



Technical Stakeholder Meeting: Update on demand management and resource options to manage future water supply.

Date: Friday 28 April 2017

Time: 10:00 to 15:00

Venue: Crowne Plaza Hotel, Caversham Bridge, Richfield Avenue, Reading, RG1 8BD

Meeting Minutes

1. Welcome and Introduction

Chris Lambert welcomed everyone to the meeting. The objectives for the day were to:

- provide an update on the on-going technical assessments of the options
- discuss the constrained list of demand management and resource options that will be used in the programme appraisal process
- provide opportunity for final comments from stakeholders on this work
- set out the next steps and reporting.

Key points made by Chris in his opening presentation included:

- an overview of previous discussions held on demand management and resource options under consideration for WRMP19
- TW published an updated screening report for demand management options (March) and an updated screening report on resource options (April) and sought feedback from stakeholders by **12 May 2017**. TW will review this further feedback and expect to publish the final fine screening report at the end of May or early June 2017. The constrained options will then be taken forward for programme appraisal.
- TW is currently undertaking modelling of demand management options to develop programmes of options to include in the programme appraisal process. TW offered a meeting in June to share this work with stakeholders if there is interest to do so.

Chris also presented the draft baseline supply demand balances for each Water Resource Zone. There will be further refinement to these following the Annual Review 2017.

- TW forecast a significant resource deficit in London WRZ of > 400 MI/d by 2045 and around 800 MI/d over the 80 year planning period using the record of historic droughts 1920 - 2010. There are also significant deficits forecast in SWOX and SWA WRZs.
- Demand forecast: TW has published method statements on the development of the demand forecasts www.thameswater.co.uk/wrmp. TW has worked with Local Authorities to develop population and housing forecasts over the next 25 years and the University of Leeds to develop the longer term population forecasts.
- Supply forecast: The Environment Agency (EA) has provided information on sources likely to be subject to sustainability reductions and advised that this information should be used in the development of the baseline supply forecast. Broadly the proposed reductions were as



expected with the exception of the large reduction proposed on the Lower Lee of 125 MI/d. TW is engaging with the EA on this and at this time has included 25 MI/d in the baseline forecast. In addition the potential impacts of climate change have been included in line with the Water Resources Planning Guideline (WRPG)

GARD queried the factors driving the 2 jumps in the London forecast. **TW** explained that these are linked to 1) agreements with Affinity Water and 2) long term forecasts and migration. TW proposed to cover the forecasts including assumptions and data at the July Water Resources Forum and a short summary note explaining the population forecasts is attached (Appendix 1).

2. Resource options

Bill Hume-Smith (Motts) provided an update on the resource option feasibility assessments. Bill recapped on the 4-phase programme to examine resource options and to develop a constrained list of options. To date TW has:

- published feasibility reports for each option type, provided an opportunity for comment, and published a response to all comments submitted.
- published iterations of the fine screening report which considers all feasible options, compares options between option types, sets out the options that are rejected, and those taken forward termed the constrained list of options.
- Conceptual Design Reports (CDRs) are now in preparation for all the constrained options. This more detailed work will provide updated cost, risk, resilience and environmental assessment for all the options.

GARD asked if the CDRs will be available for review. **TW** confirmed that summaries of the CDRs will be published in January 2018 as part of the public consultation.

The remaining presentations focused on additional work completed since autumn 2016.

Severn Thames Transfer (STT)

- The transfer will be supported primarily from Lake Vyrnwy.
- Work is ongoing to explore support from Minworth, Draycote and Mythe with STW but at this stage there is insufficient information to include these in the constrained list of options.
- The discharge point will be at Culham.

