URS

Tees Valley Water Cycle Study

Outline report

December 2012

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Prepared for:
Stockton-on-Tees Borough Council

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EXECUTIVE SUMMARY

The objective of the Tees Valley Water Cycle Study (WCS) is to identify any constraints on housing and employment growth planned for the area up to 2026 that may be imposed by the water cycle and how these can be resolved i.e. by ensuring that appropriate water infrastructure is provided to support the proposed development. Furthermore, it will provide a strategic approach to the management and use of water which ensures that the sustainability of the water environment in the region is not compromised.

Discussions with Darlington Borough Council, Hartlepool Borough Council, Middlesbrough Council, Redcar and Cleveland Borough Council, Stockton-on-Tees Borough Council, the Environment Agency, Northumbrian Water and Hartlepool Water were undertaken to identify key issues and constraints in relation to the proposed development within the Tees Valley.

The key findings from the Outline WCS include:

- The Water Resource Management Plans for both Northumbrian and Hartlepool Water state that there is adequate water availability within the Tees Valley to meet future water demand up to 2035. The majority of the available water is sourced from Northumbrian Water's Kielder Water Resources Zone (WRZ), which has 'surplus of supply to the forecast demands over the whole of the planning horizon' i.e. NWL has calculated that there is sufficient water available in the Kielder WRZ to meet its forecasted population increases until 2035. Hartlepool Water supplies water to Hartlepool and the Hartlepool WRZ (AWS) 'has a surplus of available supply against target headroom throughout the Plan period', i.e. there is sufficient water available in the Hartlepool WRZ to meet its forecasted population increases until 2035. However, it should be noted that the WRMP is due to be reviewed for the periodic review period 2014 (PR14). The current assessment of 'surplus of available against target headroom' did not take into account the WFD poor quantitative status or the outcomes from the subsequent WFD investigations.
- Flood risk across the region is dominated by the North Sea and the River Tees, although there are areas of Flood Zones 2 and 3 associated with the smaller watercourses across the area.
- There are numerous wastewater treatment works (WwTW) across the area, of which the majority have capacity within their current discharge consents limits to accept and treat additional wastewater flow from the proposed development. However, capacity to accept additional flow is limited at Graythorpe WwTW and Moorsholm WwTW. No growth is proposed within the Moorsholm WwTW catchment, although there is employment growth proposed within the catchment of Graythorpe and an increase to the consented DWF would therefore be required. It may also be possible to transfer flows from the Graythorpe WwTW catchment to the Seaton Carew WwTW catchment, which does have capacity for growth.
- Water quality across the Tees Valley has improved in recent years, although there are several watercourses which are currently not achieving the target status (or potential) of Good under the Water Framework Directive. Only one of the WwTW within the study area requires an increase to the consented DWF and there should therefore be no impact on the water quality within the majority of the study area. For Graythorpe WwTW, where capacity issues have been identified, the future discharge consent standard would need to be calculated to ensure any increases in discharges of treated wastewater do not affect water quality of the receiving watercourse.
- As only one WwTW potentially requires an increase to the consented discharge volume, there should be no impact on the European, National and locally important ecological sites downstream of the proposed development. The potential increases in discharge from Graythorpe would not lead to deterioration in downstream water quality or impact on ecological designations.

1 INTRODUCTION

1.1 Growth in the Tees Valley

The main urban areas in the Tees Valley region developed between 1850 and the 1970s in a series of economic growth surges, which has left a legacy of high density and largely low quality, small Victorian terraced houses and mid 20th century council estates. Economic restructuring from the 1970s to the 1990s led to a net outward movement from the inner city areas, as people left the region to seek work elsewhere or moved to the areas seen to be more desirable, such as rural North Yorkshire and Durham. This pattern has exacerbated existing housing problems; research by the Department of Communities and Local Government (DCLG) reveals major concentrations of deprivation around the core centres of the city region and the need for 'transformational change to the housing offer'[1]. An initiative established in 2003, the Housing Market Renewal (HMR), was a response to this housing problem and the work begun by the HMR can be continued by funds made available by the designation of the Tees Valley as a Growth Point.

Designation of an area as a Growth Point represents the Government's response to the 2004 Barker Review on housing supply in the UK[2], as discussed in the Minister of State for Housing and Planning's Statement issued on the 29th June 2006[3]:

The Tees Valley was awarded Growth Point status under the second round of awards in July 2008. The 2009 Water Cycle Study (WCS) Guidance, produced by Halcrow for the Environment Agency in conjunction with Anglian Water[4], suggests that completion of a WCS may be a condition of growth point status. The introduction of the new National Planning Policy Framework (NPPF – see section 2.2 for further discussion) also drives the need for a WCS, to inform new planning strategies.

The Tees Valley Growth Point Programme of Development identified growth sites across the Tees Valley which were to receive the levels of growth required by the report of the Panel for the North East Regional Spatial Strategy (RSS). Between 2004/2005 and 2020/2021, the report required that 37,808 houses be delivered at a rate of 2,224 per annum. However due to the recession that followed the release of these figures, the level of proposed growth within the area was revised, as the Authorities recognised that not all of the proposed development sites could be taken forward in the subdued housing market conditions.

In addition, the five Councils within the Tees Valley (shown in Figure 3-1 below) each have their own growth targets, which will form the basis of the growth figures to be assessed within the WCS.

1.2 Study History

The Tees Valley WCS is being undertaken in three stages, as recommended by the Environment Agency guidance for Water Cycle Studies[4].

The Scoping report was completed in early 2012, with its aim to define the study area, establish the WCS steering group and to determine the key water infrastructure and water environment constraints that have the potential to impact on growth during the plan period for the administrative areas of the five authorities.

[1] Second Round Growth Points, Partnerships for Growth, Department for Communities and Local Government: London, July 2008, http://www.communities.gov.uk/documents/housing/pdf/partnershipsforgrowth
[2] Delivering stability: securing our future housing needs, Barker Review of Housing Supply - Final Report – Recommendations, HM Treasury, 17 March 2004
[3] http://www.theyworkforyou.com/wms/?id=2006-06-20b.87WS.3
[4] Water Cycle Study Guidance, Halcrow, January 2009, http://publications.environment-agency.gov.uk/PDF/GEHO0109BPFF-EE.pdf

The Scoping study concluded that there were no 'showstoppers' to potential constraints on housing growth in the study area. However, a more detailed analysis of the growth locations needed to be undertaken to assess the management of drainage, wastewater treatment and control of demand for potable water.

Therefore, this Outline Water Cycle Strategy was commissioned for planned growth in the Tees Valley Study area.

1.3 Aims and Objectives

The objective of the Tees Valley Outline WCS is to identify any constraints on housing and employment growth planned for the area up to 2026 that may be imposed by the water cycle and how these can be resolved e.g. by ensuring that appropriate water infrastructure is provided to support the proposed development. Furthermore, it will provide a strategic approach to the management and use of water which ensures that the sustainability of the water environment in the region is not compromised as a result of growth.

1.4 Stakeholders

The study has been undertaken following discussions with, and using data provided by, the following key stakeholders:

- Darlington Borough Council;
- Hartlepool Borough Council;
- Middlesbrough Council;
- Redcar and Cleveland Council;
- Stockton-on-Tees Borough Council; and,
- the Environment Agency.
- Northumbrian Water Ltd (NWL); and
- Hartlepool Water company (HWC).

1.5 Report Structure

There are several water cycle elements that have been considered in this Outline WCS. However, because some strategic level infrastructure can often serve a larger geographical area some water cycle elements are common to several of the growth sites in combination. These elements are assessed at a district level and hence are presented within a separate chapter in this report. These elements include:

- Wastewater treatment;
- Water availability (Water Resources);
- Water Quality; and,
- Ecology.

The other water cycle elements of the study are specific to each potential site and hence these elements have been reported at the 'settlement area' level with detail included for each potential growth site. These elements include:

- Wastewater network;
- Ecology;
- Flood Risk;

- Surface Water Flood Risk; and
- Geology and SuDS suitability.

This report has therefore been set out in the following way to assist its presentation as a primarily planning based source of evidence.

- study background and drivers (Chapter 2);
- the planned growth in relation to the water cycle assessment (Chapter 3);
- summary of water cycle baseline determined from the Scoping WCS (Chapter 4)
- the assessment of district wide water cycle elements (Chapters 5 to 9);
- summary of how the site specific water cycle elements have been assessed and the WSI and water environment issues relevant to proposed development sites (Chapter 10); and
- recommendations (Chapter 11).

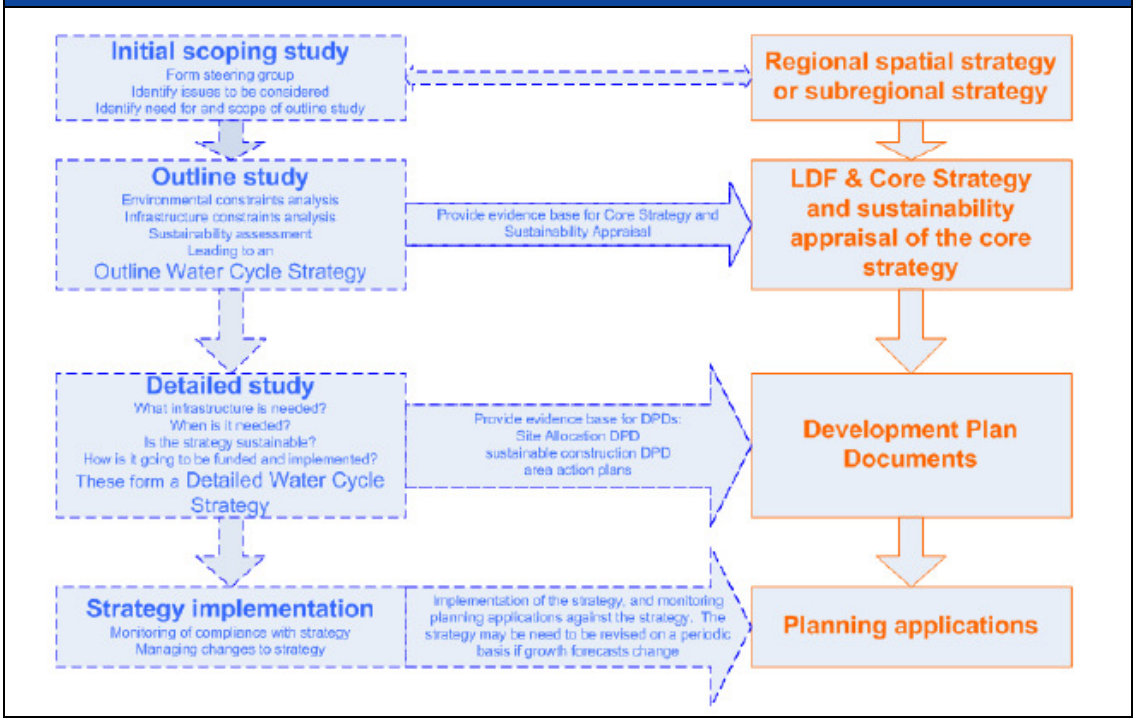
2 TEES VALLEY WATER CYCLE STUDY

2.1 Stages of a WCS

Current guidance on WCS[5] suggests that they should generally be undertaken in three stages, dependent on the status of the various Local Development Documents (LDDs), as part of the wider Local Plan, being prepared by Local Planning Authorities (LPAs). To coincide with the differing requirements of the five councils, this WCS is being undertaken in three distinct stages: Scoping, Outline and Detailed (with the requirement for a Detailed WCS to be established by the Outline WCS).

Figure 2-1 illustrates the three stages of the WCS and how they inform planning decisions and documents. This report represents the second stage, the Outline WCS.

FIGURE 2-1: STAGES OF THE WCS PROCESS (SOURCE: ENVIRONMENT AGENCY[5])



2.1.1 *Tees Valley Scoping WCS*

The Scoping WCS determined the key water-cycle areas where development is likely to either impact on the water environment, or is likely to require significant investment in water infrastructure (i.e. pipes, or treatment) to service new development.

Its key purpose was to define whether there were any significant constraints that would need further assessment to determine whether they affect either the locations of allocation options, or the amount of development that can be provided within an allocation site.

[5] Water Cycle Study Guidance, Environment Agency, 2009, http://www.environment-agency.gov.uk/research/planning/33368.aspx This Guidance, and subsequently the process diagram, has not yet been updated to reflect LDF change.

The report defined the study area, defined the key stakeholders required to input to the study and concluded which issues required further investigation and therefore, what the scope of the Outline WCS would be.

2.1.2 *Outline and Detailed WCS*

Outline WCS

This Outline WCS considers all of the ways in which new development will impact on the water environment or water infrastructure specific to where growth is most likely to be targeted. It is usually undertaken during consideration of allocation sites, such that it can inform the decision process in terms of where development will be targeted for each authority. The key aim of the Outline WCS is to provide LPAs with the evidence base which ensures that water issues have been taken into account when deciding the location and intensity of development within an authority's planning area as part of the development of the Local Plan or Core Strategy. It also aids in setting core policies related to water as part of the Development Control Policies within Development Plan Documents (DPDs). Finally, it gives the water company an evidence base to its business plans which influence how much funding is made available to invest in upgrades and the level of new infrastructure required to service proposed development.

It could be that the Outline WCS identifies that water cycle issues are not significant, and that new development can be implemented without significant new investment. If this is the case, a Detailed study may not be required. However, if new infrastructure is required, or an impact on the water environment cannot be ruled out as being insignificant, a Detailed WCS would need to be undertaken for site specific allocations, or for the authority as a whole.

Detailed WCS

The Detailed WCS can vary significantly in its scope and remit. However, its key purpose is to define what specific infrastructure and mitigation is required to facilitate development, once the decisions have been made on the location of allocations and the likely intensity and type of development within them. Dependent on the findings of the Outline WCS, there could be the potential requirement to undertake detailed and complex studies in order to define exactly what infrastructure or mitigation is required.

The Detailed WCS should be undertaken in conjunction with the development of DPDs such as Area Action Plans (AAPs) and should provide the evidence base to site specific policies in SPDs.

2.2 National, Regional and Local Drivers and Policies

National, regional, sub-regional and local planning policy and guidance documents provide requirements guidance for delivering sustainable development. Legislative, policy and guidance drivers have informed and shaped the development of this WCS and its deliverables, and have been considered at all stages in the WCS process. A detailed review of local drivers and policies can be found in the Scoping report, with summary tables provided in Appendix A of this report.

2.2.1 *National Drivers and Policies*

The growth within the Tees Valley will need to comply with EU Directives, UK legislation and guidance on water. These policies were reviewed in the Scoping report and are summarised in Table 12-1 in Appendix A. Key policy aspects pertinent to this Outline study are described in the following subsections.

National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published on 27th March 2012 and revokes most of the previous Planning Policy Statements (PPS) and Planning Policy Guidance (PPG), including PPS25: Development and Flood Risk. The PPS25 Practice Guide will continue to apply however, noted as an interim measure pending a wider review of guidance to support planning policy. The technical approach to flood risk management remains largely unchanged.

2.2.2 *Regional Drivers and Policies*

Regional Spatial Strategy – The North East of England Plan

The Regional Spatial Strategy (RSS) for the North East of England[6] published in July 2008, previously set targets to guide the scale and location of growth in the region up to 2021. It included spatial policies relating to water and flooding, including Policies 2 (Sustainable Development); 34 (Aquatic and Marine Environment) and 35 (Flood Risk). Elements of these policies related to the WCS are given below in Table 12-2, Appendix A.

The Government announced its intention to revoke the Regional Strategies in 2010 under section 79(6) of the Local Democracy, Economic Development and Construction Act 2009. however, at the time of writing this Outline WCS the revocation had not been carried out and as such RSS still forms part of the Councils' development plans, albeit a part that will be given less weight for decision making purposes due to the intention to revoke it. The NPPF has also revoked most of the previous Planning Policy Statements and Planning Policy Guidance.

2.2.3 *Local Drivers and Policies*

Local Plans/Core Strategies for DBC, HBC, MBC, RCBC and SBC with water related policy have been summarised in Appendix B, Table 11-3 to Table 11-7.

2.3 Local Plans Progress

A summary of each of the authorities Local Plan progress is described in the following subsections.

Darlington Borough Council

DBC's Core Strategy was adopted on the 6th May 2011. The Core Strategy includes a range of strategic planning policies to guide the use of land to 2026. It is accompanied by a Sustainability Appraisal, a Habitats Regulation Assessment and an Infrastructure Delivery Plan. The Core Strategy sets out how the Borough will develop over the next 15 years, including locations for housing, employment, shops and services. The Core Strategy's seven strategic locations at the Town Centre, Town Centre Fringe, Central Park, North Western Urban Fringe, Eastern Urban Fringe and Durham Tees Valley Airport are where significant housing and employment growth will take place. The amount of growth required is also identified.

Hartlepool Borough Council

HBC's Local Plan Preferred Options Document was made available for public comment between the 29th November 2010 and the 11th February 2011. The publication document was published for public consultation in February 2012. HBC submitted its Local Plan with proposed changes in June 2012 with public consultation taking place on the proposed changes. Further proposed changes were published in September 2012 for public consultation. The responses from this consultation were collated for scrutiny by the Cabinet in

[6] http://www.gos.gov.uk/nestore/docs/planning/rss/rss.pdf

September 2011. The Council published its adopted Strategic Housing Land Availability Assessment (SHLAA) Report in March 2010.

Middlesbrough Council

MBC's Core Strategy was adopted on the 20th February 2008 and its Regeneration DPD, setting out site specific allocations, was adopted on the 25th February 2009. The Council is in the early stages of reviewing the housing sections of both the Core Strategy and the Regeneration DPD and consulted on its Issues & Options report in May – July 2012. This review will establish a revised housing requirement and set out new housing allocations. At the time of the Outline WCS being completed neither the housing requirement nor the housing allocations had been established. These details will be set out in the Preferred Options Report. A review of the SHLAA has been undertaken and was published in May 2012.

Redcar and Cleveland Borough Council

RCBC is in the process of developing a single Local Plan, which will include site allocations. This document is due for adoption in August 2014, with the Scoping Report due out for consultation in November 2012. The Core Strategy was formally adopted by the Council on the 19th July 2007, but it does not set out site-specific proposals; rather it looks at the broad locations for new development such as for housing, employment, transport, retail and public services etc.

Stockton-on-Tees Borough Council

SBC adopted its Core Strategy on the 24th March 2010. The Core Strategy includes a limited range of strategic policies to guide the preparation of more detailed policies in subsequent plans. The DPD is accompanied by a Sustainability Appraisal, an Appropriate Assessment, an Infrastructure Strategy and a Consultation Statement. In addition, the Core Strategy sets out the Council's spatial strategy for meeting known and anticipated development requirements to 2024, including the number of dwellings required.

In July 2011 the Council went out to consultation on a review of the housing element of the Core Strategy. This was because SBC identified deliverability issues with some sites it is reliant on to deliver the Core Strategy, which means there is now a need to find additional land for housing. The Council is currently consulting on the Regeneration and Environment LDD Preferred Options which includes the Council's preferred site allocations. The Regeneration and Environment LDD is scheduled for adoption in 2014, with policies shaping development in Stockton-on-Tees to 2029.

2.4 Supporting Documents

The impact of flood risk within the Tees Valley has been assessed in the Tees Valley Strategic Flood Risk Assessment (SFRA)[7], subsequently updated by the SFRAs carried out for the individual authorities:

- Darlington Level 1 SFRA (2009)[8];
- Darlington Level 2 SFRA (2010)[9];
- Darlington Town Centre Fringe Flood Mitigation Strategy (2012)[10];
- Hartlepool Level 1 SFRA (2010)[11];

[7] Tees Valley Strategic Flood Risk Assessment, JBA Consulting, February 2007
[8] Strategic Flood Risk Assessment Level 1, JBA Consulting, December 2009
[9] Strategic Flood Risk Assessment Level 2, JBA Consulting, October 2010
[10] Darlington Town Centre Fringe Flood Mitigation Strategy, JBA Consulting, July 2012
[11] Hartlepool Borough Council, Strategic Flood Risk Assessment Level 1, JBA Consulting, May 2010

- Hartlepool Level 2 SFRA (2010)[12];
- Middlesbrough Strategic Surface Water Flooding Study (2010)[13];
- Redcar and Cleveland Level 2 SFRA (2010)[14]; and
- Stockton-on-Tees SFRA (2010)[15].

The findings of these studies have been reviewed and used in this Outline WCS.

2.5 Data Availability

As described in the Scoping Study, undertaking a WCS requires a large amount of data collection, much of which is reliant on the willingness of third parties to supply in order to allow the study to be progressed. In some cases, the availability of data with respect to water cycle infrastructure and future planning is not available within the time required to undertake the assessment and various assumptions may be needed to enable the study to continue. This study had collated available information within the project timeline, and produced a catalogue of the data collected. It also identifies the data provider in each case.

A full list of the data requested and that which was made available to the study is included in the data catalogue included as Appendix E.

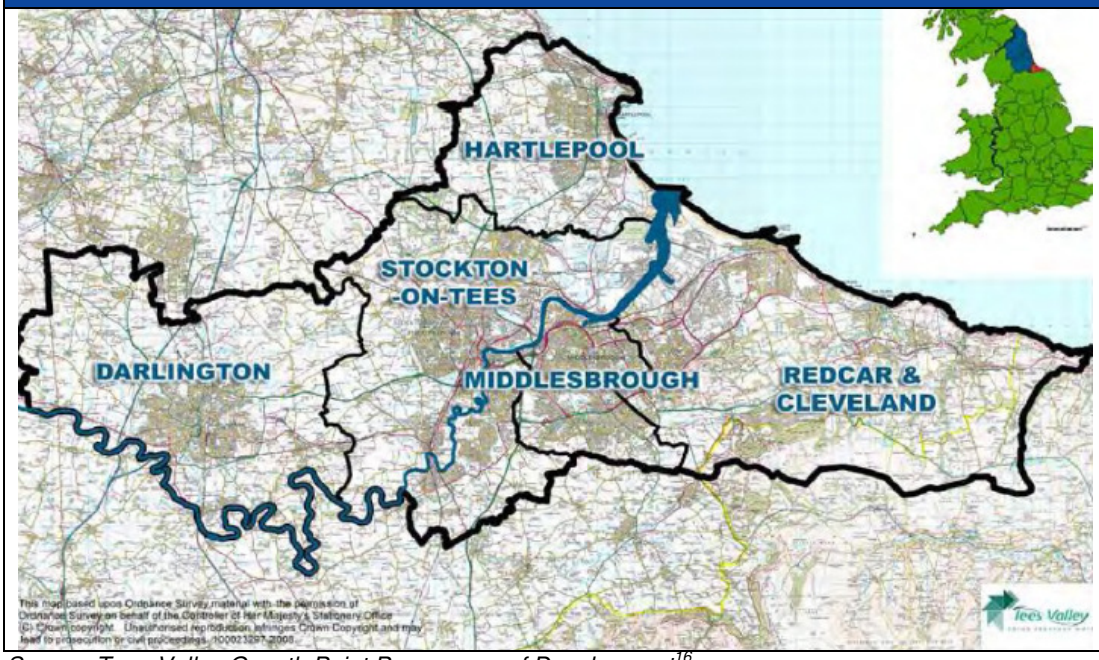
[12] Hartlepool Borough Council, Strategic Flood Risk Assessment Level 2, JBA Consulting, October 2010
[13] Middlesbrough Council Strategic Surface Water Flooding Study, JBA Consulting, Final report, 2010
[14] Redcar and Cleveland Strategic Flood Risk Assessment Level 1 and 2, JBA Consulting, 2010
[15] Stockton-on-Tees Borough Council Strategic Flood Risk Assessment Level 1 and 2, JBA Consulting, 2010

3 DEVELOPMENT IN THE TEES VALLEY

3.1 Tees Valley Study Area

The WCS study area encompasses the geographical extent of Darlington Borough Council (DBC), Hartlepool Borough Council (HBC), Middlesbrough Council (MBC), Redcar and Cleveland Borough Council (RCBC) and Stockton-on-Tees Borough Council (SBC). Four of these authorities were created by the break up of the County of Cleveland in 1996; Darlington became a unitary authority in 1997. The study area is shown in Figure 3-1 below.

FIGURE 3-1: THE LOCATIONS OF THE FIVE BOROUGHS WITHIN THE TEES VALLEY



Source: Tees Valley Growth Point Programme of Development[16]

The main urban centres of the study area are focused around Middlesbrough and Stockton-on-Tees, with smaller centres in Hartlepool, Darlington and Redcar. The total population of the Tees Valley was estimated as 662,200 in mid-2010, an increase of 0.3% from mid-2009, when there was a population of 660,300[17].

The eastern Tees Valley area is heavily industrialised, with significant industry along the banks of the Tees estuary, although much of this has declined in recent years with a shift in employment types away from manufacturing. The ports of Hartlepool and Teesport remain important to the area, dealing with approximately 50 million tonnes of cargo and 6,000 vessels annually. Freight handling, along with iron and steel production, chemical and oil refining, and ship repair and dismantling remain significant in the Tees Estuary. Away from the estuary and the urban centres, the lowland parts of the area are farmland, with a mixture of grassland, arable and horticulture.

[16] http://www.stockton.gov.uk/resources/planning/cssupdocs/HO10.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=HO10.pdf Date Accessed: 11th October 2011.
[17] ONS Indicative Estimates, Tees Valley Unlimited, http://www.teesvalleyunlimited.gov.uk/tees-valley-unlimited/information-hub/economic-intelligence.aspx

3.2 Proposed Growth within the Tees Valley

The five councils have identified the future proposed growth in the Tees Valley up to 2026. These figures form the basis for the assessments within the Outline WCS.

As set out in section 2.4 above, MBC is in the early stages of reviewing its LDF housing requirement. At this stage the housing requirement has not been established. Officers provided indicative potential low, medium and high housing scenarios solely for the purpose of undertaking the Outline WCS. The medium scenario has been assessed in the WCS.

3.2.1 *Housing growth*

The total target to 2026 is 36,644, divided across the five Boroughs as follows:

- DBC – 7,174 dwellings;
- HBC – 5,022 dwellings;
- MBC – 5,320 dwellings;
- RCBC – 3,981 dwellings; and
- SBC – 13,996 dwellings.

These comprise existing allocations, potential allocation sites and sites with planning permission. Sites with less than 50 houses proposed have not been assessed within this Outline WCS. For this level of assessment, it is felt that a cut off of 50 houses is an appropriate level of detail as this does not represent a significant flow increase in a particular WwTW's catchment. Appendix B Table 13-1 provides a summary of the housing figures assessed in the Stage 2 WCS.

3.2.2 *Employment Growth*

Proposed employment sites were received from the five councils, but job targets were only available for DBC, HBC, RCBC and SBC. MBC does not have quantifiable job targets and in order to enable the WCS to be undertaken, indicative officer estimates of the potential number of jobs that could be created on each employment site were provided. The total job target to 2026 is 79,732, divided as follows:

- DBC – 6,080 jobs[18];
- HBC – 22,195 jobs;
- MBC - 2,930 jobs;
- RCBC – 14,000 jobs; and
- SBC – 34,527 jobs[19].

Proposed employment sites of less than 1 hectare have not been assessed within this Outline WCS. For this level of assessment, it is felt that a cut off of 1 hectare is an appropriate level of detail as this does not represent a significant flow increase in a particular WwTW's catchment. Table 12-2 in Appendix B provides a summary of the employment sites assessed in the Stage 2 WCS.

[18] This figure only includes additional jobs created on employment sites, other sites e.g. for commercial uses are expected to come forward to 2026 and will also create jobs. The Darlington Business Sites and Premises Review is currently being undertaken; the number and mix of jobs, and location of sites may change.
[19] This is the preferred scenario to 2021 from the Stockton-on-Tees Employment Forecasts & Land Requirements.

4 WATER CYCLE ENVIRONMENT AND INFRASTRUCTURE BASELINE

4.1 Introduction

The full baseline of all water cycle components is not included in this Outline study as this was described and reported in the Tees Valley Scoping WCS. This section therefore summarises the environmental and water services infrastructure baseline for each of the authority areas with regards to the various components of the water cycle, as established by the Scoping WCS.

4.2 Darlington Borough

4.2.1 *Water Resources and Supply*

The Tees Catchment Abstraction Management Strategy (CAMS) identifies three Water Resource Management Units (WRMUs) (River Skerne, River Leven and Sherwood Sandstone groundwater unit), which currently all have 'water available' at low flows, although the target status for all three in 2014 and 2020 is 'No water available'. Therefore the presumption is for new licenses to allow unconstrained abstraction until that status is reached.

Darlington Borough is supplied with water by Northumbrian Water, falling within the Kielder WRZ. NWL supplies Darlington via Broken Scar groundwater abstraction. This abstraction takes groundwater supply from the Wear Magnesian Limestone and 40% of the total volume from the River Tees. The status of the Magnesian Limestone is 'move to no water available by 2012'. NWL's WRMP states that the Kielder WRZ '*remains in surplus of supply to the forecast demands over the whole of the planning horizon*' i.e. NWL has calculated that there is sufficient water available in the Kielder WRZ to meet its forecasted population increases. Therefore there is no constraint in available water supply.

4.2.2 *Flood Risk & Surface Water Management*

Darlington falls into the Tees Catchment Flood Management Plan (CFMP) Mid Catchment sub-area, defined by the CFMP as an area of moderate to high flood risk where generally further action can be taken to reduce flood risk (CFMP Policy 5). The major watercourse within the Borough of Darlington is the River Tees, which flows along the southern boundary of the Borough and poses a risk to Neasham and Hurworth Place; both are historic fluvial flooding hotspots where property has been repeatedly affected. Of more significance to the urban area is the River Skerne, which flows directly through the centre of Darlington. The most recent modelling carried out for the 2012 Darlington Town Centre Fringe Mitigation Strategy)[9], identified that during the 1-in-100 year flood event, the River Skerne would overtop its banks to varying degrees in and around the Town Centre Fringe. It also sets out a comprehensive, phased approach to flood mitigation, which reduces the risk to existing properties as well as future development.

The 2009 Level 1 SFRA[8] showed how during the more frequent flood events, water levels in the Skerne can impede land drainage networks leading to surface water flooding. This was progressed by the Level 2 SFRA, which mapped Critical Drainage Areas (CDAs) in Pierremont, Town Centre and Eastbourne.

Elsewhere the Environment Agency's flood mapping[20] shows the majority of the Borough of Darlington to lie within Flood Zone 1 (FZ1), although there are narrow areas of Flood Zone 2 (FZ2) and Flood Zone 3 (FZ3) associated with the tributaries of the Rivers Tees and Skerne, e.g. Cocker Beck, West Beck and Baydale Beck.

[20] www.environment-agency.gov.uk

The 2009 Level 1 SFRA[8] showed how during the more frequent flood events, water levels in the Skerne can impede land drainage networks leading to surface water flooding. The Level 2 SFRA notes that although surface water flooding is widely distributed, significant flood risk is limited to localised pooling of shallow water following heavy rain, which can cause a particular problem in the mapped candidate Critical Drainage Areas (CDAs) in Pierremont, the Town Centre and Eastbourne. The Level 2 SFRA only confirmed the Town Centre/Town Centre Fringe as a Critical Drainage Area because NWL identify the area as having a surface water problem and a significant amount of development is expected to take place over the next 15 years.

4.2.3 *Wastewater Treatment and Collection*

Initial assessment suggested there is capacity at all the WwTWs serving Darlington Borough. However, capacity at Stainton and Sadberge is limited and would not be able to accommodate large developments under current operation. Stressholme WwTW has significant capacity available, which should be an influencing factor in locating any larger proposed developments in Darlington.

4.2.4 *Water Quality*

Half of the water bodies within the Tees catchment achieved only Poor or Bad status/potential in the 2009 RBMP. Intensive industry in the area, particularly the lower catchment has had a significant influence on water quality. Under the WFD obligations, any proposed developments in Darlington must not contribute to any deterioration in the biological and chemical status of water bodies and, through effective infrastructure design, assist in the achievement of good ecological and chemical status of water bodies by 2015.

There are several initiatives already underway or planned to address existing and known water quality issues throughout the region. The Environment Agency, in liaison with water companies, has produced a list of potential schemes that should be undertaken as part of the National Environment Programme (NEP), to improve water quality throughout England and Wales. A large number of the proposed schemes focus on discharges from WwTW and improving these to meet proposed WFD water quality standards by 2015.

The programme in the North East is smaller than in other areas and this reflects high levels of investment in the past that has already achieved excellent river and bathing water quality in the region[21]. For NWL in the Tees Valley region, the continuation of the Tees Estuary investigation is relevant to DBC.

4.2.5 *Ecology and Biodiversity*

Whilst there are no European or nationally designated conservation sites within the Borough of Darlington, there are numerous locally designated sites that could potentially be affected by development within the Borough. In addition, the European and nationally designated conservation sites downstream of the Borough could potentially be affected by increased discharges of treated sewage effluent.

4.3 Hartlepool Borough

4.3.1 *Water Resources and Supply*

Water supply for Hartlepool is sourced from the Magnesian Limestone aquifer, where water availability status is ‘move to no water available by 2012’. Therefore the presumption is for new licenses to allow unconstrained abstraction until that status is reached.

[21] Looking to the Future - Company Strategy North East Version – Final Business Plan, Northumbrian Water, April 2009

AWS's WRMP states that the Hartlepool WRZ '*has a surplus of available against target headroom throughout the Plan period*', i.e. AWS has calculated that there is sufficient water available in the Hartlepool WRZ to meet its forecasted population increases. Therefore there is no constraint in available water supply.

However, it should be noted that the WRMP is due to be reviewed for the periodic review period 2014 (PR14). The current assessment of '*surplus of available against target headroom'* did not take into account the WFD poor quantitative status or the outcomes from the subsequent Water Framework Directive (WFD) investigations.

4.3.2 *Flood Risk & Surface Water Management*

Hartlepool Borough falls into the Eastern sub-area of the Tees CFMP, defined as an area of moderate to high flood risk where generally further action can be taken to reduce flood risk (CFMP Policy 5). Some parts of the Eastern sub-area are at risk of tidal flooding from the North Sea, which will be exacerbated by climate change and sea level rise. Culverting of urban watercourses is also a problem, which will again be exacerbated by climate change and increased intensity of rainfall events.

The major source of flood risk to the Borough of Hartlepool is the North Sea, although there is also a risk from the Tees estuary to the south of the Borough. There are several smaller watercourses, namely the Burn Valley Beck, Middle Warren Watercourse, Tunstall Farm Beck, The Stell, Seaton Snook Drain and the Greatham Beck which flows into the Greatham Creek.

The SFRA and the Environment Agency's flood mapping[20] show the majority of the Borough of Hartlepool to lie within FZ1 although there are narrow areas of FZ2 and FZ3 associated with minor watercourses.

4.3.3 *Wastewater Treatment and Collection*

Initial assessment suggested that the WWTW at Seaton Carew has significant remaining capacity that could potentially accommodate larger proposed developments. Greatham WwTW has some capacity, potentially for smaller developments. At present, Graythorpe WwTW appears to have limited capacity for growth, although flows could be transferred to Seaton Carew WwTW from the Graythorpe WwTW catchment, which could allow for additional growth above the levels that can be accommodated by Graythorpe WwTW.

4.3.4 *Water Quality*

Half of the water bodies within the Tees catchment achieved only poor or bad biological status in the 2009 RBMP. Intensive industry in the area, particularly the lower catchment has had a significant influence on water quality. Under the WFD obligations, any proposed developments in Hartlepool must not contribute to any deterioration in the biological and chemical status of water bodies and, through effective infrastructure design, assist in the achievement of good ecological and chemical status of water bodies by 2015.

There are several initiatives already underway or planned to address existing and known water quality issues throughout the region. The Environment Agency, in close liaison with water companies has produced a list of potential schemes that should be undertaken as part of the NEP, to improve water quality throughout England and Wales. A large number of the proposed schemes focus on discharges from WwTW and improving these to meet proposed WFD water quality standards by 2015.

The programme in the North East is smaller than in other areas and this reflects high levels of investment in the past that has already achieved excellent river and bathing water quality in the region[21]. For NWL in the Tees Valley region, the continuation of the Tees Estuary investigation is relevant to MBC.

4.3.5 *Ecology and Biodiversity*

The Teesmouth and Cleveland Coast SPA and Ramsar site, and the associated Seaton Dunes & Common SSSI, Seal Sands SSSI and Cowpen Marsh SSSI lie within the Borough of Hartlepool. These sites, along with numerous locally designated sites could potentially be affected by development within the Borough. In addition, the European and nationally designated conservation sites could potentially be affected by increased discharges of treated sewage effluent from development upstream of the Borough.

4.4 Middlesbrough Council

4.4.1 *Water Resources and Supply*

The Tees CAMS identifies three Water Resource Management Units (WRMUs) (River Skerne, River Leven and Sherwood Sandstone groundwater unit), which currently all have 'water available' at low flows, although the target status for all three in 2014 and 2020 is 'No water available'. Therefore the presumption is for new licenses to allow unconstrained abstraction until that status is reached.

Like the majority of the Tees Valley region, Middlesbrough is supplied with water by Northumbrian Water, falling within the Kielder WRZ. Water supplies are abstracted from the River Tees, with flows maintained by flows from Kielder Water transferred south from the River Tyne to the Rivers Wear and Tees. NWL's WRMP states that the Kielder WRZ 'remains in surplus of supply to the forecast demands over the whole of the planning horizon' i.e. NWL has calculated that there is sufficient water available in the Kielder WRZ to meet its forecasted population increases. Therefore there is no constraint in available water supply.

