Natural Hazards Research Australia

Monitoring and evaluating resilience investments: Frameworks, methods and tools

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1 Monitoring and evaluation in resilience investment planning

Monitoring and evaluation (M&E) are essential for projects and resilience investments, responding to the overarching outcomes from M&E: to learn, measure and understand (Berriett-Solliec et al., 2014). That is, M&E helps to understand whether projects or investments are achieving or have achieved what they set out to achieve and can improve implementation and provides learnings for similar future projects (World Bank, 2017).

This guidance aims to provide processes and questions that end-users can utilise to undertake monitoring and evaluation of resilience investments, and ensure learning from those processes. It has been developed by reviewing and analysing 95 documents on resilience investment and 39 interviews with end-users in areas related to emergency management, climate adaptation, infrastructure, built environment and other connected areas on the local, state and national level (see Hosseinioon et al., 2025). The developed guidance aims to support monitoring and evaluating the implementation of principles and recommendations for prioritising urban resilience investment that have been developed in a previous report (Hosseinioon et al., 2025) as seen in Appendix 1.

This guidance document is structured as follows. The current section introduces monitoring and evaluation of resilience investment. Section 2 describes common tools for monitoring and evaluation. Section 3 presents guidance for monitoring and evaluation in five elements. The tables and checklists of these elements are listed in Appendix 2 for a quick overview.

1.1 An introduction to monitoring and evaluation

Monitoring and evaluation are often combined as a phrase, yet they are different but related processes. According to definitions provided by the OECD:

- Monitoring is a continuous and systematic process that uses indicators to provide information on the progress of an ongoing project in relation to the achievement of objectives (OECD, 2022, p. 44).
- Evaluation is the systematic and objective assessment of an ongoing or completed project, program or policy, its design, implementation and results to determine the achievement of objectives as well as the efficiency, effectiveness, impact and sustainability of the project, program or policy (OECD, 2022, p. 31).

Monitoring is a “form of continuous self-evaluation” (Gosling & Edwards, 2003, p.95). It tracks the performance and impact of investments, and helps identify emerging issues early on, allowing for timely project management decisions and interventions to improve outcomes (Simister, 2017). It also supports investments remaining aligned with resilience investment principles, which ensures that investments are not only effective in the short term but also sustainable and adaptable in the face of long-term resilience challenges (Mullan & Ranger, 2022). Monitoring can assist in capturing the achievement of the above-mentioned principles for resilience investment.

Evaluation is, in general, a more substantive process than monitoring. It provides an assessment as to whether the objectives of a project have been achieved, going beyond the accountability for actions and expenditure to consider outcomes against goals. The literature on evaluation use argues that it is its capacity to influence subsequent decision-making and action which is its primary purpose (Alkin & King, 2016, p.569).

The importance of evaluation use is evident in the emergence of learning into M&E (Victorian Government, 2025), including the extended frameworks of Monitoring, Evaluation and Learning (MEL) or also Monitoring, Evaluation, Accountability, and Learning (MEAL). This shift reflects a recognition that learning and accountability are essential for achieving sustainable, equitable outcomes – especially in dynamic and complex policy environments – and that results of monitoring and evaluation can lead to learning and improved understanding of processes which can be used in subsequent projects or programs. MEAL frameworks have been adopted in Australia and internationally to enhance

the effectiveness of programs by embedding adaptive learning and stakeholder accountability into their operations (Department of Foreign Affairs and Trade, 2023; World Bank, 2024; Department of Agriculture, Fisheries and Forestry, 2025; Victorian Government, 2025).

1.2 Monitoring and evaluation in resilience investment processes

Resilience investments are an action to reduce disaster risks and adapt to climate change, and monitoring and evaluation are part of standard cycles of policy and program development in response to these challenges (Scott & Moloney, 2022). The notion of policy process as a cycle made of discrete steps is helpful to understand the general process but has been criticised as not reflecting the complexity and non-linearity of policy development in practice. Figure 1 provides an example of the many versions of the policy cycle. For this guidance, resilience investments can be seen as an implementation policy.

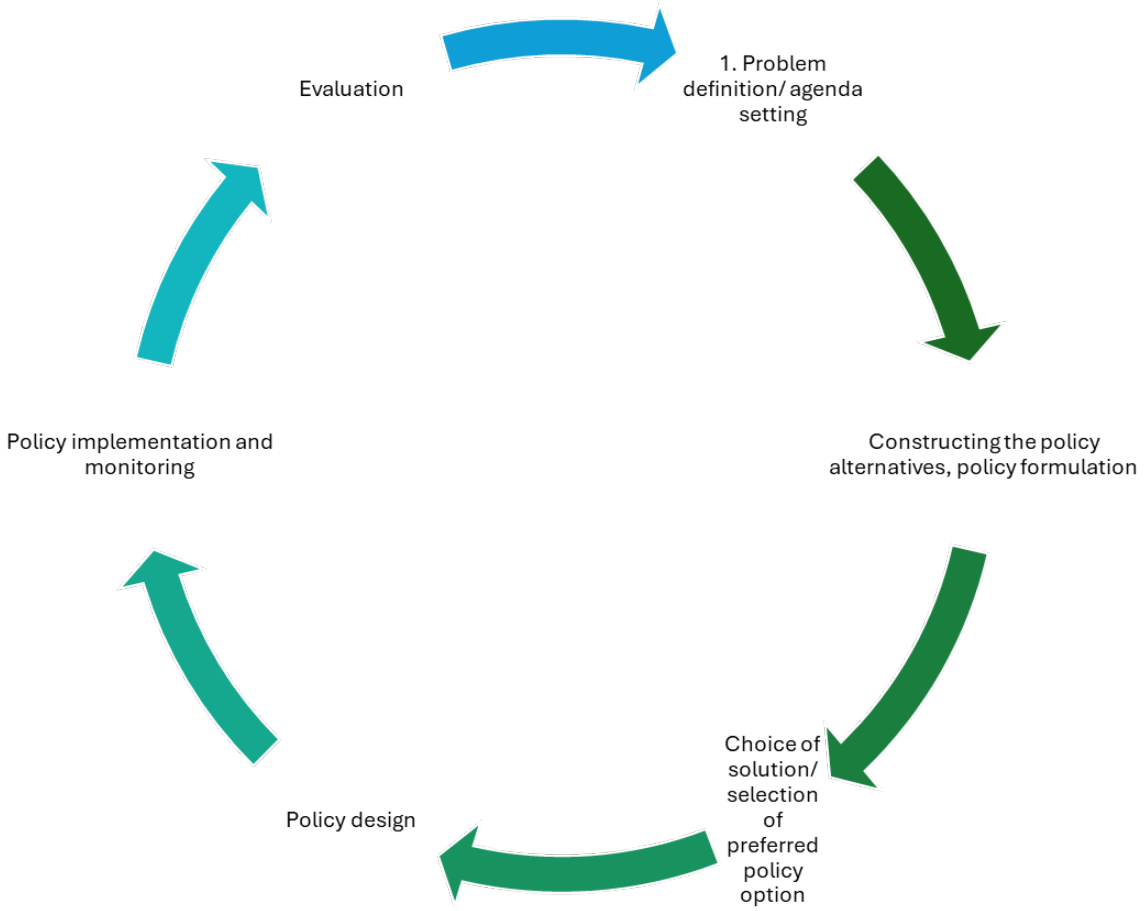


FIGURE 1: MONITORING AND EVALUATION IN THE POLICY CYCLE
Source: Young & Quinn, 2002, Broc et al., 2019.

There are three features of this cycle of particular interest for this guidance on monitoring and evaluation for resilience investments.

First, the process begins with problem definition and agenda setting, which is alternatively referred to as goal definition or aim. This is important, as it provides the basis for subsequent assessment of resilience investments against the goals or purposes of the project.

Second, this version includes monitoring within the implementation phase and evaluation as the final step in the cycle. This separation reflects their different purposes and resource requirements. Monitoring is generally less

onerous than assessment and, in this framing, provides evidence on whether the policy (or project) is meeting expectations as it is implemented – it is asking if the project is on track. Evaluation is a more extensive exercise and responds to the need to provide a fulsome account of outcomes against goals.

Third, the policy cycle underscores the learning value of evaluation, its use in learning from policy and projects to improve future iterations (Berriett-Solliec et al., 2014). This learning from assessments is an aspect of evaluative capacity and is important for resilience investments as an emerging form of disaster resilience.

1.3 Assessing resilience investment

Budget constraints, high upfront costs and the increasing climate risks to urban systems underscore the need for the monitoring and evaluation of resilience investments. However, monitoring and evaluation are not straightforward. As New et al. (2022, p.2609) observe for climate change adaptation, it is a "matter of understanding drivers of vulnerability and risk and of designing responses and M&E systems accordingly." New et al. also provide insights into the challenges of decision making under uncertainty and based on probabilities and expectations of future conditions and disaster events (see also Constable et al., 2022).

Tools for assessing benefits and costs are therefore important, including the consideration of distribution across sections of and systems within communities. Assessments of resilience investments should also capture both tangible and intangible benefits of resilience, such as avoided losses, value creation, improved adaptive capacity and social cohesion. Integrating climate and disaster risk data into evaluation processes in ways that are accessible and actionable for decision-makers is a further important step (Insurance Council of Australia, 2023; Department of Finance, 2023; Queensland Reconstruction Authority, 2025).

1.4 Challenges for evaluating resilience investments

In the interviews, practitioners stated that M&E of resilience investment is often not undertaken (Hosseinioon et al., 2025), aligning with Australian and international evidence (Berrang-Ford et al., 2021; Scott & Moloney, 2022). When it is done it is more likely to be monitoring, with a strong focus on whether the project was on time and budget, but not on the desired resilience outcomes that would be the focus of an evaluation. In Australia, budget accountability is often mandatory within government and has come to be the focus of project assessment post completion. However, evaluation of outcomes against project goals is not necessarily required or regularly undertaken. This is the case even for projects with well-developed parameters for informing project decision-making such as the Australian Transport Assessment and Planning Guidelines (ATAP, 2022; see also Denham & Dodson, 2018).

