



Ensuring good environmental outcomes from major infrastructure projects by working more effectively with other disciplines across the project development cycle

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INTRODUCTION

Much of Australia and New Zealand is in the middle of an infrastructure boom. Long promised projects are being planned for and constructed. In NSW, in particular, the amount of infrastructure projects is being called the 'wave' in recognition of the number of projects underway and the need to harness resources to bring the wave safely to shore.

The purpose of this paper is to consider what opportunities there are for environmental professionals to ride the wave and influence the outcome in a way in which the environment is integral to design and not left behind as the wave dumps into the shore. Can we learn lessons from some of the existing projects to ensure better outcomes in the future?

THE PROJECT DEVELOPMENT CYCLE

Generally, Government Agencies and their delivery partners have responsibility to design, build and operate major infrastructure projects. The mandate for projects comes from the elected Government. This means that projects generally require broad consensus that investing public funds represents value to the community through benefits such economic growth, safety, accessibility and mobility. The projects need to be constructible and meet operational objectives within a constrained social and economic framework. One of these constraints is the environment.

All major projects follow a project development process starting at inception through planning, design, construction, operation and maintenance. Figure 1 provides a generalised outline of the project development process. The process is represented as a figure of eight as project development is rarely linear and often involves re-evaluation that could occur at any stage in the process.

Traditionally environmental input has focussed on a fairly limited number of steps – these being:

- environmental assessment and approval at the planning phase and
- environmental compliance at the construction phase

Environmental input is made at other stages but the overwhelming input of environmental resources is during these two phases.

Often, by these stages of project development the potential to influence project outcomes is limited to small gains with minimal opportunity for major change. Figure 2 below illustrates this (adapted from Roberts and Sjolund 2015)

The figure show a reverse relationship between knowledge of the impact on the environment of a project and the ability to influence the project so as to avoid and minimise impacts. At the environmental assessment stage the concept design and business case have been approved by Government, funding allocated and promises for completion have been made.

It is possible to refine design after assessment using the increased knowledge of the impacts of the project from the assessment. By the time construction contracts are signed opportunities for improved outcomes are restricted to remedial actions and lessons to be learnt for the next project.

