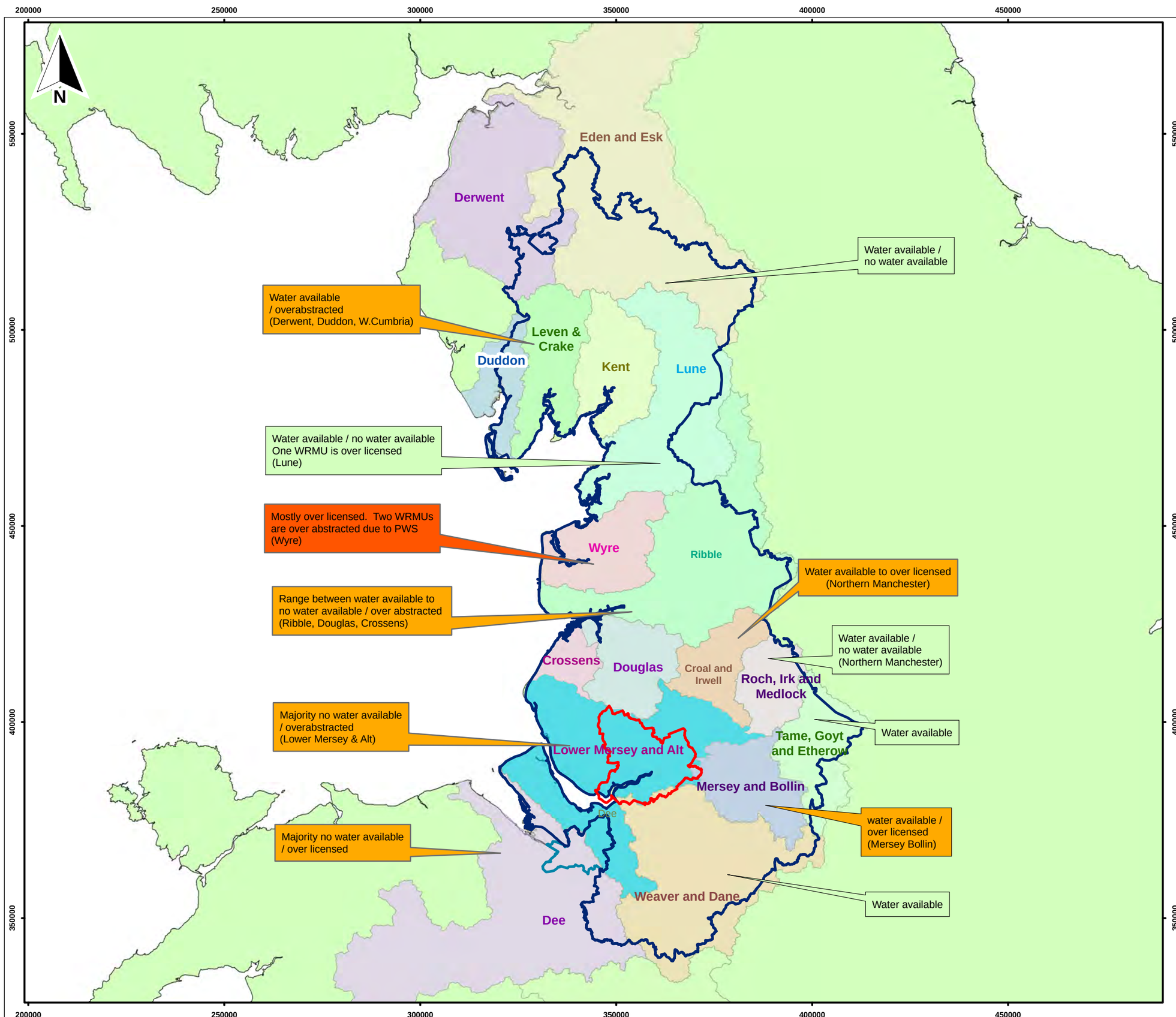

Key:

- Mid Mersey study area
- UU Integrated WRZ

CAMS

- Lower Mersey and Alt
- Croal and Irwell
- Crossens
- Dee
- Derwent
- Douglas
- Duddon
- Eden and Esk
- Kent
- Leven and Crake
- Lune
- Mersey and Bollin
- Ribble
- Roch, Irk and Medlock
- Shropshire Middle Severn
- Tame, Goyt and Etherow
- Weaver and Dane
- Wyre

UU = United Utilities
PWS = Public Water Supply

0 4.5 9 18 27 36
Kilometers
Scale: 1:1,100,000

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Mid Mersey Outline Water Cycle Study

Figure 4.4
CAMS in the water resource zone

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4.2.4 Water Supply Infrastructure

The extensive links between sources of supply and the centres of demand in the Integrated Zone means that developments in Warrington, Halton and St. Helens are more likely to be constrained by water supply infrastructure than by water resource availability. To support this Outline WCS United Utilities has examined the total number of expected development sites as set out in the SHLAA for all three Councils. United Utilities has assessed the impact on water supply of the existing distribution network and has categorised and defined sites as follows:

- High resource availability.

Infrastructure connectivity in the area is robust. There is no evidence of pressure problems within the existing customer base. Connection requests are likely to progress with minimal disruption and lead time.

- Medium resource availability.

The existing infrastructure may be inadequate for planned development. Modelling may be required to process requests for new connections. This would increase the lead time before the infrastructure is in place. It would also potentially incur costs to potential developers.

- Low resource availability.

There are known concerns with further developments in this geographical area. Modelling is definitely required to process new connection requests. It is highly likely that developers will be required to invest capital. Lead time before the infrastructure is in place may be significant. This should be factored into any planned developments in such areas.

Table 4.4 summarises the locations where the infrastructure is constraining water supply. It is important to consider the following caveats when interpreting this assessment:

- This evaluation is based upon a case-by-case basis for a single development. Multiple developments over time in a concentrated area will impact on the resource availability rating;
- In any significant connection request, there is a need to evaluate via modelling the impact on the surrounding network to ensure that customer serviceability in regards to pressure and availability of water is not negatively impacted.

The assessment focussed on housing development sites. For employment sites, water supply is normally planned based on volumes identified as being required by the developers. It is more difficult to proactively manage and plan for because industrial sites may use water for a wide range of uses for example, for domestic (kitchen, toilets) purposes, or for process use in manufacturing. Consequently, the relationship between employment land use and water demand is difficult to define and plan for.

Table 4.4 Water Supply Constraints

Council	Constraint Level	Comments
Warrington		The majority of sites are not constrained by supply infrastructure.
		There are minor supply network issues constraining development in Warrington town centre. These will be addressed through the Warrington Supply Improvements scheme. No action for Councils.
		High Warren service reservoir network periphery: developers would need to fund network enhancements (such as mains reinforcement) to ensure that development here would not result in low pressure for existing customers. New sites in North Warrington would be fed from a strategic main that has a history of bursts. Sections of this main may require duplication and no scheme is currently in place to address this. Omega and Chapelford sites would place significant additional demand on existing network. United Utilities has identified two potential solutions: 1) Construct two link mains to Winwick and Brown Edge service reservoirs, costing approximately £25m; 2) Reinforce the south side of Omega through network enhancements delivered as part of the Widnes Waterfront development, costing around £5m and requiring 12-18 months to complete. United Utilities will not progress either solution until a requisition is received. Site 1506 Peel Hall is located in an area where existing customers might experience low pressure if development were to proceed within network enhancements. Modelling is required to determine requirements. Arpley Meadows site is difficult to access in terms of water supply network due to the Manchester Ship Canal, the River Mersey and railways bordering the site. A dedicated main, funded by developers, is likely to be required, with a 3-4 year lead time and estimated cost >£5m.
		No sites are subject to prohibitive constraints
Halton		Development within the North Widnes area is not constrained by supply infrastructure.
		Sites located within Runcorn town centre are subject to minor constraints. Due to the number of sites (around 13 identified in SHLAA) and the presence a larger site (Runcorn Docks) in the area, United Utilities consider that further investigation would be required through network modelling to confirm whether network enhancements would be required. Development in the Widnes Waterfront could not be supported by the local network. A new main will be taken from an aqueduct at Dan's Road. As development is progressed, connections to the local network will be shut off so that the development is fed directly off the Dan's Road main. This project is underway currently.
		Runcorn Docks (site 288) The developer has identified the potential of up to 4000 properties on this site. The Halton Strategic Housing Land Availability Assessment 2010 identifies a yield of 1,400 units in the period to 2026. United Utilities state that demand from development in the first 5 years could be met. However, subsequently network enhancements would be required. These could include a dedicated main to Runcorn service reservoir (2-3 years lead time) or a by-pass main (6 months lead time). Sites 266 Keckwick Lane, 853 Land Adjacent to Preston Brook Marina, 801 Delph Lane and 138 Castlefields are all identified as sites with potential connectivity issues due to the presence of transport infrastructure (sites bounded by motorways, canals and railways). This makes accessing the sites and connecting to the existing network difficult. Potential solutions exist for all sites, but would require further investigation.
		No sites are subject to prohibitive constraints

