



FLOOD PREVENTION REPORT (7th BIENNIAL REPORT)

THE FLOOD PREVENTION AND LAND DRAINAGE (SCOTLAND) ACT 1997



NOVEMBER 2009

7th BIENNIAL FLOOD PREVENTION REPORT

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1 INTRODUCTION

- 1.1 On 26 May 1997 the Flood Prevention and Land Drainage (Scotland) Act 1997 came into force. This places a duty on local authorities to prepare and publish reports in relation to the discharge of their duties and in the exercise of other flood prevention powers.

The Council published the first report in November 1997. In accordance with the requirement of the Act for the Council to publish further reports every two years. This is the sixth biennial report and sets out:

- the measures (if any) which the Council consider that they require to take to prevent or mitigate the flooding of non-agricultural land in Angus.
 - the measures which have been taken (if any) since the date of publication of the previous report (November 2007).
 - all occurrences of such flooding since November 2007.
- 1.2 The purpose of publishing such reports is to allow local people and other interested parties ready access to local authority records and information with regard to flooding in their area.
- 1.3 The Council would be interested to hear or receive any information which organisations or individuals may have in respect of actual or potential flooding risk locations within the Angus Council area. The Council would also gratefully acknowledge information which has been provided from members of the public since the last biennial report on flood events and potential flood events.

1.4 **Contact Officer**

The Council's officer who should be contacted initially either to give or receive further information is:-

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- 1.5 The content of this publication, or sections of it, can be made available in alternative formats or translated into other community languages. Please contact the Council's ACCESSLine on 08452 777 778 for further information or email accessline@angus.gov.uk

2 IDENTIFICATION OF WATERCOURSES

2.1 River Catchments and General Hydrology within Angus

The river catchments within Angus were described in previous Biennial Flood Prevention Reports. For completeness this is reproduced below.

The rivers named are the main watercourses within the catchments. There are numerous tributary watercourses in addition within each catchment (see Appendix 1).

The North Esk Catchment: includes the River North Esk, the West Water, Cruik Water and the Luther Water.

The River North Esk forms the administrative boundary between Angus and Aberdeenshire for approximately 20 kilometres from the sea.

The South Esk Catchment: includes the River South Esk which rises in the Lower Grampian Mountains and which flows down Glen Clova with main tributaries the Noran Water and the Prosen Water.

The Lunan Water Catchment: which is substantially the Lunan Water from Rescobie Loch to its outfall at Lunan Bay.

The Dean Water Catchment: this relatively narrow catchment flows out of Forfar Loch in a westerly direction joining the River Isla west of Meikle.

The River Isla (Upper Catchment only) rising in an adjacent catchment to the Prosen Water and only flowing in the western part of the Angus Council Area prior to crossing into Perth and Kinross Council area.

Coastal Zone Catchments: comprise a substantial number of short catchments including the Brothock Water, Elliot Water, Barry Burn, numerous burns and the Dighty Water in the west (partially in City of Dundee Council Area).

2.2 Schedule of Watercourses Potentially Affecting Non-agricultural Land

The first flood prevention Report under the Act in November 1997 included Schedule 1 - Watercourses within urban areas in Angus, and was updated in the November 1999 Report. These are watercourses within or in close proximity to the Burghs which are known to have had flooding incidents on previous occasions or could potentially affect properties within the Burghs should any extreme conditions occur.

The Schedule is included as Appendix 2 of this Report. The Schedule forms the basis for the current inspection and assessment regime.

3 REVIEW OF FLOODING EVENTS SINCE NOVEMBER 2007

Flooding within Angus can be categorised into the following:

- Fluvial Flooding - from watercourses overtopping/breaching to flood surrounding land
- Rainfall Run Off - run off from open land as a consequence of heavy rainfall/snow melt
- Road Drainage Problems - flooding as a result of inadequate capacity or blockages in the road drainage
- Sewer Flooding - flooding as a result of inadequate or blockages in sewer drainage
- Tidal Flooding – flooding as a result of high tides conflicting with watercourse discharge
- Coastal Flooding – where land is inundated by the sea due to high water level and/or storm spray.

Since the report of November 2007, there have been a number of flooding events in Angus but nothing to the extent of that suffered in the period October to December 2002 reported in Angus Council's 4th Biennial Flood Prevention Report or indeed the flooding experienced though the spring and summer 2007 in England. The events since November 2007 are detailed below, in the categories given above.

It must be noted, however, that the events detailed in this report only cover those reported to the Council. There may be other occurrences of flooding which are not reported. It must also be noted that the Council is specifically excluded from dealing with flooding of agricultural land.

The subsequent actions undertaken by the council as a result of events is detailed in Section 4 of this report.

Of particular note in September 2009 the Angus area was subject to wide spread flood incidents due to prolonged heavy rainfall over a two day period which saw some 50-65mm of rain to fall over 36 hours. This affected watercourses and road drainage identifying problems some of which were not known or other areas which have not flooded for generations.

3.1 Fluvial Flooding

3.1.1 Barry Burn (flood defence scheme) in Carnoustie

Due to severe rainfall in August 2008 flooding occurred in Ravensby Road, Thomas Street, MacDonald Smith Drive and James Street, Carnoustie. A report is available.

In September 2009 there was again exceptional rainfall which caused the Barry to rise considerably. This prevented water from draining away on Ravensby Road, Carnoustie and Thomas Street. Although gardens were affected no properties were flooded.

3.1.2 **Rescobie Loch, Forfar**

The loch overflowed its banks and onto the B9113, where it meets the U458 in the winter of 08/09. The loch water level is close to the road level.

3.1.3 **U362 Douglstown, Glamis**

Water from the Kerbet Water flooded two properties on each side of U362 in January 2008. Suggestions were made that the owner & farmer discuss with SEPA improvement work to the mill lade.

3.1.4 **Ballumbie, Kellas**

The balancing ponds at Ballumbie burst their banks and flooded neighbouring garages in July 2008. Similar issues happened in heavy rain in September 2009, with only gardens affected. On the other side of the golf course at West lodge a garden was affected due to the volume of water from fields (no pond here). Sandbags were used.