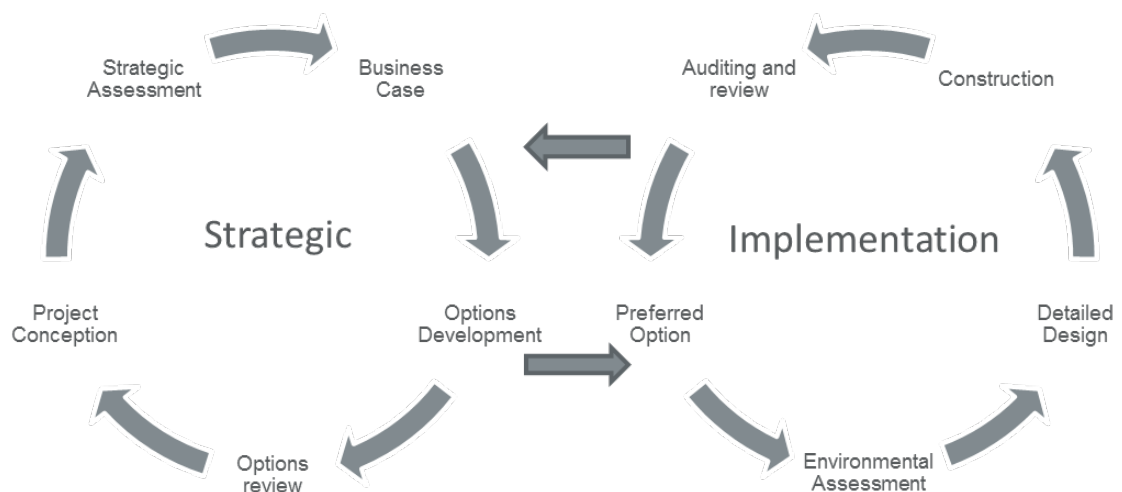


Figure 1 Project Development Process

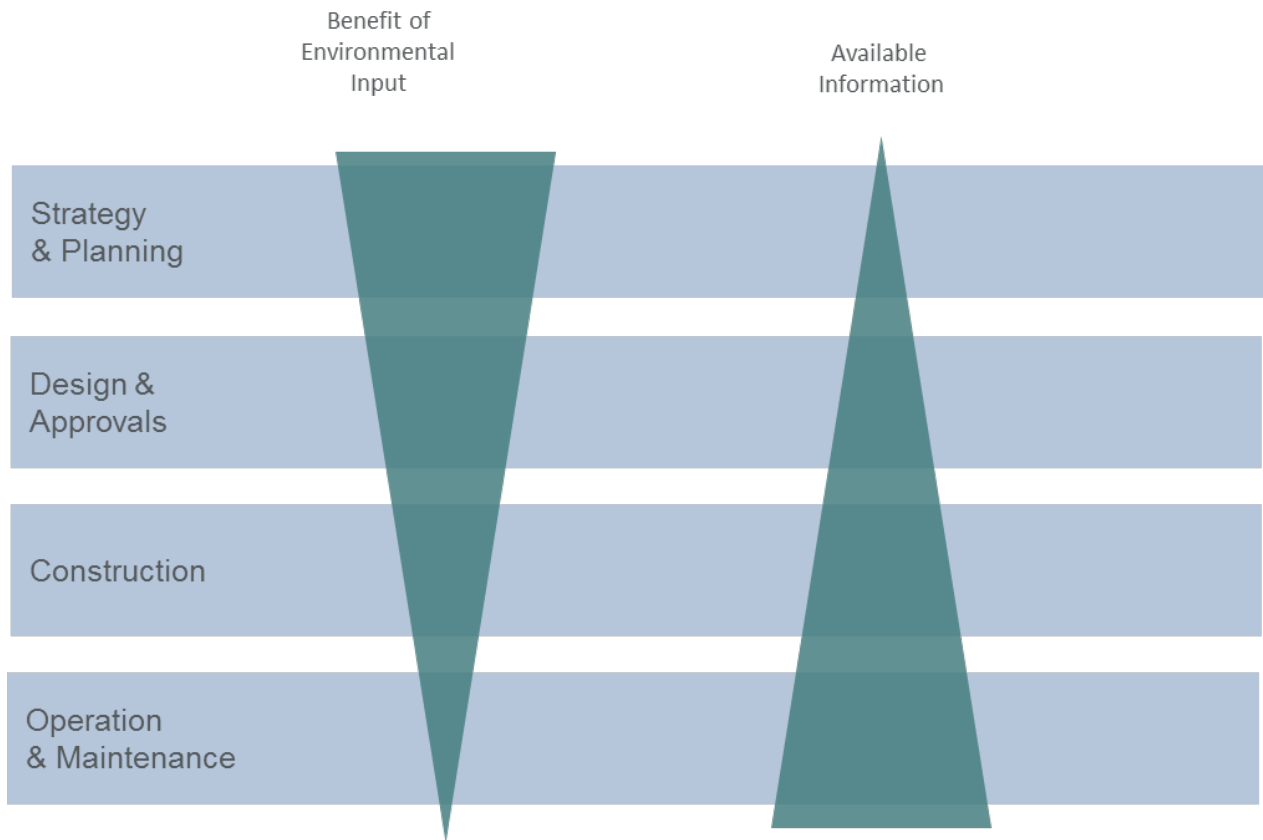


Figure 2 Ability to influence environmental outcomes during stages of a project

OPPORTUNITIES FOR MORE EFFECTIVE ENVIRONMENTAL INPUT

Policies and Guidelines

- Having environmental input into policies, guidelines or standards can be an effective means of improving outcomes – these provide legitimacy to decision processes. However, if they are wrong or misleading they can entrench poor decision making.

