

APPENDIX A – Water resource zone problem characterisation



Contents

1.	Water Resource Zone Problem Characterisation	3
1.1	Purpose	3
1.2	Methodology and Approach	3
1.2.1	STEP 1 – Assess strategic needs	3
1.2.2	STEP 2 – Assess complexity factors	5
1.2.3	STEP 3 – Assess Level of Concern	6
2.	Jersey Water: Problem Characterisation Assessment.....	8
2.1	STEP 1 – Strategic Needs Assessment	8
2.2	STEP 2 – Complexity Factors Assessment.....	9
2.3	STEP 3 – Level of Concern Assessment.....	12
3.	Conclusions.....	13

Tables

Table 1-1 – Assessment of the strategic needs for WRMP purposes (“How big is the problem?”)	4
Table 1-2 – Assessment of supply side complexity	5
Table 1-3 – Assessment of demand side complexity.....	5
Table 1-4 – Assessment of investment programme complexity.....	6
Table 1-5 – Modelling complexity matrix. Combining the results of the problem characterisation	6
Table 2-1 – Jersey Water Assessment of strategic needs	8
Table 2-2 – Jersey Water supply side complexity factors	9
Table 2-3 – Jersey Water demand side complexity factors	10
Table 2-4 – Jersey Water investment programme complexity factors.....	10
Table 2-5 – Jersey Water complexity matrix	12

Figures

No table of figures entries found.

1. Water Resource Zone Problem Characterisation

1.1 Purpose

The UKWIR (2016) guidance “WRMP 2019 Methods – Decision Making Process” includes guidance on characterising the problems faced by UK water companies in water resources planning for each Water Resource Zone. This characterisation process helps to understand the complexity of the zone to inform the choice of strategic planning approaches that may be applicable in developing a Water Resources Management Plan. Alongside the UKWIR 2016 guidance, the most recent WRMP24 Water Resource Planning Guidelines also recommend considering the UKWIR (2020) “Deriving a best value water resources management plan” when considering decision-making approaches.

The purpose of this report is to set out the problem characterisation as it relates to Jersey Water’s water resource zone and the strategic planning approaches that are most appropriate in developing the company’s Water Resources and Drought Management Plan.

1.2 Methodology and Approach

The problem characterisation approach helps to assess the vulnerability of the water resource zone to various strategic issues, risks and uncertainties, so as to allow the development of a proportional response to the planning problems faced. The problem characterisation assessment provides a documented and auditable trail to explain the planning approach adopted to the water company Board, its regulators, government and relevant stakeholders.

The assessment examines both current and future needs and planning complexity. There are two elements to the problem characterisation assessment:

- **Strategic needs (“How Big is the Problem?”)** – a high-level assessment of the scale of need for any expenditure to maintain a supply-demand balance in the water resource zone.
- **Complexity factors (“How Difficult is it to Solve?”)** – an assessment of the complexity of issues that affect the need for future expenditure in the water resource zone.

A simple matrix is applied based on the responses (scores) to a series of questions on strategic needs and complexity factors, to help determine the appropriate level of effort and decision-making tools required to develop the long-term water resources management plan. Since the development of the UKWIR guidance in 2016, new WRMP24 planning guidelines for England and Wales require a move to a 1 in 500 system level response for drought resilience, and the need to produce a best-value (multi-objective) and potentially adaptive plan. To a certain extent this therefore requires the adoption of more complex planning approaches (and so as per the risk-based planning guidance, risk composition 1 cannot be selected).

1.2.1 STEP 1 – Assess strategic needs

The first part of the problem characterisation stage is an assessment of the ‘strategic needs’. This comprises three simple questions that explore the size of any potential future supply-demand deficit,

and the cost (in relative terms) of the supply and demand management options (see Table 1-1). The left-hand column of Table 1-1 (“Strategic water resource planning risks”) considers three types of risk:

- S – supply-side risks;
- D – demand-side risks; and
- I – investment programme risks.

Table 1-1 – Assessment of the strategic needs for WRMP purposes (“How big is the problem?”)

Strategic Water Resource Planning Risks	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)
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)			

Source UKWIR (2016)

The supply-demand deficit has been separated into a supply component and a demand component, as it is possible to have a significant deficit that is mainly caused by either increasing demand or reducing source deployable output (e.g. due to climate change or environmental considerations), so only one component may be ‘of concern’.

