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Sydney Coastal Councils Group
Sydney Water
Office of Environment & Heritage

project

Demonstrating Climate Change Adaptation
of Interconnected Water Infrastructure



Overview

This interactive PDF has been developed to help water infrastructure providers with decision making for adaptation of interconnected water infrastructure via a six stage decision making framework. The interactive PDF is part of a suite of five documents which make up the synthesis report for this project. The synthesis report consists of the following documents:

Part 1 – Overview: This section provides an overview of the study, the general objectives and the issues and challenges facing interconnected water infrastructure managers in the context of climate change. It also provides a summary of key findings.

Part 2 – User Guide: This section is designed to be read in conjunction with the interactive PDF. It provides a summary of each stage of the framework including what the stage involves, why it is important and brief explanation as to how it is to be completed.

Part 3 – Interactive PDF (iPDF): The iPDF guides users through the stages of the decision making framework. The iPDF provides users with a series of inputs, tools and approaches, outputs and evaluation requirements to enable the development and implementation of an effective and efficient Flexible Adaptation Pathway.

Part 4 – Case Studies: This section provides details of how the approach was adopted on five case studies and highlights lessons learnt.

Part 5 – Background Information: This section provides a greater technical level of detail on how the framework was adopted and why it is relevant for interconnected water infrastructure. In addition, case study learnings and global practice examples are provided.



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Focus and Scope

This stage requires the stakeholders to establish a clear definition of the problem to be assessed. The stakeholders will identify a specific climate change variable and specific assets potentially affected to carry forward to the next stage. The purpose is to allow stakeholders to narrow the scope of the project. This enables the project definition to become more manageable whilst still incorporating a range of potential complex and interrelated issues. This stage need not consider whether data is available or even whether a problem exists. It must focus more on the stakeholder collaboration and agreeing on a starting point.

Focus and Scope

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The following steps are required in order to complete this stage of the process:

- **Step 1** – Identify project aims and desired outcomes.
- **Step 2** – Develop project plan.
- **Step 3** – Identify scope and dependency.
- **Step 4** – Invite others to participate.
- **Step 5** – Review climate variables and climate events.
- **Step 6** – Review climate change projections.
- **Step 7** – Define problem.
- **Step 8** – Gather data identified.

Proceed through each step by using the complementary guidance provided in Part 2 – User Guide. Obtain all relevant inputs and use the available tools and approaches discussed in the subsequent tabs in this stage of the framework. Finally, use the ‘Evaluate’ tab to query the findings and ensure the stage is completed before proceeding further.



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Risk Assessment

This stage requires stakeholders to establish the risk represented by climate change to the asset identified. This requires an understanding of the value of the asset in terms of direct financial value as well as broader economic value to the community and environment. The risk assessment also involves analysis of available relevant climate change projections and associated uncertainty. The risk is ultimately measured in terms of the likelihood of climate change impacts occurring and the consequences of the impacts over time. The risk can be described qualitatively or quantitatively and may potentially include a risk weighted economic assessment. At this stage it is also important to understand the stakeholders' attitudes towards risk and what level of risk is acceptable.

Risk Assessment

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The following steps are required in order to complete this stage of the process:

- **Step 1** – Review data and information.
- **Step 2** – Identify suitable risk assessment approach.
- **Step 3** – Identify attitudes to risk and risk thresholds.
- **Step 4** – Identify current likelihood of climate events.
- **Step 5** – Identify future likelihood of event(s) occurring with climate change.
- **Step 6** – Identify method to evaluate consequences.
- **Step 7** – Evaluate consequences.
- **Step 8** – Evaluate risk.
- **Step 9** – Compare risk against risk thresholds.

Proceed through each step by using the complementary guidance provided in **Part 2 – User Guide**. Obtain all relevant inputs and use the available tools and approaches discussed in the subsequent tabs in this stage of the framework. Finally, use the 'Evaluate' tab to query the findings and ensure the stage is completed before proceeding further.



