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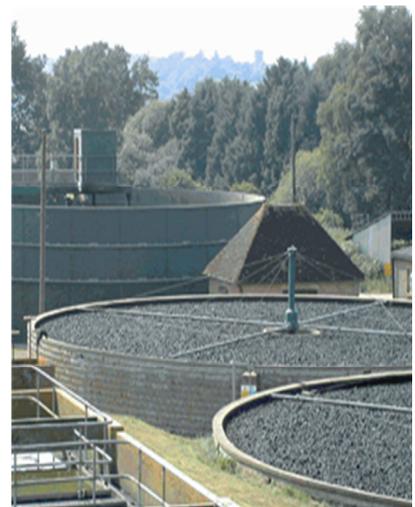
Mersey Heartlands Water Cycle Study

Outline Study: Main
Planning Report

January 2014

Prepared for:
Liverpool City Council and
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Acronyms & Abbreviations

Abbreviation	Description
AMP	Asset Management Plan
BGS	British Geological Society
BOD	Biochemical Oxygen Demand
CAMS	Catchment Abstraction Management Strategy
CBA	Cost Benefit Analysis
CFMP	Catchment Flood Management Plan
CSH	Code for Sustainable Homes
CLG	Communities and Local Government
CSO	Combined Sewer Overflow
DEFRA	Department for Environment, Food and Rural Affairs
DO	Dissolved Oxygen
DWF	Dry Weather Flow
DWI	Drinking Water Inspectorate
EA	Environment Agency
EQS	Environmental Quality Standard
FEH	Flood Estimation Handbook
FFT	Flow to Full Treatment
GQA	General Quality Assessment
GWMU	Groundwater Management Unit
HA	Highways Agency
HRA	Habitats Regulation Assessment
HMWB	Heavily Modified Water Body (under the Water Framework Directive)
l/h/d	Litres/head/day (a water consumption measurement)
LCC	Liverpool City Council
LDDs	Local Development Documents
LFRMS	Local Flood Risk Management Strategy
LLP	Liverpool Local Plan
LPA	Local Planning Authority
MI	Mega Litre (a million litres)
NE	Natural England
NPPF	National Planning Policy Framework
NWA	No Water Available (in relation to CAMS)
OFWAT	The Water Services Regulation Authority (formerly the Office of Water Services)
O-A	Over Abstracted (in relation to CAMS)
O-L	Over Licensed (in relation to CAMS)
P	Phosphorous
PE	Population Equivalent

Abbreviation	Description
PPS	Planning Policy Statement
PR	Periodic Review
PS	Pumping Station
pRamsar	Proposed Ramsar Site
pSPA	Proposed Special Protection Area
RBMP	River Basin Management Plan
RSS	Regional Spatial Strategy
RQO	River Quality Objective
SAC	Special Area for Conservation
SFRA	Strategic Flood Risk Assessment
SHLAA	Strategic Housing Land Availability Assessment
SPA	Special Protection Area
SPD	Supplementary Planning Document
SPZ	Source Protection Zone
SS	Suspended Solids
SSSI	Site of Special Scientific Interest
SWMP	Surface Water Management Plan
SuDS	Sustainable Drainage Systems
UKTAG	United Kingdom Technical Advisory Group (to the WFD)
UU	United Utilities
UWWTD	Urban Wastewater Treatment Directive
WC	Wirral Council
WCS	Water Cycle Study
WFD	Water Framework Directive
WRMP	Water Resource Management Plan
WRMU	Water Resource Management Unit (in relation to CAMS)
WRZ	Water Resource Zone (in relation to a water company's WRMP)
WTW	Water Treatment Works
WwTW	Waste Water Treatment Works

1 Executive Summary

- 1.1.1 Liverpool City Council (LCC) and Wirral Council (WC) are projecting a significant increase in housing and employment provision to the period 2027-28. In addition, the Mersey Heartlands Growth Point is expected to deliver additional dwellings, equivalent to an extra 20% of the annual Regional Spatial Strategy (RSS) housing provision for each authority over the growth period of 2008/9 to 2016/17. To ensure that both the water environment and infrastructure have the capacity to meet this growth could be challenging.
- 1.1.2 An Outline Water Cycle Study (WCS) has therefore been undertaken to identify capacity and constraints to growth that may be imposed by the water cycle and how these can be resolved. Furthermore, it provides a strategic approach to the management and use of water which aims to ensure that the sustainability of the water environment in the study area is not compromised.
- 1.1.3 The Outline WCS for the Mersey Heartlands Growth Point draws upon the findings of the Outline WCS's undertaken for Liverpool and Wirral up to the year 2028, and tests the implications of the additional growth associated with the Mersey Heartlands Growth Point for the years 2008-9 to 2016-17, over and above the growth assessed in Liverpool and Wirral WCS's. The Outline WCS for Mersey Heartlands therefore assess the cumulative impact of growth and this should be considered in light of the conclusions of the assessment.
- 1.1.4 At the time of writing, a definitive list of potential development locations for the Mersey Heartlands Growth Point were still being developed. Consequently, a strategic level assessment of capacity has been carried out for this Outline WCS.

1.2 Wastewater Assessment

Wastewater Treatment

- 1.2.1 To determine whether future development in the Mersey Heartlands might be constrained by capacity at the receiving waste water treatment works (WwTW), an assessment of the existing dry weather flow (DWF) was compared to the discharge consent limit. The potential increase in DWF was calculated as a result of the projected growth for housing. In the absence of WwTW specific information on actual DWF or headroom (capacity), a theoretical approach to determining DWF was taken. This involved using information on population, daily per capita sewage production, infiltration to the sewage connection and trade effluent flow.
- 1.2.2 There are three (3) waste water treatment works (WwTW) that serve the Mersey Heartlands. The WwTW within the Liverpool part of the Mersey Heartlands is Sandon Dock which is operated by United Utilities (UU). The assessment suggests that Sandon Dock WwTW has capacity to accept wastewater generated by the projected growth in the Liverpool Mersey Heartland. It also suggests that when considering the projected growth in the wider catchment of Sandon Dock WwTW, including projected growth in Liverpool and the

neighbouring authorities of Sefton Council and Halton Borough Council, that there is sufficient capacity within the discharge consent.

- 1.2.3 There are two WwTW serving the Wirral part of the Mersey Heartlands, all of which receive wastewater generated from Wirral only: Birkenhead and Bromborough WwTW, which are operated by UU. A review of the potential distribution of growth across the Wirral Mersey Heartlands suggests that the majority of growth will be located in the Birkenhead WwTW catchment.
- 1.2.4 The theoretical assessment suggests that Birkenhead and Bromborough WwTWs have capacity to accept wastewater generated by the projected growth within the Mersey Heartlands and the wider Wirral area, and the Outline WCS has shown that wastewater from growth in these catchments can be accommodated within existing consent conditions.
- 1.2.5 It is noted that although the capacity for the Bromborough WwTW is not expected to be exceeded, the remaining DWF headroom in the discharge consent is less than 10% for some growth scenarios.

Sewer Network Capacity

- 1.2.6 Specific development locations and sewer model results were not available at this stage of the Outline WCS for the Mersey Heartlands to enable the undertaking of a full assessment of capacity. A high level assessment of capacity in the sewer network has been undertaken to determine whether there is likely to be sufficient capacity within the existing infrastructure to transmit additional wastewater flow generated, as a consequence of growth, to the various treatment works.
- 1.2.7 The conclusions from the assessment are summarised below:
- The sewerage system is predominantly combined, with isolated pockets of separate surface water systems.
 - Generally good sewer network coverage, however, coverage around the Birkenhead Docks is relatively sparse.
 - Due to the relatively flat topography of the study area; a large part of the wastewater network relies heavily on pumping stations rather than gravity to transfer flow to the WwTWs.
 - Within the Mersey Heartlands there are a number of storage tanks and combined sewer overflows (CSOs), which suggests that parts of the drainage areas they are located in are reliant on sewage pumping and there may be capacity issues within the sewer network system in these areas
 - The DG5 records show a few locations in the Mersey Heartlands where flooding associated with the combined sewer system has occurred. It is possible that limited sewer capacity is the main cause of this flooding, which highlights the need for surface water management
- 1.2.8 As the sewerage system is predominantly combined, the capacity is not just dependant on foul water but also surface water runoff from storm events. More detailed assessments

(including modelling of the sewer network by UU) may be required to determine capacity and performance of the sewer network, pumping stations and storage tanks during storm events. It is proposed that this be undertaken by UU in consultation with LCC and WC once specific sites are identified for development, to determine if there are any constraints.

1.3 Water Supply Assessment

- 1.3.1 Future water demand for proposed growth has been calculated for the Mersey Heartlands. Six different water demand projections have been calculated based on different rates of water consumption for new homes that could be implemented through planning policy.

Available Water Resources

- 1.3.2 The Environment Agency's assessment of water availability¹ suggests that the sandstone aquifer which underlies Liverpool and most of the Wirral is at its limit of available resources and cannot sustain the level of proposed growth without causing adverse impact on rivers and ecosystems that rely on it; hence further abstraction from this resource is unlikely in the future.
- 1.3.3 Available water resources have been assessed according to the final Water Resource Management Plan (WRMP) as published by UU in September 2009. UU has undertaken an assessment to determine supply and demand and whether there is likely to be a surplus or deficit of water in the water resource zone covering the study area by 2035, taking into account additional demand from growth and other factors such as climate change.
- 1.3.4 The housing scenarios assessed in this WCS are in addition to that accounted for by UU's WRMP. Although the effect of additional housing in the Mersey Heartlands alone is not likely to overstretch the resource availability, a cumulative effect of demand increase could potentially have an impact on the supply-demand balance.
- 1.3.5 It is recommended that LCC and WC consult UU regarding water supply. It should be highlighted that, to date, development and population growth in the Wirral and Liverpool has been less than that anticipated in the WRMP. However, the rate of future growth may still mean that the targets originally catered for in the WRMP are still achievable and, until the WRMP is reviewed by UU, the conclusions can still be regarded as valid.
- 1.3.6 In considering the growth scenarios, it is also prudent to promote higher levels of water efficiency in new homes and commercial buildings to reduce water demand and achieve sustainable water supply with LCC's and WC's proposed Local Plan (Core Strategy) approach on sustainable growth.

Water Supply Infrastructure

- 1.3.7 It was not possible to carry out a detailed assessment of the water supply infrastructure for the Liverpool Mersey Heartland at this stage of the WCS due to lack of information on the

¹ Environment Agency, The Lower Mersey and Alt Catchment Abstraction Management Strategy, March 2008

Water Supply Infrastructure. However, UU have undertaken an assessment of the water supply infrastructure supplying sites identified in the SHLAA, on behalf of WC.

- 1.3.8 The majority of sites identified as part of the SHLAA and Employment Land studies are either infill or adjoining existing settlements (very little Greenfield development). It is therefore likely that a small proportion of entirely new infrastructure will be required.
- 1.3.9 The assessment indicated that some areas of the Wirral Mersey Heartland have low resource availability, associated with network reinforcement particularly around the Birkenhead Docks with some poor network connectivity, and pressure issues and network reinforcement requirements in the Tranmere area.
- 1.3.10 The phasing of potable water supply infrastructure or upgrades could therefore be considered to be a constraint to development within the Wirral Mersey Heartland, particularly in the Birkenhead Docks and Tranmere area, and should be further assessed once preferred development sites are known.

Water Neutrality

- 1.3.11 An assessment of the likelihood of achieving water neutrality has been undertaken in the Outline WCS.
- 1.3.12 The assessment combined potential future water demand projections based on different water use levels for new homes² with various water demand management measures in existing properties, ranging from installation of water meters (in unmetered properties) to retrofitting of low water use taps and shower heads. Water neutrality is theoretically feasible for the Mersey Heartlands.
- 1.3.13 An initial policy pathway to achieving neutrality has been set out in the Outline study. LCC and WC may wish to consider undertaking a detailed water efficiency and water neutrality policy pathway in collaboration with UU once preferred growth sites and locations are known.

1.4 Ecological Assessment

- 1.4.1 Designated ecological sites that have the potential to be affected by growth and its impact on the water environment have been considered. In the main, the majority of growth is unlikely to alter conclusions already drawn in UU's WRMP on abstraction and the Review of Consents³ process for wastewater discharges.
- 1.4.2 The Liverpool and Wirral Habitats Regulation Assessments (HRA) identified the following as potential sites that could be affected by growth;
- Dee Estuary SAC, SPA and Ramsar site,
 - River Dee and Bala Lake SAC
 - Sefton Coast SAC,

² Using the 5 future demand calculations from the water resources assessment

³ Undertaken as part of the requirements under the Habitats Directive

- Ribble and Alt Estuaries SPA and Ramsar site
- Manchester Mosses SAC
- Martin Mere SPA and Ramsar
- River Eden SAC
- Mersey Estuary SPA and Ramsar site,
- Mersey Narrows and North Wirral Foreshore pSPA, pRamsar and
- Liverpool Bay pSPA and pRamsar

1.4.3 The Outline WCS shows that growth is unlikely to jeopardise achievement of the WFD targets for all of the identified designated sites. The next stage of the HRA should take these findings into consideration and be informed and refined if necessary by further studies.

1.5 Flood Risk and Surface Water Management

1.5.1 The Strategic Flood Risk Assessment (SFRA) and Preliminary Flood Risk Assessment (PFRA) for Liverpool and Wirral have been used in this Outline WCS to inform the assessment of flood risk to potential development locations at a strategic level.

1.5.2 The following key flood risk issues have been identified:

- A small area of the Mersey Heartlands is located within the Flood Zone 2 and Flood Zone 3.
- The River Birket relies on pumping, and the area is reliant on flood defences to minimise flood risk to the existing development both from fluvial and tidal flood risk and surface water drainage channels. Failure of these defences constitutes a residual risk of flooding to the area.
- Groundwater flooding is not considered to be a significant constraint to future development. However, groundwater rebound is known to exist in parts of the study area and therefore groundwater flood risk is particularly significant for developments where deep foundations are required.
- The sewerage system in the study area relies on pumps. Surface water flooding from the system is a key flood risk that needs to be considered due to the finite capacity of this pumped system and the storage tanks
- Surface water flooding is considered to be a risk, particularly for the Liverpool Mersey Heartland.

1.5.3 In accordance with the National Planning Policy Framework (NPPF), when allocating land for development in Local Development Documents, the WC and LCC local plans should apply the Sequential Test to steer development towards areas of low flood risk and to demonstrate, where necessary, that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed.

The Management of Surface Water Runoff

1.5.4 Surface water management is a key flood risk consideration in the study area. The Liverpool Mersey Heartland is within a 'Flood Risk Area' and records for Wirral show that surface

water flooding has occurred in the borough following a number of either high intensity storm events or extended periods of heavy rain.

- 1.5.5 New developments must consider the impact of further urbanisation on the existing watercourses, culverts and sewers used for the discharge of surface water. The incorporation of Sustainable Drainage Systems (SuDS) into development footprints at an early stage is therefore essential to meeting the aspiration of sustainable water management in the study area.
- 1.5.6 In order to give an indication of SuDS suitability for the Outline WCS, the likely capacity for infiltration type SuDS within the administrative area has been considered. Whilst most of the Mersey Heartlands has permeable underlying geology, some parts of the study area may not be suitable for infiltration SuDS due to the presence of Source Protection Zones and/or existing development. As a result, many areas will therefore be reliant on a combination of SuDS techniques or surface attenuation and runoff restriction, which will require sites to make land available for mitigation. Once site allocations are known, further advice on types of suitable SuDS and opportunities for linking SuDS to green infrastructure should be provided from additional studies.

1.6 Cross-boundary Issues

- 1.6.1 In carrying out this WCS, consideration has been made to the potential cross-boundary issues that may exist now, and in the future, with the neighbouring authorities: Cross boundary issues have been assessed in terms of water supply, wastewater treatment capacity and ecological and HRA issues.

Water Supply

- 1.6.2 The Mersey Heartlands are assessed on a regional scale by UU in the WRMP. UU also undertook a local assessment on water supply infrastructure to SHLAA sites located in Wirral to look at local supply issues. In developing the outline WCS, this study was referred to in addition to the WRMP and no cross-boundary issues were identified.
- 1.6.3 The current WRMP is being updated and will be issued in 2014 and will include revised housing figures from all Districts. This should provide an updated indication of the cumulative impacts that future development may have on regional and local water supply.

Wastewater Treatment

- 1.6.4 The WCS found that the catchment areas of the WwTWs serving Wirral effectively covered the entire area of the Wirral, with the catchment of Bromborough WwTW including a small area located within Cheshire West and Chester – this is a small wooded area called Booston Wood near Ellesmere Port. Due to the small size and lack of developed areas, cross boundary issues were not deemed to be significant.
- 1.6.5 Cross boundary issues were identified for the Sandon Dock WwTW and associated sewer network, as the catchment of the WwTW also includes part of neighbouring Sefton Council

and Halton Borough Council. The cumulative impact of growth in the wider WwTW catchment was considered in the assessment.

Ecology and HRA

- 1.6.6 Ecological and HRA issues assessed in the WCS are predominantly associated with wastewater discharges. The Wirral WCS acknowledged that there is a potential for increased development in Cheshire West and Chester (CWC) to impact on downstream areas in Wirral, through discharges from upstream WwTW or CSOs. However local WwTW discharge licenses in CWC should ensure no adverse impacts on receiving waterbodies and designated sites as a result of going through a RoC, in terms of water supply, wastewater treatment capacity and ecological and HRA issues.

1.7 Key Constraints and Next Steps

- 1.7.1 Below is a summary of the constraints identified for Wastewater Treatment, Water Supply and Flood Risk at the following locations where a solution needs to be identified in further studies:
- Liverpool Mersey Heartland – potential issue with wastewater transmission, capacity issues of sewer network and surface water flooding.
 - Wirral Mersey Heartland – wastewater transmission and water supply transmission.
- 1.7.2 Once specific development locations and numbers are confirmed, further investigations on WwTW capacity, wastewater transmission, surface water management and water supply will be required in order to determine the impact of infrastructure on the phasing of growth in these locations. This outline assessment has been undertaken at a strategic level based on best estimates of where growth is likely to occur on a settlement by settlement basis. Further studies are therefore recommended, once site allocations are more clearly defined through the site allocations process, to address the potential constraints and knowledge gaps identified in this report.

2 Introduction

2.1 Terms of Reference

- 2.1.1 URS Infrastructure & Environment UK Ltd (URS) has been commissioned by Liverpool City Council (LCC) and Wirral Council (WC) to undertake a Scoping and an Outline Water Cycle Study (WCS) for the Metropolitan Borough of Wirral, City of Liverpool and the Mersey Heartlands Growth Point. This report documents the findings of the Outline WCS specifically for the Mersey Heartlands. The findings for Wirral and Liverpool are reported separately, however, the Mersey Heartlands WCS will refer to the conclusions of the Liverpool and Wirral WCS. This WCS will inform the evidence base of LCC's and WC's Local Plan.
- 2.1.2 Water cycle strategies are required to ensure that proposed growth does not adversely impact on the existing water cycle environment and that new water services infrastructure can be planned for and provided alongside new development in a sustainable and cost effective manner.

2.2 Growth in the Mersey Heartlands

- 2.2.1 The Mersey Heartlands straddles the Mersey Estuary and is comprised of two geographical locations – Liverpool Mersey Heartland and Wirral Mersey Heartland.
- 2.2.2 The Liverpool Mersey Heartland comprises part of the designated Urban Core and a small area of the Suburban Area of Liverpool, covering the wards of Anfield, County, Everton and Kirkdale.
- 2.2.3 The Wirral Mersey Heartland comprises Wirral's inner urban area, covering the wards of Birkenhead, Secombe, Tranmere and Bidston. The Mersey Heartlands growth point is expected to deliver additional dwellings, equivalent to an extra 20% of the annual Regional Spatial Strategy (RSS) housing provision for each authority over the growth period of 2008/9 to 2016/17.
- 2.2.4 To ensure that both the water environment and infrastructure have the capacity to meet this growth could be challenging. It is therefore a key objective of the Mersey Heartlands WCS to identify constraints on housing and employment growth that may be imposed by water cycle considerations and how these can be resolved i.e. by ensuring that appropriate water infrastructure is provided to support the proposed development. Furthermore, it should provide a strategic approach to the management and use of water so that the sustainability of the water environment in the area is not compromised.

2.3 Study History

- 2.3.1 The Mersey Heartlands WCS has been undertaken initially in two stages, as recommended by the Environment Agency guidance for Water Cycle Studies⁴.

⁴ Environment Agency (2009), Water Cycle Study Guidance.

- 2.3.2 The draft Scoping report was reported in June 2013⁵, the aim of which was to define the study area, establish the WCS steering group and indicate, at an initial high level, the key water infrastructure and water environment constraints that have the potential to impact on growth.
- 2.3.3 The Scoping study showed that although no ‘showstoppers’ were identified, there are some potential constraints on housing growth in the wider Wirral and Liverpool study area requiring further assessment; in particular, management of drainage, wastewater treatment, water availability and control of demand for potable water. This Outline WCS therefore takes the assessment of the impact of planned growth in the Mersey Heartlands a step further, building on the findings of the Scoping WCS, and identifying areas where further assessment may be required.

2.4 Water Cycle Study Reporting

- 2.4.1 The undertaking of a WCS requires a significant amount of technical data collection, analysis and interpretation. This technical work requires agreement by all stakeholders involved, such that the findings of the study can be agreed and signed up to by all parties leading to an approved strategy. However, it is acknowledged that the key purpose of the WCS is to provide a planning evidence base to the authorities’ Local Plan and associated Local Development Documents (LDD), and is therefore primarily a planning based document.
- 2.4.2 This Outline WCS has been reported via two key documents:
- **The Main Planning Report** (this report) – this report presents the Outline Mersey Heartlands WCS as a planning summary of the study process, assessments and findings, with full conclusions of the Outline strategy and policy recommendations. It is intended to be a planning based document used as the main reference point for the WCS; and
 - **The Technical Appendices** – the Mersey Heartlands WCS makes reference to the Technical Appendices associated with the Wirral and the Liverpool Outline WCS reports.

⁵ URS, The Wirral, Liverpool and Mersey Heartlands Growth Point, Water Cycle Study Scoping Report, June 2013

2.5 Study Contributors

Steering Group

2.5.1 The Outline Study has been carried out with the guidance of the Steering Group, comprising the following organisations:

- Wirral Council (WC);
- Liverpool City Council (LCC);
- United Utilities Water Plc (UU);
- Dŵr Cymru Welsh Water (DCWW); and
- Environment Agency (EA).

Consultation Strategy

2.5.2 The WCS aims to influence, and be influenced by, a wide range of stakeholders in addition to those included on the Steering Group, ranging from groups who have an influence on decisions relating to solutions, to groups directly affected by policy recommendations, such as water efficiency measures on developers and the wider public.

2.5.3 Various stakeholders, including the Steering group, were therefore considered as part of a consultation strategy. The stakeholders were grouped into three different tiers as described below:

- **Tier A** - Budget and scope setters, key decision makers: LCC and WC (by virtue of the joint commission);
- **Tier B** - Essential data providers, project contributors: Wider Steering Group (encompassing, EA, UU and DCWW); and
- **Tier C** - Secondary providers of data and project contributors: Neighbouring authorities, Mersey Environmental Advisory Services, Natural England and Countryside Council for Wales (now Natural Resources Wales).

2.6 Outline Study – Aims and Objectives

2.6.1 The overall aim of the project is to complete a holistic WCS for the Mersey Heartlands Growth Point area with a view to determining whether the growth planned in the study area can be accommodated by the existing water supply sources and infrastructure and wastewater infrastructure without having a detrimental effect on the environment and how such constraints can be removed where they exist. Constraints due to flood risk in the study area are also considered in the WCS. As such, the WCS tests the impact of the proposed development on the water cycle, defines the existing baseline capacity for growth without the need for new infrastructure and determines where new infrastructure or further investigation is required to overcome constraints that may limit the required growth levels in the study area.

