



Stockton-on-Tees
BOROUGH COUNCIL

Stockton-on-Tees Local Flood Risk Management Strategy



Revision Schedule

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1. Executive Summary

Vision - To work with our partners in the Borough of Stockton-On-Tees to reduce the risk of flooding to residents and businesses and ensure that flood risk is managed in the most effective and sustainable way.

In England, 5.2 million properties are at risk of flooding. Of these, 1.4 million are risk from rivers or the sea, 2.8 million are at risk from surface water flooding and 1 million are at risk from both.

Stockton Borough has been subject to severe flooding in the last few years. Over 200 residents and businesses have suffered damage and disruption from severe weather events in September 2012, May 2013, September 2013 and December 2013.

In September 2012, the communities along Lustrum Beck were subject to severe flooding, following persistent rain and the wettest summer on record causing Lustrum Beck to overtop. Further severe weather events in May 2013 and September 2013 caused localised flash surface water flooding affecting some communities and many highways across the Borough. In December 2013, Stockton on Tees was hit by a severe event again, this time high tides coincided with a depression over the North Sea causing a tidal surge to affect the community of Port Clarence and businesses in the area. Both the incidents were investigated under section 19 of the Flood and Water Management Act 2010 and the reports published on the Stockton Council Website.

Following the major flooding incidents in the Borough in 2012 and 2013, the Council has invested in two high volume pumps and some temporary flood barriers which are more effective and can be deployed more efficiently than sandbags to protect certain areas. There is also an operational flood plan now in place, which provides comprehensive information on equipment, diversionary routes, flood barrier installation, key contact information and staffing to assist in any future incident.

There are currently two large flood alleviation schemes being constructed in the Borough at Port Clarence and Lustrum Beck, which will provide protection to residents and businesses who have been affected by the flooding in 2012 and 2013. The scheme at Lustrum Beck is a partnership between the Environment Agency and Stockton Borough Council, which has involved a new approach of bringing together a number of different elements to form a larger scheme with a good standard of flood protection overall, for a fraction of the cost of a single large scheme which would have been unaffordable under current Government funding arrangements. The scheme at Port Clarence is an Environment Agency project which was awarded accelerated delivery funding and is a two phase scheme involving raised defences in the Port Clarence and Greatham Creek areas.

There have also been a number of smaller schemes addressing maintenance and run-off issues, including the Council's first property level protection scheme which has been installed at Ilkeston Walk in Hardwick, where a number of properties were internally flooded from surface water run-off.

When the large schemes are complete many of the main river fluvial and tidal risk areas in the Borough will have some standard of flood protection but still a large number of households are at risk from flooding by surface water, sewer flooding and flooding from ordinary watercourses, with climate change the risk of flooding will only increase from all sources. This strategy seeks to identify objectives and methods of managing this risk, through new development, effective maintenance and innovation. The risk management authority for sewer flooding is Northumbrian Water and the Council has regular liaison meetings with Northumbrian Water to address flooding issues.

In April 2015, Stockton Borough Council as a Lead Local Flood Authority became a statutory consultee of the planning process. The flood risk team now provide a response to all major planning applications (10 properties or more) and can provide pre-application advice to developers on drainage and flood risk reduction. Surface water drainage strategies are a key consideration for major development, where the

proposals must not increase the risk of surface water run-off or the risk of flooding to neighbouring sites or downstream of the development.

Sustainable drainage is critical to achieving effective surface water management and the Authority is developing its policy in this area. The five Tees Valley Authorities (Middlesbrough, Stockton, Darlington, Hartlepool and Redcar and Cleveland Councils) have worked together to produce technical guidance for sustainable drainage systems, which supports the National Standards produced by the Department for Environment, Food and Rural Affairs (DEFRA).

In the future, maintenance and improvements to flood risk assets and drainage systems will be a critical area in managing flood risk, therefore the Authority is capturing data and considering future asset management. A programme of inspection of ordinary watercourses is underway which will provide additional information for the Flood Risk Asset Register, a requirement of the Flood and Water management Act 2010.

In order to manage drainage systems cost effectively, it is necessary to have a robust drainage asset management strategy. The strategy must be able to support and inform decision making that address the need to deliver highway maintenance in a way that balances growing service demands with reducing resources.

Since the introduction of the Flood and Water Management Act in 2010, all reported flooding to the Authority is logged and has been risk assessed, each incident has then been screened to see if it was a one-off and resolved, such as a blocked gully or whether repetition is likely. Areas at risk have then been prioritised according to whether incidents are causing internal property flooding, this will form the basis for development of schemes and future bids to Government, where essential criteria are met. Successful bids are allocated funding in a given year and will go forward into the flood risk programme of work.

2. Introduction

2.1 Legislation

2.1.1 Flood and Water Management Act 2010

Following the 2007 floods Sir Michael Pitt, commissioned by Government, produced the 'Lessons learned from the 2007 summer floods'. The Government accepted the 92 recommendations made in the report, and in 2010 the recommendations were transposed into UK Law in the form of the Flood and Water Management Act 2010.

Under this Act county councils and unitary authorities were given new roles and responsibilities for local flood risk management.

A summary of the new duties and responsibilities;

| | |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Information Sharing | <p>All flood risk management authorities must co-operate with each other. The act also provides lead local flood authorities and the Environment Agency with a power to request information required in connection with their flood risk management functions</p> |
| Managing Flood Risk | <p>A Lead Local Flood Authority is responsible for the management of local flood risk in its area.</p> <p><i>The definition of Lead local flood authority in relation to an area in England means</i></p> <p><i>(a)the unitary authority for the area, or</i></p> <p><i>(b)if there is no unitary authority, the county council for the area.</i></p> <p>Local flood risk is from an ordinary watercourse, surface water or groundwater source.</p> |

| | |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Investigation of Flooding Incidents | 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. Section 5.3.1 provides further information on the duty to investigate. |
| Asset Register | Section 21 of the Flood and Water Management Act, to maintain a register of structures and features which are likely to have a significant effect on flood risk in their area. |
| Designation of features | <p>A designating authority may designate a structure, or a natural or man-made feature of the environment.</p> <p>If the designating authority thinks the existence or location of the structure or feature affects flood risk, or coastal erosion risk.</p> <p>A person may not alter, remove or replace a designated structure or feature without the consent of the responsible authority. A designation is a local land charge.</p> |
| Land Drainage Consent | The Flood and Water Management Act amends Section 23 of the Land Drainage Act 1991. The powers for provision of consent on an ordinary watercourse transfer from the Environment Agency to the Lead Local Flood Authority. Consenting powers for main rivers remain with the Environment Agency. |
| Local Strategy | A lead local flood authority must develop, maintain, apply and monitor a strategy for local flood risk management in its area (a "local flood risk management strategy"). |
| Statutory Consultee to the Planning Process | <p>In exercising a flood or coastal erosion risk management function, an authority listed in subsection (3) must aim to make a contribution towards the achievement of sustainable development.</p> <p>From April 2015, the Lead Local Flood Authority will become a statutory consultee of the planning process.</p> |

2.1.2 Flood Risk Regulations 2009

The EU Floods Directive defines flood risk:

“the temporary covering by water of land not normally covered by water”

Under the Flood Risk Regulations 2009, each Local Authority is required to produce a Preliminary Flood Risk Assessment (PFRA) for their area. The PFRA for Stockton on Tees was produced in 2011 and can be found at <https://www.stockton.gov.uk/flooding>

2.1.3 Land Drainage Act 1991

The Land Drainage Act 1991 sets out the powers and responsibilities to different bodies including riparian land owners.

Various drainage authorities, such as the Local Authority, Environment Agency and Internal Drainage Boards are granted powers under the Land Drainage Act 1991. There are no Internal Drainage Boards operating in the Borough of Stockton on Tees.

The powers under the Land Drainage Act 1991 are permissive and the decision on whether to exercise those powers rests with the relevant authority.

The most relevant sections of the Land Drainage Act 1991 to the Local Authority are as follows:

Section 14: The power for a local authority to perform works for the prevention or mitigation of flooding risk other than in connection with a main river.

Section 25: The power to serve notice on persons requiring them to carry out necessary works to maintain the flow of any water course and the power to carry out works in default and recover its reasonable expenses should the riparian owner fail to carry out their responsibility.

2.1.4 Other Legislation

Flood and coastal risk management is affected by a range of other legislation, policies and non-statutory plans, the most significant of which are listed below:

- The Climate Change Act (2008)
- The Conservation of Habitats and Species Regulations (2001)
- The Civil Contingencies Act (2004)
- The Strategic Environmental Assessment (SEA) Directive (2001)
- The Water Framework Directive (WFD)

2.1.5 Local Plans

There are a number of other plans relating to flood risk management which have been produced locally either by Stockton on Tees Borough Council or the Environment Agency.

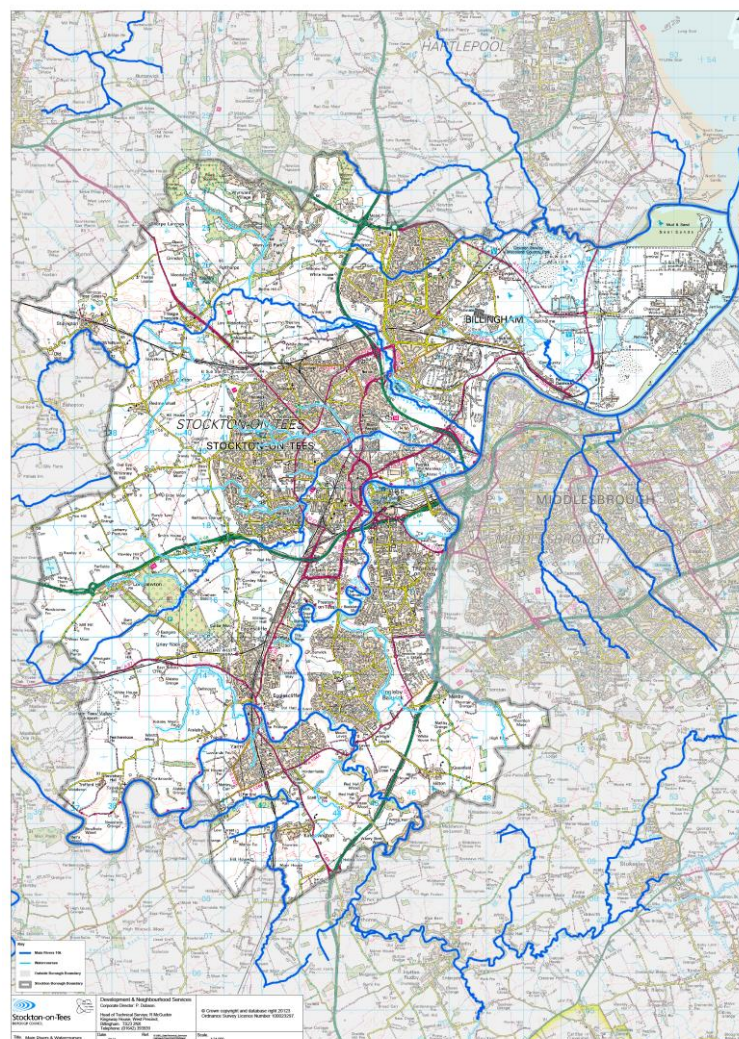
- Preliminary Flood Risk Assessment for Stockton on Tees (2011)
- Strategic Flood Risk Assessment level 1 and 2 for Stockton on Tees (2007 & 2010)
- Tees Tidal Strategy (EA)
- Catchment Flood Management Plan (EA)
- Stockton Borough Council Operational Flood Plan (2014)
- Tees Valley Water Cycle Study (2013)
- Tees Valley Investment Plan (Flood Risk Management) (2015)

3. Background

3.1.1 Stockton on Tees

The major watercourses in the borough are the River Tees, Lustrum Beck, River Leven, Cowbridge Beck, part of the Old River Tees, Homefleet Beck, Saltergill Beck and Billingham Beck which are all classified as Main Rivers. The main source of flooding in the borough is tidal and fluvial from the River Tees and other urban watercourses. Certain areas can also be prone to surface water flooding.

The tidal flood risk is particularly extensive, large parts of the industrial area on the north bank of the Tees Estuary and other, more central parts of the Borough, at risk. Tide locking (prevention of fluvial flow discharging due to high tide levels) is also a contributing factor on many watercourses that flow into the tidal Tees.



3.2 Flood Risk in Stockton Borough

There are a number of areas in the Borough, which are at risk of flooding from various sources, in Stockton the majority of flooding is from fluvial, tidal, sewer or surface water sources. The plans in Appendix A and B are the Environment Agency's Flood maps; they show the Boroughs risk of fluvial/ tidal and surface water risk areas respectively. The areas shown on the risk plans may not have a previous history of flooding incidents however are deemed to be at risk due to the topography and their location in relation to water sources.

Some of the key risk areas are shown below;

| Location | Risk | Source | Maps |
|----------------------------------------|--------------------------|--------------------------------------------------------------------------|------------|
| Central Yarm | Fluvial Surface water | River Tees Drainage system when tide locked | Appendix C |
| Browns Bridge/ Wrensfield | Fluvial Surface water | Lustrum Beck and tributaries, drainage system when tide locked | Appendix D |
| Hartburn and Oxbridge | Fluvial Surface water | Lustrum Beck and tributaries, drainage system when tide locked. | Appendix E |
| Port Clarence and Billingham Reach | Tidal | River Tees | Appendix F |
| Halidon Way, Billingham | Fluvial Surface Water | Cowbridge Beck, Surface run off | Appendix G |
| Aislaby, Nelly Burdons Beck area | Fluvial | Nelly Burdons Beck | Appendix H |
| Billingham Bottoms | Fluvial Surface Water | Billingham Beck & tributaries, drainage system when tide locked | Appendix I |

| | | | |
|---------------------------------------------------------|---------------|--------------------------------------|------------|
| Cleadon Avenue/ Tunstall Avenue shops, Billingham | surface water | Sewerage/ drainage system | Appendix J |
| Cowpen Village | surface water | Surface run-off/ drainage system. | Appendix K |
| Lewes Way | Fluvial | Cowbridge Beck | Appendix L |

3.3 Types of Flooding

3.3.1 Tidal flooding

Tidal flooding is flooding from the sea and tidal rivers, which is a particular risk when very high tides and inclement weather combine; a large industrial area of the Borough is at risk from tidal flooding, along with the community of Port Clarence.