Council	Constraint Level	Comments
St. Helens		Sites in the northern and north western areas of St. Helens are not constrained by supply infrastructure (i.e. in wards of Moss Bank, Windle, West Park, and Eccleston)
		The vast majority of sites in St. Helens have medium resource availability. Depending on the actual number of developments in a given area there may be some pressure issues that would require mains reinforcement (i.e. sites 56, 132, 135, 168, 310, 404, 411, 414, 495, 506, 507, 532, 595, 604).
		Moss Bank is generally unconstrained but there are localised areas where new development may require mains reinforcement to improve supply availability (low resource availability). Site 412 in Moss Bank is identified as not being close to the supply network. Similarly, parts of Rainford, and out towards Billinge are in the same situation. Elsewhere in parts of West Park (168, 285, 333) and Thatto Heath (41, 173, 269, 317, 501, 600) the pumped supply has already been upgraded but additional reinforcements could be needed to improve the situation.
		No sites are subject to prohibitive constraints

Within the Mid Mersey area, no potential development sites have been identified as being unable to proceed due to major water supply constraints.

Warrington is served by three service reservoirs:

- Hillcliffe is located to the south of the town centre and serves south Warrington and the town centre;
- High Warren is located to the South East of Warrington and serves the Lymm area; and
- A reservoir at Winwick serves Warrington north of the town centre.

The Warrington Supply Improvement scheme is currently being implemented by United Utilities. This will allow more water to be taken from Hillcliffe service reservoir to meet demand in the town centre, reducing demand on Winwick reservoir.

Within Halton, development along the Runcorn docks may require a dedicated main or other network enhancements to service development beyond the first five-year period. The main issue is the potential cumulative impact if all the proposed sites along the Runcorn Docks are developed. If this takes place then there could be a need to increase the capacity of the network supplying this area. Elsewhere, development sites located to the east of Runcorn are constrained by existing transport infrastructure that may make it difficult and expensive to connect these sites to the water supply network. Further network modelling and investigation is required to identify potential solutions.

Across St. Helens the water supply network presents few areas of concern. The main issues to watch out for are the few sites which are not close to the network and the areas where additional reinforcements could be needed to improve pumped supplies.

Consideration of Growth in Neighbouring Authority Areas

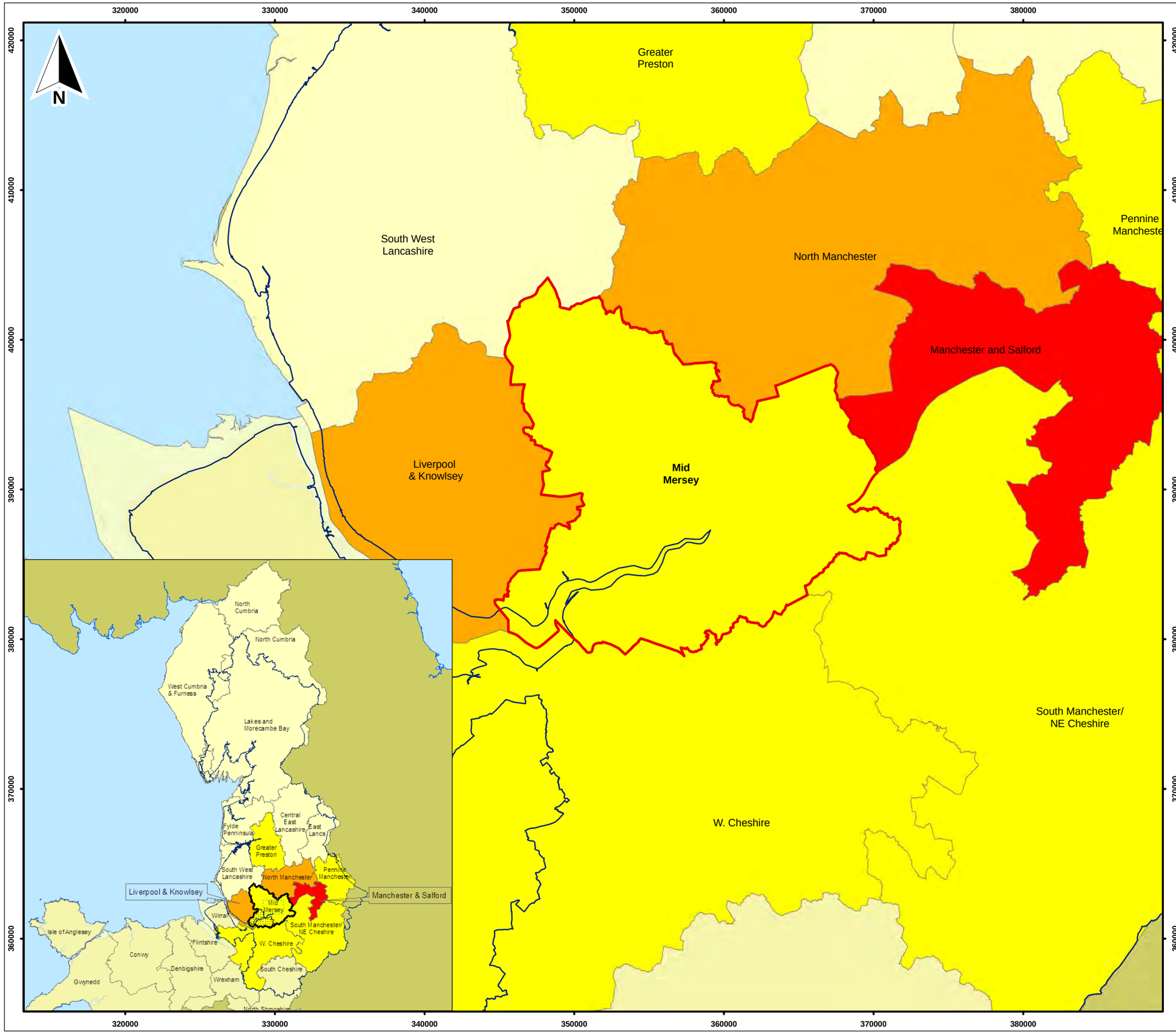
The Councils in the Mid Mersey area are three of many local authorities in the North West (within the Integrated WRZ) projecting significant growth. United Utilities has developed a strategy to secure public water supplies on the assumption that there will be a total of 609,000 new dwellings and 835,000 additional people in the Integrated WRZ by 2034/35. The company has confirmed that this assumption is based on the figures in the RSS. Figure 4.5 shows that whilst growth is expected in all areas, the majority of it will be concentrated in the southern part of the Integrated WRZ between Liverpool and Manchester. From a strategic water resource point of view water resources are not expected to be a constraint to growth.