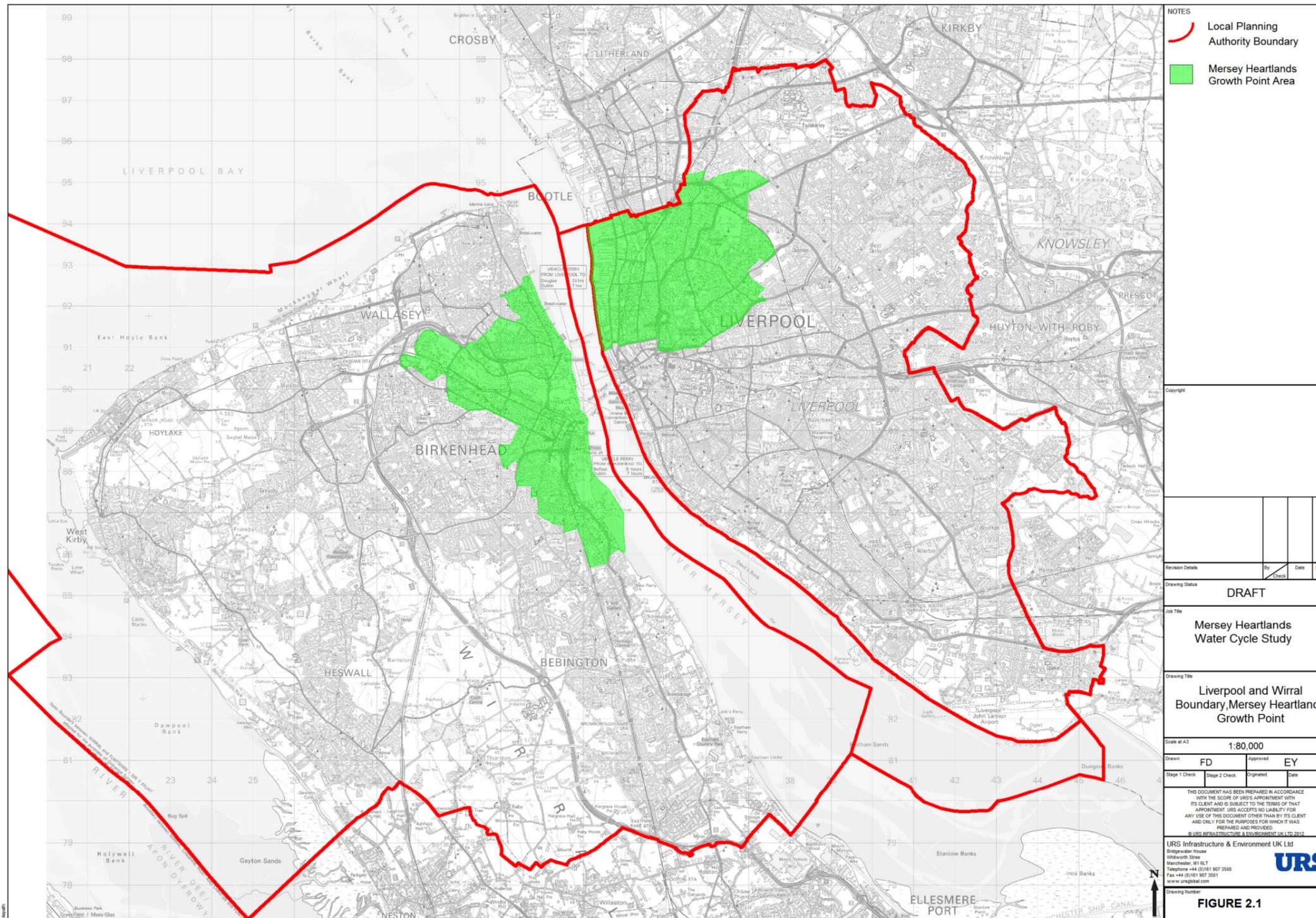
Outline Study Scope

- 2.6.2 The key aim of the Outline study is to define the baseline capacity of both the water environment and the water services infrastructure in relation to each growth area. This will then be followed by identification of the key environmental and infrastructure constraints and provide an indication of approximately how many new dwellings can be accommodated in the Mersey Heartlands before new infrastructure or mitigation is required. Where there is insufficient capacity, the Outline Study then provides an outline strategy for providing solutions or mitigation to allow development to proceed in a sustainable way.
- 2.6.3 The Outline study will specifically undertake the following:
- address the issues identified in the Scoping Study;
 - identify environmental risks, including flood risk, and constraints relevant to the water cycle;
 - determine whether environmental resources can sustain further development (with particular reference to Water Framework Directive targets and UKCP09 climate change projections);
 - identify any potential impacts of development on the hydrologically linked, specially designated conservation sites and watercourses in the Mersey Heartlands study area and other sites or features of significant nature conservation importance, within and outside the study area, resulting from additional abstraction and wastewater discharge;
 - determine if, where and when development might overload existing infrastructure, and if capacity exists for development without the need for additional infrastructure;
 - determine if major new water infrastructure or management interventions are needed to support development;
 - formulate water related policy recommendations for LCC and WC;
 - identify any outstanding concerns about infrastructure provision that need to be addressed in a detailed WCS, if required; and
 - determine the need for a detailed WCS for LCC and WC and, if it is required, what the study should include.
- 2.6.4 At the time of completing the Outline WCS, specific growth locations in the Mersey Heartlands were being developed and were not available at the level of detail required to assess specific local capacity and constraint issues in relation to the water environment and water services infrastructure. Hence, the Outline study has been undertaken at a strategic growth location level, based on the number of new dwellings expected per existing urban area. For some technical water cycle elements, this has necessitated a higher level assessment as explained in subsequent sections of this report.
- 2.6.5 Where more than one solution is possible, or further information is required to determine the solution, a detailed WCS or further studies are recommended. The detailed WCS will require a firmer understanding of specific distribution of growth to avoid having a number of permutations of how development areas can be brought forward, which could change the requirement on site specific infrastructure such as sewerage connections and water supply pipes.

2.7 Study Area

- 2.7.1 The Mersey Heartlands Growth Point and the administrative area of LCC and WC are shown in Figure 2-1. Whilst the geographic scope of the Outline Study is limited to growth within the Mersey Heartlands, the wider area should be considered where it has the capacity to impact on growth within the study area i.e. through shared water resources or development outside of the Mersey Heartlands draining to a WwTW within the study area that could utilise spare capacity.
- 2.7.2 Projected growth scenarios for the neighbouring Local Authority, Sefton Council, have been considered as it became clear during the course of the study that growth in the Sefton Council area could have a direct impact on WwTW serving the Mersey Heartlands in Liverpool as well as cumulative impacts on shared water resources.

Figure 2-1: Liverpool City Council and Wirral Council Administrative Area and the Mersey Heartlands Growth Point



3 Policy and Supporting Information

3.1.1 National, regional, sub-regional and local planning policy and associated documents provide guidance for delivering sustainable development. The following is a summary of the legislative, policy and guidance drivers which have informed and shaped the development of this WCS and its deliverables, and have been considered at all stages in the WCS process.

3.2 Legislation and Policy

International and National

Table 3-1: Water Related European and National Legislation, Policy and Guidance

Directive/Legislation/Guidance	Description
Code for Sustainable Homes	<p>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 their choice of home.</p> <p>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. The Code sets out a minimum water demand per person as a requirement for different code levels. CLG is currently in consultation on proposals to make certain code levels mandatory for all new homes. At present, only affordable homes must reach a certain code.</p>
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. The revised EU Directive 2006/7/EC will come into force in 2015.
Environment Act 1995	Sets out the role and responsibility of the EA.
Environmental Protection Act 1990	Integrated Pollution Control (IPC) system for emissions to air, land and water.
Future Water, February 2008	Sets the Government’s vision for water in England 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.

Table 3-1: Water Related European and National Legislation, Policy and Guidance

Directive/Legislation/Guidance	Description
Groundwater Directive 80/68/EEC	To protect groundwater against pollution by 'List 1 and 2' Dangerous Substances. Under Article 22 of the Water Framework Directive the 1980 Directive is due to be repealed in December 2013
Habitats Directive 92/44/EEC	To conserve the natural habitats and to conserve wild fauna and flora with the main aim to promote the maintenance of biodiversity taking account of social, economic, cultural and regional requirements. In relation to abstractions and discharges, can require changes to these through the Review of Consents (RoC) process if they are impacting on designated European Sites.
Making Space for Water, 2004	Outlines the Government's 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	<p>Planning policy in the UK is set by the National Planning Policy Framework (NPPF). This explains statutory guidelines and advises local authorities and others on planning policy and operation of the planning system.</p> <p>A WCS helps to balance the requirements of various planning policy documents, and ensure that land-use planning and water cycle infrastructure provision is sustainable.</p>
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.
Water Industry Act 1991	Sets of the duties and powers of Water and Sewerage Companies
Water Act 2003	Implements changes to the water abstraction management system and to regulatory arrangements to make water use more sustainable.
Water Framework Directive (WFD) 2000/60/EC	<p>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, or by 2027 if there are grounds for derogation. The WFD, for the first time, combines 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 has been adopted. It effectively supersedes the majority of water related legislation which drives the existing licensing and consenting framework in the UK.</p> <p>The EA is the body responsible for the implementation of</p>

Table 3-1: Water Related European and National Legislation, Policy and Guidance

Directive/Legislation/Guidance	Description
	<p>the WFD in the UK. The EA have been supported by UKTAG⁶, an advisory body which has proposed water quality, ecology, water abstraction and river flow standards to be adopted in order to ensure that water bodies in the UK (including groundwater) meet the required status⁷. These have been finalised and issued within the first round of River Basin Management Plans (RBMP) in 2009.</p>
<p>Natural Environment & Rural Communities Act 2006</p>	<p>Covering Duties of public bodies – recognises that biodiversity is core to sustainable communities and that Public bodies have a statutory duty that states that “every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity</p>
<p>EC Shellfish Waters Directive 2006/113/EEC</p>	<p>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. Sets physical, chemical and microbiological water quality requirements that designated shellfish waters must either comply with (‘mandatory’ standards) or endeavour to meet (‘guideline’ standards). Under Article 22 of the Water Framework Directive the 1980 Directive is due to be repealed in October 2013.</p>
<p>Water Resources Act 1991</p>	<p>Protection of the quantity and quality of water resources and aquatic habitats. Parts have been amended by the Water Act 2003.</p>
<p>Land Drainage Act 1991</p>	<p>Sets out the statutory roles and responsibilities of key organisations such as Internal Drainage Boards, local authorities, the EA and Riparian owners with jurisdiction over watercourses and land drainage infrastructure.</p>
<p>Flood & Water Management Act 2010</p>	<p>The Flood and Water Management Act 2010 is the outcome of a thorough review of the responsibilities of regulators, local authorities, water companies and other stakeholders in the management of flood risk and the water industry in the UK. The Pitt Review of the 2007 flood was a major driver in the forming of the legislation. Its key features relevant to this WCS are:</p> <ul style="list-style-type: none"> • To give the EA an overview of all flood and coastal erosion risk management and unitary and county councils the lead in managing the risk of all local floods. • To encourage the uptake of sustainable drainage systems by removing the automatic right to connect surface water discharges to sewers and providing for unitary and county councils to adopt SUDS for new developments and redevelopments.

⁶ 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.

⁷ UK Environmental Standards and Conditions (Phase I) Final Report, April 2008, UK Technical Advisory Group on the Water Framework Directive.

Table 3-1: Water Related European and National Legislation, Policy and Guidance

Directive/Legislation/Guidance	Description
	<ul style="list-style-type: none"> • To widen the list of uses of water that water companies can control during periods of water shortage, and enable Government to add to and remove uses from the list. • To enable water and sewerage companies to operate concessionary schemes for community groups on surface water drainage charges. • To make it easier for water and sewerage companies to develop and implement social tariffs where companies consider there is a good cause to do so, and in light of guidance that will be issued by the SoS following a full public consultation.

Habitats Directive & the Review of Consents

- 3.2.1 Specific mention is made in this section with respect to the Habitats Directive as it has a potentially significant influence on both the wastewater and waste supply strategies, owing to an ongoing review process that has been undertaken by the Environment Agency Natural England and Natural Resources Wales over several years.
- 3.2.2 The review process is referred to as the Review of Consents (RoC). The process requires the Environment Agency to review all of the existing consents and licences it has issued for both discharges and abstractions to and from rivers and/or groundwater. The purpose of the review is to determine whether, if used to their maximum permitted level, the current licences and consents are likely to impact on the integrity of ecologically designated sites which became protected under the Habitats Directive. The licences and consents being reviewed were issued prior to sites becoming designated, so the review is a retrospective process necessitated by the legislative requirements brought in by the Habitats Directive and is transposed into UK law as the Habitats Regulations.
- 3.2.3 The potential effects of the consents and licences are considered in isolation and in combination with others. In relation to consents to discharge, the pollutant load of these discharges is considered as well as the impact of the volume of discharge on habitat integrity; whilst for abstraction licences, the direct impact of reduced water availability in a groundwater or river system is determined for impact on any protected habitat reliant on the river or groundwater conditions.
- 3.2.4 If the conclusion points to the need to revoke or modify any permission, the Environment Agency must work with the licence or consent holder to ensure that they are compensated by considering alternatives for replacing the lost permission.

3.3 Local Development Framework

- 3.3.1 As the Mersey Heartlands covers Liverpool and Wirral, both of their local Development Framework have to be considered.

Liverpool Local Plan

- 3.3.2 Liverpool's Local Plan consists of the Core Strategy and Sites and Policies development plan documents. However until the Core Strategy is adopted, the Unitary Development Plan⁸ is the statutory development plan document (DPD).

- 3.3.3 The UDP is a 'saved plan', and will gradually be replaced by new DPDs and Supplementary Planning Documents (SPDs).

- 3.3.4 The Liverpool UDP includes the following water-related strategic policies:

- **GEN 8 Environmental Protection:** This policy aims to protect and enhance the environment by controlling uses which can contribute to the incidence of water pollution, and also aims to protect land drainage and preventing flooding.
- **EP11 Pollution:** States that planning permission will not be granted for development which has the potential to create unacceptable water pollution.
- **EP12 Protection of Water Resources:** States that planning permission will not be granted for development which would adversely affect the quality or supply of surface water or groundwater due to: surface or waste water discharge; disposal of foul sewage, trade effluent or surface water; disturbance of contaminated land; the spillage or leakage of stored oil or chemicals. LCC will not grant planning permission for developments involving local abstraction of surface or ground water which would increase requirements for water (unless an adequate water supply already exists or would be provided in time to serve the development) or pose an unacceptable risk to the current supply of water users.
- **EP13 Flood Prevention:** LCC will not grant planning permission for development (unless appropriate alleviation or mitigation measures are carried out) which would: be at direct unacceptable risk from flooding; be likely to increase the risk of flooding elsewhere; cause loss of access to watercourses for future maintenance; result in an adverse impact on the water environment due to additional surface water run off; or have adverse effects upon the integrity of tidal and fluvial defences. All works in, under, over or adjacent to water courses, waterbodies and the coast will need to be approved by the EA's Environmental Appraisal Procedure. Culverting and diversion will not be permitted except to enable reasonable access over a watercourse.

⁸ Liverpool City Council, The City of Liverpool Unitary Development Plan, November 2002

3.3.5 The Core Strategy Submission Draft objectives relating to water include:

- **Strategic Objective 5 High Quality Green Infrastructure:** Aims to protect and enhance Liverpool's green infrastructure to ensure more attractive and cleaner residential neighbourhoods; sustain and promote biodiversity; mitigate against climate change; and provide greater opportunities for sport and recreation to encourage better health and well-being.
- **Strategic Objective 6 – Use Resource Efficiently:** Partly aims to ensure the sustainable growth, by minimising adverse impacts on water quality; minimising the risk of flooding and managing future water usage.

3.3.6 Specific policies contained in the Submission Draft include:

- **Strategic Policy 1 – Sustainable Development Principles,** New development should
 - Avoid areas at risk from flooding, do not exacerbate flood risk, include mitigation measures, provide Sustainable Urban Drainage Systems;
 - Ensure efficient use of resources;
 - Protect and enhance environmental assets; and
 - Be supported by, and contribute to the provision, of the necessary infrastructure
- **Strategic Policy 23 – Key Place-Making and Design Principles,** include
 - Measures to ensure that proposed buildings and spaces can adapt to changing environmental, social, and economic circumstances, particularly climate change, flood risk, and energy management.
- **Strategic Policy 26 – Protecting and Enhancing Green Infrastructure:** states that Liverpool's green infrastructure resource will be protected and enhanced:
 - Protection of strategically important open spaces; sites that provide a high number of green infrastructure functions/benefits; the network of City, District, Neighbourhood, and Local Parks; Biodiversity assets; Regionally Important Geological/Geomorphological Sites; locally important open spaces and water courses; and open spaces of historic value;
 - Development which may cause material harm will not be supported unless the benefits outweigh the loss and replacement provision may be required;
 - Require development proposals to make an appropriate contribution to the enhancement of the City's green infrastructure; and
 - Further detailed criteria-based policy to protect and enhance green infrastructure will be set out in a future development plan document.
- **Strategic Policy 31 - Sustainable Growth:** aims to ensure the sustainable growth of the City by will be achieved by:
 - Ensuring development contributes to achieving the objectives of the City Council's Climate Change Strategic Framework;
 - Efficient use of land through redevelopment of previously developed land, including the remediation of contaminated sites;

- Providing high levels of energy and water efficiency and a sustainable approach to construction and the use of materials including meeting increasingly higher levels of the 'Code for Sustainable Homes' and other standards such as BREEAM 'very good' or 'excellent' ratings; and
 - Take into account culverted water courses within development proposals and providing and/or supporting continuing management as necessary for sustainable drainage methods.

- **Strategic Policy 33 - Environmental Impacts:** states that new development should seek to avoid negative impacts on the environment. Where a negative effect is identified this should be mitigated by appropriate measures. Specifically, development proposals should:
 - Improve and protect water/groundwater quality, including the River Mersey, Leeds & Liverpool Canal, and other inland rivers and watercourses;
 - Protect the ecological importance of river corridors
 - Ensure that necessary water treatment infrastructure is in place prior to development commencing;
 - Demonstrate that it will not exacerbate potential sources of flood risk; and
 - Avoid and/or mitigate negative impacts on European habitat sites within and beyond the Liverpool boundary.
 - Sensitive areas where development may have an impact and which would therefore require avoidance or mitigation measures include areas at risk from coastal and river flooding including small areas along the River Mersey and on the north east and south east fringes of the City; areas at risk from groundwater flooding; Natura 2000, Ramsar, and other European designated sites both within and beyond the Liverpool City Council boundary.

Wirral Local Plan

- 3.3.7 The consultation on the Wirral Core Strategy Preferred Options was completed in January 2011 and the Core Strategy was published in late 2012. Anticipated adoption of the Core Strategy is early 2014.
- 3.3.8 Some of the policies and proposals in the adopted Unitary Development Plan (February 2000) were saved to remain in force through the Secretary of State. The adopted Unitary Development Plan will be progressively replaced by a series of Development Plan Documents prepared as part of the Local Plan for Wirral.
- 3.3.9 The Wirral Unitary Development Plan includes the following water-related strategic policies:
- **Strategic Policy WAT1 Fluvial and Tidal Flooding:** states that planning permission will only be granted for new development which would not be at risk from fluvial or tidal flooding, or which would not increase these risks to other developments.

 - **Strategic Policy WAT2 Protection of the Water Environment:** where appropriate and particularly in vulnerable areas, the local planning authority will impose land-use planning controls and obligations directed at the prevention of the pollution of watercourses and groundwater.

- **Policy WA1 Development and Flood Risk:** development will not be permitted in 'washland' areas unless the developer is willing to provide compensatory storage and/or flood protection to an appropriate standard as part of the development. Where land is in an area protected from tidal flooding by embankments or within a floodplain but at a lower risk of fluvial flooding and the land is protected by flood embankments, which are properly maintained and provide an acceptable standard of safety, development may be permitted, subject to consultation with the Environment Agency and where necessary the imposition of appropriate conditions, for example, with respect to minimum floor level. Development which would itself increase the risk of flooding to other properties or which would reduce the effectiveness or impede the maintenance of flood control structures or works will not be permitted. Development which would adversely affect the integrity and continuity of tidal and fluvial defences or which would compromise the access requirements for maintenance or emergency purposes will not be permitted.
- **Policy WA2 Development and Land Drainage:** Where proposed development could lead to a significant increase in surface water run-off from the area, or are situated in an area where the Environment Agency has indicated that there may be drainage problems, consultation with the Environment Agency or the local Land Drainage Authority will be required and conditions may be imposed requiring storage within the surface water system.
- **Policy WA3 Development and Groundwater Protection:** In considering proposals for development, the Local Planning Authority will have regard to the need to protect sources of groundwater. The Local Planning Authority may impose conditions and obligations directed at preventing derogation in terms of both quality and quantity.
- **Policy WA4 Safeguarding Water Resources:** In considering proposals for development, the Local Planning Authority will look to safeguard water resources and water supply to water users, unless it can be demonstrated that there are adequate water resources which already exist or will be provided in time to serve the development.
- **Policy WA5 Protecting Surface Waters:** The Local Planning Authority will only permit development which includes satisfactory arrangements for the disposal of foul sewage, trade effluent or contaminated surface water, does not exacerbate existing problems such as premature or increased frequency of discharges through storm sewer overflows due to inadequate infrastructure or lack of sewer capacity and will not lead to spillage or leakage of stored oils or chemicals or other potentially polluting substances.
- **Policy WA6 Development within River Corridors:** In considering proposals for development within river corridors, the Local Planning Authority will have regard to the need to conserve or enhance the natural character of those watercourses or encourage appropriate water-based or waterside recreation. In addition, adequate provision should be made to secure permanent areas for river maintenance purposes.

- **Strategic Policy POL1 Restrictions for Polluting and Hazardous Uses:** The local planning authority will restrict potentially polluting or hazardous development to locations that will not compromise public safety; result in loss of amenity; or cause harm to the nature conservation interest, recreational value, tourist potential or landscape quality of the countryside, coast or estuaries.
- **Policy PO1 Potentially Polluting Development:** Potentially polluting development or land-use will only be permitted when the Local Planning Authority is satisfied that the proposed development would not cause harm or nuisance to neighbouring uses, the natural environment or general amenity, as a result of discharges to air, land or water, or from noise, smells, dust, soot, ash, grit or vibration; any measures required to comply with pollution control legislation will not lead to an unacceptable loss of amenity by virtue of noise or visual intrusion; and the real or perceived risk of a pollution incident occurring and the extent of its potential consequences, would not have unacceptable land-use implications beyond the boundary of the site, including prejudicing the realisation of land-use and other environmental planning objectives set out elsewhere in the Plan.

3.3.10 The Core Strategy Preferred Options policies relating to water include the following:

- **Preferred Option 3 - Spatial Vision:** There will be a greater emphasis, across all sectors, on securing sustainable approaches to design and construction; energy; water; flood risk, waste management; carbon impact; local employment and production; and mitigation, adaptation and resilience to climate change.
- **Preferred Spatial Objective 5 - Environmental Quality:** To ensure that development and investment will enhance and improve the locally distinctive characteristics and assets listed in the Settlement Area Policies.
- **Preferred Spatial Objective 6 - Flood Risk:** To direct new development away from areas that may be liable to flooding.
- **Preferred Option 16 - Development Management:** The Core Strategy will set out a list of the main issues that will need to be addressed when considering the appropriateness of any new development proposal or land allocation. The list of main issues will include impact on mitigation, adaptation and resilience to climate change (including impact on flood risk, coast protection, river maintenance, sustainable drainage, water and energy conservation and emissions), impact on the capacity of local infrastructure and services (including foul and surface water drainage), impact on wider environmental requirements (including environmental improvements; the quality of air, land and water; protection of water resources; sustainable construction and waste management; and natural processes).

- **Preferred Option 18 - Green Infrastructure:** All development proposals and land allocations will be assessed against their contribution to the delivery of any other related initiatives and strategies including river corridor and catchment area management plans; surface water management plans; flood alleviation; sustainable urban drainage; heritage characterisations; conservation area appraisals and management plans; and other local improvement plans

Mersey Heartlands Growth Point

3.3.11 In July 2008, the Government identified the Mersey Heartlands as one of the 21 second-round new growth points (NGP)⁹. Under the NGP, accelerated housing supply was to be pursued alongside housing market renewal in the wider context to provide quality and choice at all levels of the market. The ambition for the Mersey Heartlands NGP was to achieve a level of housing growth that was 20 percent greater than the dwelling targets set by the RSS during the period 2008-2017.

3.3.12 The Chief Executives of LCC and WC at the time stated that:

“Our vision is to turn the Mersey Heartlands area into a vibrant, innovative sustainable, leading regional location; providing a stimulus for the longer term growth and re-population of the inner core of the Liverpool City Region. Our plans include placing the Liverpool and Wirral waterfront areas alongside the leading international waterfront cities. We will focus on the transformation of deprived areas by providing opportunity to reverse fortunes, integrate new communities and reinvigorate new communities. We will achieve our ambitions by continuing to work in close partnership with our local, regional and national partners including our growing and established relationships with the private sector.”

3.3.13 The Growth Point is located in the Inner Core and focussed to the North of the City Centre in Liverpool and encompasses the Housing Market Renewal Initiative (HMRI) Pathfinder areas in both Liverpool and Wirral¹⁰. It was considered to offer unique opportunities as major private sector investment was already being delivered and a significant amount was being proposed by a number of investors and developers. The designation of the Mersey Heartlands NGP represented a significant opportunity to deliver transformational economic development in inner Merseyside; provide thousands of new jobs; deliver new housing to support economic growth; and bring derelict and under-used brownfield sites back into use, all within the context of securing sustainable housing and community regeneration for this part of the region.

⁹ Communities and Local Government (2008) Second Round Growth Points, Partnerships for Growth

¹⁰ Liverpool City Council, Wirral Metropolitan Borough Council and Peel Holdings Ltd, Mersey Heartlands New Growth Point Partnership, Programme of Development 2008 - 2017

3.4 Water Company Planning

Financial and Asset Planning

- 3.4.1 Water companies currently plan for asset management and the financial procurement required for their areas through the Asset Management Plan (AMP) process, which runs in 5 year cycles. The Water Services Regulation Authority (known as The Office of Water Services or OFWAT) is the economic regulator of the water and sewerage industry in England and Wales and regulates this overall process.
- 3.4.2 In order to undertake maintenance of its existing assets and to enable the building of new assets (asset investment), water companies seek funding by charging customers according to the level of investment they need to make. The process of determining how much asset investment is required is undertaken in conjunction with:
- **The Environment Agency** - as the regulator determining investment required to improve the environment, this is a two way process between the Environment Agency and Water Companies and is conducted through the National Environment Programme;
 - **The Drinking Water Inspectorate (DWI)** - who determine through a two way process with the Water Companies where investment is required to assets to improve quality of drinking water; and
 - **OFWAT** - who along with the Environment Agency require Water Companies to plan sufficiently to ensure security of supply (of potable water) to customers during dry and normal years.
- 3.4.3 The outcome is a Business Plan which is produced by each water company setting out the required asset investment over the next 5 year period, the justification for it and the price increase required to fund it.
- 3.4.4 OFWAT determines how much a water company can charge its customers and considers views of the Water Company, regulators (Environment Agency and DWI) and consumer groups (Consumer Council for Water). This process is known as the Price Review and is undertaken on a 5 year cycle. This review allows OFWAT to determine the price limits for the proceeding 5 years that allow the Water Company to raise funds required for necessary investment into asset management (the AMP period).
- 3.4.5 At the time of undertaking the Mersey Heartlands Outline WCS, OFWAT had determined the price limits for the AMP5 period (1 April 2010 to 31 March 2015), which dictates the investment that UU will be able to undertake over the next five years. A review of UU's final Business Plan has identified that there is over £3.7 billion to be spent during the period up to March 2015 across the area¹¹ serviced by UU.
- 3.4.6 Where significant water cycle infrastructure investments are not included within the AMP5 business plan, funding cannot be sought until the next Price Review in 2014 (PR14) for

¹¹ United Utilities, United Utilities Business Plan 2010–2015, Planning for the future, <http://corporate.unitedutilities.com/PR09-final-business-plan.aspx>

inclusion in AMP6 (2015 - 2020) or subsequent AMP periods. Only in exceptional circumstances will Water Companies seek to deviate from their Business Plan and submit an interim determination within the current AMP cycle to provide funding for unforeseen investment requirements.

Water Resource Planning

- 3.4.7 Water companies produce Water Resource Management Plans (WRMP) on a statutory basis covering 25 year planning horizons. WRMPs set out how a water company plans to provide and invest in existing and new water resource schemes (e.g. reservoirs) to meet increases in demand for potable supply, as a result of new development, population growth and climate change over the next 25 year period. The statutory WRMPs are updated in five yearly cycles to coincide with the periodic review (PR) and AMP process. UU's current WRMP was finalised in September 2009 and has been used in this WCS.
- 3.4.8 The Environment Agency has developed Catchment Abstraction Management Strategies (CAMS) for the Lower Mersey, Alt catchment and the River Dee catchment. These CAMS set out strategies to manage water abstraction within each catchment until 2014. This outline WCS has been informed by the CAMS in terms of water supply and abstraction management.