GARD questioned whether a larger volume than 180 MI/d from UU had been examined. **Motts** confirmed that UU has not offered a larger volume. **UU** confirmed that assessments of reliable yield set an upper limit of ~180MI/d as sufficient reserves are required for emergency storage. **GARD** stated that their modelling suggests that a release of more than 180MI/d is feasible. **GARD** requested a meeting to discuss this involving UU, TW, NRW and GARD. **Cascade** confirmed that a report had been provided to NRW and EA which included information on the frequency, duration and magnitude of the transfer. The next step is for NRW to respond. **TW** stated that NRW needed to be involved in discussions as they will provide guidance on what can be released and suggested that a response from NRW is required prior to a further meeting or discussion on this matter to ensure best use of everyone's time. **GARD** requested the report provided to NRW and also NRW's response as they do not accept that 180 MI/d is the maximum volume that can be released. **Cascade** confirmed that the report provided to NRW is draft, there are outstanding data requirements and once the outstanding data has been incorporated, and comments from NRW addressed, TW will release the report. **GARD** requested the opportunity to review and input to the draft report. **Cascade** reiterated that it was sensible to complete the full assessment,



plugging the data gaps, and taking account of engagement with NRW, prior to wider circulation so that the full position can be explained to stakeholders.

TRT queried whether NRW be covered by purdah. **Cascade** did not consider that this would be an issue covered by purdah as it should not cover day to day engagement on technical matters (as opposed to policy decisions) or the release of environmental data.

STT conveyance

Bill presented additional work on cost estimates for conveyance by a pipeline or Cotswold Canal. This work highlighted that the costs for a water transfer by the restored canal remain significantly higher than the pipeline. Bill confirmed that conveyance by canal is rejected on the basis of cost, environmental issues, specifically the transfer of invasive non-native species, constructability and operation aspects.

CCT thanked TW for the provision of information on the costs. CCT has not completed a detailed assessment of the information provided as yet but has identified a few anomalies. CCT also stated that the assessments to date omit to properly assess the advantages and benefits of the canal. CCT remains unconvinced by the arguments to reject the canal. **TW (Motts)** confirmed it was happy to receive comments on the cost breakdowns and also on the discharge location.

GARD requested to see the same cost information that had been provided to CCT. **TW** agreed and this information has been provided (Appendix 2).

TW is continuing discussions with STW on potential transfer options. EA has raised concerns about the reliability of yield from Draycote reservoir. A further issue raised is around increased summer flood risk in Stratford Upon Avon due to the nature of the Avon catchment so whilst not rejected this option is not included on the constrained list at this time. **STW** confirmed that it is working to deadline of end May to provide the required information.

GARD asked if filling Draycote reservoir is an issue. **STW** confirmed that work is in progress to assess the option yield. There was an operational performance issue in 2011, the infrastructure will be upgraded and so this should not be a constraint.

A number of issues have been identified in regard to Lake Vyrnwy which need further work as follows:

- Currently 10% losses have been assumed. The EA has raised concerns that this may be an under estimate.
- Regulation on the River Severn is complicated and requires legal advice, as does the charging mechanism.
- NRW has significant concerns that sustained continuous releases would impact on the downstream water body and WFD classification. Mitigation could be applied but this would add additional cost.

GARD requested minutes from the meeting. **TW** agreed to share these (Appendix 3).

CCT suggested that a pilot flow release trial could be undertaken to help to quantify the losses. **Cascade** agreed, stating that it is not straightforward due to the multiple abstractions and discharges from the river system, but is being investigated in dialogue with NRW and EA.

Doug Hunt (Atkins) has undertaken stochastic analysis of 300, 400, 500, 600MI/d transfer and presented this additional work and the return periods expected in the TW system. Atkins confirmed that this work does not rely on a specific drought.



GARD referenced Table 3.2 (screening report) which included stochastically generated deployable output (DO) data but only for some of the options, and asked why these data are lower than data previously produced. **Motts** confirmed that stochastic DO data had been generated for one size of the reservoir and this work will be completed for the transfer although it is not expected to change previous conclusions i.e. the 600 MI/d transfer is rejected on the grounds of cost and environmental impact, and it is expected that the 100 MI/d options will also be rejected on cost and the need for larger resource in view of the challenge in TW supply area and the wider south east.

GARD challenged the stochastic analysis stating that it is not consistent with the 100 year historic record which indicates that a 300 MI/d transfer could provide 140/150 MI/d DO. **Atkins** confirmed that the stochastic analysis has shown that the historic record is reasonable, but if there are other droughts then the expected DO is lower than during specific events. **Atkins** confirmed that weather generation, statistics for drought – return periods etc have been taken into account.

