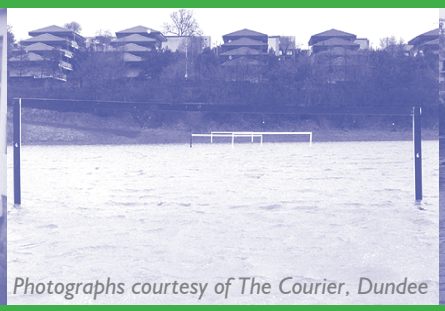
Flood Prevention Report 2009

7th Biennial Report



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Dundee City Council
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CHANGING FOR THE FUTURE

CONTENTS

1 BACKGROUND

1.1 On 26 May 1997 the Flood Prevention and Land Drainage (Scotland) Act 1997 came into force. This placed a duty on local authorities to:

- periodically inspect, assess and ensure maintenance, to a due state of efficiency, those watercourses within their area;
- publish biennial reports which contain information about areas affected by flooding and actions taken to reduce the risk of future flooding.

The Council has a duty only in certain circumstances and in default of proper action by riparian owners, to maintain watercourses where such action would substantially reduce the likelihood of flooding. This typically involves the removal of deliterious material from the watercourse and the cutting back or removal of any bush and scrub growing on the banks.

The duty to maintain the watercourse does not apply however where a failure to maintain the watercourse would result in flooding of land in the same ownership as the watercourse.

1.2 The first report was published in December 1997 and it is a requirement of the act to publish further reports every two years setting out:

- all occurrences of such flooding since that date;
- the measures which have been taken since the date of publication of their previous report; and
- the measures that are required to prevent or mitigate the flooding of non-agricultural land in their area;

1.3 The purpose of publishing these reports is to ensure that local people and other interested parties have ready access to local authority records and information with regard to flooding in their area. This report is the seventh to be published.

1.4 The City Council seeks the participation of the citizens of Dundee in providing information on flooding within the City. This report sets out the current position as far as it is known and proposes appropriate future action.

Anyone who has additional information on known flooding risk areas which have not been identified in this report is invited to bring it to the attention of:

The City Engineer
City Development Department
28 Crichton Street, Dundee City Council
Floor 14, Tayside House
DUNDEE
DD1 3RB

2 IDENTIFICATION OF WATERCOURSES

2.1 A schedule of all watercourses within the Council's boundaries has been prepared and is set out in Appendix 1. The map in Figure 1 shows the location of all known watercourses and is based on information gathered from historical records. Many of the watercourses have been culverted or piped below ground level at some time in the past and have subsequently been either diverted for industrial purposes in earlier times or more recently moved to make way for development works. Accordingly, precise records have been difficult to obtain. Where there is doubt over the exact line of a watercourse, the anticipated line has been shown as a broken line on the plan.

2.2 The main watercourses which affect the city are:

- River Tay;
- Dighty Water and its tributaries, the Gelly, Whitfield, Fithie and Murroes Burns;
- The Logie Spout/Scourin' Burn;
- Lochee Burn;
- Dens Burn;
- Fowlis Burn; and
- Liff Burn

3 REVIEW OF FLOODING EVENTS SINCE DECEMBER 2007

3.1 It must be noted that the events detailed in this report only cover those reported to Dundee City Council. There may be other occurrences of flooding which have not been reported.

Since the previous report in 2007 there have been three events resulting in damage to property and disruption to residents, local businesses and traffic.

The first event occurred on 21 August 2008 and resulted in flooding to the City Centre, and other locations across the city.

The cause of the flooding was sewer flooding in that the volume and intensity of rainfall water exceeded the capacity of the sewers. The rainfall event of the 21 August 2008 primarily affected the City Centre. The flooding resulted in disruption to traffic flows and basement flooding in areas of the City Centre.

The second and third events occurred on 4 September 2009 and 1 November 2009 respectively, primarily on the outskirts of the City Centre and these involved flooding of specific lengths of the Dighty, Fithie Burn, Murrows and Gelly Burn watercourses. Each of these areas have 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.

It should be noted that there were also reports of localised out of sewer flooding during these events.

3.2 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.

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

4 MEASURES TAKEN SINCE DECEMBER 2007

4.1 Assessment of Watercourses

The 1997 Act requires the Council to assess watercourses from time to time to establish whether or not their condition is likely to lead to flooding of non-agricultural land. It is proposed to continue the regular inspections to monitor the condition of the watercourses within the city boundaries. The watercourse inspection regime has recently been formalised with inspections being carried out on a rolling programme and prioritised with the areas of highest risk being targeted as requiring the greatest use of resources. The inspections will be recorded and added to the Dundee City Council Intranet GIS to create a historical record.

