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E1. Revision of the LTCD 2016

After the Drought Plan 2012 was issued an updated LTCD was agreed with the Environment Agency. The LTCD had previously been updated in 1997, following operational experience of managing droughts which occurred in the mid-1990s. The subsequent review of the operating agreement for abstractions from the Lower Thames was timely in light of the legislative changes at the time, the potential impacts of climate change, as well as improved hydrological and environmental information. The review of the LTCD also provided an opportunity to optimise water resources and deployable output (DO) in TW's supply area, and to reduce the environmental impact of the abstractions.

The review of the LTCD considered the environmental impacts of the abstractions to ensure environmental considerations were suitably accounted for in the optimisation process.

TW defined the environmental objectives as:

- No deterioration in the impact already associated with the Lower Thames abstraction licence (M2) and Lower Thames Operating Agreement (LTOA), and
- Opportunities for betterment i.e. reduction of impact.

TW proposed an approach to integrate environmental considerations into the wider optimisation process through consideration of the shape of the existing LTCD curves and amendment of the monthly Teddington Target Flow (TTF) values. The introduction of monthly TTF values was intended to reflect the flow thresholds and expected timings of environmental impacts and was based on key environmental factors identified in the LTOA environmental study [1]undertaken as part of the review. TW worked closely with EA colleagues to determine the environmental objectives for the LTCD and to develop the methodological approach. The environmental objectives were combined with the objective of maximising the deployable output for London using the LTCD to give a new set of optimised curves.

The revised LTCD makes an insignificant difference to Thames Water's operation during a drought and the key demand side and supply side measures are still required to be implemented at the earliest beneficial time in line with the Drought Management Methodology.

E2. Timing Between the Imposition of Customer Restrictions and the Imposition of More Severe Drought Measures Such as Drought Orders or Permits

During the 2005/6 drought it became clear that the amount of elapsed time between the imposition of customer restrictions and the introduction of Drought Permits or Drought Orders was not sufficient to accommodate the required application process. In this time, under conditions of serious drought raw water storage could have dropped by 50%. To accommodate this increased time period for imposition of demand measures, a significant increase would be required in the frequency with which demand restrictions on customer use were imposed. This is because demand restrictions would be needed earlier in the year, in some cases before, the full extent of the **actual** drought severity could be determined because the extent of surface runoff arising from rainfall would not be known. This approach results in a greater reliance on imposition of drought measures based on the **potential** drought severity in any year based on the assessment of catchment conditions (particularly groundwater levels) early in the year. The introduction of the change to the drought management strategy from one based on actual drought severity to one taking into account potential drought severity is described in Appendix F covering Drought Management Protocol.

This change in drought management strategy could result in TWUL's Target Levels of Service (TLOS) being compromised because in some years restrictions would need to be introduced early in the year on the basis of the potential for a severe drought to develop by the end of the summer. Whereas in some years with high drought severity potential early in the year the volume of summer rainfall will mitigate the drought severity such that it does not reach the potential identified early in the year and restrictions may not in fact have been required. Therefore, these changes have needed to be part of a wider review of the LTOA including other key stakeholders such as Ofwat and Defra because of the implications for water resource planning. At the time of imposition of customer restrictions, the potential drought severity would be analysed as outlined in Sub section 4.3.2, Step 1c, in order to give an assessment of the drought approximate return period in relation to the company's Levels of Service.

This element of the review of the LTOA has also been undertaken in relation to the Farmoor Control Diagram, which is currently provisional and not governed by a Section 20 Agreement. That is to say that the new drought methodology also addresses the potential need for early imposition of drought measures for Farmoor depending on the potential drought severity.

E3. Savings Assumed to Arise from the Imposition of Restrictions on Customer Use

Through the process of the LTOA review and drawing on experience gained from the imposition of restrictions during the 2005/6 drought it was recognised that the reductions in customer use of water that are assumed to occur when drought mitigation measures are introduced needed to be brought in line with the best available recent data. The review of the savings assumed was based on recently obtained data reflecting the savings of water use that actually occurred as a result of the various measures introduced. TWUL undertook extensive analysis into the levels of

water savings that resulted from the various measures, along with other water companies in the South East, based on the experience gained in the 2005 and 2006 drought periods.

The impact of the changes to the assumptions of savings from demand measures had a significant impact on the deployable output for London and is an important issue and was addressed in the Water Resource Management Plan (WRMP) submitted in 2014. The assumed savings from drought demand measures is being revisited jointly through the WRSE group and any potential changes will be addressed in our next WRMP.

For drought management scenario planning, the updated demand savings assumptions used to generate the forecast reservoir levels have been adopted to ensure that forecast timescales for crossing drought triggers are now the best operational forecasts available for drought management.

E4. Residual Flow over Teddington Weir

The residual flow over Teddington weir is prescribed within the LTCD and any departure from the current Agreement to enable greater residual flow would have a significant impact on the water available for abstraction and therefore upon the deployable output for the London WRZ. Any change that has a significant impact (i.e. changes DO so that alternative measures are needed to redress the impact) on the supply / demand balance for London and must be part of a wider review including other key stakeholders, such as Ofwat.

In view of this potential for significant impact on the water available for abstraction from the lower Thames that could result from any change to the prescribed residual flows over Teddington weir a full review of the impact of the current managed flow regime on the Lower River Thames and the Thames Tideway was completed in AMP5.The conclusion of the review found that a change in the abstraction regime was not required, but that conditions could be improved by oxygenating Mogden STW effluent during periods of low flows. This scheme has been implemented in AMP6 and Thames Water now has the ability to oxygenate the effluent from Mogden STW in low flow periods if required.