3.1.5 **River South Esk at Brechin**

There has been no repetition of the flooding in River Street in Brechin in November 2002. The Scottish Environment Protection Agency (SEPA) issue Flood Alerts, which are placed into three categories; Flood Watch, Flood Warning and Severe Flood Warning. This information can be accessed via the floodline information on the web or via telephone. Cascade Groups are issued information via SEPA and Tayside Police. Further information regarding SEPA is noted at 4.11 An update on the progress of the permanent flood defence works is given later in this report.

3.1.6 **Brothock Water, Arbroath**

September 2009 the water levels triggered the flood warning system and resources were deployed to various locations throughout Arbroath particularly with the influence of high tide. The defences performed adequately.

An update on the progress of a potential enhancement to the existing the permanent flood defence works is given later in this report.

3.1.7 **Dighty Water, Monifieth**

Milton Place, Monifieth suffered some severe flooding in September 2009 when the Dighty Water burst its banks and flooded the ground floor of a number of properties in this street.

3.1.8 **Vinney Water, Letham**

The Den in Letham was flooded due to the Vinney Water bursting its banks in September 2009. The Vinney Water has a restricted floodplain so the Letham Den was one of the few openings available.

3.1.9 Caterhaugh Mains of Kinnettles

Garden ground affected in flooding from burns over flowing in September 2009.

3.1.10 U320 Huntingfaulds Road to C6 Tealing

Burn burst banks early September 2009 flooding gardens and garages and requiring a culvert to be replaced. Some flooding between September 2008 and March 2009.

3.1.11 U322 Myreton of Claverhouse

Burn burst banks with house grounds flooding in early September 2009.

3.1.12 Dighty Water, Bridgefoot

Burn burst banks flooding road and properties in Rosemill Road. 2 houses flooded in Grants Wynd from fields also in Bridgefoot also at this time in early September 2009.

3.1.13 Balruddery and Dron Burn

Flooding from fields burn burst banks and nearly flooded property at Balruddery Meadows in September 2009.

3.1.14 Forfar Loch

Craig O'Loch Road flooded for several days at beginning of September 2009 due to Forfar Loch being high due to prolonged heavy rain.

3.1.15 Kirkton Road - Millfield Place Arbroath

Flooding of Millenium Forest area to near properties early September 2009.

3.2 Rainfall Run Off

Over the last two years since the last Biennial report in Angus there have been occasional flash floods following heavy rainfall. There have been incidents of flooding and damage to property due to the heavy rainfall running off land into private property, or along the road network and then into private property. The problem has been compounded in many areas by the type of crop/stage of growth at the time of the flooding with potato fields having particular high run off.

It is noted that the Council has no responsibility for flooding from such events where there is no presence of a watercourse.

3.2.1 **A92 Arbikie, Inverkeilor**

Field run off onto A92 partly due to the late removal of potatoes and establishment of a new crop, also the problem of sub soil drainage in October and November 2008. Temporary ditches were dug to increase the drainage capacity. The farmer has undertaken some improvement work including the installation of a drain and this work is now being monitored.

3.2.2 **A92 Ferryden Roundabout, Montrose**

After the flooding of the Bridgend Garage in the July 2008, new drains and a grill have been installed.

3.2.3 **A92 Upper Dysart, Lunan**

Properties being flooded from field at the rear in July 2008.

3.2.4 **A923 Piperdam**

With significant rainfall in September 2009 water was running down from the fields on the southern side of the road and flooding the A923 around the junction with the C12. Offlets had to be cut into the northern verge in order to clear the water.

3.2.5 **A933 and C49 Colliston**

Exceptional rainfall at the start of September 2009, caused water from the surrounding fields to flood the A933 and threaten numerous properties in the village itself with one known to be flooded. Some "over the top" drainage measures for flood events have been installed.

3.2.5 **A928 Newton of Glamis**

Heavy rain on three separate occasions December 2008, January and February 2009 caused the water to flood the road. A drainage ditch was dug in order to channel the water away to a ditch.

3.2.6 **B965 Inverkeilor**

Water on the road in September & October 2008, caused by run off from a potato field. The farmer was asked to divert water.

3.2.7 **B966 Westside Farm, Edzell**

Field run off due to unusually high rainfall in the winter of 2007/08, drains were cleaned. Ground was saturated.

3.2.8 **B978 Kellas**

Rain water from the fields ran off onto the road surface in August 2008.

3.2.9 **B9128 at junction with B978**

Flooding on the road in June 2009, caused by water coming from a nearby field and the drains not being able to cope with that volume of water, gullies have since been cleared and problem has been rectified.

3.2.10 **B9128, Craichie**

Road impassable September 2009, caused by water coming from a nearby field and flooding the road, see the cover photo. Water would normally find its way into the Vinney Water, but this was very high and the surrounding fields were also flooded.

3.2.11 **C35 Balrennie Farm, Edzell**

Water coming from the field and flooding onto the road February 2009. A drainage ditch has been dug to divert the water and a new drain has been constructed.

3.2.12 **C45 Newbarns, Inverkeilor**

The carriageway was flooded by field run off, due to blocked field drains in February 2009. New drains have since been constructed.

3.2.13 **C47 Auchmithie**

Due to the torrential downfalls in September 2009 a significant amount of water came from the surrounding fields onto the public road bringing with it large quantities of mud and gravel. The farmer has been asked to look into the prevention of further material exiting is land.

3.2.14 **U301 Burnside of Kirkbuddo, Monikie**

Partial landslide, onto the road surface in July 2008. This was cleared.

3.2.15 **U329 Liff**

Field run off onto the road and into two properties, new drains have been installed in January 2009. In September 2009 a nearby old drain could not cope in heavy rain. Sandbags were deployed to protect property.

3.2.16 **U329(1) Liff**

Field run off onto the road surface, a new drain has been constructed in January 2009.

3.2.17 **U360 (3) Carterhaugh, Mains of Kinnettles**

Mud from a potato field flowed onto the road and into a private driveway, this has happened before and new kerbing was constructed along with a drainage channel, which if kept clear would remove threat

to the private driveway. It was not kept clear and a large build up of mud occurred in June 2009 with a similar problem occurring.

3.2.18 U428 Dunlappie, Edzell

Excess water caused by rain run off the Golf Course and onto the road November 2008. A rubble drain has been added and cleaned. The area is very low lying and is being monitored.

3.2.19 U445, Kinnaird

Substantial rain runoff from the fields caused the road to become impassable in September 2009 in heavy rain. The area is very flat, which does not allow the water to escape.