The questions in the strategic needs assessment use a scale of significance to characterise the answer. This is necessarily subjective, but UKWIR has provided general guidance as follows:

- If there is a likely sustained supply deficit caused by a combination of changes in both the supply and the demand elements, then this represents a ‘moderately significant’ concern for both elements.
- Concerns become ‘very significant’ where there is a risk that either element could cause a sustained supply deficit by itself or in combination, so that there is a large deficit that is likely to fundamentally change the Level of Service to customers or present an unacceptable risk of failure of the supply system (i.e. rota cuts or standpipes).
- For the investment element, ‘moderately significant’ relates to a level of cost or a contentious option (in terms of environmental / planning / stakeholder risks) that would be highlighted as a concern (e.g. due to local opposition, some changes to water bills); whilst ‘very significant’ relates to an investment programme that has components that are potentially controversial with costs that are large enough to have a material impact on customer bills.

In the context of this assessment, the term ‘risk’ relates to uncertainties in the current estimates of supply and/or demand forecasts (i.e. evaluation of supply capability or level of customer demand under drought conditions) that could present a problem to maintaining the supply-demand balance, due to the potential size and impact of forecast changes (e.g. due to climate change, growth).

1.2.2 STEP 2 – Assess complexity factors

The purpose of the assessment of complexity factors is to explore the nature of the risks and vulnerabilities that exist within the water resource zone to help determine the level of detail and sophistication of the assessment approaches that may be required to develop the Water Resources and Drought Management Plan.

All the questions in the complexity factors assessment use a scale of significance to characterise the answer. This is subjective, but the following general guidelines have been provided by UKWIR:

- If a particular factor has the potential to notably change the composition of the company's expenditure programme, then the factor is likely to be 'moderately significant'.
- If a factor means that it potentially generates major uncertainty in the overall nature of the preferred expenditure programme, and/or could cause conflict with major stakeholders/regulators/government, then it should be considered to be 'very significant'.

The following three tables present the complexity factors for the supply side (Table 1-2), the demand side (Table 1-3), and the expenditure programme (Table 1-4).

Table 1-2 – Assessment of supply side complexity

Supply Side Complexity Factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)
S(a). Are there concerns about reliability of existing sources in the short term (due to actual problems or uncertainty about reliability in severe drought beyond the historic record)?			
S(b). Are there concerns about future performance of the water supply system due to climate change or water quality deterioration?			
S(c). Are there potential step changes in available water resources (e.g. loss of a source, environmental requirements, etc.)?			
S(d). Is the reliability of the available resources affected by other factors? (e.g. resilience, factors, dependencies on other parties, etc.)?			

Source UKWIR (2016)

Table 1-3 – Assessment of demand side complexity

Demand Side Complexity Factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)
D(a). Are there concerns about changes in demand in the short-term?			

D(b). Is the uncertainty in future population, property and consumer behaviour forecasts likely to materially affect expenditure requirements?			
D(c). Is there a high sensitivity of demand to drought?			

Table adapted from UKWIR (2016)

Table 1-4 – Assessment of investment programme complexity

Expenditure Programme Complexity Factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)
I(a). Are there concerns that investment uncertainty (e.g. new or untested methods) could compromise the company's ability to select the best value programme of measures?			
I(b). Are construction lead times and/or promotability of supply schemes a major driver for the choices of the investment programme?			
I(c). Are there concerns that trade-offs between costs and non-monetised considerations (e.g. social, environmental) are so complex that sophisticated analytical approaches will be required to justify expenditure decisions?			
I(d). Is the expenditure programme sensitive to the assumptions about future utilisation of any new water sources due to large differences in operating costs between options?			

Table adapted from UKWIR (2016)

1.2.3 STEP 3 – Assess Level of Concern

Having carried out the assessments for each of the four tables, the scores obtained are combined into a simple matrix (Table 1-5) to characterise the scale of the problems faced and the potential choice of decision-making approaches for water resources planning:

Green = Low Level of Concern: likely to be no need for sophisticated decision-making approaches

Amber = Moderate Level of Concern: consider the need for more sophisticated, but existing modelling and decision-making approaches

Red = High Level of Concern: consider whether it would be useful to apply more 'complex' approaches, as these could add considerably to the company's understanding, noting that more conceptually complex methods may need to be developed and tested for the UK water resources context.