GARD confirmed that it agreed with overall approach but was challenging some of the output. A further point raised by **GARD** was that insufficient consideration had been given to the geology of the Thames and Severn catchments. **Atkins** confirmed that it has used the HRW hydrological model of the Severn catchment as the foundation for this work and as such the geology of the catchment is taken into account. **GARD** confirmed that it did not disagree with HRW model and that it does reflect the geology of the Severn catchment and flows generated by the model had been used by **GARD** in its modelling.

Atkins reassured **GARD**, and all stakeholders, that they had been very careful to ensure the study was not biased in favour of a specific scheme and the yield benefit for the supported transfer was in line with expectations.

GARD challenged the data shown in presentation compared to report. **Atkins** explained that the data presented in the report included the increase in abstraction and impacts of climate change and agreed to check the data. **Action Atkins/Motts**

GARD requested the flow scenarios used for the Severn and the Thames, akin to the data provided for the Water UK Study. **GARD** stated that this data had been previously requested, in February. **TW/Atkins** agreed to provide this data, and explained that the data was not available in February hence could not have been provided then. **Action TW/Atkins**

GARD also stated that it would like to review the WARMs run but is more interested in stochastic flow data.

CRT highlighted that a 300 to 600 MI/d pipeline provided an increase in 60 MI/d which seemed a relatively small gain for significantly large infrastructure. **Atkins** agreed and stated that a 300/400MI/d scheme would seem to be the optimum size.

GARD requested an update on the Columbus scheme. **Motts** explained that TW is still waiting for information from Welsh Water. **GARD** stated that Welsh Water should not be allowed to prevaricate. **TW** advised that Welsh Water has indicated that the information will be provided in May/June, they need to complete analysis on their own plan before they can provide details, and it is a decision for Welsh Water.

Oxford canal



Motts advised that there had been further discussions with the Canal and River Trust (CRT) and the EA on put and take arrangements and that based on discussions to date this is a feasible option (yield 15 MI/d).

TRT queried whether Zander is a problem. **CRT** advised that the transfer is between catchments which are already connected and so the transfer of INNS is not a concern. **TRT** advised that in its view this is a significant issue and that the EA are not keen to introduce more zander into the system if this can be avoided. **EA** advised that a risk assessment would be required.

Motts advised that there is a potential new option for a larger transfer of 75MI/d. Further work is required to identify the source of the resource, discussions with STW are ongoing. **STW** agreed to provide further information on this option. **Action STW**

TW queried whether there is an issue of velocity in terms of impact on the ecology. **CRT** advised that there are already transfers of ~ 50MI/d on other canals which have no negative navigational impacts but further work would be needed to understand environmental impacts.

GARD queried if this option is a new option. **Motts** confirmed that it is a new option and that TW is considering transfers of both 15 and 75 MI/d, however these are mutually exclusive with each other and the Minworth transfer. Further engagement is needed with CRT and STW on these options.

TRT queried if the canal options are covered under the WFD. **Cascade** confirmed that they are classified as Artificial Water Bodies under WFD and so require assessment. Furthermore the impact on the receiving water bodies require assessment. **EA** confirmed that all options need a full environmental assessment including WFD assessment.

Desalination and reuse

TW is looking at a number of possible options in the Tideway (Beckton, Crossness, Teddington, Deephams, Lower Lee). The EA raised concerns about the cumulative impact on the salinity of the estuary. The study has assessed potential cumulative tidal level and salinity effects of combinations of options in the Mid-Tideway. The initial studies suggest that more than a 20% reduction in freshwater inputs (c.360 MI/d cumulative volume) could result in salinity changes. It considered all the ecological receptors and identified 3 potentially sensitive receptors as follows: proposed habitats and species associated with the proposed lower Tideway Marine Conservation Zone (MCZ); populations of swollen spire snail; populations of European Smelt fish. Additionally, local populations of other species may have adapted to the relatively low salinity environment of the Tideway and therefore may also be relatively more susceptible to increases in salinity, particularly the spawning and juvenile life cycle stages. The findings will be discussed in detail with NE & the EA in early May. **Action Cascade**

GARD questioned the basis of the 20% threshold used in the assessment. **Cascade** confirmed that the 20% threshold is a trigger to identify potential risk and need for further investigations – at this level of cumulative freshwater flow reduction (c.360 MI/d), there is an identifiable shift in the salinity regime.

