Dundee Local Development Plan 2

Strategic Flood Risk Assessment Environment Report of the Proposed Plan

June 2017

DUNDEE WATER ENVIRONMENT AND STRATEGIC FLOOD RISK ASSESSMENT.

1. Introduction

1.1 *Background.*

1.1.1 The Scottish Government and Scottish Environmental Protection Agency, supported by a network of other agencies and bodies, have developed wide ranging national frameworks that offer a rational understanding of the water environment, how it affects us and how we should respond to existing pressures and the effects of climate change. Publication of the second Scotland River Basin Management Plan, Dec 2015, (RBMP2) set out how we can improve the condition of rivers, lochs, estuaries, coastal waters and groundwater.

1.1.2 The Tay Estuary and Montrose Basin Flood Risk Management Strategy, also published in December 2015, (FRMS) gives consideration to the various categories of flood risk, the size and location of risks and what we can do to prevent, avoid, adapt to, reduce, or mitigate the effects of flood risk. This is supported by the Local Flood Risk Management Plan (LFRMP) published in June 2016.

1.1.3 Both the above publications are material planning considerations with the potential to significantly influence future land use strategies, their implementation and future development proposals within Dundee. Conversely the degree of influence afforded through the emerging Dundee Local Development Plan 2 (LDP2) will impact on the effective implementation of measures contained within each of these approaches.

1.1.4 The Strategic Dundee Flood Risk Assessment is based on latest information available on SEPA Version 1.2 flood risk hazard maps. **These can be viewed on SEPA's website and should always be referred to for the latest map versions.** The maps are updated annually although it should be noted that they do not allow the user to interpret the information at a property specific scale.

1.2 Aims and Objectives.

1.2.1 The aims of this document are:

- To produce a strategic overview and assessment of flood risk and the water environment in Dundee; and,
- To support production of a sustainable spatial development strategy as part of Local Development Plan 2.

1.2.2 In supporting these aims the objectives of this assessment will be to:

- Identify the locations and sources of flooding and pressures on the water environment:
- Provide an environmental assessment of the implications of the preferred spatial development strategy and development sites contained within Local Development Plan 2: and,
- Identify opportunities to safeguard and improve the water environment.

1.2.3 These aims and objectives will assist in the production of a development strategy which is sustainable and supports the objectives and measures contained in Scotland River Basin Management Plan 2 and Tay Estuary and Montrose Basin Flood Risk Strategy and Management Plan.

1.2.4 The SFRA has been developed in liaison with the Scottish Environment Protection Agency and will directly contribute to Strategic Environmental Assessment of the emerging Local Development Plan 2 at key stages in the process.

2. Planning Policy Context.

2.1 *Scottish Planning Policy and the Local Development Plan.*

Scottish Planning Policy (SPP) advocates promotion through the planning system of:

- a precautionary approach to flood risk from all sources, including coastal, water course (fluvial), surface water (pluvial), groundwater, reservoirs and drainage systems (sewers and culverts), taking account of the predicted effects of climate change;
- flood avoidance: by safeguarding flood storage and conveying capacity, and locating development away from functional flood plains and medium to high risk areas;
- flood reduction: assessing flood risk and, where appropriate, undertaking natural and structural flood management measures, including flood protection, restoring natural features and characteristics, enhancing flood storage capacity, avoiding the construction of new culverts and opening existing culverts where possible; and
- avoidance of increased surface water flooding through requirements for Sustainable Drainage Systems (SuDS) and minimising the area of impermeable surface.

2.11 There is an expectation that planning authorities should prevent development which would have a significant probability of being affected by flooding, would increase the probability of flooding elsewhere or reduce the functional flood plain.

2.12 The SPP document promotes a risk framework to guide development with regard to areas or sites which have little, low to medium or medium to high flood risks associated with them. The framework as expressed in SPP is largely covered by Policy 41 of the Dundee Local Development Plan (LDP) therefore no change is proposed in this report to the terms of Policy 41 or its carry-over into LDP2.

2.13 Policy 42 of the LDP sets out requirements for surface water treatment by Sustainable Drainage Systems (SUDS). These requirements are also in keeping with Scottish Planning Policy. While the Proposed Plan currently being produced as a replacement for the LDP will maintain these requirements, consideration will be given to the contribution that green networks could make to the provision of flood risk infrastructure in order to alleviate the potential for surface water flooding.

2.14 Dundee's Green Networks Supplementary Planning Advice was adopted in January 2016 and is a material consideration in development management decisions. The Proposed Plan will consider the necessity to provide guidance through policy on meeting the aspirations of the Green Networks strategy. This may for example include the provision or removal of infrastructure affecting rivers and flood plains.

2.15 Support for Scotland's River Basin Management Planning approach will continue to be maintained in the new LDP although review of Policy 43 is likely to better reflect the provisions of RBMP2. The policy will also be revised to better reflect the recommendations of this report.

2.16 Development Management decisions will take account of the Scotland River Basin Management Plan2 2015, Tay Estuary and Montrose Basin Flood Risk Strategy 2015 and the Local Flood Risk Management Plan 2016 as material considerations in decision making.

PART 1

Part 1 of this assessment considers the strategic approaches and requirements of Scotland's River Basin Management Plan 2, Flood Risk Management and Target Areas Requiring Action.

3. River Basin Management Plan 2.

3.1 *Introduction.*

3.1.1 The Water Framework Directive (WFD) is a comprehensive piece of legislation brought into force in Scotland through the Water Environment and Water Services (Scotland) Act (2003) covering rivers, lochs, wetlands and groundwater. This legislation led to development of the first and second River Basin Management Plan (RBMP) for Scotland which set out measures affecting water bodies and protected areas that are not in good condition. These bodies and areas can be affected by impacts on water quality, physical condition, water flows and levels, and accessibility for fish migration, or by the impact of invasive non-native species on their aquatic plant and animal communities. The measures proposed in RBMP2 are reflected in this document and will be given further consideration in development of Dundee Local Development Plan2 (LDP2).

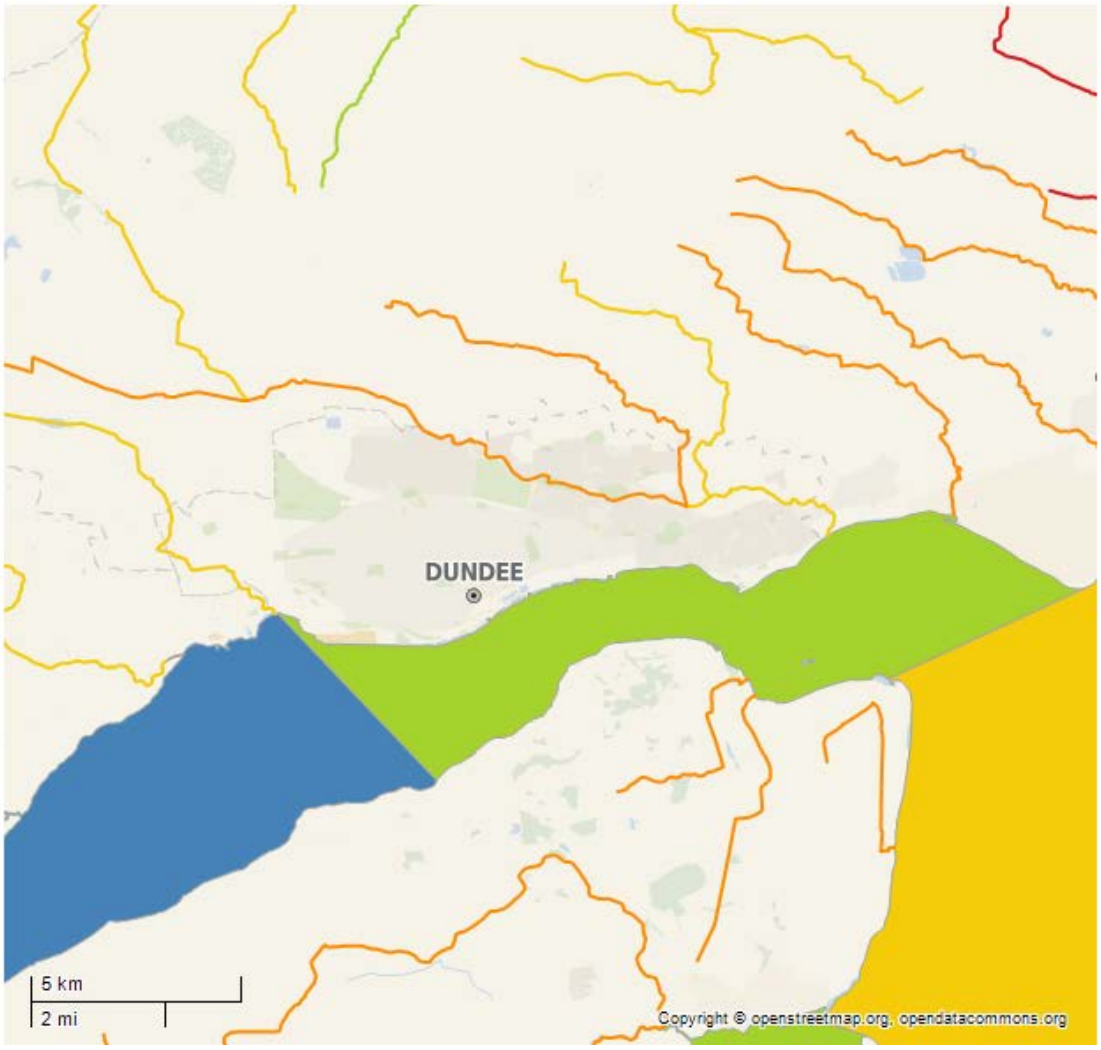
3.1.2 Opportunities are identified where LDP2 can assist by proposing measures that could be put in place to ensure that the water environment in the LDP area is not only protected but improved. These are outlined in the remainder of this report.

3.1.3 RBMP2 advises that much of the water environment in Scotland is already in good condition however actions are identified which impact on the Dighty, Fithie and Murroes Burn in relation to eg invasive species and diffuse source pollution. Action areas which were identified in the previous Management Plan are now to be identified in more detail and brought forward in the 2015-21 period. The following is a summary of the pressures and proposed actions relating to the water environment of Dundee.

3.2 *The Water Environment.*

Excerpts from the Scottish Environmental Protection Agency website at the time of production of this Assessment identified and classified Dundee's water environment at 2014 as follows.

The map below provided by SEPA shows surface water bodies subject to pressures affecting their overall condition. It shows the River Tay classifications and waterbodies within DCC area that are at less than good ecological status.



Condition

- High
- Good
- Moderate
- Poor
- Bad

Table 1

Water Body	Name	Classification	Theme	Pressure
6000	Dighty Water (lower)	Moderate	Water Quality	Rural diffuse pollution, waste water discharges
6001	Dighty Water	Poor	Freedom from invasive species	Invasion by non-native species
			Physical condition	Modifications to physical condition.
			Water Quality	Rural diffuse pollution.
6002	Murroes Burn (lower section)	Moderate	Water flows and levels	Agricultural irrigation.
6004	Fithie Burn	Poor	Access for fish migration	Man-made barriers to fish migration.
			Physical condition	Modifications to physical condition.
			Water Quality	Rural diffuse pollution, waste water discharges.
6405	Invergowrie Burn	Moderate	Water flows and levels	Agricultural irrigation.
			Water Quality	Rural diffuse pollution

3.2.1 The Dighty is designated as a heavily modified water body (HMWB) due to morphological pressures related to urban development eg variation in river depth and width; substrate of the river bed; structure of the route. These issues currently prevent the Dighty achieving good ecological potential. It is identified within a Priority Catchment in the Scotland River Basin Management Plan and it is anticipated that work will commence in the period 2015-21focussing on diffuse pollution pressures.

3.2.2 Pressures are more acutely felt in the upper reaches of the Dighty and the Fithie Burn. The lower stretches together with the Murroes Burn achieve ‘moderate’ water status as does Invergowrie Burn.

3.3. *Aims of the River Basin Management Plan.*

3.3.1 The aims for the improvement of the water environment include:

- improving the quality of bathing beaches;
- supporting the expansion of businesses that depend on a high quality water environment, such as tourism;
- contributing to the regeneration of urban areas by providing a high quality water environment; and,
- improving the health and range of populations of wild plants and animals, including rare and endangered species.

3.4 *Action.*

3.4.1 Action will be undertaken to improve the status of the water bodies by SEPA in the period 2015-2021. SEPA in consultation with Dundee City Council has through the LDP2 plan preparation process also made a number of recommendations with regard to the proposed development strategy and development sites appraisals.

3.5 *Opportunity Sites.*

3.5.1Opportunities to contribute to the advancement of these improvements and other actions through sites identified and allocated for development in LDP 2 are considered in Part 2 Work undertaken should also integrate with and support actions included in the Tay Estuary and Montrose Basin Flood Risk Management Strategy 2015 and Local Flood Risk Management Plan 2016.

4. Flood Risk Management.

4.1 *Sources and History of Flooding.*

4.1.1 SEPA Technical Guidance (Dec 2015) identifies the following primary sources of flooding as illustrated in the above map:

- FLUVIAL (river) FLOODING - occurs when the water draining from the surrounding land exceeds the capacity of the watercourse. It can occur as a result of heavy rainfall causing excessive volumes or flows of water draining from the land or blockages which can occur for various reasons including past infrastructural work affecting waterways. Overtopping/breaching of walls and embankments (either formal or informal) can also lead to river flooding.
  Flooding events occurred on 4 September 2009, 1 November 2009 and in 2010 with extensive flooding in 2012. Further flooding occurred on 7th January 2016 involving specific lengths of the Dighty, Fithie Burn, Murrows and Gelly Burn watercourses. Localised flooding occurred at diverse locations and on several occasions through January and February, 2013 A further two floods occurred involving the Dighty on 12 October 2012 and 20 December 2012. The areas affected included Ardler Baldovie and Dykes of Gray Road.

  Each of the above areas has previously been identified as being at risk of flooding. The cause of flooding in each area was prolonged rainfall which exceeded the capacity of the watercourses and was severe enough to cause damage to some properties. There were also reports of localised out of sewer flooding during these events.

- COASTAL FLOODING - is caused by a combination of high tides and storm surge and/or high wave conditions linked to low pressure weather systems. This has occurred on the following historical occasions:
  - 8 February 1868: Dundee Harbour flooded.
  - 12 February 1899: Exceptional high tide in the River Tay estuary caused widespread flooding.

- 17 December 1921: Broughty Ferry's Newport Pier and Fisher Street inundated by highest coastal flood level in the period 1883-1983. Water overflowed the docks at Dundee and flowed into the adjacent streets and sheds.
- 5 February 1983: Coastal flooding at Broughty Ferry resulted in Newport Pier being submerged almost to the booking office. Water entered sheds at Eastern Wharf and King William Dock. Fishing boats were moored to lamp posts in Fisher Street.
- 28th February 1990. Flooding at Broughty Ferry and the waterfront.
- January 2005 and January 2006. High tides and storms recorded.
- 2006: Riverside Drive, Dundee closed due to wave overtopping.
- High astronomical tides were encountered on 7 April 2008, 15, 16, 17 and 18 October 2008, 11 February 2009, and again on 21, 22 and 23 August 2009 in the Tay Estuary. Prior to these high astronomical tides, the predicted highest water level was determined to assess the likelihood of flooding in the low lying area adjoining the estuary at Fisher Street, Broughty Ferry. High tide levels were monitored throughout the period and appropriate resources were put on stand-by but no precautionary action was required.
- 25th December, 2011 say flooding at the waterfront in the vicinity of the rail bridge
- A combination of high astronomical tides and surge resulted in high water levels around the east coast and estuaries on 5 December 2013 affecting Riverside Drive. Dundee City Council is now investigating the potential risk of flooding to Dundee waterfront from coastal surge and the measures to provide appropriate flood protection.

Tidal levels are predicted to be higher in future years and should metrological effects combine then higher coastal water levels than those previously encountered are likely placing central Broughty Ferry under a higher risk of future flooding.

