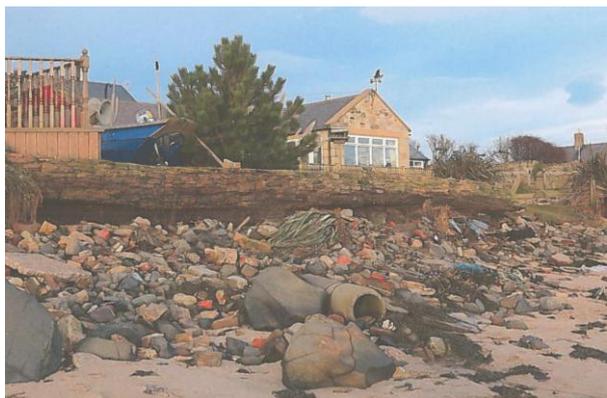


Northumberland County Council

Flood Investigation Report

Investigation of the tidal surge 5th/6th December 2013



14th January 2015

REVISION SCHEDULE

Northumberland County Council – Flood Investigation Report Investigation of the tidal surge 5th/6th December 2013

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Executive Summary

Northumberland County Council, as the Lead Local Flood Authority, has a responsibility under Section 19 of the Flood and Water Management Act 2010 to investigate flooding incidents in its area when it is deemed necessary and appropriate.

During the tidal surge of the 5th/6th December 2013 at least 8 residential properties were affected by flooding across four settlements in Northumberland. Additional flooding and coastal erosion occurred in many other places across the Northumberland coastline affecting roads, paths, fields and erosion to cliffs along the coast.

The Environment Agency are responsible for flooding from the open coast, where as Northumberland County Council has the responsibility for coastal erosion. In this instance it was important for the two organisations to work closely together. Furthermore, in some instances the sewerage system contributed to the flooding, therefore we also had to work closely with Northumbrian Water which has responsibility for sewer flooding.

Our main conclusion is that risk management authorities and other groups must continue to work together, sharing information and reports.

In addition property owners who were flooded during this event are eligible for the governments Repair and Renew grant. We are currently working with property owners assisting them to improve the flood resistance and resilience to their respective properties.

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1. Introduction

Storm or Tidal surges in the North Sea are not infrequent in nature. In recent living memory major storm surges occurred in 1953 and 1978 causing flooding and destruction along the Northumberland coastline. Other smaller surges have also occurred in this period, 15 are known to have occurred between 1876 and 2007.

The Environment Agency has described the 5th/6th December 2013 storm surge as the most serious in 60 years, with water heights exceeding those of the 1953 flood and 1978 North Sea storm surge at localised points in North Shields and the Humber Estuary. It has been calculated that the return period of the 5th/6th December 2013 storm surge to have been a 1 in 450 year event.

1.1 Lead Local Flood Authority (LLFA) investigation

Northumberland County Council (NCC), as the Lead Local Flood Authority (LLFA), has a responsibility under Section 19 of the Flood and Water Management Act 2010 to investigate flooding incidents in its area when it is deemed necessary and appropriate. Section 19 states:

(1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate -

(a) which risk management authorities have relevant flood risk management functions, and

(b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.

(2) Where an authority carries out an investigation under subsection (1) it must -

(a) publish the results of its investigation, and

(b) notify any relevant risk management authorities.

In the absence of a published Flood Risk Management Strategy, NCC does not currently have a definition or a threshold of what constitutes a flood event deemed necessary to investigate. In this instance, due to the widespread flooding and coastal erosion it was deemed necessary and appropriate to complete an investigation into the flood incidents.

This report provides a concise review of the tidal surge of 5th/6th December 2013, the areas affected and the rights and responsibilities of all risk management authorities involved. The report outlines each of the risk management authorities' actions and whether these have been exercised.

1.2 Northumberland

Northumberland is the most northerly county within England. It is bordered by Cumbria to the west, County Durham to the south, Tyne and Wear to the south east and Scottish Borders to the north. The North Sea provides 132km (82miles) of coastline to the east.

Northumberland has an area of 5,013km² which makes it the sixth largest in England. Despite the large size of the county, it only has a population of 316,000 (2011 Census, ONS), which makes Northumberland one of the least densely populated counties in England.

As stated in section 1, tidal surges are not infrequent along the Northumberland coastline to the North Sea. Table A.1 in Appendix 1 lists the known flooding events in Northumberland that have occurred from a tidal source.