TRT queried whether the assessments apply to the adult fish only or also consider the impact on spawning. **Cascade** confirmed the assessment had been completed for all life cycle stages of the species investigated. Cascade agreed with TRT that spawning and juvenile life cycle stages would be relatively more sensitive to salinity changes than the adults.

TRT queried why sea bass was not on the list. **Cascade** to check and confirm. **Action Cascade**



GARD asked if the resource deficit was achieved from land based solutions could the additional freshwater discharged into estuary reduce salinity and affect the ecology? **Cascade** agreed that salinity could potentially be reduced but this had not been considered in this study as it was the increase in salinity that EA and Natural England were particularly concerned about. **GARD** also suggested that communities would adapt to the changing environmental circumstances so it is possibly not a concern.

TRT stated that estuarine fish species have different tolerances to salinity and move depending on their ability to cope with the saline surge, however if the salinity change is more permanent a key issue is the location of spawning areas.

GARD suggested that the terms of reference should be reviewed and potentially extended. **Cascade** confirmed that the WRMP programme-level cumulative assessment of different combinations of supply and demand management options will consider the potential for increases in freshwater inputs under certain combinations of schemes and demand increases in the east of London and the consequent implications of reduced salinity on species in the middle Tideway.

TRT queried how the salinity affects the efficiency of desalination. **Motts** confirmed that a back checking exercise will be undertaken which will include checking that designs are sufficiently flexible to cope with a range of salinities. **Cascade** advised that the salinity effects of desalination schemes have been reduced due to the mitigation measures included in the conceptual designs, in particular ensuring the brine discharge is mixed with final effluent from sewage treatment works. The salinity assessment work has assumed these mitigation measures will be in place.

Direct River Abstraction (DRA)

Teddington

Motts outlined the detailed modelling work underway to consider the navigational and environmental impacts of this option. A meeting is scheduled with PLA (4 May) to discuss the preliminary results of the hydrodynamic modelling and then with EA and NE later in May to discuss the environmental assessments. To date there are no significant showstoppers identified.

TRT queried the temperature difference. **TW** confirmed that it would check and confirm. **Action TW**

Lower Lee

Studies have focused on water quality and specifically arsenic contamination, and yield. It has been identified that bankside storage would be needed as part of mitigation.

GARD stated that the assessment should focus on DO in the context of a conjunctive system, thereby providing in the region of 100 MI/d. **Motts** advised that WARMs modelling has not been completed on this option to date hence the reference to yield and that historical record is poor hence TW will need to complete robust hydrological analysis.

TRT queried whether the modelling takes into account the proposed sustainability reduction (SRs) of 125 MI/d. **Cascade** advised that the location of the sustainability reduction is key within the lower Lee catchment, the scheme is downstream of Deephams sewage treatment works and as such the yield of this scheme may not be affected as it will be predominately supported by the treated effluent, but this will be assessed once the SRs are confirmed.

Culham

Motts advised that this option will be rejected as it would impact available DO for London.



GARD advised that this option is similar to its proposal for effluent reuse scheme in SWOX WRZ submitted to TW & the EA which could provide ~ 30-40 Ml/d. **Motts** advised that it had considered GARD's proposal in context of EA's Catchment Abstraction Licensing Strategy and concluded that the option would require a substantially lower Hands off Flow which would conflict with the EA's Catchment Abstraction Licensing Strategy, furthermore this would negatively impact on downstream abstractors, and as such the proposal had been rejected. GARD disagreed. **EA** proposed a meeting between TW, EA and GARD to discuss this option further. **Action EA to set up the meeting.**

Groundwater

Motts advised that there were 3 changes: Kidbrooke AR and SLARS have been combined into a single option; Merton has been introduced as a new option; and Southfleet/Greenhithe location has been amended.

