Public Meeting
Stonehaven Flood

A Partnership Response

15 JUNE 2010

FORMAT

1. CAUSE OF THE FLOOD
2. RESPONSE
3. RECOVERY
4. FUTURE PREVENTION AND RESILIENCE
5. DISCUSSIONS AND QUESTIONS

WHO IS HERE

- Aberdeenshire Council
- Grampian Police
- Grampian Fire and Rescue Service
- Grampian Emergency Planning Unit
- Strategic Coordinating Group
- Scottish Environment Protection Agency
- Scottish Water
- Scottish Flood Forum

CAUSE

Aberdeenshire Council

GRAMPIAN POLICE
Keeping our communities safe

Grampian Fire and Rescue Service

SEPA
Scottish Environment Protection Agency

Scottish Water
Always serving Scotland

Scottish Flood Forum

CAUSE

- RAINFALL
- RIVER FLOWS
- FLOODING MECHANISM
- GULLIES AND DRAINS

SEPA's Role

Scotland's Environment Watchdog

Scotland's Flood Warning Authority

More than 40 areas receive flood warning information in Scotland.
To deliver effective warnings requires appropriate infrastructure, modelling systems / staff / systems and protocols
Ability to disseminate warnings quickly
Hydrometric Data – backbone of information we need to provide flood warning / flood watch advice

Stonehaven is served by Flood Watch, a generalised area based indication of the potential risk of flooding.

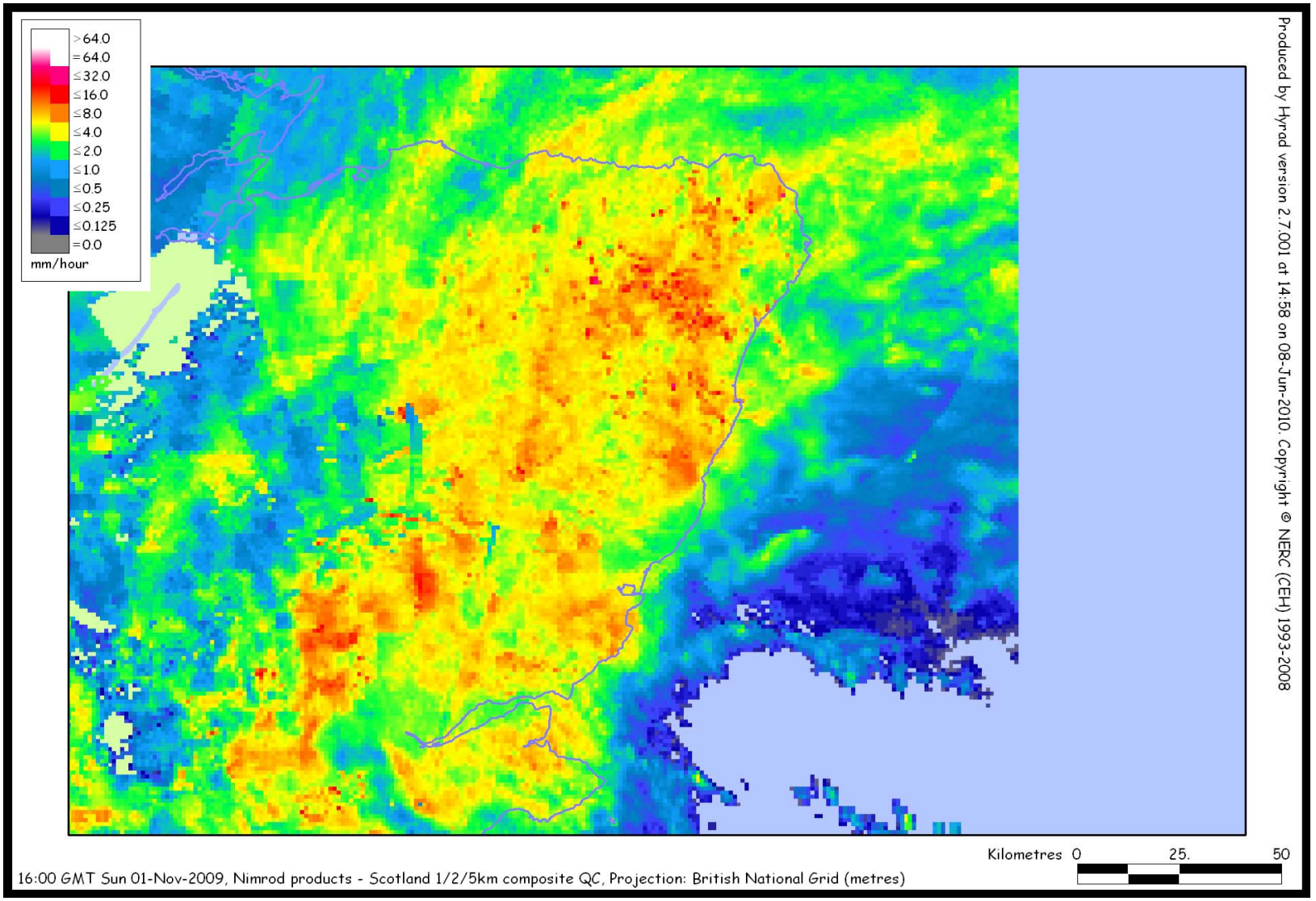
Flood Event 1- 2 November 2009

The Stonehaven flood event was part of widescale flooding affecting much of the North East of Scotland during 1-2 November 2009, when many North East rivers recorded their highest ever levels, and serious flooding affected many communities.