2. Flood incident

2.1 Tidal surge 5th/6th December 2013

A tidal surge (also known as a storm surge) occurs when a storm causes changes in sea levels. Low pressure causes sea level to rise while high pressure causes sea level to fall. In general a one millibar change in pressure gives a one centimetre change in sea level.

In the days before 5th December a low pressure system also known as a depression was forming over north east Northumberland, in the North Sea. As the low pressure system passed over the coast of Scotland and into the North Sea, sea levels began to rise. As the area of low pressure crosses the top of the North Sea it pushed water southwards causing sea levels to rise over the shallow sea bed. The strong northwest winds behind the depression caused big waves to form on top of the rising sea level.

The height of a tidal surge depends on many factors such as the size and strength of the storm, the direction it approaches the coast, and the shape of the coastline and seabed.

The tide is a major factor when a tidal surge hits the coast. The 5th December tidal surge coincided with a spring tide. Spring tides occur twice each lunar month all year long during full or new moons, which occur when the Earth, sun and moon are nearly in alignment.

Due to a combination of all the factors mentioned above the tidal surge hit the Northumberland coast at the time of a spring tide.

		Berwick		Holy Island		Seahouses		Amble		Blyth	
		Time	Height	Time	Height	Time	Height	Time	Height	Time	Height
5 Dec	High tide	03:39	5.00m	03:50	5.20m	04:37	5.20m	05:10	5.30m	04:25	5.20m
	Low tide	09:45	0.70m	09:46	0.70m	10:41	0.80m	11:23	1.10m	10:46	0.70m
	High tide	15:53	5.00m	16:04	5.20m	16:47	5.20m	17:20	5.30m	16:42	5.20m
	Low tide	22:14	0.50m	22:16	0.50m	23:13	0.60m	23:55	0.70m	23:15	0.50m
6 Dec	High tide	04:30	4.90m	04:42	5.10m	04:37	5.10m	05:10	5.30m	05:15	5.10m
	Low tide	10:32	0.80m	10:34	0.80m	10:41	0.70m	11:23	1.10m	11:32	0.80m

Table 1 – Tide times and heights along the Northumberland coast on the 5th and 6th December 2013.

2.2 Areas affected

The tidal surge affected many areas along the Northumberland coastline. Flooding and coastal erosion occurred at numerous and sporadic points along the coast. Amongst those areas affected were Amble, Alnmouth, Beadnell, Berwick, Boulmer, Blyth, Holy Island, Seahouses and Warkworth. At some points the flooding affected

the promenade, paths, roads and fields. At other places the water did flood individual properties.

2.3 NCC Investigation

As the flooding occurred all along the Northumberland coastline, we relied on residents informing us of flooding occurring, council officers who were working in the affected areas, news reports across the county as well as other word of mouth accounts of where flooding occurred. Thank you to everyone who contributed to this data collection exercise.

When we were alerted of an area affected we attempted to visit this area immediately to ascertain the damage to the coast and the effect of flooding on people and property in these effected areas.

2.4 Repair and Renew grant

As a result of the tidal surge, as well as the flooding that occurred in the south of England over January/February 2014¹, the government set up a grant to help people who were affected by flooding to make their properties more resistant and resilient to flooding. The Repair and Renew grant² is eligible for those people affected by flooding between 1st April 2013 and 31st March 2014. The purpose of the grant is to help people with the cost of buying and installing new measures to reduce the chances of flooding in the first place, or limit the damage should they be flooded in the future.

If you believe you are eligible for this grant then we would like to hear from you; please contact via email – fcerm@northumberland.gov.uk

Due to this grant we received many enquiries from those affected by the tidal surge of which added to our investigation.

2.5 Data sharing with other risk management authorities

Throughout the preceding months after each flooding event we have regularly kept in touch through phone calls, emails and meetings with the Environment Agency and Northumbrian Water. We have passed on details of known flooding incidents and they have passed on similar information. This ensures that we are all aware of problem areas, the source of the problem and the Risk Management Authority responsible.

¹ http://www.metoffice.gov.uk/media/pdf/n/i/Recent_Storms_Briefing_Final_07023.pdf

² <https://www.gov.uk/government/news/repair-and-renew-grant-scheme-opens-today>

3. Roles and Responsibilities

3.1 Northumberland County Council (NCC)

Northumberland County Council is both the Lead Local Flood Authority (LLFA) and the Highway Authority (HA) within Northumberland.

As the LLFA Northumberland County Council has a responsibility to investigate flood incidents under Section 19 of the Flood and Water Management Act (2010). The nature of the investigation will depend upon the extent of the flooding and the outcome from any investigation will be used to help prioritise future bids for funding. Funding to manage flood risk is prioritised and allocated on a national basis. Therefore, we cannot promise to address all issues.

