



DEE VALLEY WATER
DRAFT
WATER RESOURCES MANAGEMENT PLAN
2009

JANUARY 2009

EXECUTIVE SUMMARY

The Water Act 2003 made it a statutory obligation on water companies to produce a Water Resources Plan.

In this Water Resources Plan Dee Valley Water sets out its approach to managing the water resources to ensure there is an adequate supply of water to 2034/35.

This Water Resources Plan has been prepared on the basis of the guidance contained in the Environment Agency's *Water Resources Planning Guidelines (2007)*. This Plan provides a comprehensive overview of water resources and demands in Dee Valley Water. Chapter 1 provides a general introduction to the Water Resources Planning Process. Chapter 2 contains general information on the Plan content and future developments. Chapter 3 provides a general overview of the water resources available to Dee Valley Water. Chapter 4 outlines the projected demand for water over the next 25 years. And finally, Chapter 5 concludes the Plan by presenting the overall water resources strategy.

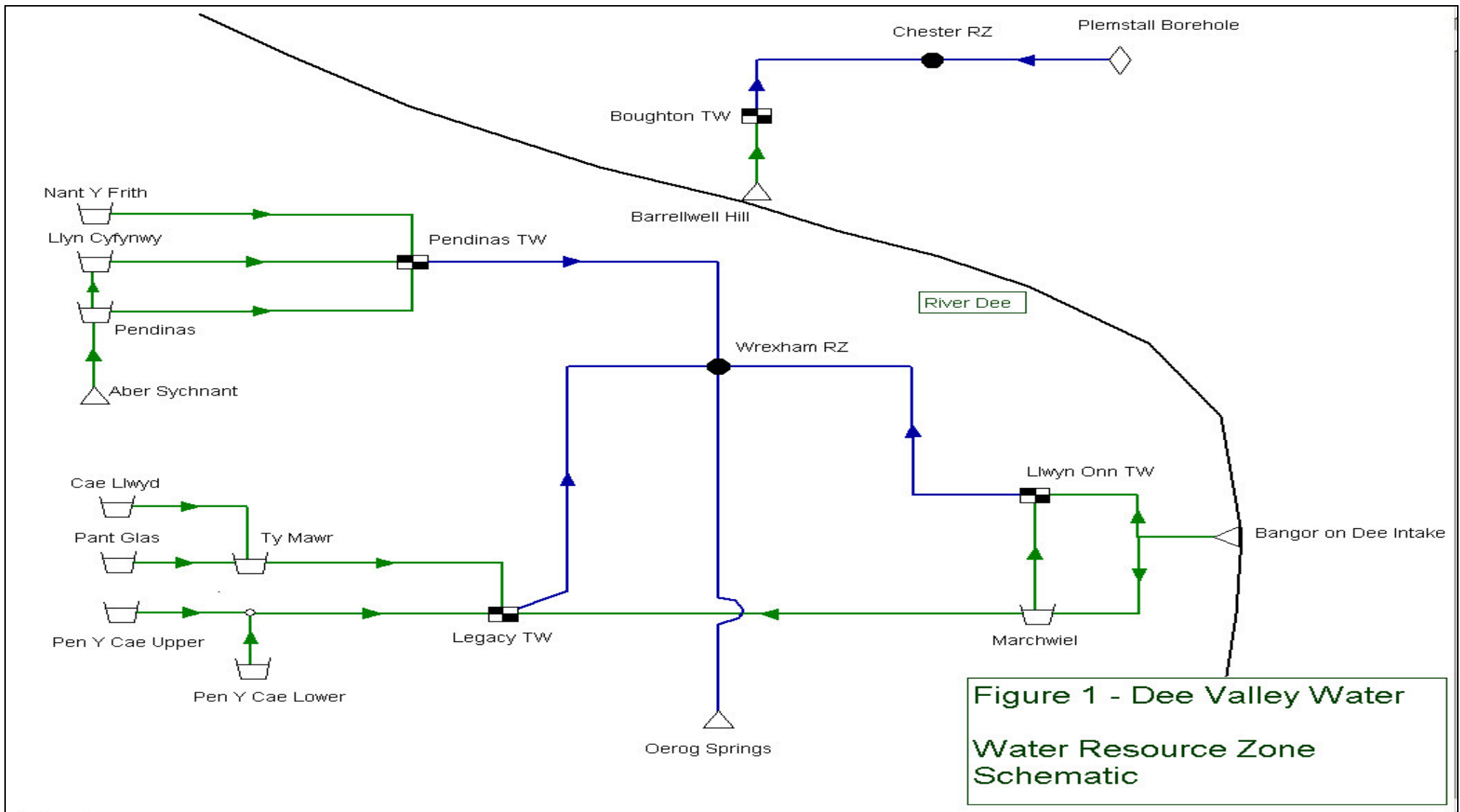
In developing this Water Resources Plan the Company has based its projections on the guidance set out in the *Guidelines*. Where possible the Company has utilised Company-specific data rather than relying upon national statistics.

The Company has taken into account existing policies in developing its demand forecasts. The Company plans to continue with the free metering scheme, the free supply pipe repair scheme and the distribution of free cistern displacement devices. In addition, the Company is committed to achieving the Economic Level of Leakage target of 10.36Mld and maintaining it at or below this level for the period of forecast.

The Company has taken note of customers interest in using water wisely and has increased its promotion of water efficiency generally.

Although there are significant uncertainties in the future regarding climate change and the effect this will have on the supply and demand the overall conclusions from the studies carried out and the results set out in this Water Resources Plan is that there is adequate available headroom for the period of forecast.

SCHEMATIC



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1. INTRODUCTION

1.1 Dee Valley Water

Dee Valley Water provides 70 million litres of water per day to a population of over a quarter of a million in the area of north east Wales and Chester. 95% of all the raw water comes from rivers and impounding reservoirs, with the remainder from underground sources.

The Water Act 2003 made it a statutory obligation on water companies to produce a Water Resources Plan under new sections of the Water Industry Act 1991.

In this Water Resources Plan Dee Valley Water sets out its approach to managing the water resources to ensure there is an adequate supply of water to the end of 2034/35.

The key points of this Plan are as follows:

- Total water delivered is forecast to remain broadly stable to 2034/35, with increasing meter penetration and reducing household demand offsetting the projected growth in population
- Continued level of security of supply to avoid the imposition of restrictions on demand
- Continued promotion of the free meter scheme
- Continued promotion of water efficiency
- Continuing to achieve the Economic Level of Leakage target
- Continue to operate its own resources.

1.2 Summary of plan

This Plan was prepared in accordance with the Environment Agency's *Water Resources Planning Guidelines*.

Demand forecasts were prepared using the agreed industry standard approach to demand forecasting. Total water delivered is projected to show a small reduction to 2011/12 followed by a gradual increase for the remainder of the planning period. Distribution input is projected to show a total rise of 3.8% from 2006/07 to 2034/35.

Population projections show a steady increase of about 0.25% per year.

The Company has re-assessed the deployable output of the Company owned sources, reviewed the outage allowances and re-assessed the headroom in accordance with industry standard approaches. In addition the Company investigated the impact of climate change based on the updated UK Climate Impacts Programme.

As part of its leakage control strategy, the Company plans to increase its rate of mains renewal over the next five years. Together with the use of new

technologies to detect and find leaks, Dee Valley Water will strive to maintain its leakage at one of the lowest levels in England and Wales.

2. WATER RESOURCES PLAN

2.1 General information in plan content and development

In this plan Dee Valley Water considered the many factors affecting the amount of water available for use and the demand for it to the planning horizon of 2035/36. For the demand side the Company examined current levels of domestic and commercial demand, projected growth in population and households and reviewed the impact of losses in the supply network. Uncertainties in the demand forecasts were taken account of by making an allowance in headroom (the buffer that a prudent water company allows between projected demand and water available for use).

On the supply side, Dee Valley Water carried out another review of its own water resources to confirm that the yields calculated for the previous Water Resources Plan are appropriate for this Plan. The review included a re-assessment of the outage allowances for the assets refurbished during the last 5 years.

The Company has re-assessed the Economic Level of Leakage based on the latest guidance on the inclusion of externalities.

2.2 Planning period

The Company has planned ahead until 2035/36 using 2007/08 as the base year.

2.3 Resource zones

The Company reported previously on three Resource Zones (RZ) covering Pendinas, Llwyn Onn and Chester. During AMP4 Dee Valley Water has a scheme to install a transfer link main from the Llwyn Onn RZ to the Pendinas RZ to improve the security of supply to the isolated Pendinas RZ. Llwyn Onn RZ and Pendinas RZ will therefore be combined into a single resource zone, Wrexham RZ, for the planning period covered by this Plan. The number of Water Resource Zones has therefore been reduced from three to two as a result of the new scheme.

In the Chester and Wrexham RZs, the River Dee is the principal source of water (see Figure 1). In Wrexham, there are additional upland reservoir sources and a spring. In Chester RZ, the only additional source is a borehole.

2.4 Scenarios

The Company has followed the EA *Guidelines* in developing the scenarios in this Water Resources Plan. The two scenarios that Dee Valley Water has investigated are the **normal year** and **dry year scenarios**. The Dee System has a critical period of two summers and one winter at the current level of abstraction. Given this the Company has not modelled a season critical scenario.

The Company has developed its **dry year scenario** from the **normal year scenario**. The **normal year scenario** has been normalised by taking account of the three previous years data in calculating the base year demands.

The relationship between **normal year** and **dry year** is based on the ratio of demand in 1996/97 compared with that in 1995/96. 1995/96 is considered a “dry year” in which no demand restrictions were imposed. After allowing for relative variations in the non-demand related components (leakage and bulk transfers, for example), a 3% increase was determined for Wrexham RZ and 5.5% for Chester RZ.

The increase has been factored between measured and unmeasured properties for each RZ.

2.5 Reconciliation of data

The Company used the Maximum Likelihood Estimation (MLE) method (*Demand Forecasting Methodology Main Report (NRA and UKWIR 1995)*) to reconcile the water balance at resource zone level in order to minimise the uncertainty in the base year estimates.

For the forecast years measured and unmeasured per capita consumption figures are an average of the previous three years, thereby reducing the effect of any individually high or low years.

2.6 Sensitivity testing

Dee Valley Water has carried out sensitivity testing on areas of the supply demand balance to gain an understanding of the factors which are the most significant to the plan. The main areas considered are listed below:

- How would the plan change if a higher population and housing growth scenario is realised?
- How would the plan change if the outage allowances were underestimated?
- How would the plan change if the Economic Level of Leakage target is not achieved?
- How would the plan change if the rate of increase in per-capita consumption (pcc) is higher or lower?
- How would the plan change if more meters are installed internally?

How would the plan change if a higher growth scenario is realised?

The high growth scenario is intended to simulate high levels of in-migration, high birth rates and low mortality together with high levels of low occupancy rate dwellings. This scenario has been tested on both resource zones and the results are summarised below.

