# Durham County Council
# Water Cycle Study

Final

Project number: 60565568

2018

## Quality information

| Prepared by | Checked by | Verified by | Approved by |
|---|---|---|---|
| Laura Bilton<br>Graduate Consultant, Water | Jo Somerton<br>Principal Flood Risk Consultant | Cathryn Spence,<br>Regional Director, Water | Anna Gee<br>Senior Consultant, Water |

## Revision History

| Revision | Revision date | Details | Authorized | Name | Position |
|---|---|---|---|---|---|
| 00 | 31/05/2018 | Issued to DCC | Y | Joanne Somerton | Principal Consultant |
| | | | | | |
| | | | | | |
| | | | | | |

## Distribution List

| # Hard Copies | PDF Required | Association / Company Name |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

## Prepared for:

Durham County Council
County Hall
Durham
DH1 5UF

## Prepared by:

AECOM Limited
5th Floor, 2 City Walk
Leeds LS11 9AR
United Kingdom

T: +44 (0)113 391 6800
aecom.com

# Table of Contents

# Figures



# Tables

# Abbreviations

| | |
|---|---|
| AMP | Asset Management Plan |
| CAMS | Catchment Abstraction Management Strategy |
| CFMP | Catchment Flood Management Plan |
| FRA | Flood Risk Assessment |
| GWMU | Groundwater Management Unit |
| HMWB | Heavily Modified Water Body |
| LLFA | Lead Local Flood Authority |
| NVZ | Nitrate Vulnerable Zone |
| PFRA | Preliminary Flood Risk Assessment |
| RBD | River Basin District |
| RBMP | River Basin Management Pan |
| RFCC | Regional Flood and Coastal Committee |
| SAC | Special Area of Conservation |
| SFRA | Strategic Flood Risk Assessment |
| SHLAA | Strategic Housing Land Availability Assessment |
| SPA | Special Protection Area |
| SPZ | Source Protection Zone |
| SSSI | Site of Special Scientific Interest |
| STW | Sewage Treatment Works |
| SWMP | Surface Water Management Plan |
| SWRA | Surface Water Risk Area |
| SuDS | Sustainable Drainage Systems |
| WCS | Water Cycle Study |
| WFD | Water Framework Directive |
| WRMP | Water Resource Management Plan |
| WRMU | Water Resource Management Unit |
| WRZ | Water Resource Zone |

# Glossary

**Asset Management Period (AMP) –** investment in the water industry is broken down into AMPs which comprise five year periods.

**Capacity –** in the context of the WCS capacity refers to the ability of pipes and STW to receive water or wastewater.

**Catchment Abstraction Management Strategy (CAMS) –** a strategy to assess how much water can be abstracted to meet its many economic uses – agriculture, industry, and drinking water supply – while leaving sufficient water in the environment to meet ecological needs.

**Catchment Flood Management Plan (CFMP) –** a strategic plan in which the Environment Agency seek to understand the factors that contribute to flood risk in a catchment (e.g. land use), and to identify and agree policies for sustainable flood risk management across a river catchment for the next 50-100 years.

**Department for Environment, Food and Rural Affairs (Defra) –** Department that brings together the interests of farmers and the countryside; the environment and the rural economy; the food we eat, the air we breathe and the water we drink.

**Environment Agency –** The Environment Agency was established under the Environment Act 1995, and is a Non-Departmental Public Body of Defra. The Environment Agency is the leading public body for protecting and improving the environment in England and Wales today and for future generations. The organisation is responsible for wide ranging matters, including the management of all forms of flood risk, water resources, water quality, waste regulation, pollution control, inland fisheries, recreation, conservation and navigation of inland waterways. It will also have a new strategic overview for all forms of inland flooding.

**Floods and Water Management Act (2010) –** Act of Parliament to clarify the legislative framework for managing surface water flood risk in England.

**Local Authority or Local Planning Authority (LA or LPA) –** the Local Authority or Council that is empowered by law to exercise planning functions. Often the Local Borough or District Council, National Parks and the Broads Authority are also considered to be local planning authorities. County Councils are the authority for waste and minerals matters.

**Main River –** generally main rivers are larger streams or rivers, but can be smaller watercourses. Main Rivers are determined by Defra in England, and the Environment Agency has legal responsibility for them.

**Ordinary watercourse –** an ordinary watercourse is any other river, stream, ditch, cut, sluice, dyke or non-public sewer which is not a Main River. The Local Authority or Internal Drainage Board have powers for such watercourses.

**Potable Water –** water of sufficiently high quality that it can be consumed or used without risk of immediate or long term harm. In most developed countries, the water supplied to households, commerce and industry is all of potable water standard, even though only a very small proportion is actually consumed or used in food preparation. Also known as drinking water.

**River Basin Management Plans (RBMP) –** a management plan for all river basins required by the Water Framework Directive. These documents will establish a strategic plan for the long-term management of the River Basin District, set out objectives for waterbodies and, in broad terms, what measures are planned to meet these objectives, and act as the main reporting mechanism to the European Commission.

**Sewage Treatment Works (STW) –** water services infrastructure that receives waste water effluent from the sewer network. A STW uses a combination of physical, biological and chemical processes to remove pollutants from the sewage before discharging the treated effluent to the water environment.

**Sewer –** a pipe used to convey surface water, sewerage or both.

**Sewerage –** the infrastructure that conveys sewage or wastewater. It encompasses receiving drains, manholes, pumping stations, storm overflows, screening chambers, etc. Sewerage ends at the entry to a sewage treatment plant or at the point of discharge into the environment.

**Site of Special Scientific Interest (SSSI) –** a site identified under the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) as an area of special interest by reason of any of its flora, fauna, geological or physiographical features (basically, plants, animals, and natural features relating to the Earth's structure).

**Special Areas of Conservation (SAC) –** a site designated under the European Community Habitats Directive, to protect internationally important natural habitats and species.

**Special Protection Area (SPA) –** sites classified under the European Community Directive on Wild Birds to protect internationally important bird species.

**Strategic Flood Risk Assessment (SFRA) –** an assessment of flood risk from all sources which is used to inform the planning process of flood risk and provides information on future risk over a wide spatial area. It is also used as a planning tool to examine the sustainability of the proposed development allocations.

**Supplementary Planning Documents (SPD) –** supplementary planning documents can give further context and detail to local development plan policies. It is not part of the statutory development plan. Therefore, it does not have the same weight when local planning authorities are considering planning applications.

**Surface Water Flooding –** surface water flooding describes flooding from sewers, drains, groundwater, and runoff from land, small water courses and ditches that occurs as a result of heavy rainfall.

**Surface Water Management Plan (SWMP) –** is a plan which outlines the preferred surface water management strategy in a given location.

**Sustainable Drainage Systems (SUDS) –** Sustainable drainage systems (previously referred to as sustainable urban drainage systems): a sequence of source control, management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques (may also be referred to as SUDS or SDS).

**Water Cycle Study (WCS) –** the purpose of a water cycle study is to strategically plan the most sustainable water infrastructure in a timely manner, across all of the water cycle from water supply and water resources, flood risk and surface water drainage, and wastewater and biodiversity.

**Water Framework Directive (WFD) –** a European Community Directive (2000/60/EC) of the European Parliament and Council designed to integrate the way water bodies are managed across Europe. It requires all inland and coastal waters to reach “good status” by 2015 through a catchment-based system of River Basin Management Plans, incorporating a programme of measures to improve the status of all natural water bodies.

**Water Resource Management Plan –** every five years water companies in England and Wales are required to produce a Water Resources Management Plan that outlines how they aim to meet predicted demand for water over the next 25 years.

**Water Resources –** water which is available for human use.

**Water Resource Zone –** a geographical area defined by the water supply/demand balance in the region such that all customers within it receive the same level of service in terms of reliability of water supply.

**Water Supply –** the provision of water to homes and industry using a pipe network.

# Introduction

01

# 1. Introduction

## 1.1 Background

The County Durham Plan sets out the planning framework and policies for the County, and makes a commitment to meet the County's need for housing up to 2035. A critical component of the infrastructure required to support new housing development is associated with water; the provision of clean water, the safe disposal of wastewater, and protection from flooding. When new houses are built, there is a risk that the existing infrastructure will be overwhelmed, and both the environment and people's quality of life will suffer.

In light of this, AECOM was appointed by Durham County Council to update the Water Cycle Study (WCS) previously completed in 2012. The WCS will form part of the evidence base for the County Durham Plan by providing a review of the capacity of the water cycle to accommodate significant housing growth up to 2035.

## 1.2 The Water Cycle

The water cycle describes the continuous movement of water on, above, and below the surface of the Earth. Water evaporates, forms clouds and falls over the land surface as precipitation in the form of rain, snow, or sleet. The precipitation subsequently flows over the ground surface into rivers which flow into lakes and the sea. Precipitation which does not reach rivers may evaporate or infiltrate the ground entering groundwater storage.

This natural cycle of water has been interrupted to facilitate development. Water is intercepted and stored in reservoirs or abstracted directly from rivers and groundwater aquifers, and treated to potable quality before it is supplied through an extensive pipe system to homes and industry. Some of this water is used to transport waste through a network of sewers to Sewage Treatment Works (STW) which discharge treated effluent into rivers or the sea.

Excessive precipitation over rural or urban areas presents a risk of flooding. This is a natural phenomenon however can cause problems if inappropriate development has taken place without due regard for the risk. Precipitation falling on urban areas can pose a risk of surface water flooding therefore historically it has been collected by an extensive drainage system of sewers for disposal.

## 1.3 What is a Water Cycle Study?

The water cycle cannot simply provide more and more water to support development. Equally, there is a limit to the amount of wastewater that can be safely returned to our rivers, the sea and groundwater without having a detrimental impact on the environment in terms of water quality. Furthermore, we know that extreme rainfall can overwhelm drains, sewers and watercourses, and cause overtopping of flood defences. Climate change is bringing fresh challenges as patterns of rainfall are predicted to change, with more intense and frequent rainfall events. Consequently planning the timing and location of future development has to take into account these natural constraints associated with the water cycle.

A WCS will identify tensions between development proposals, infrastructure provision and environmental requirements and seek to identify potential solutions to address them. The optimum solution for a given locality may be to adjust the location, timing or nature of development. For example, it may be more cost effective to improve the water efficiency of new and existing houses rather than build a new water supply reservoir, or to build houses outside of the floodplain rather than build costly flood protection. Equally the WCS may identify what, and when, new infrastructure is required to support development.

A WCS is:

- a method for determining what sustainable water infrastructure is required and where and when it is needed;
- a risk based approach ensuring that town and country planning makes best use of environmental capacity and opportunities, and adapts to environmental constraints;
- a way for all stakeholders to have their say, preventing any unexpected obstacles to growth; and
- the process that brings all the available knowledge and information together to help make better, more integrated, risk based planning decisions.

### 1.3.1 Durham County Council Water Cycle Study

This is the Durham County Council WCS which has the following structure:

- Chapter 2 presents the potential future housing growth that has been considered;
- Chapter 3 reviews housing development with regard to water resources & water supply;
- Chapter 4 reviews housing development with regard to sewage treatment;
- Chapter 5 reviews water quality and wider environmental constraints on housing development;
- Chapter 6 reviews flood risk; and
- Chapter 7 draws the findings of the previous chapters together and presents the conclusions of the WCS.

## 1.4 Partnership

A partnership approach is the most efficient means to co-ordinate future development and the impact on the water cycle given that a number of different organisations are involved in the process. These organisations need to work collaboratively to understand the impact of development on the water cycle and to identify and assess options to overcome any issues that are identified.

A WCS brings together three Key Partners who must be involved and actively engaged in the process to ensure future development is sustainable and that the necessary infrastructure is in place to facilitate development. Since development is the driver for a WCS, Local Authorities are charged with the responsibility for leading the WCS and providing the relevant information concerning future development. Water and Sewerage companies are responsible for the provision of clean water and disposal of wastewater and are therefore essential to a WCS to appraise the impact of future development on their infrastructure. The Environment Agency's 'operational' role with responsibility for river defences, river structures, development control and water quality makes it a key player in the WCS process.

One of the most important benefits of a WCS is that it allows the key organisations to work together in the planning process and builds confidence between parties. It provides each Partner with an indication of future growth aspirations and what potential constraints may exist.

The Key Partners involved in the County Durham WCS are:

- Durham County Council;
- Northumbrian Water;
- Anglian Water Services (Hartlepool Water); and,
- The Environment Agency.

Each of the Partners has a vital role to play to ensure the successful delivery of a WCS for County Durham that meets the objectives of each Partner. Input is required from each of the Partners in terms of providing data, reviewing reports and project outputs and steering the direction that the WCS ultimately takes. A lack of participation by any one Partner will affect the quality of the WCS. Table 1-1sets out what each Partner is required to contribute to the WCS and the benefits that they will get out of it.

**Table 1-1: Roles & Responsibilities**

| Partner | Role in the WCS | How they inform the WCS | What they get out of the WCS |
|---|---|---|---|
| Durham County Council | Lead partner responsible for future development and that a partnership approach is adopted. | Provision of information concerning future development; locations and phasing. | The WCS comprises part of the evidence base for the County Durham Plan, showing how water services and the water environment have been considered during the strategic planning process. The study provides information and assurances that the Council's development aspirations can be met with sufficient water infrastructure. The WCS' input to the Infrastructure Delivery Plan will also contribute towards the evidence base.<br>The WCS will ensure a joined up approach between land owners, water infrastructure providers and planners during strategic growth and regeneration planning.<br>The WCS will help to ensure that the natural water environment is protected. |
| Northumbrian Water | Essential partner for the WCS responsible for provision of public water supply and disposal of wastewater. | Assess if their water infrastructure can support development aspirations; identify constraints and measures by which they could be overcome. | An appreciation and understanding of the development aspirations of Durham County Council, learning when development will come forward, where and its phasing.<br>The WCS can inform long term planning, identifying where and when investment is required.<br>An opportunity to comment on the proposed growth to influence the location and timing of future development by supporting proposals or make recommendations for changes. |
| Environment Agency | Essential partner for the WCS responsible for flood risk, development control and water quality. | Provision of information and data concerning the water environment and its constraints and limitations. | Support growth and ensure growth is sustainable with regard to the environment.<br>Encourage sustainable development.<br>Participate in and prove partnership working to achieve greater efficiencies by working together. |

## 1.5 Links with Other Studies

In addition to forming part of the evidence base for the County Durham Plan, the WCS has been informed by a number of other studies;

- The Durham County Council Level 1 Strategic Flood Risk Assessment (SFRA[1]) has been updated alongside this WCS, to support Durham County Councils Local Plan. The SFRA aims to collate and analyse the most up to date flood risk information for all sources of flooding to inform strategic decision making for future development. Further details are provided within Chapter 6; and
- The County Durham WCS has been updated using information contained within the County Durham Surface Water Management Plan (SWMP). The SWMP was primarily driven by the need to provide a robust evidence base for the County Durham Plan and identified high level solutions to resolve surface water flooding problems.

The WCS has also been informed by many other studies which have been referred to throughout the body of the report.

[1] AECOM, October 2016, *Durham County Council Level 1 Strategic Flood Risk Assessment*

# Future Housing Development

02

# 2. Future Housing Development

## 2.1 Introduction

Following the creation of the County Durham Unitary Authority in April 2009, the Council has commenced the preparation of the County Durham Plan which will be used as a guide to development within the County in the period to 2035. The purpose of the County Durham Plan is to set out the levels of development which will be required in the plan period, as well as to identify the broad locations and the specific sites where this development will take place. However, in accordance with national planning guidance, the policies set out in the County Durham Plan are required to be based on a sound understanding of the relevant issues which is informed by a comprehensive evidence base. The WCS for County Durham will play a key part of this evidence base.

The Plan outlines the potential allocation sites for 6,330 new properties across the County covering 44 sites and 20 settlements. In order to undertake the WCS, the spatial distribution of proposed housing across County Durham has been assessed. The location and number of new potential allocation sites is based on the potential housing allocations.

## 2.2 Housing Development in County Durham up to 2035

The following section provides a summary of the new potential allocation sites. Table 2-1 outlines the total housing capacity per settlement area, and illustrates the spatial distribution of these. It can be seen that the majority of the future development is located within the central and eastern parts of the County.