Land Drainage Consent is required from Northumberland County Council for any works that are likely to impede the flow of water within an Ordinary Watercourse. This is to ensure that the risk of flooding does not increase and that any ecological issues are addressed.

Northumberland County Council also has powers under Section 25 of the Land Drainage Act (1991) to serve notice on any persons impeding the flow of an ordinary watercourse without consent and causing an increase in flood risk.

As the Highway Authority NCC has a duty to maintain the highway under Section 41 of the Highway Act (1980). This includes the management of road drainage such as gullies and highway drains.

Culverts under a Highway are most likely to be the responsibility of Northumberland County Council and blockages or any damage to these culverts should be reported to NCC.

In the event of a flooding emergency Northumberland County Council will deploy sandbags in strategic locations only, sand bags will not be available to the public. Members of the public are advised to self-help by purchasing sandbags in advance from hardware stores and builders merchants where alternative flood protection devices can also be acquired.

3.2 The Highways Agency

The Highways Agency is responsible for managing road drainage including gullies and highway drains, from the trunk road network in England, including the slip roads to and from trunk roads. Within Northumberland this includes the A1, A19 and A69.

Culverts under a trunk road are most likely to be the responsibility of the Highways Agency. Any blockages or any damage to these culverts should be reported to the Highway Agency.

3.3 Environment Agency (EA)

The Environment Agency is responsible for managing the flood risk from main rivers, estuaries and the sea.

The Environment Agency provides a flood warning service throughout England and Wales in areas at risk of flooding from rivers or the sea. They do this by monitoring rainfall, river levels and sea conditions 24 hours a day and then use this information to forecast the possibility of flooding.

Coastal and estuarine flood defences are the responsibility of the Environment Agency.

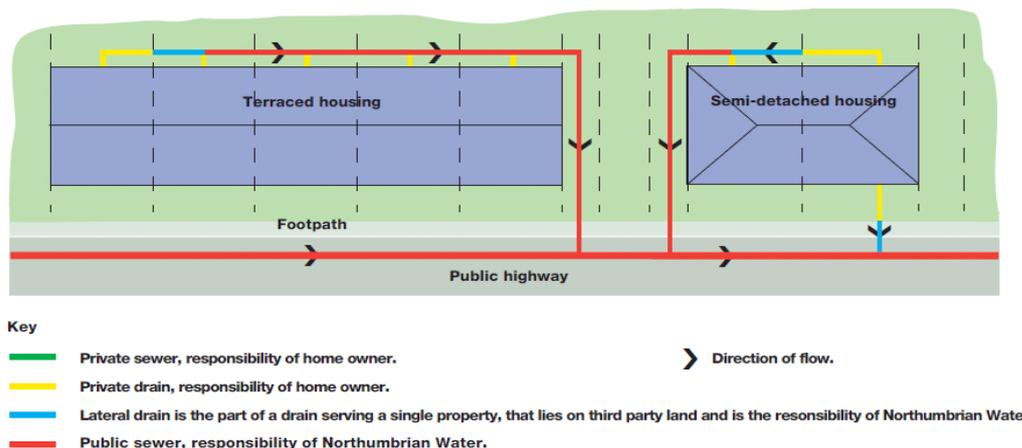
3.4 Northumbrian Water (NWL)

Under the Water Industry Act 1991, Northumbrian Water is responsible for the public sewerage system within Northumberland.

Where properties are connected to a drain (i.e. serving a single property), this is the responsibility of the property owner. Property owners are responsible for maintaining and resolving any problems within the drains up to the boundary of their property. If a property owner has a blocked drain, they will need to contact a plumber or drain unblocking service to unblock it for them.

The drain is connected to a sewer usually in the street or road near the property. In most cases this will be a public sewer; it belongs to NWL and is their responsibility. If you are concerned that there may be a blockage in the public sewer, please call 0845 717 1100 (24 hours).

The schematic overleaf shows a typical drainage system.



3.5 Riparian owners

Riparian landowners own land adjoining a watercourse. As detailed within the Environment Agency document 'Living on the Edge', they are presumed to own the land up to the centre of the watercourse – unless it is known to be owned by someone else. Riparian landowners have certain rights and responsibilities, including the following:

- they must maintain the bed and banks of the watercourse, and also the trees and shrubs growing on the banks;
- they must clear away any debris, even if it did not originate from their land. This debris may be natural or man-made;
- they must keep any structures that they own clear of debris. These structures include culverts, trash screens, weirs and mill gates;
- if they do not carry out their responsibilities, they could face legal action.