In addition to the above, inspections are carried out during periods of heavy rainfall, concentrating on known flood risk locations.

4.2 Watercourse Maintenance Operations

As a result of the above inspections it may be necessary for the City Council to use its powers under the Flood Prevention (Scotland) Act 1961 as amended by the Flood Prevention and Land Drainage (Scotland) Act 1997 to instruct watercourse maintenance operations to be carried out. These powers would only be used where the maintenance operations would substantially reduce the likelihood of flooding occurring and where flooding is likely to affect more than one owner.

Subsequent to the flooding events on 4 September and 1 November 2009, maintenance operations were instructed to the length of the Fithie Burn between the Dundee City Council/Angus Council boundary and the Drumgeith Road bridge. These maintenance operations were completed in November 2009 and involved the removal of debris and repair of the banks of the watercourse which were damaged during the recent flooding events.

4.3 Flood Alleviation Operations

4.3.1 Since the publication of the 2007 report no precautionary action was required in Fisher Street in Broughty Ferry during high astronomical tides as noted in section 3.2 of this report.

4.3.2 Scottish Water have completed the Broughty Ferry Flood Alleviation Scheme which will reduce the risk of sewer flooding in this area.

4.3.3 Road drainage improvements in St Vincent Street, Broughty Ferry are planned for future years.

4.3.4 Dundee City Council with Scottish Water have completed the review of the hydraulic sewer model for the waterfront area of central Dundee. The drainage design for the Central Waterfront Development has been finalised and agreed with Scottish Water. The drainage scheme will incorporate a flood alleviation measure in the form of a surface water pumping station in Trades Lane. A new underground surface water storage tank is also being constructed to reduce the risk of flooding in the Central Waterfront area. Both the pumping station and underground storage tank are currently being constructed but will not be fully operational until future phases of the Central Waterfront project are completed.

4.4 Assessment of Reservoirs

Clatto Reservoir, which is the only reservoir within the Dundee City Council boundary, is managed by the Leisure & Communities Department and the City Development Department.

Under the Reservoirs Act 1975. the reservoir is inspected annually by the Supervising Engineer and ten-yearly by the Inspecting Engineer. The 2009 annual inspection of the reservoir was completed on 2/3 April 2009. The next ten-yearly inspection is due in May 2013.

The newly enacted Flood Risk Management (Scotland) Act 2009 will transfer the reservoir enforcement responsibilities from Local Authorities to SEPA. The anticipated target date for the transfer of responsibility is mid 2011.

4.5 Hydrological Studies

4.5.1 The Dighty Hydrological Model first carried out during 1995 has been reviewed and updated to include later developments and adjustments for climate change to rainfall intensities. The Hydrological Model has also been extended to include the Fithie Burn

4.5.2 A Hydrological Study for the, Fowlis, Liff and Lochee Burns is planned for future years.

4.5.3 The first stage of the Coastal Study for Dundee has been completed and the second stage is being undertaken and programmed for completion for the end of March 2010.

4.5.4 A flood mapping study has been completed for Clatto Reservoir and the Gorrie Burn

4.6 Flood Emergency and Warning Planning

In the event of an emergency involving flooding, the City Council has in place an integrated emergency management strategy, underpinned by a Generic Emergency Plan. Within this plan there will be a flood emergency plan which adopts the principles of preparation, planning, response and recovery. The flood emergency plan was completed in March 2009 and is reviewed annually.

The flood emergency plan has been developed so as to provide a document which is complimentary with the Council's generic plan. In addition, the plans provide specific information relating to both physical and material resources required for emergency preparation, planning and response.

The flood emergency plan provides clarity in respect of the interaction and roles of those involved and further provide information relating to the support and assistance available from the City Council. Areas at risk from flooding shall be identified within the plan in an effort to provide those involved in the emergency procedure with sufficient information to respond in a manner appropriate to the situation.

As part of this preparation and planning phase, the City Council has access to information from various sources to assist in the warning of potential flooding occurrences. Information on severe weather conditions, atmospheric surge conditions in the Tay estuary and predicted tide levels is collated. In addition,

contacts have been made with the Scottish Environment Protection Agency (SEPA) who can provide information on flow levels due to extreme events such as snow melt combined with heavy rainfall with the Tay catchment area.

