Private and Social Proposed Sites

Address	Site Reference	Number of Units	Coastal 1 in 200 year	Fluvial 1 in 200 year	Flooding Comment
West Brae, Oakshaw (Paisley West End Phase II) Paisley	RFRF0711/ RFRF0711B	171 units	No	No	No significant flood risk issues identified on site. A comprehensive and satisfactory drainage assessment should promote attenuation and control of water run-off from the site.
Ingliston Drive, Bishopton	RFRF0752	40 units	No	No	Extreme North East of site floods to a maximum of 500mm from existing ditch. A Flood Risk Assessment and Drainage Impact Assessment is required to be submitted alongside the planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Mill of Gryffe Road, Bridge of Weir	RFRF0758B	20 units	No	Yes	Drainage issues on site will need to be resolved. The Northern section of the site is at risk of fluvial flooding. A Flood Risk Assessment will be required as part of the planning application which will determine the developable area of the affected sites and any infrastructure/mitigation will be determined.
Hillfoot Drive (Carsewood House), Howwood	RFRF0840	10 units	No	No	Access is subject to pluvial flood risk up to 500mm, mitigatory measures required. A Flood Risk Assessment and Drainage Impact Assessment is required to be submitted alongside any planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined. .
65 Espedair Street, Paisley	RFRF0856	10 units	No	No	No flood risk issues identified on site.
Beith Road (Former Primary Schools, Johnstone) (east)	RFRF0912E	128 units	No	No	No flood risk issues identified on site. However, redevelopment of this area for Johnstone South West Community Growth Area will ensure that a comprehensive drainage system will be put in place resulting in overall betterment for this site and the surrounding area.
Garthland Lane, Paisley	RFRF0934	36 units	No	No	No significant drainage issues, the implementation of a comprehensive drainage system should allow attenuation and treatment of any water from the

Address	Site Reference	Number of Units	Coastal 1 in 200 year	Fluvial 1 in 200 year	Flooding Comment
					site.
Bracken Place, Bridge of Weir	RFRF0938	5 units	No	No	Potential pluvial flood risk on the southern half of the site. A Flood Risk Assessment will be required to be submitted alongside the planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Barbush Farm, Johnstone	RFRF0940	65 units	No	Yes	Potential fluvial flood risk on the southern half of the site. A Flood Risk Assessment will be required to be submitted alongside the planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Johnstone Hospital, Linwood	RFRF0941	110 units	No	No	No flood risk issues identified on site.
Grampian Avenue/Lomond Crescent, Paisley	RFRF0952	30 units	No	No	There are no watercourses on this site therefore no flood risk assessment required. The implementation of drainage infrastructure should this site be developed would lead to attenuation and treatment of surface water leading to betterment for the site and surrounding land.
Arkleston Road, Paisley	RFRF0954/ A	60 units	No	No	A comprehensive and satisfactory drainage assessment should promote attenuation and control of water run-off from the site.
Middleton Road, Linwood	RFRF0964	120 units	Yes	Yes	There is the potential for coastal and fluvial flooding to the South East of the site due to the nearby Black Cart Water. A Flood Risk Assessment will be required to be submitted alongside the planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Paisley South UWS, Paisley	RFRF0971	200 units	No	No	No flood risk issues identified on site.

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Paisley South Dykebar, Paisley	RFRF0971A	620 units	No	Yes	There is a potential fluvial flood risk in a small North West section of the site with a number of burns near the site such as To Burn and Oldbar Burn. A Flood Risk Assessment will be required to be submitted alongside a planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
MacDowall Street/Mill Brae, Johnstone	RFRF0972	25 units	No	No	No flood risk issues identified on site.
Station Road, Bishopton	RFRF0979	50 units	No	No	The Craigton Burn runs through the south eastern section of the site therefore a Flood Risk Assessment is required with flood risk possible further downstream.
Wallneuk, Paisley	RFRF0993	90 units	No	No	No flood risk issues identified on site.
Clyde Waterfront and Renfrew Riverside Area 2, Renfrew	RFRF0994	434 units	No	No	A Flood Risk Assessment is required due to the proximity to the River Clyde. This will be required to be submitted alongside a planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Erskine Riverfront, Erskine	RFRF1003	250 units	Yes	No	Potential coastal flooding of the north and east of the site from the River Clyde. A Flood Risk Assessment will be required to be submitted alongside the planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Glencourse Road (Former Tennis	RFRF1007	50 units	No	Yes	Potential fluvial flood risk to the north west of the site due to the Candren Burn. A small section of the northern western part of the site adjacent to a floodplain is at risk of medium to high flooding. A Flood Risk Assessment will be required