Example: South Australia Mapping resilience funding and its influence

The South Australian Fire and Emergency Services Commission (SAFECOM) has used Wicked Lab's Tool for Systemic Change to map the portfolio of initiatives that are funded through South Australia's Disaster Risk Reduction Grants and to measure and monitor their impact on systems change. For example, the funded initiatives have been mapped against defined characteristics required for systems change to understand how these initiatives are working together as a system, and where there are opportunities to further strengthen activities. Furthermore, it is mapped how actors and programs are connected to and dependent on each other and where critical actors may be missing. This has helped SAFECOM identify priority areas for grant funding and identify where building new relationships and capacity building is necessary (SAFECOM, 2022).

Four related challenges for evaluation of resilience infrastructure have been identified:

First, there is not much advice on how to measure outcomes related to resilience, which can often lead to it being neglected in evaluation processes. Interviewees shared there are no clear guidelines or standard approaches to measuring these benefits, which provides a barrier to monitoring or evaluating them. Therefore, it is difficult to attribute long-term benefits and quantifying intangible outcomes such as social cohesion. From an investment for

resilience perspective, the difficulty in quantifying financial and other risks and returns on investment makes it challenging to assess the value and impact of such investments. Additionally, data gaps and the complexity of interpreting disaster risk undermine the ability to monitor progress effectively.

Second, they are investments in response to risk assessments and identification of likely impacts (New et al. 2022), and so evaluations are dependent on the timeframe of the assessment and are also likely to change, particularly following the occurrence of the types of climatic events they were designed to mitigate the impact of. Interviewees mentioned using the argument of avoided costs in their business cases for projects, but in evaluation, costs are only avoided if there was an actual impact. Finding ways to evaluate resilience outcomes regardless of a hazard event is necessary. A further challenge is that to evaluate resilience projects following the events they have been designed to mitigate means that the evaluation most likely needs to occur long after a project is completed and the associated resources no longer available. This temporal aspect of resilience evaluation also indicates that the retention of key staff, with knowledge of the project and its decision-making processes, is important.

Third, this also implies that any assessment of decisions taken to invest in resilience need to consider social change and other conditions during the evaluation period. Investment decisions are made based on forecasts and available information and are thus not certain to meet expectations. Resilience investments are particularly prone to variations from expectations, as the forecasts for and experiences of impacts of hazard events are non-linear, and complex urban systems are affected in compounding and cascading ways. For example, residential development on greenfield land can change flood risk due to increased run-off from the impervious surfaces.

Fourth, there is an emerging literature on maladaptation, that is concerned with how well-intentioned projects can often have detrimental outcomes (e.g. Schipper 2020). This has consequences for scoping resilience investment evaluations, to ensure that possible detrimental outcomes are not omitted in the process.

There are approaches for monitoring and evaluation of resilience investments ready for use or currently being developed. This includes analysing return on investment in resilience (i.e. costs of loss and damage, and impact of investment) and understanding if the risk of impact has decreased. Other types of analysis include whether projects contribute to strategic objectives of the implementing organisation (e.g. the strategic objective of increasing tree canopy to decrease heat effects and improve air quality). Examples such as increasing tree canopy show the challenge of the temporal aspect for achieving an objective – while trees have been planted, the actual increase in tree canopy will take years. In terms of time needed for evaluation, there are suggestions for systemic approaches, but they can be quite complex and costly. A further approach to support or enable monitoring and evaluation includes building monitoring and evaluation into the program or project from the beginning, so that relevant data can be captured during the implementation and approaches for measuring desired outcomes are included at the start. Policies that require the monitoring and evaluation of resilience investment, i.e. their resilience outcomes, would also help to develop more standardised approaches.

Example: Wonthaggi Desalination Plant

The State of Victoria in Australia announced the construction of a desalination plant in 2007, in the midst of the millennium drought, at a time when water storage levels had dropped below 30% of capacity and had fallen 20% in the past year. By the time it was completed, in 2012, the drought had broken, water levels had returned to pre-drought levels, and the plant sat it in standby mode until 2017. It has rarely been used to supply water in the intervening years.

The plant is regularly referred to as a 'white elephant' in public discourse in Victoria. However, forecasts provide an expectation of more frequent droughts across southeastern Australia, so Victoria could be seen as being lucky to have avoided needing desalinated water since the plant's completion: a good decision that has fortunately not been needed. The assessment would be positive if the state is unfortunate enough to go into a prolonged drought in the future. This example highlights the time-dependency of resilience investment evaluation, the possibility that assessments of decisions and outcomes may result in different views, and also that assessments are prone to political biases.

2 Common tools and methods for monitoring and evaluation

Assessing whether a project has achieved the intended outcomes can be undertaken using a range of Monitoring and evaluation (M&E) tools, selected based on the project's nature, scale and objectives. Monitoring is an ongoing process, and as Simister (2017, p.1) observes, the main monitoring is "carried out by internal rather than external staff, it is ongoing rather than periodic, and it focuses more on activities and outputs than on outcomes and impact." As this indicates, monitoring is a system or ongoing assessment, while evaluation is more likely to be a one-off activity (?) and also employ more resource-intensive methods. Therefore, the two forms require somewhat different tools, however, depending on the monitoring and evaluation processes some tools and methods can also overlap, and similar questions can be asked during monitoring and evaluation. Similarly, both monitoring and evaluation contribute to ongoing reporting, reflection and learning (IFRC, 2011, p.10).

Processes for and approaches to monitoring have received much less attention than those for evaluation, as monitoring systems are designed in response to the project and organisational context. The available guides to monitoring are typically from the international development field, where monitoring and evaluation processes are linked to funding (e.g. Simister, 2017; Gosling & Edwards, 2003; IFRC, 2011).

The IFRC (2011, p.11-12) provides examples of methods of monitoring, which enable the ongoing assessment of inputs, activities, outputs and outcomes, but not goals due to the time taken for an assessment of them. The methods are summarised in Table 1 below.

TABLE 1: APPROACHES TO AND FOCI OF MONITORING

Monitoring type	Brief description
Results monitoring tracks effects and impacts	Assesses whether the project is meeting its intended outputs, outcomes and impact, as well as positive or negative unintended impacts.
Process (activity) monitoring	Concerned with delivery and questions of efficiency in time and resource use.
Compliance monitoring	Assesses compliance with grant and contract requirements, governmental regulations and laws and ethical standards.
Context (situation) monitoring	Monitors the context that the project is occurring within, to identify and track risks, the validity of assumptions and other considerations that may emerge.
Beneficiary monitoring	Focusses on the perceptions of people who are the expected beneficiaries of the program or project and can include complaints and feedback mechanisms.
Financial monitoring	Concerned with the accounting of inputs, activities and expenditure within project allocations.
Organisational monitoring	Assesses the sustainability, institutional development and capacity building in the project/program and with its partners.

Source: Adapted from IFRC (2011, p.11-12).

Table 1 indicates that monitoring can be used in response to different assessment requirements of organisations, offering insights into combinations of inputs, activities, outputs and outcomes. These methods are also not to be seen as exclusive, but rather a suite of options to address specific needs and considered against the resources and information available to the organisation. The text box below shows questions which were suggested by Simister (2017, p.3) as a guide to monitoring, which can be used to address the forms of monitoring in the table above.

Questions to inform monitoring

What work has been carried out?

What work was planned but not done?

Why was this work not done?

What problems have been encountered?

How were these problems addressed (if at all)?

If they were not addressed, why not?

What opportunities have been identified?

What changes have there been in target populations?

Is the project or program on track to deliver its objectives?

Are they still the right objectives?

What lessons have been learned?

How can these lessons be applied to future work?

How has the external situation changed (e.g. political, socioeconomic etc.)?

What immediate adjustments need to be made to plans?

What longer-term adjustments might need to be made?

In comparison to monitoring, there are more methods and more literature on methods for evaluation. There are also vastly different approaches to program, policy and project evaluation that draw on qualitative, quantitative and mixed methods. Evaluation is a more extensive process than monitoring and generally carried out by external teams, although evaluation can also be undertaken internally.

This section presents several key tools which can be used for M&E. Additional methods may be employed as needed to ensure comprehensive monitoring and evaluation. Table 2 presents a summary of the tools described.

TABLE 2: SUMMARY OF COMMON TOOLS FOR EVALUATING RESILIENCE INVESTMENTS

Tools/Methods	Definition	Method/Application
Cost–Benefit Analysis (CBA)	A method for assessing the economic, social, environmental and cultural value of initiatives.	Used primarily before project implementation to justify government spending. Involves structured assessments and guidelines to capture comprehensive costs and benefits, including intangible aspects.
Capability Maturity Models (CMMs)	Tools to assess development levels across elements like people, resources, governance and processes.	Used in emergency planning and resilience strategies to identify capability gaps, prioritise actions and provide benchmarks for evidence-based investment decisions and strategic planning.
Theory of Change	A narrative explaining how and why activities are expected to achieve objectives, detailing assumptions and risks.	Guides development of M&E frameworks by linking project characteristics to outcomes, supporting resource allocation and evaluating impact and effectiveness of initiatives.
Logic Model	Describes inputs, activities, and expected outputs/outcomes of a project, illustrating causal links between elements.	Supports adaptive, evidence-based policymaking by visually mapping project elements and objectives, enabling monitoring from initiation through completion, and providing a basis for performance measurement and evaluation.

2.1 Cost–benefit analysis and associated methods

Cost–benefit analysis (CBA) has been identified as a common tool for monitoring and evaluating resilience investment, brought up in our interviews. CBA can be used to assess and compare policy and investment options (ex-ante), and less often it is used in post-completion assessment (ex-post). As an assessment method, CBA is concerned with net improvements to social welfare and the monetisation of benefits and costs over time to provide an estimate of net present value (NPV, benefits minus costs) and cost–benefit ratio (CBR, benefits divided by costs). CBA is not a financial assessment for determining or forecasting profits or loss, it is an economic assessment that uses estimation of monetary value to result in an indication of whether a project is of net benefit to society. The measures of project outcomes that result from CBA enable comparisons between projects of different types, although practice in Australia has been subject to criticism and ex-post analysis is rare (Denham & Dodson, 2018; Dobes et al., 2016).