The information obtained from these various sources is analysed and used to predict the likelihood of flooding in low lying areas adjoining the estuary such as the Broughty Ferry area at Fisher Street where a combination of adverse conditions occasionally results in local flooding events (see section 3.2 of this report). Similarly, for the other watercourses, meteorological information is used to assess the risk of flood events occurring. In addition, SEPA has a telephone Floodline Service for the whole of Scotland. This provides public information on the possible risk of flooding 365 days a year 24 hours a day. Callers will receive details of any flood warnings in force in their area. There is also an option to speak to a duty officer if necessary. The service is based at SEPA's new communications centre in Perth. **The Floodline number is 0845 988 1188** and is also available on SEPA's web site.

SEPA's 2nd Generation Flood Maps are available on their website at www.sepa.org.uk. These flood maps have been developed to give an indication of whether a general area, not individual properties or specific location, may be affected by flooding. Instructions on use and information relating to SEPA's 2nd Generation Flood Maps can be found on their website.

4.7 Development Control - SUD's Group

All development within the City is controlled to ensure that it complies with the Guidance given in Scottish Planning Policy SPP7 and that where appropriate, Sustainable Urban Drainage Systems (SUD's) are incorporated. This is achieved largely through the work of the SUD's Group which meets as required.

This Group comprises representatives from Dundee City Council together with a representative from SEPA. The SUDS group meet with developers and their Agents to review proposed developments and to offer guidance on acceptable measures for dealing with surface water and to ensure that development does not encroach inappropriately into the flood plain.

Developers and their agents are actively encouraged to participate in pre-application discussions with this group to facilitate the development process.

4.8 Tay Catchment Basin Planning Area Advisory Group

Dundee City Council is represented on the Tay Area Advisory Group which reports to the National Advisory Group for the Scotland River Basin District for which the Scottish Environment Protection Agency is the responsible authority.

This report is one information resource that can be called on by the Tay Area Advisory Group to provide information on flooding and flood management which reflects the pressures on the water environment and the economic importance of these pressures on the environmental and economic characterisation of the Scotland River Basin District.

4.9 Flood Liaison & Advisory Group (FLAG)

A formal Flood Liaison & Advisory Group has been established and incorporates representatives from the City Council, the Scottish Environment Protection Agency, Scottish Water, Angus Council, Association of British Insurers and Network Rail. In addition the following organisations have an open invitation to attend and are

circulated with minutes of meetings; Perth and Kinross Council, University of Dundee and University of Abertay.

This Group presently meets as required.

4.10 SCOTS Flood Risk Management Group

Dundee City Council is a member of the Society of Chief Officers of Transportation in Scotland (SCOTS) Flood Risk Management Group which deals with strategic flooding issues. The group are currently considering the future implications of the new Flood Risk Management (Scotland) Act 2009 and are also developing strategies designed to assist the transition from old to new legislation.

5 FURTHER MEASURES TO BE TAKEN

5.1 Maintenance Inspections and Operations

It is proposed to continue the rolling programme of watercourse inspections to monitor the condition of the watercourses within the city boundaries (refer to Section 4.1 of this report). Where necessary, the City Council may use its powers under the Flood Prevention (Scotland) Act 1961 as amended by the Flood Prevention and Land Drainage (Scotland) Act 1997 to instruct watercourse maintenance operations to be carried out.

Further maintenance operations are to be programmed for watercourses which were damaged during the September and November 2009 flooding events.

5.2 Flooding Event Investigations

Investigations are to be undertaken to establish the cause of the September and November 2009 Fithie Burn flooding events. The investigations will take the form of site inspections, hydraulic modelling of the Fithie Burn and a review of the impact of new and recent development along the banks of the watercourses. The outcome of these investigations will determine whether any improvement works can be completed to reduce the risk of flooding and this may lead to the identification of required Capital Works.

5.3 Identification of Capital Works

Where the assessment of watercourses show that there is a requirement for more substantial works than routine maintenance, then consideration will be given to promoting a flood prevention scheme. The Flood Prevention (Scotland) Act 1961 Act, as subsequently supplemented by the Flood Prevention and Land Drainage Act (Scotland) Act 1997, is to be repealed in the medium term (ie approximately within the next 18 months) by the Flood Risk Management (Scotland) Act 2009 once the relevant subordinate regulations have been generated. However, until such time as these Acts are repealed, if a Flood Prevention Scheme is required it will be promoted under the provisions of the 1961 Act, as supplemented.

