



Middlesbrough Flood Risk Management Partnership

Middlesbrough Local Flood Risk Management Strategy

In England, in 2009, around 5.2 million, or one in six, residential and commercial properties were identified as being in areas at risk of flooding from rivers, the sea and surface water.

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Figure 1 Saltersgill Fields

Executive Summary

The Vision

This local flood risk management strategy will show the extent of flood risk in Middlesbrough and how it will be managed in partnership with others. In particular the strategy will identify risks and include actions to alleviate flooding from surface water, groundwater and ordinary watercourses. It will also ensure appropriate key messages and information are developed and deliver them to the right people at the right time and in the right way.

A key new duty of the Floods and Water Management Act 2010 is for Lead Local Flood Authorities (LLFA) to develop a local strategy for managing local flood risk. It must set objectives for managing local flood risk, in the context of a local strategy. Objectives for local strategies should be consistent with the strategic objectives and guiding principles set out in the National Strategy.

The strategic objectives to be delivered by this document include

- Develop a joint approach to the use of resources and funding.
- Community involvement in making decisions regarding flood risk management
- Ensure planning decisions are properly informed by flood risk
- The adoption of a holistic approach to flood risk management
- Work in partnership to deliver flood risk management activities
- Ensure that all flood risk management activities in Middlesbrough deliver WFD
- The improvement of the future environment for people and wildlife.
- Encourage businesses and communities to take steps to prepare for flooding

It is important that the rationale for, and scope of the LFRMS needs to be explained clearly, particularly its local relevance in relation to other existing priorities. Middlesbrough 2020, lists three key priorities for Middlesbrough over the coming years, this strategy will help to deliver those priorities,

- A town that is clean, safe and healthy
- A learning town in which families and communities thrive
- A town that continues to transform

In order to be able to carry out this task the strategy must specify the following:

- the flood and coastal erosion risk management functions that may be exercised by those authorities in relation to the area (EA responsibility for Main river)
- the objectives for managing local flood risk
- the measures proposed to achieve those objectives;
- how and when the measures are expected to be implemented;
- the costs and benefits of those measures, and how they are to be paid for;
- how the strategy contributes to the achievement of wider environmental objectives.

1. Introduction

The Middlesbrough Local Flood Risk Management Strategy is an important new tool to help everyone understand and manage flood risk within the town. Its primary focus is on 'local flooding' from surface water, groundwater or ordinary watercourses such as streams and ditches.

The EU Directive defines flood as “the temporary covering by water of land not normally covered by water”. Flood Risk is defined “as the combination of the probability of a flood event and of the potential adverse consequences for human health, the environment, cultural heritage and economic activity associated with a flood event”.

However, for those who suffer flooding, it matters little what type of flooding is causing the problem. This strategy aims to provide information about all forms of flooding and the organisations involved in all aspects of flood risk management, from flooding protection to dealing with a serious flooding event. It will not repeat information that is available elsewhere but will signpost the reader to relevant material.

This strategy will cover the town of Middlesbrough. With ever improving knowledge, additional legislation and budgetary constraints it will be necessary to update and review the strategy and its associated action plan on a regular basis. This review process will be overseen by the Middlesbrough Flood Risk Management Partnership and scrutinised by a panel of local councillors through the Environmental Scrutiny Panel.

The main aim of the strategy is to reduce the risk of flooding and the misery and economic damage that flooding causes, in a sustainable manner. Also, any flood management activities carried out will aim to enhance the built and natural environment.

The strategy document starts with information on the legislation that underpins flood risk management activities, who is involved and what part each will play in helping reduce the risk of flooding in Middlesbrough, then looks at the nature of flood risks in Middlesbrough and what further information is needed to help build a better picture of local flood risks.

The next section looks at the objectives for managing flood risk and how we might achieve them, leading onto the action plan. This plan outlines a range of actions, from small-scale local activities to long-term major plans. Where possible we have identified who will be involved, when things might happen and how they might be paid for.

The money available for flood risk management is never going to be adequate to deal with all known existing flood risks and the increasing future risk brought about by a changing climate.

Traditional approaches to flood risk management will need to be supplemented by everyone working together, including those at risk taking responsibility for themselves.

However a new funding formula offers financial benefit to all projects submitted to the Regional Flood and Coastal Committee. DEFRA and the Environment Agency are being proactive, working with all Local Lead Flood Authorities (LLFA) in order to develop and submit projects for funding appraisal.

1.1 History of flood risk management

In 1991, a number of pieces of legislation were enacted which consolidated existing water legislation. Most relevant in terms of flood risk management were the Land Drainage Act. This outlined the duties and powers needed to manage land drainage for a number of bodies including internal drainage boards and local authorities. The Water Resources Act outlined the roles and responsibilities of the National Rivers Authority. District councils were originally responsible for sewerage and councils continue to manage a number of ordinary watercourses and highway drainage.

1996 Cleveland County Council was dissolved and Middlesbrough Council became a unitary authority, thereby taking full control of flood risk management duties. In 1998 Agency arrangements for sewerage returned to Northumbrian Water Limited, resulting in significant skills being lost to the local authorities as the transfers took place.

The Environment Act established the Environment Agency in 1995, taking over the roles and responsibilities of the National Rivers Authority and also the responsibility for issuing flood warnings, a role previously held by the police. The management and operation of the Environment Agency is divided into a number of regions across the country; Middlesbrough lies within the North East Region.

Following the floods of 2000, the government decided to transfer the maintenance responsibility of Critical Ordinary Watercourses from Local Authorities to the Environment Agency. In 2006 the Environment Agency had identified Newham and Marton West Beck, Ormesby Beck and Middle Beck as 'Critical Ordinary Watercourses'. These were transferred under a process known as 'enmainment'.

1.2 Legislation

Following the extreme floods of 2007, the Pitt Review stressed the importance of implementing better legislation for the effective management of flooding, particularly from surface water. Many of the recommendations from the Pitt Review have been implemented through the **Flood and Water Management Act 2010**, which places a greater responsibility on upper tier local authorities for surface water management issues, under their new role as a Lead Local Flood Authorities. The role of the Environment Agency in respect of river and tidal flooding remains in

force. The Environment Agency is also given a strategic overview role for all flood and coastal erosion risk management.

1.2.1 The Flood Risk Regulations (2009)

Came into force in December 2009 and transpose the EU Floods Directive into law for England and Wales. The Flood Risk Regulations required a **Preliminary Flood Risk Assessment (PFRA)** to be produced which identifies areas where significant numbers of people are at risk of surface, ground and ordinary watercourse flooding. Where such areas exist the regulations also require the production of hazard and risk maps and flood management plans. Within Middlesbrough, there are no areas that satisfy the national criteria for defining such areas, not because there is no risk, but due to the way the way the national criteria is set out. The PFRA for Middlesbrough was completed in June 2011 and will be reviewed in 2016.

The Preliminary Flood Risk Assessment is a high level screening exercise that brings together, from a number of sources, easily available information on past and potential flooding to enable judgments to be made about local flood risk. The assessment of potential flood risk was derived from national datasets produced by Defra. The assessment of past flooding was obtained from a number of sources, but the process of analysing past flooding revealed some inadequacies in the collection of data on flooding incidents which will be addressed through this strategy. However the information generated through the PFRA has been used to inform this strategy.

1.2.2 The Flood and Water Management Act 2010

Gained royal assent in April 2010 and provides legislation for the management of risks associated with flooding and coastal erosion. The Act reinforces the need to manage flooding holistically and in a sustainable manner. It places a number of new roles and responsibilities on Middlesbrough Council, which is designated a Lead Local Flood Authority'. The preparation of this Local Flood Risk Management Strategy is one of the new duties placed upon the council.

A national Flood and Coastal Erosion Risk Management strategy has been produced by the Environment Agency that sets out the principles that will guide local strategies. The Act defines various bodies as 'risk management authorities'.

These include:

- Lead Local Flood Authority
- Environment Agency
- Water company
- Highway Authority.

The powers and duties in the Act are summarised below. More details on how they will be discharged are in Chapter 2

RESPONSIBILITY DETAILS

*The commencement of the role of Sustainable Drainage Systems Approval Body is expected to be in 2014.

Preparation of an Asset Register	Lead Local Flood Authority (LLFAs) have a duty to maintain a register of structures or features which are considered to have an effect on flood risk, including details on ownership and condition as a minimum. The register must be available for inspection and the Secretary of State will be able to make regulations about the content of the register and records.
Power to designate flood risk management structures	LLFAs, as well other flood management authorities have powers to designate structures and features that affect flooding or coastal erosion in order to safeguard assets that are relied upon for flood or coastal erosion risk management.
Investigation of flood incidents	LLFAs have a duty to co-ordinate the investigation and recording of significant flood events within their area. This duty includes identifying which authorities have flood risk management functions and what they have done or intend to do with respect to the incident, notifying risk management authorities where necessary and publishing the results of any investigations carried out. Further information with respect to this duty is provided at Section 2.4.2.
Prepare a Local Strategy for Flood Risk Management	LLFAs are required to develop, maintain, apply and monitor a local strategy for flood risk management in its area. The local strategy will build upon information such as national risk assessments and will use consistent risk based approaches across different local authority areas and catchments.
Works powers	LLFAs have powers to undertake works to manage flood risk from surface runoff and groundwater, consistent with the local flood risk management strategy for the area.
Consenting changes to Ordinary Water Courses	If riparian owners wish to culvert an ordinary watercourse or insert any obstructions, consent is required from the LLFA.

1.2.3 Planning legislation:

The Department of Communities and Local Government published the National Planning Policy Framework in March 2012. It is designed to streamline existing planning policy and reduce the amount of planning guidance. To supplement the framework a separate technical guidance document has also been produced. Both documents replace Planning Policy Statement 25 (PPS25) which was the main instrument for flood risk.

1.2.4 Other legislation:

Flood and coastal risk management is affected by a range of other national and local 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 Strategy Environmental Assessment (SEA) Directive (2001)
- The Land Drainage Act (1991)
- The Water Framework Directive
- Natural Environment White Paper

1.2.5 Regional and local plans:

River Basin Management Plan, Northumbria River Basin District (December 2009) – the plan for the 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. There are four plans covering the river catchments across Middlesbrough:

- Tees Mouth & Ingleby Barwick
- Old River Tees
- Middlesbrough Becks
- Stokesley and Great Ayton

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

A Strategic Flood Risk Assessment was undertaken in 2007 as part of the strategic planning process and informs the Local Development Frameworks/ Local Plan. A Strategic Surface Water Study was completed in 2010 as a partial update to the 2007 assessment. This identified a number of candidate Critical Drainage Areas (cCDAs)

The Surface Water Management Plan (2012) for Middlesbrough is a more detailed study of surface water risks in the town leading to a plan to manage the main risks.

Middlesbrough Partnership Green Spaces Public Places strategy 2007- 2012 (updated for 2013) and Open Spaces Needs Assessment 2012. These plans seek to protect and improve the beck and river networks in terms of flood risk as well as for public and wildlife purposes.

1.3 The Local Flood Risk Management Strategy

The Flood and Water Management Act 2010, establishes that flood risk will be managed within the framework of National Strategies for England and Wales and Local Strategies for each Lead Local Flood Authority area. The national strategy for England has been developed by the Environment Agency with the support and guidance of Defra. It sets out principles for

how flood risk should be managed and provides strategic information about different types of flood risk and which organisations are responsible for their management. The Act requires risk management authorities (local authorities, internal drainage boards, sewerage companies and highways authorities) to act consistently with the national strategy in carrying out their flood and coastal erosion risk management functions.

Lead Local Flood Authorities have responsibility for developing a Local Flood Risk Management Strategy for their area covering local sources of flooding. The local strategy must be consistent with the national strategy. It will set out the local organisations with responsibility for flood risk in the area, partnership arrangements to ensure co-ordination between these, an assessment of the flood risk and plans and actions for managing the risk. It must also follow the guiding principles set out in the national guidance, these guiding principles which underpin this strategy, are: -

- Community focus and partnership working
- A catchment based approach
- Sustainability
- Proportionate, risk-based approaches
- Multiple benefits
- Beneficiaries should be allowed and encouraged to invest in local risk management

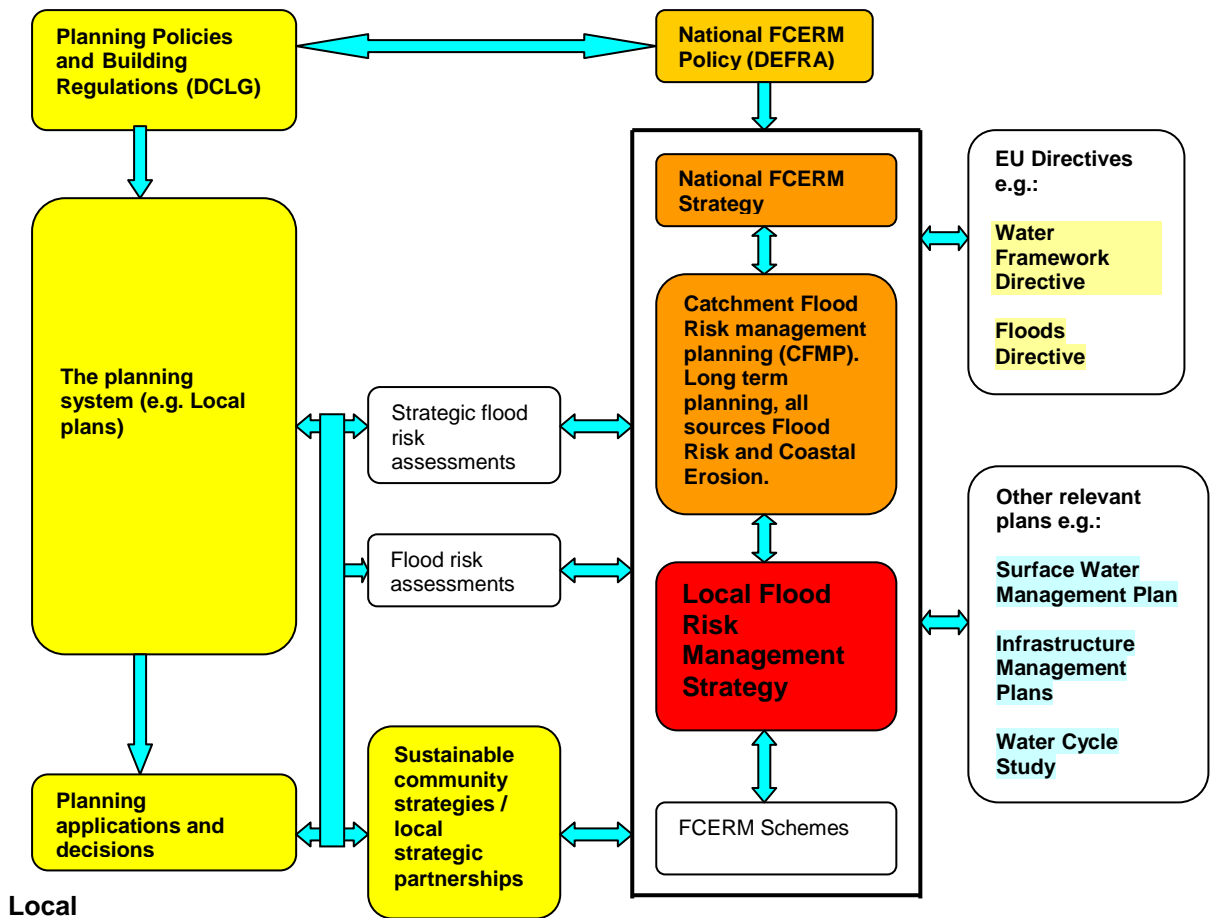
The Local Strategy is predominantly concerned with the management of surface, ground and ordinary water course flooding but will clearly need to link to flooding from critical ordinary watercourses and rivers.

It is important to add a caveat to this as there are some aspects of the Flood & Water Management Act 2010 that have yet to come into force, most notably the sustainable drainage powers and duties. This strategy has been prepared using current information, which may change before the document goes out for formal public consultation. The document will be reviewed continuously.

The strategy has been produced by the Lead Local Flood Authority for Middlesbrough. The LLFA sits with in Economic Development.

Figure 2 Relationship between National and Local Strategies

National



Local

1.4 The Middlesbrough Flood Risk Management Partnership

Middlesbrough Flood Risk Management Partnership

- Middlesbrough Council
- Environment Agency
- Northumbrian Water Limited
- Cleveland Resilience Forum
- Highways Agency

The Flood and Water Management Act requires Middlesbrough Council to take a leading role in managing local flood risks, working in partnership with other relevant authorities and the public.

The Middlesbrough Flood Management Partnership, made up of key risk management authorities, is fundamental to the delivery of a co-ordinated and consistent approach to local flood risk management and working alongside the public to make a real difference in the town.

This partnership was set up following the publication of the Pitt Recommendations to share expertise and local knowledge and work jointly to understand and reduce flood risk across

Middlesbrough. It has links to a number of other relevant groups and key players in managing flood and coastal risks, including:

1.4.1 Northumbrian Regional Flood & Coastal Committee

brings together councillors appointed by Lead Local Flood Authorities (LLFAs) and appointees with relevant experience. Their role is to approve the annual programme of work ensuring there are coherent plans for risk-based investment that optimises value for money and benefits for local communities in flood and coastal erosion risk areas.