Inter-zonal transfers

Motts advised that detailed information on inter-company transfers is not available. There are 2 potential transfers from (1) Wessex Water to SWOX and (2) transfers to Guildford from South East Water.

GARD on behalf of ARK advised that they would be concerned about additional abstraction from chalk in the Avon which would affect chalk streams.

Catchment management

Cascade presented an overview of work to explore catchment management, overall the contribution in terms of resource benefit will be small however the wider benefits are acknowledged. A CDR will be produced setting out the detail of the options.

GARD on behalf of ARK stated that it has been campaigning to reduce groundwater abstraction at Marlborough and would not support increased abstraction at this site.

TRT observed that options considering storm water/wastewater are not included in the catchment management work. **TW** confirmed that work is underway to examine opportunities for non-potable reuse in London (WRF March 2017). These are not referenced as catchment management.

Other catchment management schemes focused on addressing wider issues such as river water quality and surface water flooding are being considered as part of the wider business planning work for the 2019 Price Review but these are not part of the WRMP process.

Fine Screening

Motts ran through the main messages in the fine screening report and the constrained list of options.

GARD asked why the costs have changed for Abingdon reservoir. **Motts** advised that costs have been revised in line with recent land valuations, removal of TW overheads, reappraisal of earthworks and consideration of costs to extend the Thames Lee Tunnel (TLT), which would be common to a number of options and as such the costs would be proportionally allocated between the options. Motts agreed to ensure explanatory text is reported. **Action Motts.**

GARD queried whether Beckton and Crossness costs will also reduce, and why therefore had Beckton costs had increased. **Motts** confirmed that these costs had also been reviewed and will confirm the reasons for the changes in Beckton costs. **Action: Motts.**



GARD advised that some of the changes in costs between reports are significant and more transparency is needed. **Motts** agreed to include explanations in the updated report.

System analysis

TW (Keith Banner) explained the work underway to consider the development of new resource within the wider water treatment and network system, for example:

- to transfer new resource developed from either the STT or reservoir will require enhancements to the system including the intake capacity at Datchet, operation of local storage reservoirs.
- similarly for Teddington DRA, the additional resource would be input into the Thames Lee Tunnel (TLT) to transfer the resource to NE London. The TLT would require enhancement.
- The ring main transports water around London, there may be requirements to reinforce this network.

The constrained option list sets out the resource options and the associated conveyance and treatment requirements.

System enhancements and reinforcements will be required to both support additional demand but also to provide resilience to the system.

Estimating costs and risk

Working with Motts, TW has completed work to improve the process to estimate option costs and risk. Costs are developed using TW's cost information where available (note this data has been independently validated). If TW has not had experience of developing and operating a specific scheme the costs are developed via bottom up assessment taking industry wide data. There is uncertainty in all cost estimates and TW is managing this using optimism bias, this is in line with the Treasury Green Book. In addition, TW has developed utilisation data for each option which will be used in programme appraisal for example desalination is in hot stand by for 3 months per annum. TW is currently working through all the options.

GARD questioned whether hot stand by is similar to Beckton desalination plant. **TW** agreed.

Environmental assessments

Cascade has completed SEA, HRA and WFD assessments for all the constrained options and their respective elements eg treatment / conveyance. These assessments are currently being provided to NE and EA for review and comment. The data informs the environmental metric used in programme appraisal modelling.

Throughout the process of review and design of options, mitigation has been identified and integrated as far as possible, e.g. mixing the brine discharge from desalination plants with final effluent of WWtW.

TW will hold a technical stakeholder meeting to review the environmental work with stakeholders in June, if there is interest in doing so. This will allow comments to be considered during programme development. The stakeholders present indicated that such a meeting would be beneficial. **Action TW**

Drought Plan (DP)

TW summarised the consultation on the draft DP including the main comments received and TW responses to these comments. The formal response to consultee comments is set out in the Statement of Response (SoR). This was provided to Defra on 21 April alongside the revised draft DP. The SoR was also sent to all consultees who submitted comments.