Currently, it is considered that a Flood Prevention Scheme may be required for parts of the estuarial coast at Broughty Ferry. As part of the second stage of the Dundee Coastal Study (see section 4.5.3 of this report) an option appraisal will be undertaken prior to a decision being taken on promoting a Flood Prevention Scheme to the Scottish Government. Further Flood Prevention Schemes for other sections of the Dundee river/coastal frontage may be considered for future years.

5.4 Continuing Liaison

In order to help reduce the risk of flooding occurring in the future, it is vital that the City Council maintains and builds on its current links with other organisations and bodies. In order to achieve this, the City Council shall seek to develop closer links in this regard with the following organisations:

- Perth and Kinross Council;
- Angus Council;
- Scottish Environment Protection Agency;
- Scottish Water;
- Scottish Natural Heritage;

- Scottish Government, Environment Directorate
- Tay Catchment Basin Planning Area Advisory Group

5.5 Control of Future Development

Existing planning legislation already provides for the possibility of new development and must assess the risk of any such development in areas identified as being prone to flooding. In addition Scottish Planning Policy No 7 "Planning and Flooding" contains further detailed guidance on the inter-relationships between planning and flood risk issues.

Future development within the City shall continue to be controlled through the work of the SUD's Group in line with Scottish Planning Policy No 7 and where appropriate, by reference to national guidance in the form of the SUDS manual and the recently published SUDS for Roads document. To allow new development to proceed, a balance has to be achieved between improving surface water quality through the use of SUDS as recommended by SEPA and the requirement to reduce the risk of flooding. Such SUDS have the combined benefit of improving water quality and attenuating surface water discharges in order to minimise the risk of flooding downstream and upstream of the development.

The Water Environment and Water Services Act 2003 (WEWS Act) transposes the EU Water Framework Directive into Scots Law and requires Scottish Ministers, SEPA and the responsible authorities to work in an integrated fashion and co-operate with each other to promote sustainable flood management. Under the WEWS Act the Water Environment (Controlled Activities) Regulations 2005 (known as CAR Regulations) were passed by the Scottish Government in June 2005 and came into force in April 2006. These regulations control the following activities:

- Activities liable to cause pollution of the water environment;
- Abstraction of water from the water environment;
- The construction, alteration or operating of impounding works in surface waters or wetlands;
- Carrying out building, engineering or other works: in inland water other than groundwater, or wetlands; or in the vicinity of inland water or wetlands, and likely to have a significant adverse effect on the water environment;
- Artificial recharge or augmentation of groundwater.

5.6 E-Documents

To facilitate information retrieval, knowledge transfer and inform maintenance operations the Council is in the process of transferring flood records, coast protection records and asset management data to the councils Graphical Information System (GIS). Some of this information will be accessible by the public in the future over the internet.

The most recent flood report is available for public access on the Council's Website at http://www.dundeecity.gov.uk.

BIBLIOGRAPHY

EU Water Framework Directive

The Flood Prevention and Land Drainage (Scotland) Act 1997

The Flood Prevention (Scotland) Act 1961

Water Environment and Water Services Act 2003

Water Environment (Controlled Activities) Regulations 2005

Scottish Planning Policy No 7 - "Planning and Flooding"
Scottish Executive - Development Department

A Guide to Surface Water Best Management Practices - SEPA 1996

SUDS Manual - CIRIA 2007 C697
Sustainable Urban Drainage Scottish Working Party - 2000 CIRA Report 521
Site Handbook for Construction of SUDS - CIRIA 2007 C698

Sewers For Scotland 2nd Edition – November 2007 – Scottish Water

Planning Advice Note 61
Planning & Sustainable Urban Drainage. July 2001

Planning Advice Note 69
Planning and Building Standards Advice on Flooding

Liaison with Planning Authorities – SEPA.

COSLA Task Group on Flooding Report – March 2003.

Development Control Guidance Note on Flood Risk
SCOTS Flooding Group – December 2003.