4.4.2 *Flood Risk & Surface Water Management*

Middlesbrough falls into the Tees CFMP Mid Catchment sub-area, defined by the CFMP as an area of moderate to high flood risk where generally further action can be taken to reduce flood risk (CFMP Policy 5). The CFMP highlighted areas historically prone to surface water flooding in the Marton Road, Talbot Street and Park Vale Road areas.

The River Tees forms the northern boundary of Middlesbrough Council and is predominantly tidal. Any outfalls into the river here are susceptible to backing up and flooding during high tide events. As Middlesbrough is heavily urbanised, there are also many culverted watercourses, which when blocked, can often cause flooding during heavy rainfall events. This has been a particular problem in the Valley Road area. The 2007 Tees Valley SFRA mapped flood zones, which were superseded in 2010 by the Strategic Surface Water Flooding Study and in 2011 by the Environment Agency's flood mapping. The Environment Agency's flood mapping shows the major sources of flooding to be the River Tees, although the tributaries of the Tees have areas of FZ2 and FZ3.

4.4.3 *Wastewater Treatment and Collection*

There are no WwTWs within the Borough of Middlesbrough that were assessed; foul sewerage from this area discharges to WwTW outside of the Borough.

4.4.4 *Water Quality*

Half of the water bodies within the Tees catchment achieved only Poor or Bad biological status in the 2009 RBMP. Intensive industry in the area, particularly the lower catchment has had a significant influence on water quality. Under the WFD obligations, any proposed developments in Middlesbrough must not contribute to any deterioration in the status/potential of water bodies and, through effective infrastructure design, assist in the achievement of Good status/potential of water bodies by 2015.

There are several initiatives already underway or planned to address existing and known water quality issues throughout the region. The Environment Agency, in close liaison with water companies has produced a list of potential schemes that should be undertaken as part of the NEP, to improve water quality throughout England and Wales. A large number of the proposed schemes focus on discharges from WwTW and improving these to meet proposed WFD water quality standards by 2015.

The programme in the North East is smaller than in other areas and this reflects high levels of investment in the past that has already achieved excellent river and bathing water quality in the region[21]. For NWL in the Tees Valley region, the continuation of the Tees Estuary investigation is relevant to MBC.

4.4.5 *Ecology and Biodiversity*

Whilst there are no European or nationally designated conservation sites within the Borough of Middlesbrough, there are numerous locally designated sites that could potentially be affected by development within the Borough. In addition, the European and nationally designated conservation sites downstream of the Borough could potentially be affected by increased discharges of treated sewage effluent.

4.5 Redcar & Cleveland Borough

4.5.1 *Water Resources and Supply*

The Tees CAMS identifies three Water Resource Management Units (WRMUs) (River Skerne, River Leven and Sherwood Sandstone groundwater unit), which currently all have 'water available' at low flows, although the target status for all three in 2014 and 2020 is 'No water available'. Therefore the presumption is for new licenses to allow unconstrained abstraction until that status is reached.

Like the majority of the Tees Valley region, Redcar and Cleveland Borough is supplied with water by Northumbrian Water, falling within the Kielder WRZ. Water supplies are abstracted from the River Tees, with flows maintained by flows from Kielder Water transferred south from the River Tyne to the Rivers Wear and Tees. NWL's WRMP states that the Kielder WRZ 'remains in surplus of supply to the forecast demands over the whole of the planning horizon' i.e. NWL has calculate that there is sufficient water available in the Kielder WRZ to meet its forecasted population increases. Therefore there is no constraint in available water supply.

4.5.2 *Flood Risk & Surface Water Management*

Redcar & Cleveland Borough falls into the Eastern sub-area defined by the CFMP as an area of moderate to high flood risk where generally further action can be taken to reduce flood risk (CFMP Policy 5). Some parts of the Eastern sub-area are at risk of tidal flooding from the North Sea, which will be exacerbated by climate change and sea level rise. Culverting of urban watercourses is also a problem, which will again be exacerbated by climate change and increased intensity of rainfall events.

The Borough is bounded to the North by the Tees Estuary so can be susceptible to tidal flooding, although in general the risk is lower than neighbouring boroughs due to higher ground. There is also a long stretch of coastline. Direct flooding from the sea has only historically really been an issue at Redcar where the coastline is lower compared to high cliffs elsewhere. The sea wall had an estimated life of less than ten years and suffered much damage from storms. Studies indicated that almost 1,200 properties were at risk of flooding and 200 at risk from erosion providing impetus for the Redcar Flood Alleviation Scheme[22] which commenced in April 2011. Construction of the 2.7 km defence is under way and due for completion by December 2012.

[22] Redcar Flood Alleviation Scheme, Environment Agency http://www.environment-agency.gov.uk/homeandleisure/floods/127992.aspx?

Particular fluvial flooding issues have been identified with culverted watercourses, where capacity can decrease during high tides. Often the capacity is not adequate to deal with heavy rainfall events regardless of the tide, creating flood risk hotspots, particularly around South Bank Road flooding from Spencer Beck. Flooding incidents in Guisborough have also been attributed primarily to inadequate capacity and blocking of culverts leading to floods linked to Chapel Beck. Skinningrove has suffered significant floods, frequently caused by blockages of the bridges forcing Skinningrove Beck to overtop

Surface water flooding has been highlighted as a significant issue in the borough, particularly in the urbanised western part of the borough around Eston, where there are numerous records of drains overflowing. Additional issues have been highlighted in Redcar & Dormanstown, New Marske, Saltburn, Brotton and Guisborough.

The 2010 SFRA modelled flood risk to the employment and housing sites proposed by RCBC and concluded that with the inclusion of barriers to flood waters, such as the dune system at Coatham Sands and the railway embankment at Warrenby, a small number of RCBC's proposed development sites were at residual risk of flooding. The SFRA concluded that this residual risk could be managed through mitigation measures such as land raising and flood resilient construction techniques and therefore all the proposed sites were suitable for development.

4.5.3 *Wastewater Treatment and Collection*

Initial assessment suggests significant available capacity at Bran Sands WwTW. Marske and Skinningrove WwTWs also show capacity that could potentially accommodate large developments. However, no available capacity is indicated at Moorsholm WwTW and a very small amount of capacity at Dunsdale WwTW.

4.5.4 *Water Quality*

Half of the water bodies within the Tees catchment achieved only Poor or Bad biological status/potential in the 2009 RBMP. Intensive industry in the area, particularly the lower catchment has had a significant influence on water quality. Under the WFD obligations, any proposed developments in Redcar & Cleveland must not contribute to any deterioration in the status/potential of water bodies and, through effective infrastructure design, assist in the achievement of Good status/potential of water bodies by 2015.

There are several initiatives already underway or planned to address existing and known water quality issues throughout the region. The Environment Agency, in close liaison with water companies has produced a list of potential schemes that should be undertaken as part of the NEP, to improve water quality throughout England and Wales. A large number of the proposed schemes focus on discharges from WwTW and improving these to meet proposed WFD water quality standards by 2015.

The programme in the North East is smaller than in other areas and this reflects high levels of investment in the past that has already achieved excellent river and bathing water quality in the region[21]. For NWL in the Tees Valley region, the following key schemes have been identified:

- Bathing Water investigations at Saltburn; and
- continuation of the Tees Estuary investigation.

Particular note should be made of designated Bathing Waters along the coastline which have the potential to be impacted by upstream discharges. There are a number of designated Bathing Waters along the coastline of Redcar and Cleveland Borough. Any planned development must consider how these waters may be impacted. Although all sites met minimum quality requirements under the Bathing Water Directive in 2011, it must also be

taken into account that the directive has been revised with more stringent water quality targets being implemented from the 2012 bathing season. As mentioned above, although Saltburn failed to meet bathing water standards in 2010, all Redcar and Cleveland bathing waters passed the highest possible standards (a Guideline pass) under the Environment Agency's 2011 compliance report, published in December 2011, and the Saltburn Bathing Water Management Group are undertaking measures to achieve continuous improvement.

4.5.5 *Ecology and Biodiversity*

The Teesmouth and Cleveland Coast SPA and Ramsar site and the associated North York Moors SSSI lie within the Borough of Redcar and Cleveland. These sites, along with numerous locally designated sites could potentially be affected by development within the Borough. In addition, the European and nationally designated conservation sites could potentially be affected by increased discharges of treated sewage effluent from development upstream of the Borough.

4.6 Stockton-on-Tees Borough

4.6.1 *Water Resources and Supply*

The Tees CAMS identifies three Water Resource Management Units (WRMUs) (River Skerne, River Leven and Sherwood Sandstone groundwater unit), which currently all have 'water available' at low flows, although the target status for all three in 2014 and 2020 is 'No water available'. Therefore the presumption is for new licenses to allow unconstrained abstraction until that status is reached.

Like the majority of the Tees Valley region, Stockton-on-Tees Borough is supplied with water by Northumbrian Water, falling within the Kielder WRZ. Water supplies from Kielder Water are transferred south from the River Tyne to the Rivers Wear and Tees. NWL's WRMP states that the Kielder WRZ 'remains in surplus of supply to the forecast demands over the whole of the planning horizon' i.e. NWL has calculate that there is sufficient water available in the Kielder WRZ to meet its forecasted population increases. Therefore there is no constraint in available water supply.

4.6.2 *Flood Risk & Surface Water Management*

The main source of flooding in Stockton-on-Tees is tidal and fluvial from the River Tees and other urban watercourses[15]. Predicted sea level rise suggests potential for some current defences to be outflanked by tidal flooding in the future. This source of flooding can be exacerbated by high river flows in urban watercourses draining to the Tees, when tide-locked. A number of significant tidal floods are on record in the Borough, particularly affecting the Greatham Creek and Port Clarence areas.

With regards to fluvial flooding, Yarm has suffered from significant flooding from the Tees, although improved protection measures were constructed in 1993 and 1995. Lustrum beck also has a long history of flooding, strongly influenced by insufficient channel capacity and culvert blockages. A flood risk mapping study has identified a significant number of properties at risk in the event of defence failure in a 1 in 100 year flood. The River Leven, Billingham Beck, Cowbridge Beck, The Old River Tees, and Holme Fleet have all been identified as potential sources of fluvial flood risk.

The major source of flood risk to the Borough of Stockton-on-Tees is the River Tees. There are numerous formal and informal defences adjacent to the river, although these are mainly agricultural defences upstream of Stockton-on-Tees and the proposed Bowesfield North, Boathouse Lane and Chandler's Wharf sites are undefended. The Level 2 SFRA concluded that some sites were at risk of flooding from the River Tees (Phases 1 and 2 of Bowesfield North, Boathouse Lane and Chandlers Wharf), which would be exacerbated by the predicted

effects of climate change. The majority of the Borough lies within FZ1 although there are narrow areas of FZ2 and FZ3 associated with the River Tees and the Lustrum Beck.

4.6.3 *Wastewater Treatment and Collection*

Initial assessment indicates that all of the WwTWs in the Borough have some additional capacity with the most notable availability at Billingham WwTW. Carlton & Redmarshall, Kirklevington and Longnewton WwTWs may only be able to accommodate smaller scale developments under current operation.

4.6.4 *Water Quality*

Half of the water bodies within the Tees catchment achieved only Poor or Bad biological status in the 2009 RBMP. Intensive industry in the area, particularly the lower catchment has had a significant influence on water quality. Under the WFD obligations, any proposed developments in Stockton-on-Tees must not contribute to any deterioration in the status/potential of water bodies and, through effective infrastructure design, assist in the achievement of Good ecological and chemical status of water bodies by 2015.

There are several initiatives already underway or planned to address existing and known water quality issues throughout the region. The Environment Agency, in close liaison with water companies has produced a list of potential schemes that should be undertaken as part of the NEP, to improve water quality throughout England and Wales. A large number of the proposed schemes focus on discharges from WwTW and improving these to meet proposed WFD water quality standards by 2015.

The programme in the North East is smaller than in other areas and this reflects high levels of investment in the past that has already achieved excellent river and bathing water quality in the region[21]. For NWL in the Tees Valley region, the continuation of the Tees Estuary investigation is relevant to SBC.

4.6.5 *Ecology and Biodiversity*

The Teesmouth and Cleveland Coast SPA and Ramsar site and the associated Tees and Hartlepool Foreshore and Wetlands SSSI, Seal Sands SSSI and Cowpen Marsh SSSI lie within Stockton-on-Tees Borough. These sites, along with numerous locally designated sites could potentially be affected by development within the Borough. In addition, the European and nationally designated conservation sites could potentially be affected by increased discharges of treated sewage effluent from development upstream of the Borough.

5 WATER RESOURCES & SUPPLY

5.1 Introduction

To follow on from the baseline assessment carried out in the Scoping WCS and summarised in section 4 above, the potential effects of the proposed development on water resources has been updated following on from the Scoping report.

5.1.1 *The Tees Catchment Abstraction Management Strategy*

The Tees CAMS states that there is currently water available at low flows in all three Water Resources Management Units (WRMUs) in the Tees CAMS area (River Skerne, River Leven and Sherwood Sandstone groundwater unit), although the target status for all three in 2014 and 2020 is 'No water available'.

The current water resource availability status for the Skerne and Leven WRMUs is 'Water available' at low flows and the target status in 2014 is 'No water available'. A status of 'Water available' means water is likely to be available at all flows including low flows, although some restrictions may apply. A status of 'No water available' means no water is available for further licensing at low flows, although water may be available at higher flows with appropriate restrictions. 'No water available' is considered to be the optimum status for both the environment and abstractors. The strategy for future abstractions in this WRMU is to allow unconstrained abstraction until the target status of no water available is reached, when a 'hands off flow' (HoF) condition would be introduced.

The current water resource availability status for the Sherwood Sandstone groundwater unit is also 'Water available' at low flows and the target status in 2014 is no water available. As for the two surface water WRMUs, the presumption for new licences is to allow unconstrained abstraction until the status of 'No water available' is reached; the unit currently has 156.2 Ml/d available for abstraction. The Northumbria RBMP[23] classifies the Sherwood Sandstone groundwater unit (GB40301G70200) as being at Good qualitative and quantitative status, with a target of maintaining Good status to 2015.

5.1.2 *The Wear Catchment Abstraction Management Strategy*

The Wear CAMS has been split into five surface water WRMUs and one groundwater management unit.

The Wear CAMS states that there is currently water available in the Magnesian Limestone GWMU, which is the principal aquifer from which Hartlepool Water abstracts to supply the Hartlepool Borough. The CAMS notes that local chemical and physical variations in the aquifer mean that water resources availability may vary across the aquifer, which is reflected in the target status of '*move towards no water available*' rather than '*no water available*' by 2012.

The target status means that new abstraction licenses could be granted for unconstrained abstraction with a time limit of 31st March 2014. For existing licences, there is a presumption to renew existing time limited licenses subject to satisfying renewal criteria and local considerations, which may include minor water efficiency conditions. Other local restrictions may include the following:

- in certain locations new or increased abstractions may cause deterioration in water quality due to dissolution of minerals or increased upward flow from the Coal Measures;
- due to aquifer properties, water yields are known to be low in specific areas of the Magnesian Limestone GWMU e.g. Newton Aycliffe;

[23] http://www.environment-agency.gov.uk/research/planning/124807.aspx

- new or increased licence applications along the coastal strip of this GWMU are unlikely to be successful because of the threat of saline intrusion affecting water quality;
- abstractions in and around the area of the Hell Kettles SSSI in Darlington are constrained by conditions linked to the chemistry in the ponds. Abstracted quantities will be controlled if the water chemistry of the ponds changes. Similar conditions would be placed on any future groundwater abstraction licences in the area, should they be granted.

The Northumbria RBMP[24] classifies the Wear Magnesian Limestone groundwater unit (GB40301G701700) as being at Poor chemical or qualitative status due to widespread occurrence and threshold breaches of sodium, chloride, nitrate and sulphate. The quantitative elements of the RMBP classification are also reported as being at Poor status, due to impacts on surface waters (i.e. groundwater abstraction related deterioration of dependent surface water body status), saline intrusion and water balance (i.e. impact of groundwater abstraction on the groundwater body resource balance).

This classification under the RBMP could limit further abstraction from the Wear Magnesian Limestone groundwater unit by Hartlepool Water.

5.2 Water Supply

The study area is supplied by two water companies. NWL supplies water to the majority of the Tees Valley area, with exception of Hartlepool, which is supplied with drinking water by Hartlepool Water company (HWC) (owned by Anglian Water Services). The HWC area represents a single Water Resource Zone (WRZ), the Hartlepool WRZ. The rest of the Tees Valley study area is covered by NWL's Kielder WRZ. The baseline summary in the previous section provides information relating to the water resource zones, whilst the Scoping study provides more detailed information.

The level of growth proposed in the Tees Valley study area has been confirmed by NWL and HWC as being catered for in their WRMPs.

However, it should be noted that the WRMP is due to be reviewed for the periodic review period 2014 (PR14). The current assessment of '*surplus of available against target headroom'* did not take into account the WFD poor quantitative status or the outcomes from the subsequent WFD investigations[25].

As noted above, the RBMP classification of the Wear Magnesian Limestone groundwater unit being at Poor status for both qualitative and quantitative elements could limit further abstraction by HWC.

As part of discussions held in undertaking the Outline Assessment, HWC has advised[26] that if the EA confirms that changes to the rate and pattern of abstraction are required as a result of the WFD status, the impact of these on well-field operations and the supply-demand balance will be assessed as part of the next RBMP round. If a deficit results, options for maintaining the supply-demand balance will be evaluated. This work will be completed in accordance with the requirements of the Water Resource Planning guideline and will involve assessing the cost-effectiveness of both demand management and supply-side options. Schemes that are selected will then be incorporated into an update of the Water Resource Management Plan.

5.3 Demand for Water

Likely increases in water demand in the study area have been calculated separately for the NWL (Darlington Borough, Middlesbrough Borough, Stockton-on-Tees Borough and Redcar

[24] http://www.environment-agency.gov.uk/research/planning/124807.aspx
[25] Cameron Sked, Planning Technical Specialist, Environment Agency, Personal Communication, 31/05/2012
[26] Steve Moncaster, Supply Demand Strategy Manager, Anglian Water, pers. comm., 25th August 2012

and Cleveland Borough) HW (Hartlepool Borough) supply areas, using six different water demand projections based on different rates of water use for new homes that could be implemented through potential future policy.

The projections were derived as follows:

- Projection 1 – Baseline Assumption – New homes would use 146 l/h/d for HWC and 150 l/h/d for NWL, this reflects the current average unmetered consumption used by HWC and NWL respectively;
- Projection 2 – Building Regulations – New homes would conform to (and not use more than) Part G of the Building Regulations requirement (in force as of the 6th April 2010) of 125 l/h/d (equivalent to the Code for Sustainable Homes (CfSH) Level 1/2 rating of 120 l/h/d plus 5 l/h/d for outdoor use) – this is considered to be the 'Business as Usual' scenario;
- Projection 3 – Code for Sustainable Homes Levels 1 & 2 – New homes would achieve CfSH Level 1/2 rating of 120 l/h/d – this is the Low efficiency scenario;
- Projection 4 – Code for Sustainable Homes Levels 3 & 4 – New homes would achieve CfSH Level 3/4 rating of 105 l/h/d – this is the Medium efficiency scenario;
- Projection 5 – Code for Sustainable Homes Levels 5 & 6 – New homes would achieve CfSH Level 5/6 rating of 80 l/h/d; and – this is the High efficiency scenario,
- Projection 6 – Very High efficiency – New homes would include both greywater recycling and rainwater harvesting reducing water use to a maximum of 62 l/h/d – this is the Very High efficiency scenario.

Using these projections, the increases in demand for water as a result of the planned growth are shown in Figure 5-1 and Figure 5-2 below.

FIGURE 5-1: WATER DEMAND SCENARIOS – NWL SUPPLY AREA

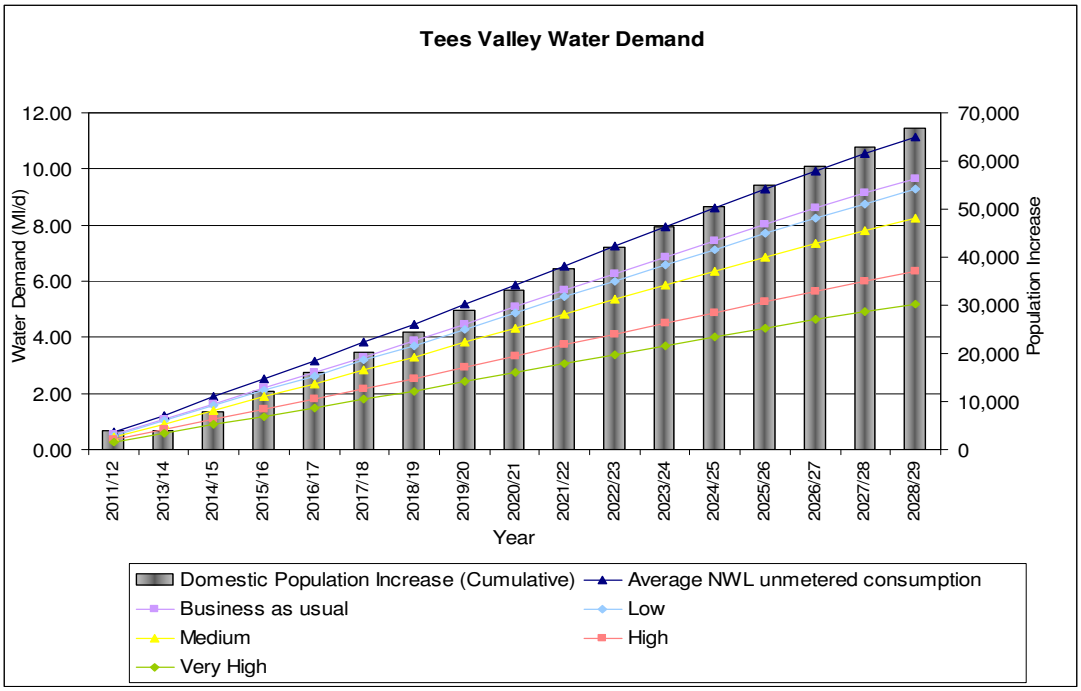
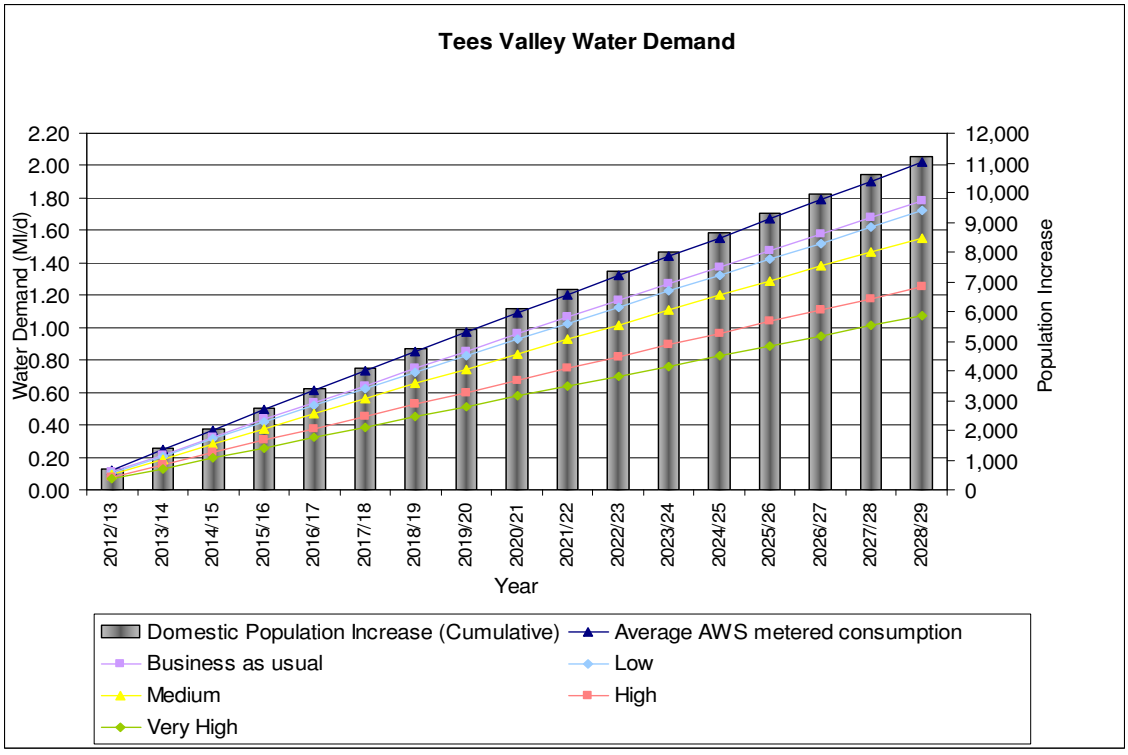


FIGURE 5-2: WATER DEMAND SCENARIOS – HWC SUPPLY AREA



The above figures demonstrate that for NWL, the additional water demand for the proposed development would vary between 11.16 Ml/d for current unmetered demand and 5.21 Ml/d for

the Very High efficiency scenario of 62 l/h/d. For HWC, the water demand for the proposed development would vary between 2.02 Ml/d for current unmetered demand and 1.07 Ml/d for the Very High efficiency scenario of 62 l/h/d.

The 'Business as Usual' water consumption figures i.e. equivalent to the Code for Sustainable Homes (CfSH) Level 1/2 rating of 120 l/h/d plus 5 l/h/d for outdoor use, for the proposed development are as follows:

- NWL – 9.66 Ml/d; and
- HWC – 1.78 Ml/d.

NWL and HWC are both predicting a supply surplus of available water in 2035 within the WRZs located within the Tees Valley, which would provide sufficient water supply to supply the proposed levels of growth within the area through the plan period.

5.3.1 *Water Efficiency Plan*

Despite the predicted surplus of available water in 2035 within the WRZs located within the Tees Valley, there are several key drivers for ensuring that water use in the development plan period is minimised as far as possible. There is a drive to ensure new development meets the sustainable development aspirations, particularly within Hartlepool Borough where there are identified issued with the underlying aquifer that supplies HWC (see 5.1.7 above) and hence sustainable water delivery is a key part of achieving this vision. As is the case for all sustainable use of resources, the three 'R's of reduce, reuse and recycle are key to maximising sustainability; reduce is the first, and arguably most important element, of sustainable water use to consider.

5.3.2 *Policy and Legislation Drivers*

Future Water, the Government's water strategy for England[27] was published in February 2008 and lays out the Government's policies for the future management of water in England. Part of its vision is for water efficiency to play a prominent role in achieving a sustainable supply and demand balance.

Future Water specifically aims to reduce water consumption in existing homes to 130 or 120 l/h/d by 2030. This will require the retrofitting of water efficient measures in existing homes and business in addition to behavioural change regarding the use of water and understanding of where it comes from.

The Building a Greener Future Policy Statement[28] published by Communities and Local Government in 2007 gives the target of zero carbon by 2016 (CSH Level 6) for all new homes. This will be achieved by a progressive tightening of the Building Regulations.

5.4 Climate Change and Availability of Water

It is predicted that climate change will reduce available water resources as rainfall patterns change to less frequent, but more extreme, rainfall events in the summer months, and winter rainfall patterns become more frequent and intense. This could lead to sustainability reductions[29] of abstraction licences.

[27] Future Water, the Government's water strategy for England, DEFRA, 2008
[28] Building a Greener Future: Policy Statement, CLG, 2007, http://www.communities.gov.uk/publications/planningandbuilding/building-a-greener
[29] Reductions in abstracted volume to bring abstraction back to sustainable levels. The Environment Agency has various approaches for implementing such sustainability reductions, including making increased use of time-limited licenses and reducing and modifying licences in agreement with licence holders.

5.4.1 *Managing Climate Change – Hartlepool Water*

In its Strategic Direction Statement, AWS (which owns HWC) states that climate change is the biggest single risk facing its business over the next 25 years. Similarly, in its 2010-2035 WRMP AWS highlighted that, over the planning period, one of the key water resources challenges it faces are from the impacts of climate change. Customers expect AWS to provide a continuous supply of water, but the resilience of the supply systems have the potential to be affected by the impact of climate change with severe weather-related events, such as flooding or an 'outage' incident at a source works supplying one of the major centres of population in the region. In its PR09 submission, AWS addressed the impacts of climate change through the need for investment in both mitigation and adaptation, with changes both to long-term averages and short-period acute events.

AWS has assessed the impacts of climate change and the results identified a more significant impact on surface water source yield than for groundwater. The modelling results also indicated that in some cases potential groundwater yield could increase, as the climate change scenarios not only predict higher temperatures but increased periods of prolonged and heavy rainfall. The overall impact of climate change on water resources over the plan period is estimated as around 30 Ml/d, indicating that small reductions in deployable output may affect local areas of the supply network, although these are not anticipated in the Hartlepool WRZ.

5.4.2 *Managing Climate Change – Northumbrian Water*

NWL's WRMP has also assessed the effects of climate change on water supplies, based upon CCDew regional estimates[30], UK Climate Impacts Programme's climate scenarios[31] and Environment Agency water demand scenarios[32].The three scenarios assessed for the Kielder WRZ concluded the following;

- Wet Climate Change Scenario. The results indicated that this scenario would not change the way in which the NWL surface water resources system is operated.
- Median Climate Change Scenario. The results indicated that this scenario would not change the way in which the NWL surface water resources system is operated.
- Dry Climate Change Scenario. The results indicated that if the 'Dry Climate Change Scenario' materialises, it may not be necessary to change the operation of the Northumbrian surface water resources system drastically. However at the Fontburn and Burnhope reservoirs, the amounts of water sent to treatment during low inflow periods may need to be reduced, although this could be supplemented from other sources.

[30] As reported in Climate Change and the Demand for Water, Defra, 2003
[31] Climate Change Scenarios for the United Kingdom, The UKCIP02 Briefing Report, April 2002
[32] Water for people and the environment Water Resources Strategy for England and Wales, http://www.environment-agency.gov.uk/research/library/publications/40731.aspx, accessed 16/08/2012

6 WASTEWATER TREATMENT

6.1 Introduction

This wastewater assessment assesses how much 'spare' capacity is available in existing WwTW once growth plans are considered.

An important aspect of the spare capacity of the existing wastewater treatment facilities is the assessment of the environmental capacity of the receiving watercourses. Discharge of additional treated wastewater from new development could have a detrimental impact on the water quality of receiving waters and the hydrological/hydraulic regime of receiving waters and associated habitats.

The Scoping WCS assessed the baseline of the WwTWs within the Tees Valley, as summarised in section 4 above. This Outline WCS builds on the baseline assessment, by assessing the effects of the proposed growth on this baseline headroom to see if the growth would cause the discharge consent limits at any of the WwTWs to be exceeded.

6.2 Assessment Methodology

6.2.1 *Baseline*

Wastewater treatment and collection infrastructure within the Tees Valley study area is owned and operated by NWL. The Environment Agency sets standards for effluent discharged into rivers, estuaries and the sea from water companies and industry, through consents to discharge issued under the 1991 Water Resources Act. Discharge consent standards are set individually for each wastewater treatment works (WwTW) taking into account what is required to protect water quality and ecology.

The scoping report identified several WwTWs that serve the study area, which discharge to both inland river systems and tidal waters. The WwTWs, Population Equivalents (PE) and discharge consent limits for dry weather flow (DWF), suspended solids (SS), biochemical oxygen demand (BOD) and ammonia (NH_4) are shown below in Table 6-1.

TABLE 6-1: WWTWS WITHIN THE STUDY AREA

WwTW	PE	DWF	95%ile			Absolute limits mg/l
			SS mg/l	BOD mg/l	NH_4 mg/l	
Graythorpe	1*	44*	30	20	-	-
Greatham	889	249	60	30	10	-
Seaton Carew	120,222	41,815	60	-	-	SS = 250, BOD = 250
Billingham	35,293	11,941	60	-	-	SS = 250, BOD = 250
Carlton & Redmarshall	2,287	685	40	20	10	-
Kirklevington	1,172	299	60	40	15	-
Longnewton	760	184	60	30	15	-
Bran Sands	391,142	171,140	60	-	40	SS = 250, BOD = 250
Dunsdale	213	42.66	60	30	20	-
Marske	93,556	26,716	60	-	-	SS = 250, BOD = 250
Moorsholm	346	132	60	35	20	-
Skinningrove	8,668	3,699	-	-	-	SS=250, BOD = 250
Bishopton	280	135	60	35	15	-
Stainton	503	245	50	30	10	-
Stressholme	101,653	28,658	50	40	15	BOD = 80, NH3 = 44
Sadberge	564	236	50	20	10	-
Goose Beck	740	447	40	25	10	BOD = 60, NH3 = 37

** Only domestic population is included in the calculation and the catchment at Graythorpe is almost exclusively an industrial catchment*

The baseline assessment within the scoping study identified the volumetric capacity at the WwTWs as shown below in Table 6-2.

TABLE 6-2: DWF CONSENT CAPACITY

WwTW	Receiving watercourse	Local authority*	Current DWF capacity (m3/d) (based on Measured DWF 2011)	Dwelling Capacity
Graythorpe	Tees Estuary	HBC	24	71
Greatham	Tees Estuary	HBC	103	305
Seaton Carew	The North Sea	HBC	20,535	60,844
Billingham	The North Sea	SBC	6,001	17,781
Carlton & Redmarshall	Whitton Beck	SBC	254	753
Kirklevington	Picton Stell	SBC	150	444
Longnewton	Tributary of the Coatham Beck	SBC	62	184
Bran Sands	Dabholm Gut	RCBC	74,790	221,600
Dunsdale	Dunsdale Beck	RCBC	19	56
Marske	The North Sea	RCBC	7,244	21,464
Moorsholm	Hagg Beck	RCBC	-10	-30
Skinningrove	The North Sea	RCBC	1,107	3,280
Bishopton	Bishopton Beck	DBC	99	293
Stainton	Stainsby Beck	DBC	18	53
Stressholme	River Tees	DBC	5,398	15,994
Sadberge	Carcut Beck	DBC	41	121
Goose Beck	Goosepool Beck	DBC	285	844

**There are no WwTW within Middlesbrough Council which were assessed for the purposes of this WCS.*

6.3 Proposed Growth within the Tees Valley

Using the proposed growth figures given in Appendix B, the potential effects of the proposed growth on the WwTW within the Tees Valley were assessed. Some of the proposed growth sites within the study area were excluded from the assessment; if no significant growth is proposed it was assumed that there would not be an effect on a particular WwTW. It was assumed that less than 50 dwellings or less than 1 hectare of employment land would not represent a significant flow increase in a particular WwTW's catchment and therefore the limits were taken as the cut-off for site to be included within the assessment.

For each WwTW catchment, the additional wastewater generated was calculated using the following assumptions:

- an occupancy rate of 2.16[33] for all new dwellings;
- a per capita water consumption figure of 125 litres[34] per day; and
- an assumed average per job use of 15 litres per job[35].

The values for 'post growth' wastewater flow are provided below in Table 6-3.

TABLE 6-3: POST-GROWTH DWF CONSENT CAPACITY

WwTW	Proposed housing growth within catchment (dwellings)	Proposed employment growth within catchment (jobs)	Post growth DWF (m^3/d)	Post growth capacity (m^3/d)
Graythorpe	0	3,035	72	-28
Greatham	0	0	188	61
Seaton Carew	4,722	17,960	25,975	15,840
Billingham	8,268	1,766	9,888	2,053
Carlton & Redmarshall	0	83	570	115
Kirklevington	0	0	231	68
Longnewton	0	0	161	23
Bran Sands	19,920	14,233	115,150	55,990
Dunsdale	0	0	29	14
Marske	3,008	7,303	21,573	5,143
Moorsholm	0	0	142	-10
Skinningrove	54	29	3,344	325
Aycliffe	0	423	14,510	1,341
Bishopton	0	0	43	92
Stainton	0	0	227	18
Stressholme	7,174	5,207	26,788	1,870
Sadberge	0	0	220	16
Goose Beck	0	4,298	298	149

The current consents for all WwTW are assessed by the Environment Agency each AMP period, and hence, unless the Environment Agency have highlighted that consent conditions need to change in order to meet the requirements of the WFD, Habitats Directive or another local driver, then the assumption used in this assessment is that the consent is considered to

[33] Taken from NWL's WRMP
[34] Taken as the Building Regulations minimum for new homes plus 5 litres for garden watering - this is the 'Business as Usual' scenario from section 5.3 above.
[35] A standard assumed consumption figure, the employment figures have been converted into residential population equivalents, by using the relative water use figures.

be fully usable (up to its maximum) without affecting the ability of the downstream waterbody to meet its statutory water quality standards.

The WwTW at Graythorpe currently treats wastewater from industrial premises within its catchment. A sample and flow survey carried out by NWL in 2009[36] indicates that Graythorpe WwTW then treated 50% of its consented DWF (20 m^3 of the consented 44 m^3/d). In order to accommodate the proposed growth, it would therefore be necessary to increase the consented DWF. To ensure no deterioration of the receiving watercourse as a result of this increased flow, tighter discharge consent standards may be required. Graythorpe WwTW discharges to the Tees Estuary via a small stream/ditch, which is assumed to be at least partially tidal. As flows in the stream are not known, it has not been possible to calculate the required discharge consent standards to protect water quality using RQP modelling[37] and Load Standstill calculations[38] have been used instead.

The results of the Load Standstill calculations indicate that to maintain the current load polluting load discharged from Graythorpe WwTW, the consented BOD limit would need to be reduced from the current 20 mg/l BOD to 12 mg/l. However, it should be noted that these calculations take a precautionary approach, based on the assumption that the plant is currently treating the effluent to the standard required by the consent to discharge (i.e. 20 mg/l BOD), as it is not known how loads treated currently compare with the 2009 loads. It is therefore likely that a feasibility exercise is needed at Graythorpe WwTW to fully asses the impact of all the proposed employment growth on the works. If a feasibility study concluded that Graythorpe WwTW could not accept all the increased flow from the proposed growth it may be possible to take flows to Seaton Carew WwTW, which has an estimated 15,840 m^3/d available capacity, after the proposed growth.