Wrexham Resource Zone

If a higher growth scenario is realised the rate of growth in the Wrexham zone would be 0.48% (0.26% higher than the planned growth rate). On its own this resource zone would not be in deficit until 2033/34 however if a bulk transfer were required for the Chester resource zone then the deficit in Wrexham would be brought forward to 2022/23.

Chester Resource Zone

For the Chester resource zone the higher growth scenario results in a population growth rate of 0.69% per annum (0.43% higher than the Company adopted forecast growth rate). The higher growth scenario results in a supply/demand deficit in 2016/17. Low cost measures, which are already in place, such as wash-water recycling at Boughton treatment works and an internal bulk transfer from the Wrexham RZ could delay the deficit until at least 2022/23.

How would the plan change if the outage allowances were under-estimated?

The outage allowances have been estimated based on the best available information. However, given the uncertainty associated with some aspects of the outage allowances it is possible that the outage allowances could be under-estimated. For the purposes of the sensitivity analysis the outage allowances have been factored by +100%.

Wrexham Resource Zone

The modelled increased outage allowance in the Wrexham Resource Zone has little effect on the supply demand balance.

Chester Resource Zone

For the Chester Resource Zone, the increased outage allowance results in a small supply demand deficit from 2033/34 onwards. A small transfer from the Wrexham Resource Zone would offset any deficit in the supply demand balance.

How would the plan change if the Economic Level of Leakage target is not achieved?

For this scenario the Company tested the sensitivity of the supply/demand balance to the leakage target. The initial assessment investigated the effect of a slightly higher Total Leakage level with the additional water lost to leakage split equally between Chester and Wrexham. The results indicated a small deficit in Chester in 2034/35, which could be offset by a small transfer of the surplus remaining in Wrexham.

How would the plan change if the rate of increase in per-capita consumption (pcc) is higher or lower?

The Company defined pcc growth figures have been determined from historical data. For the unmeasured properties the annual growth rate in pcc has been set as 1.3 l/hd/day whilst the measured properties have been set as 0.36 l/hd/day. For the sensitivity analysis, the Company referred to the Environment Agency's "*A scenario approach to water demand forecasting*" to derive pcc growth figures to be used.

For the high pcc growth analysis the Company used the Alpha growth scenario. The unmeasured pcc growth rate was estimated as 1.6 l/head/day per year and the measured pcc growth rate was estimated as 1.52 l/head/day per year. For Chester this resulted in a deficit in 2017/18 and a deficit in 2022/23 for Wrexham.

For the low pcc growth analysis the Company used the Gamma growth scenario. The unmeasured pcc growth rate was estimated as -1.08 l/hd/day per year and the measured pcc growth rate was estimated as -1.64 l/head/day per year. This scenario resulted in a surplus in both zones at the planning horizon.

How would the plan change if more meters are installed internally?

The Company's policy is to install meters at the customer boundary which helps the Company to identify supply pipe leakage and reduce distribution losses. For properties that are fed from a joint supply the meter is often installed internally and the supply pipe leakage benefit of installing a meter is lost. The Company has therefore carried out a sensitivity analysis to determine the effect of installing more internal meters than forecast (20% increase). The results of the analysis indicate a small deficit in the Chester zone from 2033/34, which could be overcome by a small internal transfer from the Wrexham zone.

Conclusions from sensitivity analysis

From the above results it is clear that the Water Resources Plan is less sensitive to changes in the outage allowance, leakage or the specific location of new meters. The population forecast influences the supply/demand balance but this is taken into account in the headroom target.

The rate of increase of measured and unmeasured per-capita consumption has the biggest influence on the supply demand balance, particularly in the Chester Resource Zone. However, in this Plan the Company has used its own data in the derivation of the demand forecasts and believes that the rate of growth in per-capita consumption reflects recent trends. Nevertheless the per-capita consumption figures will be monitored closely to assess whether any demand management measures will be required in the latter part of the planning period.

2.7 Company policies

Level of service (LoS)

The Company's planned level of service is to survive a drought similar to that experienced in 1995 without the need to impose demand restrictions. In the periods of record studied back to 1925, a hose-pipe ban would only have been required once in 1933, and then only briefly.

The River Dee is regulated by the Environment Agency according to the Dee General Directions: Normal General Directions and Drought General Directions. The Drought General Directions specify the principles and detail under which the prescribed flows and abstractions must be reduced in a drought, more severe than the design drought.

The Drought General Directions provide for measures that must be implemented as system storage crosses drought control curves.

For a drought crossing the stage 3 control curve all designated abstractors:

- (i) Must introduce a hosepipe ban (seasonally dependent).
- (ii) Must make an application for a drought order to ban non-essential water use.
- (iii) Make every effort to reduce demand on the Dee System by use of alternative sources.

Section 2.1.12 of the Drought General Directions states the stage 3 control curve has not been crossed in any of the historic drought sequences modelled. Given this the level of service for the Chester and Wrexham resource zones is estimated as a hosepipe ban less frequently than once in 82 years.

Water efficiency

The Company's water efficiency strategy is based principally on the extension of optional metering and supply pipe leakage control.

The free meter option is offered to all domestic customers and continues to be taken up by about 3.2% averaged over six years of unmeasured customers per year. At this rate of uptake the Company forecasts that meter penetration will exceed 80% by the end of the planning horizon. This forecast meter penetration is based on the current limited promotion of the free meter scheme. If uptake drops the Company will consider increasing the promotion of the free meter option scheme or change of occupier metering.

The Company makes a small adjustment to take account of customers that revert during the first twelve months.

The leakage control strategy includes a subsidised supply pipe repair policy, which is offered to all domestic customers for the first two leaks.

The Company has introduced a policy to distribute cistern displacement devices to customers on request. The water saved from these devices has been estimated based on Ofwat's *Good Practice Register*.

Variable rate tariffs are a mechanism that the Company could use to encourage customers to use water wisely in the future. The Company is therefore monitoring developments in intelligent metering and associated technologies.

2.8 Details of competitors for each resource zone

The Company is not aware of any inset appointments within either of its resource zones. The Company has not made an allowance for the possible effects of competition because at this stage they are still unknown.

2.9 Strategic Environmental Assessment (SEA)

The objective of the Strategic Environmental Assessment Directive is “to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view of contributing towards sustainable development”.

The studies undertaken in the development of this Water Resources Plan and the overall conclusion is that there is sufficient available headroom to meet demands to the end of the planning period. In light of this the Company has not included options to resolve a Supply/Demand deficit supported by SEA. However, as Strategic Environmental Assessment (SEA) became a statutory requirement following the adoption of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment the Company has undertaken a Strategic Environmental Assessment scoping study of the Company's operations. The Assessment identified the baseline conditions and the possible progression based on projected changes, which could be used in future decisions. The screening report is included as Appendix C.

2.10 Habitats Directive

The River Dee, as a Natura 2000 site, falls under the jurisdiction of an Appropriate Assessment. The Company followed the guidance *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6 (3) and (4) of the Habitats Directive 92/43/EEC* to assist with the decision making in applying the Habitats Directive. The scoping assessment, which is included as Appendix D, concluded that the plan will have no likely significant effect on a European site.

3. WATER SUPPLY

3.1 Deployable output

The deployable output of the Company operated surface water and groundwater sources, which were assessed for WRP2004, has been re-assessed during the compilation of this Water Resources Plan. The yields were re-assessed based on *Reassessment of Water Company Yields and A Methodology for the Determination of Outputs of Groundwater Sources* and it was concluded that there was no change in the deployable output.

The re-assessment supported the calculations undertaken for the previous WRP. Given that there has not been a drought in the Company's supply area since the last assessment was carried out it has not been possible to test the sources in drought conditions.

3.2 Reductions in deployable output

Sustainability reduction

The Company has been informed by the Environment Agency that the Company's licensed abstractions are unlikely to be affected by any sustainability reductions and hence no reductions have been allowed for in this Plan.

Outage

Outage allowances have been assessed in accordance with *Sufficiency of Water: Methodology for Assessing Supply/Demand Balance*.

Since the last outage assessment was carried out the new Pendinas treatment works in the Wrexham RZ and the refurbished Boughton treatment works in the Chester RZ have been commissioned. The outage allowances have been re-assessed for these works but given that the treatment works were inherently reliable before the work the outage allowances remain the same. The outage calculations are available for viewing at the Company's Head Office.

Raw and potable water transfers and bulk supplies

The Company currently has three permanent bulk imports (two from Dwr Cymru Welsh Water and one from Severn Trent Water) and one bulk export (United Utilities). The bulk supplies are relatively small in size (less than 0.05Mld). It has been assumed that these will not change.

The Company supplies non-potable water to the Wrexham Industrial Estate. The non-potable supply has been normalised for the forecast years to take account of the high non-potable demand during the very hot summer in 2006/07.

Distribution and treatment works operational uses and losses

The Boughton treatment works has recently undergone a major refurbishment. The refurbishment included the facility to recycle the wash-water and rinse water and this has resulted in reduced treatment works usage. For this Water Resources Plan a conservative estimated reduction in treatment work usage has been made until the upgraded treatment works has been fully commissioned (February 2008) and better information is available.

For AMP5 the Company is proposing the upgrading of the Llwyn Onn treatment works in the Wrexham Resource Zone. At this stage it is likely that the treatment works will include the facility to recycle the wash-water. However, for this Water Resources Plan the Company has not made any allowance for the possible reduction in treatment works usage.

During 2008 the Company undertook a re-assessment of the Economic Level of Leakage based on the inclusion of externalities. The results of the assessment tended to a much higher leakage level (approximately 12.3Mld). The Company, therefore, re-assessed the economic level of leakage based on the previous method, which resulted in a leakage target of 10.36Mld to 2014/15. The Company's leakage strategy includes a number of initiatives to help it meet its target. The key points of the strategy include:

- Installation of pressure control areas with enhanced pressure control technology
- Reducing leak awareness times
- Increasing the number of district metered areas
- Monitoring leakage levels using leakage detection software
- Installing critical monitoring point loggers
- Using sophisticated leak detection equipment to help locate difficult to find leaks.

4. WATER DEMAND

4.1 Demand forecasts

The demand forecast has been prepared on the basis of the Environment Agency's *Water Resources Planning Guidelines*. The Company has continued to use its own demand forecast spreadsheet model, which has been developed based on an industry standard approach to demand forecasting.

The Company has built up separate demand forecasts for the Chester and Wrexham Resource Zones based on the best available data. Details of the work carried out by the Company on populations and households are attached as Appendix A.

For Wales, the Company liaised with the local authorities in the Company's supply area to gain an understanding of the likely growth in households and populations. The North Wales local authorities collaborated on a population and household projection model which utilised different growth scenarios to reflect possible changes in population and households. The North Wales local authorities are currently consulting on their Local Development Plans (LDP) and are, in general, opting for medium growth policies that reflect recent house-building rates. The councils have developed their Local Development Plans to reflect the Welsh Assembly Government's "*Wales Spatial Strategy*" (2006-2025) and have agreed to split the allocated number of properties for North Wales through regional apportionment.