DCC Coastal Flooding Study – Atkins 2007

SUDS for Roads
SCOTS and SUDS Working Party - 18 August 2009

Flood Risk Management (Scotland) Act 2009

Watercourses and Culverts Appendix 1

Name	Length (m)	Watercourse Route
Dighty	12192	Bridge at Baldovan to Estuary
Gelly Burn	1219	Old Glamis Road to Claverhouse Road
Gelly Burn	1750	Dalmahoy Drive/Downfield Golf Course/Templeton Wood/Templeton Road
Gelly Burn (Culverted)	3048	Dalmahoy Drive/Macalpine Road/GilburnRoad/Old Glamis Road
Whitfield Burn	2286	Berwick Drive to Fithie Burn
Whitfield (Culverted)	762	Berwick Drive
Fithie Burn	1097	Rear of Pitkerro Mill to Dighty
Gorrie Burn	1096	Pitempton Farm and west from Strathmartine Road parallel to Sidlaw Avenue
Gorrie (Culverted)	365	Bridge at Baldovan/Pitempton Farm and Strathmartine Road/Pitempton Farm
Invergowrie	1676	Rear Swallow Hotel to Estuary
Murroes	1036	Pitkerro House to Dighty
Lochee	1341	Gourdie Industrial to Invergowrie Burn
Lochee (Culverted)	3047	Burnside Street/Gourdie Industrial Estate
Camperdown Park	792	Through park
Camperdown (Culverted)	396	Liff Road/Kingsway
Clive Road	152	Rear of houses at Clive Road at right angles to Gelly Burn
Back Burn	243	Rear to sub-station at Macalpine Road parallel to Birkdale Place
Back Burn (Culverted)	2090	Macalpine Road/Strathmartine Road and Baldragon Academy/Dighty
Mause Burn (Culverted)	396	Commerical Street/Dock Street
Dens Burn (Culverted)	2636	Glenogil Avenue/Arthurstone Terrace and St Roques/East Dock Street
Logie Spout (Culverted)	1036	Victoria Park/Edward Street
Scouring Burn (Culverted)	1179	Edward Street/Ward Road
Ward Road (Culverted)	481	Length of Ward Road
Perth Road (Culverted)	198	Perth Road/Foreshore
Perth Road (Culverted)	182	Foreshore at 590 Perth Road
Foster Road (Culverted)	243	Foster Road/Gelly Burn
Kingsway (Culverted)	610	Tesco/Clive Road
Craigiebank (Culverted)	631	Arbroath Road/Craigie Avenue to Strips of Craigie
Claypotts (Culverted)	1829	Ferndale Drive/Church Street
Barnhill (Culverted)	1432	Strathmore Street/Monifieth Road
Tay		Invergowrie/Barnhill
Fowlis	1900	Rear Swallow Hotel to Benvie
Liff Burn	1840	Liff to Fowlis

Flood Risk Locations Including Out Of Sewer Flooding Appendix 2

No.	Name	Flooding Location	Flood Risk Potential	Flood Risk Category
1	Dighty	Land between Harestane Road and Home Farm	Property damage and flooding of agricultural land	2
2		Dighty/Old Glamis Road junction	Flooding of local road	2
3		Land north of Trottick	Flooding of agricultural land	3
4		Land between Mill Ponds and Barns of Claverhouse Road	Recreational and property damage	1
5		Playing fields west of St Saviours school	Flooding of recreational ground only	1
6		Industrial land west of Forties Road	Property damage	2
7		Land between Pearce Avenue and Tom Johnstone Road	Flood plain	2
8		Land northwest of Lilac Cottage on A92 Arbroath Road	Flooding of agricultural land	3
9		Land west of Milton Park Monifieth	Property damage	2
10	Gelly Burn (Culverted)	Dalmahoy Drive/Turnberry Avenue junction	Property damage	2
11		South of Primary school Turnberry Avenue	Property damage	2
12		Turnberry Avenue and Turnberry Avenue/Macalpine Road junction	Road flooding and property damage	2 (3)
13		Camperdown Road west of Strathmartine Road junction	Property damage	2
14		Gillburn Road south of Gillburn Primary School	Road flooding	3
15	Whitfield Burn	Northwest of Berwick Drive/Ballumbie Road junction	Flooding of recreational ground	2
16	Fithie Burn	From Sunadale Court South to Drumgeith Road bridge	Property damage	1
17	Gorrie Burn	Gorrie Burn/Strathmartine Road junction	Property damage	1