It can however be concluded that the DWF limits at Graythorpe WwTW should not be considered to be a constraint to growth within the catchment, although the phasing of development must be carefully considered to allow any necessary changes to the consent to discharge to be made in time. In the unlikely event that an increase to the consented DWF were not possible, or the process capacity of the WwTW was insufficient, then flow from the proposed growth within the catchment of Graythorpe WwTW could be transferred to Seaton Carew WwTW, which has an estimated 15,840 m^3/d available capacity, after the proposed growth

6.4 Wastewater Network

A high level assessment of the existing wastewater network has been undertaken to determine whether there is likely to be sufficient capacity in the system to transmit additional wastewater flows from new development to the relevant WwTW.

NWL's DG5 register[39] to OFWAT records sewer flooding locations for the study area, which suggest that network capacity could be limited in several locations.

[36] David Charlton, NWL, pers. comm., 2nd October 2012
[37] Mass Balance calculations (using the Environment Agency's RQP 2.5 (River Quality Planning); the software is a Monte-Carlo based statistical tool that determines what statistical quality is required from discharges in order to meet defined downstream targets, or to determine the impact of a discharge on downstream water quality compliance statistics
[38] Load Standstill calculations are simplified calculations of the reduction required in the concentration of a discharge element to offset the increase in load that would otherwise be discharged as a result of increased flow volumes. The calculation determines what is required to ensure the overall load after increased discharge volumes is no greater than before growth.
[39] As part of an ongoing performance checking process associated with delivery during the AMP Period, each year OFWAT require Water Companies to report on the current number of properties in their areas at risk of flooding. This is reported under a series of returns to the Director General (DG) of OFWAT known as the June Return. OFWAT describe this process as "our main source of information…….in which each company sets out its levels of service to customers, the investment it has made and the outputs delivered". Sewer flooding is the fifth measure and hence known as the DG5 Register (others include DG2 – Properties affected by low water pressure and DG3 – Properties affected by supply interruptions). The information contained on these returns is critical in terms of assessing company performance.

The growth scenarios proposed entail major increases in flows into/through the sewerage network, which could lead to a risk of pollution and amenity issues from combined sewer overflows and sewer flooding. In order to fully assess the capacity within wastewater networks and the effect that the proposed growth could have on this, further detailed study would be required, including network modelling (see section 10). However, network modelling requires confirmation of the exact location of growth and hence would be too detailed at this Outline WCS stage. Therefore, a high level strategic assessment has been undertaken.

The network layout, including pipe sizes and locations of pumping stations have been used in conjunction with records of sewer flooding to determine which catchments are likely to have more capacity than others. The assessments have been carried out where there is significant growth proposed of 50 houses or more; see section 9 below for settlement specific assessments.

TABLE 6-3: SEWER NETWORK ASSESSMENT

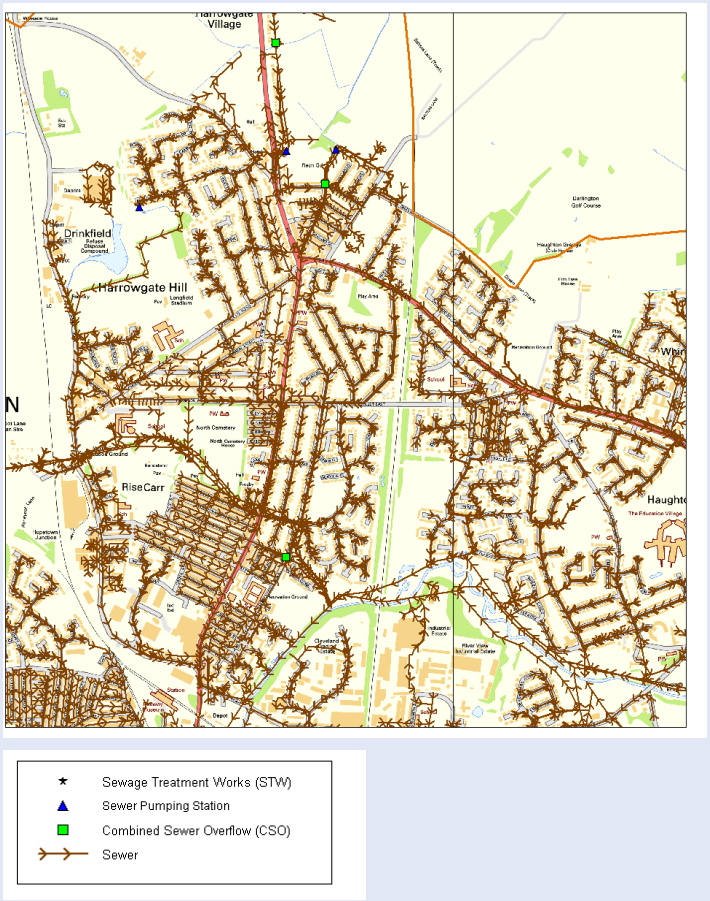
Darlington Borough	Sewer network assessment	Proposed development area
Harrowgate Hill (including DU33, M08, DU324 and M64)	This 'zone' is located on the northern edge of Darlington, where the sewerage network coverage is less comprehensive. Some of the development is proposed for Greenfield sites, which presently contain some surface water sewers draining to a local watercourse. It is likely that these sites will require some new infrastructure; however, there are a number of locations where the sewer network could possibly be connected to adjacent areas. The existing sewer network in the vicinity is a separate surface and foul system, mainly drained through gravity sewers with some pumped sewers on the edges of existing development. All foul flows from the proposed development would drain to the Stressholme WwTW, which has capacity to treat all current proposed development without upgrades via the existing network. However it should be noted that the WwTW is south of the town so any additional flows generated in this northern area will add to that being carried through the central network to Stressholme. There are no DG5 locations in this area. Large sewers exist adjacent to the brownfield former Corus site, although they presently drain several industrial sites and current capacity is unknown. As notable development is proposed in this area, and current available data is incomplete regarding pipe diameters, detailed modelling should be carried out to determine where new flows can be accepted in the system or if infrastructure upgrades are necessary.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

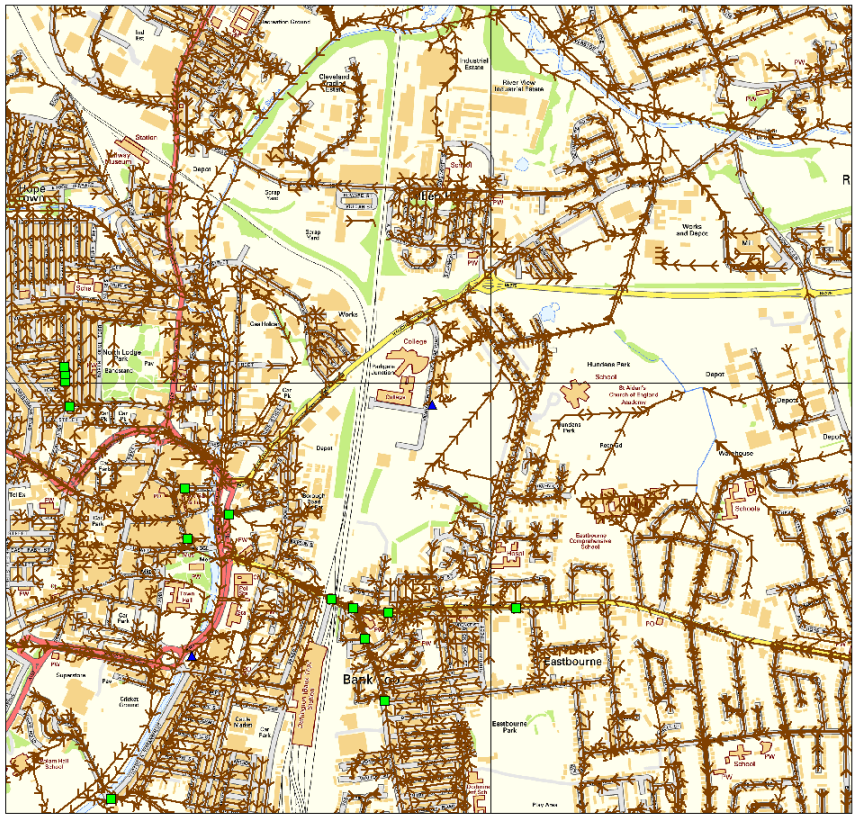
Central (Including DU286, DU331, M13, M32, M48, M59, M75, M79 and M80)	Significant levels of development are proposed for central areas of Darlington. Whilst there is an extensive sewer network in this area the spare capacity is unknown and phasing of development should be agreed with NWL once available capacity of the existing network has been determined. A number of CSOs lie along the sewer routes that drain the town towards Stressholme WwTW. One DG5 location is noted south of the former Eastbourne Comprehensive School. Data on the diameter of sewers in this area is incomplete but the network is predominantly a combined foul and surface water system, with some additional surface water sewers Connections to existing sewers may be possible but hydraulic modelling should be carried out to determine how much additional flow the network can accommodate. Upgrades are likely to be needed if proposed housing numbers are fully progressed.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

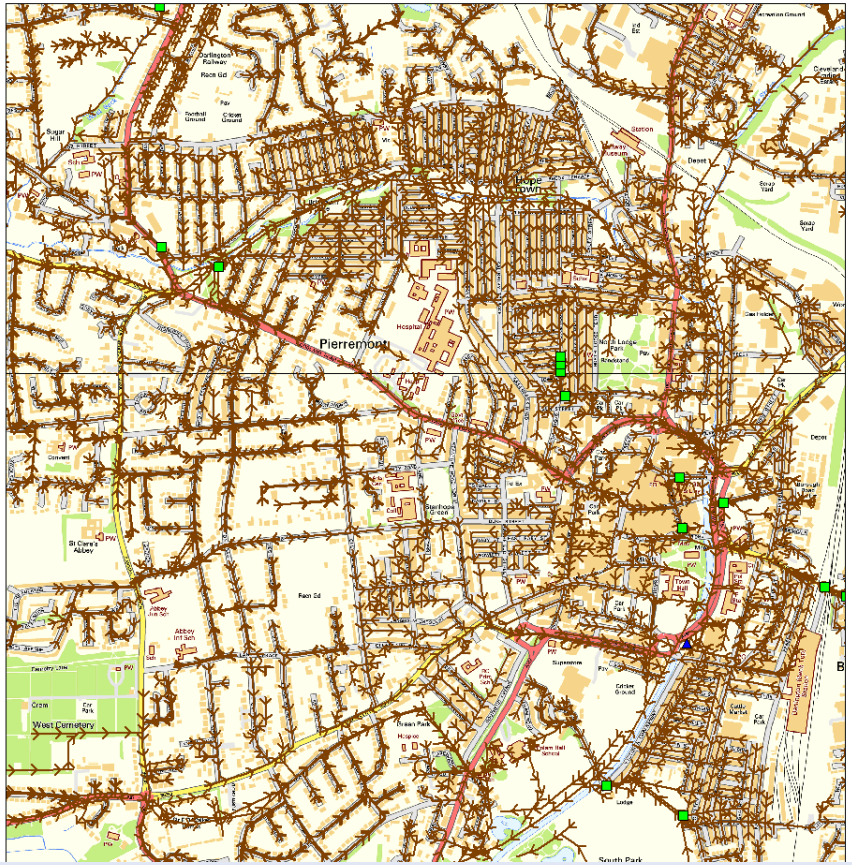
West Central (inc DU229, M03)	Similarly to the central area, the sewer network is extensive and complex west of the centre. Development has already commenced at the former Darlington Tech site, where separate surface and foul sewerage infrastructure seems to be already in place, including a gravity sewer of 1,000 mm diameter. Whilst connections may be possible, it should be noted that five DG5 locations exist in nearby streets, where the network is largely a separate system, implying that the existing network is already operating at capacity in this area. The hospital site lies over part of the central combined sewer network and two of the DG5 locations are recorded from pipes adjoining the sewer draining sewer from the site. All flow from new development will need to join existing routes to Stressholme WwTW. Infrastructure upgrades are likely to be required and detailed modelling should be carried out to determine where the network is able to accommodate any additional flow without causing negative impacts for existing property.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

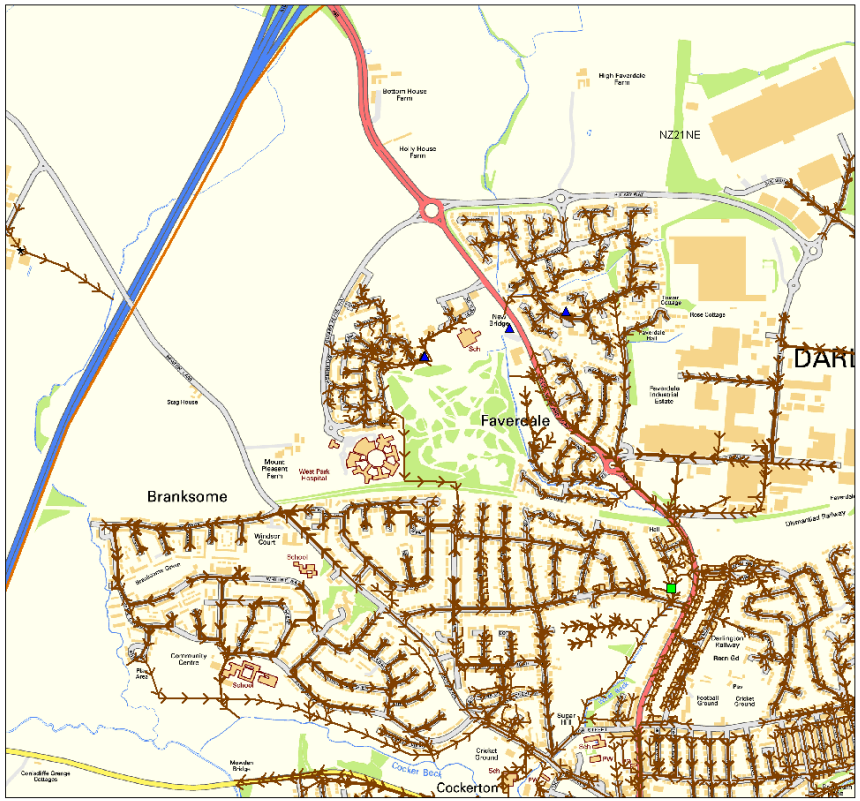
West Park (including DU178 all, DU239 and M15)	The North West Urban Fringe is a greenfield site, which at present contains no sewerage infrastructure. There is an existing residential area to the south, where it may be possible to connect to the network, although data is incomplete on the diameter of pipes here. To the east lies the West Park development, which has a network of small gravity sewers draining to two pumping stations, pumping flow form the estate out past the hospital to the rejoin the gravity sewer network. A development of that size proposed will require new onsite infrastructure, but modelling should be carried out to assess the impacts downstream in the network as foul flows are carried to Stressholme WwTW. The entire sewerage infrastructure in this area is separate surface and foul water drains, predominantly gravity sewers. One DG5 location is noted but further south than most of the proposed development sites near Cocker Beck. The site at the former Alderman Leach school lies within the established network. Data is incomplete on the diameter of pipes here, but modelling should be carried out to determine additional flows that could be accommodated without adverse effects on the downstream network.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

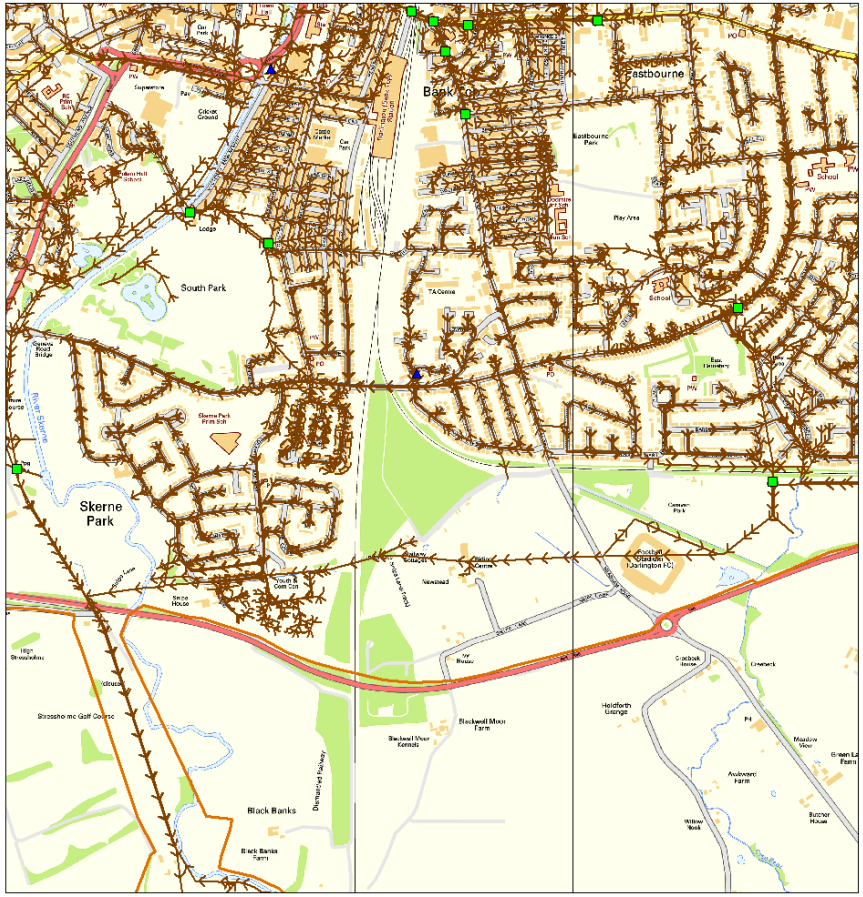
South Central (including DC002, DU240 and DU239)	The sites in this area are located on the southern fringe of Darlington and include some previously undeveloped greenfield sites, although these lie adjacent to existing residential areas. The sewers connecting to Stressholme WwTW pass through the larger greenfield sites in this area although available data is incomplete on the size and capacity of these pipes. The majority of development is already underway at the Snipe House Farm site, with new sewerage infrastructure of 150-300 mm diameter pipes already in place. Detailed modelling should be carried out to establish any available capacity in the existing sewers to accept additional flow from the proposed Neasham Road development site. The sewer passing through here receives flow from a large urban area to the north and two CSOs are located upstream on this sewer. Stressholme WwTW has been assessed to have available capacity to accept foul flow for all proposed dwelling numbers at present.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

Yiewsley (including DV044)	This proposed development area is a greenfield site on the western edge of Darlington. The site is adjacent to the existing Yiewsley sewerage network, to which connection may be possible. The existing network is a separate surface and foul system and while there are no records of DG5 locations nearby, clusters of sewer flooding have been recorded downstream in the network towards the centre of the city. The existing network is largely gravity drained towards the large sewers that drain to Stressholme WwTW. Hydraulic modelling should be carried out to determine how much additional flow could be accepted into the system without causing adverse effects elsewhere in the network.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

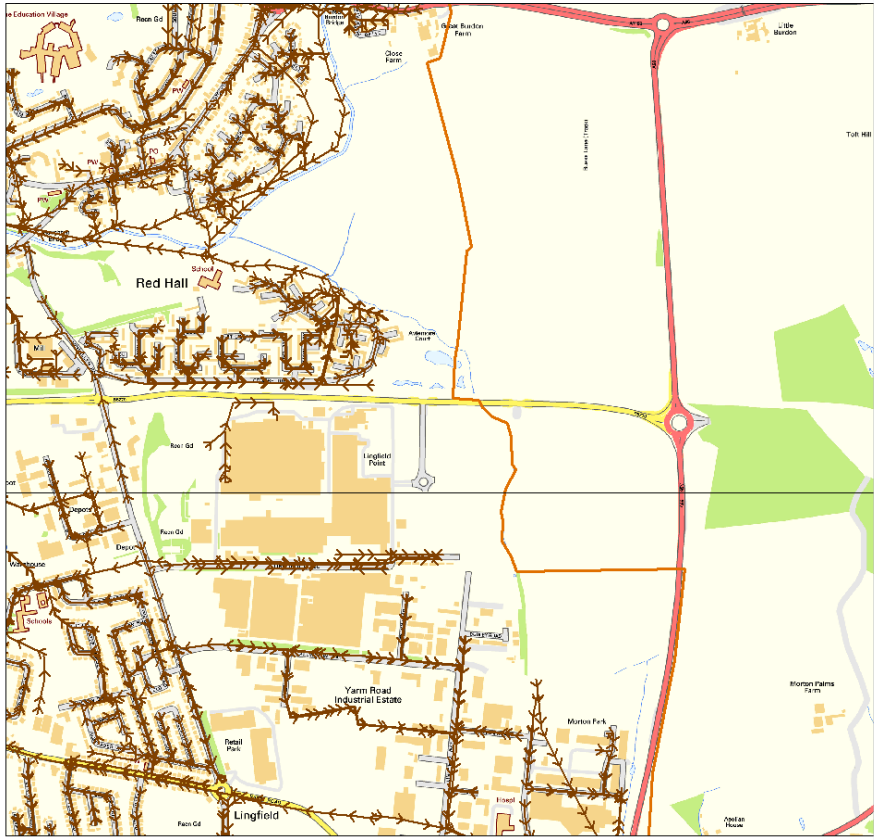
Eastern Fringe (including DU238, M24 and M66)	The Eastern edge of Darlington has some of the largest numbers of proposed new dwellings with the 'Eastern Urban Fringe' representing a very large greenfield development site, with no existing infrastructure. New sewers and upgrades of existing networks would be required in order to make connections. As the site lie adjacent to the edge of Darlington's current urban sewerage network, which has a separate surface and foul water system, connections should be possible. However detailed analysis should be carried out on the capacity of the existing network to ensure no adverse impacts downstream. The proposed site at Lingfield point is also large. As a former industrial site, some infrastructure is in place although data is incomplete on the size of the existing sewers. Although there are no DG5 locations nearby, upgrades to principal sewers connecting the area to Stressholme WwTW are likely to be required should both developments go ahead in full. Phasing should be agreed in collaboration with NWL to ensure the necessary infrastructure is in place to manage the significant additional flows both locally and downstream on the network.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

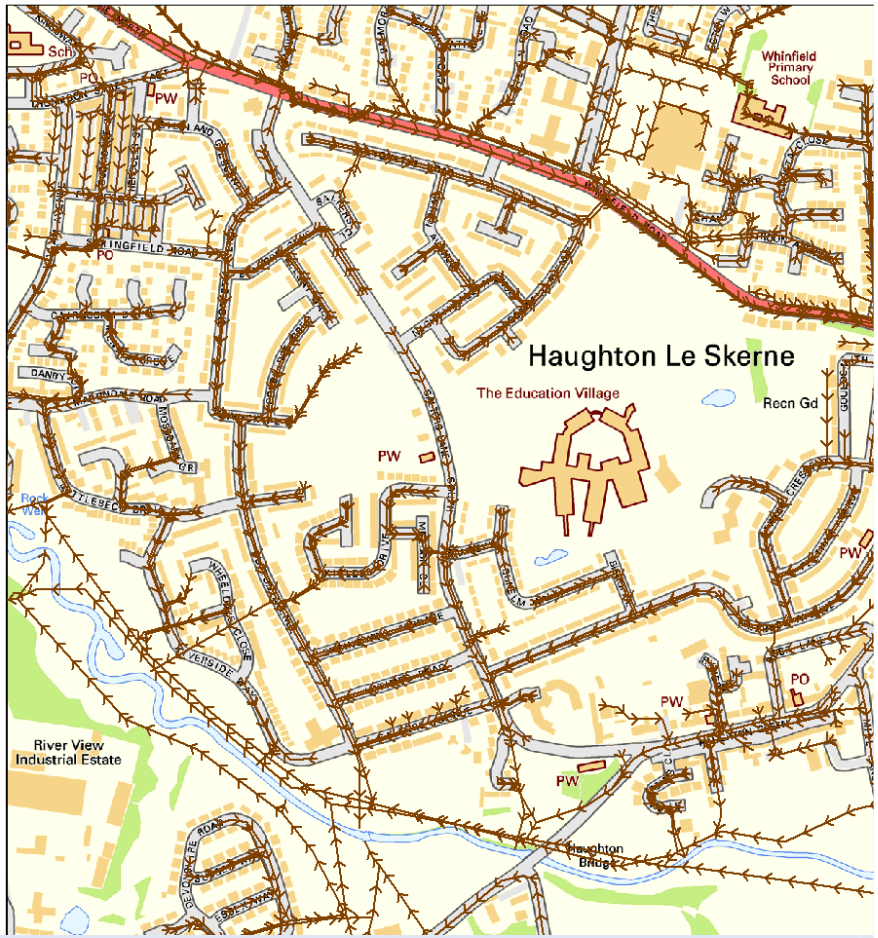
Springfield (M65)	The proposed development site lies within the established network in the north east of Darlington, which is a separate surface and foul water system. Although the site is greenfield, there are a number of potential connection points for the new development. The sewers surrounding the proposed site sewers are smaller gravity sewers (150-225mm diameter) and hydraulic modelling should be carried out to establish available capacity. There are no DG5 records nearby, although principal connecting sewers to Stressholme STW are likely to already under heavy use and modelling should be carried out.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

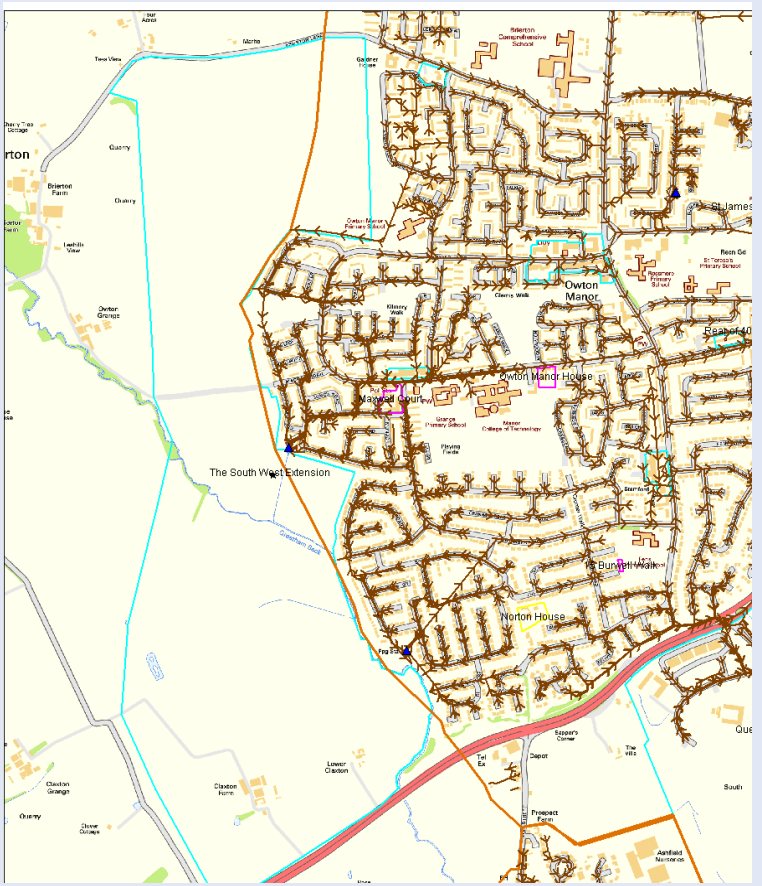
Hartlepool Borough	Sewer network assessment	Proposed development area
Claxton (The South West Extension - includes Eaglesfield Road)	This is the largest proposed area of development in the Hartlepool area. It is presently a greenfield site and it is therefore presumed that no existing sewer infrastructure is present within it. The sewer network runs down the eastern side of the proposed area; however the quantity of development proposed for the area would require new infrastructure. Phases of development should be agreed in collaboration with Northumbria Water. No DG5 locations have been noted in this area and existing sewer networks are almost entirely separate surface and foul sewers. Most surface water from the Owton Manor area flows by gravity to the Greatham Beck, foul flows drain to pumping stations. Further information is required on the capacity of these pumping stations as well as the implications for the Greatham Beck as a drainage feature should large scale development go ahead. More detail is required on specific housing locations and numbers to determine the most likely sewer connections. Detailed modelling can then be carried out.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

Britmag coastal sites	This area is currently an industrial site and proposed housing locations are not yet specified, although coastal protection and contamination issues may limit where properties can be built. Current sewer infrastructure records indicate a large outfall pipe running through the site, which is connected to the Brus pumping station. This pumping station receives the majority of sewerage from the nearby urban area of northern Hartlepool, a predominantly combined system. Three DG5 locations in nearby streets indicate that capacity could already be a problem here. Within the industrial site itself, very little sewerage infrastructure is indicated, other than the sewer outfalls, although it is possible that privately owned infrastructure may exist. Depending on the scale and location of development, the impact on the sewerage network should be quantified using hydraulic modelling.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

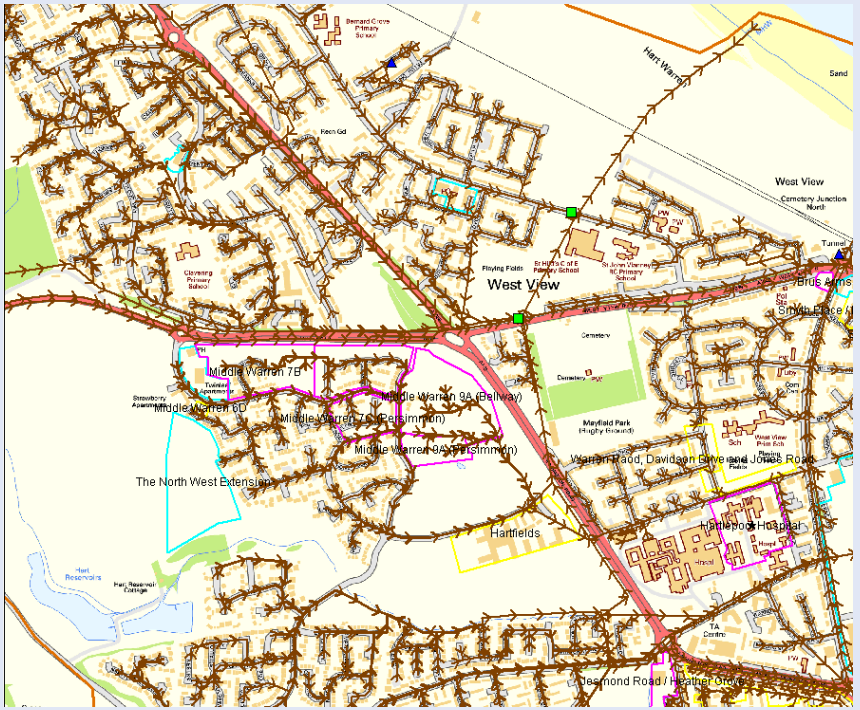
Middle Warren (including Hartlepool Hospital, Upper Warren, former St Hilds School and Oaksway Industrial Estate)	Considerable development is continuing around the Middle Warren area, for which sewer infrastructure looks to already be in place in the form of a separate surface and foul system. It should be noted however that there are two CSOs on one of the sewers that the Middle Warren Estate drains to and given the size of proposed development, more detailed modelling should be carried out to assess existing capacity. Significant areas of potential development are also proposed for the greenfield areas to the west of the Middle Warren estate, which presently have no sewerage infrastructure. The impact of any proposed development on these sites should be quantified using hydraulic modelling as capacity improvements and new infrastructure are likely to be required. All development within this Middle Warren area will potentially increase flow to the Brus PS, which is likely to be already operating close to capacity. DG5 locations in the downstream network near Brus PS indicate existing capacity issues.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

Central (including Tunstall Court, Headway)	This area of Hartlepool has extensive sewer network coverage as it is the urban centre of the town. Proposed developments sites in this zone lie adjacent to a number of sewers. As the current utilised capacity of these sewers is not known, detailed hydraulic modelling should be carried out to determine whether this predominantly combined sewer network can accommodate additional flow and whether this would cause an adverse effect on the existing network. It should be noted that two CSOs are located on the sewer running from the proposed site at Tunstall Court. Infrastructure upgrades may be required to accommodate additional flow from this site. Sewers in central and southern Hartlepool could affect bathing waters at Seaton Carew (notably Seaton Carew North), via discharges from Mainsforth Terrace pumping station and CSOs discharging the Stell.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

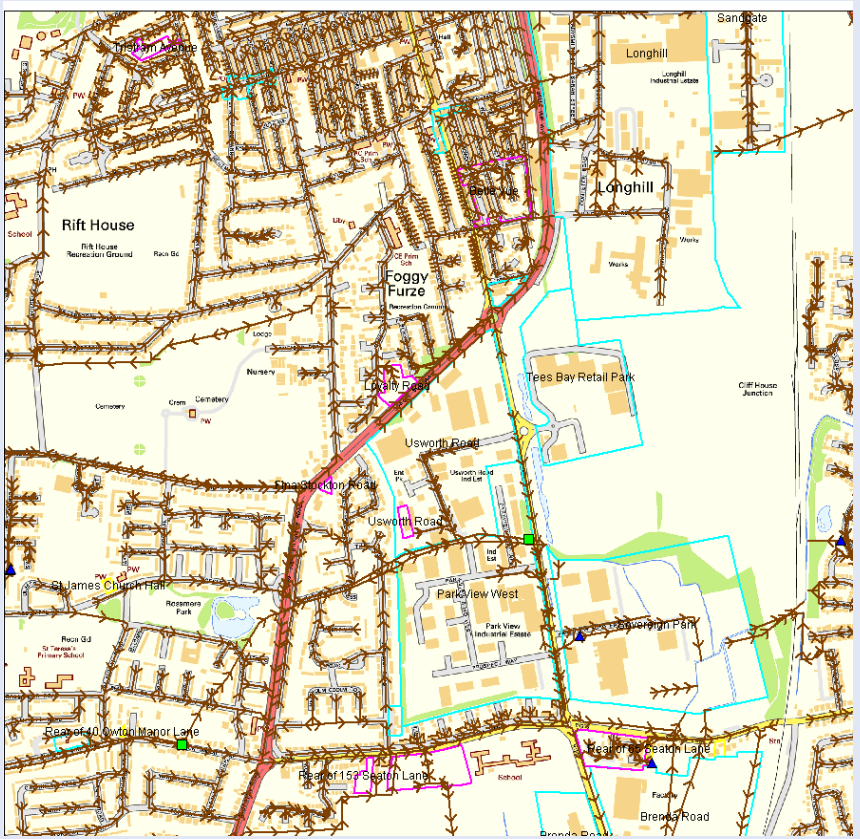
Central South (Including Bellevue , Golden Flatts)	The proposed development at Bellevue falls within an existing combined sewer network. Sewers of varying size surround the site. There are no DG5 locations nearby, but building density in this central location is high and spare capacity may be limited. Hydraulic modelling is required to determine the capacity of the existing network to accept additional flow. The Golden Flatts site has existing infrastructure of mostly 150 mm foul and 375 mm surface water gravity sewers draining foul flows to a pumping station and surface water to a culverted watercourse. No DG5 locations are recorded nearby, although further information is required on the capacity of this pumping station and existing infrastructure before acceptable additional flow levels can be determined. Sewers in central and southern Hartlepool could affect bathing waters at Seaton Carew (notably Seaton Carew North), via discharges from Mainsforth Terrace pumping station and CSOs discharging the Stell.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

Marina sites (including Niramax, all blocks Marina, Old Council Depot and Mixed Use Maritime Avenue)	The developments proposed in this area are predominantly brownfield so sewerage infrastructure is already in place. Principal sewers generally have a diameter of 375 mm. However, a significant number of dwellings are proposed here, particularly in the marina area, and more information is required about current network capacity in this area before development can progress. Much of the local network in the marina area and parts of the town centre drain towards the Burn Valley PS 1 & 3, which would also receive foul flows from the proposed new developments. A CSO is located near the PS1. Detailed hydraulic modelling is required to determine whether additional flow can be accommodated here.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

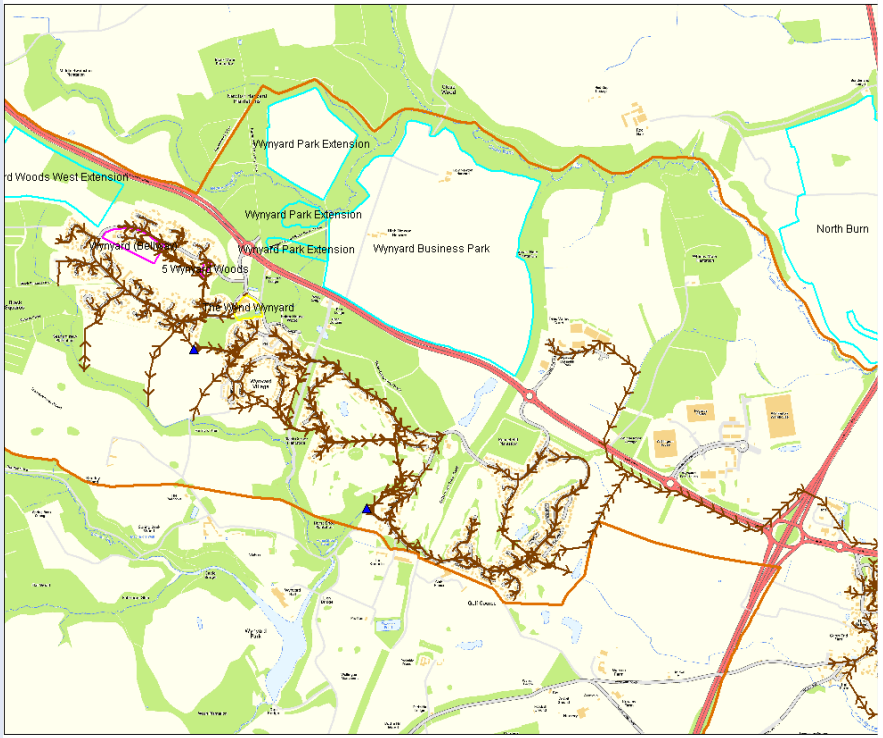
Wynyard	Wynyard Park is currently a rural greenfield site. The existing nearby settlement of Wynyard has a separate surface and foul sewer system, with a combination of gravity sewers and pumped rising mains. The level of development proposed north of the A689 would require significant new infrastructure. The existing business park is connected directly to the Billingham WwTW via a 450 mm gravity sewer. Detailed hydraulic modelling is required to determine the level of development able to connect foul flows to this sewer and where upgrades may be required in the future. Phasing should be agreed in collaboration with NWL. There are no DG5 locations within the network draining to Billingham WwTW.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