3.2.20 C6 Leyshade including Cotton of Brigty

Flooding of 3 gardens coming from fields including grain drier in September 2009. Kerbs altered.

3.2.21 Lucky Slap

Water from field ran into house during a downpour in early September 2009.

3.2.22 West Hall Cottages Farm Kellas

Flooding from fields in heavy rain early September 2009.

3.2.23 Dundee Street, Letham

Flooding from fields in heavy rain early September 2009.

3.2.24 Croston Farm, Letham

Flooding from fields in heavy rain early September 2009

3.2.25 Various Flooding from fields

September 2008 to March 2009 B9113 Redroofs, A932 Kookaburras, C42 Farnell Village, C46 Woodville Cotton of Brighty. And from farm tracks – C6 Kirkton of Tealing, C30 Balnamoon, C34 Larkhall/Margie.

3.2.26 Various Flooding from fields

Kellas and old Kellas Smiddy. March 08 to September 08.

3.2.27 Tannadice

House flooded from potato field summer 2009.

3.3 Road Drainage Flooding

Drainage and road drainage has been inundated as a result of the heavy cloudburst type of events suffered throughout the period. Field/land drains overloaded and overflowed into road drainage systems. In other areas the road drainage itself has been unable to take the excessive amounts of water feeding into the systems. This has been compounded in some areas by blockages of drains or gullies, sometimes as a result of silt/debris from land run off.

Silted soakaways caused flooding of the B965 Douglasmuir in August 2008. New drains have since been constructed and the soakaways have been cleaned out.

In the summer of 2008 a culvert was blocked in East Haven on the C61 and a stone culvert collapsed on the C4 in Murroes Road, which caused flooding on the B961. These have been replaced.

At Sleepyhillock Cemetery on the A935 flooding on several occasions. Work was undertaken to clear the existing connection drain.

In July 2009 there was a downpour which led to manholes and surfacing lifting in Cookston Road and Whitchden/River Street Brechin lifting. Repairs were carried out.

In Kirriemuir in summer time 2009 within a few days two storms were experienced where the road systems could not cope with downpour in the time period leading to localised flooding in Northmuir and Kirk Wynd.

The A92 at Mains of Ardestie eastbound had to be shut for several hours, while the underpass was closed for a couple of days at the beginning of September 2009.

Between March 2008 and September 2008 flash floods C49, C489, B965 – Colliston, Letham Grange, Chapelton Cross, A92 Meadowbank, Arbroath, Carnoustie High Street, Nolt Loan area of Arbroath and U475(1) Guttermill

Between September 2008 and March 2009 culvert collapses A933 Montreatmont and U402 Glenmoy.

U494/A933 Woodville Smiddy experienced flooding due to gully problems.

Flooding in early September 2009 occurred in Cairnie Lodge, Arbroath, as a result of water from the A933 possibly due to water from adjacent land due to heavy rain. Culvert blockage being investigated.

Throughout the periods of heavy rainfall the drainage problems created made driving conditions hazardous. When necessary roads were closed for the duration of the flooding.

3.4 Sewer Flooding

Flooding may occur as a result of under capacity or blockage of the foul water/sewerage systems. These systems are the responsibility of Scottish

Water and are not detailed in the report as in most circumstances the local authority is not informed of such problems.

An overflowing sewer in Brechin Road, Kirriemuir in February 2009 was flooding the carriageway with sewage. As this was the responsibility of Scottish Water it was duly reported to them.

3.5 Tidal/Coastal Flooding

In March 2009 unusually high tides were experienced, which caused extensive damage to the coastline in Montrose, Arbroath and Monifieth. Damage was caused to surfacing at Dangerpoint, Arbroath.

4 MEASURES TAKEN SINCE NOVEMBER 2007

4.1 Assessment of Watercourses

The 1997 Act requires Angus Council to assess from time to time and ascertain whether or not any watercourse is in a condition likely to cause flooding of non-agricultural land. Where it appears, whether or not as a result of any assessment, that the Council in exercising its powers to maintain the efficiency of the watercourse would substantially reduce the likelihood of flooding the Council is required to exercise that power accordingly.

The assessment does not require to be a detailed engineering study and the survey form used is included at Appendix 5.

The survey programme has continued, concentrating on those areas with the potential for flooding to impact on non-agricultural land, properties, roads and associated infrastructure. A regime whereby approximately 50% of watercourses are inspected annually continues to be adopted.

There are a number of specific flooding cases, which have been or are being investigated in their own right. These include the River South Esk, which is the subject of study in connection with the Brechin Flood Prevention Scheme; Tayock Burn, Montrose; and Logie Mill on the River North Esk. Also, as a consequence of reports on the condition of all existing flood schemes in Scotland, prepared on behalf of the Scottish Executive, the situation regarding Brothock Water, Arbroath; the Barry Burn, Carnoustie; and Gairie Burn, Kirriemuir have been assessed. With respect to the Barry Burn, Carnoustie, this is also the subject of study with respect to the existing Carnoustie (Barry Burn) Flood Prevention Scheme following a flooding incident in mid-August 2008. These are outlined in Section 4.4.

It is noted that some of the flooding in the Angus area was as the result of field run off and some due to road drainage problems. Whilst this form of flooding does not require assessment of a watercourse it has necessitated investigation and consultation with affected parties and landowners.

Concerns of the level of the Dean Water near Forfar and rising water levels in Forfar Loch led to the commissioning of consultants to undertake a

morphological survey to determine if third party property not in the ownership of riparian owners was at risk. Dredging of around 300 to 350m of the Dean is currently being arranged under a licence from SEPA associated with the requirements of the Controlled Activities Regulations.

4.2 Maintenance Operations

Routine Maintenance operations are as outlined in the Schedule forming Appendix 4 of the Report. Works are undertaken as necessary to maintain the watercourses.

This can include:

- Clearance of watercourses (may need a simple or complex licence from SEPA or to be carried out within General Binding Rules (GBR) under the Controlled Activities Regulations).
- Clearance of roadside ditches, culverts and gullies assuming compliance with licences or GBRs or on ditches not shown on 1:50:000 scale plans.
- Installation of new or replacement drainage systems to reduce road drainage problems and where appropriate reduce land run off problems.