The development proposed within County Durham will be completed within the period of the County Durham Plan (2035). As such Durham County Council and Northumbrian Water will need to work together with developers to anticipate the likely delivery of development to coincide with investment of the Northumbrian Waters Asset Management Plan (AMP) cycles and the priorities of the Environment Agency River Basin Management Plan (RBMP).

It is recommended that a periodic review of the WCS is completed against the County Durham Plan, RBMP and Northumbrian Water AMP investment strategies to ensure the necessary investment is prioritised as needed.

**Table 2-1: Potential New Housing Allocations across Durham Settlements**

| Settlement | Allocated Housing | Settlement | Allocated Housing |
|---|---|---|---|
| Annfield Plain | 40 | Murton | 130 |
| Barnard Castle | 35 | Newton Aycliffe | 830 |
| Bearpark | 250 | Pelton | 115 |
| Bishop Auckland | 135 | Peterlee | 65 |
| Shildon | 10 | Seaham | 445 |
| Huwick | 25 | Spennymoor | 210 |
| Chester-le-Street | 60 | Thornley | 50 |
| Consett | 820 | Willington | 200 |
| Crook | 385 | Wolsingham | 40 |
| Durham City | 2460 | | |
| Langley Park | 25 | | |

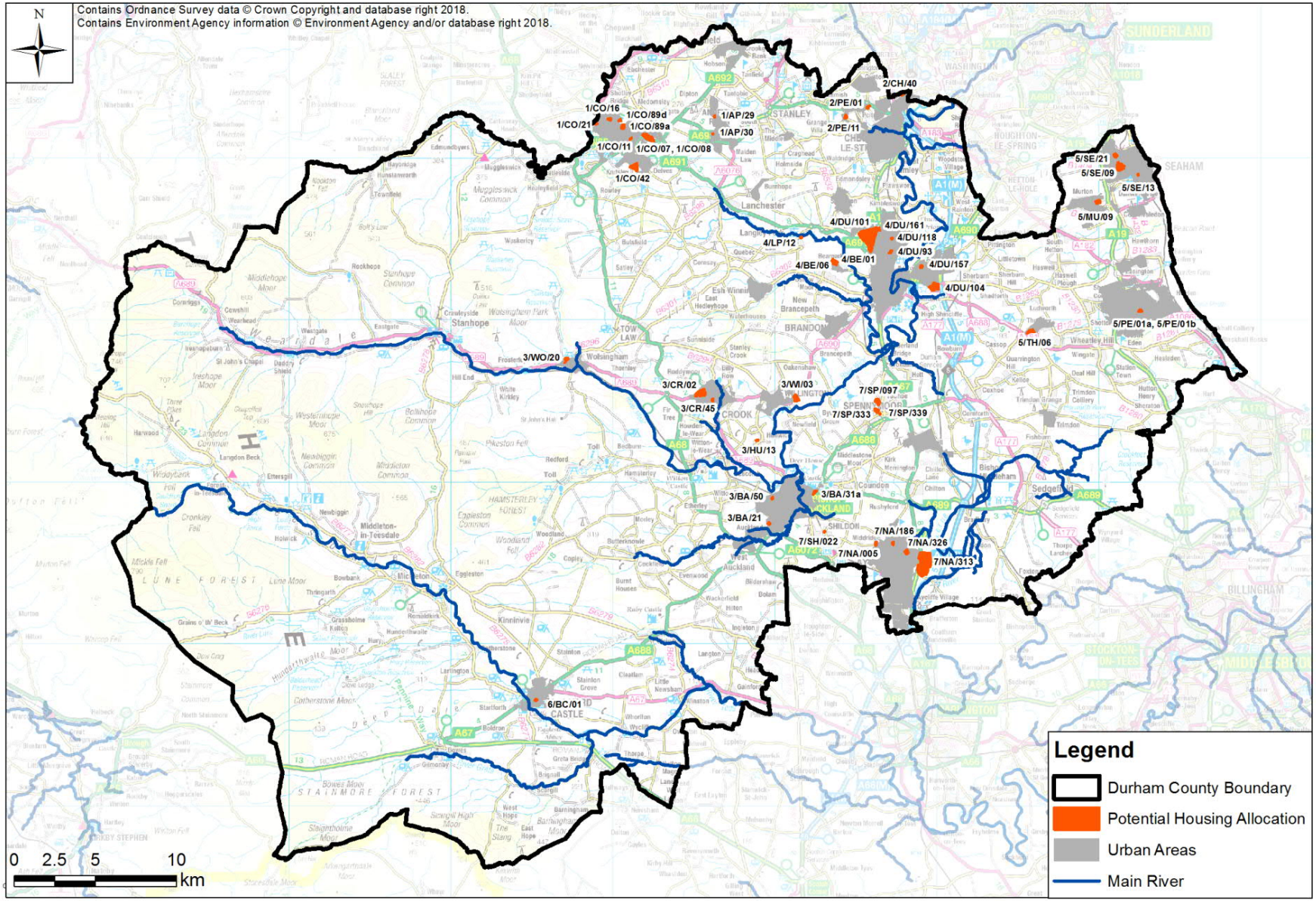



**Figure 2-1: Distribution of New Potential Allocation Sites**

Of the new potential allocation sites, there are number of sites which have a yield (number of properties) in excess of 200 houses. These are outlined in Table 2-2 below.

**Table 2-2: New Potential Allocation sites in excess of 200 houses**

| Site Name | SHLAA Reference | Yield (number of properties) | Settlement |
|---|---|---|---|
| Cook Avenue | 4/BE/01 | 200 | Bearpark |
| South Knitsley Lane | 1/CO/42 | 290 | Consett |
| Laurel Drive | 1/CO/07 | 290 | Consett |
| High West Rd | 3/CR/02 | 350 | Crook |
| Sniperley Park | 4/DU/101 | 1900 | Durham City |
| Low Copelaw | 7/NA/313 | 600 | Newton Aycliffe |
| Seaham Colliery Site | 5/SE/09 | 335 | Seaham |
| Sherburn Road | 4/DU/104 | 420 | Durham City |
| Lowfield Farmland to East of Ash Drive | 3/WI/03 | 200 | Willington |

It is possible that development of these larger potential allocation sites could exacerbate the hydraulic performance or create hydraulic performance issues within STW catchment areas and the proposed development would be required to be phased in line with investment and improvements by NWL (See Chapter 4). The larger sites do however present opportunities for the use of Sustainable Drainage Systems and urban water management in order to create space for water, slow down the flow of surface water and provide water quality and ecological enhancement.

# Water Resources and Water Supply

03

# 3. Water Supply Strategy

## 3.1 Introduction

The Northumbrian Water - Water Resource Management Plan 2014[2] (WRMP), Northumbrian Water draft WRMP 2019[3] and the updated Environment Agency Tees[4], Tyne[5] and Wear[6] Catchment Abstraction Management Strategies (CAMS), published in 2013, have been used to determine the available water resource in the County Durham study area. This assessment considers the ability of existing water resource infrastructure to accommodate demand from proposed new growth.

In reviewing the 2014 WRMP and through liaison with Northumbrian Water it has been established that the growth figures assessed for this WCS update are catered for in the 2040 prediction of demand in the relevant Planning Zones under average conditions within the WRMP.

## 3.2 Catchment Management Strategies (CAMS)

An assessment of the existing environmental baseline with respect to locally available resources in the aquifers and the main river systems has been completed based on the Environment Agency's CAMS. There are three CAMS that cover water resources in County Durham; the Wear, Tees and Tyne, as illustrated in Figure 3-1.

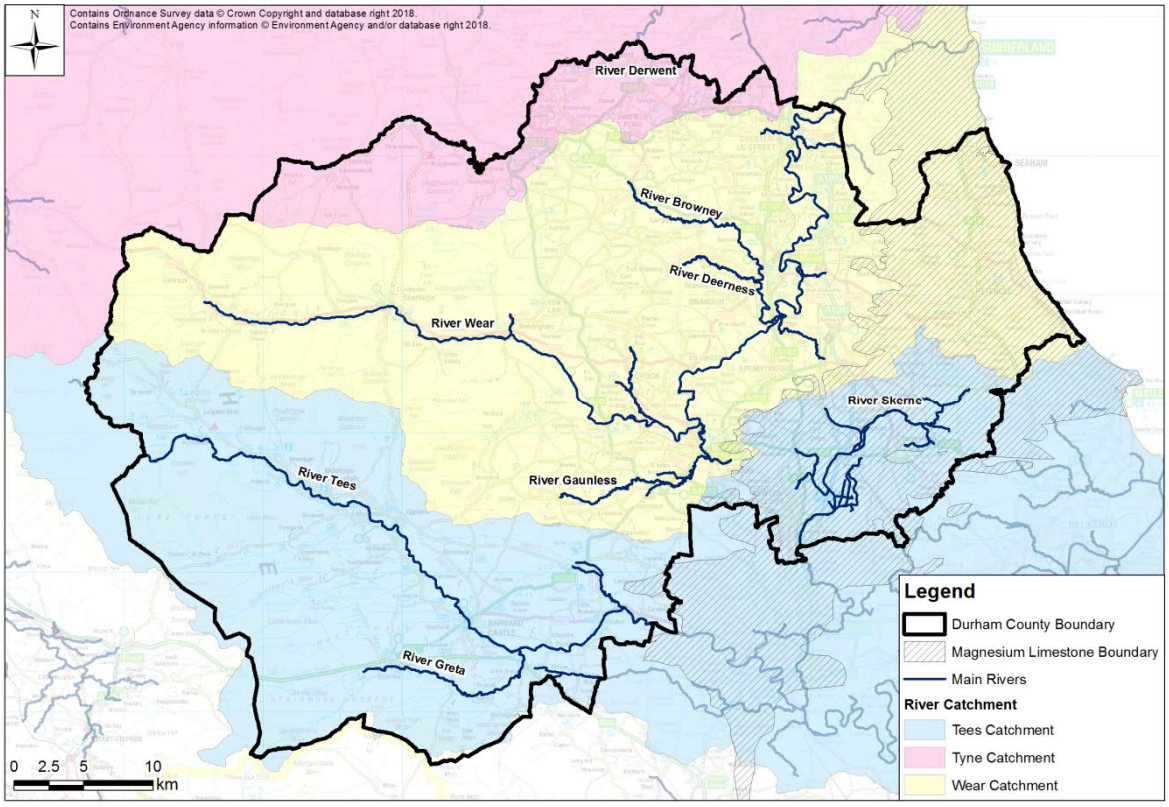



**Figure 3-1 River Catchments and Magnesium Limestone Aquifer**

[2] Northumbrian Water Ltd 2014, Final Water Resources Management Plan 2014
https://www.nwl.co.uk/_assets/documents/NW_Final_Published_PR14_WRMP_Report.pdf
[3] Northumbrian Water Ltd 2018, Draft Water Resources Management Plan 2019
https://www.nwl.co.uk/_assets/documents/NW_PR19_WRMP_Report_-_V4.pdf
[4] Tees Abstraction Licensing Strategy, February 2013
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307285/lit_7875_1dfa59.pdf
[5] Tyne Abstraction Licensing Strategy, February 2013
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307287/lit_7873_84be79.pdf
[6] Wear Abstraction Licensing Strategy, February 2013
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307290/lit_7874_54b957.pdf

The Environment Agency manages water resources at the local level through the use of CAMS. Within the CAMS, the Environment Agency's assessment of the availability of water resources is based on a classification system that gives a resource availability status which indicates:

- The relative balance between the environmental requirements for water and how much is licensed for abstraction;
- Whether water is available for further abstraction; and
- Areas where abstraction needs to be reduced.

The categories of resource availability status are shown in Table 3-1. The classification is based on an assessment of a river system's ecological sensitivity to abstraction-related flow reduction. This classification can then be used to assess the potential for additional water resource abstractions.

**Table 3-1 CAMS surface water resource availability status categories**

| Indicative Resource Availability Status | Licence Availability |
|---|---|
| Water available for licensing | There is more water than required to meet the needs of the environment.<br>New licences can be considered depending on local and downstream impacts. |
| Restricted water available for licensing | Full Licenced flows fall below the Environmental Flow Indicators (EFIs).<br>If all Licenced water is abstracted there will not be enough water left for the needs of the environment. No new consumptive licences would be granted. It may also be appropriate to investigate the possibilities for reducing fully licenced risks. Water may be available if you can 'buy' (known as licence trading) the entitlement to abstract water from an existing licence holder. |
| No water available for licensing | Recent actual flows are below the EFI.<br>This scenario highlights water bodies where flows are below the indicative flow requirement to help support Good Ecological Status (GES) (as required by the Water Framework Directive<br>(Note: The EA are currently investigating water bodies that are not supporting GES / Good Ecological Potential (GEP).<br>No further consumptive licences will be granted. Water may be available if you can buy (known as licence trading) the amount equivalent to recently abstracted from an existing licence holder. |

Groundwater availability is guided by the surface water resource availability colours unless better information on principle aquifers is available or the Environment Agency is aware of local issues that need to be protected, refer to Table 3-2.

**Table 3-2 CAMS groundwater resource availability status categories**

| Indicative Resource Availability Status | License Availability |
|---|---|
| Water available for licensing | Groundwater unit balance shows groundwater available for licensing. New licences can be considered depending on impacts on other abstractors and on surface water. |
| Restricted water available for licensing | Groundwater unit balance shows more water is licensed than the amount available, but that recent actual abstractions are lower than the amount available **OR** that there are known local impacts likely to occur on dependent wetlands, groundwater levels or cause intrusions but with management options in place.<br>In restricted groundwater units no new consumptive licences will be granted. It may also be appropriate to investigate the possibilities for reducing fully licensed risks. Water may be available if you can 'buy' (known as licence trading) the entitlement to abstract water from an existing licence holder.<br>In other units there may be restrictions in some areas e.g. in relation to saline intrusion. |
| No water available for licensing | Groundwater unit balance shows more water has been abstracted based on recent amounts than the amount available.<br>No further consumptive licences will be granted. |

The classification for each of the surface waters and groundwater bodies (Water Resource Management Units (WRMU) and Groundwater Resource Management Units (GWMU)) in the County Durham Area is summarised below.

### 3.2.1 Wear CAMS

The Wear CAMS area covers the northern half of County Durham and includes the River Wear, River Browney, River Deerness and the River Gaunless. The Wear CAMS has been split into five WRMUs which cover the surface waters, and one GWMU (Magnesium Limestone principal aquifer, illustrated in Figure 3-1 previously) which covers the areas of water underground. The classification for each of the surface waters and groundwater bodies in the Wear CAMS area is summarised in Table 3-3.

Table 3-3 Wear CAMS resource availability classification

| River – WRMU | Surface Water (flow exceedance scenarios) | | | | Groundwater |
|---|---|---|---|---|---|
| | 30yr | 50yr | 70yr | 95yr | |
| Upper Wear (AP1) | Water available for licensing | Water available for licensing | Water available for licensing | Water available for licensing | Water available for licensing |
| Middle Wear (AP2) | Water available for licensing | Water available for licensing | Water available for licensing | Water available for licensing | Water available for licensing |
| Gaunless (AP3) | Water available for licensing | Water available for licensing | Water available for licensing | Water available for licensing | Water available for licensing |
| Browney (AP4) | Water available for licensing | Water available for licensing | Water available for licensing | Water available for licensing | Water available for licensing |
| Lower Wear (AP5) | Water available for licensing | Water available for licensing | Water available for licensing | Water available for licensing | Water available for licensing |

AP – Assessment Point

### 3.2.2 Tees CAMS

The southern half of County Durham falls within the Tees CAMS and includes the River Tees, River Greta and the River Skerne. The Tees CAMS has been split into two WRMUs covering surface water and two GWMUs (Magnesium Limestone and Sherwood Sandstone principal aquifers) covering groundwater. The River Skerne WRMU is the only WRMU that falls within the County Durham boundary. This is because the majority of the River Tees has not been assessed due to the regulation of the River Tees by Cow Green Reservoir and Kielder Water Reservoir, refer to Section 3.4.

The classification for the Skerne WRMU area is summarised in Table 3-4.