Riparian landowners must understand and act upon these responsibilities.

Riparian owners have the right to protect their property from flooding and their land from erosion. These activities may require a Land Drainage Consent from Northumberland County Council if the works are by an Ordinary Watercourse or a Flood Defence Consent from the Environment Agency if the works are by a Main River.

For more information on the responsibilities of riparian ownership please read 'Living on the Edge' at www.environment-agency.gov.uk

Further information on protecting your property from flooding can be found via the Flood Forum Blue Pages – <http://www.floodforum.org.uk/>

4. Maps of affected areas

This section of the Flood Investigation Report looks in detail at specific settlements that were affected by the 5th/6th December 2013 tidal surge. It is worth noting that some areas, mainly those where just roads were flooded have been omitted from this report. We have recorded all known flooding incidents by registering them on a GIS database.

The maps produced are based on information that we received and observed on site visits to the affected area. Therefore, there may be occasions where we have missed certain buildings and roads being flooded.

If you are aware of any errors or omissions within the maps of affected areas, then please contact us and we can amend them accordingly.

- 4.1 Alnmouth
- 4.2 Berwick
- 4.3 Blyth
- 4.4 Warkworth

5. Conclusions

As a result of these flood events we are working with other Risk Management Authorities to identify the areas at greatest risk and prioritise those where funding can be secured to alleviate future flooding.

We are very keen to ensure that all Risk Management Authorities and riparian river owners are aware of their roles and responsibilities. During the flooding events of summer 2012, we developed a booklet which outlines these. This booklet can be downloaded via our website:

<http://www.northumberland.gov.uk/default.aspx?page=12684>

With regards to our duties stipulated in the Floods and Water Management Act (2010), we have investigated each individual flooding incident where it was deemed necessary; have informed each respective Risk Management Authority; and we have published the results of this investigation on our website.

6. Disclaimer

This report has been prepared as part of Northumberland County Council's responsibilities under the Flood and Water Management Act 2010. It is intended to provide background information to support the delivery of the local Flood Risk Management Strategy and should not be used for any other purpose.

The findings of the report are based on a subjective assessment of the information available by those undertaking the investigation and therefore may not include all relevant information. As such it should not be considered as an absolute assessment of all factors that may have caused or contributed to the flood event.

The opinions, conclusions and any recommendations in this report are based on assumptions made by Northumberland County Council when preparing this report, including, but not limited to those key assumptions noted in the report, including reliance on information provided by others.

Northumberland County Council expressly disclaims responsibility for any error in, or omission from, this report arising from or in connection with any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on circumstances encountered and information evaluated at the time of preparation and Northumberland County Council expressly disclaims responsibility for any error in, or omission from, this report arising from or in connection with those opinions, conclusions and any recommendations.

Northumberland County Council does not accept any liability for the use of this report or its contents by any third party.

Acronyms

EA – Environment Agency
FCERM – Flood and Coastal Erosion Risk Management
GIS – Geographical Information System
HA – Highways Authority
LLFA – Lead Local Flood Authority
NCC – Northumberland County Council
NWL – Northumbrian Water Ltd
ONS – Office for National Statistics
SFRA – Strategic Flood Risk Assessment
FAP – Flood Action Plan

Terms and Abbreviations

Culvert

A covered pipe or channel designed to prevent the obstruction of a watercourse or drainage path by an artificial construction.

Groundwater

Groundwater is all water that is below the surface of the ground and in direct contact with the subsoil or ground.

Lead local flood authority (LLFA)

In England this means—

- (a) the unitary authority for the area, or
- (b) if there is no unitary authority, the county council for the area.

Main rivers

Main rivers are usually larger streams and rivers, but some of them are smaller watercourses of local significance. In England Defra decides which watercourses are the main rivers, and the Welsh Government does this in Wales. Main rivers are marked on an official document called the main river map. Environment Agency local offices have copies of these maps. Main rivers can include any structure that controls or regulates the flow of water in, into or out of the channel.

Ordinary watercourse

An ordinary watercourse is every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows, but which does not form part of a main river.

Return Period

A return period is an estimate of the likelihood of a rainfall event which is expressed in years, i.e. 1 in 20 year return period.

Risk management authority

The following risk management authorities have powers over and responsibilities for watercourse management:

- The Environment Agency
- Lead Local Flood Authorities

Northumbrian Water Ltd are responsible for the public sewerage system within Northumberland.