- **High astronomical tide level:** cyclical variation in tide levels due to the gravitational effects of (mainly) the sun and moon. These effects lead to the twice daily variation between high and low tide, and to the spring – neap tide cycle, which occurs approximately monthly, largely controlled by the phases of the moon.
- **Surge** an increase in water level above the astronomical tide level caused by low barometric pressure exacerbated by the wind acting on the surface of the sea (also known as “set-up”).
- **Wave action** dependent on wind speed, wind direction, fetch length, local topography and exposure. Waves can be in the form of sea-scale swell waves, of more local sea surface waves.



Port Clarence Road – December 2013

3.3.2 Main River flooding

River flooding also known as fluvial flooding occurs when levels from the river become so high that they over top or breach their banks or flood defences, if any are installed. Main rivers are usually the larger streams and rivers, but some are small watercourses of local significance, they are shown on the Environment Agencies Main River Map. The Environment Agency is the risk management authority for main rivers; they have duties and powers relating to them. In Stockton, The Tees, The Leven, Lustrum Beck, Billingham Beck, Cowbridge Beck, Holme Fleet Beck, Saltergill Beck and part of the Old River Tees are all classified as main rivers.



Yarm – September 2012

3.3.3. Ordinary Watercourse flooding

Ordinary watercourses are every river, stream, ditch, sluice or drain, where water flows but are not main rivers (as described above). The local authority is the risk management authority for ordinary watercourses and has similar powers to the Environment Agency. Flooding can occur when the flows in the watercourse become too great for its capacity, if the watercourse becomes obstructed or it cannot discharge into a main river because the levels in the main river are too high.



Grays Road – September 2012

3.3.4. Sewerage flooding

Flooding from sewers can originate from several sources; surface water, foul and combined sewers and rivers flooding into the sewerage network. The main causes of sewerage flooding are; blockages, defects such as collapsed sewers, mechanical failure such as pumping failures or overloaded sewers (flows are too great for the size of the sewer).

Where possible surface water sewers may discharge into watercourses, additionally some combined sewers are designed to discharge excess flows into watercourses during significant rainfall events. These excess flows are agreed by the Environment Agency to ensure that the receiving watercourse can accept flows without causing any issues to them. Sometimes during long periods of wet weather or very heavy rainfall, these outfalls cannot discharge due to the raised level of the receiving watercourse.

3.3.5. Highway drainage

Highway drainage is the network of gullies, pipes and culverts that drain water from roads and footpaths. This system may connect to the sewerage system operated by Northumbrian Water or it may discharge into watercourses or retention facilities such as balancing ponds. Highway drainage can flood from blockages, defects such as collapsed drains, lack of capacity in the system or due to the inability to discharge into a watercourse or balancing pond due to the levels in that body of water being too high.

3.3.6. Culvert issues

A culvert is a covered channel or pipe, a culvert allows the watercourse to flow along its natural path without obstruction by construction of any infrastructure for example a highway. Some culverts have trash screens or 'grids' at either end to prevent obstructions entering the culvert and unauthorised access. These trash screens collect debris and require regular maintenance or in themselves can become a cause of flooding.

3.3.7. Run off

Run off from land or over land flows of water can be a cause of flooding, particularly in situations of prolonged rainfall where ground becomes saturated, or the natural water table is high and also in extreme events where the rainfall is so intense the ground is unable to drain, the water follows the natural topography of the land and will collect at a low point.



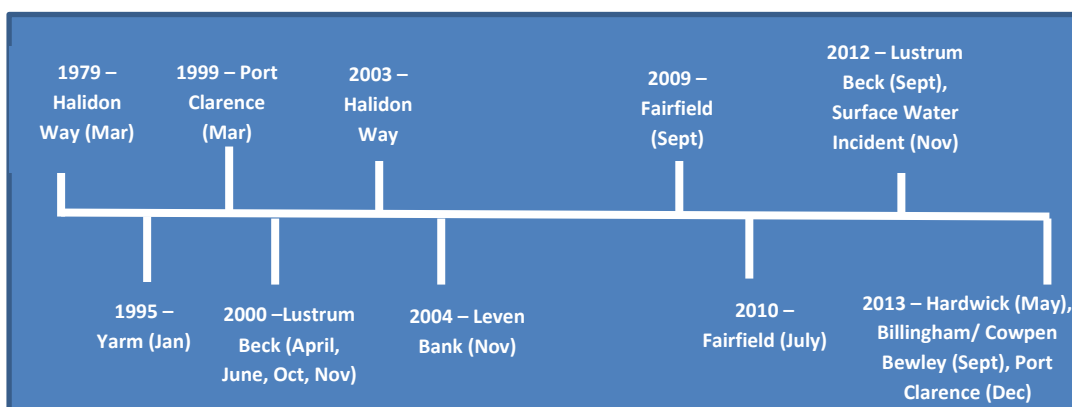
Ilkeston Walk – May 2013

3.3.8. Ground water

Groundwater flooding is the emergence of groundwater at the ground surface away from main rivers or ordinary watercourses, or it can also be the rising of groundwater into man-made ground, under conditions where the 'normal' ranges of groundwater level and groundwater flow are exceeded.

3.4 History of Flooding

Stockton-On-Tees Flooding Timeline



3.4.1 Yarm

An intense storm hit Yarm on 31st January & 1st February 1995 and flooding was caused by surcharge from surface water drainage system serving the

Town Centre. The flooding affected gardens, car parks, the Tannery Housing Site and the High Street but did not affect any properties. Cleveland Fire and Rescue Service managed to contain the flood water at acceptable levels within Yarm High Street.

High river levels caused surcharging of the highway drainage system onto the High Street in September 2012; however no property was internally flooded.



Yarm High Street – September 2012

3.4.2 Lustrum Beck

Lustrum beck has a record of flooding dating back to 1771 with a severe flood occurring on the 29th of March 1979 which included substantial flooding of land, residential and commercial properties. Further floods occurred in April, June, October, and November 2000 all of which affected properties along Hartburn Avenue and the area around Browns Bridge. It was reported that properties along Darlington Road, Burnside Grove, Oxbridge Lane, Bishopton Road, Wrensfild Road, the Adult Training Centre, Newtown Methodist Church, Kingdom Hall and Wrensfild School were also affected by flooding during the severe event in November 2000.

Following the summer of 2012 which was the wettest ever recorded leading to saturated ground and high river levels. On the 25th and 26th September 2012 after more than 24 hours of persistent heavy rain, the Lustrum Beck area experienced the worst flooding in decades.

The most severely affected were the communities along Lustrum Beck at Browns Bridge, Oxbridge, Burnside Grove and Darlington Road. We estimate that in the region of 150 properties and businesses were affected internally but the exact number may never be known as not all residents report flooding to their properties. <https://www.stockton.gov.uk/flooding>



Bishopton Road – September 2012

3.4.3 Norton

The residents living in Norton near to Billingham Beck were also subject to internal Flooding at the same time as the Lustrum Beck flooding incident, on 25th September 2012. The Billingham Road and Chesham Grove areas were particularly badly affected. The trunk road network (A19/A66) was also severely affected leading to wide spread traffic disruption.



Rear of Chesham Grove – September 2012

3.4.3 Halidon Way, Billingham

Over recent years there have been several instances of flooding in and around Halidon Way in Low Grange, Billingham. The most notable of which was the event which occurred in March 1979, resulting in 68 dwellings being flooded, some to depths in excess of 1 metre.

Following the 1979 event, a number of works were implemented to reduce the impact and risk of repetition. The work comprised the construction of a new trash screen at the entrance to the culverted section of Cowbridge Beck, sealing the pedestrian subway on Neasham Avenue and constructing an earth bund around the perimeter of the Billingham Campus playing field.

During heavy rainfall in 2003, several properties of Halidon way, Billingham suffered from internal flooding. It was reported that the flooding seemed to originate from two areas surface water run-off from within the curtilage of Oakdene School, other water running off Neasham Avenue down into Halidon way.

Halidon Way was subject to flooding again in September 2013, when localised intense rainfall hit the Billingham and Cowpen Bewley areas causing surface

water flooding, affecting a number of individual properties in the area and the shops.

3.4.4 Leven Bridge, Low Lane (A1044)

In November 2004, the River Leven burst its banks from continuous heavy rainfall and flooded carriageway and nearby houses including Cross Keys (PH). Leven Bridge was closed by police on the night of the 2/3 November due to water flowing across the road. The River Leven is classed as Main River and flood risk management is the responsibility of the Environment Agency.



Leven Bridge – September 2012

3.4.5 Fairfield, Stockton on Tees

An intense storm hit the Borough of Stockton on Tees on the 21st July 2010; one area hit particularly badly was Fairfield, where several properties suffered from internal flooding. The area affected by flooding included Victoria Road, Blackburn Close, and Logan Drive. It was reported that the flooding occurred due to the drainage exceeding its capacity within the area.

In September 2009, surface water flooding across Stockton Borough occurred along with drainage exceeding its capacity in several places across the

Borough. One area hit hard which included internal flooding was Fairfield. It was reported that properties on Victoria Road, Logan Drive, Blackburn Close suffered flooding.

Northumbrian Water has since carried out works to reduce the risk of flooding within the area. Since the scheme was installed, we have not had any reports of flooding.

3.4.6 Port Clarence

In March 1999 substantial flooding occurred due to heavy rain and peak flows unable to pass through Holme Fleet culvert, which is located to the north of Port Clarence. It was reported that the culvert was blocked at the time by material which had entered the access chambers.

On the 8th November 2000 between 2-4am an intense storm hit the area of Port Clarence where approximately 16 properties suffered from internal flooding with flood water reaching ground floor level. The properties affected included Holly Terrace, High Clarence, Palm Terrace and Laburnum Grove, Port Clarence. There were also a number of properties that suffered flooding to their gardens within the Port Clarence area. It was reported that the flooding occurred due to Holme Fleet Beck bursting its banks due to heavy rainfall.

Following these events Stockton Borough Council desilted the culvert and improvements were made to the inlet. In spring 2006 a pre-feasibility study was completed and concluded that the risk presented from tide locking of the outfall is insignificant. It was concluded that future operations and maintenance activities along Holme Fleet should be focussed on keeping the culvert free from blockage. In April 2005 Holme Fleet Beck was classified as Main River and became the responsibility of the Environment Agency.

On Thursday 5th December 2013, Port Clarence was again subject to severe flooding. A high spring tide was forecast; the tide at Teesport was due to peak at 1704 hrs. At a height of 2.85m AOD (Above Ordnance Datum). The forecast metrological conditions on that day were a strong off shore wind, with a deep area of low pressure forming in the North Sea; it was this low pressure system that caused the positive surge, on top of the already high tide. The positive

surge measured 1.24m above the spring tide, giving a total tide height of 4.09m AOD (Above Ordnance Datum), which exceeded previous historical events.

The main source of flooding from this particular weather event was tidal flooding as described above, seeing defences overtopped and a major breach of the flood defence at Greatham Creek.

The incident caused damage and disruption, with up to 32 residential properties recorded as being internally flooded in Port Clarence, along with 20 businesses both large and small, in Port Clarence, Billingham Reach Industrial Estate and Seal Sands. There was also the additional issue of severe transport disruption due to three major highways being flooded, including the closure of the A19 Portrack interchange; this is one of the busiest interchanges in the area, which sees the secondary road network connect to the A19 Trunk Road (North and South). The A178 was completely closed for approximately 2 months, due to the breach of defences at Greatham Creek and the A66 trunk road was also partially closed at Teesside Park.

At the peak of the event approximately 250 residents were evacuated from Port Clarence and taken by bus to Billingham Forum, which had been set up as a rest centre, where they were given food and other essential items. The majority of the residents returned to their properties when it was safe to do so, although up to 20 residents chose to stay for the night at the rest centre.

A flood bank on the Southern side of Greatham Creek, downstream of the A178 failed during the tidal event, leading to a very significant breach in the defences. The Environment Agency mobilised immediately and engaged the military, as there was no access to the breach due to the wide spread flooding. A large area of land was flooded due to the breach which had a significant impact on the local industry and infrastructure but also the wider chemical industry, due to businesses having to shut down and breaking the supply chain.

<https://www.stockton.gov.uk/flooding>



Port Clarence – December 2013

4. Local Flood Risk Management Strategy

4.1 Purpose

Local Flood Risk Management Strategies: England

A Lead Local Flood Authority for an area in England must develop, maintain, apply and monitor a strategy for local flood risk management in its area.

Local Flood Risk means flood risk from surface water, groundwater and ordinary watercourses

Stockton Borough Council Flood Risk Management Strategy assesses local flood risk within the Borough and sets objectives for managing this risk. The strategy will detail mechanisms for achieving the objectives and seeks to reduce the risk of flooding to residents of Stockton-On-Tees.

4.2 National Flood Risk Management Strategy

The National Flood and Coastal Erosion Risk Management Strategy for England; Understanding the Risks, Empowering Communities, Building Resilience. The strategy builds on existing approaches to flood and coastal risk management and promote the use of a wide range of measures to manage risk. It states that risk should be managed in a co-ordinated way within catchments and along the coast and balances the needs of communities, the economy and the environment.