3.5 Guidance

- 3.5.1 The Environment Agency has issued a National Guidance (The Water Cycle Study Guidance¹²) document to ensure that water cycle studies are carried out in a consistent way. The approach set out in the guidance forms current best practice and the basis for the methodology followed in this WCS.
- 3.5.2 A Surface Water Management Plan (SWMP) is currently under development by LCC and not been undertaken by WC. With respect to the management of surface water, the WCS has utilised guidance on the development of SWMPs and management of surface water as issued by DEFRA¹³.

¹² <http://publications.environment-agency.gov.uk/pdf/GEHO0109BPFF-e-e.pdf>

¹³ DEFRA (2010), Surface Water Management Plan technical Guidance - <http://www.defra.gov.uk/environment/flooding/documents/manage/surfacewater/swmp-guidance.pdf>

3.6 Mersey Heartlands Flood & Water Management Studies

3.6.1 In line with policy and legislation requirements, there are several flood and water management studies, either completed or ongoing in the study area, that are interlinked with the WCS. Figure 3-1 shows the linkages between these study reports and the WCS.

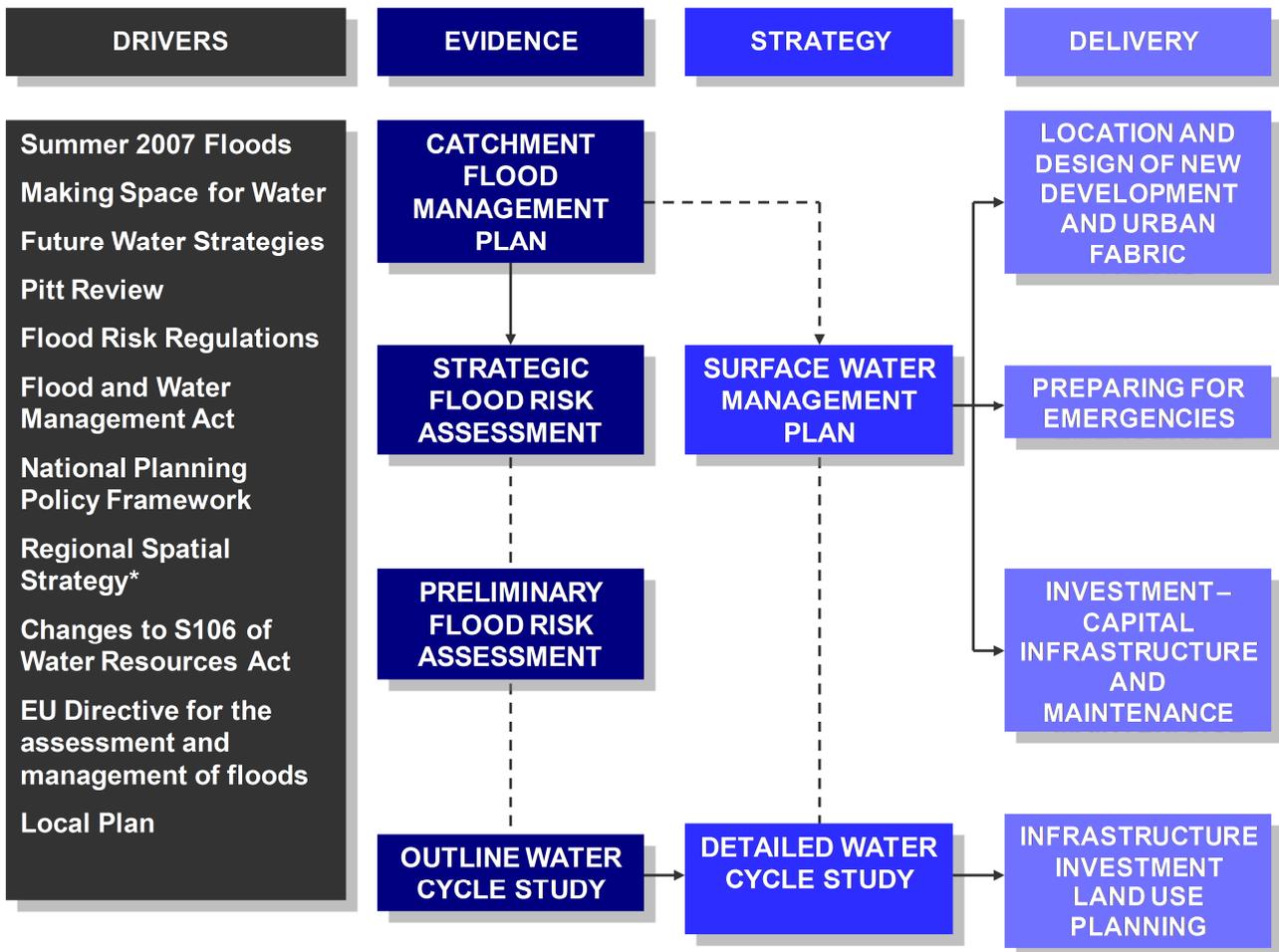


Figure 3-1: Linkages between water and flooding management studies¹⁴

Studies Progress

3.6.2 A Level 1 Strategic Flood Risk Assessment (SFRA) was completed on behalf of LCC in 2008 and in 2009 for WC, with level 2 elements completed for WC in 2009. The SFRA aims to inform the sustainability appraisals, land allocations and development control policies of the LPA. It provides an evidence base that informs the Local Plan and LDF in relation to the overall spatial strategy for the area as well as the allocation of individual sites with respect to all forms of flooding, including flooding from rivers and the sea, flooding from groundwater, surface water and sewerage and other artificial forms of flooding (e.g. reservoirs and

¹⁴ Adapted from Water Cycle Guidance, Environment Agency 2009

canals). The Outline WCS has been informed by the SFRA in terms of flood risk to development areas and management of surface water.

- 3.6.3 The Environment Agency's Catchment Flood Management Plans (CFMPs) give an overview of the flood risk by river catchment. They recommend ways of managing those risks now and over 50-100 year period. CFMPs consider all types of inland flooding, from rivers, ground water, surface water and tidal flooding. They also take into account the likely impacts of climate change and how development can meet present day needs without compromising the ability of future generations to meet their own needs. The Mersey Heartlands is covered by the Mersey Estuary CFMP completed in September 2008, and the Alt Crossens CFMP which was completed in December 2009.
- 3.6.4 Preliminary Flood Risk Assessments (PFRA) were prepared by LCC and WC in June 2011. The PFRAs were prepared in accordance with Environment Agency guidance to support the Lead Local Flood Authorities (LLFAs) in managing local flood risk under the Flood Risk Regulations 2009, which implement the European Floods Directive. LLFAs are required to prepare PFRAs as a high level documentation of local flood risk from surface runoff, groundwater and ordinary watercourses. LLFAs are required to collect information on past (historic) and future (potential) floods to identify Flood Risk Areas (areas where the risk of flooding is significant).

3.7 Supporting Documents

- 3.7.1 In addition to the legislation and guidance set out in Table 3.1 above, the following studies and reports are relevant and, where available, have been used within the Mersey Heartlands Outline WCS:

- North West Growth Area Water Cycle Strategy Scoping Study;
- Liverpool Level 1 SFRA¹⁵;
- Wirral Level 1 SFRA¹⁶;
- Mersey Estuary CFMP¹⁷;
- Alt Crossens CFMP¹⁸;
- North West England and North Wales Shoreline Management Plan SMP2;
- The Lower Mersey and Alt CAMS;
- The Dee CAMS;
- North West River Basin District, River Basin Management Plan (RBMP)¹⁹;
- The EA Groundwater Protection Policy²⁰;
- The EA Review of Consent Process;
- Wirral Habitats Regulations Assessment – Interim Screening Assessment²¹;

¹⁵ Liverpool City Council, Strategic Flood Risk Assessment, 2008

¹⁶ Wirral Council, Level 1 SFRA, Faber Maunsell, 2009

¹⁷ Environment Agency, Mersey Estuary Catchment Flood Management Plan, 2008

¹⁸ Environment Agency, Alt Crossens Catchment Flood Management Plan, 2009

¹⁹ Environment Agency, River Basin Management Plan, North West River Basin District <http://www.environment-agency.gov.uk/research/planning/124837.aspx>

²⁰ Environment Agency, Groundwater protection: policy and practice. <http://publications.environment-agency.gov.uk/pdf/GEHO1006BLMW-e-e.pdf>

²¹ Wirral Metropolitan Borough Council Local Development Framework For Wirral Core Strategy Development Plan Document, Habitats Regulations Assessment – Interim Screening Assessment, 2009

- Liverpool Core Strategy Development Plan Document Revised Preferred Options Report, Habitats Regulations Assessment –Screening Statement²²;
- UU Water Resources Management Plan²³;
- The SuDS Manual²⁴; and
- The National Planning Policy Framework (NPPF).

3.8 Data Summary

- 3.8.1 The undertaking of 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. This study has built on data collated as part of the Scoping Study and further detailed information that has been requested. A catalogue of the data collected, identifying the data provider in each case, is included in Appendix B of the Technical Appendices Report (Data Request) for both the Liverpool and Wirral Outline WCS reports.

²² Liverpool City Council, Liverpool Core Strategy Development Plan Document Revised Preferred Options Report, Habitats Regulations Assessment –Screening Statement, November 2009

²³ United Utilities, Final Water Resources Management Plan, September 2009, <http://www.unitedutilities.com/WaterResourcesPlan.aspx>

²⁴ CIRIA, The SuDS Manual, C697, 2007

4 Proposed Growth

4.1 Housing

4.1.1 In order to facilitate an assessment of the potential future demand and impact on water resources, growth projections for housing need to be considered. The government’s ambitions for the Mersey Heartlands growth points were to achieve a level of housing growth that was 20% greater than the dwelling targets set by the Regional Spatial Strategy (RSS) during the period from 2008-2017. There was an estimated 31,584 new houses to be built to meet these targets across Liverpool and Wirral between 2008 and 2017, with 3,510 additional housing located in the Liverpool Mersey Heartlands and 900 additional housing in the Wirral Mersey Heartlands over the 9 year period (Table 4-1). These figures provide projected growth numbers of housing; this will help determine the spatial distribution of development.

Table 4-1: Housing Projections for the Mersey Heartlands ²⁵

Area	RSS 2008 – annual provision	RSS 2008 – annual provision – plus 20%	Total Dwellings proposed 2008-16/17 (Delivery)	Of which additional located in the Mersey Heartlands
Liverpool	1,950	2,340	24,718	3,510
Wirral	500	600	6,866	900
Total	2,450	2,940	31,584	4,410

4.1.2 It should be noted that the RSS for the North West was formally revoked by the Government on 20th May 2013 and it is no longer forms part of the statutory development plan. In light of this, the Mersey Heartlands WCS has used the 20% uplift over and above the RSS as a basis to undertake the Outline WCS. LCC and WC have agreed with these growth figures as it is based on the best available knowledge at the time of undertaking the Outline WCS, however they are subject to change and should be reviewed in any future studies.

4.1.3 Information on specific development locations within the Mersey Heartlands was not available as LCC and WC have not yet reached site allocation stage.

4.1.4 The Mersey Heartlands WCS has built upon the findings of the impact of growth up to the year 2028 in the Liverpool and Wirral WCS’s. The WCS’s assessed the capacity available in the water environment that is required to accommodate the projected growth without having a detrimental impact. A range of growth scenarios were tested for Wirral and Liverpool to 2027-28.

²⁵ Liverpool City Council, Wirral Metropolitan Borough Council and Peel Holdings Ltd, Mersey Heartlands New Growth Point Partnership Programme of Development 2008 – 2017

- 4.1.5 However, the Mersey Heartlands assessment tests the impact of the anticipated additional growth of the Mersey Heartlands Growth Point for the years 2008-9 to 2016-17, over and above the projected growth in Liverpool and Wirral. The Outline WCS for Mersey Heartlands therefore assess the cumulative impact of growth and this should be considered in light of the conclusions of the assessment.

5 Overview of Study Approach and Methodology

5.1 Introduction

- 5.1.1 The WCS broadly follows the Environment Agency guidance and investigates three key areas: Water Resources and Water Supply, Wastewater Collection and Treatment and Flood Risk Management (Figure 5-1). The water resources and wastewater assessments investigate the impact of growth on both the existing infrastructure and the water environment.
- 5.1.2 The key output for the Outline Study is to provide a capacity and constraints assessment (of the water environment and water infrastructure) for each of the proposed housing development areas. This gives an approximate numerical value to the number of houses that can be provided in the proposed development scenario before infrastructure capacity is reached or the impact of growth on the environment is considered to be significant.

5.2 RAG Assessment

- 5.2.1 The results of the assessment are represented using a traffic light assessment matrix or Red, Amber and Green (RAG) assessment. Where there are no constraints or no infrastructure or environmental improvements are required the result is shown as **Green**. Where a constraint is identified and additional improvements are required the result is either **Amber** or **Red**. In general terms Amber means that a fairly straightforward solution is available whereas Red means that either a solution is not available, or where a solution may be available, the cost and timing implications may be significant and need to be investigated further.
- 5.2.2 The level of detail of the assessment of each WCS element depends on the amount of data available; however, the general approach and RAG assessment principle applies in each case. Further details of the assessment methodology can be found in the Technical Appendices of the Wirral and Liverpool WCS.
- 5.2.3 The traffic light assessment gives a visual representation of constraints, both spatially and over time to highlight where and when new infrastructure is required to facilitate development and mitigate impact on the water environment.

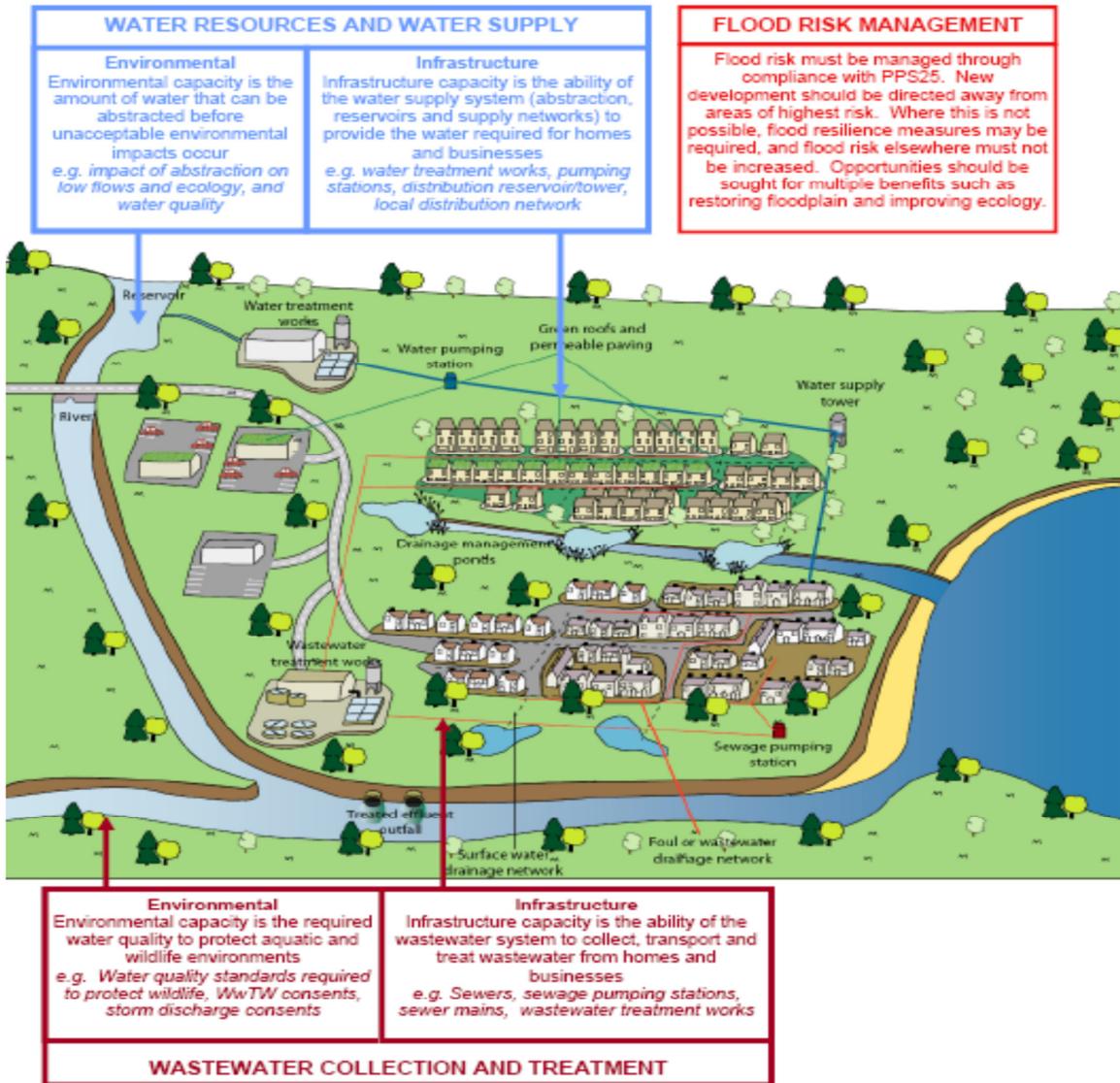


Figure 5-1: Water Cycle Study Components²⁶

²⁶ Source: Environment Agency, Water Cycle Study Guidance, January 2009

6 Wastewater Assessment

6.1 Introduction

6.1.1 The wastewater assessment addresses two key areas for wastewater infrastructure and water environment (including water quality and ecology). The infrastructure assessment comprises:

- the baseline with respect to treatment of wastewater and how much 'spare' capacity is available in existing wastewater treatment facilities; and
- the baseline with respect to wastewater or sewer network and whether there is scope to use the existing and/or planned network system before upgrades are required.

6.1.2 An important aspect of the wastewater assessment is the determination of the environmental capacity of the waterbodies receiving the treated effluent discharges. Discharge of additional treated wastewater from new development could potentially have a detrimental impact on: the water quality of receiving waters; the hydrological/hydraulic regime of receiving waters and associated habitats; and, potential increase in flood risk downstream of the discharge. The Outline WCS focuses on the water quality aspects of tidal waters, because all of the WwTWs serving the Mersey Heartlands discharge into tidal waters. Hydraulic capacity issues of the receiving waters are therefore not considered to be an issue for the Mersey Heartlands because of the dominance of tidal conditions in tidal waters.

6.1.3 This section presents a summary of the methodology for the outline wastewater assessment and the results of the assessment. Full details of how the assessments were undertaken (including the calculations and modelling), and the full results are provided in the Technical Appendices to the Wirral and Liverpool WCS.

6.2 Wastewater Treatment in the Study Area

6.2.1 In total there are three WwTWs that serve the Mersey Heartlands. There are two WwTWs within the Wirral Mersey Heartland: Birkenhead WwTW and Bromborough WwTW and one in the Liverpool Mersey Heartland: Sandon (North Liverpool Dock) WwTW. All of which are owned and operated by UU.

6.2.2 The majority of the Wirral Mersey Heartland is served by Birkenhead WwTW, with a small area in the south (approximately 1.4km²) served by Bromborough WwTW. No information was available on development locations within the Mersey Heartlands as WC has not yet reached site allocation stage.

6.2.3 A review of the location of the Strategic Housing Land Availability Assessment²⁷ (SHLAA) and Employment Land²⁸ sites within the Wirral Mersey Heartland was undertaken to get an appreciation of the potential distribution of growth across the WwTWs catchments. The

²⁷ Wirral Council, Strategic Housing Land Availability Assessment: Vol 1 – Main Report, Final Version, July 2010

²⁸ Wirral Council, Employment Land Study, August 2009

distribution of potential development sites suggest that most of the development would be within the catchment of Birkenhead WwTW, as 87% of the SHLAA sites and 97% of the SHLAA site unit capacity is located in its catchment area. None of the Employment sites in the Wirral Mersey Heartland were located within the catchment of Bromborough WwTW.

- 6.2.4 The Wirral Outline WCS found that the catchment areas of the WwTWs for Wirral effectively covered the entire area of the Wirral and included only minor areas covered by Cheshire West and Chester – notably a small, undeveloped wooded area called Booston Wood near Ellesmere Port. Therefore, the drainage catchments of Birkenhead and Bromborough WwTWs only accept wastewater generated within Wirral. Due to the small size and lack of developed areas, cross boundary issues were not deemed to be significant.
- 6.2.5 The catchment of Sandon Dock WwTW also encompasses some of the area under the authority of Sefton Council, including the Crosby area, and Hale in Halton Borough Council area.
- 6.2.6 URS understands that UU are currently investing to improve the facilities at Sandon Dock following the granting of planning permission in January 2012, involving extending the existing outfall pipe from Sandon Dock WwTW into the River Mersey as well as upgrading of existing works and extension onto the adjacent Wellington Dock. This project will extend the existing 2m diameter outfall pipe, enabling a discharge further out into the Mersey Estuary by approximately 280m. The purpose of the works is to increase the initial dilution and reduce the environmental impact of the discharged effluent, with works to be completed in February 2016..
- 6.2.7 Full details of all WwTW are shown in the Technical Appendices to the Liverpool and Wirral Outline WCS', including their various flow parameters, location and receiving waterbody. The location of each WwTW and corresponding receiving water body is shown in Figure 6-1 and the catchment areas are shown in Figure 6-2.

Figure 6-1: WwTW locations and main rivers/'protected' watercourses near the Mersey Heartlands

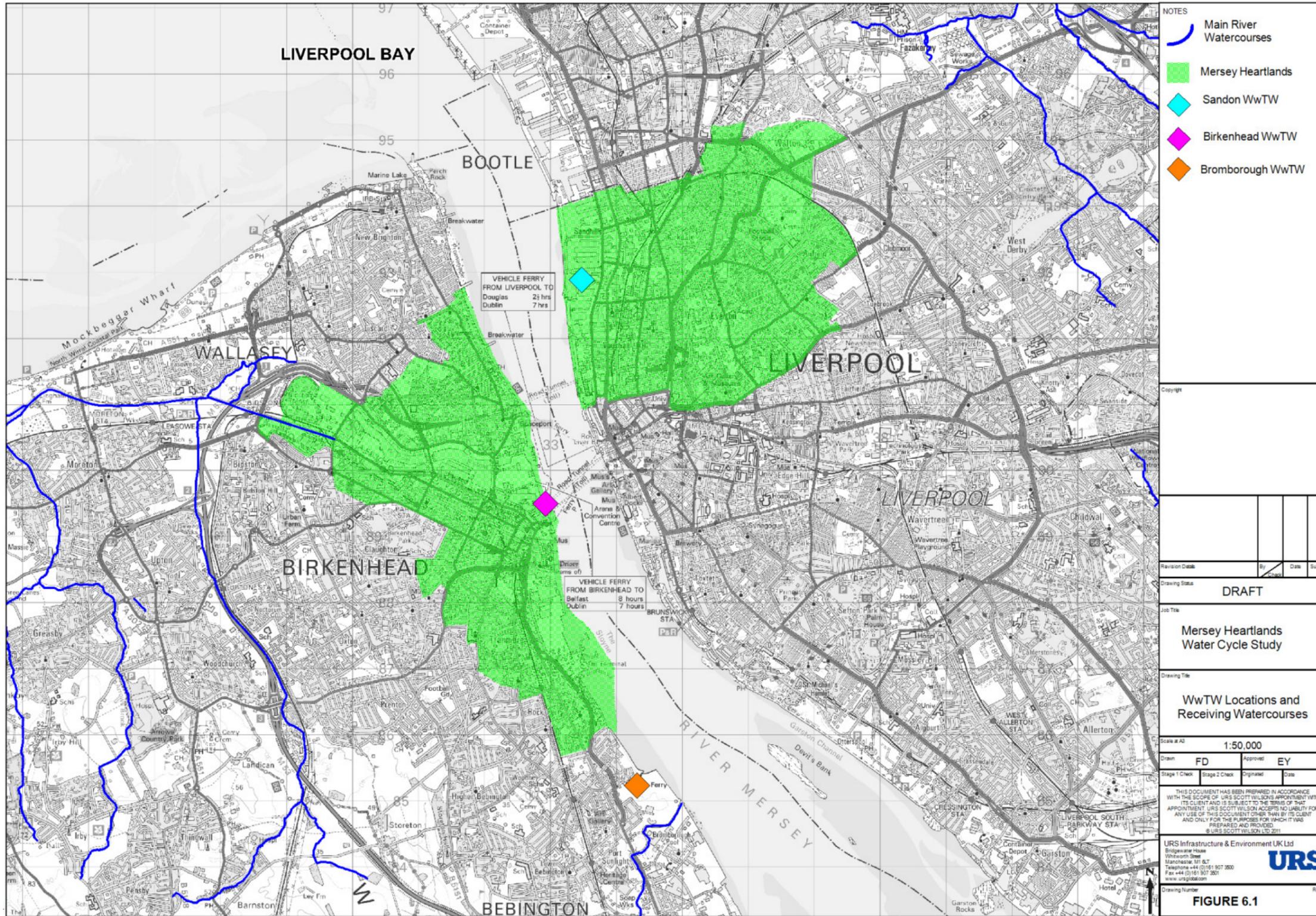
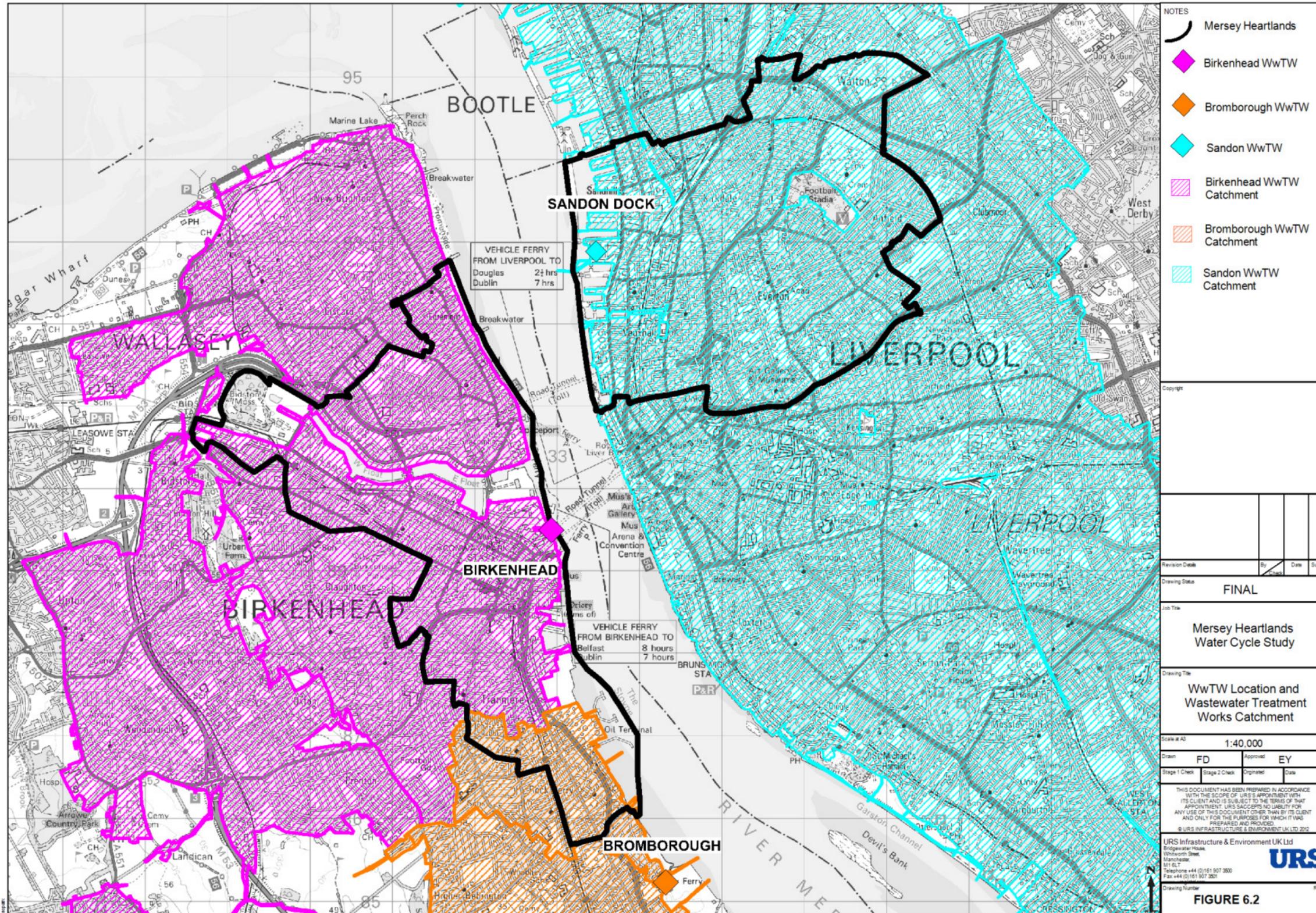