1.4.2 Developers

have a vital role in delivering sustainable drainage as promoted by the Flood and Water Management Act as well as the wider planning proposals in relation to flood risk outlined in this strategy. It is crucial that future development takes proper regard to all sources of flooding and wherever possible deliver reductions in flood risks both on and off site

1.4.3 Tees Valley Strategic Flood Risk Management Partnership

A grouping of all lead local flood authorities from across the Tees Valley has been created for mutual assistance and to share expertise.

1.4.4 Riparian Owners

The many land and homeowners whose land adjoins a watercourse have certain rights and responsibilities in relation to flood risk management. These people are key players in the management of local flood risk.

1.4.5 Middlesbrough Environment Scrutiny Panel comprising of elected members of the Council. It is their role is to scrutinise the proposals and actions of Middlesbrough Council's Environment Department which includes flood risk management.

1.4.6 Community & Parish Councils

are a key route to the general public and local information. They have a key role in encouraging local self-help groups to prepare for flooding and other emergencies.

1.5 What is the nature of flood risk within Middlesbrough?

Floods can happen anywhere at anytime, caused by rising ground water levels, burst water drains, hillside run-off from sudden rain as well as flooding from rivers and the sea. Even if you live miles away from the coastline or a river, there's still a chance flooding could affect you

“Environment Agency”

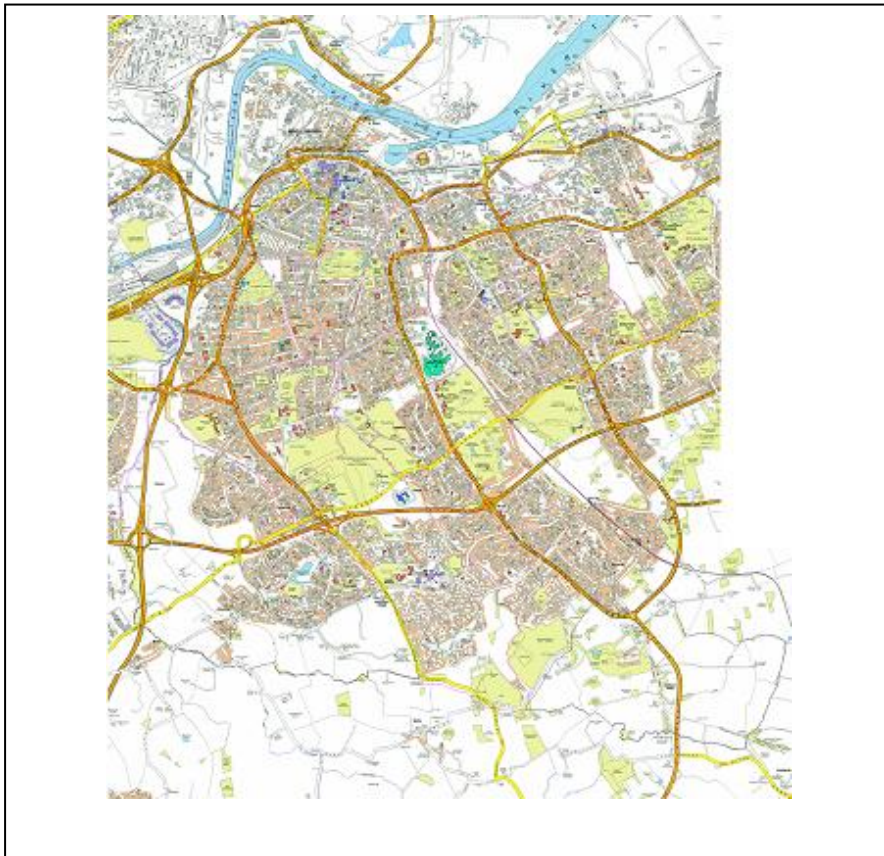
Flooding is a natural phenomenon. It results from a variety of sources including heavy rainfall causing surface water run off, ordinary watercourses, groundwater, and from surcharging sewers. When flooding occurs it can cause damage to property and harm people and communities.

Rainfall and the consequential flooding by its very nature is unpredictable in location and severity and dealing with these uncertainties will be challenging, particularly in the case of surface water flooding. However, flood risk is something that can be understood and its effects are generally more predictable, however blockages in drainage systems may cause unusual and even less predictable flooding.

Topographically Middlesbrough falls from its southern boundary with North Yorkshire, from approximately 100m AOD to 50m AOD at the A174 Parkway. To the north of the Parkway, the land falls steadily to approximately 15 to 20m AOD, at Easterside Playing Fields, Middlesbrough Municipal Golf Centre Acklam, and subsequently falling at a shallower gradient towards the River Tees estuary.

The catchment covers an area of approximately 5,400 hectares with a population of 137,900 (Middlesbrough LDF). The catchment is predominantly urban in character, consisting of Middlesbrough to the north (A174 Parkway to the River Tees) and Hemlington, Coulby Newham and Nunthorpe to the south. There are a number of undeveloped areas/primary open space notably to the south of the confluence of Marton West Beck and Newham Beck, which incorporates Middlesbrough Municipal Golf Centre, Stewart Park and Albert Park. There are also other smaller areas of open space adjacent to the system of becks through out the catchment.

Figure 3 Middlesbrough



1.5.1 Surface water flooding

Also known as Pluvial Flooding occurs when intense rainfall (typically greater than 30mm/hr), often of short duration, is unable to permeate into the ground or enter drainage systems quickly enough, resulting in ponding or overland flows. It can cause considerable problems in urban areas. Surface water flooding can also originate from rural areas where high intensity rainfall can run off land without entering land drainage systems.

Flooding from surface water can be hazardous due to its depth, velocity of flow and rapid occurrence.

Based on current information Middlesbrough has 2300 properties predicted to be affected by surface water flooding during an extreme rainfall event with a 0.5 per cent (1 in 200) chance of happening each year and a flooding depth of 0.3 metres.

1.5.2 Groundwater flooding

Occurs when water levels in the ground rise above the ground surface. Flooding of this type tends to occur after long periods of sustained heavy rainfall and can last for weeks or even months. The areas at most risk are often low-lying areas where the water table is more likely to be at a shallow depth and flooding can be experienced through water rising up from the underlying aquifer or from water flowing from springs. The Areas Susceptible to Ground

Water Flooding maps, provided by the Environment Agency identifies areas susceptible to groundwater flooding across the borough; this information will be used to assist with the prioritisation of flood risk areas.

1.5.3 River flooding,

Also known as fluvial flooding, occurs when a watercourse cannot accommodate the volume of water that is flowing into it. Rivers are categorised into main rivers and ordinary watercourses. Main rivers are usually large watercourses but also include smaller watercourses of strategic drainage importance. The Environment Agency's powers to carry out flood defence works apply to main rivers only.

All other smaller watercourses, ditches and streams are classified as ordinary watercourses. Middlesbrough Council has powers to carry out works on ordinary watercourses in the borough.

Middlesbrough has a number of main rivers (see section 2.5.2) these are Marton West Beck, Newham Beck, Middle Beck and Ormesby Beck which all pose a threat of river flooding, in addition to the vast

1.5.4 Coastal flooding

Usually occurs during storm surges when there is an increased risk of high sea levels causing overtopping or breaching of coastal flood defences leading to flooding inland, however Middlesbrough does not have a coast.

1.5.5 Reservoir flooding

Results from the complete or partial failure of a reservoir structure. It may be caused by erosion due to seepage, overtopping of the dam beyond its design level or through accidental damage to the structure. There is only large raised reservoir in Middlesbrough, Hemlington Lake that may pose a slight risk to a small number of properties.



Figure 4 Hemlington Lake

1.5.6 Sewer flooding

Occurs when the sewer network cannot cope with the volume of water that is entering it or when pipes within the network become blocked. This type of flooding is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding.

The vast majority of Middlesbrough drains into a combined sewerage system where surface water runoff and foul discharges (domestic and commercial sewage) are conveyed together.

To meet requirements set by the Office of Water Trading (OFWAT), water companies must record all instances of sewer flooding where flooding has resulted from rainfall events. These are recorded in the DG5 register, there are two bands internal flooding and external flooding. Currently there are no addresses within Middlesbrough on this register.

1.5.7 Highway flooding

Can be defined as flooding caused by heavy rainfall or overflowing from blocked or overloaded drains, soakaways and gullies causing water to pond within the highway network or from a lack of formal drainage system. During the Preliminary Flood Risk Assessment process, it was clear that reports had been received regarding flooding from blocked gullies however these are dealt with immediately upon receipt. A task has also taken place to ascertain the condition of highway drainage and this will feed into this strategy.

It is frequently difficult to establish a single precise cause for flooding and a holistic approach needs to be taken.

1.6 Factors increasing flood risk

Flood risk is a combination of probability and consequence. There are a number of factors, which could lead to a higher probability of flooding in the future and more serious potential consequences that could result in an increase in the risk of flooding across Middlesbrough.

The factors leading to an increase in flood risk include:

- The prediction that climate change will lead to more frequent and more severe extreme weather and rising sea levels, and therefore to more extreme floods with more serious consequences;
- The deterioration in the condition and performance of existing drainage infrastructure and flood defence structures over time will increase future flood risk.
- New development and changes in land use may lead to an increase in impermeable surfaces and general loss of vegetation cover, therefore causing increased levels of runoff during heavy rainfall events

1.7 Middlesbrough's environment

Middlesbrough is located on the south bank of the River Tees estuary to the north of the Cleveland Hills and North York Moors. The borough is bounded to the west by the Old River Tees and A19, the River Tees to the north, Spencer Beck and the Middlesbrough to Whitby railway to the east and open agricultural land to the south.

Middlesbrough is a predominantly urban area, which means a greater impermeable area and associated runoff and as development continues in the borough the impermeable area will increase. The urban areas of Middlesbrough are also drained via Northumbrian Water Ltd (NWL) sewers, discharging some surface water runoff and combined sewer overflow into the

watercourses. Combined runoff primarily discharges to Bran Sands STW, however, Thornton, Stainton, Brookfields, Coulby Newham, Mount Pleasant and Hemlington discharge to Seal Sands STW.

1.8 What happens next?

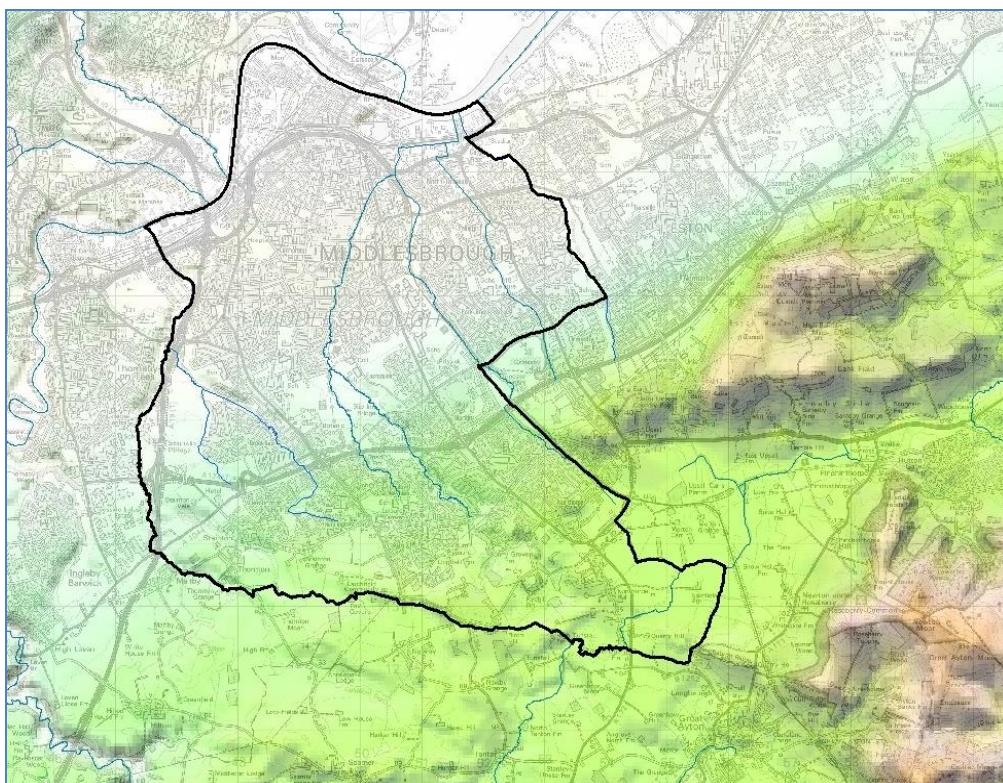
The wish is for people in Middlesbrough to face only a minimal threat of disruption caused by flooding from watercourses and surface run off. Measures taken will take account of climate change and will seek to manage flood risk in an environmentally sensitive way. Residents at risk of flooding will be supported to become more self-resilient.

Extract from Middlesbrough's 'One Planet Living Action Plan'

The Local Flood Risk Management Strategy and its associated Action Plan will be a working document that will be amended as new legislation and policy comes into force and as new information guides our activities.

The Middlesbrough Flood Risk Management Partnership will publish a short review each year reporting progress on delivery of the action plan and agreeing any appropriate amendments to the strategy, detailed in Chapter 7.

Figure 5 Middlesbrough and its Environment



2. Flood Management Authorities

2.1 The players in flood and coastal management in Middlesbrough

Middlesbrough Council, as the Lead Local Flood Authority, is responsible for taking the lead in managing flood risk from local sources. This includes surface water, groundwater and ordinary watercourses and also where there is an interaction between these sources and main rivers. The council also has other related roles in emergency planning and road drainage – detailed in sections below.

There are a number of key organisations who together manage flood risks in Middlesbrough. These are:

2.1.1 The Environment Agency

is responsible for managing flood risk from main rivers, reservoirs and the sea, and also has a strategic overview role over all flood and coastal erosion risk management. It also has a key role in providing flood warnings to the public and protecting and improving the environment and promoting sustainable development.



2.1.2 Northumbrian Water Limited

is both a water and sewerage company, responsible for the provision of foul and surface water sewerage across the whole of Middlesbrough as well as providing water to the borough.



2.1.3 The Highways Agency and Middlesbrough Council Transport and Infrastructure Department,

as the Highway Authority are responsible for managing flood risk on roads and highways within the borough. The A19 and A174 (trunk roads) responsibility lies with the Highways Agency, all other adopted



(maintainable at the public expense) roads lies with the Council. There are some private roads in Middlesbrough and the responsibility for managing flood risk on these lies with the landowner.

2.1.4 Cleveland Emergency Planning Unit (CEPU)

provides an emergency planning service to the four local authorities in the former Cleveland area. Their role is to ensure the local authorities are prepared to respond to emergencies and to support the emergency services and the community. To this end they maintain and test the Major Incident Plan for each authority. The CEPU also hosts the



Cleveland Local Resilience Forum and its sub groups including a flooding group. The forum comprises of Flood Risk officers representing all Category 1 Responders, as defined under the Civil Contingencies Act, together with key partners. Whilst it is not a statutory body it is seen as the principal mechanism for facilitating multi-agency co-operation across the responding bodies to a major incident.

2.1.6 Major Land owners and Developers –Thirteen

thirteen

Thirteen was created in April 2014 from the merger of two respected North East housing groups, Fabrick and Vela. There are a number of other stakeholders outside the key players listed above. These will depend upon the nature of the LFRM work, for example high-level strategy work or scheme specific work.

2.2 Responsibility for flooding

Flooding can come from a number of different sources and under recent legislation the responsibility for managing the risk from these different sources falls with different Risk Management Authorities; a simplified illustration of this can be seen in Figure 6 below.

The sections below provide more information about all the powers and responsibilities that these organisations have. But flood risk management is not something that can be left solely in the hands of certain organisations and forgotten by everyone else. Households, businesses and landowners have their part to play too. A key point is that the organisations would not be able to prevent all floods or solve all concerns. That is why the powers and responsibilities of Middlesbrough’s citizens are also recorded in this section.

2.3 Powers and Responsibilities of Flood Risk Management Authorities

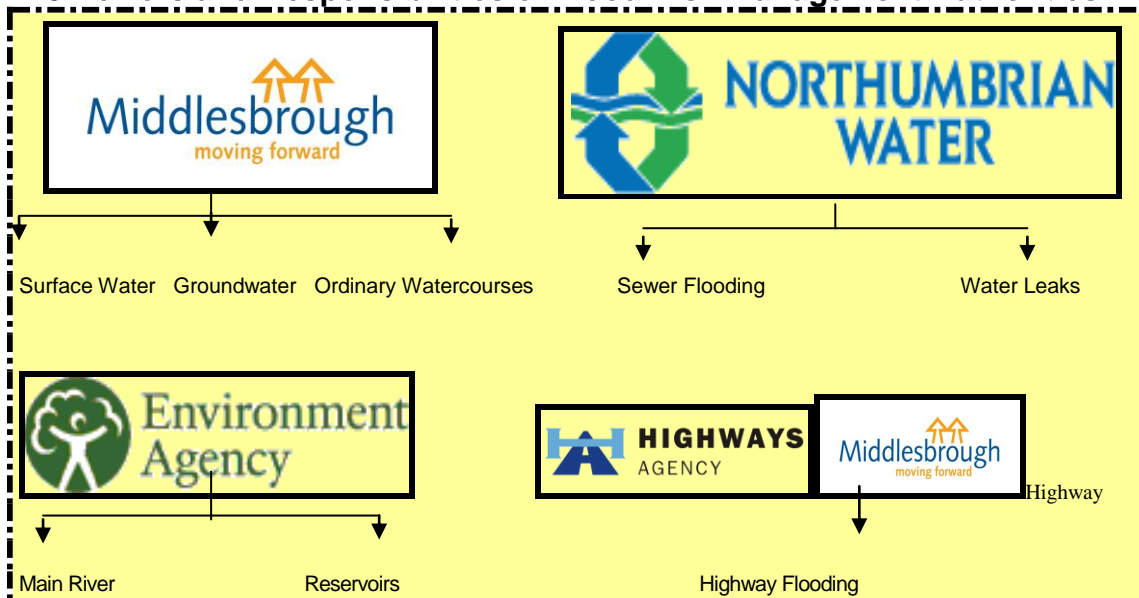


Figure 6 Flood Risk Management Authorities

The Flood and Water Management Act identified certain organisations as ‘Risk Management Authorities’ which have responsibilities around flooding, both new ones from the Flood and Water Management and longstanding ones from previous legislation. These organisations all

have assets and flood risk management responsibilities therefore being the most likely partners in developing schemes. They may be able to offer access to potential sources of funding and/or contribute in non-financial ways.