It is a framework within which communities have a greater role in local risk management decisions and sets out the Environment Agency's strategic overview role in flood and coastal erosion risk management (FCERM). This approach is aligned with the recommendations made by Sir Michael Pitt in his review of the summer 2007 floods. The strategy encourages more effective risk

management by enabling people, communities, business, infrastructure operators and the public sector to work together to:

- ensure a clear understanding of the risks of flooding and coastal erosion, nationally and locally, so that investment in risk management can be prioritised more effectively;
- set out clear and consistent plans for risk management so that communities and businesses can make informed decisions about the management of the remaining risk;
- manage flood and coastal erosion risks in an appropriate way, taking account of the needs of communities and the environment;
- ensure that emergency plans and responses to flood incidents are effective and that communities are able to respond effectively to flood forecasts, warnings and advice
- Help communities to recover more quickly and effectively after incidents.

The strategy shows how communities can be more involved in local flood and coastal erosion risk management. It also emphasises the need to balance national and local activities and funding. In setting out future approaches to FCERM, this strategy considers the level of risk and how it might change in the future, the risk management measures that may be used, roles and responsibilities, future funding and the need for supporting information.¹

4.3 Other Policies and Strategies relating to flood risk

The River Basin Management Plan, (Northumbria River Basin District, revised December 2015) is the plan for delivery of the Water Framework Directive in the region. Its focus is to improve the ecological qualities of water bodies (sea, rivers, streams, ponds, etc).

Catchment Flood Management Plans are high-level strategic plans through which the Environment Agency, working with key decision-makers within a river catchment, identify and agree policies for sustainable flood risk management.

Shoreline Management Plans are strategic plans for the long-term management of the coast. There are no plans covering Stockton Borough as there is no coastline to consider.

Strategic Flood Risk Assessment (SFRA); level 1 was produced in 2007 as part of the strategic planning process and informs the Local Development Frameworks/ Local Plan. A Level 2 SFRA was completed in 2010, which identified a number of candidate Critical Drainage Areas (cCDAs)

Water Cycle Study (WCS)

The Tees Valley Water Cycle Study objective of the WCS is to identify any constraints on housing and employment growth, planned for the area up to 2026, which may be imposed by the water cycle and how these can be resolved. The main purpose of water cycle management is to make better use of the water that we have, which aligns well with many fundamental FRM concepts (i.e. delaying run off and holding water where it can be tolerated and used).

Preliminary Flood Risk Assessment (PFRA)

The purpose of the PFRA report is aimed at providing a strategic assessment of flood risk from local sources including surface water, groundwater, ordinary watercourses and canals. The report is a high level screening exercise using readily available data held by Stockton Borough Council and partnering organisations. The report looks at historical past flood events and considers the potential future flood events that may have a significant consequence on human health, economic activity and the environment including cultural heritage.

Tees Valley Investment Plan

The Tees Valley investment Plan was commissioned in 2014 to develop a Flood Mitigation Investment Strategy for the Tees Valley. The purpose of the plan is to assist the Tees Valley Local Authority's to identify and prioritise

locations where efforts should be concentrated when considering surface water flood risk.

The project has involved development, and implementation, of a standardised approach that was applied to each of the five council areas in order to provide each authority with a prioritised list of locations where surface water flood risk is a potential issue.

Stockton has considered the locations identified in the plan, applied its own flood risk matrix and added the locations in a suitable priority in the flood risk programme. The highest risk location in Stockton Borough in the Tees Valley Investment Plan was shown to be Halidon Way in Billingham, which already has a long established history of flooding.

5. Working together

5.1 Partnership working

Pitt Review – Recommendation 15:

“Local authorities should positively tackle local problems of flooding by working with all relevant parties, establishing ownership and legal responsibility.”

Stockton Borough Council participates in a number of forums along with partners and other Tees Valley Authorities. These forums include;

Tees Valley Strategic Flood Risk Management Partnership

Stockton Borough Council chairs the Flood Risk Partnership for the Tees Valley. The group is attended by a representative from each Tees Valley Authority, an Elected Member from each Authority, Environment Agency, Northumbrian Water, and the Emergency Planning Unit. The group's terms of reference are to discuss flood risk at a Tees Valley regional level, emerging legislation, local priorities, cross boundary working and local standards.

Northumbrian Water Liaison Meetings

Stockton Borough Council attends quarterly NW liaison meetings where representatives from the following areas attend, flood risk management, development services, spatial planning, building control and environmental health. The purpose of the liaison meetings is to discuss any major works programmed by NW or SBC, any potential major developments within the borough and local sewerage and surface water issues.

Local Resilience Forum, (LRF)

The Local Resilience forum (LRF) is responsible for emergency planning and civil contingencies across; Hartlepool, Stockton, Redcar and Cleveland and Middlesbrough. The LRF undertakes risk assessments and production of the community risk register of hazards that may lead to a flood risk. The Flood and Adverse Weather Group (FAWG) is a sub group of the LRF and deals specifically with flooding and weather related issues.

Northumbria Regional Flood and Coastal Committee, (NRFCC)

Cabinet Member for Environment attends the NRFCC on behalf of Stockton Borough Council; a Senior Officer may attend with or substitute for the Cabinet Member. The Group discusses and/ or approves financial matters, funding, major schemes and emerging legislation.

Inland Liaison Meeting

The group is hosted by the Environment Agency and is attended by Lead Officers from all the North East Local Authorities and Northumbrian Water, the group's remit is emerging legislation, joint training initiatives, regional issues and best practise.

Strategic Prioritisation

The Group is hosted by Northumbrian Water, attended by all North East Local Authorities and the Environment Agency. The terms of reference are regional prioritisation of surface water and sewerage issues, modelling work and partnership investment.

Darlington Partnership

Stockton Borough Council have a contract with Darlington Borough Council, where Stockton carries out the Lead Local Flood Authority duties on behalf of Darlington in their Borough, the duties include investigation of flooding incidents, technical advice on planning applications and drainage issues, provision of land drainage consents on ordinary watercourses and development of an asset register. We are also sharing a resource for ecological advice by using Darlington's Ecologist for advice on sustainable drainage systems.

Project Boards/ Meetings

A number of project boards and meetings take place for all major schemes and joint working between Lead Local Flood Authorities and risk management authorities.

5.2 Roles and responsibilities

5.2.1 Lead Local Flood Authority

The Lead Local Flood Authority (LLFA) is the unitary authority or if there is no unitary authority then the County Council for the area. Stockton Borough Council is the Lead Local Flood Authority in its area. The LLFA has powers and responsibilities for flood risk management. The Technical Services Division of Stockton Borough Council has responsibility for Flood Risk Management and carrying out the LLFA role, which includes investigation of flooding incidents under Section 19 of the Flood and Water Management Act 2010. The LLFA have powers over ordinary watercourses and not main rivers as these come under the jurisdiction of the Environment Agency.

5.2.2 Stockton on Tees Borough Council

Stockton on Tees Borough Council is the Highway Authority and as such has a duty to maintain the highway under Section 41 of the Highways Act 1980 and have responsibilities for highway drainage. Stockton Council's Direct Services Division are responsible for highway drainage and clearing trash screens on highway culverts, all trash screens receive regular inspections and maintenance is carried out as necessary. There is also a wet weather list of problem areas, whereby screens are checked when a warning of severe weather is received. Direct Services operates a 24 hour call out service and will respond to flooding incidents.

Stockton Council's Economic Growth and Development Services is responsible for Highways structures, which are routinely inspected once every two years.

5.2.3 Environment Agency

The Environment Agency has powers and responsibilities for flood risk management on the main river network (main rivers are defined in paragraph 4.1) and also the sea. This includes providing a flood warning service. The Environment Agency can carry out flood risk management work, such as installation and operation of flood alleviation measures on main rivers, an example of this are the flood gates at Yarm. The EA maintains flood risk assets such as flood banks to manage water levels and ensure flood water can flow freely. The EA can also carry out work to prevent environmental damage to

watercourses or to restore conditions. If a main river becomes blocked by an obstruction then, once notified the EA will remove it.

5.2.4 Northumbrian Water

Northumbrian Water is the water distribution and sewerage company which covers the Stockton on Tees Borough Council area. Northumbrian Water is responsible for all public combined, foul and surface water sewerage systems. Following sewerage flooding due to its assets Northumbrian water will arrange for the area to be inspected and take any action deemed appropriate.

5.2.5 Highways England

Highways England is responsible for the Trunk Road network and associated drainage which includes culverts under Trunk Roads and balancing ponds. In Stockton-on-Tees, Highways England is responsible for the A19 and A66. The A66 is operated by Aone on behalf of Highways England and the A19 is operated by Autolink on behalf of Highways England.

5.2.6 Riparian Landowners

Riparian landowners are those who own land adjoining a watercourse. As detailed with the EA document 'living on the Edge', 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 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 responsibilities².

5.3 Duties and Powers

5.3.1 Investigation of Flooding Incidents

Stockton Borough Council as LLFA has the duty to investigate a flood event when considered necessary or appropriate under Section 19 of the FWMA.

Section 19 Local authorities: investigations

- (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 investigation under subsection (1) it must –
- a) publish the results of its investigation, and
 - b) Notify any relevant risk management authorities.

Flood and Water Management Act (2010), S.19, c.29, London: HMSO³

The Tees Valley authorities through the Tees Valley Strategic Flood Risk Partnership agreed that an investigation for a flood event, is deemed locally significant and considered appropriate, if one or more of the following is affected by flooding:

- 5 or more residential properties;
- 2 or more businesses;
- 1 or more critical services;
- 1 or more transport links (Impassable for 10 Hours or more).

6. Funding

6.1 Flood Defence Grant in Aid

In 2012/13 a new approach to funding of flood alleviation schemes was introduced, based on the outcomes of the proposed schemes. Flood and Coastal Resilience Partnership funding, was designed to allow more schemes to proceed and receive some level funding.

A cost-benefit analysis is carried out on the schemes and outcome measures calculated to ascertain the amount of funding a scheme could receive. Additional funding required would need to be secured through other sources to enable a scheme to proceed.

Local Authorities have the opportunity to bid for Flood Defence Grant in Aid funding and propose schemes for future years. All proposals are assessed and if successful they are allocated to the Medium Term Plan for funding in a given year.

6.2 Local Levy

An annual levy is charged to each Authority based on the numbers of properties in its area, within a Council Tax banding. The total sum raised from all North East Local Authorities is open to bids from the Councils or the Environment Agency and is usually used to match fund Flood Defence Grant in Aid.

The amount of levy allocated to projects is discussed by the Programme and Investment sub group of the RFCC (Regional Flood and Coastal Committee). The Regional Flood and Coastal Committee consists of Elected Members from each Local Authority and attended by Officers from a range of interested organisations. The final programme for funding is decided at the RFCC meeting on an annual basis and changes need to be agreed at the committee.

6.3 Surface Water Disposal Service Charge

Since April 2015, all new major developments (10 properties or more) will need to incorporate a means of surface water disposal, through the use of sustainable drainage systems.

Sustainable drainage systems will need to be maintained for the life time of the development and there are various options for this maintenance, through the local Authority, a management company appointed by the developer or the local water and sewerage company (Northumbrian Water in Stockton Borough).

A surface water disposal charge will be levied on all properties served by a sustainable drainage system regardless of who maintains the system and the monies raised from the charge will fund the maintenance of that system. The level of charge is specific to a development and is determined by the cost of maintenance over the life time of the system. All properties on a development, using the same system will pay the same charge however charges may vary from development to development, as drainage systems can be very different and are specific to a development.

6.4 Private Funding

Recent changes to Flood Defence Grant in Aid (FDGiA), allows private contributions; private funding enables schemes that are unable to achieve a high cost benefit score, required for full funding from FDGiA to be delivered. Local businesses, commercial organisations, private individuals, anyone who may benefit from a flood defence scheme maybe asked to contribute to make up the shortfall for these schemes.

6.5 S106 Funding – Developer Contributions.

The Town and Country Planning Act 1990, Section 106; allows a local planning authority to enter into an agreement with a landowner/ developer when granting planning permission.

The agreement is used to address issues and secure funding to support the development through service or infrastructure improvement.

6.6 Community Infrastructure Levy (CIL)

The Community Infrastructure Levy came into force in April 2010. It allows local authorities in England and Wales to raise funds from developers undertaking new building projects in their area. The money can be used to fund a wide range of infrastructure that is needed as a result of development. This includes new or safer road schemes, flood defences, schools, hospitals and other health and social care facilities, park improvements, green spaces and leisure centres.

6.7 Repair and Renew Grant

Following an announcement by the Prime Minister on 12 February 2014, the Repair and Renew Grant (RRG) scheme was established to provide grants of up to £5,000 to homeowners and businesses that have been flooded between 1 April 2013 and 31 March 2014, to implement flood resistance and/ or resilience measures to minimise the impact of any future floods.

A number of properties and businesses in the area were eligible due to the tidal flooding incident in December 2013 and were assisted with the scheme by the Council. The scheme has now closed with all work being completed and funding claimed by September 2015.

6.8 Other Funding

The Council actively seeks grant funding for schemes, all opportunities are considered and where appropriate the Council will submit a bid. Sometimes grants are available purely for flood risk but often we look to fund flood risk improvements along-side other proposals such as highways improvements. Integrating improved surface water and flood risk management measures into wider green infrastructure projects may also unlock additional funding.

7. What do we want to Achieve?

Objective 1

Reducing Flood Risk to Communities severely affected by recent flooding

How will we do it?

- Supporting the Environment Agency Flood Alleviation Scheme at Port Clarence and Greatham South.
- Working in partnership with the Environment Agency to deliver a flood alleviation scheme at Lustrum Beck. The Council is delivering the Londonderry Bridge, Wrensfeld Road sustainable drainage system and demolition elements of the scheme.
- Installation of a property level protection scheme in Hardwick
- Future scheme at Halidon Way
- Supporting residents and businesses with the Repair and Renew Grant
- Investigation of flooding incidents.
- Temporary flood barriers
- Partnership working with risk management authorities
- Where feasible, develop and manage green infrastructure to reduce or slow the rate of surface water run-off and provide temporary flood storage.