**Table 3-4: River Skerne - resource availability classification**

| River – WRMU | Surface Water (flow exceedance scenarios) | | | | Groundwater |
|---|---|---|---|---|---|
| | 30yr | 50yr | 70yr | 95yr | |
| Skerne (AP1) | Restricted water available for licensing | Restricted water available for licensing | Restricted water available for licensing | Restricted water available for licensing | Restricted water available for licensing |

AP – Assessment Point

### 3.2.3 Tyne CAMS

The Tyne CAMS has been split into seven WRMUs covering surface water, however only the Derwent WRMU falls within the County Durham boundary. However, water is also supplied to County Durham from Kielder Reservoir which is abstracted from the Lower Tyne WRMU. There are no GWMUs within the Tyne CAMS area due to the limited presence of principal aquifers. The classification for each of the surface waters in the relevant Tyne CAMS areas is summarised in Table 3-5.

**Table 3-5 Tyne CAMS resource availability classification**

| River – WRMU | Surface Water (flow exceedance scenarios) | | | | Groundwater |
|---|---|---|---|---|---|
| | 30yr | 50yr | 70yr | 95yr | |
| River Derwent (AP2) | Water Available | Water Available | Water Available | Water Available | No GWMU |
| Lower Tyne (AP3) | Water Available | Water Available | Water Available | Water Available | No GWMU |

With the exception of the Skerne WRMU, the majority of rivers and aquifers are forecast as having water available for licensing to support growth. In the case of groundwater in the Skerne WRMU, applications for groundwater abstractions will be considered on a case by case basis, depending on scale and impact on surface water.

## 3.3 Water Resource Planning

Water companies have historically undertaken medium to long term planning of water resources in order to demonstrate sustainable delivery of water supply within its operational area to meet existing and future demand.

As of 2007, it became a statutory requirement for water companies to prepare and maintain WRMPs which demonstrate how water companies are managing the balance between available supply and future demand over a 25 year period. These plans are subject to consultation and approval by the Secretary of State every five years, but must be reviewed on a yearly basis.

WRMPs are a key document for a WCS as they set out how demand for water from growth within a water company's supply area can be met, taking into account the need for the environment to be protected. As part of the statutory approval process, the plans must be approved by both the Environment Agency and Natural England (as well as other regulators) and hence the outcomes of the plans can be used directly to inform whether growth levels being assessed within a WCS can be supplied with a sustainable source of water supply.

Water companies manage available water resources within key zones, called Water Resource Zones (WRZ). These zones share the same raw resources for supply and are interconnected by supply pipes, treatment works and pumping stations. As such the customers within these zones share the same available 'surplus of supply' of water when it is freely available; but also share the same risk of supply when water is not as freely available during dry periods (i.e. deficit of supply). Water companies undertake resource modelling to calculate if there is likely to be a surplus of available water or a deficit in each WRZ by 2040, once additional demand from growth and other factors such as climate change are taken into account.

## 3.4 Water Resources & Northumbrian Water

Northumbrian Water is responsible for ensuring that there are sufficient water resources available and the operation and maintenance of the potable water supply system within the study area. Northumbrian Water manages water resources across their region through a WRMP. The WRMP sets out how they intend to maintain their water resources over a 25 year planning horizon.

Northumbrian Water has two Water Resource Zones (WRZ); Kielder WRZ and Berwick and Fowberry WRZ. County Durham falls within the Kielder WRZ which is not forecast to experience a deficit in water resources or water supply in the long term to 2040. Northumbrian Water has advised that there is approximately 227Ml/d available headroom within the WRZ[7]. The WRMP states "*in the case of NW no deficit is forecast in either water resource zone over the next* 25 years". The draft WRMP 2019 outlines water demand and supply forecasts for a 40 year planning period from 1st April 2020 to 31st March 2060 and states "*that both of the Company's water resource zones have a supply surplus across the full planning period to 2060*".

The River Wear and Tees are regulated by the presence of Kielder Water; northern Europe's largest manmade lake which has capacity to hold 200,000Ml of water. The Kielder Water Scheme allows transfers to be made between the major north east catchments and allows water resources to be used to a fuller extent if and when needed. The principal objective in the design of the Kielder Scheme was to supplement the water resources of

[7] Northumbrian Water (2016) Annual Review of the Water Resources Management Plan 2016

the Tees basin to meet the forecast increase in demand for water, notably for industrial use. Although the forecast industrial demands did not materialise, recent droughts have shown the advantages of a strategic regional resource. Whilst the volume of transfer has been limited, the option of support has allowed cheaper local sources to be used more effectively without placing restrictions on water use. The transfer system also supports the Rivers Wear and Tees to ensure that prescribed minimum maintained flow conditions are met. The water from Kielder that is used to supplement resources elsewhere is abstracted from the Lower Tyne WRMU, which the Environment Agency has classified as having more water than required to meet the needs of the environment (Table 3-5).

Kielder Water is not Northumbrian Water's only water resource; they also abstract groundwater in the south of County Durham. The Environment Agency has indicated that whilst there is currently water available there will be a move towards there being no water available, especially within the Skerne WRMU. This would, however, have no impact on Northumbrian Waters ability to supply drinking water as they do not abstract in the Skerne catchment and are unlikely to do so in future. Anglian Water Services (Hartlepool Water) abstract in this area, supplying Hartlepool and Wynyard. It is likely that the Environment Agency would only allow additional small scale groundwater abstractions in this catchment given the high volumes already taken and the number of issues (pollution and impact to river flows) already being investigated.

Northumbrian Water abstract groundwater at a number of locations in the northern section of the Magnesium Limestone. If additional supplies are required from this area it is likely that Northumbrian Water would look to improve existing abstractions, use redundant boreholes or drill new boreholes within the northern area, where necessary. Potential impacts need to be counter-balanced against the fact that groundwater, in general, is a more cost effective water supply since it requires less treatment and by being located closer to the point of use minimises infrastructure requirements and consequently leakage.

It is therefore recommended that if Northumbrian Water intend to abstract increased volumes of water from the aquifer to supply the housing development that could occur in the south of County Durham, they liaise very closely with the Environment Agency concerning the potential implications of doing so, to avoid upsetting the current balance and causing environmental degradation.

### 3.4.1 Climate Change

As part of the Northumbrian Water WRMP, the impact of climate change on water resources has been examined. The UK Climate Projections (UKCP09[8]) projects indicate that summer months are going to get both drier and warmer, with the winter months getting wetter. This could potentially lead to increased pressure on water resources across the county.

For the Kielder WRZ, the WRMP outlines that *"the increase in temperature will have negligible effect on the water available within the WRZ. The potential decrease in summer rainfall is within the range of historic rainfall for the area and as such is not going to affect the quantity of surface or groundwater water available. Therefore, along with the result of the magnitude vs. sensitivity plot, the Kielder WRZ's vulnerability to climate change would be low."* The 2019 draft WRMP states *"NW assessments conclude that after considering the effects of climate change, both WRZs remain in surplus across the whole planning horizon".*

## 3.5 Water Efficient Development

Although there is sufficient water resource to support housing growth across County Durham, new development should take measures to ensure the maximum implementation of water efficient measures.

Within the WRMP, Northumbrian Water plan for increasing water efficiency through schemes such as their Every Drop Counts retrofitting project and supply of water saving kits.

It is recommended that planning policy for new development aims to ensure that where possible, houses and businesses are built to high standards of water efficiency through the use of water efficient fixtures and fittings, and in some cases rainwater harvesting and greywater recycling.

[8] UK Climate Projections (UKCP09) Available online at: http://ukclimateprojections.metoffice.gov.uk/

## 3.6 Summary

In conclusion, there is sufficient water resource available to support housing growth across County Durham to the year 2060. Kielder Water is used to supply the County and has sufficient spare resource to support the growth. Additionally the Environment Agency's assessment of water resources corroborates that there are spare resources from Kielder Water and within the majority of WRMUs providing that urban drainage (foul, STWs and surface water drainage to infiltration SUDs) does not cause deterioration in groundwater quality.

It should be noted that this assessment has not examined the existing capacity of water treatment works or the water supply network. Northumbrian Water has advised that water supply is not considered to be a barrier to development. Whilst investment may be required in parts of the water supply network to support the housing growth, Northumbrian Water will endeavour to support additional development where feasible, however, contributions from the developer may be required should these upgrades fall outside of the current AMP investment programme

# Sewerage and Sewage Treatment

04

# 4. Sewerage and Sewage Treatment

## 4.1 Introduction

As well as being accountable for the provision of potable water, Northumbrian Water also has a responsibility to process and treat wastewater from commercial and residential properties across their administrative area. The sewerage network is responsible for providing this essential linkage between properties and Sewage Treatment Works (STW), which remove contaminants and return environmentally safe water back into the water cycle. In some instances, storm water can also be captured by the sewerage network through surface water and combined sewers and subsequently treated by STW.

Treated water from STW is usually discharged into nearby watercourses or receiving water bodies, which hold great environmental and ecological significance. These features have the potential to be influenced by STW discharge and other land and aquatic based management practices. Under the Water Framework Directive (WFD), all watercourses must have achieved or be actively progressing towards 'good ecological status' standard in relation to water quality.

This chapter examines the capability of the existing sewerage infrastructure within County Durham to accept new development and identifies where future development could put pressure on Northumbrian Water's Infrastructure or the condition of receiving watercourses. In order to do this, the following has been assessed:

- The ability of the existing 'sewerage network' to manage increased conveyance; and
- The ability of existing STW to accommodate increased flows.

## 4.2 Sewerage Infrastructure

Northumbrian Water holds a number of hydraulic models which have been used to review the ability of existing sewerage infrastructure to accommodate additional flows from new housing development. For each proposed new housing allocation site, Northumbria Water has provided an assessment of the available capacity within the existing sewer network which serves the site.

However, Northumbrian Water does not have complete model coverage across its administrative area, and consequently where these gaps exist it has not been possible to assess the impact of additional flows on this infrastructure. Appendix B provides a summary of the network capacity between each proposed new housing allocation site and the receiving STW.

The data provided by Northumbrian Water indicates that 18 of the assessed new potential allocation sites could have the potential to exacerbate existing network performance issues. Furthermore, an additional six sites could create hydraulic performance issues, placing existing development at risk. This suggests that Northumbrian Water would have to invest in their sewerage infrastructure network to be able to accommodate the level of future development proposed by Durham County Council. Only four of the proposed allocation sites are considered unlikely to contribute to hydraulic performance issues whilst 19 sites have not been assessed or fall in areas where Northumbrian Water do not have a network model.

Some of the investment in the sewerage infrastructure network will include surface water separation plans or flow attenuation schemes which could impact groundwater resources (quality and level) in both principal (public water supply aquifers) and secondary aquifers.

Northumbrian Water aim to ensure customers are not at risk from flooding from a storm event with an annual probability of less than 5 percent. As part of their licence to operate, Northumbrian Water monitor and report on instances of sewer flooding across their administrative area, refer to Figure 4-1. The data shows some locations at current risk, by highlighting some of the higher concentrations of hydraulic sewer flooding across County Durham. An instance of flood risk is illustrated by a 100m by 100m grid square. This information has been used as a proxy for identifying broad locations where the sewer infrastructure may struggle to accept additional flows from new housing developments. Note that the figure portrays current sewer flood risk and does not account for areas of new development such as the Durham County Council New Potential Allocation Sites.

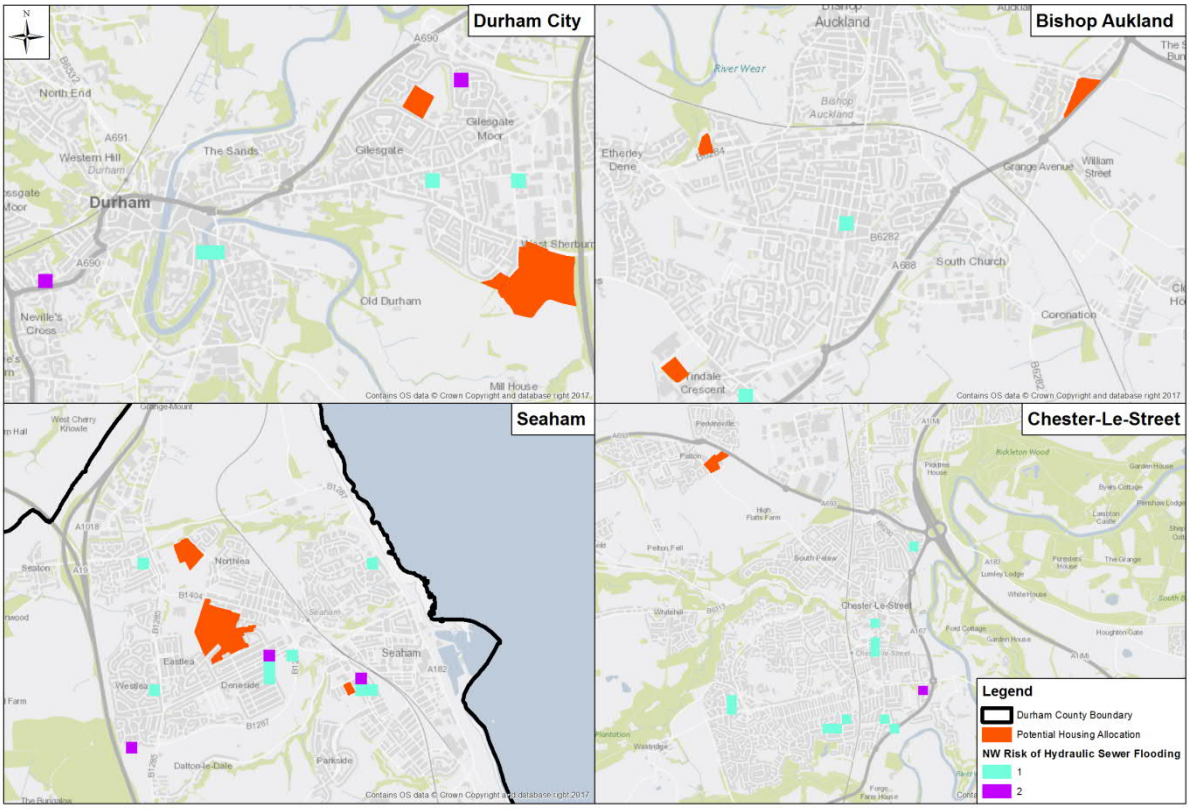



Figure 4-1: Areas at Risk of Sewer Flooding

Figure 4-1 shows Chester-le-Street to be a hotspot for the risk of sewer flooding, with no potential new allocation site located within the centre of the town. A similar situation is found in east Durham, with two new potential allocation sites located in this part of the City. There are also a number of sewer flood risk locations in Deneside and Parkside, suburbs of the town of Seaham.

Sewer flooding can result as a consequence of too much surface water going into the system, groundwater ingress or a combination of the two. Possible areas identified where groundwater ingress may reduce sewer capacity are Bishop Middleham, West Auckland.

Where new potential allocation sites are located in the vicinity of flood risk locations, the existing sewer network may struggle to accommodate additional wastewater flows and investment may be required to address the issue.

However, in locations where existing development is currently placing pressure on the sewer network, new development may present opportunities to reduce runoff rates and consequently flow entering the sewer network through the implementation of SuDS. Developers should consult with Northumbrian Water and make reference to Durham County Council's SuDS guidance[9] prior to submission of a planning application.

In other parts of the county such as Bishop Auckland and Wolsingham, there are limited locations of sewer flooding. In these areas, the sewers are unlikely to be a constraint to development.

## 4.3 Sewage Treatment

Northumbrian Water provided the catchment areas for each of their STW which enabled the forecast housing development to be grouped by STW so that the cumulative impact of development could be evaluated per STW. Table 4-1 presents the results of this assessment, providing details of the headroom (spare capacity at the STW in terms of the number of houses), and the total number of houses that are forecast to be built within the catchment area. The table also indicates the headroom remaining after all of the forecast development has been accounted for or, how many houses fall outside the existing capacity of the STW.

[9] Durham County Council (2016) Sustainable Drainage Systems (SuDS) Adoption Guide.