- PLUVIAL (rainfall) FLOODING - is caused when precipitation (rain/snow-melt etc) ponds or flows over the ground before it enters a natural or man-made drainage system or watercourse, or when it cannot enter the drainage system because the system is already full to capacity.
  - There have been a number of pluvial events recently in Dundee that have caused significant flooding. 11 August 2004: Surface water flooding occurred in Dundee City centre including Seagate, Murraygate, St Leonards Place and Mains of Fowlis and many smaller locations across the city. Additionally, the green urban fringe of the city was affected by surface water runoff causing some roads to become impassable.
  - 16 August 2004: Dundee City centre was affected by surface water flooding, resulting in basement flooding and disruption to traffic flows.
  - On 21 August 2008 it was reported that around 100 properties were affected by flooding. The areas affected included Trades Lane, Dock Street, Candle Lane, Seagate, Commercial Street and Meadowside. The cause of the flooding was sewer flooding in that the volume and intensity of rainfall water exceeded the capacity of the sewers. The flooding resulted in disruption to traffic flows and basement flooding in areas of the City Centre.
  - On 4 September 2009 there was reported flooding at St Leonards Place and on 7 September 2010 there was significant flooding in areas including the Seagate area, Commercial Street, Trades Lane and Gellatly Street and roads in the Lochee area. Dundee businesses forced to evacuate staff in Seagate, West Henderson's Wynd, Hospital Street, and Dock Street due to surface water flooding.
  - Significant pluvial flooding occurred on 12 October 2012 which affected Baldovie Road, Macalpine Road, Roseangle, Turnberry Avenue, Riverside Drive, Ardesite Underpass and Rosemill, Linlathen and Botanic garden areas.
  - Further pluvial flooding on 20th December, 2012 affected, the Liff Hospital site, Dyke of Gray Road, Arbroath Road, Drumgeith Road area and Balmossie Mill areas.

Other sources of flooding include:

- SEWER FLOODING - occurs when combined sewers are overwhelmed by heavy rainfall. Sewer flooding is often closely linked to surface water flooding, and may contain untreated foul water. Since 2007 there have been three events resulting in damage to property and disruption to residents, local businesses and traffic.

- GROUNDWATER FLOODING - occurs when water levels below ground (i.e. in soils, sands and gravels or rock formations) rise above surface levels. Low-lying areas underlain by impermeable strata are particularly susceptible. It is normally only a contributory or exacerbating factor and is hard to quantify or measure. There is no verified evidence of groundwater flooding in Dundee.

- RESERVIOR FLOODING and flooding from other infrastructure - although unlikely, failure of infrastructure such as reservoirs or canals could result in a large volume of water being released very quickly. Clatto Reservoir was the only such infrastructure in Dundee. It ceased to be operational in 1972 and has never flooded.

4.2 *Risks Associated With Strategic Development Areas.* (from Tayplan SFRA Nov. 2014).

4.2.1 Elements of the following site assessments contained in Tayplan SFRA are further developed in PART 2 of this report.

Table 2

Dundee, Linlathen	40 ha	The greatest risk from flooding is in relation to the Dighty Burn and surface water run-off. The majority of the development area is likely to be outwith the 0.5% AP (200 year) fluvial flood envelope. However, it has not been possible to fully assess this proposal as it is not location specific. However, with careful siting and the use of SUDS it is considered that there will not be a significant risk from flooding or an increase in flooding elsewhere. Nonetheless it may be necessary to undertake a flood risk assessment at the Local Development Plan stage or when specific development proposal come forward. Sustainable Flood Management Strategies should primarily avoid development in flood risk areas.
Dundee Wider Waterfront	Not known	The greatest risk of flooding at this location is from coastal flooding and subsequently from rising sea levels. However, given it is identified for port related uses it will be necessary to accept that risk. There is a surface water threat from weather storms and surcharge. However, with the use of SUDS and porous surfaces potential effects from surface water run-off can be mitigated. It may also be necessary to undertake further hydrological studies to determine whether development will have an adverse effect elsewhere. Any Flood Risk Assessment submitted should also consider what can be done to minimise the flood risk through appropriate layout and design of the development. It is also recommended that the historical pluvial/surface water flooding events are considered and mitigated where necessary.
Dundee Western Gateway	80 ha	The greatest risk of flooding at this location is from surface water runoff from agricultural land and the Fowlis, Lochee and Balruddery Burns However, with careful siting and the use of SUDS it is considered that there will not be a significant risk from flooding. It will also be necessary to ensure that surface water run-off from the fields is managed to ensure flood risk is not heightened elsewhere. Consequently, it will be necessary to undertake a Flood Risk Assessment to ensure the area(s) to be developed will not flood or adversely affect flooding elsewhere. This should be done through the Local Development Plan or when proposals come forward. Sustainable Flood Management Strategies should primarily avoid development in flood risk areas.

Current Status

4.2.2 At the Linlathen site flood risk will be assessed when specific development proposals come forward. A buffer strip may be required as indicated in Part 2 of this report.

4.2.3 Sustainable drainage has been provided at the Waterfront in the form of an underground water attenuation tank and SUDS. The tank collects and holds surface water when tidal levels are too high to permit the water to discharge naturally into the river. Construction of a Sustainable Urban Drainage ("SUDS") pond located between South Commercial Street and the Development Opportunity at Site 17 is now complete. This pond is designed to accommodate the road and development surface water during periods of high rainfall and discharge via an existing storm water outfall to the Tay. Both infrastructural elements also accept road surface water from beyond the Waterfront towards the City Centre. See ‘4.1.1 Coastal Flooding’ above.

4.2.4 A Flood Risk Assessment and supporting reports on different elements of the water environment have been submitted and agree on development of the Western Gateway. Various infrastructural elements are included in the proposals currently being development in agreement and with input from SEPA.

4.3 *Risks and Opportunities Associated With Potential Local Development Plan 2 Development Sites.*

Risks to the water environment and opportunities for enhancement arising from the sites that have been identified as potential development sites during the preparation of LDP 2 are considered in Part 2.

4.4 *Tay Estuary and Montrose Basin Flood Risk Management Strategy and Plan.*

4.4.1 Scotland has been separated into 14 Local Plan Districts for flood risk management purposes. These districts are based on river catchments and coastal areas which cross administrative and institutional boundaries. The Tay Estuary and Montrose Basin Flood Risk Management Strategy has been produced with the support and collaboration of Angus Council, Aberdeenshire Council, Dundee City Council, Fife Council, Perth and Kinross Council, Scottish Water and others with an interest in flood management. This Strategic Flood Risk Management Plan was approved and published in December 2015 following a consultation process carried out by SEPA from March to June 2015.

4.4.2 The Strategy sets out an approach for managing flooding through the identification of areas potentially vulnerable to flooding and the range of actions to be taken forward to achieve the aims of the Strategy. A Local Flood Risk Management Plan was published in June, 2016, by Angus Council as lead local authority for the Tay Estuary and Montrose Basin Local Plan District on behalf of the above local authorities.

4.4.3 The local management plan provides map based information about how implementing the measures in the Strategy may alter, enhance or restore natural features and characteristics and the method of implementation. It provides information about the results of any other consultation exercises and resulting alterations to the Plan, the timetable, who is responsible, funding and other steps.[1]

4.4.4 The Tay Estuary and Montrose Basin Flood Risk Management Strategy is made up of three sections:

Section 1: Background information on the approach taken to managing flooding in Scotland.

Section 2: This is the main focus of the Flood Risk Management Strategy. 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 the strategy aims over the short, medium and long term. **Part 2** of this report summarises information relevant to Dundee contained in the Flood Risk Management Strategy. Source information and a full description of each PVA is available on SEPA's website at **View Potentially Vulnerable Areas**

Section 3: Supporting information is available on the sources of flooding, including surface water, described within wider river catchments and coastal areas within this Section.

[1] Flood Risk Management (Scotland) Act 2009

4.4.5 **Part 2** of this report summarises information drawn from the Potentially Vulnerable Areas affecting Dundee which are identified in the Flood Risk Management Strategy. These are shown as PVAs 07/10, 07/11, 07,12 and07/13 in following map and overall characteristics are presented in the table below.

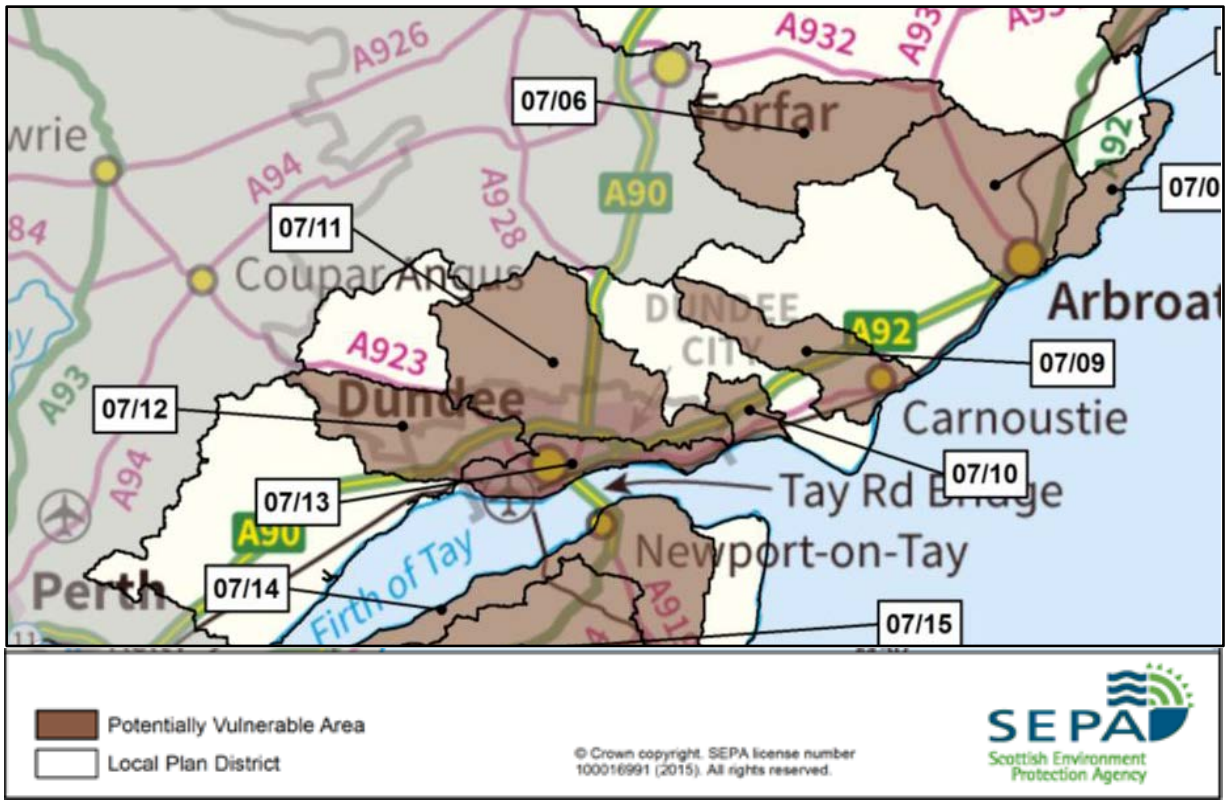


Table 3

Potentially Vulnerable Area (PVA).	Catchment	Property at risk of Flooding in the PVA		Annual Average Damages (Percentage of Potential Cost of Damages)		
		Residential	Non-Residential	Coastal Flooding	River Flooding	Surface Water Flooding
Monifieth (07/10)	Dundee Coastal	250	20	-	93%	7%
Downfield and Dundee (07/11)	Dighty Water	190	80	-	57%	43%
Invergowrie (07/12)	Invergowrie Burn.	240	60	-	21%	79%
Dundee and Broughty Ferry (07/13)	Dundee Coastal	1,300	460	82%	-	18%

4.6 *Existing flood risks, flood risk management schemes and other flood risk management infrastructure.*

4.6.1 Fluvial (River) Flooding.

Investigations into the Fithie Burn flooding in 2009 were undertaken in 2009/2010. They took the form of site inspections and hydraulic modelling of the Fithie Burn. There were no Flood Protection (Capital) Works identified as part of the investigations completed at that time. There were however general Clearance and Repair works undertaken to the Fithie bank in an effort to reduce the risk of flooding. The Tay Estuary and Montrose Basin Local Flood Risk Management Plan includes an action (see PVA 11 below) to undertake a study of the Fithie/Dighty with a view to identifying measures which can be introduced to reduce flood risk along these watercourses.

A system of Sustainable Urban Drainage has been a standard planning requirement in Dundee targeted at all new development other than single houses discharging to a watercourse for over 10 years. Recent developments which have occurred adjacent to watercourses which are based on detailed and ecologically sustainable urban drainage proposals include Mill o Mains, the Western Gateway and Dundee Waterfront.

4.6.2 Coastal Flooding.

The Dundee Coastal Study Stage 2 developed from 2009 to 2013 identified that there is a risk of coastal flooding particularly at Central Dundee, Broughty Ferry, Riverside Drive and Dundee Airport. A full Economic Appraisal was carried out which demonstrated that the upgrading of flood defences along the Dundee frontage could be economically justified and that the greatest benefits would be achieved in the Central Waterfront and Riverside Drive. Significant benefits could also be gained in, Broughty Ferry.

From the above appraisal process progression of two coastal flood protection schemes is currently underway. These areas are:
• Broughty Ferry – Grassy Beach to the Esplanade.
• City Quay to Dundee Airport

Broughty Ferry Town
The Coastal Study identified the need to improve defences in Broughty Ferry town centre to protect against future storm events at an estimated cost of £9.9 million. The recent SEPA prioritisation workshop has ranked this scheme as National Priority Number 2. Work on initial design options has started along with initial consultations. The Flood Protection Scheme is being promoted through the process identified within the “Flood Risk Management (Scotland) Act 2009 Local Authority Functions Under Part 4 Guidance.” A grant funding application has been made for this scheme to the Scottish Government and confirmation of funding is currently awaited.

Scottish Government Grant Funding is to be made available from 2016/17 onwards and will most likely be awarded to those projects with the highest National Priority ranking. It is currently proposed that 80% funding will be provided and therefore Dundee City Council will need to identify 20% up front funding (approximately £3.2 million) to progress these schemes.

Broughty Ferry Esplanade – Broughty Ferry Castle Car Park to Glass Pavilion:
Design works are progressing on soft flood protection measures utilising and extending the existing sand dunes. A Planning Application had previously been submitted for this scheme but will now be promoted as part of the Broughty Ferry Town Scheme and consultation with SEPA and SNH is well under way..

City Quay to Central Waterfront and Central Waterfront to Dundee Airport:
Design works are progressing on a Flood Protection Scheme utilising set back walls

and flood gates. A Planning Pre-Application Notice for the scheme was submitted in December 2014 and consultation carried out in January 2015 however the Flood Protection Scheme will now be promoted through the process identified within the "Flood Risk Management (Scotland) Act 2009 Local Authority Functions Under Part 4 Guidance." A recent SEPA prioritisation workshop of National Flood Risk Management Actions utilising economic appraisal methods has ranked this scheme as National Priority Number 5 with an estimated cost of £6.2 million. A grant funding application has been made for this scheme to the Scottish Government and confirmation of funding is currently awaited.

In addition to the two Flood Protection Schemes being progressed Dundee City Council have also funded and completed coastal flood protection works at:

Broughty Ferry – Glass Pavilion to Bridge Street and Bridge Street to Council Boundary:

This section of Rock Armour Revetment works has been constructed and funded totally from the DCC Capital Plan.

Central Waterfront:
Works to raise the height of the existing sea wall over the Central Waterfront have been completed as part f the V&A development contract. The works are funded from the DCC Capital Plan.

4.6.3 Pluvial **(**Surface Water) Flooding.

Reference should be made to SEPA Flood Maps which show a large number of surface water flooding locations in Dundee. Various works to tackle surface water flooding have recently been carried out including:

- A surface water pumping station was installed in 2009 in the Trades Lane area to tackle problems mentioned at 4.1.1 above.
- Additional gullies/drainage channels and associated pipework were installed at St Vincent Street Broughty Ferry by Dundee City Council in March 2010.
- A new underground surface water storage tank has been constructed to reduce the risk of flooding in the Central Waterfront area. SUDS have been installed at the Waterfront to alleviate City Centre flooding around the Commercial Street area.

- An Integrated Catchment Study (ICS) is being carried out covering Dundee, Broughty Ferry, Monifieth and Carnoustie to consider the interaction of surface water (be that pluvial or fluvial) with the sewer system. This study will identify areas at risk of flooding and measures which can be introduced to reduce such flood risk.

4.6.4 Sewer Flooding.

The Integrated Catchment Study as detailed in 4.5.3 will identify sewer flood risk areas and measures which can be introduced to reduced the risk of sewer flooding.
The Trades Land pumping station and associated additional galleys/drainage channels will reduce the risk in this location.

Scottish Water has completed sewer improvement works in Broughty Ferry which will reduce the risk of sewer flooding in this area

4.6.5 Flooding Advice.

Dundee City Council publishes a Flooding Advisory Note on its website which sets out the roles and responsibilities of those with an interest in flooding before, during and after a flood event.