Objective 2

Reducing in the incidence of Surface Water Flooding

How will we do it?

- Pioneer Maintenance of ordinary watercourses.
- Inspection and maintenance of trash screens.
- Flood risk features recorded on an asset register
- Ordinary watercourse inspections
- Investigation of flooding incidents

- Incident mapping
- Regulation of work on ordinary watercourses
- Designation of flood risk features

Objective 3

Ensuring Flood Risk is managed in new development

How will we do it?

- Statutory consultee on major planning applications
- Ensuring discharge is appropriately restricted and surface water attenuated on site
- Sustainable drainage systems incorporated into major new development
- Encourage pre-planning discussions with developers
- Surface water disposal charge on new development to pay for maintenance of the system.
- Design standards for sustainable drainage systems.
- National Planning Policy Framework (NPPF) maintains strong planning policy on avoiding and managing flood risk, based on the role of local authorities in preparing local plans.
- Flood Risk Assessment
- Planning for flood exceedance.

Objective 4

Keeping our highways safe and passable

How will we do it?

- Maintenance of highway drainage system.
- Management of highway verges.
- Highway maintenance
- Flood plan – incident plan for effective deployment of resources
- Diversionary routes
- Managing flow paths

- Drainage improvement works
- Upgrading trash screens.

Objective 5

Delivering wider benefits

How will we do it?

- Water sensitive urban design
- Integrating flood risk management into green infrastructure development and management.
- Water quality
- Amenity
- Strategic prioritisation
- Partnership working
- Community engagement
- Innovative projects
- Sharing best practice
- Natural flood risk management

8. Making it Happen

8.1 Current Schemes



Objective 1

Port Clarence

The Environment Agency has been allocated £19m 'accelerated delivery' funding, from Flood Defence Grant in Aid (FDGiA), to deliver a flood alleviation scheme for Port Clarence and Greatham South. This was additional funding from central government to bring flood defence schemes forward in the medium term programme.

The first phase project involves constructing a raised embankment to protect Port Clarence from the River Tees, with demountable barriers at Wilton Engineering and the raising of the road by 600mm on the approach to the Transporter Bridge. A second phase of the project is planned for the Greatham North area, which is in the form of a raised embankment to protect the industrial area from Greatham Creek.

A Community engagement event around options for the defence was carried out in July 2014, at the local primary school and was well attended by the community. The Environment Agency obtained a planning permission in October 2014 and commenced construction in March 2015. It is anticipated that the construction of the defence through Port Clarence will take 8 months to complete.

The new defences will provide an increased standard of flood protection to 351 residential properties, 21 commercial properties, transport links and environmental designations. The scheme aims to improve the standard of protection to withstand a flood event with a 1 in 200 (0.5%) chance of occurring in any given year.

Lustrum Beck

The Lustrum Beck Flood Risk Management Partnership Project is a £3m scheme to provide a range of flood alleviation measures to protect the communities along Lustrum Beck. The project is a partnership between the Environment Agency and Stockton Council. The first phase commenced in late 2014, with a new flood wall being installed along Bishopton Road by the Environment Agency. Further elements of phase 1 are to be installed on site during 2015 and 2016, including a new trash screen at Primrose Hill culvert (to be delivered by the Environment Agency), the replacement of Londonderry Bridge (to be delivered by Stockton Council) to allow increased river flows, new embankments and walls at Bedford Street and Wrensfield (Environment Agency), along with a sustainable drainage system being installed at the former Adult Training Centre on Wrensfield Road (Stockton Council).

A second phase is planned for the watercourses upstream of Oxbridge and Hartburn, which will use natural flood alleviation measures to hold back flows and release the water slowly, reducing flood risk for the downstream communities.



Bishopton Road – September 2012



Bishopton Road – February 2015 (New flood wall)

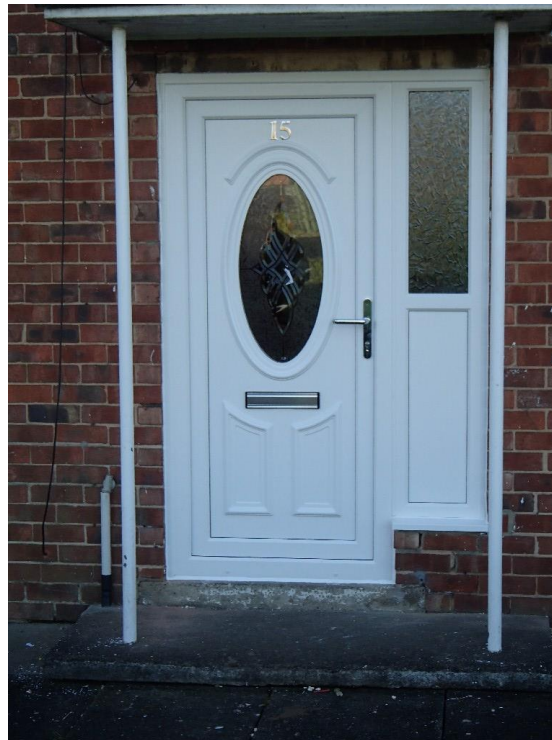
Ilkeston Walk

A property level protection scheme has been installed at Ilkeston Walk in Hardwick. The scheme involved installing flood doors, one-way airbricks and waterproofing at a cost of £54k and is funded from Flood Defence Grant in Aid. There are also minor drainage improvement works planned for 2016.



Ilkeston Walk – May 2013

Objective 1



Ilkeston Walk, new flood door – April 2015

Objective 2

Pioneer Maintenance

The Authority received £25k from Local Levy funds to carry out work on ordinary watercourses, where a risk to property exists. The pioneer maintenance work is extensive maintenance over and above the normal requirements of routine maintenance. Work is currently taking place in several areas of the Borough, including Wynyard Road, Surbiton Road and Cowpen Bewley.



Surbiton Road – December 2014 (before work)

Objective 2



Surbiton Road – January 2015 (after work)

8.2 Future Opportunities

Halidon Way

The Council has submitted a bid for a scheme to alleviate surface water flooding at Halidon Way in Billingham. A number of properties have been flooded by surface water, most recently on 6th September 2013. The scheme has been added to the Environment Agency medium term plan and will secure funding in 2016/17, with a study to be carried out in 2015/16 to determine the most beneficial scheme for the area. There may also be opportunities to work with the Environment Agency to combine surface water and river flooding schemes in the area, which may be of wider benefit; these opportunities will be fully explored before any surface water scheme could commence.

Objective 1

8.3 Maintenance

Objective 4

In Stockton Borough, there are 43,601 highway gullies that need to be maintained to keep the highway drainage system working correctly. There is currently a three tier maintenance regime in place, whereby each of these gullies are cleaned at least once per year to keep them free from blockage by silt and weed growth, in some areas there are gullies are more prone to

Objective 4

problems and are programmed for routine cleansing twice yearly. In certain locations where there are problems with flood risk and gullies block frequently, they are subject to routine maintenance on a monthly basis.

Stockton Borough Council is using data capture to develop strategies to manage and control future flood risk, two main areas being developed are:-

- Maintenance of Highway drainage assets
- Developing the authorities Flood Risk Asset register

In order to manage drainage systems cost effectively, it is necessary to have a robust drainage asset management strategy. The strategy must be able to support and inform decision making that address the need to deliver highway maintenance in a way that balances growing service demands with reducing resources.

Improvements to the drainage asset management systems will allow SBC to quantify the condition of its drainage assets, prioritise maintenance and assess the suitability of those assets to deal with present and future flood and contamination risks. Decisions based on asset management planning principles take wider organisational goals and practises into account and have a greater chance of a successful delivery

The efficiency of a gully cleaning operation can be measured by the number of gullies it takes a team to clean in one day. The effectiveness of the work can be measured by how many of those gullies needed cleaning.

The location of all 43,601 highway gullies currently maintained by the Authority has been recorded; this information will enable us to target our gully cleansing operations to those areas where we will be most effective in reduce flood risk. The challenge to effective gully cleansing operations is increasing as the numbers of gullies to be cleaned grow due to the number of new developments. SBC are looking to develop a highway maintenance strategy based on need as

Objective 4

opposed to cleaning every highway gully once a year irrespective of need or flood risk

The raw data has been captured and analysed, the second phase of the works is to collect and record more detailed information in known areas of flood risk, and this more detailed investigation will record the following information, type of gully, condition of the gully, and silt levels.

The gully cleansing teams will be collecting this information, so that we record the wealth of information they hold, data will be collected as they undertake this year's routine gully cleans. The flood risk team will be undertaking surveys of known flood risk areas and will be identifying critical highway drainage assets key to managing the flood risk. All the information gathered by the gully cleansing teams and the flood risk team will determine the future gully cleansing strategy, it will also identify existing highway assets that require upgrading, any replacement programme would be subject to funding.

8.4 Asset Register

Objective 2

Stockton Borough Council has produced a flood risk asset register that accurately records its flood risk assets, (these are mainly culvert inlet and outlet trash screens), the register records the exact location and condition of the asset. All of the assets have been assessed for flood risk, based on the probability of the culvert blocking and the extent of the damage caused if the culvert was to block all of the grids will be classified Red, Amber or Green based on the risk. This information will form the maintenance / inspection regime for all of our flood risk assets, all trash screens classified Red will be inspected on receipt of a weather warning, during an adverse weather event and after the extreme event has subsided. The Asset Register is an on-going project with watercourse inspections being carried out when conditions are appropriate.

8.5 Trash Screen upgrades

Objective 4

Trash screens (also known as grids) are frequently used on the inlets and outlets of culverts, for the purpose of catching debris to prevent it from travelling

Objective 4

into the culvert and causing blockage, and also to prevent unauthorised access into a culvert which can become a dangerous place where children might decide to play.

The trash screens classified as 'red' are high risk in terms of flooding will be assessed to see if a scheme can be developed to reduce the risk of flooding on that particular culvert, subject to funding becoming available.

Other screens may be assessed to see if they are required for safety reasons, following a risk assessment the screen may be removed to reduce flood risk. On occasions screens on new developments, may also be subject to the same risk assessment.

8.6 Development Management

Objective 3

The National Planning Policy Framework (NPPF) sets out the Government's policy that planning should proactively help mitigation of, and adaptation to climate change including the management of water and flood risk. The NPPF states that when determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and gives priority to the use of sustainable drainage systems.

On the 15th April 2015, Lead Local Flood Authority's became a statutory consultee of the planning process, with the commencement of the final part of the Flood and Water Management Act 2010. This means the LLFA is now consulted on all major planning applications (10 or more properties). The Act changes the previous right of a developer to connect surface water discharge to the public sewerage system and makes it conditional on meeting new standards, as follows;

Surface water not collected for use must be discharged to one or more of the following, listed in order of priority:

- 1. Discharge into the ground (infiltration); or where not reasonably practicable,*
- 2. Discharge to a surface water body; or where not reasonably practicable,*

3. *Discharge to a surface water sewer, highway drain or another drainage system; or where not reasonably practicable,*
4. *Discharge to a combined sewer.*

Discharge into a water body will also need to be attenuated to prevent a risk of flooding. The attenuation can take many different forms from ponds, swales and basins to oversized pipes and attenuation tanks.

The Department of the Environment Flood and Rural Affairs (DEFRA) has developed national standards in order to manage surface water run-off in accordance with the Act. The National Standards are a very high level guide to design, construction and maintenance of sustainable drainage systems.

To assist developers in the local area; the five Tees Valley Authorities have produced a design guide of local standards for the design, construction and maintenance of SUD's, although occasional slight variations between authorities may occur, where local policy dictates.

Pre-Application Advice

Engagement with a developer at an early stage is preferred, as this can address a lot of the potential problems at an early stage and the developer will be able to design the site with reference to the blue/green corridors. This is especially important where a natural SUDs design is proposed.

Information for Assessment

When assessing major planning applications, the information detailed below is considered. The more information submitted at an earlier stage, the more efficient the approval process. It is possible to condition some information but key information such as discharge points and rates must always be agreed, prior to approval;

- a. Flood risk assessment and drainage strategy
- b. Detailed site layout at an appropriate scale, with North point

Objective 3

- c. Topographical survey of the site, including water course cross-sections and proposed discharge points and rate. It is helpful to highlight the blue corridors.
- d. Plan of drainage system and catchment areas, including impermeable areas and phasing.
- e. Full design calculations and design parameters. The design must demonstrate conformance with the local standards.
- f. Provision of Micro Drainage/ WinDes (mdx) files to assess the proposed drainage design.
- g. Long-sections and cross sections for the proposed drainage systems, at an appropriate scale
- h. Construction details.
- i. Details of connections (including flow control devices) to watercourses, sewers, highway drains and SUD's
- j. Details of off-site works and any necessary consents.
- k. Operational characteristics of any mechanical or electrical components, including maintenance and energy requirements.
- l. Plan demonstrating flooded areas for the 1 in 100 year event plus climate change, if system is at capacity and flow paths for exceedance.
- m. Access arrangements for maintenance.
- n. Landscape planting scheme.
- o. Proposals for pollution control
- p. Plan for management of construction and programme
- q. Health and Safety Plan
- r. Maintenance plan and costs.
- s. Agreement for the long-term maintenance of the system

8.7 Strategic prioritisation

Objective 5

Strategic Prioritisation is a partnership project between Northumbrian Water and local authorities. The purpose of this project is to establish a proactive cross party process and procedure in order to:

- Create a template of how we can work together in our communities to understand current and future sewerage issues.
- Establish and implement data share and communication protocols.