At the peak of the event SEPA had 21 Flood Watches, 17 Warnings and 4 Severe Flood Warnings in force across Scotland.

This information was passed to emergency responders across the country, including the Scottish Government, and published live on SEPA's 'Floodline' service which attracted nearly 29000 'hits' during the flood event.

Rainfall radar imagery for the east of Scotland at 16:00hrs on the 1st November



Flood Event 1- 2 November 2009, Stonehaven

Met Office weather advisories issued on the 29th October, 30th October

Flash Warnings issued on the 1st November.

SEPA issued a Flood Watch for Dee, Bervie and Kincardine Rivers at 11:44 on the 1st November.

During the 1st November;

- 53mm fell in 13hrs to (64mm outwith the catchment)
- 134 mm fell in previous 12 days (200mm outwith the catchment)
- Saturated catchments, drainage systems near capacity prior to event

- The combination of persistently wet conditions prior to the 1st, in combination with the rainfall during the event, resulted in the particularly severe flooding in the Carron catchment

- Historical evidence that this was the worst flood in 60- 70 years

CAUSE

- Heavy and persistent rain on an already saturated catchment – led to a rapid rise in river levels in late afternoon and evening
- River out of bank and flowing fast upstream of Stonehaven picked up assorted debris - trees, branches and straw and carried them downstream into town
- Upstream of Green Bridge, river rose to higher than previously recorded – debris collected on trellis of bridge

CAUSE

Water year	Peak flow (m3/s)	Time to peak (hours)	Hydrograph volume	
			Total volume (m3)	Time period for total volume (hours)
2003	15.3	1.75	410,000	24.25
2004	33.9	3.75	770,000	22.75
2005	13.9	12.25	720,000	27.50
2006	12.9	5.75	470,000	28.00
2007	13.9	4.75	610,000	31.75
2008	15.1	14.50	1,100,000	47.25
2009 (to present)	82.4	6.00	**2,150,000**	**19.75**

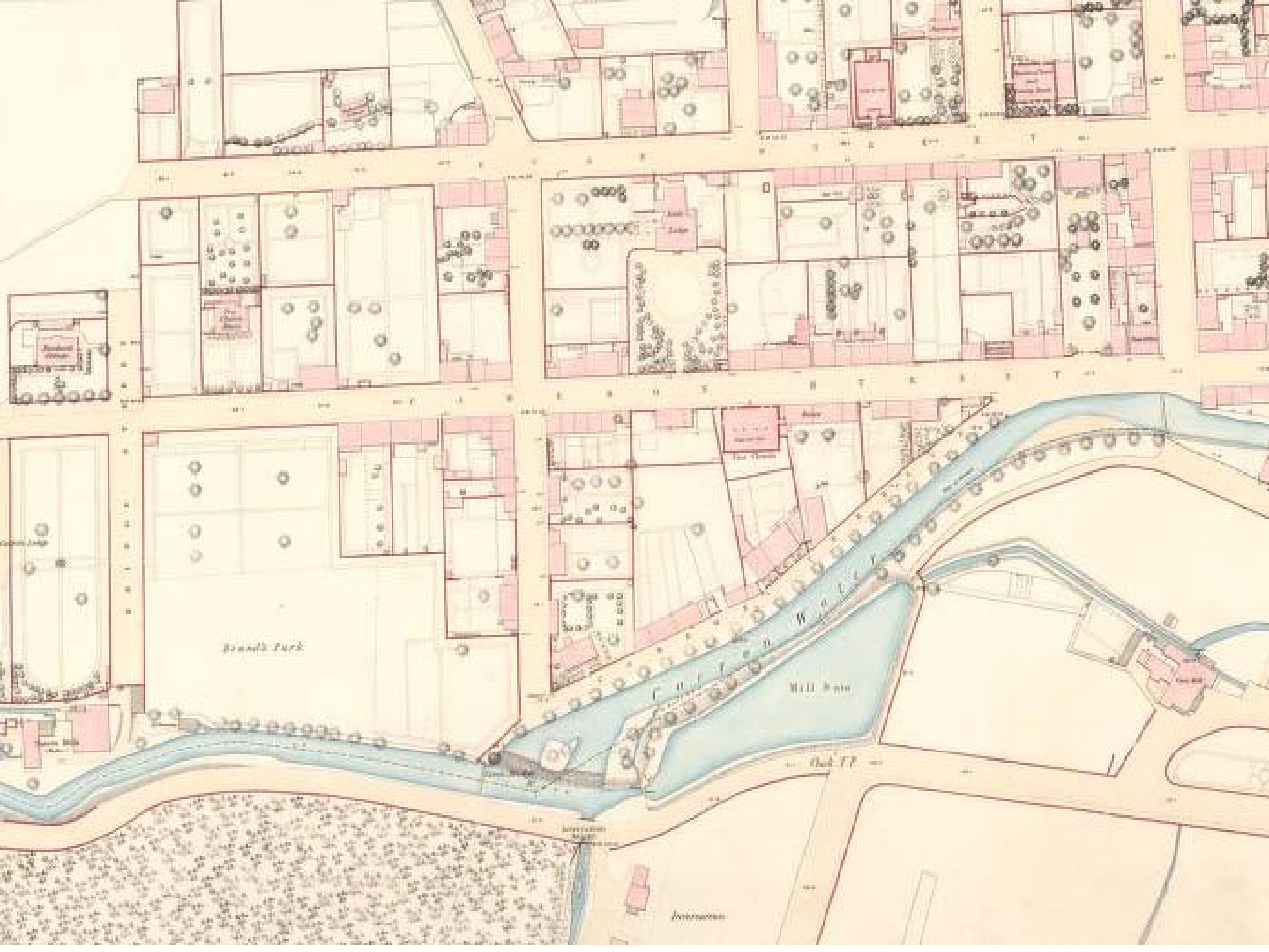
Large volume of water passed through the river in a relatively short period of time