Whilst owners have the primary responsibility for protecting their property from flooding, Dundee City Council provides the following assistance during flood events:-

- provide advice on flooding related issues
- offer sandbags for flood prevention in case of an emergency and subject to prioritisation
- work with emergency services in response to severe flooding
- co-ordinate shelter for people evacuated from house
- provide inspection and assessment following a flood event

4.7 *Assessment of Climate Change.*

UK Climate Change predicts that climate change may lead to warmer and drier summers, warmer and wetter winters with less snow and more extreme temperature and rainfall. In response Scottish Planning Policy states that it is not possible to plan for development solely according to the calculated probability of flooding. In applying the risk framework therefore (interpreted within Policy 41 of the LDP) the effects of climate change should take into account an allowance for "freeboard" of 500mm. The glossary of SPP defines freeboard as - a height added to the predicted level of a flood to take account of the height of waves or turbulence and uncertainty in estimating the probability of flooding.

Climate change expectations and allowances were built into the Tay Estuary and Montrose Basic Flood Risk Management Strategy. The pluvial modelling undertaken considered climate change scenarios with a 20% increase in rainfall intensity. The predicted increases in flood risk were solely based on the impact of a changing climate on the magnitude of flooding and did not take into account any potential increase due to population change, development pressures or urban sprawl. Mitigation measures contained within or arising from actions identified in the 2015 Flood Risk Management Strategy are also unaccounted for. Similarly the Dundee Coastal Study and programme of works also built in an allowance for Climate Change.

It is recommended that the potential update to LDP SUDS Policy 42: Sustainable Drainage Systems includes a requirement that SUDS should be designed such that in a 1 in 200 year rainstorm event flooding will not be higher than 500 mm below floor level.

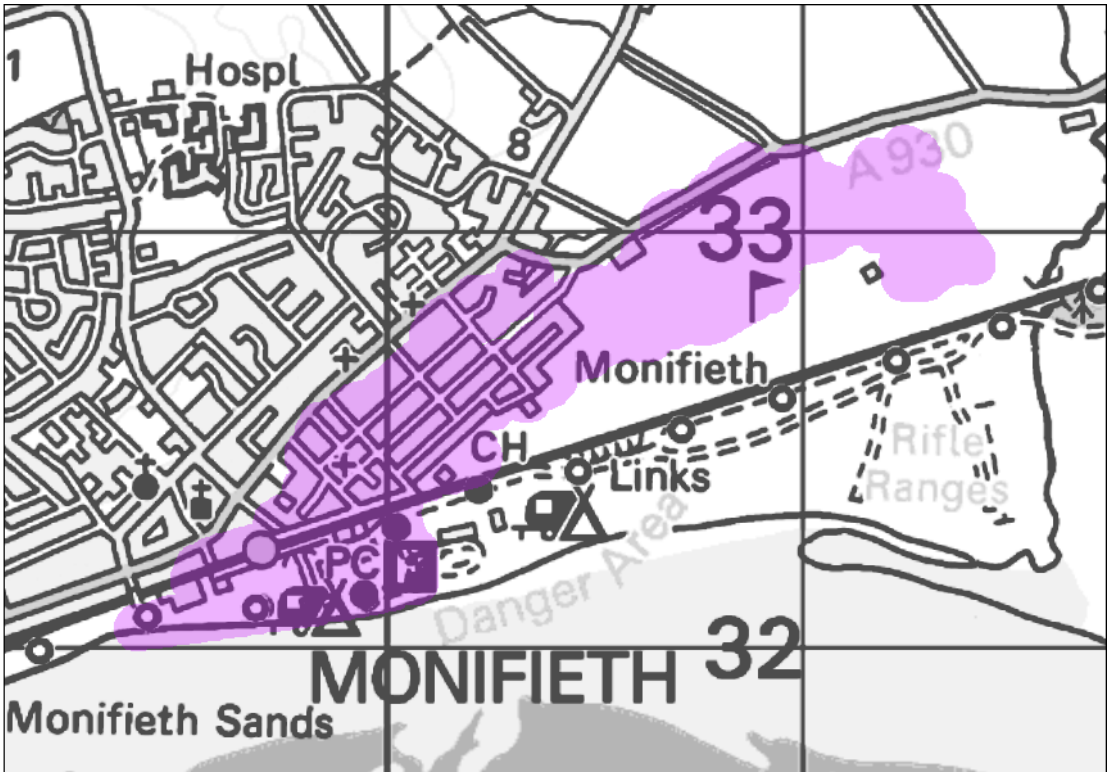
4.8 *Drainage.*

Private waste water treatment systems are not supported by SEPA within sewered areas unless it is a temporary measure to overcome a constraint before a planned upgrade to the public system occurs. Consequently, LDP2 should consider making a requirement that development has the ability to connect to the public sewer. Such an approach would minimise the risk of pollution to the water environment by ensuring that waste water discharges are directed to the public treatment works which are managed by Scottish Water.

5. Target Areas Requiring Action.

Actions led or supported by Dundee City Council for each of the relevant Potentially Vulnerable Areas are summarised below. These actions are extracts from the Flood Risk Management Strategy 2015 and are developed by the Local Flood Risk Management Plan 2016. Greater detail of actions listed under the four PVAs which overlap with the administrative area of Dundee is available at Annex 1

5.1 PVA 10 *Monifieth.*

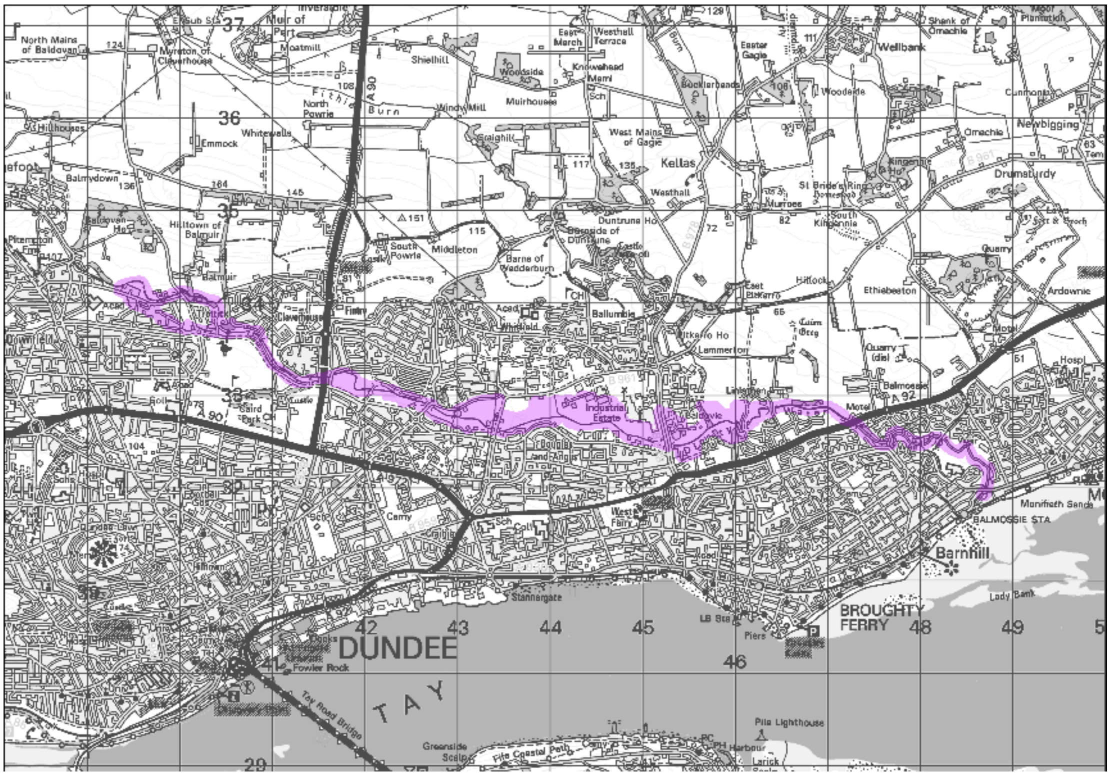


Target area

Actions:

- Potential for flood storage/defence and sediment management. Flood Protection Study to determine actions.
- Surface Water Management Plan to be undertaken to determine actions to manage surface water flooding.
- Integrated Catchment Study to be undertaken to support above.
- SEPA to undertake strategic mapping and modelling exercise for coastal flooding and Scottish Water to assess flood risk within the highest risk sewer catchments.
- Maintain flood defences where in place. Carry out clearance and repair works where these would substantially reduce flood risk.
- Avoid overall increase in flood risk.

5.2 PVA 11 *Downfield and Dundee (Dighty).*

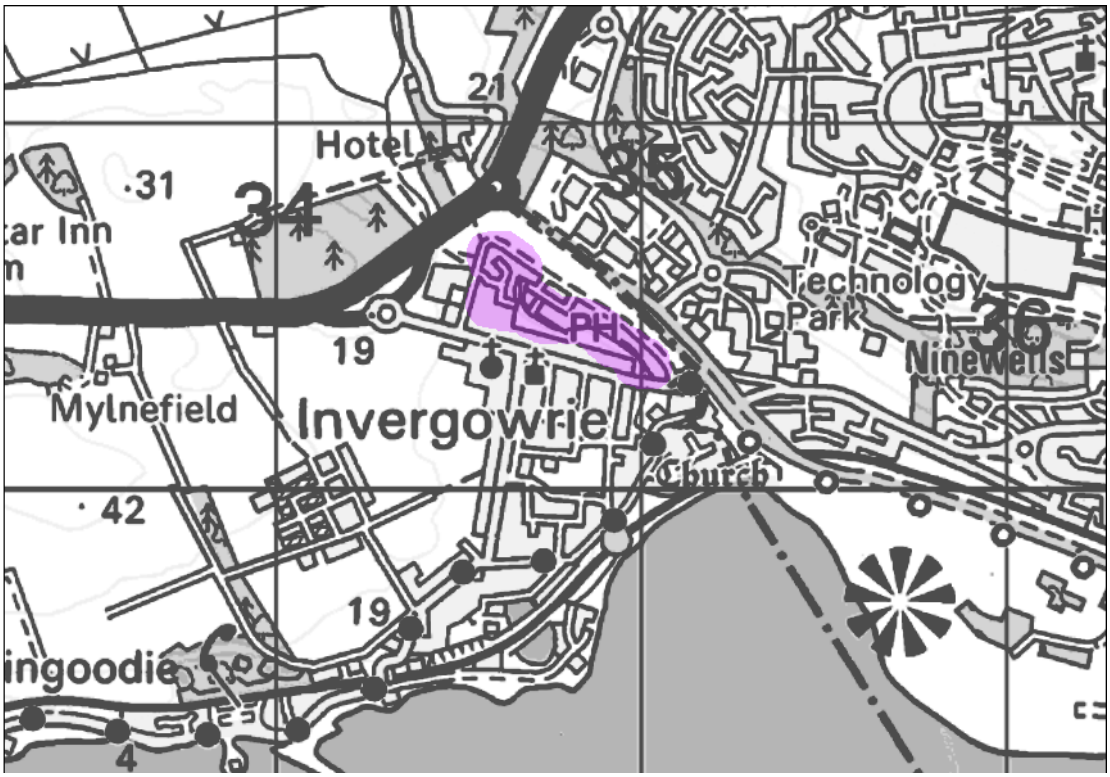


Target area

Actions:

- Undertake flood protection study associated with Dighty Water and Fithie Burn. Potential for flood defences, sediment management and natural flood management eg floodplain restoration.
- Surface Water Management Plan to be undertaken to determine actions to manage surface water flooding.
- Integrated Catchment Study to be undertaken to support above.
- SEPA to undertake strategic mapping and modelling exercise for coastal flooding and Scottish Water to assess flood risk within the highest risk sewer catchments.
- Maintain flood defences where in place. Carry out clearance and repair works where these would substantially reduce flood risk.
- Avoid overall increase in flood risk.

5.3 PVA 12 *Invergowrie (Invergowrie Burn).*

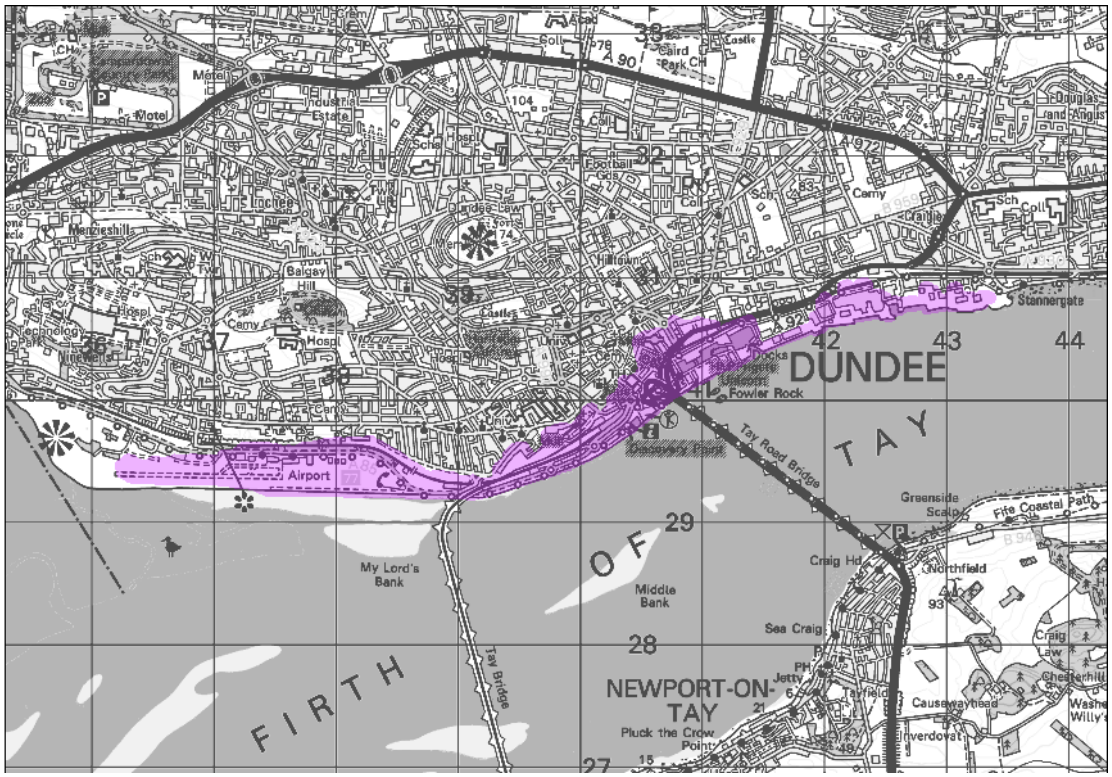


Target area

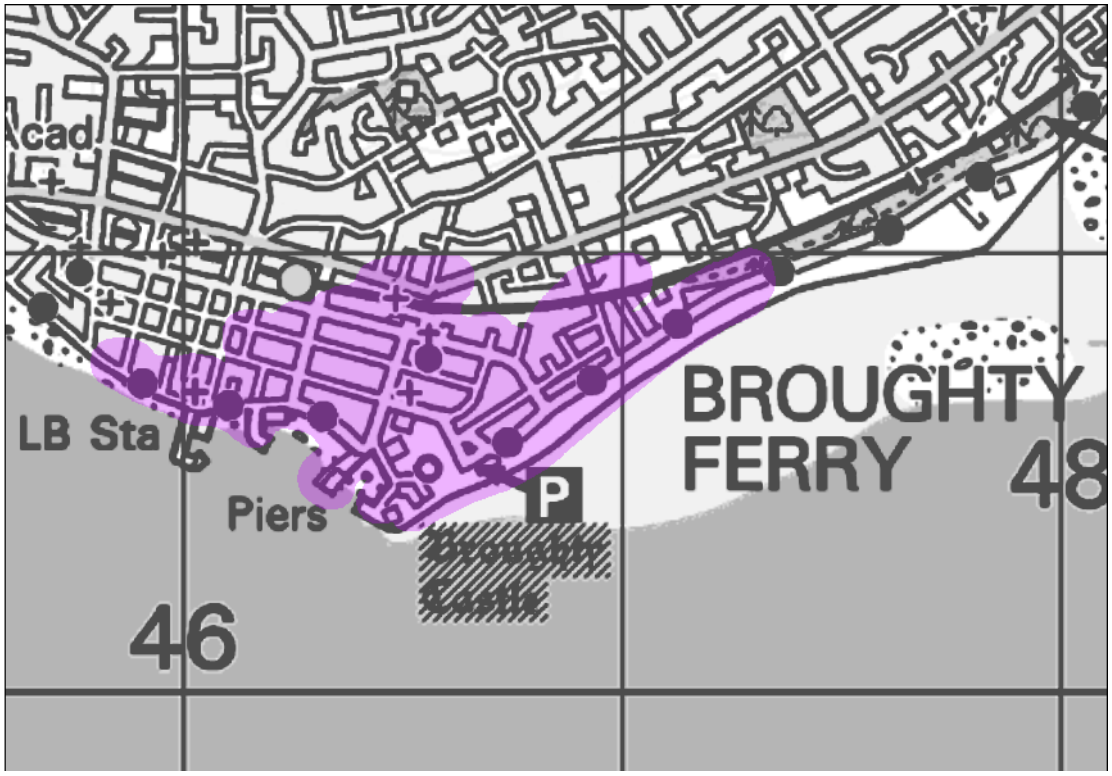
Actions:

- Natural Flood Management Study to assess whether river / floodplain restoration and sediment management could help reduce flood risk. Consider actions upstream and downstream.
- Surface Water Management Plan to be undertaken to determine actions to manage surface water flooding.
- Integrated Catchment Study to be undertaken to support above.
- Scottish Water to assess flood risk within the highest risk sewer catchments.
- Maintain flood defences where in place. Carry out clearance and repair works where these would substantially reduce flood risk.
- Avoid overall increase in flood risk.