4.3 Assessment of Reservoirs

4.3.1 Engineering Review Of Monikie Reservoirs Downstream Flood Risk Assessment

The Monikie Reservoirs are managed by the Countryside Services Section of Leisure Services. During the flooding which occurred on 4 September 2009 an operational plan was enacted to reduce flood risk to the downstream watercourses which the reservoirs discharge to, namely Monikie Burn and Barry Burn (Pitairlie Burn) with SEPA's agreement. This plan involved storing water in the reservoirs and included:

- Filling Denfind, Island and North Pond to their maximum operating levels;
- Controlled release from these reservoirs when conditions allowed;
- Close monitoring of the reservoirs and receiving watercourse water levels, weather conditions and weather forecasts;
- Liaison with Angus Council Roads Maintenance and Flood Prevention officers regarding when to allow a controlled release.

It has been assessed that no further studies are required at the Monikie and Crombie reservoirs, following the completion of remedial works in 2007. The inspecting engineer is due to carry out an inspection of these reservoirs in 2010.

The newly enacted Flood Risk Management (Scotland) Act 2009 will transfer the reservoir enforcement responsibilities for both publicly and privately owned reservoirs from local authorities to SEPA. The target date for the transfer of responsibility is mid 2011.

4.3.2 Private Reservoirs

No further studies have been required at the 14 registered private reservoirs in the Angus area with regard to flooding issues.

4.4 Flood Prevention Schemes

Section 4 of the Flood Prevention (Scotland) Act 1961 allows Local Authorities to promote flood prevention schemes and effect improvement works subject to confirmation by the appropriate Scottish Minister. The 1961 Act, as subsequently supplemented by the Flood Prevention and Land Drainage (Scotland) Act 1997, will be repealed in the medium term (i.e. within the next 12 months or so) by the Flood Risk Management (Scotland) Act 2009 once the relevant sub-ordinate regulations have been generated. However, until such time as these acts are repealed, a flood prevention scheme may still be promoted under the provisions of the 1961 Act, as supplemented, through the granting of a Flood Prevention Order.

At present there is no ring-fenced Scottish Government grant for developing fluvial flood prevention schemes as there had been previously. All such grant monies (other than for established scheme proposals) have been rolled up in local authorities' block capital grant. It is not clear how this will be addressed into the future; hence this raises a very major question mark over the affordability of flood prevention projects to the council, consistent with available capital resources.

Five such potential schemes, or proposals for upgrading existing schemes, are under consideration.

4.4.1 Tayock Burn, Montrose

The potential problem appears to be one of tidal inundation rather than fluvial flooding. A form of flow control mechanism may be needed to replace the former gate found under the bridge on the A935. The problem continues to be monitored, and designs will be progressed once a practicable solution has been determined.

4.4.2 River South Esk, Brechin

Flooding at River Street, Brechin had been the subject of a number of previous reports; in particular those of June 1989 and May 2000 by Babbie Group, Hydrological Report by H R Wallingford in 2004; Options Appraisal Report by Angus Council in November 2004; and Stormwater Drainage Analysis by H R Wallingford in November 2008; with a view to promoting a flood prevention scheme.

The report of November 2004 recommended a mixture of earth-bunds and walls to provide protection against the 1 in 100 year return period flood event plus an allowance for climate change.

The structures would run from the Inch area adjacent to River Street to beyond the existing caravan site downstream of Brechin Old Bridge.

The design of the works is progressing on the basis of the estimated 1 in 200 year flood levels predicted in the H R Wallingford report, as these levels are considered to give the necessary allowance for climate change.

The flooding in November 2002 also highlighted concern regarding the sewer system in the area. Storm overflows normally outfall to the river but could not be discharged against the head of the increased water level while the river was in spate. This back-up contributed to the flood. Methods to deal with this issue require extensive modelling and the redesign of drainage systems behind the potential floodwalls/levees of the proposed scheme to prevent flooding of property once the scheme is implemented. The situation regarding funding of the implementation of these redesigned drainage systems remains uncertain but discussions are continuing with Scottish Water to bring forward a scheme to ensure the sewers do not surcharge during flood conditions in the river.

A full Environmental Impact Assessment and Sustainability Assessment are underway and it is envisaged that a Flood Prevention Scheme will be promoted by means of a Flood Prevention Order during Summer 2010 and subject to agreement of the relevant committee of the council. A planning application may follow thereafter subject to the required funding for the whole scheme being available.

4.4.3 Barry Burn, Carnoustie

In response to JBA's assessment, on behalf of the Scottish Executive (see Section 4.1 above) that the Carnoustie (Barry Burn) 1979 Flood Prevention Scheme offered a slightly lower standard of defence than that estimated at the time of design (i.e. 1 in 100 year return period) Angus Council subsequently undertook works to raise the flood embankments (levees) to provide a minimum standard of protection, equivalent at the time of study, to a 200 year return period.

Following the flooding incident in mid August 2008, a number of short and long-term measures were recommended to improve the existing scheme, these have been set out in Report No 181/09 considered by Infrastructure Services Committee at its meeting of 3 March 2009. Initially, Angus Council has undertaken to carry out the short-term measures as being urgently required.

The short term measures which have been implemented to date include:

- (i) informing the residents affected by the flooding incident in Carnoustie, by means of a letter, what investigations and measures the Council intends to undertake to alleviate the potential for future flooding;
- (ii) fitting a non-return valve in the Waterybutts Ditch Culvert Outfall Manhole to the Barry Burn to prevent a backflow occurring;
- (iii) reviewing the emergency maintenance access routes and arrangements to ensure that all parts of the levee are accessible in an emergency; and

- (iv) investigating taking down the levee protecting the potato field from flooding on the south side of Waterybutts Ditch.

Work has also been progressed on other measures identified within the report including periodic grass cutting. Following development of a scheme, granting of the required licensing and the procurement process a contract will shortly be awarded for the removal of silt from certain reaches of the burn thereby improving the performance of the channel of the burn in conveying flood waters.

4.4.4 Brothock Water, Arbroath

The condition assessment of the Brothock Water Flood Prevention Scheme undertaken by JBA for the Scottish Executive, indicated that the standard of protection had declined to that which might be expected in a lesser return period event than the 1 in 25-year return period for which it was designed. Subsequently the defects identified have been rectified and the level of protection is currently assessed at between 1 in 20-25 year return period. A feasibility study has been undertaken into upstream attenuation to increase the level of protection afforded to the urban area of Arbroath up to a 1 in 100 year event plus allowances for climate change. One proposed solution is for twin storage areas in the natural flood plane. The scheme is intended for development over the next few years subject to the availability of funding.