Figure 6-2: Mersey Heartlands and WwTW Catchment



6.3 Wastewater Treatment Capacity and Environmental Assessment

Assessment Methodology Overview

- 6.3.1 The assessment methodology used in this WCS is based on meeting the objective of the WFD of no deterioration in water quality status, which the Environment Agency has adopted. The Environment Agency's Dee and North West River Basin Management Plans set the base status for the classification of waterbodies. This approach provides the best available methodology to assess the impacts of growth on legislative water quality targets for receiving waterbodies (under the WFD and Habitats Directive) and it has therefore been used as the basis of the following assessment methodology.
- 6.3.2 It is important to note that the Environment Agency has undertaken a RoC for the Mersey Estuary, which, at the time of writing this report, did not identify changes to the consented DWF for any of the WwTW located in Wirral. The review did identify issues at Sandon Dock WwTW, in relation to the current discharge and concluded that initial dilution alone was not sufficient to prevent environmental quality standards (EQS) limits being breached around the outfall for copper, zinc and iron²⁹. The review reports exceedance of standards for total ammonia (annual average), Tributyl Tin EQS and sediment Threshold Effects Levels and Predicted Effects Level. Stage 4 of the RoC determined that no action was to be taken in relation to total ammonia and it was proposed that the permits were affirmed³⁰. However, to address the exceedance of EQS it was proposed that the outfall be extended to increase the initial mixing at the discharge point. No revision was proposed to the DWF value for the WwTW.
- 6.3.3 The assessment methodology to determine the existing capacity of WwTW, if growth can be accommodated within the existing discharge consent, and subsequent environmental assessment is described fully in the Technical Appendices for the Liverpool and Wirral Outline WCS'. However, in simplified terms, the steps undertaken were as follows (an example summary process diagram is provided in Table 6.1):
- **Step 1** - the proposed growth locations within the Mersey Heartlands were mapped and overlain with the wastewater catchments or drainage areas to determine which WwTW they discharge into.
 - **Step 2 - (WwTW capacity assessment)** – the capacity of each WwTW to accept further flow from growth was calculated using industry standard calculations for each growth scenario. This was undertaken for each growth scenario in the Mersey Heartlands.
 - **Step 3 - (1st stage of RAG assessment)** - if the additional flow can be accepted by the WwTW without requiring an increase in the flow it is consented to discharge, then growth is considered to have a solution for that catchment (Green RAG status).
 - **Step 4 - (Environmental assessment)** - if calculated flow would exceed the consented flow as a result of growth, a water quality modelling exercise was then undertaken to determine whether the increase in flow would result in deterioration in

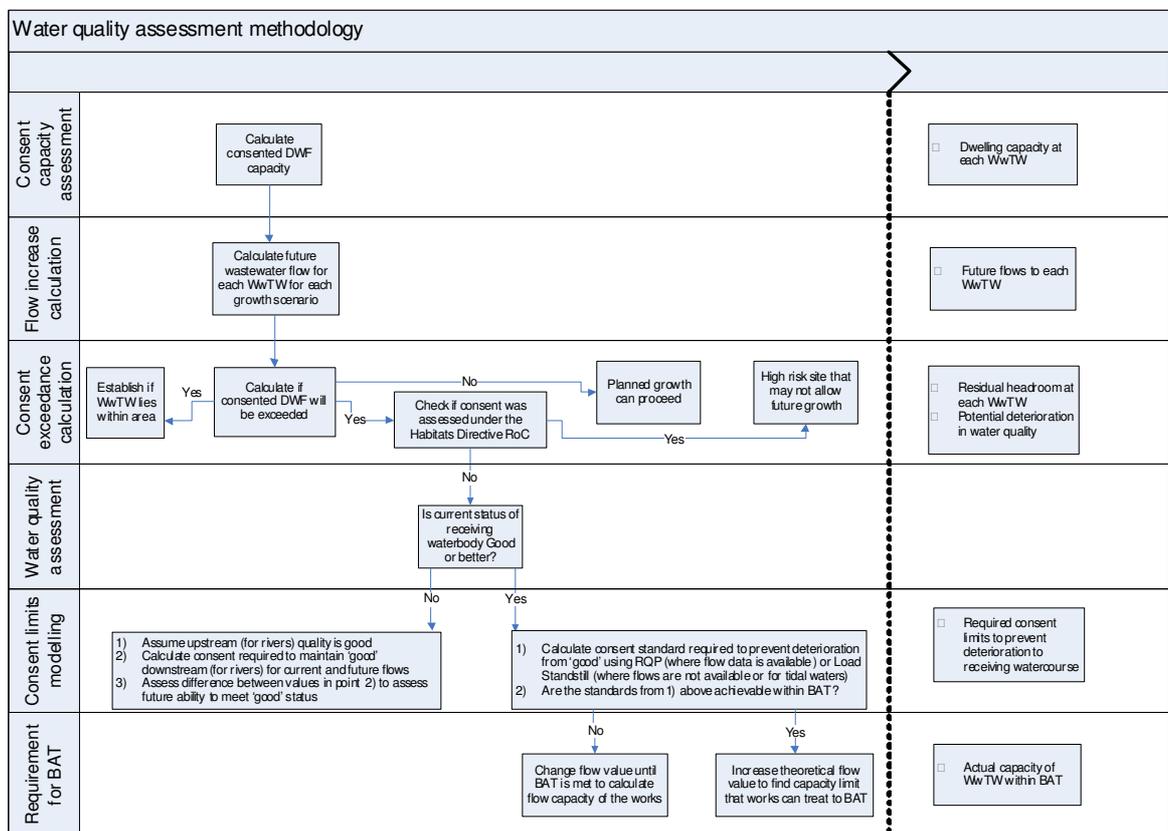
²⁹ Environment Agency, Natural England, Mersey Estuary SPA/Ramsar – Site Action Plan, 26th March 08

³⁰ Environment Agency, Natural England, Mersey Estuary SPA Stage 4 Water Quality Options Appraisal Technical Report

water quality of the receiving waterbody or impact on ecological sites linked to the receiving waterbody. This exercise included an assessment of what quality conditions would have to be applied to each WwTW in order to meet legislative water quality targets and whether these are achievable within the limits of conventional treatment processes and technology.

- Step 5 (2nd stage of RAG assessment)**– if the quality conditions that would have to be applied to the discharge are within the limits of conventional treatment, then a solution is considered to be available and the improvements required to deliver these standards would need to be investigated in the WCS (Amber RAG status). If the conditions cannot be met within the limits of conventional treatment and technology, then a solution with existing infrastructure is not available and further investigations to determine a viable alternative option is required in a Detailed WCS (Red RAG status).

Table 6-1: Diagrammatic representation of the water quality assessment methodology



6.3.4 All of the WwTW in the Mersey Heartlands discharge into tidal waters therefore a load standstill calculation method has been applied to determine the consent limits required to ensure that the loading in effluent discharges do not exceed the current consent limits. It is important to note that the WwTW consent has two components; flow and water quality parameters (in this instance biological oxygen demand). The load standstill calculation works on the basis that flow can be increased whilst reducing the concentrations of the water quality parameter to ensure that the loading in effluent flows remains the same.

Capacity Assessment Results – Steps 1 to 3

6.3.5 An assessment of the existing capacity of the WwTWs is contained in the Liverpool and Wirral Outline WCS Technical Appendices.

Liverpool Mersey Heartland: Sandon Dock WwTW

6.3.6 The existing capacity assessment in the Liverpool WCS Technical Appendices indicates that there is capacity within the existing dry weather flow (DWF) consent at Sandon Dock WwTW (i.e. the daily DWF for the WwTW is less than the consented flow) (Table 6-2).

6.3.7 An assessment of the potential growth within the catchment of Sandon Dock WwTW in the Liverpool Outline WCS Technical Appendices, including projected growth within the authority of Sefton Council and Halton Borough Council, determined that there is sufficient capacity at Sandon Dock WwTW to accommodate the additional 3,510 houses anticipated in the Liverpool Mersey Heartland.

6.3.8 Therefore, potential growth in the catchment of Sandon Dock WwTW can be accommodated within current consented limits.

Wirral Mersey Heartland: Birkenhead WwTW and Bromborough WwTW

6.3.9 Assessment of the existing capacity indicates that there is some capacity within the existing DWF consent at Birkenhead and Bromborough WwTWs (i.e. the daily dry weather flow for each WwTW is less than the consented flow), which indicates that they have capacity for some growth (Table 6-2).

Table 6-2: Calculated DWF capacity (m³/day)

WwTW	Current DWF consent ³¹	Calculated Q80 flow	Current DWF capacity	Dwelling Capacity
Sandon Dock	234,000	112,228*	121,712	239,473
Birkenhead	55,200	38,447	16,753	32,413
Bromborough	25,100	20,283	4,817	9,320

6.3.10 The future growth assessments in the Wirral Outline WCS Technical Appendices indicate that Birkenhead WwTW will have sufficient spare capacity to accept and treat the additional wastewater likely to be generated by the projected growth within both the Mersey Heartland (900 units) and the wider Wirral area.

6.3.11 The future growth assessments for Bromborough WwTW suggests that there could be capacity at the WwTW for between 565 and 4,075 new dwellings over that anticipated in the wider Wirral area (based on three different growth scenarios for Wirral). This suggests that there may be a potential limit on the number of Mersey Heartlands dwellings that could be

³¹ Data provided by the Environment Agency

accommodated within the area covered by the Bromborough WwTW catchment, depending on the growth within the wider Wirral area. However, analysis of the location of SHLAA sites suggests that only a small proportion of the Mersey Heartlands growth would be in the catchment of Bromborough WwTW (13% of the sites and 3% of the number of units). This suggests that it is likely that Bromborough WwTW could accommodate some or all of the proposed growth within the Mersey Heartlands without exceeding its consent limits, depending on the amount of growth in the wider Wirral area.

- 6.3.12 Although the assessment suggests that Bromborough WwTW could accommodate some future growth in its current consent, it is worth noting that Bromborough WwTW has less than 10% of the current consent available when the future Wirral growth scenarios are taken into consideration. The sensitivity of growth to areas draining into these WwTW should therefore be tested in future investigations.
- 6.3.13 Full details of the scenarios tested for Wirral and Liverpool are included in Appendix D of their respective Outline WCS Technical Appendices, including how each growth scenario impacts on the residual dwelling capacity of each WwTW. This has been based on the assumption that new development would connect to the existing UU system.

Capacity Assessment Results – Steps 4 & 5

- 6.3.14 As the calculated flow at Sandon Dock, Birkenhead and Bromborough WwTWs is not anticipated to result in exceedance of the consented flow as a result of growth, a water quality modelling exercise is not required and therefore Steps 4 and 5 of the assessment methodology are not required.
- 6.3.15 The Wirral and Liverpool Outline WCS' identified that some of the WwTWs serving the wider area had limited capacity to accommodate projected growth and the assessments went through Steps 4 and 5 of the methodology. The Outline WCS' and their Technical Appendices provide information on the steps taken and report on the ecologically sensitive sites that could potentially be affected by additional wastewater discharges from WwTW or combined sewer overflows (CSOs).
- 6.3.16 There are a number of consented CSOs in the study area, which can affect water quality in the receiving watercourses they discharge into. However, unlike the WwTWs a comprehensive assessment of the capacity and potential water quality impacts associated with an increase in the frequency of discharges from CSOs cannot be undertaken within the scope of the Outline WCS. This may be considered further on a case by case basis when a better idea of development locations becomes available.

6.4 Ecological Site Assessment

Habitats Directive sites

- 6.4.1 There are a number of hydrologically sensitive, internationally important sites either within or linked to the Mersey Heartlands that could potentially be affected by additional wastewater discharges from WwTW or combined sewer overflows (CSOs) as a result of growth. The

location of all ecological sites (including national, regional and local) are listed below and shown in Figure 6-3.

- Liverpool Bay SPA;
- Mersey Estuary, SPA, Ramsar;
- Mersey Narrows and Wirral Foreshore pSPA and pRamsar;
- Ribble and Alt Estuaries SPA;
- Sefton Coast SAC;
- Dee Estuary SAC, SPA & Ramsar; and
- River Eden SAC

Sites of Special Scientific Interest (SSSI)

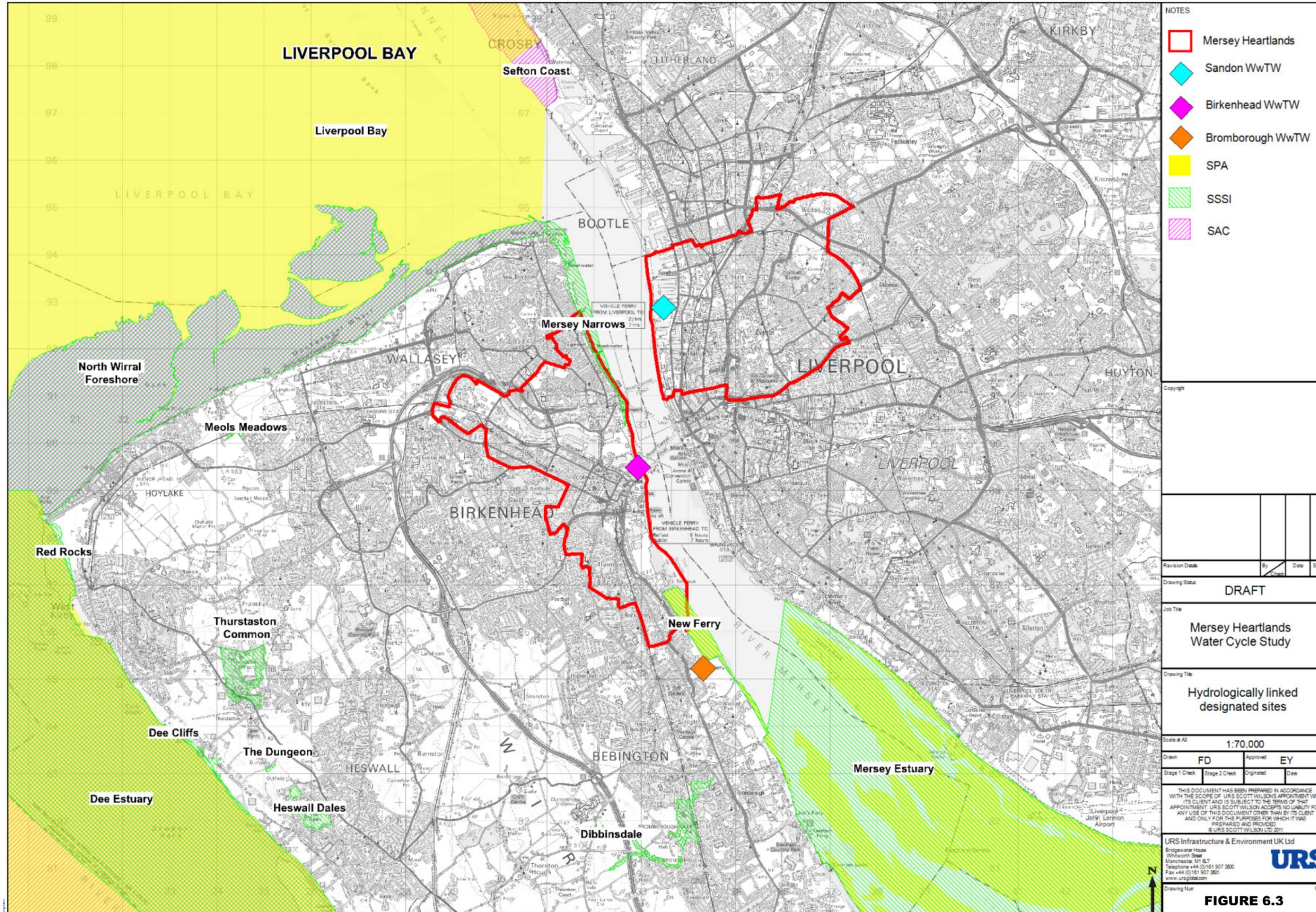
6.4.2 There are also a number of nationally important SSSI sites in the study area (other than those already mentioned) that have hydrological links or dependencies on surface water systems, which may be affected by discharges from WwTW and CSOs. These are listed below, as a result of additional wastewater discharge:

- Mersey Estuary (Birkenhead, Bromborough and Sandon Dock WwTW, CSOs);
- Mersey Narrows SSSI (Birkenhead, Bromborough and Sandon Dock WwTW, CSOs);
- New Ferry SSSI (Birkenhead, Bromborough and Sandon Dock WwTW, CSOs); and
- North Wirral Foreshore SSSI (Birkenhead, Bromborough and Sandon Dock WwTW, CSOs).

Local Sites

6.4.3 There are a number of non-statutory sites near the Mersey Heartlands, including Sites of Nature Conservation Value (SNCVs) and Local Nature Reserves. None of the WwTWs discharge into these sites, although they may potentially be affected by CSO discharges.

Figure 6-3: Hydrologically Linked designated sites



NOTES

- Mersey Heartlands
- ◆ Sandon WwTW
- ◆ Birkenhead WwTW
- ◆ Bromborough WwTW
- SPA
- SSSI
- SAC

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Job Title: Mersey Heartlands Water Cycle Study			
Drawing Title: Hydrologically linked designated sites			
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URS Infrastructure & Environment UK Ltd Bridgegate House Whitworth Street Manchester, M1 1LT Telephone +44 (0)161 907 3000 Fax +44 (0)161 907 3001 www.ursglobal.com			
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Water Framework Directive Targets and Next Stage of the HRA

6.4.4 A screening assessment of a Habitats Regulation Assessment (HRA)^{32/33} was undertaken on behalf of LCC and WC in 2009, to inform the Council's Core Strategy Preferred Options. The HRA screening report described those areas of the delivery strategies which are likely to have a significant effect on the Natura 2000 sites identified, and which will need to be subjected to further assessment (as required by the Habitats Directive). A number of potentially negative impacts were identified on Natura 2000 sites either within or adjacent to the Mersey Heartlands, as a result of water abstraction and waste water treatment. The sites identified included:

- Dee Estuary SAC, SPA and Ramsar;
- River Dee and Bala Lake SAC;
- Mersey Narrows and Wirral Foreshore pSPA and pRamsar;
- Liverpool Bay pSPA and Ramsar;
- Mersey Estuary SPA and Ramsar;
- Sefton Coast SAC;
- Manchester Mosses SAC;
- River Eden SAC; and
- Ribble and Alt Estuaries SPA & Ramsar site.

6.4.5 Table 6-3 shows the WFD based water quality targets for the receiving waterbodies associated with the discharge from the WwTW.

Table 6-3: Downstream waterbodies WFD status and targets

WwTW	Receiving waterbody	Downstream WFD waterbody	Current Overall Status	Target Overall Status	Current DO status	Target DO status
Sandon Dock	Mersey Estuary	Mersey GB531206908100	Moderate Potential	Good (2027)	Good	Good
Birkenhead	Mersey Estuary	Mersey GB531206908100	Moderate Potential	Good (2027)	Good	Good
Bromborough	Mersey Estuary	Mersey GB531206908100	Moderate Potential	Good (2027)	Good	Good

6.4.6 The wastewater assessment has shown that all of the WwTWs have headroom in its consent for the growth scenario.

³² Liverpool City Council, Liverpool Core Strategy Development Plan Document Revised Preferred Options Report, Habitats Regulations Assessment –Screening Statement, November 2009

³³ Wirral Metropolitan Borough Council, Local Development Framework for Wirral, Core Strategy Development Plan Document, Habitats Regulations Assessment- Interim Screening Assessment, November 2009

- 6.4.7 It can therefore be deduced from the outline assessment that growth will not jeopardise achievement of the WFD targets. The next stage of the HRA should take these findings into consideration and be informed and refined if necessary in further studies.

Further Modelling

- 6.4.8 As the WwTW provide sufficient headroom for the growth scenario and will not jeopardise WFD targets water quality modelling does not need to be undertaken.

Ecological Enhancement Opportunities

- 6.4.9 There are opportunities to enhance the biodiversity of the Mersey Heartlands through WCS considerations. As a first step towards identifying these opportunities the Green Infrastructure Strategy³⁴ for Liverpool, North East Wales, Cheshire and Wirral³⁵ was reviewed in order to determine which, if any, WwTWs are physically close to any of the green corridors initiatives identified in the Framework.
- 6.4.10 A review of the areas of priority for green infrastructure investment identified a number of areas within the Mersey Heartlands with opportunities for green infrastructure.
- 6.4.11 The Green Infrastructure Framework identifies several areas as priorities for green infrastructure action. Two out of the three WwTWs were identified as being located within or immediately adjacent to the action plan areas:
- Mersey Shore (Ellesmere Port to Seacombe) – contains Birkenhead and Bromborough WwTWs.
 - Liverpool city centre and Atlantic Gateway – contains Sandon Dock WwTW drainage catchment.
- 6.4.12 Opportunities to enhance the green infrastructure are discussed later in Section 9.3.

³⁴ Liverpool Green Infrastructure strategy: Technical Document. Version 1.0 - http://www.ginw.co.uk/liverpool/Technical_Document.pdf

³⁵ Mersey Dee Alliance, Green Infrastructure Framework for North East Wales, Cheshire and Wirral, March 2011

6.5 Wastewater Network Assessment

- 6.5.1 In order to fully assess flow capacity within a combined system, detailed hydraulic network modelling would be required to take into consideration the effect of rainfall in addition to foul water flows from development sites on the hydraulic capacity of the sewers. However, development site locations are not available at this point and network modelling would be too detailed for an Outline Strategy.
- 6.5.2 A high level assessment of potential capacity issues in the catchment networks draining to the key WwTWs has been carried out based on the existing data on the sewer network and historical flooding. Full details and results of the assessment are included in Appendix F of the Wirral and Liverpool Outline WCS Technical Appendices.
- 6.5.3 UU provided GIS layers of their sewer network, including drainage catchments for each WwTW, pipe sizes, location of pumping stations, storage tanks and combined sewer over flows (CSOs). These were used in combination with records of sewer flooding (DG5) and historical evidence of flooding as documented in the LCC and WC's PFRA, to determine which catchments are likely to have hydraulic capacity problems.
- 6.5.4 The high level assessment involved:
- assessing the coverage of the sewer network in growth areas;
 - assessing the frequency of current sewer flooding incidents, which highlight current incapacity in the network; and
 - assessing the location of wastewater pumping stations and storage tanks, the adequate functioning of which are key to the performance of the sewer network. Although the presence of storage tanks in itself does not necessarily mean that a capacity problem exists, they underline the need to minimise additional flows discharging into the combined sewerage system.
- 6.5.5 Most of the sewers in the Mersey Heartlands are combined systems, which receive both foul flows and surface water runoff from the area they are connected to and there are isolated pockets of separate surface water sewer systems.
- 6.5.6 Due to the relatively flat topography of the study area; a large part of the wastewater network relies on pumping stations rather than gravity to transfer flow to the WwTWs. The WwTWs serving the Mersey Heartlands have storm overflow discharge consents as their sewer networks are predominantly combined systems (i.e. they transmit both foul wastewater and surface water).
- 6.5.7 The DG5 records show a few locations in the Mersey Heartlands where flooding has occurred, associated with the combined sewer system. It is possible that limited sewer capacity is the main cause of this flooding, which highlights the need for surface water management.

Wirral Mersey Heartland

- 6.5.8 The Wirral Mersey Heartland is served predominantly by combined sewer systems with isolated pockets of separate surface water sewers in the Tranmere and Rock Ferry area. The sewer catchments are dependent on a network of wastewater pumping stations. A storm water storage tank is located in Woodside, Birkenhead and five CSOs are spread across the Wirral Mersey Heartland.
- 6.5.9 The Wirral Mersey Heartland is densely populated and the sewer network coverage for the area is generally good, so connecting new developments to the network is not likely to be a problem. The sewer network coverage around the Docks is relatively sparse. This might pose a potential constraint given the significant amount of planned development. In areas of regeneration or replacement of existing buildings, the use of water efficiency measures will reduce flows into the existing network.