There is insufficient detail on the location of proposed development in the neighbouring local authority areas on which to determine the potential competing pressures on the water supply network. According to the distribution pattern set out in the approved RSS, growth will be greatest in the Manchester and Salford area. However, it is reasonable to assume that this is unlikely to be adjacent to the Mid Mersey area (alongside the M62 at Chat Moss, currently undeveloped). There may be more of a risk of competing growth from Ashton-in-Makerfield/Golborne (North Manchester) adding to pressure on systems supplying Haydock. Similarly, in the west of the study area if Liverpool/Knowlsey growth is proposed for Huyton-with-Roby and Whiston this could add pressure on the system supplying the south western areas of St. Helens, e.g. Rainhill and Prescot. It is recommended that the local authorities and United Utilities liaise closely to identify early on if these risks are likely to materialise.

4.2.5 Potential Solutions

The conclusion is that growth in Mid Mersey would not be constrained by water resources on the condition that United Utilities is able to implement its WRMP, the solution of which is primarily to develop its groundwater resources at Southport and Oldham. The Local Authorities should work with the water company to identify opportunities to promote water efficiency, to reduce average per capita consumption below 144 l/p/day.

Water supply infrastructure improvements are likely to be required across the study area although the level of works will depend on the extent of development. The required upgrades do not represent significant constraints but it is clearly essential for United Utilities to be made aware of development plans at the earliest stage in order to prevent various lead times from delaying development.



Key

- Mid Mersey study area
- Local authority/sub-regional districts
- United Utilities Integrated WRZ

Scale of proposed housing growth (RSS)

- < 1100 p.a
- 1100 - 2000 p.a
- 2000 - 2500 p.a
- > 5000 p.a

WRZ = Water Resource Zone
RSS = Regional Spatial Strategy
p.a = Per Annum

Inset: growth projections across the North West and North Wales regions

0 1.5 3 6 9 12 Kilometers

Scale: 1:300,000 @ A3

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Mid Mersey Outline Water Cycle Study

Figure 4.5
Growth in neighbouring areas

Data source: Table 7.1 of the North West Regional Spatial Strategy (2008)

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4.3 Waste Water Treatment and Water Quality

4.3.1 Wastewater Treatment Capacity and Constraints

Wastewater services in the Mid Mersey area are provided by United Utilities. These are listed in Table 4.5 below and illustrated in Figure 4.7. The level of constraint currently imposed by each treatment works is summarised in Table 4.6. There are eight wastewater treatment works identified in Table 4.5. These vary in size and thus the volume of effluent that they discharge. Billinge South is a small wastewater treatment works, serving the local community however, most of the area is served by large treatment works at Warrington North, Widnes, St. Helens and Runcorn. There are also many other discharges that are consented in this area.

Table 4.5 Wastewater Treatment Works and Settlements Served

Wastewater Treatment Works	Areas Served by
Warrington North WwTW	Located to the west of central Warrington and treating wastewater from central Warrington and many of the settlements located to north. Catchment area is broadly bounded by the Manchester Ship Canal to the south, Sankey and Penketh to the West, Newton-le-Willows to the north and Risely and Birchwood to the east.
Warrington South WwTW	Wastewater treatment works located in South Warrington, taking wastewater from settlements in Warrington Borough to the south of the Manchester Ship Canal including Stockton Heath and Grappenhall.
Glazebury WwTW	Wastewater treatment works located just within the Mid Mersey area, treating wastewater from small area of Warrington Borough around Culcheth.
Irlam WwTW	Wastewater treatment works located within the Mid Mersey area, treating wastewater from small area of Warrington Borough around Hollins Green.
St. Helens WwTW	Large wastewater treatment works treating wastewater from St. Helens and surrounding settlements including Eccleston, Denton's Green, Moss Bank, and Peasley Cross.
Billinge South WwTW	Small wastewater treatment works taking flows from Billinge area.
Widnes WwTW	Large wastewater treatment works draining the Widnes area and Halton Borough Council administrative area to the north of the River Mersey. Wastewater flows from the south west of St. Helens are pumped to the Widnes wastewater treatment works.
Runcorn WwTW	Wastewater from settlements located to the south of the River Mersey in Halton Borough is treated at this works. Settlements include Runcorn, Halton, Norton and Daresbury.

In delivering this Outline WCS a wastewater workshop was held with United Utilities operational and engineering staff. The objective of the workshop was twofold:

- To identify where wastewater treatment works capacity may constrain development, either due to the hydraulic capacity of the works itself, or due to known capacity constraints of the receiving watercourse to receive additional treated effluent; and

- To identify where the capacity of the wastewater drainage network may constrain development.

The format of the workshops involved discussion of the main sites identified in each of the Councils' SHLAAs. United Utilities is not able to provide detailed modelling information relating to each development due to the time (and cost) of undertaking this work. Instead, the preferred approach was to provide a largely qualitative assessment of the impact of potential development sites on growth. The assessment is based on the experience of United Utilities' operational staff on the capacity of the current wastewater treatment works.

In adopting this approach it is important to recognise that the assessment is largely qualitative, based on the knowledge and experience of the United Utilities catchment manager. The approach considered the potential requirements of each SHLAA site in isolation, and does not consider the cumulative impact of development in the area in detail. This cannot be completed without detailed modelling of the wastewater treatment works and network provision.

Effect of Growth on Wastewater Treatment Works

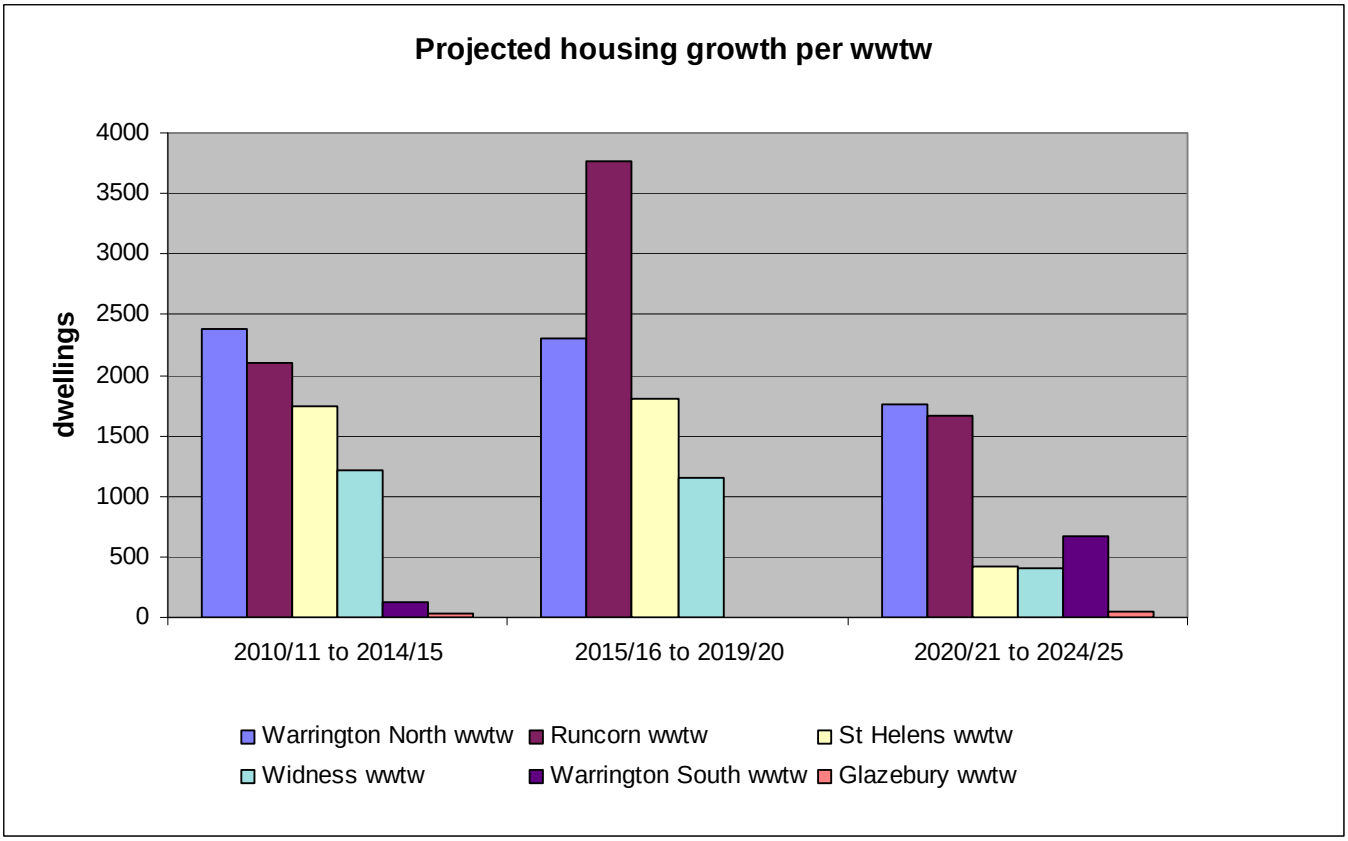
- **Location of growth:** Using the potential development sites identified in the SHLAAs, growth is likely to be concentrated in the catchments of six of the eight wastewater treatment works serving the study area: Warrington North, Warrington South, St. Helens, Glazebury, Widnes, and Runcorn WwTW. The remaining two works are Irlam which serves the Hollins Green area of Warrington, and Billinge South which is a small works serving the local Billinge area. According to the growth proposals provided by the Council's growth in these areas will be minimal and so neither of these works are likely to be affected;