Objective 5

- Produce and apply a methodology that can be used to risk rank locations using for more detailed studies.
- Promote integrated sustainable drainage solutions.
- Promote 'best possible' service to both customer and the environment.
- Provide risk based evidence to inform future business planning requirements.

NW Drainage Areas (DA) are ranked at a strategic level, where necessary and appropriate the partners engage in studies of those high ranking drainage areas, which will form a basis for future investment.

8.8 Flood Risk Programme

Objective 2

Since the Flood and Water Management Act commenced in 2010, Stockton Borough Council has kept records of all reported flooding within the Borough. The flooding incidents have been assessed and any unresolved incidents have been subject to a risk scoring matrix, then prioritised as red, amber, green; red priority scoring a number 1, will be investigated in more detail for potential schemes, the remaining high priority schemes will then be assessed forming a future programme of works. When a scheme is identified this will be flagged up to the Environment Agency with a funding bid and entered onto the medium term plan.

The incidents are ranked based on where the flooding occurs, the frequency and disruption caused; high risk areas are also assessed. High priority is always given to frequent internal property, where bids for funding stand a greater chance of success. It is not possible to bid for funding for external flooding, though the incidents are recorded for monitoring purposes and advice can be given to residents who are affected.

The incidents are also compared against Northumbrian Water's drainage areas to check if there are any opportunities for a joint study.

8.9 Flood Plan

Objective 4

Following the major flooding incidents in the Borough in 2012 and 2013, the Council has invested in two high volume pumps and some temporary flood barriers which are more effective and can be deployed more efficiently than sandbags to protect certain areas. An operational flood plan was also implemented and is available on Resilience Direct for the emergency response partners, such as the emergency services.

The Flood Plan for Stockton provides a contingency plan which supplements other plans such as the Snow Plan, and can be introduced during the course of the year to ensure a coordinated approach when isolated and larger weather related problems occur, which are outside of the normal winter maintenance policy or Snow Plan.

For example, in cases where flooding and high winds occur, which could result in danger / hazard to life and property, and/or causing a significant impact to Stockton's road infrastructure.

The plan provides comprehensive information on equipment, diversionary routes, flood barrier installation, key contact information and staffing.

The Operational Flood Plan is intended for use by the Authority for any flood or weather related incident, where it is deemed severe enough to require the mobilisation of the Command Centre to control operations which fall outside the normal call out procedures. This is will take effect for Stockton Council regardless of whether a full scale multi-agency response is set up at Police HQ. Where a full scale response is in operation, communication will be established between Silver Command and Stockton Borough Council's Operational Command Centre.

Objective 4



Stockton Council Flood Barriers at Bedford Street, Stockton

8.10 Natural Flood Risk Management

Objective 5

The Council is committed to looking at alternative means of reducing flood risk. Natural flood risk management is the alteration, restoration or use of landscape features to reduce the risk of flooding. It involves the development and management of green infrastructure to reduce and slow the rate of surface water run-off and provide temporary flood water storage. This approach should be explored and where feasible delivered through the Borough's Green Infrastructure Strategy.

The aim is to reduce the amount of water travelling downstream at the peak of the event and allowing it to be released more slowly by restricting the progress of water through a catchment. They rely on either one, or a combination, of the following techniques:

- **Storing water** - using ponds, ditches, channels, reservoirs or flooding land.
- **Slowing the progress of water through the catchment** – this can be done by planting in the channel or on flood plain land.

Objective 5

- **Infiltration** – free draining soils will allow infiltration and potentially reduce surface water run-off.
- **Interrupting the flow of water** – through natural dams, ponds, introducing meanders or planting.

The Environment Agency has used this natural flood risk management strategy for a scheme in Belford, Northumberland where the rural village was hit by severe flooding. In Stockton it is proposed to use these techniques for the second phase of the Lustrum Beck Flood Risk Management Partnership Scheme in the area upstream of Hartburn. Other opportunities to reduce flood risk through the development and management of green infrastructure in other catchments should also be explored.

8.11 Innovative Projects

Objective 5

Many flooding incidents are caused when the amount of rainfall exceeds the capacity of a drainage system, this is more apparent in extreme events, where a drainage system is working properly however cannot take the amount of rainfall, causing flooding. It isn't possible to design a drainage system that can meet demand for all extreme events; therefore it is important to look at other ways of reducing the amount of water going into a system. One method of this is to engage the community in water usage, for example a large number of properties installing water butts and the residents using the water on their gardens. For this method to be successful it needs the participation of a number of residents in a particular area. This approach has been trialled in the Gresham area of Middlesbrough and recently through Project Downpour in Darlington; to date there is not enough information to confirm the success of the projects however any number of residents taking part is seen as a positive contribution however small.

9. Sustainability

9.1 Sustainable Drainage

Sustainable drainage systems are now the preferred approach to managing rainfall from hard surfaces and can be used on any site. There are many different SUDS features available to suit the constraints of a site. These features include green roofs, and more natural features such as ponds, wetlands and shallow ditches called swales. Hard engineered elements are often used in high density, commercial and industrial developments. These include permeable paving, canals, treatment channels, attenuation storage and soakaways. In well-designed SUDS a number of different features are provided in sequence, which is known as the management train.

The primary purpose of SUDS is to mimic the natural drainage of the site prior to development. This is achieved by capturing rainfall, allowing as much as possible to evaporate or soak into the ground close to where it fell, then conveying the rest to the nearest watercourse to be released at the same rate and volumes as prior to development. Along the way any pollutants, such as metals and hydrocarbons from roads and car parks, are reduced. Water entering a local watercourse is therefore cleaner and does not harm wildlife habitats. SUDS generally replace traditional underground, piped systems that use grates or storm water drains at street level. If the water is kept on the surface as much as possible the SUDS can provide valuable amenity asset for local residents and create new habitats for wildlife. This also means that any problems with the system are quicker and easier to identify than with a conventional system and are generally cheaper and more straightforward to rectify. SUDS will become increasingly important to control surface water as rainfall increases because of climate change. They can also provide other benefits in developments such as passive cooling, which will again help mitigate any increase in temperatures due to climate change.

When choosing to which type of SUD system to install the developer must consider the ground conditions and the maintenance liabilities. In Stockton Borough, the vast majority of the area is covered by dense clay soils which do not lend themselves to infiltration methods. Due to this and the potential difficulties in maintaining soakaways, leading to an increase in flood risk in

future years the Council does not support this as a suitable method of drainage within the Borough. It is recommended that the developer considers low maintenance SUDs, so as to ensure low on-going maintenance costs. All proposals in Borough when submitted for planning approval are expected to be accompanied by a maintenance plan or a condition will be imposed requiring this.

In the Governments proposals for SUDs there are various options for maintenance suggested, the options are for the maintenance to be carried out by the local authority, water and sewerage company or the developer (including a management company on their behalf). Due to financial constraints and a lack of clarity regarding funding arrangements, the Authority generally do not accept maintenance responsibility for SUDs.

To provide more information and technical guidance on SUDs techniques, the five Tees Valley Authorities (Middlesbrough Council, Stockton Borough Council, Darlington Borough Council, Redcar and Cleveland Council and Hartlepool Borough Council) have jointly produced a Design Guide and Specification which is available on the Councils website <https://www.stockton.gov.uk/flooding>

9.2 Water Framework Directive

The European Water Framework Directive came into force in December 2000 and became part of UK law in December 2003. WFD establishes a strategic framework for managing the water environment. It requires a management plan for each river basin to be developed every 6 years. WFD offers a unique opportunity to integrate flood risk management with other aspects of river/watercourse management. WFD however does include some derogation for flood risk management but stringent assessments must be carried out to ensure that there are no better environmental alternatives to the proposed scheme.

As part of WFD all water bodies need to reach either Good Ecological Status (GES) or Good Ecological Potential (GEP) in the case of artificial or heavily modified water bodies by 2027. Local authorities and other public bodies are

required to provide information and “such assistance as the Environment Agency may reasonably seek in connection with its WFD functions”. Additionally, Local authorities, along with other public bodies, have a general responsibility not to compromise the achievement of UK compliance with EU Directives, including the WFD. Non-compliance with EU Directives could potentially lead to the European Commission bringing legal proceedings and fines against the UK.

10. Review of the Local Strategy

It is anticipated that the local flood risk strategy will be reviewed every five years and the objectives will be reviewed on an annual basis.

If the Borough is subject to any severe flooding incidents, the incident will be investigated under section 19 of the Flood and Water Management Act. If the outcome of that investigation has any bearing on the contents of the local strategy, then the strategy will be reviewed based on recommendations from the investigation.

All schemes detailed in this strategy are subject to on-going review and monthly project meetings, technical details may change where necessary. Any changes to projects will always be decided with the impact on flood risk assessed; we will always seek to achieve the best possible reduction in flood risk in line with the available budget.

11. Glossary of terms

| | Definition |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Catchment | The catchment is the total area of land draining into a watercourse or other drainage system |
| Climate Change | This is a long term change to weather patterns, it is predicted that climate change will produce more frequent and severe weather events, such as heavy rainfall leading to flooding. This is why drainage calculations include a factor for climate change. |
| Critical Infrastructure | This is infrastructure which is vital to the communities it serves, critical infrastructure includes a range of buildings such as hospitals and school, major transport links and utility services such as electricity substations and water treatment works. |
| Environment Agency (EA) | An executive non-departmental public body, sponsored by the Department for the Environment, Food and Rural Affairs (DEFRA). Working to create better places for people and wildlife, and support sustainable development. The EA has a strategic overview role in flood risk management. |
| Exceedance Flow Routes | Excess water that appears on the surface when all the capacity in the drainage systems have been exceeded. It is important to understand where this water will flow to in an extreme event. |
| Flood Defence Grant in Aid (FDGiA) | Central Government funding stream for flood alleviation schemes. Local Authorities and the Environment Agency can bid for FDGiA funding. |
| Flood Map for Surface Water (FMfSW) | Flood maps produced by the Environment Agency which give a broad indication of areas that may be at risk from surface water flooding. Based on topography the maps show where water would be likely to flow or pond. |

| | |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flood Risk Regulations | Legislation that transposed the European Floods Directive (2009) |
| Flood and Water Management Act 2010 (FWMA) | Following the 2007 floods Sir Michael Pitt, commissioned by Government, produced the 'Lessons learned from the 2007 summer floods'. The Government accepted the 92 recommendations made in the report, and in 2010 the recommendations were transposed into UK Law in the form of the Flood and Water Management Act 2010. |
| Fluvial | Referring to rivers, fluvial flooding is excess water leaving a river channel and flooding adjacent land. |
| Green Infrastructure | Interconnected networks of open spaces, water bodies and environmental features, which support natural systems and perform multiple functions. |
| Highways England | Highways England is responsible for the Trunk Road network and associated drainage which includes culverts under Trunk Roads and balancing ponds. |
| Lead local Flood Authority (LLFA) | LLFAs are county councils and unitary authorities, who have a number of duties and responsibilities for flood risk management, under the Flood and Water Management Act 2010. |
| Local Flood Risk | Flood risk from surface water, groundwater and ordinary watercourses. |
| Local Levy | A levy on local authorities which is collected regionally and pooled, it is used to fund flood alleviation measures. |
| Local Resilience Forum (LRF) | The Local Resilience forum (LRF) is responsible for emergency planning and civil contingencies across; Hartlepool, Stockton, Redcar and Cleveland and Middlesbrough. |
| Main River | Watercourses that are designated as such on the main river map. Generally the larger watercourses, for which the Environment Agency has flood risk management responsibilities. |

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|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| National Planning Policy Framework (NPPF) | National Planning Policy Framework (NPPF) maintains strong planning policy on avoiding and managing flood risk, based on the role of local authorities in preparing local plans |
| Natural Flood Risk Management | The alteration, restoration or use of landscape features to reduce the risk of flooding. It involves the development and management of green infrastructure to reduce and slow the rate of surface water run-off and provide temporary flood water storage. |
| Ordinary Watercourse | Ordinary watercourses are every river, stream, ditch, sluice or drain, where water flows but are not main rivers |
| Pioneer Maintenance | Extensive maintenance over and above the normal requirements of routine maintenance |
| Pitt Review | An independent review of the summer flooding in 2007, which affected large parts of the UK. |
| Pluvial Flooding | Flooding caused by surface water run-off or overland flows. |
| Preliminary Flood Risk Assessment (PFRA) | A strategic assessment of flood risk from local sources including surface water, groundwater, ordinary watercourses and canals. |
| Property Level Protection (PLP) | Flood protection measures on a property, examples include; Flood doors, gates, one-way air brick covers, waterproofing etc. |
| Riparian Owner | Riparian landowners are those who own land adjoining a watercourse. As detailed with the EA document 'living on the Edge', riparian landowners have certain rights and responsibilities |
| Risk Management Authority (RMA) | An Authority with powers and responsibilities for managing flood risk, the Environment Agency, Lead Local Flood Authorities and Water and Sewerage Companies are all risk management authorities. |
| Strategic Flood Risk Assessment (SFRA) | Part of the strategic planning process and informs the Local Development Frameworks/ Local Plan. |

| | |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sustainable Drainage System (SUDs) | A drainage system designed to mimic natural drainage and reduce the potential impact from new or existing developments, with respect to surface water drainage discharges. |
| Trash Screen | The screen fixed to the inlets and outlets of culverts to prevent large objects or persons from entering them. |
| Water Cycle Study | Study objective of the WCS is to identify any constraints on housing and employment growth, planned for the area up to 2026, which may be imposed by the water cycle and how these can be resolved. |
| Water Framework Directive (WFD) | The European Water Framework Directive came into force in December 2000 and became part of UK law in December 2003. WFD establishes a strategic framework for managing the water environment |
| Water and Sewerage Company (WaSC) | The private companies responsible for water distribution and sewerage operations within a given area. In Stockton on Tees Borough this is Northumbrian Water. |