In Wales, the medium growth scenario has been adopted as the principal projection. The upper and lower growth scenarios have been used in the calculation of headroom and also in the sensitivity analysis. Where data is not available up to 2034/35 it has been extrapolated based on the latest two years of forecast.

For England, the North West Regional Assembly (NWRA) provided the Company with a copy of its draft Regional Spatial Strategy. The draft Regional Spatial Strategy (RSS) for North West England provides a framework for the physical development of the region over the next fifteen to twenty years.

The draft RSS sets out how many houses are required to be built between 2003 and 2021. The target for Chester is policy-based and sets a total maximum housing provision of 7,500 (net of clearance replacement) between 2003 and 2021. Between 2003 and 2006, 1,021 houses were built in the Chester area. The target figure of 7,500 has therefore been adjusted to take account of the houses already built and the proportional allocation of the properties in the Chester resource zone. This reduces the projected average annual housing rate from the draft RSS figure of 417 to 376.

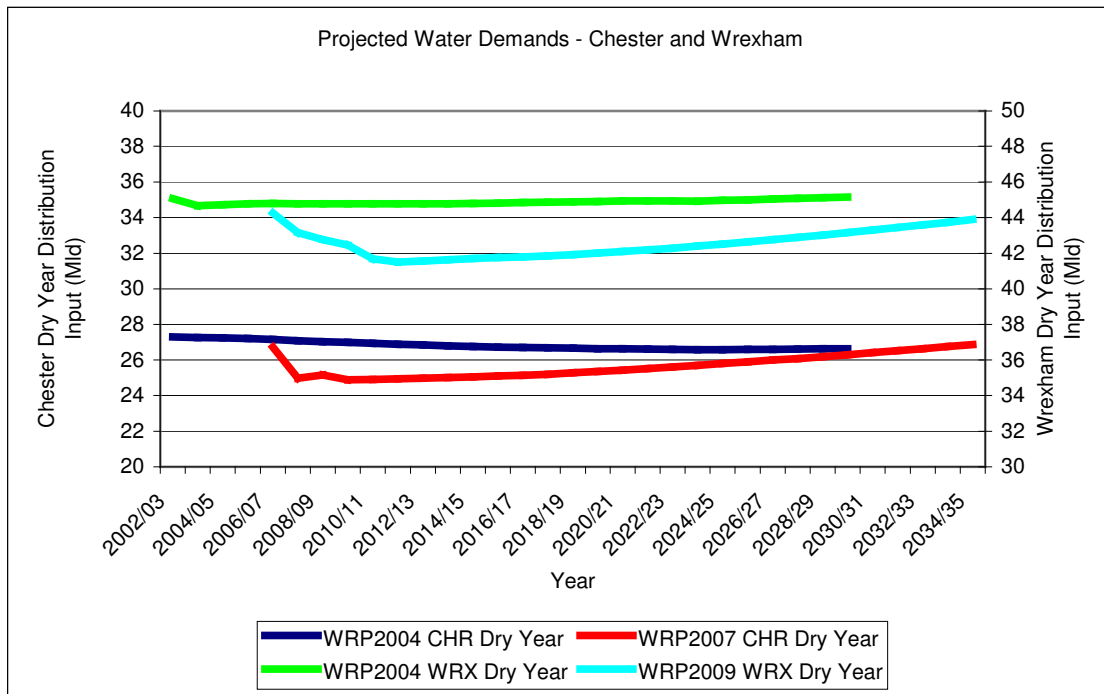
In view of the current economic climate, during 2008/09, the Company undertook a review of the forecast increase in household connections. The

review indicated a downturn in the number of new connections in the short-term. The Company has reduced the forecast annual number of household connections in 2009/10 and 2010/11 followed by a gradual increase for the remaining years. The WAG and RSS projected number of households is achieved by 2021.

Figure 2 shows the forecast amount of water put into supply. For the Wrexham Resource Zone the new projection is slightly lower than the previous WRP forecast which is primarily due to a lower leakage target.

For the Chester Resource Zone, the new demand projection shows a gradual increase from 2010 onwards. The step change in distribution input shown in Figure 2 between 2006/07 and 2007/08 reflects the reduction in treatment works usage at Boughton. The rising trend from 2010 reflects the change in planning policy in the Chester Resource Zone.

Figure 2. Projected Water Demands



4.2 Per-capita consumption figures

The Company has carried out trend analyses of the unmeasured and measured per-capita consumption (PCC) figures using the data available to the Company. The results, in general, indicate that measured customers show an increase in PCC of 0.36 l/hd/day per annum whilst the unmeasured customers have shown an increase in PCC of 1.3l/hd/day per annum. These figures have been utilised in the demand forecasts.

The Company attempted to take account of per capita consumption increasing with decreasing occupancy rates. However, this was not taken

forward to the final forecasts as the change in overall occupancy rates had limited effect on the overall plan.

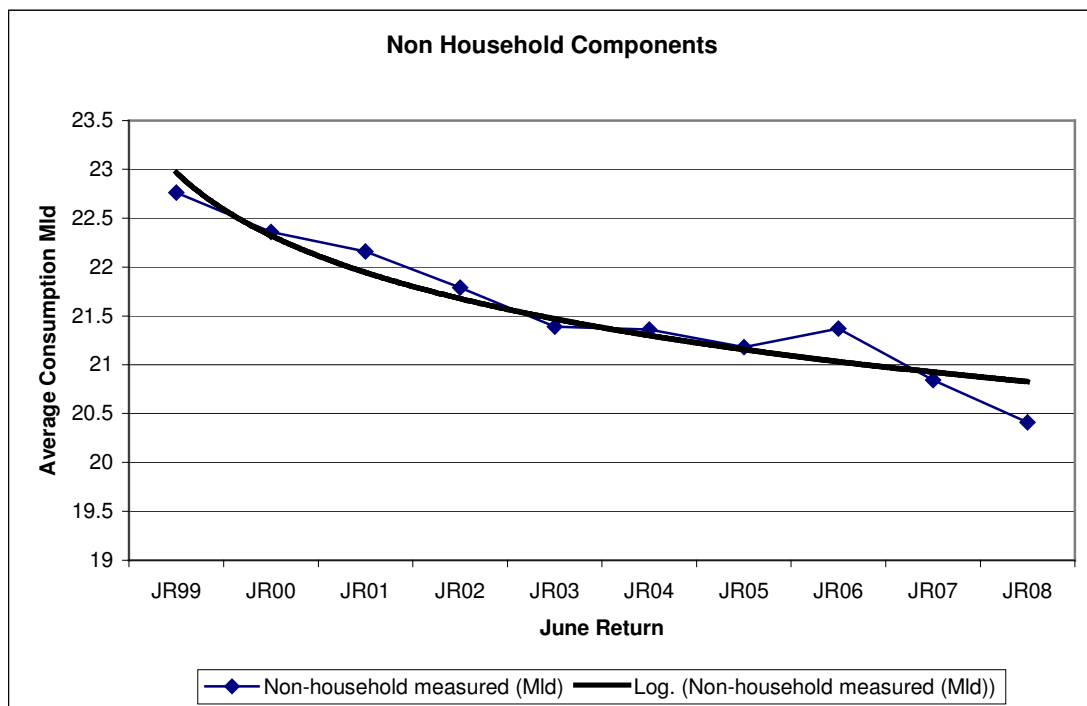
Possible effects of climate change on consumptions has been taken into account in the headroom calculations.

4.3 Non-household demand

The Company consulted all relevant local authorities and the Company's 15 largest users to understand trends and influences and to establish a future non-household demand. The Company carried out a simple sensitivity analysis for non-household demand. The results tended to show little variance between the high and low scenarios (+1.5% to -2%) with the majority of customers not reporting any change. However, during 2008, the Company was made aware that Flexsys, the Company's second largest customer, was to close with a consequent phased reduction in demand of approximately 1Mld by 2010. In addition, Kelloggs, also confirmed that they were undertaking a water efficiency initiative to reduce water usage by 10%. The total reduction in demand from these two customers is estimated at 1.12Mld, and this reduction has been taken forward to the overall demand forecast.

The downward trend in non-household demand, which was reported in the Company's previous Water Resources Plan, has continued into 2007/08. Non-household demand over the 11 years to 2007/08 shows a 0.6% reduction per annum for potable water (see Figure 3).

Figure 3 – Non household demand



The Chester Resource Zone is predominantly influenced by planning decisions made by Chester City Council. Small units of industrial land are

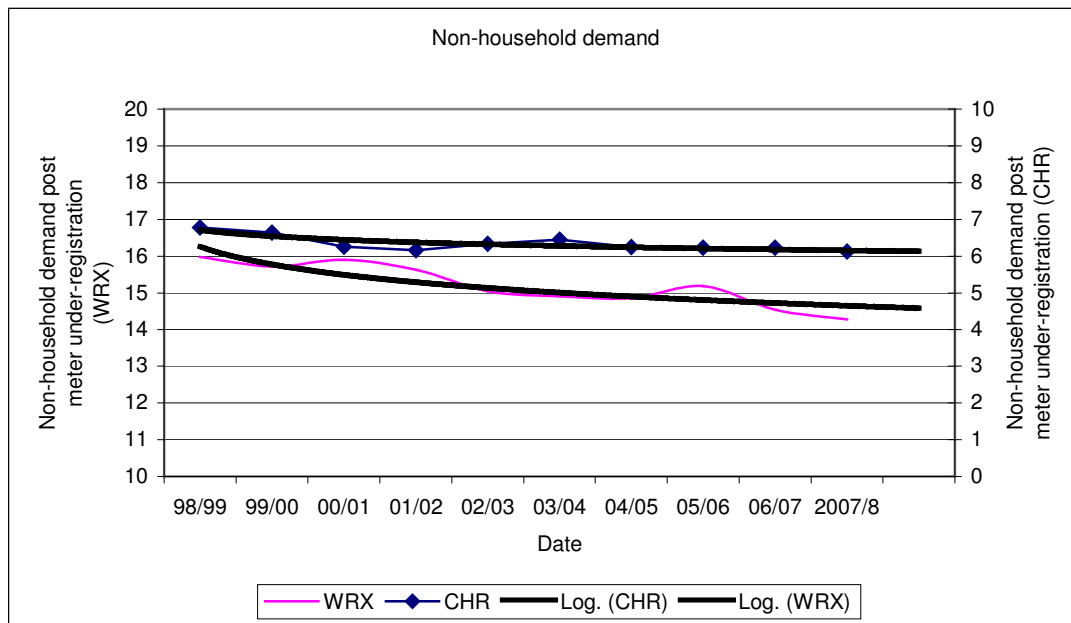
available for development but the Council is not aware of any potential large water users planning to set up business in the Chester City area. Instead, the City tends to favour the expansion of the service sector, such as the corporate banking sector.

Flintshire County Council covers the western area of the Chester Resource Zone. A large commercial development in the Old Warren area is planned for construction during the next AMP and a scheme has been designed to cater for this additional demand.