**Table 4-1: Sewage Treatment Headroom Status**

| STW Name | Current Headroom (Houses) 10 | Total Houses Forecast to 2035* | Remaining Headroom or Remaining Requirement |
|---|---|---|---|
| Aldin Grange North | 237 | 275 | -38 |
| Aycliffe | 10,838 | 840 | 9,998 |
| Barkers Haugh | 1,628 | 2,460 | -832 |
| Barnard Castle | 3,856 | 35 | 3,821 |
| Birtley | 7,845 | 175 | 7,670 |
| Bishop Auckland | 8,045 | 545 | 7,500 |
| Consett | 7,248 | 220 | 7,028 |
| Crookhall | 1,172 | 310 | 862 |
| East Tanfield | 0 | 40 | -40 |
| Horden | 28,249 | 115 | 28,134 |
| Knitsley | 909 | 290 | 619 |
| Seaham | 13,062 | 575 | 12,487 |
| Tudhoe Mill | 4,065 | 210 | 3,855 |
| Willington | 0 | 200 | -200 |
| Wolsingham | 0 | 40 | -40 |

*Northumbrian Water would not expect to have capacity to accommodate all aspirational growth up to 2035 at this stage.

In all there are 15 STW affected by the forecast development. Of these, the existing infrastructure at 12 would be able to accommodate a high proportion of the forecast housing development within their catchment. This facilitates the development of 5,180 houses between now and 2035 in places such as Bishop Auckland, Peterlee and Seaham. 10 STW also collectively have sufficient headroom to support an additional 83,016 houses. As a general rule, there is significant spare capacity in the east of County Durham, around Seaham and Consett, and in the central area around Bishop Auckland and Crook.

There are five STW where headroom to support all planned growth investment may be required during the period up to 2035 and any investment would need to be aligned with the actual delivery of housing. The catchment areas of these STW cover are illustrated in Figure 4-2 and include:

- Barkers Haugh STW,
- Aldrin Grange North STW,
- East Tanfield STW,
- Willington STW, and
- Wolsingham STW.

Northumbrian Water is planning to increase capacity at all of the STW locations identified above. In order to accommodate the required headroom within the STWs development would need to be phased in line with planned investment.

The changing and active mine water level control will have an impact that needs to be considered in all development in the catchment of many of these STWs. Seaham and Horden will need to consider both the groundwater quality in the Magnesian Limestone (water supply aquifer) and the managed mine water levels in the underlying coal measures.However, Northumbrian Water are continuing to heavily invest in the upgrade of their infrastructure with work at Crookhall completed in Asset Management Plan (AMP) 5. In addition, consultation with Northumbrian Water in February 2018 suggests that further upgrade works as part of AMP 6 is planned at Aldrin Grange STW, Barkers Hough STW, , and Wolsingham STW in the next 2 years. In addition there is currently a scheme in delivery at East Tanfield STW. Works in these locations are likely to help alleviate existing network capacity issues and help deliver additional development in the future.

[10] The current headroom at each STW was calculated using data provided by Northumbrian Water as part of the updated consultation undertaken between January - March 2018.

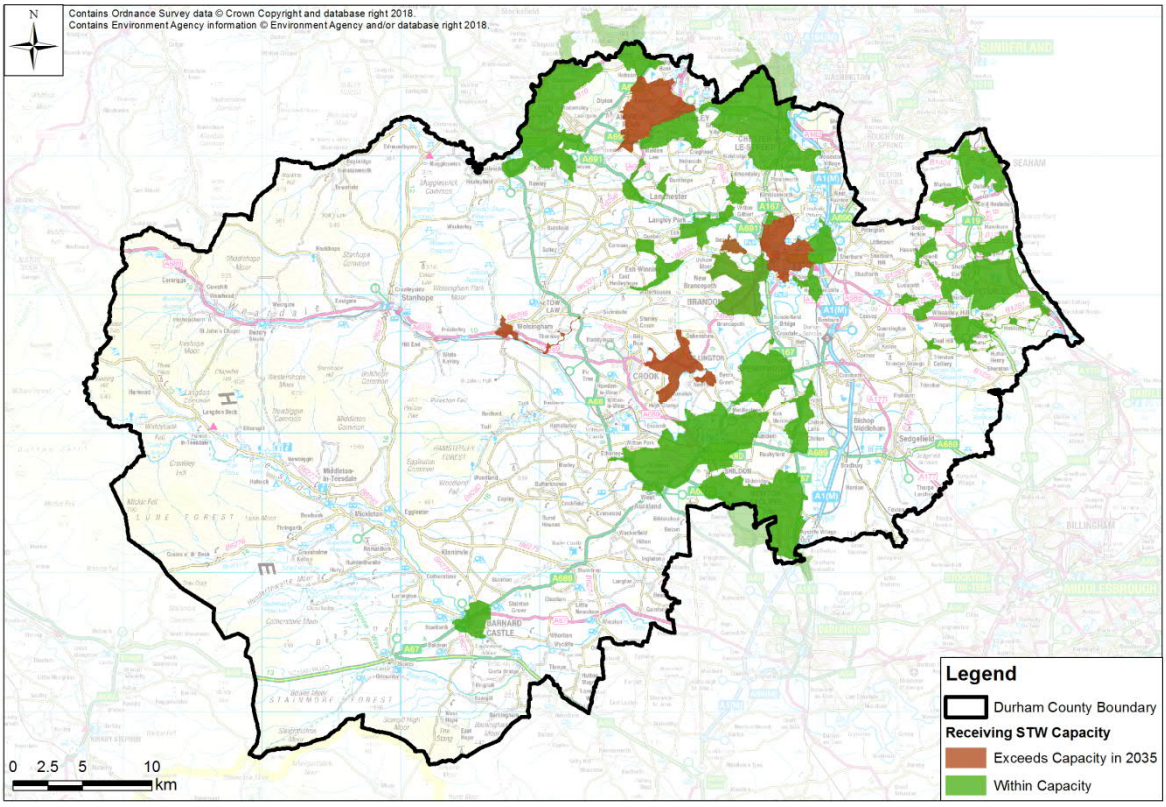



Figure 4-2: STW Headroom

It is apparent from Figure 4-2 that the areas where it may be necessary to manage the rates of development include Durham City, Willington, Wolsingham, and Annfield Plain.

### 4.3.1 Addressing the Shortfall in STW Headroom

It is essential that Northumbrian Water continue to plan appropriate strategies for STW in County Durham where significant housing development is going to take place, so as to avoid exceeding the current headroom.

At STW where the headroom would only be exceeded by a small number of houses (e.g. Aldrin Grange North; 38) there may be means of freeing up existing headroom, rather than investing in upgrades to the STW. This could be undertaken through separation of combined sewers into wastewater and surface water flows. Surface water can be treated at source through the use of Sustainable Drainage Systems (SuDS) and discharged to local watercourses or the ground via infiltration, subsequently freeing up headroom within the sewer system. Alternatively, it may be possible to divert flows to STW with additional capacity, through the implementation of additional sewage transfer infrastructure.

In situations where there is a significant shortfall in headroom, Northumbrian Water will align investment to upgrade existing infrastructure or provide new infrastructure with actual housing delivery. This may be of greatest priority to Willington and Wolsingham where the available headroom has already been exceeded. Wolsingham STW has investment planned within the next 2 years.

Where there are potential future capacity issues, it may be necessary to phase development to remain within the existing headroom allowances. It is recommended that Durham County Council and Northumbrian Water work with developers to plan investment and phase development where required.

### 4.3.2 Sustainable Drainage Systems

SuDS are an approach to managing rainwater and surface water that aims to replicate natural drainage, the key objectives being to manage flow rates and volumes of runoff to reduce the risk of flooding, reduce water pollution and provide landscape and wildlife benefits.

However, development which increases greenfield infiltration could cause water quality issues and in particular brownfield development has the potential to pollute and increase current infiltration rates to that above greenfield rates. Groundwater quality must be protected to ensure the resource is there to support the potential housing allocation requirements. Mining and groundwater considerations for the use of SuDS are provided in more detail in Section 4.3.2.1 below.

Planning policy ensures that SuDS form an essential component of the drainage system for new developments. The Durham County Council's Sustainable Drainage Systems (SuDS) Adoption Guidance sets out the requirements, appraisal and consultation processes developers should follow in order to adequately manage surface water through the use of the SuDS management train.

Opportunities should also be taken to examine the potential to retrofit SuDS within the existing urban environment, especially where there are high concentrations of combined sewers and existing pressures on the drainage network.

#### 4.3.2.1 Mining and Groundwater Considerations for Sustainable Development and Drainage

Large areas of the North East have been undermined by coal mine workings. When the mines were working, mine water pumping artificially lowered groundwater levels providing drainage pathways. Following the closure of the mines and cessation of pumping, groundwater levels are now recovering to the pre-mining position. In some areas with specific geology and a high water table, infiltration sustainable drainage system (SuDS) (or any SUDs with a component of infiltration) may not work and could result in groundwater flooding risks.

The large network of mining beneath Durham County has also resulted in some areas where mine water is close to surface, being controlled by either surface discharges or being actively controlled by Coal Authority pumping sites. Infiltration (SuDS) (or any SUDs with a component of infiltration) in some of these areas could have a detrimental impact on the amount and quality of water entering mine workings resulting in increased mine water pollution, flooding risks, or impacts on pumping infrastructure.

To provide better information on this, the Environment Agency and Coal Authority have combined their knowledge to create a spatial screening tool for the Local Authorities to use in strategic planning, development planning, urban drainage, and engineering. This GIS screening tool and accompanying work flow identifies what developers need to consider in their development proposals to provide sustainable drainage systems.

This screening tool has been created by analysing data sets to model the current and final mine water levels, along with the surface levels across all the coalfield areas. This has enabled five different category areas to be identified, each with varying drainage requirements.

A. Off the coalfield areas – SuDS guidance and best practice for assessing pollution and flood risk should be followed:

B. On the coalfield area with no shallow mine workings, nearby controlling outflow, or shallow mine water – specific requirements for major development and deep ground works or deep drainage boreholes;

C. C1**.** On the coalfield area with shallow mine workings, or a nearby controlling outflow - major development and deep ground works or deep drainage boreholes require pre-consultation with the Coal Authority;

   C2**.** On the coalfield area with shallow mine water - SuDS may not work, developer must suggest alternative methodologies that may require pre-consultation with the Environment Agency and / or Lead Local Flood Agency (LLFA); and

D. On the coalfield area with shallow mine workings, nearby controlling outflow and shallow mine water - SuDS may not work, developer must suggest alternative methodologies that will require pre-consultation with the Coal Authority, Environment Agency and / or LLFA;

This process has been introduced to provide developers with a better understanding of the drainage implications they will need to consider within their development proposals and if necessary to seek pre-consultation advice.

Under the Coal Industry Act 1994 any intrusive activities, including initial site investigation boreholes, and/or any subsequent treatment of coal mine workings/coal mine entries for ground stability purposes require the prior

written permission of the Coal Authority[11], since such activities can have serious public health and safety implications. Failure to obtain a permit will result in trespass, with the potential for court action.

### 4.3.3 Non-Mains Sewerage

Not all houses are connected to the public sewerage system, operated by Northumbrian Water. In areas where there is a public sewerage system the Environment Agency normally insists that new houses connect to it. However, in the more rural, remote areas of County Durham public sewer systems are not always available for properties to connect to. In such circumstances alternative means of disposing of wastewater are required, such as package sewage treatment works, septic tanks and cesspits, often referred to as "non-mains sewerage".

Whilst individually such methods of disposal may pose little risk to groundwater or watercourses in terms of water quality and pollution, the cumulative impact could be detrimental in the long term. Many of the watercourses in County Durham are failing WFD targets therefore the continued prevalence of non-mains drainage schemes could inhibit attempts to meet WFD targets.

It is advised that any new development proposing the use of a non-mains foul drainage system should be supported by a Foul Drainage Assessment (FDA1) as a minimum. The form provides the information required to assess the development's impact, however in certain instances, the LPA, LLFA or the Environment Agency[12] may require further justification and/or groundwater risk assessment to ensure no detriment to the environment or quality of receiving water/ groundwater bodies.

Developers should also refer to the non-mains sewerage hierarchy in the National Planning Policy Framework and Building regulations Approved Document H[13] which stipulates the use of package sewerage treatment plants (which may be offered to Northumbrian Water for adoption) over the use of septic tanks and cesspools.

Where available, public sewers should be as the primary method of foul drainage, even where capacity issues within the existing network exist as the Environment Agency is not guaranteed to grant a permit for a discharge to surface or groundwater. In this instance, careful discussion is required between Northumbrian Water and developer to establish how best to connect the development into the network without exacerbating existing issues.

## 4.4 Summary

Data provided by Northumbrian Water indicates that 18 of the 44 new potential allocation sites could have the potential to exacerbate existing sewer network performance issues; with a further six sites potentially creating new hydraulic performance issues. This has the potential to increase the risk of sewer flooding to new and existing properties in the affected catchments.

In addition, five of the 15 STWs across County Durham would require investment to ensure the headroom was not exceeded. Failure to account of extra capacity could result in too much flow arriving at the STW. This also has the potential to cause pollution incidents.

However, 10 of the 15 STW would be able to accommodate all of the development within the existing infrastructure. This facilitates the building of 5,180 houses between now and 2035 in places such as Bishop Auckland, Peterlee and Seaham. Northumbrian Water may also be able to undertake works in some catchments to free-up headroom through separation of the foul and surface water sewers.

[11] Application forms for a Coal Authority Permit and further guidance can be obtained from the Coal Authority's website at:
https://www.gov.uk/get-a-permit-to-deal-with-a-coal-mine-on-your-property
The Coal Authority has also adopted policies for development affected by mine entries and for drilling and piling in coalfield areas, which are available to view at:
**Development and Mine Entries Policy**
https://www.gov.uk/government/publications/building-on-or-within-the-influencing-distance-of-mine-entries
**Drilling and Piling Near Coal Policy**
https://www.gov.uk/government/publications/guidance-on-managing-the-risk-of-hazardous-gases

[12] Note, that since April 2015, the Environment Agency are no longer a statutory consultees on planning applications for non-major developments proposing to use non-mains foul drainage.

[13] HM Government (2010) *The Building Regulations Drainage and Waste Disposal – Approved Document H.* London.

In order to manage the predicted sewer infrastructure and STW capacity issues across County Durham, Northumbrian Water would likely need to significantly invest in the upgrade of their existing sewerage network.

However, this may not be possible in the short term and it is therefore advised that Durham County Council, Northumbrian Water and the Environment Agency work together to manage development. This could involve, but is not restricted to;

- Phase development in line with STW investment timelines;
- Direct developers to areas where there is sufficient headroom, and;
- Implement temporary arrangements at STW to facilitate development.

[Page left intentionally blank]

# Water Quality and Other Environmental Considerations

05

# 5. Water Quality and Other Environmental Considerations

## 5.1 Introduction

Water is essential for life, and is vital for our health and wellbeing (potable supplies, disposal of waste water, recreation and amenity), for agriculture, aquatic environments and fisheries, industry and transportation. The water environment, through wetlands and floodplains, can also provide natural water storage and flood protection. Therefore, it is important that this resource is protected and used sustainably and there are numerous European Directives and National Acts that have legislated to that effect, in addition to national and local planning policy. Durham County Council is committed to the holistic management of the water environment. The County Durham Plan will include policies that protect and enhance the water environment, making prudent use of water resources, and encouraging the use of SuDS.

The following chapter provides a review of the potential impacts of potential housing development on the water environment taking issues such as water quality into account.

## 5.2 The Strategic Water Environment in County Durham

This section provides an overview of the strategic water environment in County Durham so as to be able to understand what environmental constraints might exist that could affect housing development and the role that housing development could potentially play to work towards improving the water environment.

### 5.2.1 Study Area – County Durham

County Durham can be divided in two roughly either side of the A68 and A688 between Consett and Barnard Castle. To the west lies the western North Pennines (a rural upland landscape) and to the east is the lowland and more populated coastal plain. There are three main river catchments; the Wear, Tees and Derwent (of the River Tyne), as shown in Figure 5-1. All rise in the North Pennines and flow east, meeting the sea outside of County Durham. The County's rivers provide an important source of water for domestic, industrial and agricultural purposes, as well as supporting important aquatic ecosystems.

The River Wear rises in the North Pennines at the confluence of the Killhope and Burnhope Burns, in an Area of Outstanding Natural Beauty (and the North Pennines Moors Special Area of Conservation and Special Protection Area). It flows east to Bishop Auckland, and then north towards Sunderland and the North Sea. Significant tributaries of the River Wear include the River Deerness and River Browney (refer to Figure 5-1).