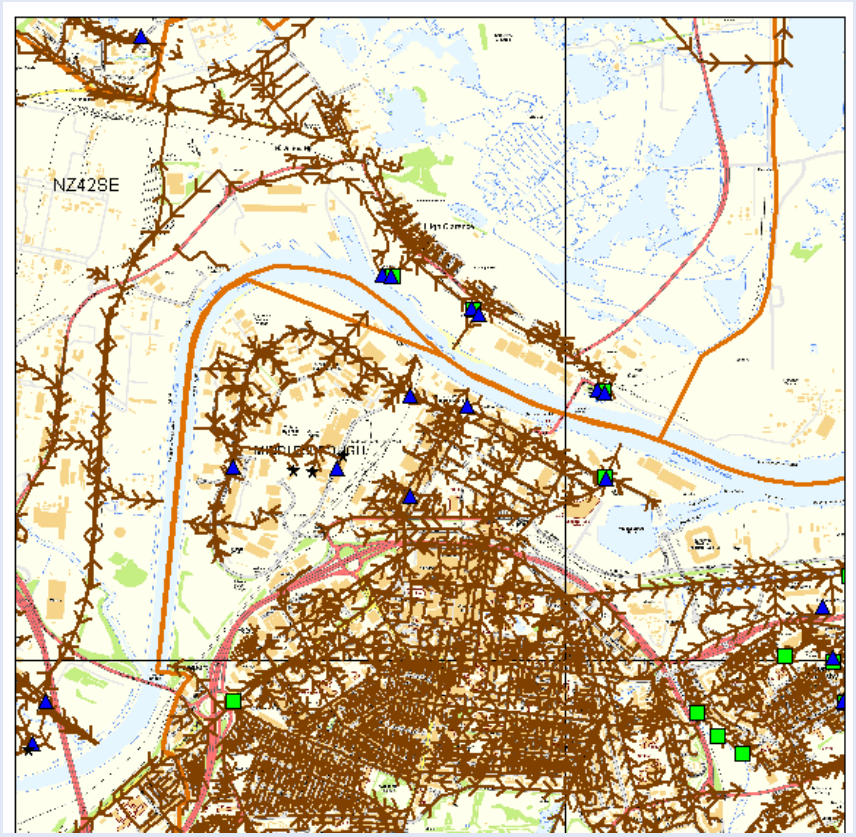
Middlesbrough	Sewer network assessment	Proposed development area
Middlesbrough North (including Bridgewater View, Middlehaven excluding CIAC and Whickham Villas, Linthorpe Hall, the Wave, Whitestone Business Park and CIAC)	The potential development sites in this northern part of Middlesbrough (north of the A66) are predominantly in and around former industrial areas, where sewerage infrastructure exists but may need upgrading to accept flows from new development. Most of the network north of the A66 is a separate surface and foul system, although there are some areas where it is combined. Existing sewers are generally quite large (450-675mm diameter) so connections may be possible, although modelling should be carried out to determine how much capacity is available to accept additional flows from new housing. In addition, the capacity of the six pumping stations on this part of the network should be modelled. South of the A66 is a mixture of separate and combined systems and the network is much more complex. There are no DG5 locations recorded in this area, although the network is likely to be heavily used in such a dense urban area and development should be phased in collaboration with NWL to ensure any capacity issues in the network are not exacerbated by the proposed development. It should be noted that although the Bran Sands WwTW has been shown to have capacity to accept foul flow from the potential housing, a number of CSOs and pumping stations lie along the sewers connecting to the WwTW.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

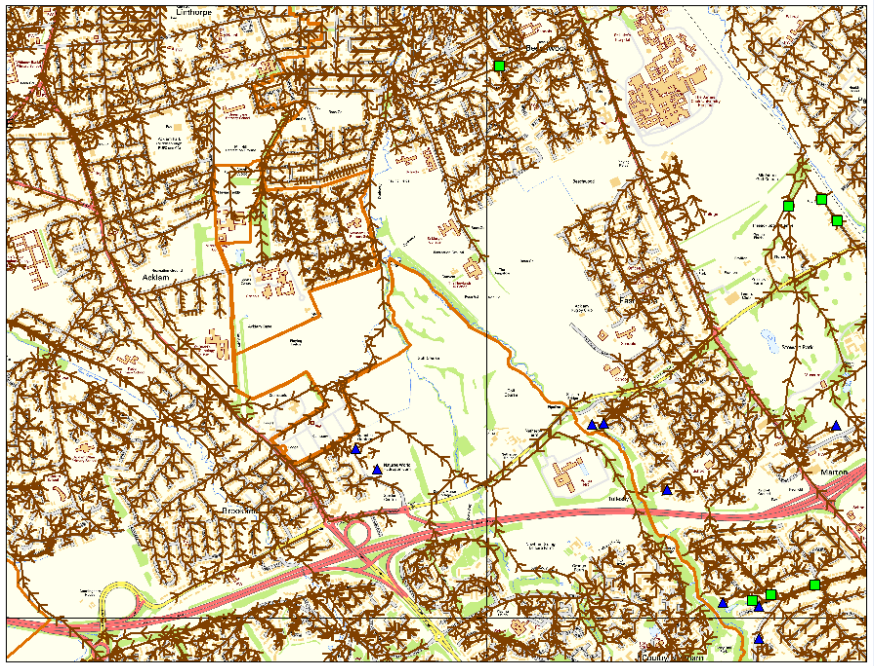
Middle (including Hutton Road, Grove Hill, Acklam Green, Orchard View and Brookfield (Stainsby Hall Farm and Low Lane) and Ladgate Lane and Acklam (Acklam Hall and Swedish Mission Field)	All the potential development sites within this central area of Middlesbrough lie adjacent to the existing extensive urban sewer network. Some large developments have potential here, particularly at Hemlington Grange, where new separate infrastructure is already in place with large gravity pipes (1,200 mm) connecting to the sewer sewers to Bran Sands WwTW. Additional infrastructure will be needed at the Hutton Road site, which is currently connected to a combined part of the network by two 150 mm gravity sewers. There are three DG5 locations north of the A174 and west of the A1032, indicating existing capacity issues in this part of the sewer network. It is likely that the network is under heavy use and given the size of potential developments, phasing should be considered in collaboration with NWL to ensure any additional flows do not having adverse impacts downstream in the network; this should be supported by hydraulic modelling to ascertain where capacity exists.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

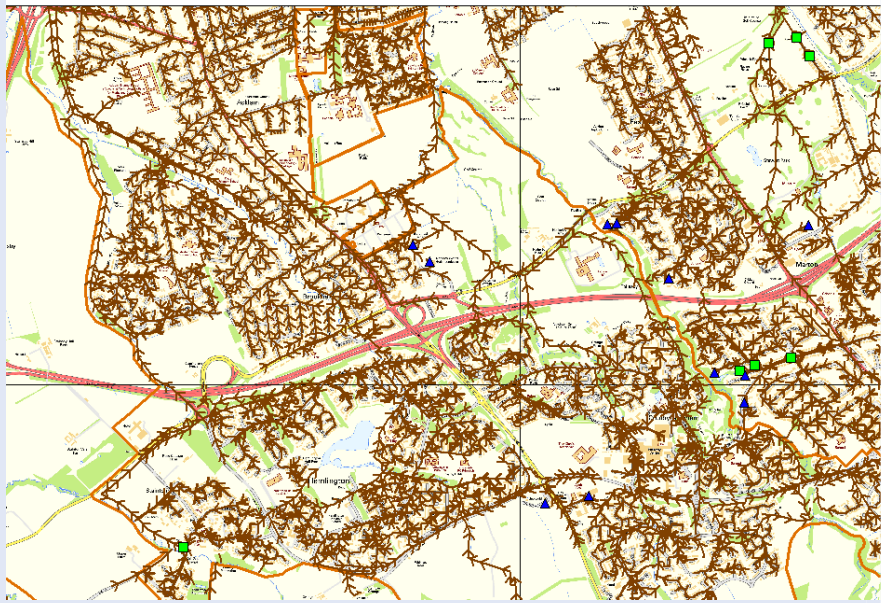
South (including Hemlington, Stainton and Thornton (Rose Cottage Farm, LA Hemlington Hall School, Hemlington Grange), Coulby Newham (Longridge), Marton and Nunthorpe (Grey Towers Farm)	The potential development sites in the southern area of the town are a mixture of greenfield and brownfield sites. The existing sewer network is almost entirely separate surface and foul water sewers south of the A174, supported by five pumping stations. There are two DG5 locations on the western edge of town close to the potential development site at Acklam Hall, which suggests the sewer network may already be operating at capacity. Most nearby sewers are fairly small gravity sewers (150-225 mm) and upgrades may therefore be needed to accommodate additional flow from new development. The potential development site at Stainsby Hall Farm represents a significant number of new dwellings on greenfield land, which would not only require new infrastructure but would add significantly to the flow being carried in the existing network. Five DG5 locations are recorded within 1 km of the site. Phasing of development should be considered in collaboration with NWL to ensure any necessary upgrades are carried out in time to ensure no adverse impacts downstream in the network. Hydraulic modelling should be carried out to identify capacity constraints.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

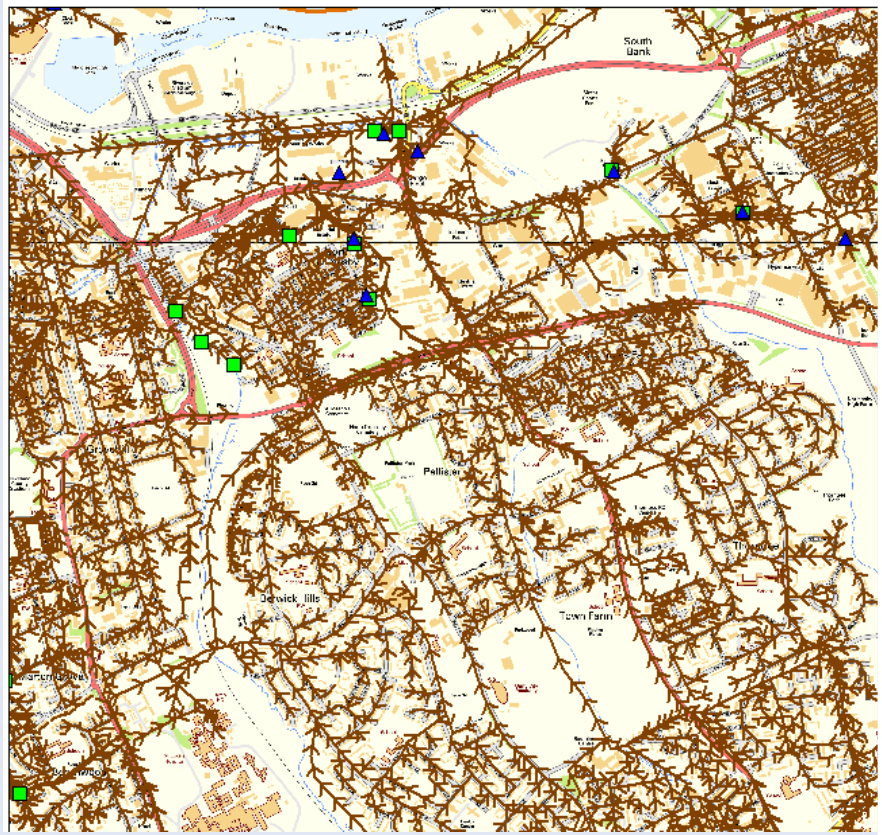
North East (including Prissick (Scholars Rise, Prissick Depot), East Middlesbrough (Land adjacent to Teaching Centre and Roworth Road), Trinity Gardens and Middlesbrough Warehousing)	There are a number of larger potential development sites in the north-eastern area of the town. Land between South Bank Road and Longlands Road is predominantly industrial and while available network data suggests not all sites have existing sewerage infrastructure, it is possible that private sewers do exist (most of which would have transferred to NWL on the 1st October 2011 under the Flood and Water Management Act). Sites where infrastructure is present have a mixture of combined and separate foul and surface water sewers. The requirements for sewerage for large scale residential development will differ from previous industrial uses and upgrades could be required. No DG5 locations are recorded nearby but there are eight pumping stations and ten CSOs on the network in this area. Hydraulic modelling should be carried out to identify where upgrades may be required in order to transfer additional flow from potential development sites in this area to the Bran Sands WwTW. Further potential developments lie to the south around Cargo Fleet Lane, where the existing network is mostly combined. Connecting to the network could be possible at these sites but as above, capacity constraints should be fully understood and agreed with NWL prior to development.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

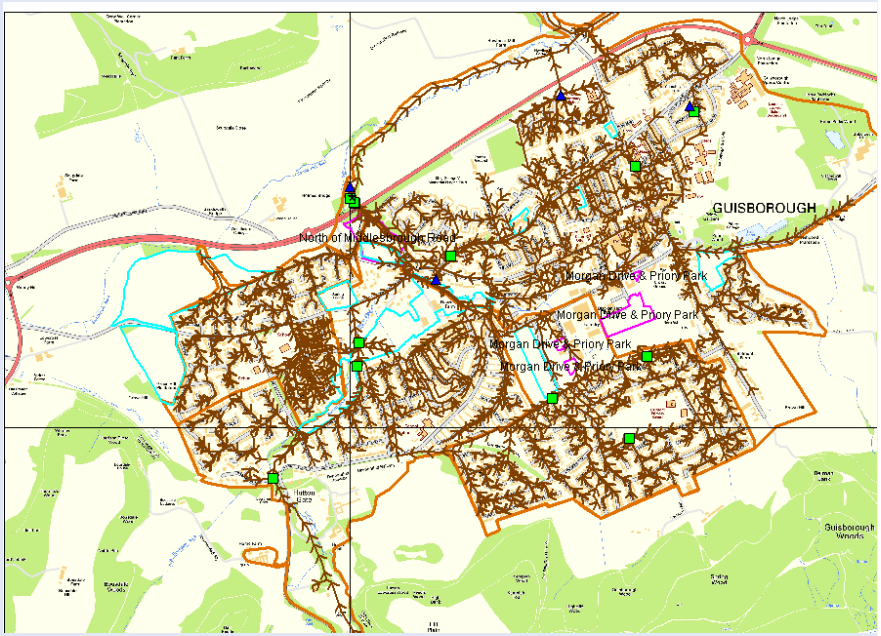
Redcar and Cleveland Borough	Sewer network assessment	Proposed development area
Guisborough (including Galley Hill Extension, One Hills Extension, Pine Hills Extension and Jackson's Field)	The proposed development sites at Guisborough are currently greenfield, with no known sewerage infrastructure, although they do all lie adjacent to existing parts of the sewer network where connections may be possible. However, most nearby sewers are smaller gravity sewers (150-225mm) and modelling should be carried out to assess how much capacity they have for additional flows. It is likely that upgrades would be required. Guisborough is a relatively small town and the existing combined network is known to suffer flooding during heavy rainfall, with a number of DG5 locations recorded, particularly around Stokesley Road. The downstream pumping station at the Guisborough holding tanks is likely to be at capacity. The pumping station is therefore likely to require an upgrade to cope with additional flows from the proposed development. Network issues in Guisborough appear already to impact on the Saltburn bathing water and NWL may need future investment to address this. Surface water run-off into the combined sewer network should be reduced where possible through the use of SuDS for all new development. Although largely outside the present catchment, most of the new development to the west of the town is likely to be treated at Skinningrove WwTW, although parts of the town also drain to Marske WwTW. Both of these works have capacity to treat foul flow from the proposed development, if flows can be transmitted to the WwTWs without exacerbating any current capacity issues.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

Marske (including Marske Inn Farm, Mackinlay Park and Mickle Dales East)	There are a number of proposed greenfield development sites in the Marske area. Although there is little in the way of existing infrastructure within the boundaries of the proposed developments, they are located close to Marske WwTW and the additional flows would not need to be transferred far to the WwTW. This could limit the adverse impacts on the existing local network. Marske WwTW has capacity to accept foul flows from the proposed new development. The existing sewerage system is a mixture of separate and combined foul and surface water sewers in a fairly complex network of gravity sewers with a number of pumping stations connecting flows to the STW. No DG5 locations are recorded in the nearby vicinity. Full data is not available regarding the sewers running adjacent to the proposed development site and detailed modelling should be carried out to ascertain how much capacity is available to accept flows from new development or whether entirely new infrastructure will need to be constructed. Coastal CSOs in Redcar have been designed to protect bathing water quality and increases in discharges from them have the potential to adversely affect BWD compliance.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

Redcar (including Connexions, Coatham Bowl, Mersey Road, Redcar AEC, Wheatacres and Kirkleatham Grange)	Most of the proposed development sites in and around Redcar are brownfield sites or lie within the existing complex urban network; as a result there are plenty of potential connection points. However, the network already has capacity problems, it is a largely combined surface and foul water system with a number of DG5 locations recorded. There are four DG5 locations just south of the proposed site at the former Mersey Road School and another four to the west of the site. A number of CSOs are located on the sewers connecting to the works. All additional foul flow from developments in Redcar would drain to Marske WwTW, which has capacity to treat flow from the proposed additional housing. All proposed developments should be phased in collaboration with NWL to ensure any necessary upgrades are in place to carry additional flow without exacerbating existing problems. Hydraulic modelling should be carried out to accurately assess which parts of the network are able to accept additional flow and where upgrades are required. Coastal CSOs in Redcar have been designed to protect bathing water quality and increases in discharges from them have the potential to adversely affect BWD compliance.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

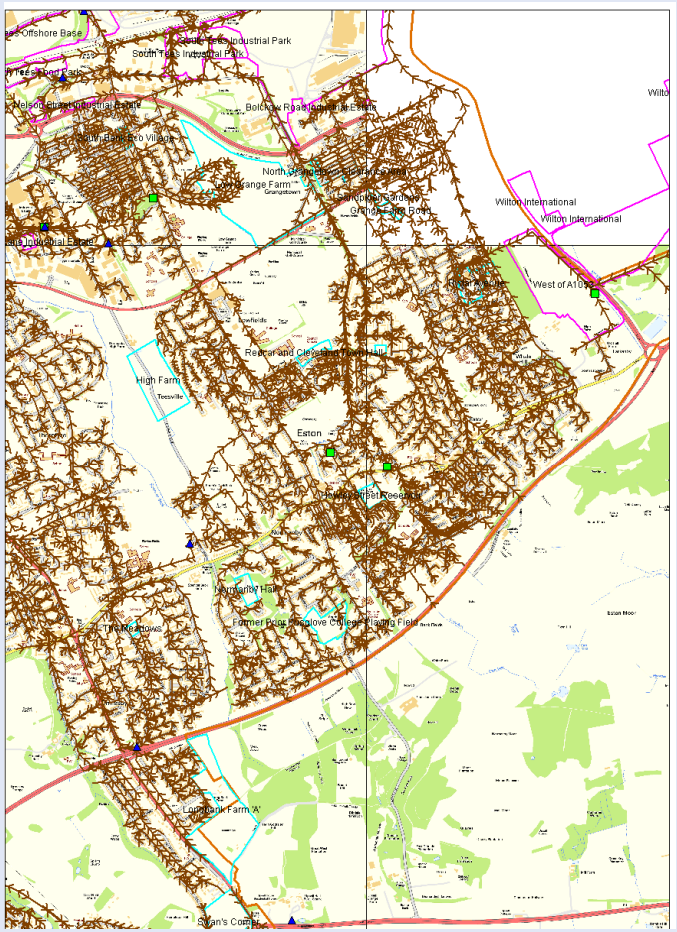
Eston (including High Farm, North Grangetown, Swans Corner, Sandpiper Gardens, Rydale Avenue, Longbank Farm, Mallinson Park, and Hewley St reservoir)	Eston has an extensive combined and separate sewerage network, likely to already be under heavy use. Existing capacity problems are evident from a cluster of 11 DG5 locations west of Normanby Road in an area of combined sewers. A further three DG5 locations are noted in other parts of Eston, with two in the south close to proposed development sites at Longbank Farm. A high number of new dwellings are proposed for this region and it is likely that upgrades will be required in order to accept extra volumes of flow without causing negative impacts on the existing network. Hydraulic modelling should be carried out to more accurately determine where capacity exists and development should be phased in collaboration with NWL to ensure the necessary infrastructure is in place. Flow from new development in Eston will be treated at Bran Sands WwTW, which has available capacity for foul flows from the proposed development.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

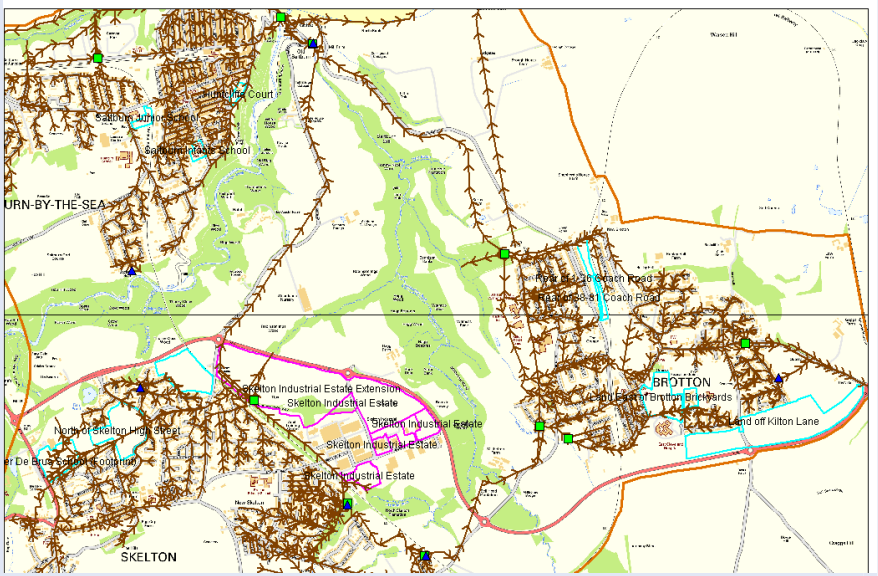
Skelton & Brotton (including Kilton Lane, Hunley Manor, Castle View and Church Hill)	Skelton and Brotton are neighbouring villages with discrete local networks, connected to the south by a 300 mm gravity sewer. It is likely that current sewerage network is operating close to capacity, particularly in Brotton where there are four DG5 locations recorded. The proposed site at Kilton Lane is a greenfield site with no known existing sewerage infrastructure. Hydraulic modelling should be carried out to determine how much capacity there is in the existing network to accept additional flows. It is likely that upgrades could be needed to manage flow for the full number of proposed dwellings without causing adverse impacts elsewhere on the network. The proposed development sites at Skelton are also mostly greenfield, although they generally lie within the existing network coverage, which could theoretically be connected to. Like Brotton, the village has a mixture of combined and separate surface and foul water sewers and three pumping stations support a combination of pumped sewers and gravity sewers. One DG5 location to the west of the village indicates that there may already be capacity issues, which should be more accurately determined by modelling. Network issues in Skelton/Brotton appear already to impact to varying degrees on the Saltburn bathing water and NWL may need future investment to address this. Both villages connect to the Marske WwTW, which has capacity for foul flows from the proposed developments. CSOs are located on the sewers in this area.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

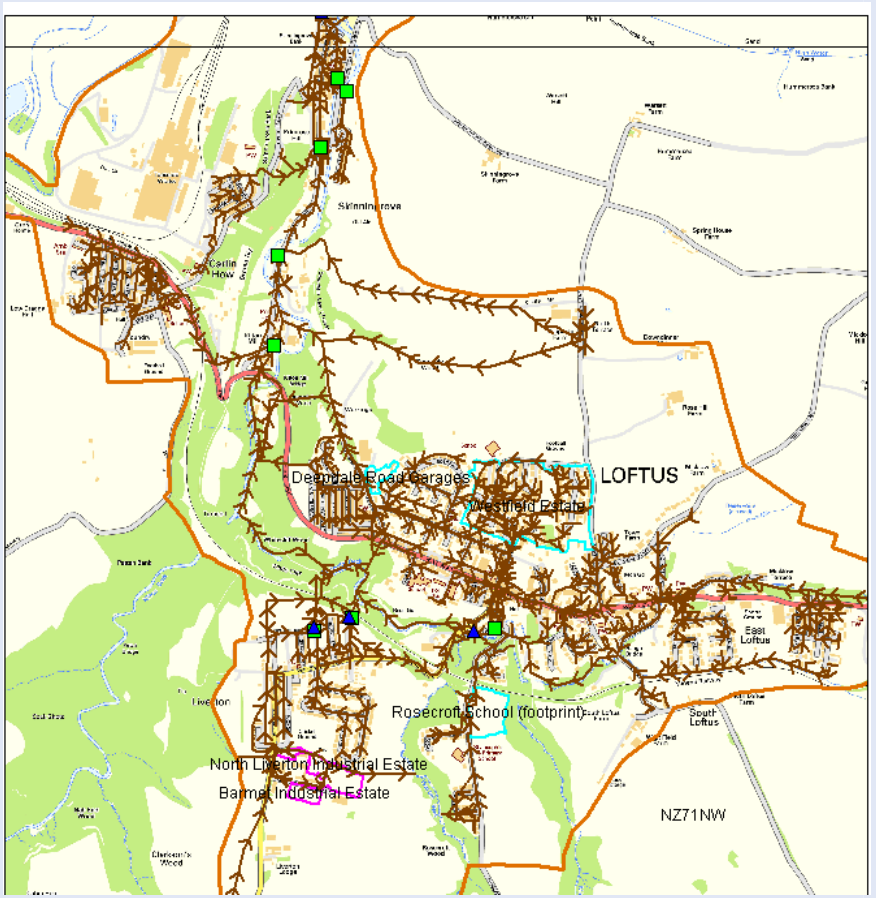
Loftus (including Rosecroft School)	Loftus has an existing network of predominantly combined gravity sewers, with some separate foul and surface water sewers in areas of newer development. Flow from the village drains to Skinningrove WwTW, which has capacity to accept additional foul flow from the proposed development. The network is supported by three pumping stations, each with a CSO nearby. No DG5 locations are recorded in Loftus. Data is incomplete on the dimensions of the connecting sewer to Skinningrove WwTW. The WwTW is geographically close to the village and four CSOs are located along the connecting route. Hydraulic modelling should be carried out to ensure new development does not cause adverse impacts elsewhere on the network. Development should be phased in collaboration with NWL to ensure necessary infrastructure upgrades are in place to manage additional flows.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

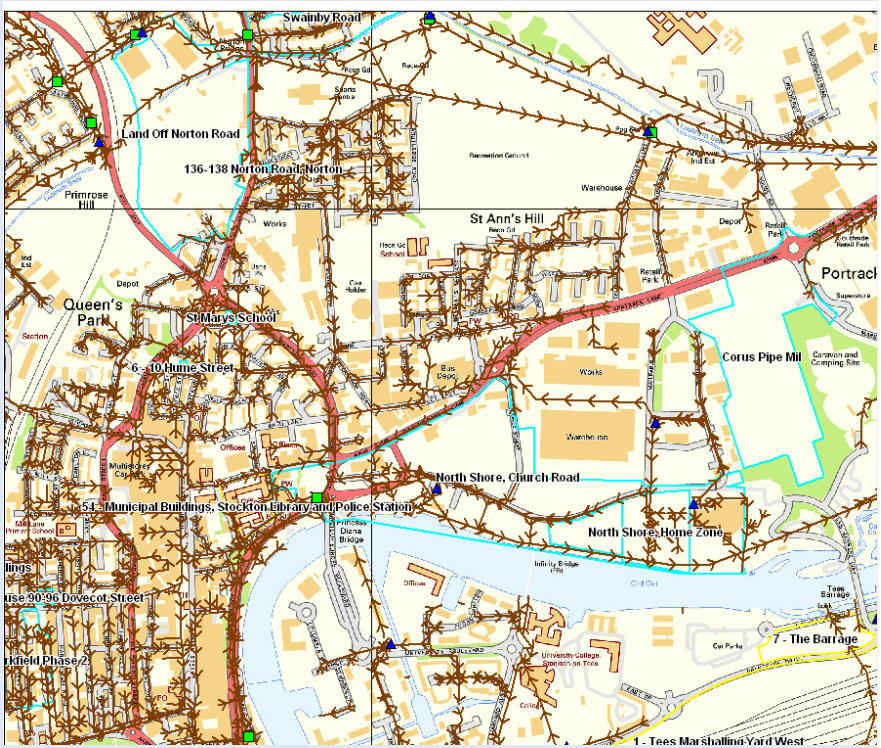
Stockton-on-Tees Borough	Sewer network assessment	Proposed development area
Core Area (Corus, Green Blue Heart, North Shore and Northern Gateway)	The Core area is made up predominantly of some large former industrial sites, which are now proposed for housing development. Most of the sewerage infrastructure in place around proposed development sites is a separate surface and foul system, with a combination of gravity sewers and pumped rising mains. Numerous pumping stations are located within the industrial areas adjacent to the River Tees. Slightly further north, the proposed Northern Gateway area has some large sewers running through and alongside it (up to 1350 mm). However, it is likely these are carrying flows from large areas of the north of the city and may already be close to capacity. Five CSOs are located around the proposed development. There are no DG5 locations in the area but detailed hydraulic modelling should be carried out to establish whether the existing system is able to accept additional flow.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

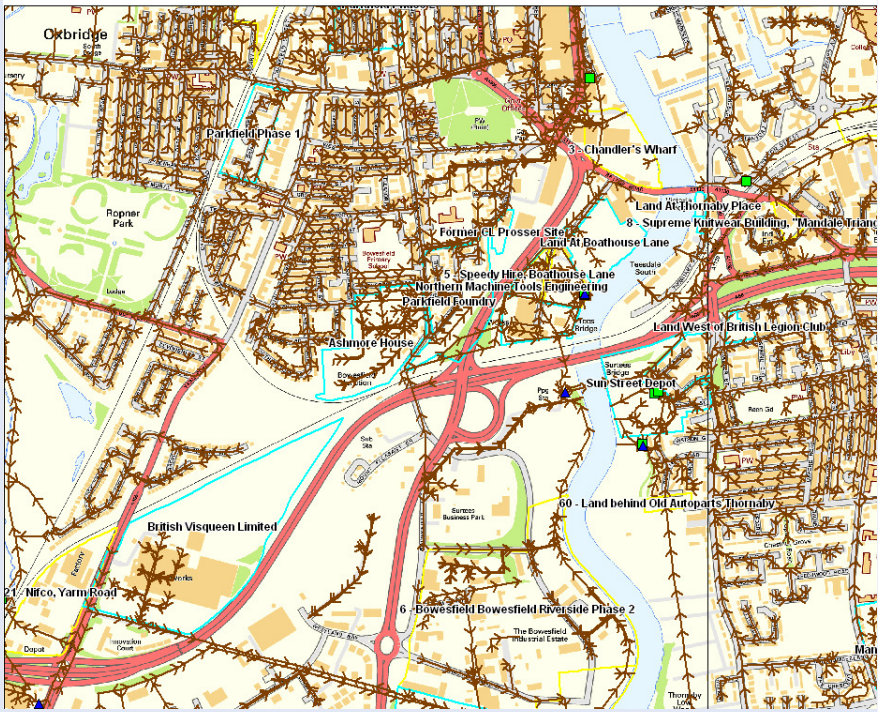
Core West (British Visqueen, Boathouse Lane, Parkfield, Ashmore House, Nifco and Bowesfield)	This area of proposed development sites is predominantly made up of former industrial sites; a fairly complex sewerage network is already in place around most of the proposed sites with a mixture of combined and separate surface and foul systems. However, the capacity required for new housing developments may differ from previous industrial discharges and anticipated flow volumes should be modelled to check whether upgrades of existing infrastructure would be required. Furthermore, hydraulic modelling should determine whether the downstream network can accept additional flows into an already heavily used system. There are no recorded DG5 locations in the area. A number of pumping stations and CSOs are located on the network nearby.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

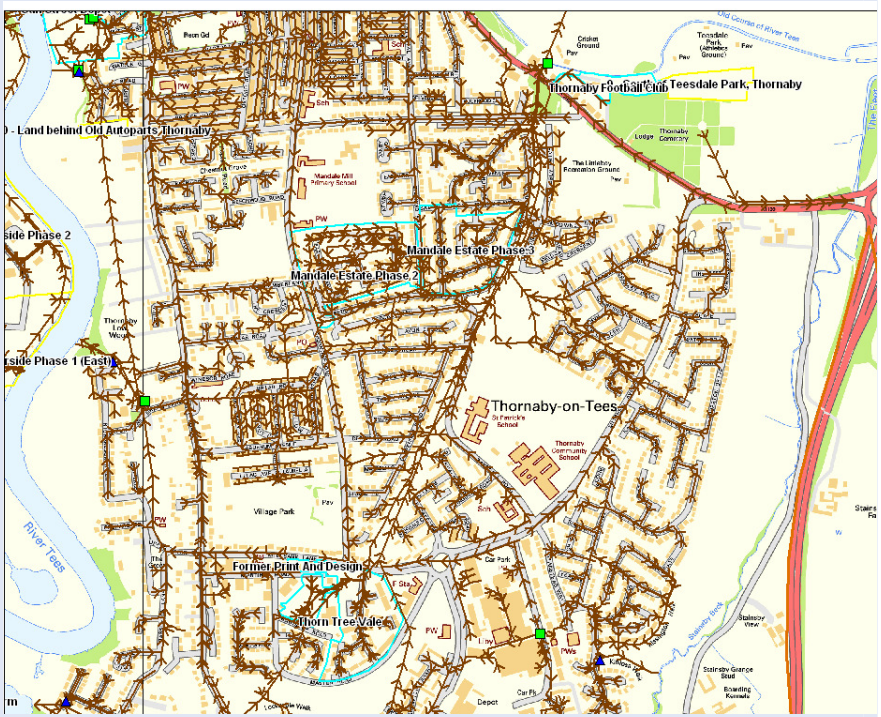
Thornaby (Thornaby Football Club, Mandale Estate phases 2 & 3 and Thorn Tree Vale)	There are several large housing developments already underway in this part of Stockton. New sewer infrastructure looks to already be in place within the development boundaries, with the exception of Thornaby Football Club where there is presently one gravity sewer of 225mm diameter. Some of the network around the developments comprises a separate surface and foul system, although the majority of the surrounding network is combined. The proposed new developments in Thornaby would connect to an already heavily used network and modelling should be carried out to identify where any capacity issues may exist. There are no DG5 locations in the Thornaby region, There are a number of CSOs in the vicinity, notably one near Thornaby Football Club.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

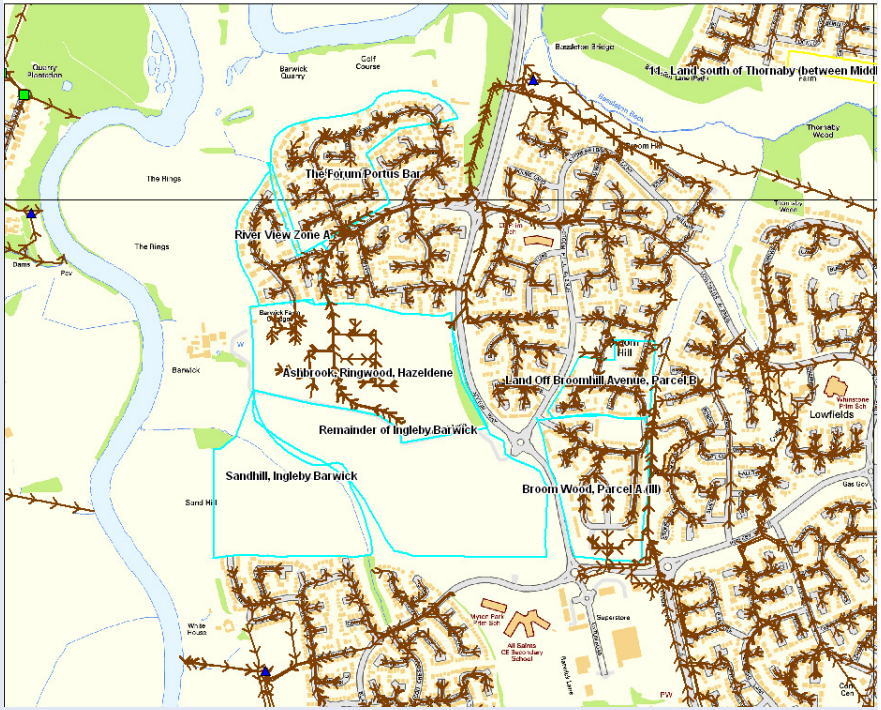
Ingleby Barwick (Ashbrook, remainder of Ingleby Barwick, Sandhill and Land Parcel At Blair Avenue)	This is a large area of new development, predominantly on greenfield sites. With building already underway within some of the proposed development sites, many new sewer connections are already in place. The network in Ingleby Barwick is entirely separate surface and foul sewers, with a combination of gravity sewers and pumped rising mains of varying sizes. It should be noted that two DG5 locations are recorded close to the 'remainder of Ingleby Barwick' proposed area indicating that capacity issues may already exist here. Development should be phased in collaboration with NWL to ensure any necessary upgrades to the network can be implemented to prevent adverse effects downstream. Modelling should be carried out to assess how much capacity exists both in the local and wider network to accept the proposed volume of housing.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