Dates of next meetings

- June (Date TBC) - Technical Stakeholder Meeting on environmental assessments and demand management programmes
- 18 July 2017 - Water Resources Forum, London

Stakeholders also requested a technical meeting to discuss programme appraisal – this will be held in early Autumn 2017.

End



Attendees

| Name | Organisation |
|-------------------|------------------------------------|
| Paul Leinster | Independent Consultant |
| Harry Hodgson | CCG/Small Business Federation |
| Ken Burgin | Cotswold Canal Trust (CCT) |
| John Lawson | GARD |
| Neil Edwards | RWE Generation UK |
| Doug Hunt | Atkins |
| Lester Sonden | Sutton and East Surrey Water |
| Andrea Farcomeni | Affinity Water |
| Tom Ormesher | NFU |
| Peter Canavan | South Oxfordshire District Council |
| Peter Spillett | Thames Rivers Trust |
| David Howarth | EA |
| Mat Wells | CRT |
| Richard Blackwell | United Utilities |
| Colin Fenn | WWF |
| William Mackveley | Severn Trent Water |



Appendix 1

FACTORS EXPLAINING THE HIGH GROWTH FORECASTS FOR THE THAMES WATER REGION

Philip Rees

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The University of Leeds has been commissioned by Thames Water Utilities Limited to produce forecasts of domestic water consumption over the Long-Term, from 2011 to 2101. Three scenario forecasts have been produced: Business as Usual, Light Green and Dark Green, which see successive reductions in demand.

However, in all scenarios water demand grows substantially, driven by changes in population and household numbers over the 90-year forecast period. Thames Water and Stakeholders who have viewed the forecasts have raised questions about the Leeds forecasts which this note attempts to answer.

Three tables provide relevant statistics. Table 1 compares the Leeds population forecasts with those of ONS, for the years to 2039, the last year of the official forecast. Table 2 presents household forecasts for 2011 (the base year), 2071 (after which growth slackens) and 2101 (after 90 years). Table 3 presents 2011 Census figures for the ethnic composition of Slough, Greater London and the South East region.

Q1: Why are the Leeds Forecasts of population higher than those of other organizations?

- Table 1 compares the LEEDS MID forecasts and the ONS SNPP forecasts. The LEEDS forecast is higher than the ONS in 4 out of 6 WRZs. The effect is largest in the London and SWA WRZs. Note that both the LEEDS MID and ONS SNPP forecasts are Trend Based not Housing Led.
- The LEEDS MID forecasts use local authority-ethnic group sub-populations. Local authority-ethnic minority populations grow much faster than the White British & Irish (WBI) majority population.
- The reasons for this faster growth differ between ethnic minority groups. For the Indian, Pakistani and Bangladeshi groups, they are assumed, based on 2011 estimates, to have fertility rates higher than the average and have net international migration gains. Their age distributions are younger than the majority WBI population, which means a high concentration in the family building ages. So, they are among the fastest growing ethnic groups.
- Ethnic minority populations are concentrated in the London WRZ and in the Slough LAD of the Slough Wycombe and Aylesbury WRZ. Other WRZs have much smaller ethnic minority populations and so grow at a slower rate.
- Note that this effect only occurs where a “bottom up” approach is adopted: that is, the populations of LADs or WRZs are forecast as the sum of their ethnic sub-populations. GLA does not adopt this approach in its ethnic group forecasts. Instead, to maintain consistency between different



projections, GLA use the “top-down” approach and adjusts ethnic sub-group forecast populations to add to the all group London Borough forecast populations. ONS does forecasts the all group population and so misses out on the ethnic group effect (see Table 1).

Q2: Why is the rate of growth in households greater in the London Water Resource Zone (WRZ) than in the other WRZs?

- The London WRZ household number grows faster than the numbers in the other WRZs because it has the largest ethnic minority population.

Q3: Why is the rate of growth in the Slough, Wycombe and Aylesbury WRZ higher than in other WRZs outside London?