CAUSE

- At its peak, the river was flowing at 3 to 5 times the quantity of water of the other subsequent events of 2009 / 2010.
- Observations by a long term resident of the town with nearly 70 years knowledge of the Carron Den said its by far the highest the river has been – consistent with majority of observations
- The river capacity would need to be increased by up to 50% upstream of the green bridge to contain the flow (assuming total blockage of the trellis) and by around 15% on Carron Terrace

TRENDS OVER LAST 43 YEARS

- Rainfall Averages up 21%
- Heavy rain days up 8%
- Intensity up 8%
- Maximum 5 day totals up 21%
- Dry spells – no change
- Data from SG Research Project / Met Office


Brandt Park
Mill Pond

CAUSE - HISTORICAL CHANGES?

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CAUSE HISTORICAL CHANGES?

CAUSE HISTORICAL CHANGES? - SUMMARY

- Construction of the concrete weir (assumed 1970's) raised the river bed immediately downstream of the green bridge
- Widening of Low Wood Road in early 1980s reduced capacity by around 10%
- Construction of the rock island and raising of the banks improved the capacity of the river downstream of the green bridge but it did not address the upstream capacity

CAUSE - SUMMARY

- Exceptional Event – Rainfall data, River flow data, Highest observed flows in living memory, Widespread across Aberdeenshire
- Long term trend of increased rainfall – total quantities and intensity
- Improved drainage on agricultural land leads to > flows in rivers
- As levels rose above the green bridge trellis trigger for debris getting trapped – significantly reduced capacity
- The green bridge was clear of debris before the event

CAUSE - SUMMARY

Road Gullies - Operation

- Primary purpose to drain surface water from Roads and Footways
- Not designed to carry flood water when major watercourses burst their banks
- In Stonehaven generally connected to Scottish Water's surface water sewers or directly to water courses.
- Only operate effectively when outlets are above the flood water levels

Road Gullies - Effectiveness

- Cleaned out following the initial flooding in Stonehaven in late October.
- In areas flooded in November many gullies blocked by debris carried in flood water.
- Investigation following flooding found that certain drains (mainly at build-outs) connecting the road gullies to the main sewer were less effective due to deterioration of materials used and blockage by litter.