12. Useful Links

FloodLine 0845 988 1188

<https://fwd.environment-agency.gov.uk/app/olr/home>

River Levels <http://www.environmentagency.gov.uk/homeandleisure/floods>

Flood Warnings

<http://www.environment-agency.gov.uk/homeandleisure/floods/31618.aspx>

Warning Areas

<http://maps.environment->

[agency.gov.uk/wiyby/mapFromCMSCodes?topic=fwa&lang=e&codes=121WAF925&layer](http://maps.environment-agency.gov.uk/wiyby/mapFromCMSCodes?topic=fwa&lang=e&codes=121WAF925&layer)

[Group=2](#)

Stockton Borough Council

<https://www.stockton.gov.uk/flooding>

Environment Agency

<https://www.gov.uk/government/organisations/environment-agency/services-information>

Northumbrian Water

<https://www.nwl.co.uk/>

The National Flood Forum

<http://www.nationalfloodforum.org.uk/>

Tees Valley Authorities Local Standards for Sustainable Drainage

<http://www.middlesbrough.gov.uk/index.aspx?articleid=1668>

CIRIA

<http://www.ciria.org/>

SusDrain

<http://www.susdrain.org/>

Stockton Councils Green Infrastructure Strategy

Stockton Council Climate Change Strategy

References

National Flood and Coastal Erosion Risk Management Strategy – *Environment Agency*

Preliminary Flood Risk Assessment - *Stockton on Tees Borough Council*

Strategic Flood Risk Assessment L1 & 2 - *Stockton on Tees Borough Council*

Living on the Edge – *Environment Agency*

Thank you to the Environment Agency for use of the aerial photography images

13. Contacts

Stockton Borough Council

Economic Growth and Development Services **01642 526727 or 01642 526879 (Office hours)** (For more information on this strategy or other information on Flood Risk Management)

Care for Your Area **01642 391959 (Office Hours)** (To report flooding in your area)

Surveillance Centre **01642 528989 (24 hours)** (To report flooding in your area)

<http://www.stockton.gov.uk>

Email: EGDS@stockton.gov.uk

Environment Agency

Flood Line **0845 988 1188** (To sign up to receive flood alerts and warnings in your area)

Incident Hotline **0800 80 70 60 (24 hours)**

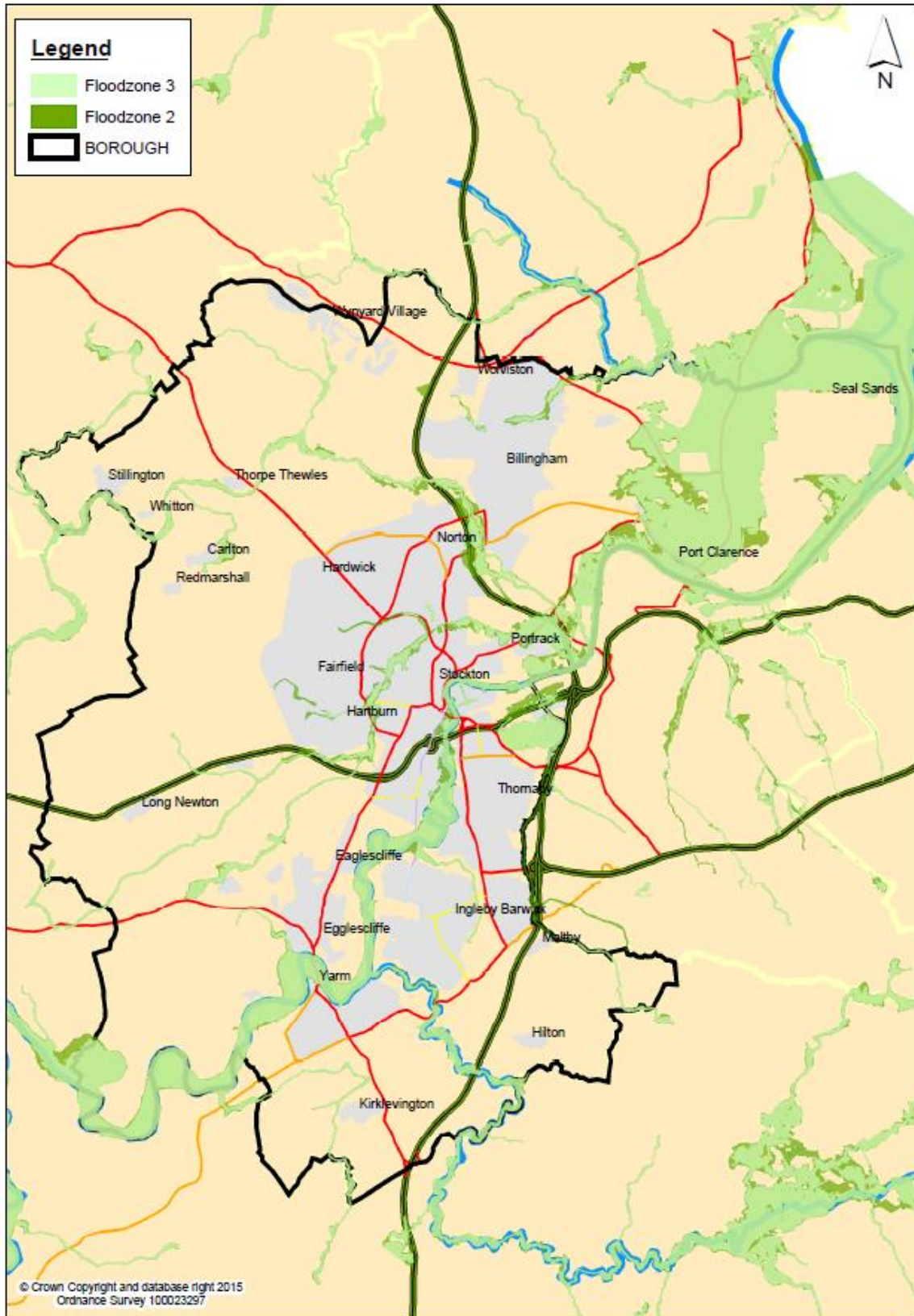
<http://www.environment-agency.gov.uk>

Northumbrian Water

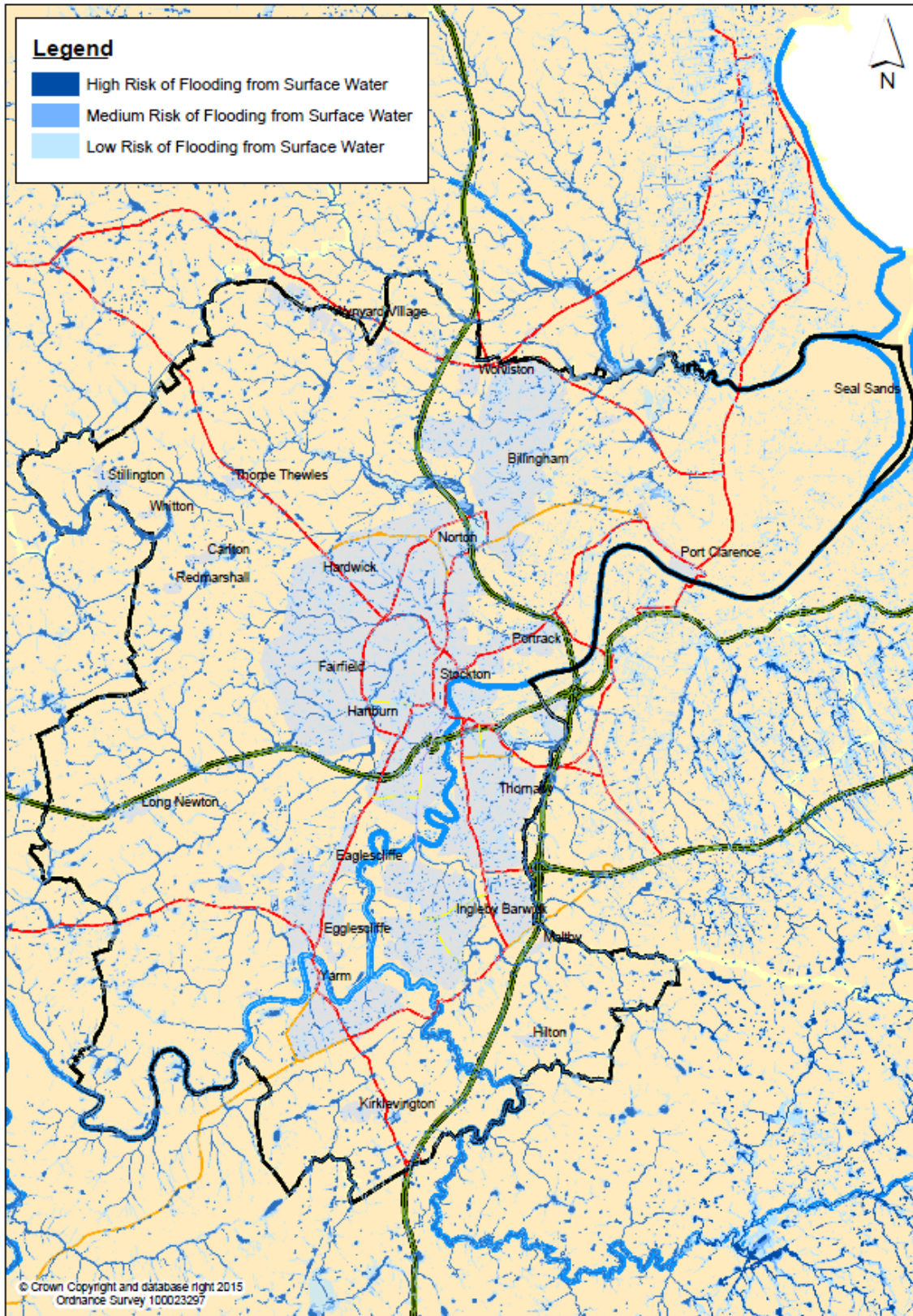
Customer Contact Centre **0800 328 7648 (24 hours)**

<http://nwl.co.uk/your-home/your-services/sewer-flooding.aspx>

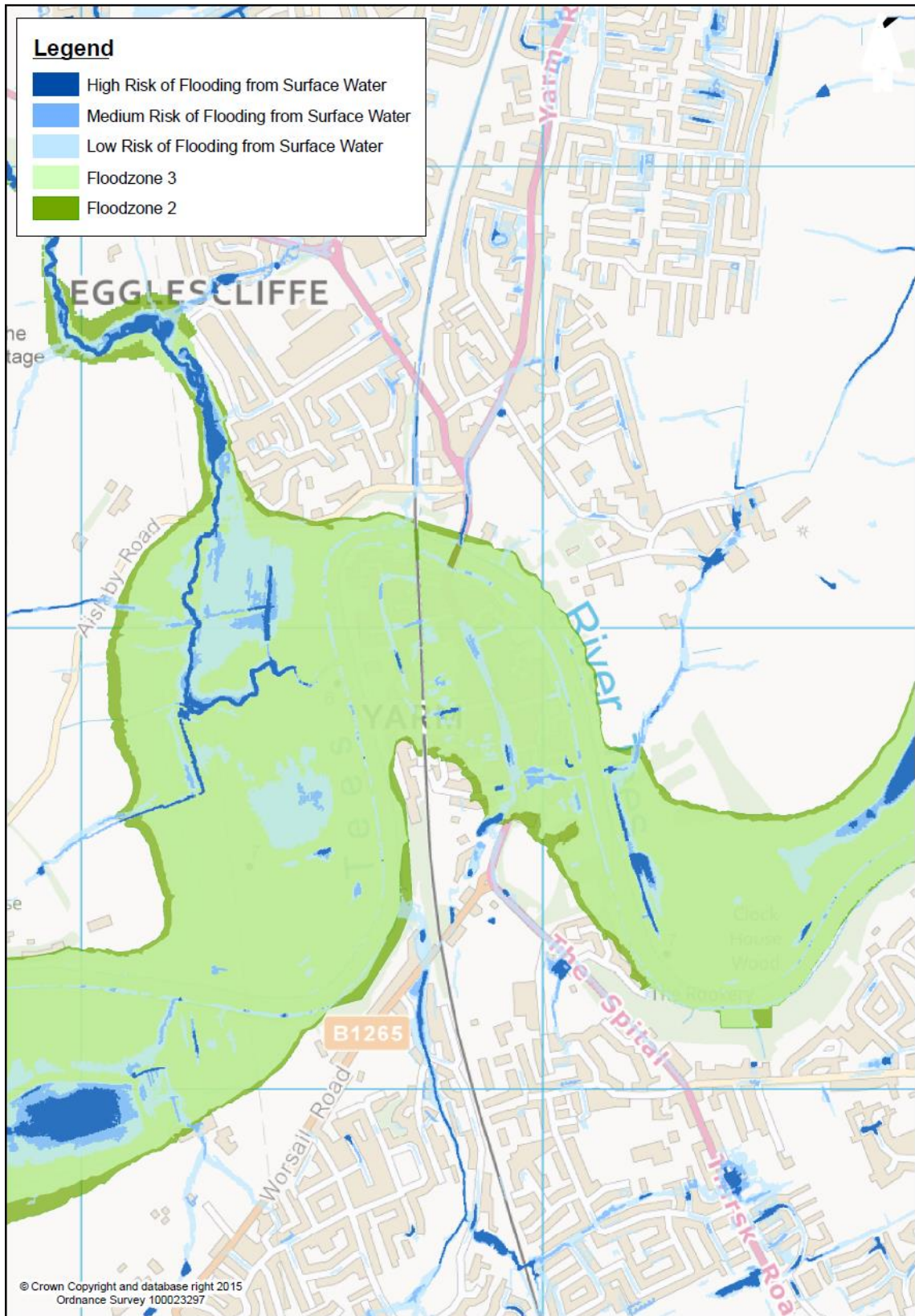
Appendix A - Stockton Borough Flood Zones