All of these authorities have the following 'universal' duties and powers:

- Duty to be subject to scrutiny from the Lead Local Flood Authorities democratic processes. In Middlesbrough we have an Environmental Scrutiny Panel comprising non-executive Councillors who review the effectiveness of decisions, policies and services which affect Middlesbrough and hold the Executive to account.
- Duty to co-operate with other risk management authorities in the exercise of their flood and coastal erosion risk management functions, including sharing flood risk management data.
- Power to take on flood and coastal erosion functions from another risk management authority when agreed by both sides

2.4 Powers and duties of Middlesbrough Council

2.4.1 As Lead Local Flood Authority

The Flood and Water Management Act 2010 identified Middlesbrough Council as the Lead Local Flood Authority for the county of Middlesbrough. This gives the council a strategic role in overseeing the management of local flood risk.

The main responsibilities of Middlesbrough Council are as: -

- Lead Local Flood Authority (LLFA)
- Emergency Planning Authority
- Highways Authority
- Planning Authority

The Flood and Water Management Act 2010 gives the council the following duties and powers.

NB. A duty is something the council is legally obliged to do; a power can be used if appropriate but does not have to be used.

- A duty to develop, maintain, apply and monitor a strategy for local flood risk management;
- Strategic leadership of local risk management authorities is a duty;
- Powers to request information from any person in connection with the authority's flood risk management functions;
- A duty to investigate and publish reports on flooding incidents as appropriate, to identify which authorities have relevant flood risk management functions and what they have done or intend to do;
- A duty to maintain a register of structures or features (asset register) which have a significant effect on flood risk in their area, in the view of the Lead Local Flood Authority;

- Decision making responsibility for whether third party works on ordinary watercourses that may affect water flow can take place.
- A duty to exercise flood risk management functions in a manner consistent with the national and local strategies;
- A duty to aim to contribute towards the achievement of sustainable development in the exercise of flood risk management functions and to have regard to the Ministerial guidance on this topic.
- Power to do works to manage flood risk from surface runoff or groundwater;
- Power to designate structures and features that affect flooding;

Middlesbrough Council has an important role to play as the strategic leader for local flood risk management in Middlesbrough. This involves developing this strategy, ensuring that all organisations involved in flood risk management are aware of their responsibilities, monitoring progress and activity by all parties involved in flood risk management and co-ordinating communication with the public and between organisations.

The Middlesbrough Flood Risk Management Partnership is led and managed by the council and provides an important forum to discuss all aspects of flood risk management in the borough.

2.4.2 In the Recording of Flood Incidents

Investigations will normally be carried out on all flooding incidents however they will only be reported where any of the following criteria are met:

- **where there was a risk to life as a result of flooding;**
- **where there is ambiguity surrounding the source or responsibility of a flood incident;**
- **where internal flooding of five properties has been experienced during one single flood incident;**
- **where a major transport route was closed for more than 10 hours as a result of flooding**
- **where critical infrastructure was affected by flooding**

To assemble an accurate picture of flood risk across Middlesbrough requires the collection of precise and useful records from actual flood incidents occurring through out the borough.

The decision whether or not to investigate a flood is at the discretion of the Lead Local Flood Authority and the comprehensiveness of the investigation will be adjusted to reflect the significance of the incident and the resources available. In the event of very widespread, significant flooding affecting large areas of Middlesbrough, our ability to investigate every

incident in detail is likely to be severely limited. In these cases it may be a possibility that additional help, from third parties, is requested.



Figure 7 Flooded South Bank Road

The investigations will examine which authorities have an involvement in a flood incident, if any. Investigations will involve consultation with the relevant risk management authorities, landowners and private organisations involved, all of whom we expect to cooperate with us and provide comments.

The aim is for Flood Investigation Reports to bring all useful information together in one place, providing an understanding of situations, outlining possible causes of flooding and potential long-term solutions. Further recommendations will also be made to highlight potential flood risk management actions. Reports will provide a clear and thorough understanding of flooding situations, but our duty to investigate does not guarantee that problems will be resolved and cannot force other authorities into action. Decisions about next steps must be made by the parties involved.

Flood Investigation Reports will be available to anyone on request within 3 months of an incident being reported to Middlesbrough Council. However, there may be cases where this timeframe will be extended.

2.4.3 In the preparation of an Asset Register

Flood Risk Assets are structures or features that are considered to have an effect on flood risk. An example could be an embankment protecting properties and therefore decreasing flood risk, or an undersized culvert in a residential area, which may actually increase flood risk during high rainfall

Middlesbrough Council is required to ensure there are records of all significant assets available for use by risk management authorities and for inspection by the public at all reasonable times. The development of a register for the council is underway and can be found on the council's website.

Unlike major assets associated with fluvial or tidal flooding or coastal erosion, there has often been much confusion over the ownership and maintenance responsibility of local flood risk assets. This is likely to be due to local drainage infrastructure commonly being hidden underground or along land boundaries, where landowners either do not realise or acknowledge that they have any responsibility. The Asset Register is a way to address this problem and ensure that residents are aware of assets in their area and have information to enable them to contact the assets' owners when there are problems.

There are no set criteria for what defines an asset as significant but the most important consideration is its location. Future flood risk mapping and the flood history at a site will be used to analyse the 'significance' of each flood risk asset. The vulnerability of the asset's surroundings will also be used to determine the consequences of its failure.

New sustainable drainage assets will be recorded via the SuDS approval process and asset data may also be captured through local studies and flood investigations. The council is also a riparian owner of both ordinary and main watercourses and as such carry out the duties imposed on riparian owners by the Land Drainage Act.

2.4.4 In the Designation Of Assets

The Flood and Water Management Act provides Middlesbrough Council, and the Environment Agency with powers to designate structures and features that affect flooding or coastal erosion. The powers are intended to overcome the risk of a person damaging or removing a structure or feature (this could be a natural feature such as a rock outcrop) that is on private land and which is relied on for flood or coastal erosion risk management.

Once a feature is designated, the owner must seek consent from the authority to alter, remove, or replace it. An individual may appeal against a designation notice, refusal of consent, conditions placed on a consent or an enforcement notice.

There are four criteria for a structure or feature to be designated these being

1. The designating authority thinks the existence or location of the structure or feature affects
a flood risk, or
a coastal erosion risk.
2. The designating authority has flood or coastal erosion risk management functions in respect of the risk which is affected
3. The structure or feature is not designated by another authority

4. The owner of the structure or feature is not a designating authority.

If an asset becomes 'designated' its owner cannot alter or remove it without first consulting the designating risk management authority. The aim of designating flood risk assets is to safeguard them against unchecked works which could increase flood risk in the area. Designating of features or structures is not something that will be done regularly but only when there are concerns about the asset.

Note: designation of an asset does not mean there is a duty on anyone to maintain it in its current condition.

2.4.5 In carrying out a 'Consenting' role in respect to Watercourses

It is essential for flood risk management purposes that watercourses retain their capacity to carry water away and so drain the land. Construction of works or maintenance by other parties can impact on flood risk management and water quality, leading to flooding and/or environmental damage. Section 23 Land Drainage Act 1991 prohibits the construction of certain kinds of obstructions in ordinary watercourses without the prior consent of the drainage board.

Any riparian owner or other body must contact the Council if they require consent to carry out works which may obstruct the flow of the watercourse. This only applies to Ordinary watercourses as the role still lies with the Environment Agency for main river.

2.4.6 Statutory Consultee on major planning applications.

To support planning policy, the Government has made LLFAs statutory consultees on planning applications for major development in relation to surface water drainage under Schedule 4 of the Town and Country Planning (Development Management Procedure) (England) Order 2015. This came into force on the 15 April 2015.

The LLFA should satisfy themselves that the proposed minimum standards of operation are appropriate, and ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

The policy also states that the sustainable drainage system should be designed to ensure that the maintenance and operation requirements are economically proportionate.

Sustainable drainage means managing rainwater with the aim of

- reducing damage from flooding,
- improving water quality,
- protecting and improving the environment
- protecting health and safety and
- ensuring the stability and durability of drainage systems

Sustainable drainage is a measure that will assist in the management of flood risk but can clearly be needed to address other issues including water quality and amenity. The SuDS approach is therefore needed even where flood risk is small.

2.4.7 In carrying out Emergency Planning

Emergency Planning in Middlesbrough is undertaken by the Cleveland Emergency Planning Unit. The Unit provides an emergency planning service to the four local authorities in the former Cleveland area. Their role is to ensure the local authorities are prepared to respond to emergencies and to support the emergency services and the community. To this end they maintain and test the Major Incident Plan for each authority.

Contingency plans are prepared for a range of hazards in the community including large scale events, industrial accidents and flooding in cooperation with organisations such as businesses, the Environment Agency, volunteer groups and the emergency services.

The objectives of the unit are

- To ensure that the emergency planning service provided meets the needs of the four local authorities.
- To ensure that Emergency Planning Officers and appropriate local authority personnel receive appropriate training that allows them to develop the necessary knowledge and expertise, thereby enabling them to respond effectively to incidents.
- To establish, consolidate or improve partnerships with the emergency services and other agencies, particularly Category 1 and Category 2 Responders under the Civil Contingencies Act.
- To lead co-ordination with Category 1 Responders during an incident and the subsequent recovery stage.
- To raise the awareness of the general public to the risks within their area and they can prepare for and protect themselves in the event of a major incident.
- To ensure communication strategies and procedures are in place to deal with major incidents and service continuity planning.

The Unit also incorporates the Emergency Planning Officers from Cleveland Police, Cleveland Fire Brigade and the North East Ambulance Service making it a unique arrangement. This approach ensures strong partnership working with excellent co-operation and sharing of information.

2.4.8 As the Highway Authority

All Highway Authority are Risk Management Authorities according to the Flood and Water Management Act and must adhere to all the responsibilities of risk management authorities.

The Council is the highways authority for most of the borough. However the exceptions to this are the A19 and A174 trunk roads where the Highways Agency is the Highway Authority.

The responsibilities/powers listed in this section are relevant to both these highway authorities. In addition to their responsibility as a risk management authority, highway authorities also have further responsibilities:

Responsibility to maintain the Highways

Under the Highways Act 1980, the Highways Authority has a duty to maintain the highway. This includes ensuring that highway drainage systems are clear and that blockages on the highway are cleared, where reasonably practicable. As part of this duty, roads are regularly inspected and maintained.

Powers to deliver works

Highways Authorities are able to adopt SuDS that serve the highways.

The Highway Authority can deliver works that they consider necessary to protect the highway from flooding. These can be on the highway or on land which has been acquired by the Highway Authority in the exercise of highway land acquisition powers for that purpose.

Highway authorities may divert parts of a watercourse or carry out any other works on any form of watercourse if it is necessary for the construction, improvement or alteration of the highway or provides a new means of access to any premises from a highway.

Response in an Emergency Flooding Event

In the event of an emergency or major incident Middlesbrough Council as Highway Authority will aim to provide an Incident Co-ordinator whose role will be to:

- Providing appropriate briefings to Managers as the incident develops
- Call for reports from the Tactical Team Managers to enable the Corporate Management Team to be kept fully briefed on the Council's response to the incident.
- Arrange for the Tactical Team Managers and other incident room staff to be relieved for rest and meal breaks.
- At the end of the incident, co-ordinate the preparation of a detailed report for the Corporate Management Team

In general Middlesbrough Council as Highway Authority will:

- Arrange to call all staff to duty who are considered necessary to respond to the incident
- Direct the repair of highways, street lighting and the council's drainage systems
- Ensure the preparation and implementation of road closures and traffic diversions
- Ensure the maintenance of traffic signals
- Establish transport routes

- Provide access to appropriate records for highways, drainage and bridge structures
- Provide assistance with the inspection of dangerous buildings and other structures
- Provide road closures and diversionary routes
- Remain at the disposal of the Emergency Management Response Team/Works Manager.
- During the recovery process cleanse and prove drainage systems

2.4.9 Responsibilities as a Planning Authority

The Councils' planning authority has a key role in Flood Risk Management, in developing its policies and plans the following must be considered;

- Climate change over the long term including factors such as flood risk.
- New developments in vulnerable areas, care should be taken to ensure risks can be suitably managed through adaptation and green infrastructure.
- The production of a Strategic Flood Risk Assessment which considers not just fluvial flooding but also local flood risk issues. Where Critical Drainage Areas have been identified these have been included.
- Develop a Local Development Framework (LDF) that carefully considers flood risks. This is a statutory planning document which will be used to resist to inappropriate development in the floodplain.

Consequently the LDF has embedded the Strategic Flood Risk Assessment (SFRA). However the Preliminary Flood Risk Assessment and Surface Water Management Plan (SWMP) were completed after the LDF, so are not included.

The Council as Planning Authority also has a requirement to:

- Promote development in hazard free areas through embedding the sequential approach referred to in the National Planning Policy Framework into the LDF Safeguard land for critical infrastructure.
- Develop action plans, where necessary, to support sustainable spatial planning and ensure all plans are integrated and firmly linked to local strategies.
- Ensure that neighbourhood plans fully consider flood risk issues.
- When determining planning applications ensure that flood risk is not exacerbated elsewhere

It will be essential that close co-operation between the Planning Authority and LLFA. This will enable the Planning Authority to:

- Alert developers and land owners at the master planning stage of the need to consult with the LLFA about drainage issues on the site
- Ensure that requests for outline planning permission are discussed with the LLFA

Planning authorities should only approve development where it can be demonstrated that the proposal satisfies all the following criteria: (a) it does not increase the overall risk of all forms of flooding in the area through the layout and form of the development and use of appropriate SuDS; (b) it will be adequately protected from flooding; (c) it is and will remain safe for people for the life time of the development and (d) it includes water efficiency measures such as rainwater harvesting or use of a local watercourse where practicable.

2.5 Powers and Responsibilities of the Environment Agency

The Environment Agency has both a national strategic role and local operational role when it comes to flood and coastal erosion risk management.

2.5.1 National Strategic Role

The Environment Agency is required to publish the National Strategy which provides a national framework for all forms of flood and coastal erosion risk management. It aims to deliver a risk-based approach whilst allowing local responsibility and decision-making where appropriate. Like the local strategy, it looks to define and understand the roles and responsibilities of risk management authorities and to provide information to communities at risk and know what they need to do

The National Strategy identifies the following strategic actions for the Environment Agency:

- Use strategic plans like the Catchment Flood Management Plan to set the direction for Flood and Coastal Erosion Risk Management
- Support the creation of Flood Risk Regulations reports by collating and reviewing the assessments, plans and maps that Lead Local Flood Authority produce
- Providing the data, information and tools to inform government policy and aid risk management authorities in delivering their responsibilities.
- Support collaboration, knowledge-building and sharing of good practice including provision of capacity-building schemes such as trainee schemes and officer training.
- Manage the Regional Flood and Coastal Committees (RFCCs) and support their decisions in allocating funding for flood defence and flood resilience schemes.
- Report and monitor on flood and coastal erosion risk management
- Provide grants to risk management authorities to support the implementation of their incidental flooding or environmental powers.

2.5.2 Local Operational Role

The Environment Agency's Local Operational Role includes emergency planning and managing flooding from main rivers, reservoirs and the sea.