5.4 PVA 13 *Dundee and Broughty Ferry (Dundee Coast).*



Target area Dundee



Target area Broughty Ferry.

Actions:

- Flood protection scheme proposed along the Broughty Ferry coastline including new sea walls and set-back embankments, sand dune replenishment and rock armour.
- Flood protection scheme proposed for the Dundee coastline including set-back walls and flood defences. Construction work to raise the sea wall at the Central Waterfront is to commence in 2015/16.
- Surface Water Management Plan to be undertaken to determine actions to manage surface water flooding.
- Integrated Catchment Study to be undertaken to support above.
- SEPA to undertake strategic mapping and modelling exercise for coastal flooding and Scottish Water to assess flood risk within the highest risk sewer catchments.
- Maintain flood defences along the coast. Carry out clearance and repair works where these would substantially reduce flood risk.
- Avoid overall increase in flood risk.

PART 2

The proposed Dundee Local Development Plan 2 identifies an optimum number of sites considered potentially suitable for development resulting in provision for a range of different uses. Whilst most of these are thought suitable for strategic housing development some sites are identified for other potential uses including hotel, restaurant, retail etc. During consultation on the Main Issues Report key partners provided information relevant to environmental site assessment which established whether there could be water environment issues or opportunities affecting any of the proposed development sites.

Particular consideration carried forward into this Assessment involved whether development of a site could bring about restoration and improvement in the water environment effecting the current condition and status of rivers in the local and regional area. Suggested improvement measures could include for example the provision of buffer strips or enhanced SUDS and could assist in achieving the aims of Scotland RBMP2, Tay Estuary and Montrose Basin FRMS and FRMP. These measures are often a requirement mitigating potential negative effects on the water environment that development might have.

A substantial amount of this information was offered by SEPA who also suggested that development should not add any further morphological pressures to the water bodies or result in any deterioration in status. Any opportunities to improve modified habitat should also be harnessed. Developers should be encouraged to assess the potential for channel restoration by removing the existing or possible culverts thereby restoring the water environment to its natural state. These suggestions are incorporated throughout Part 2 of this Assessment.

6. Sites with Potential to Protect or Improve the Water Environment.

Sites that afford opportunities for watercourse protection, improvement or restoration are identified in the following sections. Other opportunities may arise as development proposals and detailed site assessments are undertaken as part of the development process.

6.1 Buffer Strips and open water course protection.

SEPA has identified sites that have watercourses either flowing through them or along the site boundary. These are listed in Table 4. To ensure watercourses are safeguarded and enhanced a buffer strip between the waterbody and site boundary or built development may be required. Watercourses should not be culverted for land gain. Any other site which has a watercourse through or adjacent to them should be similarly protected. Buffer strips should be a minimum of 6m on either side of the watercourse, as measured from the top of the bank. Sites brought forward from the Main Issues Report to the Proposed Plan associated with the forthcoming Dundee Local Development Plan 2018-2028 are identified below.

Table 4 Sites Requiring Buffer Strip.

Site Reference	Site name	PVA	Co-Location Issues.	Mitigation
MIR85	Allocation H72 - Land to East of Strathyre Avenue. Dighty Burn in or adjacent to site boundary.	07/11. Med/High risk from fluvial water flooding. Risk of increasing flooding elsewhere.	No	Investigate potential culvert and re-opening. Buffer strip required. FRA required – assess impact of Arbroath Road bridge on upstream levels.
MIR76	Dykes of Gray (East). Small watercourses run along north and east sides.	07/12. Small area affected by surface water/ fluvial flood risk. Risk of increasing flooding elsewhere.	Adjacent to regulated sites. Potential for odour and noise, vermin, litter, fire complaints.	Multiple issues. Liaise with SEPA for mitigation. FRA required. Works may include buffer strip and de-culverting.
MIR77	Western Gateway, Dykes of Gray (North West). Small watercourses on north and west boundaries.	07/12. Small area affected by surface water flood risk. Risk of increasing flooding elsewhere.	Adjacent to regulated sites. Potential for odour and noise, vermin, litter, fire complaints.	Multiple issues. Liaise with SEPA for mitigation. FRA required. Works may include buffer strip and de-culverting.
201424	Strathyre Avenue. Dighty Burn in or adjacent to site boundary.	07/11. Small area affected by surface water/ fluvial flood risk. Risk of increasing	No	Buffer strip required. FRA required. Assess potential of bridges/ culverts to

		flooding elsewhere.		exacerbate flooding.
PD04	Linlathen Principal ED. Murroes and Dighty Burns in or adjacent to site boundary.	07/11. Small area affected by surface water/ fluvial flood risk. Risk of increasing flooding elsewhere.	Potential for noise/ odour from Michelin.	Buffer strips required. FRA required.

6.2 De-culverting opportunities

Sites where culverted watercourses may be present could afford opportunities to restore the water environment to its natural state by removing the culvert. The potential for channel restoration should be assessed where a culverted watercourse is suspected taking account of any potential for increasing the risk of flooding elsewhere.

SEPA recommend that where culverts are to remain in situ that these are identified and development layouts are arranged so that culverts do not fall within property boundaries. Where a culvert is located under a property boundary the owner is responsible for its inspection, maintenance and replacement. This can make maintenance and replacement of culverts difficult due to multiple ownership issues. Culverts should therefore be located under the footprints of open landscape, roads or pavements where possible.

6.3 High Quality SUDS requirements

Any development site where the receiving watercourse is more sensitive with less capacity to dilute surface water run-off from development should provide enhanced/high quality SUDS. This will ensure that the surface water discharge is to a high enough standard to protect the watercourse and pervert further deterioration. It will also ensure that potential developers are aware that adequate space to accommodate SUDS features needs to be included within the site layout. The former Lined SUDS may be required at a number of sites allocated for development. These are identified in Appendix 2.

7. LDP Development Sites Flood Risk Assessment incorporating MIR Development Sites Assessments and SEPA consultation responses.

Sites proposed for development in the Proposed Local Development Plan effect each of the three largest areas which are potentially vulnerable to flooding in Dundee. These are PVA 11: **Downfield and Dundee (07/11);** PVA 12: **Invergowrie (07/12);** and PVA 13: **Dundee and Broughty Ferry (07/13).** Sites are assessed in the following tables accordingly. No sites are proposed for development within or impacting on Potentially Vulnerable Area 07/10. On occasion a single site can have an impact on more than one PVA. Where this is the case the site particulars have been entered into each relevant table below for consideration.

7.1 Sites Proposed for Development in the Local Development Plan within Potentially Vulnerable Area 07/11.

The main vulnerabilities relate to river and surface water flooding with the target area of concern situated around the lower reaches of the Dighty. Most of the proposed development sites given in Table 5 below lie on the northern side of the Dighty, mainly associated with development frameworks around Whitfield, Mill O Mains, Downfield, north of Arbroath Road, and Dundee north-west. A strategic approach to mitigation of the impact of development on the water environment is adopted covering a number of sites taken together for most of these areas. Details of the approaches adopted are expressed in development frameworks or regeneration masterplans for Whitfield, Mill o' Mains, the Linlathen Estate (north of Arbroath Road) and the north-west.

Collectively the impact of mitigation measures for sites in Whitfield listed in Table 5b below includes development of a regional SUDS system to control discharge into the River Dighty while avoiding discharge into Whitfield Burn. A number of Planning Briefs have been developed guiding implementation of this approach through the Whitfield Development Framework. Similarly a strategic approach to protect the water environment in the Mill o' Mains Masterplan is based on Flood Risk Assessment which promotes surface water control in concert with a new area SUDS scheme.

Sites in and around Downfield are not grouped under a single masterplan however individual planning briefs have been developed for proposals which include the former Kingspark School site, Downfield Primary, Macalpine Road Primary and Lawside Academy. Other sites are: St Columba's Primary School, and; land at Lauderdale Avenue. There are no significant water issues associated with these sites however there is a potential for surface water flooding and presence of culverted water courses on some. The assessment of flood risk and potential for installation of SUDS will establish development requirements, avoid and reduce surface water flooding in the area.

Substantial development is proposed north of Arbroath Road spread over a number of sites adjacent to the River Dighty and Fithie Burn including Linlathen Estate, east Strathyre Road, Tom Johnston Road and Douglasfield Leisure Park. Flood Risk Assessments are required for two of the sites to assess the potential for flooding from the Dighty or small watercourses and surface water flooding. Use of a buffer strip is recommended at Strathyre Road as well as investigating the potential for blockage at Arbroath Road Bridge and flood resistant materials at Linlathen Estate.

Sites towards north-west Dundee include Baldragon Farm and Clatto Water Services Depot. An assessment is required regarding the potential for flooding from small watercourses at Baldragon Farm and a precautionary Flood Risk Assessment at Clatto Depot regarding the potential for flooding from the former reservoir.

All other sites in PVA 11 relate to former schools with few water environment issues. FRA is required at two sites to investigate flooding potential from the Dighty and the existence or otherwise of a culverted water course.

Many of the above proposed works should contribute positively to meeting the aims of the Tay Estuary and Montrose Basin Flood Risk Strategy and Management Plan.

Table 5.

ID	Site Name/PVA	Fluvial Flooding Category				Coastal Flooding Category				Ground Water/ Culvert (Y/N)	Surface water	Mitigation Measure	Development type and neighbouring uses	1.Assess Risk/ Vulnerability 2. Assess socio-economic justification
		No risk	Low-Med Risk	Med/High Risk: Built Up Area	Med/ High risk: Undev Area	No risk	Low-Med Risk	Med/ High Risk: Built Up Area	Med/ High risk: Undev Area					
Sites suitable for Housing Development (reference number to the LDP 2014 is represented by the ID in red)														
H01	√ Site 4, Whitfield Whitfield Loan/Summerfield Terrace PVA 07/11	x				x				x	Surface water flood risk – Medium probability	Regional SUDS system developed draining to pond on south side of the road prior to discharge into the Dighty via an open ditch.	Residential	**1 Surface Water Flood Risk** **2 Brownfield regeneration**
H15	√ Site 2, Whitfield, Lothian Crescent PVA 07/11	x				x				N	Surface water flood risk – Medium probability. Development could increase flooding elsewhere	Regional SUDS system developed draining to pond on south side of the road prior to discharge into the Dighty via a open ditch	Residential/ Retail/ Education	**1 Surface Water Flood Risk** **2 Brownfield regeneration**
H16	√ Site 1, Whitfield Aberlady Crescent PVA 07/11	x				x				N	Surface water flood risk – Medium probability. Development could increase flooding elsewhere	The Whitfield Burn is adjacent to the north of the site regional SUDS system developed draining to pond on south side of the road prior to discharge into the Dighty via a open ditch. FRA	Residential	**1 Surface Water Flood Risk** **2 Brownfield regeneration**
H22	Whitfield South West PVA 07/11			Potentially		x				Potential for culverted watercourse.	Possible flood issues within or adjacent to site. Development could increase flooding elsewhere	FRA and SUDS	Residential.	**1 Possible fluvial and surface water flooding.** **2 Brownfield regeneration**

H22	Whitfield South East PVA 07/11			Potentially		x				Potential for culverted watercourse.	Possible flood issues within or adjacent to site. Development could increase flooding elsewhere	FRA and SUDS	Residential.	**1 Possible fluvial and surface water flooding. 2 Brownfield regeneration**
H28	√ Downfield Primary School, East School Road PVA 07/11	x				x				Dundee bi annual flood report indicates that there may be a culverted watercourse in the area. Known flood location to north of site on Camperdown Road	Possible flood issues within or adjacent to site. Development could increase flooding elsewhere	FRA required to inform the areas suitable for Development. Commitment that no development would take place within the functional flood plain, or within an area of coastal flood risk, unless appropriate defences are in place. SUDS source control and infiltration.	Residential	**1 There might be culverted watercourse in the area 2 Brownfield regeneration**
H29	√ Mid Craigie Primary School PVA 07/11	x				x				N	Need to mitigate effects of surface water	Suds by infiltration and ponds	Residential	**1 No flood risk identified 2 Brownfield regeneration**
H30	√ Macalpine Primary School, St Leonard Place PVA 07/11	x				x				N	N	Lined SUDS may be required due to potential contamination.	Residential/ Education/ Church and open space	**1 No flood risk identified 2 Brownfield regeneration**
H31	√ Lawside Academy, West School Road PVA 07/11 and 07/12	x				x				Dundee bi annual flood report indicates that there may be a culverted watercourse (Gelly Burn) under or close to the site.	Y small area. Development could increase flooding elsewhere	Assessment of flood risk recommended. Culverted watercourse may be in site or in the middle of the road. SUDS source control and infiltration	Residential/ Ambulance Station/ Crematorium in woodland setting	**1 Culverted watercourse may be present 2 Brownfield regeneration**
H32	Site 3, Whitfield PVA 07/11	x				x				N	Y small area. Development could increase flooding elsewhere	SUDS. Early engagement with Scottish Water recommended.	Residential	**1 No flood risk identified 2 Brownfield regeneration**
H33	√ Site 5, Whitfield, Dunbar Park / Haddington Avenue PVA 07/11	x				x				N	Surface water flood risk – Medium probability. Development could increase flooding elsewhere	The Whitfield Burn is adjacent to the north of the site. Regional SUDS system developed draining to pond on south side of the road prior to discharge into the Dighty via a open ditch	Residential/ Whitfield Life Services complex	**1 Surface Water Flood Risk 2 Brownfield regeneration**
H34	√ Site 6, Whitfield, Tranent Grove PVA 007/11	x				x				N	Surface water flood risk – Medium probability	Regional SUDS system developed draining to pond on south side of the road prior to discharge into the Dighty via a open ditch.	Residential/ Open space	**1 Surface Water Flood Risk 2 Brownfield regeneration**
H35	√ Site 7, Whitfield, Whitfield Drive PVA 07/11	x				x				N	Surface water flood risk – Medium probability	Regional SUDS system developed draining to pond on south side of the road prior to discharge into the Dighty via a open ditch	Residential/ Open Space/ Retail centre	**1 Surface Water Flood Risk 2 Brownfield regeneration**
H36	√ Site 8, Whitfield, Lothian Cresent PVA 07/11	x				x				N	Surface water flood risk – Medium probability	Regional SUDS system developed draining to pond on south side of the road prior to discharge into the Dighty via a open ditch	Residential/ open space	**1 Surface Water Flood Risk 2 Brownfield regeneration**
H42	√ Mossgiel Primary School/ Alloway Place / Ballochmyle Drive PVA 07/11	x				x				N	Y small area.	Potential FRA	Residential/ Retail/Open ground	**1 Potential development may increase the probability of flooding elsewhere 2 Brownfield regeneration**
H49	√ Land at Hebrides Drive PVA 07/11	x	Majority of the site is within the 1:200 year fluvial flood outline of the Dighty Burn.			X				N.	Y. Part area. Potential to increase flooding elsewhere.	Development agreed. FRA required should layout change. Operational issues with existing SUDS will have to be taken into account.	Housing/ Wildlife corridor	**1 Fluvial flood risk identified 2 Brownfield regeneration**
H50	√ Hebrides Drive Mill O'Mains (North) PVA 07/11	x				x				N	Y small area. Development could increase flooding elsewhere On site source control for surface water required	Surface water control required to fit in with master plan SUDS for overall development. Operational issues with existing SUDS will have to be taken into account. FRA	Housing	**1 No flood risk identified 2 Brownfield regeneration**