Liverpool Mersey Heartland

- 6.5.10 In the Liverpool Mersey Heartland the sewerage network is mainly a combined system, with localised areas of separate surface water and foul systems in some areas of Anfield and Kirkdale. Whilst separate surface water sewers exist these are typically for short lengths and drain into the combined system. The Sandon Dock WwTW sewer catchment is dependent on a number of wastewater pumping stations (one in the Liverpool Mersey Heartland itself and six to the south). In addition, there are nine storm water tanks. Historical flooding has occurred predominantly in the north of the Liverpool Mersey Heartland.
- 6.5.11 The area is densely populated and the sewer network coverage for the area is generally good, so connecting new developments to the network is not likely to be a problem. In areas of regeneration or replacement of existing buildings, the use of water efficiency measures will reduce flows into the existing network.

General Conclusions for the Mersey Heartlands

- The sewerage system is predominately combined in the Mersey Heartlands with separate surface water and foul systems in localised areas;
- The historical evidence of flooding shows a distribution of localised sewer flooding internally and externally throughout the Mersey Heartlands. Historical flood records have occurred at combined sewers, which was potential caused by capacity constraints for significant rainfall events. This highlights the need for surface water management;
- A number of pumping station, storage tanks and CSOs are located across the Mersey Heartlands. This suggests that significant areas are reliant on sewage pumping and suggests that there may be capacity issues within the sewer network system; and
- In areas where the sewer network coverage is sparse it may be necessary to lay new trunk sewers to collect foul and surface water flows from new developments. This could be a constraint to developments planned to come forward in a relatively short timeframe.

Further Work

- 6.5.12 Due to the flat topography of the study area, the sewer system relies on pumping (rather than gravity) to transmit wastewater flow and in many cases, the wastewater system is mainly combined with separate surface water sewers in some areas. This means that the capacity is not just dependent on foul water from the number of connected properties; but also on runoff during storm events. More detailed, site specific assessment therefore needs to be undertaken including sewer network modelling to determine the capacity within the system, and performance and capacity of pumping stations and storage tanks during storm events. It is proposed that this should be undertaken by UU in consultation with LCC and WC once specific sites are identified to enable an assessment to be made.

6.6 Wastewater Assessment: Recommendations

- 6.6.1 The Outline WCS has highlighted several areas where further work may need to be undertaken once further clarification on location and quantity of housing and employment growth become available on preferred locations. Recommendations for this further work are discussed in the subsequent section, along with an indication of stakeholder's involvement.
- 6.6.2 Recommendations on outline phasing are provided in Section 10 (Mersey Heartlands Assessments) for those areas where a known constraint or potential future constraint has been highlighted. Recommendations on initial Outline policy for wastewater are included in Section 13.

Wastewater Transmission

- 6.6.3 A quantitative or semi-quantitative assessment of capacity or detailed modelling assessment of network capacity may be required at several key locations (once development locations are known) to determine if upgrades to sewer mains, pumping stations, detention tanks or new sewer provision is necessary. It is recommended that this is carried out by UU using their existing network models once the site locations are known.

7 Water Supply Assessment

7.1 Water Demand Calculations

Methodology

7.1.1 The future water demand following proposed growth has been calculated. Six different water demand projections have been calculated based on different rates of water use for new homes that could be implemented through potential future policy³⁶. In undertaking the calculations, it has been assumed that there will be an overall decrease in occupancy rates in new homes to reflect changing demographics as it is anticipated that there will be movement of individuals within the study area as well as inward/ outward migration. The information on dwelling occupancy rate to establish a population associated with growth was provided by LCC and WC.

7.1.2 The projections were derived as follows:

- **Projection 1** – New homes would use UU average metered household consumption of 139 l/h/d reducing to 130 l/h/d by 2024, this should be considered to be the ‘business as usual’ projection (assuming new homes will have the same level of water consumption as for metered properties currently);
- **Projection 2** – New homes would use UU new metered household consumption (normal year) of 118 l/h/d;
- **Projection 3** - New homes would conform to 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);
- **Projection 4** – New homes would achieve CfSH Level 3/4 rating of 105 l/h/d;
- **Projection 5** – New homes would achieve CfSH Level 5/6 rating of 80 l/h/d; and
- **Projection 6** – The suggested policy projection (125 l/h/d to 2019).

7.1.3 Projection 6 is intended to represent water use as policy changes in the future, reflecting the application of minimum ratings under Part G of the Building Regulations and the CfSH for all new homes, which will be achieved in a stepped approach in line with government aims set out in Building a Greener Future: Towards Zero Carbon Development³⁷.

7.1.4 The HRA Screening Statement for Liverpool was undertaken in 2009 in relation to the Liverpool Core Strategy, Development Plan Document, Revised Preferred Options Report. The Screening Statement identified that increased abstraction may impact the following habitat sites:

- Berwyn and South Clwyd Mountains SAC;
- Dee Estuary/Aber Dyfrdwy SAC;

³⁶ NB – employment demand remains constant at 28 litres per job created and industrial process demand at 64.8m³/day/hectare

³⁷ DCLG, Building a Greener Future: Towards Zero Carbon Development, 2007.

- Dee Estuary SPA and Ramsar; and
- River Dee and Bala Lake SAC.

7.1.5 This highlights the Dee catchment as being particularly sensitive to increased abstraction. Four water companies abstract from sources that affect the River Dee, including UU, Dee Valley Water, Dwr Cymru Welsh Water and Severn Trent Water.

7.1.6 The HRA Screening Statement for Wirral stated that the strategic planning of development requires that local planning authorities have a role in ensuring that the pressures on available water resources are minimised as far as is practical, using the Core Strategy as a mechanism to deliver measures to supplement those adopted by the EA and water companies as part of their wider resource planning roles.

7.1.7 The HRA states that Core Strategy Preferred Option Policy 15 (Better Design) promotes sustainable construction and design including water conservation. The HRA recommends that a specific reference within this Policy could be made for a requirement for new development to achieve a minimum of Level 4 under CSH to ensure that water issues are adequately considered. The suggested policy projection is in line with this recommendation of 105 l/h/d by 2020.

Calculated water demand

7.1.8 Table 7-1 summarises the range of future additional demand (in Millions of litres or Mega litres per day) for the Mersey Heartlands to 2017, based on an additional 4,410 dwellings (additional 2,003 people in Wirral part of the Mersey Heartland and 7,756 in the Liverpool part).

Table 7-1: Additional future water demand for the Mersey Heartlands

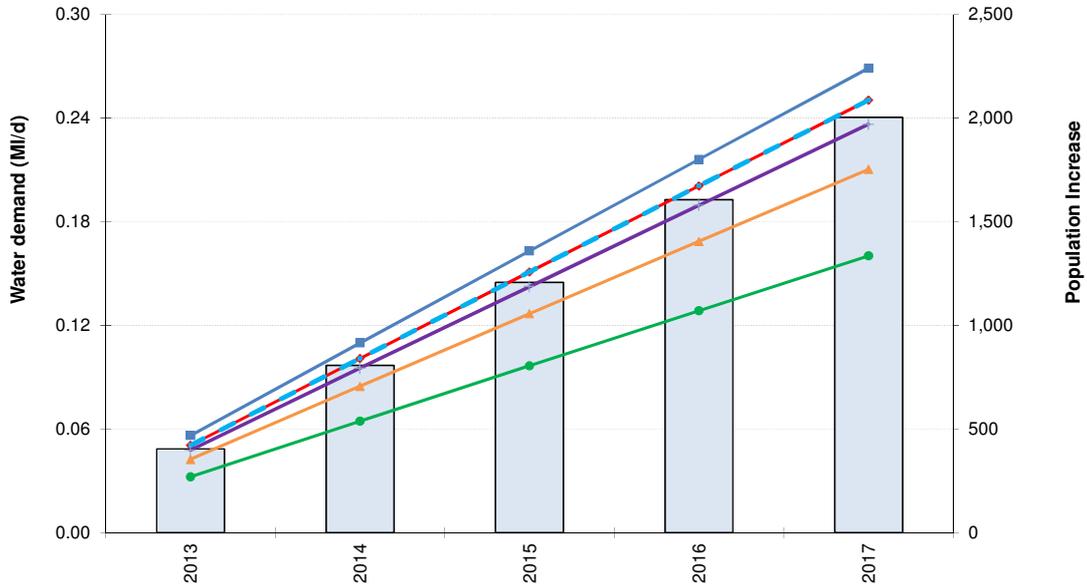
Mersey Heartland	Future Demand (MI/d)	
	Max ³⁸	Min ³⁹
Liverpool	1.04	0.62
Wirral	0.27	0.16
Total	1.31	0.78

7.1.9 The results show that demand for water in the Mersey Heartlands could be reduced by up to 0.53 MI/d by adopting more stringent water consumption approaches. The suggested policy projection could provide a saving of 0.09 MI/d by 2017.

³⁸ based on UU's average metered household consumption of 139 l/h/d reducing to 130 l/h/d by 2024,

³⁹ based on demand if new homes meet code levels 5/6 under Code for Sustainable Homes (80l/h/d)

Water Demand Scenarios - Wirral



Water Demand Scenarios - Liverpool

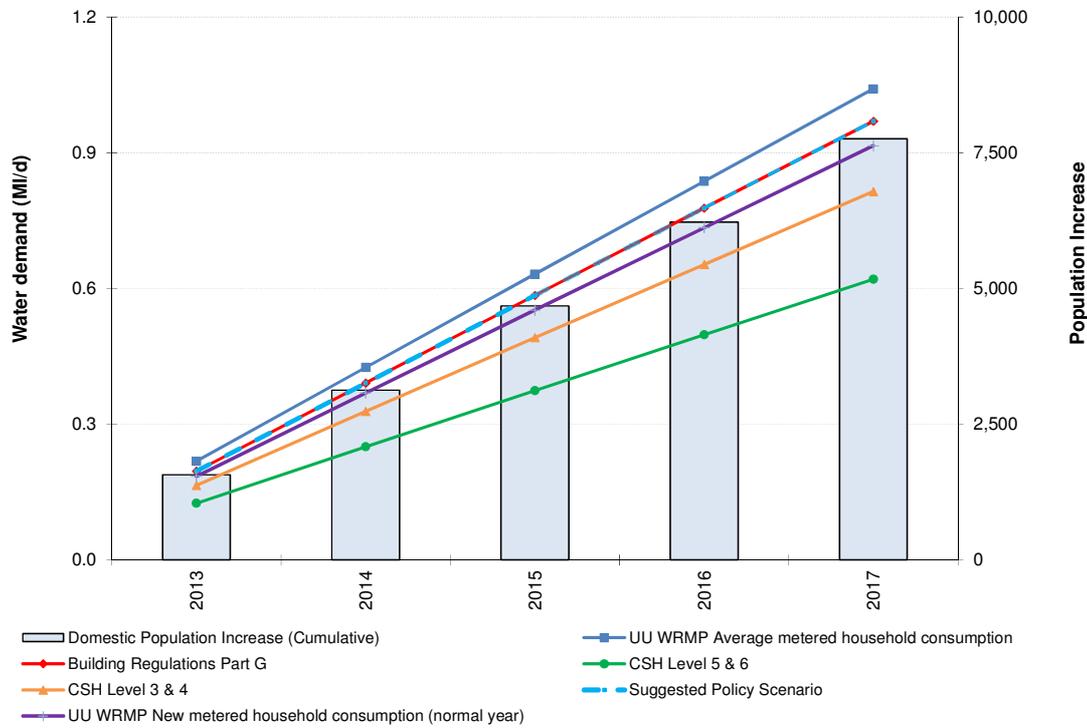


Figure 7-1: Cumulative predicted demand for water by 2017

7.2 Water Resource Availability and Environmental Assessment

- 7.2.1 The Scoping study has already completed an assessment of the existing baseline with respect to locally available resources in the sandstone aquifers and the main river systems. This assessment was based on the EA's CAMS for the Dee, Lower Mersey and Alt and is not repeated in this Outline WCS. Instead, the Outline study has used the final version of UU's WRMP to determine available water supply against predicted demand within UU's Water Supply area.
- 7.2.2 A full assessment of the available water resources in the study area has been undertaken and is included in Appendix G of the Wirral and Liverpool Outline WCS Technical Appendices. This section of the planning report summarises the key findings with respect to available water supply against projected water demand with growth.
- 7.2.3 UU manages available water resources within the Water Resource Zones (WRZ), which supplies water to the Mersey Heartlands. The areas within the zone share the same raw resources for water supply and are interconnected by supply pipes, treatment works and pumping stations such that customers can share the same available 'surplus of supply' of water when it is freely available; but also share the same risk of supply when water is not as freely available during dry periods (i.e. deficit of supply). The Integrated WRZ covers the Mersey Heartlands and the baseline supply-demand balance for this WRZ is anticipated to remain in surplus of supply to the forecast demands until 2020.
- 7.2.4 The water available for use in the Integrated WRZ is expected to reduce by 24.8 MI/d between 2009-10 and 2014-15. There will be an increase in 2012-13 of 16.6 MI/d due to the introduction of a bi-directional pipeline, known as the "West-to-East Link", between Merseyside and North Manchester. Water availability will then reduce markedly by 2014-15, mainly due to the anticipated 32.9 MI/d sustainability reductions arising from the proposed abstraction licence changes for the Haweswater and Thirlmere reservoirs and rivers Brennand and Whitendale. A deficit is anticipated to occur by 2022-23 which is expected to increase to the end of the planning period of 2034-35 (deficit of 74.6 MI/d)⁴⁰.
- 7.2.5 A water resources and demand strategy including leakage reduction, water efficiency and water source enhancements are anticipated to ensure that the demand is met by supply to 2034-35. The source enhancements included in 2034-35 within the Integrated WRZ are Widnes groundwater (22.7 MI/d), Southport groundwater (22.5 MI/d) and Oldham groundwater (2.5 MI/d).
- 7.2.6 The solutions identified by UU, if implemented, would remove the deficits in the supply and demand balance for the Integrated WRZ including the Mersey Heartlands. However, it is important to note that the solutions rely on transfer of resources to the WRZ in an area reliant on finite groundwater abstractions. The EA's assessment of water availability⁴¹ suggests that the sandstone aquifer is at its limit of available resources without adverse

⁴⁰ UU WRMP

⁴¹, Environment Agency, The Lower Mersey and Alt Catchment Abstraction Management Strategy, March 2008

impact on rivers and ecosystems that rely on it; hence further abstraction (beyond those proposed in the WRMP) and transfer is unlikely in the future.

- 7.2.7 The assessment concludes that, whilst the WRZ that supplies the study area has abstractions that are hydrologically linked to designated European sites, the information provided in the WRMP indicates that abstractions are not likely to lead to a significant effect on European sites, following limited sustainability reductions that may be required subsequent to the completion of the RoC process. As such, there is no reason to conclude that there should be any adverse impact on these sites related to the delivery of the WRMP.
- 7.2.8 It is noted that UU states in its adopted WRMP that the RoC process is not completed and that further sustainability reductions may be put forward; if so, this conclusion may have to be revised but the implication of the WRMP is that UU has taken these possible sustainability reductions into account. The WRMP is due for review in 2014 and it is understood that it will be subjected to a HRA during the next iteration. The assumptions based on the WRMP at this stage will need to be revisited when the next iteration of the WRMP has been agreed.
- 7.2.9 UU's demand forecast is based on housing and population growth forecast for Liverpool and Wirral as detailed in the North West of England Plan: Regional Spatial Strategy (RSS) to 2021 (35,100 homes for Liverpool and 9000 homes for Wirral). In addition, the demand forecasts for all of the north-west growth points, including an additional 29,448 dwellings above Regional Spatial Strategy levels by 2016-17, were also included in UU's WRMP.
- 7.2.10 Although the effect of additional housing in the Mersey Heartlands alone is not likely to overstretch the resource availability within the Integrated WRZ, a cumulative effect of demand increase could potentially have an impact on the supply-demand balance if growth in the Liverpool or Wirral exceeds that assessed in UU's WRMP. LCC and WC should therefore consult UU regarding water supply if development is anticipated to exceed that assessed by UU.
- 7.2.11 It should be highlighted that the Liverpool and Wirral WCS's state that, to date, development and population growth in the Wirral and Liverpool has been less than that anticipated in the WRMP. However, the rate of future growth may still mean that the targets originally catered for in the WRMP are still achievable and, until the WRMP is reviewed by UU, the conclusions can still be regarded as valid.
- 7.2.12 In order to cater for the higher levels of growth proposed, it would be prudent to promote water efficiency in new homes and commercial buildings to reduce the additional demand and make supply of water more sustainable. The Outline WCS has therefore undertaken an assessment of feasibility of achieving Water Neutrality in the Study Area, as described in Section 8 of this report.
- 7.2.13 It is worth noting that, at the time of writing the final WRMP, UU stated that they were abstracting less water from the environment than at any time since the 1960s and that their water resources and demand strategy will reduce average water demand in each water

resource zone. UU have produced a 2010-11 annual review⁴² of the WRMP. This states that no material changes have arisen since publication of the 2009 WRMP.

7.3 Water Supply Infrastructure

- 7.3.1 Liverpool is supplied with water via several routes. Up to 15% of the regional flow is supplied by water from Lake Vyrnwy in Wales, which is transported along large diameter trunk mains (LDTM) from Oswestry water treatment works in Shropshire to Prescott water treatment works near Liverpool⁴³. The Vyrnwy LDTM and Dee LDTM services Liverpool and some major towns in the Merseyside area. In addition, three large water mains supply Liverpool via Knowsley. The West East Link pipeline will have the capacity to supply a significant volume to the area, with the exchange of water between Prescott Reservoir in Merseyside and Woodgate Hill Reservoir in Greater Manchester⁴⁴.
- 7.3.2 Water in Wirral is also primarily sourced from Lake Vyrnwy Reservoir (Llyn Efyrynwy), the River Dee and groundwater sources in Cheshire. During times of additional demand, the supply is supplemented by water from the Lake District.
- 7.3.3 It was not possible to carry out a detailed assessment of the water supply infrastructure for the Liverpool Mersey Heartland at this stage of the WCS due to lack of information on the Water Supply Infrastructure. However, UU have undertaken an assessment of the water supply infrastructure supplying sites identified in the SHLAA, on behalf of WC.
- 7.3.4 UU have undertaken an assessment of the water supply infrastructure supplying sites in the SHLAA, on behalf of WC. The assessment involved identifying if there are any supply issues (pressure, capacity, etc) that may hinder development at the sites. It should be noted that the majority of sites identified as part of the SHLAA and Employment Land studies are either infill or adjoining existing settlements (very little Greenfield development). It is therefore likely that little entirely new infrastructure will be required and the remainder could be supplied through the existing network.
- 7.3.5 UU undertook the water supply infrastructure assessment and categorised water supply to the SHLAA sites as high, medium or low water resource availability as follows:
- High - Water and connections available; no expected difficulty in accommodating identified demand growth;
 - Medium - Connections not widely available; potential requirement for funding to assist in meeting the new water supply demand; and
 - Low - Network at capacity; funding required to meet new water supply demand.
- 7.3.6 Figure 7-2 shows the traffic light assessment undertaken on the SHLAA sites, which is summarised below by Settlement Area:

⁴² United Utilities, Annual Review of Water Resources Management Plan 2010/11, June 2011

⁴³ United Utilities, Vyrnwy water pipe works, <http://www.unitedutilities.com/vyrnwy.aspx>

⁴⁴ UK Water Projects Online, Cast Study - West East Link Main, http://waterprojectsonline.com/case_studies/2010/UU_WELM_2010.pdf?bcsi_scan_AB11CAA0E2721250=0&bcsi_scan_filename=UU_WELM_2010.pdf

- Low Resource Availability (red) - network reinforcement particularly around the Docks with some poor network connectivity, and pressure issues and network reinforcement requirements in the Tranmere area.
- Medium Resource Availability (amber) – network reinforcement issues in the Hamilton Square area and cluster of sites south of Birkenhead Dock
- High Resource Availability (green) – Rock Ferry area and between Seacombe and Egremont.

7.3.7 The phasing of potable water infrastructure or upgrades could therefore be considered to be a constraint to the initial phasing of development within the Wirral Mersey Heartland and should be assessed in more detail, in collaboration with UU, once preferred development sites are known.

7.3.8 UU have a 14 year cleaning and maintenance programme (2006-2020), involving the cleaning and refurbishment of water mains in the North West. This programme involves undertaking a water mains cleaning or refurbishment process for approximately 40 kilometres of pipes in Wallasey and Birkenhead to improve supply and is expected to be completed by 2015. This will help to secure continuity of supply rather than creating additional capacity.

7.4 Water Supply Recommendations

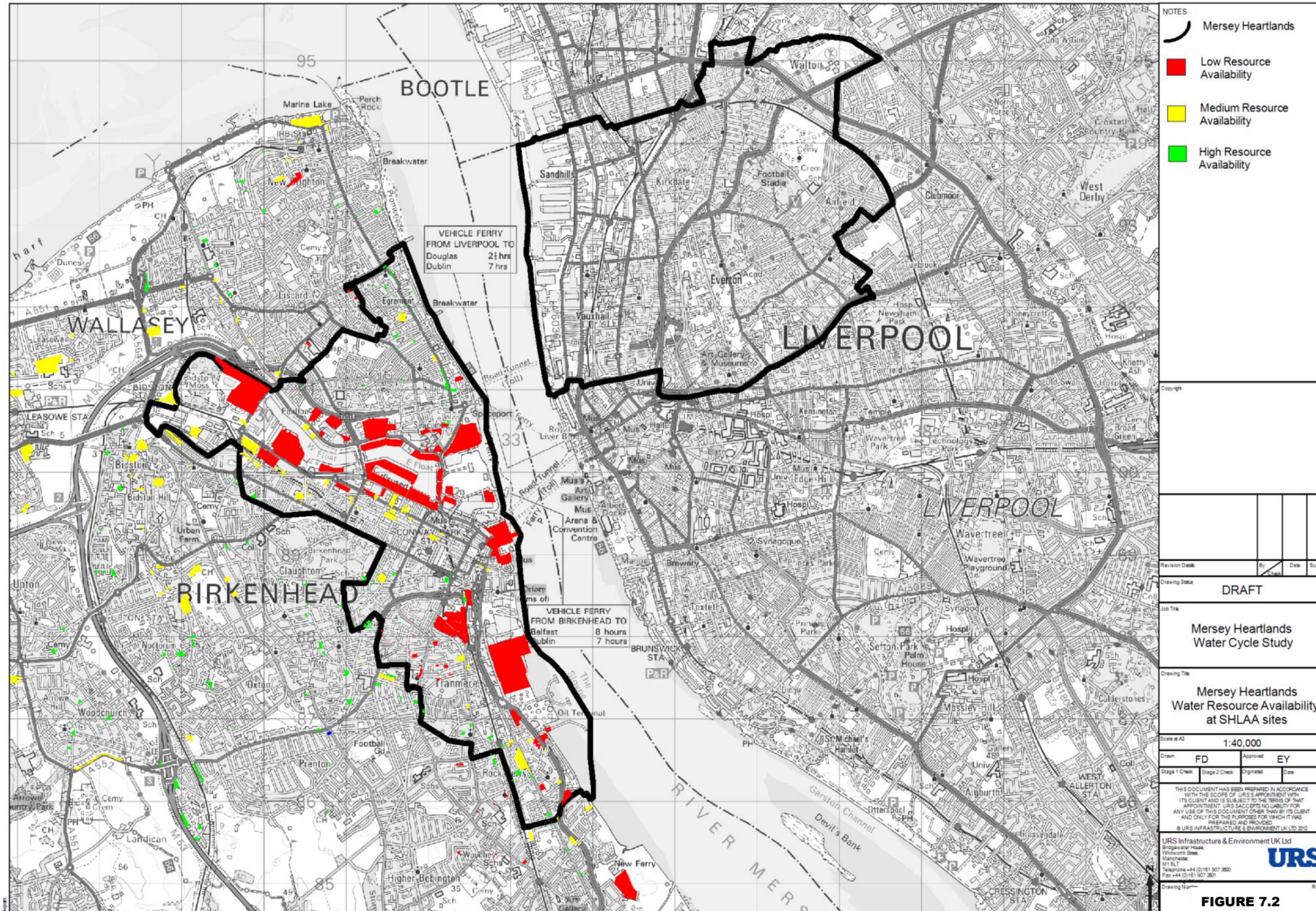
7.4.1 The Outline WCS has highlighted several areas of further work that need to be undertaken once further clarification is available on preferred location and numbers for housing and employment growth. Recommendations for this further work related to water supply are set in the subsequent section, along with an indication of stakeholder's involvement. Recommendations on initial outline policy for water resources are included in Section 12.

7.4.2 Water resource availability is reliant on intra- and inter-zone transfer, metering and water efficiency measures. The housing scenarios assessed in this WCS were accounted for within UU's WRMP. Although the effect of additional housing in the Mersey Heartlands alone is not likely to overstretch the resource availability, a cumulative effect of demand increase over that assessed in UU's WRMP could potentially have an impact on the supply-demand balance. It is recommended that LCC and WC consult UU regarding water supply if development is anticipated to exceed that assessed by UU.

7.4.3 If additional resources are required, it will be necessary to determine if sustainable solutions for local abstraction are available for developers to allow future growth to occur in conjunction with the EA and UU.

7.4.4 Once preferred development locations are known a study may be required, in conjunction with UU, to determine the network connectivity, resilience of water supply trunk mains, pumping stations and water treatment works in key locations. This assessment will need to determine when upgrades to supply infrastructure will need to be phased in and what impact this will have on development phasing.

Figure 7-2: Mersey Heartlands Water Resource Availability at SHLAA sites



NOTES

- Mersey Heartlands
- Low Resource Availability
- Medium Resource Availability
- High Resource Availability

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Revision Date	By Date Suffix
Drawing Status	DRAFT
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<small>URS Infrastructure & Environment UK Ltd Bridgewater House, Whitearth Street, Manchester, M17 6L Telephone +44 (0)161 907 3800 Fax +44 (0)161 907 3501</small>	
Drawing Number	FIGURE 7.2

8 Water Neutrality

- 8.1.1 The Outline WCS has identified that meeting demand for water in some parts of the study area towards the end of the plan period is reliant on strategic transfers of water within the Integrated Water Resource Zone. The UU WRMP states that sufficient resources are likely to be made available for growth up to the end of the plan period; however, the CAMS states that water resources in the study area are close to their sustainable limit and may require further sustainability reductions in the future.
- 8.1.2 It is therefore essential to consider how demand for water in new housing can be managed by making new homes as efficient as possible and taking measures to reduce demand from existing population.