- **Timing of development beyond AMP5:** United Utilities states that it does not anticipate problems meeting wastewater requirements within the Mid Mersey area between 2010 and 2015. However, without undertaking detailed modelling it is not possible to confirm any constraints at wastewater treatment works beyond this period. The water company has stated that the cumulative impact of development could trigger the need for further investment in the period beyond AMP6 (after 2020).

Figure 4.6 shows how the wastewater treatment works would be affected by growth during the next three AMP periods (2010/11 to 2024/25). It is clear that in the first five years (within AMP5) the growth would occur in order, in the catchment areas of the Warrington North, Runcorn, St. Helens and Widnes works. Similar rates of growth are expected in the catchment areas of these treatment works (with the exception of Runcorn) between 2015/16 and 2019/20 (AMP6). Growth in Halton is projected to peak between 2015/16 and 2019/20, in particular large scale housing developments in Daresbury and Runcorn Docks among others. This will drive a rapid increase in demand for wastewater treatment at Runcorn WwTW.

Less growth is expected from 2020 although there will still be large additional demands generated in the catchments of Warrington North and Runcorn WwTWs. At this point demands are likely to increase on Warrington South WwTW, but to a lesser extent.

Figure 4.6 Projected Housing Growth in relation to Wastewater Treatment Works



Section 5 sets out a recommended action plan for the local authorities to follow that will help to ensure the finalised growth proposals in the Core Strategies are deliverable. The key point regarding wastewater services is that the local authorities need to continue dialogue with United Utilities, highlighting the potential demands on Runcorn, Warrington North, St. Helens, and Widnes WwTW from 2015/16 onwards.

Factors Constraining Ability to Increase Capacity

Once a treatment works reaches capacity, United Utilities would be required to apply for a revised discharge consent to increase the Dry Weather Flow (volume of discharge) over and above the existing consent.

- **Discharge consent parameters:** To comply with the no deterioration policy under the Water Framework Directive (WFD), the Environment Agency is likely to require further improvements in effluent quality if discharge volumes need to increase. For example, a treatment works serving fewer than 10,000 people (Population Equivalent) may be able to discharge effluent with a phosphorous concentration of 2 milligrammes (mg) per litre. However, if the population served increases to more than 10,000 the consent may be tightened to 1 mg per litre. The tightened consents and thus improvements required to increase effluent volume are in addition to the improvements already identified to deliver environmental objectives;

- United Utilities has already made plans to invest to improve wastewater treatment at Warrington North, Glazebury, Widnes and Runcorn WwTW during AMP 5 (2010-15). However, none of this investment is driven by new development:

  - Investment at Warrington North and Widnes is to improve effluent quality under the Habitats Directive, in order to protect the European designated sites located in the Mersey Estuary. In the North West River Basin Management Plan[5] the Environment Agency also highlights the need for AMP5 (2010-15) improvement schemes at Widnes and Warrington WwTWs to remove more ammonia than required by the Urban Waste Water Treatment Directive;

  - Glazebury WwTW discharges into the River Glaze, which is designated as a Sensitive area (Eutrophic) under the Urban Waste Water Treatment Directive. United Utilities is investing to improve treatment processes and reduce biochemical oxygen demand, ammonia and phosphorus at this works. This is in line with the actions recommended in the North West RBMP;

  - Investment at Runcorn WwTW is for maintenance purposes and will neither increase capacity nor improve effluent quality.

- **Designated sites:** Section 4.3.1 presents the designated sites that are downstream of wastewater treatment works serving the study area. As stated the presence of a designated site can contribute to the environmental issues constraining the likelihood of an increase in discharge consent. The Environment Agency will not approve requests to vary discharge consents, or applications for new consents unless it is confident that the discharge will not cause water quality to deteriorate. Environmental objectives therefore, can pose a constraint to development if additional capacity is required although the level of constraint is dependent on what options are available to improve the level of treatment to serve a higher volume as well as the environmental considerations. The location of a designated site downstream of a WwTW is therefore a critical consideration, particularly if the site is aquatic or linked to the watercourse;

- **Best Available Technology:** It may not be possible to improve the water quality any further if a sewage treatment works is already treating effluent using Best Available Technology (BAT) techniques. In this situation there are no additional technological improvements that can be made to improve the water quality any further. Consequently, it is not possible to generate any additional capacity at a works operating with BAT. Without further information on the level of technology at each of United Utilities' WwTW and without undertaking detailed modelling, it is not possible to confirm if and where the presence of BAT will limit additional growth in the Mid Mersey area. Where treatment technology can be enhanced, the treatment processes at the existing treatment facilities at a works may not be suitable for further treatment processes to be added. United Utilities has indicated that this is the case at St Helens WwTW;

- **Availability of land for expansion of wastewater treatment works** can present a constraint to development. Information from United Utilities confirms that expansion at the St. Helens and Runcorn works would be constrained by available space. Although St. Helens WwTW is situated in a local amenity area (the Sankey Valley Park), this is not considered to be an absolute constraint to

[5] Annex C: Actions to deliver objectives

works expansion. Runcorn WwTW is located in a built-up area with no land available immediately adjacent to the existing works. Considering the potential number of dwellings to be built within both of these catchments, but particularly Runcorn, it is recommended that United Utilities begin examining the options for this area as part of the lead in for future AMPs;

- **The impacts of climate change** are uncertain but it is likely that treatment works discharging into smaller, surface water dominated rivers will be most affected by reductions in summer rainfall. This will reduce low flows in rivers and the reduced availability of water for effluent dilution could result in deterioration in water quality in the receiving watercourse:

  - the treatment works at Runcorn, Widnes, Warrington North, and Warrington South all discharge into the Mersey (directly or indirectly via the Ship Canal). The impact of reduced summer flows is not an issue here due to the tidal influence of the estuary;

  - St. Helens WwTW discharges into the Sankey Brook. It has a large natural river catchment (100 km^2) and a baseflow index (BFI) of 0.482. Rivers with significant inflows from groundwater have higher BFI scores, e.g. chalk rivers have BFI closer to 0.7. This means that flows in the Sankey Brook are dominated by surface water with only a small amount of flow coming from groundwater. Therefore, flows and thus the capacity to absorb/dilute wastewater discharges could potentially be at risk from climate change impacts on summer flows. Median flows in this river at the point of discharge are typically 1.51 cubic metres per second (m^3/s). Flow in the river drops to half this (0.78 m^3/s) during prolonged 'dry' periods (approximately five per cent of the time). The issue here is the potential disparity between low flow in the Sankey Brook and wastewater discharge volumes. It may be worth investigating the potential increase in volume generated by the proposed growth levels in St. Helens and the relationship between discharge and river flow to determine if there is a risk/constraint;

  - There is a similar issue at Glazebury and Billinge South. However, only small levels of growth are proposed in these catchments and so this is less likely to be an issue.