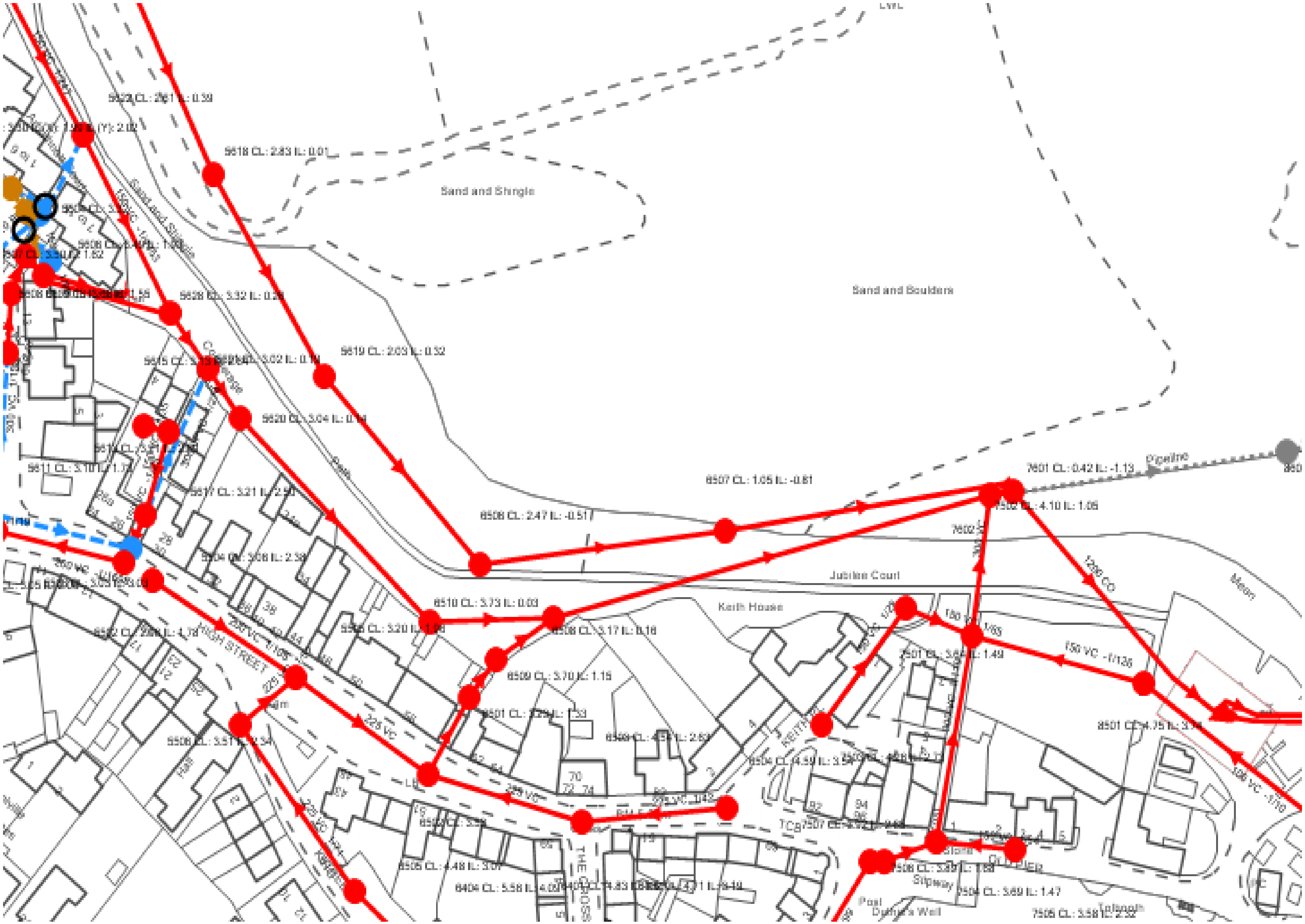
SCOTTISH WATER

Responsibilities

- Scottish Water are responsible for draining foul and surface water from within the property boundaries of domestic and non-domestic properties. These drain to public sewers, for which Scottish Water are responsible for the associated maintenance. In most cases, local authority road gullies located in public roads also discharge into these sewers.

Background to Stonehaven Sewerage System

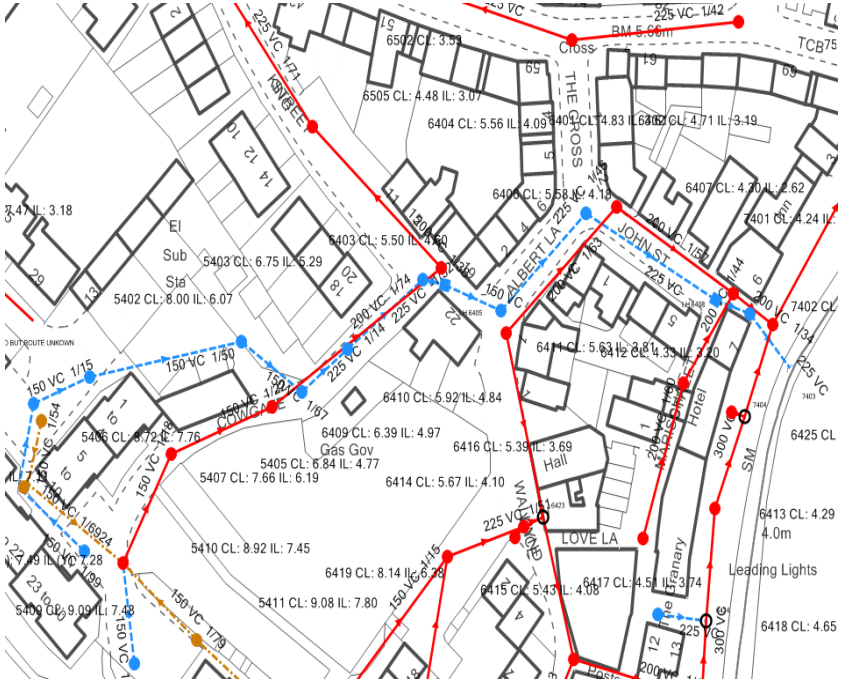
- Older parts of the town (town centre etc) are served by a combined drainage system, with newer parts connected to a separate system (separate foul and surface water sewers). The majority of flows from sewers within the town centre area discharge to a large pumping station located adjacent to the Backies car park. These flows are then pumped to Aberdeen for treatment at Nigg Wastewater Treatment Plant.