H52	Land at Hebrides Drive. East. PVA 07/11	x				x				N	Y small area. Development could increase flooding elsewhere Historic flooding adjacent to site.	FRA to assess risk from surface water flooding	Residential	**1 No flood risk identified** **2 Brownfield regeneration**
H55	√ Land at Barns of Claverhouse Road PVA 07/11	x				x				N	Surface water flood risk – medium probability. Small area. Development could increase flooding elsewhere	Recommend a requirement to undertake a Flood Risk Assessment (FRA) to inform the areas suitable for development. Commitment that no development would take place within the functional flood plain, or within an area of coastal flood risk, unless appropriate defences are in place. Operational issues with existing SUDS will have to be taken into account.	Residential/ Open space	**1 Minor surface water flood risk** **2 Brownfield regeneration**
H56	√ Hebrides Drive Mill O' Mains PVA 07/11		Majority of the site is within the 1:200 year fluvial flood outline of the Dighty Burn.			X				N	Y Small area. Development could increase flooding elsewhere	Should current approval lapse new FRA will be required. Operational issues with existing SUDS will have to be taken into account.	Green space/Housing /	**1 Fluvial flood risk (1:200) identified** **2 Brownfield regeneration**
H61	√ Land at Lauderdale Avenue PVA 07/11	x				x				N	N	N	Housing	**1 No flood risk identified** **2 Brownfield regeneration – potentially important area of open space**
H66	√ Clatto Water Services Depot PVA07/11	x				x				N	Y. Small area. Development could increase flooding elsewhere.	FRA Required to assess risk from the outfall of the reservoir.	North – Clatto Reservoir (Country Park) East – Scottish Water Waste Treatment Works South – Residential West – Country Park and Open Countryside	**1 Consideration of potential reservoir failure** **2 Brownfield regeneration**
H67	St Columba's PS PVA07/11		x			x				N	Potential for surface water issues.	Discuss with Dundee City Council Engineers Division.	Residential	**1 Potential surface water issues** **2 Brownfield regeneration**
H70 (2)	Baldragon Farm. PVA07/11	Y		Small watercourses running through and adjacent to site.		x				N	Y. Small area. Development could increase flooding elsewhere.	FRA to assess flooding potential from small watercourses.	Residential.	**1 Surface water flood risk FRA Required to identify potential issues 2 Brownfield regeneration**
H71-2	√ Linlathen Estate PVA 07/11	x				x				N	Surface water flood risk – medium probability. Small area. Development could increase flooding elsewhere.	FRA is required. Consider relation between site access and Dighty. Flood resistant material s and design recommended.	Open countryside/ Residential/ Farm	**1 1 Minor surface water flood risk** **2 Greenfield development**
H72	Land to East of Strahyre Avenue PVA 07/11	Y		Potential for fluvial flooding from the Dighty Burn. Level of risk unknown.		N				N	Development could increase flooding elsewhere.	FRA is required to determine risk from Dighty and assess potential impact arising from possible blockage scenario at Arbroath Road bridge. Buffer strip.	Residential.	**1 Surface water flood risk FRA Required to identify potential issues 2 Greenfield development**
New or Amended Sites (MIR 2016 Ref)														
MIR 78	Ballumbie Road PVA 07/11	x				x				N	N	N/A	Residential	**1. None 2. None**
Non-Residential Sites (MIR 2016 Ref)														
MIR 93/96	Myrekirk Road PVA 07/11	x				x				N	Part surface water risk. Potential to increase flooding	Discuss site with DCC Engineers. Adjacent to PD01 Hazard site.	Retail, leisure and restaurant.	**1. To be established 2. Brownfield regeneration**

											elsewhere.			
MIR 95	Douglasfield Leisure Park PVA 07/11	x				x				N	N. Adjacent to site.	none	To be assessed.	**1. To be established 2. Brownfield regeneration.**
MIR 97	Forfar Road PVA 07/11	x				x				N	Adjacent to or encroaching onto site.	Discuss site with DCC Engineers.	Leisure. Food/drink.	**1. To be established 2. Brownfield regeneration**
MIR 98	Tom Johnston Road PVA 07/11	x				x				N	N Adjacent to site.	None	Commercial/ hotel.	**1. None. 2. Brownfield regeneration.**
Draft Sites to be Forwarded by DCC and Considered (MIR 2016 Ref)														
DCC 3	Longhaugh PS PVA 07/11	x				x				N	N	None	Residential.	**1. None. 2. Brownfield regeneration.**
DCC 4	Former St Saviours School PVA 07/11			Potential flood risk from Dighty		x				Potential	Historic surface water flooding	FRA.	Residential	**1. High risk of flooding in future. 2. Brownfield regeneration.**
DCC 5	St Luke's and St Matthew's RC PS PVA 07/11	x				x				N	N	None	Residential	**1. None. 2. Brownfield regeneration.**
DCC 6	Our Lady's RC PS PVA 07/11	x				x				N	N	None	Residential	**1. None. 2. Brownfield regeneration.**
DCC 7	Kingspark PVA 07/11	x				x				N	N	None	Residential	**1. None. 2. Brownfield regeneration.**
DCC 10	Former Baldragon Academy PVA 07/11	x				x				Potential culvert through site	N	Investigate possible culvert and avoid development on or adjacent to same. Avoid increase in flows into the culvert.	Residential	**1. To be established. 2. Brownfield regeneration.**

7.2 Sites Proposed for development in the Local Development Plan within Potentially Vulnerable Area 07/12.

A substantial part of Dundee west falls within PVA 17/12 with the Target Area situated in Invergowrie in Perth and Kinross. The latter area is at risk of river and surface water flooding associated with the Invergowrie Burn which is fed by the Lochee Burn and Fowlis Burn. Most of the proposed development sites given in Table 6 below are Inner City sites many of which raise surface water flooding issues. Mitigation takes the form of sustainable urban drainage methods of controlling the potential effects of flooding across almost all sites. The potential for the existence of culverted water courses effecting three sites requires Flood Risk Assessment and development of appropriate mitigation.

Four sites forming part of the Western Gateway have the potential to impact on fluvial flooding. Flood Risk Assessments are required in order to inform areas suitable for development. Each site is effected by a medium/high risk of flooding over part of the site. Buffer strips may be required depending on the findings of the assessments and the potential for de-culverting will be considered at Dykes of Gray north-west.

Other sites in PVA 12 relate to former schools. No water environment issues are present.

These works will contribute to identified actions or PVA 07/12 in the Tay Estuary and Montrose Basin Flood Risk Management Strategy and Plan.

Table 6.

ID	Site Name/PVA	Fluvial Flooding Category				Coastal Flooding Category				Ground Water/ Culvert (Y/N)	Surface water	Mitigation Measure	Development type and neighbouring uses	1.Assess Risk/ Vulnerability 2. Assess socio-economic justification
		No risk	Low-Med Risk	Med/High Risk: Built Up Area	Med/ High risk: Undev Area	No risk	Low-Med Risk	Med/ High Risk: Built Up Area	Med/ High risk: Undev Area					
Sites suitable for Housing Development (reference number to the LDP 2014 is represented by the ID in red)														
H12	Foggyley Gardens PVA 07/11 + PVA 07/12	x				x				N	N	Need to minimise input of surfaces water into the combined sewer SUDS by infiltration. FRA if current permission lapses.	Employment land/ Residential/ Leisure	**1 No flood risk identified** **2 Brownfield regeneration**
H23	√ 117 Liff Road PVA 07/12	x				x				N	N	Potential contamination risk may require mitigation by lined SUDS	Residential/Open ground/ Mixed uses	**1 No flood risk identified** **2 Brownfield regeneration**
H24	√ Quarry Gardens PVA 07/12	x				x				N	N	SUDS may be contaminated may need to be lined	Residential/ Recreational/Education	**1 No flood risk identified** **2 Brownfield regeneration**
H27	Loons Road Part PVA 07/12 and PVA 07/13	x				x				May be a culverted watercourse in the western part of the site.	Possible flood issues within or adjacent to site. Development could increase flooding elsewhere	FRA Lined SUDS.	Residential	**1 There might be culverted watercourse in the area** **2 Brownfield regeneration**
H31	√ Lawside Academy, West School Road PVA 07/11 and 07/12	x				x				Dundee bi annual flood report indicates that there may be a culverted watercourse (Gelly Burn) under or close to the site.	Y. Small area. Development could increase flooding elsewhere.	Assessment of flood risk recommended. Culverted watercourse may be in site or in the middle of the road. SUDS source control and infiltration	Residential/ Ambulance Station/ Crematorium in woodland setting	**1 Culverted watercourse may be present** **2 Brownfield regeneration**
H58	√ Stack Leisure Park PVA 07/12	x				x				Potential for a culverted watercourse (Lochee) to the south of the site.	Y. Small area. Development could increase flooding elsewhere.	SUDS by infiltration and by ponds to create treatment train; avoid overbuilding a culvert. FRA required	Residential	**1 Potential Pluvial flooding** **2 Brownfield regeneration**
H60	√ Lochee Primary School PVA 07/12		Part of the site is within the 1:200 year fluvial flood outline of the Dighty Burn.			X				N	Y. Small area. Development could increase flooding elsewhere.	SEPA recommend 'SUDS – space for ponds and infiltration to create the treatment train.	Residential	**1 Fluvial flood risk (1:200) identified** **2 Brownfield regeneration**
H63	√ Highgate Centre, High Street, Lochee PVA 07/12 **Under construction.**	x				x				Dundee bi annual flood report indicates that there may be a culverted watercourse (Lochlee) under the site which should be avoided.	Y. Small area. Development could increase flooding elsewhere.	Assessment of flood risk recommended if current permission lapses. Potential contamination due to previous land uses lined SUDS may be required	Residential	**1 Identified culverted watercourse** **2 Brownfield regeneration**
H65	√ Charleston Primary school PVA 07/12	x				x				N	Y. Small area. Development could increase flooding elsewhere.	N	Residential	**1 Potential surface water issues** **2 Brownfield regeneration**

H69	√ Western Gateway Site, Land to south of former Liff Hospital PVA 07/12 Permission for proportion of site being pursue.	x				x				N	Surface Water Flood Risk – Medium Probability	Recommend a requirement undertake a Flood Risk Assessment (FRA) to inform the areas suitable for development. Commitment that no development would take place within the functional flood plain, or within an area of coastal flood risk, unless appropriate defences are in place	North – residential/ farmland East – industrial estate/residential South – open space/residential West – farmland	**1 Surface water flood risk FRA Required to identify potential issues** **2 Greenfield development**
New or Amended Sites (MIR 2016 Ref)														
MIR 75	Western Gateway Mid [Land East of Dykes of Gray Road.] PVA 07/12				Y	x				N	Medium/high risk of flooding over part of site.	FRA required risk in north and east.	Residential	**1. Potential to increase probability of flooding elsewhere.** **2. None**
MIR 76	Western Gateway Mid [Dykes of Gray. East.] PVA 07/12				Y	x				N	Medium/high risk of flooding over part of site.	FRA required. Risk from Lochee Burn and east site. Buffer strip required.	Residential use proposed In vicinity of regulated site PD01	**1. Potential to increase probability of flooding elsewhere.** **2. None**
MIR 77	Western Gateway Mid. [Dykes of Gray. North West] PVA 07/12				Y	x				Y	Medium/high risk of flooding over part of site.	FRA required including assessment of surface water run off and mitigation measures considered. Consider buffer strip north and west and the potential for de-culverting.	Residential use proposed In vicinity of regulated site PD01	**1. Potential to increase probability of flooding elsewhere.**
Draft Sites to be Forwarded by DCC and Considered (MIR 2016 Ref)														
DCC 1	Hillside Primary School (PS) PVA 07/12	x				x				N	N	None	Residential.	**1. None.** **2. Brownfield regeneration.**
DCC 2	Gowriehill PS PVA 07/12	x				x				N	N	None	Residential.	**1. None.** **2. Brownfield regeneration.**
Sites Submitted During SHIP to Consider (MIR 2016 Ref)														
SHIIP 2	St Mary's Infant School. PVA 07/12	x				x				N	N	None	Residential	**1. None.** **2. Brownfield regeneration.**

7.3 Sites Proposed for development in the Local Development Plan within Potentially Vulnerable Area 07/13.

The main vulnerabilities relate to coastal and surface water flooding with the majority of damages caused by coastal flooding.
Most of the proposed development sites given in Table 7 below are Inner City sites. A range of issues effect these sites as a whole with the potential for culverted water courses at three sites, the potential for surface water flooding over small areas on a few sites and the potential for development to increase the possibility of flooding elsewhere. Proposed mitigation takes the form of sustainable urban drainage methods of controlling the potential effects of flooding, avoiding development in areas prone to flooding and Flood Risk Assessment to guide mitigation measures proposed.

Flood risks at the Railyards, Dock Street and Dundee Waterfront are mainly coastal. SUDS, FRA, Flood Defences and urban design methods are employed to mitigate flood risk supported by extensive discussions with SEPA on their methods and implementation.

These approaches are in agreement with actions proposed in the Tay Estuary and Montrose Basin Flood Risk Management Strategy and Plan.

Table 7

ID	Site Name/PVA	Fluvial Flooding Category				Coastal Flooding Category				Ground Water/ Culvert (Y/N)	Surface water	Mitigation Measure	Development type and neighbouring uses	1.Assess Risk/ Vulnerability 2. Assess socio-economic justification
		No risk	Low-Med Risk	Med/High Risk: Built Up Area	Med/ High risk: Undev Area	No risk	Low-Med Risk	Med/ High Risk: Built Up Area	Med/ High risk: Undev Area					
Sites suitable for Housing Development (reference number to the LDP 2014 is represented by the ID in red)														
H02	√ Railyards, Greenmarket PVA 07/13	x					Majority of the site is within the 1:200 year coastal flood area Potential development of allocation could increase the probability of flooding elsewhere			N	Y. Small area. Development could increase flooding elsewhere.	Flood Risk Assessment required if current permission lapses to inform the areas suitable for development. Commitment that no development should take place within the functional flood plain, or within an area of coastal flood risk, unless appropriate defences are in place. Provide water attenuation via lined SUDS. Contamination potential due to previous land uses- lined SUDS	Residential	**1 Coastal flood risk (1:200) identified** **2 Brownfield Regeneration**
H03	Car Park at South Tay Street PVA 07/13	x				x				N	N	n/a	Residential	**1 No Flood Risk identified** **2 Brownfield land redevelopment**
H09	√ Queen Victoria Works PVA 07/13	x				x				Dundee bi annual flood report indicates that there may be a culverted watercourse (Scourin' Burn) under or close to the site. Development could increase flooding elsewhere.	Y. Small area. Development could increase flooding elsewhere.	Assessment of flood risk recommended. Contamination potential due to previous land uses- lined SUDS may be required.	Residential/ Business/ Industrial	**1 Culverted watercourse may be present** **2 Brownfield regeneration**
H10	√ Taybank works Phase 2 PVA 07/13	x				x				Y Location unknown	Surface Water Flood Risk – Medium Probability	SEPA Recommend that a requirement for an FRA is attached to the site specific requirements as appropriate.	Industrial/ Residential	**1 FRA required to identify potential issues** **2 Brownfield regeneration**
H20	Maryfield Depot PVA 07/13	x				x				Potential for culverted watercourse.	N	FRA and Lined SUDS required. Investigate possible culvert and avoid development on or adjacent to same. Avoid increase in flows into the culvert.	Residential.	**1 No flood risk identified.** **2 Brownfield regeneration**
H27	Loons Road Part PVA 07/12 and PVA 07/13	x				x				May be a culverted watercourse in the western part of the site.	Possible flood issues within or adjacent to site. Development could increase flooding elsewhere	FRA Lined SUDS.	Residential	**1 There might be culverted watercourse in the area** **2 Brownfield regeneration**
H39	√ Maxwelltown High and Low Rise PVA 07/13	x				x				N	Y. Small area. Development could increase flooding elsewhere.	SUDS ponds and source control advised.	Residential/ Education/ Health.	**1 No flood risk identified** **2 Brownfield Regeneration**
H40	√ Derby Street High and Low Rise PVA 07/13	x				x				N	Y. Small area. Development could increase flooding elsewhere.	n/a	Residential	**1 No known issues** **2 Brownfield regeneration**

H41	√ Central waterfront PVA 07/13	x					Large part of the site is within the 1:200 Coastal flood outline			Dundee bi annual report indicates there is likely to be a culverted watercourse (Scourin' Burn) under the site.	Y. Majority of area. Development could increase flooding elsewhere.	FRA required to inform the areas suitable for development. Commitment that no development would take place within the functional flood plain, or within an area of coastal flood risk, unless appropriate defences are in place. Ongoing discussions with SEPA regarding SUDS.	North – Retail and other employment with Residential on upper floors East – Port Area South – River Tay West – transport / Employment	**1 Identified coastal flood risk (1:200) Identified culverted watercourse** **2 Brownfield regeneration**
H62	√ Maxwelltown Works, Alexander Street PVA 07/13	x				x				N	Need to mitigate effects of surface water however potential contamination due to previous land uses	Lined SUDS may be required	Residential	**1 No flood risk identified** **2 Brownfield regeneration**
Non-Residential Sites (MIR 2016 Ref)														
MIR 91	Kingsway East Former ABB Nitran PVA 07/13	x				x				x	Part surface water risk. Potential to increase flooding elsewhere.	Discuss site with DCC Engineers. SUDS	Mixed use. Retail/ commercial/ industrial.	**1. To be established** **2. Brownfield regeneration**
MIR 92	Hawkhill PVA 07/13	x				x				N	Part surface water risk. Potential to increase flooding elsewhere.	Discuss site with DCC Engineers. Adjacent to PPC/E/0020031 Hazard site.	Commercial	**1. To be established** **2. Brownfield regeneration.**
MIR 94	Dock Street Gas Holder PVA 07/13	x						Y		Y	Part surface water significant risk. Potential to increase flooding elsewhere.	FRA required to assess both coastal and surface water risk.	Retail	**1. To be established** **2. Brownfield regeneration.**
Draft Sites to be Forwarded by DCC and Considered (MIR 2016 Ref)														
DCC 8	Rosebank PS PVA 07/13	x				x				N	N	None	Residential	**1. None.** **2. Brownfield regeneration.**
DCC 9	Menzieshill High School (HS) PVA 07/13	x				x				N	N	None	Residential	**1. None.** **2. Brownfield regeneration.**

Conclusion

The ‘Water Environment and Dundee Strategic Flood Risk Assessment’ sought to draw together the implications for Dundee of the Scotland River Basin Management Plan and Tay Estuary and Montrose Basin Flood Risk Management Strategy and Plan in terms of both the strategic approaches being pursued and the actions designed to improve the water environment and mitigate the consequences of development.