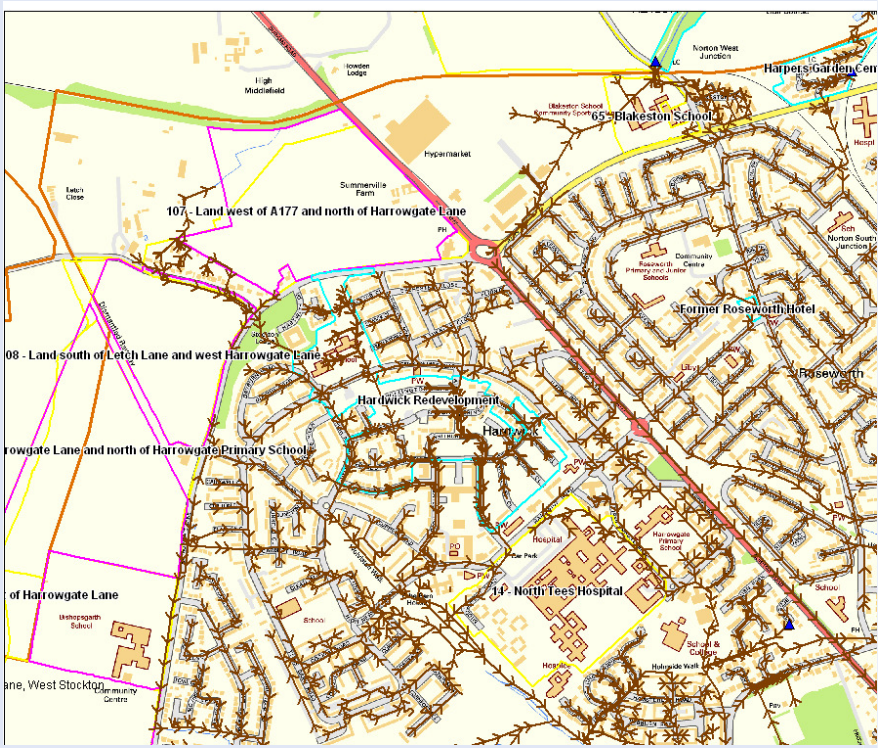
North West (Hardwick, Hospital, Peacocks Yard and Harrowgate Lane)	Like many of the development areas proposed in Stockton-on-Tees, the sewer network here is extensive and complex. Infrastructure is already in place around the Hardwick redevelopment and adjacent to the hospital site. Modelling should be undertaken to understand available capacity in the surrounding network and downstream, as foul flows would be carried to the Bran Sands treatment works. Most of the network in this area is combined surface and foul sewers with some exceptions including the newer sewers within the Hardwick development which are separate. Flow is carried via large gravity sewers to two pumping stations. There are no DG5 locations recorded in this area, but more data is required on the current capacity of these pumping stations to ensure they can cope with the additional flows from development. The proposed development sites at Harrowgate Lane represent a very large number of new dwellings on greenfield land, which could have a significant impact on the existing sewer network. It is likely that upgrades would be required both within the development areas and to the sewers carrying additional flow through the sewer network. Phasing should be agreed in collaboration with NWL to ensure necessary infrastructure is in place.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

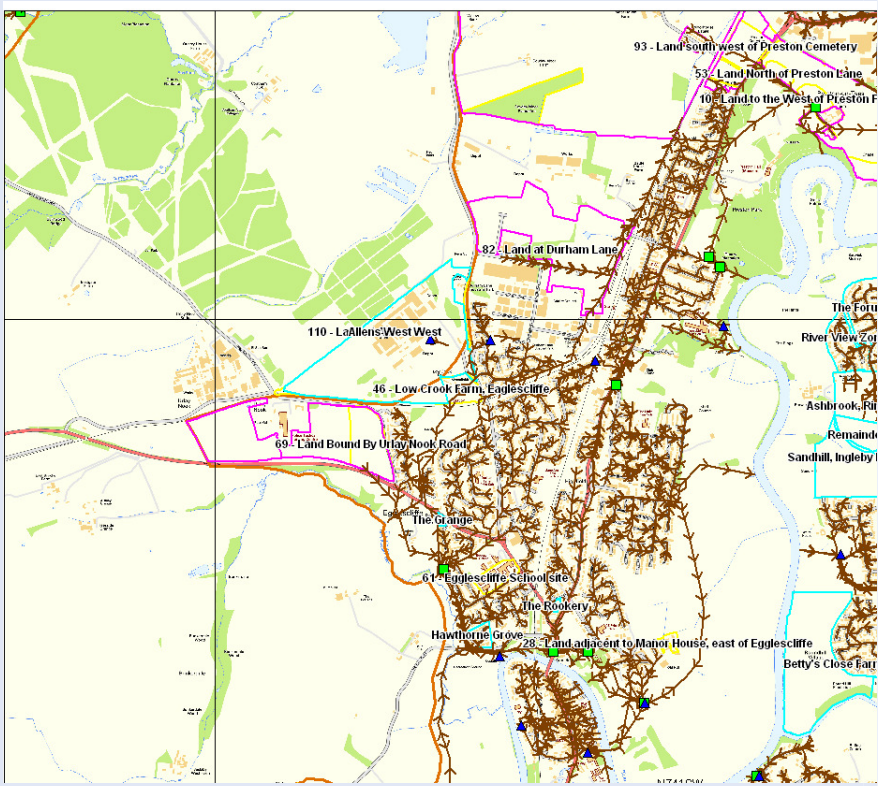
Eaglescliffe Urlay Nook and Allens West	Located to the south of the main urban area of Stockton-on-Tees, most of the proposed development sites in Eaglescliffe and Urlay Nook are on greenfield land with some brownfield redevelopment at Allens West. At present, little sewerage infrastructure exists within the proposed development sites and upgrades would need to be incorporated into development in collaboration with NWL. The nearby network is mixture of combined and separate surface and foul sewers with a number of surface water sewers draining east to the River Tees and west to Nelly Burdon's Beck. The implication for the Beck in particular as a drainage feature should be fully modelled to ensure large scale development nearby doesn't lead to adverse impacts downstream. No DG5 locations have been recorded nearby, although there are numerous pumping stations and CSOs in the local network.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

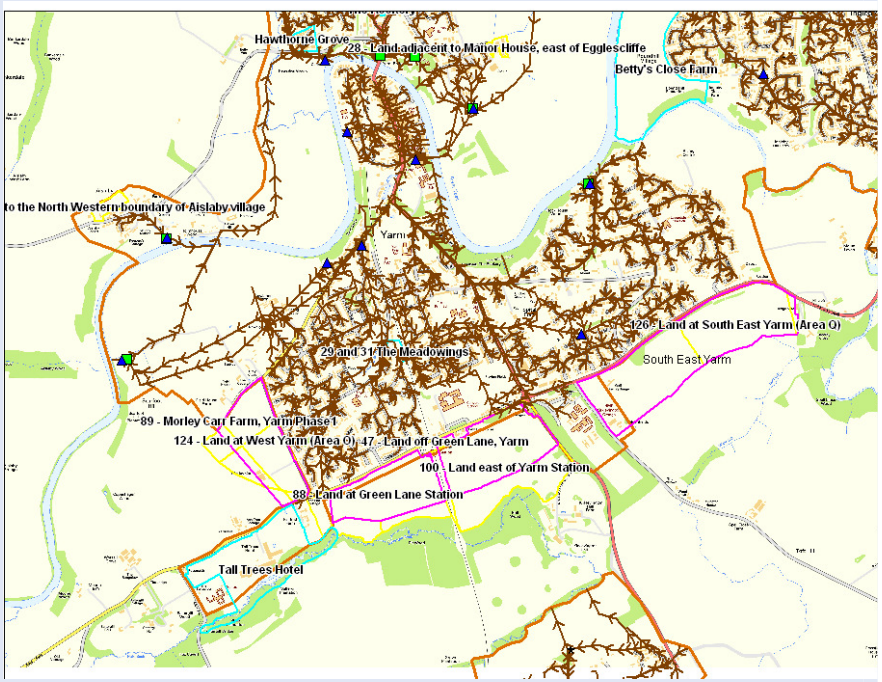
Yarm	The proposed greenfield developments at Yarm are likely to add significant flows to the local network, which is made up of separate surface and foul sewers of varying size. The surface water mostly drains by gravity to the River Tees. There are no DG5 locations recorded. There are seven pumping stations operating on the network within Yarm and their capacity should be fully assessed when phasing new development to ensure the existing network is not overloaded. Additional infrastructure will need to be incorporated into any new development sites and hydraulic modelling should be carried out to establish the existing capacity of the local network to avoid any adverse impacts locally or downstream in the network.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

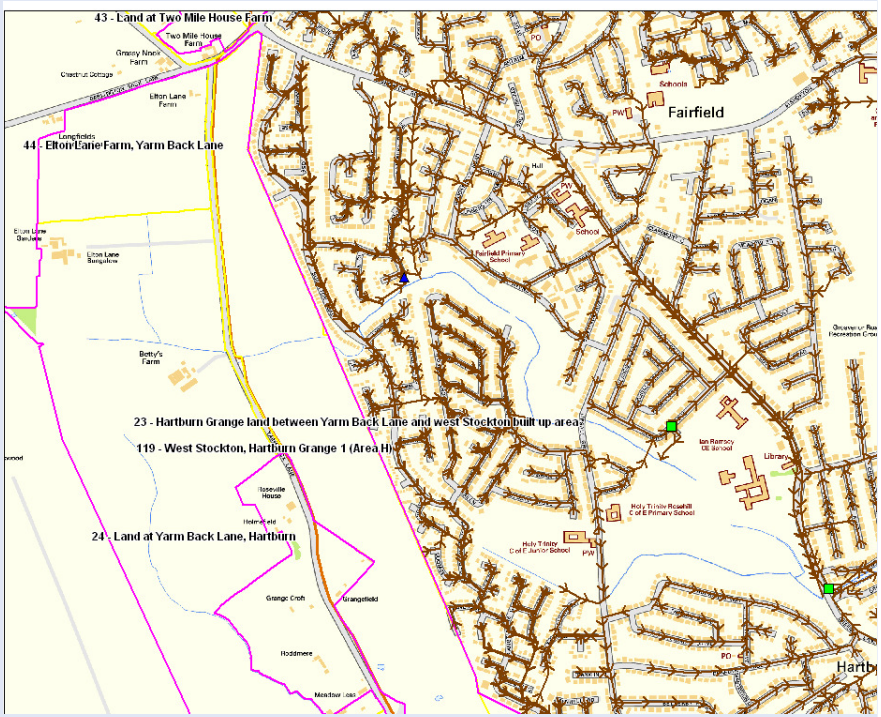
Yarm Back Lane	The proposed sites at Yarm Back Lane are greenfield sites, with no sewerage infrastructure currently in place. The sites lie adjacent to a large urban network with a mixture of combined and separate foul and surface water sewers, likely to have potential connection points. However capacity issues may exist in the system as indicated by a DG5 location nearby. A pumping station and a number of CSOs are located downstream on the receiving network. In addition to new infrastructure that would be required to connect the proposed development, phasing in collaboration with NWL would ensure any required upgrades to the network are in place to carry the additional flow. Detailed hydraulic modelling should be carried out to assess current capacity and requirements to handle the additional flow.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

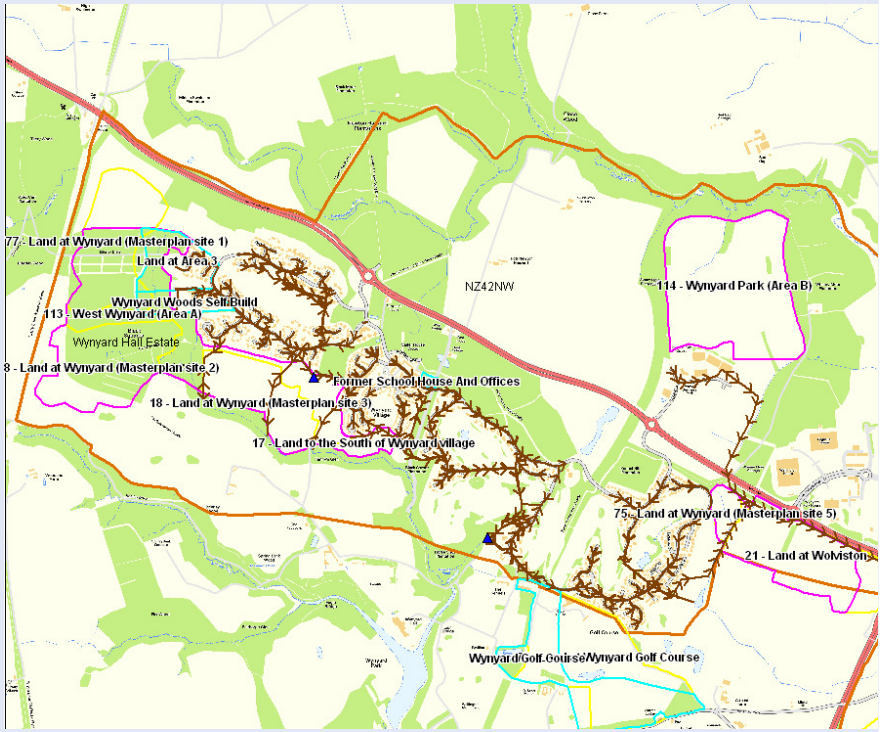
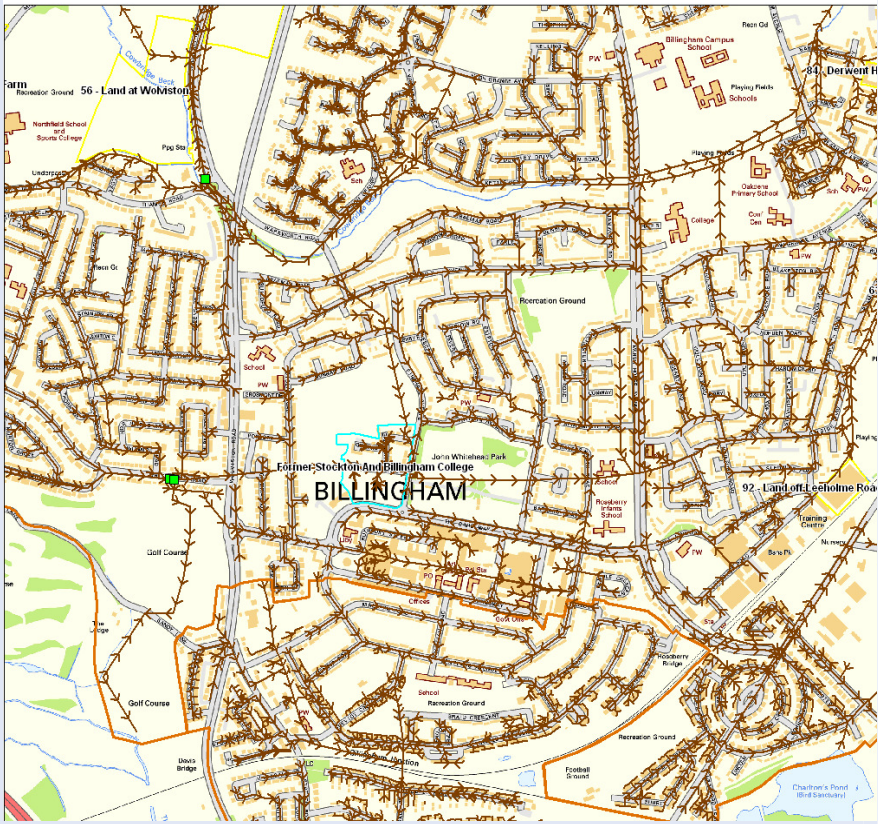
Wynyard	The proposed development sites at Wynyard are greenfield sites that mostly border the existing Wynyard village, which has a separate surface and foul sewer system with a combination of gravity sewers and pumped rising mains. The sites have no existing sewerage infrastructure and while it is possible that connections could be made to the existing system, upgrades are likely to be required to accommodate the full level of development proposed. The majority of existing pipes range from 150 to 375mm in diameter. Foul sewage flows would be transported to Billingham STW, which has sufficient capacity for all proposed dwelling numbers. However hydraulic modelling should be carried out to determine capacity in the network and development should be phased in collaboration with NWL to ensure sufficient infrastructure is in place.	

TABLE 6-3: SEWER NETWORK ASSESSMENT

Billingham	Development is already underway at the former Stockton and Billingham college site and the necessary infrastructure is already in place. The proposed new development would connect to the existing network, which drains to Billingham STW. Hydraulic modelling should be carried out to establish existing capacity and avoid any adverse impacts on the existing network from the input of additional flows. The local network is complex and is predominantly combined surface and foul sewers around the development site, with gravity sewers ranging in size around 150-450mm in diameter. These connect to large sewers carrying the flow to Billingham STW, which has been shown to have capacity to treat additional foul flows from the proposed level of development.	

7 WATER QUALITY

7.1 Introduction

Any proposed development will need to demonstrate no deterioration of existing surface water and groundwater quality, through effective design of wastewater and surface drainage infrastructure. In addition, development will, in combination with other measures, need to assist in the achievement of Good Status or Potential by 2015 (or 2027) as required by the WFD.

7.2 River Basin Management Plan

Within the Tees catchment, there are 83 river waterbodies and 31 lakes defined in the Northumbria RBMP[40]. 25% of these rivers currently achieve good or better status/potential, 14% of the rivers assessed for biology are at Good or better biological status, with 41% at Poor biological status/potential, and 9% at Bad status/potential.

There are two main ways in which new development can affect the water quality of the waterbodies identified in the RBMP:

- alterations in the volume and quality of surface water runoff; and
- increases in treated foul sewage effluent and frequency of storm discharges from the foul sewage network.

The first can be managed by the use of SuDS techniques, which is discussed in section 9.2 below. The second can be managed through consents to discharge issued by the Environment Agency, as discussed above in section 6.3. The RBMP waterbodies which have the potential to be affected by discharges from the WwTW to which the currently proposed growth would drain[41] are indicated in Table 7-1 below.

[41] This excludes WwTW that don't have any growth proposed within their catchments

TABLE 7-1: TEES VALLEY WATERBODIES POTENTIALLY AFFECTED BY PROPOSED GROWTH				
WwTW	**Receiving watercourse**	**RBMP waterbody**	**Current status/potential**	**2027 target status/potential**
Bran Sands	Dabholm Gut	Wilton (tidal Tees) Area GB103025072320	Moderate Status	Good Status
Marske	The North Sea	Yorkshire North GB650301500003	Good potential	Good potential
Skinningrove	The North Sea	Yorkshire North GB650301500003	Good potential	Good potential
Billingham	The North Sea	Yorkshire North GB650301500003	Good potential	Good potential
Carlton & Redmarshall	Whitton Beck	Billingham Beck, Bishopton Beck to Brierley Beck GB103025072360	Poor Status	Good Status
Graythorpe	Tees Estuary	Tees GB510302509900	Moderate potential	Good potential
Seaton Carew	The North Sea	Yorkshire North GB650301500003	Good potential	Good potential
Stressholme	River Tees	Tees US Low Worsall GB103025072593	Poor potential	Good potential
Goose Beck	Goosepool Beck	Lustrum Beck Catchment (trib of Tees) GB103025072550	Moderate potential	Good potential

7.3 Bathing Water Quality

The coastline in the Tees Valley region has several designated Bathing Waters with the potential to be impacted by effluent discharges directly, or through the cumulative effect of several upstream discharges. It is essential that any growth does not impact on compliance with the Bathing Water Directive (BWD)[42]. Table 7-2 indicates that in the 2011 bathing season, all sites in the region achieved the Guideline water quality standard with the exception of Redcar Lifeboat Station, which achieved a Mandatory pass. 2012 marks commencement of water quality measurements under more stringent standards under the revised BWD.

An assessment was carried out in 2009 using Bathing Water quality data from 2005 to 2008 to assess future compliance against the revised BWD. The outcomes from this assessment indicate that two sites in the Tees Valley region would achieve Excellent and five would achieve Good. Despite failing standards at Saltburn in 2010, the work of the Saltburn Bathing Water Management Group comprising Northumbrian Water, Environment Agency and RCBC has resulted in the beach meeting the higher Guideline standards in 2011[43].

[42] Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC
[43] Water Quality Classification Predictions for Bathing Waters in England and Wales under the Revised Bathing Water Directive , Environment Agency for Defra, November 2008.
http://archive.defra.gov.uk/environment/quality/water/waterquality/bathing/documents/bathingwaterqualitypredictions.pdf

TABLE 7-2: LOCAL DESIGNATED BATHING WATERS

Site name	Local authority	2011 Water Quality	Prediction under revised BWD based on 2005-2008 results
Seaton Carew North	Hartlepool	Guideline	Good
Seaton Carew Centre	Hartlepool	Guideline	Excellent
Seaton Carew North Gare	Hartlepool	Guideline	Excellent
Redcar Coatham	Redcar & Cleveland	Guideline	Good
Redcar Lifeboat Station	Redcar & Cleveland	Mandatory	Sufficient
Redcar Granville	Redcar & Cleveland	Guideline	Good
Redcar Stray	Redcar & Cleveland	Guideline	Good
Sea at Marske Sands	Redcar & Cleveland	Guideline	Good
Saltburn	Redcar & Cleveland	Guideline	Poor

Whilst the proposed discharge consent standards given above in section 6.3 would ensure no adverse effects on water quality in terms of WFD compliance, this does not ensure compliance with the requirements of the BWD. The BWD measures bacterial levels within designated Bathing Waters, bacteria which may originate from discharges of treated (i.e. from STW) or untreated (i.e. storm overflows) sewage. Discharge consents do not normally have limits on the same bacteriological parameters in effluents as are measured at designated EU bathing waters and used for assessing compliance in the environment. However, WwTW and their catchments are designed to ensure that bathing waters are unaffected by both continuous and intermittent treated sewage discharges i.e. to avoid storm spills in a location or at a frequency that could cause BWD standards to be failed. It should be noted that the BWD standards were updated and tightened in 2011 and operation of NWL's assets in relation to the new standards is currently under review. If investment is required it is anticipated that this would be through a specific funding driver in the NEP.

In order to remove bacteria from sewage discharges, tertiary treatment in the form of UV treatment is required. Tertiary treatment is currently not in place at Skinningrove WwTW (which could affect Saltburn) and an increase in the consented discharge volume could increase the levels of bacteria present within the discharge. Marske WwTW (which could affect Saltburn, Marske Sands, Redcar Stray, Redcar Granville, Redcar Lifeboat Station and Redcar Coatham) or Bran Sands WwTW (which could affect Saltburn, Marske Sands, Redcar Stray, Redcar Granville, Redcar Lifeboat Station, Redcar Coatham, Seaton Carew North Gare, Seaton Carew Centre and Seaton Carew North) , Seaton Carew (which could affect Seaton Carew North Gare, Seaton Carew Centre and Seaton Carew North) and Billingham (which could affect Seaton Carew North Gare, Seaton Carew Centre and Seaton Carew North) all have UV tertiary treatment in place to reduce the levels of bacteria in the final effluent.

Additional wastewater flow within the sewer network could also increase the number of CSO spills during rainfall, as there would be less capacity available. This is taken into consideration by NWL when new development proposals are considered in WwTW catchments adjacent to designated bathing waters. NWL requests that new development is served by separate foul and surface water sewers, which would limit the increases in storm spills to a certain degree, although some of the proposed development lies within or adjacent to areas of combined sewers and separation of foul and surface water may therefore not be possible.

In 2007, the discharge from Billingham Sewage Treatment Works was diverted from its previous location to a long sea outfall to ensure that it had no adverse effect on the ecologically important area at Seal Sands. The location of the outfall and the level of treatment mean that these discharges have no perceptible impact on bathing water quality[44].

7.4 Groundwater Quality

There are four (WFD) groundwater waterbodies that underlie the Tees Valley study area, as designated by the Northumbria RBMP. These are:-

- the Tees Carboniferous Limestone and Millstone Grit;
- the Tees Sherwood Sandstone;
- the Tees Mercia Mudstone and Redcar Mudstone; and
- the Wear Magnesian Limestone groundwater bodies.

The proposed development in the Tees Valley could potentially impact the groundwater quality, e.g. through sewer leakage or infiltration SuDS (see section 9.2.1 below). No deterioration in groundwater status would be permitted under the WFD.

The Wear Magnesian Limestone groundwater body has been classified by the Northumbria RBMP as being at poor status for both quality and quantity aspects. The Environment Agency's WFD investigations have identified new impacts from abstraction on flows in the dependent surface waters (the Skerne and its tributaries) and on the coastal and estuarine surface water bodies. The Wear Magnesian Limestone is reported as being at poor chemical and qualitative status, due to widespread occurrence and threshold breaches of sodium, chloride and nitrate and sulphate.

The Sherwood Sandstone is reported in the Northumbria RBMP as being at good status for both quality and quantity aspects, but this is based on limited quality monitoring data and few abstractions and constraints of the WFD classification test. There are known issues relating to the poorer quality of Sherwood Sandstone which could constrain development.

[44] Bathing Water Profile, Seaton Carew Centre, Hartlepool, Environment Agency, February 2012

8 ECOLOGY AND BIODIVERSITY

8.1 Introduction

The Ecology and Biodiversity assessment includes a review of the statutory designated ecological sites that could be impacted by potential new development within the Tees Valley region.

This chapter identifies and reviews any water dependent sites within and linked to the Tees Valley region and assesses whether abstraction for the public water supply or increased discharge from WwTW associated with the proposed development within the Tees Valley region is likely to impact upon any of these sites, thereby presenting a constraint to development.

An Appropriate Assessment (AA) of the RSS for the North East was prepared for the Government Office for the North East in 2007[45]. This identified a number of key issues which could influence water dependent sites, and the extent to which they can currently be managed, to meet their objectives. In relation to water and future development, these included:

- sea level rise and coastal squeeze which can reduce certain intertidal habitats; and
- water supply and quality (a particular issue for sites with fens, bogs and wet heathland).

These issues were reviewed to determine whether the RSS[46] (either alone or in combination with other plans or projects) might influence key ecological processes and functions[47] or exacerbate any existing adverse trends. However, as discussed in section 2.2.2, the RSS will shortly be revoked.

A number of European designated sites are located within the Tees Valley region and the surrounding area which are designated as such to protect Europe's rare and endangered habitats and species. These designated sites have the potential to be affected by development within the region, especially those sites located downstream of a discharging WwTW. A number of these are designated for habitats or species that are water dependent and are therefore more likely to be impacted by changes in the volume (through additional discharges or abstractions) or quality of watercourses in the region.

There are also a number of nationally and locally important designated sites located within the Tees Valley region which could potentially be impacted by proposed development to the region.

The main potential sources of effects of development relating to water dependent sites are essentially:

- the promotion of development in coastal districts and the growth of ports which may affect the ability of certain intertidal habitats to migrate naturally landward as sea level rises,
- development of housing and employment areas and the associated increase in hard standing areas a which may affect water quality at European sites through an increase in nutrient loading or contamination by toxic substances;
- drawdown of water levels (in rivers and aquifers) as a result of excessive abstraction,

[45] Government office for the North East (February 2007) Draft Appropriate Assessment of the Regional Spatial Strategy for the North East - Non Technical Summary http://www.gos.gov.uk/nestore/docs/planning/rss_documents/k.pdf
[46] Although the RSS is likely to be revoked, Northumberland County Council are using these growth projections to plan for growth in their County over the next 10-15 years, so the findings from the Draft AA are still valid for the purposes of this Outline WCS.
[47] EC guidance (2000) or Article 6 of the Habitats Directive, indicates that the ecological functions/requirements of a site *"involve all the ecological needs of abiotic and biotic factors necessary to ensure the favourable conservation status of the habitat types and species, including their relations with the environment (air, water, soil, vegetation, etc.)"*.

- hypernutrification resulting from increased nitrogen (in marine systems) due to WwTW discharges which can lead to eutrophication; and
- localised changes in scour patterns if WwTW discharge volumes increase significantly.

These impacts are the focus of the ecology assessment in the WCS. Figures 13-3 to 13-7 in Appendix C show the distribution of designated sites across the Tees Valley region.

8.2 Methodology

There is no statutory requirement for a WCS to be subject to Habitat Regulations Assessment (HRA)/Appropriate Assessment (AA) since it is part of the plan making evidence base rather than a plan or project in itself. However, a WCS should ensure that any proposed development protects and where possible enhances all important conservation features and as such consideration needs to be given to designated ecological sites that are located within the WCS study area.

Additionally, sites outside the study area that may be affected by the proposed new development (e.g. by increases in abstraction or discharge through identified pathways[48]) should be considered. In order to ensure compliance with the Habitats Directive, it is necessary to have consideration for the impacts of water resource and disposal options when developing a WCS. The purpose of this assessment is therefore to identify if there are any ecological constraints to the proposed development within the study region. Full details of the HRA process are included in Appendix D.

8.2.1 *Pathways of Impact*

The ecological assessment for this Outline WCS is entirely concerned with abstraction, treated effluent discharge and flood risk. As such, this report concerns itself exclusively with those pathways of impact.

8.2.2 *Assessment of Other Designated Sites*

This assessment does not confine itself exclusively to sites of international importance. Consideration is also given to the potential impacts of development on other designated sites in the Tees Valley region including Sites of Special Scientific Interest (SSSIs) and locally designated/protected sites. The assessment of these designated sites will follow a similar methodology to that undertaken for the European protected sites.

Since this is an Outline WCS, the assessment involves an identification of risks based upon interest feature sensitivity (within the context of the conservation objectives for the sites), pathways connecting WwTW discharge/abstraction to designated sites, current baseline as set out in the Environment Agency's Review of Consents (RoC) assessments and potential for future impact based upon any need for relevant WwTW to increase their consented discharge volumes. Since the Environment Agency RoC work will have already analysed the impact of consented abstraction/discharge volumes, it is assumed in this analysis that WwTW that do not need to exceed their consented volumes will have already been fully considered in the RoC process.

8.3 Screening Assessment - European and Nationally Important Sites

Within the Tees Valley region there are two European sites and nine SSSIs that are water dependent and theoretically linked to proposed development in the Tees Valley region, see Table 13-1 in Appendix C for a list of all Nationally and Internationally designated sites with the study area. The listing of these within this table does not imply an adverse effect.

[48] A pathway can be defined as a route by which a change in activity within the development area can lead to an effect upon a European site. These pathways, in terms of water related impacts, could include recreational impacts, water resources, water quality and coastal squeeze.

8.3.1 *Habitats Directive Review of Consents*

The Habitats Directive came in to force in 1992, requiring the Environment Agency to review the impacts of all permissions that had been granted to emit to air, land and water without consideration of the Habitats Directive in order to ensure there were no adverse effects on the nature conservation interests of designated sites.

The RoC process is undertaken in four stages. Stages One and Two look at all the consents and identifies those that have the potential to have a significant effect. Stage Three looks at whether the consents affect special sites and Stage Four investigates those consents which have an adverse effect. A RoC has been undertaken for the Teesmouth and Cleveland Coast SPA Ramsar[49], as summarised below.

8.3.2 *Teesmouth and Cleveland Coast SPA Ramsar / Seal Sands SSSI*

Teesmouth and Cleveland Coast is a wetland of international importance and large numbers of water birds feed and roost on the site in winter and during passage periods. Features of the site are potentially at risk from excess levels of nutrients. The EA RoC process identified that Seal Sands SSSI (one of the most important bird feeding and roosting areas in the site) suffers from growth of opportunistic macroalgal mats. These deteriorate the quality of the interest feature by smothering and depleting oxygen and adversely affecting invertebrates that live in the sediments, plants, fish and other animals and also restrict the use of the mudflats by short billed waders who struggle to feed past the algal barrier.

There has been extensive study of this issue for the RoC, which reported in 2005, and a follow-up study funded by NWL in 2005-2008. A number of measures have already been implemented to try and address this issue including the diversion of Billingham WwTW to a long sea outfall. However, the macroalgae situation has not improved thus far, even after a significant reduction in dissolved inorganic nitrogen inputs from the diversion of Billingham WwTW and other measures. As part of the RoC study, the Environment Agency carried out predictive modelling that indicated that the macroalgae would not be reduced, even if all the sources of nutrients to the estuary were removed or reduced as far as appeared technically feasible. This conclusion therefore does not support the case for further reducing nutrient inputs, but suggests that further work to determine what factors contribute to the growth of macroalgae on Seal Sands is required instead.

The Environment Agency is currently undertaking WFD investigations, for completion by December 2013, which will lead to a strategy for addressing the elevated levels of dissolved inorganic nitrogen failure, and to find ways to reduce it. In addition, Natural England is funding a study during 2012 to assess environmental conditions within SPA intertidal habitats and what the WFD transitional water status and criteria are. The study is timely for Seal Sands SSSI part of the SPA as it is in part to see if algal growth has reduced, following the diversion of Billingham STW to reduce the amount of nutrients being discharged into the estuary affecting the SPA/SSSI sites. The study report will be completed by February 2013. A separate predictive modelling exercise, using an improved model, is also being undertaken to reassess the impact of further nutrient reduction on macroalgae. The impacts of the conclusions of this report on the WCS are discussed further in Section 11.

8.4 Screening Assessment – Locally Important/Designated Sites

The locally important sites that fall within the Tees Valley area are shown in figure 13-2 in Appendix C. The listing of these sites within this table does not imply an adverse effect.

[49] Habitats Directive Review of Consents Options Appraisal, Site Action Plan, Teesmouth & Cleveland Coast Special Protection Area (SPA) and Ramsar, Tees SAP 1-2, Environment Agency

As discussed, the volumetric capacity at Graythorpe WwTW would be exceeded as a result of the proposed development. However, at this stage no local sites have been identified that are connected to the discharge of Graythorpe WwTW.

8.5 Water Quality Conclusion and Recommendations

Tables 6-1, 6-2 and 6-3 above identify the WwTWs within the Tees Valley region, their DWF consent capacity and the receiving watercourse which they discharge to. There is only one WwTW where the volumetric capacity will be exceeded as a result of growth, namely Graythorpe. The WwTW at Graythorpe currently treats wastewater from industrial premises within its catchment and has been assessed to have insufficient capacity to accept flows form the proposed levels of development within the catchment; an increase to the consented DWF is therefore required. If the quality conditions of the discharge consent are not altered, this additional discharge could increase nutrient loading discharged from Graythorpe WwTW to the Tees Estuary, resulting in a decline in water quality. This could have an effect on the downstream water dependant ecological sites, the Seal Sands SSSI, the Teesmouth and Cleveland Coast SPA Ramsar (Seal Sands SSSI forms part of the SPA Ramsar) and the foreshore elements of Seaton Dunes & Common SSSI and South Gare & Coatham Sands SSSI.

However, it is considered that it should be possible to increase the consented DWF without a deterioration in treated effluent quality, although a feasibility study is needed to confirm this. If a feasibility study concluded that Graythorpe WwTW could not accept all the increased flow from the proposed growth it may be possible to take flows to Seaton Carew WwTW, which has an estimated 15,840 m^3/d available capacity, after the proposed growth.

The Teesmouth and Cleveland Coast SPA Ramsar (and Seal Sands SSSI) is coastal/estuarine/tidal in nature and therefore unlikely to be adversely impacted by water quality issues. Additional nutrient loading as a result of development is unlikely due to tighter treatment standards and the discharge would also be diluted by the tidal volume of the North Sea and it is therefore concluded that there would be no adverse effects on the designated site from the proposed development within the Graythorpe WwTW catchment.

9 FLOOD RISK AND SURFACE WATER MANAGEMENT

It is important for the WCS to include an assessment of the constraints of flood risk, and the infrastructure required to mitigate it as a result of proposed growth. Both flood risk to, and flood risk from development need to be considered.

A review of the Environment Agency's flood mapping[50] and the SFRA demonstrates that there are large areas at risk of flooding, especially from tidal sources. An overview of the flood risk baseline for the authorities as a whole has been included in the scoping report and a summary for each authority provided in Section 4. The flood risk to the individual proposed development sites is provided in the assessment tables below.

The main sources of flood risk in the Tees Valley are fluvial, associated with rain and snow fall, and tidal associated with high sea levels. As with eastern tidal watercourses, the Tees Estuary is vulnerable to coastal flooding caused by a combination of high tides, wave heights and storm surges in the North Sea. Fluvial flooding can be caused by precipitation, particularly in the upper catchment.

9.1 Flood Zone definition

The NPPF Technical Guide and the PPS25 Practice Guide[51] set out guidance and requirements for the assessment of flood risk. While these documents do not directly form part of the guidance for carrying out a WCS, they have been used during the production of this report. The guidance set out within the NPPF and PPS25 Practice Guide must be applied in order to address flood risk from all sources (fluvial, pluvial, tidal, groundwater, artificial and sewer).

