Briefing Note for the Technical Stakeholder Meeting, 22 March 2016

Decision making approach to choose the preferred programme for WRMP19

1. Introduction

For over a decade water companies have used an approach called "*Economics of Balancing Supply & Demand* (EBSD)"[1] to plan water resources. This approach has worked well and is widely understood, however planning priorities have changed, with more emphasis on climate change, resilience, and consumer engagement, and it is recognised, across the industry and by regulators, that in some circumstances, more advanced decision making tools are required. In response to this, a study has been undertaken through the UK water industry research body (UKWIR) to examine alternative approaches to decision making[2]. At the technical stakeholder meeting on 22nd March 2016 we will discuss the results of this study and set out the approach Thames Water (TW) intends to follow for our next Water Resources Management Plan (WRMP19) and seek comments and feedback.

2. Overview of the decision making framework

The UKWIR project, to examine alternative approaches to decision making, has developed a framework to provide a clear, auditable and systematic process. The approach helps to frame the problem and then decide and apply decision making tools (both old and new) for water resource planning. The framework comprises **4 phases**, as described below, and illustrated in Figure 1.

1. **Data phase**: This involves review and collation of data and assessment of the problem that needs to be solved i.e. how vulnerable is a company to various strategic issues, risks and uncertainties to allow the development of a proportional response.

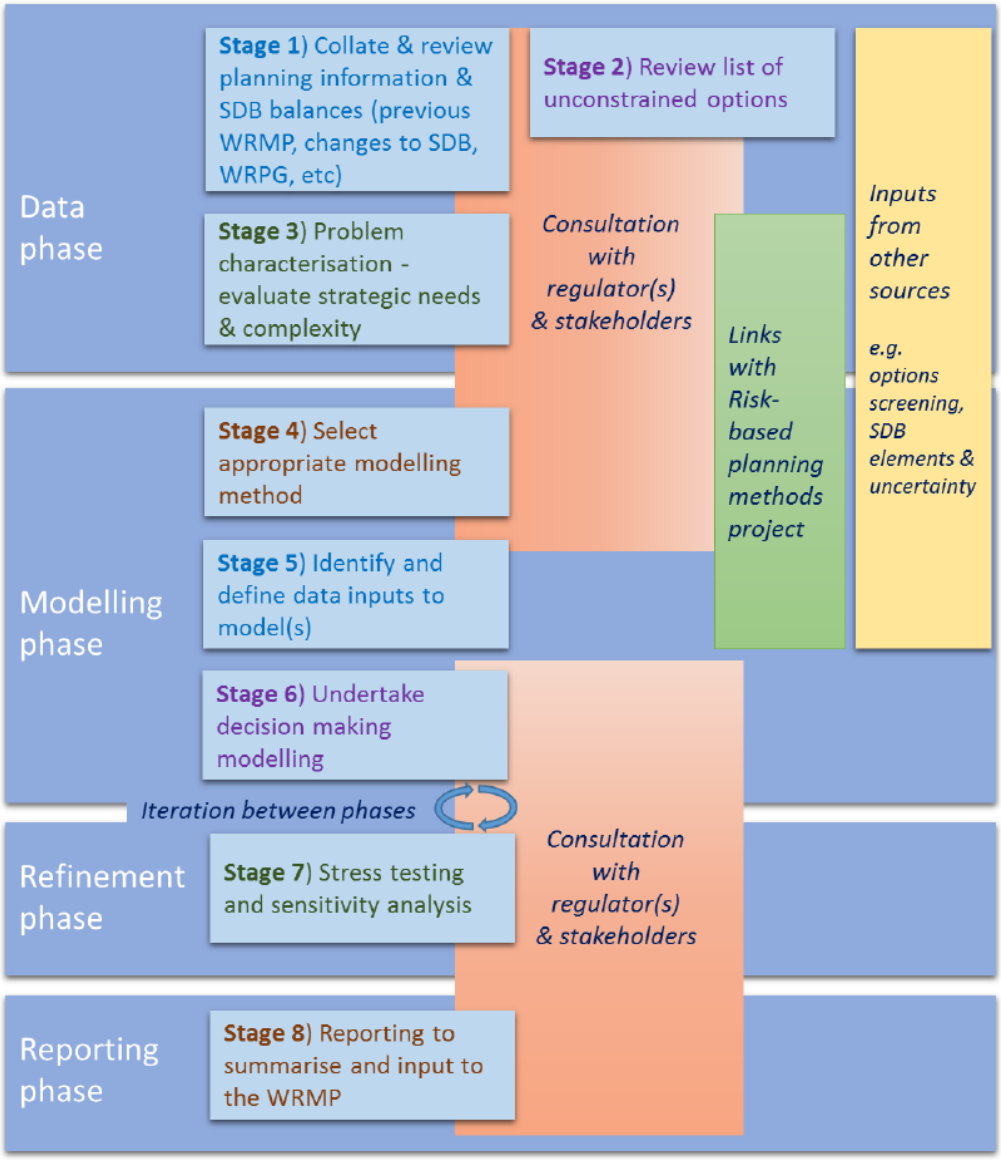
2. **Modelling phase**: This follows the assessment of the problem and aims to decide on the appropriate decision making modelling approach to use to derive an initial plan. Where the assessment suggests low levels of concern, then less complex methods such as the established EBSD approach is likely to be sufficient. Where resource deficits are predicted over the planning horizon, more complex approaches should be considered.