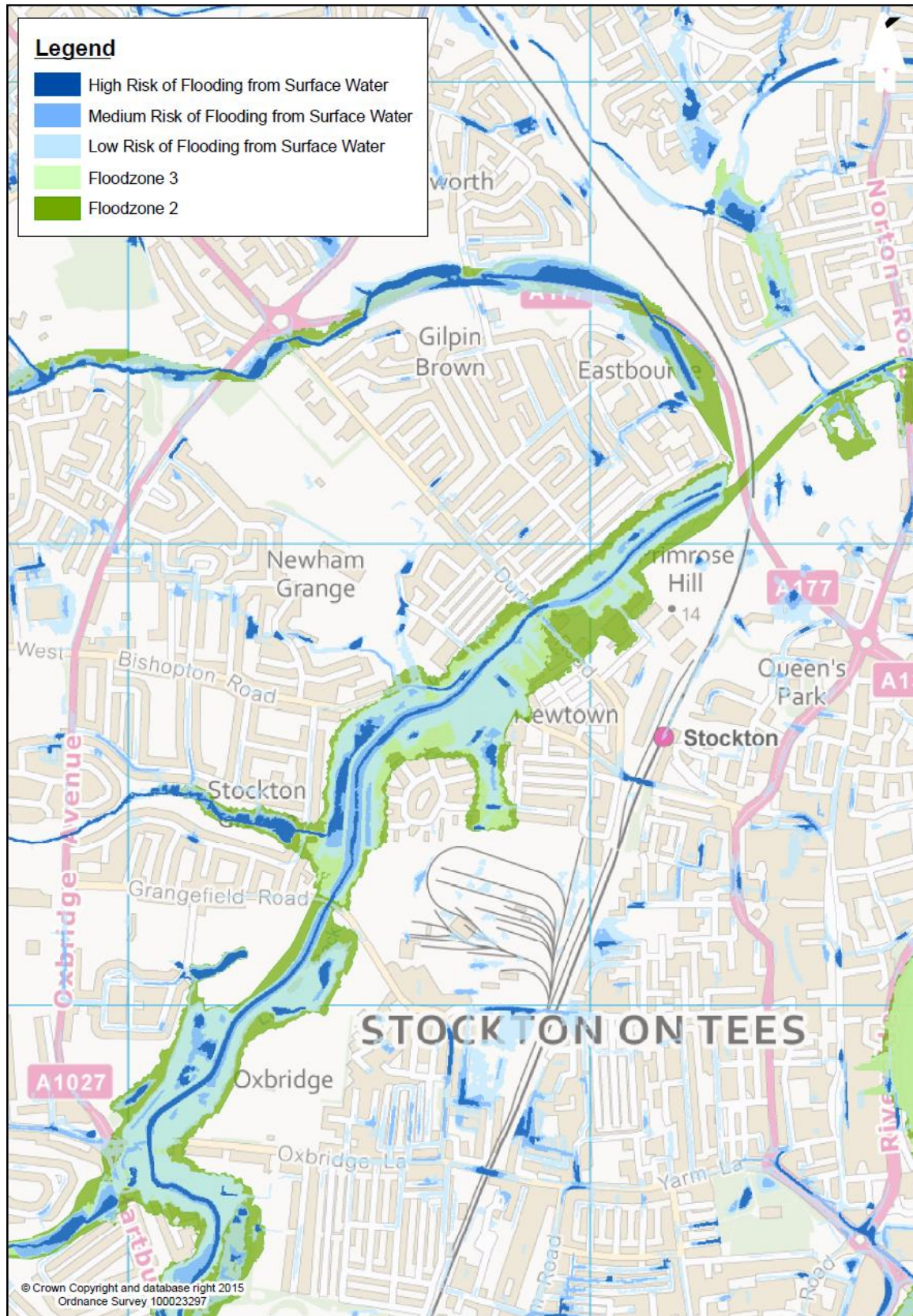
Appendix B – Stockton Borough Surface Water Flood Risk



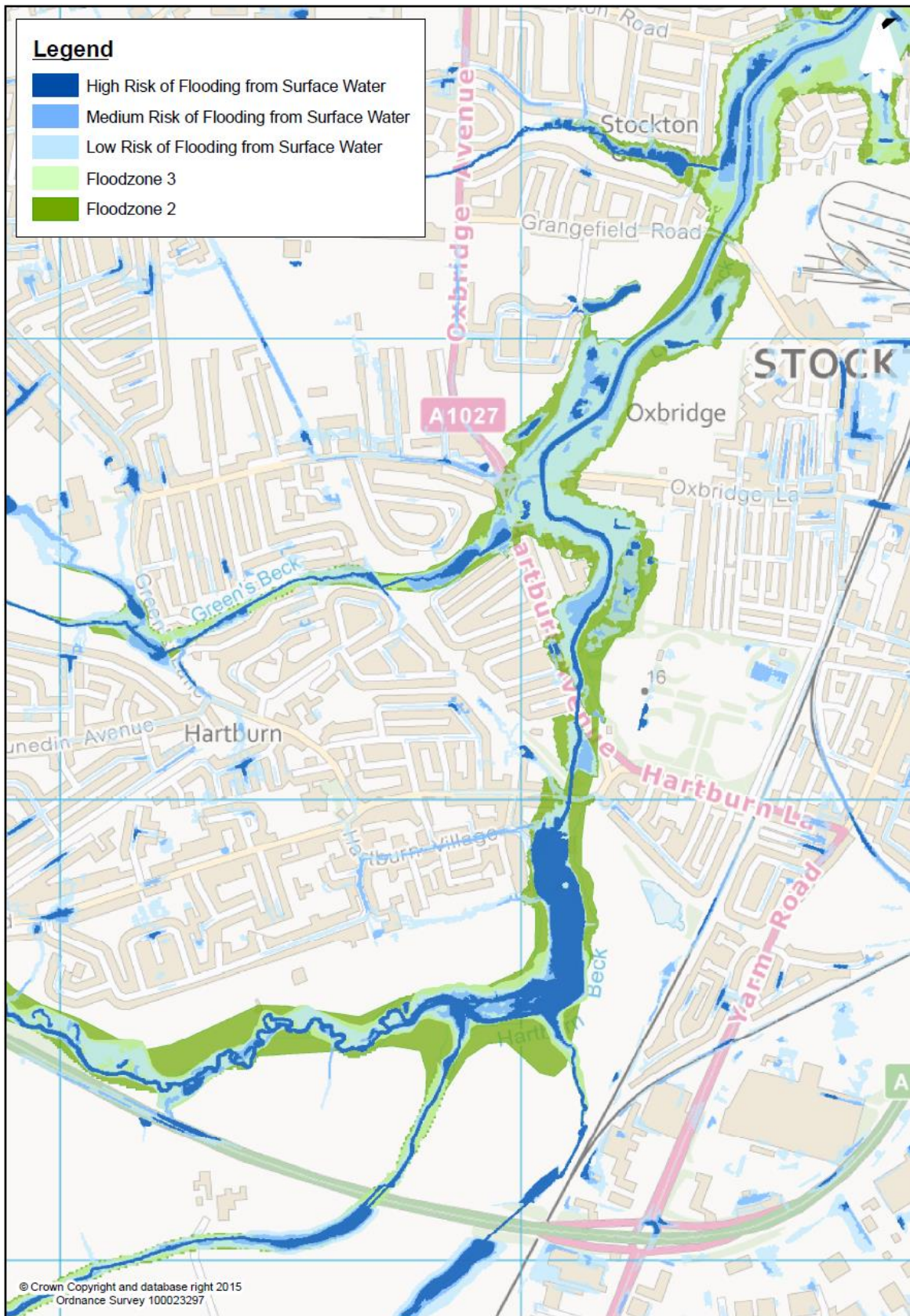
Appendix C – Central Yarm Flood Risk



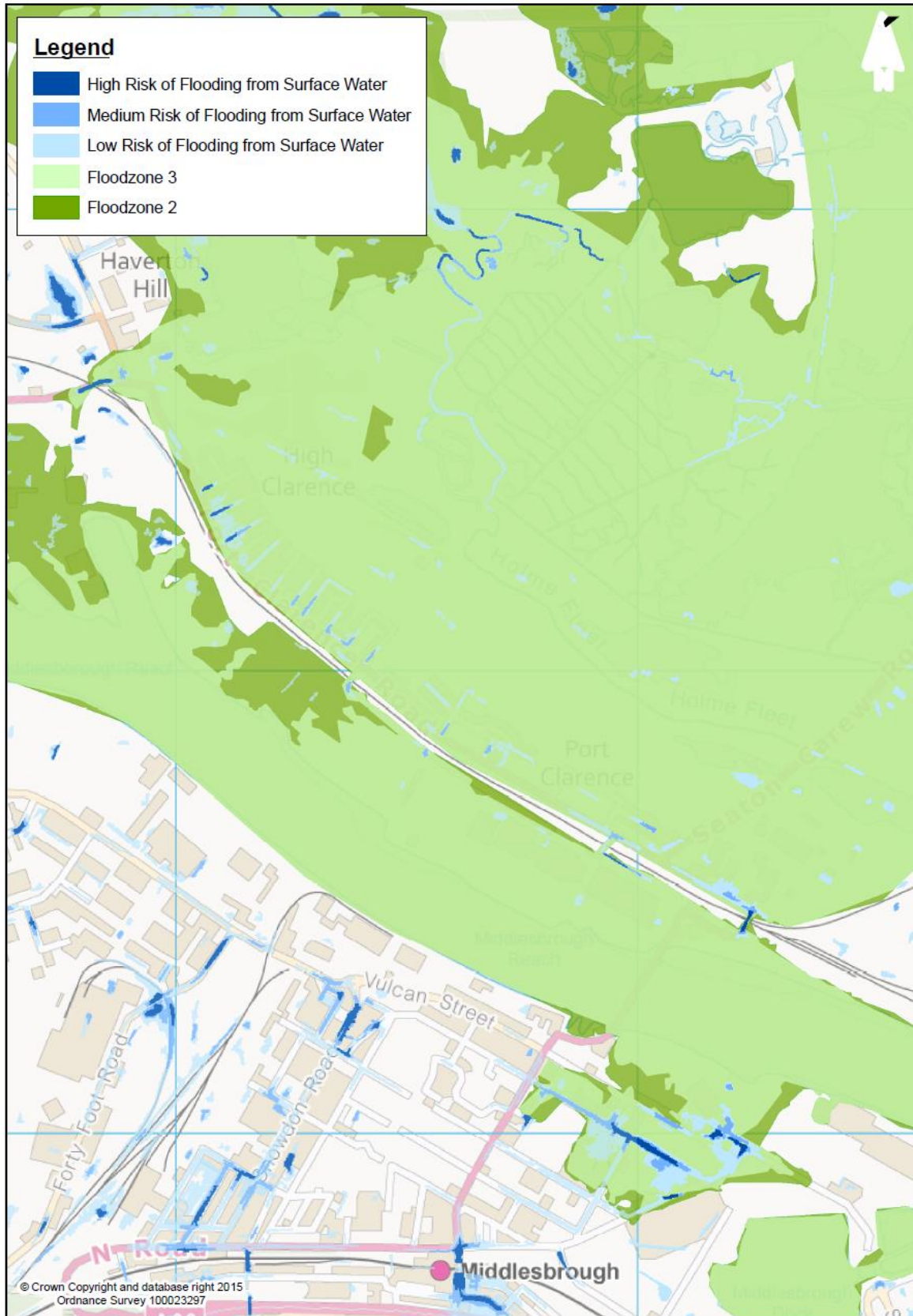
Appendix D – Browns Bridge/ Wrensfield Flood Risk