Main Rivers

Main Rivers are watercourses shown on the Environment Agency's statutory Main River map (see Figure 8). The Environment Agency has permissive powers to carry

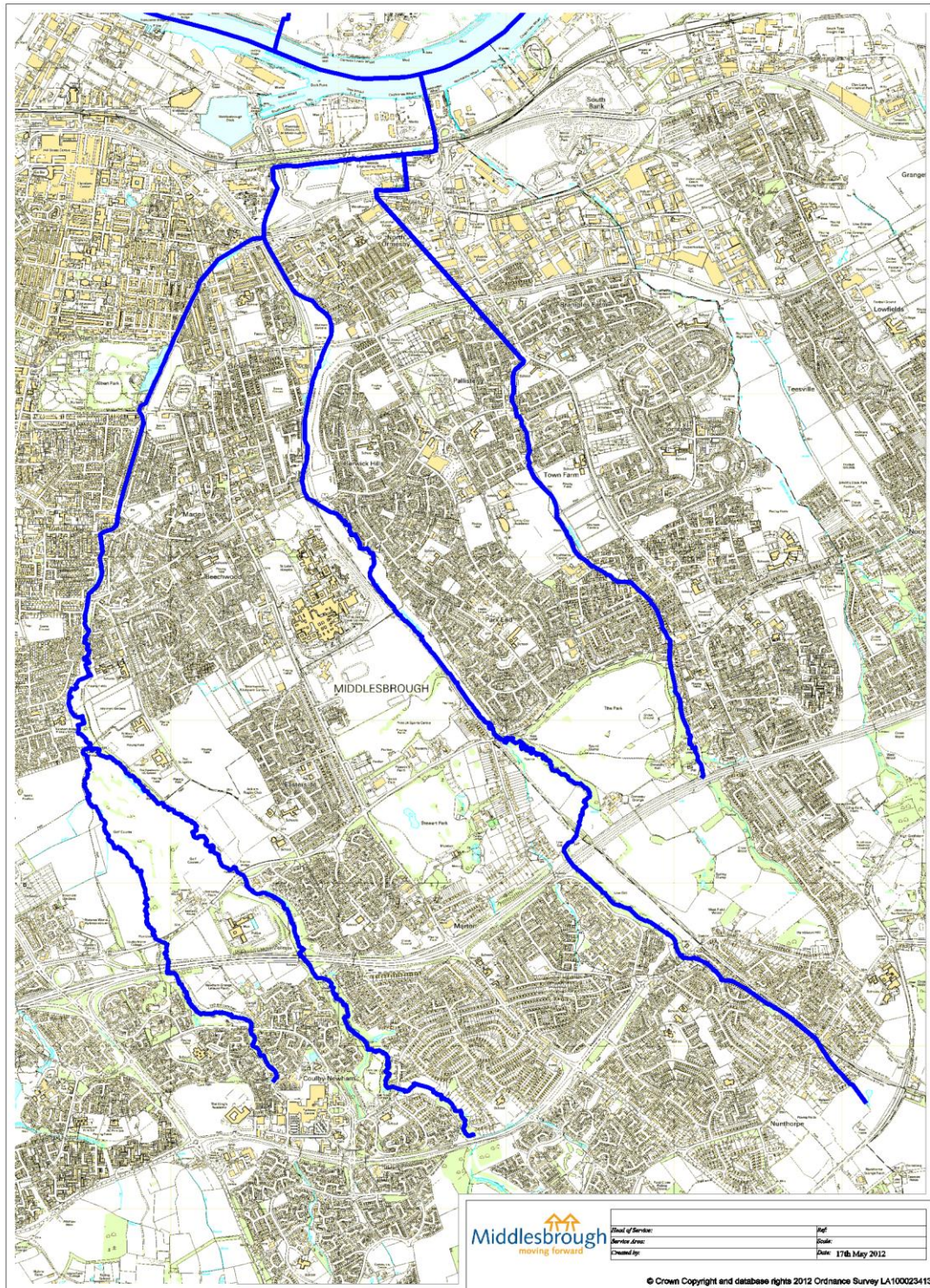


Figure 8 Middlesbrough's Main Rivers

out works of maintenance and improvement on Main Rivers. This can include any structure or appliance for controlling or regulating flow of water into or out of the channel. The overall responsibility for maintenance of Main Rivers, however, lies with the riparian owner.

It can also bring forward flood defence schemes through the Regional Flood and Coastal Committees, and it will work with Lead Local Flood Authority and local communities to shape schemes which respond to local priorities.

Reservoirs

The Environment Agency enforces the Reservoirs Act 1975, which is the safety legislation for reservoirs in the United Kingdom. The Environment Agency is responsible as the Enforcement Authority in England and Wales for reservoirs that are greater than 25,000m³, this may be reduced to 10,000m³ following consultation. As Enforcement Authority the Environment Agency must ensure flood plans are produced for specified reservoirs. However responsibility for carrying out work to manage reservoir safety lies with the reservoir owner/operator who should produce the flood plans. The Environment Agency is also responsible for establishing and maintaining a register of reservoirs, and making this information available to the public.

2.5.3 Emergency Planning

The Environment Agency contributes to the development of multi-agency flood plans, which are developed by local resilience forums to help the organisations involved in responding to a flood to work better together. It also contributes to the National Flood Emergency Framework for England which includes guidance on developing and assessing these plans.

It works with the Met Office to provide forecasts and warnings of flooding from rivers and the sea in England. The Environment Agency and other asset operating authorities also have a role in proactive operational management of their assets and systems to reduce risk during a flood incident.

2.5.4 Planning process

Environment Agency also has a regulatory role in consenting works carried out by others in or adjacent to water courses and sea/tidal defences to ensure that they have regard to flood risk and do not cause unnecessary environmental damage.

It is also responsible for providing advice to planning authorities in development and flood risk; providing fluvial and coastal flood warnings; monitoring flood and coastal erosion risks and supporting emergency responders when floods occur.

2.6 Responsibilities of Water Companies

Northumbrian Water Limited (NWL) provides water and sewerage services in the north east of England under the brand name Northumbrian Water. In addition to the main business of collecting, treating and supplying drinking water and collecting, treating and disposing of sewage and sewage sludge, NWL has a leisure business, which provides holiday accommodation, conferencing, recreation and fishing facilities, and a business called Property

Solutions. This undertakes a range of searches for new homeowners relating to water and waste water connections, contaminated land, flooding and planning applications.

Water and Sewerage Companies

The water industry is highly regulated and the quality of customer service and the prices they are able to charge their customers are regulated by Ofwat, the Water Services Regulation Authority. The water industry operates on five-yearly cycles called Asset Management Plan (AMP) periods. Prices are set by Ofwat at the beginning of each period, following submissions from each company about what it will cost to deliver their business plans.

2.6.1 Flood Risk Management

Water and sewage companies have the following responsibilities around flood risk management:

- Respond to flooding incidents involving their assets.
- Produce reports of the flood incidents.
- Maintenance of a register of properties at risk of flooding due to a hydraulic overload in the sewerage network (DG5 register).
- Undertake capacity improvements to alleviate sewer flooding problems on the DG5 register
- Provide, maintain and operate systems of public sewers and works for the purpose of effectually draining an area.
- Have a duty to co-operate with other relevant authorities in the exercise of their flood and coastal erosion risk management functions.
- Must have a regard to national and local flood and coastal erosion risk management strategies.
- May be subject to scrutiny from Lead Local Flood Authorities democratic processes.
- Have a duty for the adoption of private sewers.

2.6.2 Reducing sewer flooding

Water and Sewerage Companies are responsible for flooding from their foul and surface water sewers, and from burst water mains. The majority of flooding is reported using NWL's online form. However if urgent a telephone call line is used, 0800 393 084.

If flooding is present or evidence of flooding present details will be recorded on the 'DG5 Form' and investigated as appropriate which may lead to recording on the DG5 Register.

The DG5 register is a register of properties and areas that have suffered or are likely to suffer flooding from public foul, combined or surface water sewers due to overloading of the sewerage system. Investment in the alleviation of sewer flooding is closely allied to the DG5 register. Priority is given to frequent internal flooding problems where a cost beneficial and sustainable solution is available.

2.6.3 System of public sewers and works

An essential flood risk management duty is defined under Section 94 of the Water Industry Act 1991, which states that Water and Sewerage Companies have a duty to provide, maintain and operate systems of public sewers and works for the purpose of effectually draining our area. They also have a duty under the same Act relating to premises for 'domestic sewerage purposes'. In terms of wastewater this is taken to mean the ordinary contents of lavatories and water which has been used for bathing, washing and cooking purposes and for surface water the removal from yards and roofs. However, there is no legal duty or responsibility relating to highway drainage, land drainage and watercourses, with the exception that Water and Sewerage Companies can accept highway drainage by agreement with a Highway Authority.

Currently, foul and surface water drainage from new developments can be connected to public sewers and the Water and Sewerage Company. The hierarchy for surface water connections is as Part H of Building Regulations - Hierarchy of preference for surface water management:

- SuDS
- Watercourse
- Surface water sewer
- Combined sewer

This is why Northumbrian Water Limited comments on planning applications even though they are not a statutory consultee.

2.7 Responsibilities of Businesses, Landowners and Local Households

2.7.1 Utility and Infrastructure Providers

Utility and infrastructure providers such as Network Rail, energy companies and telecommunication companies are not risk management authorities. However they have a crucial role to play in flood risk management as their assets can be important consideration in planning for flooding. Moreover they may have assets such as culverts, information about which needs to be shared with flood risk management authorities. They already maintain plans for the future development and maintenance of the services they provide and it is important that they factor in flood risk management issues into this planning process.

This will ensure that their assets and systems are resilient to flood risks and that the required level of service can be maintained in the event of an incident. Utility and infrastructure providers may wish to invest time and resources into developing and delivering the local flood risk management strategy, to realise the significant benefits for them and their customers that follow from flood risks being effectively managed.

2.7.2 Property Owners and Residents

It is the responsibility of householders and businesses to look after their property, including protecting it from flooding. While in some circumstances other organisations or property owners may be liable due to neglect of their own responsibilities, there will be many occasions when flooding occurs despite all parties meeting their responsibilities. Consequently it is important that house holders, whose homes are at risk of flooding, take steps to ensure that their house is protected.

These steps include to:

- check whether their household is at risk from flooding from the river, coast or local flood sources
- ensure that preparations have been made in the event of a flood
- take measures to ensure that their house is protected from flooding, either through permanent measures such as sealants in the wall or temporary measures such as flood guards
- take measures to make sure the house is resilient to flooding so that if it does occur it does not cause too much damage
- where possible, take out flood insurance.

Information on whether households are at risk can be provided by the Environment Agency. All households in Flood Zones 2 and 3 (areas at risk from coastal or main river flooding) should have been contacted notifying them of this and, unless they have chosen to opt-out, will receive flood warnings from the Environment Agency when the risk of river or coastal flooding is high. Information can also be found on the Environment Agency website: www.environment-agency.gov.uk/homeandleisure/floods/31650.aspx.

Surface water flooding which occurs when heavy rainfall overwhelms the drainage capacity of the local area. It is difficult to predict and pinpoint, much more so than river or coastal flooding. Maps which show areas which are susceptible to surface water were produced by the Environment Agency and these were used to inform Middlesbrough's Preliminary Flood Risk Assessment.

The Environment Agency does provide information for property owners and residents on a number of issues with regards to flood risk, these include;

- what to do to prepare a household for emergencies. This includes how to make a flood plan which will help you decide what practical actions to take before and after a flood.
- advice on how to make your house more resilient.

Another valuable document for householders to refer to is The National Flood Forum's Blue Pages Directory which provides information and advice on what products are available to help protect homes or businesses against flooding.

2.7.3 Riparian Ownership

Landowners, householders and businesses whose property is adjacent to a river or stream or ditch are likely to be riparian owners with responsibilities. If a property backs out onto a river or stream then the property owner is likely to be a riparian owner, owning the land up to the centre of the watercourse. The Land Registry details should confirm this.

Riparian owners have a right to protect their property from flooding and erosion but in most cases will need to discuss the method of doing this with the Environment Agency. They also have responsibility for maintaining the bed and banks of the watercourse and ensuring there is no obstruction, diversion or pollution to the flow of the watercourse. Full details can be found in the EA document 'Living on the Edge' https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/454562/LIT_71_14.pdf

2.8 Responsibilities of Parish Councils and Communities

Flooding events can affect whole communities with households which do not suffer from internal flooding still potentially being trapped as roads are blocked or having to help support and provide shelter to neighbours who have suffered from flooding.

Communities know better than anyone the level of flood risk that they face and can make important contributions to helping manage the levels of flood risk.

2.8.1 Reporting flood incidents

Officers from risk management authorities are not in a position to know about every flooding incident that occurs, particularly those which do not lead to flooding within properties. However, records of flooding incidents which affected roads or entered the curtilage of people's properties are important to record. They can indicate that there has been extensive flooding in relatively regular rainfall events which would warn that the properties are at risk in more extreme rainfall events. This information is crucial in building up cases for flood defence and flood resilience schemes, which will require strong evidence of the flood risk to properties. Parish Councils and community groups in areas which suffer from local flooding (i.e surface runoff, groundwater and ordinary watercourses) should contact the Council to discuss how best they should record and report flooding incidents when they occur. Incidents can be reported via 01642 726001 or envservices@middlesbrough.gov.uk

Flooding incidents caused by main rivers or the coast should be reported to the Environment Agency through their emergency floodline 0800 807060.

2.8.2 Emergency Self-Help Plans

If a community is at risk from flooding it is advisable to create an Emergency Plan which details who can be contacted to lead and assist in an emergency, what equipment is available and the location of premises that can be used as emergency accommodation. The Emergency Planning Unit is currently working in partnership with the Environment

Agency and alongside other organizations on a Community Engagement Project. This aims to raise awareness of flooding in communities across Middlesbrough and the other Local Authorities in the Tees Valley. It also encourages communities to take action to respond to a flooding event. The work is funded by the Northumbria Regional Flood and Coastal Committee through local levy.

2.8.3 Raising funding and skills for flood resilience and flood defence measures

Under Defra's new partnership funding approach, relatively small amounts of local funding (or cost savings) could make the difference between locally-important projects going ahead or not. Such contributions will supplement the amount of Government funding available at the national level. A contribution could lever large amounts of funding from Government, and in turn deliver benefits to the community that dwarf the costs involved. Benefits include

- Working in a funding partnership enables more to be achieved and creates further benefits.
- Facilitates local decision making and having influence on the decisions of others
- Draws on more funds, skills, knowledge and resources.
- Fosters trust and co-operation across the activities of various partners.

3. Assessment of local flood risk

3.1 Historic flooding

This section describes past flood events that have had significant harmful consequences for human health, economic activity, cultural heritage and the environment. The information on historic flood events was collected as part of the Middlesbrough Preliminary Flood Risk Assessment (PFRA) process, however flood defences and processes in our area are being improved constantly,

Ormesby Beck

This flooding is predominantly due to overtopping of Ormesby Beck, however culvert restrictions under the Middlesbrough to Whitby railway line prevented water being passed



through. In November 2000 there was severe flooding to several properties in Kentmere Road. In August 2008 properties in Stanhope Gardens and properties in Kentmere Road were flooded to depths of between 200mm and 270mm. In July 2009 properties Stanhope Gardens reported being flooded to depths of between 50mm and 270mm, along with properties in Kentmere Road.

Following these floods, properties in Kentmere Road and Stanhope Gardens

Figure 9 Ormesby Beck Flood Relief Channel

have benefited from property level flood protection. Work to realign Ormesby Beck in this vicinity has also recently been completed, which has also included wider benefits for amenity use and increased biodiversity value through community involvement with Friends of Ormesby Beck.

Marton West Beck

Following intense period of heavy rainfall, flows from heavily developed areas upstream make their way downstream, where Marton West Beck becomes critical and surcharges. This has resulted in 230 homes becoming flooded. Subsidiary flooding added to the event due to the sewerage system being overwhelmed during flooding, causing further surcharging. These occurrences happened in Summer/Autumn 2000 and Summer 2002. A number of properties were flooded as a result of the overtopping along Marton West Beck. These included;



Figure 10 Albert Park Lake

Marton Rd / Talbot St / Park Vale Rd / St. Johns Gate / Borough Rd – 230 properties
Valley Rd / Aspen Dr. -75 properties
Ravenscroft Ave / Emmerson Ave / Glendale Rd, 15 properties.

The latter location was also prone to flooding from combined sewer surcharges, however mitigation works, carried out by NWL, have now taken place to alleviate this. Following the floods in 2000 a major project was instigated to incorporate over 20,000m³ of additional storm water storage capacity in Albert Park Lake. This will provide storage for excess flows in Marton West Beck and therefore reduce the flood risk downstream of Park Road North.

Moortown Road, Sunningdale Road

Following intense rain in the Autumn 2001, the culvert taking surface water run off from adjacent playing fields surcharged. This caused a number of properties to be flooded as the water passed overground, overwhelming sewer systems.

Holbeck Avenue

Flooding to 1-15 Holbeck Avenue during times of intense rain. Surface Water run off comes from surrounding roads which all fall down towards Holbeck Avenue. Existing sewer systems cannot cope with the volume of water, Northumbrian Water have recently completed a remediation scheme for this location.



Figure 11 Holbeck Avenue works

Middlebeck (Town Farm)

The watercourse has overflowed on a number of occasions including Autumn 2000, mainly due to restrictions caused by the highway culverts. This has led to properties being flooded in Courtney Walk and Kelfield Avenue.

Blairgowrie

A number of properties were flooded during periods of intense rainfall during October 2006 and May 2007. The ordinary watercourse which runs adjacent to these properties was diverted and turns 90° into a culvert. This cannot cope with the flow of water around this bend, leading to it overtopping bank sides, and flooding adjacent properties. Measures were put in place to limit the flow entering the culvert.

Whilst the flood occurrences listed above have had significant consequences for those involved on a number of occasions they are not 'significant' in line with the definition of significant provided by DEFRA. The definition of 'significant' as required for European Union reporting purposes is based 1km grid squares which have at least 200 people or 20

businesses or more than 1 critical service flooded to a depth of 0.3 metres by a rainfall event, with a chance of 1 in 200 of occurring in any given year. From a local stance a flood is deemed significant if 5 or more properties, 1 or more critical infrastructure, are flooded or a transport link for more than 10 hours is flooded.

To be able to gain a better understanding of where the main problems are and where the focus of future help should be placed we are setting-up a flood incident reporting process.

The data collected through the flood incident recording process will be used to supplement the current information on historic flooding. This information together with that derived from any flood investigations undertaken will be reviewed on a regular basis to guide future work, in particular where we need to undertake more detailed investigations to understand flooding mechanisms and possible solutions.

3.2 Potential risk of flooding

Surface water flooding may develop quickly especially in urbanised catchments and is often difficult to predict. Current predictions on the impacts of climate change suggest more frequent short-duration, high intensity rainfall and more frequent periods of long duration rainfall. This reinforces the need to manage surface water for the present and future situation.