Wrexham County Borough Council has set aside areas of land for industrial development but at present there is limited demand for the land. Wrexham County Borough Council is not aware of any interest by a large water user to develop a business in the Wrexham area.

The Company has carried out regression analysis of the non-household consumption for each RZ (see Figure 4), both of which exhibit a downward trend. The downward trend has been included to 2010/11 after which it has been assumed that there will be a recovery by the planning horizon from the minimum estimated demand in 2009/10 (assumed end of the economic downturn) recovering 50% of the reduction from the JR08 figure by including a gradual increase year on year beginning in 2010/11

Figure 4 – Non-household demand by RZ



4.4 Water efficiency, metering and leakage control

Households

The Company's water efficiency strategy is principally based on the extension of optional metering, distribution of cistern displacement devices and the subsidised supply pipe repair policy.

Household water efficiency is promoted through "*A guide to water services*" leaflet which is sent out with all customer bills. In addition "*A guide to water efficiency in the home*" is sent to all domestic customers that request a free cistern displacement device (Save-A-Flush).

The Company's current policy is to distribute Save-A-Flush sachets to customers on request. The take up rate by metered households is estimated at about 5% of the metered households but this is expected to tail off in future years and the Company has assumed an average take up rate of 3% for the planning period. The savings from the sachets are estimated based on Ofwat's *Water Efficiency Good Practice Register* and amount to 0.032Mld at the planning horizon.

Non-households

The Company continues to carry out non-household audits principally at schools but also to other commercial customers upon request. The Company distributes self-audit packs to all non-household customers on request and takes the opportunity to promote water efficiency during water audits.

4.5 Climate change

Supply and Demand

The Company has not made an explicit allowance for climate change on the supply or demand side. The uncertainty is included in headroom.

4.6 Target headroom

Method

In accordance with the Environment Agency *Guidelines*, the Company incorporates an element of Headroom in its forecast to allow for uncertainties in the forecasts of supply and demand. Given that the Company does not forecast a deficit in the planning period and does not plan any significant investment to resolve a supply demand imbalance, the Company has continued to use the 1998 UKWIR Methodology for calculating headroom rather than the 2003 UKWIR Methodology.

Target headroom

The main areas of the supply/demand forecast that are deemed to change over the planning period, and hence have the greatest degree of uncertainty, are believed to be:

- climate change on deployable output,
- the demand forecast variation and,
- the uncertainty of climate change on demand.

In the calculation of headroom these factors have been determined and these factors show a gradual increase up to the planning horizon. The target headrooms for both Resource Zones therefore show a small increase over the planning period to account for these uncertainties. The headroom calculations are included as Appendix B.

5. BASELINE SUPPLY-DEMAND BALANCE

The Company's assessment of the baseline supply demand balance indicates that there are adequate resources to meet local water needs through to 2034/35. The results are summarised in Figures 5 and 6 below.

Figure 5 - Headroom – Wrexham Resource Zone

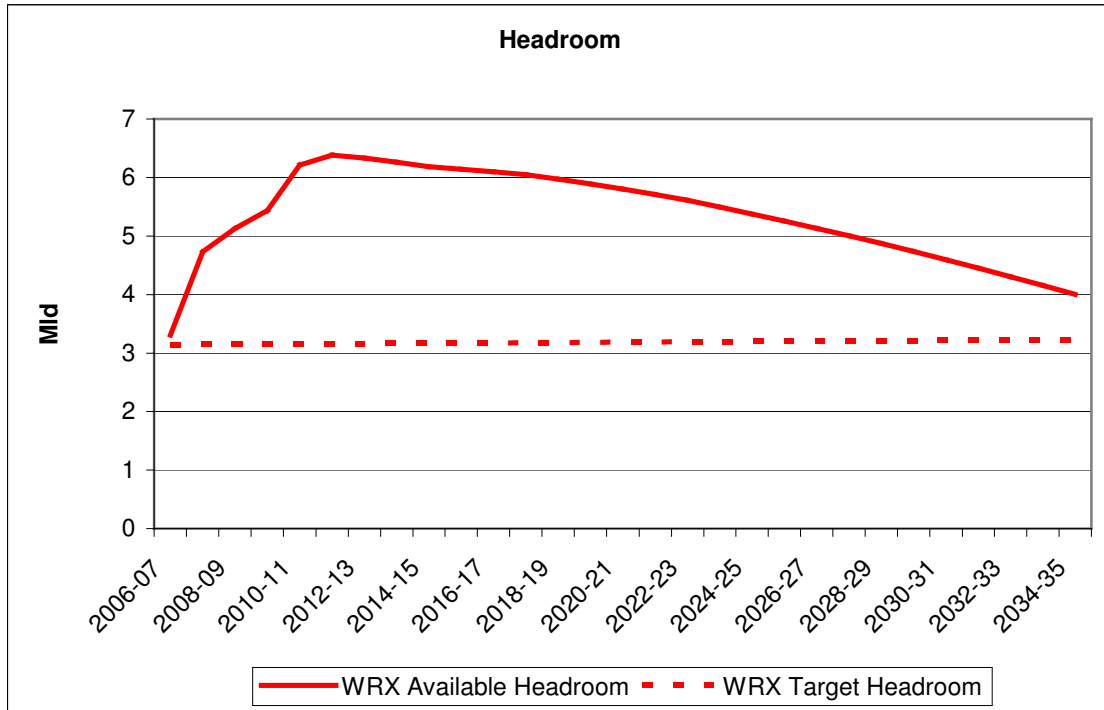
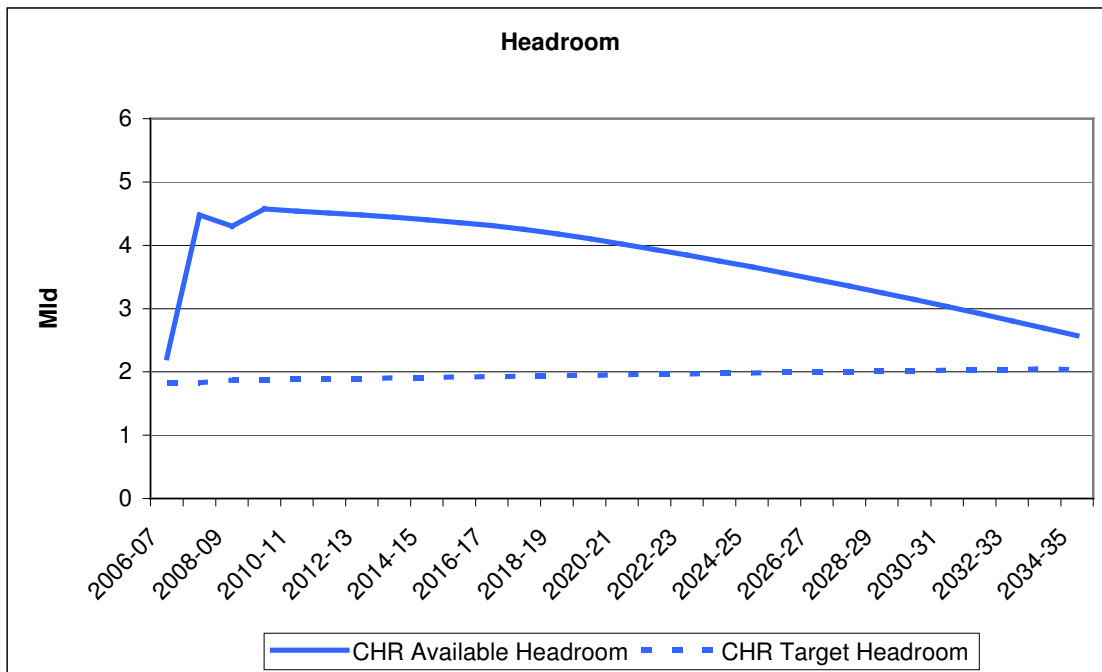


Figure 6 - Headroom – Chester Resource Zone



TABLES AND COMMENTARIES

TABLE COMMENTARIES

The base year for the demand forecasts is 2007/08. Data has been included for 2006/07 for information purposes only.

WRP1

Deployable output row 1 is not net of Treatment Works Operational Use.

Raw Water abstracted is derived from the demand forecast plus treatment works operational use and non-potable supplies.

Non-potable supplies have been included in deployable output but not in distribution input. Available headroom is therefore calculated as:

Water available for use less distribution input less non-potable supplies (WAFU – (DI+ non-potable supplies))

WRP2 and 3

There is no deficit identified for dry year scenario so Tables WRP2 and WRP 3 have not been completed.

WRP4 and WRP4a

These tables have been copied and pasted from WRP1 and WRP1a respectively.

WRP5

The Company has one time-limited licence (24/67/7/221) within the Wrexham RZ with an expiry date of 2018. It has been assumed that this licence will be renewed at current levels.

The Company holds a licence at Teirw (24/67/6/28/S, licenced quantity 0.47Mld), which is not currently used. The Company intends to retain this licence until further notice.

WRP6, 7 and 8

For Table WRP6 the Company is only able to provide incremental number of properties/population added during the year. The rows for per capita consumption figures have not been populated.

For Table WRP7 the Company has not derived its demand forecast based on micro-components. The figures included in Tables 7 and 7a are based on an assessment of water usage and projected changes in water use behaviour.

For Table WRP8 the Company is currently updating the SIC codes for non-household customers. The Table has been left blank.

APPENDICES

Appendix A – Population and Dwelling Review

Appendix B – Headroom calculations

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APPENDIX A – Population and Dwelling Review

POPULATION AND DWELLING REVIEW FOR WATER RESOURCES PLAN

1. INTRODUCTION

Water undertakers have a statutory duty to prepare and maintain a water resources plan under new sections of the Water Industry Act 1991, brought in by the Water Act of 2003.

The current Periodic Review 2009 process requires a comprehensive review of the forecast of population and numbers of households in the Company's supply area. The Company carries out these comprehensive reviews at five-yearly intervals to match the periodic review cycle.

The previous review of forecasts was carried out in 2003. Since then, forecast trends in numbers of households have been checked annually against the Company's billing data, which is a reliable source.

The Company has followed the *Water Resources Planning Guidelines 2007* and has also taken account of local knowledge in developing the population and household projections.

This report describes the Company's investigation into sources of data for population and households and proposes population and household projections to be used in the Supply/Demand forecast.

2. CONSULTATIONS

2.1 Welsh Assembly Government

The Welsh Assembly Government (WAG) commissioned Anglia Ruskin University to produce sub-national household projections for Wales (SDR 30/2006). The projections use the ONS 2003 mid-year population estimates (MYEs) of the usually resident population as their base. Between 2003 and 2026, the Anglia Ruskin University 2003-based household projections for the North Wales unitary authorities indicated an increase of 16.0%

WAG also commissioned ONS to produce 2003-based national and sub-national population projections for Wales. Again, the projections use the ONS 2003 MYE of the usually resident population as their base and are essentially derived by applying patterns of mortality, fertility and migration by local authority area averaged over the last 5 years (to mid 2003). Between 2003 and 2023, the 2003 based population projections indicate that the population for North Wales will increase by 3.6%.