- The SWA WRZ has almost comparable growth. This WRZ also has a high concentration of ethnic minority sub-groups. Table 3 presents 2011 Census statistics on the ethnic composition of the population of Slough, the largest LAD in the SWA WRZ. In Slough, ethnic minorities make up the majority. There is a concentration of people of Indian and Pakistani ethnicity in Slough. These groups have above average fertility (especially Pakistani families), a young age profile and continuing immigration through family unification or out-marriage.

Q4: Why does growth slow down the last thirty years of the forecast?

- The reason lies in the assumptions adopted for international migration and for internal migration. Following ONS practice, we assume in the long run after the 2020s that the balance of immigration and emigration **flows** remains constant. For internal migration, we assume that the LAD-ethnic group out-migration **rates** (not the flows) remain constant. The out-migration flows from Greater London increase as its population grows, eventually cancelling out the net gains from international migration. On the other hand, WRZs outside London experience gains through internal migration from London which continue to grow, alongside smaller and constant gains from international migration.

Q5: What about the impact of Brexit on the future populations of the Thames water region?

- We adopt the ONS National Population Projection assumption for international migration factored to LADs which cover the Thames Water region. The ONS Long-term net international migration assumption is substantially below recent levels, even post-referendum, so has an element of Brexit effect built in. We have also carried out a forecast which assumes decline to the net international migration target of 100,000 immigrants per year for the UK, but this target is only achieved in the second half of the 90-year period.

Table 1: Leeds MID and ONS SNPP forecasts for Water Resource Zones, 2011-2039

| Water Resource Zone/Greater London | 2011 | 2014 | 2021 | 2031 | 2039 |
|--|------|-------|-------|-------|-------|
| Population in 1,000s | | | | | |
| LEEDS MID (ONS Aligned, 2011-Based) | | | | | |
| Guildford | 175 | 179 | 188 | 198 | 205 |
| Henley | 53 | 54 | 57 | 61 | 64 |
| Kennet Valley | 350 | 358 | 380 | 408 | 428 |
| London | 7671 | 8044 | 9022 | 10305 | 11377 |
| Slough, Wycombe, Aylesbury (SWA) | 538 | 557 | 608 | 681 | 741 |
| Swindon and Oxfordshire (SWOX) | 1069 | 1094 | 1155 | 1229 | 1280 |
| Thames Water Region | 9856 | 10288 | 11411 | 12882 | 14095 |
| Not London WRZs | 2185 | 2243 | 2389 | 2578 | 2718 |
| Greater London | 8204 | 8617 | 9694 | 11118 | 12309 |
| ONS SNPP (SNPP, 2014-based) | | | | | |
| Guildford | 175 | 178 | 188 | 200 | 207 |
| Henley | 53 | 55 | 58 | 61 | 63 |
| Kennet Valley | 350 | 358 | 374 | 390 | 401 |
| London | 7671 | 7975 | 8773 | 9608 | 10201 |
| Slough, Wycombe, Aylesbury (SWA) | 538 | 553 | 589 | 630 | 658 |
| Swindon and Oxfordshire (SWOX) | 1069 | 1148 | 1206 | 1275 | 1320 |
| Thames Water Region | 9856 | 10267 | 11187 | 12164 | 12850 |
| Not London WRZs | 2185 | 2292 | 2414 | 2555 | 2649 |
| Greater London | 8204 | 8539 | 9410 | 10328 | 10976 |
| Time Series (2011=100) | | | | | |
| LEEDS MID (ONS Aligned, 2011-Based) | | | | | |
| Guildford | 100 | 102 | 108 | 114 | 117 |
| Henley | 100 | 102 | 108 | 115 | 121 |
| Kennet Valley | 100 | 102 | 109 | 117 | 122 |
| London | 100 | 105 | 118 | 134 | 148 |
| Slough, Wycombe, Aylesbury (SWA) | 100 | 104 | 113 | 126 | 138 |
| Swindon and Oxfordshire (SWOX) | 100 | 102 | 108 | 115 | 120 |
| Thames Water Region | 100 | 104 | 116 | 131 | 143 |
| Not London WRZs | 100 | 103 | 109 | 118 | 124 |
| Greater London | 100 | 105 | 118 | 136 | 150 |
| ONS SNPP (SNPP, 2014-based) | | | | | |
| Guildford | 100 | 102 | 108 | 114 | 118 |
| Henley | 100 | 103 | 108 | 114 | 118 |
| Kennet Valley | 100 | 102 | 107 | 112 | 115 |
| London | 100 | 104 | 114 | 125 | 133 |
| Slough, Wycombe, Aylesbury (SWA) | 100 | 103 | 109 | 117 | 122 |
| Swindon and Oxfordshire (SWOX) | 100 | 107 | 113 | 119 | 124 |
| Thames Water Region | 100 | 104 | 114 | 123 | 130 |
| Not London WRZs | 100 | 105 | 110 | 117 | 121 |
| Greater London | 100 | 104 | 115 | 126 | 134 |