3. **Refinement phase**: This involves stress-testing and sensitivity analysis of the initial plan and developing refinements.

4. **Reporting phase**: This involves documenting the process that has been applied to develop a final plan.

[1] Economics of Balancing Supply & Demand (EBSD) developed for UKWIR by NERA, 2002
[2] UKWIR Project WR02A205: WRMP 2019 Methods – Decision Making Process, Atkins, NERA and University of Manchester. Publication date to be confirmed

Figure 1: The decision making framework



3. Understanding the problem faced in Thames Water's supply area

One of the first steps is to understand the problem that is faced in terms of a company's vulnerability to various strategic issues, risks and uncertainties. There are two elements to the problem characterisation assessment (Stage 3). These are:

- Strategic needs – This is a high-level assessment of the scale of need for new water resources and/or demand management strategies. The assessment is presented in Table 1.

- Complexity factors – This is an assessment of the complexity of issues that affect investment in a particular water resource zone or area. This assessment is set out in Tables 2, 3 & 4.

At the meeting we intend to undertake the problem characterisation assessment to understand the problem for the Water Resource Zones in the Thames Water supply area.

Table 1: Assessment of the strategic needs for WRMP purposes ("How big is the problem?")

Strategic WRMP risks	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
S. Level of concern that customer service could be significantly affected by current or future **supply side** risks, without investment				
D. Level of concern that customer service could be significantly affected by current or future **demand side** risks, without investment				
I. Level of concern over the acceptability of the cost of the likely **investment programme**, and/or that the likely investment programme contains **contentious options** (including environmental/planning risks)				

Table 2 Assessment of supply side complexity for WRMP purposes

S	Supply side complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
S(a)	Are there concerns about **near term supply system performance**, either because of recent Level of Service failures or because of poor understanding of system reliability /resilience under different or more severe droughts than those contained in the historic record? Is this exacerbated by uncertainties about **the benefits of operational interventions contained in the Drought Plan?**				
S(b)	Are there concerns about **future supply system performance**, primarily due to uncertain impacts of **climate change** on vulnerable supply systems, including associated source deterioration (water quality, catchments etc.), or poor understanding?				
S(c)	Are there concerns about the potential for **'stepped' changes in supply** (e.g. sustainability reductions, bulk imports etc.) in the near or medium term **that are currently very uncertain?**				
S(d)	Are there concerns that the **'DO' metric might fail to reflect resilience** aspects that influence the choice of investment options (e.g. duration of failure), or are there **conjunctive dependencies between new options** (i.e. the amount of benefit from one option depends on the construction of another option). These can both be considered as ***non-linear problems.***				

Table 3 Assessment of demand side complexity for WRMP purposes

D	Demand side complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
D(a)	Are there concerns about **changes in current or near term demand**, e.g. in terms of demand profile, total demand, or changes in economics/demographics or customer characteristics?				
D(b)	Does **uncertainty associated with forecasts** of demographic / economic / behavioural changes over the planning period cause concerns over the level of investment that may be required?				
D(c)	Are there concerns that a simple **'dry year/normal year' assessment of demand is not adequate**, e.g. because of high sensitivity of demand to drought (so demand under severe events needs to be understood), or because demand versus drought timing is critical.				