Middlesbrough's SWMP

The Preliminary Flood Risk Assessment (PFRA) was undertaken by the Council to satisfy obligations under the Flood Risk Regulations 2009. This work identified key areas in Middlesbrough where the potential risk of surface water flooding is thought to be the greatest. The extent of flooding is often topographically defined (i.e. dependent on the height of the land), we can make assumptions about the extent of flooding from surface runoff and small ordinary watercourses, which is likely to be similar in many cases.

Two sets of maps have been provided by the Environment Agency

Flood Map for Surface Water

This identifies land naturally vulnerable to surface water or "pluvial" flooding. following extreme rainfall events The 1 in 200 year event used in modelling for the map would overwhelm even the most modern drainage system and so any impact from the drainage system can be ignored and is not accounted for in the model

Areas Susceptible to Surface Water

This map shows areas that are susceptible to surface water flooding, with three bandings, indicating 'Less' to 'More' susceptible to surface water flooding.

The map has been produced using a simplified method that ignores urban sewerage and drainage systems, ignores buildings, and uses a single rainfall event – therefore it only provides a general indication of areas which may be more likely to suffer from surface water flooding.

After reviewing both these maps with Environment Agency representative it was decided that Areas Susceptible to Surface Water best represents local conditions and will be used in the consideration of future flood risk management.

Figure 12 Areas Susceptible to Surface Water Flooding



Head of Service:	Ref:
Service Area:	Scale:
Created by:	Date: 25th January 2011

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3.3 Interactions between the different sources of flooding

Whilst the primary focus of this strategy is local flooding (surface, ground and small water courses such as ditches and streams), flooding in Middlesbrough can arise from a number of different sources. To members of the public suffering from flooding, the source of the water may seem irrelevant, but for each source there could be a different responsible organisation – see Chapter 2 for details.

Where the source can be clearly identified, the responsible organisation will be the main point of contact. However, as is often the case, where it is not easy to ascertain the source or where multiple sources are involved, the Lead Local Flood Authority will take the lead and work with partners to investigate and deal with the issue in a manner appropriate to the level of risk.

The flood incident reporting process will have provision within it for the collection of information to enable, where at all possible, the responsible organisation for flooding to be identified. Where the flooding satisfies the criteria for carrying out a full investigation (see section 2.4.2) and it has not been possible, based on information obtained through a flood incident report, to establish the source, this would need to be done as part of the full investigation.

The full investigation will take account of all elements of information such as stakeholders' historic records, hydraulic model output and, critically, information obtained from members of the public at the time of the flooding incident. Parish Councils, landowners and the public will be crucial to helping us increase our knowledge and understanding of localised flooding.

Figure 13 Potential flooding sources and responsible organisations

Flooding type	Description	Responsible organisation
Ordinary watercourses e.g. streams and ditches	Local, generally smaller watercourses	Riparian owners.
Main rivers	Principal watercourses and strategic smaller watercourses (see map Section 2.5.2)	Environment Agency
Reservoirs	Large water pounds which have embankments represent a potential flood risk	Environment Agency
Surface water flooding	High intensity rainfall gives rise to overland flow of surface water which can pond in low lying areas giving rise to flooding. This is also known as pluvial flooding	Middlesbrough Council
Groundwater flooding	Geological conditions can cause surface water which has infiltrated into the ground to emerge at certain locations in the form of wells etc. Also high water tables can be present in locations where there are particular ground conditions. This type of flooding generally occurs after long periods of rainfall as water builds up in underground aquifers ultimately causing an increase in flow in features such as leets (groundwater-fed watercourses)	Middlesbrough Council
Highway flooding	Highways have extensive drainage systems and at times of heavy rainfall either hydraulic overload or perhaps inadequate maintenance can give rise to ponding of water which can in turn have an impact on property. The presence of deep water on roads can also give rise to problems for road users causing flooded roads to be closed at certain times	Middlesbrough Council Highways Agency
Sewer flooding	The public sewer system has a finite capacity and at times of heavy rainfall surface water entering designated surface water sewers, combined sewers (ones which receive foul and surface water flows) and designated foul sewers which are subject to penetration of surface water through misconnections etc can become overloaded giving rise to surface flooding	Northumbrian Water
Railway flooding	A rare occurrence, but at times of heavy rainfall there is the potential for hydraulic incapacity or poor maintenance to give rise to flooding which can effect railway operations	Network Rail

3.4 Prioritisation of areas where resources will be focused

It is not feasible to look in detail at every potential flooding location straight away. The resources to manage flood risk are finite and it is therefore necessary to identify locations where the focus of effort will derive the maximum benefit in terms of overall flood risk reduction in Middlesbrough.

The SWMP and SFRA along with our knowledge of historical flooding have shown areas where an initial level of priority in relation to surface water flooding may lay, but there are other key factors which will have a bearing on where resources should be concentrated;-

- Proposed development activity. This will give rise to the consideration of drainage arrangements/opportunities in particular areas which might offer a way of reducing existing flood risks.
- Locations for capital investment. Any capital project might offer opportunities for flood risk reduction through modification of construction proposals. Conversely, where specific flood defence investment is being made there maybe opportunities to modify the project to provide wider benefits to other stakeholders, thus encouraging additional investment.
- Flood investigations will become increasingly relevant following the implementation of the flood incident reporting process.
- Groundwater flooding.
- Main river flooding. Information on main river flooding is derived from the Environment Agency 'Flood Map' and is considered in detail in the Catchment Flood Management Plans covering the Tees Valley.
- Ordinary watercourse flooding. There is currently limited data available on this and, like surface water flooding, will benefit from future records of local flooding incidents.
- Northumbrian Water records of sewer flooding. Water Companies provide information to Ofwat on flooding experienced on the public sewerage network, referred to as DG5 information. Northumbrian Water's investment in reducing flooding from the public sewerage network is focussed on historic flooding locations.

3.5 Surface Water Management Plan

Middlesbrough has a detailed Surface Water Management Plan, the key drivers to undertaking this study were underpinned by planning issues and various publications and guidance, including the Surface Water Management Plan Technical Guidance Living Draft. The document is a framework through which key local partners with responsibility for surface water and drainage in their area work together to understand the causes of surface water flooding and agree the most cost effective way of managing surface water flood risk.

The objectives of the Plan are as follows:

- To provide a properly conceived prioritised long-term strategy for Middlesbrough's surface water management;

- To provide a strategic overview of surface water flood risk with detailed assessment of surface water risk at high risk locations, including identification and assessment of options and selection of preferred options for implementation;
- To consider the use of sustainable drainage systems (SuDS) in dual use public recreation and potential surface water temporary storage areas alongside other surface water drainage options;
- To consider other plans and initiatives in Middlesbrough in order to produce a shortlist of surface water drainage options that are effective, achievable and cost beneficial to the management of surface water flooding;
- To provide on the ground improvements to surface water flood risk reduction as soon as possible.

3.6 Catchment Flood Management Plans

Catchment Flood Management Plans give an overview of the flood risk across each river catchment. They recommend ways of managing those risks now and over the next 50-100 years. All types of inland flooding are considered, from rivers, ground water, surface water and tidal flooding. They also take into account the likely impacts of climate change, the effects of how we use and manage the land, and how areas could be developed to meet our present day needs without compromising the ability of future generations to meet their own needs. They enable flood risk management measures to be planned over the long-term in a way that makes sense across a catchment.

The paragraphs above largely concentrate on the risks from surface, ground and ordinary watercourse flooding which are the responsibility of the Lead Local Flood Authority. However, the management of these risks will need to be aligned with wider flood risk priorities as detailed with in the Catchment Flood Management Plans (CFMPs),

Middlesbrough falls into the Tees CFMP Mid Catchment sub-area, defined by the CFMP as an area of moderate to high flood risk where generally further action can be taken to reduce flood risk. These plans primarily focus on river and tidal flooding, but also include mention of surface/ground water risk. There are 4 CFMP policy units covering the river catchments across Middlesbrough

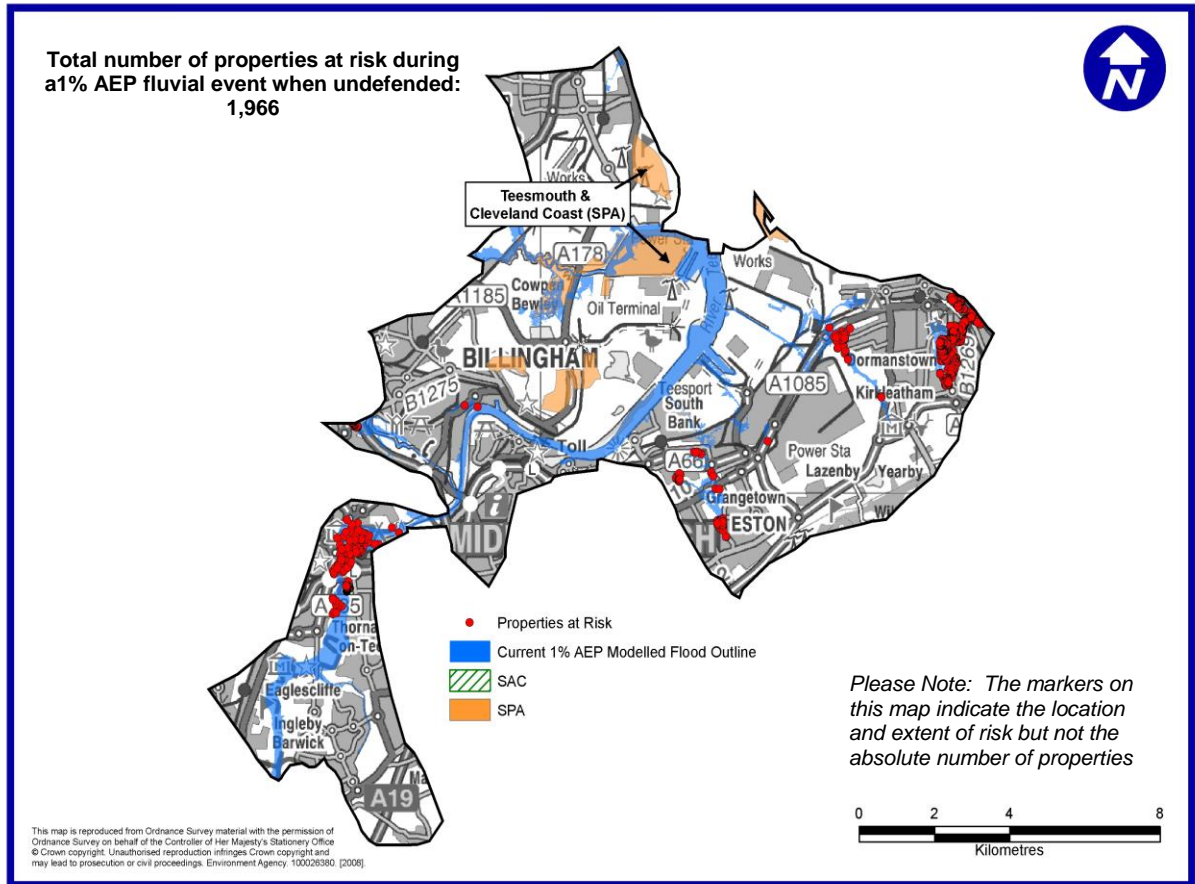
These are

- Tees Mouth & Ingleby Barwick
- Old River Tees
- Middlesbrough Becks
- Stokesley & Great Ayton

Tees Mouth & Ingleby Barwick

The main overall risk of flooding for this policy unit comes from the risk of tidal flooding from the Tees estuary. The main fluvial flood risk comes from the River Tees, which runs through the policy unit. Water levels in the tributaries of the estuary will also be influenced by the tides and high winds, particularly in the downstream reaches.

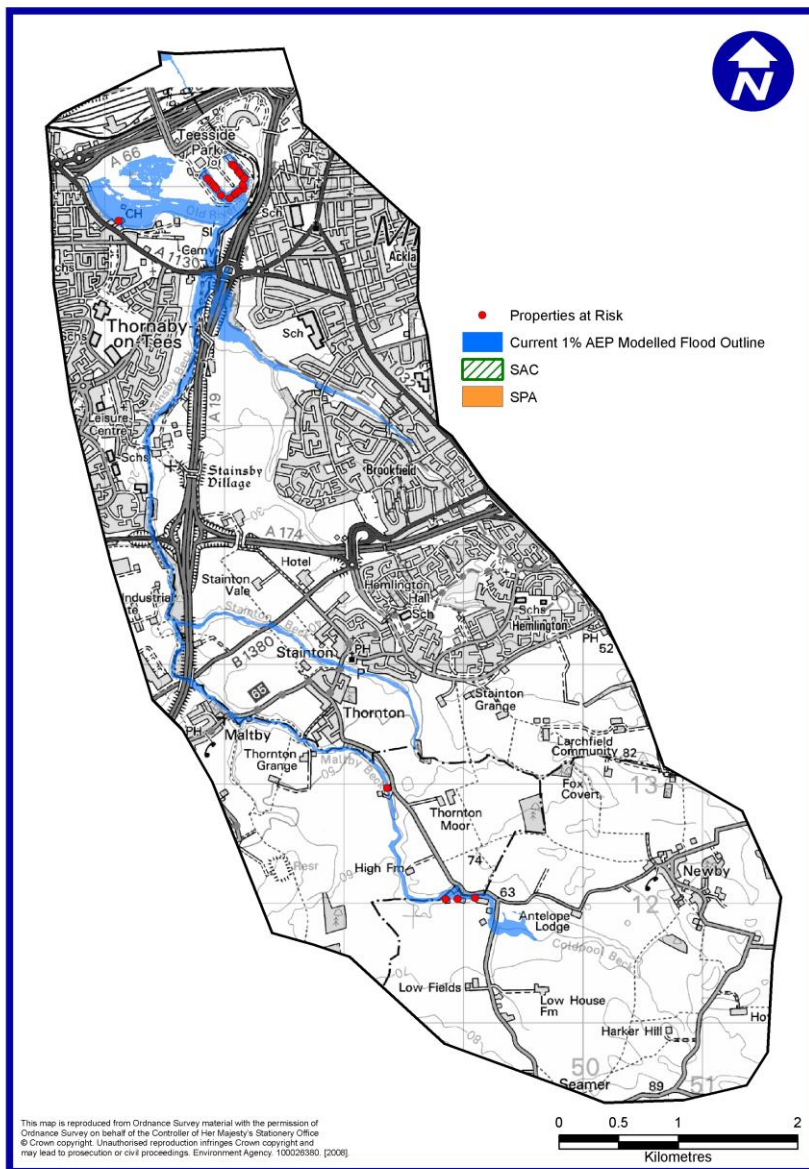
Figure 14 Tees Mouth & Ingleby Barwick CFMP



Old River Tees

This policy unit is located to the southeast of the Tees Barrage. It contains part of the urban area of Middlesbrough, and Thornaby-on-Tees. The main watercourse is the tidally influenced Old River Tees, draining from Thornaby-on-Tees to the confluence with the River Tees. The smaller Maltby Beck is also in the policy unit. The river is contained in an artificial channel for its length until joining the Tees. The policy unit is principally urban with little agricultural land. The A19, A66, and A174 are within the area as key infrastructure to Middlesbrough, and a railway line runs along the north of the unit.

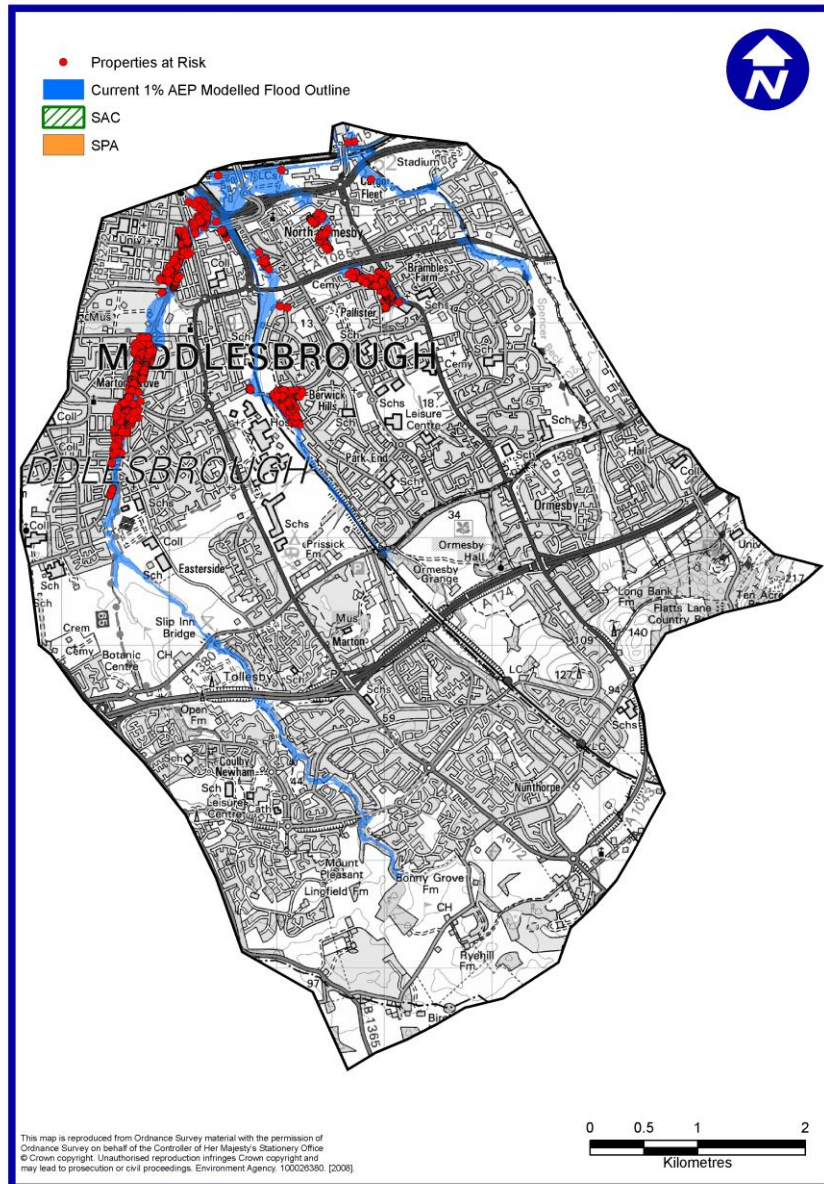
Figure 15 Old River Tees CFMP



Middlesbrough Becks

The Middlesbrough Becks, including Marton West Beck, Middle Beck, Spencer Beck, and Ormesby Beck, drain through Middlesbrough into the south bank of the Tees and are tide-locked in their lower reaches. This is an urban policy unit and all these tributaries have been intensively urbanised, particularly through Middlesbrough, and long reaches of their channels have been straightened, confined, or culverted.