8.2 Water Efficiency in the Study Area

Water Neutrality

- 8.2.1 Water neutrality is a concept whereby the total demand for water within a planning area after development has taken place is the same (or less) than it was before development took place. In order for the water neutrality concept to work, the additional demand created by new development needs to be offset by reducing the demand from existing population. If this can be achieved, the overall balance for water demand is 'neutral'.
- 8.2.2 The likelihood of achieving water neutrality can be enhanced by maximising water efficiency within new developments (housing) by introducing a water neutrality concept at a development wide level. It is an aim for any development, (new housing or new employment), to use no more water than is absolutely necessary and re-use as much water as is practical.
- 8.2.3 The first step of any water efficiency plan in the Mersey Heartlands should be to look at water efficiency measures being undertaken by UU.

UU Future Water Efficiency Plan

- 8.2.4 A summary of UU's water efficiency measures and targets included in the WRMP are as follows:
 - distributed over 550,000 cistern devices free of charge to household customers since 1997/98 and are now distributing the "Save-a-flush" water saving cistern device;
 - offer customers household water audits, which provides them with the opportunity to both educate customers with water efficiency messages and provide them with devices to help them save water at home. They have also trialled "visit and fix" home audits;
 - regular visits to major industrial, commercial and institutional customers to promote water conservation and related services such as Water Audit Service;

- provides water conservation information in a range of information packs including: “water savers” packs, to educate and raise awareness of customers;
- UU provides a free meter option scheme, and compulsorily meters to new and unmeasured non-households (where appropriate);
- Water butts / composters / trigger hoses;
- UU offers subsidised water butts to all domestic customers in the region for rainwater collection; and
- UU conduct “visit and fix” home audits using qualified personnel, amongst other things to fit “EcoBeta” dual flush conversion devices to save water.

8.3 Water Efficiency Targets

- 8.3.1 UU was notified by OFWAT of the mandatory requirement to introduce Water Efficiency Targets as a measure of the company’s obligation to promote water efficiency. This sets a target saving of 2.95 Ml/d each year.
- 8.3.2 The Water Efficiency Targets are based on carrying out activities aimed at increasing water savings by household and is set at 1 litre per property per day for each year, which equated to 2.95 Ml/d, and a requirement to provide information to consumers on how to use water more wisely.
- 8.3.3 UU has included the benefits of the Water Efficiency Targets in their baseline demand forecast.

Water Efficiency in New Homes

- 8.3.4 New homes can be fitted with a range of fittings to reduce demand. In addition, new developments can have community wide measures to reduce the demand in water, these can range from rainwater harvesting to grey water recycling – the use of wash water from showers and sinks in toilets after on site treatment.
- 8.3.5 The CSH sets six levels of sustainability for new build housing. Each level includes mandatory requirements for energy performance and water usage. Level 1 is entry level above building regulations, and Level 6 is the highest, reflecting exemplary developments in terms of sustainability. This provides a flexible outline for improving the overall sustainability of a house. Table 8-1 outlines the water use that must be achieved to reach each of the CSH levels.

Table 8-1: Code for Sustainable Homes – Water consumption targets for the different code levels and examples of how these targets can be attained in new build

CSH levels.	Litres/person/day	Examples of how to achieve water efficiency level.
1	120	Install efficient equipment within the home – 18l max volume dishwasher and 60l max volume washing machine. Install 4/6l dual flush toilets. Install 6-9l/min showers. Educate users about how to be efficient water users. Installation of water meters.
2		
3	105	As above. In addition, install water butts and equipment to use rainwater in the garden. Install aerating fixtures into bathrooms and kitchens. Include surface water management in the surrounding development.
4		
5	80	As above, in addition: Grey water recycling, reduction of surface water from the development. Provide water audits for people to show them where they can reduce water usage.
6		

- 8.3.6 The examples of water efficiency measures included in Table 8-1 provide an outline of the possible ways to improve water efficiency. There are many more possibilities that are site specific. Other steps which should be considered in new buildings include: rainwater harvesting from roofs and paved areas; grey water recycling (with some mains support) which can provide enough water to run all toilets, a washing machine and outside taps. These recommendations should be considered further in a detailed study at a site specific level, including a high-level assessment of the possible cost and energy use implications of rainwater harvesting and greywater recycling.
- 8.3.7 Measures such as spray taps, water efficient showers and appliances, low flush toilets and outdoor water butts can achieve the water efficiency levels specified above. These add a minimal cost of £200-£800 to development per house. Water meters should also be installed by water companies. Increased water efficiency will directly reduce consumer water and energy bills and reduce carbon dioxide emissions.
- 8.3.8 A strategic community approach to water harvesting and reuse provides an opportunity to achieve significant water savings and should be considered for future developments. Non-residential developments should form part of such proposals. The Liverpool and Wirral Waters developments may be suitable for such an approach.

Water Efficiency in Existing Homes

- 8.3.9 There are possibilities within existing homes to achieve significant savings and to improve efficiency and reduce the baseline water consumption, thereby theoretically freeing up water availability for new homes. Existing homes can be retrofitted with a range of fixtures to increase efficiency in these homes, including retrofitting water meters, and installing water efficient fixtures and fittings.

8.3.10 The cost of retrofitting water saving devices depends on the size and the age of property, as well as the scale (single property or a number of properties). However, findings from the Environment Agency report Water Efficiency in the South East of England⁴⁵, costs have been used as a guide to potential costs of retrofitting of water efficient fixtures and fittings and are presented in Table 8-2 below.

Table 8-2: Water Saving Methods

Water Saving Method	Approximate Cost per House
Variable flush retrofit toilets	£50 - £140
Low Flow Shower Head Scheme	£15-£50
Aerating Taps	£10-£20

8.4 Water Neutrality Feasibility Assessment

Feasibility Assessment

- 8.4.1 Achieving water neutrality should be a key sustainability aspiration for the study area. In order to determine the Outline feasibility of achieving water neutrality, a high level assessment of the likelihood of achieving water neutrality has been undertaken in the Outline WCS.
- 8.4.2 The assessment combined potential future water demand projections based on different water use levels for new homes⁴⁶ and combined these with different options for installing water demand management measures in existing properties, as described in the following section.
- 8.4.3 A draft water neutrality policy pathway could be developed further by LCC and WC, has been included as Appendix H of the Wirral and Liverpool Technical Appendices reports.

8.5 Water Neutrality – Measures for Existing Homes

- 8.5.1 In assessing the feasibility of water neutrality, the first step is to consider whether the savings created by installing meters into existing unmetered homes would be sufficient to offset the increase in water demand from the new development. This is because metering is a specific water management strategy proposed by UU in its WRMP and is a generally accepted as a management measure which brings immediate tangible benefits. On average, the savings created per person as a result of installing a water meter is 12 litres a day.

⁴⁵ Environment Agency (2007) Water Efficiency in the South East of England, Retrofitting existing homes, <http://publications.environment-agency.gov.uk/pdf/GEHO0407BMNC-E-E.pdf>

⁴⁶ Using the 6 future demand calculations from the water resources assessment

8.5.2 There are further possibilities within existing development to achieve significant savings through improving efficiency and reducing the baseline water consumption, thereby theoretically freeing up water availability for new homes. Existing homes can be retrofitted with a range of fixtures to increase efficiency in these homes, this can include:

- water efficient fixtures and fittings – for example, flow restrictors or aerating fixtures;
- low flush or dual flush toilets;
- water efficient dishwashers and washing machines
- installation of water butts for garden use; and
- education of the existing population about water efficiency and in particular about water efficient fixtures, fittings and appliances can help to reduce water demand. This can be achieved through, for example, water audits or community education programmes.

8.5.3 Based on findings from the Environment Agency report Water Efficiency in the South East of England⁴⁷ some of these measures have been considered as a guide to potential reductions in water demand through the use of water efficient measures in existing homes (Table 8-3).

Table 8-3: Water Saving Methods

<i>Water Saving Method</i>	<i>Potential Saving</i>	<i>Comments/uncertainty</i>
Ultra Low Flush replacement Scheme	50-55 litres/ household/ day	4.5l toilet assumed to be used. Need incentive to replace old toilets with low flush toilets.
Variable flush retrofit device	21-29 litres/ household/ day	Need incentive to buy equipment and install the equipment. Potential problems with operation particularly if installed incorrectly.
Low flow shower head scheme	12-14 litres/ household/ day	Cannot be used with electric, power or low pressure gravity fed systems.
Metering Scheme	5-10% reduction. = 33.5 litres/ household/ day	This can be implemented through compulsory metering or through metering on change of occupancy.
Low use fittings	49.9 litres/ household/ day (conservative est.)	This includes fitting low use taps, low flow showerhead and a variable flush device.

8.5.4 The water savings in Table 8-3 for litres per household were converted into savings per person using the occupancy rate of 2.25 for existing homes (note this occupancy rate differs to that used for proposed new homes at 2.19). The results for two retrofitting options for new homes in the study area are shown in Table 8-4.

⁴⁷ Environment Agency (2007) Water Efficiency in the South East of England, Retrofitting existing homes, <http://publications.environment-agency.gov.uk/pdf/GEHO0407BMNC-E-E.pdf>

Table 8-4: Retrofitting Options for existing homes

<i>Retrofit Option</i>	<i>Potential Saving</i>	<i>Measures Included</i>
High Intervention	27 l/h/d	Low flush toilet and a low flow shower.
Low Intervention	21.7 l/h/day	Low use fittings.

8.5.5 Finally, the retrofitting options were combined with reductions achieved from metering properties that are not currently metered, to give five demand option scenarios with the following potential savings as shown in Table 8-5.

Table 8-5: Demand Management Options for Existing Homes

<i>Demand Option</i>	<i>Description</i>	<i>Potential Saving</i>	<i>Measures Included</i>
1	Metering only	14.5 l/h/d	Meters in all non metered properties, no retrofitting
2	Low intervention retrofit only	21.7 l/h/d	No metering, installation of low use fixtures and fittings in all existing properties
3	High Intervention retrofit only	27 l/h/d	No metering, installation of low flush toilets and low flow shower head
4	Metering and low intervention retrofit	36.3 l/h/d	Meters in all non metered properties, installation of low use fixtures and fittings in all existing properties
5	Metering and high intervention retrofit	41.50 l/h/d	Meters in all non metered properties, installation of low flush toilets and low flow shower heads

Assessment Results

- 8.5.6 This section summarises the key findings and the key results of the water neutrality assessment. The six water demand projections reported in Section 7 were all assessed for neutrality feasibility.
- 8.5.7 The proportion of unmetered houses in the North West region is approximately 68.4%⁴⁸.
- 8.5.8 Assuming 137,800 existing properties in Wirral⁴⁹; approximately 94,255 will not have a meter. Using an occupancy rate of 2.25 (for existing properties as agreed with WC), the feasibility assessment suggests that water neutrality could be achieved through all demand management options, when considering growth in the Wirral Mersey Heartland alone.
- 8.5.9 Assuming 214,757 existing properties in Liverpool⁵⁰; approximately 146,894 will not have a meter. Using an occupancy rate of 2.3 (for existing properties in 2011), the feasibility assessment suggests that water neutrality could be achieved through all demand management options, when considering growth in the Wirral Mersey Heartland alone.

Table 8-6: Water Neutrality Achievability Assessment for the Mersey Heartlands Only

Wirral Mersey Heartland

New homes & employment demand Projections	New demand (MI/d)	Demand Management Option (deficit/ surplus)				
		1	2	3	4	5
Projection 1	0.27	2.81	6.46	8.10	9.56	11.18
Projection 2	0.24	2.84	6.49	8.13	9.59	11.21
Projection 3	0.25	2.82	6.48	8.12	9.57	11.20
Projection 4	0.21	2.86	6.52	8.16	9.61	11.24
Projection 5	0.16	2.91	6.57	8.21	9.66	11.29
Projection 6	0.25	2.82	6.48	8.12	9.57	11.20

Liverpool Mersey Heartland

New homes & employment demand Projections	New demand (MI/d)	Demand Management Option (deficit/ surplus)				
		1	2	3	4	5
Projection 1	1.04	3.77	9.49	12.06	14.34	16.88
Projection 2	0.92	3.90	9.62	12.19	14.46	17.00
Projection 3	0.97	3.84	9.56	12.13	14.41	16.95
Projection 4	0.81	4.00	9.72	12.29	14.56	17.10
Projection 5	0.62	4.19	9.91	12.48	14.76	17.30
Projection 6	0.97	3.84	9.56	12.13	14.41	16.95

- 8.5.10 When considering the projected growth for the Mersey Heartlands combined with the anticipated growth in the Liverpool and Wirral WCS, with neutrality not achievable for demand management options 1-3 for most of the growth scenarios considered in the Liverpool and Wirral WCS.

⁴⁸ Based on linear interpolation of UU's WRMP data for 2006 (21%) and 2014 (38%)
⁴⁹ Taken from Wirral Council Housing Market Assessment, Sept 2010
⁵⁰ Taken from Liverpool City Council, Liverpool Strategic Housing Market Assessment, January 2011

Water Neutrality Summary

The key points of the initial water neutrality assessment are that the Mersey Heartlands can theoretically achieve water neutrality aspirations for the projected growth increase for new homes.

8.5.11 It is recommended that, should the Councils consider neutrality as a realistic sustainability target, a detailed pathway to neutrality is developed to determine the exact requirements for achieving neutrality in terms of policy, developer contributions, funding implications, community involvement and what is technically required from new development. This will include:

- a list of recommended policies that are required to deliver water neutrality;
- the technical requirements of new development and requirement of retrofitting measures in order to deliver the policies;
- high level estimates of costs to deliver water efficiency savings in new homes and existing homes;
- options for funding water efficiency programmes as a solution to growth; and
- the evidence base behind the suggested policies, and where the evidence base does not exist, what is required to procure it.

9 Management of Flood Risk

- 9.1.1 It is important for the Outline WCS to include an assessment of the constraints of flood risk, and the interventions required to mitigate it as a result of proposed growth. Both flood risk to, and flood risk from development needs to be considered in the overall assessment of growth as proposed for the Mersey Heartlands.
- 9.1.2 Guidance on the assessment of flood risk is provided in National Planning Policy Framework (NPPF)⁵¹. The NPPF aims to ensure that flood risks are considered at all stages in the planning process. The NPPF sets out measures and guidance to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is necessary in higher risk areas and is considered to be consistent with wider sustainability objectives, the NPPF requires that a site-specific flood risk assessment is formulated and must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

9.2 Flood Risk to Development

- 9.2.1 The NPPF and its accompanying Technical Guidance⁵² emphasises the active role that LPAs should have in ensuring that flood risk is considered in strategic land use planning. The NPPF and the preceding Policy Statement 25: Development and Flood Risk (PPS25)⁵³ encourages LPAs to undertake a Strategic Flood Risk Assessment (SFRA) as one of the documents to be used as the evidence base for strategic land use planning decisions as part of the Local Plan. A level 1 SFRA was completed by LCC in 2008 and WC in 2009. The SFRA considers the sources of flood risk and maps out areas within the study area that are considered susceptible to flooding both now and in the future according to the requirements of the now superceded PPS25.
- 9.2.2 In addition, following the introduction of the Flood Risk Regulations (2009) and the Flood and Water Management Act (2010), LCC and WC have produced a Preliminary Flood Risk Assessment (PFRA) under their duties as a LLFA that focuses on flooding from surface water, ordinary watercourses and groundwater sources.

Flood Risk Sources

Tidal Flood Risk

- 9.2.3 Tidal flood risk within the Liverpool Mersey Heartland is largely confined to the frontage along the Mersey Estuary. The extents of Flood Zone 2 and Flood Zone 3 are limited and there are no flood defences present. The risk of flooding from this source in relation to potential development within the Liverpool Mersey Heartland is considered low.

⁵¹ National Planning Policy Framework, Department for Communities and Local Government, March 2012.

⁵² Technical Guidance to the National Planning Policy Framework, Department for Communities and Local Government, March 2012.

⁵³ Planning Policy Statement 25: Development and Flood Risk, Department for Communities and Local Government, December 2006.

- 9.2.4 In the north of the Wirral Mersey Heartland, there is a man-made tidal defence along the Mersey that stretches for 4km from Seacombe Ferry to Perch Rock (mouth of the River Mersey). The possibility of two breaches of the Wallasey Embankment defence (2km north and 3km west of the Mersey Heartlands) during rare storm events was considered and analysed as part of the Wirral SFRA. The outputs show that some of the Bidston area of the Wirral Mersey Heartland was inundated during the 0.5% AEP tidal event, under future conditions.
- 9.2.5 The SFRA highlights other areas potentially susceptible to tidal flooding, this includes the area around Birkenhead Docks. Overtopping of the existing coastal/ tidal defences or the failure of existing pumping arrangement in the area can lead to severe tidal flooding as a result of the high tidal levels in the area.
- 9.2.6 The North West England and North Wales sub-cell 11a7 of the Shoreline Management Plan SMP2 covers the Mersey Estuary. Project unit 7.1 covers the Wirral Mersey Heartland and Project unit 7.9 that covers the Liverpool Mersey Heartland. The long term policy for these units are to 'Hold the Line' to 2110 through maintaining and upgrading existing defences.
- 9.2.7 Figure 9-1 shows the main rivers, flood defences and Shoreline Management Plan (SMP) policy boundaries in and around the Mersey Heartlands. Figure 9-2 shows the flood zones and areas benefitting from flood defences.

Fluvial Flood Risk

- 9.2.8 The WC SFRA identifies the River Birket as a main river that runs through the Wirral Mersey Heartlands and into Birkenhead Docks. The River Birket flows through the rural countryside of Hoylake, Leasowe and North Wirral. The River Birket is culverted and discharges into the West Float under normal operating conditions and ultimately into the River Mersey. In flood conditions water is channelled along the 'Great Culvert' to discharge direct into the Mersey Estuary, via a tidal valve at Birkenhead. Some of the areas through which the Birket flows are susceptible to flooding, however, the flood zones associated with this watercourse are narrow within the Wirral Mersey Heartland. The Wirral SFRA confirms the existence of flood defences along the River Birket in the Wirral and along the North Wirral coast.
- 9.2.9 The LCC SFRA identifies that there are no main rivers located within the Liverpool Mersey Heartland. A small area of the eastern edge of the Liverpool Mersey Heartland, in Walton Hall Park is located in Flood Zone 2 and 3.

Groundwater Flood Risk

- 9.2.10 It is understood from the Liverpool PFRA and Wirral PFRA, that groundwater pumping has been increased to keep the Mersey tunnels free of the rising groundwater since 1986. Groundwater flooding incidents have been noted and rising groundwater levels could potentially have a significant effect on developments which require a deep foundation. The Wirral SFRA suggests further analysis to be undertaken to determine the longer term implications of the rising groundwater levels. In addition, the Mersey Heartlands groundwater levels are rising due to a significant reduction in industrial abstraction as reported in the Liverpool PFRA.

Surface Water Flood Risk

- 9.2.11 Flood risk from surface water (direct runoff and sewer flooding) is not well defined within Wirral. The Preliminary Flood Risk Assessment (PFRA) report for Wirral⁵⁴ states that records show that surface water flooding has occurred in the borough following a number of either high intensity storm events or extended periods of heavy rain.
- 9.2.12 There are a number of ordinary watercourses with an uncertain course and outfall location in Wirral. WC has recently commissioned a study to investigate and document the location of the outfalls for some of these watercourses. The intention is to build on this study to gain a better understanding of the actual course and flood risk associated with these watercourses in future to inform the development of the Wirral Local Strategy for Flood Risk Management.
- 9.2.13 The surface water drainage system within the Wirral Mersey Heartland catchment comprises an extensive combined sewer network which can surcharge during severe rainfall events leading to sewer flooding within the catchment. Incidents of flooding have been recorded at a number of locations in the Wirral Mersey Heartland, as shown in Figure 9-3. The sources of flooding for these incidents include UU sewer flooding and flood records from WC including highways and land drainage flooding.
- 9.2.14 Flood risk from surface water has been identified as a significant issue within Liverpool. Liverpool is within a defined 'Flood Risk Area' according to the work undertaken by LCC on their PFRA. Areas Susceptible to Surface Water Flooding maps have been confirmed as the 'Locally agreed surface water flooding information' and they indicate the potential for a significant number of properties to be at risk of future flooding. This information is being further refined through the Liverpool Local Flood Risk Management Strategy (LFRMS). There are areas in the Liverpool Mersey Heartlands that are considered to be 'more' susceptible to surface water flooding.
- 9.2.15 The surface water drainage system within the Liverpool Mersey Heartland also comprises mainly a combined sewer network, which have the potential to surcharge and cause flooding during severe rainfall events. In addition, there are culverted ordinary watercourses (some of these may also function as sewers) and open ordinary watercourse in the wider Liverpool area. Ongoing investigation by LCC's Land Drainage department are being undertaken to identify structures at significant risk of potential collapse in order to provide a better understanding and prioritisation of maintenance and emergency planning.
- 9.2.16 Incidents of flooding have been recorded in the Mersey Heartlands, as shown in Figure 9-3. The sources of flooding for these incidents include surface water incidents, sewer flooding and flood records.

⁵⁴ Wirral Council, Preliminary Flood Risk Assessment Report, 2011

Summary of Flood Risk Issues

9.2.17 The flood risk issues can be summarised as follows:

- Small areas of the Mersey Heartlands have areas located within the Flood Zone 2 and Flood Zone 3. Development should be steered towards areas of lowest risk, and where this is unavoidable, sequential allocation based on flood risk vulnerability should be undertaken to reduce the potential risk of flooding to existing and future development.
- The main river draining the Wirral Mersey Heartland, the River Birket, relies on pumping, and the area is reliant on flood defences to minimise flood risk to the existing development both from fluvial and tidal flood risk and surface water drainage channels. Failure of these defences constitutes a residual risk of flooding to the area.
- The sewerage system in the study area relies on pumps. Surface water flooding from the system is a key flood risk that needs to be considered as capacity of this pumped system and the storage tanks in the catchment is finite.
- Groundwater flooding is not considered to be a significant constraint to future development. However, groundwater rebound is known to exist in parts of the study area and therefore groundwater flood risk is particularly significant for developments where deep foundations are required.
- Surface water flooding is considered to be a risk, particularly for the Liverpool Mersey Heartland.