Table 1-5 – Modelling complexity matrix. Combining the results of the problem characterisation

		Strategic Needs Aggregate Score (How Big is the Problem?)			
		0-1 (None)	2-3 (small)	4-5 (medium)	6 (large)
Complexity Factor	Low (<7)				
Aggregate Score (How					

difficult is it to solve the problem?)	Medium (7-11)				
	High (11+)				

Source UKWIR (2016)

2. Jersey Water: Problem Characterisation Assessment

2.1 STEP 1 – Strategic Needs Assessment

Table 2-1 summarises the assessment of the risks faced by Jersey Water, which leads to a **Strategic Needs Score of 5**. The main risks relate to supply-side and population growth uncertainties and the consequent potential need for future expenditure requirements to address a potential supply-demand deficit.

Table 2-1 – Jersey Water Assessment of strategic needs

Strategic Water Resource Planning Risks	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)
S. Level of concern that customer service could be significantly affected by current or future supply side risks, without investment		.	YES. There are concerns due to climate change, water quality risks and hydrological data uncertainties. Additionally, moving to a 1 in 500 drought resilience will likely drive additional resource requirements.
D. Level of concern that customer service could be significantly affected by current or future demand side risks, without investment		YES. There are concerns due to potential population increases. There is also some uncertainty of the ongoing impact of Covid-19 on demand, although this is not expected to be very significant for Jersey.	
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)			YES. Where a supply-demand deficit is forecast, the available options are limited and may have water bill implications. Also, the acceptability of any new water supply schemes on Jersey would be sensitive to stakeholder opinions and media interest, so there may be significant opposition if the scheme is considered contentious.
TOTAL SCORE	5		

Table adapted from UKWIR (2016)

2.2 STEP 2 – Complexity Factors Assessment

Table 2-2 to Table 2-4 provide the results of the assessment of the supply-side, demand-side and expenditure programme complexity factors, respectively.

Table 2-2 – Jersey Water supply side complexity factors

Supply Side Complexity Factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)
S(a). Are there concerns about reliability of existing sources in the short term (due to actual problems or uncertainty about reliability in severe drought beyond the historic record)?			YES. The reliability of the system has not previously been tested to droughts beyond the historic record. There is also the potential for poor understanding of current system reliability due to hydrological data issues.
S(b). Are there concerns about future performance of the water supply system due to climate change or water quality deterioration?		YES. There are concerns about the impact of climate change and water quality issues on water source deployable output (reliable yield). Algal blooms and water quality issues because of agriculture runoff are an issue at reservoirs.	
S(c). Are there potential step changes in available water resources (e.g. loss of a source, environmental requirements, etc.)?		YES. Proposal for Grands Vaux reservoir to be used as a flood attenuation scheme may impact the deployable output of the scheme. Additionally, there is the potential for future PFAS regulation to remove some existing sources from supply.	
S(d). Is the reliability of the available resources affected by other factors? (e.g. resilience, factors, dependencies on other parties, etc.)?	No other material factors affect source reliability. Whilst start-up times at the desalination plant can take a number of weeks, the operation of the plant is well understood		
TOTAL SCORE	4		

Table adapted from UKWIR (2016)

Table 2-3 – Jersey Water demand side complexity factors

Demand Side Complexity Factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)
D(a). Are there concerns about changes in demand in the short-term?	There is some uncertainty in the ongoing impact that Covid-19 will have on demand. However, this is not considered to be a material issue for Jersey.		
D(b). Is the uncertainty in future population, property and consumer behaviour forecasts likely to materially affect expenditure requirements?			YES. The wide range of population projections leads to substantial uncertainty in demand forecasts that could affect future expenditure requirements
D(c). Is there a high sensitivity of demand to drought?	There is some uncertainty of the impact of drought on demand, but this is not considered to be a significant concern. Critical period peaks are not an issue for Jersey.		
TOTAL SCORE	2		

Table adapted from UKWIR (2016)

Table 2-4 – Jersey Water investment programme complexity factors

Expenditure Programme Complexity Factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)
I(a). Are there concerns that investment uncertainty (e.g. new or untested methods) could compromise the company's ability to select the best value programme of measures?		YES. The plan does not contain any significant new or untested options. However, there may be some risk that new solutions may be needed following the move to a 1 in 500 resilience. Levels of per capita consumption and leakage are relatively low, and so uncertainty around further demand management implementation should not be materially significant. Assumptions will also be informed by studies such as a smart metering trial.	