4.4.5 Gairie Burn, Kirriemuir

The condition assessment of the Gairie Burn Flood Prevention Scheme undertaken by JBA for the Scottish Executive, highlighted areas of concern where the defences were no longer capable of fulfilling their original function. At today's standards the standard of protection was equivalent to a 10 year return period flood. Most works to bring the Flood Prevention Scheme to its original level of intent (i.e. 50 year return period) were carried out in 2008. Additional works to complete the upgrading of the existing scheme are due to be completed within the 2009/2010 financial year.

4.4.6 Other Issues

Logie Mill

An initial feasibility study has been undertaken, which concluded that a flood barrier could be installed around the affected properties. There has however been no further progress with this scheme as it does not currently have a benefit : cost ratio greater than unity (i.e. the cost of the scheme would outweigh the benefit afforded by it).

The North Esk forms the boundary between the Angus Council area and neighbouring Aberdeenshire Council. A flood warning system is being introduced by SEPA.

4.5 Flood Liaison and Advisory Group (FLAG)

The Flood Liaison and Advisory Group continue to meet on a 6 monthly basis.

The group is convened on an informal and advisory basis to provide a forum for the exchange of information and data, and to enable discussion on such issues as:

- catchment drainage management
- flood prevention schemes and other mitigation measures
- watercourse repair and maintenance
- development plan land allocations
- significant development proposals

The current representation on the group continues to be from two sources, namely from within the Council, and from out with the Council as detailed in the table below.

Representation	
Internal	External
Roads Division (Chair) Planning & Transport Division (incl planning and development control functions) Law & Administration Division Chief Executive's Department (incl. Emergency Planning)	Scottish Environment Protection Agency Authority of British Insurers Scottish Water

Scottish Natural Heritage and adjacent council representatives attend as and when appropriate.

There is also contact and exchange of information with the North East Scotland Flood Liaison and Advisory Group covering Aberdeen City and Aberdeenshire Council areas together with the Dundee City Council Flood Appraisal Group.

There continues to be local and national contact between Council Officers involved in flooding issues, particularly between those in neighbouring Councils, for example between officers in Angus Council and their counterparts in Perth and Kinross Council

4.6 North East Coastal Coordination Group

This informal group comprises Aberdeenshire Council, Angus Council, Scottish Natural Heritage, Dundee City Council, Fife Council, Network Rail and Tay Estuary Forum. Since the last report, meetings of this group have been convened every 6 months to discuss matters of joint interest concerning coastal protection issues. Angus Council continues research into potential low impact techniques to control erosion at Montrose Beach in collaboration with the University of Dundee.

4.7 Flood Strategy

As a result of the flooding in Angus in autumn 2002 the Council undertook a review of its existing policies and strategies for flooding.

The policy for flood prevention schemes was updated at that time and a new policy drawn up for a flood prevention and response strategy. Copies of the Policy and Strategy are included in Appendix 3.

4.8 Flood Forum

No further forums have been held in the period since the last report.

4.9 Emergency Response and Protection Measures

The Civil Contingencies Act 2004, and the Contingency Planning (Scotland) Regulations 2005 has implications for the way in which the local authority operates. The regulations formalise the planning process in preparing for and responding to emergencies and came into effect in November 2005.

The council has in place a civil contingencies team, located within the Chief Executive's Dept which includes a civil contingencies manager and civil contingencies officer. The council emergency plan outlines the council's response in preparing for, responding to and recovering from emergencies and or major incidents, in addition there is a section of the plan dealing specifically with flooding. This outlines the council's responsibilities with regard to the management of minor and serious flooding incidents, Scottish Environment Protection Agency's Flood Warning Schemes and all necessary contact arrangements and public information procedures and resources.

The civil contingencies team have responded to 3 flooding incidents within the last 2 years and have assumed the role of co-ordination for council services. These incidents are noted as the Barry Burn area within Carnoustie (2) and the Brothock Burn in Arbroath.

Exercises for emergencies (not limited to flooding) are carried out in conjunction with other partners on a multi-agency basis and who form part of the Tayside Strategic Co-ordinating Group (Tayside SCG). A Tayside flood response plan; an overarching document for all partner agencies, is in place within the Tayside SCG. This details the command and control elements, escalation and generic partner issues in the event of widespread flooding across the Tayside area.

A flood resources capability exercise (Exercise "Stranded") was held by Tayside SCG, lead by the Fire & Rescue Service in September 2009, to test the various agencies with water capability resources, at Monikie Country Park. Lessons identified from this exercise will be incorporated into the Tayside SGC Flood Plan as part of the annual review.

For Brechin the measures considered are for the interim period prior to completion of the formal Flood Prevention Scheme detailed in Section 4.4.

The Roads Division examined the flood protection products that have become available commercially. This included demountable barriers, temporary barriers and protection to individual properties.

The council has purchased a quantity of BSI “kitemarked” door guard products to assist in preventing water ingress through residential doors. A quantity of air vent covers has also been purchased. The quantity of products purchased is sufficient to provide assistance to those residential properties which were flooded in River Street, Brechin in November 2002 and a limited number are available for other properties. An emergency exercise has taken place to ensure effectiveness in deployment of these defences.

In addition the council has previously written to every property (residential and commercial) considered to be at risk of a 1 in 200 year flood in the River Street/East Mill area of Brechin advising of the risk of flooding and giving advice on how to plan for and protect against flooding. This included the option of residents purchasing the door guard products through a council promotion.

4.10 SEPA Floodline

The Scottish Environmental Protection Agency introduced a Flood Warning Procedure and FLOODLINE on 1 November 2001. FLOODLINE gives a telephone contact for enquiries on flooding and pollution. The telephone call centre is based in Bristol providing information for the whole of the UK. The centre telephone number is 0845 985 1188.

The scheme currently covers the Brothock Water, River South Esk and shortly to be the River North Esk in Angus.

4.11 Planning Matters

The risk of flooding to proposed developments or existing property as a result of proposed developments is a planning consideration. On several occasions proposed developments have been refused or conditioned due to the possible risk of flooding.

The Angus Local Plan Review was adopted by Angus Council in February 2009 and takes fully into account considerations to flood risk as required under SPP7 - Planning & Flooding (February 2004) and PAN 69 - Planning and Building Standards Advice on Flooding (August 2004). The Local Plan Review policies on Flood Risk are now a material consideration in dealing with development proposals.