Flood Risk Locations Including Out Of Sewer Flooding Appendix 2

No.	Name	Flooding Location	Flood Risk Potential	Flood Risk Category
18	Gorrie (Culverted)	Farm land between Strathmartine Road and Pitempton Road	Flooding of agricultural land	3
19	Invergowrie	Southwest of Swallow Hotel	Flooding of agricultural land	3
20		Pedestrian bridge and track	Pedestrian access problems	2
21	Murroes	East end of Barlow Avenue	Flooding of agricultural land and property damage	2 (3)
22	Lochee (Culverted)	Bridge at Denhead of Gray	Flooding of agricultural land	3
23	Mause Burn (Culverted) & River Tay	Town Centre Shops	Flooding of roads and property basement flooding possibly linked to storm water overflows	1 1
24	Logie Spout (Culverted)	Industrial Development	Property damage	2
25	Perth Road (Culverted)	Riverside Avenue west of Wright Avenue	Localised flooding of road	3
26	Tay	Fisher Street, Broughty Ferry	Damage to property and flooding or road due to tidal effects	1
27		St Vincent Street, Broughty Ferry underpass below railway line	Flooding of road from sewer	1
28	Back Burn (Culverted)	St Leonards Road/Cox Street	Flooding on road	2
29		Gray Street/Long Lane/ Broughty Ferry	Property damage	2
30	Fowlis/Lochee	Liff Road/Rear of Swallow Hotel	Flooding on road	2
31	Tay	Riverside Drive at Tesco	Road closure	1
32		Trades Lane, Candle Lane, Gellatly Street, South Commercial Street, Dock Street & Seagate	Flooding of roads and property damage from sewer flooding	1

Flood Risk Locations Including Out Of Sewer Flooding Appendix 2

33		New Mill Of Gray	Property damage	2
34		Greendykes Road	Property basement flooding from sewer	2
35		Richmond Terrace	Property basement flooding from sewer	2
36		Dens Road/North Isla Street junction	Flooding of road from sewer	2(0)

*( ) - Figure in brackets refers to flood risk category from previous report.

Flood Risk Category:-

1 - Serious damage to property, risk of personal injury, major disruption to services and transportation links.
2 - Nominal damage to property, disruption of services and transportation links.
3 - Minor inconvenience or little disruption to members of the public.

Figure 1 - Existing Water Courses

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Tayside House,
28 Crichton Street, Dundee, DD1 3RB