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Adaptation Options

This stage requires stakeholders to identify potential adaptation options, the associated potential costs and benefits, and risk reduction potential. The adaptation options are assessed qualitatively or quantitatively against the business as usual (or no adaptation) case to understand their relative merits. Adaptation may also be optimised in terms of size and timing of implementation. This stage also requires stakeholders to identify barriers to each adaptation option and potential measures to overcome these barriers. Overcoming barriers may in itself represent additional ‘no regrets’ adaptation options.

Adaptation Options

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The following steps are required in order to complete this stage of the process:

- **Step 1** – Identify potential adaptation options.
- **Step 2** – Identify ‘real options’.
- **Step 3** – Check for maladaptation.
- **Step 4** – Identify barriers and adaptive capacity building options.
- **Step 5** – Refine adaptation options.
- **Step 6** – Evaluate effectiveness of options.
- **Step 7** – Nominate efficiency evaluation criteria.
- **Step 8** – Evaluate efficiency of options.
- **Step 9** – Test efficiency and effectiveness under multiple climate change scenarios.

Proceed through each step by using the complementary guidance provided in Part 2 – User Guide. Obtain all relevant inputs and use the available tools and approaches discussed in the subsequent tabs in this stage of the framework. Finally, use the ‘Evaluate’ tab to query the findings and ensure the stage is completed before proceeding further.



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Flexible Adaptation Pathway (FAP)

This stage requires the stakeholders to consider the relative merits of adaptation options and to develop a pathway of actions and trigger points.

The FAP will consider which options are complementary and non-complementary as well as explicitly identify those ‘no regrets’ options which should be implemented now. Where there is insufficient information for a decision to be made between two non-complementary options, the FAP will highlight this. It then identifies the adaptive capacity building activities that need to occur in order to proceed.

Flexible Adaptation Pathway (FAP)

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The following steps are required in order to complete this stage of the process:

- **Step 1** – Identify and evaluate ‘no regrets’ options to implement now.
- **Step 2** – Review complementarity of other options.
- **Step 3** – Identify trigger points for options to implement later.
- **Step 4** – Prepare Flexible Adaptation Pathway (FAP).
- **Step 5** – Undertake scenario testing.

Proceed through each step by using the complementary guidance provided in Part 2 – User Guide. Obtain all relevant inputs and use the available tools and approaches discussed in the subsequent tabs in this stage of the framework. Finally, use the ‘Evaluate’ tab to query the findings and ensure the stage is completed before proceeding further.



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Implementation

The implementation stage is where the actions from the Flexible Adaptation Pathway will be executed. Stakeholders are required to develop the governance framework and project funding mechanisms for implementation. Where the adaptation pathway includes the construction or replacement of infrastructure, this stage will also identify the business model for the construction, ownership and operation/maintenance for the assets involved.

Implementation

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The following steps are required in order to complete this stage of the process:

- **Step 1** – Review Flexible Adaptation Pathway (FAP).
- **Step 2** – Agree governance for works.
- **Step 3** – Prepare business case (if required).
- **Step 4** – Identify funding opportunities.
- **Step 5** – Implement adaptation option.

Proceed through each step by using the complementary guidance provided in Part 2 – User Guide. Obtain all relevant inputs and use the available tools and approaches discussed in the subsequent tabs in this stage of the framework. Finally, use the ‘Evaluate’ tab to query the findings and ensure the stage is completed before proceeding further.



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Monitoring and Evaluation

The uncertain nature of climate change means that a successful adaptation pathway includes a program of regular monitoring and evaluation to ensure the adaptation options implemented are appropriate and implemented at the optimal time. This stage requires the implementation of an ongoing monitoring and evaluation program. Specifically the program will seek to identify when the Flexible Adaptation Pathway may need to be revisited as a result of revised climate change projections, new information or changes in attitudes towards risk.

Monitoring and Evaluation

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The following steps are required in order to complete this stage of the process:

- **Step 1** – Monitor to define problem.
- **Step 2** – Monitor risk attitudes and risk thresholds.
- **Step 3** – Monitor climate change projections.
- **Step 4** – Monitor social, physical and economic factors.
- **Step 5** – Monitor and evaluate adaptation options.