In Australia, CBA is the preferred method for appraising the economic, social, environmental and cultural value of government policies and proposals (Department of Prime Minister and Cabinet, 2020; NSW Treasury, 2025a, 2025b). It can capture a range of costs and benefits, but the inclusion of inputs is limited by their ability to be monetised, or the development of appropriate methodologies for their monetisation. This is a frequent criticism of CBA, as it often leads to the exclusion of environmental and social outcomes from the analysis, or they are included as a qualitative adjunct and references to 'intangible benefits' (Denham et al., 2019; Johnson et al., 2014; Witte, 2017). Another shortcoming of CBA is that it does not consider distributional effects of policy within the standard assessment process, and so distributional analysis has been added as an additional step within guidelines (e.g. NSW Treasury, 2025a).

While 'intangible benefits' are likely to include community resilience and other outcomes from resilience investments, there are examples of specific CBA approaches used for this purpose. The New South Wales Government's Flood Cost–Benefit Analysis Tool and NSW Treasury Disaster Cost–Benefit Framework are used for rapid and detailed assessment of proposed initiatives, including estimating flood damage and evaluating benefits before implementation, as described in the text box below (NSW Treasury, 2025a, 2025b; NSW Department of Planning and Environment, 2023).

Example: NSW Disaster Cost–Benefit Framework

The NSW Disaster Cost–Benefit Framework (NSW Treasury, 2025a) guides the conduct of cost–benefit analysis on disaster resilience initiatives. It supplements the NSW Government Guide to Cost–Benefit Analysis (NSW Treasury, 2025b) and was developed following the 2022 NSW Flood Inquiry Final Report. The Framework offers a rapid assessment method for urgent disaster responses and emphasises the importance of considering climate change and risk uncertainty in CBAs (NSW Treasury, 2025a). While the Framework focuses on CBA and ex-ante evaluation, it requires proposals without a CBA (e.g. due to emergency circumstances) to include a high-level monitoring and evaluation plan and resourcing for conducting an evaluation. The Framework acknowledges that monitoring and evaluating a disaster initiative can be very different to 'standard' projects, due to monitoring of contextual risks, i.e. "assessing the degree to which the initiatives have reduced contextual risks by reducing exposure and vulnerabilities, or by strengthening communities' capacities to absorb or adapt to hazards" (NSW Treasury, 2025a, p. 38). It also asks that M&E should include measures and indicators to monitor performance of the initiative, even without a disaster occurring during the assessment period, such as assessing the implementation and delivery of the initiative. The Framework refers to the NSW Evaluation Guidelines (NSW Treasury, 2025c), however, these Guidelines do not consider specific aspects for disaster initiatives or resilience investment.

CBA also allows the comparison of the efficacy of initiatives across all government activities (NSW Treasury, 2025a, 2025b). It is significant to consider that although traditional CBA includes avoided losses from disasters, it may not capture the full range of resilience benefits in the resilience valuation (Queensland Reconstruction Authority, 2024).

Example: The Queensland Disaster Resilience Mitigation Investment Framework

The Queensland Disaster Resilience Mitigation Investment Framework (Queensland Reconstruction Authority, 2019) states that CBA should involve a comprehensive economic evaluation of both quantitative and qualitative costs and benefits associated with proposed investments. The Framework emphasises the importance of accounting for avoided costs to stakeholders and incorporating qualitative considerations like social, health and environmental impacts. In this context, the Queensland Reconstruction Authority SAVI Tool is a cost–benefit analysis tool that helps assess intangible benefits using various indicators, such as road disruption and mental health. Tested on Queensland Betterment Funds, it provides evidence to strengthen business cases for resilience infrastructure investments, including financial and social values. These indicators can be taken up and assessed in the monitoring and evaluation of projects and programs.

Monte Carlo and Real Options analysis

CBA is more often used to assess project proposals rather than evaluate project outcomes. As evaluation is intended to inform subsequent decisions as discussed in Section 1.2, CBA approaches that are useful in decision-making under uncertainty are included here.

The Monte Carlo method is a technique used to provide insight into unpredictable, complex, or interrelated risks (European Commission, 2014). It serves as an additional tool to enhance ex-ante Cost–Benefit Analysis (CBA) where uncertainty and variability are significant (NSW Treasury 2025a, 2025b). By establishing parameters and probability distributions, Monte Carlo methods use repeated random sampling to generate likelihood distributions of forecast conditions. The method is applicable in evaluating resilience investments because it supports an improved understanding of the probability of outcomes. The method is used to assess high-cost proposals to account for various risks, enhancing understanding of the variability and unpredictability in timing, severity and consequences of such events. It helps determine suitable strategies for projects like flood preparedness, where modelling aids in achieving desired outcomes.

In CBA for disaster resilience investment, key variables use probability distributions to measure risk hazard. Monte Carlo simulations generate a range of scenarios, aiding thorough assessment of uncertainty and risk, allowing decision-makers to explore how different assumptions affect outcomes. It can be applied at various stages—such as estimating damages, sensitivity analysis or developing scenarios and options. For example, probability distributions for the frequency and intensity of a natural hazard, along with associated costs, can be integrated to produce overall financial impact distributions (NSW Treasury, 2025a, 2025b).

Real Options Analysis is used in CBA to account for uncertainty within investment decisions, by placing a benefit on retaining flexibility in decision-making through delaying, changing scales, changing project types, abandoning and design amendments. Examples with relevance to resilience investments include “delaying an investment until better information about demand becomes available or building flexibility in design to allow an investment to be expanded or modified” (ATAP, 2020, p.5). As this indicates, in situations of great uncertainty it may be prudent to retain available funds and other resources until more information is available. Combining Monte Carlo with real options analysis can be useful in unpredictable situations, helping projects adapt to future uncertainties by adjusting timing or scope.

The Triple Dividend of Resilience (TDR) framework

The Triple Dividend of Resilience (TDR) framework is a conceptual and analytical tool designed to capture the full spectrum of benefits from climate adaptation. Its roots lie in the recognition that traditional cost–benefit analyses often undervalue adaptation by focusing solely on avoided losses. TDR reframes adaptation as a development opportunity by identifying three types of returns:

1. avoided or reduced losses
2. induced economic gains and benefits from outputs and investment conditions
3. social and environmental co-benefits such as health improvements and ecosystem preservation (Brandon et al., 2025; NSW Government, 2025).

This framework originated from earlier work by the Global Facility for Disaster Reduction and Recovery – GFDRR – (GFDRR, 2025) and has been refined to support more comprehensive investment appraisals. Its significance lies in its ability to bridge the information gap that hinders adaptation finance, enabling more accurate valuation and prioritisation of projects.

In practice, the TDR framework integrates standard cost–benefit analysis with a broader lens that includes non-monetised and long-term benefits. For example, a flood-resilient road not only prevents damage (first dividend) but also boosts trade and mobility (second dividend) and potentially reduces emissions through improved transport efficiency (third dividend). Similarly, investments in climate-resilient agriculture can reduce crop losses, increase farmer incomes and enhance soil health. By capturing these layered benefits, the TDR approach strengthens the case for adaptation as a strategic investment rather than a cost. It also supports the development of innovative financial instruments, such as blended finance and resilience bonds, by aligning adaptation with investor interests and sustainable development goals (Brandon et al., 2025; NSW Government, 2025).

The TDR framework helps quantify Return of Investment (ROI) (see next section) within the broader value of climate adaptation investments, beyond just financial returns. ROI becomes a powerful indicator when viewed through the TDR lens, as it reflects not only avoided losses but also the economic and social gains that adaptation projects generate. This connection shows that adaptation is a strategic investment that drives development, improves livelihoods and strengthens resilience. By capturing these layered benefits, the TDR framework enhances the credibility and appeal of adaptation investments, making ROI a more comprehensive and persuasive metric for decision-makers and investors (Brandon et al., 2025; NSW Government, 2025).

2.2 Resilience Return on Investment (RROI)

Return on investment (ROI) is a financial performance metric that measures the profitability of an investment by comparing its expected profit to its cost, expressed as a percentage. ROI assists in evaluating the efficiency and worth of an investment, allowing to compare different opportunities or assess the success of past investments. As a financial measure concerned with profit and loss it is different from the net public benefit outcomes of CBA (i.e. ROI is monetary, CBA is monetisation of benefits and cost).

The associated term Resilience Return on Investment (RROI) refers to financial benefits from investments that enhance systems' ability to withstand disruptions (Hall et al., 2017). It emphasises tangible and intangible benefits of resilience measures, which may include infrastructure upgrades and disaster preparedness programs. RROI extends beyond financial savings to include benefits like improved community wellbeing and faster recovery times, allowing decision-makers to prioritise resilience investments (Hall et al. 2017).

An example of the use of ROI in resilience investments is the Commonwealth's Disaster Ready Fund (Department of Finance, 2023; Insurance Council of Australia, 2023; NEMA, 2024). The Disaster Ready Fund's annual target for ROI is CPI plus 2.0% to 3.0% per annum, net of fees, over the long term (NEMA, 2024). This target primarily focuses on financial returns from investments like flood defences, aiming to avoid future losses, but as a financial measure does not account for intangible benefits like community resilience (Insurance Council of Australia, 2023; Investor Group on Climate Change, 2024). A key element of RROI is the distributions of costs and benefits, and as with many public sector investments the organisations funding investments are not necessarily the same as the organisations that receive the reduction in costs or increased revenues.

ROI and RROI are valuable tools, providing metrics to assess cost-effectiveness and financial and value of resilience initiatives. They help demonstrate investments' contributions to long-term resilience through financial outcomes, enabling informed decision-making.

2.3 Capability Maturity Models (CMMs)

A Capability Maturity Model (CMM) is a structured tool used to assess and rank the development level of systems or communities across key elements – such as people, resources, governance and processes – providing valuable insights for monitoring, evaluation and investment decision-making in disaster resilience. CMMs support monitoring investment outcomes or designing inclusive emergency management strategies for assessing preparedness across systems and communities (Gissing, 2021; UNDRR, 2025). They play a critical role in emergency planning and investment decision-making by providing quantitative and qualitative insights through scenario-based exercises and structured assessments (Gissing, 2021; Gissing, 2023a).