- **The potential Barrage for the Mersey Tidal Power Project**. Engineering works in the Mersey Estuary have the potential to affect hydraulics in the estuary. The Environment Agency has identified this as a potential constraint to wastewater discharges, whose consents are linked to conditions in the estuary.

Consideration of Growth in Neighbouring Authority Areas

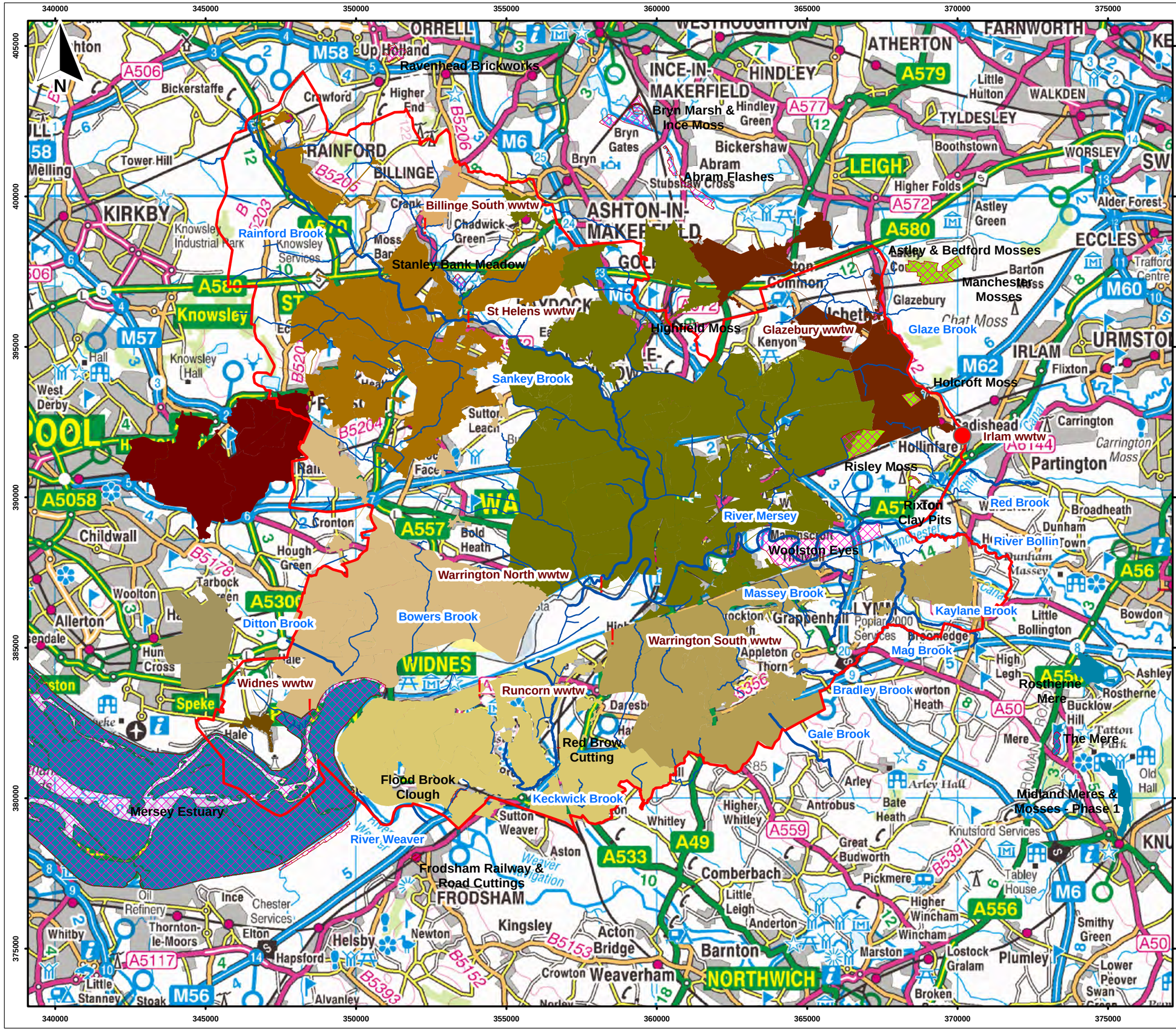
Growth planned in the local authority areas surrounding Mid Mersey could increase competition for wastewater services. A review of the proposed growth across the North West of England and North Wales shows that there is significant growth planned across the southern part of the region, surrounding Mid Mersey (Figure 4.5). In particular, high growth rates are planned in Liverpool and Knowlsey, and Manchester and Salford. This neighbouring growth is highly relevant to Mid Mersey.

To the south of the study area, growth in Cheshire West is most likely to be served by the United Utilities treatment works at Frodsham and Northwich. Of all the 'Mid Mersey' treatment works it is Irlam and Glazebury that are

most likely to be affected by the growth in Manchester and Salford. Mid Mersey growth in these catchments is projected to be quite small so this is less likely to be an issue.

Information on wastewater treatment works serving the neighbouring areas of Liverpool and Knowlsey has not been made available to this study and so it is recommended that the local authorities work together and with United Utilities to identify potential risks of competing demands and capacity limits in the east of the area.

It is unlikely that growth south of Wigan or in the Skelmersdale and Kirkby areas will be in the Billinge South WwTW or St. Helens WwTW catchments as GIS indicates that these catchments are relatively self-contained within the study area.



Mid Mersey Outline Water Cycle Study

Figure 4.7
Wastewater treatment catchment areas

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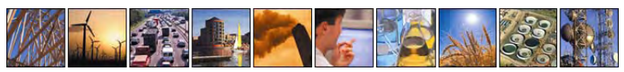


4.3.2 Water Quality Context

- **Upstream influences:** The Mid Mersey study area is located on the lower reaches of the River Mersey, at the point where the river becomes tidal. Water in the lower reaches of the River Mersey has been sourced from the Mersey and its tributaries including the Irwell, Roch, Irk, Medlock, Bollin, Tame, Etherow and Goyt. This means that land use and water use upstream in the wider Mersey catchment impacts on the water quality of the River Mersey in the study area;

- **The North West River Basin Management Plan** (RBMP) confirms that 30 per cent of surface waters in the North West river basin currently have 'Good Ecological Status/Potential'*. However, most of the brooks within the Mid Mersey area have Moderate Ecological Status or worse. This is due to elevated levels of phosphate and ammonia and biological parameters such fish and invertebrate populations. High levels of phosphate and ammonia are usually associated with wastewater discharges, however it should be noted that most of these watercourse do not receive effluent from United Utilities wastewater treatment works. Potential sources include combined sewer overflows, sewer pumping stations, private wastewater treatment facilities, sewer misconnections or industrial/diffuse sources of pollution;

- St. Helens WwTW discharges to the Sankey Brook, which has Poor Ecological Status due to high levels of phosphate. The Environment Agency states that it would be disproportionately expensive to improve this situation by 2015 (Environment Agency, 2009). However, by 2027 improvements will be required, thus St. Helens WwTW may be required to reduce phosphate output to meet environmental objectives;