The NPPF Technical Guide defines the following flood zones:

- Zone 1 - low probability. This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). All uses of land are appropriate in this zone.
- Zone 2 - medium probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year. Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses, as set out in table 2, are appropriate in this zone. The highly vulnerable uses are only appropriate in this zone if the Exception Test is passed.
- Zone 3a - high probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. The water-compatible and less vulnerable uses of land (table 2) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.
- Zone 3b - the functional floodplain. This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or

[50] www.environment-agency.gov.uk
[51] Planning Policy Statement 25: Development and Flood Risk – Practice Guide, Communities and Local Government, December 2009

greater in any year, or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain. Only the water-compatible uses and the essential infrastructure listed in Table 2 of the NPPF Technical Guide that has to be there should be permitted in this zone. Essential infrastructure in this zone should pass the Exception Test and should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows; and
- not increase flood risk elsewhere.

The NPPF Technical Guide and the PPS25 Practice Guide state that the Sequential Test must be applied by local authorities when allocating new development sites, in order to steer development away from the areas of greatest flood risk. The Sequential Test is a planning principle that seeks to identify, allocate or develop land in low flood risk zones before land in high flood risk zones. When a development type is not compatible with flood risk in a particular location, the Exception Test may be applied if there are valid reasons as to why the development should proceed.

In addition, development in Flood Zones 3, 2 and sites greater than 1 ha in area within Flood Zone 1 should be subject to an NPPF compliant FRA. The FRA should also ensure compliance with the detailed WCS, Level 2 SFRA and SWMP. The NPPF Technical Guide and PPS25 Practice Guide also set out requirements for local authorities to carry out SFRAs.

9.2 Surface Water Management

Surface Water Management is a key consideration when assessing development, particularly for large areas. The National Planning Policy Framework (NPPF) published in March 2012[52] supersedes PPS25 (although the PPS25 Practice Guidance is still valid) but maintains requirements that new development does not increase the risk of flooding elsewhere by managing surface water runoff generated as a result of developing land.

Altering large areas of land by urbanisation fundamentally alters the way in which rainfall drains to watercourses and has the potential to increase the rate and amount of water that enters watercourses, causing an increase in flood risk. In many cases, the management of surface water is achieved via a requirement to restrict runoff from developed sites to that which occurs from the pre-development land use, and this is achieved by incorporating a range of Sustainable Drainage Systems (SuDS). These aim to maximise the amount of rainwater which is returned to the ground (infiltration) and then to hold back (attenuate) excess surface water.

9.2.1 *Sustainable Drainage Systems*

A range of benefits and objectives are associated with incorporating SuDS into development; not only controlling volumes of surface water run-off but also the rate and quality. There are also opportunities to enhance landscaping and therefore amenity and/or conservation value of a site. Reducing the need for piped connections and surface water sewers can also lead to cost savings in the project.

The implementation of SuDS is significant in the achievement of sustainable development, which forms the central theme of the new NPPF. Local Plans largely already state that SuDS should be incorporated into development proposals. In addition, the provisions of Schedule 3

[52] National Planning Policy Framework, Department for Communities and Local Government, March 2012 http://www.communities.gov.uk/documents/planningandbuilding/pdf/2116950.pdf

of the Flood and Water Management Act 2010[53], which come into force on 1 October 2012, require the inclusion of sustainable drainage as part of any development. Lead Local Flood Authorities (LLFA) will have the responsibility of adoption and future maintenance of SuDS, which is likely to have a notable impact on acceptable designs.

Under the Flood and Water Management Act, responsibility for the adoption and maintenance of SuDS systems has been clarified. Before the implementation of the Act, maintenance and responsibility for SuDS systems in developments was inconsistent, with some SuDS systems becoming ineffective some time before their design life was exceeded, due to inadequate maintenance.

The Act will confirm the exact arrangement for adoption and maintenance of SuDS systems during 2012, but for the purposes of the Tees Valley Outline WCS it should be assumed that:

- the LLFAs will become responsible for the adoption and maintenance of new build SuDS that meet the require criteria;
- the LLFAs will become the SuDS approving body (SAB) for all new build SuDS that meet the required criteria;
- the requirements for approving new build SuDS will be outlined in forthcoming national standards on the construction and operation of surface water drainage; and
- the current right to connect new developments to the existing public surface water sewerage network will be revoked and new surface water drainage systems will need to be approved in line with forthcoming National Sustainable Drainage Standards (to be published in 2012[54]) before any connection to the public sewerage network is allowed.

In light of the change in SuDS approval and maintenance, this WCS has undertaken a high level review of issues affecting potential SuDS options at specific sites, including:

- underlying geology (affecting some infiltration techniques);
- Environment Agency Flood Zone (potentially affecting space for surface attenuation features; and
- groundwater protection issues).

The use of SuDS must be considered for all new development, in order to limit surface water run-off to pre-development levels for all development and to further limit run-off where possible. This latter option should be considered for areas where surface water flooding and combined sewer capacity issues are known to occur following rainfall e.g. Guisborough. Developer contributions through s106 agreements or Community Infrastructure Levies (CIL) could be sought to fund schemes to reduce existing problems, in conjunction with recommendations made by Councils' SFRAs and SWMP[55] (see section 2.4).

When considering infiltration SuDS, developers should consider the protection of groundwater quality in the study area, which is potentially vulnerable to pollution from inappropriately located and/or designed infiltration SuDS. Soakaways and other infiltration SuDS must not be constructed in contaminated ground. The use of infiltration drainage would only be acceptable if a phased site investigation (in line with CLR11, 'Model Procedures for the Management of Land Contamination') showed the presence of no significant contamination. The use of non infiltration SuDS may be acceptable subject to agreement with the Environment Agency. More information on SuDS will be available in the SuDS Manual produced by each LLFA.

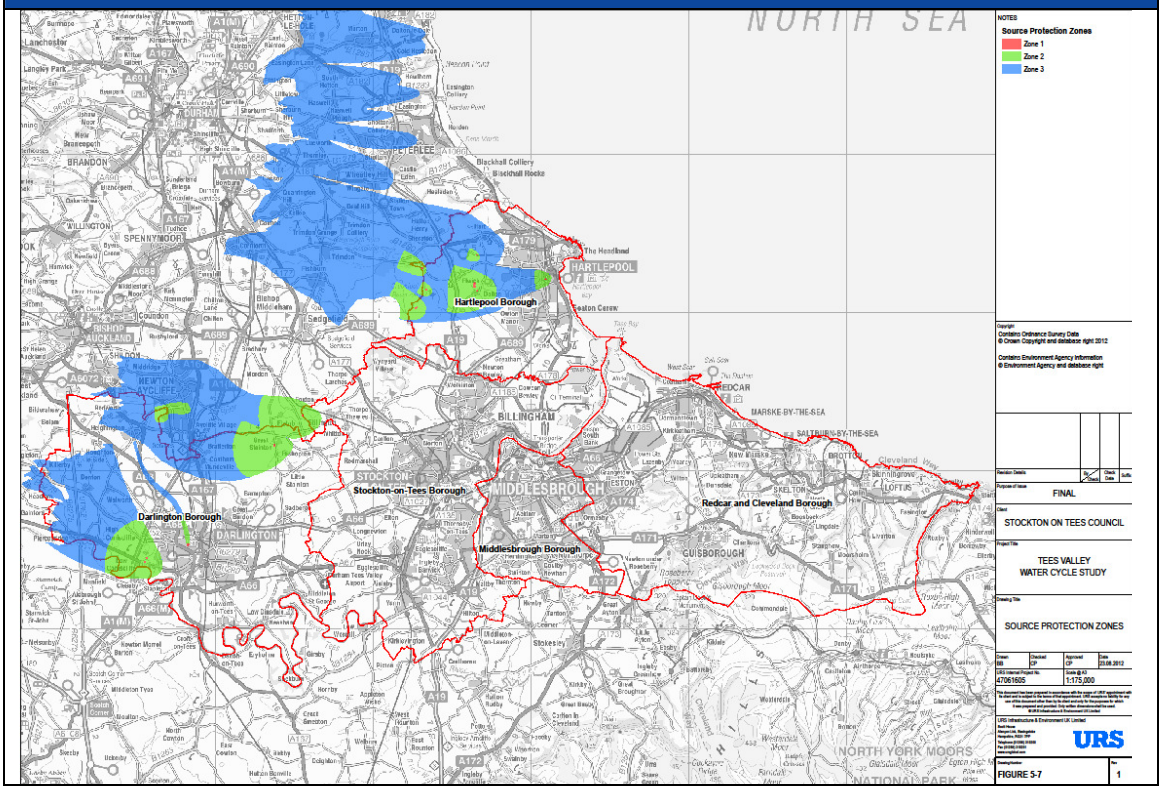
[53] The Flood and Water Management Act 2010, http://www.legislation.gov.uk/ukpga/2010/29/contents
[54] http://ww2.defra.gov.uk/news/2010/07/29/benyon-flood-speech/
[55] The Redcar and Cleveland SWMP is due for completion in February 2012

The Environment Agency considers that deep boreholes and other deep soakaways systems are not appropriate in areas where groundwater constitutes a significant resource. Deep soakaways increase the risk of groundwater pollution.

The majority of the Tees Valley is not located within an Environment Agency Source Protection Zones (SPZ); however, there are some within DBC and HBC as shown in Figure 9-1 below. It should be noted that the SPZ designation is not mapped for small private water supplies, for which a default of 50m radius is given as a Zone 1 (equivalent of 50 day travel time – the time required for bacteriological pollution to decay).

The upper and middle parts of the Tees Valley where the Carboniferous Limestone and Millstone Grit outcrop have extensive numbers of private water supplies via springs, wells and boreholes. All of these will have a default Zone 1 of the minimum 50 m radius around the source. It is recommended that the local Environmental Health Department be contacted prior to the planning of individual developments, to ensure no adverse effects on potential private water supplies.

FIGURE 9-1: SOURCE PROTECTION ZONES



9.2.2 *Geology in the Tees Valley and site specific SuDS*

The superficial geology, of the study area will be an important factor in determining the types of SuDS that can be used at the proposed development sites.

The bedrock geology of the upper and middle Tees Valley is largely carboniferous, with alternating limestones, shale, sandstones and thin coal seams and Millstone Grit. Towards the lower reaches of the Tees, the estuarine geology is Triassic marls and sandstones[7]. Strategic scale mapping[56] of the geology and soils in the Tees Valley shows predominant soil type to be

[56] http://www.landis.org.uk/soilscapes/

slowly permeable, seasonally wet basic loams and clays. There are smaller areas of freely draining loamy soils, but it is thought unlikely based on strategic scale geology mapping that attenuation SuDS would be suitable for the proposed development.

When assessing the type and location consideration should be made of both the individual and cumulative impact of the pollution risk and impact to groundwater levels and flow patterns with the aim to prevent pollution and of derogation of water supply, especially in SPZs and within 50 m of spring and surface waters (Code of Good Agricultural Practice[57] principles) and on principle aquifers and in areas of no or little drift geological cover.

[57] Protecting our water, soil and air – a code of good agricultural practice for farmers, growers and land managers, Defra, 2009, http://www.defra.gov.uk/publications/2011/06/16/pb13558-cogap/

10 DEVELOPMENT AREA ASSESSMENTS

10.1 Site Specific Assessment Methodologies

Following the assessment of wastewater treatment capacity and water resources at the district level, this section of the WCS addresses infrastructure capacity issues related to site specific locations in an assessment table format for each site.

A 'Red-Amber-Green' (RAG) assessment has been undertaken; a key indicating the coding applied to each assessment is provided in Table 10-1 below.

TABLE 10-1: KEY FOR RAG ASSESSMENT

Water resources	Wastewater transmission and treatment	Environment and ecology	Flood risk	Surface water management
There is water available based on CAMS Methodology Classification and the water supply company's WRMP	The proposed growth can be accommodated within existing available headroom at WwTW and in wastewater network	No environmental constraints identified	There is little/no perceived risk of flooding i.e. Fluvial/Tidal FZ1 with low risk of surface water flooding	The site is not in a SPZ and/or FZ1 and/or has permeable underlying geology
There is no water available based on CAMS Methodology Classification and/or the water supply company's WRMP	Minor upgrade or discharge consent increase of existing WwTW needed and/or network may need upgrading	Site is downstream of or in close proximity to designated sites and may impact upon site if not mitigated	There is a perceived medium risk of flooding i.e. within Fluvial/Tidal FZ2 and/or there is a low or medium risk of surface water flooding	The site is in SPZ1 or 2 and/or lies within a Flood Zone and/or has impermeable underlying geology
Water sources are over abstracted/over licensed based on CAMS Methodology Classification and/or WRMP predicts supply/demand defecit	Major/significant upgrade of WwTW and/or wastewater network is required to accommodate the proposed development	Site is downstream of or in close proximity to designated sites and is likely to impact upon site if not mitigated	There is a perceived high risk of flooding i.e. within Fluvial/Tidal FZ2 and 3 and/or there is a high risk of surface water flooding	SuDS provision should not be considered an absolute constraint to development

10.2 Proposed Development Areas in Darlington

TABLE 10-2: DARLINGTON HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
DC002	-	149	NWL	NWL's WRMP predicts a surplus of supply over demand until the end of the plan period (2035)	Stressholme WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Constraints not identified from high level assessment, but modelling needed establish network capacity	No discharge consent or abstraction licence increases are required therefore no effects on ecology are anticipated.	1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
DU178	-	842	NWL			New infrastructure likely to be required, but modelling needed establish network capacity		Eastern corner in FZ3 and some other small areas also in 2 and 3. ~85% FZ1	Surface water flooding associated with drainage ditch to east of site	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3
DU217	-	67	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		Areas of FZ3 (site is adjacent to river but EA indicate Flood defence) ~80% FZ1	Surface water flooding associated with drainage ditch to west of site	Till, Devensian and Alluvium	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3
DU229	-	123	NWL			5 DG5 records exist in nearby network, which may be already operating at capacity		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
DU239	-	95	NWL			Network data is incomplete and modelling is needed establish network capacity		~10% FZ3, small area of 2		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3
DU240	-	133	NWL			Constraints not identified from high level assessment, but modelling needed establish network capacity		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
DU286	-	500	NWL			Existing extensive network in this area, which is heavily used. Phasing of development should be agreed with NWL		1	Small area at risk of surface water flooding	Till, Devensian and Glaciolacustine Deposits	Use of Infiltration SuDS limited by low permeability of geology
DU324	-	110	NWL			Additional flows from new development will need to be transferred across the central network, modelling needed establish network capacity		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology

TABLE 10-2: DARLINGTON HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	Name	No. of Dwellings	Water supply company	Water resources capacity	WwTW capacity	Network capacity	Ecology	Flood Zone	Surface Water Flood risk	Geology	SuDS Constraints
DU328	-	1200	NWL			Some existing infrastructure and although there are no DG5 records nearby, upgrades to principal mains connecting the area to Stressholme STW are likely to be required.		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
DU329	-	160	NWL			Constraints not identified from high level assessment, but modelling needed establish network capacity		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
DU331	-	146	NWL			Existing extensive network in this area, which is heavily used. Phasing of development should be agreed with NWL		Mostly FZ3, small areas of FZ2	Small area at risk of surface water flooding	Alluvium	Use of SuDS will be limited within FZ2 and 3.
DU333	-	250	NWL			Additional flows from new development will need to be transferred across the central network, modelling needed establish network capacity		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
DV044	-	83	NWL			New infrastructure required. Impact on downstream network should be modelled		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
M03		60	NWL			5 DG5 records exist in nearby network, which may be already operating at capacity		1	Small area at risk of surface water flooding	Glaciofluvial Deposits – Devensian	Use of Infiltration SuDS limited by low permeability of geology
M08	-	80	NWL			Additional flows from new development will need to be transferred across the central network, modelling needed establish network capacity		1	Small area at risk of surface water flooding in north of site	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
M13	-	100	NWL			Existing extensive network in this area, which is heavily used. Phasing of development should be agreed with NWL		~30% FZ2,rest in 1		Alluvium	Use of SuDS will be limited within FZ2 and 3.

TABLE 10-2: DARLINGTON HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
M15	-	1128	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1	Small area at risk of surface water flooding in north of site	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
M24	-	1320	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		~20% FZ3, 10%FZ2	Small area at risk of surface water flooding in west of site associated with drainage ditch	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3
M32	-	100	NWL			One DG5 record is noted south of Eastbourne comprehensive School, which may be already operating at capacity		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
M48	-	72	NWL			Existing extensive network in this area, which is heavily used. Phasing of development should be agreed with NWL		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
M59	-	64	NWL			Existing extensive network in this area, which is heavily used. Phasing of development should be agreed with NWL		Mostly FZ3, small areas of FZ2[58]	Small area at risk of surface water flooding in centre of site	Alluvium	Use of SuDS will be limited within FZ2 and 3.
M64	-	50	NWL			Additional flows from new development will need to be transferred across the central network, modelling needed establish network capacity		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
M65	-	52	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
M66	-	80	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1	Small area at risk of surface water flooding in north of site	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology

[58] The 2012 Town Centre Fringe Mitigation Strategy states that while these sites are currently, to a lesser or greater degree, in high risk flood zones, the strategic, comprehensive flood mitigation plan identified will ensure that the amount of land in FZ3 on each site is reduced significantly, so that viable residential development can take place.

TABLE 10-2: DARLINGTON HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	Name	No. of Dwellings	Water supply company	Water resources capacity	WwTW capacity	Network capacity	Ecology	Flood Zone	Surface Water Flood risk	Geology	SuDS Constraints
M75	-	95	NWL			Existing extensive network in this area, which is heavily used. Phasing of development should be agreed with NWL		~10% FZ3, 90% FZ2		Alluvium	Use of SuDS will be limited within FZ2 and 3.
M79	-	50	NWL			Existing extensive network in this area, which is heavily used. Phasing of development should be agreed with NWL		~55% FZ3, 45%FZ2		Alluvium	Use of SuDS will be limited within FZ2 and 3.
M80	-	65	NWL			Existing extensive network in this area, which is heavily used. Phasing of development should be agreed with NWL		~40%FZ3, 60% FZ2		Alluvium	Use of SuDS will be limited within FZ2 and 3.

10.3 Proposed Development Areas in Hartlepool

TABLE 10-3: HARTLEPOOL HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
H222	South West Extension	2500	HWC	Surplus of supply over demand currently predicted for the Hartlepool WRZ, although AWS's WRMP did not consider the results of RBMP investigations and is due to be updated in 2014, which may change the current prediction.	Seaton Carew WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Greenfield site so new infrastructure required. Impact on downstream network should be modelled, include impacts on two pumping stations	No discharge consent or abstraction licence increases are required therefore no effects on ecology are anticipated.	1 (dependant on specific site proximity to R. Tees)	Surface water flooding associated with drainage ditch	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H199	Britmag Main (Sites A & B)	300	HWC			Little exiting infrastructure, although it is possible that privately owned. The impact on the existing network should be modelling		1 (location is coastal so may depend on specific location)			
H224	Wynyard Park	200	HWC		Billingham WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1,2,3 (depends on specific location and size)	Small area at risk of surface water flooding in centre of site	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3
H204	Headway	167	HWC		Seaton Carew WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Site lie next to a number of sewers, although the capacity is not known and modelling should be carried out		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H223	Hartlepool Hospital (SHLAA)	150	HWC			Development will increase flow to the Brus PS, which DG5 records in the downstream network operating close to capacity.		1,2,3 (depends on specific location and size)	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3
H225	Upper Warren	100	HWC			Development will increase flow to the Brus PS, which DG5 records in the downstream network operating close to capacity.		1			
H203	Hartlepool Hospital (planning permission)	77	HWC			Development will increase flow to the Brus PS, which DG5 records in the downstream network operating close to capacity.		1,2,3 (depends on specific location and size)		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3

TABLE 10-3: HARTLEPOOL HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
H201	Wynyard Woods	71	HWC		Billingham WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H198	Belle Vue (The Lakes)	67	HWC		Seaton Carew WwTW has sufficient capacity for the proposed growth without Requiring an increase to the consented DWF or a process upgrade	No DG5 records nearby but building density is high and infrastructure is likely to be under heavy use. Hydraulic modelling is required		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H210	Middle Warren 9A (Bellway) & (Persimmon), 7B & 7E (Charles Church)	63	HWC			Development will increase flow to the Brus PS, which DG5 records in the downstream network operating close to capacity.		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H207	Tunstall Court	57	HWC			Two CSOs lie on sewer from the proposed site at Tunstall Court and upgrades may be required to accommodate additional flow from this site		1	Small area at risk of surface water flooding	Till, Devensian	Site lies within SPZ. Use of Infiltration SuDS limited by low permeability of geology
H130	Golden Flatts	100	HWC			No DG5 records nearby but building density is high and infrastructure is likely to be under heavy use. Hydraulic modelling is required		1 (close to FZ2 – depends on size)	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H131	Oaksway Industrial Estate	179	HWC			Development will increase flow to the Brus PS, which DG5 records in the downstream network operating close to capacity.		Parts in FZ3 & 2 (depends on specific site)		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3.
H132	Niramax Site Mainsforth Terrace	84	HWC			Brownfield with infrastructure is already in place, but modelling should be carried out		2 & 3		Tidal Flat Deposits	Use of SuDS will be limited within FZ2 and 3.
H133	Former St Hilds School	74	HWC			Development will increase flow to the Brus PS, which DG5 records in the downstream network operating close to capacity.		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology

TABLE 10-3: HARTLEPOOL HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
H135	Britmag Middle (Sites C)	367	HWC			Little exiting infrastructure, although it is possible that privately owned. The impact on the existing network should be modelling		1 (coastal site, may depend on size of development)			
H136	Eaglesfield Road	315	HWC			Impact on downstream network should be modelled		1	Surface water flooding associated with drainage ditch	Till, Devensian	Area in NW of site within SPZ. Use of Infiltration SuDS limited by low permeability of geology
H137	All Blocks Marina (14 sites)	54	HWC			A significant number of dwellings are proposed here and more information is required about capacity in this area before development		2 & 3		Tidal Flat Deposits	Use of SuDS will be limited within FZ2 and 3.
H222	Council Depot	2500	HWC			Brownfield site with infrastructure is already in place, but modelling should be carried out		1			
H199	Mixed Use Maritime Avenue	300	HWC			Brownfield with infrastructure is already in place, but modelling should be carried out		3		Tidal Flat Deposits	Use of SuDS will be limited within FZ3.

10.4 Potential Development Areas in Middlesbrough

TABLE 10-4: MIDDLESBROUGH HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
22	Hemlington Grange	800	NWL	NWL's WRMP predicts a surplus of supply over demand until the end of the plan period (2035)	Bran Sands WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	New separate infrastructure is already in place with large gravity pipes (1200mm) connecting to the main routes to Bran Sands STW	No discharge consent or abstraction licence increases are required therefore no effects on ecology are anticipated.	1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
35	Coulby Newham	650	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
34	Brookfield	390	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1		Till, Devensian and Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
16	Middlehaven (excluding CIAC & Whickham Villas)	379	NWL			Proposed development lies adjacent to the very extensive urban network; modelling should be carried out		Site lies within Flood Zones 1, 2 and 3	Small area at risk of surface water flooding	Tidal Flat Deposits and Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
18	Ladgate Lane	375	NWL			Proposed development lies adjacent to the very extensive urban network; modelling should be carried out		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
14	Stainsby Hall Farm	343	NWL			This proposed large development on Greenfield land would require new infrastructure and would add significantly to the flow in an already busy network.		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
1	Acklam Green	325	NWL			There are two DG5 records close to the proposed site at Acklam Green suggesting the network may need upgrading in this area		1	Small area at risk of surface water flooding	Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
19	Grey Towers Farm	295	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology

TABLE 10-4: MIDDLESBROUGH HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
30	Grove Hill	292	NWL			Sewerage infrastructure exists but may need upgrading to accept flows from residential developments		1	Small area at risk of surface water flooding	Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
3	Scholars Rise	199	NWL			Sewerage infrastructure exists but may need upgrading to accept flows from residential developments		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3.
37	Hemlington, Stainton and Thornton	195	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
41	Nunthorpe	190	NWL			Sewerage infrastructure exists but may need upgrading to accept flows from residential developments		Site lies within Flood Zones 1, 2 and 3	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
26	Land adjacent Middlesbrough Teaching & Learning Centre	180	NWL			Sewerage infrastructure exists but may need upgrading to accept flows from residential developments		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
36	East Middlesbrough	180	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1	Small area at risk of surface water flooding	Till, Devensian and Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3.
40	Prissick	175	NWL			Sewerage infrastructure exists but may need upgrading to accept flows from residential developments		Mainly 1, although a small part of the site is FZ2		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
39	Acklam	150	NWL			There are two DG5 records close to the proposed site at Acklam suggesting the network may need upgrading in this area		1	Small area at risk of surface water flooding	Till, Devensian and Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
27	Prissick Depot	140	NWL			Sewerage infrastructure exists but may need upgrading to accept flows from residential developments		FZ 1 and 2	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology

TABLE 10-4: MIDDLESBROUGH HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
31	Roworth Road	140	NWL			Sewerage infrastructure exists but may need upgrading to accept flows from residential developments		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
38	Marton	140	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
8	Bridgewater View	109	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1	Small area at risk of surface water flooding	Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
13	Rose Cottage Farm	106	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
17	Hutton Road	90	NWL			Additional infrastructure will be needed at the site, which is currently connected to a combined part of the network by two 150mm gravity drains		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
2	The Wave	80	NWL			Existing network is a mixture of separate and combined systems. There are no DG5 records although the network is likely to be heavily used in and development should be phased in collaboration with NWL		FZ 2 and 3		Alluvium	
6	CIAC	80	NWL			Sewerage infrastructure exists but may need upgrading to accept flows from residential developments		1		Tidal Flat Deposits	Use of SuDS will be limited within FZ2 and 3.
21	Whitestone Business Park	78	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		Mostly 1, some small areas in 2		Alluvium	

TABLE 10-4: MIDDLESBROUGH HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
20	Low Lane	77	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
33	Middlesbrough Warehousing	75	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1	Small area at risk of surface water flooding	Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
24	Longridge	72	NWL			Sewerage infrastructure exists but may need upgrading to accept flows from residential developments		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
9	Linthorpe Hall	56	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology SuDS will be limited within FZ3.
15	Acklam Hall	56	NWL			There are two DG5 records close to the proposed site at Acklam Hall suggesting the network may need upgrading in this area		1	Small area at risk of surface water flooding	Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
7	Orchard View	53	NWL			Connection to the existing network should be possible, capacity constraints should be fully understood and agreed with NWL before development		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology

10.5 Proposed Development Areas in Redcar and Cleveland

TABLE 10-5: REDCAR AND CLEVELAND HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
54	Marske Inn Farm	1004	NWL	NWL's WRMP predicts a surplus of supply over demand until the end of the plan period (2035)	Marske WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Greenfield site so new infrastructure required. Impact on downstream network should be modelled	No discharge consent or abstraction licence increases are required therefore no effects on ecology are anticipated.	1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
352	Church Hill Final Phase	265	NWL			Existing network likely to already be under heavy use - upgrades may be needed		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
29	Galley Hill Extension	240	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
256	High Farm	199	NWL		Bran Sands WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Existing network likely to already be under heavy use as indicated by numerous DG5 records. Upgrades may be needed		1		Till, Devensian and Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
342	Connexions Phase 1	162	NWL		Marske WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	CSOs on main sewers connecting to Marske suggest network capacity problems, Hydraulic modelling is required		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
43	Kilton Lane Phase 1	158	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
158	Mackinlay Park	141	NWL			CSOs on main sewers connecting to Marske suggest network capacity problems, Hydraulic modelling is required		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
131	North Grangetown, Cleared Area	129	NWL		Bran Sands WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Existing network likely to already be under heavy use as indicated by numerous DG5 records. Upgrades may be needed		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology

TABLE 10-5: REDCAR AND CLEVELAND HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
389	Hummersea Hills Phase 1, Loftus	123	NWL		Marske WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Network Supported by 3 pumping stations, each with a CSO nearby suggesting they may sometimes be unable to cope with levels of flow although no DG5 incidents are recorded		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
9	Mickle Dales East	117	NWL			CSOs on main sewers connecting to Marske suggest network capacity problems, Hydraulic modelling is required		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
24	Swans Corner	116	NWL		Bran Sands WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Existing network likely to already be under heavy use as indicated by numerous DG5 records. Upgrades may be needed		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
335	Sandpiper Gardens	115	NWL			Existing network likely to already be under heavy use as indicated by numerous DG5 records. Upgrades may be needed		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
134	Rydale Avenue	112	NWL			Existing network likely to already be under heavy use as indicated by numerous DG5 records. Upgrades may be needed		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
353	Castle View	111	NWL		Marske WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Existing network likely to already be under heavy use - upgrades may be needed		1		Till	Use of Infiltration SuDS limited by low permeability of geology
294	Longbank Farm	110	NWL		Bran Sands WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Existing network likely to already be under heavy use as indicated by numerous DG5 records. Upgrades may be needed		1		Till	Use of Infiltration SuDS limited by low permeability of geology
30/66	Pine Hills Extension	100	NWL		Marske WwTW has sufficient capacity for the proposed growth	Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1		Whitby Mudstone and Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology

TABLE 10-5: REDCAR AND CLEVELAND HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	Name	No. of Dwellings	Water supply company	Water resources capacity	WwTW capacity	Network capacity	Ecology	Flood Zone	Surface Water Flood risk	Geology	SuDS Constraints
386	Coatham Bowl	86	NWL		without requiring an increase to the consented DWF or a process upgrade	CSOs on main sewers connecting to Marske suggest network capacity problems, Hydraulic modelling is required		1		Blown Sand	
119	Mersey Road	85	NWL			CSOs on main sewers connecting to Marske suggest network capacity problems, Hydraulic modelling is required		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
118	Jackson's Field	82	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
206	Redcar AEC	78	NWL			CSOs on main sewers connecting to Marske suggest network capacity problems, Hydraulic modelling is required		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
123	Mallinson Park (Prior Pursglove)	75	NWL		Bran Sands WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Existing network likely to already be under heavy use as indicated by numerous DG5 records. Upgrades may be needed		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
145	Hunley Manor Phase 1, Brotton	74	NWL		Marske WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Four DG5 records indicate network is likely to be at capacity, upgrades may be required		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
378	Wheatacres	66	NWL			CSOs on main sewers connecting to Marske suggest network capacity problems, Hydraulic modelling is required		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
127	Hewley St Reservoir	64	NWL		Bran Sands WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Existing network likely to already be under heavy use as indicated by numerous DG5 records. Upgrades may be needed		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
341	Kirkleatham Grange / King's Chase	58	NWL		Marske WwTW has sufficient capacity for the proposed growth without requiring an	CSOs on main sewers connecting to Marske suggest network capacity problems, Hydraulic modelling is required		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology

TABLE 10-5: REDCAR AND CLEVELAND HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
106	Connexions Phase 2	58	NWL		increase to the consented DWF or a process upgrade	CSOs on main sewers connecting to Marske suggest network capacity problems, Hydraulic modelling is required		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
360	Rosecroft School	54	NWL		Skinningrove WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Site is close to the WwTW although 4 CSOs along the connecting route suggest it may be operating close to capacity - hydraulic modelling needed		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology

10.6 Proposed Development Areas in Stockton-on-Tees

TABLE 10-6: STOCKTON-ON-TEES HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	Name	No. of Dwellings	Water supply company	Water resources capacity	WwTW capacity	Network capacity	Ecology	Flood Zone	Surface Water Flood risk	Geology	SuDS Constraints
198	Former Stockton And Billingham College Site, Fincdale Avenue/The Causeway	176	NWL	NWL's WRMP predicts a surplus of supply over demand until the end of the plan period (2035)	Billingham WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Development is already underway and will connect to an existing heavily used network - modelling should be carried out	No discharge consent or abstraction licence increases are required therefore no effects on ecology are anticipated.	1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
99	Parkfield Foundry	229	NWL		Bran Sands WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Existing network, but capacity required for new developments may differ from previous industrial discharges and modelling should be carried out		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
130	Ashmore House, Richardson Road (KVAERNER site)	217	NWL			Existing network, but capacity required for new developments may differ from previous industrial discharges and modelling should be carried out		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
137	Corus Pipe Mill, Portrack Lane,	375	NWL			No DG5 records in the area but modelling should be carried out to establish where the existing system is able to accept additional flow		1	Small area at risk of surface water flooding	Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
168	Parkfield Phase 2	180	NWL			Existing network, but capacity required for new developments may differ from previous industrial discharges and modelling should be carried out		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
408	British Visqueen Limited, Yarm Road,	474	NWL			Existing network, but capacity required for new developments may differ from previous industrial discharges and modelling should be carried out		1	Small area at risk of surface water flooding	Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
452	Bowesfield Riverside Phase 1	150	NWL			Existing network, but capacity required for new developments may differ from previous industrial discharges and modelling should be carried out		Some FZ3 & 2, depends on specific location		Glaciolacustrine Deposits and Sherwood Sandstone	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3.

TABLE 10-6: STOCKTON-ON-TEES HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
295	Ashbrook, Ringwood, Hazeldene	363	NWL			Development should be phased in collaboration with NWL to ensure any necessary upgrades can be implemented		1	Small area at risk of surface water flooding in centre and east of site	Till, Devensian and Lacustine Deposits	Use of Infiltration SuDS limited by low permeability of geology
295	Remainder of Ingleby Barwick	500	NWL			Two DG5 records close to the site indicating some capacity issues may already exist		1	Small area at risk of surface water flooding in south of site	Till, Devensian and Lacustine Deposits	Use of Infiltration SuDS limited by low permeability of geology
383	Sandhill, Ingleby Barwick	150	NWL			Development should be phased in collaboration with NWL to ensure any necessary upgrades can be implemented		1	Surface water flooding associated with drainage ditch across site	River Terrace Deposits	
479	Land Parcel At Blair Avenue, Ingleby Barwick	48	NWL			Development should be phased in collaboration with NWL to ensure any necessary upgrades can be implemented		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
158	Tall Trees Hotel, Worsall Road, Yarm	143	NWL			No DG5 records although there are seven pumping stations within Yarm and their capacity should be fully assessed when phasing development to allow for any necessary upgrades		1	Surface water flooding associated with drainage ditch across site	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
189	Peacocks Yard, Land East Of Blakeston Lane, Norton	149	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1	Surface water flooding associated with drainage ditch across site	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
52	Hardwick Redevelopment	638	NWL			Infrastructure is already in place although modelling should be undertaken to understand available capacity		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
45	Mandale Redevelopment Phase 2	266	NWL			Developments will connect to an already heavily used network - modelling should be carried out		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
95	Mandale Estate Phase 3	192	NWL			Developments will connect to an already heavily used network - modelling should be carried out		1		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology

TABLE 10-6: STOCKTON-ON-TEES HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
232	Thorn Tree Vale, Master Road, Thornaby	327	NWL			Developments will connect to an already heavily used network - modelling should be carried out		1	Small area at risk of surface water flooding	Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
238	Thornaby Football Club, Land At Teesdale Park, Acklam Road	64	NWL			Site currently has one gravity sewer of 225mm diameter and nearby CSO, which suggests existing capacity issues		Some FZ 3 & 2, some 1	Surface water flooding associated with drainage ditch on northern boundary	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3.
382	Allens West, Durham Lane, Eaglescliffe	500	NWL			Little infrastructure exists within the boundaries of the proposed site and upgrades would need to be incorporated into development in collaboration with NWL		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
297	Land off Norton Rd	552				No DG5 records in the area but modelling should be carried out to establish where the existing system is able to accept additional flow		Mainly FZ1, with a small area of FZ2 and 3		Basic loams and clays	Use of Infiltration SuDS limited by low permeability of geology
H1a	Nifco site	165	NWL			Existing network, but capacity required for new developments may differ from previous industrial discharges and modelling should be carried out		1	Small area at risk of surface water flooding	Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology
H1b	Urlay Nook	570	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1	Small area at risk of surface water flooding on eastern boundary	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H1c	University Hospital of North Tees	340	NWL			Although connections to the network should be possible, modelling should carried out to understand capacity in the surrounding and downstream network		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H1g	Harrowgate Lane	2,480	NWL			Although connections to the network should be possible, modelling should carried out to understand capacity in the surrounding and downstream network		1	Surface water flooding associated with drainage ditch	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology

TABLE 10-6: STOCKTON-ON-TEES HOUSING SITE ASSESSMENTS

Site Information			Water resources		Wastewater treatment and transmission		Environment	Flood Risk and Surface Water Management			
Site ref	**Name**	**No. of Dwellings**	**Water supply company**	**Water resources capacity**	**WwTW capacity**	**Network capacity**	**Ecology**	**Flood Zone**	**Surface Water Flood risk**	**Geology**	**SuDS Constraints**
H1h	Yarm Back Lane (east)	945	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled as there is a DG5 records at a nearby pumping station		1	Surface water flooding associated with drainage ditch	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H1i	West Yarm	300	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H1j	South West Yarm	735	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1		Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H1l	Wynyard Hall Estate	300	NWL		Billingham WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1	Surface water flooding associated with drainage ditch	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
H1m	Wynyard Park	990	NWL			Greenfield site so new infrastructure required. Impact on downstream network should be modelled		1	Small area at risk of surface water flooding	Till, Devensian	Use of Infiltration SuDS limited by low permeability of geology
R1	Green Blue Heart	900	NWL		Bran Sands WwTW has sufficient capacity for the proposed growth without requiring an increase to the consented DWF or a process upgrade	No DG5 records in the area but modelling should be carried out to establish where the existing system is able to accept additional flow		~30%FZ3, 20%FZ2		Tidal Flat Deposits	Use of SuDS will be limited within FZ2 and 3.
R2	North Shore	400	NWL			No DG5 records in the area but modelling should be carried out to establish where the existing system is able to accept additional flow		~30% FZ3, small areas of FZ2		Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3.
G2	Northern Gateway	330	NWL			No DG5 records in the area but modelling should be carried out to establish where the existing system is able to accept additional flow		~20% FZ3 (south of Denby Road), 10% FZ2	Small area at risk of surface water flooding	Glaciolacustrine Deposits	Use of Infiltration SuDS limited by low permeability of geology. SuDS will be limited within FZ2 and 3.
G4	Boathouse Lane	400	NWL			Existing network, but capacity required for new developments may differ from previous industrial discharges and modelling should be carried out		~40% FZ 3, 50% FZ 2	Small area at risk of surface water flooding	Alluvium	Use of SuDS will be limited within FZ2 and 3.