Address	Site Reference	Number of Units	Coastal 1 in 200 year	Fluvial 1 in 200 year	Flooding Comment
Courts), Paisley					to be submitted alongside the planning application where the developable area of the site will be determined.
Land between Nos. 32 and 38 St. James Street, Paisley	RFRF1020	7 units	No	No	No flood risk issues identified on site.
Station House, Barochan Road, Johnstone	RFRF1021	24 units	No	No	No flood risk issues identified on site.
40 Church Street, Lochwinnoch	RFRF1022	33 units	No	No	No flood risk issues identified on site.
Beith Road, Johnstone	RFRF1024	100 units	No	Yes	Potential fluvial flooding in the centre of the site from the Black Cart Water. A Flood Risk Assessment will be required to be submitted alongside the planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Corseford Avenue, Johnstone	RFRF1025	53 units	No	No	No flood risk issues identified on site
Station Road, Bridge of Weir	RFRF1026	39 units	No	No	There is the potential for low level flooding. A Flood Risk Assessment is required due to the potential risk of flooding. This will be dealt with through the submission of a detailed planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Dee Drive, Findhorn Avenue, Manor Road, Foxbar, Paisley	RFRF0671	40 units	No	No	Mitigation and attenuation will be required as part of the Drainage Impact Assessment.

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Don Drive, Foxbar, Paisley	RFRF0671A	40 units	No	No	Mitigation and attenuation will be required as part of the Drainage Impact Assessment.
Ryefield, Kilbarchan Road, Johnstone	RFRF0759	24 units	No	No	A Drainage Impact Assessment will be required to be submitted alongside the planning application where the developable area will be determined.
Almond Crescent, Foxbar Rivers, Paisley	RFRF0773	41 units	No	No	Mitigation and attenuation will be required as part of the Drainage Impact Assessment.
High Calside (Westerfield House), Paisley	RFRF0817A	10 units	No	No	No flood risk issues identified on site.
North Road (East)/Gibson Crescent, Johnstone	RFRF0819B	25 units	No	No	A Drainage Impact Assessment will be required to be submitted alongside the planning application where the developable area will be determined.
Heriot Avenue (Adj. Nursing Home), Foxbar, Paisley	RFRF0839	35 units	No	No	A Drainage Impact Assessment will be required to be submitted alongside the planning application where the developable area will be determined.
Bute Crescent, Iona Drive, Glenburn, Paisley	RFRF0875	120 units	No	Yes	There is the potential for fluvial flooding in a small section of the southern edge of the site. A Flood Risk Assessment will be required to be submitted alongside the planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Auchengreoch Road, Johnstone	RFRF0912K	35 units	No	No	No flood risk issues identified on site. Redevelopment of this area for Johnstone South West Community Growth Area will ensure that a comprehensive drainage system will be put in place resulting in overall betterment

Address	Site Reference	Number of Units	Coastal 1 in 200 year	Fluvial 1 in 200 year	Flooding Comment
					downstream of the site.
Amochrie Road (former Stanely Firs), Paisley	RFRF0937	36 units	No	No	The submission of a comprehensive flood assessment along with implementation of a drainage scheme should lessen any impact from redevelopment and may result in betterment downstream of the site.
Millarston Drive, Paisley	RFRF0949	100 units	No	No	No flood risk issues identified on site.
Cartha Crescent, Paisley	RFRF0950	25 units	No	No	No flood risk issues identified on site. A Drainage Impact Assessment will be required to be submitted alongside the planning application where the developable area will be determined.
MacDowall Street, Mill Brae, Johnstone	RFRF0972A	25 units	No	No	No flood risk issues identified on site. The implementation of drainage infrastructure is required which would lead to attenuation and treatment of surface water resulting in betterment for the site and surrounding land.
Albert Road (School Site), Renfrew	RFRF0997	44 units	No	No	No flood risk issues identified on site.
New Sneddon Street, Paisley	RFRF1004	30 units	No	No	A Flood Risk Assessment is required due to the sites close proximity to the White Cart Water. This will be required to be submitted alongside a planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
Church Street, Lochwinnoch	RFRF1006	30 units	No	No	There is the potential for low level flooding. A Flood Risk Assessment is required due to a minimal risk of flooding. Constraints will be addressed through the submission of a detailed planning application.
St. Ninian's Road/Crescent,	RFRF1009	16 units	No	No	There is the potential for low level flooding in the centre of the site. A Flood Risk Assessment will be required through the assessment of a planning application which will determine the developable area.

Address	Site Reference	Number of Units	Coastal 1 in 200 year	Fluvial 1 in 200 year	Flooding Comment
Paisley					
Cotton Street (Former Institute), Paisley	RFRF1012	20 units	No	Yes	A Flood Risk Assessment will be required to be submitted alongside the planning application where the developable area of the affected sites and any infrastructure/mitigation will be determined.
High Calside, Paisley	RFRF1013	20 units	No	No	No flood risk issues identified on site.

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ਜੇ ਇਹ ਜਾਣਕਾਰੀ ਤੁਹਾਨੂੰ ਕਿਸੇ ਹੋਰ ਭਾਸ਼ਾ ਵਿਚ ਜਾਂ ਕਿਸੇ ਹੋਰ ਰੂਪ ਵਿਚ ਚਾਹੀਦੀ, ਤਾਂ ਇਹ ਸਾਥੋਂ ਮੰਗ ਲਓ।

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