Figure 9-1: SMP Policy Boundaries, Main Rivers and Flood Defences

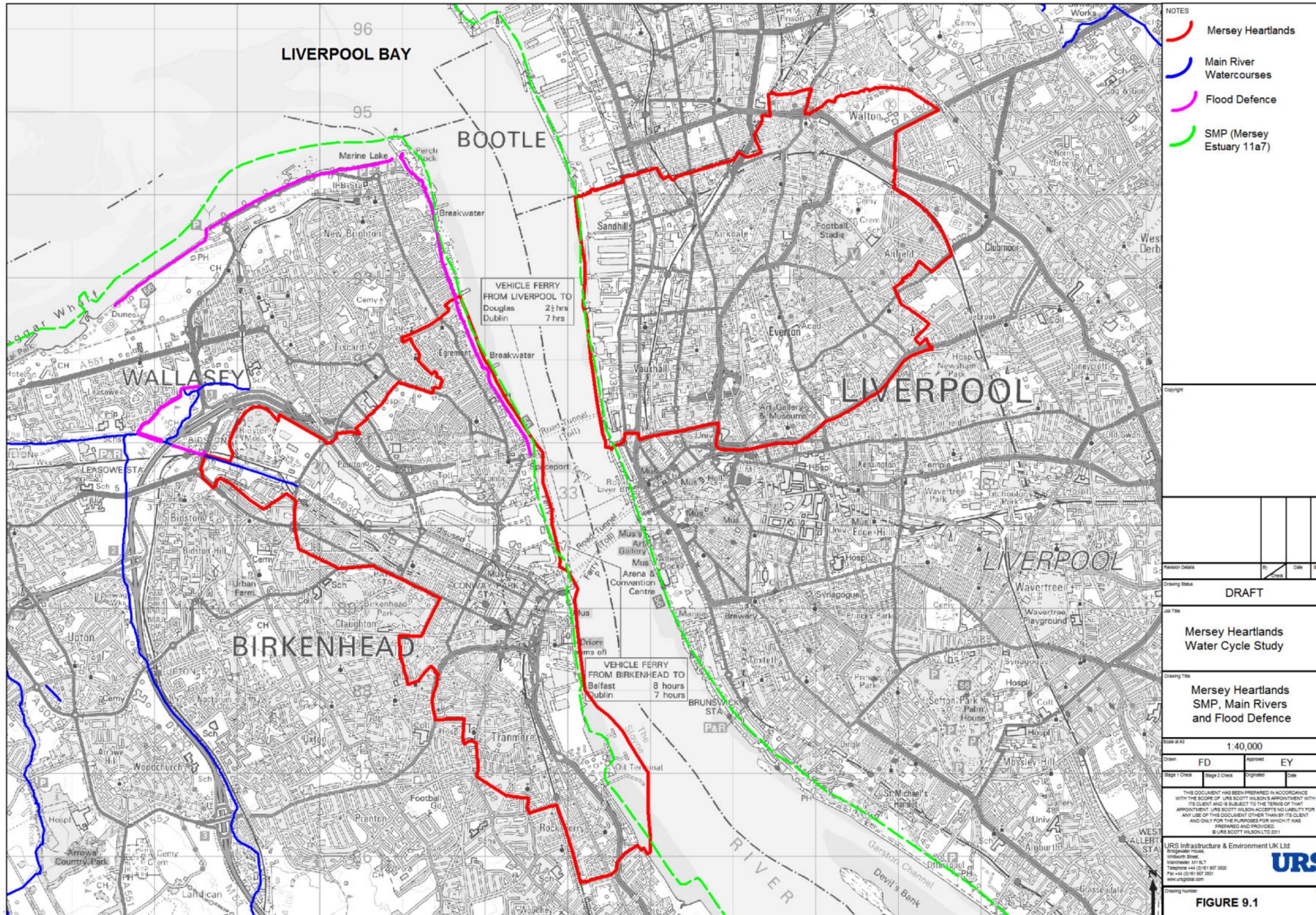


Figure 9-2: Flood Zones, Defences and Areas Benefiting from Defences

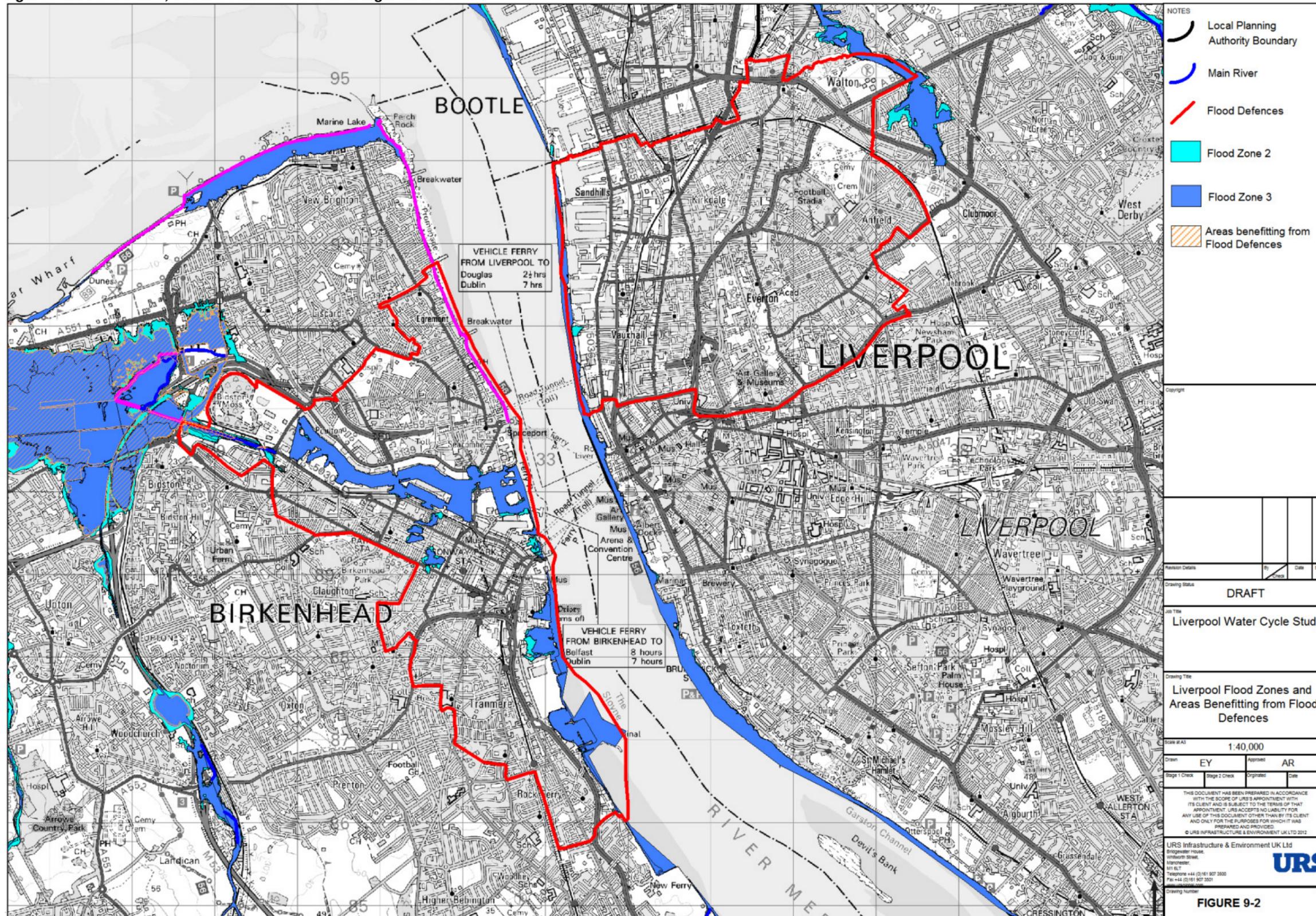
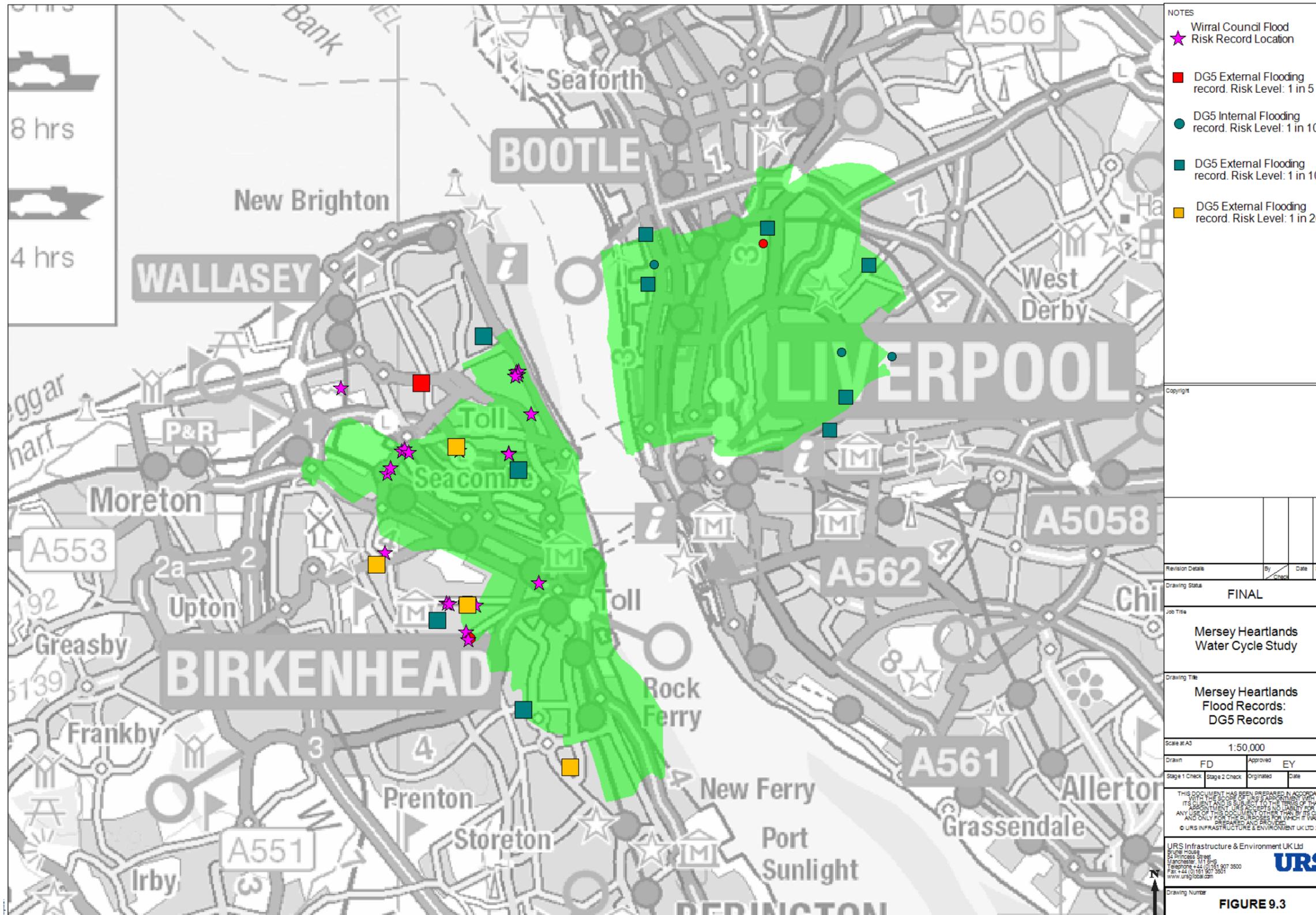


Figure 9-3: Incidents of Surface Water and Sewer Flooding



9.3 Flood Risk from Development – Surface Water Management

- 9.3.1 Surface water management is a key consideration when assessing development within large areas. NPPF requires new developments to manage runoff generated from impermeable surfaces as a result of change in land use in order to reduce the risk of flooding elsewhere. Urbanisation fundamentally alters the way in which runoff from rainfall drains to watercourses and has the potential to increase the rate and amount of water that enters watercourses or sewers, thus causing an increase in flood risk.
- 9.3.2 The WCS has shown that the Mersey Heartlands discharges most of its runoff into combined sewers. The combined and surface water sewer networks are likely to have potential capacity constraints for significant rainfall events (i.e. those typically greater than a 1 in 30 year return period) due to the design standard of modern and historical sewers. It is therefore essential that surface water drainage, where practicable, is managed separately from foul water, to reduce the pressure on the combined sewerage system and reduce the impact of runoff from growth in line with local and national guidance.
- 9.3.3 Often, the management of surface water is achieved via restriction of runoff from developed sites to pre-development rates using a range of Sustainable Drainage Systems (SuDS) which aim to maximise the amount of rainwater returned to the ground (infiltration), if ground conditions permit, and to hold back (attenuate) excess surface water. It is not always possible to apply infiltration based SuDS. The geological conditions, presence of contamination or the need to protect groundwater resources may limit the applicability of infiltration based SuDS systems. In such cases surface water attenuation systems or other methods such as rainwater harvesting have to be used.
- 9.3.4 It is also important to ensure that SuDS are multifunctional and incorporated as part of the overall provision of green infrastructure as far as possible. SuDS can provide opportunities for biodiversity enhancement and recreation.

SuDS suitability

- 9.3.5 In order to give an indication of SuDS suitability for the Outline WCS, opportunities for infiltration based SuDS for the Mersey Heartlands have been considered. A high level assessment has been made, based on the geological conditions of the main growth areas as a whole using the following criteria:
- the presence of an aquifer underneath the site; and
 - the requirement to protect groundwater used as potable supply underneath sites from the effects of pollution as a result of different types of above ground development.

Geology and Hydrogeology

- 9.3.6 The geology under Liverpool is predominantly Sherwood Sandstone, pebble beds and basement beds. The Wirral Peninsula is underlain by Keuper marls, waterstones and basement beds, and Bunter sandstones and pebble beds⁵⁵ post-glacial alluvium and blown sands.
- 9.3.7 The solid geology is generally overlain by a variable thickness of drift deposits of glacial boulder clay and sand and gravels. Alluvium and silty sandy clay tidal flat deposits are found along the River Birkett and Liverpool Docks⁵⁶.
- 9.3.8 Principal (major) aquifers are highly permeable rock formations, generally fractured, and capable of supporting large abstractions. The Principal aquifer underlying the Mersey Heartlands is the Triassic Sherwood and Bunter Sandstones which forms the Liverpool and Wirral aquifer unit. The aquifer is exploited for both public water supply and for industrial abstraction within the Mersey Heartlands and the surrounding area. The groundwater within the principle aquifer also contributes baseflow to the River Birket. The groundwater quality in the Sherwood Sandstone is reported as being generally high although contamination from surface activities has resulted in occasional elevated nitrate levels in Liverpool.
- 9.3.9 Secondary A aquifers underlying the Mersey Heartlands are confined to the more permeable drift (superficial) deposits. Secondary A aquifers are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers. These include alluvial deposits along the watercourses in his case the River Birket. Groundwater quality in the drift deposits is variable and may be highly susceptible to surface pollution.
- 9.3.10 Figure 9-4 shows the groundwater vulnerability map for the Mersey Heartlands. The map shows the location of aquifers and vulnerability of groundwater to pollution. The aquifers are classified by the Environment Agency into major, minor and non-aquifers according to their physical properties and their consequent value as a resource⁵⁷. The classification of the land surface (low, intermediate, high) reflects the ability of contaminants to leach through the covering soils and potentially pose a risk to groundwater. The maps also indicate areas where the presence of low permeability drift may provide additional groundwater protection. The map indicates that the Mersey Heartlands are predominately Major Aquifer High, with a small section in the Mersey Heartlands Liverpool classed as Minor Aquifer High.
- 9.3.11 The vulnerability maps are produced by the Environment Agency as a screening tool to help in the initial assessment of the risks posed by a surface-based activity (on the land/soil) to groundwater.

⁵⁵ BGS, Solid and Drift Geology Sheet 96, Liverpool, 1: 50,000

⁵⁶ BGS, Solid and Drift Geology Sheet 97, Runcorn, 1: 50,000

⁵⁷ These are now referred to as 'Principal', 'Secondary A' and 'Secondary B' under the revised Aquifer Designation Maps for superficial and bedrock classifications.

- 9.3.12 There are a number of major groundwater sources and associated Source Protection Zones (SPZs) (Figure 9-5), within the Mersey Heartlands. The SPZs classify groundwater source catchments into three zones:
- **SPZ1:** Defined as the 50 day travel time from any point below the water table to the source;
 - **SPZ2:** Defined by a 400 day travel time from a point below the water table; and
 - **SPZ3:** Defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source.
- 9.3.13 The Liverpool Mersey Heartland is not within a designated SPZ. However, a small part of the Wirral Mersey Heartland around Birkenhead and Tranmere is within SPZ1, and located in SPZ2 and SPZ3.
- 9.3.14 The Environment Agency publication Groundwater Protection: Policy and Practice (GP3)⁵⁸ sets out their approach to groundwater protection and management. The following policies contained in Part 4 of that document are particularly relevant to discharge of surface water to groundwater sources from new development and redevelopment:
- *“Providing there is no pollution, we will encourage the augmentation of groundwater resources through techniques such as SuDS and artificial recharge, particularly where resources are scarce, or where such activities would reduce flood risk from development”.*
 - *“Other than inside SPZ1, we will support the use of sustainable drainage systems for new discharges to ground of surface run-off from roads, vehicle parking and public/amenity areas, provided that an appropriate level of risk assessment demonstrates the groundwater conditions to be suitable. There should be adequate protective measures for groundwater and arrangements for effective management and maintenance of the system. (CIRIA 2000, 2004, 2007. SUDSWG)”.*
- 9.3.15 The existence of SPZs therefore does not mean that SuDS cannot be implemented as part of new development; however the Environment Agency have advised that infiltration SuDS may not be appropriate in SPZ1 and within SPZ2 and SPZ3 the guidance underlines the need for source control of potential contaminants to protect groundwater resources. Consequently, the constraint on the use of infiltration-based SuDS is classified as amber in areas where SPZs exist in the study area and the applicability of SuDS should be determined on a case by case basis for new developments as part of the evidence to support planning applications in these areas.

⁵⁸ Groundwater protection: Policy and practice (GP3), Part 4 – Legislation and Policies, Environment Agency, 2008

Enhancement of Green Infrastructure through SuDS

9.3.16 SuDS can be broadly split into two types: source control and site control. Source control methods aim to control runoff at or close to the source e.g. green roofs, rainwater harvesting. Site control is the management of runoff from several areas e.g. the use of ponds. Table 9-1 has been reproduced from the SuDS Manual, CIRIA C679 and outlines typical SuDS components, particularly site control types, which can be applied to reduce site runoff and contribute to the enhancement of Green Infrastructure in the Mersey Heartlands.

Table 9-1: Typical SuDS Components

Component Description	Example
Filter Strips	These are wide, gently sloping areas of grass or other dense vegetation that treat runoff from adjacent impermeable areas.
Swales	Swales are broad, shallow channels covered by grass or other suitable vegetation. They are designed to convey and/or store runoff, and can infiltrate the water into the ground (if ground conditions allow).
Infiltration Basins	Infiltration basins are depressions in the surface that are designed to store runoff and infiltrate the water to the ground. They may also be landscaped to provide aesthetic and amenity value.
Wet ponds	Wet ponds are basins that have a permanent pool of water for water quality treatment. They provide temporary storage for additional storm runoff above the permanent water level. Wet ponds may provide amenity and wildlife benefits.
Extended Detention Basins	Extended detention basins are normally dry, though they may have small permanent pools at the inlet and outlet. They are designed to detain a certain volume of runoff as well as providing water quality treatment.
Constructed Wetlands	Constructed wetlands are ponds with shallow areas and wetland vegetation to improve pollutant removal and enhance wildlife habitat.
Filter Drains and Perforated Pipes	Filter drains are trenches that are filled with permeable material. Surface water from the edge of paved areas flows into the trenches, is filtered and conveyed to other parts of the site. A slotted or perforated pipe may be built into the base of the trench to collect and convey the water.

9.3.17 The Green Infrastructure Strategy for Liverpool (although not adopted) identifies a number of actions that can be implemented across the administrative area whilst considering constraints. The strategy encourages actions to actively encourage the use of SuDS (Action 3.3) across Liverpool. Further to this, promotion of green roofs is actively encouraged (Action 3.4).

9.3.18 The Wirral WCS recommended that the WwTWs in Wirral could also potentially contribute directly to initiatives within the Green Infrastructure Strategy, for example in the form of the creation of wetland green infrastructure (e.g. the creation of ponds and reed beds both of which are UK BAP priority habitats or using treated effluent to supply new water features). This is mainly associated with action plan area W2 (Birkenhead & Wallasey housing renewal

areas, including Wirral Waters⁵⁹), through the settlement-focussed initiative of 'urban river & water management'.

- 9.3.19 The Flood Risk Regulations and the Flood & Water Management Act give Lead Local Flood Authorities statutory responsibilities with respect to local flood risk management, including the duty to adopt SuDS through the SuDS Approving Body (SAB). The duty to adopt SuDS does not apply to a drainage system or parts of it designed only to provide drainage for a single property. This implies that under the Act the Councils would be responsible for the approval and maintenance of SuDS serving multiple properties, unless a developer volunteers to adopt the SuDS and for individual systems connected to a single property, the owner of the property will be responsible for its maintenance.
- 9.3.20 The Floods and Water Management Act states that SuDS must be constructed in accordance with the national standards for sustainable drainage. However, the national standards for sustainable drainage are still in development. On 20 December 2011 the Government launched a public consultation presenting proposals to implement the requirements for SuDS in new and redeveloped sites in England, which are provided for in Schedule 3 of the Flood and Water Management Act (2010)⁶⁰. The consultation period ended in March 2012. In the interim, the SuDS manual by CIRIA⁶¹ provides the most comprehensive guidance and best practice with regard to the design and maintenance of SuDS.

Key Findings

- 9.3.21 According to the broad assessment carried out in the Outline WCS, infiltration based SuDS systems are applicable in the majority of the Mersey Heartlands, with the exception of the small area that falls within SPZ1, provided adequate source control measures are put in place to prevent ground water contamination, and SuDS are designed to the national SuDS standards or the SuDS Manual (C697). A combination of SuDS methods appropriate to specific developments, will therefore be required to manage surface water across the Mersey Heartlands.

⁵⁹ Mersey Dee Alliance, Green Infrastructure Framework for North East Wales, Cheshire and Wirral, March 2011

⁶⁰ DEFRA, Reducing the threats of flooding and coastal change, <http://www.defra.gov.uk/environment/quality/water/sewage/sustainable-drainage/>

⁶¹ CIRIA (2007) The SUDS Manual C697

Figure 9-4: Groundwater Vulnerability Map

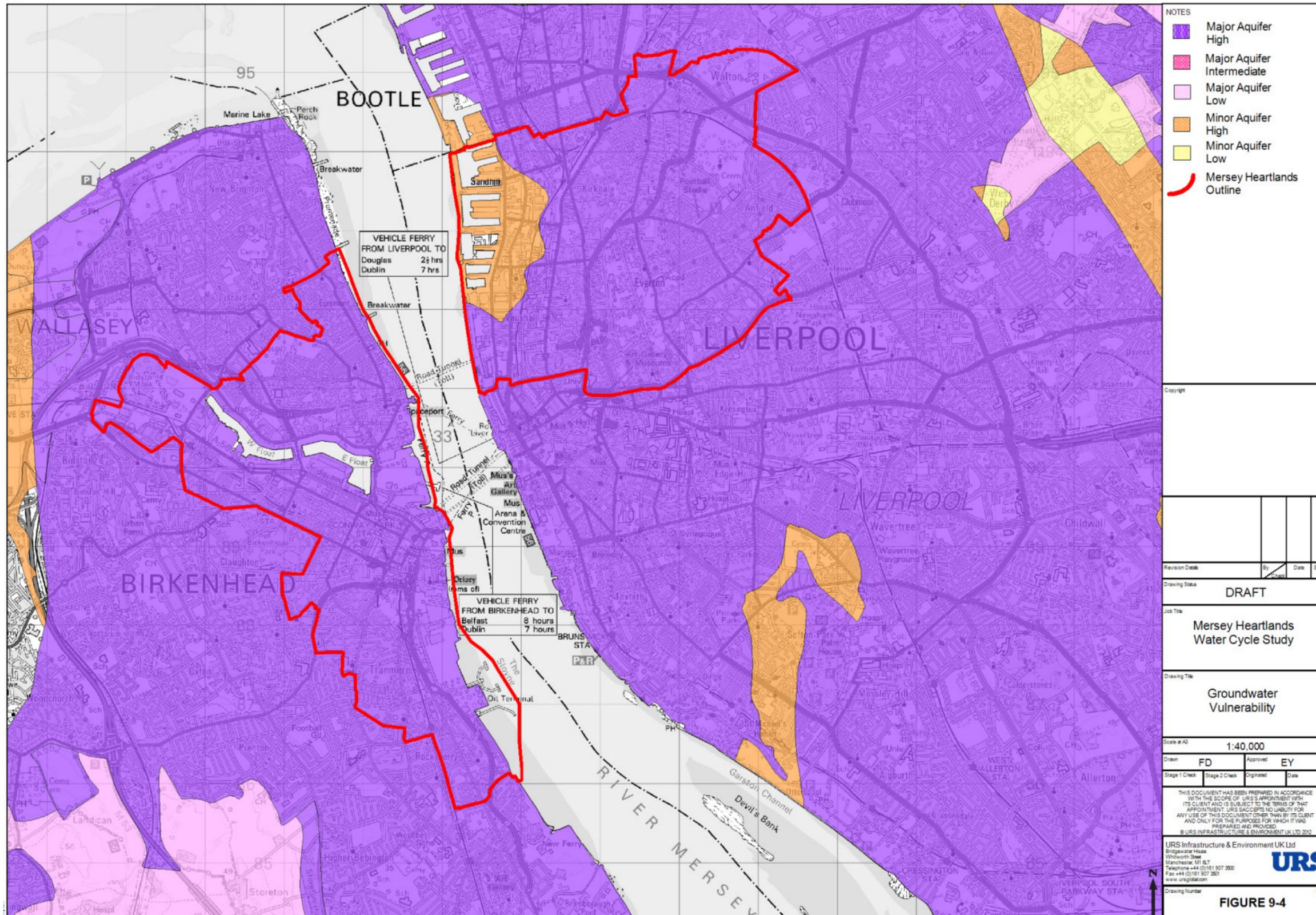
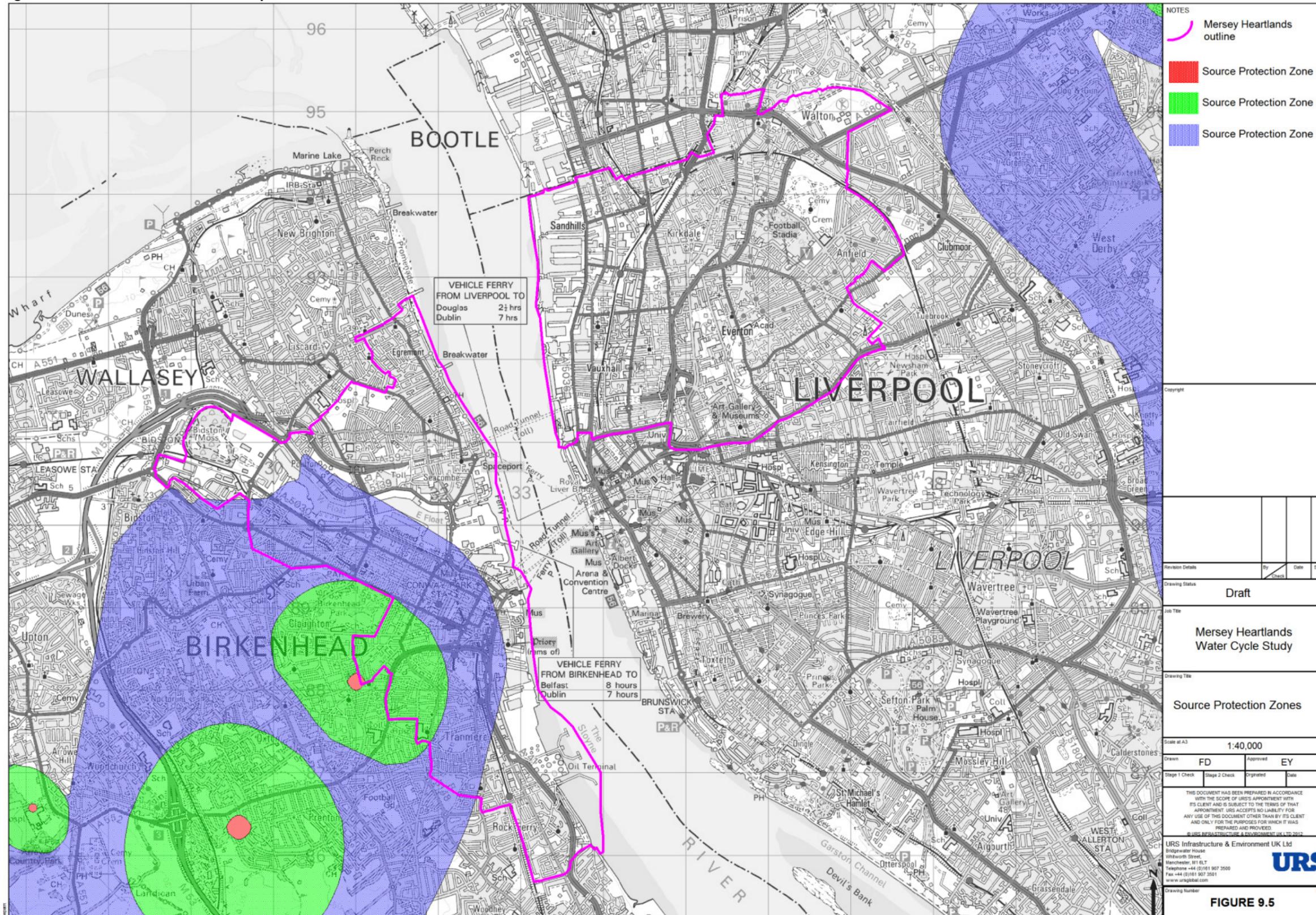


Figure 9-5: Source Protection Zone Map



10 Mersey Heartlands Assessment

10.1 Introduction

- 10.1.1 The WCS report has identified constraints in terms of proposed growth within the Mersey Heartlands in relation to the three key components of the 'water cycle':
- water resources;
 - wastewater treatment; and
 - flood risk and surface water management.
- 10.1.2 The resultant outcome is presented in the form of a constraints matrix for the Liverpool and Wirral Mersey Heartlands. The matrix has been designed so that the amount of subjective interpretation of the data is minimised, although a certain degree of subjectivity still remain, not least due to the high level, strategic nature of the Outline WCS.
- 10.1.3 The most relevant and important constraints have been identified to aid the prioritisation and allocation of development within the Mersey Heartlands. For the purpose of the constraints matrices the results were amalgamated and put into generic colour coded categories, as outlined below.
- 10.1.4 In relation to the colour coding, it is important to note that a colour coding of red does not necessarily mean that the proposed development cannot take place, rather, it merely indicates that if development were to take place greater, more significant, and potentially costly constraints would have to be overcome, which would most likely involve a higher level of infrastructure investment or greater strategic planning.
- 10.1.5 The constraints matrix and traffic light colour coding has been applied to the Mersey Heartlands, as described further in the subsequent sections.