In establishing the Local Plan Review policy and dealing with pre-application enquiries and planning applications the council has utilised the existing SEPA flood maps for the area. Where development is proposed, an assessment of the potential for flooding will be required, taking into account the location of the site and the flow characteristics of the local watercourse. Where appropriate, developers will be required to provide a detailed flood risk assessment in support of a planning application.

Angus Council consult SEPA on all development proposals in areas known to be subject to flooding. To minimise the risk of localised flooding, surface water run off from all new development will be managed using Sustainable Urban Drainage Systems (SUDS) with an appropriate condition(s) attached to planning permissions.

5 FURTHER MEASURES TO BE TAKEN

5.1 Flood Prevention Schemes

5.1.1 River South Esk River Street Brechin

It is proposed to promote a formal Flood Prevention Scheme for Brechin under the current legislative regime subject to the agreement of the appropriate committee of the council.

Currently proposals for the works to contain the peak flows in the River South Esk are likely to include the construction of reinforced concrete walls, faced with masonry and blockwork, possibly with demountable sections and a raised viewing area, on the central section at River Street with earth bunds being favoured for the Inch to the west and, including a length of floodwall, for the area east of Old Brechin Bridge.

5.1.2 Barry Burn, Carnoustie

The Council is proposing to carry out the remaining short term measures mentioned in the report to committee (see Section 4.4.3 above) by the end of this financial year (i.e. 2009/2010). The implementation of the recommended Longer Term Measures, a number of which are dependent on the outcome of the short-term investigation measures, will be considered at a later date.

5.1.3 Tayock Burn

The potential problem here appears to be one of tidal inundation rather than fluvial flooding. A form of flow control mechanism may be needed to replace the former gate found under the bridge on the A935. The problem continues to be monitored, and designs will be progressed once a practicable solution has been determined.

If this simple control is not effective then further assessment may be required with a view to progressing a flood prevention scheme.

5.1.4 Brothock Burn, Arbroath

The Council is considering a recommendation to promote further flood prevention measures for the Brothock Water, incorporating upstream attenuation in the existing flood plain to the north of Arbroath which will reduce the peak flows to a level within the capacity of the existing flood prevention scheme downstream.

5.1.5 Gairie Burn, Kirriemuir

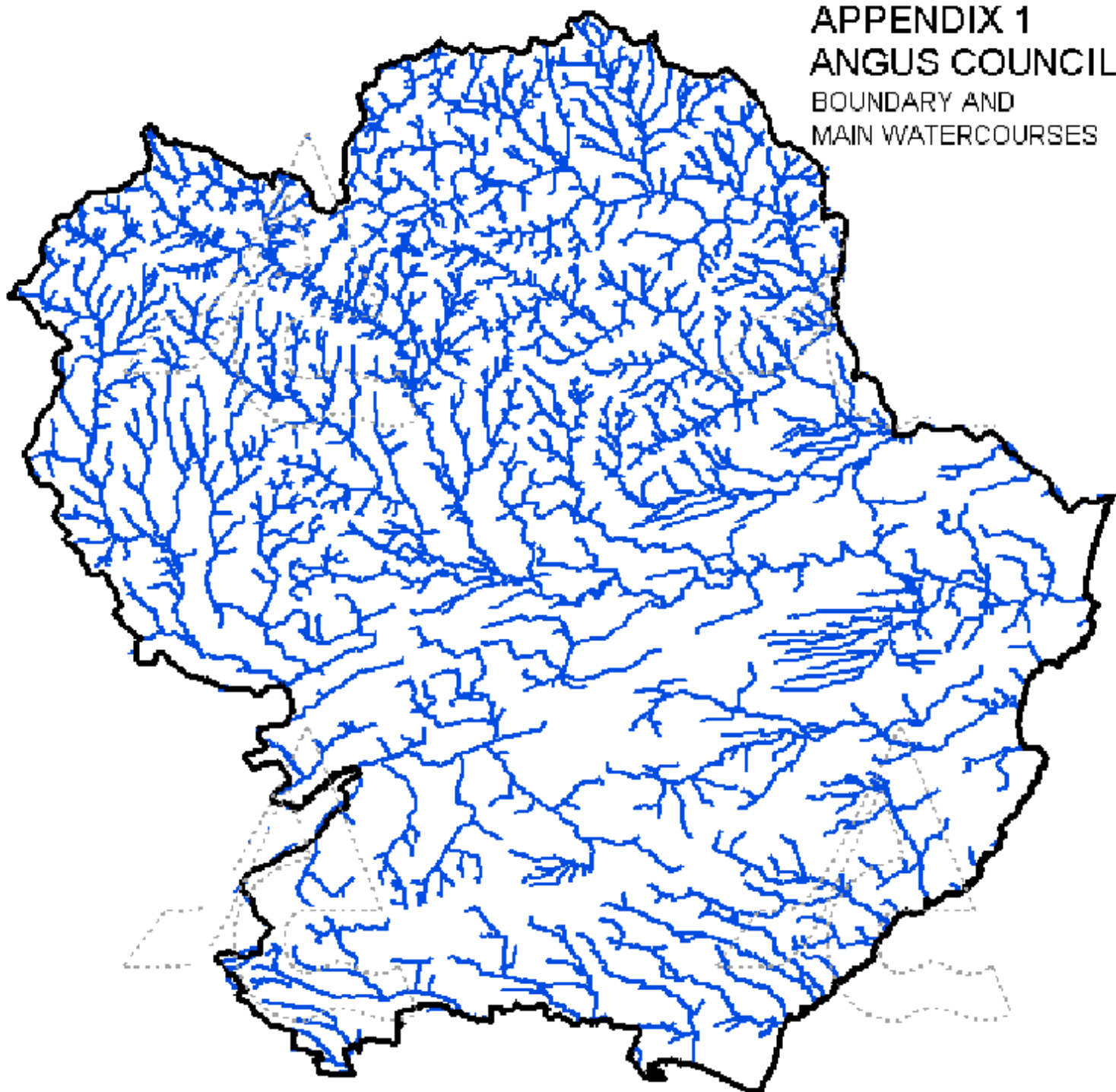
In May 2008 works were undertaken in order to bring the Flood Prevention Scheme to its original level of protection (i.e. 50 year return period). The project commenced on site on 17 November 2008 and most operations which included the construction of flood walls and an earth bund have been successfully completed. Approval has been granted for this scheme to be completed within the 2009/2010 financial year. The remaining works required involve the placement of two

demountable floodgates across the two Bridges that provide access to the J & D Wilkie factory.