The UNDRR has prepared tools like the Resilience Maturity Assessment (ReMA) (UNDRR, 2025) for organisations and the Disaster Resilience Scorecard for cities (UNDRR 2017), which assist in measuring resilience capacity and preparedness against the Sendai Framework. These tools guide improvement by identifying capability gaps and prioritising actions, making maturity models essential for effective monitoring, evaluation, and strategic planning in disaster resilience (UNDRR, 2025).

The objective of a capability maturity assessment is to identify and prioritise capability gaps. CMMs provide insights into capability gaps across the components people, resources, governance, systems and processes (Department of Home Affairs, 2018, p. 7). Capacity is the key determinant of how long a capability can be sustained at a particular level of ability (Gissing 2023a). Capability targets are key in this process, as they define the objectives each capability aims to achieve, incorporating measures of impact and time, which helps project managers understand future capability planning requirements. The Capability Maturity Assessment Tool Facilitators' Guide recommends additional validation of priority capabilities to identify the specific extent of existing gaps (Gissing, 2021, pp. 3 & 45; Gissing, 2023a).

The tool uses a series of criteria to measure capability maturity based on input from subject matter experts. The tool's output provides a ranking of capabilities based on their maturity scores. Understanding of capability maturity and gaps can ensure that investments are directed towards capabilities that will best manage risk and increase resilience capacities (Gissing 2023a; UNDRR, 2025). CMM helps with monitoring and evaluation by offering structured ways to measure current capabilities, identify gaps and track progress over time. It provides clear benchmarks that support evidence-based planning and investment decisions in disaster resilience.

2.4 Theory of Change

Theory of change (ToC) is a summary narrative that explains how and why the activities of an initiative are intended to achieve its objectives, including assumptions and risks about causal links (NSW Government, 2025). ToC traces pathways from a results framework where the project characteristics, goals and objectives are set to activities and outputs to outcomes and impacts, including assumptions and risks (Noltze et al., 2021; OECD, 2022; World Bank, 2017; NSW, 2025).

When using ToC, it is important to identify critical success factors, risks or barriers to achieving the goals and intended outcomes of the investment, for example, strategies to mitigate and to manage risks. For use in evaluation, it needs to be considered where the strategies should be tested in the evaluation (NSW Treasury, 2025d). Evidence to support the ToC may include evidence from relevant case studies, research, prior evaluations, theories of how processes work and expert opinion of internal and external teams. Theories of change can be considered (formally or informally) in the initial stages of the project/initiative (and can even be used to support the business case) to identify the gaps and challenges that hinder the initiative's activities to achieve the intended changes (NSW Government, 2025). This

process can be used to allocate resources and identify priorities for investing towards overcoming gaps and challenges. The World Bank suggests the following steps (World Bank, 2017, 2008, 2010):

1. describing the context and resilience investment goals and objectives
2. designing resilience investment components (logic model)
3. agreeing on M&E goals and objectives
4. selecting indicators to monitor output and outcomes
5. conducting monitoring and evaluation.

2.5 Logic Model

The Logic Model describes inputs, activities, and expected outputs and outcomes of a project and helps understand how an intervention contributes to desired results and supports adaptive, evidence-based policy making (Noltze et al., 2021; OECD, 2022; World Bank, 2017; NSW, 2025). Logic models help identify the impacts and transformations resulting from the project, which will have long-term effects or impacts beyond the scale of the project. The NSW CBA Guide (NSW Government, 2025) suggests using a logic model as part of the development process of an initiative, hence ensuring the monitoring of the project results can start from the first stages of project initiation.

The Logic Model is reflected in Figure 2 which shows how an initiative is intended to solve an identified problem. It can be used to set out the expected results/timing for initiative implementation and realisation of outputs, outcomes and impacts, and a set of key measures or indicators will be defined to help monitor the outcomes and outputs of the project (NSW Government, 2025; Noltze et al., 2021; OECD, 2022; World Bank, 2017).

FIGURE 2: LOGIC MODEL

Note: Adapted from NSW Treasury (2025b); World Bank (2017)

Logic models describe the causal links between an initiative's identified need, inputs, activities, outputs, outcomes and benefits. They provide a robust, logical explanation of how an initiative will deliver on its objectives. Logic models can take several forms and are adaptable to the nature and needs of the project (NSW Government, 2025).

3 Framework for monitoring and evaluation for resilience investment

This section describes a framework for monitoring and evaluating resilience investment. The framework consists of several elements, from initial definition to final evaluation, which are shown in Figure 4 and Figure 5.

As resilience investment varies in scale, form and expected outcomes, so should their monitoring and evaluation approach (e.g., data-driven, expert-driven or community-driven). For example, a large infrastructure project may prioritise cost–benefit analysis and institutional reporting, while a community-based initiative may focus on participatory evaluation, intangible benefits and social capital indicators. Independent evaluations can be beneficial as they support objectivity. Sharing results with stakeholders promotes transparency and continuous improvement and can offer lessons learned for future initiatives.

The suggested elements can be tailored to fit the nature of the project, program, or policy (in the following the term 'project' or 'initiative' will be used to cover these different types of initiatives that can be monitored and evaluated), including its goals, characteristics, timing and the time intervals needed for the planned monitoring and evaluation. Different project types demand different evaluation questions, and the monitoring and evaluation indicators need to be adapted to align with internal policies and procedures. Thus, the elements and suggested approaches serve as a flexible guide.

The Monitoring and Evaluation (M&E) framework is built on an approach that incorporates capability maturity models, logic models and theories of change (Williams, 2016; World Bank, 2008, 2017, 2024; NSW Government, 2025). This assists in understanding how an intervention contributes to desired results and supports investment for resilience and adaptation (Noltze et al., 2021; OECD, 2022; World Bank, 2017; NSW Government, 2025).

The following sections explain the Elements in more detail.