10.2 Initial Phasing Recommendations

- 10.2.1 Due to the lack of detail on preferred development sites at this stage of the Local Plan process, it has not been possible to develop an overall Outline Strategy for the provision of infrastructure within the study area. However, key constraints have been identified for the Mersey Heartlands and hence initial recommendations on likely impact of these constraints on phasing of development has been provided, along with interim advice on how applications for development should proceed until a detail assessment has been completed.

Wirral Mersey Heartland

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Supply – Wirral Mersey Heartland is located within UU's Integrated Water Resource Zone. This zone has forecasted supply surplus to 2020, with supply matching demand to 2035	Treatment – Birkenhead and Bromborough WwTWs have sufficient capacity within the DWF consent to treat additional foul flows from growth.	No ecological constraints were identified in relation to water abstractions or discharges. Development levels are considered unlikely to materially increase impacts on European sites.	Most of the area lies within flood Zone 1; part of the area close to Birkenhead Dock is located in Flood Zone 3. The risk of flooding from the Mersey and the Birket is therefore generally low. As some of the developments planned for the area are high rise buildings they will need a deep foundation, which may be vulnerable to groundwater flooding. Flood Risk assessments considering all sources of flooding should be carried on a site specific basis for proposed development once the precise locations have been established.	The area has permeable underlying geology but is partly located in Source Protection Zones 1, 2 and 3 The suitability for SuDS and surface water management is feasible, but need to be assessed on a site-by-site basis. A strategic approach to surface water management could be a viable option. Early consultation with UU to determine available capacity and strategic solutions to surface water management should be undertaken for new developments.
Transmission – The majority of the SHLAA sites are identified as having low resource availability, predominantly associated with the requirement for network reinforcement and pressure issues, particularly around the Docks area	Transmission – Sparse sewer network around the Dock area, the existence of 5 pumping stations and a CSO suggest that the existing sewer network is not likely to sustain the significant growth in the area.			

Development Phasing and Interim Planning Implications

- 10.2.2 The water supply network surrounding SHLAA sites has been identified as having potential limitations on supplying water. For the Wirral Mersey Heartland potentially serious constraints have been identified with the transmission of supply and it has therefore been classified as red. Liaison with UU is therefore recommended prior to development so as to ascertain if additional infrastructure is necessary to supply the site.
- 10.2.3 Similarly, the sewer network may be limited by pumping stations, a storage tank and potential impact on CSO discharges. Therefore, liaison with UU is recommended prior to development to determine available capacity and clarify the need for additional connections. The purpose of the liaison is to allow the developer to demonstrate to the Council and other regulatory bodies (the Environment Agency) that consideration of the impacts of connecting has been taken into account. It is recommended that an informative on any planning application is provided.
- 10.2.4 It is recommended that advice on appropriate SuDS should be sought from WC as the SAB (SuDS Approval Body) under the Floods & Water Management Act prior to submission of details (designs and calculations) to support a planning application. For those developments located within an SPZ or where contaminants have been identified on site, there is an increased potential for pollution from inappropriately located and/or designed infiltration SuDS (such as soakaways, unsealed porous pavement systems or infiltration basins) to transport contaminants into vulnerable groundwater resources and controlled waters. Therefore, for these areas, it is recommended that the Environment Agency are consulted early in the development process as a risk assessment may be required to demonstrate that pollution to groundwater would not result and that the proposed SuDS are compatible with the Groundwater Protection Policy⁶².
- 10.2.5 Developers should seek guidance from WC and the EA on whether a site specific flood risk assessment is required for sites located in Flood Zone 1. If development sites are located in Flood Zones 2 or 3, a Level 2 (and possibly) Level 3 site specific FRA will be required to show that these sites can fulfil the Exception Test under NPPF, depending on the risk of flooding and vulnerability classification of the development.
- 10.2.6 Proposals for runoff management from sites should include mitigation measures to ensure water quality effects do not impact on ecological sites.

⁶² Groundwater protection: Principles and Practice (GP3), LIT 7562, November 2012, V1, Environment Agency

Liverpool Mersey Heartland

Water Resources	Wastewater Treatment and Transmission	Ecology	Flood Risk Management	Surface Water Management & SuDS Potential
Supply – The Liverpool Mersey Heartland is located within UU’s Integrated Water Resource Zone. This zone has forecasted supply surplus to 2020, with supply matching demand to 2035.	Treatment - The proposed growth can be accommodated within existing available headroom at Sandon Dock WwTW.	No ecological constraints were identified in relation to water abstractions or discharges. Development levels are considered unlikely to materially increase impacts on European sites.	The area lies predominantly within FZ1. The area near the Dock is located in Flood Zone 2/3 associated with tidal flood risk; however, the overall risk of flooding is considered to be reasonably low. Flood Risk Assessments considering all sources of flooding should be undertaken on a site specific basis for proposed development once site allocations have been made.	Most of the area has permeable underlying geology and there are no groundwater Source Protection Zones present. The suitability for infiltration SuDS is feasible, however, it will need to be assessed on a site-by-site basis.
Transmission – Sufficient data was unavailable to analyse water supply network capacity at this stage of the WCS.	Transmission – Specific constraints could not be identified at this stage as development sites are not known. High level assessment indicates good sewer network coverage and historical records have not indicated problems with sewer flooding, although the presence of storm water storage tanks indicate potential capacity issues. Further study will be required to more accurately assess capacity constraints once development sites allocations are known.			

Development Phasing and Interim Planning Implications

- 10.2.7 It has not been possible to assess the water supply network in the study as the data required was not available. It is recommended that the requirement to undertake a pre-development enquiry regarding water supply availability with UU, forms part of a section 106 planning condition to consent. Permission can then be granted, but conditioned that discussion must take place before development commences.
- 10.2.8 The sewer network may be limited as indicatively demonstrated by the presence of storage tanks and potential impact on CSO discharges. Until the capacity is assessed in full, planning permission for development can be conditional upon clarification from UU that capacity is available to connect. It is recommended that the requirement to undertake a pre-development enquiry on sewer capacity with UU forms part of a section 106 planning condition to consent. Permission can then be granted, but conditioned that discussion with UU must take place before development commences.
- 10.2.9 Site investigations may be required to inform the decisions on infiltration relating to ground contamination, and infiltration testing may be required as part of any SuDS approval. Advice should be sought from LCC as Lead Local Flood Authority under the Flood & Water Management Act and as the designated SuDS Approving Body under that Act.
- 10.2.10 Developers should seek guidance from LCC and the Environment Agency on whether a site specific flood risk assessment is required for sites located in Flood Zone 1. If development sites are located in Flood Zones 2 or 3, a Level 2 (and possibly) Level 3 site specific FRA will be required to demonstrate that these sites can fulfil the Exception Test under NPPF, depending on the risk of flooding and vulnerability classification of the development.
- 10.2.11 Proposals for runoff management from sites should include mitigation measures to ensure water quality effects do not impact on ecological sites.

11 Climate Change

11.1 Introduction

11.1.1 The Outline WCS incorporates the 2009 UK Climate Projections (UKCP09) and identifies the potential impacts on flood risk, surface water management, water supply, wastewater management and water environment elements of the water cycle.

11.1.2 Specifically, the assessment identifies:

- the impact of projected changes on water cycle elements and infrastructure;
- the impact of climate change on flood risk; and
- the planning considerations required as a result of the above.

Climate Change Projections and Impacts on the Water Cycle Elements and Infrastructure

11.1.3 Table 11-1 shows the potential effects of climate change on key parameters affecting the water environment in the North West of England from the latest UKCP09 projections.

Climate Change Projections and Impacts on Flood Risk

11.1.4 It is widely accepted that Climate Change is likely to have a large impact on all sources of flood risk. UKCP09 suggests that the risk of inland flooding (fluvial, surface water, sewer and groundwater) is likely to increase as a result of a greater number of rain days throughout winter months and an increase in heavy and convective storms during both winter and summer months. Similarly, tidal and coastal flood risk is set to increase as a result of sea level rise. The potential result is that areas that are currently classed as having a lower flood risk (Flood Zone 1) may have an increased risk of flooding in the future and be classed as a medium to high risk (Flood Zones 2/3) in the future. Furthermore defences currently considered to be at an acceptable standard of defence might require further works in the future as a result of climate change.

Planning for Climate Change Projections

11.1.5 Figure 11-1 illustrates the potential climate change impacts on the Mersey Heartlands water cycle elements based on the projected climate change for the region. Table 11-2 provides a summary of the potential adaptation and mitigations options that should be considered for the Mersey Heartlands Outline WCS. This list is not exhaustive and should be expanded in further investigations once development locations have been confirmed, to enable location specific adaptation/mitigation considerations.

Table 11-1: UKCP09 Projections for North West of England (High Emissions Scenario)

Climatic Variable	Year	Projected Change (compared to 1961-1990 baseline under high emissions scenario)		
		10% (very unlikely to be less than)	50% (central estimate)	90% (very unlikely to be greater than)
Winter Mean Temperature	2020s	0.3°C	1.2°C	2.0°C
	2050s	1.2°C	2.1°C	3.3°C
	2080s	1.9°C	3.1 °C	4.8°C
Summer Mean Temperature	2020s	0.6°C	1.5°C	2.5°C
	2050s	1.5°C	3.0°C	4.7°C
	2080s	2.5°C	4.7°C	7.3 °C
Annual Mean Precipitation	2020s	-6%	0%	6%
	2050s	-7%	0%	8%
	2080s	-10%	1%	12%
Winter Mean Precipitation	2020s	-4%	4%	13%
	2050s	3%	13%	27%
	2080s	9%	26%	50%
Summer Mean Precipitation	2020s	-19%	-5%	10%
	2050s	-37%	-18%	2%
	2080s	-51%	-28%	-2%

Figure 11-1 : Potential Climate Change Impacts on the Mersey Heartlands Water Cycle Elements

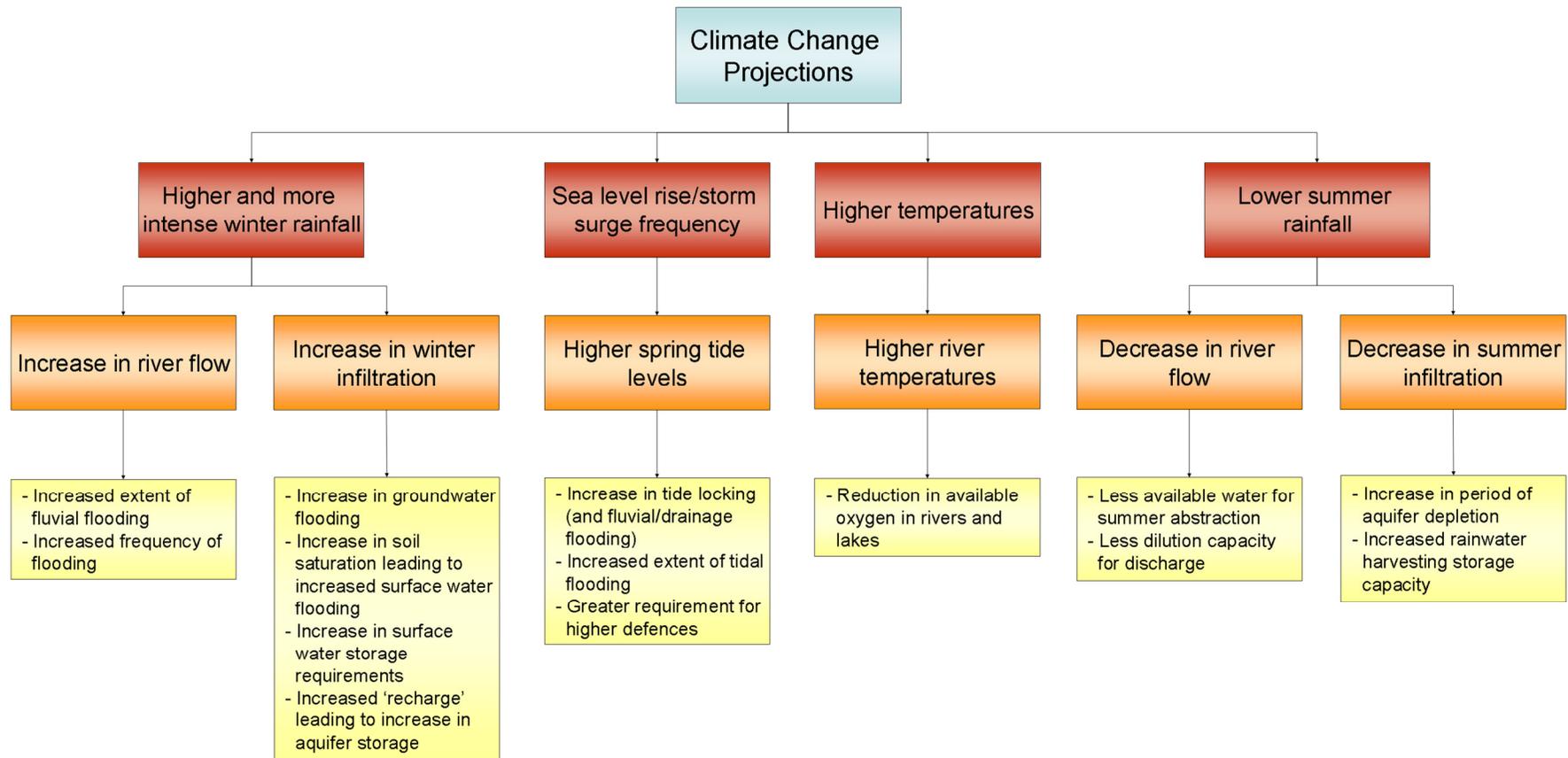


Table 11-2: Summary of adaptation/mitigation considerations for the Mersey Heartlands WCS

Water Cycle Element	Impact of Climate Change	Adaptation and Mitigation Measures
Water Resources & Supply	Hotter, drier summers will affect water supply and demand	Ensure regional drought plans take into account the impacts of climate change
		UU WRMP has predicted a potential deficit in the integrated WRZ by 2022-23. Mersey Heartlands should contribute to managing water demand through encouraging increased water efficiency in homes, businesses, industry and agriculture
	Low river flows and groundwater levels will increase water pollution	Ensure that water abstraction is sustainable through monitoring Improve river basin management plans through the Water Framework Directive
Flood Risk	Increased flood risk will pose a greater threat to property and infrastructure	Regional flood risk strategies to account for rising sea levels and climate change
		Ensure Planners are aware of appropriate locations for new development
	Sea level rise could lead to longer pumping times and larger area requirements for attenuation as a result of longer tide-locking and runoff rates and volumes will increase	Engage communities in managing flood risk
Wastewater Collection & Treatment	Greater volume of surface water runoff entering combined sewer systems and WwTW as a consequence of more intense storms	Ensure that adequate strategic approach to surface water management is in place and encourage dialogue and involve UU in search for solutions at an early stage
		Record of sewer and surface water flooding emphasises the importance of managing surface water runoff from new developments to reduce the volume entering combined sewers by separating foul from surface water.
Water Quality, Ecology & Biodiversity	Changes in temperature, rainfall and sea level rise will affect species and habitats	Ensure climate change mitigation strategies are in place for species and habitats at risk, e.g. Biodiversity Action plans
	Warmer summer temperatures may increase tourism	Continually monitor water quality
	Hotter, drier summers and extreme weather events may increase soil erosion and therefore cause increased runoff/pollution from agricultural runoff to receiving watercourses	

Recommendations for Further studies

- 11.1.6 It is recommended that further studies are undertaken to determine the following, once preferred development sites are known:
- Sensitivity assessment of the predicted climate change impacts including the impact of different rates of sea level rises on flood risk (where feasible).
 - Guidance on Mitigation and Adaptation measures for new development (to effects of climate change), including:
 - design of water management systems (e.g. rainwater harvesting during lower rainfall periods in the summer);
 - design of SuDS and drainage systems to manage surface water; and
 - consider impact of infrastructure solutions on climate change (as part of Sustainability Analysis).
 - Climate Change Impacts Timeline and impacts/considerations for water cycle elements.

12 Outline Policy Guidance

12.1 Introduction

- 12.1.1 The following policy recommendations are made to ensure that the emerging Local Plan, Core Strategy and the Sites and Policies Development Plan Documents, for Liverpool and Wirral considers potential limitations (and opportunities) presented by the water environment and water infrastructure on growth, and phasing of growth in the Mersey Heartlands.

12.2 Water Cycle Policy

- 12.2.1 This section draws on the various assessments undertaken in this Outline WCS. It summarises the key issues and opportunities and suggests direction for policies to be included in Liverpool's and Wirral's Local Plan, to help ensure that the aims of this WCS and a sustainable water environment are achieved. Flood risk policies relating to the sequential approach to site allocation have not been included as these are already covered by existing Local Plan policies.

12.3 General

Development Phasing

Policy Recommendation 1: Development Phasing

- 12.3.1 It is recognised that further detailed analysis will be required as part of the site allocation appraisal to assess the impact on existing and future water services infrastructure required to deliver the proposed housing. However, it is recommended that prior to new homes being built, agreement should be sought with the water and wastewater utility providers so that, sufficient capacity in existing or future water services infrastructure is available in accordance with the Mersey Heartlands Outline WCS or measures are taken to mitigate any concerns or objections.
- 12.3.2 **Reason:** *The WCS has demonstrated capacity within some of the existing infrastructure; however this capacity is limited and upgrades (or new) infrastructure may be required at certain locations to deliver full housing requirements. Developments must not be permitted to proceed until the water services infrastructure is in place to service them.*

Wastewater Treatment and Transmission

Policy Recommendation 2: Wastewater Network

- 12.3.3 Recognition is given to the fact that solutions to remedy limitations in the existing wastewater network may be required in some locations to connect new development areas and transfer the wastewater generated to the WwTW for treatment.

- 12.3.4 **Reason:** As specific development sites are not yet available, only a high level assessment of the wastewater network has been carried out. Although network coverage is generally good, the presence of pumping stations and storm water storage tanks suggests possible capacity limitations. The Local Plans need to ensure that the transfer of wastewater from developments to WwTW is fully supported.

Water Resources & Supply

Policy Recommendation 3: Protection of Water Resources

- 12.3.5 Any new development should not adversely affect Source Protection Zone 1. In Source Protection Zones 2 and 3 adequate source control measures should be provided to prevent ground water contamination and satisfy the Environment Agency that the risk is acceptable. SuDS design should follow the national SuDS standards currently being developed as and when they become available or the SuDS Manual (C697).
- 12.3.6 **Reason:** The WCS has highlighted that water supply in the study area is highly dependent on groundwater abstraction and as such, it is important to continue to protect the areas that recharge the groundwater through suitable management of surface activities. Several development locations are likely to be over or close to source protection zones around abstraction boreholes and hence Environment Agency will need to be achieved for some development types in these areas.

Policy Recommendation 4: Water Demand Management

- 12.3.7 New development should aim to achieve the water use target under Code Levels 3 & 4 of the Code for Sustainable Homes.
- 12.3.8 **Reason:** The WCS has highlighted that higher levels of growth will require new development to use less water than current policy or legislative requirements and in order to achieve the aspiration of water neutrality and protect the environment, all new development must aspire to be as water efficient as possible.

Flood Risk and Drainage

Policy Recommendation 5: Site drainage

- 12.3.9 All new developments, including those that are on brownfield sites, where feasible should be served by separate surface water and wastewater drainage. No new development will be permitted to discharge surface runoff directly into foul drainage connections without prior agreement from the utility provider and consultation with the Lead Local Flood Authority.
- 12.3.10 **Reason:** The WCS has highlighted that sewer flooding and CSOs are an existing concern in several growth areas and that with climate change, capacity will be limited. Therefore further discharges of surface water to foul or combined drainage should not be permitted, unless approved by UU, to prevent exacerbation of existing problems.

Policy Recommendation 6: Surface Water Management

- 12.3.11 All new developments, including those on Brownfield sites, should provide sufficient surface water management and attenuation to ensure that flood risk from the development as a result of surface water runoff can be managed in line with the requirements of the Flood and Water Management Act 2010 and NPPF both during construction and during the design life of the development. The design and adoption of SuDS should be discussed and agreed with Lead Local Flood Authority and UU.
- 12.3.12 **Reason:** *The WCS has determined that management of surface water is key to preventing exacerbation of surface water or downstream flood risk as a result of development. Therefore, design of runoff attenuation (through SuDS design) needs to be built into developments as part of the master plan and as part of the Environmental Management Plan for construction for major developments.*

Policy Recommendation 7: SuDS and Water Quality

- 12.3.13 Development should not have a detrimental impact on the water environment through changes to water chemistry or resource and this should be ensured through the use of drainage systems which limit pollution to the water environment.
- 12.3.14 **Reason:** *Management of surface water drainage needs to consider quality of discharge in addition to quantity. Several hydrologically linked statutory and non-statutory ecological sites have been identified in the study area, which need to be protected from deterioration in water quality as a minimum requirement of the Water Framework Directive.*

13 Conclusions & Further Work

- 13.1.1 This Outline WCS has highlighted the key constraints to growth in the Mersey Heartlands has identified:
- where there are solutions to utilise existing infrastructure;
 - where more detailed solutions will need to be investigated in further work;
 - where there are potential phasing implications;
 - the feasibility of achieving water neutrality and what measures might be needed; and
 - the outline implications of climate change impacts and adaptation.
- 13.1.2 The study has demonstrated that there are some potential limitations to achieving growth that needs to be investigated further in order to determine if there is a potential infrastructure solution. No show-stoppers have been identified in the Outline WCS and a detailed WCS is not required at this stage.
- 13.1.3 This Outline assessment has been undertaken at a strategic level based on best estimates of where growth is likely to occur. At the time of undertaking the study, LCC or WC were not in a position to provide a preferred list of development sites to allow a more detailed site specific assessment. Further investigations will be required to assess the potential impact of proposed growth when a preferred list of development sites is produced.

13.2 Wastewater

- 13.2.1 The proposed growth in the Liverpool Mersey Heartland and growth in the wider catchment, can be accommodated in the existing discharge consents for Sandon Dock WwTW.
- 13.2.2 The proposed growth in the Wirral Mersey Heartland can be accommodated in the existing consent for Birkenhead and Bromborough WwTW.
- 13.2.3 The sensitivity of growth distribution (for both the Mersey Heartlands and wider Wirral area) in the catchment of Bromborough WwTWs should be tested further, because the calculated DWF as a consequence of growth has been shown to be within 10% of the consented DWF. This should be investigated when more robust information on site distribution becomes available.
- 13.2.4 Further investigation may be required when a preferred list of development sites becomes available, depending on the scale of development within the WwTW drainage area, to determine whether:
- the increase in flow is likely to affect water quality;
 - there are likely to be adverse ecological impacts as a result of increases in discharges;
 - if the outcome of the above listed stages concludes a detrimental impact, consider whether alternative discharge location options are available in conjunction with the EA;
 - consider whether changes in per capita consumption (water efficiency and achieving water neutrality), occupancy rate and changing population may free up headroom at

the WwTW to allow development to proceed without the need to increase consented flow.

13.2.5 Further investigations will also be required to determine the impact of growth and phasing of development on the wastewater transmission infrastructure, as outlined below:

- in conjunction with UU, determine whether process capacity upgrades are technically and physically possible at site, determine quick wins and what impact the timing of upgrades have on phasing of development; and the impact that delivering such solutions will have on:
 - phasing for key growth areas; and
 - deliverability of sites and infrastructure (cost and practicality).
- Modelling of network capacity may be required at several key locations (once precise development locations are known) to determine if upgrades to sewer mains, pumping stations or storage tanks is necessary. It is recommended that this is carried out by UU using their existing models for Liverpool and Wirral, covering the Mersey Heartlands.
- A sensitivity assessment of capacity and likely requirement for upgrades and new sewers should be undertaken in conjunction with UU to determine the impact on pumping station and storage capacity and required upgrades once development locations are known.

13.3 Water Supply

13.3.1 Once preferred development locations are known, it is recommended that further investigations are undertaken to assess the resilience in water supply trunk mains, pumping stations and water treatment works in key locations in collaboration with UU, to determine if and when upgrades need to be made and what impact this will have on development phasing.

13.3.2 Water Neutrality is not absolutely necessary within the Integrated WRZ, however, it is recommended as a worthy aspiration. A detailed pathway to neutrality should be developed in conjunction between LCC/ WC and UU to determine the exact requirements for achieving neutrality in terms of policy, developer contributions, funding implications, community involvement and what is technically required from new development.

13.3.3 Based on the current projections of supply and demand highlighted in the UU WRMP, it is anticipated that UU's Integrated Supply Zone can supply additional demand for water. However, on publication of the next WRMP, which has been submitted to Defra for public consultation, it is recommended that LCC/ WC liaise with UU to ensure that this is still the case.

13.4 Flood Risk Management

13.4.1 More detailed assessment of SuDS requirements should be provided for preferred development sites when known, including deriving values for permitted runoff rates and options for linkage with green infrastructure;

- 13.4.2 Policy recommendations need to be provided in the study to set out how sustainable drainage will be achieved by developers, and how the strategic aspiration to move to 100% separation of surface water runoff and foul water drainage can be achieved through collaboration between the relevant stakeholders; and
- 13.4.3 Further studies are recommended to build on the Liverpool and Wirral PFRAs and LFRMS to investigate the risk and management of flooding from Ordinary Watercourses and the potential consequences of sewer flooding in collaboration with UU and WC.

13.5 Infrastructure Solutions and Phasing

- 13.5.1 Measures to achieve water neutrality should be investigated further in collaboration with UU to be considered as an option for reducing water demand and providing potential solutions to limited wastewater treatment capacity and provision of sustainable water supply.
- 13.5.2 Infrastructure phasing timelines should be produced for the Mersey Heartlands to determine impact of infrastructure and mitigation provision on housing delivery in collaboration with UU.

13.6 Climate Change Assessment

- 13.6.1 It is recommended that, once preferred development sites are known, further studies should be undertaken to build on the work undertaken in the Outline WCS to provide:
- Sensitivity assessment of the predicted climate change impacts, including Impact of different rates of sea level rises on flood risk (where feasible);
 - Guidance on Mitigation and Adaptation measures for new development (to mitigate against the effects of climate change), e.g.
 - design of water management systems (e.g. larger storage volumes for rainwater harvesting during lower rainfall periods in the summer);
 - design of SuDS and drainage systems; and
 - consider impact of infrastructure solutions on CC (as part of Sustainability Analysis).
 - Climate Change Impacts Timeline and impacts/considerations for water cycle elements.