Surface water runoff

Surface water runoff is rainwater, including snow. It is water on the surface of the ground, whether or not it is moving, which has not entered a watercourse, or drainage system.

Trash screen

A screen installed in a waterway to collect and prevent the passage of trash such as twigs, branches and litter.

Weir

A dam in a stream or river designed to raise the water level or divert its flow.

Useful links and contacts

Northumberland County Council

County Hall
Morpeth
Northumberland
NE61 2EF

Tel: 0845 600 6400

Email: ask@northumberland.gov.uk

Website: www.northumberland.gov.uk

Environment Agency

North East Area Office
Tyneside House
Skinnerburn Road
Newcastle Business Park
Newcastle-upon-Tyne
NE4 7AR

Tel: 03708 506 506

Email: enquiries@environment-agency.gov.uk

Website: www.environment-agency.gov.uk

Northumbrian Water

Boldon House
Wheatlands Way
Durham
DH1 5FA

Tel: 0845 717 1100 Floodline 0800 328 7648

Website: <https://www.nwl.co.uk/your-home/your-services/sewer-flooding.aspx>

Highways Agency

Lateral
8 City Walk
Leeds
LS11 9AT

Tel: 08459 55 65 75

Email: ha_info@highways.gsi.gov.uk

Website: www.highways.gov.uk

Appendix 1

Date	Areas affected by flooding	Source
December 1876	Waves flowing into streets of Blyth	SFRA
September 1890	Extraordinary high tide in Blyth, highest in 30 years, affected Cowpen Square, Havelock Street, Croft Road, Waterloo Hotel and houses close to Cambois Ferry, Grey Street and Turner Street (1 in 167 year return period)	SFRA
December 1921	In Blyth flood water flowing through the gratings covering the sewers, affected Park Road, Havelock Street, Croft Road, Regent Street, Turner Street, Cowpen Street and Cowpen Square (1 in 63 year return period)	SFRA
February 1924	Flooding in Blyth with overflow down Regent Street almost as far as Travellers Rest Hotel also affected business premises east of the Arcade and Turner Street (1 in 28 year return period)	SFRA
January 1953	Floods up to 1m (3 feet) deep caused by high tides land gales up to 82mph. Affected Golden Fleece, Regent Street, Waterloo Road, Havelock Street and Bondicar Terrace in Blyth	SFRA
	Flooding to the properties Berwick Pier Road	FAP
November 1954	Serious flooding in Blyth at High Ferry (1 in 38 year return period).	SFRA
January 1978	1ft was recorded along the Quayside at high tide, and waves were seen breaking over the sea wall at the Lifeboat Station - Seahouses	FAP
	Waters bypassed the flood bank, running just below road level it covered 50-60 yards of roadside - Alnmouth	FAP
	Roads and an unconfirmed number of properties were flooded at Amble Harbour were the sea was reported to have gone inland 30yds to the edge of the Fisheries building	FAP
	2 properties flooded by the Tweed at the Salmon Fisheries, Berwick	FAP
February 1978	Roads surrounding North Blyth were flooded. The Mini Roundabout and the road to the Working Mens Club were flooded, and the now dismantled Power Station was flooded to 300mm.	FAP

1983	Roads flooded in 1983 and one property was flooded on Riverside Road	FAP
1995	One property was flooded - Blyth (North Sea)	FAP
1996	Coastal roads were flooded at Beadnell	FAP
February 1997	Roads were flooded to a depth of 100mm due to high tide levels - Blyth (North Sea)	FAP
	1 property was flooded in 1997 by the old bridge, North Sea Berwick-upon-Tweed	FAP
	Waves exceeded pier wall at Holy Island	FAP
August 1999	Localised flooding in coastal areas.	SFRA
September 2002	Sea spray flooded the roads at Seahouses. Flooding is known to have happened in the past but details have not been recorded.	FAP
October 2005	The estuary broke its banks under the bridge in 2005, however sandbags prevented any damage to Properties. North Sea Berwick-upon-Tweed	FAP
March 2006	Riverside Walk was flooded to wading depth. Flooding generally occurs in this area due to high tides and the backing up of The Gut. Previous flooding also known but not recorded	FAP
	Lifeboat Slipway was submerged in tidal flood waters, flooding occurred along low-lying areas along Blakewell Street no properties were damaged - Berwick upon Tweed.	FAP
February 2007	Road at the Quayside, Berwick upon Tweed	FAP

Table A.1 – Known incidents of tidal flooding across Northumberland from 1876 to 2007.