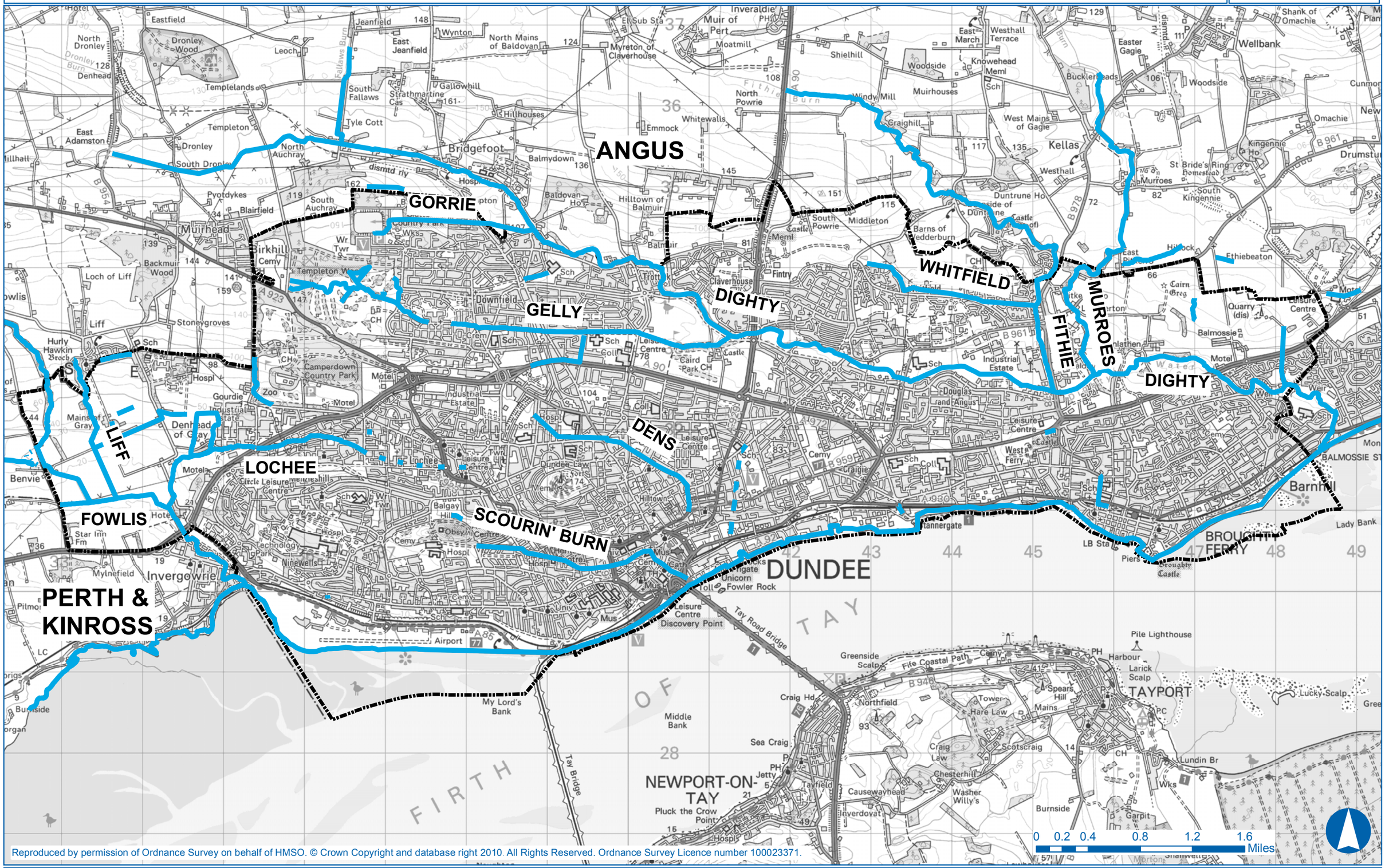

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Figure 2 - Known Flood Risk Areas

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Tayside House,
28 Crichton Street, Dundee, DD1 3RB

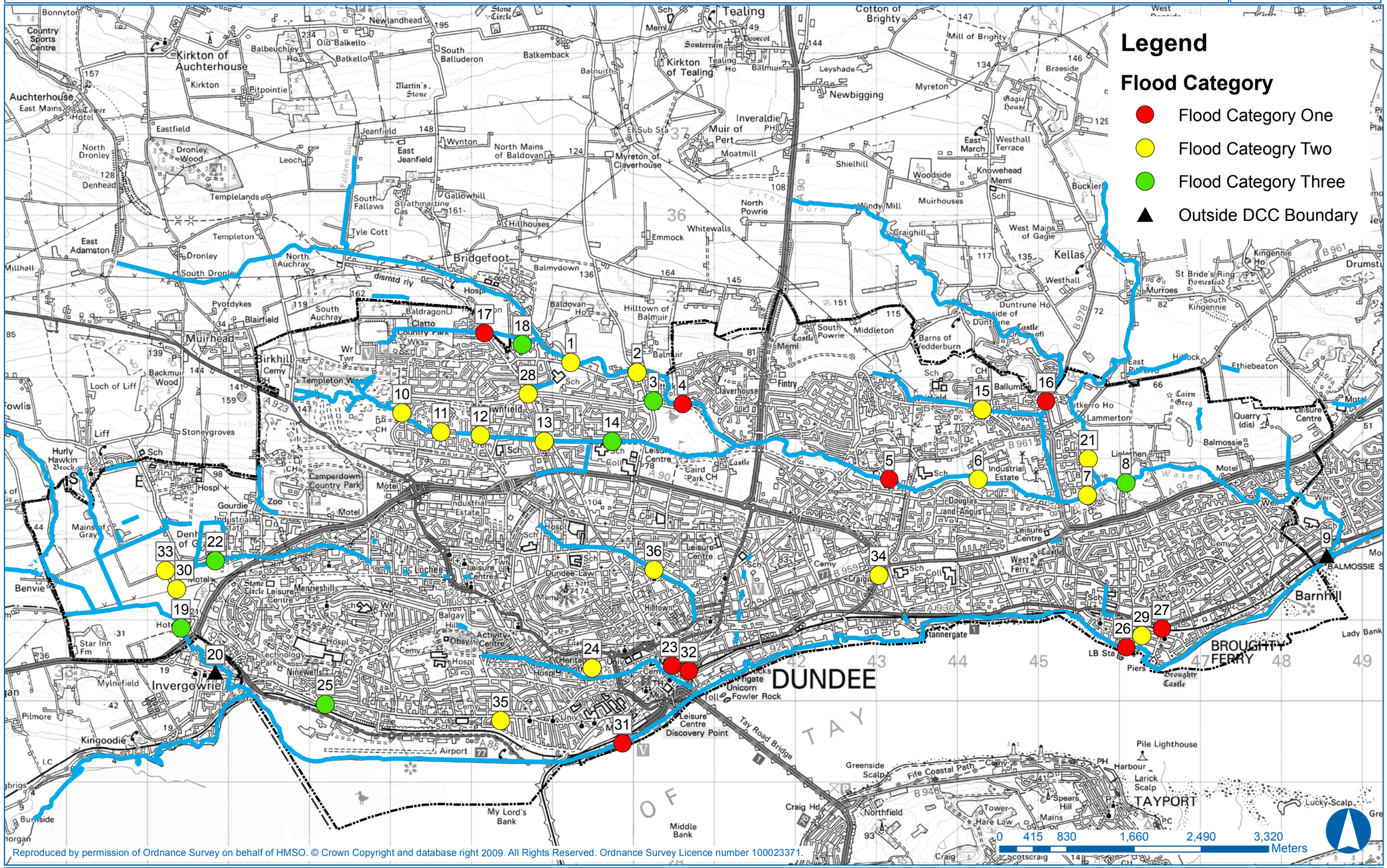

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Figure 3 - Hydrological Study Areas