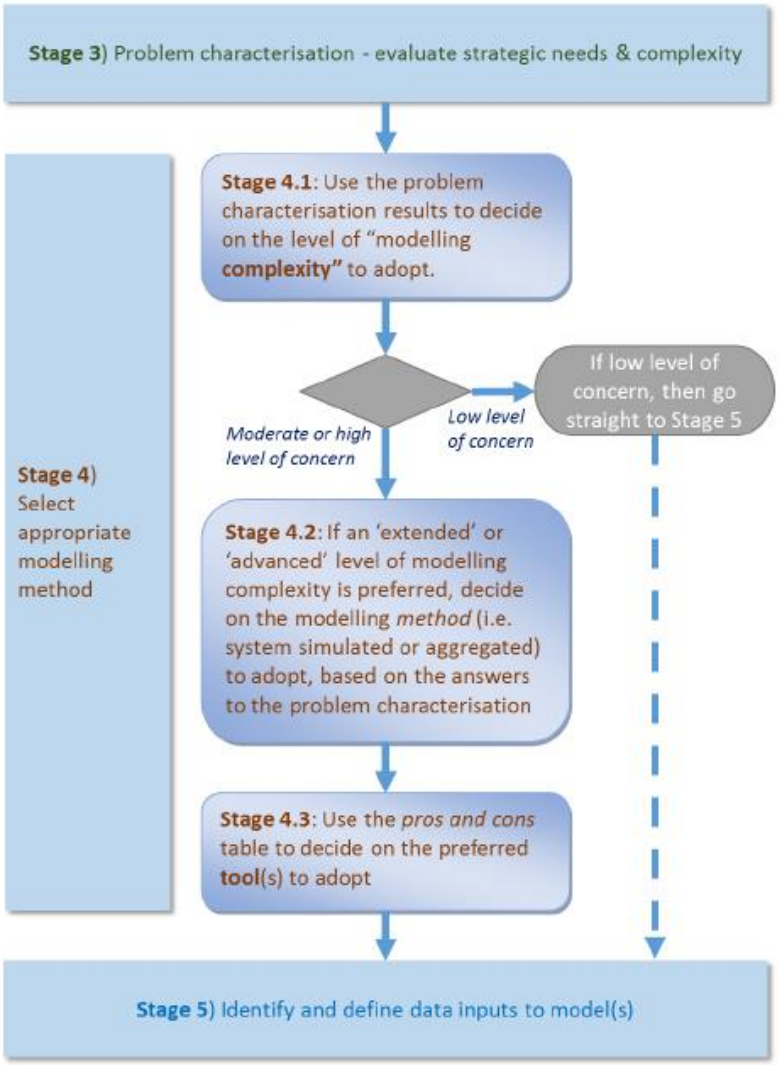
Table 4 Assessment of the investment programme complexity for WRMP purposes

I	Investment programme complexity factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)	Don't know
I(a)	Are there **concerns that capex uncertainty** (particularly in relation to new or untested technologies) could compromise the company's ability to select a 'best value' portfolio over the planning period?				
I(b)	Does the nature of feasible options mean that **construction lead time or scheme promotability** are a major driver of the choice of investment portfolio?				
I(c)	Are there **concerns that tradeoffs between costs and non-monetised 'best value' considerations** (social, environment) are so complex that they require quantified analysis (beyond SEA) to justify final investment decisions.				
I(d)	Is the investment programme sensitive to assumptions about the utilisation of new resources, mainly because of large differences in variable opex between investment options?				

4. What modelling method should we use?

Having completed the problem characterisation assessment in Stage 3, the next step is to use the evaluation of strategic needs and the complexity of issues to determine an appropriate decision making approach and the choice of modelling tool(s). This is the objective of Stage 4. The selection of the preferred method(s) has a three step process, as shown in Figure 2.