This assessment was designed to supplement the above approaches by providing additional detailed information related to the water environment in Dundee and in doing so to support development of the Proposed Dundee Local Development Plan 2. All sites contained in the proposed LDP2 are assessed for their potential impact on watercourses and the various sources of flood risk. Mitigation measures are proposed which draw heavily on the Site Assessments carried out for the LDP2 and consultations and discussions with SEPA and Scottish Water as well as others. This provided a database which will guide development in Dundee for the next five years following adoption of the proposed Local Development Plan 2.

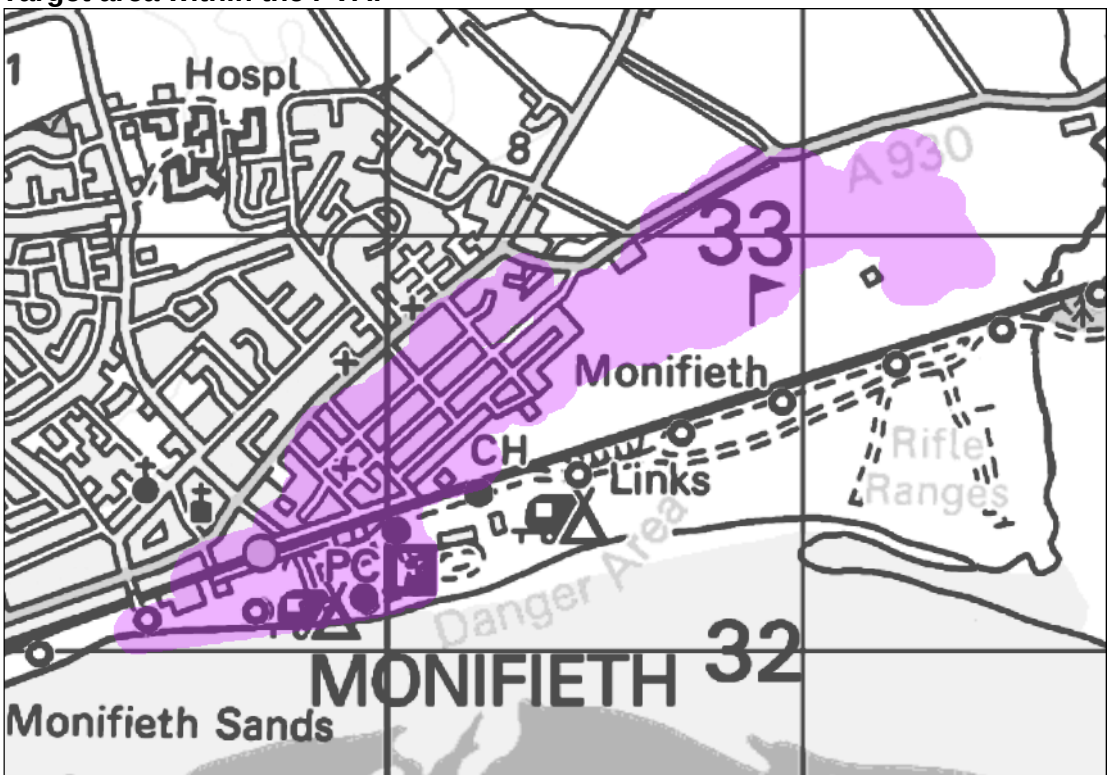
Annex 1: Tay Estuary and Montrose Basin Flood Risk Management Strategy. Extended Summary of Information Related to PVA's 07/10, 07/11, 07/12 and 07/13.

PVA 07/10. Monifieth (Potentially Vulnerable Area 07/10) Main Catchment: Dundee Coastal.

History of Flooding.
No significant floods have been recorded in this Potentially Vulnerable Area.

Aim: Reduce economic damages to residential and non-residential properties and risk to people in Monifieth caused by flooding from the Monifieth Burn

Target area within the PVA:



Overall objectives to manage flooding:

- Reduce economic damages and number of residential properties at risk of **surface water** flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical. This objective will be monitored using surface water flood risk across the Potentially Vulnerable Area. For 07/10 there are 30 residential properties at risk and Annual Average Damages of £44,000.
- Avoid an overall increase in flood risk. 250 residential properties are affected (from **river or surface water** flooding).
- Reduce overall flood risk. 250 residential properties are affected (from **river or surface water** flooding)..

Organisations such as Scottish Water, energy companies and Historic Environment Scotland actively maintain and manage their own assets, including the risk of flooding. These actions are not detailed further in the Flood Risk Management Strategy.

Action (ID): NEW FLOOD WARNING (70540010)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: SEPA
Status: Not started. Indicative delivery: 2016-2021.

Description: The area under consideration includes properties in Monifieth affected by flooding from the Monifieth Burn. Further feasibility assessment will be required to assess delivery potential. A local authority study has been proposed for this area which can inform the scoping exercise once complete.

Action (ID): FLOOD PROTECTION STUDY (70230005)
Objective (ID): Reduce economic damages to residential and non-residential properties and risk to people in Monifieth caused by flooding from the Monifieth Burn (7023, 7024)
Delivery lead: Angus Council
Status: Not started Indicative delivery: 2016-2021

Description: A flood protection study has been recommended for Monifieth to assess whether flood storage, flood defences and sediment management could reduce flood risk. The study should take a catchment approach and consider the potential benefits and disbenefits and interaction between actions upstream and downstream.

Potential Impacts:
Economic
The study could benefit 243 residential properties and 15 non-residential properties at risk of flooding in this location, with potential damages avoided of up to £17 million.
Social
Social impacts will depend on the outcome of the study and recommended actions. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people located within the study area. In addition the study could benefit two utilities and one railway line located within the study area.
Environmental
Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment and designated sites. Where possible opportunities to enhance and restore the environment should be sought. The Buddon Burn (water body ID 5954) is located within the study area and the physical condition of this river is identified by SEPA to be at less than good status. Opportunities to improve the condition of this river should be considered by coordinating with river basin management planning. To be in accord with the FRM Strategy, the responsible authority should seek to ensure as part of the study that the action will not have an adverse effect on the integrity of the Firth of Tay and Eden Estuary Special Area of Conservation and Special Protection Area. Listed buildings, Sites of Special Scientific Interest and Ramsar sites are also present within the study area and could be positively or negatively impacted.

Action (ID): SURFACE WATER PLAN/STUDY (70210018)
Objective (ID): Reduce economic damages and number of residential properties at risk of surface water flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical (7021)
Delivery lead: Dundee City Council, Perth and Kinross Council and Angus Council
Status: Not started Indicative delivery: 2016-2021.

Description: The area must be covered by a surface water management plan or plans that set objectives for the management of surface water flood risk and identify the most sustainable actions to achieve the objectives.

Action (ID): SURFACE WATER PLAN/STUDY (70210019)
Objective (ID): Reduce economic damages and number of residential properties at risk of surface water flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical (7021)
Delivery lead: Scottish Water in partnership with local authorities
Status: Ongoing Indicative delivery: 2016-2021.

Description: An integrated catchment study will be carried out to support the surface water management plan process and improve knowledge and understanding of surface water flood risk and interactions with other sources of flooding e.g. with the sewer network, watercourses and the sea.

Action (ID): STRATEGIC MAPPING AND MODELLING (70540016)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: SEPA
Status: Not started Indicative delivery: 2016-2021

Description: SEPA will seek to develop flood mapping in the Arbroath to Dundee area to improve understanding of coastal flood risk. The extent and timing of improvements will depend on detailed scoping and data availability.

Action (ID): STRATEGIC MAPPING AND MODELLING (70540019)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Scottish Water
Status: Not started Indicative delivery: 2016-2021

Description: Scottish Water will review the assessment of flood risk within the highest risk sewer catchments to improve knowledge and understanding of surface water flood risk.

Action (ID): MAINTAIN FLOOD PROTECTION SCHEME (70230017)
Objective (ID): Reduce economic damages to residential and non-residential properties and risk to people in Monifieth caused by flooding from the Monifieth Burn (7023, 7024)
Delivery lead: Angus Council
Status: Existing Indicative delivery: Ongoing

Description: Continue to maintain the Monifeith Flood Protection Scheme. The scheme includes coastal protection works at Tayview Caravan Park.

Action (ID): FLOOD FORECASTING (70540009)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: SEPA
Status: Existing Indicative delivery: Ongoing

Description: The Scottish Flood Forecasting Service is a joint initiative between SEPA and the Met Office that produces daily, national flood guidance statements which are issued to Category 1 and 2 Responders. The service also provides information which allows SEPA to issue flood warnings, giving people a better chance of reducing the impact of flooding on their home or business. For more information please visit SEPA's website.

Action (ID): SELF HELP (70540011)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead:
Status: Existing Indicative delivery: Ongoing

Description: Everyone is responsible for protecting themselves and their property from flooding. Property and business owners can take simple steps to reduce damage and disruption to their homes and businesses should flooding happen. This includes preparing a flood plan and flood kit, installing property level protection, signing up to Floodline and Resilient Communities initiatives, and ensuring that properties and businesses are insured against flood damage.

Action (ID): AWARENESS RAISING (70540013)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Responsible authorities

Status: Existing Indicative delivery: Ongoing

Description: SEPA and the responsible authorities have a duty to raise public awareness of flood risk. Improved awareness of flood risk and actions that prepare individuals, homes and businesses for flooding can reduce the overall impact. From 2016 SEPA will engage with the community through local participation in national initiatives, including partnership working with Neighbourhood Watch Scotland. In addition, SEPA will engage with local authorities and community resilience groups where possible. Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.

Action (ID): MAINTENANCE (70540007)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Angus Council and Dundee City Council, asset / land managers
Status: Existing Indicative delivery: Ongoing

Description: Local authorities have a duty to assess watercourses and carry out clearance and repair works where such works would substantially reduce flood risk. They produce schedules of clearance and repair works and make these available for public inspection. Scottish Water undertake inspection and repair on the public sewer network. Asset owners and riparian landowners are responsible for the maintenance and management of their own assets including those which help to reduce flood risk.

Action (ID): EMERGENCY PLANS/RESPONSE (70540014)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Category 1 and 2 Responders
Status: Existing Indicative delivery: Ongoing

Description: Providing an emergency response to flooding is the responsibility of many organisations, including local authorities, the emergency services and SEPA. Effective management of an emergency response relies on emergency plans that are prepared under the Civil Contingencies Act 2004 by Category 1 and 2 Responders. The emergency response by these organisations is co-ordinated through regional and local resilience partnerships. This response may be supported by the work of voluntary organisations.

Action (ID): PLANNING POLICIES (70010001)
Objective (ID): Avoid an overall increase in flood risk (7001)
Reduce overall flood risk (7054)
Delivery lead: Planning authority
Status: Existing Indicative delivery: Ongoing

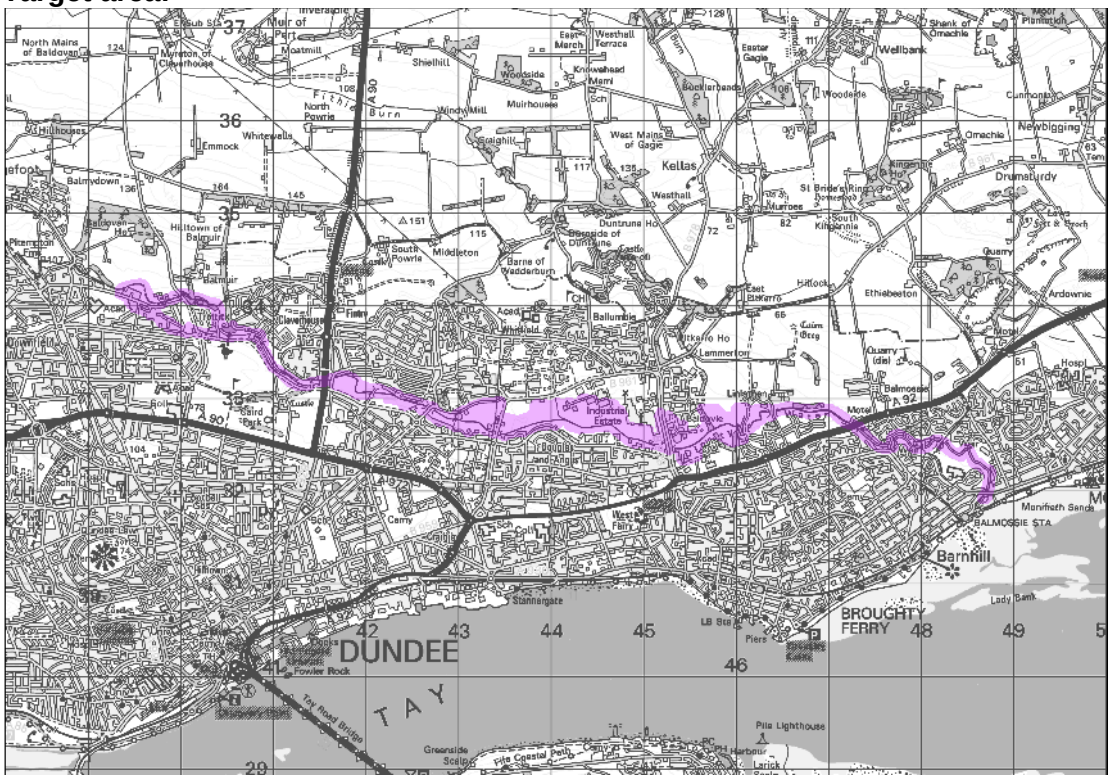
Description: Scottish Planning Policy and accompanying Planning Advice Notes set out Scottish Ministers' priorities for the operation of the planning system and for the development and use of land. In terms of flood risk management, the policy supports a catchment-scale approach to sustainable flood risk management and aims to build the resilience of our cities and towns, encourage sustainable land management in our rural areas, and to address the long-term vulnerability of parts of our coasts and islands. Under this approach, new development in areas with medium to high likelihood of flooding should be avoided.

PVA 07/11. Downfield and Dundee. Main Catchment: Dighty Water.

History of Flooding.
Flooding occurred in this Potentially Vulnerable Area on 4 September 2009, 1 November 2009 and 7th January, 2016. On all occasions, the outskirts of Dundee city centre were affected following flooding of the Dighty Water, Fithie Burn, Murrows and Gelly Burn watercourses. The cause of flooding was prolonged rainfall which exceeded the capacity of the watercourses, and it was severe enough to cause damage to some properties.

Aim: Reduce economic damage to residential and non-residential properties and risk to people in Dundee caused by flooding from the Dighty Water and Fithie Burn.

Target area:



Overall objectives to manage flooding:

- Reduce economic damage and number of residential properties at risk of **surface water** flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical. This objective will be monitored using surface water flood risk across the Potentially Vulnerable Area. 80 residential properties at risk from surface water flooding and Annual Average Damages of £250,000.
- Avoid an overall increase in flood risk. 190 residential properties and 80 non-residential properties are affected (by **river or surface water** flooding).
- Reduce overall flood risk. 190 residential properties and 80 non-residential properties are affected (by **river or surface water** flooding).

Organisations such as Scottish Water, energy companies and Historic Environment Scotland actively maintain and manage their own assets, including the risk of flooding. These actions are not detailed further in the Flood Risk Management Strategy.

Action (ID): NEW FLOOD WARNING (70540010)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: SEPA
Status: Not started. Indicative delivery: post 2021.

Description: The area under consideration includes properties in Dundee affected by flooding from the Dighty Water. A review of the flood risk in this location is required to assess the potential for flood warning delivery and subsequent to that appropriate timescales for delivery can be determined.