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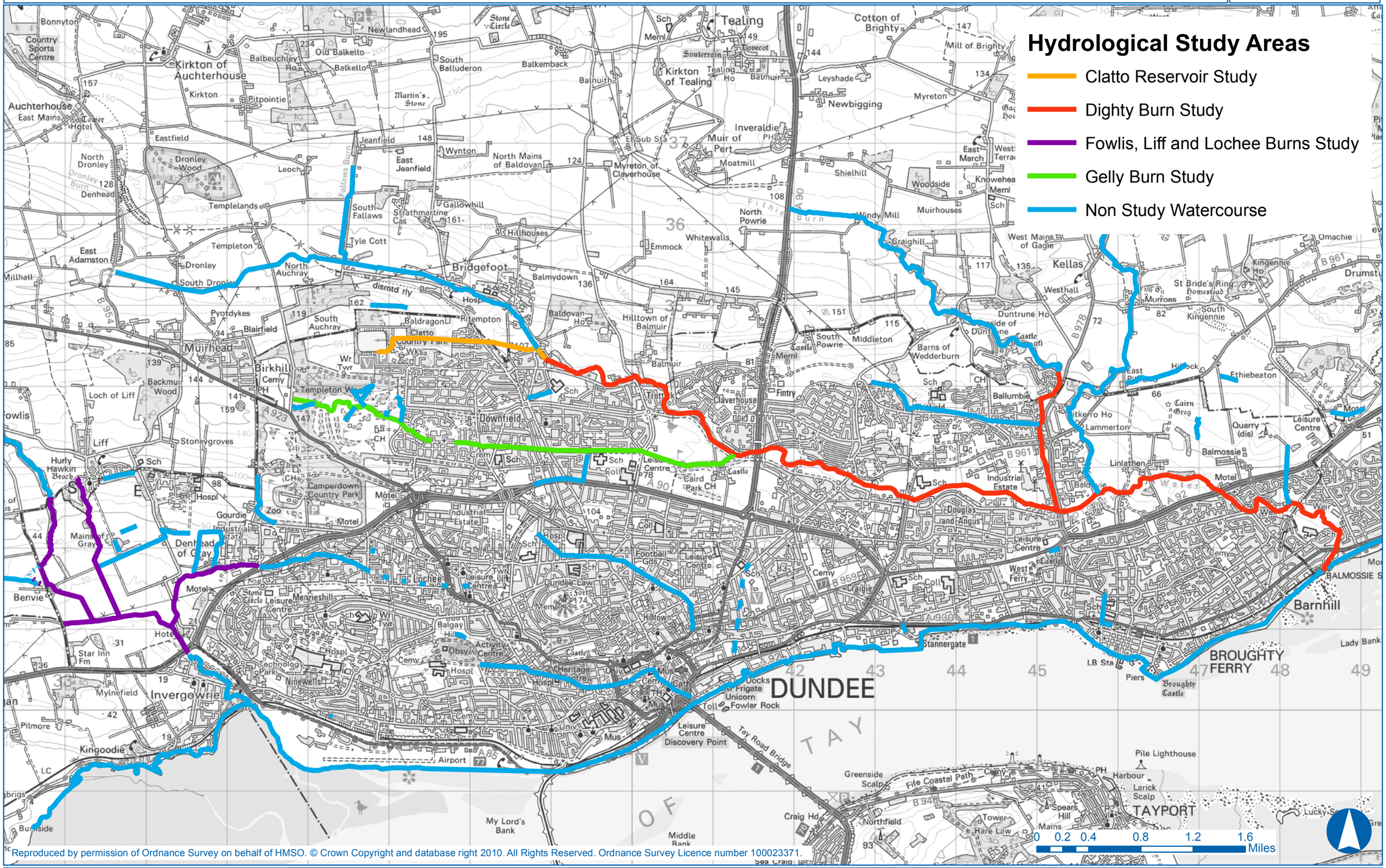

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