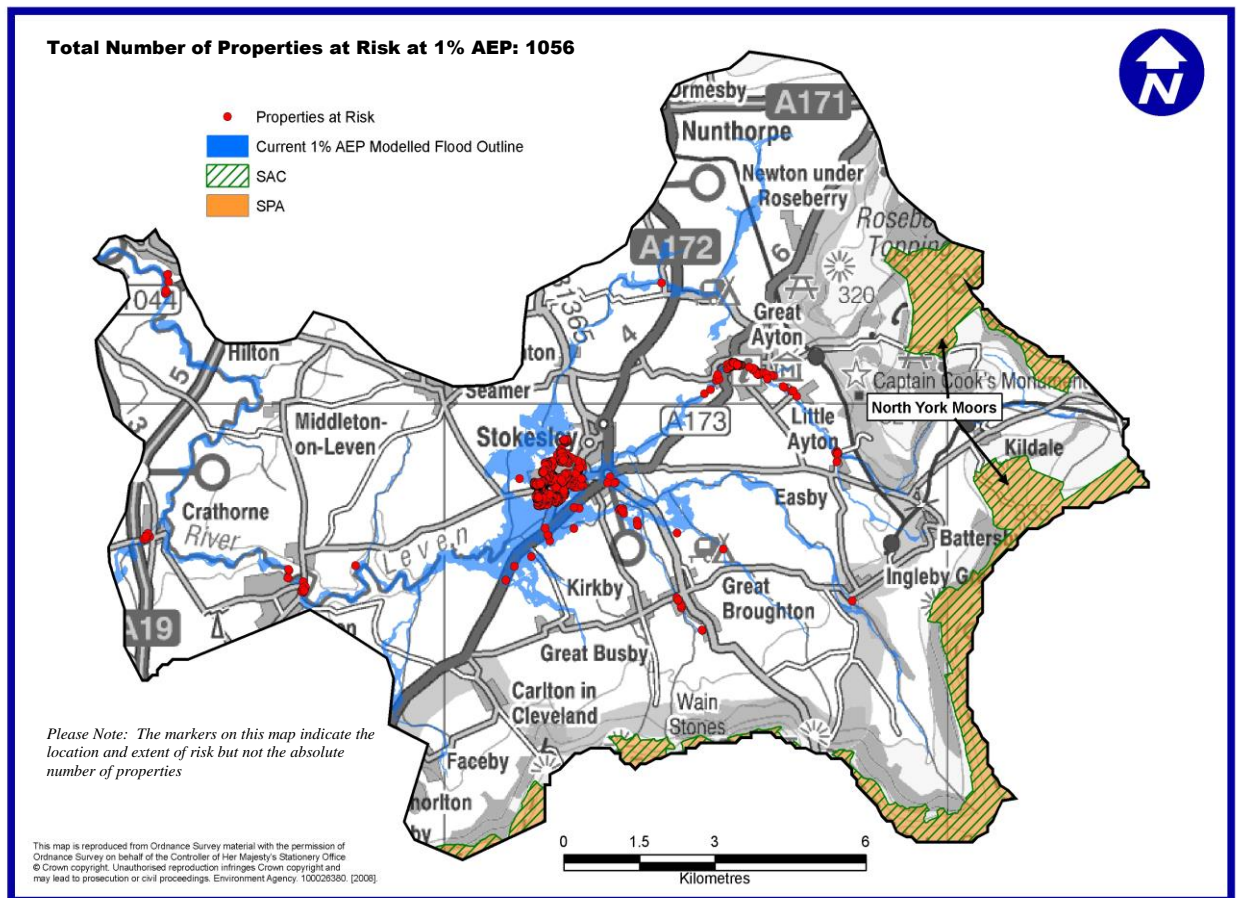
Figure 16 Middlesbrough Becks CFMP



Stokesley and Great Ayton

This policy unit is generally rural, low-lying and flat across much of the policy unit, however there is only a small part of this unit in the southern part of Middlesbrough

Figure 17 Stokesley and Great Ayton CFMP



A number of measures have emerged from the documents which will inform our strategies and actions.

The Plan remains a live document, the recently published National Flood Risk Management Strategy requests that the Environment Agency “ensure that strategic plans, including catchment flood management plans or their equivalents, are in place and monitored to assess progress.” Therefore, minor changes and updates will be made routinely where required.

4. Objectives for managing flood risks and options to achieve them

This Chapter sets out the primary objectives and actions, which will be taken forward to make progress in the reduction of risk associated with flooding. The overarching aim is to work with the population of Middlesbrough to reduce the risk to residents and businesses of suffering the misery and economic devastation that flooding brings. The ways in which we hope to achieve this are summarised in the following table and developed in the following sections.

	Objective	Actions to achieve the objective
1	To improve understanding of flood risks and ensure all stakeholders understand their roles and responsibilities in relation to flood risk management.	<p>This strategy will provide a clear explanation of the statutory duties of flood risk management authorities as well as the important roles of individuals, businesses and land managers.</p> <p>Property owners will be involved in decisions regarding flood risk management, confirming the value that their participation will bring for flood reduction.</p> <p>Flood Risk Management partners will provide information in consistent and easy ways for the public to obtain information about flood risk. Websites will provide relevant information/links. This information should allow the public and businesses to make informed decisions about how best to manage the residual flood risk and become more resilient to flooding.</p> <p>The development of guidance notes/pamphlets to assist in improving the public understanding of surface water management related issues stressing the actions that property owners can take themselves to reduce flood risk.</p> <p>Instigate and publicise a process for recording all flooding incidents and where appropriate carrying out Flooding Investigations (see Section 2.4.2.).</p> <p>Develop a consistent approach to recording of flood assets and make this readily available to all interested parties.</p> <p>Develop a consistent approach to designation of structures.</p> <p>Develop greater understanding of surface water flood risks through targeted detailed investigations.</p> <p>Promote local emergency flood groups where relevant and provide appropriate level of support and information to ensure their effectiveness.</p> <p>Ensuring flood risk management activities are properly aligned with the work of the Cleveland</p>

		Emergency Planning Unit.
2	To take a collective approach to reducing flood risks, using all available resources and funds in an integrated way and in so doing derive enhanced overall benefit	<p>Continue to develop partnership working through the Middlesbrough Flood Risk Management Partnership.</p> <p>Develop investment plans to make use of opportunities for sharing financial burdens and resources associated with the provision of flood and coastal risk management through the new national partnership funding and local initiatives.</p> <p>Ensure that consideration is given to achieving short-term flood risk improvements where local partners wish to contribute, alongside a commitment to understanding and reducing future flood risks.</p> <p>Promote cost effective flood protection measures such as individual property protection.</p> <p>Carry out a review of resources and skills available for delivery of the new responsibilities alongside existing flood risk management activities.</p>
3	To prevent an increase in flood risk as a result of development by preventing additional flow entering existing drainage systems and watercourses wherever possible.	<p>Prepare Planning/SuDS Advisory Guidelines that will underscore the requirement to have a zero increase in surface water flow from future development, gives guidance on site layout and levels in new development, provides a robust inspection process for new SuDS and provides advice on impacts on natural environments.</p> <p>Agree a clear process for SuDS approval following Defra guidelines.</p> <p>Ensure that planning decisions are properly informed of all flood risks and that there is a consistent approach to surface water management in new development.</p> <p>Prepare and maintain a database of historic and predicted local flood risk to provide data for use in the planning process.</p>
4	Take a sustainable and holistic approach to flood management, seeking to deliver wider environmental and social benefits, climate change mitigation and improvements under the Water Framework Directive.	<p>Promote the concept of water cycle management and blue corridors/green infrastructure in master planning.</p> <p>When undertaking any flood risk management schemes, ensure consideration is given to relevant plans and policies, e.g. CFMPs, SMPs, RBMPs, SFRA and the impact on protected environments. Work with partners to ensure that all planning and other relevant guidance documents include reference to relevant advice on these issues.</p> <p>Link all flood erosion risk management with the River Basin Management</p> <p>Plan and work to delivering improvements in water</p>

		body status wherever possible, including removal of unnecessary structures in watercourses
5	Encourage maintenance of privately owned flood defence structures and ordinary watercourses and minimise unnecessary constrictions.	Develop and promote clear process for consenting of new structures and maintenance of existing structures that discourages further blocking of watercourses wherever possible. Ensure riparian owners are aware of their duties. Record all appropriate structures/assets on watercourses.
6	To obtain and share information on the latest best practice initiatives within the 'industry' as a whole.	The Middlesbrough Flood Risk Management Partnership and staff involved in flood risk management will share and where relevant publicise exemplars of flood management to ensure that local decisions about processes and practices take account of best practice.
7	To ensure that proposals and policies in this strategy properly integrate with in the rest of the Council departments.	Develop improved, effective communication arrangements between Middlesbrough Council and all organisations with responsibility for flood risk management in the Middlesbrough area.

4.1 To provide a clear explanation of everyone's responsibilities

The requirement for the LLFA to work with all interested parties is enshrined in Pitt Recommendation 15: *"Local authorities should positively tackle local problems of flooding by working with all relevant parties, establishing ownership and legal responsibility."*

The Middlesbrough Flood Risk Management Partnership and via its links with other forums will be the main vehicle for co-ordination and collaborative working. A Stakeholder and Communication Plan will be formulated to ensure the co-ordination and collaboration takes place.

4.2 Develop a joint approach to the use of resources and funding.

Chapter 5 outlines the main funding mechanisms for flood and risk management. The Middlesbrough Flood Risk Partnership working together with relevant stakeholders will identify and prioritise relevant schemes and then collectively seek appropriate funding. The challenge will be to use existing funding streams in a more co-ordinated way so as to derive additional benefit in terms of overall flood risk reduction.

An example of this in action in Middlesbrough is in relation to Green Infrastructure creation. Middlesbrough Council has been working with the Environment Agency and Middlesbrough Environment City to enhance the current water infrastructure through a three year Beacon Becks project. The project supports Middlesbrough's aims under the terms of the Water Framework Directive, identifying measures to enhance current water infrastructure particularly in relation to surface water flooding and water quality.

4.3 Community involvement in making decisions regarding flood risk management

The administration of surface water has been simplified by recently implemented legislation but the average non-professional is likely to find it difficult to develop an understanding of some of the more complex issues and there is a need to provide concise and clear guidance to address this. There are a number of areas where clarification will be required, most notably in respect to the role of riparian owners and also in connection with issues associated with funding and installation of resistance/resilience facilities to premises where flooding has been occurring on a continuing basis.

The underlying theme of information provided for residents and businesses should be that more significant progress can be made in flood risk reduction if people in Middlesbrough are

Resilience measures Can be described as those which make it easier and quicker to undertake a clear-up following a flooding inundation. Such measures could include for instance internal house walls, which are constructed in such a way as to enable them to be flushed down after a flooding event. A cement, rather than plaster, based surface material to a wall with a waterproof paint application could be considered as a resilience measure.

Resistance measures Can be described as those which prevent water getting into property. These could include dams located at individual property doorways/air brick flaps and also more regionalised measures such as the installation of temporary dams to provide flooding protection to perhaps a number of properties.

able to make their own contribution, with guidance from the Council if required. The Council will be able to make progress in a wide range of aspects but individuals doing what they can to help will be a very powerful additional source of improvement.

Residents ensuring that any development of their personal property does not give rise to increased loads on surface water systems for instance will be very beneficial. Some of these issues are subject to planning law but residents are in a position to assist in the avoidance of increase (and may generate a decrease) in flow rates through consideration of things like permeable driveways and water butts etc. There are a number of relevant guidance notes/pamphlets available from flood risk management authorities and where appropriate others will be produced to provide concise and clear information to non-professionals on all aspects of surface water management that are relevant to that audience.

Some of the identified topics, which require better communication, are: -

- Riparian owner responsibilities
- Installing and operating flood protection measures to individual properties
- Opportunities for individual property owners to assist in reducing flood risk, such as reducing impermeable surfaces in gardens and use of water butts.

Individuals can also assist by reporting things like screens blocking-up and culverts overflowing and reporting flooding incidents. The Contact Centre telephone number is 01642 726001

4.4 The prevention of additional flow entering sewerage systems from new development

Surface water drainage systems have historically comprised underground pipes and tank storage systems that drain and control run-off from the development site. These sewerage systems were designed to meet the criteria so that long-term adoption of the infrastructure could be secured from local water and sewerage companies who would then take ownership of the system as part of their asset base.

It has been recognized that urban creep, the increase of paved areas and extensions, results in increased flows being discharged to surface water systems. Climate change, even with controlled discharges for extreme events, will also increase flood risk. One calculation suggests that these factors, even without new development generating additional impermeable areas, are likely to give rise to an average 1% year on year increase in flows being received which raises the prospect, in the medium/long term, of significant system overloading. It must also be noted that the average age of sewers in the area is 65, as they were designed for rainfall characteristics of the past and the rate of run off at the time of construction, also leads to capacity problems.

LLFA's and Water companies will need to be more innovative in their approach to surface water management and are moving away from conventional underground drainage solutions to investment in sustainable drainage (SuDS).

Sustainable drainage systems (SuDS) are required to:

- mimic existing conditions
- minimise the change in the hydrological regime resulting from the urbanisation of the area (and associated negative impact on downstream flood risk);
- protect the safe replenishment of groundwater resources and river base flows and conserve surface water resources
- protect or enhance the natural drainage pathways on the development site;
- protect water quality, watercourse morphology, habitat diversity and biodiversity, and public health and amenity;
- manage the risks associated with on-site flooding from the drainage system.

In support of this Middlesbrough will be aiming for a zero overall increase in flows being received by sewers and watercourses. It is, however, recognised that this may not be feasible in all situations. The achievement of this aim will have to be considered in relation to the entirety of the public sewerage system, watercourses and rivers within Middlesbrough as

there may be incidences where the zero increase cannot be achieved but where a reduction in current flows would be possible.

Northumbrian Water have discussed with Middlesbrough Council's regeneration team, local development plans. They also established population growth by drainage area, which has led them to make an assessment of their sewerage assets and therefore draw up an action plan.

An important consideration in the achievement of objectives will be the defining of clear statements of intent. When reviewing the objectives it will be appropriate to carry out an assessment as to whether the aim has been achieved.

The move to achieving greenfield pre-development flow rates would represent a step change in surface water management, reversing the trend which has given rise to ever increasing flood risk, habitat loss, biodiversity reduction. Where objectives cannot be achieved within a development a contribution to the wider objectives would be sort.

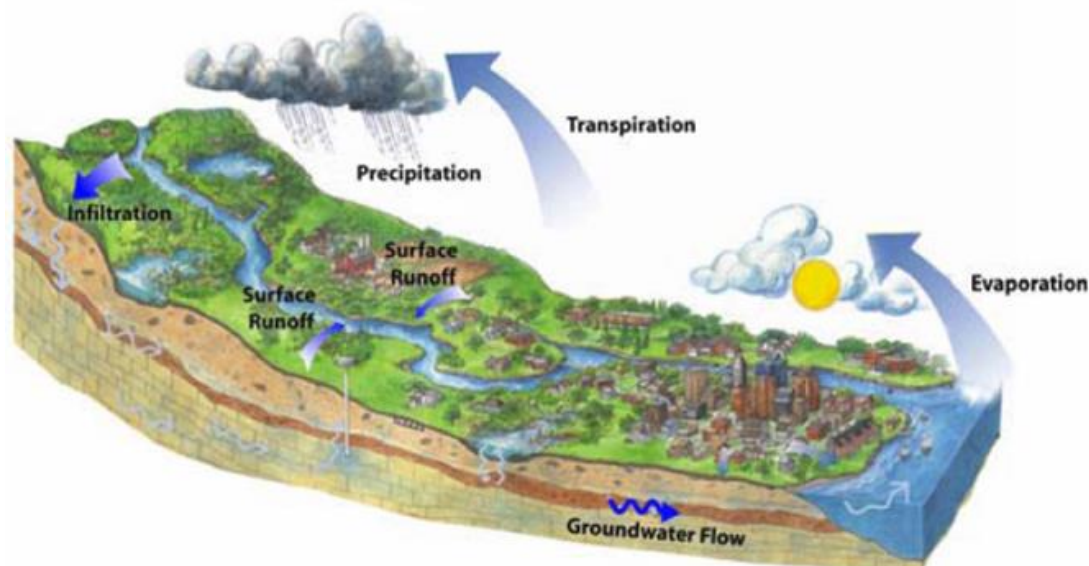


Figure 18 Natural Water Balance

“Water is an essential part of our natural and built environment. The way we live, work and play to varying degrees are influenced by the availability and quality of water. Increasingly we need to embrace water management as an opportunity rather than a challenge. Successfully delivered sustainable drainage provides communities and wider society with benefits set within the context of adapting to climate change, development and improving our natural environment.”