The River Tees also rises in the North Pennines (to the south of Weardale) and flows in a south-easterly direction towards Barnard Castle leaving County Durham upstream of the A1(M) and Darlington. The River Skerne is a significant tributary of the River Tees and drains a catchment south of Durham towards Darlington, leaving County Durham south of Newton Aycliffe.

The upper reaches of the River Derwent and Derwent Reservoir lie along the northern boundary of County Durham between Townfield and Rowlands Gill, with numerous small first and second order tributaries extending within the County boundary.

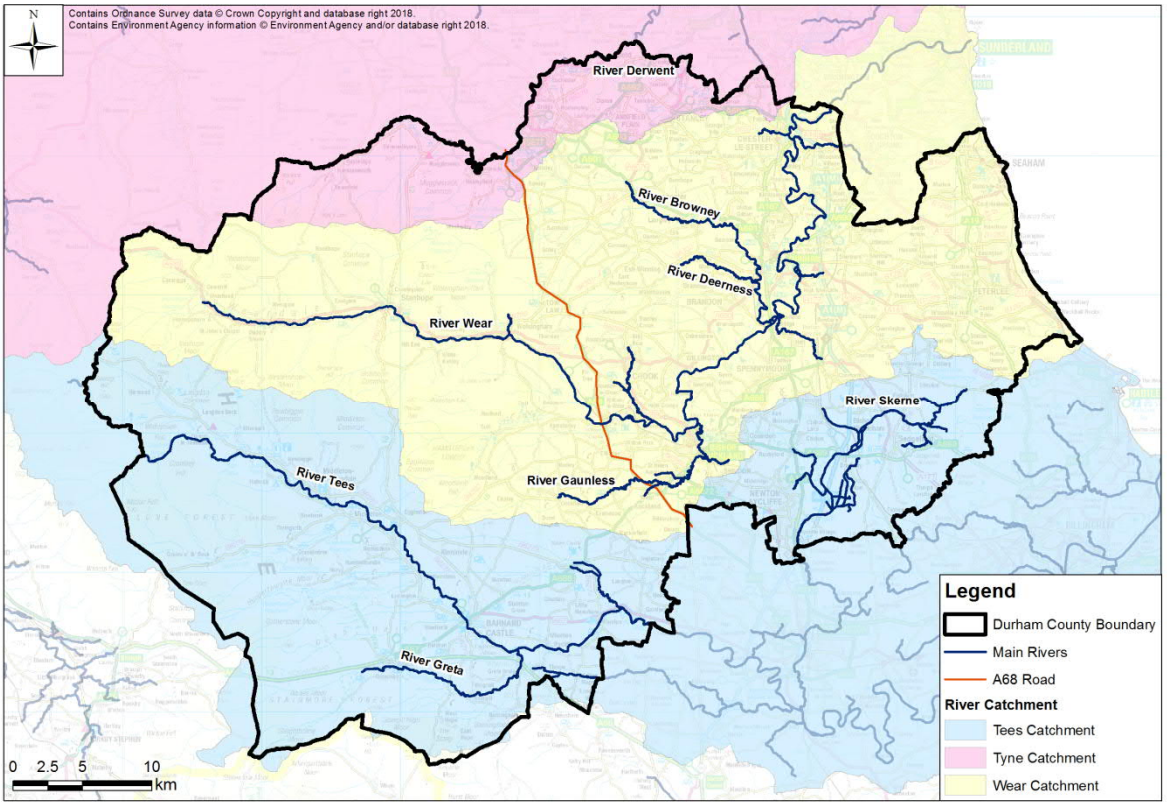



Figure 5-1: River Catchments and Main Rivers

## 5.3 Surface Water Quality

As previously described in Chapter 4, the increase in housing will result in an increase in the total volume of waste water being treated and thus discharged to watercourses. This may in turn lead to water pollution reaching unacceptable levels. The primary impact of excessive discharges is on chemical water quality but this can be reflected in deterioration in the ecology of the receiving water.

To examine the potential impact of the increase in treated effluent on the watercourses, an assessment of the current WFD status has been completed for each of the receiving watercourses. The location of these, in association to the sewer catchments and sewage treatments works is shown in Figure 5-2. The following WFD definitions apply.

Ecological Status

- Poor - Major change from natural conditions as a result of human activity. Some restrictions on the beneficial uses of the water body. Some impact on amenity. Moderate impact on wildlife and fisheries;
- Moderate - Moderate change from natural conditions as a result of human activity. Some restriction on the beneficial uses of the water body. No impact on amenity. Some impact on wildlife and fisheries; and
- Good - Slight change from natural conditions as a result of human activity. No restriction on the beneficial uses of the water body. No impact on amenity or fisheries. Protects all but the most sensitive wildlife.

Chemical Status

- Fail; and
- Good.

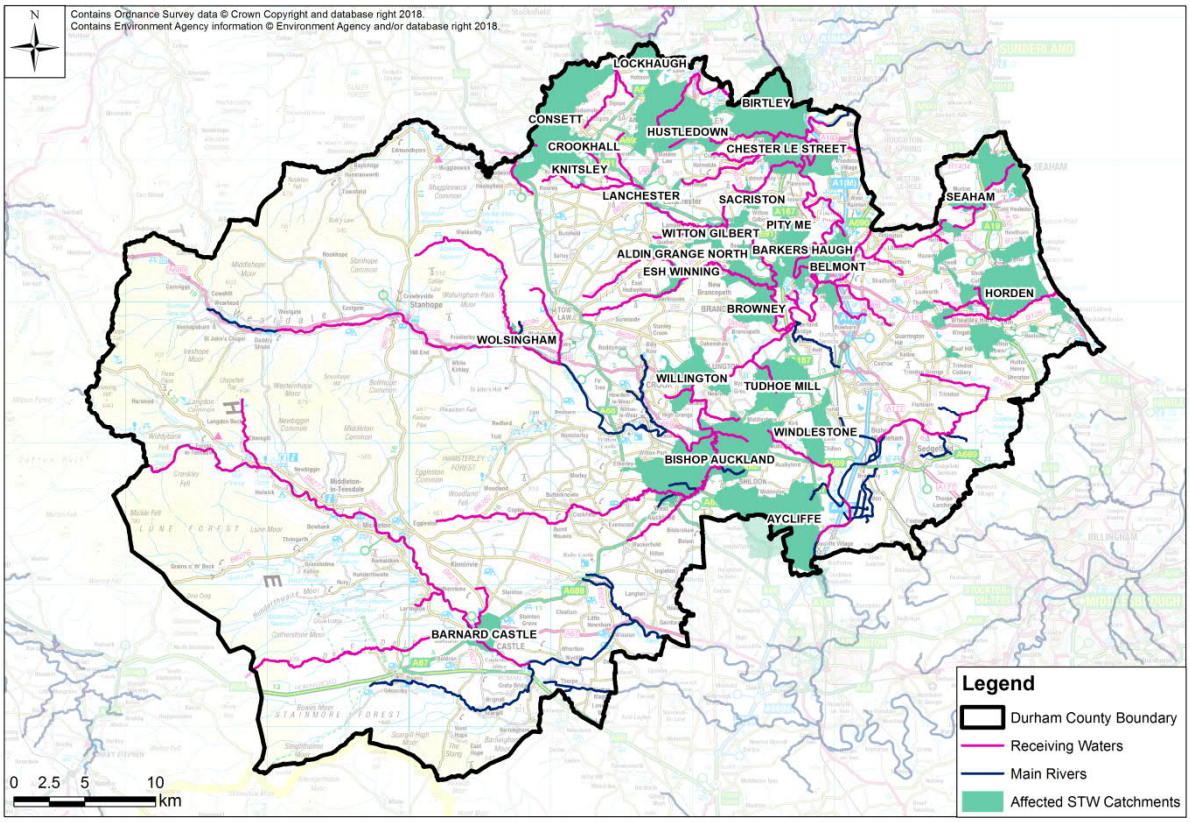



Figure 5-2: Sewage treatment works and receiving watercourses

Table 5-1 summarises the current and future WFD chemical and ecological status derived from the RBMP Classification Data (2016[14]). The WFD aims to achieve and maintain good ecological status. As shown in Table 5-1, all of the receiving watercourses have moderate or poor ecological status, with forecast moderate or good status by 2027. With regards water quality, two watercourses currently fail (1. Smallhope Burn from Source to Browney, Stocke and 2. Team from Source to Tyne), but all are expected to have good status by 2027.

The discharge from STW to watercourses has the potential to influence the following chemical parameters:

- Ammonium;
- Phosphate;
- Dissolved Oxygen;
- Temperature; and
- pH.

Table 5-2 summarises the current and predicted status of these chemical measures for the watercourses affected. It can be seen that for the majority of rivers, the current and future measures of Dissolved Oxygen, Temperature and pH are high.

The current ammonia and phosphate levels vary across the river bodies, however many aim to see betterment in one or both of these chemical measures by 2027. However, increased discharges from STW, as a result of increased development, could negatively impact water quality within the receiving watercourses, through discharge of higher pollutant concentrations. Northumbrian Water should continue to work closely with the Environment Agency to ensure no detriment to the receiving waterbodies and where possible, should seek to provide betterment of the current water quality status.

[14] WFD Water Bodies in England: 2016 status and objectives for the update to the river basin management plans - Cycle 2 – Available online at: http://environment.data.gov.uk/catchment-planning/RiverBasinDistrict/3

The high metal concentrations found in the watercourses are also noted in Table 5-2. By contrast, an increase the volume discharging to these watercourses could assist in diluting these metals and thus improving this component of chemical quality.

Prior to any future development, planning of improvements to the STW may be necessary to ensure suitable water quality standards. This falls under the responsibility Northumbrian Water.

It should be noted that discharges from sewerage systems and STW are subject to permission from the Environment Agency. The Environment Agency imposes conditions on the volume and quality of discharges from STW to ensure, that the quality of the receiving water complies with the relevant standard.

Where developments do not connect into the public sewerage system (i.e. non-mains foul drainage) the Environment Agency will only permit discharges to watercourses which use a package treatment system. Discharges from cesspits and septic tanks will not be permitted other than in very exceptional circumstances.

Table 5-1: WFD Classification (Extracted from the Northumbria RBMP)

| Sewage Treatment Works (STW) | River Name | RBMP River ID | Operational Catchment | Modified Waters Designation | Ecological Status | | Chemical Status | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 2016 | 2027 | 2016 | 2027 |
| Aldin Grange North STW, Witton Gilbert STW | Browney from Smallhope Burn Deerness confl | GB103024077551 | Browney | Not Designated A/HMWB | Moderate | Good | Good | Good |
| Browney STW | Browney from Deerness confl to Wear | GB103024077552 | Browney | Heavily Modified | Moderate | Moderate | Good | Good |
| Esh Winning STW | Deerness from Hedleyhope Burn to Browney | GB103024077280 | Browney | Not Designated A/HMWB | Poor | Good | Good | Good |
| Esh Winning STW | Hedleyhope Burn from Source to Deerness | GB103024077290 | Browney | Not Designated A/HMWB | Moderate | Good | Good | Good |
| Crookhall STW<br>Knitsley STW<br>Lanchester STW | Smallhope Burn from Source to Browney, Stocke | GB103024077330 | Browney | Not Designated A/HMWB | Poor | Good | Fail | Good |
| Lockhaugh STW | Derwent from Burnhope Burn to River Tyne | GB103023074790 | Derwent Tyne | Heavily Modified | Moderate | Good | Good | Good |
| Aycliffe STW | Skerne from Demons Beck to Tees | GB103025072596 | Skerne | Heavily Modified | Moderate | Good | Good | Good |
| Windlestone STW | Rushyford Beck from Source to Woodham Burn | GB103025072450 | Skerne | Heavily Modified | Moderate | Good | Good | Good |
| Barnard Castle STW | Tees from Percy Beck to River Greta | GB103025072512 | Tees Middle | Heavily Modified | Moderate | Good | Good | Good |
| Birtley STW<br>East Tanfield STW | Team from Source to Tyne | GB103023075670 | Tyne Lower and Estuary | Heavily Modified | Moderate | Good | Fail | Good |
| Wolsingham STW | Wear from Middlehope Burn to Houselop Beck | GB103024077461 | Wear Upper | Heavily Modified | Moderate | Good | Good | Good |
| Wolsingham STW | Wear from Houselop Beck to Beechburn Beck | GB103024077462 | Wear Middle | Not Designated A/HMWB | Moderate | Good | Good | Good |
| Bishop Aukland STW<br>Willington STW | Wear from Gaunless to Browney | GB103024077464 | Wear Lower and Estuary | Heavily Modified | Moderate | Good | Good | Good |
| Hustledown STW | Twizell Burn from Source to Cong Burn | GB103024077590 | Wear Lower and Estuary | Heavily Modified | Moderate | Moderate | Good | Good |
| Barkers Haugh STW<br>Belmont STW | Wear from Croxdale Beck to Lumley Park Burn | GB103024077621 | Wear Lower and Estuary | Heavily Modified | Moderate | Good | Good | Good |
| Sacriston STW | South Burn to confluence with Wear | GB103024077623 | Wear Lower and Estuary | Heavily Modified | Moderate | Moderate | Good | Good |
| Chester-le-Street STW | Wear DS of Lumley Park Burn to Tidal Limit | GB103024077624 | Wear Lower and Estuary | Not Designated A/HMWB | Moderate | Good | Good | Good |
| Tudhoe STW | Valley Burn from Source to Wear | GB103024077350 | Wear Lower and Estuary | Heavily Modified | Moderate | Good | Good | Good |

Table 5-2: Chemical components (Extracted from the Northumbria RBMP)

| Sewage Treatment Works (STW) | River Name | RBMP River ID | Ammonia | | Phosphate | | Dissolved Oxygen | | Temperature | | pH | | Heavy Metals (High) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2016 | 2027 | 2016 | 2027 | 2016 | 2027 | 2016 | 2027 | 2016 | 2027 | 2016 |
| Aldin Grange North STW, Witton Gilbert STW | Browney from Smallhope Burn Deerness confl | GB103024077551 | High | High | Poor | Good | High | High | High | High | High | High | |
| Browney STW | Browney from Deerness confl to Wear | GB103024077552 | High | Good | Poor | Poor | Good | High | Good | High | High | High | |
| Esh Winning STW | Deerness from Hedleyhope Burn to Browney | GB103024077280 | High | High | Poor | Good | High | High | Good | High | High | High | |
| Esh Winning STW | Hedleyhope Burn from Source to Deerness | GB103024077290 | High | Good | High | Good | High | High | High | High | High | High | |
| Crookhall STW Knitsley STW Lanchester STW | Smallhope Burn from Source to Browney, Stocke | GB103024077330 | Good | Good | Poor | Good | High | High | High | High | High | High | Copper, Iron, Zinc |
| Lockhaugh STW | Derwent from Burnhope Burn to River Tyne | GB103023074790 | High | High | High | High | High | High | High | High | High | High | Copper, Iron, Managnese, Zinc, Arsenic |
| Aycliffe STW | Skerne from Demons Beck to Tees | GB103025072596 | High | No data | Poor | No data | High | No data | High | High | High | High | Iron |
| Windlestone STW | Rushyford Beck from Source to Woodham Burn | GB103025072450 | Good | Good | Moderate | Good | Good | Good | High | High | High | High | Copper, Zinc |
| Barnard Castle STW | Tees from Percy Beck to River Greta | GB103025072512 | High | High | High | High | High | High | High | High | High | High | Copper, Iron, Managnese, Zinc |
| Birtley STW East Tanfield STW | Team from Source to Tyne | GB103023075670 | Good | Good | Poor | Good | High | High | High | High | High | High | Copper, Iron, Manganese, Zinc |
| Wolsingham STW | Wear from Middlehope Burn to Houselop Beck | GB103024077461 | High | High | High | High | High | High | High | High | High | High | Arsenic, Copper, Iron, Manganese |
| Wolsingham STW | Wear from Houselop Beck to Beechburn Beck | GB103024077462 | High | High | High | High | High | High | High | High | High | High | Copper, Zinc, Iron, Manganese |

| Sewage Treatment Works (STW) | River Name | RBMP River ID | Ammonia | | Phosphate | | Dissolved Oxygen | | Temperature | | pH | | Heavy Metals (High) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2016 | 2027 | 2016 | 2027 | 2016 | 2027 | 2016 | 2027 | 2016 | 2027 | 2016 |
| Bishop Aukland STW<br>Willington STW | Wear from Gaunless to Browney | GB103024077464 | High | High | High | High | High | High | Good | High | High | High | Copper, Iron, Manganese, Zinc |
| Hustledown STW | Twizell Burn from Source to Cong Burn | GB103024077590 | High | Moderate | Good | Moderate | High | High | High | High | High | High | Copper, Zinc |
| Barkers Haugh STW<br>Belmont STW | Wear from Croxdale Beck to Lumley Park Burn | GB103024077621 | High | High | Moderate | Good | High | High | Good | High | High | High | Arsenic, Copper, Iron, Zinc |
| Sacriston STW | South Burn to confluence with Wear | GB103024077623 | High | High | Bad | Poor | High | High | High | High | High | High | Copper |
| Chester-le-Street STW | Wear DS of Lumley Park Burn to Tidal Limit | GB103024077624 | High | High | Moderate | Good | High | High | High | High | High | High | Arsenic, Copper, Iron, Manganese, Zinc |
| Tudhoe STW | Valley Burn from Source to Wear | GB103024077350 | Moderate | Good | Poor | Good | High | High | High | High | High | High | Iron |

## 5.4 Geology, Hydrogeology and Groundwater Quality

With reference to the British Geological Survey Geological Ten Mile Map Northern Sheet (Solid) scale 1:625 000, the central area around Durham and occupying the lowland plain consists of the Westphalian Formation of the Carboniferous Period, a sedimentary rock described as Coal Measures (a Secondary A Bedrock Aquifer according to the Environment Agency). In the southeast corner of County Durham is Magnesian Limestone of the Permian Period (a Principal Bedrock Aquifer according to the Environment Agency) and in the western edge of the Northern Pennines consists of the Namurian Formation of the Millstone Grit series, a sedimentary rock laid down during the Carboniferous Period. The valleys of the River Wear and Tees have formed in the Tournaison and Viséan Formation of the Carboniferous Limestone Series, with some igneous rock intrusions.