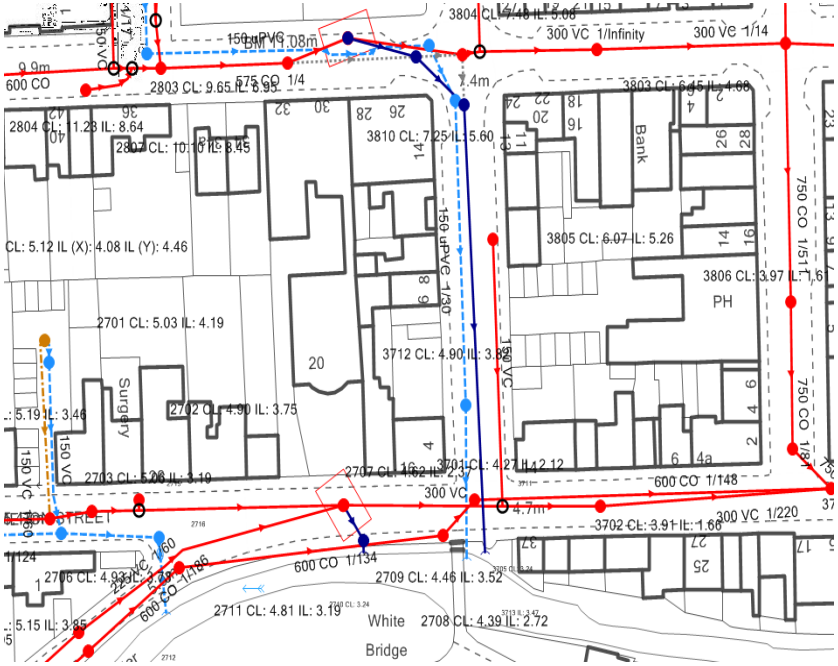


Sand and Shingle
Sand and Boulders
Jubilee Court
Keith House
HIGH STREET
THE CROSS
Pipeline
7601 CL: 0.42 IL: -1.13
6507 CL: 1.05 IL: -0.81
6506 CL: 2.47 IL: -0.517
9618 CL: 2.83 IL: 0.01
9619 CL: 2.03 IL: 0.32
9620 CL: 3.04 IL: 0.14
9617 CL: 3.21 IL: 2.50
6510 CL: 3.73 IL: 0.03
6508 CL: 3.17 IL: 0.16
6509 CL: 3.70 IL: 1.15
7501 CL: 3.64 IL: 1.49
8501 CL: 4.75 IL: 3.74
7502 CL: 4.10 IL: 1.05
7504 CL: 3.69 IL: 1.47
7505 CL: 3.58 IL: 2.32
6505 CL: 4.48 IL: 3.07
6404 CL: 5.56 IL: 4.09
9611 CL: 3.10 IL: 1.71
9628 CL: 3.32 IL: 0.28
1200 CO
150 VC -1/126
225 VC
Old Pier
Slipway
Post
Dubie's Well

Issues Raised at Previous Public Meeting

Two main issues were raised with respect to the performance of Scottish Water infrastructure during the flood event in November 2009. These were the operation of an outfall in the harbour area outside the Marine Hotel and the condition of a number of outfalls located at various points along the Carron Water. The results of the subsequent investigations into these issues will be covered later in the presentation.





RESPONSE

Aberdeenshire Council

Grampian Police
Keeping our communities safe

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Scottish Flood Forum

RESPONSE

- Emergency Plans
- Timeline
- Grampian Fire and Rescue Service
- Grampian Police
- Roads
- Rest Centre
- Debriefings

GRAMPIAN EMERGENCY PLANNING UNIT

Planning

- Work with external partners in development of multi agency contingency plans and arrangements
- work with Service Directors to assist them in development of corporate and operational plans and arrangements
- provide appropriate Emergency Planning and Response training

Response

- provide the immediate Local Authority contact with the Emergency Services where existing operational arrangements are stretched or if an emergency is occurring or predicted
- activate initial response actions via the Emergency Response Coordinator
- provide ongoing support and assistance to the appropriate Council services

TIMELINE

- 11:00 Roads Service
- 12:50 Flood Watch Issued
  SEPA ➡ Police ➡ GEPU
- 13:30 Visual Checks
- 16:00 Fire and Rescue Service
- 17:00 Roads Service calls - River Carron
  GEPU ➡ DERC
- 18:00 Roads Service notified by Police – River Carron
  Police ➡ GFRS
- 18:15 F.O.C.C Set Up
- 19:15/19.30 Operational decision ➡ Town Hall
- 19:45 Town Hall opened
- 20:15 Police ➡ GEPU ➡ DERC Rest Centre
- 21:00 Peak
- 21.45 Housing Manager
- 23:00 Rain stopped
- 00:30 F.O.C.C closed then rest centre closed

GRAMPIAN EMERGENCY PLANNING UNIT

Response on the day/night of 1/11/2009

- Notified by Grampian Police, as per established procedure, of the flood watch on Dee and Don.

- Ongoing communication where necessary between the Emergency Planning Unit (EPU) Duty Officer and the Director of Transportation and Infrastructure (T&I) from 17:00 onwards.
  - requests for information from the Police re Bervie Braes, Pennan, the roads network in general and the wider coordination and deployment of resources across Aberdeenshire.

- When the Carron burst its banks, the EPU Duty Officer established or maintained contact with myself, the Area Manager, Director of T&I and Police Force Operational Control Centre (FOCC) .
  - Maintained an awareness of developing situation particularly with regard to decisions taken on the ground – eg Rest Centre locations.