Action (ID): FLOOD PROTECTION STUDY (70270005)
Objective (ID): Reduce economic damages to residential and non-residential properties and risk to people in Dundee caused by flooding from the Dighty Water and Fithie Burn (7027, 7028).
Delivery lead: Angus Council

Status: Not started. Indicative delivery: 2016-2021.

Description:

A flood protection study has been recommended for Dundee to reduce the risk of flooding from the Dighty Water and Fithie Burn. The study should assess whether flood defences, sediment management and natural flood management could reduce flood risk. Natural flood management options that should be considered include river / floodplain restoration and sediment management. The study should also investigate the viability of property level protection. The study should take a catchment approach and consider the potential benefits and disbenefits and interaction between actions upstream and downstream. It should be noted that part of the study requirements may be met by the integrated catchment study for Dundee.

Potential Impacts:

Economic

The study could benefit 534 residential properties and 138 non-residential properties at risk of flooding in this location, with potential damages avoided of up to £5.8 million.

Social

Social impacts will depend on the outcome of the study and recommended actions. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community. In addition the study could benefit three utilities and two roads located within the study area. Natural flood management actions can restore and enhance natural environments and create opportunities for recreation and tourism.

Environmental

Flood protection studies should consider the positive and negative impacts of proposed actions on the ecological quality of the environment and designated sites. Where possible, opportunities to enhance and restore the environment should be sought, for example through natural flood management. The physical condition of a
number of rivers within the study area is identified by SEPA to be at less than good status. These include parts of the Dighty Water, Fithie Burn and Dronley Burn (water body IDs 6001, 6004 and 6007). Opportunities to improve the condition of these rivers should be considered by coordinating with river basin management planning. Conservation areas, listed buildings and local nature reserves are also present in the study area and could be positively or negatively impacted.

Action (ID): SURFACE WATER PLAN/STUDY (70210018)
Objective (ID): Reduce economic damages and number of residential properties at
risk of surface water flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical (7021)
Delivery lead: Dundee City Council, Perth and Kinross Council and Angus Council
Status: Not started. Indicative delivery: 2016-2021.

Description:

The area must be covered by a surface water management plan or plans that set objectives for the management of surface water flood risk and identify the most sustainable actions to achieve the objectives.

Action (ID): SURFACE WATER PLAN/STUDY (70210019)
Objective (ID): Reduce economic damages and number of residential properties at risk of surface water flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical (7021)
Delivery lead: Scottish Water in partnership with local authorities.
Status: Not started. Indicative delivery: 2016-2021.

Description: An integrated catchment study will be carried out to support the surface water management plan process and improve knowledge and understanding of surface water flood risk

and interactions with other sources of flooding e.g. with the sewer network, watercourses and the sea.

Action (ID): STRATEGIC MAPPING AND MODELLING (70540016)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: SEPA
Status: Not started. Indicative delivery: 2016-2021.

Description: SEPA will seek to develop flood mapping in the Arbroath to Dundee area to improve understanding of coastal flood risk. The extent and timing of improvements will depend on detailed scoping and data availability.

Action (ID): STRATEGIC MAPPING AND MODELLING (70540019)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Scottish Water
Status: Not started. Indicative delivery: 2016-2021.

Description: Scottish Water will review the assessment of flood risk within the highest risk sewer catchments to improve knowledge and understanding of surface water flood risk.

Action (ID): FLOOD FORECASTING (70540009)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: SEPA
Status: Existing. Indicative delivery: Ongoing.

Description:

The Scottish Flood Forecasting Service is a joint initiative between SEPA and the Met Office that produces daily, national flood guidance statements which are issued to Category 1 and 2 Responders. The service also provides information which allows SEPA to issue flood warnings, giving people a better chance of reducing the impact of
flooding on their home or business. For more information please visit SEPA's website.

Action (ID): COMMUNITY FLOOD ACTION GROUPS (70270012)
Objective (ID): Reduce economic damages to residential and non-residential properties and risk to people in Dundee caused by flooding from the Dighty Water and Fithie Burn (7027, 7028)
Delivery lead: Community
Status: Existing. Indicative delivery: Ongoing.

Description:

Dighty Flood Action Group and Strathmartine Community Council Flood Group operate in this area. The groups aim to increase community resilience to flooding.

Action (ID): SELF HELP (70540011)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Community
Status: Existing. Indicative delivery: Ongoing.

Description:

Everyone is responsible for protecting themselves and their property from flooding. Property and business owners can take simple steps to reduce damage and disruption to their homes and businesses should flooding happen. This includes preparing a flood plan and flood kit, installing property level protection, signing up to Floodline and Resilient Communities initiatives, and ensuring that properties and businesses are insured against flood damage.

Action (ID): AWARENESS RAISING (70540013)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Responsible authorities
Status: Existing. Indicative delivery: Ongoing.

Description:

SEPA and the responsible authorities have a duty to raise public awareness of flood risk. Improved awareness of flood risk and actions that prepare individuals, homes and businesses for flooding can reduce the overall impact. From 2016 SEPA will engage with the community through local participation in national initiatives, including partnership working with Neighbourhood Watch Scotland. In addition, SEPA will engage with local authorities and community resilience groups where possible. Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.

Action (ID): MAINTENANCE (70540007)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Angus Council and Dundee City Council, asset / land managers
Status: Existing. Indicative delivery: Ongoing.

Description:

Local authorities have a duty to assess watercourses and carry out clearance and repair works where such works would substantially reduce flood risk. They produce schedules of clearance and repair works and make these available for public inspection. Scottish Water undertake inspection and repair on the public sewer network. Asset owners and riparian landowners are responsible for the maintenance
and management of their own assets including those which help to reduce flood risk.

Action (ID): EMERGENCY PLANS/RESPONSE (70540014)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Category 1 and 2 Responders
Status: Existing. Indicative delivery: Ongoing.

Description:

Providing an emergency response to flooding is the responsibility of many organisations, including local authorities, the emergency services and SEPA. Effective management of an emergency response relies on emergency plans that are prepared under the Civil Contingencies Act 2004 by Category 1 and 2 Responders. The emergency response by these organisations is co-ordinated through regional and local resilience partnerships. This response may be supported by the work of voluntary organisations. Angus Council operates an emergency response plan in areas of high flood risk. Dundee City Council owns and operates an emergency flood plan for Dundee City.

Action (ID): PLANNING POLICIES (70010001)
Objectives (ID): Avoid an overall increase in flood risk (7001)
Reduce overall flood risk (7054)
Delivery lead: Planning authority
Status: Existing. Indicative delivery: Ongoing.

Description:

Scottish Planning Policy and accompanying Planning Advice Notes set out Scottish Ministers' priorities for the operation of the planning system and for the development and use of land. In terms of flood risk management, the policy supports a catchment-scale approach to sustainable

flood risk management and aims to build the resilience of our cities and towns, encourage sustainable land management in our rural areas, and to address the long-term vulnerability of parts of our coasts and islands. Under this approach, new development in areas with medium to high likelihood of flooding should be avoided.

PVA 07/12. Invergowrie. Main Catchment: Invergowrie Burn.

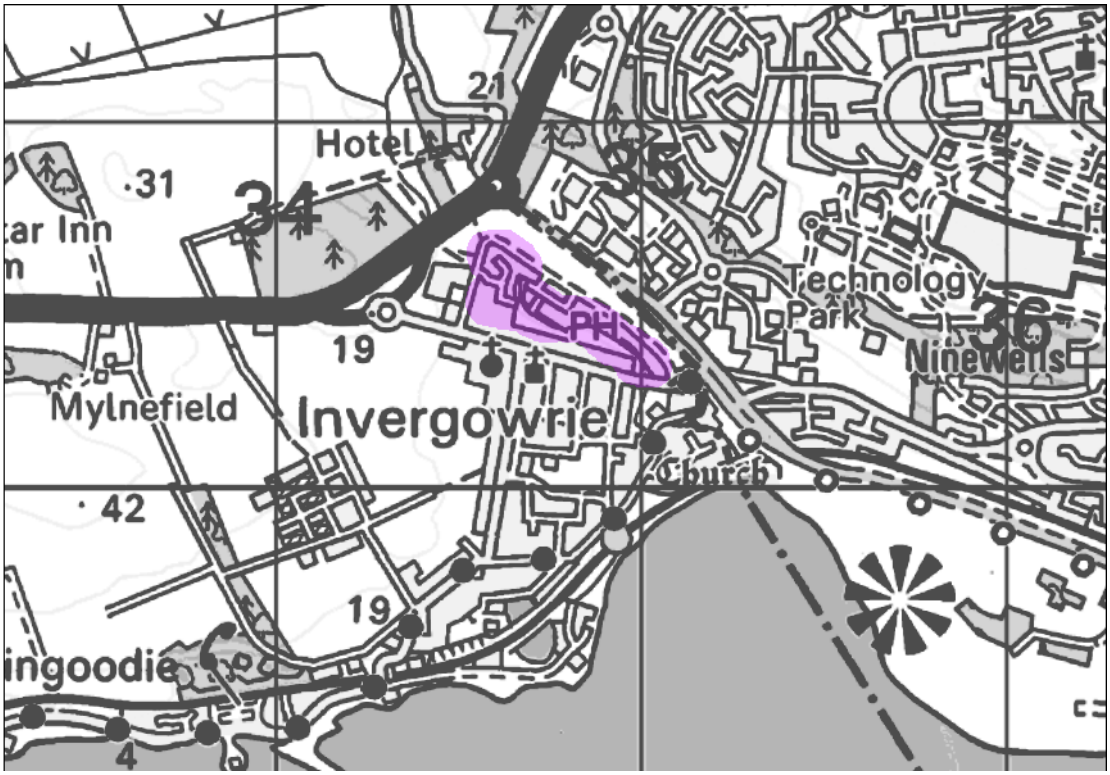
Although Invergowrie Burn is outwith Dundee City Council's administrative boundary the Potentially Vulnerable area has a significant land-take in the west of the City. As the watercourse is fed by Fowlis and Lochee Burns action must be pursued through a multi agency approach.

History of Flooding.

One flood has been recorded in this Potentially Vulnerable Area. The event occurred in August 2004 when flooding from Invergowrie Burn affected properties on Main Street, Burnside Road and Balruddery Farm. It also flooded the highway in Boniface Road and Boniface Place. All Invergowrie.

Aim: Reduce economic damages to residential and non-residential properties in Invergowrie and Dundee caused by flooding from the Invergowrie Burn.

Target area:



Overall objectives to manage flooding:

- Reduce economic damages and number of residential properties at risk of **surface water** flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical. This objective will be monitored using surface water flood risk across the Potentially Vulnerable Area. 220 residential properties at risk and Annual Average Damages of £590,000.
- Avoid an overall increase in flood risk. 240 residential properties are affected (by **river or surface water** flooding).

- Reduce overall flood risk. 240 residential properties are affected (by **river or surface water** flooding)..

Organisations such as Scottish Water, energy companies and Historic Environment Scotland actively maintain and manage their own assets, including the risk of flooding. These actions are not detailed further in the Flood Risk Management Strategy.

Action (ID): NATURAL FLOOD MANAGEMENT STUDY (70310003)
Objective (ID): Reduce economic damages to residential and non-residential properties in Invergowrie and Dundee caused by flooding from the Invergowrie Burn (7031)
Delivery lead: Perth and Kinross Council
Status: Not started. Indicative delivery: post 2021.

Description: A natural flood management study has been recommended for Dundee to assess whether river / floodplain restoration and sediment management could help reduce flood risk. The study should take a catchment approach and consider the potential benefits and disbenefits and interaction between actions upstream and downstream.

Potential Impacts:
Economic
The economic impact of natural flood management actions is difficult to define. However, these actions can reduce flood risk for high likelihood events. Fifty-two residential and non-residential properties could potentially benefit from natural flood management actions in this location.
Social
Social impacts will depend on the outcome of the study and recommended actions. A reduction in flood risk would have a positive benefit to the health and wellbeing of the community. Natural flood management actions can restore and enhance natural environments and create opportunities for recreation and tourism.
Environmental
Natural flood management actions can have a positive impact on the ecological quality of the environment by restoring and enhancing natural habitats. Invergowrie Burn (water body ID 6405) is located within the study area and the physical condition of this river is identified by SEPA to be at less than good status. Opportunities to improve the condition of this river should be considered by coordinating with river basin management planning. Listed buildings are also present in the study area and could be positively or negatively impacted.

Action (ID): SURFACE WATER PLAN/STUDY (70210018)
Objective (ID): Reduce economic damages and number of residential properties at risk of surface water flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical (7021)
Delivery lead: Dundee City Council, Perth and Kinross Council and Angus Council
Status: Not started. Indicative delivery: 2016-2021.

Description:
The area must be covered by a surface water management plan or plans that set objectives for the management of surface water flood risk and identify the most sustainable actions to achieve the objectives.

Action (ID): SURFACE WATER PLAN/STUDY (70210019)
Objective (ID): Reduce economic damages and number of residential properties at risk of surface water flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical (7021)
Delivery lead: Scottish Water in partnership with local authorities.
Status: Not started. Indicative delivery: 2016-2021.

Description:

An integrated catchment study will be carried out to support the surface water management plan process and improve knowledge and understanding of surface water flood risk and interactions with other sources of flooding e.g. with the sewer network, watercourses and the sea.

Action (ID): STRATEGIC MAPPING AND MODELLING (70540019)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Scottish Water
Status: Not started. Indicative delivery: 2016-2021.

Description:

Scottish Water will review the assessment of flood risk within the highest risk sewer catchments to improve knowledge and understanding of surface water flood risk.

Action (ID): FLOOD FORECASTING (70540009)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: SEPA
Status: Existing. Indicative delivery: Ongoing.

Description:

The Scottish Flood Forecasting Service is a joint initiative between SEPA and the Met Office that produces daily, national flood guidance statements which are issued to Category 1 and 2 Responders. The service also provides information which allows SEPA to issue flood warnings, giving people a better chance of reducing the impact of
flooding on their home or business. For more information please visit SEPA's website.

Action (ID): SELF HELP (70540011)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead:
Status: Existing. Indicative delivery: Ongoing.

Description:

Everyone is responsible for protecting themselves and their property from flooding. Property and business owners can take simple steps to reduce damage and disruption to their homes and businesses should flooding happen. This includes preparing a flood plan and flood kit, installing property level protection, signing up to Floodline and Resilient Communities initiatives, and ensuring that properties and businesses are insured against flood damage.

Action (ID): AWARENESS RAISING (70540013)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Responsible authorities
Status: Existing. Indicative delivery: Ongoing.

Description:

SEPA and the responsible authorities have a duty to raise public awareness of flood risk. Improved awareness of flood risk and actions that prepare individuals, homes and businesses for flooding can reduce the overall impact. From 2016 SEPA will engage with the community through local participation in national initiatives, including partnership working with Neighbourhood Watch Scotland. In addition, SEPA will engage with local authorities and community resilience groups where possible. Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.

Action (ID): MAINTENANCE (70540007)

Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Local Authorities, asset / land managers
Status: Existing. Indicative delivery: Ongoing.

Description:

Local authorities have a duty to assess watercourses and carry out clearance and repair works where such works would substantially reduce flood risk. They produce schedules of clearance and repair works and make these available for public inspection. Scottish Water undertake inspection and repair on the public sewer network. Asset owners and riparian landowners are responsible for the maintenance
and management of their own assets including those which help to reduce flood risk.

Action (ID): EMERGENCY PLANS/RESPONSE (70540014)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Category 1 and 2 Responders
Status: Existing. Indicative delivery: Ongoing.

Description:

Providing an emergency response to flooding is the responsibility of many organisations, including local authorities, the emergency services and SEPA. Effective management of an emergency response relies on emergency plans that are prepared under the Civil Contingencies Act 2004 by Category 1 and 2 Responders. The emergency response by these organisations is co-ordinated through regional and local resilience partnerships. This response may be supported by the work of voluntary organisations. Angus Council operates an emergency response plan in areas of high flood risk. Dundee City Council owns and operates an emergency flood plan for Dundee City.

Action (ID): PLANNING POLICIES (70010001)
Objectives (ID): Avoid an overall increase in flood risk (7001)
Reduce overall flood risk (7054)
Delivery lead: Planning authority
Status: Existing. Indicative delivery: Ongoing.

Description:

Scottish Planning Policy and accompanying Planning Advice Notes set out Scottish Ministers' priorities for the operation of the planning system and for the development and use of land. In terms of flood risk management, the policy supports a catchment-scale approach to sustainable flood risk management and aims to build the resilience of our cities and towns, encourage sustainable land management in our rural areas, and to address the long-term vulnerability of parts of our coasts and islands. Under this approach, new development in areas with medium to high likelihood of flooding should be avoided.

PVA 07/13. Dundee and Broughty Ferry. Main Catchment: Dundee Coastal.