Strategic Planning

- Conceptual and Business Case Phases.
- Incorporating environmental costs into business case.
- Ensuring project team understands the environmental risks of options and alternatives.
- Providing opportunities for environmental enhancement as integral to the project.

Environmental professionals can legitimately be part of the business case and project scoping teams. The challenge is to recognise the opportunity and resource the input.

Detailed design

The detailed design phase of a project generally takes an approved project from concept to construction. It is where the intent of conditions of approval are translated on the

ground. Generally this phase is the domain of the design engineers and drafters. However it is also the phase where mistakes are made through misunderstanding of environmental requirements.

As an example, the Woolgoolga to Ballina upgrade of the Pacific Highway is a major project with significant environmental impacts. It is currently being constructed. The project was approved by government following environmental assessment and required compliance with over 700 conditions and standards.

The Arup Cardno joint venture that prepared the detailed design of Portion C of the upgrade adopted a range of initiatives:

- upfront environmental workshops with the design team, the proponent and regulatory agencies on the key challenges
- placing information of the key environmental issues around the design office so that key issues stayed in the mind of the designers
- actively participating in the design process including physically sitting environmental professionals with the other design team members – contributing environmental design elements to all of the design packages – sharing the challenges of design as well as the successes
- use of real-time GIS system that allowed the design to be rapidly assessed against constraints

The detailed design improved outcomes for the environment and construction reflecting the commitment of the whole team.

LESSONS LEARNT

This presentation uses lessons learnt from recent major infrastructure projects in Australia to propose greater environmental input in collaboration with other disciplines at all project stages.

It is legitimate for environmental professionals to be part of all stages of the project development cycle. Environmental professionals add a perspective that helps ensure that projects are appropriately conceived and costed, using the best available knowledge of the impacts and that design proceeds in a manner that improves environmental outcomes.

Environmental professionals need to successfully engage as peers with other project professionals such as policy, business case, project development, transport, communications, cost estimators, urban designers and civil and construction engineers. Those professionals are recognising the legitimacy of environmental input through experience of working with environment professionals.

As environmental professionals we must also share our specialist knowledge with these other disciplines so that the knowledge becomes part of their project work. A commitment to engage in the project development process and to respect the work of other specialists will ultimately result in better outcomes.

It is recommended that EIANZ continue to advocate for an increased role of environmental professionals across the project development process.

REFERENCE:

Roberts K and Sjolund A (2015) 'Incorporating biodiversity issues into road design: the road agency perspective' in van der Ree R et.al (2015) Eds *Handbook of Road Ecology* Wiley Blackwell UK.