GRAMPIAN EMERGENCY PLANNING UNIT

•As situation deteriorated across Grampian EPU attendance at the Police Force Operational Control Centre (FOCC) later in the evening. Once there invited Director of T&I to attend to discuss the overall response strategy for Aberdeenshire with the Police Tactical Commander.

•Major difficulty for responders and those directly affected is/was the ability to predict the impact of the rainfall.

- The scale and location of the flooding in Stonehaven and in Huntly does not have recent historical precedent.
- Affects ability to deploy resources speedily particularly where demand is geographically widespread.
- Affects the ability of those ultimately affected to protect their property.
- Flexible response arrangements

Roads – Initial Response to Flooding

- Main responsibility to minimise the damage and disruption caused to the public road network.
- Operational staff deployed throughout Kincardine and Mearns from 10 a.m. on 1st November to deal with flooding to the road network.
- As emergency developed in Stonehaven resources were diverted to filling and making available sandbags for properties affected by flooding in Stonehaven.
- The filling and distribution of sandbags continued until about midnight.

RESPONSE

- Emergency Plans
- Timeline
- Grampian Fire and Rescue Service
- Grampian Police
- Roads
- Rest Centre
- Debriefings

RECOVERY

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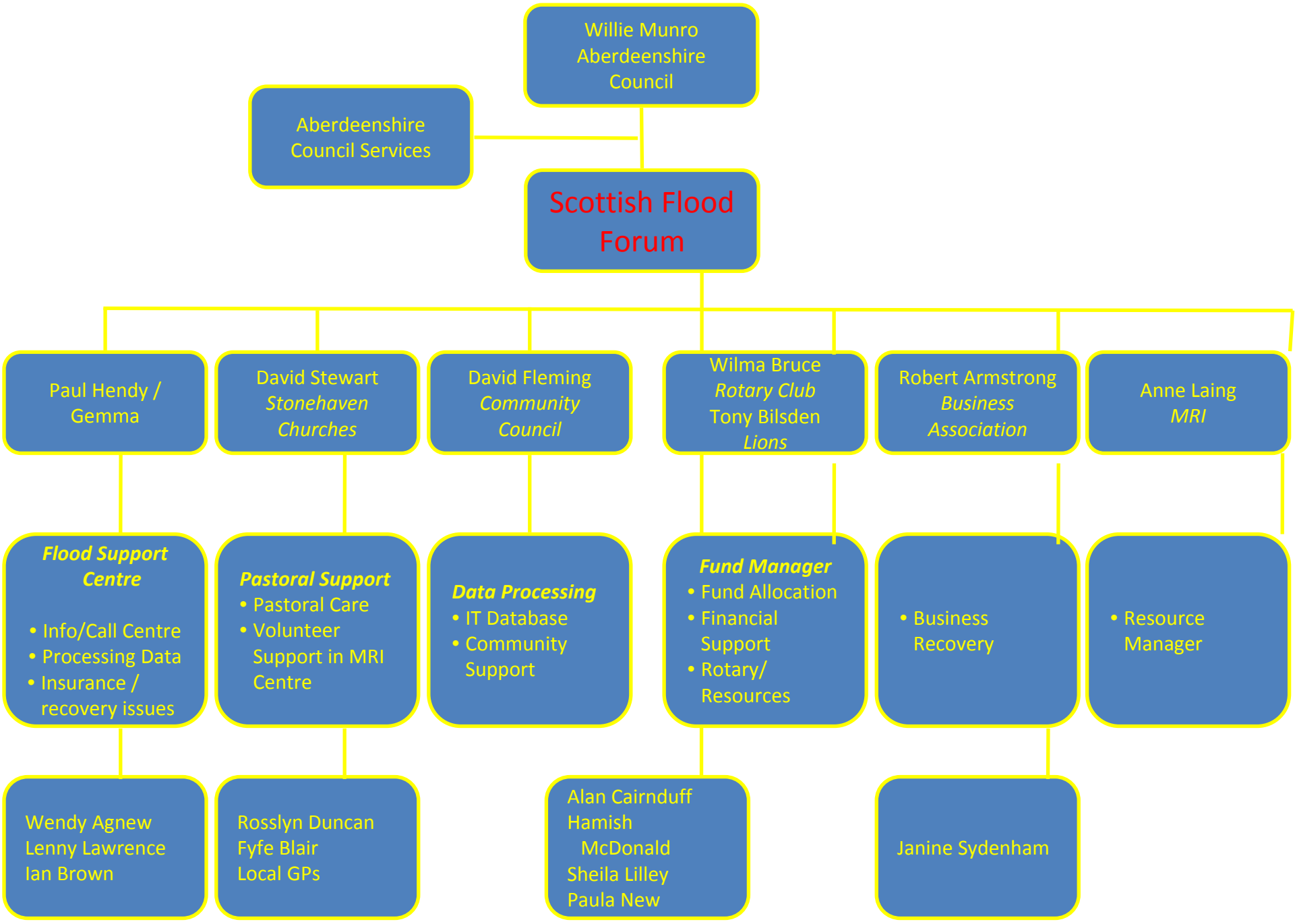
RECOVERY