The sub-national household projections, like the population projections, are presented for four regional groupings of unitary authorities (UAs) rather than individual unitary authorities. The North Wales Region consists of Isle of Anglesey, Gwynedd, Conwy, Denbighshire, Flintshire and Wrexham.

WAG also provided “Wales’s Population - A Demographic Overview 1971 – 2005”. The report highlights key trends in population estimates and provides population projections for the next 20 years. These are based on the Government Actuary Department, which are described in more detail in section 2.8 below. The report also provides an analysis of migration patterns both to and from Wales, which indicate that from 1994 onwards there has been on average 2,400 more people per year moving to Wales.

WAG provided “Statistics on migrant workers in Wales”. Since May 2004, when 10 further countries joined the EU there has been considerable interest in the number of migrants coming to Wales in order to work. Prior to enlargement the UK government put in place measures to regulate the access of the new countries to the UK labour market, via the Worker Registration Scheme (WRS). The WRS provides information regarding the number of migrants applying to work in Wales. In the period May 2004 to March 2007 Wrexham County Borough Council gave approval for 2,565 migrants, Flintshire County Council gave 1,160 and Denbighshire just 375. The statistics show that for the first quarter of 2007 there has been a slowdown in the number of applicants. This slowdown is expected to continue.

2.2 North Wales Authorities

In addition to the Welsh Assembly Government projections the North Wales unitary authorities commissioned Conwy CC to produce a revised set of trend-based population projections for authorities across North Wales.

In producing the 2003-based projections, the mid-year population estimates (as at October 2004) from 1991 to 2003 were used. A number of trend based scenarios were considered and these are outlined below:

- **Option H1** assumes 5 year migration trend (i.e. short-term trend and the one used by WAG).
- **Option H2** assumes a 10 year migration trend.
- **Option H3** assumes the long term migration trend (i.e. all available years of migration trend).
- **Option H4** assumes housing completions at the rate of the last 5 years
- **Option H5** assumes static population (i.e. the total population remaining at the 2003 level in subsequent years)
- **Option H6** assumes natural change only (i.e. zero migration after 2003).

Clearly, some of the growth options listed above are unrealistic as the higher growth option (H1) would require a big increase in house building while the low growth options (H5 and H6) would require a big reduction in house building. The Company understands that the natural change scenario was only run because this shows the effect of migration on population change. Similarly, the static population scenario shows the effect on the population age structure if the total population of the County remained constant.

Options H2, H3 and H4 suggest medium housing growth and are generally within 10% of actual housing completions since 1996.

2.3 Wrexham County Borough Council

The Wrexham County Borough Council (WCBC) area falls within the Wrexham Resource Zone (WRZ). It is therefore considered to be a very good indicator for the likely changes in population and dwellings for this resource zone.

WCBC was able to provide mid year population estimates for each year from 2001 to 2006. This was based on ONS data and was in line with the 2001 Census of Population results.

Based on conversations with the North Wales Authorities Planning Departments the Company understands that the North Wales Authorities have agreed to split the Welsh Assembly Government trend-based household projections amongst themselves.

WCBC provided the breakdown of the population and household projections for each of the North Wales Authorities in a spreadsheet (NWPHRG Pop Proj 200505 - 4th run summary - overall conv factor.xls). WCBC stated that the preferred strategy for WCBC is 420 dwellings pa between 2006-2021. This

ties in with Growth option H4 (housing completions at the rate of the last 5 years).

It is worth noting that in the period 1996-2006, 4,378 new homes were built, which is about 14% higher than the policy figure in the Wrexham Unitary Development Plan (385 per year), i.e. the actual number of builds can be higher than the policy figure.

2.4 Denbighshire County Council

Denbighshire County Council (DCC) area covers a small percentage (4.28%) of the WRZ.

DCC was able to provide population data for 2001 to 2005 and household data for 2001 to 2004.

DCC also provided a report, which included the results of the 2003 trend based population projections carried out by Conwy County Council and Denbighshire County Council. For growth options H3, H4 and H5, detailed above, the projections indicated a possible increase in the total population for DCC of 9%, 12% and 18% respectively.

DCC are currently working on their Local Development Plan and two growth options are being considered to be taken forward as policy by the Council. The options are as follows:

- Adopt 10-year migration trend, which would result in 420 dwellings pa being built between 2006 and 2021.
- Adopt 5 year build completion rates, which would result in 280 dwellings pa being built between 2006 and 2021.

DCC hope to have full Council approval for the preferred strategy by November 2007.

2.5 Flintshire County Council

Flintshire County Council (FCC) area covers a small percentage of the population of the Company (approximately 8.2% in the Chester Resource Zone and 9.5% in the Wrexham Resource Zone).

FCC provided the Company with a copy of the Council's draft deposit Unitary Development Plan (UDP) (September 2003), which sets out their strategy for housing between 2000 and 2015. The strategy estimates the population to be 153,200 in 2015, which matches fairly closely the projected figure of 153,447 based on the North Wales Authorities population projections spreadsheet.

The UDP sets a target build rate of approximately 490 dwellings pa or a total of 7,400 between 2000 and 2015.

2.6 Cheshire County Council and Chester City Council

Cheshire County Council provided data at District Level, for the Chester area of Cheshire which predominantly covers the Chester Resource Zone (CRZ) (approximately 80%).

Cheshire County Council (CCC) made available dwelling data for 2001, 2002, 2003 and 2005 by Ward, Electoral Division and Parish. In addition years 1981 to 2005 data for population by district was provided.

Population forecasts were made available by CCC covering from 2005 to 2021.

A number of population projections are available for Chester as follows:

- **Cheshire County Council Population Report 2007** – the report forecasts a 5% increase in the population from 2005 to 2021.
- **Chester City Council Annual Monitoring Report 2006** – this earlier report forecasted a 2% fall in population from 2001 to 2021 due to an ageing population and declining number of young people and is based on the Cheshire County Council Population Report 2004. The CCC Population Report 2004 has now been superseded by Cheshire County Council Population Report 2007 described above.
- **Chester City Council Housing Needs Survey 2005** – the report includes 2001 based population projections and it also indicates a 2% fall over the 20 years to 2021. It has been assumed that the report is also based on the CCC Population Report 2004.

2.7 Department for Communities and Local Government (DCLG)

DCLG were only able to provide projection data for England.

DCLG published household estimates/projections for 1991 to 2026 in Table E: 2003 Based Household Estimates/Projections. The projections show the number of households that would form if recent demographic trends continue. The projections are available for regions only. The North West of England is projected to show an increase by 2026 of 17.5% on 2003 household MYE.

DCLG also published sub-regional household projections giving household projections for Chester in Table F: Sub Regional Household Projections, England (2004 based). The projection to 2029 indicates an increase in households of 15.7% on 2004 MYE.

2.8 Office of National Statistics

The Office of National Statistics (ONS) released population and household data at Output Area (OA) level based on the 2001 Census. An OA is stated to consist of approximately one hundred households, which is of sufficient resolution to allow the Company to produce base population and household levels.

The ONS web site was used as the source of 2001 Census data at OA level. Electronic OA boundaries were also made available by ONS and digitised on the Company's GIS system.

ONS provided population projections for Chester from 2004 to 2029. The population projections are 2004 trend based, which means assumptions for future levels of births, deaths and migration are based on observed levels over the previous five years. They show what the population will be if recent trends in these continue.

2.9 Government Actuary's Department (GAD)

GAD provided population projections for England and Wales. The projection forecasts are 2004-based. GAD projections gave upper and lower limits based on different scenarios eg the upper projection is based on high fertility, high life expectancy, high migration and the lower projection is based on low fertility, low life expectancy and low migration.

The increase in populations to 2035 based on the different scenarios is shown in Table 1.

Table 1 – Increase in population to 2035

	Base population	Low projection		Principal projection		High projection	
	2004 population (million)	2035 Population (million)	%age increase	2035 Population (million)	%age increase	2035 Population (million)	%age increase
England	50	52.08	4.16	57.92	15.84	63.33	26.66
Wales	2.96	2.93	- 1.01	3.29	11.15	3.66	23.65

2.10 North West Regional Assembly Regional Spatial Strategy

The North West Regional Assembly (NWRA) provided the Company with a copy of their draft Regional Spatial Strategy. The draft Regional Spatial Strategy (RSS) for North West England provides a framework for the physical development of the region over the next fifteen to twenty years.

The draft RSS sets out how many houses are required to be built between 2003 and 2021. The target for Chester is policy based and sets a total maximum housing provision of 7,500 (net of clearance replacement) between 2003 and 2021 and the proportional allocation to the Chester Resource Zone.

This target figure of 7,500 has been adjusted to take account of the 1,021 houses built between 2003 and 2006 in the Chester resource zone. This reduces the required average annual housing rate from the draft RSS figure of 417 to 376.

2.11 Review of housing supply – final report (Barker Review)

The Government published their Review of housing supply (Barker Review, March 2004). The Review sets out a series of policy recommendations to address the lack of housing supply in the UK.

The Review identified that affordability of housing has worsened and the latest evidence suggests that the trend rate of real UK house price growth has increased to 2.7 per cent over the last 20 years, considerably higher than the European average of 1.1 per cent.

According to estimates there are between 220,000 and 230,000 (Table F: Sub Regional Household Projections, England (2004 based)) new households being formed annually. Yet, only 165,000 homes were built in 2002.

The Review set out three scenarios to tackle the affordability issue by reducing the trend in real house prices by increasing the level of housebuilding. Taking as the baseline the level of private sector build in 2002-03, 140,000 gross starts and 125,000 gross completions it is estimated that:

- Reducing the trend in real house prices to 1.8 per cent, would require an additional 70,000 private sector homes per annum; and
- To reduce the trend in real house prices to 1.1 per cent, an additional 120,000 private sector homes per annum would be required.

The Review concluded that to reduce the trend in real house prices to zero is undesirable and unachievable. Even so the above estimates imply that large increases in the rate of new build would be required to achieve a reduction in the price trend, which is unsurprising given the fact that new build is only around 1 per cent of the existing stock.

The Interim Report points out that if house building was to take-off in the UK skills shortages are likely to come into play. At present more than eight out of ten construction firms report skill shortages and given this even modest growth would require 70,000 new workers.

2.12 North West Regional Housing Board (NWRHB)

In 2003 the government launched the Sustainable Communities Plan to tackle housing supply issues in the south east and low demand in other parts of the country. The government set up the North West Regional Housing Board to ensure delivery of the policies set out in the Communities Plan.

The NWRHB published the North West Regional Housing Strategy in 2003. It does not contain much information of how the policies will be implemented

and where the proposed housing will be located, apart from naming Metropolitan areas. The Strategy is acknowledged by the authors as being an interim document and more detailed investigations are required to produce a better formed, better argued and more informed Strategy.