Improving Environmental Outcomes from Infrastructure Projects

PRESENTER:
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Outline of talk

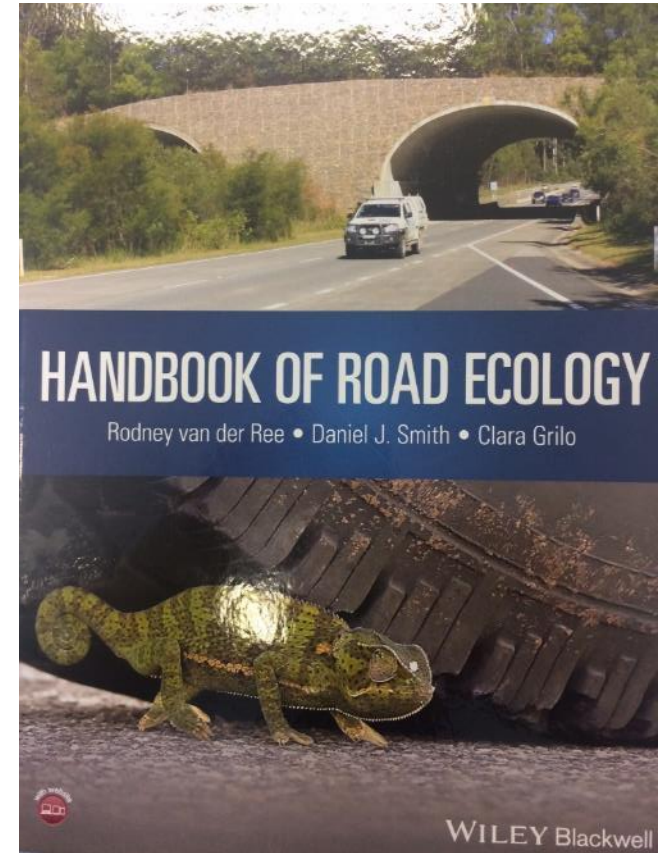
01 Project Development Process

02 Opportunities for greater Environmental Engagement

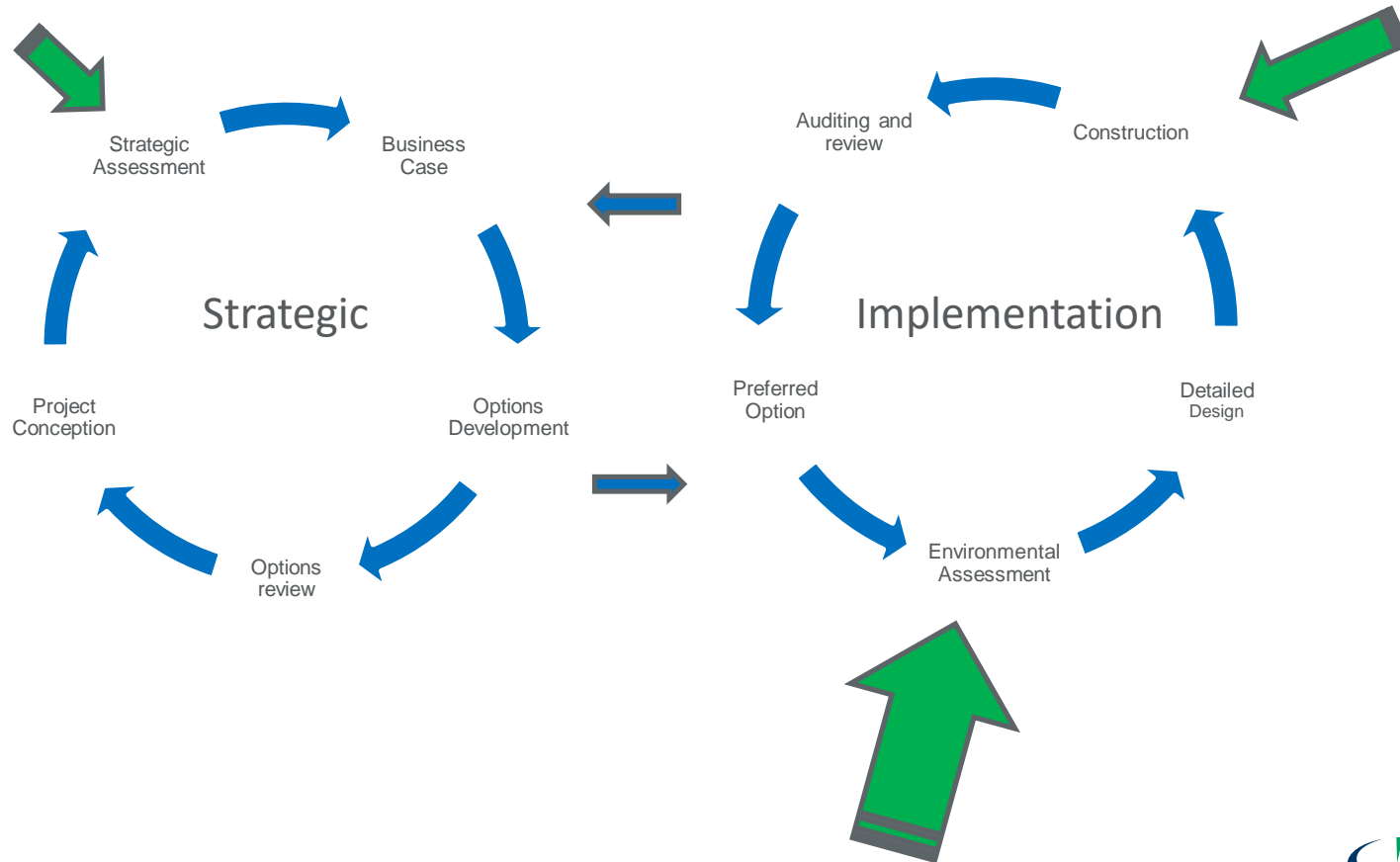
03 Lessons learnt from examples

Key reference

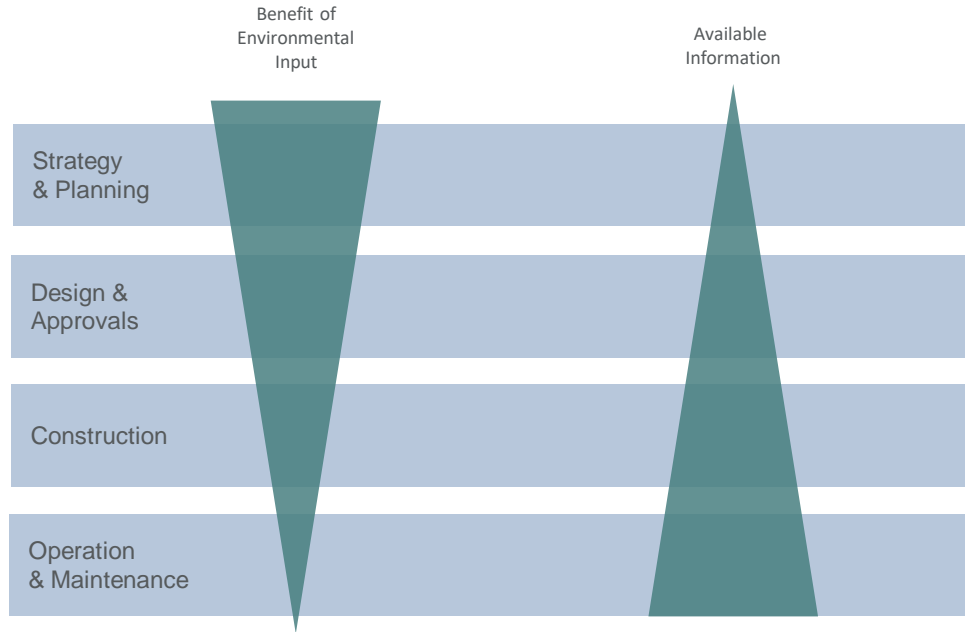
Roberts K and Sjolund A (2015) 'Incorporating biodiversity issues into road design: the road agency perspective' in van der Ree R et.al (2015) Eds *Handbook of Road Ecology* Wiley Blackwell UK.



Project Development Process



Ability to influence environmental outcomes during stages of a Project



- Environmental input has the greatest benefit early in the project lifecycle
- However the knowledge of environmental impacts is less – and therefore environmental risk is greater.

Policies and Guidelines

- > Agencies and regulatory bodies have guidelines, policies and standards that influence the way environment is managed during the project development process.
- > Generally in place from project inception to completion
- > Examples include:
 - Construction and operational noise guidelines
 - Biodiversity assessment and management guidelines
 - Air Quality Guidelines
 - Heritage assessment and consultation guidelines

Key Benefit:

- Essential because they legitimise the need to properly consider a particular issue
- They provide a standard approach that can be replicated on different projects

Policies and Guidelines

> Key Issues

- Tend to be focused on one particular discipline and don't guide integration or trade offs between disciplines
- Are essentially limited to guiding standard circumstances – become problematic in real world situations where standard assumptions are not always reasonable
- Problematic when 'following the guideline' becomes the driver rather than the outcome
- Guidelines have inertia – even when out of date

> Lessons Learnt

- Guidelines should be reviewed regularly – with input from environmental professionals experienced in using the guideline
- Environmental professionals need to understand the technical detail enough to advise on the integration and trade off opportunities between discipline areas
- Focus should always remain on the outcome rather than the Guideline.