Large parts of the County are underlain by porous rock that holds groundwater. The Magnesium Limestone in the east provides a significant amount of water at the regional scale, but there are locally important Secondary Aquifers further west. The geological strata in the central area can hold and transmit water, but this area tends to be contaminated by previous mine workings.

### 5.4.1 Magnesium Limestone Aquifer

The Magnesian Limestone aquifer as shown in Figure 5-3 extends from South Shields to Darlington and is considered to be the most important groundwater resource within the area, supporting both public supply and industrial abstraction. Whilst the aquifer is an important water resource it also presents a number of environmental constraints that need consideration particularly if Northumbrian Water were to seek to abstract additional water from the aquifer in order to serve the additional housing development planned for County Durham. Please note, this section of the report has been informed by the Northumbrian Magnesian Limestone Aquifer Hydrogeological Conceptual Model[15].

Under the Northumbria RBMP, the WFD status of the Wear Magnesian Limestone is recorded to currently have a poor classification with a poor chemical classification and poor chemical drinking water protected areas. These classifications are forecast to be good by 2027.

Table 5.3 shows a total of 10 of the potential housing allocation sites are located within the Magnesian Limestone boundary in areas such as Newton Aycliffe, Peterlee and Seaham. Groundwater levels in and around Newton Aycliffe on the Magnesium Limestone are at, or close to, the surface. A short distance to the south and west, groundwater levels are artesian (i.e. above ground). High water levels may mean that infiltration SuDs will not be appropriate in some areas as the ground may not have capacity for additional water (above greenfield rates). In comparison, Newton Aycliffe is located in the recharge area of the Magnesium Limestone (main source area for aquifer and water supplies) therefore developments should retain as much greenfield area as possible.

**Table 5.3 Potential Housing Allocations located within the Magnesium Limestone Boundary**

| Site Ref. | Site Name | Settlement | Area (ha) | No. of Houses |
|---|---|---|---|---|
| 7/NA/186 | Cobblers Hall | Newton Aycliffe | 1.827 | 50 |
| 7/NA/313 | Copelaw | Newton Aycliffe | 93.389 | 600 |
| 5/PE/01a, 5/PE/01b | North Blunts | Peterlee | 2.356 | 65 |
| 5/SE/21 | Former Seaham School | Seaham | 3.692 | 95 |
| 7/NA/326 | Land at Woodham College | Newton Aycliffe | 4.408 | 100 |
| 5/MU/09 | Murton Colliery | Murton | 5.613 | 130 |
| 5/SE/13 | Land at Camden Square | Seaham | 0.591 | 15 |
| 7/NA/005 | Eldon Whins | Newton Aycliffe | 2.265 | 80 |
| 5/TH/06 | Dunelm Stables | Thornley | 5.821 | 50 |
| 5/SE/09 | Seaham Colliery | Seaham | 14.749 | 335 |

As such, the existing pollution threat to the Magnesium Limestone could be further exacerbated by new housing development. There will be a need to address future development proposals and their impact on abstraction

[15] Environment Agency (2009), Northumbrian Magnesian Limestone Aquifer Hydrogeological Conceptual Model

rates and impact on the aquifer (such as the inclusion of SuDS, areas of green space within a recharge area and appropriate remediation of sites that are potentially contaminated).

Within this area, the Environment Agency has designated areas around major groundwater abstractions as Source Protection Zones (SPZ). Table 5.4 shows that SPZs can be one of three zones depending on the time it takes for water to travel to the point of abstraction, or the percentage of the entire resource (whichever is the greater).

**Table 5.4 SPZ Classifications**

| SPZ | Classification |
|---|---|
| SPZ 1 | A 50 day travel time to degrade bacteriological contaminants. |
| SPZ 2 | A 400 day travel time or 25% of total catchment area - required to attenuate chemical pollutants |
| SPZ 3 | A total catchment for the source - groundwater within this zone will end up at the abstraction borehole eventually. |

SPZs will change with pumping rates and new evidence suggests there may be more north south flows due to the fractured nature of the aquifer.

Figure 5-3 illustrates the potential development sites with regard to the SPZs. The SPZs are used in conjunction with the Environment Agency's Groundwater Protection Policy to set up pollution prevention measures in areas which are at a higher risk, and to monitor the activities of potential polluters nearby. Eight of the new potential allocation sites fall within the total catchment area of the SPZ, of which three sites fall within the outer SPZ. No sites fall within the Inner SPZ. Developers should have due regard to the SPZs that sites fall in, since it will influence the type of SuDS technique that is appropriate and will be acceptable.

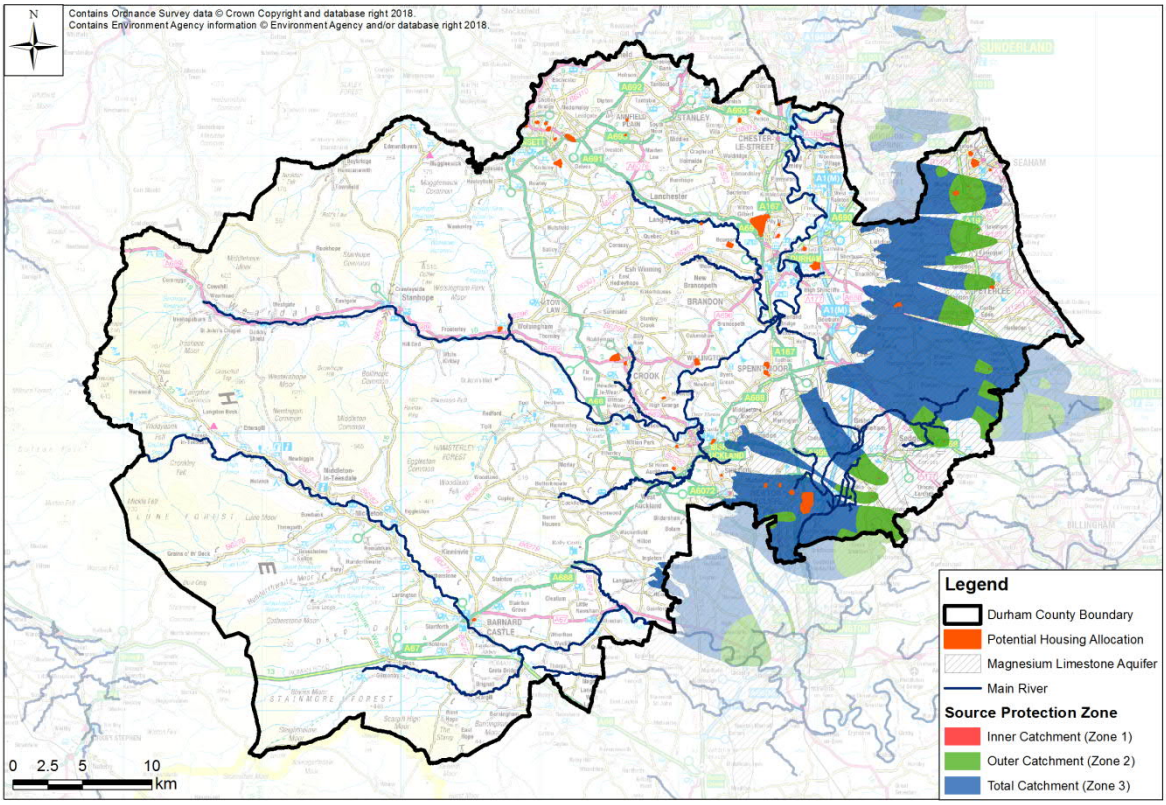



Figure 5-3: Source Protection Zones

### 5.4.1.1 Water Supply

At present, approximately 93% of licensed groundwater abstraction from the Magnesian Limestone aquifer is for public water supply. However, as the Northumbrian Water supply is primarily from the Kielder Reservoir, the Magnesium Limestone Aquifer does not act as a significant source of water for Northumbrian Water.

Hartlepool Water however relies on water from Magnesium Limestone aquifer boreholes. Whilst the area served by Hartlepool Water is outside of County Durham many of its boreholes lie within County Durham in the River Skerne catchment and could be affected if development in County Durham were to negatively impact the aquifer.

#### 5.4.1.2 Coal Mining

The Magnesian Limestone aquifer is underlain by the Carboniferous Coal Measures. Coal was extracted from beneath the Magnesian Limestone from the mid eighteenth century until the late twentieth century. The presence of mine workings beneath the Magnesian Limestone has had a number of consequences for the groundwater resources in the Magnesian Limestone aquifer.

The coal mines were maintained in a dry condition by abstracting considerable volumes of groundwater, a high percentage of which originated as water draining down from the overlying Magnesian Limestone aquifer. This induced a significant amount of drawdown of groundwater levels in the aquifer.

On cessation of mining, the mines no longer needed to remain dry and abstraction stopped resulting in water levels rising in the Coal Measures. Where these levels have reached the base of the Magnesian Limestone aquifer, the leakage rates from the Magnesian Limestone have reduced, resulting in a rise in groundwater levels in the Magnesian Limestone aquifer. Since 1975 there has been a rise in groundwater levels of 10m or more.

One consequence of this has been a change in the flows of the River Skerne, a tributary of the River Tees which flows across the limestone for almost all its length and significant interaction with groundwater occurs. When the groundwater levels were depressed due to abstraction from the coal mines, the River Skerne lost water into the aquifer. Since mining has ceased and groundwater levels have risen, the aquifer is contributing water to the river in some sections.

A second consequence of the rising water levels in the mines has been the threat of contamination of the Magnesian Limestone aquifer by rising polluted water from the mines, which has the potential to threaten the viability of a number of public water supply abstractions. This is of key interest in the area north of Newton Aycliffe, where mine water is discharging to the aquifer and appears to have developed a plume of pollution that threatens some of Hartlepool Water's water sources. However, after a first flush of highly contaminated mine water, the high concentrations appear to be declining and the plume is moving slowly eastwards. Work done to date suggests that mine water levels appear to have stabilised in the area, the pollution plume may not reach the water sources for 50 to 150 years and it may be decreasing in terms of its severity. There is only likely to be an additional risk if mine water levels increase again or groundwater levels decline, but since mine water levels appear to have stabilised it is less likely that this will be the case. Groundwater discharge to the River Skerne may slow the eastward movement of the plume.

Whilst the situation appears to be in balance it would appear to be a delicate balance. If the Coal Authority, or either water company were to alter its current pumping regimes it could affect the balance, positively or negatively.

### 5.4.2 Implications for Development

Appropriate planning constraints should ensure that groundwater quality will not be adversely affected by the proposed housing development. Durham County Council, in consultation with the Environment Agency should ensure that developers identify potential risks to the groundwater quality from the development through a source-pathway-receptor methodology. If unacceptable risks are identified Durham County Council in consultation with the Environment Agency can ensure that suitable mitigation measures are implemented by the developer. Durham County Council has the powers to enforce such assessments of risk and implementation of mitigation measures through the planning process and Part IIA of the Environmental Protection Act 1990. The risk of pollution to the aquifer may place constraints on the types of SuDS that could be implemented.

## 5.5 WFD Protected Areas

The WFD takes into account the requirements of other European Directives, relevant Protected Areas are:

- Sites designated for nature conservation (including Special Areas of Conservation (SAC) and Special Protection Areas (SPA));
- Freshwater fisheries;
- Nitrate Vulnerable Zones, and;

- Water Protection Areas / Drinking Water Protection Areas.

### 5.5.1 Special Areas of Conservation and Special Protection Areas

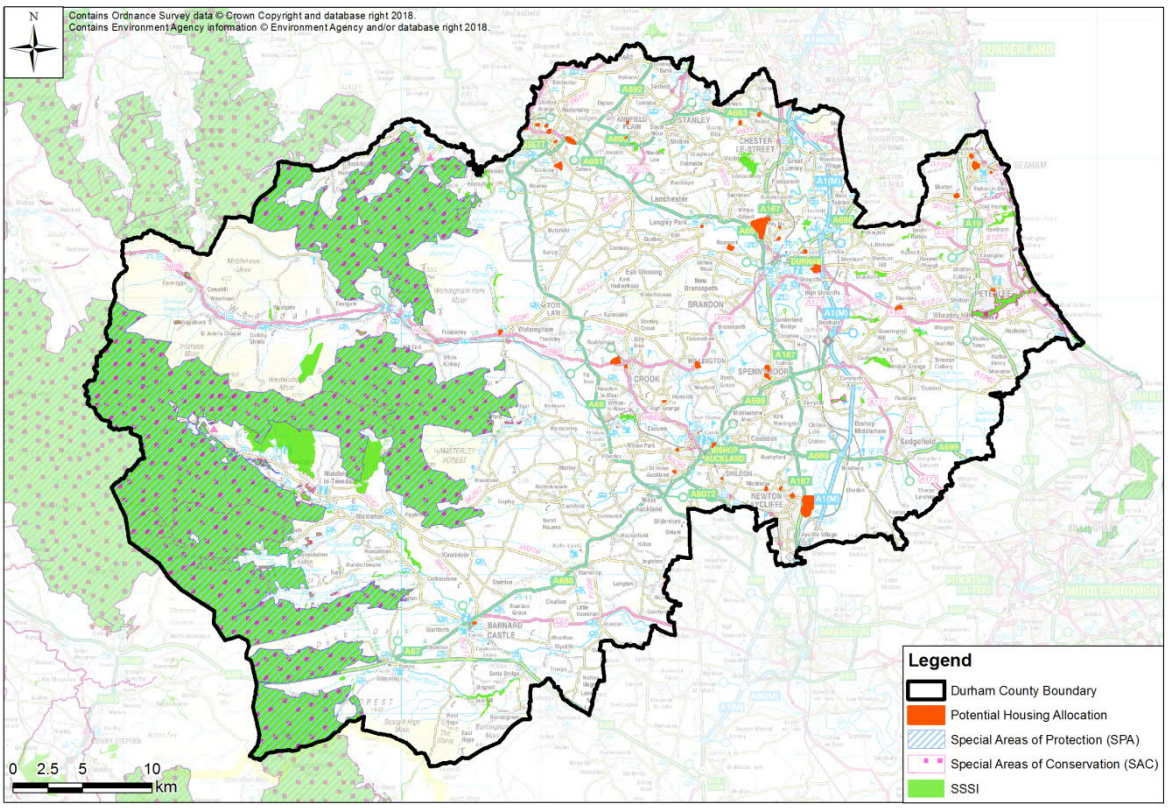
The Relevant SACs and SPAs across County Durham are listed below and illustrated in Figure 5-5:

- North Pennine Moor SAC & SPA;
- North Pennine Dales Meadow SAC;
- Castle Eden Dene SAC;
- Moor House – Upper Teesdale SAC;
- Thrislington SAC;
- Durham Coast SAC;
- Northumbria Coast SPA, and;
- Teesmouth and Cleveland Coast SPA.