3. POPULATION ANALYSIS

3.1 Baseline population

The baseline population was calculated by allocating 2001 Census OAs to the Company's water supply and resource zones. This involved allocating household 2001 Census figures to Ordnance Survey Plans generated from the Company's GIS. It is worth noting, at this point, that the population forecasts will be affected by the rate of housing in the supply area.

The OA boundaries were used to determine the proportion of councils within each resource zone. The proportional allocations by population are shown in Table 2.

Table 2 – Proportional allocation by population

Local Authority	CRZ	WRZ	Total
Flintshire	8.18%	9.47%	17.65%
Denbighshire	0%	4.28%	4.28%
Wrexham	0%	100%	100.00%
Chester	78.40%	3.33%	81.73%

Subsequent mid-year estimates for 2006 for WCBC and 2004 for FCC, DCC and CCC were projected forward to form a 2006 baseline figure. A 2006/07 baseline figure was calculated on a *pro rata* basis.

The WRZ baseline population for 2006/07 of 153,479 closely matched that of the PR04 2006/07 projection of 153,665, a variance of 0.12%.

The CRZ baseline population for 2006/07 was estimated at 105,994, some 628 fewer than the PR04 2006/07 projection of 106,622 an apparent decrease of 0.6%.

3.2 Population Projections

General information

The various projections from Section 2 have been analysed to establish the changes per year. These changes have then been applied to the 2006 baseline figure to provide a resource zone based projection.

In the absence of better data it has been assumed that the proportional allocations remain static throughout the planning period.

Where data is not available up to 2035 it has been extrapolated based on the latest two years forecast. Data for years between projection figures has been interpolated *pro rata*.

The population projections from the data sources described in Section 2 have been combined in a variety of ways to produce a range of projections which

have been used to identify the underlying trends and any anomalies. The combinations of the source projections are defined in Table 3 below.

Table 3 – Combination of source projections

Scenario No.	Wales Growth Option	England Growth Option
DVW1	Current DVW PR04 forecast	projected forward to 2034/35
DVW2	H6	ONS data
DVW3	H4	ONS data
DVW4	H2	ONS data
DVW5	H1	ONS data
DVW6	H2	GAD mid projection
DVW7	H6	GAD low projection
DVW8	H1	GAD high projection
DVW9	H4	GAD mid projection
DVW10	H4	Cheshire County Council Projection

Obviously, there are significant other possible combinations but the above are considered to provide the upper, middle and lower ranges for CRZ and WRZ.

Wrexham resource zone

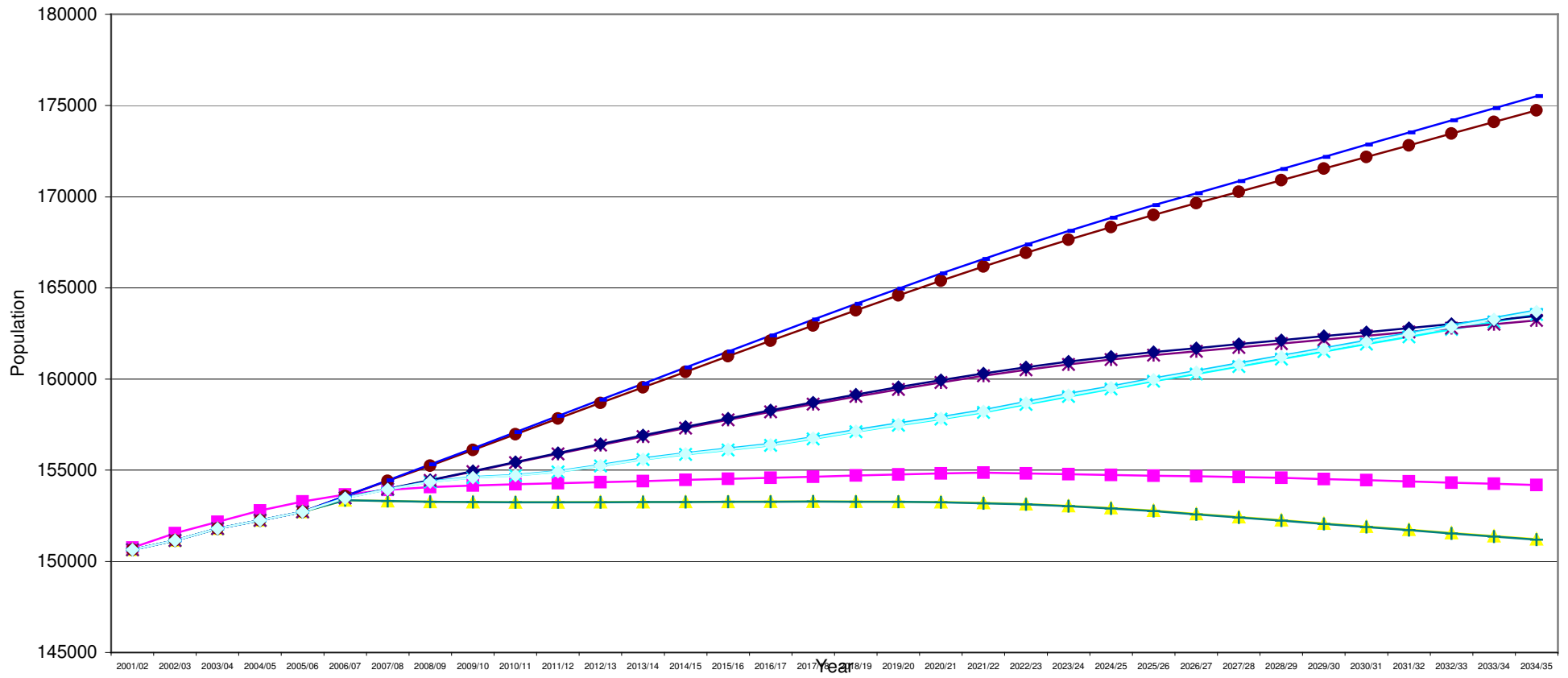
The Wrexham resource zone comprises population from WCBC, CCC, DCC and FCC. The trend based population projections from each Council have been incorporated into the population projection for the Wrexham resource zone.

A comparison of the population projections for the various sources is presented in Chart 1.

The projected populations vary in 2034/35 from 175,515 for scenario DVW8 to 151,189 for scenario DVW7. The Company's PR04 estimate, which is based on data provided by others, of 154,187 lies midway between the lowest scenario DVW7 and the middle growth option DVW9 estimate of 163,776.

For sensitivity analysis DVW8 will be adopted as the upper band, DVW2 as the lower band and DVW10 as the middle forecast.

Chart 1 - Wrexham Population Projections



- WRZ Population DVW1
- ✕ WRZ Population - Councils projection DVW3
- WRZ Population - Councils projection DVW5
- ◆ WRZ Population - Councils projection DVW6
- ◆ WRZ Population - Councils projection DVW8
- ▲ WRZ Population - Councils projection DVW2
- ✕ WRZ Population - Councils projection DVW4
- ◆ WRZ Population - Councils projection DVW7
- ◆ WRZ Population - Councils projection DVW9
- ◆ WRZ Population - Councils projection DVW10

Chester resource zone

The Chester Resource Zone is influenced principally by policy-based decisions taken by Chester City Council. However, the CCC, FCC and WCBC projections have been taken into consideration when developing population projections for the Chester Resource Zone. A comparison of the population projections for the various sources is presented in Chart 2.

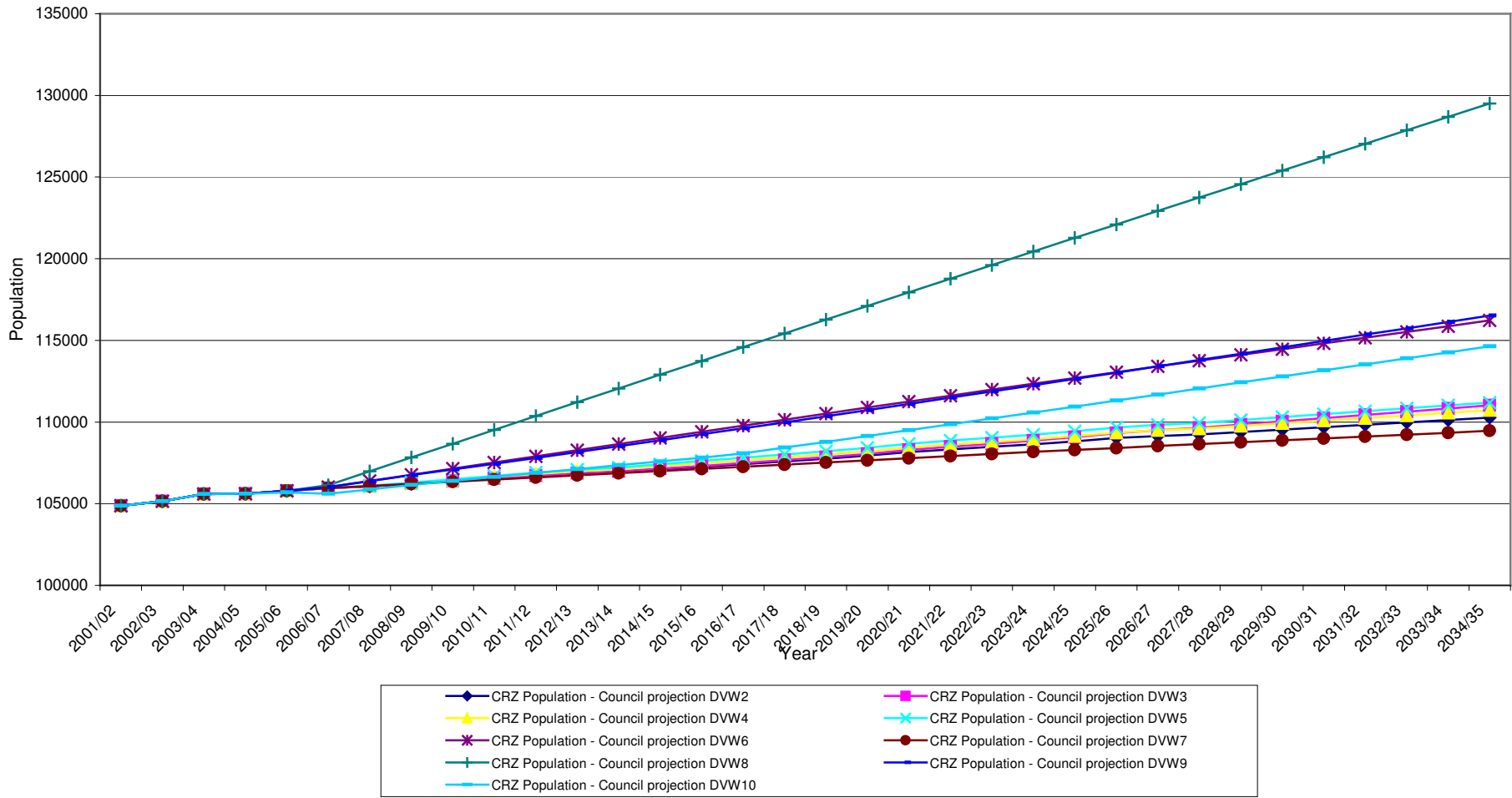
The projections vary in 2034/35 from 105,876 for the current Company forecast to 129,509 based on scenario DVW8. The Company's current estimate reflects the assumption that the current rate of growth in the Chester resource zone is unsustainable, which is evident from the number of vacant "For Sale" properties in the centre of Chester.