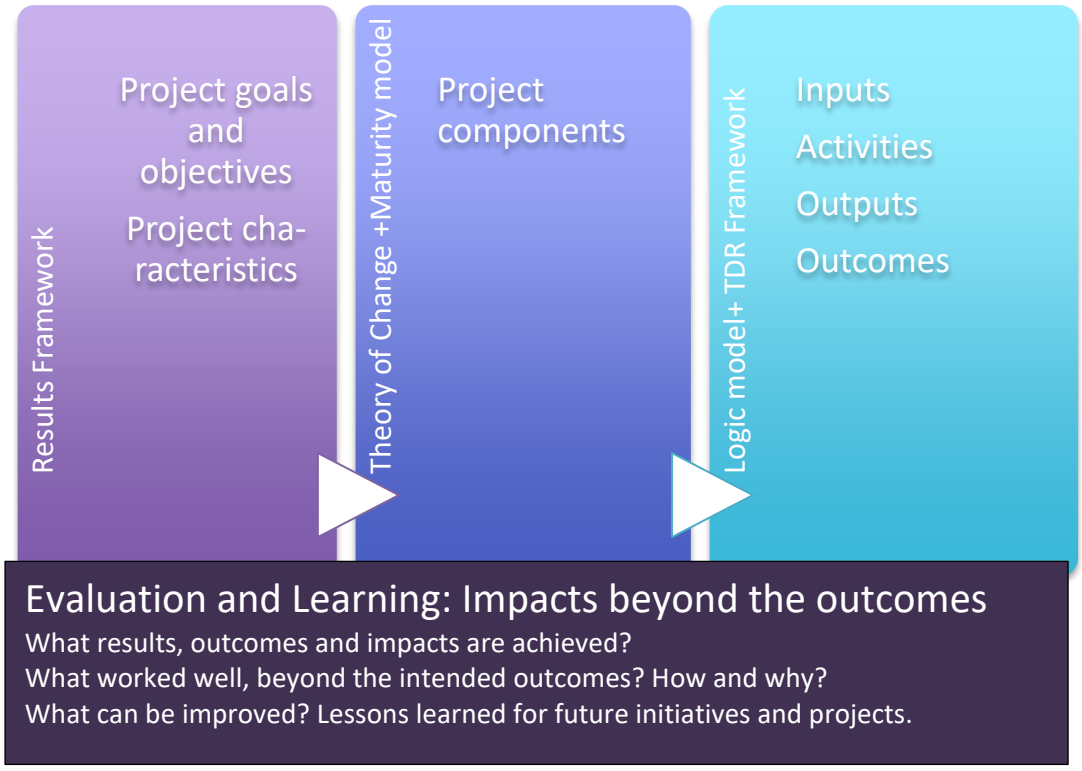


FIGURE 4: MAIN MONITORING AND GUIDANCE COMPONENTS

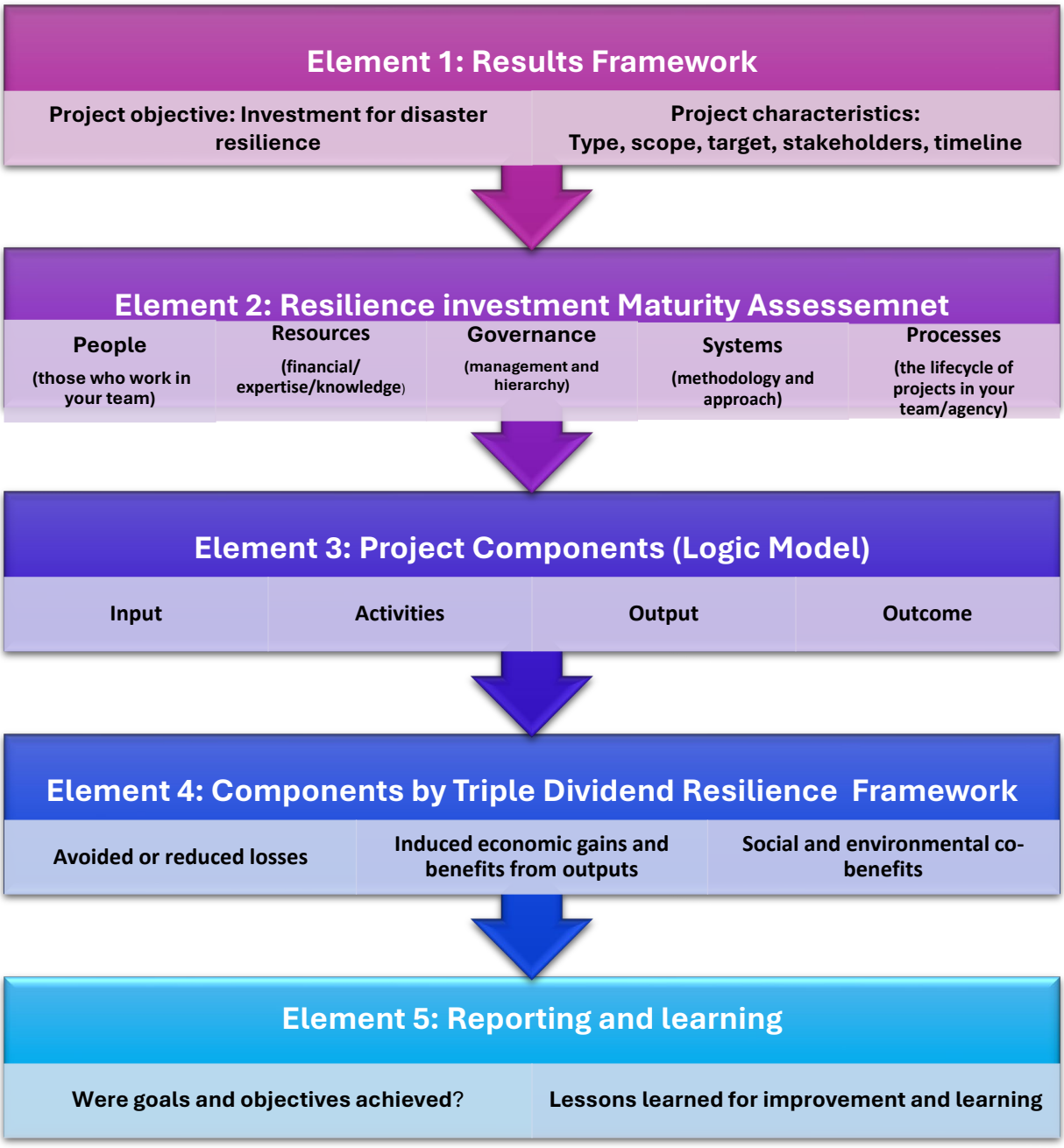


FIGURE 5: ELEMENTS OF THE EVALUATION FRAMEWORK

3.1 Results framework (Element 1)

Monitoring and evaluation and should be based on a clear understanding of the reason for the initiative (the case for change) and define the key characteristics and its role in leading to change as the first step of the procedure (NSW Government, 2025). This is why the proposed framework for resilience investment starts with a clear understanding of the objectives for the project. This involves to define the principles, aims and key characteristics of the project and its role in improving disaster resilience and/or leading to investment in disaster resilience.

The Results Framework entails defining how the project aims to achieve its objectives (e.g. the objective of increasing disaster resilience). This includes defining the characteristics of the initiative: type, scope, target, stakeholders,

timeline. This sets the foundation for what success looks like and guides all subsequent monitoring and evaluation activities. This step is often undertaken when developing a project but could also be done when starting an evaluation or monitoring process. Table 3 provides an overview of how the reasons, key characteristic and intended change could be recorded.

The project/problem definition involves preparing a preliminary list for project identification. It includes a clear understanding of:

- the reason for the initiative (case for change)
- the key characteristics of the initiative
- how the initiative is intended to lead to change (NSW Treasury, 2025b).

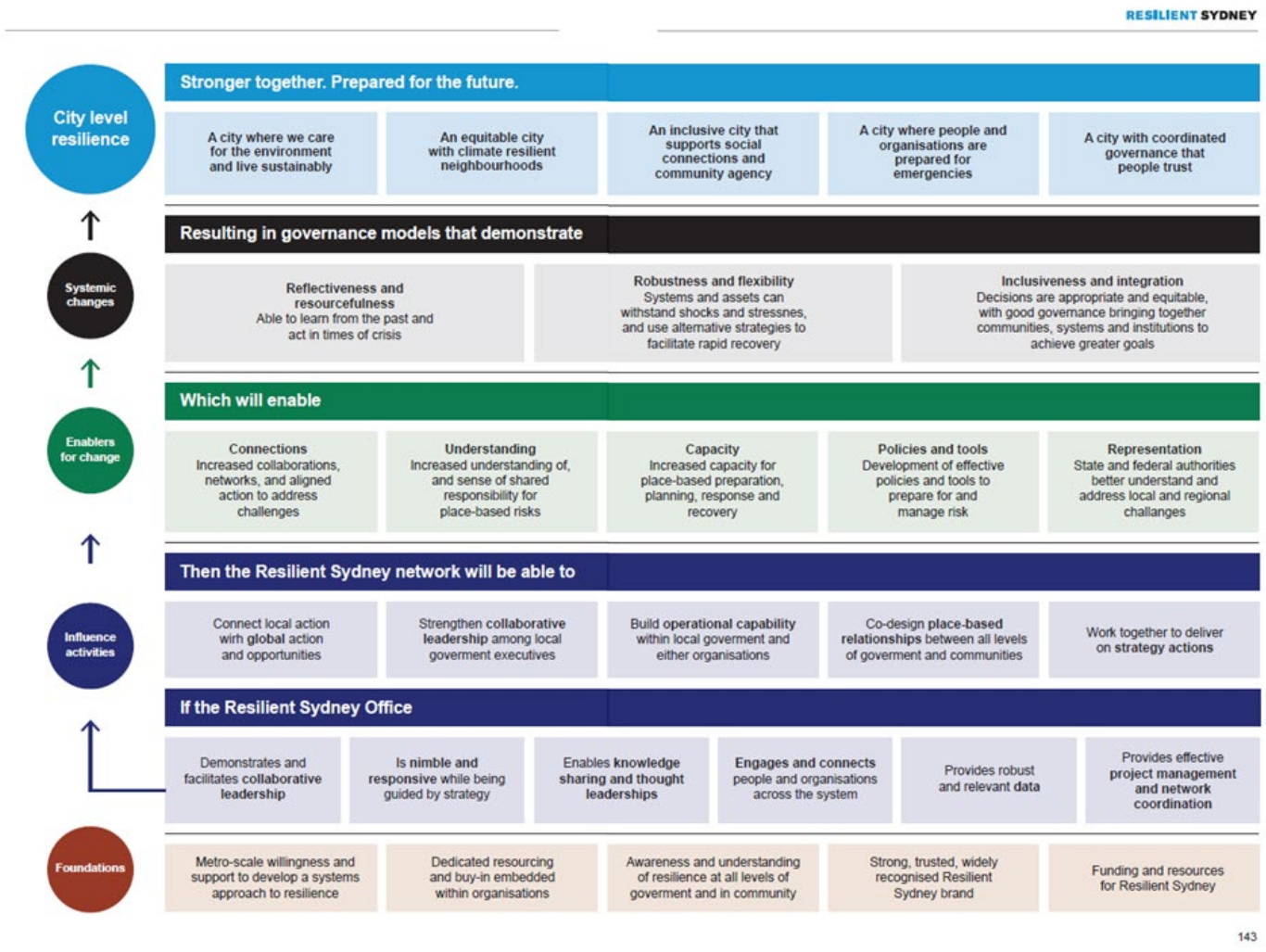
Key characteristics of the initiative include for example the context in which the initiative operates (including how it interacts with other initiatives). They also include implementation details, such as providers, delivery methods, locations, timeframes, any changes made to the initiative, project stakeholders and the people and communities who are impacted by the initiative (NSW Government, 2025, page 2).

TABLE 3: RECORDING THE KEY CHARACTERISTICS OF A PROJECT

		Comment
Project objectives and resilience goals	What are project objectives? What resilience aspect does the project aim achieve (adaptation, mitigation, recovery….)?	
Type/ nature of the project	For example, is it a risk reduction project, nature-based solutions, community capacity building, retrofitting infrastructure etc.	
Project location and scale	Is it a local, regional, state or nationwide project? What does the geographic context mean for risks, community needs, ecological factors etc.	
Alignment with resilience strategies?	To what extend does the project align with resilience principles in broader policy frameworks (higher-level documents) and funding mandates?	
Stakeholders and partners	Identify roles, responsibilities, decision-making authority, end-users and beneficiaries	
Governance arrangements	Identify supervision mechanisms, accountability structures and coordination pathways	

A Theory of Change can identify how the initiative is expected to lead to outcomes and benefits. This includes identifying and explaining assumptions about the causal links in an initiative, including key assumptions about how outputs will lead to the expected level of outcomes and how outcomes will support the realisation of benefits (NSW Government, 2025; UNDG, 2016). Figure 6 shows the ToC developed for the Resilient Sydney Strategy 2025-2030, as an example for a presentation of a ToC for achieving urban resilience.

FIGURE 6: THEORY OF CHANGE FROM THE RESILIENT SYDNEY STRATEGY 2025-2030



Source: Resilient Sydney (2025)

3.2 Capability Maturity Model (Element 2)

This element identifies areas needing support or development by assessing the project team's or agency's capacity to deliver the project effectively. This includes evaluating:

- processes – how projects are managed across their lifecycle
- people – skills and roles of team members
- resources – availability of funding, expertise and knowledge
- governance – decision-making structures and accountability
- systems – tools, methodologies and approaches used.

The CMM progression can be used for monitoring and evaluation of investment for resilience. This Element assesses the Maturity Stage Achieved, identifying the level of resilience maturity attained by the project, from 'initial' to 'optimising' (Gissing 2023a, 2023b; UNDRR, 2025) (see Table 4). The previously mentioned resilience investment principles and recommendations (Appendix 1) can guide future capability maturity assessments and are used here as key capability targets for ensuring that resilience investments are achieving their targets (see Table 5).

The Capability maturity assessments focus on collective capability maturity of a project or the appointed organisation. Using this model at the start of the project helps to set objectives and follow and pursue their fulfilment in the lifecycle of the project (Gissing, 2023a; UNDRR, 2025). Using the CMM will assist in understanding the following questions:

- What stage of resilience maturity has been achieved through the project investment (Initial, Developing, Defined, Integrated, Optimising)?
- Are the project systems and processes aligned with maturity stage objectives to support resilience investments?
- Has the investment contributed to advancing investment towards resilience maturity?