Expenditure Programme Complexity Factors	No significant concerns (Score = 0)	Moderately significant concerns (Score = 1)	Very significant concerns (Score = 2)
I(b). Are construction lead times and/or promotability of supply schemes a major driver for the choices of the investment programme?		YES. Promotability of supply schemes (e.g. any new storage requirement) could influence the choice of investment programme	
I(c). Are there concerns that trade-offs between costs and non monetised considerations (e.g. social, environmental) are so complex that sophisticated analytical approaches will be required to justify expenditure decisions?		YES. There may be sensitive social and environmental issues if additional water storage is required, requiring assessment by extended methods such as multi-criteria analysis and scenario testing in addition to least cost methods. But it is unlikely that complex analytical approaches will be needed for the decision making.	
I(d). Is the expenditure programme sensitive to the assumptions about future utilisation of any new water sources due to large differences in operating costs between options?		YES. Utilisation of new water sources could impact operational decisions.	
TOTAL SCORE	4		

Table adapted from UKWIR (2016)

2.3 STEP 3 – Level of Concern Assessment

The scores derived in Table 2-2 to Table 2-4 can be summarised as follows:

- Strategic Needs total score = 5
- Complexity Factors total score = 10
 - (4 for supply-side + 2 for demand-side + 4 for expenditure programme)

Table 2-5 sets out where the Jersey Water resource zone sits in relation to the UKWIR problem characterisation assessment matrix. The assessment indicates an overall **MODERATE LEVEL OF CONCERN**.

In accordance with the UKWIR methodology, this indicates that “extended” modelling approaches may add to a company’s understanding if appropriate. Such extended methods could include Real Options Analysis or Modelling to Generate Alternatives. Additionally, more recent guidance emphasises the value in understanding other plan drivers through the generation of a best value plan over the traditional least cost. Within this category, conventional water resource planning decision-making tools and methods (e.g. least-cost optimisation tools) supported by multi-criteria analysis and scenario analysis could also be used to evaluate alternative programmes should a supply-demand deficit be forecast over the planning horizon. Such methods enable the Company to present the pros and cons of alternative solutions and demonstrate to stakeholders the reasons for choosing a particular programme of options.

Table 2-5 – Jersey Water complexity matrix

		Strategic Needs Score (How Big is the Problem?)			
		0-1 (None)	2-3 (small)	4-5 (medium)	6 (large)
Complexity Factor Aggregate Score (How difficult is it to solve the problem?)	Low (<7)				
	Medium (7-11)			Jersey Water	
	High (11+)				

Source UKWIR (2016)

3. Conclusions

As recommended in the WRMP24 water resource planning guidelines the 2016 UKWIR methodology has been followed to produce a Problem Characterisation assessment of the Jersey Water resource zone based on a review of the supply-side and demand-side data available for the Water Resources and Drought Management Plan.

The assessment has concluded that (in a UK-wide context), the issues and challenges faced by Jersey Water should be characterised as being of a **MODERATE LEVEL OF CONCERN**. This indicates that “extended” modelling approaches may add to the company’s understanding where appropriate.

The assessment highlights that:

- The possible effects of climate change, water quality deterioration and population growth are the more uncertain elements of the supply-demand balance projections over the planning horizon.
- A move to a 1 in 500-year level of drought resilience compared to the previous worst historic will likely drive additional resource requirements. The impact of this on DO can be explored as part of the water resources modelling.
- There are potentially significant environmental and planning sensitivities about any new water supply schemes (particularly new water storage if needed) so that robust and transparent decision-making approaches are needed. Non-water supply benefits can be incorporated into the decision-making process although careful consideration needs to be given to the form and inclusion of these metrics to ensure they are meaningful.
- There is some uncertainty around the ongoing impact of the Covid-19 pandemic on the demand although this is not anticipated to present a significant risk to the Jersey zone.
- Decision-making techniques such as multi-criteria analysis and scenario testing are likely to be beneficial in addition to least cost optimisation methods. These will enable the Company to provide transparent demonstration to stakeholders of the reasons for choosing a particular programme of options instead of an alternative programme.

REFERENCE

Environment Agency (2023), Water resources planning guideline,
<https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline> [Accessed 20/12/2023]

UKWIR (2016), WRMP 2019 Methods – Decision Making Process: Guidance (UKWIR Report Ref. No. 16/WR/02/10)

UKWIR (2020), Deriving a best value water resources management plan (UKWIR Report Ref: No. 20/WR/02/14)