Excluding the current Company projection all of the projections show a gradually increasing population, which reflects a change in policy from the PR04 projections, i.e. prior to 2004 Cheshire County Council were forecasting a 2% fall in the population for the Chester area. The new forecasts indicate a 5% increase in population.

If the highest and lowest forecasts are excluded it can be seen that there is a tight band from 116,517 for scenario DVW9 to 109,463 for scenario DVW7 in 2034/35 a variance of 6.4%.

The Company's current forecast would appear to be unrealistic as it is less than the natural change growth option, i.e. zero migration after 2003. It is therefore proposed to use DVW7 as the low projection and DVW8 as the upper band. DVW10 will be adopted as the middle projection.

Chart 2 - Chester Population Projections



4. HOUSEHOLD ANALYSIS

4.1 Baseline households and occupied non-households

Household and occupied non-households baseline has been generated using the proportional allocations shown in Table 3 below.

Table 3 – Proportional allocation by household

Local Authority	CRZ	WRZ	Total
Flintshire	8.14%	9.26%	17.40%
Denbighshire	0%	4.34%	4.34%
Wrexham	0%	100%	100.00%
Chester	79.29%	3.31%	82.60%

The definition of household has changed for the 2001 Census, however it remains broadly in line with that used by the Company and therefore will be utilised.

The base year 2006 figure is derived from the 2001 Census and then projected to a mid-year estimate using the mid-year local authority data.

The Company's billing system has been used to identify the numbers of households (houses plus single supply flats). These figures have been subtracted from the base year mid-year estimate (after taking into account private supplies) to provide an occupied non-household estimate.

The household projections from the data sources described in Section 2 have been combined in a similar way to the population projections. The combinations of the source projections are outlined in Table 4 below.

Table 4 – Combinations of source projections

Scenario No.	Wales Growth Option	England Growth Option
DVW HH1	DVW AMP4 forecast projected forward to 2034/35	
DVW HH2	H6	DCLG data
DVW HH3	H4	DCLG data
DVW HH4	H2	DCLG data
DVW HH5	H1	DCLG data
DVW HH6	H2	RSS adjusted
DVW HH7	H6	RSS adjusted
DVW HH8	H1	RSS adjusted
DVW HH9	H4	RSS adjusted

4.2 Household Projections

Wrexham resource zone

The WCBC has the greatest influence on the household projections and this is clearly demonstrated by the projections for households in Chart 3 aligning more distinctly to the low, medium and high projections proposed by the local authorities.

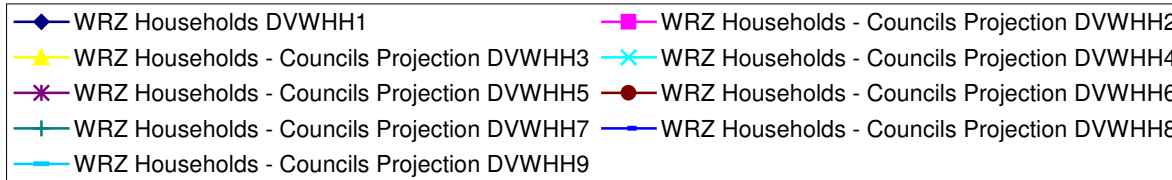
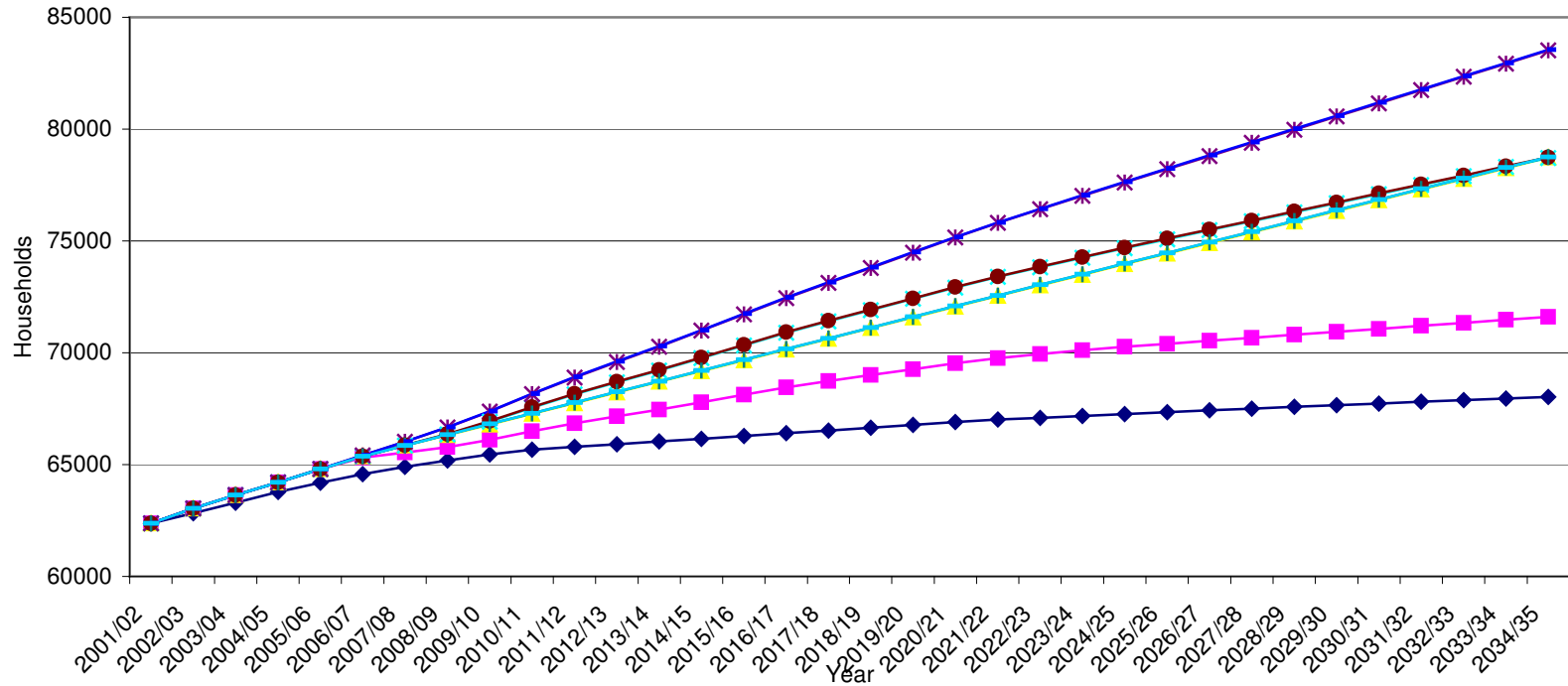
It can be seen that the lower projections include the Company's PR04 projection and scenario DVWHH7. However, when one considers that the variation between the Company's forecast number of households of 64,573 in 2006/07 and the actual figure from the billing system of 63,486 is -1.7 % it is considered to reflect more accurately the recent trend in house building.

The middle projections (DVW HH2, 3, 4, 6, 7 and 9) are based on the Welsh local authorities mid and low growth options combined with DCLG projection data for Chester.

The upper projections (DVW HH5 and 8) are based on the Welsh local authorities high growth options combined with the RSS-adjusted projection data for Chester.

For sensitivity analysis DVWHH2 will be used as the lower projection. The upper projection will be taken as DVWHH8 and the middle projection will be taken as DVWHH9.

Chart 3 Wrexham household projections



Chester resource zone

The projections for the Chester resource are shown in Chart 4. It is clear from the projections that there has been a divergence from policy in the Chester area since the PR04 forecasts were produced.

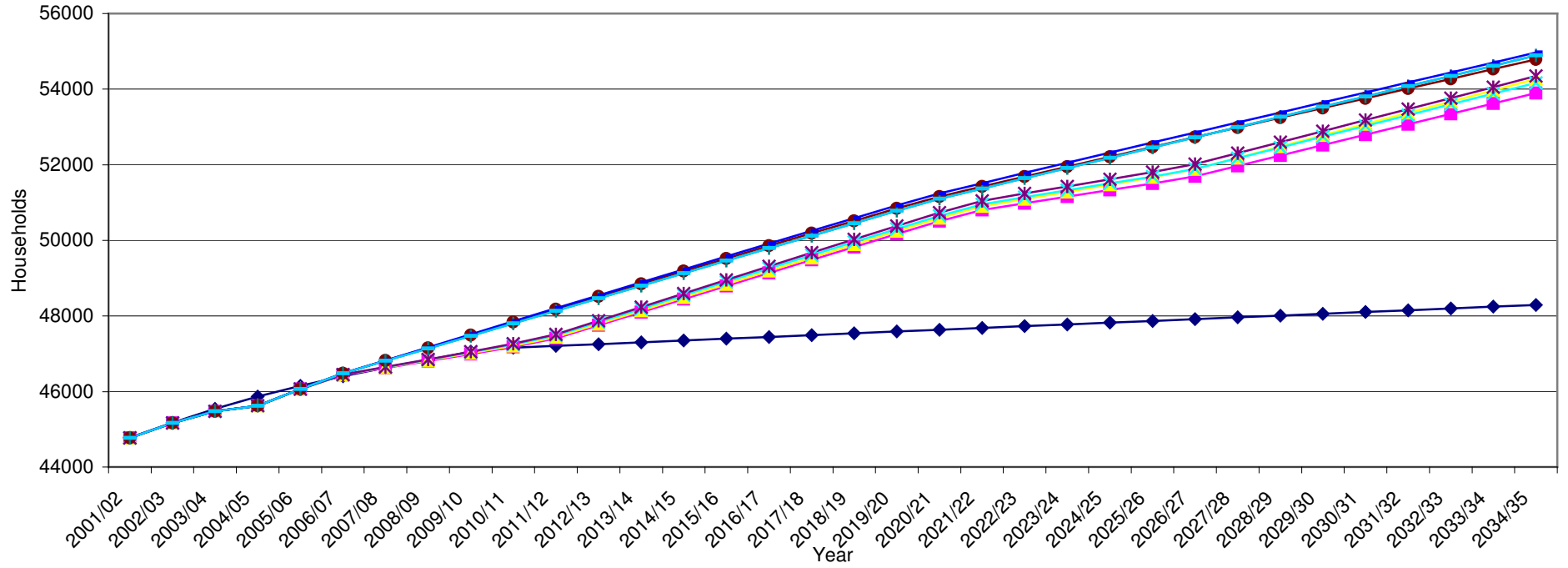
The Chester resource zone is predominantly affected by changes in the Chester district. The tight band evident in the local authority projections shows that the various Wales growth options have little effect in the Chester resource zone. The forecasts are influenced more by the Chester projection data.