There are 77 river stretches designated as salmonid fisheries in County Durham covering 399 km (including 11 still waters). There are also 27 cyprinid river stretches in County Durham (including nine still waters) covering 75 km.

Although not a Protected Area in terms of the WFD, it is also important to consider nationally important Sites of Special Scientific Interest (SSSI) for which there are 88 in County Durham (Figure 5-5).

The North Pennine Moors stretch over the western rural side of County Durham and comprises the most expansive SAC, SPA and SSSI designation in the County. None of the proposed allocated housing is located in SSSI, SAC or SPA areas. None of the new proposed allocation sites cross an environmental designation but impacts of the proposed housing and other development within the County Durham Plan are being considered as




required by the European Habitats Directive.

Figure 5-4: Conservation and Protection Areas

### 5.5.2 Nitrate Vulnerable Zones

The objective of the Nitrates Directive is to reduce water pollution caused by nitrates from agricultural sources and to prevent further such pollution occurring. Nitrate Vulnerable Zones (NVZs) are designated where nitrate concentrations in surface and/or groundwaters are high or increasing, or where waters are, or may become eutrophic, due to agricultural nitrate pollution. Farmers within NVZs must comply with mandatory action programme measures to reduce agricultural nitrate losses. In addition a code of good agricultural practice has been established, for voluntary implementation by all farmers.

Much of the land to the east of Bishop Auckland and between the A1(M) and the A19 is designated as a Nitrate Vulnerable Zone (NVZ) as is the area between just west of Consett (Muggleswick Common) and Chester-le-Street.

In the Wear catchment nitrate concentrations are causing a WFD failure of the Magnesium Limestone whilst in the Skerne nitrate concentrations puts it at risk of failure. Developments that fall within the NVZ should be assessed in terms of their site suitability and potential nitrate impacts on the development, associated watercourses and the surrounding urban area.

### 5.5.3 Drinking Water Protected Areas

The WFD requires the identification of Drinking Water Protected Areas. All groundwater bodies in the Northumberland RBMP are Drinking Water Protected Areas. Balderhead, Blackton, Hury, Selset, Grassholme, Derwent, Hisehope, Waskerley, Smiddy Shaw and Burnhope Reservoirs are also Drinking Water Protected Areas, as is the Lower (freshwater) Wear and Middle Tees (between Barnard Castle and Darlington) river sub-catchments.

Safeguard zones have been established for water sources in Drinking Water Protected Areas where extra treatment is likely to be required in the future. Although there are currently no designated safeguard zones within the Durham area it is likely that designations will occur in the future as the Magnesium Limestone in the Wear and Tees (Skerne) catchments are impacted by nitrate (see Section 5.5.3 above) which is impacting drinking water supplies. Safeguard zone action plans have been developed including measures needed to manage activities that may threaten raw water quality for surface waters and ground waters. There are no Safeguard Zone Action Plans for surface water or groundwater sources across the DCC area.

## 5.6 Summary

There are a number of watercourses within County Durham that are currently failing WFD targets. The ecology and water quality of some of these watercourses may be failing in part because of discharges from STW. The Environment Agency has a Programme of Measures to improve the class of these watercourses, which includes reviewing discharge consents and thus are likely to resist any increased loading of pollutants from treated sewage discharges.

County Durham is underlain by the Magnesian Limestone aquifer which is at Poor Chemical Status. The Magnesian Limestone aquifer is for public water supply and is the most important groundwater resource in the area. Whilst development within County Durham can be supported by water resources from Kielder Reservoir and need not abstract water from the aquifer, there will be a need to address future development proposals and their impact on abstraction rates and impact on the aquifer (such as the inclusion of SuDS and appropriate remediation of sites that are potentially contaminated). It is not anticipated that discharges from STW will have any impact on groundwater bodies.

Where water quality requires improvement, a number of options can be adopted including the use of SuDS, local policies and plans to improve drainage and pollution and ecological enhancements.

Developments that fall within an environmental designation, SPZ, NVZ, or the Magnesian Limestone boundary should be assessed in terms of their site suitability and their potential impacts on the environment, associated watercourses and the surrounding urban area.

[Page left intentionally blank]

# Flood Risk

06

# 6. Flood Risk

## 6.1 Introduction

Flood risk to people and property can arise from various different sources, including from rivers (fluvial), tidal, surface water runoff (or pluvial), sewers & drains, culverted watercourses, groundwater, as well as though breaching/overtopping of flood defences and from artificial sources such as canals and reservoirs. The risk of flooding can never be totally removed, however through good planning, management and use of sustainable flood mitigation and drainage approaches, the risk and consequences of flooding in many areas can be managed.

The following section summarises the key local and regional assessments of Flood Risk.

## 6.2 Regional Flood Risk Assessments, Policy and Legislation

### 6.2.1 Northumbria River Basin District Flood Risk Management Plan 2015 – 2021

Under the Flood Risk Regulations, the Environment Agency is required to prepare Flood Risk Management Plan's (FRMPs) for all of England covering flooding from Main Rivers, the sea and reservoirs. The Northumbria FRMP[16] has been published by the Environment Agency and sets out the proposed measures to manage flood risk in the Tees, Wear, Tyne and Northumberland catchment from 2015 to 2021 and beyond.

The Durham County Council administrative area covers the majority of the Wear catchment, but also forms the upper extents of the Tyne and the Tees catchments to the north and south respectively, as illustrated previously in Figure 2-1.

### 6.2.2 Northumbria Regional Flood and Coastal Committee

Durham County Council falls within the Northumbria Regional Flood and Coastal Committee (RFCC) area and is represented on the RFCC. The RFCC allocates Local Levy funding for flood risk management to manage local flood risk and fulfil the duties and responsibilities under both the Flood Risk Regulations (2009) (refer to Section 3.4) and Flood and Water Management Act (2010).

### 6.2.3 Catchment Flood Management Plans

A Catchment Flood Management Plan (CFMP) is a high-level strategic planning document that provides an overview of the main sources of flood risk and how these can be managed in a sustainable framework for the next 50 to 100 years. The Environment Agency engages stakeholders within the catchment to produce policies in terms of sustainable flood management solutions whilst also considering local land use changes and effects of climate change.

County Durham falls within the Environment Agency's CFMP area for the River Wear[17] the River Tees[18] and the River Tyne[19]. The visions and preferred policy for these areas and sub areas are outlined in the following section.

#### 6.2.3.1 Wear CFMP

The CFMP infers that between 200 and 1,000 properties are currently at risk in this sub-area, notably at Lanchester and Durham City. The Durham and Browney sub-area is the notable flood risk hotspot in the CFMP, where the Policy Option is to "Take further action to reduce flood risk".

[16] Environment Agency. 2016. *Northumbria River Basin District Flood Risk Management Plan 2015 to 2021.* Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/505383/LIT_10244_NORTHUMBRIA_FRMP_HRA.pdf
[17] Environment Agency. 2009. *Wear Catchment Flood Management Plan.* Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289186/River_Wear_Catchment_Flood_Management_Plan.pdf [Accessed: 15/08/2016]
[18] Environment Agency. 2009. *Tees Catchment Flood Management Plan*. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289194/River_Tees_Catchment_Flood_Management_Plan.pdf [Accessed: 15/08/2016]
[19] Environment Agency, *2009, Tyne Catchment Flood Management Plan.* Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289171/River_Tyne_Catchment_Flood_Management_Plan.pdf

The Upper and Mid Wear sub-area falls under Policy Option 6 – take action with others to store water or manage runoff in locations that provide overall flood risk reduction or environmental benefits, locally or elsewhere in the catchment. The Mid Wear sub-area provides a natural storage area for flood waters reducing the risk of flooding downstream.

#### 6.2.3.2 Tees CFMP

The key flood risk areas in the Tees CFMP fall outside County Durham and include Redcar, Hartlepool, Middlesbrough, Darlington and Stockton on Tees. Newton Aycliffe is the only urban area within County Durham that the Tees CFMP defines as a flood risk area, showing between 50 and 100 properties at risk from a river flood event with an annual probability of 1%. The majority of the Tees sub-areas within County Durham, including Newton Aycliffe, fall under Policy Option 3 - continue with existing or alternative actions to manage flood risk at its current level. With flood risk expected to increase in the future in these sub-areas without further alleviation measures, any potential developments ought to be located away from these flood risk areas.

#### 6.2.3.3 Tyne CFMP

The Derwent and Rural Team sub-area is the only sub-area that falls within County Durham and is deemed a low flood risk area which supports its preferred Policy Option - “Reduce flood risk management actions”. The northern parts of Consett and Stanley fall within this CFMP sub-area.

## 6.3 Local Flood Risk Assessments, Policy and Legislation

### 6.3.1 Strategic Flood Risk Assessment

The Durham County Council Level 1 Strategic Flood Risk Assessment (SFRA[20]) has been updated alongside this WCS, to support Durham County Council’s Local Plan. The SFRA aims to collate and analyse the most up to date flood risk information for all sources of flooding to inform strategic decision making for future development.

#### 6.3.1.1 Flood Risk

The flood risk across the county can be summarised as follows:

- Flooding from rivers: Fluvial flooding occurs when the channel capacity of a river is exceeded as a result of increased flows. This can be a result of either sustained or intense rainfall. Fluvial flood risk across Durham County Council originates from the River Tees, Wear and Derwent and their tributaries. Flood mapping identifies relatively confined floodplains associated with each of these Main Rivers. There are numerous smaller watercourses across the county. These are typically culverted in highly urbanised areas.
- Flooding from the sea: The North Sea forms the eastern boundary of County Durham, however, due to the naturally high coastal elevations in this area and the presence of tidal flood defences, the risk of tidal flooding is considered to be low.
- Flooding from surface water: Surface water flooding, also known as pluvial flooding, occurs when high intensity rainfall generates runoff which flows over the surface of the ground and accumulates in low lying areas. The presence of impermeable surfaces, saturated soils and insufficient capacity within the drainage network can further exacerbate surface water flooding. Surface water flood risk across the County is relatively wide-spread, although the majority of flows are primarily confined to the low lying fluvial corridors associated with the River Tees and River Wear.
- Flooding from groundwater: Groundwater flooding usually occurs in areas underlain by permeable rock and aquifers that allow groundwater to rise to the surface through the permeable subsoil following long periods of wet weather. Within Durham, the susceptibility to groundwater flooding is greatest to the east of the county. It should be noted that there is uncertainty over the impact of ceasing mine dewatering on groundwater levels. See Section 4.3.2.1 for more information.
- Flooding from sewers: Sewers can flood when their capacity is exceeded, they become blocked or when surcharging occurs as a result of high water levels in receiving watercourses. Data supplied by Northumbria Water from their DG5 Sewer Flooding 'Risk' Register, plotted on a 100m grid square scale, shows the current risk to be greatest in the urban areas of Durham City, Chester-le-Street, Seaham, Stanley and Lanchester.

[20] AECOM, October 2016, *Durham County Council Level 1 Strategic Flood Risk Assessment*

- Flooding from artificial sources: Within County Durham, reservoirs form artificial sources of flooding. A reservoir can be defined as a natural or artificial waterbody where water is collected and stored until needed. Typically, should reservoirs breach, flooding remains within the channel of the river floodplain.

#### 6.3.1.2 Climate change

The impact of climate change on flood risk should be considered for all future developments. The impact of changing weather patterns on the hydrological cycle is significant, as predicted increases in peak rainfall intensity and river flow could result in more frequent and severe flash flooding and increase soil and river bank erosion. As such, the risk of flooding from all sources is likely to increase.

As of March 2016 the Environment Agency[21] has issued new climate change allowances, which is a regionalised approach whereby climate change allowances (% increases in flows) are provided for each river basin district over three different timeframes (epochs) and for three different emissions scenarios. The March 2016 climate change allowances and guidance for changes to river flood flows relevant to the Northumbrian region and peak rainfall intensity are provided in Table 6-1 and Table 6-2 below.

Table 6-1: Peak River Flow Allowances for the Northumbrian River Basin District (1961 to 1990 baseline)

| River Basin District | Allowance category | Total potential change anticipated for the '2020s' (2015 to 2039) | Total potential change anticipated for the '2050s' (2040 to 2069) | Total potential change anticipated for the '2080s' (2070 to 2115) |
|---|---|---|---|---|
| Northumbria | Upper End | 20% | 30% | 50% |
| | Higher Central | 15% | 20% | 25% |
| | Central | 10% | 15% | 20% |

Table 6-2: Peak Rainfall Intensity Allowances in Small Urban Catchments (1961-1990 baseline)

| Applies across all of England | Total potential change anticipated for the 2020s | Total potential change anticipated for the 2050s | Total potential change anticipated for the 2080s |
|---|---|---|---|
| Upper End Estimate | 10% | 20% | 40% |
| Central | 5% | 10% | 20% |

For future developments, Site Specific Flood Risk Assessment (FRA) will need to take into account these revised climate change allowances. The Environment Agency should be contacted as part of any FRA to determine the appropriate allowances for climate change. Consideration of the level of risk posed to the site (Flood Zone), the vulnerability of the development and the lifetime of the development inform the assessment required. Further details on the application of the revised Climate Change allowances can be found in the Environment Agency's 'Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities' guidance[22].

#### 6.3.1.3 Sequential Test

The Level 1 SFRA has been used by Durham County Council to apply the Sequential Test to potential new future site allocations. The Sequential Test is a decision-making tool designed to ensure that sites at little or no risk of flooding are developed in preference to sites at higher risk, so avoiding the development of sites that are inappropriate on flood risk grounds. Where this cannot be avoided, application of an Exception Test allows for the possibility of some development in flood risk areas taking place if flood risk is clearly outweighed by other sustainability drivers.

Following application of the Sequential Test, all of Durham County Council's new potential allocation sites are located outside of the extent of Flood Zones 2 and 3, thus passing the Sequential Test.

[21] Department for Communities and Local Government. 2016. *Flood Risk Assessments: Climate Change Allowances.* Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances [Accessed: 15-08-2016]
[22] Environment Agency. 2016. *Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities.* Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/516116/LIT_5707.pdf. [Accessed: 15-08-2016]

### 6.3.2 Local Flood Risk Management Strategy

In March 2016 Durham County Council prepared a Local Flood Risk Management Strategy (LFRMS[23]) in line with the requirements of the FWMA. In the LFRMS, Durham County Council set out that the Council will work to deliver the following Flood Risk Management objectives:

- To understand flood risk in County Durham;
- To mitigate flood risk in County Durham; and
- To increase resilience to flood risk in County Durham.

The LFRMS is a document which sets out how Durham County Council is responding to identified local flood risk across the County and specifies:

- The RMAs in County Durham;
- The FCERM functions that may be exercised by the RMAs within the County;
- 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 and when the LFRMS is to be reviewed;
- How the Local Strategy contributes to the achievement of wider environmental objectives;
- Work in partnership with other RMAs;
- Participate in the production of coherent plans aimed at identifying, communicating and managing flood and coastal erosion risks across catchments and shorelines; and
- Encourage efficient, targeted and risk-based investment in FCERM.

### 6.3.3 Preliminary Flood Risk Assessment

Under the Regulations, all LLFAs were required to prepare a PFRA[24] report which Durham completed in 2011, and which has since been updated in 2016. The PFRA is a high level screening exercise to identify areas of significant risk as 'Indicative Flood Risk Areas' across England where 30,000 people or more are at risk from flooding for reporting to Europe.

An update to the PFRA was prepared for Durham County Council in 2016 and sought to provide a high level overview of flood risk from local flood sources and including flooding from surface water, groundwater, Ordinary Watercourses, and canals. It excludes flood risk from Main Rivers, the sea and reservoirs, as these are assessed nationally by the Environment Agency. The PFRA report looks at past flooding and where future flooding might occur across the area and the consequences it might have to people, properties and the environment. The report provides a useful baseline in the preparation of this revised Level 1 SFRA.