- The River Glaze catchment has been identified as a sensitive area (eutrophic) under the European Urban Waste Water Treatment Directive. Glazebury WwTW and Irlam WwTW both discharge treated effluent into the River Glaze. Under this designation, United Utilities is required to treat sewage to a more stringent standard. The company has an improvement scheme at Glazebury WwTW to be delivered by 2015. However, this does not cover the demands from additional growth;

- There are a number of smaller watercourses that are sourced within or close to the Mid Mersey area including the Sankey, Ditton, Bowers, Keckwick, Bradley, and Massey Brooks. Due to their size (and flows), these watercourses are highly sensitive to water quality impacts;

- The Stewards Brook, Hardshaw (Windle) Brook, and the Bowers Brook (both biology) all have Poor Ecological Status based on the biology (Stewards Brook also has problems with phosphates). These watercourses do not receive discharges from United Utilities wastewater treatment works, indicating that the Poor Ecological Status of these watercourses is determined by other factors (e.g. combined sewer overflows, other sources of pollution). However, United Utilities notes that significant investment has been undertaken on all but one of the combined sewer overflows in the last five years.

*Waterbodies that have been heavily modified are assessed against their ecological Potential, rather than Status.

4.3.3 Proposed Growth Areas that Could be Most Constrained by Wastewater Treatment

The highest levels of growth in the study area are proposed in Halton, followed by St. Helens, and then Warrington. Developments in Halton are served by Widnes WwTW (north of the Mersey) and Runcorn WwTW (south of the Mersey). Widnes WwTW discharges directly into the River Mersey, designated under Ramsar, as a SPA, and a SSSI. The Environment Agency is likely to be cautious if a request to vary the discharge consent is submitted but there is no evidence at this point that such a request, possibly required to facilitate growth beyond 2015, would not be granted.

Runcorn WwTW discharges into the Manchester Ship Canal. While this is an artificial water body, discharges into it are strictly regulated. Runcorn WwTW has also been identified as having limited options to expand due to available space. Consequently, at this stage the wards with the highest levels of growth beyond 2015 are identified as potentially being at the greatest risk of constraint. The wards with the highest levels of proposed growth in this period are: Daresbury (1773 dwellings), Mersey (790 dwellings), Farnworth (373 dwellings), Heath (277 dwellings), Windmill Hill (270 dwellings), and Halton Lea (272 dwellings). Further after 2020 the highest growth continues to be in the areas of Daresbury (1030 dwellings) and Mersey (518 dwellings).

Growth in St. Helens could potentially be constrained by discharge consents at some point after 2015/16. United Utilities has indicated that it may not be possible to add additional treatment streams to the treatment works due to compatibility with existing treatment processes. It is however, anticipated that improvements will be required at St. Helens WwTW to reduce phosphates to meet WFD objectives. The risk if St. Helens is found to be constrained after 2015 will affect all wards in the region, but the impact would be greatest in those areas with the most development proposed in this period, i.e. the Town Centre (871 dwellings), Newton (499 dwellings), Thatto Heath (299 dwellings), Parr (284 dwellings), Earlestown (269 dwellings), and Moss Bank (264 dwellings). If treatment is constrained from 2020 the areas most at risk include the Town Centre (246 dwellings), Earlestown (123 dwellings), Newton (119 dwellings), Bold (99 dwellings), and Eccleston (82 dwellings).

4.3.4 Potential Solutions

- This assessment clearly identifies the need for further investigation by United Utilities to determine the level of headroom that is available at its treatment works, now and over time in advance of the proposed growth taking place;
- There is uncertainty regarding the likelihood of revising discharge consents into the River Mersey and other key water bodies, including the Sankey Brook. To resolve the uncertainty, it is recommended that the Environment Agency considers and present its position on this matter;
- In terms of volume, water efficiency measures in new and existing buildings (dwellings and non households) would reduce the pressure in terms of DWF. However, this would increase concentrations at treatment works.

Table 4.6 Wastewater and Water Quality Constraints

Council Ward	Total Proposed Dwellings*	Proposed Employment	WwTW	Receiving Water	Receiving Water Ecological Status/Potential (Reason)	Comments on Capacity to Receive Additional Flows	Options
Beechwood, Castlefields, Daresbury, Grange, Halton Brook, Halton Castle, Halton Lea, Heath, Mersey, Norton North, Norton South.	7534		Runcorn	Manchester Ship Canal	Moderate (ammonia and phosphate status is poor)	Works is undergoing £10m maintenance investment in AMP5. Investment will not improve effluent quality nor increase hydraulic capacity of works.	Preliminary assessment in this study has not identified a requirement for upgrading this WwTW. This would need to be confirmed by detailed modelling. Works is located in urban area and United Utilities identified that further work would need to be undertaken to confirm whether there is sufficient space available to expand works if required.
Bewsey & Whitecross, Birchwood, Burtonwood & Winwick, Culcheth Glazebury & Croft, Fairfield & Howley, Great Sankey North, Latchford East, Latchford West, Orford, Penketh & Cuerdley, Poplars Hulme, Poulton North, Poulton South, Whittlehall. Billinge & Seneley, Earlestown, Haydock, Newton.	6435		Warrington North	River Mersey	Moderate (biological status, dissolved inorganic nitrogen)	No known issues with current hydraulic capacity at this works. There is an AMP5 scheme to achieve an ammonia consent of 3 mg/l ammonia under Habitats Directive (reduced from 15 mg/l). Current work is to meet quality needs and serviceability– not to increase capacity of works to meet growth requirements. No constraints to receiving additional growth identified.	Preliminary assessment in this study has not identified a requirement for upgrading this WwTW. This would need to be confirmed by detailed modelling. However, sufficient land is available on site to expand works if required.
Blackbrook, Bold, Eccleston, Haydock, Moss Bank, Parr, Rainford, Sutton, Thatto Heath, Town Centre, West Park, Windle.	3984		St. Helens	Sankey Brook (Black Brook to Mersey)	Poor (biological status, phosphate status is poor)	United Utilities has recently completed an extensive rebuild on this works to meet ammonia consent standard. No further investment is currently planned. Capacity of works is sufficient during AMP5 (to 2015). Detailed assessment under a supply demand scheme is required to assess whether there is sufficient capacity.	There is no capacity to increase footprint of existing works in existing site footprint, although site could be expanded beyond existing site perimeter. Detailed modelling is required to identify point at which current capacity would be exceeded and potential for upgrading works. Investigation of compatibility of additional treatment streams with existing works also required.
Bold, and Rainhill. Appleton, Birchfield, Broadheath, Ditton, Farnworth, Halton View, Hough Green, Kingsway, Riverside.	2764		Widnes	River Mersey	Moderate (biological status, dissolved inorganic nitrogen)	No known issues with current hydraulic capacity at this works. There is an AMP5 scheme to improve the quality of effluent from the works to meet ammonia consents under the Habitats Directive. This work will increase the biological treatment capacity by about a third. However, no upgrade of upstream or downstream processes is being undertaken as part of this work and haven't created any hydraulic capacity.	Preliminary assessment in this study has not identified a requirement for upgrading this WwTW. This would need to be confirmed by detailed modelling. However, sufficient land is available on site to expand works if required.
Appleton, Grappenhall & Thelwall, Hatton Stretton, & Walton, Lymm, Stockton Heath.	803		Warrington South	Manchester Ship Canal	Moderate (ammonia and phosphate status is poor)	United Utilities currently has no investment plans for this relatively small works. No specific programme identified.	Preliminary assessment in this study has not identified a requirement for upgrading this WwTW.
Culcheth, Glazebury, & Croft.	79		Glazebury	Glaze Brook	Poor (biological status, phosphate status is poor)	Glazebury WwTW has programme of investment during AMP5 to improve effluent quality (BOD, ammonia and phosphorus). Following completion of investment, no further constraints identified.	Preliminary assessment in this study has not identified a requirement for upgrading this WwTW. This would need to be confirmed by detailed modelling. Works was originally designed to be doubled in size and therefore space existing to install additional treatment. Need to confirm whether BAT is currently in place.
Billinge & Seneley Green.	12		Billinge	Black Brook	Moderate (biological status)	No significant development planned in catchment therefore not assessed.	Preliminary assessment in this study has identified that no significant growth is likely in this catchment. No options required.
None applicable	1		Irlam	Glaze Brook	Poor (biological status, phosphate status is poor)	No significant development planned in catchment therefore not assessed.	Preliminary assessment in this study has identified that no significant growth in the Mid Mersey area is likely in this catchment. No options required.
*There are approximately 3000 dwellings in the SHLAA GIS that currently lie outside of the existing wastewater treatment catchment areas							