11 PROGRESSION OF WCS

11.1 Detailed WCS

As stated in section 2.1.2, the need for a detailed WCS is identified by the Outline WCS. The results of this study demonstrate that there are two issues within the Tees Valley that require further investigation, as discussed below in sections 11.1.1 and 11.1.2.

11.1.1 *Graythorpe WwTW*

The Outline WCS has identified that the volumetric capacity will be exceeded at Graythorpe WwTW by the proposed growth in Hartlepool Borough. In order to accommodate the proposed growth, it would therefore be necessary to increase the consented DWF at Graythorpe WwTW. To ensure no deterioration of the receiving watercourse as a result of this increased flow, tighter discharge consent standards may be required. In order to calculate the required standards, Load Standstill calculations[59] have been used.

A sample and flow survey carried out by NWL in 2009[60] indicates that Graythorpe WwTW then treated 50% of its consented DWF (20 m^3 of the consented 44 m^3/d). As it is not known how loads treated currently compare with the 2009 loads it is therefore likely that a feasibility exercise is needed at Graythorpe WwTW to fully asses the impact of all the proposed employment growth on the works. If a feasibility study concluded that Graythorpe WwTW could not accept all the increased flow from the proposed growth it may be possible to take flows to Seaton Carew WwTW, which has an estimated 15,840 m^3/d available capacity, after the proposed growth

It can however be concluded that the DWF limits at Graythorpe WwTW should not be considered to be a constraint to growth within the catchment, although the phasing of development must be carefully considered to allow any necessary changes to the consent to discharge to be made in time. In the unlikely event that an increase to the consented DWF were not possible, or the process capacity of the WwTW was insufficient, then flow from the proposed growth within the catchment of Graythorpe WwTW could be transferred to Seaton Carew WwTW, which has an estimated 15,840 m^3/d available capacity, after the proposed growth.

11.1.2 *Sewer network capacity*

A high level analysis of the sewer network has been carried out for this WCS, which has identified where there could be capacity issues from the proposed growth. A more detailed analysis was not possible for this assessment. In order to assess the full effects of the proposed growth in all five council areas on the sewer network, modelling of the sewers should be carried out.

It is not considered that this would be a requirement of a Detailed WCS, it is suggested that this be carried out by NWL as and when a development comes forward. NWL propose to commission sewerage models for several catchments, the proposed programme for which should be altered if required to assess the effects of a particularly major development.

Network model delivery is due December 2012 for Port Clarence, North Billingham, Whitton & Thorpe Thewles, Middlesbrough North, Middlesbrough East, Nunthorpe, Yarm, Thornfield Road, Guisborough and Thornaby South & Ingleby Barwick.

[59] Load Standstill calculations are simplified calculations of the reduction required in the concentration of a discharge element to offset the increase in load that would otherwise be discharged as a result of increased flow volumes. The calculation determines what is required to ensure the overall load after increased discharge volumes is no greater than before growth.
[60] David Charlton, NWL, pers. comm., 2nd October 2012

Network model delivery is due after December 2012 for Stockton South, Saltburn Skelton Brotton, Hartlepool North, Thornaby North, Stockton East, Hartlepool South, Loftus, South Bank Eston, Eastbourne, Darlington South and Eaglescliffe.

11.1.3 *Teesmouth and Cleveland Coast SPA/Seal Sands SSSI*

The Environment Agency and Natural England studies that are currently underway (see Section 8.3.2) will add to the overall picture of the WFD waterbody status, the condition of the SPA and suggest solutions or further evidence requirements in addressing the causes of excessive growth of macroalgae at Seal Sands. It is thought to be unlikely that the solution scope will be to just focus on the STWs and from the current available evidence there is no reason to suggest that growth as assessed within this Outline WCS would need to be restricted as a result of this issue. However, there is a risk that the Environment Agency and Natural England studies and further potential information could alter this position, as the studies could conclude that nutrient loads from WwTWs do lead to deterioration in the condition of the SPA, which could constrain acceptance of flows from new development until appropriate treatment was provided.

11.2 Conclusion

The Graythorpe and sewer network issues could be resolved by NWL as in discussion with the Environment Agency and it is not felt that a Detailed WCS is required. The increase in consented DWF at Graythorpe WwTW would require a more detailed analysis of the process capacity of the WwTW, which should be carried out prior to any application to the Environment Agency for a variation to the consent to discharge.

NWL has an extensive programme of modelling planned for the sewer networks in the study area, which has been scheduled to reflect the phasing of development. Should pre-development enquiries highlight that the phasing of proposed development has changed, the scheduling of network modelling should be changed accordingly.

It is also recommended that the EA, NE and NWL continue to liaise with the Tees Valley councils and that a review of the WCS is undertaken once the Environment Agency and Natural England studies have been completed[61].

[61] This advice is based on the information provided to date in the outline WCS and available to NE and EA. It is given without prejudice to any advice that Natural England may offer in accordance with its statutory role under the Conservation of Habitats and Species Regulations 2010, or any assent that may be required under the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000). Cameron Sked (Environment Agency) and Ruth Bull (Natural England), Pers Comm., November 2012.

12 APPENDIX A– NATIONAL, REGIONAL AND LOCAL POLICY DRIVERS

TABLE 12-1: EU DIRECTIVES & UK LEGISLATION & GUIDANCE ON WATER

Directive/Legislation/Guidance	Description
Bathing Waters Directive 76/160/EEC	To protect the health of bathers, and maintain the aesthetic quality of inland and coastal bathing waters. Sets standards for variables, and includes requirements for monitoring and control measures to comply with standards.
Code for Sustainable Homes	The Code for Sustainable Homes has been introduced to drive a step-change in sustainable home building practice, providing a standard for key elements of design and construction which affect the sustainability of a new home. It will become the single national standard for sustainable homes, used by home designers and builders as a guide to development, and by home-buyers to assist in their choice of home. It will form the basis for future developments of the Building Regulations in relation to carbon emissions from, and energy use in homes, therefore offering greater regulatory certainty to developers.
Environment Act 1995	Sets out the role and responsibility of the Environment Agency.
Environmental Protection Act, 1990	Integrated Pollution Control (IPC) system for emissions to air, land and water.
Future Water, February 2008	Sets out the Government's vision for water in England up to 2030. The strategy sets out an integrated approach to the sustainable management of all aspects of the water cycle, from rainfall and drainage, through to treatment and discharge, focusing on practical ways to achieve the vision to ensure sustainable use of water. The aim is to ensure sustainable delivery of water supplies, and help improve the water environment for future generations.
Groundwater Directive 80/68/EEC	To protect groundwater against pollution by 'List 1 and 2' Dangerous Substances.
Making Space for Water, 2004	Outlines the Government strategy for the next 20 years to implement a more holistic approach to managing flood and coastal erosion risks in England. The policy aims to reduce the threat of flooding to people and property, and to deliver the greatest environmental, social and economic benefit.
National Planning Policy Framework	Planning policy in the UK is now led by the National Planning Policy Framework (NPPF), which supersedes former Planning Policy Statements (PPSs) with the aim of simplifying planning guidance into one document with 12 'core' planning principles. The NPPF aims to explain statutory guidelines and advise local authorities and others on planning policy and operation of the planning system.
The Pollution Prevention and Control Act (PPCA), 1999	Implements the IPPC Directive. Replaces IPC with a Pollution Prevention and Control (PPC) system, which is similar but applies to a wider range of installations.
Shellfish Waters Directive 2006/113/EC	To protect or improve shellfish waters in order to support shellfish life and growth, therefore contributing to the high quality of shellfish products directly edible by man. It sets physical, chemical and microbiological water quality requirements that designated shellfish waters must either comply with ('mandatory' standards) or endeavour to meet ('guideline' standards).
Water Act 2003	Implements changes to the water abstraction management system and to regulatory arrangements to make water use more sustainable.

TABLE 12-1: EU DIRECTIVES & UK LEGISLATION & GUIDANCE ON WATER	
Directive/Legislation/Guidance	**Description**
Water Framework Directive (WFD) 2000/60/EC	The WFD was passed into UK law in 2003. The overall requirement of the directive is that all river basins must achieve "good ecological status" by 2015 unless there are grounds for derogation. The WFD will, for the first time, combine water quantity and water quality issues together. An integrated approach to the management of all freshwater bodies, groundwaters, estuaries and coastal waters at the river basin level will be adopted. It will effectively supersede all water related legislation which drives the existing licensing and consenting framework in the UK. UKTAG[62], the advisory body responsible for the implementation of the WFD in the UK, has set water quality, ecology, water abstraction and river flow standards in order to ensure that water bodies in the UK (including groundwater) meet the required status[63]. These were formalised by the River Basin Management Plans issued in December 2009. The WCS is required to consider the longer term issues with respect to the water cycle and water environment and as such, an assessment of the impact of the WFD standards has been considered.
Flood and Water Management Act, 2010	The Flood and Water Management Act provides for better, more comprehensive management of flood risk for people, homes and businesses, helps safeguard community groups from unaffordable rises in surface water drainage charges and protects water supplies to the consumer.
Water Resources Act, 1991	Protection of the quantity and quality of water resources and aquatic habitats.

TABLE 12-2: WATER RELATED POLICIES IN NORTH EAST OF ENGLAND RSS	
Policy	**Description**
Policy 2: Sustainable Development 2.1 Environmental Objectives	Planning proposals and Local Development Frameworks should support sustainable development and construction through the delivery of the following environmental objectives: • to protect and enhance the quality of the Region's ground, river and sea waters; • to protect and enhance the Region's biodiversity, geodiversity and soil quality; • to mitigate environmental and social costs of developments, and encourage efficient resource use; • to prevent inappropriate development in flood plains.
Policy 34: The Aquatic & Marine Environment	Strategies, plans and programmes, and planning proposals should: • ensure that any schemes involving the transfer of water between catchments have consideration to the impacts on environmental and recreational assets of areas both nearby and upstream of the transfer base, particularly in relation to Kielder Water; • integrate the objectives of emerging and existing plans and strategies which consider the wider management of water bodies, groundwater and coastal / marine areas; • ensure that the construction and use of new development along river corridors

[62] The UKTAG (UK Technical Advisory Group) is a working group of experts drawn from environment and conservation agencies. It was formed to provide technical advice to the UK's government administrations and its own member agencies. The UKTAG also includes representatives from the Republic of Ireland.
[63] UK Environmental Standards and Conditions (Phase I) Final Report, April 2008, UK Technical Advisory Group on the Water Framework Directive

TABLE 12-2: WATER RELATED POLICIES IN NORTH EAST OF ENGLAND RSS	
Policy	**Description**
	takes account of its potential polluting effects; any opportunities for improvements and conservation of water quality; the possibility of flooding onsite and elsewhere along the watercourse; the availability of water resources; biodiversity; the impacts of climate change and the incorporation of necessary adaptation and mitigation measures, and the risk from minewater pollution; • ensure, where appropriate, that Sustainable Drainage System techniques are adopted; • set a positive policy framework for delivering plans for Integrated Coastal Zone Management, River Basin Management, Shoreline Management and Catchment Flood Management for the Region's coastal, estuarine and near-shore zones by adopting an ecosystem based approach to promote the recovery and conservation of marine eco-systems, including designated sites, favouring the evolution of the coast, estuaries and near-shore zones through natural processes wherever possible and seeking to safeguard the conservation of marine heritage features; • take into account, and where possible plan to ameliorate, the risk of "coastal squeeze" having an impact on internationally designated nature conservation sites; and • promote appropriate water-based recreational and leisure opportunities, particularly at Kielder Water and along the Region's coastline.
Policy 35: Flood Risk	A. Strategies, plans and programmes should adopt a strategic, integrated, sustainable and proactive approach to catchment management to reduce flood risk within the Region, managing the risk from: • tidal effects around estuaries and along the coast including the implications of the latest Government predictions for sea level rise; • fluvial flooding along river corridors and other significant watercourses resulting from catchments within and beyond the Region and other sources of flooding; and • flooding resulting from surface water runoff and capacity constraints in surface water drainage systems. B. In developing Local Development Frameworks and considering planning proposals, a sequential risk-based approach to development and flooding should be adopted as set out in PPS25. This approach must be informed by Strategic Flood Risk Assessments prepared by planning authorities in liaison with the Environment Agency to inform the application of the Sequential Test and, if necessary, the Exception Test, in development allocations in their LDDs and consideration of planning proposals.

TABLE 12-3: DARLINGTON BOROUGH COUNCIL WATER RELATED POLICIES	
Policy	**Description**
Policy CS16: Protecting Environmental Resources, Human Health and Safety	New development should protect and, where possible, improve environmental resources, whilst ensuring there is no detrimental impact on the environment, general amenity and the health and safety of the community. Development which may have an adverse impact on environmental resources should be avoided. Exceptionally, development may be permitted to promote regeneration or provide for essential infrastructure. In these cases, it should comply with national planning guidance and statutory environmental quality standards for: (a) areas at risk from river flooding along the main rivers of the River Tees, River

TABLE 12-3: DARLINGTON BOROUGH COUNCIL WATER RELATED POLICIES	
Policy	**Description**
	Skerne and Cocker Beck, and the ordinary watercourses of Neasham Stell, Baydale Beck and West Beck; (b) areas at risk from surface water run off, groundwater, mine water and sewer flooding; New development will be focussed on areas of low flood risk, that is Flood Zone 1, as identified by the Borough's Strategic Flood Risk Assessment. In considering development on sites in higher flood risk areas, the Sequential and Exception Tests must be passed and the sequential approach applied on site. To reduce the impact of fluvial and surface water flood risk in the Town Centre Fringe a strategic flood risk management scheme will be required setting out appropriate sustainable mitigation measures. Flood storage compensation, restoration of the natural floodplain, the creation of a green corridor next to the River Skerne, flood resilience and resistance measures will all be required. (c) air, land, light or noise pollution; (d) contaminated land and unstable land; and (e) water quality of the River Tees, River Skerne and Cocker Beck and other water courses and the Magnesian Limestone Aquifer. Development proposals must include an assessment appropriate to the type and extent of impact and any associated risks to the satisfaction of the relevant environmental body. Proposals will only be permitted where the impact and risks are, or can be mitigated appropriately for the proposed use.

TABLE 12-4: HARTLEPOOL BOROUGH COUNCIL WATER RELATED POLICIES	
Policy	**Description**
CC4: Flood Risk	The Borough Council will seek to ensure that new development will be focused in areas of lower flood risk where possible, that is Flood Zone 1. In areas of higher flood risk the extent and impact of flooding will be assessed and reduced by requiring developers to provide evidence that the sequential and exceptions test can be passed where appropriate. Where relevant the sequential approach should be applied within individual sites and through a detailed Flood Risk Assessment demonstrated how the development will make a positive contribution to reducing or managing flood risk and surface water drainage. To manage surface water drainage and to reduce surface water run-off and sewer flooding from the development the use of Sustainable Drainage Systems (SuDS) will be actively encouraged. Exceptionally, developments may be permitted in higher flood risk areas to meet strategic regeneration objectives or to provide essential infrastructure. Where necessary mitigation measures would have to be identified though a detailed Flood Risk Assessment.
NE1: Green Infrastructure	The Borough Council in conformity with policy CC1 and CC4 will support and encourage green infrastructure improvements, Sustainable Drainage Systems (SuDS) that can alleviate flood risk and address surface water drainage issues by incorporating: • Physical mitigation measures that reduces Flood Risk such as watercourse improvements and wetland creation to be used for flood attenuation, and; • Schemes that address surface water drainage issues in critical drainage areas. The loss of green infrastructure will be resisted. In exceptional circumstances green infrastructure will only be considered for other uses where it can be

TABLE 12-4: HARTLEPOOL BOROUGH COUNCIL WATER RELATED POLICIES	
Policy	**Description**
	demonstrated that it no longer has any recreational, wildlife or amenity function, and where the local need has already been met elsewhere. Where an area of open space is lost to development the Borough Council will impose planning conditions or a legal agreement, as appropriate to ensure compensatory provision of an alternative site or enhancement of adjoining open space.
ND3 : Design of New Development	The Borough Council will seek to ensure developments are of a high quality design. All new developments should be designed to take into account, where relevant, the following:… The adequacy of infrastructure, including improvements as required to transport infrastructure, cycle ways, the water supply system and the provision of surface and fouls main drainage.
NE2: Natural Environment	The Borough Council will look to protect, manage and actively enhance the biodiversity, geodiversity, landscape character and Green Infrastructure assets of the Borough. The Borough Council will seek to ensure that:… The Magnesian Limestone and the Sherwood Sandstone major/principal aquifers underlying the area, watercourses and other surface and coastal waters must be protected from contamination from pollutants resulting from development or redevelopment of brownfield land,

TABLE 12-5: MIDDLESBROUGH COUNCIL WATER RELATED POLICIES	
Policy	**Description**
CS4 Sustainable Development	All development will be required to contribute to achieving sustainable development principles by, where appropriate: (j) ensuring that biodiversity assets, geodiversity assets, wildlife species, natural habitats, water resources, landscape character, green infrastructure, air quality and water quality; within and outside Middlesbrough are protected. Where possible such assets should be enhanced; (m) ensuring that inappropriate development is not carried out in the floodplain and that sustainable methods of surface drainage are used. This should include the incorporation of Sustainable Drainage Systems in new developments to mitigate against localised flooding, promote water conservation and help protect water quality;

TABLE 12-6: REDCAR AND CLEVELAND BOROUGH COUNCIL WATER RELATED POLICIES	
Policy	**Description**
CS2 Locational Strategy	The locational strategy for the LDF will concentrate development in the Conurbation, with a small proportion of development in Guisborough and the East Cleveland towns. Priority will be given to supporting the regeneration priorities in Greater Eston and Redcar. This means:... The location of new development will avoid areas at risk of flooding in line with the requirements set out in PPG25.

TABLE 12-7: STOCKTON-ON-TEES BOROUGH COUNCIL WATER RELATED POLICIES	
Policy	**Description**
Core Strategy Policy 3 (CS3) – Sustainable Living and Climate Change	1. All new residential developments will achieve a minimum of Level 3 of the Code for Sustainable Homes up to 2013, and thereafter a minimum of Code Level 4. 2. All new non-residential developments will be completed to a Building Research Establishment Environmental Assessment Method (BREEAM) of 'very good' up to 2013 and thereafter a minimum rating of 'excellent'.
Core Strategy Policy 10 (CS10) – Environmental Protection and Enhancement	9. New development will be directed towards areas of low flood risk, that is Flood Zone 1, as identified by the Borough's Strategic Flood Risk Assessment (SFRA). In considering sites elsewhere, the sequential and exceptions tests will be applied, as set out in Planning Policy Statement 25: Development and Flood Risk, and applicants will be expected to carry out a flood risk assessment.

13 APPENDIX B – PROPOSED HOUSING AND EMPLOYMENT GROWTH IN TEES VALLEY

TABLE 13-1: PROPOSED HOUSING GROWTH WITHIN THE TEES VALLEY

Council	Site reference	Site	Number of dwellings	Type
DBC	DC002		149	Committed site
DBC	DU178 (all sites)		842	Committed site
DBC	DU217		67	Committed site
DBC	DU229		123	Committed site
DBC	DU239		95	Committed site
DBC	DU240		133	Committed site
DBC	DU286		500	Committed site
DBC	DU324		110	Committed site
DBC	DU328		1200	Committed site
DBC	DU329		160	Committed site
DBC	DU331		146	Committed site
DBC	DU333		250	Committed site
DBC	DV044		83	Committed site
DBC	M03		60	Potential
DBC	M08		80	Potential
DBC	M13		100	Potential
DBC	M15		1128	Potential
DBC	M24		1320	Potential
DBC	M32		100	Potential
DBC	M48		72	Potential
DBC	M59		64	Potential
DBC	M64		50	Potential
DBC	M65		52	Potential
DBC	M66		80	Potential
DBC	M75		95	Potential
DBC	M79		50	Potential

TABLE 13-1: PROPOSED HOUSING GROWTH WITHIN THE TEES VALLEY				
Council	**Site reference**	**Site**	**Number of dwellings**	**Type**
DBC	M80		65	Potential
HBC	H222	South West Extension	2500	Core Strategy Site
HBC	H199	Britmag Main (Sites A & B)	300	Identified deliverable SHLAA
HBC	H224	Wynyard Park	200	Core Strategy Site
HBC	H204	Hartlepool Hospital	167	Identified deliverable SHLAA
HBC	H223	Upper Warren	150	Core Strategy Site
HBC	H225	Wynyard Woods	100	Core Strategy Site
HBC	H203	Oaksway Industrial Estate	77	Identified deliverable SHLAA
HBC	H201	Former St Hilds School	71	Identified deliverable SHLAA
HBC	H198	Britmag Middle (Sites C)	67	Identified deliverable SHLAA
HBC	H210	Eaglesfield Road	63	Identified deliverable SHLAA
HBC	H207	Council Depot	57	Identified deliverable SHLAA
HBC	H130	Hartlepool Hospital	100	Planning permission
HBC	H131	Headway	179	Planning Permission
HBC	H132	Tunstall Court	84	Planning Permission
HBC	H133	Niramax Site Mainsforth Terrace	74	Planning Permission
HBC	H134	Belle Vue (The Lakes)	97	Planning Permission
HBC	H135	All Blocks ,Marina (14 sites)	367	Planning Permission
HBC	H136	Middle Warren 9A (Bellway), (Persimmon) 7B, 7E (Charles Church	315	Planning Permission
HBC	H137	Mixed Use Maritime Avenue	54	Planning Permission
MBC	22	Hemlington Grange	800	LDF allocation
MBC	35	Coulby Newham	650	Broad search areas
MBC	34	Brookfield	390	Broad search areas
MBC	16	Middlehaven (excluding CIAC & Whickham Villas)	379	Planning Permission
MBC	18	Ladgate Lane	375	Planning Permission
MBC	14	Stainsby Hall Farm	343	Planning Permission
MBC	1	Acklam Green	325	Under construction
MBC	19	Grey Towers Farm	295	Planning Permission

TABLE 13-1: PROPOSED HOUSING GROWTH WITHIN THE TEES VALLEY				
Council	**Site reference**	**Site**	**Number of dwellings**	**Type**
MBC	30	Grove Hill	292	LDF allocation
MBC	3	Scholars Rise	199	Under construction
MBC	37	Hemlington, Stainton and Thornton	195	Broad search areas
MBC	41	Nunthorpe	190	Broad search areas
MBC	26	Land adjacent Middlesbrough Teaching & Learning Centre	180	LDF allocation
MBC	36	East Middlesbrough	180	Broad search areas
MBC	40	Prissick	175	Broad search areas
MBC	39	Acklam	150	Broad search areas
MBC	27	Prissick Depot	140	LDF allocation
MBC	31	Roworth Road	140	LDF allocation
MBC	38	Marton	140	Broad search areas
MBC	8	Bridgewater View	109	Under construction
MBC	13	Rose Cottage Farm	106	Planning Permission
MBC	17	Hutton Road	90	Planning Permission
MBC	2	The Wave	80	Under construction
MBC	6	CIAC	80	Under construction
MBC	21	Whitestone Business Park	78	Planning Permission
MBC	20	Low Lane	77	Planning Permission
MBC	33	Middlesbrough Warehousing	75	LDF allocation
MBC	24	Longridge	72	Planning Permission
MBC	9	Linthorpe Hall	56	Under construction
MBC	15	Acklam Hall	56	Planning Permission
MBC	7	Orchard View	53	Under construction
RCBC	54	Marske Inn Farm	1004	Potential site
RCBC	352	Church Hill Final Phase	265	Full consent
RCBC	29	Galley Hill Extension	240	Potential site
RCBC	256	High Farm	199	Started
RCBC	342	Connexions Phase 1	162	Potential site

TABLE 13-1: PROPOSED HOUSING GROWTH WITHIN THE TEES VALLEY				
Council	**Site reference**	**Site**	**Number of dwellings**	**Type**
RCBC	43	Kilton Lane Phase 1	158	Potential site
RCBC	158	Mackinlay Park	141	Potential site
RCBC	131	North Grangetown, Cleared Area	129	Potential site
RCBC	389	Hummersea Hills Phase 1, Loftus	123	Started
RCBC	9	Mickle Dales East	117	Potential site
RCBC	24	Swans Corner	116	Potential site
RCBC	335	Sandpiper Gardens	115	Nearing completion
RCBC	134	Rydale Avenue	112	Potential site
RCBC	353	Castle View	111	Started
RCBC	294	Longbank Farm	110	Potential site
RCBC	30/66	Pine Hills Extension	100	Potential site
RCBC	386	Coatham Bowl	86	Potential site
RCBC	119	Mersey Road	85	Potential site
RCBC	118	Jackson's Field	82	Potential site
RCBC	206	Redcar AEC	78	Potential site
RCBC	123	Mallinson Park (Prior Pursglove)	75	Started
RCBC	145	Hunley Manor Phase 1, Brotton	74	Started
RCBC	378	Wheatacres	66	Potential site
RCBC	127	Hewley St Reservoir	64	Potential site
RCBC	341	Kirkleatham Grange / King's Chase	58	Under development
RCBC	106	Connexions Phase 2	58	Potential site
RCBC	360	Rosecroft School	54	Potential site
SBC	198	Former Stockton And Billingham College Site, Fincdale Avenue/The Causeway	176	Planning permission/commitment
SBC	99	Parkfield Foundry	229	Planning permission/commitment
SBC	130	Ashmore House, Richardson Road (KVAERNER site)	217	Planning permission/commitment
SBC	137	Corus Pipe Mill, Portrack Lane, Stockton-on-Tees, TS18 2NF	375	Planning permission/commitment
SBC	168	Parkfield Phase 2	180	Planning permission/commitment

TABLE 13-1: PROPOSED HOUSING GROWTH WITHIN THE TEES VALLEY				
Council	**Site reference**	**Site**	**Number of dwellings**	**Type**
SBC	408	British Visqueen Limited, Yarm Road, Stockton-on-Tees, TS18 3RD	474	Planning permission/commitment
SBC	452	Bowesfield Riverside Phase 1	150	Planning permission/commitment
SBC	295	Ashbrook, Ringwood, Hazeldene	363	Planning permission/commitment
SBC	295	Remainder of Ingleby Barwick	500	Planning permission/commitment
SBC	383	Sandhill, Ingleby Barwick	150	Planning permission/commitment
SBC	479	Land Parcel At Blair Avenue, Ingleby Barwick	48	Planning permission/commitment
SBC	158	Tall Trees Hotel, Worsall Road, Yarm	143	Planning permission/commitment
SBC	189	Peacocks Yard, Land East Of Blakeston Lane, Norton	149	Planning permission/commitment
SBC	52	Hardwick Redevelopment	638	Planning permission/commitment
SBC	45	Mandale Redevelopment Phase 2	266	Planning permission/commitment
SBC	95	Mandale Estate Phase 3	192	Planning permission/commitment
SBC	232	Thorn Tree Vale, Master Road,Thornaby,Stockton-On-Tees,TS17 0BE	327	Planning permission/commitment
SBC	238	Thornaby Football Club, Land At Teesdale Park, Acklam Road	64	Planning permission/commitment
SBC	382	Allens West, Durham Lane, Eaglescliffe	500	Planning permission/commitment
SBC	297	Land off Norton Road	552	Planning permission
SBC	H1a	Nifco site	165	Regeneration and Environment LDD Housing allocations
SBC	H1b	Urlay Nook	570	Regeneration and Environment LDD Housing allocations
SBC	H1c	University Hospital of North Tees	340	Regeneration and Environment LDD Housing allocations
SBC	H1g	Harrowgate Lane	2480	Regeneration and Environment LDD Housing allocations
SBC	H1h	Yarm Back Lane (east)	945	Regeneration and Environment LDD Housing allocations
SBC	H1i	West Yarm	300	Regeneration and Environment LDD Housing allocations
SBC	H1j	South West Yarm	735	Regeneration and Environment LDD Housing allocations

TABLE 13-1: PROPOSED HOUSING GROWTH WITHIN THE TEES VALLEY				
Council	**Site reference**	**Site**	**Number of dwellings**	**Type**
SBC	H1l	Wynyard Hall Estate	300	Regeneration and Environment LDD Housing allocations
SBC	Hlm	Wynyard Park	990	Regeneration and Environment LDD Housing allocations
SBC	R1	Green Blue Heart	900	Regeneration and Environment LDD Housing allocations
SBC	R2	North Shore	400	Regeneration and Environment LDD Housing allocations
SBC	G2	Northern Gateway	330	Regeneration and Environment LDD Housing allocations
SBC	G4	Boathouse Lane	400	Regeneration and Environment LDD Housing allocations

TABLE 1313-2: PROPOSED EMPLOYMENT GROWTH WITHIN THE TEES VALLEY				
Council	**Site**	**Site Area (ha)**	**Number of employees**	**Type**
DBC		13	168	B1a
DBC		57	0	B1 / B2 and B8
DBC		73	310	B1 / B2 and B8
DBC		41	266	B1 / B2 and B8
DBC		36	0	B1 / B2 and B8
DBC		42	659	B1 / B2 and B8
DBC		15	268	B1 / B2 and B8
DBC		19	190	B1 / B2 and B8
DBC		16	0	B1 / B2 and B8
DBC		12	0	B1 / B2 and B8
DBC		8	305	B1 / B2 and B8
DBC		11	0	B1 / B2 and B8
DBC		6	423	B1 / B2 and B8
DBC		15	0	B1 / B2 and B8
DBC		120	0	B8
DBC		66	738	B8
DBC		22	190	B1
DBC		7	305	B1
DBC		14	676	B1
DBC		28	933	B1
DBC		12	0	B1 and B2
DBC		3	0	B1 and B2
DBC		7	22	B1 and B2
DBC		46	0	B1 and B2
DBC		13	33	B1 and B2
DBC		3	132	B1 and B2
DBC		66	410	B1 / B2 and B8
DBC		39	0	B1 / B2 and B8

TABLE 1313-2: PROPOSED EMPLOYMENT GROWTH WITHIN THE TEES VALLEY				
Council	**Site**	**Site Area (ha)**	**Number of employees**	**Type**
DBC		19	52	B1 / B2 and B8
HBC	Queens Meadow	Not given	1770	(B1/B2/B8)
HBC	South Works (Corus)	Not given	1200	(B1/B2/B8)
HBC	West of Seaton Channel (Tioxide)	Not given	1050	(B1/B2/B8)
HBC	Graythorpe Yard (TERCC)	Not given	1110	(B1/B2/B8)
HBC	North Seaton Channel (Zinc Works)	Not given	115	(B1/B2/B8)
HBC	Zinc Works Road (Zinc Works)	Not given	445	(B1/B2/B8)
HBC	North Graythorpe	Not given	285	(B1/B2/B8)
HBC	Graythorpe	Not given	590	(B1/B2/B8)
HBC	Brenda Road West (Tofts Farm West)	Not given	815	(B1/B2/B8)
HBC	Tees Bay Retail Park Expansion	Not given	125	Non-Food (A1)
HBC	Tofts Farm East	Not given	935	(B1/B2/B8)
HBC	Hunter House (part of Tofts Farm East)	Not given	595	(B1/B2/B8)
HBC	Parkview West	Not given	870	(B1/B2/B8)
HBC	Usworth Road	Not given	710	(B1/B2/B8)
HBC	Sovereign Park	Not given	760	(B1/B2/B8)
HBC	Brenda Road East	Not given	15	(B1/B2/B8)
HBC	Longhill and Sandgate	Not given	1870	(B1/B2/B8)
HBC	Oakesway Industrial Estate	Not given	1055	(B1/B2/B8)
HBC	North Burn	Not given	560	(B1/B2/B8)
HBC	Wynayrd Business Park	Not given	2625	(B1/B2/B8)
HBC	The Port	Not given	2350	(B1/B2/B0
HBC	Connoco Phillips Tank Farm	Not given	610	(B1/B2/B8)
HBC	Trincomalee Wharf Mixed Use	Not given	20	Commercial (A/C/D)
HBC	Aldi Burbank	Not given	420	Commercial (A1)
HBC	Seaton Sands (A1 element)	Not given	450	Leisure (D2)
HBC	Middleton Grange Opportunity Site	Not given	50	Non-Food (A1)
HBC	Seaton Park	Not given	370	Museum/Tourist (D1)

TABLE 1313-2: PROPOSED EMPLOYMENT GROWTH WITHIN THE TEES VALLEY				
Council	**Site**	**Site Area (ha)**	**Number of employees**	**Type**
HBC	Longscar Centre	Not given	425	Mixed Use (A1/A3/C3)
MBC	Teesside Advanced Manufacturing Park	13 ha	430	B,1 B2
MBC	South of Simcox Court	1.9 ha	40	B1, B2, B8
MBC	Site L South, Riverside Park Road	1.3 ha	50	B2
MBC	Land adjacent River Court, Riverside Park Road	1.4ha	100	B1(a), B2
MBC	Site G, Riverside Park Road	3.0 ha	45	B1, B2, B8
MBC	Site North East of Brighouse Business Village	2.2ha	100	B1, B2, B8
MBC	Site K, Startforth Road	1.9 ha	30	B1, B2, B8
MBC	Site D, Depot Road	1.1 ha	15	B8
MBC	Forty Foot Road East	1.7ha	25	B8
MBC	BF Gas site , Forty Foot Road	1.1 ha	15	sui generis
MBC	Abattoir site	3.8 ha	80	B1, B2, B8
MBC	Greater Middlehaven	50.9 ha	1500	B1
MBC	Police headquarters site	3.1 ha	400*	B1
MBC	Hemlington Grange	4.8 ha	500	B1, B2, B8
RCBC	Corus Corridor (2)	64.9	1989	PDL
RCBC	Corus Corridor (1) (South Bank Quarf)	51.5	1580	PDL
RCBC	Kirkleatham Business Park	49.8	1527	Greenfield
RCBC	Wilton International	42.5	1303	PDL
RCBC	Wilton International	26.2	803	PDL
RCBC	Skelton Industrial Estate Extension	25.3	776	Greenfield
RCBC	Corus Corridor (3) East of Lackenby Works	23.5	722	PDL
RCBC	West of A1053	22.7	695	Greenfield
RCBC	Corus Corridor (2)	18.8	576	PDL
RCBC	Wilton International	13.8	423	PDL
RCBC	Wilton International	13.1	401	PDL

TABLE 1313-2: PROPOSED EMPLOYMENT GROWTH WITHIN THE TEES VALLEY				
Council	**Site**	**Site Area (ha)**	**Number of employees**	**Type**
RCBC	Tees Offshore Base	12.3	377	PDL
RCBC	South Tees Industrial Park	6.8	209	PDL
RCBC	Wilton International	6.6	203	PDL
RCBC	Wilton International	5.0	154	PDL
RCBC	Wilton International	4.8	148	PDL
RCBC	Wilton International	4.8	146	Greenfield
RCBC	Wilton International	4.7	144	Greenfield
RCBC	Wilton International	4.5	138	Greenfield
RCBC	Wilton International	4.3	132	PDL
RCBC	North of Middlesbrough Road	4.3	131	Greenfield
RCBC	Wilton International	4.2	128	PDL
RCBC	Wilton International	4.0	122	PDL
RCBC	South Tees Imperial Park, off Tilbury Road	3.6	109	PDL
RCBC	South Tees Industrial Park	3.4	104	PDL
RCBC	Tees Offshore Base	3.2	99	PDL
RCBC	Wilton International	3.2	98	PDL
RCBC	Wilton International	3.0	91	PDL
RCBC	Wilton International	3.0	91	PDL
RCBC	Land to the Rear of Priory Park	2.7	82	Greenfield
RCBC	Land at A1085 and West Coatham Lane, Dormanstown Industrial Estate	2.6	81	Greenfield
RCBC	Tees Offshore Base	2.5	77	PDL
RCBC	Land off A1085, Trunk Road	13.1	401	PDL
RCBC	Wilton International	12.3	377	PDL
RCBC	Skelton Industrial Estate	2.2	68	Greenfield
RCBC	Skelton Industrial Estate	2.1	66	PDL
RCBC	Skelton Industrial Estate	1.8	56	PDL
RCBC	Wilton International	1.5	45	PDL
RCBC	North Liverton Industrial Estate	1.4	44	PDL