- Clean Up
- Information
- Flood Recovery Committee
- Scottish Flood Forum
- Flood Support Centre
- Repairs
- Investigations


Willie Munro
Aberdeenshire Council
Aberdeenshire Council Services
Scottish Flood Forum
Paul Hendy / Gemma
David Stewart
Stonehaven Churches
David Fleming
Community Council
Wilma Bruce
Rotary Club
Tony Bilsden
Lions
Robert Armstrong
Business Association
Anne Laing
MRI
Flood Support Centre
• Info/Call Centre
• Processing Data
• Insurance / recovery issues
Pastoral Support
• Pastoral Care
• Volunteer Support in MRI Centre
Data Processing
• IT Database
• Community Support
Fund Manager
• Fund Allocation
• Financial Support
• Rotary/ Resources
• Business Recovery
• Resource Manager
Wendy Agnew
Lenny Lawrence
Ian Brown
Rosslyn Duncan
Fyfe Blair
Local GPs
Alan Cairnduff
Hamish McDonald
Sheila Lilley
Paula New
Janine Sydenham


Scottish
Flood Forum


Scottish
Flood Forum

Human & Social Impact - Causes

Main causes of stress:	A	B
• Builders	39%	54%
• Loss Adjusters	38%	72%
• Personal effects	37%	40%
• Accommodation	23%	44%
The biggest effect of stress:		
• The Home	45%	68%
• Relationships	29%	66%
• Work	25%	40%
• Finances	22%	38%

SCOTTISH FLOOD FORUM

Stonehaven – Current Active Inquiry Issues as of 27 April 2010

Issued as a hand-out.

Roads - Following Flooding

- 2nd November resources deployed to remove flood debris from affected streets and road gullies.
- Also on 2nd November assessments of damage to road infrastructure throughout K & M and arranging the necessary repairs.
- In Stonehaven main repairs were to pipe-work from gullies at various build-outs in Stonehaven town centre.
- The majority of remedial works completed by end of December

FUTURE PREVENTION AND RESILIENCE

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FUTURE PREVENTION AND RESILIENCE - REPAIRS

- Removal of rocks from the channel bed (d/s of the green bridge), strengthening of the left river bank upstream of the green bridge and rebuilding the training wall on the beach.
- The vegetated sediment bank on the left side of the river bed upstream from the green bridge (the duck island) has been removed and overhanging branches trimmed back.
- Provides some immediate relief but not against a repeat of 1st November 2009

FUTURE PREVENTION AND RESILIENCE - INVESTIGATIONS

- Undertaken detailed level survey of river banks, channel and structures
- Built computer model of the river to assess capacity at nearly 50 river sections from Walker Bridge to the sea
- Assessed a number of potential options for improving capacity of the river without causing problems elsewhere

FUTURE PREVENTION AND RESILIENCE – SHORT TERM OPTIONS

- Remove / modify log weir to increase capacity upstream by up to 30%
- This will match minimum downstream capacity
- Further tree management to reduce risk of fallen trees blocking the river in spate – job let
- Detailed flood response plan for operations staff including temporary barriers to divert flood flows
- Improved information on flood warning (SEPA) to include visual gauge boards
- Assist with “self help” to vulnerable properties

FUTURE PREVENTION AND RESILIENCE – LONG TERM OPTIONS

- Full catchment study to determine long term options including potential for upstream storage, flood routing and the potential for any further capacity improvements in town. Also includes assessment of impacts of climate change.
- Very important to undertake a very rigorous assessment and obtain the support of the local community to progress with long term options with minimum risk of major delays and to maximise funding opportunities

FUTURE PREVENTION AND RESILIENCE – LONG TERM OUTLOOK

- By 2050 winter rainfall up 12%
- By 2080 winter rainfall up 15%
- Likely further increases in intensity of rain
- Data from UKCP09
- Significant challenges across Aberdeenshire for the future
- New Legislation to encourage long term planning for flooding

FUTURE PREVENTION AND RESILIENCE SCOTTISH WATER

Marine Hotel Outfall

- The outcome of the investigation into the outfall outside the Marine Hotel confirmed that this pipe drained surface water from the Kingsgate area of the town and was not therefore connected with the flooding in the High Street. This was confirmed by dye testing the road gullies within the High Street and verifying that the outfall did not discharge during dry weather. The flap valve on the outfall was found to be rusted and was replaced to ensure effective operation in the future.

Carron Water Outfalls

- Of the 4 no. outfalls identified as giving cause for concern, only one was confirmed as being connected to live Scottish Water infrastructure. The upstream manhole was checked and no evidence was found of any recent discharge from the combined storm overflow at this location. This was consistent with predicted overflow frequency data from the hydraulic model of the Stonehaven sewerage system.

Flood Forecasting and Warning

Local Investment

Improved River Flow and Rainfall Infrastructure

Installation of a new river gauge on the Carron, connected directly to

SEPA data collection systems.

2 local raingauges now with alarms connected to SEPA monitoring system.