5.1.6 **Logie Mill, River North Esk**

The scheme does not have a favourable cost-benefit ratio and is not being promoted

APPENDIX 1
ANGUS COUNCIL
BOUNDARY AND
MAIN WATERCOURSES



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APPENDIX 2

SCHEDULE OF WATERCOURSES

Water course	Location	Known History of Flooding	Comments
ARBROATH URBAN Brothock Burn Elliot Water Geordies Burn Hercules Den Burn	Dens Road to Harbour Below A92 A92 to the Sea St Vigeans area/Inverbrothock P.S.	Yes 1976 and 1977 Locally upstream of the A92 Yes flooding to the rear of Inverbrothock Primary School as attenuation control	To west of Westway then culverted under A92
BRECHIN URBAN Den Burn Skinners Burn/South Esk River South Esk	North Latch Rd with mixture of culverts and open sections to River South Esk Area of the Inch River Street	Yes Yes flooding of River Street Brechin	Extensive flooding November 2002
CARNOUSTIE URBAN Barry Burn Lochty Burn Culvert in Burnside St Waterybutts Ditch	A930 to Golf Course North of A930 to Sea Enters Barry Burn from fields to west	Yes Yes A930 affecting Tesco Supermarket Yes at same time as Barry Burn	Grill fitted under licence from SEPA 2009
FORFAR URBAN Lour Road Culvert Treacle Burn Culvert Halfpenny Burn	Area of Lour Rd downstream to swimming pool flooding in the Vennel East Greens Car Park via Queenswell Rd to Forfar Loch A94 Glamis Road	Road flooded	New screen fitted and minor shaping
KIRRIEMUIR URBAN Gairie Burn	Bellies Brae to Marywell Brae	Yes flooding to mill area and to east	Remedial work 2008/09

SCHEDULE OF WATERCOURSES

Water course	Location	Known History of Flooding	Comments
MONIFIETH URBAN Dighty Water Monifieth Burn	North of A930 at Interbuild East End of Moire Drive and at sea outfall		
MONTROSE URBAN Stormwater Drain Broomfield Rd Tayock Burn	Area to North of A935	Yes suffers frequent tidal inundation	Flood prevention scheme being considered
RURAL WATERCOURSES Dun Burn Pow Burn Gallery Burn Lunan Water (Part)	Montrose Area		
Glamis Burn Kerbit Burn Kirkinch Burn	Forfar Area	Yes	
Gairie Burn White Burn Quharity Burn Kilry Burn	Kirriemuir		
Vinney Burn	Letham/Friockheim		
Lemno Burn Noran Water Cruick Water West Water Barries Burn	Brechin Area		
Whishop Burn	Edzell		

SCHEDULE OF WATERCOURSES

Water course	Location	Known History of Flooding	Comments
Monikie Burn Panlathy Burn Buddon Burn Pitairlie Burn	Carnoustie/Newbigging Area		
Dighty Burn Binn Burn Dron Burn Monifieth Burn Dronley Burn Fallows Burn Fowlis Burn Liff Burn Fithie Burn Sweet Burn Flocklones Burn	Monifieth/Duntrune/ Angus West Area	Flooding Flooding Flooding	
River North Esk	U330/1 Flocklones Road to Perth and Kinross boundary	Flooding	
River North Esk	Lower Logie	No known history prior to 2002.	1830's agricultural flood bank understood to have been built following flooding around that time. No recent flooding history prior to 2002 known to the Council. Failure of this embankment led to flooding of agricultural land and consequential flooding of residential properties
River North Esk	Craigo	No known history prior to 2002.	

FLOOD PREVENTION AND RESPONSE POLICY AND STRATEGY

Policy on the Provision of Flood Prevention Schemes

Angus Council's policy with regard to the provision of Flood Prevention Schemes shall be:-

- The primary responsibility for safeguarding land or property against flooding rests with the individual landowner. The Council will therefore encourage self-help.
- The Council will not promote a Flood Prevention Scheme for the protection of one individual property or more than one property on contiguous land in one ownership, other than in exceptional circumstances.
- Any Flood Prevention Scheme carried out by the Council shall be in the general public interest and shall be of such a nature and magnitude that the works would be unlikely to be done by individuals or other interested parties unless the Council itself became involved.
- A Flood Prevention Scheme shall not be promoted where the estimated cost of the works exceeds the estimated value of the asset(s) being protected (taking into account the appropriate project appraisal guidance issued by the Scottish Executive) other than in exceptional circumstances.
- Where the Council proposes to promote a Flood Prevention Scheme efforts shall be made to obtain appropriate contributions towards the cost of the scheme from all parties who might benefit from the scheme, whether they be private individuals, commercial organisations, statutory authorities or other public bodies.
- The Council will carry out maintenance, repair and management operations of Flood Prevention Schemes promoted by it, inherited from predecessor local authorities and otherwise in terms of Section 4B of the Flood Prevention (Scotland) Act 1961 as amended.

FLOOD PREVENTION AND RESPONSE POLICY AND STRATEGY

Flood Prevention and Response Strategy

Flood Prevention

The Council through the Roads Division and within the current regime of financial constraint will endeavour to prevent flood events by:-

- Carrying out cyclic maintenance and where possible increasing the frequency of gully cleaning with respect to public roads – subject to finance being available.
- Clearing watercourses where this is likely to significantly mitigate future flooding having due regard to environmental factors.
- Recording information on flooding and on the basis of this information prioritising drainage improvement schemes and flood prevention works as appropriate.
- Carrying out drainage improvements within the limits of the available finance, with the process informed by the recorded information/prioritisation system to maximise the benefits from the available funds.
- Continuing to undertake inspections and assessment of watercourses in accordance with the Flood Prevention and Land Drainage (Scotland) Act 1997.

Flood Response

1 The Council, through the Roads Division, will allocate available resources to deal with flooding events on a prioritised basis, in the following order of priority:-

- (1) Where there is a threat to life or limb from flooding.
- (2) Where there is a risk to road users as a result of water standing on or flowing over public roads.
- (3) Where there is a threat to property with priority given to the larger number of properties and to residential property where the residents are especially vulnerable (disabled; elderly; young children).