Extracted from ‘Planning for SuDS – Making it happen’ (CIRIA report C687, 2010)

4.4.1 The preparation of Planning/Drainage Advisory Guidelines and SuDS guidance to establish comprehensive requirements/opportunities associated with new development.

There will be specific requirements for managing surface water in respect to any new development carried out in Middlesbrough and it will be necessary to clearly define what those requirements are for the benefit of Planners and Developers alike. Middlesbrough

Council, in its capacity as the Lead Local Flood Authority, will ultimately have responsibility for the approval of drainage designs submitted for new development. However the responsibility for Planning remains with Middlesbrough Council's **Community Protection Service** as the planning authority. The Council has, in collaboration with partners, produced guidance for planning authorities as well as a detailed SuDS guidance for developers. This will include advice on environmental and public health considerations.

4.4.2 Blue Corridors

Since 2004 Defra's Flood and Coastal Erosion Risk Management Strategy has been promoting the idea of 'making space for water' in the environment and has made significant advances in many areas through its programme of work in promoting sustainable approaches and adaptation. Blue corridors form part of this approach - urban development is set back from watercourses, overland flow paths and ponding areas creating a mosaic of urban corridors designed to facilitate natural hydrological processes whilst minimising urban flooding, enhancing biodiversity and improving access to recreation. The establishment of such corridors will form an important part of future flood risk schemes. Creating interconnecting green and blue corridors can also provide routes above ground for extreme or exceedance flows to pass through.

In designating overland flow paths, surface water ponding areas and multi use flood storage areas will help relieve the pressure of flooding on upstream and downstream communities and make flood protection options within the urban area more resilient and flexible. They also contribute to networks of green infrastructure, which act as the life support systems for cities, towns and rural areas and provide a range of environmental, social, economic benefits and provides a big opportunity to create habitats and encourage biodiversity.

4.4.3 Flood Risk Assessment

Computer software and improved techniques generally enable the consequences of urbanisation for flooding risk to be identified with accuracy and the Council will expect relevant planning applications to be supported by a detailed flood risk assessment. A section of the Advisory Guidelines will identify the key issues that need to be considered when undertaking such flood risk assessments

4.4.4 Interaction with other stakeholders

The process of preparing surface water design solutions for new development must be undertaken with the benefit of understanding of all relevant stakeholder issues. The carrying out of work to provide new drainage systems offers considerable opportunity for the resolution of existing flooding problems which must be explored.

4.4.5 The integration of surface water system design into all stages of the development process.

To ensure that the maximum benefit can be gained in respect to issues such as availability and quality of water, enhancement of human and natural environments and flood risk reduction it will be necessary to think about all water related issues at the earliest stage of master planning and at all subsequent stages. Complete integration of all water related design issues into the overall project design process is a necessity.

4.4.6 Flood exceedance paths

Exceedance conditions resulting in above ground flood flow occur either when the capacity of the drainage system is exceeded and/or where the rate of runoff exceeds the inlet capacity of the drain. Flood exceedance paths are referred to above under the section on blue corridors. Applications relating to drainage proposals for new development must ensure that attention is given to the identification of flow paths that will come into use when rainfall exceeds designed system capacity.

Drainage systems can only be designed economically to cater for rainfall events of a realistic magnitude but inevitably there will be 'freak' storms when the design capacity is exceeded. Previous practice made scant allowance for this but with the improved understanding of the mechanisms and the comprehensive software tools now widely available it is possible to designate flow routes around property to cater for this situation. Roads - perhaps with raised kerbs and alternative vehicle cross-over details - are an obvious way of providing for this with often minimal inconvenience being caused.

4.4.7 Integration with the new National Planning Policy Framework (NPPF)

As part of its reforms to the planning system the Government has published a streamlined National Planning Policy Framework (NPPF). The NPPF maintains strong planning policy on avoiding and managing risks from flooding, based on the central role of local planning authorities in preparing local plans and in deciding applications for planning permission.

The NPPF highlights that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.

It is necessary when determining planning applications that;

The development does not increased flood risk elsewhere

The development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning.

The planning authority will also need to ensure that;

- It gives priority to the use of sustainable drainage systems.
- It safeguards land from development that is required for current and future flood management.
- It uses opportunities offered by new development to reduce the causes and impacts of flooding; and
- Where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.

4.5 Ensuring a balance between the identification of high level plans and the resolution of local flooding

There is a danger that the focus just on high level plans and strategies will delay actually making progress 'on the ground' with flood risk reduction.

The success of the overall flood risk reduction strategy will require the demonstration to all residents who have knowledge/experience of problems within Middlesbrough that progress is actually being made on flood risk reduction at their local level. There of course will be a need to establish things like long term actions for ensuring that flood risk does not increase.

A primary objective for our work will be an overall reduction in flood risk in the whole of Middlesbrough. From a practical point of view it makes sense for resources to be focused not just on the priority areas in terms of the number of properties at risk but also based on the likelihood of being able to implement flood risk reduction.

Data collected both on risks and actual flooding will be incorporated into GIS so as to facilitate improved spatial understanding of all relevant information and focus future investigations in areas where the most activity is planned. Middlesbrough Council will endeavour to ensure that short term solutions to existing flood risks are identified and that those affected and all relevant stakeholders are made aware of the opportunities that exist for early resolution of flooding through co-operation and collaboration.

4.6 Ensure planning decisions are properly informed by flood risk and that there is a consistent approach to flood risk management in new development

There is a need to ensure that the evidence base used to determine planning decisions is consistent and up-to-date, the Lead Local Flood Authority will take responsibility for the development of a system for reporting and recording local flooding incidents and the asset register making this readily available to all who need to see it.

The Environment Agency continues to develop and publish flood maps, Surface water mapping is not yet publicly available but information will be made available to all who need it.

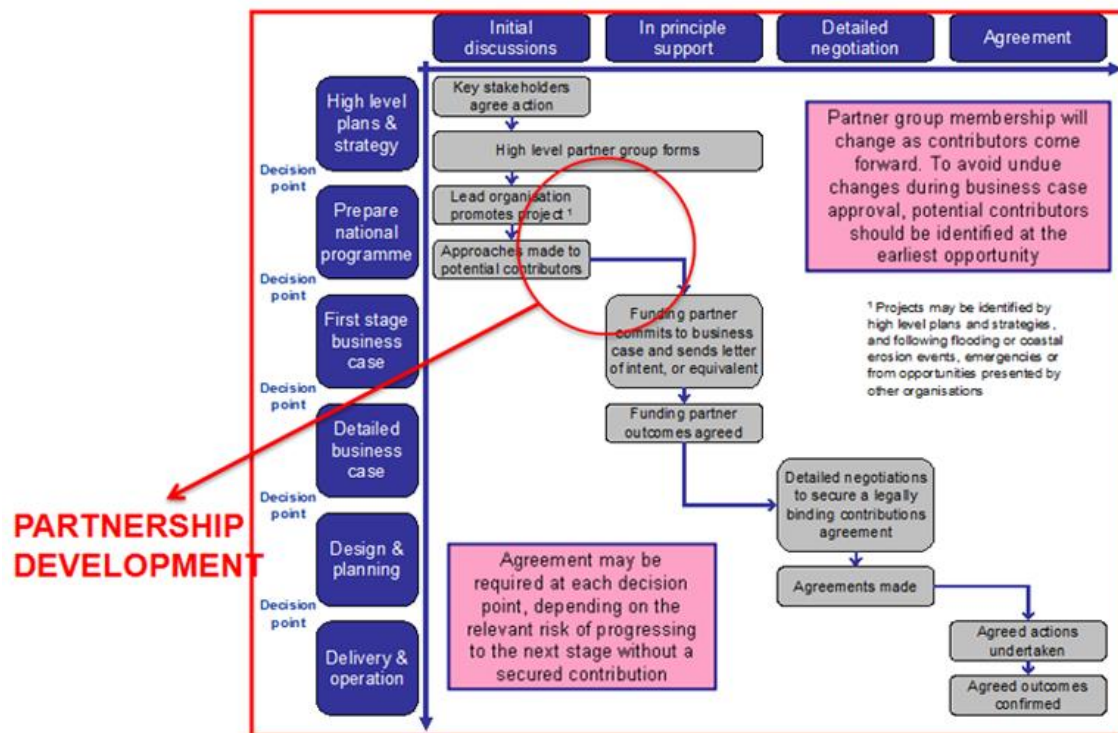
4.7 The adoption of a holistic approach to flood risk management

Climate change is bringing fresh challenges as patterns of rainfall are predicted to change, with more intense rainfall events. We know that extreme rainfall can overwhelm drains and overtop flood defences. In planning for water it is necessary to take into account these natural constraints, this in turn will mean that a holistic approach must be adopted.

4.8 Work in partnership to deliver flood risk management activities

Due to our responsibility, as LLFA, to lead on all LFRM, there is a particular need to work collaboratively with other relevant organisations and the public to obtain a holistic understanding of local flood risk. Depending on local circumstances, all the types of flooding can influence each other. Within Middlesbrough we will work together to build partnerships with private, public, voluntary organisations and communities who will benefit most from flood risk management activities.

Figure 19 Working in Partnership



4.9 Ensure that all flood risk management activities in Middlesbrough seek to deliver wider environmental and social benefits, climate change mitigation and improvements under the 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. 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 derogations for flood risk management but stringent assessments must be carried out to ensure that there are no better environmental alternatives to the proposed scheme.

4.10 Encourage ordinary watercourse maintenance and minimise unnecessary constrictions

The maintenance of assets relating to ordinary watercourses is inconsistent over the Middlesbrough area. To counteract this we will create an inspection/maintenance plan incorporating a cyclic inspection regime. This will encourage actions are taken to ensure that assets are being used to their full capacity.

4.11 To obtain as much information as possible on the latest best practice initiatives within the 'industry' as a whole

Middlesbrough Council as a Unitary Council previously had a peripheral role in the management of surface water, but now has the ultimate responsibility for reducing risk of flooding from surface water, ground water and ordinary watercourses. Middlesbrough Council are making significant progress with our new responsibilities, however developing these processes is dependant upon such things as the provision of necessary resources and political will.

In collaboration with neighbouring Lead Local Flood Authorities, the Local Government Association Flood Group and relevant professional bodies, the Council will share its experiences and learn from others. A particular focus for key staff will therefore be the development of understanding of best practice in the industry as a whole through such things as continued participation in the Environment Agency's Capacity Building Programme, attendance at training courses and the obtaining of information from sources such as the Communities and Local Government websites.

4.12 Encourage businesses and communities to take steps to prepare for flooding

There will be an ongoing requirement to ensure that flooding emergency response procedures are comprehensive and up to date. Through continual reviews of emergency response flood plans they will benefit from the latest information as it becomes available.

4.13 Prioritisation of key actions identified

The key objectives and related actions identified above will not all progress concurrently and it is therefore necessary to establish priorities – based on the costs of delivering them in relation to benefits achieved.

5. Funding & delivery of plan

It is important that the local strategy sets out how the proposed actions and measures will be funded and resourced within Middlesbrough. It is also important to identify what funding mechanisms are available to Middlesbrough Council and its partners to pay for the flood risk management measures that are set out in the strategy. Effective practical implementation of flood policy objectives requires adequate resources both for the management and response activities of lead local flood authorities as well as for capital projects.

The following chapter provides a summary of available forms of funding that are being considered and will also help to identify any further actions that will be needed to ensure that particular funding alternatives are feasible.

5.1 Current funding mechanisms

Figure 19 below identifies the various streams of funding open to risk management authorities. These are discussed further below.

5.1.1 Public funding

With less direct government funding available, it is clear that changes are needed to the traditional approaches to funding flood risk management.

The current situation of government flood risk management funding is summarised below:

- the Government expects to spend a minimum of £2.1 billion on flood and coastal erosion risk management by 2015.
- Defra remains committed to fully funding LLFA's to carry out their new responsibilities under the Flood and Water Management Act. Up to £36 million a year will be provided directly to lead local flood authorities.
- Middlesbrough Council, received £138,800 in 2012/13 and a similar amount is expected thereafter to spend on local flood risk management activities.
- Local authorities also have money available through a formula grant from the Department for Communities and Local Government (DCLG). This money will support the on-going flood risk management responsibilities, including drainage activity and the maintenance of ordinary watercourses and coastal defences, and payments of levies to the Environment Agency (local levy).
- The DCLG have indicated that local authorities are spending around £30million from local levy. To date this has only been available for tidal flooding or fluvial schemes, but since the Flood and Water Management Act and the creation of Regional Flood and Coastal Defence Committees, this money is now also available for surface water schemes.
- There are other sources of public funding which may be able to assist in flood relief schemes, two examples being Highway Authority works and Environment Agency funding through Water Framework Directive.

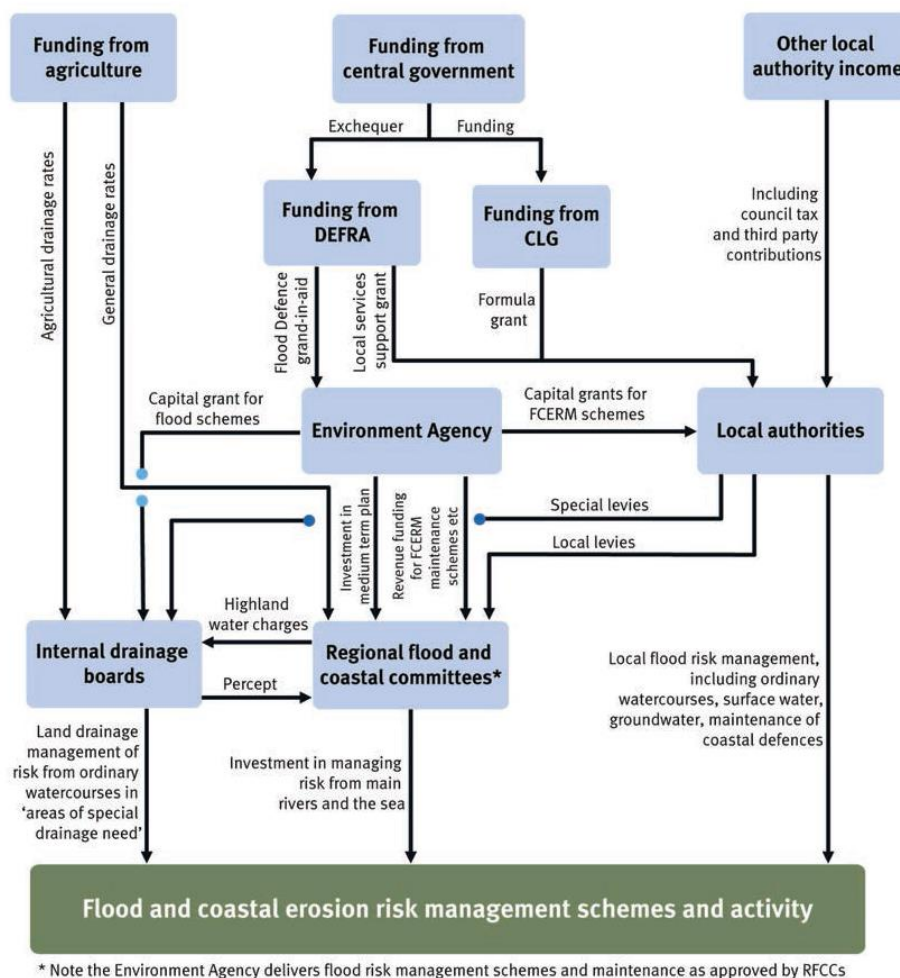


Figure 20 – Funding Mechanisms

Flood Defence Grant in Aid

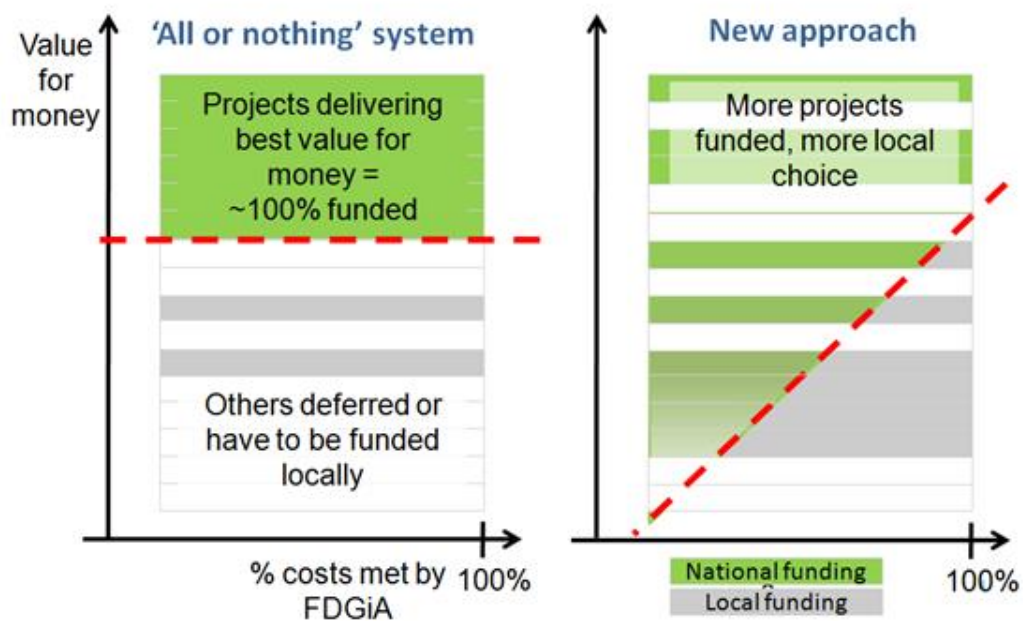
The Pitt Review recommended that ‘Government should develop a scheme that allows and encourages local communities to invest in flood risk management measures’. From April 2012 projects will be assessed under the new Government policy of *Flood and Coastal Resilience Partnership Funding* (‘partnership funding’). This new approach whereby Government funding is allocated to projects based on the number of households protected, scoring higher in areas of deprivation and other benefits (protection of commercial properties, public buildings, infrastructure and agricultural land, and the creation or improvement of water dependent habitat) achieved through flood and coastal erosion risk management. It aims to encourage greater partnership working between the authorities, sectors, communities and others that have an interest in tackling flooding over the long-term, so that more schemes can go ahead. The Environment Agency will prepare a programme of schemes for approval by Regional Flood and Coastal Committees in each part of the country. These committees are responsible for overseeing flood and coastal defence activity and include local authority representatives. The figure below describes how the share of project costs available from Defra will be calculated.