4.4 Surface Water Drainage, Sewerage, and Flood Risk

4.4.1 Sewerage and Drainage Context

United Utilities is the sewerage undertaker for the Mid Mersey area. Section 4.3.1, describes the wastewater workshop that was held with United Utilities' operational and engineering staff. At this workshop we reviewed the capacity of the wastewater drainage network to accept flows from new development and to identify where capacity may constrain development. The assessment is qualitative, based on the experience and knowledge of United Utilities' operational staff on the location of historic sewer flooding or other operational issues within the network. The company presented maps showing 'hot spots' where historical sewer flooding has been an issue in the past.

The additional foul flows generated from new household development are very low compared to the high capacity sewers that were traditionally built to convey urban run-off during storm conditions. Surface water from all new development (or any brownfield redevelopment) now has to be managed sustainably and must not be connected to the foul or combined sewer network. This means that additional foul water flows that flow into the existing foul or combined sewer network will generally be small in comparison to the design capacity of existing sewer networks in most locations. However, where an existing sewerage system is close to capacity, these additional flows could mean that capacity improvements may be necessary. Further detailed hydraulic modelling will be required once development proposals are confirmed at these locations.

Table 4.7 summarises the sewerage issues in relation to the proposed development as discussed with United Utilities in August 2010. There are some known sewer flooding problems within each of the Council areas and these can be used to inform areas where more detailed assessment will be required. Some sites are near completion whilst others have been granted planning permission. For the purpose of complete information these have been included in Table 4.7. There may be residual issues for the Developers, the Council, and United Utilities to manage at these sites.

Table 4.7 Summary of Drainage/Sewer Flooding

Council	Site Reference	Specific Comments
Warrington	Sites to be delivered: 2010-15	Sites located in **Warrington town centre** are unlikely to be constrained by wastewater network requirements due to the area being served by large diameter Victorian sewers. However, sewer flooding incidents have been identified close to the following sites: - Site 1235 (Marsden Van Plant), which is nearly complete. ; - Site 1249 (George Howard Scrap Yard Ltd) where planning permission has been granted but development has not yet begun. The scrap yard is low lying and United Utilities indicate that wastewater may need to be pumped into the network. - Site 1262 (Western Greenalls Ave) where planning permission has been granted but development has not yet begun. United Utilities has been consulted during the planning process and therefore development of these sites is not considered to be constrained by historic sewer flooding.. **Pumping Station problems:** Whittleford Avenue pumping station serves the town centre. It is 20 years old and was not designed to meet the level of anticipated future need. There are no plans to invest to upgrade this in AMP5 (i.e. prior to 2015). Detailed modelling is required to confirm the capacity of this pumping station beyond 2015.
Warrington	Sites to be delivered: 2016-20	Major sewer improvements will be completed during August 2011 to alleviate sewer flooding in the area relevant to site 1412 (Dawson House). Planning permission has been granted but it is recommended that developers liaise with UU to agree delivery timescales. This scheme is not intended to provide additional capacity for growth, but instead to ensure that existing properties are provided with correct levels of service. Modelling is required to confirm the sewer capacity. **Pumping Station problems:** Site 1643 (Bruche former Police Training Centre). There are no records of historical sewer flooding in relation to this site. However, the combined development of this site 1178 (Cardinal Newman High School) may result in network capacity being exceeded. Planning permission has been granted but not yet implemented. Further investigation by UU is required to confirm the capacity of the network to take additional flows from these developments. It is recommended that the Council notifies UU of the permission. Both sites drain to Paddington pumping station, which is at capacity. The cellar at site 1178 (Cardinal Newman High School) has flooded in the past due to failures at Westy pumping station, which is at capacity. United Utilities has no plans to invest to upgrade this pumping station. Any investment would be undertaken to improve service levels to existing customers rather than to accommodate growth, and this could not be implemented until AMP6 (2015-20) at the earliest. Site 1101 (Howley Quay) is in an area where flooding events have occurred in the past. However, these were caused by failures at a local sewage pumping station. Development at this site is not considered to be constrained by network capacity. **Topography:** Site 1451 Cantilever Gardens (Old Beers Timber yard) is located below the level of the existing network. Additional pumping would be required to discharge effluent into existing sewer network. No capacity issues have been identified. Planning permission has been granted but not yet implemented. It is recommended that the Developers liaise with UU to agree delivery timescales. Site 1411 (Former Timber Planing Mill near Walton Locks) is lower than United Utilities' network and so foul water would need to be pumped up to the mains network. Lower Walton pumping station is almost at capacity and further investigation is required to determine its capacity to accommodate additional wastewater flows. However, construction has commenced and so it is recommended that the Council and/or Developers liaise with UU regarding delivery timescales.

Council	Site Reference	Specific Comments
		Silting/blockages: Site 1642 (Bewsey Old Hall) is in a part of the network where a trunk sewer is prone to silting. United Utilities is installing access shafts along the sewer so that the silt can be cleared. Bewsey Bridge pumping station has had problems and improvements are due to start in 2011.
Warrington	Sites to be delivered: 2021-26	**Further investigation required:** The sites located close to the Manchester Ship Canal and sites 1864 (Eagle Ottowa) and1201 (New World) are in an area that has not had sewer flooding problems. Due to the number of developments in close proximity further investigation is required to confirm the capacity of the network to accommodate flows from these sites. Construction has commenced at the New World site and so it is recommended that UU are notified and prioritise investigation in this area.
Halton	Sites to be delivered: 2010-26	**Management issues:** The development sites along the Runcorn Waterfront and site 258 (The Decks) are in areas which have not experienced sewer capacity issues. However, on these sites there are sewers that are owned and operated by a third party. United Utilities will be responsible for drainage on these sites but will discharge into sewers operated by the third party, and then back into the wider network operated by United Utilities. Although this will not constrain development there is a management issue that will need to be addressed as the sites are developed. **Historical sewer problems:** Several development sites are identified to the north of Widnes, near Pex Hill and Lunts Heath. There have been sewer capacity problems in central Widnes, through which wastewater from the development sites will drain. Further investigation and modelling are required to confirm the capacity of the network. Widnes drains to Ditton pumping station, where wastewater is pumped to Widnes WwTW. Ditton pumping station is currently undergoing minor investment to ensure continuation of service but has been identified by United Utilities as requiring more significant investment in the longer term to increase capacity. **Scale and concentration of development:** Much of the development in Halton will be in the Daresbury area. Properties in this area drain to two pumping stations (Sandy Lane PS and Chancellor Road PS), which pump wastewater into the Windmill Hill catchment which then drains to Runcorn WwTW. All pumping stations have been built in last decade and there are no major operational concerns. Due to the scale and concentration of development here, modelling should be undertaken to provide an initial view of the capacity of the drainage system to accept additional flows, and to identify whether additional investment is required. **Commercial development:** Widnes Waterfront is a focus for commercial development. United Utilities does not anticipate capacity problems in this area as sewers in the Widnes area are sized to cope with industrial flows. There have been no sewer flooding problems in this area.
St. Helens	Sites to be delivered: 2010-26	**No public sewer main:** Site 459 (Deacon Trading Estate) currently has no public sewer on site. This will not constrain development as long as the foul and stormwater are separated. Site 306 (Penlake Industrial Estate) currently has no public sewer on site, but would likely be connected to an adjacent combined sewer. There are no known sewer problems at this site. **Separating foul and stormwater drainage:** Site 14 (Vulcan loco works) drains south to Warrington North WwTW through a trunk sewer in the Sankey Valley. This is not anticipated to be a constraint to development as long as the foul and stormwater are separated.