TABLE 4: CAPABILITY MATURITY LEVELS FOR ASSESSMENT

Level	Description
L1 Initial/Baseline	No formal processes; relies on individual effort, yet to recognise the strategic importance.
L2 Developing/Adaptive	Basic structure, tools, templates and relevant databases are available. Some planning and documentation; limited coordination, individual department or function makes an effort, but no shared efforts. Processes are documented and repeatable.
L3 Integrated/Evolved	Coordinated, cross-agency collaboration; data-driven decisions, high recognition of importance. The need for processes/tasks is clearly recognised and supported with stated means of improvement.
L4 Optimised	Continuous improvement: scenario-based planning, the operating environment is well understood. Anticipating and responding to uncertainty. Quantitative approaches are used to understand internal and external variations.

Note: Adapted from Adeniyi et al. (2018) and UNDRR (2025).

Table 5 assists with measuring how the principles and recommendations are incorporated in the projects that are evaluated or monitored and illustrates the maturity level of each project in incorporating resilience across the above-mentioned: people, resources, governance, systems and processes.

The proposed timeline for M& E depends on the type of the project, and can be conducted at: initial stage, mid-term and end of the project. Table 5 can be used at various stages of the project to assess and demonstrate how resilience capacities have been integrated throughout the project lifecycle. The scoring of the project's level for the elements and in relation to the principles and recommendations as 'initial/baseline', 'developing/adaptive', 'integrated/ evolved' or 'optimised' will assist in understanding the status of the project and where additional elements might need to be taken to achieve a higher level. If the project has been implemented and no further changes can be made, the assessment can be used as lessons learned for future projects.

TABLE 5: CAPABILITY MATURITY ASSESSMENT TABLE FOR RESILIENCE INVESTMENT PRINCIPLES AND RECOMMENDATIONS

Principles/ re-commendations / **Capability maturity assessment**	**People (project team)**	**Resources (financial/ expertise/ knowledge)**	**Governance (Manage-ment and hierarchy)**	**Systems (method-logy and approach)**	**Processes (life cycle of projects in the team/ agency)**
Shift from a reactive to a proactive approach					
Shift from a single hazard to a systemic risk approach					
Prioritise areas and groups at high risk of exposure					
Prioritise long-term, sustainable solutions over short-term investment					
Embed resilience building in investment mechanisms and projects					
Consider interdependencies across scales and sectors					
Prioritise investment in the community to create value and reduce negative effects					
Invest in innovative methods					
Encourage and facilitate public-public, public-private and private-private partnerships					
Encourage and facilitate private sector and household resilience investment by developing a market for resilience investment					
Consider scenario planning					
Harness the insurance mechanism's potential for resilience					
Diversify funding mechanisms, models, resources and funds					

Note: Score projects as: L1. Initial/Baseline, L2. Developing /Adaptive, L 3. Integrated/ Evolved, L 4. Optimised. Based on Gissing, 2023a, UNDRR, 2025 and Hosseinioon et al., 2025.

3.3 Logic Model (Element 3)

This element involves developing a logic model to map out how the project will achieve its goal by linking resources to results and providing a structure for tracking progress.

The scale and significance of the changes a project brings about can be measured or demonstrated to provide evidence to support decisions about whether to continue, expand, modify, or discontinue a project, and inform future policy and investment choices (Noltze et al., 2021; World Bank, 2017). The logic model needs to be adapted to the specific characteristics and requirements of the project, including the type and nature of the project, scale, location, stakeholders, data, objectives, and governance (NSW Government, 2025; Noltze et al., 2021; OECD, 2022).

Table 6 depicts the component descriptions of the Logic Model framework, which are described further in the following (adapted from NSW Treasury, 2025b). As a general overview, inputs refer to resources and institutional arrangements; activities involve implementation and compliance; outputs include deliverables and reporting; outcomes reflect achievement of objectives and learning; and impact relates to long-term systemic change and resilience (World Bank, 2008).

TABLE 6: THE LOGIC MODEL COMPONENTS DESCRIPTION FOR THE PROJECTS

Categories	Description
Objective	The fundamental aim(s) of the initiative, based on the problem or opportunity identified. It often provides the basis for determining success.
Inputs	The financial, human, material, technological and information resources used to implement and deliver the initiative.
Activities	The actions and processes of an initiative that transform inputs into outputs.
Outputs	The products, services and infrastructure that result from the initiative activities.
Outcomes	The changes that are attributable to the initiative outputs. Changes may be in economic, social, environmental or cultural conditions and may occur in the short, medium or long term. They may include changes in lives, status, health, surroundings, knowledge, attitudes, values, behaviours or satisfaction levels.
Impacts	An increase in welfare associated with an initiative's outcomes (including economic, social, environmental or cultural outcomes). Benefits need to be first understood as changes in conditions, i.e., as outcomes.

Note: Adapted from NSW Treasury (2025b).

Inputs and activities

Inputs are the financial, human, material, technological and information resources used to implement and deliver a project (NSW Government, 2025b). They involve different actors – government agencies, banks, implementing partners and communities – to carry out specific activities. The activities may involve capacity building, infrastructure development, service delivery or policy reform. The implementation of these activities leads to outputs, which are the immediate, measurable products or services delivered by the project (see next section).

Inputs encompass both tangible and intangible elements that are essential for project preparation, execution, and monitoring (Noltze et al., 2021; OECD, 2022; World Bank, 2017), including:

- financial resources such as available funds, trust funds and donor contributions
- human resources, including technical expertise, staff time and stakeholder engagement
- institutional mechanisms like rules, procedures and governance structures
- planning tools and systems, such as monitoring and evaluation frameworks, data systems and reporting protocols.

Outputs

Outputs refer to the immediate, tangible deliverables, results, products or services delivered through adaptation and resilience activities (World Bank, 2008). They capture what has been produced or provided as a direct result of an intervention, rather than long-term outcomes or impacts (UNEP, 2024).

Outputs are the direct products of activities undertaken during an intervention. They are typically monitored and include tangible deliverables, such as infrastructure built or retrofitted, conducted trainings or published policy reports.

Outcomes

Outcomes represent the short- to medium-term changes or benefits that result from the project, reflecting progress towards the intended objectives, including investment for resilience (World Bank, 2008). Metrics at this level assess whether the project's desired results are being achieved and how well they align with original goals. Outputs are measured to assess the effectiveness of an intervention and reflect changes in fields such as enhancing or retrofitting infrastructure, capacity building, behaviour change and systems thinking. Unlike outputs, outcome metrics go beyond measuring scale to also consider the depth and significance of the impact (UNEP, 2024).

Impact

The impacts of a project encompass both outcomes and the associated benefits. Impacts are the likely or achieved higher-level effects of an intervention's outcomes and ultimate effects or longer-term changes, including intended and unintended, positive or negative higher-level effects (OECD, 2022). Impacts refer to the extent of changes that result from an initiative – such as improvements in systems, behaviours or conditions. Furthermore, they can demonstrate achieved benefits that arise from the changes brought about by the project. Impacts are assessed in terms of economic, social, environmental and cultural changes. They measure the value of outcomes and can be expressed in monetary or non-monetary terms (NSW Government, 2025). By monetising impacts through cost–benefit analysis, evaluators can determine the net social benefit of an initiative. Evaluating impact helps to understand whether a project is effective, efficient, and valuable (Noltze et al., 2021; OECD, 2022; World Bank, 2017).

Table 7 shows a summary of examples for each Element of the Logic Model in the context of resilience investment and what questions need to be asked. This questionnaire can be used when undertaking monitoring and evaluation of resilience investments. It can be tailored according to different project types.

TABLE 7: LOGIC MODEL TABLE FOR MONITORING AND EVALUATION GUIDANCE FRAMEWORK (EXAMPLE)

Project/Initiative title					
Objective: e.g. increased disaster resilience	How is the objective going to be achieved?				
Purpose of the M&E framework	Which factors, elements and transformations will be monitored or evaluated and how? Examine if the initiative is being implemented as intended.				
Logic	**Inputs**	**Activities**	**Outputs**	**Outcomes** (immediate, short, mid, long term)	**Impacts**
Timeframe	For example, six months	For example, six months	For example, one year	For example, 2-3 years, more than 4 years	For example, over a twenty-year period
Key monitoring and evaluation questions to address the evaluation purpose and provide information to meet the needs of decision-makers and key stakeholders	How are financial, human, material and technological resources are used to implement and deliver this initiative?	Actions and processes that transform inputs into outputs.	What is known regarding the quantity and quality of outputs? Such as products, services and infrastructure. Is the initiative on track to achieve its intended outputs?	What are the actual changes (outcomes) delivered by the initiative? What is the distribution of outcomes among different groups? Has the project reached the target populations? Under what conditions has the initiative been most effective?	What are the impacts attributable to the initiative (including future benefits)? What is the distribution of impacts (and costs) among different stakeholders?
Monitoring: required performance metrics & data collection	To what extent has this initiative delivered value for money? Has this initiative created net values, such as social benefit?				
Evaluation	Identifying the impacts beyond the defined project objective				
Learning	Identifying opportunities for improvement and lessons learned for future projects and initiatives				

Note: Adapted from NSW Government 2025

3.4 Triple Dividend Resilience Framework (Element 4)

In order to assess the added values and loss prevention achieved through the project as well as the extra co-benefits which are achieved as impacts, the project components can also be evaluated by the Triple Dividend of Resilience (TDR) framework as depicted in Table 8 and includes:

TABLE 8: THE PROJECT COMPONENT (OUTPUTS, OUTCOMES, IMPACTS) EVALUATION USING THE TDR MODEL

	Avoided or reduced losses (loss prevention)	Created values (economic gains and benefits)	Impacts (social and environ-mental benefits)	**Notes**
Outputs				
Outcomes				
Impacts				

3.5 Indicators for resilience investment

Indicators that measure whether the project is moving towards its main objectives provide support for monitoring and evaluation processes. Developing indicators that match the nature of the projects helps track progress and ensure the effectiveness of resilience initiatives. For example, indicators can include metrics like the frequency of resilience plan exercises and the improvement shown in these exercises over time (Risk and Resilience Hub, 2023). Outcomes formulated in the theory of change of M&E frameworks can be measured by one indicator or several (Noltze et al., 2021; OECD, 2022; World Bank, 2017). Resilience investments require multi-dimensional indicators that go beyond traditional performance metrics (OECD 2022). Context-specific indicators acknowledge that resilience is highly dependent on local conditions and priorities and need to account for factors outside the control of the intervention that can positively or negatively affect the achievement of expected results.