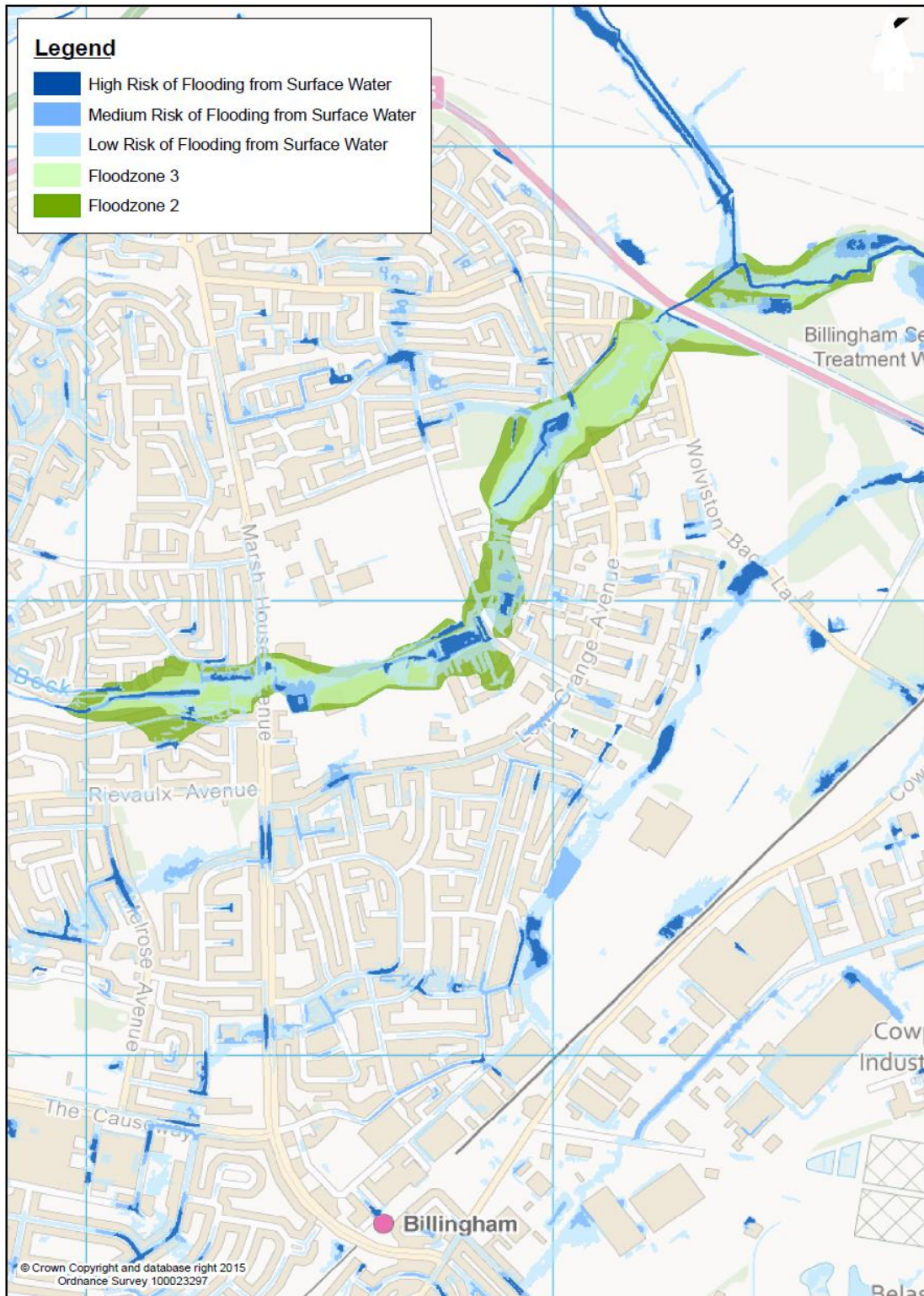
Appendix E – Hartburn and Oxbridge Flood Risk



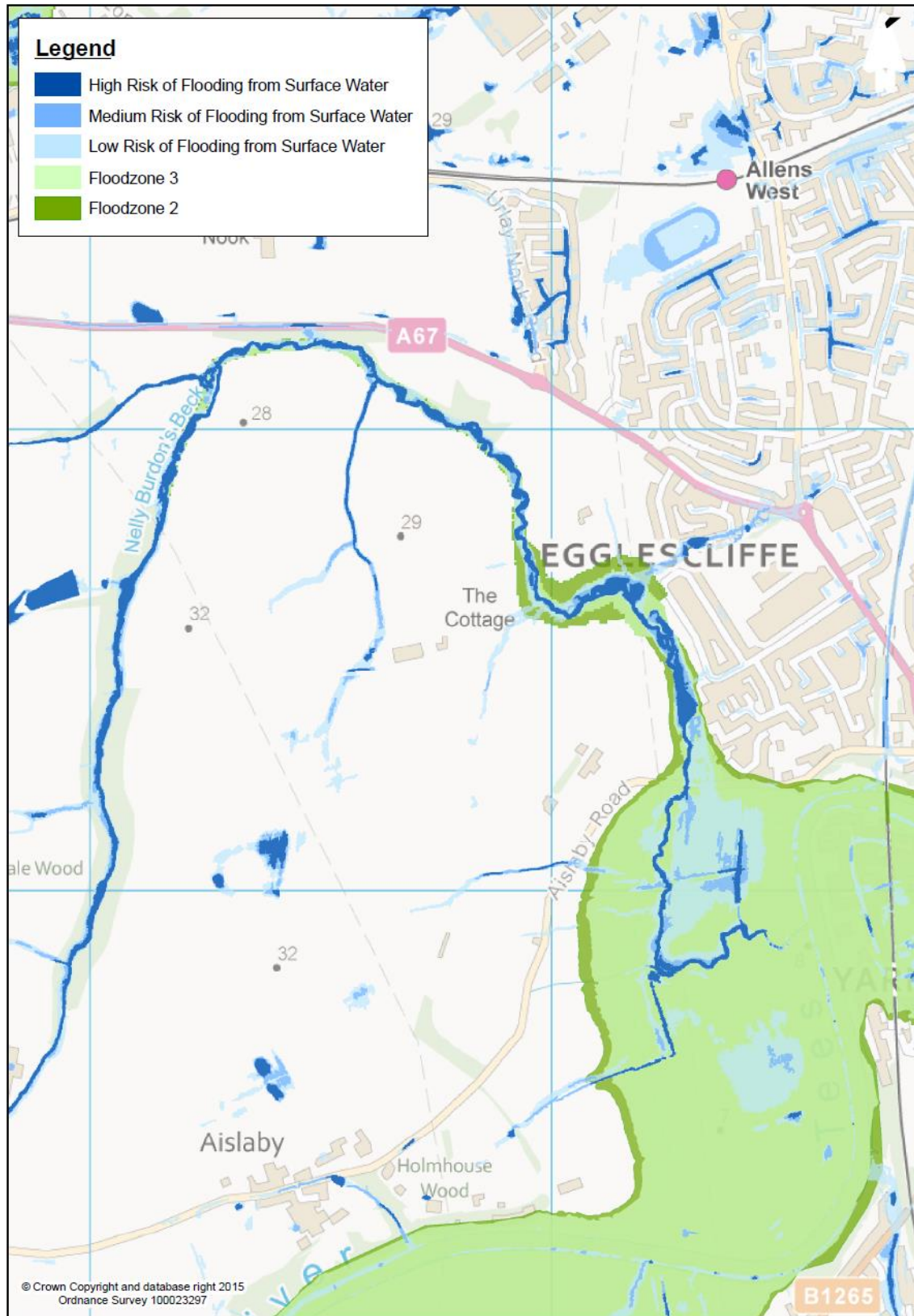
Appendix F – Port Clarence/ Billingham Reach Flood Risk



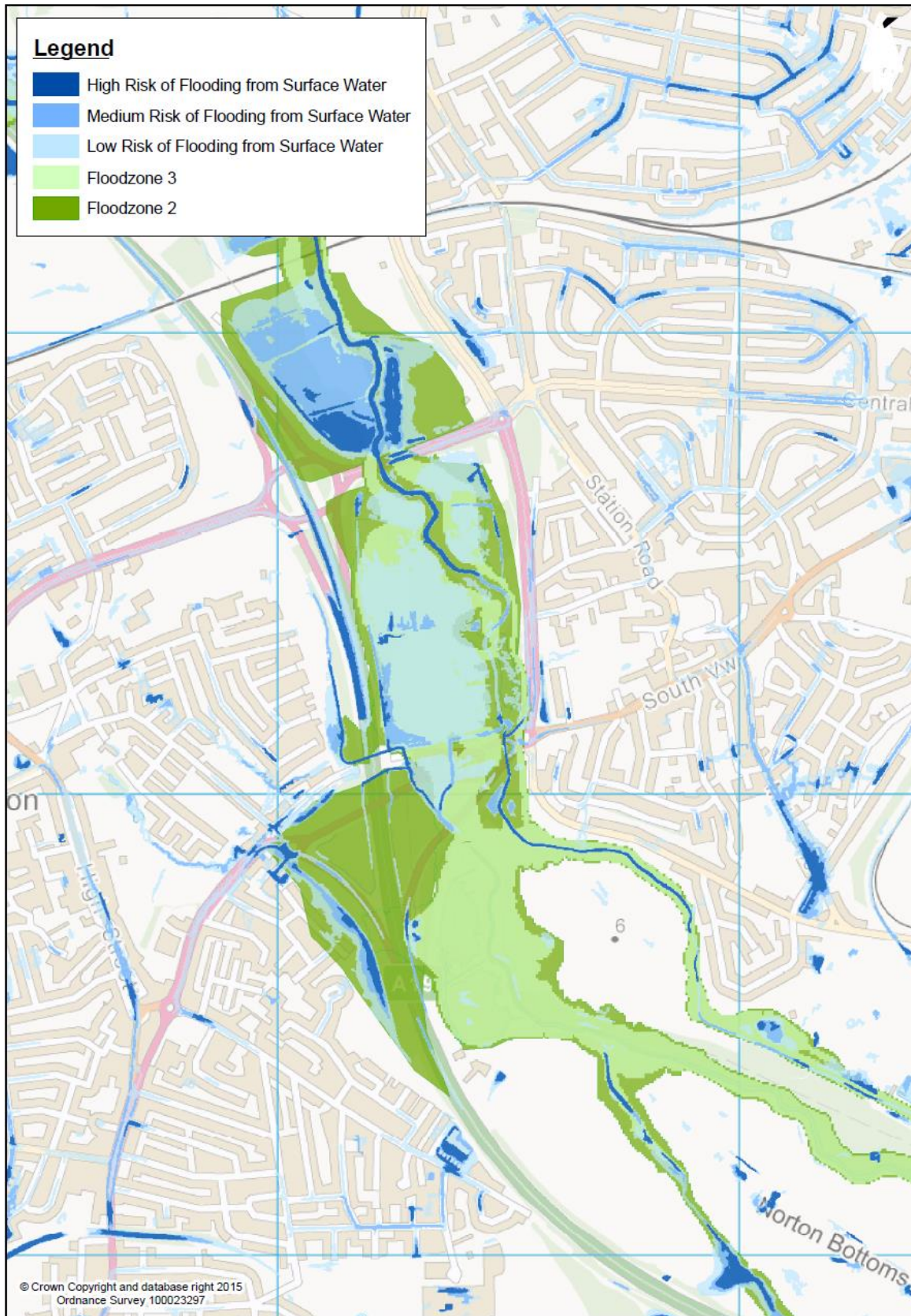
Appendix G – Halidon Way, Billingham flood risk



Appendix H – Aislaby, Nelly Burdons Beck flood risk



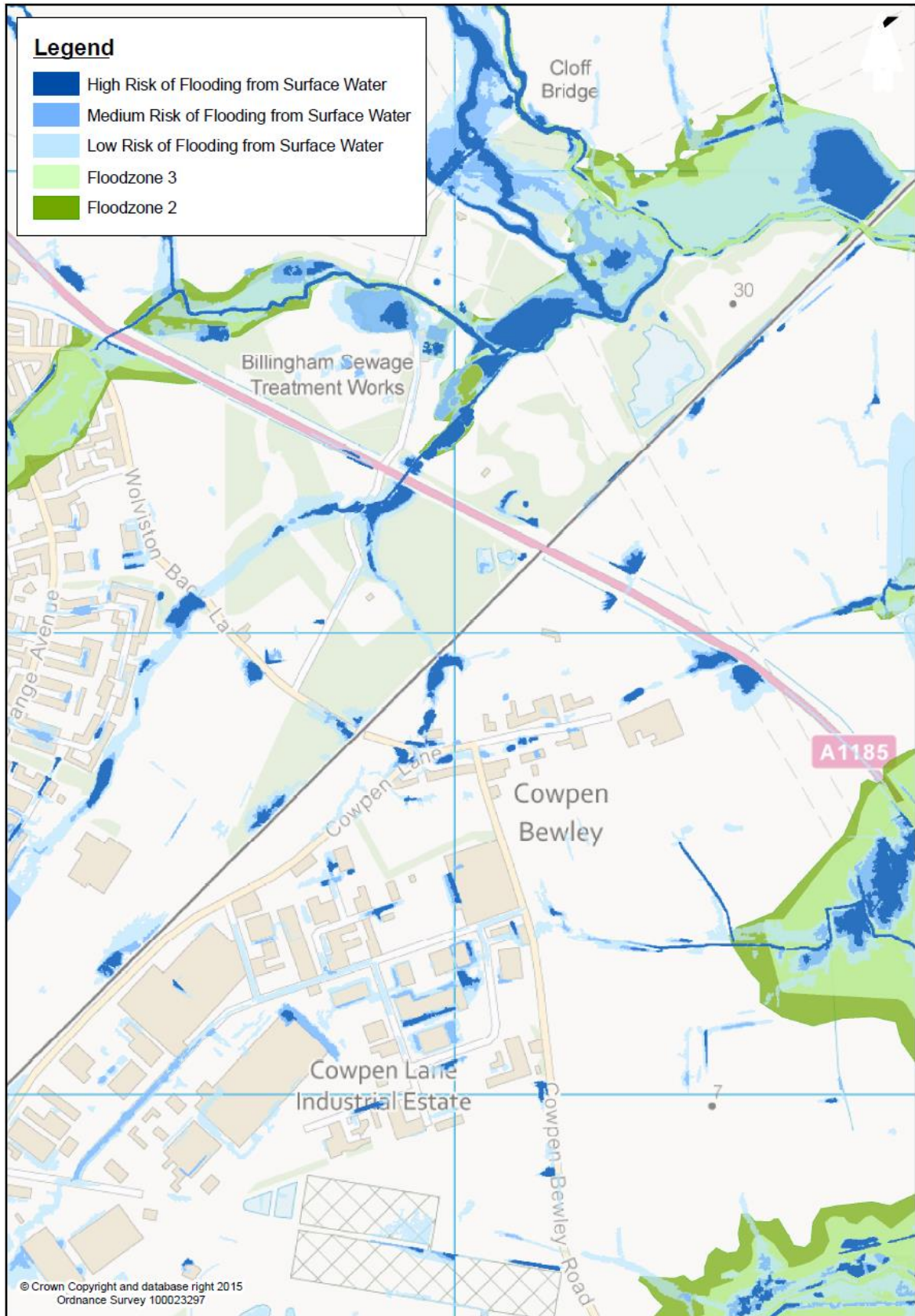
Appendix I – Billingham Road flood risk



Appendix J – Cleadon Avenue/ Tunstall Avenue flood risk



Appendix K – Cowpen Village



Appendix L – Lewes Way, Billingham