TABLE 1313-2: PROPOSED EMPLOYMENT GROWTH WITHIN THE TEES VALLEY				
Council	**Site**	**Site Area (ha)**	**Number of employees**	**Type**
SBC	Belasis Technology Park	21.9	1190	B1(b), B1(c), B2, B8
SBC	Billingham House	3.5	192	B1(b), B1(c), B2, B8
SBC	Cowpen Industrial Estate	4.1	224	B1(b), B1(c), B2, B8
SBC	Durham Lane Industrial Estate	34.9	1902	B1(b), B1(c), B2, B8
SBC	Durham Lane Industrial Estate	5.0	272	B1(b), B1(c), B2, B8
SBC	Oxbridge Foundry	2.1	112	B1(b), B1(c), B2, B8
SBC	Portrack Interchange	15.3	831	B1(b), B1(c), B2, B8
SBC	Preston Farm	6.2	336	B1(b), B1(c), B2, B8
SBC	Preston Farm	5.8	315	B1(b), B1(c), B2, B8
SBC	Durham Tees Valley Airport	70.4	3836	B1(b),B1(c),B2,B8
SBC	Stillington	1.5	83	B1(b), B1(c), B2, B8
SBC	Teesside Industrial Estate	30.9	1683	B1(b), B1(c), B2, B8
SBC	Corus	2.6	140	B1(b), B1(c), B2, B8
SBC	Teesdale	2.6	144	Principal Office Location
SBC	Wynyard One	47.9	2608	B1(b), B1(c), B2, B8, poss B1(a)
SBC	Wynyard Two	19.5	1061	B1(b), B1(c), B2, B8, poss B1(a)
SBC	North Tees	73.8	4021	Process Industry
SBC	Seal Sands	158.2	8615	Process Industry
SBC	Billingham Chemical Complex	65.4	3562	Process Industry
SBC	Billingham Reach	9.3	506	Port Related
SBC	Casebourne	6.2	336	Port Related
SBC	Haverton Hill	24.6	1339	Port Related
SBC	Port Clarence	22.4	1217	Port Related

B1 - Business B2 - General industrial B8 - Storage or distribution
A1 – Shops C – Residential and hotels D2 - Assembly and leisure
Sui generis - Uses which do not fall within any use class e.g. theatres, scrap yards, petrol filling stations, nightclubs, launderettes, taxi businesses, amusement centres or casinos.
PDL – Previously developed land
** Police headquarters site is a proposed relocation from an existing site in Middlesbrough and does not involve additional job creation. Therefore the 400 employees have not been included in the assessment.*

14 APPENDIX C – DESIGNATED SITES WITHIN THE TEES VALLEY

TABLE 14-1: WATER RELATED EUROPEAN AND NATIONALLY DESIGNATED SITES WITHIN THE TEES VALLEY REGION

Site name	Designation	Description	Condition[64]	Local authority
Teesmouth and Cleveland Coast	SPA, Ramsar	The SPA is a wetland of international importance comprising intertidal sand and mudflats, rocky shore, sand dunes, salt marsh and freshwater marsh. All habitats are used for breeding, feeding and roosting. Large numbers of waterfowl feed and roost on the site in winter and during passage periods.	Habitat Regulation assessment concluded the following could be adversely impacting on the site: nutrient enrichment, effluent discharges (particularly containing copper, cyanide, ammonia and nonyl-phenol), sediment contamination (particularly arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) and entrapment due to water abstraction.	Multiple
Tees & Hartlepool foreshore and wetlands	SSSI (part of above SPA)	Tees and Hartlepool Foreshore and Wetlands comprises several coastal areas which are an integral part of the complex of wetlands, estuarine and maritime sites supporting the internationally important population of wildfowl and waders on the Tees Estuary	Unfavourable declining due to population decline for sanderling and knot	Hartlepool
Seaton Dunes & Common	SSSI (part of above SPA)	An area of considerable importance for its flora, invertebrate fauna, and bird life. The range of habitats present include sandy, muddy and rocky foreshore, dunes, dune slacks and dune grassland, as well as relict saltmarsh, grazed freshwater marsh with dykes (known locally as fleets and stells) pools and seawalls	Favourable - data from the current year (2009) revealed maxima of 321 wigeon (January), 643 lapwing (December) and 247 curlew (November), indicating an improvement in habitat condition.	Hartlepool
Cowpen Marsh	SSSI (part of above SPA)	The largest saltmarsh between Lindisfarne and the Humber Estuary and together with adjacent coastal grazing marshes and mudflats it provides an important wintering site for migratory wildfowl and wading birds. It forms an integral part of Tees Estuary, a site of international importance for over wintering shore birds.	Unfavourable recovering	Stockton-on-Tees & Hartlepool
Seal Sands	SSSI (part of above SPA)	The only extensive area of intertidal mudflats, with tidal channels on the East coast of England between the Lindisfarne National Nature Reserve to the north and the Humber Estuary to the south, a distance of 200 miles. These mudflats are of great ornithological importance attracting large numbers of migratory wildfowl (c. 4,000) and wading birds (c. 24,000) especially during the winter months.	Unfavourable recovering - Salicornia encroachment upon the sandflats in the east. Bird counts showed an increase in redshank numbers of 55% but declines in shelduck and knot of 48% and 34% respectively.	Hartlepool
South Gare & Coatham Sands	SSSI (part of above SPA)	A range of habitats present includes extensive tracts of intertidal mud and sand, sand dunes, saltmarsh and freshwater marsh which have all developed since the construction of the South Gare breakwater with tipped slag during the 1860s. Also exposed at low tide are areas of rocky foreshore along the breakwater, three slag banks known as the German Charlies, and Coatham Rocks.	Unfavourable recovering - increases in ringed plover of 46% and of sanderling of 264%, along with a 65% decline in knot. Breeding little tern has declined by 96%.	Redcar & Cleveland
Redcar Field	SSSI	Though small in area, Redcar Field supports a range of fen vegetation types not found at any other site in the region. It is one of the few remaining examples of spring fed vegetation on the Magnesian Limestone of County Durham, and the only site known to contain fen meadow.	Favourable - Within the fen meadow 4 cited species were found at each stop, 1 species was abundant, a further 3 were frequent and 1 occasional. Within the fen marsh 3 species were found at each stop including phragmites; 1 further species was dominant and 2 frequent. There was evidence of rush control, and although litter content within the swamp was higher than is desirable the site is still considered to be in favourable condition.	Darlington
Newton Ketton Meadow	SSSI	One of the few surviving unimproved hay meadows in the coastal plain between the Rivers Tyne and Tees	Favourable - little evidence of undesirable species; no evidence of bare ground; very little litter content within the sward; and no scrub or tree encroachment. A good range of species is evident across the site, with site management continuing to ensure the site remains in favourable condition.	Darlington
North York Moors	SSSI, SAC, SPA	The North York Moors contain the largest continuous tract of heather moorland in England. The site is of national importance for its mire and heather moorland vegetation communities and of international importance for its breeding bird populations, particularly merlin and golden plover.	Unfavourable recovering	Redcar & Cleveland
Hell Kettles	SSSI	A 3 hectare area of lowland fen, marsh and swamp.	Favourable	Darlington
Neasham Fen	SSSI	A 2 hectare area of peat and pond habitat, with a good cover of grass and fen species across the site including indicator species such as wild angelica.	Favourable	Darlington

[64] www.sssi.naturalengland.org.uk

FIGURE 14-2: LOCALLY DESIGNATED SITES WITHIN THE TEES VALLEY REGION

Site name	Designation	Description	Local authority
Geneva Woods	LNRS		
Brinkburn (includes the previous SNCIs of: Horsefield and Black Path Ponds	LNRS and LWS	Horsefield Pond and meadows: Habitat for large 100+ GCN population, smooth newt, Toad and Common frog. Species rich meadows. Black Path Ponds: Interesting aquatic plants. Woodland with willows. Frogs, GCN and smooth newts breed in the ponds. UKBAP Wet woodland habitat monitoring and management of vegetation (Black Path Ponds). Allotments: only site in Darlington with Palmate newt.	
Rockwell (includes previous SNCI: Rockwell Pastures, St. Williams Pond & Skerne Restoration)	LNRS and LWS	The wetlands represent the major habitat at Rockwell and, although only the large, northern pond still held water at the time of my visit, about six further ponds of varying sizes and permanence, are present earlier in the year. The pond margins and extensive damp areas, however, boast an impressive number of species. Although the ponds are rich in invertebrates, it is the Odonata that is the most important in terms of species and abundance Large number of willow. GCN, water voles, common frog, toad, planted Black Poplar. St. Williams: Large GCN population. No open water due to Typha.	
Drinkfield Marsh	LNRS and LWS	Large lake, with established Phragmites reedbeds, wildflower and rough grasslands, marshy grassland, natural spring with a stream.	
The Whinnies	LNRS and LWS	Mosaic site of calcareous wildflower meadow, damp meadow, scrub, early successional brownfield and seasonal wetlands	
Maidendale	LNRS		
Brankin Moor	LNRS and LWS	Mosaic of grass, trees, scrub, ponds Trees and shrubs planted. Ponds created. Creation of footpath and maintenance work. Aquatic plants present. Breeding site for dragonflies and damselflies. Pressure from football stadium	
Ulnaby Beck	LWS	Spring, beck with woodland along its shore and a restoration area with 5 year old native trees	Darlington
Burtree Gate Marsh	LWS	A relatively large marsh with a small amount of open water and a species rich wet grassland Provides a valuable habitat as a passage and resting area for birds. This is one of very few marshes left in the area of the formerly large wetland of Morden-Bradbury Carrs	Darlington
Whiley Hill Sandpit	LWS	Unimproved neutral grassland with scrub and a pond in a former sand pit.	Darlington
Coatham Grange Marsh	LWS	Marsh. small pond remains with bulrush (Typha latifolia), water-plantain (Alisma plantago-aquatica) and canary reed-grass (Phalaris arundinacea). To the west the marsh is largely soft-rush (Juncus effusus), bladder-sedge (Carex vesicaria) and yellow iris (Iris pseudacorus) with a few goat willow (Salix caprea) .	Darlington
Fox Hill Quarry	LWS	Neutral grassland. Species rich neutral grassland in a former quarry site (>1Ha).	Darlington
River Tees Woods	LWS	A narrow bank of deciduous semi natural woodland. 3 species of dragonflies, otter, bats, badger present. Breeding Lesser Spotter Woodpecker	Darlington
Low Coniscliffe Tees bank	LWS	Scrub. Narrow strip of deciduous woodland with willows, and hawthorn. Important walkway for ramblers. Breeding Lesser spotted woodpecker	Darlington
West Cemetery	LWS	Cemetery with mature non-native trees and small strip of woodland along the north side. Created in Victorian times, the area is outstanding for fungi, with over 1300 species recorded, a site of national importance. The stripe of wood alongside is popular with dog walkers and cyclists. Reliable site for brambling in winter. Roost site for finches.	Darlington
Arnold Road Pond	LWS	Grassland, scrub and wetland Two ponds with aquatic plants.	Darlington
Central Park (formerly known as: Railway Site Haughton Road)	LWS	Former goods yard, Woodland, scrub, neutral grassland, urban grassland and small pond. Southern and central site areas contain considerable areas of UKBAP Early successional brownfield habitat, along with UKBAP species, Dingy Skipper butterfly population. Burnet companion moth also present.	Darlington
Broken Scar	LWS	Ponds with great crested newts. Wasteland with an area of grassland and scrub. 7 species of dragonflies and 17 species of butterflies. Species rich grassland.	Darlington
Neasham Brickworks	LWS	Former clay pit. Lake. GCN breeding site.	Darlington
Carr house Pond	LWS	Pond, marshy grassland and calcareous grassland Apparently this is the last remaining of a series of ponds from former brickworks. The pond margins have a well developed flora	Darlington
Denton Quarry	LWS	Semi natural woodland in an abandoned quarry, probably dating from Victorian industrial times. Interesting ground flora. Very steep banks, which make access difficult. The site needs revisiting at an earlier time of year,	Darlington
Blackwell Grange Golf course east and west	LWS		Darlington

FIGURE 14-2: LOCALLY DESIGNATED SITES WITHIN THE TEES VALLEY REGION

Site name	Designation	Description	Local authority
High Firth Moor (Maidendale)	LWS	Mosaic of grassland, scrub, ponds Several ponds created for wildlife and fishing. Surfaced network of footpaths. Known also as Maidendale. Site transformed recently to encourage public involvement.	Darlington
Newton Grange Farm	LWS	Two ponds situated in sheep grazed fields. Both ponds have fencing to deter animal access. Harvest Mouse also found.	Darlington
Sadberge ponds	LWS	Two ponds in adjacent fields. One was newly excavated in 2005/6	Darlington
Cocker Beck Meadows	LWS	West Meadow: Semi-improved and herb-rich grassland in an urban valley greenspace. A large rectangular area in the centre has recently been enhanced by the addition of green hay from the Durham Tees Valley Airport site creating a Lowland Meadow (MG5) community. The site has 5 grasses and 15 herbs from the criteria list for G1. Ridge and furrow present. East Meadow: Unimproved grassland in an urban valley greenspace. The site has 3 grasses and 11 herbs from the criteria list for G1. Ridge and furrow present.	Darlington
Janet's Meadow (Working title, previously: Tees Triangle)	LWS	Species rich grassland alongside River Tees, on the inside of a meander.	Darlington
Hunger Hill Farm	LWS		Darlington
Oxbow Lake	LWS	GCN present in one small pond, in good condition, surrounded by trees and rough unimproved grassland.	Darlington
Hart Quarry	SNCI		Hartlepool
Hart Reservoir	SNCI		Hartlepool
Naisberry Quarry	SNCI		Hartlepool
Elwick Hall Fishpond	SNCI		Hartlepool
Dalton Piercy Gorse bushes	SNCI		Hartlepool
Tilery Gill	SNCI		Hartlepool
Beacon Hill	SNCI		Hartlepool
Whelly Hill Quarry	SNCI		Hartlepool
Pawton Hill Gill	SNCI		Hartlepool
Crookfoot Reservoir & Wood	SNCI		Hartlepool
Cow Pasture Wood	SNCI		Hartlepool
Gunnersvale Marsh	SNCI		Hartlepool
North Burn Marsh	SNCI		Hartlepool
Phillips Tank Farm	SNCI		Hartlepool
Sharwoods Brinefield	SNCI		Hartlepool
Greenabella Marsh	SNCI		Hartlepool
Hartlepool Power Station	SNCI		Hartlepool
The Slake	SNCI		Hartlepool
Greatham Beck	SNCI		Hartlepool

FIGURE 14-2: LOCALLY DESIGNATED SITES WITHIN THE TEES VALLEY REGION

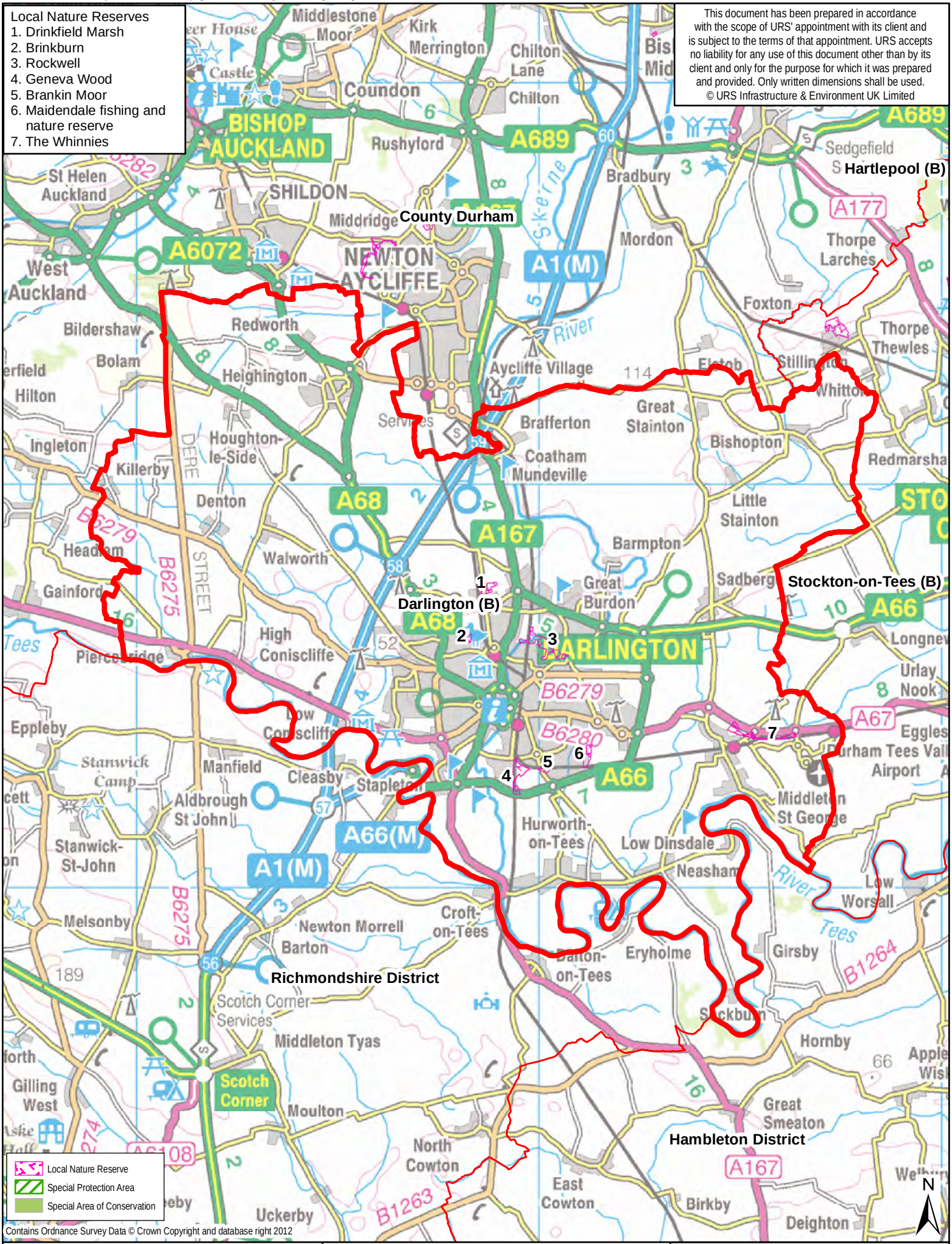
Site name	Designation	Description	Local authority
Brierton Quarry	SNCI		Hartlepool
Hart Warren Railway Embankment	SNCI		Hartlepool
Crimdon Road Verge	SNCI		Hartlepool
Hart-Haswell Walkway	SNCI		Hartlepool
Summerhill	Country Park & LNR	Woodlands, meadows, wetlands & hedgerows	Hartlepool
Stainton Quarry	LNR	Stainton Quarry straddles Stainton Beck, between the villages of Stainton and Thornton in Middlesbrough	
Linthorpe Cemetery	LNR	In the southern section of the cemetery there is an almost complete canopy cover of mature trees. Most of these were planted in the nineteenth century. The dominant species are horse chestnut and sycamore with scattered species of pine, lime and oak. The cemetery is rich in bird life, both resident and seasonal visitors. Regular songbirds include the nuthatch, green finch, dunnock and siskin. There is some dead standing timber with luxuriant ivy growth which provides important nesting and feeding sites for tawny owls and great spotted woodpeckers	
Berwick Hills	LNR	Wildflower meadows, new woodlands, and ponds on former derelict allotment land	
Berwick Hills and Ormesby Beck Complex	LWS	Reed Bed	
Bluebell Beck Complex	LWS	Neutral Grassland	
Maltby Beck	LWS	Neutral Grassland	
Three sites along Marton West Beck including Fairy Dell, Anderson's Field and Bonny Grove.	LWS	Neutral Grassland and Broad leaved woodland	
Marton West Beck/ Newham Beck.	LWS	Watercourse	
Maze Park	LWS	Urban grassland	
Middlebeck	LWS	Water Course	
Newham Beck Complex	LWS	Neutral Grassland	
Old River Tees	LWS	Saltmarsh	
Plum Tree Pasture	LWS	Neutral grassland	
Poole Hospital	LWS	Woodland and Woodland Flora	
Stainsby Wood	LWS	Ancient Woodland	
Teessaurus Park	LWS	Urban grassland	
Thornton Wood and Pond	LWS	Pond	
Whinney Banks Pond	LWS	Pond	
Berwick Hills and Ormesby Beck Complex	LWS	Reed Bed	
Bluebell Beck Complex	LWS	Neutral Grassland	
Bassleton Woods	LNR	Six-hectare pocket of ancient deciduous woodland sandwiched between the Bassleton Court housing estate of Thornaby and the River Tees. It is a haven to a sizeable amount of Wych Elm and some English Elm	Stockton-on-Tees

FIGURE 14-2: LOCALLY DESIGNATED SITES WITHIN THE TEES VALLEY REGION

Site name	Designation	Description	Local authority
Holmes Local Nature Reserve	LNR	The Holmes area of the nature reserve comprises 6.8-hectares of low-lying ex-agricultural land in a meander known as horseshoe bend. It is a mix of developing woodland, wildflower meadow and wetlands.	Stockton-on-Tees
Black Bobby' s Field	LNR	6 ha site, host to a range of wildlife. There are developing woodland, wet meadows, a large pond and a fish haven connected to the river.	Stockton-on-Tees
Quarry woods	LNR	Former Victorian Quarry with mix of trees. Part of the quarry is flooded and home to frogs, toads, newts, birds and many invertebrates	Stockton-on-Tees
Billingham Beck Valley County Park	LNR	Wetlands and woodlands; including meadows, reedbeds, marshes and ponds	Stockton-on-Tees
Cowpen Bewley Woodland Park	Country Park	Reclaimed industrial site now includes a lake, woodlands, ponds, wetlands and meadows	Stockton-on-Tees
Wynyard Woodland Park	Country Park	Woodland, meadows and wetland habitats	Stockton-on-Tees
Bowesfield	Wetland reserve	Wetland Reserve formed by 3 loops in the River Tees, home to a growing number o birds as well as otters and sand martins	Stockton-on-Tees
Aislaby Bank	SNCI		Stockton-on-Tees
Errington Wood	LNR	22 ha site on the hillside above New Marske. One of the oldest conifer plantations in the region	Redcar & Cleveland
Eston Moor	LNR	Classed as lowland heath, this habitat is characterised by dwarf shrubs: common heather, bell heather and cross-leaved heath. There are numerous areas of semi mature birch woodland, scrub, wetlands and acid grassland. The site also has archaeological and geological interest	Redcar & Cleveland
Guisborough Branch walkway	LNR		Redcar & Cleveland
Flatts Lane Woodland Country Park	LNR	Variety of habitats including deciduous and coniferous woodland, grassland and ponds	Redcar & Cleveland
Rosecroft & Loftus woods	LNR	South of Loftus West and East of Rosecroft Lane. These quaint sites are valued for their picturesque and rights of way leading to the wider countryside.	Redcar & Cleveland
Hazelgrove	LNR	Small wooded valley to the rear of the caravan site at Saltburn. The mature trees form a small oasis for wild birds on migration, a wide range of natural herbs and shrubs provide feeding and breeding areas for song birds during the summer months.	Redcar & Cleveland
Whitecliff & Clarkson woods	LNR	These ancient woodlands harbour rare species including small leafed lime, and spindle.	Redcar & Cleveland

Plot Date: 11 Dec 2012
File Name:I:\5004 - Information Systems\47061605 SBC Scoping WCS\ArcGIS\MXD\Figure 14-3 Darlington Designated Sites.mxd

Local Nature Reserves
1. Drinkfield Marsh
2. Brinkburn
3. Rockwell
4. Geneva Wood
5. Brankin Moor
6. Maidendale fishing and nature reserve
7. The Whinnies



Local Nature Reserve
Special Protection Area
Special Area of Conservation

N

Drawing Title

DESIGNATED SITES
DARLINGTON BOROUGH

Scale @ A4		
1:120,000		
Drawn	Checked	Approved
BB, AR	CP	CP
Date		Rev
11.12.12		

Drawing Number
FIGURE 14-3

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Plot Date: 11 Dec 2012
File Name:I:\5004 - Information Systems\47061605 SBC Scoping WCS\ArcGIS\MXD\Figure 14-4 Hartlepool Designated Sites.mxd

Local Nature Reserves
1. Hart to Haswell walkway
2. Hart Warren
3. Spion Cop Cemetary
4. Summerhill
5. Greatham Beck
6. Seaton Dunes and Common SSSI

Local Nature Reserve
Special Protection Area
Special Area of Conservation

Drawing Title: DESIGNATED SITES HARTLEPOOL BOROUGH	Scale @ A4: 1:100,000	
	Drawn: BB, AR	Checked: CP
	Approved: CP	
	Date: 11.12.12	Rev:
	Drawing Number: FIGURE 14-4	

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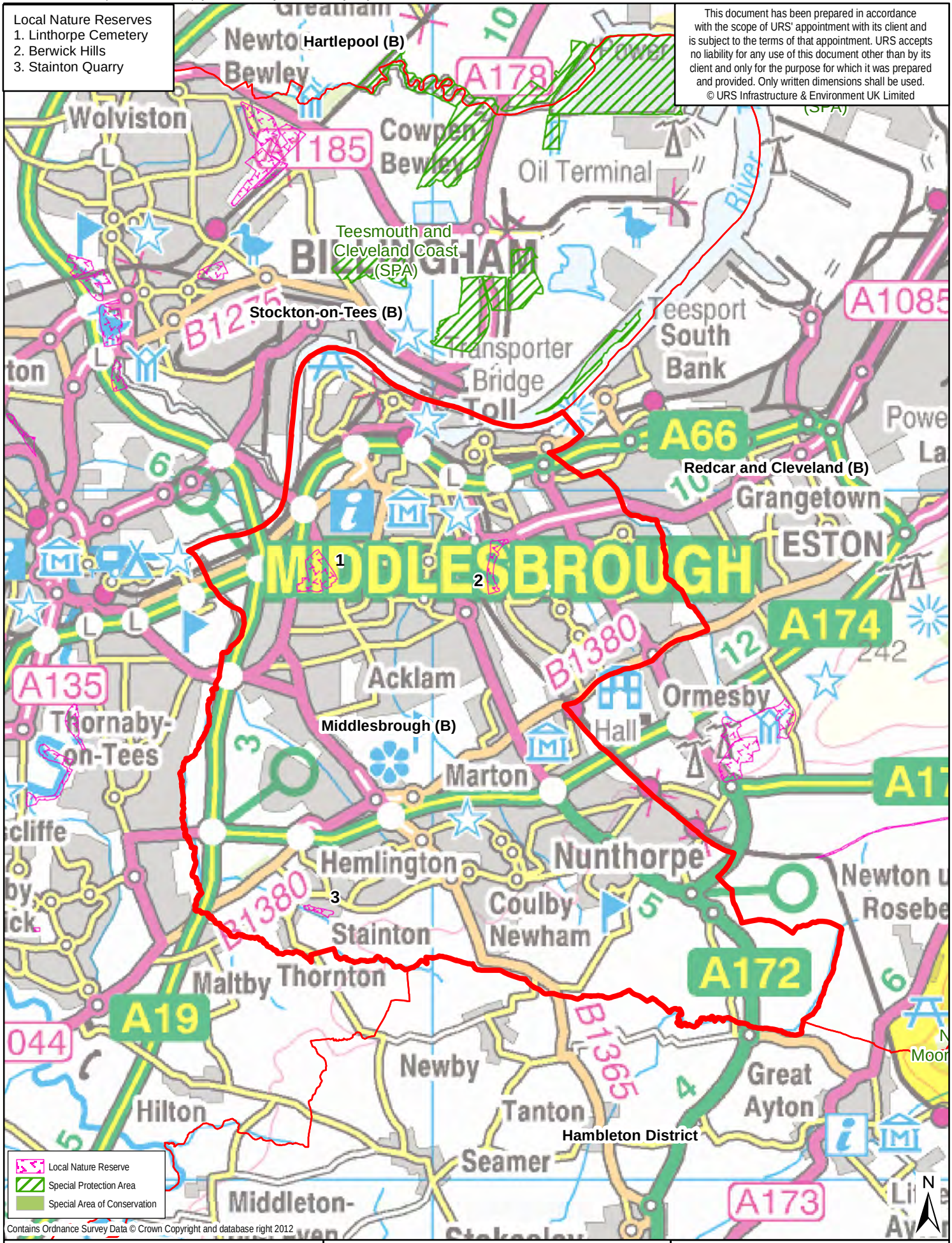
Plot Date: 11 Dec 2012
File Name:I:\5004 - Information Systems\47061605 SBC Scoping WCS\ArcGIS\MXD\Figure 14-5 Middlesbrough Designated Sites.mxd

Local Nature Reserves
1. Linthorpe Cemetery
2. Berwick Hills
3. Stainton Quarry



Drawing Title: DESIGNATED SITES MIDDLESBROUGH BOROUGH	Scale @ A4: 1:70,000		
	Drawn: BB, AR	Checked: CP	Approved: CP
	Date: 23.08.12		Rev
	Drawing Number: FIGURE 14-5		

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Plot Date: 11 Dec 2012
File Name:I:\5004 - Information Systems\47061605 SBC Scoping WCS\ArcGIS\MXD\Figure 14-6 Cleveland Redcar Designated Sites.mxd

Local Nature Reserves
1. Flatts Lane Woodland Park
2. Guisborough Branch Walkway
3. Whitecliff, Loftus and Rosecroft Woods
4. Clarksons Wood

Local Nature Reserve
Special Protection Area
Special Area of Conservation

Drawing Title: DESIGNATED SITES REDCAR AND CLEVELAND BOROUGH	Scale @ A4: 1:150,000	
	Drawn: BB, AR	Checked: CP
	Approved: CP	
	Date: 11.12.12	Rev:
	Drawing Number: FIGURE 14-6	

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Plot Date: 11 Dec 2012
File Name:I:\5004 - Information Systems\47061605 SBC Scoping WCS\ArcGIS\MXD\Figure 14-7 Stockton-On-Tees Designated Sites.mxd

Local Nature Reserves
1. Cowpen Bewley Woodland Country Park
2. Thorpe Wood
3. Stillington Forest Park
4. Billingham Beck Valley
5. Charltons Pond
6. Norton Grange marsh
7. Hardwick Dene & Elm Tree Woods
8. Greenvale
9. Black Bobbies Field
10. Bassleton Wood and The Holmes
11. Quarry Wood
12. Barwick Pond

Local Nature Reserve
Special Protection Area
Special Area of Conservation

Drawing Title

DESIGNATED SITES
STOCKTON-ON-TEES BOROUGH

Scale @ A4		
1:120,000		
Drawn	Checked	Approved
BB, AR	CP	CP
Date		Rev
11.12.12		
Drawing Number		
FIGURE 14-7		

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15 APPENDIX D – ECOLOGY AND BIODIVERSITY APPROPRIATE ASSESSMENT

The need for Appropriate Assessment is set out within Article 6 of the EC Habitats Directive 1992, and interpreted into British law by the Conservation of Habitats and Species Regulations 2010 (Table 9-1). The ultimate aim of appropriate assessment is to "maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest" (Habitats Directive, Article 2(2)). This aim relates to habitats and species, not the European sites themselves, although the sites have a significant role in delivering favourable conservation status.

TABLE 15-1: THE LEGISLATIVE BASIS FOR APPROPRIATE ASSESSMENT

Habitats Directive 1992 Article 6 (3)
"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives."
Conservation of Habitats and Species Regulations 2010
"A competent authority, before deciding to … give any consent for a plan or project which is likely to have a significant effect on a European site … shall make an appropriate assessment of the implications for the site in view of that sites conservation objectives". "… The authority shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site".

In the past, the term "Appropriate Assessment" has been used to describe both the overall process and a particular stage of that process (see below). Within recent months, the term Habitat Regulations Assessment has come into use in order to refer to the process that leads to an "Appropriate Assessment", thus avoiding confusion. Throughout this report, Habitat Regulations Assessment is used to refer to the overall procedure required by the Conservation of Habitats and Species Regulations 2010.

In practice, Habitats Regulations Assessment can be broken down into three discrete stages, each of which effectively culminates in a test. The stages are sequential, and it is only necessary to progress to the following stage if a test is failed. The stages are:

Stage 1 – Likely Significant Effect Test

This is essentially a risk assessment, typically utilising existing data, records and specialist knowledge. The purpose of the test is to decide whether 'full' Appropriate Assessment is required. The essential question is:

"Is the project, either alone or in combination with other relevant projects and plans, likely to result in a significant adverse effect upon European sites?"

If it can be demonstrated that significant effects are unlikely, no further assessment is required.

Stage 2 – Appropriate Assessment

If it cannot be satisfactorily demonstrated that significant effects are unlikely, a full "Appropriate Assessment" will be required. In many ways this is analogous to an Ecological Impact Assessment, but is focussed entirely upon the designated interest features of the European sites in question. Bespoke survey work and original modelling and data collation are usually required. The essential question here is:

"Will the project, either alone or in combination with other relevant projects and plans, actually result in a significant adverse effect upon European sites, without mitigation?"

If it is concluded that significant adverse effects will occur, measures will be required to either avoid the impact in the first place, or to mitigate the ecological effect to such an extent that it is no longer significant. Note that, unlike standard Ecological Impact Assessment, compensation for significant adverse effects (i.e. creation of alternative habitat) is not permitted at the Appropriate Assessment stage.

Stage 3 – Imperative Reasons of Overriding Public Interest (IROPI) Test

If a project will have a significant adverse effect upon a European site, and this effect cannot be either avoided or mitigated, the project cannot proceed unless it passes the IROPI test. In order to pass the test it must be objectively concluded that no alternative solutions exist. The project must be referred to Secretary of State on the grounds that there are Imperative Reasons of Overriding Public Interest as to why the plan should nonetheless proceed. The case will ultimately be decided by the European Commission.

Although there is no legal requirement for HRA/AA, the analysis in this report is essentially analogous to the first stage of Habitat Regulations Assessment – the Likely Significant Effect Test.

16 APPENDIX E – DATA CATALOGUE

Request No.	Data Description	Stakeholder	Notes	Received
1	Final Water Resource Management Plan	NWL	Available on-line	06/03/2012
2	Final Water Resource Management Plan	HWC	Available on-line	06/03/2012
3	NGRs for WwTW locations and outfalls	NWL	Required to map WwTW and discharge points	12/03/2012
4	Measured (or calculated where not available) dry weather flow for each WwTW affected by growth	NWL	Required to calculate consented volumetric headroom	19/03/2012
5	Consent details for each WwTW for both flow (DWF and FFT) and quality conditions for BOD, Amm-N and P	NWL	Required to calculate consents and undertake RQP modelling for watercourse capacity.	19/03/2012
6	PE figures for each WwTW, broken down into domestic, trade and holiday, with estimate of trade flow for each WwTW	NWL	Required to calculate consented volumetric headroom	05/03/2012
7	Assumptions used on water consumption rates for current and future populations in each WRZ, broken down into metered, unmetered and average of the two	NWL	Required to calculate consented volumetric headroom	06/03/2012
8	Assumptions used on water consumption rates for current and future populations in each WRZ, broken down into metered, unmetered and average of the two	HWC	Required to calculate consented volumetric headroom - breakdown into metered and unmetered not essential	06/03/2012
9	Wastewater network layer, including pipe sizes, pumping station locations, and CSO outfall locations	NWL	Required to map wastewater catchments, and make assessment of potential capacity in absence of network model coverage	12/03/2012
10	Further information on wastewater capacity constraints, particularly pumping station constraints	NWL	To further inform sewer network capacity assessments	19/03/2012
11	Confirmation of network model coverage	NWL	Network models not required, but information on coverage of modelling is required to determine where modelling assessments on capacity will not be possible	12/03/2012
14	Information of growth forecasts already catered for in AWS' planning	NWL	What growth figures have been used by NWL for the water supply zone/WRZ - ideal to make a comparison with RSS target which is being assessed in the WCS as an evidence base, and to compare against RSS review levels	05/03/2012
17	Information of growth forecasts already catered for in AWS' planning	HWC	What growth figures have been used by NWL for the water supply zone/WRZ - ideal to make a comparison with RSS target which is being assessed in the WCS as an evidence base, and to compare against RSS review levels	06/03/2012
18	DG5 sewer flooding database	NWL	To inform sewer network capacity assessment	10/02/2012
19	Growth figures to use, broken down into proposed allocations, already built, granted permission but not built, and residual target to meet RSS requirements, where possible.	Councils	To be determined following meetings between Councils' and URS's planners	Received
20	Boundaries for proposed allocation sites (where known) for both housing and employment	Councils	For mapping and to allow accurate assessment of impact on wastewater drainage areas	Received
21	Confirmation of employment types for each employment area envisaged	Councils	Important as it affects wastewater generation and water supply requirements (although not essential)	Received
22	Urban Capacity studies or SHLAA information	Councils		Received
23	Employment Land Reviews	Councils	If available	Received
24	Core Strategy documents	Councils		Received
25	Location of regional, county and local wildlife/ecology sites including RNR, LNR, SNCI	Councils		Received
26	Annual Monitoring Reports for 2010/11	Councils		Received

Request No.	Data Description	Stakeholder	Notes	Received
28	OS mapping for all Districts	Councils	SW have access to maps, but would need an OS licence agreement from all	Received
29	BGS Bedrock and drift geology for study area	EA		12/03/2012
30	GIS river lines for main rivers in all districts	EA	To provide accurate GIS mapping outputs	08/03/2012
31	River Flows (mean and 95%ile for period 2004-2009) for receiving watercourse upstream of each WwTW	EA	Required to Run RQP for water quality capacity of receiving watercourses - Gauged data preferred, followed by national SIMCAT data, or flow estimates	15/03/2012
32	Water Quality monitoring data (2004-2009) upstream and downstream of each WwTW for BOD, Ammonia (as N), Phosphate (as orthophosphate), DO and Suspended Solids	EA	Required to Run RQP for water quality capacity of receiving watercourses	08/03/2012
33	Source Protection Zone Maps	EA	To inform SuDS assessments and management of groundwater resources	12/03/2012
34	Groundwater vulnerability maps	EA	For SuDS assessments	12/03/2012
35	Tees Valley CAMS (2007)	EA	Available on-line	06/03/2012
36	Stage 3 (and Stage 4 where available) RoC reports for Teesmouth and Cleveland Coast	EA	Required for HRA of solutions	08/03/2012
37	Areas susceptible to surface water flooding mapping	Councils	To inform SuDS assessments and management of surface water	Received