Strategic Planning/Business Cases

- > This phase of the project development process supports the initiation of projects – taking them from a concept through to a project that can be designed and assessed.
- > Used to get approval to proceed and/or budget allocated to plan.
- > Critical phase that can significantly influence the impact of the project as it can rule in or out possible options.
- > Generally Business Case are prepared at a number of different phases in the project. Funding bodies provide templates/guidelines for how these documents are prepared.

Key Benefit

- > Can be used to build in the environmental and sustainability costs into the project
- > Allow the project to be refined before significant expenditure or public commitment so as to minimise or avoid environmental impacts

Strategic Planning/Business Cases

> Key issues:

- At this phase may not know all of the constraints or issues e.g. surveys have not yet been completed; community not yet consulted
- Focus is on cost and benefit - not environmental impact
- Difficult for environmental professionals to engage (or traditionally haven't engaged)

> Lessons Learnt:

- There is a place for consideration of environmental impacts in business cases and value in environmental professionals having greater involvement
- Increasing awareness of the problems caused by not incorporating environment into strategic planning
- Opportunities for environmental improvement can be introduced as part of the project.

Detailed Design

- > The detailed design phase of the project development process generally takes an approved project from concept to construction.
- > It is where the intent of conditions of approval are translated on the ground. Generally this phase is the domain of the design engineers and drafters.
- > An example of where environmental expertise has been successfully integrated into the project development process is the, Woolgoolga to Ballina upgrade of the Pacific Highway. This is a major project and is currently in the construction phase. Working with the clients, NSW Roads & Maritime, Pacific Highway Office and Pacific Complete, Arup Cardno joint venture prepared the detailed design for the 34 km of the upgrade between area known as Devils Pulpit to Richmond River

Detailed Design

> The project included a range of initiatives:

- upfront environmental workshops with the design team, the client and regulatory agencies on the key challenges
- integrating the design requirements and principles set by Roads & Maritime from the Pacific Highway Design Guidelines and specific Threatened Species Management Plans prepared as part of the EIA for project
- placing information of the key environmental issues around the design office so that key issues stayed in the mind of the designers
- actively participating in the design process including physically sitting environmental professionals with the other design team members – contributing environmental design elements to all of the design packages – sharing the challenges of design as well as the successes
- use of real-time GIS system that allowed the design to be rapidly assessed against constraints

> The detailed design improved outcomes for the environment and construction reflecting the commitment of the whole team.

Detailed Design

> Key Issues

- Complying with over 700 conditions, guideline requirements and management plan requirements
- Managing the conflicts within these and meeting the design and cost objectives of the project
- Keeping the designers focused on the key requirements under pressure.

> Lessons Learnt

- Provide a well resourced environmental team to the project
- Physically integrate environmental professionals with design professionals
- Keep key issues front of mind for whole project team
- Success is dependent on a client committed to improving environmental outcomes

Lessons Learnt

- > There is an opportunity to build on the examples of integrating environmental management into the project development process as demonstrated in projects such as the Pacific Highway upgrade
- > It is legitimate for environmental professionals to be part of all stages of the project development process.
- > Environmental professionals add a perspective that helps ensure that projects are appropriately conceived and costed, using the best available knowledge of the impacts and that design proceeds in a manner that improves environmental outcomes.
- > Environmental professionals need to successfully engage as peers with other project professionals.
- > As environmental professionals we must also share our specialist knowledge with these other disciplines so that the knowledge becomes part of their project work. It is recommended that EIANZ continue to advocate for an increased role of environmental professionals across the project development process.