Monitoring and evaluating the outputs, outcomes and impacts of projects through indicators (or Key Performance Indicators (KPIs)) ensures alignment with projects' strategic objectives and principles. While indicators will differ between projects and need to be tailored to different types of projects, such as scenario-based planning and place-based approaches, we have listed example indicators in Table 9, which are based on the previously mentioned resilience investment principles and recommendations (see Appendix 1). These indicators are derived from outcomes and outputs which can be defined and tailored according to each initiative's type, scale, characteristics and intended outputs and outcomes. The indicators are considered within a framework that aims to enhance adaptation, reduce loss and add tangible and intangible value, such as retrofitting infrastructure or encouraging collaboration and community empowerment. The indicators provide examples of how goals, inputs, outputs and outcomes and impacts act towards disaster resilience investment-related activities can be measured.

TABLE 9: EXAMPLES OF INDICATORS FOR RESILIENCE INVESTMENT

Category	Examples of outputs and outcomes	Examples of indicators
1. Goals and objectives	Defined approach towards disaster resilience investment	Number of projects with a documented disaster resilience investment approach
	Development of a project logic model to support resilience investments	Percentage of projects utilising a project logic model for resilience investments
2. Project definition	Project investment alignment with broader disaster resilience and ecological goals	Number of projects aligned with national or regional disaster resilience strategies
	Clarification of nature, scale, funding, governance and stakeholders	Number of partnerships formed to enhance project investment towards resilience
3. Inputs	Resource allocation towards resilience	Total value of resources allocated through collaborative financing
4. Activities	Alignment of activities and outputs with goals	Number of partnerships actively contributing to project goals
5. Outputs	Delivered products, services or infrastructure	The number of infrastructure projects completed that enhance resilience
	Measurability and linkage of outputs to activities	Percentage of outputs directly linked to resilience improvement
6. Outcomes	Short/medium-term changes and alignment with objectives	Number of projects achieving short-term resilience objectives
	Unintended outcomes detection	Number of community engagement activities conducted
7. Impacts	Long-term tangible or intangible improvements	Number of long-term improvements realised as reported in evaluations
	Valuation of benefits (monetary or non-monetary)	Per cent increase in biodiversity or water quality assessments
8. Learning	Lessons learned through the impacts of the project, including the Identification of data/implementation/governance gaps	Number of documented lessons learned used in planning future projects
	Definition of future projects and initiatives	Number of future projects designed based on current learning

3.6 Monitoring and Evaluation Checklist (Element 5)

The evaluation, as the last phase, considers the impacts beyond the designated goals of the project and the transformations it brought about This element valuates whether the project has achieved its goals and objectives. It involves reflecting on lessons learned to improve future initiatives and inform strategic decisions.

This section lists a number of questions that can be asked when undertaking monitoring and evaluation. These questions serve as a checklist and assist in designing the process from the start of the project and ensuring its strategic alignment with the objective of achieving improved disaster resilience or increased investment in disaster resilience. Further objectives of each project will need to be included in the overall M&E process. This checklist focuses on increased disaster resilience and investment.

The questions from the box on page 8 are additional useful questions to consider.

1. Goals and Objectives

- Is there a clearly defined approach or need towards disaster resilience that the investment addresses?
- Has the project been developed in a way to explain how the investment leads to resilience outcomes?
- Is there a logic model showing inputs, activities, outputs, outcomes and impacts?

2. Strategic Alignment for Investing in Resilience

- Does the project clearly define its nature, scale, alignment, source of funding, governance and stakeholders?
- Are there strategic planning resources that can be referred to in order to strengthen alignment with national/local resilience strategies.

3. Identification and Addressing Gaps and Challenges for Investment

- Has the project identified data/ implementation/governance gaps and challenges in the process of project investment?
- How can gaps and challenges be addressed to proactively enhance project success?
- Has the project engaged with community and data management experts to address identified challenges?

4. Planning & Integration

- Has monitoring and evaluation been imbedded in the investment prospectus from the outset?
- Has the project explored strategies to incorporate monitoring activities from the start to improve project outcomes?

5. Inputs and Activities

- Are the inputs and resources (financial, human, technical) allocated sufficiently and appropriately towards resilience?
- Are the planned activities and outputs aligned with the resilience goals?
- Have outputs and outcomes achieved intended results?

6. Outputs

- What products, services or infrastructure have been delivered?
- Are outputs measurable and linked to the planned activities?
- Have outputs reached the intended stakeholders or systems?

7. Outcomes

- What short-term and medium-term changes have occurred because of the investment?
- Are the outcomes aligned with resilience objectives (e.g., reduced vulnerability, improved adaptive capacity)?
- Have any unintended outcomes emerged?

8. Impacts

- What are the long-term tangible or intangible improvements that occurred (e.g., in community or system resilience)?
- Are benefits monetary or non-monetary, and how are they valued?

- Do benefits reflect equity, sustainability and social impact?

9. Indicators & Tools

- Have output and outcome indicators relevant to the resilience aspects of the project been defined?
- What types of data is needed to capture the full spectrum of project impacts? How could the data be collected?

10. Implementation & Tracking

- Is there a regular schedule for data collection and progress tracking?
- Are results of different data collections compared?

11. Reporting & Review

- Have you designed an M&E process for producing periodic reports and updates?
- Are reports internal or public?

12. Introducing Impact / Impact Assessment

- Can you recognise the impacts of the project in enhancing resilience in different scales/aspects?
- Can you introduce further activities to evaluate the impacts of the project?

13. Evaluation and Further Learning

- Has an evaluation plan been developed with clear questions and methods?
- Is the evaluation independent, objective and appropriately resourced?
- Are counterfactuals or baseline scenarios considered?

14. Future Improvement & Learning

- Do you integrate findings from previous projects to inform future resilience investments?

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Appendix 1: Principles and Recommendations for Urban Resilience Investment

Principles and Processes for Prioritising and Influencing Urban Resilience Investment

Principles	Processes
Shift from a reactive to a proactive approach	Shift the focus of resilience investment from the response phase to preparedness, mitigation, adaptation, and transformation Adopt a systems approach Incentivise preventative investments Enhance socio-spatial and economic justice Ground lived experiences and community voices in investment in preparedness, mitigation adaptation and transformation Promote proactive planning for investment
Shift from a single hazard to a systemic risk approach	Adopt a systems approach Recognise the interconnected nature of risks Prioritise projects considering multidimensional and compound impacts Consider interactions between multiple hazards Move beyond assessing individual hazards Consider stress and deficiencies from damage and disruption Consider intensifying effects Consider social cohesion within systemic risk assessments
Prioritise vulnerability and risk exposure	Consider vulnerability in the context of risk exposure Consider differences in risks of exposure Prioritise areas and groups at high risk of exposure Establish mechanisms for community led action
Prioritise long-term, sustainable solutions over short-term investment	Promote long-term planning and adaptability Shift towards sustainable investment Overcome traditional business practices
Embed resilience building in investment mechanisms and projects	Embed resilience investment in multiscale policymaking Facilitate capacity building for resilience investment Embed resilience in general projects Leverage existing programs and services
Consider interdependencies across scales and sectors	Enhance coordination and relationships Foster a shared understanding of risks Pursue collaborative financing and funding Foster multisectoral and multiscale coordination Support community-led initiatives Ensure accountability
Prioritise investment in communities to create value and reduce negative effects	Emphasise long-term planning and adaptability Create value through resilience investment Empower communities for successful resilience delivery Develop continuous, meaningful engagement that adapts to changing community needs and contexts