This will;

- Improve information we provide before and during flood events to assist all emergency responders in their duties
- Give SEPA a better estimate of how much water is flowing in the Carron - in real time
- Provide better information when considering flood alleviation proposals

Flood Forecasting and Warning

Flood Warning for Carron - progress

The Council has requested a flood warning scheme for the Carron. SEPA has now commissioned a feasibility study, which will report in August. This will then be discussed with the Council and Scottish Government.

Community Flood Events

As part of SEPA's community engagement commitment we have worked with the Council, the Scottish Flood Forum and others to provide local information –most recently at a public event at the MRI on March 16th.

Flood Forecasting and Warning

National Investment

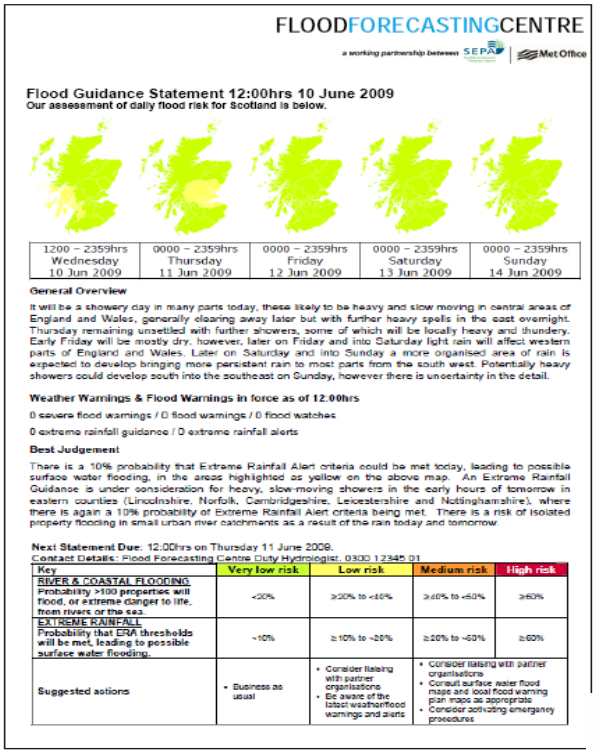
Improved Met Office/SEPA
Joint Forecasting –

Proposal

- Improved working between Met Office & SEPA to provide early alert to emergency partners.
- Utilising new technologies on a Scotland wide basis to improve the detection of events on smaller river systems, such as the Carron.

Floodline Warnings Direct

- service launch Spring 2011. Direct dissemination of targeted flood warning messages to communities / individuals at risk via mobile, text, landline.



FLOODFORECASTINGCENTRE

a working partnership between SEPA | Met Office

Flood Guidance Statement 12:00hrs 10 June 2009
Our assessment of daily flood risk for Scotland is below.

1200 – 2359hrs Wednesday 10 Jun 2009	0000 – 2359hrs Thursday 11 Jun 2009	0000 – 2359hrs Friday 12 Jun 2009	0000 – 2359hrs Saturday 13 Jun 2009	0000 – 2359hrs Sunday 14 Jun 2009

General Overview

It will be a showery day in many parts today, these likely to be heavy and slow moving in central areas of England and Wales, generally clearing away later but with further heavy spells in the east overnight. Thursday remaining unsettled with further showers, some of which will be locally heavy and thundery. Early Friday will be mostly dry, however, later on Friday and into Saturday light rain will affect western parts of England and Wales. Later on Saturday and into Sunday a more organised area of rain is expected to develop bringing more persistent rain to most parts from the south west. Potentially heavy showers could develop south into the southeast on Sunday, however there is uncertainty in the detail.

Weather Warnings & Flood Warnings in force as of 12:00hrs

0 severe flood warnings / 0 flood warnings / 0 flood watches

0 extreme rainfall guidance / 0 extreme rainfall alerts

Best Judgement

There is a 10% probability that Extreme Rainfall Alert criteria could be met today, leading to possible surface water flooding, in the areas highlighted as yellow on the above map. An Extreme Rainfall Guidance is under consideration for heavy, slow-moving showers in the early hours of tomorrow in eastern counties (Lincolnshire, Norfolk, Cambridgeshire, Leicestershire and Nottinghamshire), where there is again a 10% probability of Extreme Rainfall Alert criteria being met. There is a risk of isolated property flooding in small urban river catchments as a result of the rain today and tomorrow.

Next Statement Due: 12:00hrs on Thursday 11 June 2009.
Contact Details: Flood Forecasting Centre Duty Hydrologist, 0300 12345 01

Key	Very low risk	Low risk	Medium risk	High risk
RIVER & COASTAL FLOODING: Probability >100 properties will flood, or extreme danger to life, from rivers or the sea.	<20%	≥20% to <40%	≥40% to <60%	≥60%
EXTREME RAINFALL: Probability that ERA thresholds will be met, leading to possible surface water flooding.	<10%	≥10% to <20%	≥20% to <60%	≥60%
Suggested actions	• Business as usual	• Consider liaising with partner organisations • Be aware of the latest weather/flood warnings and alerts	• Consider liaising with partner organisations • Consult surface water flood maps and local flood warning plan maps as appropriate • Consider activating emergency procedures