The current Company forecast is lower than the other projected data but the given that the PR04 Company forecast for 2006/07 of 44,849 compared to the Company billing system of 44,680 only varies by -0.4% it is considered to more accurately reflect the recent trend in house building in the Chester Resource Zone.

If the current Company forecast is excluded the numbers of households in 2034/35 varies between 53,896 for scenario DVWHH2 to 54,969 for scenario DVWHH8, a variance of just 2.0%.

For sensitivity analysis the upper band will be taken as DVWHH8, the lower band will be taken as DVWHH2 and the middle projection taken as DVWHH9.

Chart 4 Chester household projections



- ◆ CRZ Households DVWHH1
- ◆ CRZ Households - Councils Projections DVWHH2
- ◆ CRZ Households - Councils Projections DVWHH3
- ◆ CRZ Households - Councils Projections DVWHH4
- ◆ CRZ Households - Councils Projections DVWHH5
- ◆ CRZ Households - Councils Projections DVWHH6
- ◆ CRZ Households - Councils Projections DVWHH7
- ◆ CRZ Households - Councils Projections DVWHH8
- ◆ CRZ Households - Councils Projections DVWHH9

5. DISCUSSION

The above household projections all tend to show a significant increase in households compared to previous years. The lowest household projections for WRZ and CRZ show an increase of 10% and 16% respectively on 2006/07 baseline figures. The highest household projections for WRZ and CRZ show an increase of 27% and 18% respectively. The current DVW PR04 projections forecast a corresponding increase of 5% for WRZ and 4% for CRZ.

Given the Government's support and strategy to improve the affordability of housing it would seem reasonable to acknowledge that the rate of house building will increase over the planning period.

This is tempered by the statement in the Barker Review that eight out of ten construction firms are claiming a skills shortage. When this is combined with the reluctance of school leavers to opt for the building trade and the tendency of any new recruits to be attracted to London by higher wages and to work on projects presented by the Olympics in 2012, it seems unlikely that the Government's policy for at least 70,000 new homes per year will be realised.

In addition, there would appear to be a general reluctance by the local councils to adopt much higher growth rates than in previous years.

Although the Company has adopted the population and household projections supplied by others it would seem reasonable to assume that the current rate of building will continue in the short term to 2012/13 and then show a moderate increase thereafter.

6 SUMMARY

6.1 Population

- The projection data for the WRZ PR04 population appears to have been underestimated by around 260 (0.2% variance) at 2006/07.
- The projection data for the CRZ Pr04 population appears to have been overestimated by around 678 (0.6% variance) at 2006/07.
- The Company proposes to use scenario DVW10 as the principal projection for the Chester and Wrexham Resource Zones.
- The Company proposes to use scenario DVW2 as the lower forecast for both resource zones.
- The Company proposes to use scenario DVW8 as the upper forecast for both resource zones.

6.2 Households

- WRZ has seen a total increase from PR04 2002/03 projected figures of around 2,292.
- CRZ has seen a total increase from PR04 2002/03 projected figures of 1,139.
- The Company proposes to use scenario DVWHH9 as the principal projection for the Chester and Wrexham Resource Zones.
- The Company proposes to use scenario DVWHH2 as the lower forecast for both resource zones.
- The Company proposes to use scenario DVWHH8 as the upper forecast for both resource zones.

REFERENCES

Office of National Statistics Web Site www.statistics.gov.uk

2003-based short-term subnational population for local authority areas

1996-based English subnational population projections 9 October 2001

Government Actuary's Office Web Site www.gad.gov.uk

1998-Based Population and Household Projections for Wales, The National Assembly for Wales Statistical Directorate SB 32/2001

Welsh Assembly Government Web Site www.wales.gov.uk

DVW Customer Billing System

2001 Census

APPENDIX A

DWELLING AND HOUSEHOLD

DEFINITIONS

2001 Census Household

A household comprises one person living alone, or a group of people (not necessarily related) living at the same address with common housekeeping, that is, sharing either a living room or sitting room or at least one meal a day.

It is this definition that the Company proposes to utilise; however a further division is required to take into account industry standards. These are multiple households, which are billed by either a common meter or one rateable value and are classed as (occupied) non-households.

2001 Census Household space

A household space is the accommodation available for an individual household, which may be occupied or unoccupied. A household space is not necessarily self contained. For example, a bedsit occupied by a single person with a shared bathroom is counted as a household space.

It should be noted that household spaces which were originally identified by the enumerator as absents, refusals or non-returns may subsequently have had a household imputed by the One Number Census process. Households that returned a form but then proved to be all visitor households were classified as second/holiday homes in output.

Dwelling

A household's accommodation (a household space) is defined as being in a shared dwelling if it has accommodation type 'part of a converted or shared house', not all the rooms (including bathroom and toilet, if any) are behind a door that only that household can use *and* there is at least one other such household space at the same address which can be combined to form a shared dwelling. If any of these conditions is not met, the household space forms an unshared dwelling. Therefore a dwelling can consist of one household space (an *unshared* dwelling) or two or more household spaces.

The definition has changed since 1991, when a dwelling was defined as structurally separate accommodation. This was determined primarily by considering the type of accommodation, as well as separate and shared access to multi-occupied properties.

Appendix B – Headroom calculations

Appendix C – SEA scoping report

Appendix D – Habitats Directive screening appraisal

List of consultees and details of consultations

No.	Consultee	No.	Consultee
1.	Chief Executive Countryside Agency Northwest Regional Office 3 rd Floor Bridgewater House Whitworth Street Manchester M1 6LT	2.	Chief Executive English Heritage North West Region Canada House 3 Chepstow Street Manchester M1 5FW
3.	Chief Executive English Nature Pier House Wallgate Wigan Lancashire WN3 4AL	4.	Director Wales Environment Agency Wales Cambria House 29 Newport Road Cardiff CF24 0TP
5.	Chief Executive Countryside Council for Wales Maes-y-Ffynnon Penrhosgarnedd Bangor Gwynedd LL57 2DW	6.	Director Cadw Welsh Assembly Government Plas Carew Unit 5/7 Cefn Road Parc Nantgarw Cardiff CF15 7QQ
7.	Director Welsh Development Agency Unit 7 Ffordd Richard Davies St Asaph Business Park St Asaph LL17 0LJ	8.	Director Northwest Development Agency Brew House Wilderspool Park Greenalls Avenue Warrington WA4 6HL
9.	Regional Manager Consumer Council for Water Wales Room 140 Caradog House 1-6 St Andrews Place Cardiff CF10 3BE	10.	Chief Executive Wrexham County Borough Council Crown Buildings Chester Street Wrexham LL13 8BG
11.	Chief Executive Denbighshire County Council County Hall Wynnstay Road Ruthin LL15 1YN	12.	Chief Executive Flintshire County Council County Hall Mold CH7 6NF
13.	Director Chester City Council The Forum Chester CH1 2HS	14.	Chief Executive Cheshire County Council Backford Hall Backford Chester CH1 6EA
15.	Chief Executive United Utilities Dawson House Great Sankey Warrington WA5 3LW	16.	Chief Executive Severn Trent Water 2297 Coventry Road Birmingham B26 3PU

17.	Managing Director Dwr Cymru Welsh Water PO Box 690 Cardiff CF23 5WL	18.	Chief Executive The RSPB Maes-y-Ffynnon Penrhosgarnedd Bangor Gwynedd LL57 2DW
19.	Director North Wales Wildlife Trust 376 High Street Bangor Gwynedd LL57 1YE	20.	Director Cheshire Wildlife Trust Grebe House Reaseheath Nantwich Cheshire CW5 6DG
21.	Director Welsh Assembly Government Cathays Park Cardiff CF10 3NQ	22.	Director Friends of the Earth Cymru 33 Castle Arcade Balcony Cardiff CF10 1BY
23.	Director Campaign for the Protection of Rural Wales Ty Gwyn 31 High Street Welshpool Powys SY21 7YD	24.	Chairperson Friends of the Meadows Chester City Council The Forum Chester CH1 2HS
25.	Olwen Minney Water Policy Manager Water Policy Branch Climate Change and Water Division Welsh Assembly Government Cathays Park Cardiff CF10 3NQ	26.	Paul Hope Head of Supply/Demand Balance OFWAT Centre City Tower 7 Hill Street Birmingham B5 4UA
27.	Dawn Instone Water Supply & Regulation Division Department for Environment, Food and Rural Affairs Ergon House 17 Smith Square London SW1P 2AL	28.	Miss J A King Flat 4 7 St Andrews Road Surbiton Surrey KT6 4DT
29.	Lesley Griffiths AM (Labour - Wrexham) Constituency Office: Vernon House 41 Rhosddu Road Wrexham LL11 2NS	30.	Ian Lucas MP Wrexham Constituency Office: Vernon House 41 Rhosddu Road Wrexham LL11 2NS
31.	Karen Sinclair AM (Labour - Clwyd South) Constituency Office 6 Oak Mews Oak Street Llangollen Denbighshire LL20 8RP	32.	Martyn Jones MP Contact Information Foundry Buildings Gutter Hill Johnstown Wrexham LL14 1LU

33.	Christine Russell (MP for City of Chester) Constituency Office: York House York Street Chester CH1 3LR	34.	Mr. Mark Tami Alyn & Deeside MP Deeside Enterprise Centre Rowley's Drive Shotton Deeside Flintshire CH5 1PP
35.	Mr. David Hanson (MP Delyn) 64 Chester Street Flint Flintshire CH6 5DH	36.	Mr. Carl Sargeant (AM Alyn & Deeside) Deeside Enterprise Centre Rowley's rive Shotton Deeside Flintshire CH5 1PP
37.	Eleanor Burnham (AM North Wales Region) Constituency Office 67 Regent Street Wrexham LL11 1PF	38.	Ms. Janet Ryder (AM North Wales Region) 65 Well Street Ruthin Denbighshire LL15 1AG

List of libraries

No	Library
1	Chester Library, Northgate Street, Chester, Cheshire, CH1 2EF
2	Blacon Library, Western Avenue, Blacon, Chester, Cheshire, CH1 5QY
3	Lache Library, Lache Park Avenue, Lache, Chester, Cheshire, CH4 8HR
4	Upton Library, Wealstone Lane, Upton, Chester, Cheshire, CH2 1HB
5	Hoole Library, 91Hoole Road, Hoole, Chester, Cheshire, CH2 3NG
6	Great Boughton Library, Green Lane, Vicars Cross, Chester, Cheshire, CH3 5LB
7	Bishops High Library, Vaughans Lane, Great Boughton, Chester, Cheshire, CH3 5XF
8	Tarvin Library, Village Room Community Centre, Meadow Close, Tarvin, Cheshire, CH3 8LY
9	Tattenhall Library, Park Primary School, Tattenhall, Chester, Cheshire, CH3 9AH
10	Malpas Library, Bishop Heber High School, Malpas, Cheshire, SY14 8JD

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