Threat of flooding to land only will not be prioritised. Flooding of agricultural land will not be attended to.

2 Where there is a history of recurring flooding incidents and the Council does not have statutory duties, powers or resources (including finance) to mitigate the effects of flooding then the landowners will be so advised and also advised that they should provide their own measures for protection.

Examples would include:-

- Where there is no watercourse or road involved.
- Where there is a watercourse but maintenance would not mitigate the risk of flooding and where a Flood Prevention Scheme is not viable (physically or financially).

In such circumstances if the landowner repeatedly fails to mitigate the risk of flooding or the damage caused, then the Head of Roads may authorise withdrawal of the Council's assistance for dealing with such occurrences and the landowner will be so advised.

- 3 Where the Roads Division are asked to attend an incident which later proves to be improperly reported e.g. property at risk, vulnerable residents at risk etc, then the Head of Roads will consider invoicing for the costs incurred or writing to the parties involved.

MAINTENANCE REGIME FOR WATERCOURSES IN ANGUS

WATERCOURSE	MAINTENANCE OPERATION	FREQUENCY	COMMENTS
ARBROATH			
Brothock Burn (various locations)	Clear 'man made' debris etc	Monthly	Existing flood prevention scheme completed in 1987 had maintenance works carried out on it in accordance with recommendations of JBA report to bring it back to design level of protection .
	Dredge build up of silt and weed growth	3 yearly (or as required)	
Elliot Water	Clean bed of silt and gravel – A92 bridge downstream	3 yearly	
Geordies Burn	Clean grid upstream of A92	Monthly or after high flows	

CARNOUSTIE			
Barry Burn (various locations)	Clear 'man made' debris	Monthly	Existing flood prevention scheme, recently improved by the Council. Subject to ongoing studies into improving its maintenance and the resolution of existing maintenance issues (i.e. dredging and grass-cutting)
	Dredge build up of silt and weed growth	3 yearly (or as required)	
Lochty Burn	Clear beneath A930 bridge and downstream of silt & gravel	As required from inspection	Improved trash screen recently installed on upstream side of High Street culvert following flooding incident due to culvert blockage
KIRRIEMUIR			
Gairie Burn (various locations)	Clear 'man made' debris	Monthly	Existing flood prevention scheme, currently in process of being substantially upgraded following receipt of JBA report
	Dredge build up of silt and weed growth	3 yearly (or as required)	

GRIDS ON CULVERT INLETS			
Arbroath			
A933 Condor Woodville	Clear Debris	Monthly or after high flows	
A933 Fernlea	Clear Debris	Monthly or after high flows	
A92 Geordies Burn Westway	Clear Debris	Monthly or after high flows	
Beach	Clear Debris	Monthly or after high flows	
Peasihill Road	Clear Debris	Monthly or after high flows	
Carnoustie			
Lochty Burn Grid at Co-Op	Clear Debris	Monthly or after high flows	
Braefoot Ditch	Clear Debris	Monthly or after high flows	
Lochend Road Grid	Clear Debris	Monthly or after high flows	
Barry School Culvert	Clear Debris	Monthly or after high flows	
McDonald Smith Drive No. 32 / 34	Clear Debris	Monthly or after high flows	New non-return valve at Barry Burn end of the culvert.
Station Rd Barry, Panmure Golf Club (Viewfield Burn)	Clear Debris	Monthly or after high flows	
Station Rd Barry, Gowanlea	Clear Debris	Monthly or after high flows	
B9128, Hayhillock	Clear Debris	Monthly or after high flows	
Viewfield Burn, Carnoustie	Clear Debris	Monthly or after high flows	
Forfar			
Little Mill, Forfar	Clear Debris	Monthly or after high flows	
Treacle Burn, Forfar	Clear Debris	Monthly or after high flows	
Kirriemuir			
Dykehead, Kirriemuir	Clear Debris	Monthly or after high flows	
Brechin			
Whishop Burn, Edzell	Clear Debris	Monthly or after high flows	
Montrose			
A92 Viaduct	Clear Debris	Monthly or after high flows	

*This Schedule may be expanded as further needs are identified.

BLANK WATERCOURSE INSPECTION SHEET

Watercourse: <input style="width: 250px;" type="text"/>		Section: <input style="width: 300px;" type="text"/>		
Observers: <input style="width: 150px;" type="text"/> And <input style="width: 150px;" type="text"/>		Date <input style="width: 100px;" type="text"/>		
SECTION TYPE	CHANNEL DETAILS	STRUCTURES	IN/OUT FLOWS IN SECTION	FLOOD RISK DAMAGE ASSESSMENT
Open Channel <input type="checkbox"/>	Width (top): <input style="width: 80px;" type="text" value="0.00"/>	Type: <input style="width: 150px;" type="text"/>	Position: <input style="width: 100px;" type="text"/>	FLOOD RISK <input style="width: 80px;" type="text"/>
Revetment RHS <input type="checkbox"/>	Width (bottom): <input style="width: 80px;" type="text" value="0.00"/>			<input style="width: 80px;" type="text"/>
Revetment LHS <input type="checkbox"/>	Depth (top to bottom): <input style="width: 80px;" type="text" value="0.00"/>	Inlet Size: <input style="width: 80px;" type="text" value="0.00"/>	Type inflow: <input style="width: 100px;" type="text"/>	DAMAGE ASSESSMENT <input style="width: 80px;" type="text"/>
Culvert <input type="checkbox"/>	Gradient:	Outlet Size: <input style="width: 80px;" type="text" value="0.00"/>	Size: <input style="width: 100px;" type="text"/>	<input style="width: 80px;" type="text"/>
Between Walls <input type="checkbox"/>	Bank Material:	Length: <input style="width: 80px;" type="text" value="0.00"/>	<input style="width: 100px;" type="text" value="0.00"/>	<input style="width: 80px;" type="text"/>
From: <input style="width: 100px;" type="text"/>		Trash Grid <input type="checkbox"/>	ADJACENT LANDFORM	
To: <input style="width: 100px;" type="text"/>			LHS: <input style="width: 100px;" type="text"/>	RHS: <input style="width: 100px;" type="text"/>
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All references are as viewed looking upstream				