Share of costs funded by Defra	=	Household benefits + other whole-life benefits + environmental outcomes	X	Fixed payment rates	
		÷			
		Amount of funding required			

This allows greater local influence on which schemes proceed each year.

Figure 21 illustrates the 'Payment for Outcomes' approach and the importance of the local levy in fully funding flood defence and maintenance schemes.

Figure 21 Payment for Outcomes



Payment for outcomes puts a strong emphasis on the need for external contributions. Middlesbrough Council will continue to work with key stakeholders including:

- Defra and the Environment Agency.
- Northumbrian Water Limited and OFWAT.
- Private sector developers.
- Highways Agency.
- Other infrastructure providers such as Network Rail.
- Other Tees Valley LLFA's.

Middlesbrough Council will take the lead partner role for surface/local flood risk and will:

- Identify and plan projects.
- Establish funds required.
- Outline responsibilities.
- Present to Regional Flood and Coastal Committee.

The Tees Valley Flood Risk Management Partnership will endeavour to ensure a balanced programme of flood and coastal risk management projects covering all sources of flooding. The partnerships will also need to work together to seek and deliver external sources of funding.

Local Levy Funding

The local levy is an existing way that Regional Flood and Coastal Committees can raise money to help pay for additional flood and coastal erosion risk management. It is voted for, and paid by, the county and unitary local authority members of each committee. Each local authority's levy payments are supported by grants from central Government.

Funding through the Community Infrastructure Levy

The Community Infrastructure Levy came into force in April 2010 and potentially could provide Middlesbrough Council with an alternative source of funding for flood defence schemes. It allows local authorities to raise funds from new development in their area in order to pay for the impact that the development has on local infrastructure. The levy is based on the concept that almost all development has some impact on infrastructure and services, so it is fair that development should contribute towards the cost of maintaining or upgrading local infrastructure.

5.1.2 Private funding

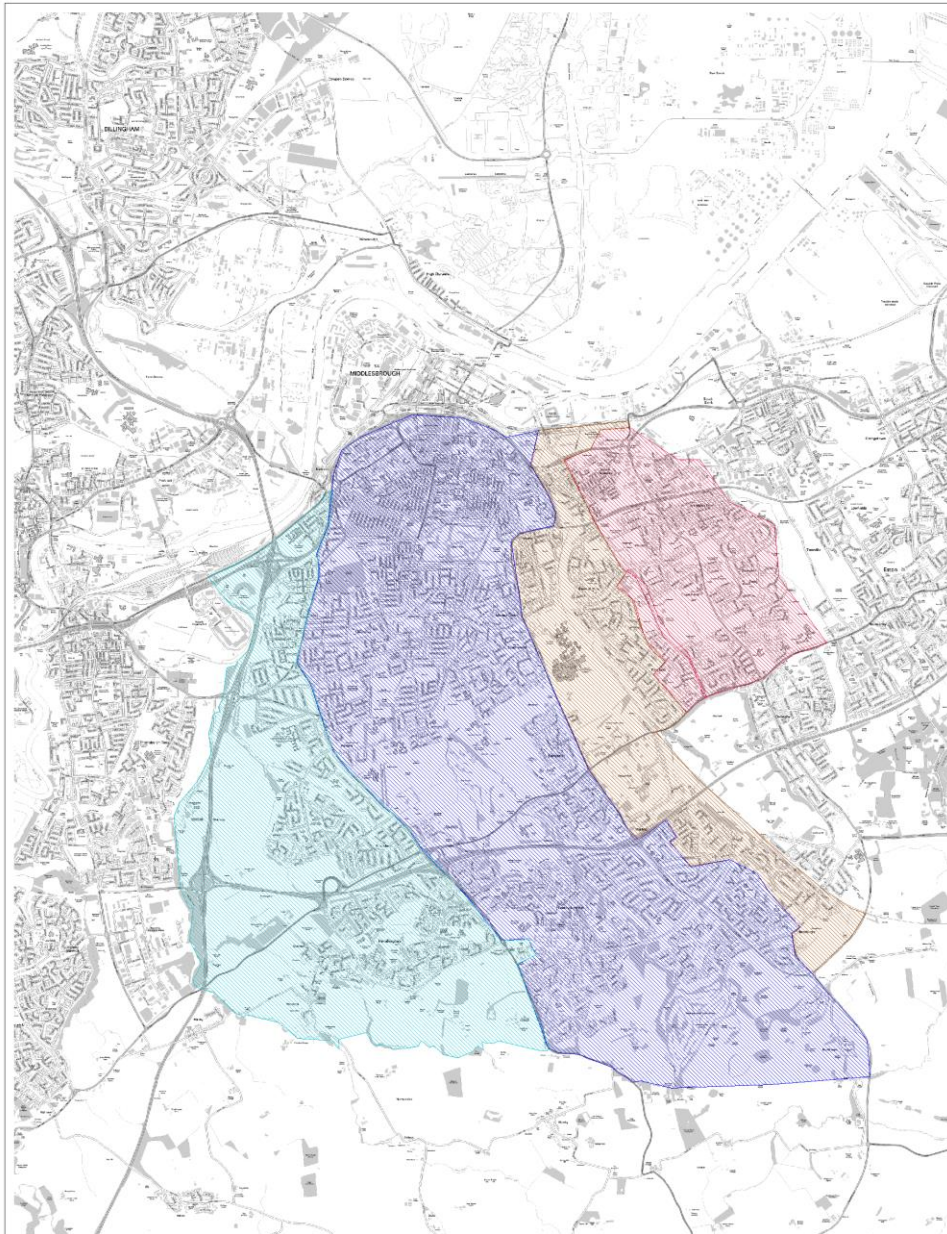
Section 106 funding – Developer Contributions

Section 106 of the Town and Country Planning Act 1990 allows a local planning authority to enter into an agreement with a landowner or developer in association with the granting of planning permission. A Section 106 agreement is used to address issues that are necessary to make a development acceptable, such as supporting the provision of services and infrastructure. One of the recommendations of 'Making Space for Water' was that local planning authorities should make more use of Section 106 agreements to ensure that there is a strong planning policy to manage flood risk. Any flood risk measures that are required to ensure that a new development does not cause or increase flood risk will be funded by the developer. Figure 22, below, shows the catchment areas for each of Middlesbrough's becks, this will enable S106 funding to be attributed to schemes in the catchments that the proposed development lies.

5.1.3 Other possible sources of funding

All possible sources of funding will be pursued as they become available, including European funding. Examples might include;

- Private beneficiary investment ('beneficiary pays') - Voluntary contributions from private beneficiaries of flood risk management, could include local businesses, landlords, etc.



Red= Middlebeck, Brown=Ormesby Beck, Purple- Marton West Beck, Green=Blue Bell Beck

Figure 22 Middlesbrough Becks Catchments

- Water company investment - Water companies are able to invest in some types of surface water management, and increased resilience for their assets. Water companies may be increasingly willing and able to invest in local FRM strategies in order to protect their customers and assets at risk of surface water flooding.
- Trusts, community groups, NGOs - Formation of a legal entity to channel revenue raising into additional flood and coastal defence and other relevant projects
- Lottery funding (Big Lottery Fund, Heritage Lottery Fund) Funding provided by the National Lottery for projects benefiting UK cultural heritage.

- Landfill Community Fund - The Landfill Tax Credit Scheme (LTCS) was introduced with the landfill tax and enables Landfill Operators to donate up to 6.5% of their landfill tax liability to implement social and environmental projects

6. Achieving borough wide environmental benefits through effective flood risk management

The primary purpose of this report is to set out the strategy for reducing flood risk in Middlesbrough but if this is done with sensitivity, good design and planning it is possible to derive significant benefit in respect to aspirations in the wider context of sustainability, environmental and social improvement.

The UK Climate Projections (2009) provide information on how the UK's climate is likely to change in the 21st century, as it responds to rising levels of greenhouse gases in the atmosphere. The North East Climate Change Adaptation Study (2008) pre-dated the publication of these projections and made use of assessments from the Environment Agency's Rainfall and Weather Impact Generator (EARWIG) for ten locations across the North East region to determine the climate changes projected by the 2050s. Key findings from this assessment across the North East region are:

- Annual rainfall is projected to reduce throughout the region by up to 10%.
- Rainfall is projected to show increased seasonality with increases of up to around 21% in winter and reductions of up to around 37% in summer.
- There is projected variability in extreme rainfall events, but increases of up to around 20% will be felt in some areas.
- Average seasonal temperatures are projected to increase, with a region-wide annual average daily temperature change of just under 2°C.
- There is projected to be an increase in mean sea levels of around 0.3m.
- There is projected to be an increase in sea surge levels of around 0.30m to 0.35m.

6.1 One Planet Living

In achieving borough wide environmental benefits through effective flood risk management Middlesbrough Council have developed a One Planet Living Plan of which Sustainable Water is one of the ten key principal.

Extract from 'Middlesbrough's One Planet Living Plan;

The One Planet vision is one where we use water much more efficiently in buildings and in the products we buy; and manage water in such a way as to support healthy land-use, avoid local flooding and avoid pollution to watercourses.

The vision is for people in Middlesbrough to face only a minimal threat of disruption caused by flooding from water courses and surface run off. Measures taken will take account of climate

change and will seek to manage flood risk in an environmentally sensitive way. Residents at risk of flooding will be supported to become more self-resilient.

6.2 Water Cycle Management Opportunities

With the Tees Valley being awarded Growth Point Status in 2008 a Water Cycle Study has been undertaken. The study considered all of the ways in which new development will impact on the water environment or water infrastructure specific to where growth is most likely to be targeted. There is a finite capacity within the environment, and it cannot simply provide more and more water.

The objective of the WCS is to identify any constraints on housing and employment growth, planned for the area up to 2026, that 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.

In the context of flood risk management we must ensure that new development assists in delivering flood risk reductions. This must be by means of Sustainable Drainage Systems (SuDS) which are being promoted by the Government. The incorporation of SuDS measures into new developments have considerable potential to manage surface water at source, pathway and receptor, they would also present opportunities to contribute to biodiversity and wildlife corridors thereby contributing to overall green infrastructure objectives.

The most appropriate method to manage surface water is to implement a management train, this enables the prevention of the increase in surface water runoff by controlling surface water at all stages along the source/pathway/receptor model.

Source control can take a number of forms but the basic philosophy is to emulate the natural situation where water is held close to where it falls rather than being rushed over impermeable surfaces and into sewers from where it can be disposed of.

This can be achieved in a number of ways:

Ground infiltration – where ground conditions permit the passing of rainwater into the ground has a number of benefits. Unfortunately the underlying clays in Middlesbrough do not lend themselves to significant infiltration.

Attenuation of Surface Water by means of Sustainable Drainage, currently the Environment Agency ask for the greenfield run off rate to be achieved on greenfield sites and 30% betterment on brownfield sites. The primary aim in Middlesbrough is to achieve current greenfield run off rate, if at all possible, for all sites, using Sustainable Drainage techniques.

Source Mitigation Measures include:

- Green Roofs
- Permeable Paving
- Attenuation/Storage Basins

- Ponds and Wetlands
- Rainwater Harvesting

The benefit of source control to water cycle management can be summarised as:

- Reduction in peak flow to sewers and watercourses
- Reduction in flood ponding volumes (pluvial flooding reduction)
- Retention of water in the catchment for recreational use, biodiversity enhancement, potential water supply improvement, etc

6.3 The Water Framework Directive

The Northumbrian River Basin Management Plan outlines the pressures facing the water environment in the Environment Agency's North East region, and the actions that will address them. It was prepared to satisfy the requirements of the Water Framework Directive, and is the first of a series of six-year planning cycles. A consultation has just commenced on the latest plan.



Blue = Moderate

Red = Bad

Figure 23 Water body Ecological Status (2009)

The objectives which are relevant to this local flood risk management strategy are: -

- to prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters
- to achieve at least good status for all water bodies by 2015.
- to promote sustainable use of water as a natural resource
- to conserve habitats and species that depend directly on water;
- to progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- to progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants;
- to contribute to mitigating the effects of floods and droughts.

It is clear from the above that flood risk management activities have the potential to help deliver some of the improvements needed. Some examples of relevant actions that risk management authorities, land managers and the public can take to overcome the challenges are: -

- **Prevent pollution.** It is essential to avoid pollutants from industrial and domestic drains entering watercourses (everything from hazardous industrial chemicals to pouring oil down household drains). This can be achieved through education as well as regulation and any activities relating to watercourse.
- **Reduce sediments getting into water bodies** through landscaping and use of SuDS and managing activities and soils prone to run-off.
- **Protect and enhance wildlife** – either through wetland creation schemes (could be part of SuDS) or by taking appropriate precautions with local flood management schemes.
- **Save water** –There is a clear need to think about flood management in a holistic way, looking at the whole water cycle.
- **Avoid further artificial modifications to water bodies.** The use of more natural forms of flood and coastal defences is widely promoted and used where applicable, not only to deliver the aims of the Water Framework Directive but also because they are the most sustainable and least expensive option.

6.4 Zero Carbon

In order to deliver Middlesbrough's One Planet Living vision for Zero Carbon it is essential that all flood management authorities aim to reduce their carbon footprint. Sensitive flood management can assist as a consequence of:

- The reduced embedded carbon in soft engineered flood risk reduction measures when compared to conventional solutions using reinforced concrete, metal etc.
- The minimisation of the pumping requirement for surface water and the consequent reduction in the need to use energy.
- The reduced energy needed for water treatment by minimising the amount of surface water entering foul/combined sewer systems.
- Water storage areas and wetlands for flood management also act as areas of carbon capture.

6.5 Land use and Wildlife

The One Planet vision is of communities that contribute to an overall increase in biodiversity and biological productivity, as well as supporting beautiful landscapes. The vision is for Middlesbrough to protect, enhance and sustain a local natural environment that is rich in wildlife, with habitats and species that are local to the area, and to ensure that land is available for wildlife to move into in order to be able to adapt to a rapidly changing climate.

The availability of good quality water is often a critical factor in maintaining bio-diversity in natural environments. Effective surface water management can support the preservation of those existing environments that need a supply of clean water by maintaining the quantity and quality of the surface water that they need but also has the potential for generating new water based environments. For example a design for a new development may require not only source control surface water management features located within a development but also perhaps the further attenuation of water in 'regional' facilities such as lakes, ponds or water meadows. This offers the opportunity to create an asset which not only satisfies the surface water management requirements but also deliver an environmental and water quality (WFD) improvements.

An additional benefit of designing facilities, which enhance biodiversity, is that environmental charities, e.g. Wildlife Trusts, may be happy to take on responsibility for some element of the ongoing costs of maintenance of the asset, thus reducing the ongoing funding liability.

In fluvial flood management, the practise of 'making space for water' and working with the natural environment have been common practise for many years and demonstrate that working with nature is not only effective but often the cheapest option for local flood management.

Extract from Boro Becks Newsletter



Following the diversion of Ormesby Beck last November, a number of eels were rescued from the old channel and released back in to the new channel, together with a stone loach. Eels are enigmatic fish with a complex and little known life cycle starting when they hatch out in the Sargasso Sea. They make an epic journey across the Atlantic to reach rivers and streams in the UK like the Tees and Ormesby Beck. The fish may live here for a decade or more before making the return trip to the Sargasso Sea to spawn and begin the cycle again. Ormesby Beck's eels were at least 5-6 years old and with a dramatically declining population across their range, to see them in our beck is a real coup for the town.

7 The Future

Monitoring, reviewing and updating this Local Strategy will be essential both to ensure it continues to be 'fit for purpose' but also as a way of demonstrating success in delivering reduced flood risks to the people of Middlesbrough.

The strategy will be reviewed continuously as new procedures from legislation are enacted, more knowledge of our area is gained and best practice emerges from our partners and other practitioners. It is important that we will need to show progress against the action plan and that this is done in a manner that is easy to read.

The strategy and action plans will also be monitored through the Environmental Scrutiny Panel and through other local authority political processes as appropriate. It will be publicly available.

Reviewed September 2016 S Binks