Council	Site Reference	Specific Comments
		Historical sewer problems: There have been sewer flooding problems at the former Pilkington glass site and site 284 (Knowsley Rd). Modelling is required to confirm the capacity of the network and to identify solutions if required.

4.4.2 Flood Risk

PPS25 classifies Flood Risk into three zones:

- Flood Zone 1: less than 0.1 per cent annual probability of flooding from fluvial or tidal sources;
- Flood Zone 2: between 0.1 per cent and 1 per cent annual probability of flooding from fluvial sources, and between 0.1 per cent and 0.5 per cent probability of flooding from tidal sources;
- Flood Zone 3a: *"High risk"* - between 1 per cent and 20 per cent annual probability of flooding from fluvial sources, and between 0.5 per cent and 20 per cent probability of flooding from tidal sources;
- Flood Zone 3b: *"functional floodplain"* - greater than 20 per cent annual probability of flooding from both fluvial and tidal sources. Or a designated flood water storage/conveyance area.

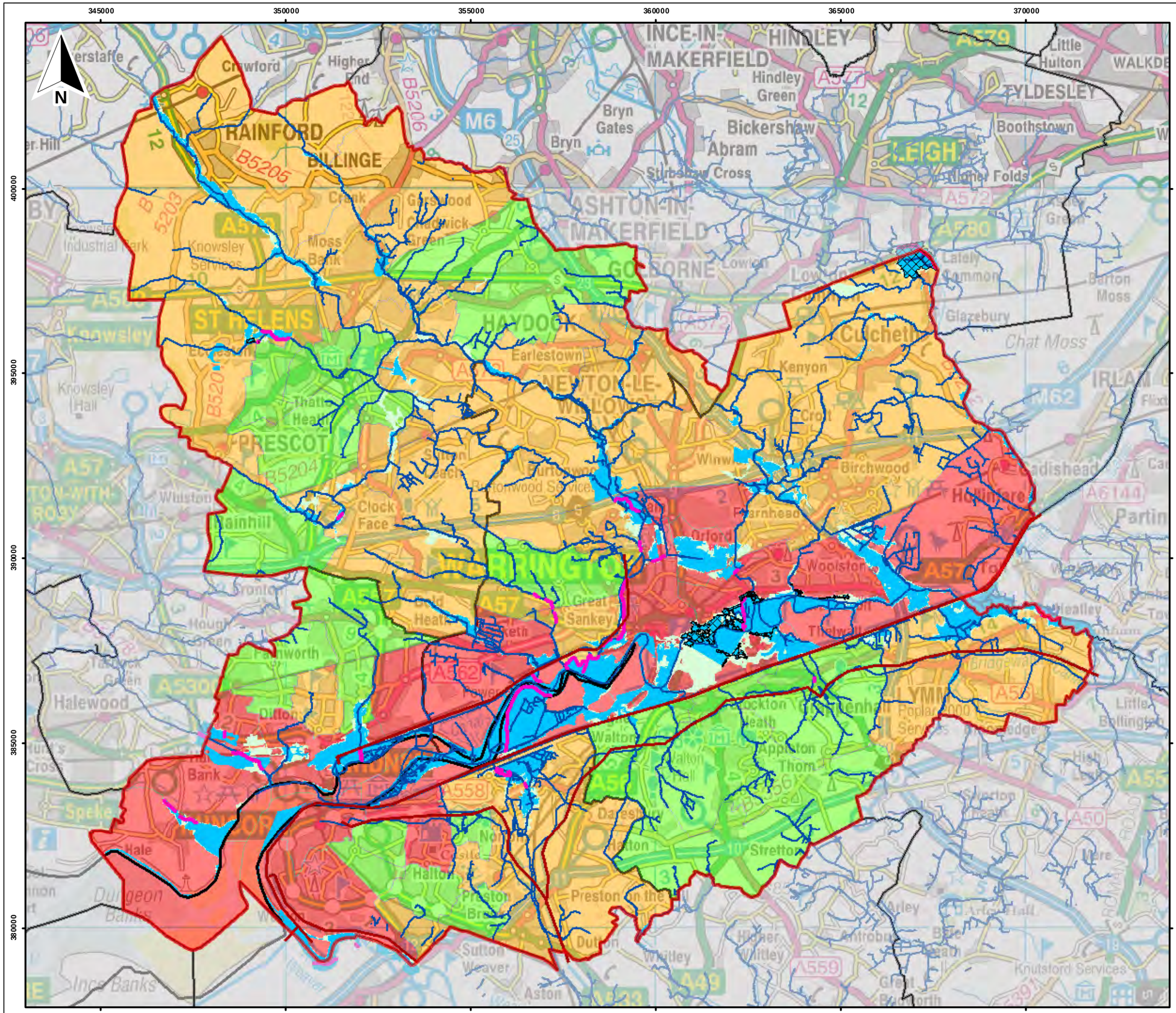
It should be noted that the flood zones do not take into account other sources of flood risk. Table D.1 from PPS25 indicates the acceptability of development within the flood zones:

Flood Risk Vulnerability classification (see Table D2)		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table D.1)	Zone 1	✔	✔	✔	✔	✔
	Zone 2	✔	✔	Exception Test required	✔	✔
	Zone 3a	Exception Test required	✔	✗	Exception Test required	✔
	Zone 3b 'Functional Flood plain'	Exception Test required	✔	✗	✗	✗

A tick indicates the development type is appropriate, a cross indicates that it is not.

Figure 4.8a shows the study area, the main rivers, canals, flood zones 2 and 3, flood defences and the areas benefiting from these flood defences. The Environment Agency's Flood Zone 3 and 2 (November 2010 version) show that most of the areas at risk of flooding and the defended areas are located along the Mersey valley, and its tributaries to the north and south.

A Strategic Flood Risk Assessment (SFRA) has been completed previously for each of the three Councils and the results are reviewed here in the context of the water cycle study. The development 'flood risk vulnerability classification', Sequential and Exception Tests are defined further in PPS25, and in the three SFRAs prepared for Halton, St. Helens and Warrington. Figure 4.8b shows the Flood Zone 3 and 2 extents for Halton based on more detailed investigation were available as an output of the Level 2 SFRA. The St Helens Level 1 SFRA used Environment Agency Flood Zone data, whilst for Warrington Borough Council more detailed investigations have been undertaken as part of the Level 2 SFRA, currently being finalised. Consequently, Figure 4.8b only shows data for Halton.



Key:

- Mid Mersey study area
- Neighbouring local authorities
- Watercourses
- Canal
- Flood defences
- Area benefiting from flood defence
- Flood zone 3
- Flood zone 2

Area of ward in flood zone 3:

- Low <1.5%
- Medium 1.5% to 10%
- High >10%

Flood Zone data:
Based on the Environment Agency's November 2010 Flood Zone 3 Extent

0 0.5 1 2 3 4 5
Kilometers
Scale: 1:100,000 @ A3

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Mid Mersey Outline Water Cycle Study

Figure 4.8a
Flood Risk in Mid Mersey
Environment Agency Flood Extents

March 2011
28467-W03a BREAR

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