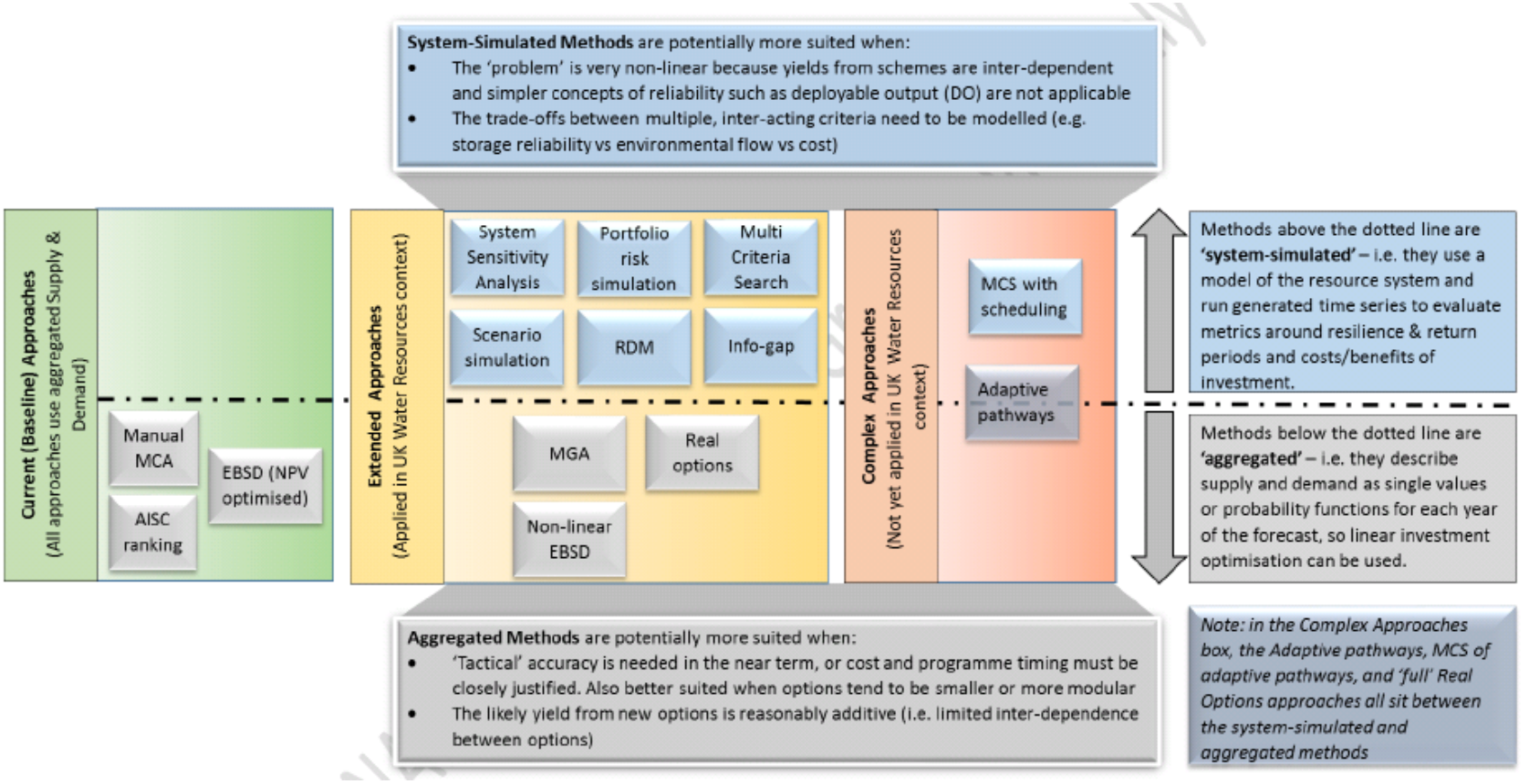
Figure 2 Sub-stages for selecting an appropriate decision making modelling tool from problem characterisation



A general categorisation of the individual methods that can be used is provided in Figure 3. This illustrates that there are two main factors that need to be taken into account when choosing and then justifying the most appropriate method, the **degree of "modelling complexity"** and the **choice of "modelling method"**.

At the meeting we will present Thames Water's draft approach for modelling and the tools to be used and seek feedback and comments.

Figure 3 Mapping the decision making methods and tools



END