### 6.3.4 Surface Water Management Plan

Flooding from surface water presents a risk across County Durham, particularly in the urban areas. A SWMP was prepared for Durham County Council in August 2014[25]. The SWMP outlines the preferred surface water management strategy across the County. In this context surface water flooding describes flooding from local sources.

The objectives of the SWMP were to:

- Guide limited resources to surface water risk areas of greatest need

[23] Durham County Council *Local Flood Risk Management Strategy*, June 2016, Available at: http://www.durham.gov.uk/media/10353/Durham-Local-Flood-Risk-Management-StrategyDraft/pdf/Durham_Local_Flood_Risk_Management_Strategy_Draft.pdf

[24] Durham County Council *Preliminary Flood Risk Assessment* – Final Report, May 2016. Available at: http://www.durham.gov.uk/media/9944/Preliminary-Flood-Risk-Assessment-2016/pdf/PreliminaryFloodRisk_AssessmentReport2016.pdf

[25] AECOM. 2011. *County Durham Surface Water Management Plan.* Available at: http://www.durham.gov.uk/media/875/County-Durham-Surface-Water-Management-Plan/pdf/DurhamSWMPReport.pdf [Accessed: 15-08-2016]

- Ensure the level of future development does not exacerbate existing problems and identify opportunities for new development to provide benefits in terms of flood risk management
- Inform emergency planning and feed into Durham County Council's Flood Plan
- Protect and improve water quality in accordance with the objectives of the WFD.

The Risk Assessment component of the SWMP strategically identified broad locations which are considered to be more vulnerable to surface water flooding which have been called Surface Water Risk Areas (SWRAs). In total 139 SWRAs were created across County Durham (Figure 6-1), the majority of which are located in the eastern part of the County, in and around urban areas.

The areas at greatest risk were identified as being:

- Durham City;
- Newton Aycliffe;
- East Stanley;
- Bishop Auckland;
- Lanchester;
- Crook;
- Chester-le-Street, and;
- Burnopfield.

The SWMP considered high level options through which the risks of surface water flooding can be managed. An Action Plan was developed to cover all of County Durham which lists actions by which the risk of surface water flooding can be managed.

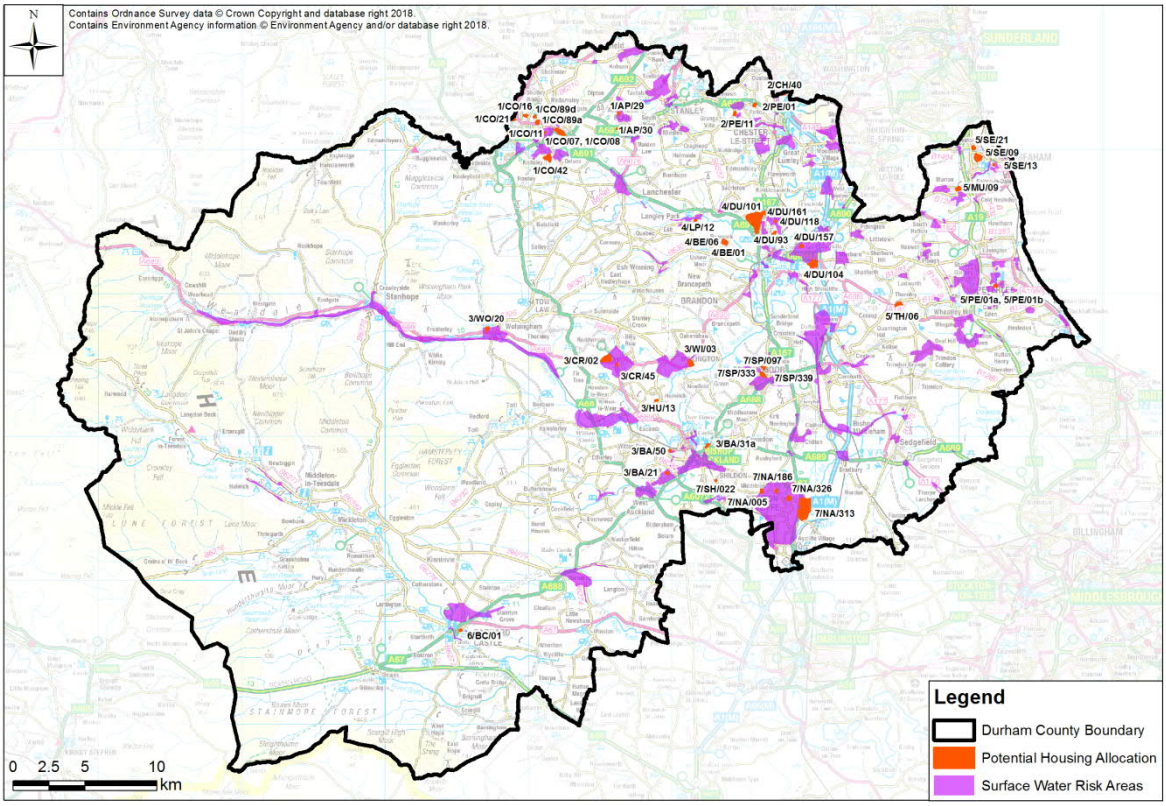



Figure 6-1: Surface Water Risk Areas

## 6.4 Summary

In summary, there are numerous sources of flood risk across County Durham primarily from fluvial flooding and surface water flooding. Climate change is likely to increase the frequency and magnitude of flooding events.

The Sequential Test completed by Durham County Council as part of the SFRA however shows that all of the proposed future developed is located away from areas of greatest fluvial flood risk.

It should however be noted that for site specific FRAs, developers will need to demonstrate consideration of climate change as part of any planning application, including the groundwater regime and mine water control measures.

[Page left intentionally blank]

# Conclusions

07

# 7. Recommendations and Conclusions

## 7.1 Recommendations

Following the completion of the WCS, the following policy recommendations have been made:

- It is recommended that a periodic review of the WCS is completed to examine the progress of development as outlined in the County Durham Plan against the RBMP and Northumbrian Water AMP investment strategies to ensure the necessary investment is prioritised;
- It is recommended that planning policy for new development aims to ensure that where possible, houses and businesses are built to high standards of water efficiency through the use of water efficient fixtures and fittings, and in some cases rainwater harvesting and greywater recycling;
- Where there is potential future capacity issues associated with STW, it is recommended that:
  - Development is phased to remain within the existing headroom allowances,
  - Development is directed to areas where there is sufficient headroom; or
  - Temporary arrangements at STW to facilitate development are implemented.
- SuDS are a requirement of all new developments; however it is recommended that the potential to retrofit SuDS within the existing urban environment is examined, especially where there are combined sewers or areas with drainage capacity issues;
- The use of SuDS in developments located in the SPZs to the east of the County will need to consider the potential impact on the groundwater receptor; and
- Developments that fall within environmental designations or SPZ should be assessed in terms of their site suitability and their potential impacts on the environment, associated watercourses and the surrounding urban area.

## 7.2 Conclusions

The County Durham Plan sets out the planning framework and policies for the County, and makes a commitment to significant housing growth during the period to 2035. The WCS has been completed to identify where infrastructure to support the water component of new housing development is suitable or would require future investment. In summary:

- There are sufficient water resources available to support new housing growth; however it is recommended that water efficient measures are adopted to reduce the pressure from development;
- There are potentially capacity issues within the sewer drainage and sewage treatment works, however Durham County Council and Northumbrian Water will work together to ensure development is phased and appropriate infrastructure investment is identified within each of the AMP cycles;
- There are a number of watercourses within County Durham that are currently failing WFD targets, partly because of discharges from STW. As part of the RBMP, the Environment Agency will work with Durham County Council and Northumbrian Water to manage any increase in risk to surface water and groundwater quality; and
- There are numerous sources of flood risk across County Durham primarily from fluvial flooding and surface water flooding. Climate change is likely to increase the frequency and magnitude of flooding events. New development will need to consider the risk of flooding from all sources to and from the development, taking into account climate change.

[Page left intentionally blank]

# Water Quality Legislation Review

A

# Water Quality Legislation Review

### Water Framework Directive

The aim of the WFD is to prevent further deterioration and protect and enhance the status of aquatic ecosystems and associated wetlands, promote sustainable water consumption, and contribute to mitigating the effects of floods and droughts. The WFD was transposed into law in England and Wales by the Water Environment (Water Framework Directive) Regulations 2003. These regulations implement a holistic approach to the management, protection and monitoring of the water environment. The key objectives of the WFD are to prevent deterioration in the status of water bodies and aim to achieve good ecological and chemical status/potential (including quantitative status in groundwater bodies) by 2015. Water bodies must also comply with standards and objectives of Protected Area (i.e. an area designated under another European Directive, such as an SAC or SPA) where these apply. In addition, under the WFD emissions of priority substances must be reduced and emissions of priority hazardous substances prevented. Finally, action must be taken to reverse any identified sustained upward trend in pollution concentrations in groundwater bodies.

The actions (or measures) required to ensure that all the water bodies achieve their WFD objectives are set out in a series of statutory River Basin Management Plans (RBMPs) originally published in December 2009 by the Environment Agency, and updated in 2015. County Durham is covered by the 2015 Northumberland RBMP.

### Preventing Deterioration in Status or Potential

Deterioration in WFD terms refers to a change between status classes – for example, from high to good status or from moderate to poor status. Preventing deterioration in status is a strict requirement of the WFD. For water bodies other than those at 'high status', there is only one possible exception to this requirement. This is the situation where physical modification to the water body is required to support certain sustainable human activities (including flood defence) and where a number of criteria set out in the Directive are met (See Section 1.2.2.6).

*Meeting the 'Aim to Improve' Objective*

If a water body is not already at good status, the RBMP may set out the measures required to achieve good status or it may set an alternative objective for the water body (which must be justified on grounds of technical feasibility or disproportionate cost). It is important to take these measures into account in the WCS to avoid conflicts that could prevent any intended improvements being realised and to resolve any such potential conflicts; to identify whether other measures could be taken to help improve status in failing water bodies.

### WFD Objective for Groundwater Bodies

Groundwater bodies are classified in terms of their chemical (quality) and quantitative status, in addition to an indication of trend. There are only two classes for groundwater status – good and poor, the outcome being set at the lower of either chemical or quantitative status. The specific criteria that must be met for a groundwater body to be classed as being at good quantitative status and good chemical status are set out in the WFD and further elaborated in the Groundwater Directive (2006/118/EC, (replacing 1980/68/EC)). These criteria have been developed in the UK into a series of tests, which are triggered when a relevant risk is identified (i.e. the identification of a risk leads to investigations to determine whether or not the criteria specified in the test are met).

### Achieving Objectives for EU Protected Sites

The WFD identifies areas requiring special protection under other EC Directives (which will also be taken into account where necessary) and water used for the abstraction of drinking water as protected areas. Under Article 4 of the Directive, Member States were required to achieve compliance with any standards and objectives set for each protected area by the end of 2015 unless otherwise specified in the other EC Directive.

*Article 4.7*

Article 4.7 provides a mechanism whereby the objectives of the Directive may not be achieved if this is a result of new modifications and / or new sustainable human activities, and providing the following conditions are met:

- All practicable steps are taken to mitigate the adverse impact on the status of the water body;
- The reasons for those modifications or alterations are specifically set out and explained in the RBMP, required under Article 13 and the objectives are reviewed every six years;

- The reasons for those modifications or alterations are of overriding public interest and / or the benefits to the environment and to society are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development; and
- The beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

The WFD requires that effects on water bodies do not cause deterioration nor do they lead to the prevention of a target being achieved, although under certain circumstances there can be exceptions (using Article 4.7). There is also the possibility that the status of a watercourse may change to a modified status, and vice versa, although this would depend on the degree of change relative to the size of the water body.

### The Flood and Water Management Act 2010

The Flood and Water Management Act 2010 intends to provide better, more comprehensive management of flood risk for people, homes and businesses. It will also help ensure continuity of water supplies. In particular, it encourages the uptake of SuDS by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt SuDS for new developments and redevelopments.

### The Water Resources Act 1991 (as amended)

It is an offence under Section 85 of the Water Resources Act 1991 to cause or knowingly permit pollution of controlled waters. Controlled waters include all watercourses (drainage ditches, streams, rivers), canals, lakes, estuaries and groundwater. The Water Resources Act also makes provision for the consenting (by the Environment Agency) of discharges of potentially polluting substances and the licensing of water abstractions (amended by the Water Act 2003). Both the consenting of discharges and the abstraction of water from waterways have implications for future water quality and the aquatic environment.

### Future Water

The Government's water strategy for England, Future Water was published in February 2008. This strategy sets out the Government's long-term vision for water and the framework for sustainable water management in England. It aims to permit the supply of secured water supplies whilst ensuring an improved and protected water environment. Future Water brings together the issues of water demand, water supply, water quality in the natural environment, surface water drainage, river/coastal flooding, into a single coherent long term strategy, in the context of the need to reduce greenhouse gas emissions, and also considers the issue of charging for water. The water environment and water quality have great economic, biodiversity, amenity and recreational value, playing an important role in many aspects of modern day society, and thus the functions provided must be sustainably managed to ensure they remain available to future generations without compromising environmental quality. Future Water refers to the improvements that have been made to reduce polluting activities but reaffirms the work still to be done.

[Page left intentionally blank]

# Review of existing sewer infrastructure to accommodate development

B

# Appendix B Review of existing sewer infrastructure to accommodate development

In order to determine if the existing Sewerage Infrastructure (pipes) have enough capacity to accommodate the new proposed allocation sites, the capacity of each 'system' i.e. pipe capacity from the site to the receiving STW, has been assessed.

The information has been extracted from Northumbrian Water's hydraulic sewer network models; however this model does not cover the entire county, as such in some locations it has not been possible to undertake an assessment. In this instance, they have been recorded in Table B-1 below as not assessed. Furthermore, a number of the potential allocation sites were subject to last minute revision and as such, it has not been possible to obtain the capacity information for these.

Table B-1: Ability of Sewage Network to accommodate increase flow from the new proposed allocation sites

| New Proposed Allocation Sites | STW | Impact of development on existing Sewer Infrastructure |
|---|---|---|
| 4/BE/01 | Aldin Grange North | Development likely to exacerbate predicted hydraulic performance issue |
| 7/NA/005 | Aycliffe | |
| 7/NA/326 | Aycliffe | |
| 7/NA/313 | Aycliffe | |
| 6/BC/01 | Barnard Castle | |
| 2/CH/40 | Birtley | |
| 3/BA/21 | Bishop Auckland | |
| 3/BA/31a | Bishop Auckland | |
| 3/BA/50 | Bishop Auckland | |
| 1/CO/16 | Consett | |
| 1/CO/89a | Consett | |
| 1/AP/29 | East Tanfield | |
| 1/AP/30 | East Tanfield | |
| 5/TH/06 | Horden | |
| 1/CO/42 | Knitsley | |
| 5/MU/09 | Seaham | |
| 5/SE/09 | Seaham | |
| 3/WI/03 | Willington | |
| 7/NA/186 | Aycliffe | Development could create hydraulic performance issue |
| 4/DU/157 | Barkers Haugh | |
| 1/CO/89d | Consett | |
| 5/PE/01a, 5/PE/01b | Horden | |
| 5/SE/21 | Seaham | |
| 4/DU/101 | Barkers Haugh | *Not assessed. No data or hydraulic model provided by Northumbrian Water.* |
| 4/DU/118 | Barkers Haugh | |
| 4/DU/161 | Barkers Haugh | |
| 4/DU/93 | Barkers Haugh | |
| 4/DU/104 | Barkers Haugh | |
| 2/PE/11 | Birtley | |
| 2/PE/01 | Birtley | |
| 3/CR/02 | Bishop Auckland | |
| 3/CR/45 | Bishop Auckland | |
| 3/HU/13 | Bishop Auckland | |
| 1/CO/21 | Consett | |
| 1/CO/07, 1/CO/08 | Crookhall | |
| 1/CO/11 | Crookhall | |
| 7/SP/339 | Tudhoe Moor | |
| 3/WO/20 | Wolsingham | |
| 4/BE/06 | Aldin Grange North | |
| 4/LP/12 | Aldin Grange North | |

| New Proposed Allocation Sites | STW | Impact of development on existing Sewer Infrastructure |
|---|---|---|
| 7/SH/022 | Aycliffe | |