Proceed through each step by using the complementary guidance provided in Part 2 – User Guide. Obtain all relevant inputs and use the available tools and approaches discussed in the subsequent tabs in this stage of the framework. Finally, use the ‘Evaluate’ tab to query the findings and ensure the stage is completed before proceeding further.



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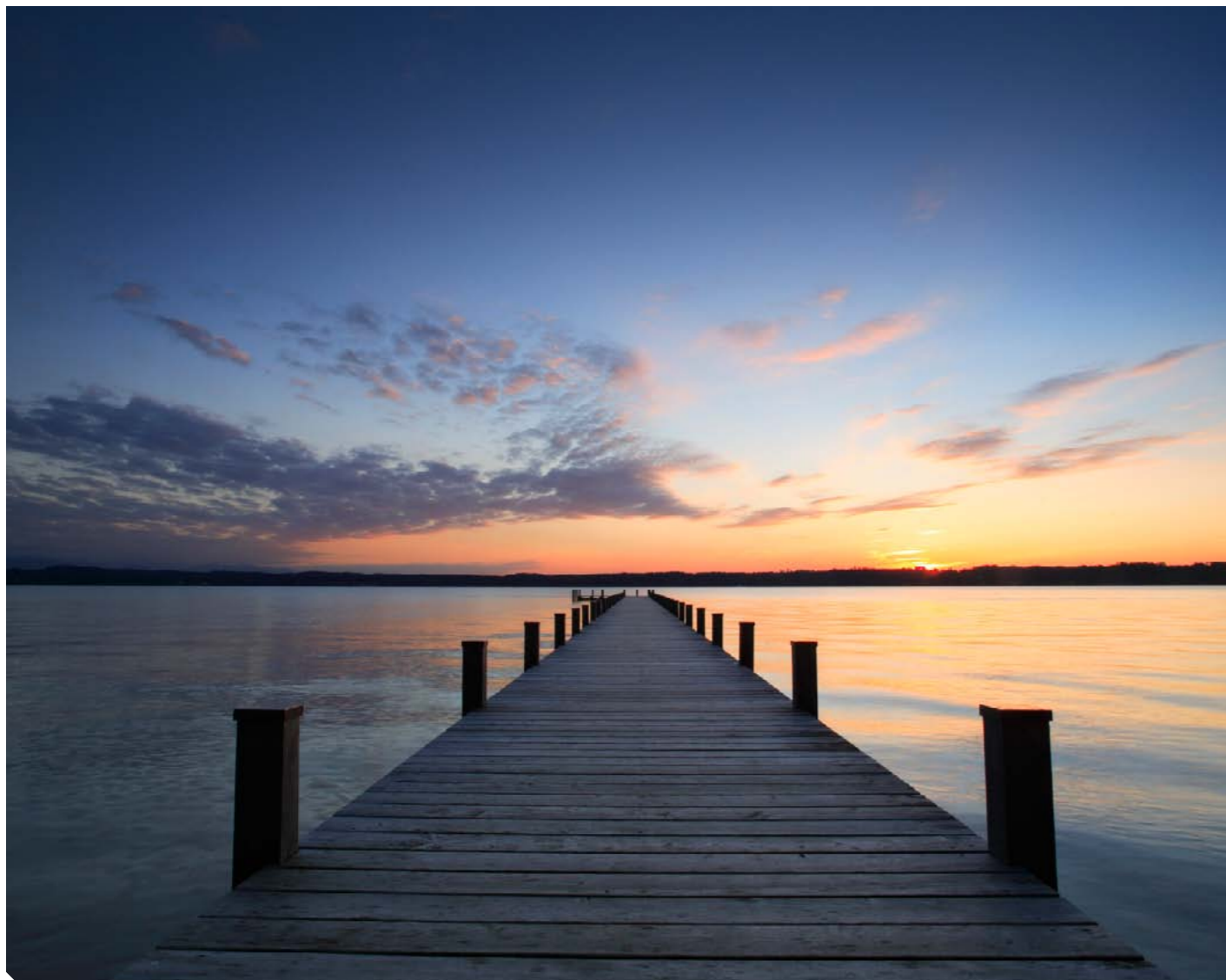


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