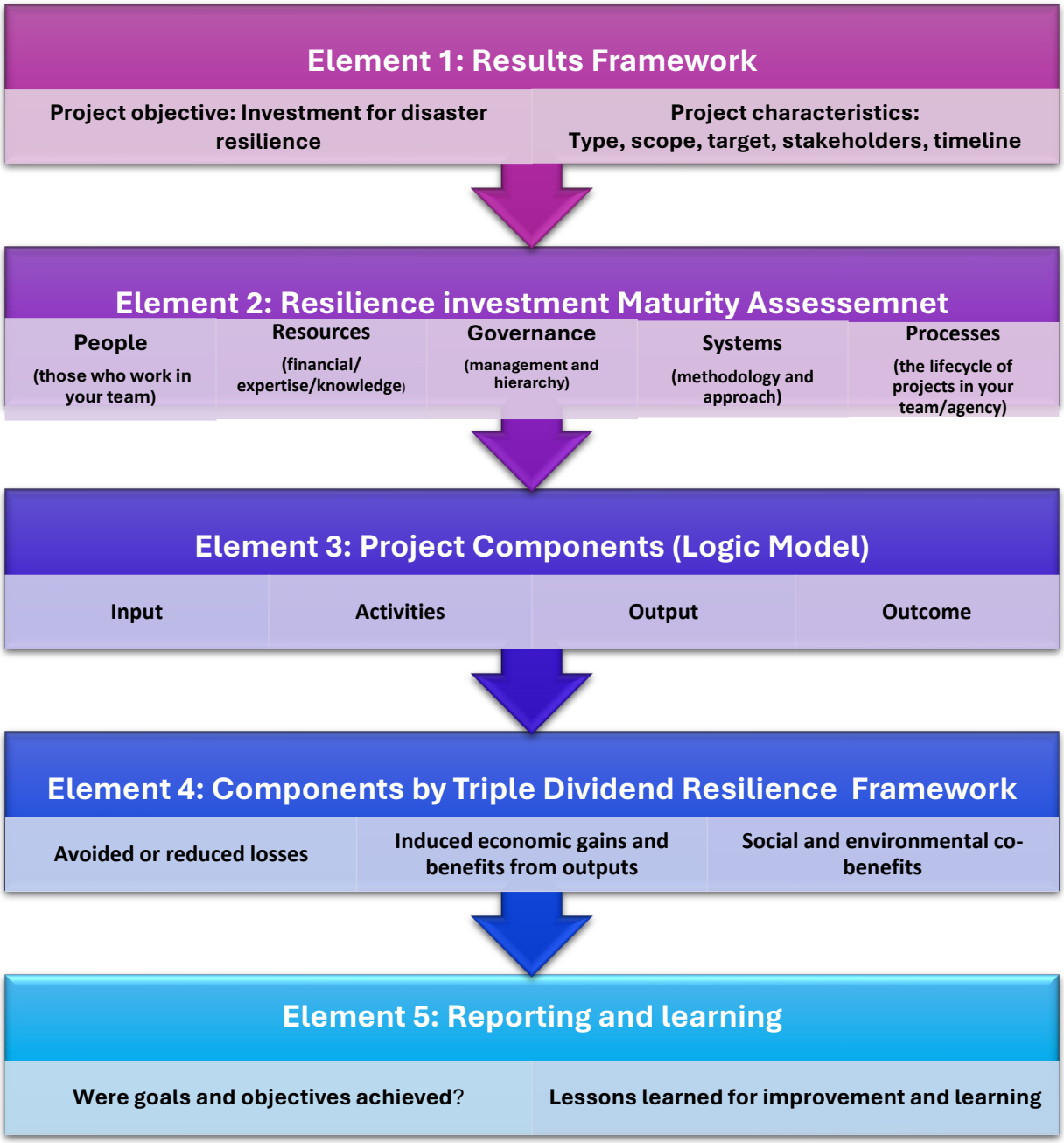
Source: Hosseinioon et al. 2025

Recommendations for Prioritising and Operationalising Urban Resilience Investments

Recommendations	Processes
Promote innovative methods for funding and investment	Consider innovative investment mechanisms Invest in advanced infrastructure Harness data and information Explore the use of smart city technologies Invest in innovative technologies
Encourage and facilitate public and private partnerships	Facilitate partnerships to leverage resources and expertise Promote collaborative financing Develop public-public and public-private partnerships Encourage collaborative private sector investment (public-private and private-private) Leverage government policies and programs towards partnerships
Encourage and facilitate private sector and household investment for resilience by developing a market for resilience investment	Mobilise private capital Enhance individual-level involvement Encourage private sector support for communities Develop standardised methodologies for capturing and quantifying the value of resilience Promote private sector investment in resilience-building Develop a market for resilience investments Help businesses and individuals to invest in adaptation
Consider scenario planning for complex urban systems	Explore and evaluate various potential futures in decision-making Understand the range of possible outcomes Invest in adaptable systems and make informed decisions
Harness insurance mechanisms' potential for resilience	Utilise risk-sharing and financial protection Acknowledge disaster risk in insurance premiums Use innovative insurance models Use insurance products for resilience Address insurance protection gaps
Diversify funding mechanisms, models, resources and funds	Decentralise investment methods and funding sources Diversify assets, funding models, and beneficiaries Leverage national funding streams Incorporate financial resilience principles

Source: Hosseinioon et al. 2025

Appendix 2: Elements and tables of the Monitoring and Evaluation Guidance



Element 1: Results Framework

Define the project's nature, scale, alignment, source for funding/investment, governance and stakeholders

		Comment
Project objectives and resilience goals	What are project objectives? What resilience aspect does the project aim achieve (adaptation, mitigation, recovery….)?	
Type/ nature of the project	For example, is it a risk reduction project, nature-based solutions, community capacity building, retrofitting infrastructure etc.	
Project location and scale	Is it a local, regional, state or nationwide project? What does the geographic context mean for risks, community needs, ecological factors etc.	
Alignment with resilience strategies?	To what extend does the project align with resilience principles in broader policy frameworks (higher-level documents) and funding mandates?	
Stakeholders and partners	Identify roles, responsibilities, decision-making authority, end-users and beneficiaries	
Governance arrangements	Identify supervision mechanisms, accountability structures and coordination pathways	

Element 2: Capability maturity assessment for resilience investment

CMA / Principles/ Re-commendations	People	Resources	Governance	Systems	Processes
Shift from a reactive to a proactive approach					
Shift from a single hazard to a systemic risk approach					
Prioritise areas and groups at high risk of exposure					
Prioritise long-term, sustainable solutions over short-term investment					
Embed resilience building in investment mechanisms and projects					
Consider interdependencies across scales and sectors					
Prioritise investment in the community to create value and reduce negative effects					
Invest in innovative methods					
Encourage and facilitate public-public, public-private and private-private partnerships					
Encourage and facilitate private sector and household resilience investment by developing a market for resilience investment					
Consider scenario planning					
Harness the insurance mechanism's potential for resilience					
Diversify funding mechanisms, models, resources and funds					

Based on Gissing, 2023a, UNDRR, 2025 and Hosseinioon et al., 2025.

Score projects as:

L1. Initial/Baseline (No formal processes; relies on individual effort, yet to recognise the strategic importance)

L2. Developing /Adaptive (Basic structure, tools, templates and relevant databases are available. Some planning and documentation; limited coordination, Individual department or function makes an effort, but they are not shared. Processes are documented and repeatable)

L 3. Integrated/ Evolved (Coordinated, cross-agency collaboration; data-driven decisions, High recognition of importance. The need for processes/tasks is highly recognised and supported with stated means of improvement)

L 4. Optimised (Continuous improvement: scenario-based planning, the operating environment is well understood. They anticipate and respond to uncertainty. Quantitative approaches are used to understand internal and external variations)

Element 3: Logic Model Table for Evaluation (example)

Project/Initiative title					
Objective: e.g. increased disaster resilience	How is the objective going to be achieved?				
Purpose of the M&E framework	Which factors, elements and transformations will be monitored or evaluated and how? Examine if the initiative is being implemented as intended.				
Logic	**Inputs**	**Activities**	**Outputs**	**Outcomes** (immediate, short, mid, long term)	**Impacts**
Timeframe	For example, six months	For example, six months	For example, one year	For example, 2-3 years, more than 4 years	For example, over a twenty-year period
Key Monitoring and Evaluation Questions to address the purpose and provide information to meet the needs of decision-makers and key stakeholders	How are financial, human, material and technological resources are used to implement and deliver this initiative?	Actions and processes that transform inputs into outputs.	What is known regarding the quantity and quality of outputs? Such as products, services and infrastructure. Is the initiative on track to achieve its intended outputs?	What are the actual changes (outcomes) delivered by the initiative? What is the distribution of outcomes among different groups? Has the project reached the target populations? Under what conditions has the initiative been most effective?	What are the impacts attributable to the initiative (including future benefits)? What is the distribution of impacts (and costs) among different stakeholders?
Monitoring: required performance metrics & data collection	To what extent has this initiative delivered value for money? Has this initiative created net values, such as social benefit?				
Evaluation	Identify the impacts beyond the defined project objective				
Learning	Identify opportunities for improvement and lessons learned for future projects and initiatives				

Note: Adapted from NSW Government (2025)

Element 4: The project component evaluation using the TDR model

	Avoided or reduced losses (loss prevention)	Created values (economic gains and benefits)	Impacts (social and environ-mental benefits)	**Notes**
Outputs				
Outcomes				
Impacts				

Element 5: Monitoring and Evaluation Checklist

Checklist Questions	Yes/No/Further comments
Goals and objectives	
Is there a clearly defined approach or need towards disaster resilience that the investment addresses?	
Has the project been developed in a way to explain how the investment leads to resilience outcomes?	
Is there a logic model showing inputs, activities, outputs, outcomes and impacts?	
Strategic alignment for investing in resilience	
Does the project clearly define its nature, scale, alignment, source of funding, governance and stakeholders?	
Are there strategic planning resources that can be referred to in order to strengthen alignment with national or local resilience strategies.	
Identification and addressing gaps and challenges for investment	
Has the project identified data/ implementation/governance gaps and challenges in the process of project investment?	
How can gaps and challenges be addressed to proactively enhance project success?	
Has the project engaged with community and data management experts to address identified challenges?	

Checklist Questions	Yes/No/Further comments
Planning & Integration	
Has monitoring and evaluation been imbedded in the investment prospectus from the outset?	
Has the project explored strategies to incorporate monitoring activities from the start to improve project outcomes?	
Inputs and Activities	
Are the inputs and resources (financial, human, technical) allocated sufficiently and appropriately towards resilience?	
Are the planned activities and outputs aligned with the resilience goals?	
Have outputs and outcomes achieved intended results?	
Outputs	
What products, services or infrastructure have been delivered?	
Are outputs measurable and linked to the planned activities?	
Have outputs reached the intended stakeholders or systems?	

Checklist Questions	Yes/No/Further comments
Outcomes	
What short-term and medium-term changes have occurred because of the investment?	
Are the outcomes aligned with resilience objectives (e.g., reduced vulnerability, improved adaptive capacity)?	
Have any unintended outcomes emerged?	
Impacts	
What are the long-term tangible or intangible improvements that occurred (e.g., in community or system resilience)?	
Are benefits monetary or non-monetary, and how are they valued?	
Do benefits reflect equity, sustainability and social impact?	
Indicators & Tools	
Have output and outcome indicators relevant to the resilience aspects of the project been defined?	
What types of data is needed to capture the full spectrum of project impacts? How could the data be collected?	
Implementation & Tracking	
Is there a regular schedule for data collection and progress tracking?	
Are results of different data collections compared?	

Checklist Questions	Yes/No/Further comments
Reporting & Review	
Have you designed an M&E process for producing periodic reports and updates?	
Are reports internal or public?	
Introducing Impact / Impact Assessment	
Can you recognise the impacts of the project in enhancing resilience in different scales/aspects?	
Can you introduce further activities to evaluate the impacts of the project?	
Evaluation and Further Learning	
Has an evaluation plan been developed with clear questions and methods?	
Is the evaluation independent, objective and appropriately resourced?	
Are counterfactuals or baseline scenarios considered?	
Future Improvement & Learning	
Do you integrate findings from previous projects to inform future resilience investments?	