Sources: LEEDS MID Forecasts prepared for Thames Water. ONS Sub-National Population Projections, available on the ONS website.

Notes: ONS = Office for National Statistics. SNPP = Sub-National Population Projections



Table 2: Forecast number of households in Thames Water Resource Zones, 2011, 2071 and 2101

| Water Resource Zone/Greater London | 2011 | 2071 | 2101 |
|--|------|------|------|
| Households (1,000s) | | | |
| LEEDS MID (ONS Aligned, 2011-Based) | | | |
| Guildford | 59 | 86 | 91 |
| Henley | 19 | 28 | 31 |
| Kennet Valley | 154 | 231 | 250 |
| London | 2723 | 5886 | 6165 |
| Slough, Wycombe, Aylesbury (SWA) | 196 | 369 | 430 |
| Swindon and Oxfordshire (SWOX) | 400 | 599 | 637 |
| Thames Water Region | 3551 | 7199 | 7604 |
| Not London WRZs | 828 | 1313 | 1439 |
| Times Series Index (2011=100) | | | |
| Guildford | 100 | 146 | 154 |
| Henley | 100 | 147 | 163 |
| Kennet Valley | 100 | 150 | 162 |
| London | 100 | 216 | 226 |
| Slough, Wycombe, Aylesbury (SWA) | 100 | 188 | 219 |
| Swindon and Oxfordshire (SWOX) | 100 | 150 | 159 |
| Thames Water Region | 100 | 203 | 214 |
| Not London WRZs | 100 | 159 | 174 |

Source: Demand Scenario Forecasts workbook delivered to Thames Water along with the Final Report on Phase 2 of the Long-Term Population and Property Forecasts for Thames Water.

Table 3: Ethnic composition of Slough, Greater London and South East. 2011 Census

| Ethnic Group | Slough (LAD) | Greater London (GOR) | South East (GOR) |
|------------------------|--------------|----------------------|------------------|
| Population | 140,205 | 8,173,941 | 8,634,750 |
| Percentages | | | |
| White: British & Irish | 35.8 | 47.1 | 86.2 |
| White: Other | 9.9 | 12.6 | 4.4 |
| Mixed/Multiple | 3.4 | 5.0 | 1.9 |
| Indian | 15.6 | 6.6 | 1.8 |
| Pakistani | 17.7 | 2.7 | 1.1 |
| Bangladeshi | 0.4 | 2.7 | 0.3 |
| Asian (not IPB) | 6.0 | 6.4 | 2.0 |
| Black: All groups | 8.6 | 13.3 | 1.6 |
| Other Ethnic Group | 2.6 | 3.4 | 0.6 |
| Total | 100.0 | 100.0 | 100.0 |

Source: 2011 Census Key Statistics Ethnicity Table.

Note: The 18 original ethnic categories have been aggregated to match the harmonized ethnic groups used in the LEEDS MID forecast.



Appendix 2

Cost information provided by TW to Cotswold Canal Trust provided as a separate file.

Appendix 3

Minutes of the meeting with TW, NRW and UU and appointed consultants are provided as a separate file.