History of Flooding.
This area has a long history of coastal flooding and more recently surface water flooding. The following significant floods have been recorded in this Potentially Vulnerable Area:
☐ 7 September 2010: Dundee businesses forced to evacuate staff in Seagate, WestHenderson's Wynd, Hospital Street, and Dock Street due to surface water flooding.
☐ 21 August 2008: Flooding primarily to Dundee City centre and other locations across the city from surface water. The flooding resulted in disruption to traffic flows and basement flooding in areas of the city centre.
☐ 2006: Riverside Drive, Dundee closed due to wave overtopping.

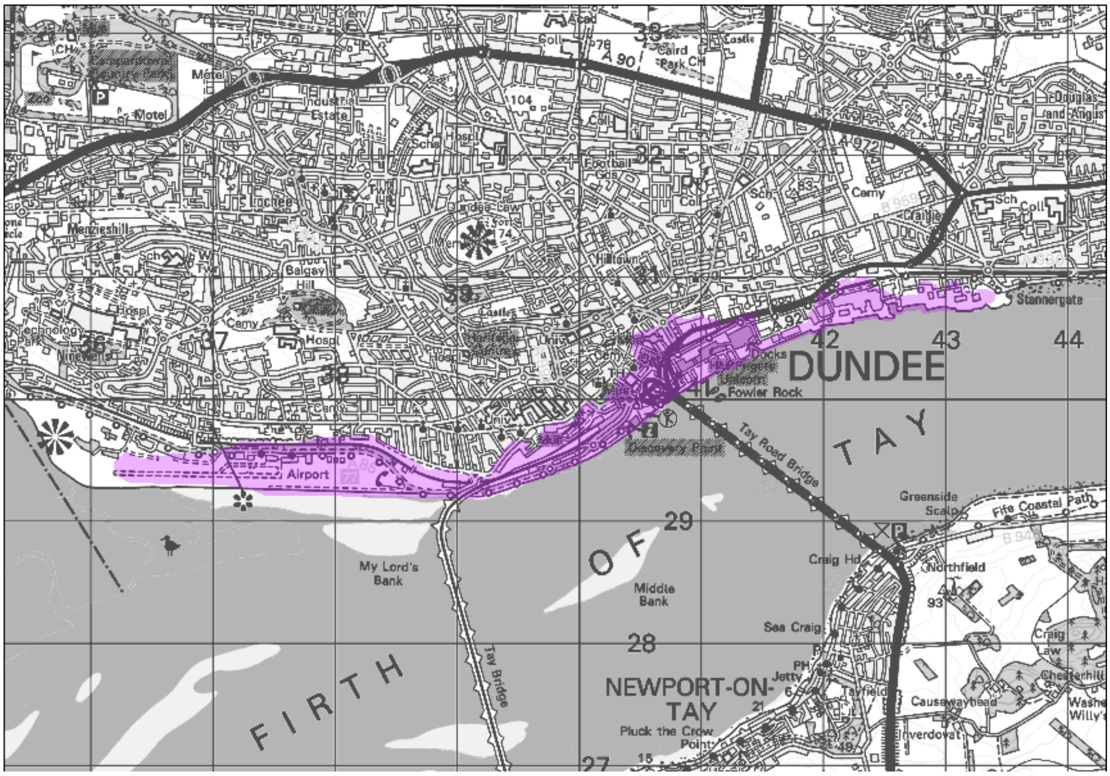
☐ 16 August 2004: Dundee City centre was affected by surface water flooding, resulting in basement flooding and disruption to traffic flows. The event was estimated to be a 1 in 100 year event.
☐ 11 August 2004: Surface water flooding occurred in Dundee City centre and many smaller locations across the city. Additionally, the green urban fringe of the city was affected by surface water runoff causing some roads to become impassable. The rainfall event was estimated to be a 1 in 200 year event.
☐ 5 February 1983: Coastal flooding at Broughty Ferry resulted in Newport Pier being submerged almost to the booking office. Water entered sheds at Eastern Wharf and King William Dock. Fishing boats were moored to lamp posts in Fisher Street.
☐ 17 December 1921: Broughty Ferry's Newport Pier and Fisher Street inundated by highest coastal flood level in the period 1883-1983. Water overflowed the docks at Dundee and flowed into the adjacent streets and sheds.
☐ 12 February 1899: Exceptional high tide in the River Tay estuary caused widespread flooding.
☐ 28 December 1879: Approximately 75 deaths occurred and damage caused to lighthouse and numerous homes when the Tay Bridge collapsed under heavy flooding from high tides.
☐ 8 February 1868: Dundee Harbour flooded.

Aims:

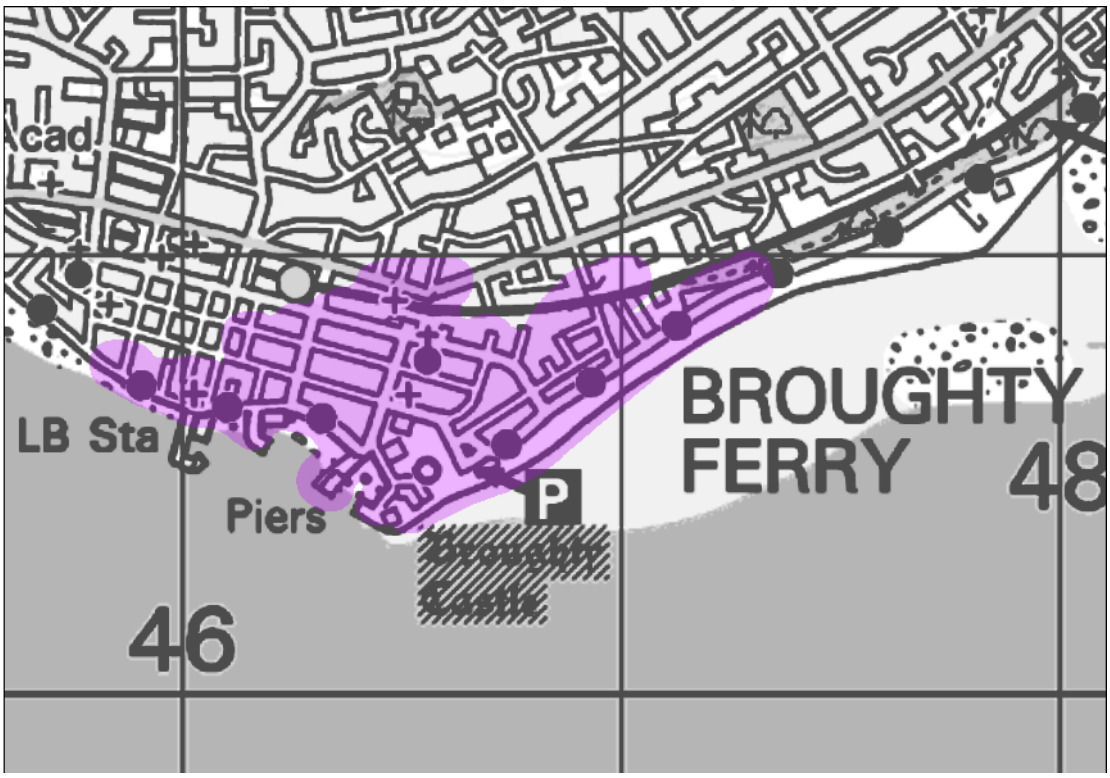
- Reduce economic damages to residential and non-residential properties in Dundee caused by coastal flooding.
- Reduce economic damages to residential and non-residential properties and risk to people in Broughty Ferry caused by coastal flooding.

Target areas:

Dundee



Broughty Ferry



Overall objectives to manage flooding:

- Reduce economic damages and number of residential properties at risk of surface water flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical. This objective will be monitored using surface water flood risk across the Potentially Vulnerable Area. For 07/13 there are 260 residential properties at risk and Annual Average Damages of £800,000.
- Avoid an overall increase in flood risk (from **coastal and surface water** flooding).
- Reduce overall flood risk (from **coastal and surface water** flooding).

Organisations such as Scottish Water, energy companies and Historic Environment Scotland actively maintain and manage their own assets, including the risk of flooding. These actions are not detailed further in the Flood Risk Management Strategies.

Action (ID): FLOOD PROTECTION SCHEME/WORKS (70350006)
Objective (ID): Reduce economic damages to residential and non-residential properties and risk to people in Broughty Ferry caused by coastal flooding (7035, 7036)
Delivery lead: Dundee City Council
Status: Under development Indicative delivery: 2016-2021.

Description: A flood protection scheme has been proposed along the Broughty Ferry coastline. The scheme will include new sea walls and set-back embankments, sand dune replenishment and rock armour. The scheme will provide a 1 in 200 year (plus climate change) standard of protection.

Potential Impacts:
Economic
The proposed scheme may benefit 450 residential properties at risk of flooding in this location, with estimated damages avoided of £97 million. The flood protection scheme has an estimated benefit cost ratio of 9.8.
Social A reduction in flood risk would have a positive benefit to the health and wellbeing of the community and socially vulnerable people located within the flood protection scheme area. There

may be negative impacts through disturbance to the local community during the construction phase.
Environmental Flood protection schemes may have both positive and negative impacts on the ecological quality of the environment depending on how they are designed. To be in accord with the FRM Strategy, the responsible authority (and where applicable, the licensing authority) should seek to ensure that the works will not have an adverse effect on the integrity of the Firth of Tay and Eden Estuary Special Area of Conservation and Special Protection Area. In addition, a number of nationally and locally designated sites are also present in the study area and could be positively or negatively impacted. These include conservation areas, scheduled monuments, listed buildings and designated bathing waters.

Action (ID): FLOOD PROTECTION SCHEME/WORKS (70340006)
Objective (ID): Reduce economic damages to residential and non-residential properties in Dundee caused by coastal flooding (7034)
Delivery lead: Dundee City Council
Status: Under development Indicative delivery: 2016-2021

Description: A flood protection scheme has been proposed for the Dundee coastline. The scheme will include set-back walls and flood defences. The construction work to raise the sea wall at the Central Waterfront is to commence in 2015/16. The scheme will provide a 1 in 200 year (plus climate change) standard of protection.

Potential Impacts:
Economic
The proposed scheme may benefit 200 residential and non-residential properties at risk of flooding. The economic benefits have been estimated west and east of the rail bridge. West of the rail bridge to the airport has estimated damages avoided of £55 million. The scheme has an estimated benefit cost ratio of 2.2. East of the rail bridge to Stannergate has estimated damages avoided of £330 million. The scheme has an estimated benefit cost ratio of 35.8.
Social
A reduction in flood risk may have a positive benefit to the health and wellbeing of the community. In addition there are two emergency services and one railway station which have been identified as potentially benefitting from this action. There may be negative impacts through disturbance to the local community during the construction phase.
Environmental
Flood protection scheme may have both positive and negative impacts on the ecological quality of the environment depending on how they are designed. To be in accord with the FRM Strategy, the responsible authority (and where applicable, the licensing authority) should seek to ensure that the works will not have an adverse effect on the integrity of the Firth of Tay and Eden Estuary Special Area of Conservation and Special Protection Area. In addition, a number of
nationally and locally designated sites are also present in the study area and could be positively or negatively impacted by the action. These include listed buildings, local nature reserves and Sites of Special Scientific Interest.

Action (ID): SURFACE WATER PLAN/STUDY (70210018)
Objective (ID): Reduce economic damages and number of residential properties at risk of surface water flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical (7021)
Delivery lead: Dundee City Council, Perth and Kinross Council and Angus Council
Status: Not started Indicative delivery: 2016-2021

Description: The area must be covered by a surface water management plan or plans that set objectives for the management of surface water flood risk and identify the most sustainable actions to achieve the objectives.

Action (ID): SURFACE WATER PLAN/STUDY (70210019)

Objective (ID): Reduce economic damages and number of residential properties at risk of surface water flooding in Dundee, Broughty Ferry, Invergowrie, Lochee and Monifieth where practical (7021)
Delivery lead: Scottish Water in partnership with local authorities
Status: Ongoing Indicative delivery: 2016-2021

Description: An integrated catchment study will be carried out to support the surface water management plan process and improve knowledge and understanding of surface water flood risk and interactions with other sources of flooding e.g. with the sewer network, watercourses and the sea.

Action (ID): STRATEGIC MAPPING AND MODELLING (70540016)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: SEPA
Status: Not started Indicative delivery: 2016-2021

Description: SEPA will seek to develop flood mapping in the Arbroath to Dundee area to improve understanding of coastal flood risk. The extent and timing of improvements will depend on detailed scoping and data availability. A detailed local authority led study has already been undertaken in this area and SEPA will work collaboratively to ensure consistent modelling approaches are applied.

Action (ID): STRATEGIC MAPPING AND MODELLING (70540019)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Scottish Water
Status: Not started Indicative delivery: 2016-2021

Description: Scottish Water will review the assessment of flood risk within the highest risk sewer catchments to improve knowledge and understanding of surface water flood risk.

Action (ID): MAINTAIN FLOOD PROTECTION SCHEME (70340017)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Dundee City Council
Status: Existing Indicative delivery: Ongoing

Description: Continue to maintain existing flood defences along the coast.

Action (ID): MAINTAIN FLOOD PROTECTION SCHEME (70350017)
Objective (ID): Reduce economic damages to residential and non-residential properties and risk to people in Broughty Ferry caused by coastal flooding (7035, 7036)
Delivery lead: Dundee City Council
Status: Existing Indicative delivery: Ongoing

Description: Continue to maintain existing flood defences along the coast.

Action (ID): MAINTAIN FLOOD WARNING (70540030)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: SEPA
Status: Existing Indicative delivery: Ongoing

Description: Continue to maintain the Broughty Ferry, Dundee Central and Riverside West flood warning areas which are part of the Firth of Forth and Tay coastal flood warning scheme.

Action (ID): FLOOD FORECASTING (70540009)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: SEPA

Status: Existing. Indicative delivery: Ongoing

Description: The Scottish Flood Forecasting Service is a joint initiative between SEPA and the Met Office that produces daily, national flood guidance statements which are issued to Category 1 and 2 Responders. The service also provides information which allows SEPA to issue flood warnings, giving people a better chance of reducing the impact of flooding on their home or business. For more information please visit SEPA's website.

Action (ID): SELF HELP (70540011)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead:
Status: Existing. Indicative delivery: Ongoing

Description: Everyone is responsible for protecting themselves and their property from flooding. Property and business owners can take simple steps to reduce damage and disruption to their homes and businesses should flooding happen. This includes preparing a flood plan and flood kit, installing property level protection, signing up to Floodline and Resilient Communities initiatives, and ensuring that properties and businesses are insured against flood damage.

Action (ID): AWARENESS RAISING (70540013)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Responsible authorities
Status: Existing. Indicative delivery: Ongoing

Description: SEPA and the responsible authorities have a duty to raise public awareness of flood risk. Improved awareness of flood risk and actions that prepare individuals, homes and businesses for flooding can reduce the overall impact. From 2016 SEPA will engage with the community and promote Floodline. This will be achieved through community safety partnership events. Local authorities will be undertaking additional awareness raising activities. Further details will be set out in the Local FRM Plan.

Action (ID): MAINTENANCE (70540007)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Angus Council and Dundee City Council, asset / land managers
Status: Existing. Indicative delivery: Ongoing

Description: Local authorities have a duty to assess watercourses and carry out clearance and repair works where such works would substantially reduce flood risk. They produce schedules of clearance and repair works and make these available for public inspection. Scottish Water undertake inspection and repair on the public sewer network. Asset owners and riparian landowners are responsible for the maintenance and management of their own assets including those which help to reduce flood risk.

Action (ID): EMERGENCY PLANS/RESPONSE (70540014)
Objective (ID): Reduce overall flood risk (7054)
Delivery lead: Category 1 and 2 Responders
Status: Existing. Indicative delivery: Ongoing

Description: Providing an emergency response to flooding is the responsibility of many organisations, including local authorities, the emergency services and SEPA. Effective management of an emergency response relies on emergency plans that are prepared under the Civil Contingencies Act 2004 by Category 1 and 2 Responders. The emergency response by these organisations is co-ordinated through regional and local resilience partnerships. This response may be supported by the work of voluntary organisations. Dundee City Council owns and operates an emergency flood plan for Dundee City.

Action (ID): PLANNING POLICIES (70010001)
Objective (ID): Avoid an overall increase in flood risk (7001). Reduce overall flood risk (7054)
Delivery lead: Planning authority
Status: Existing. Indicative delivery: Ongoing

Description: Scottish Planning Policy and accompanying Planning Advice Notes set out Scottish Ministers' priorities for the operation of the planning system and for the development and use of land. In terms of flood risk management, the policy supports a catchment-scale approach to sustainable flood risk management and aims to build the resilience of our cities and towns, encourage sustainable land management in our rural areas, and to address the long-term vulnerability of parts of our coasts and islands. Under this approach, new development in areas with medium to high likelihood of flooding should be avoided.