

PROJECT SUSTAINABILITY MANAGEMENT IN INFRASTRUCTURE PROJECTS

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ABSTRACT

This paper explores how by integrating environmental and social considerations into project management you can deliver projects that are environmentally sound and contribute to sustainable development.

This paper covers:

- An overview of sustainability management as it relates to infrastructure projects
- A case study which illustrates sustainability management in action
- Relevant tools and frameworks

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Introduction

Over recent years environmental considerations have become a significant part of all major infrastructure projects. In today's world when we consider environment we not only consider biodiversity, pollution prevention, air and water quality, habitat and species protection, land use and visual amenity, but we now add to the list a wider range of issues incorporating impact on communities now and in the future, climate change considerations, efficient resource use, source of materials, whole of life considerations, waste management and future proofing.

We have moved from a time when environmental considerations on projects sat firmly in the compliance space to a time when the proactive and responsible management of the natural environment is a key factor in best practice project management.

If we expand our thinking even wider we incorporate a wider range of social, cultural and economic considerations which lead us not just to stronger environmental management but indeed to a focus on sustainability management across environmental, social, cultural and economic dimensions.

The drivers for a more holistic approach are signalled clearly in New Zealand legislation e.g.

- Resource Management Act – 1991 (RMA):
 - Promotes 'sustainable management of natural and physical resources' - 'effects based'
- Local Government Act 2002:
 - Encourages councils' to "promote the social, economic, environmental and cultural well-being of communities in the present, and for the future"
- Land Transport Management Act 2003 (LTMA);
 - the Act aims to achieve "an integrated, safe, responsive and sustainable land transport system"
- Building Act
- And others.....

Other initiatives such as the New Zealand Waste Strategy and the Urban Design Protocol provide further guidance and direction.

This paper outlines the aspects of a sustainability management framework and its application in practice. It also presents two tools which can be used to guide the development of a project-specific framework.

Applying a Sustainability Framework – Overview

A sustainability management framework ensures that the project is managed to include environmentally sustainable practices in the design, construction and operational phases of the project. The framework takes into account the social and economic aspects of the project performance and provides management with a tool to measure, drive and reward outstanding behaviour on the project.

The sustainability framework ensures sustainability principles are integrated into the project through:

- Championing a commitment to balance and sustainability at a project management level

- Incorporating sustainability criteria (energy efficiency, focus on renewables, whole of life considerations, waste management, aesthetics, ecology and biodiversity, land use, cultural and community impacts, materials use) into design and assessing options against the relevant criteria
- Incorporating sustainability criteria (proactive environmental management practices, stakeholder involvement and feedback, energy efficiency, transport efficiency, sustainable procurement practices, waste minimisation and management, health and safety, staff management and development, cultural and community impacts) into the construction phase of the project
- Establishing simple sustainability performance measures and putting monitoring and measurement systems in place
- Raising awareness within the project team and establishing a culture of care and ownership related to the natural environment and to people
- Linking project sustainability objectives to individual and team performance through Key Performance Indicators and a focus on continuous improvement
- Reporting project performance against the triple bottom line and using this to communicate to stakeholders
- Working alongside stakeholders to ensure the project meets the needs of the communities involved in, and affected, by the project
- Ensuring that the chosen project delivery model works to achieve sustainable outcomes.

As signalled above a more holistic framework for management of projects is a move towards a different way of working and thinking. The table below identifies some of the key differences.

Sustainable Project Approach	Orthodox Project Approach
• Consensus	• Top down decision-making
• Leaps of faith – climate change	• Fact-based
• Systemic approach - ecosystem	• Linear & mathematical analysis
• Social, environmental science	• Engineering & Science
• Business judgement	• Engineering judgement
• Business case (benefit) justification	• Risked-based justification
• Design as a journey-with errors	• Design as a deliverable-zero defects
• Triple bottom line	• NPV
• Customer ownership	• Outsourced
• Root cause	• Specification
• Long term	• Short term

Presented by Sally Garrett, GM, Business Services, Watercare Services Ltd at NZSSES Forum, May 2006

Applying a Sustainability Framework – Details

Leadership

Incorporating a focus on sustainability in design and construction projects is a developing field in New Zealand and abroad. Best practice is starting to be established and can be best

supported by committed management and a sustainability champion or manager on the project.

The champion works with others to develop a customised framework for the project and support the designers and construction teams to identify opportunities and risks, to take appropriate action and to monitor progress. The framework also guides on-going performance management across the dimensions of sustainability, establish project and stakeholder reporting and provide inspiration and momentum.

Design Phase

Crucial to the principles to sustainability is the involvement of multiple disciplines across the project in the design process – design engineers, planners, environmental management specialists, communications, ecologists, safety specialists, landscape designers as well as sustainability advisors. A project delivery model which supports multiple disciplines working together will allow for innovation and creativity applied to more sustainable design solutions. At a management level the vision and values of the project and associated communications need to reflect the commitment to incorporating a wider agenda.

The sustainability assessment framework provides a guide for designers to consider issues related to sustainability in their design during option selection and each stage of the design. The framework used would be finalised in discussion with the design team. It would draw on international frameworks such as CEEQUAL (the Civil Engineering Environmental Quality Assessment and Award Scheme) and the Project Sustainability Management Framework (see Appendix) as well as tools used in recent infrastructure projects in New Zealand.

Construction Phase

During the construction phase the focus moves more to the integration of sustainability principles into the day to day operations of the project and there is a stronger focus on monitoring, measurement and reporting and ensuring that the construction teams are enthused and on board. During this phase there is a strong focus on making the project's commitment to sustainability meaningful to the construction teams. The sustainability champion works with the management team, team leaders and the communications manager to make these commitments real on the ground and provide guidance, motivation and recognition.

While the project will of course involve compliance with established resource consent requirements a commitment to a sustainable management approach goes beyond compliance to a proactive desire to consider economic social and environmental dimensions in all aspects of the project. During the construction phase there is often the opportunity to refine and enhanced the design – an on-going focus needs to be maintained on environmental and community benefits alongside financial savings.

The social dimension of the triple bottom line comes to the fore during this phase with a strong focus on the well-being and development of project staff and involvement and engagement of the affected and interested communities and stakeholders.

Sustainability and Project Systems

To ensure that the commitments and decisions made during design live on during the project these needs to be reflected in the project management policies, plans and systems – in the following way:

- The project vision, objectives and principles reflect the commitment to achieving excellence in environmental and social outcomes

- Relevant Policies and Project Management Plans incorporate sustainability criteria as appropriate to each area
- Tendering and contracting processes are explicit about the project requirements related to environmental and social performance
- Project instructions are developed to support commitments to various practices such as resource efficiency, waste management, procurement, stakeholder relationships etc
- Appropriate training is provided at all levels to ensure understanding of the project commitments to sustainability. Project induction training translates the commitments of the project in ways that are understood across the project team
- Performance Management Systems include relevant key performance indicators (KPIs) at a project level and these are translated to individual managers and their teams. Reward and recognition schemes are linked to outstanding achievement.
- Throughout the project KPIs are tracked and reported at a governance, management and team level.
- Performance is also shared with stakeholders through regular communications.

Creating a culture of care

In addition to the design work and performance management approach there needs to be a strong emphasis on imbedding sustainability into the culture of the project team. This reflects a clear understanding that raising awareness and developing mindsets is as much part of the process as is the physical design and the development of systems and measurement programmes. Understanding of what sustainability means at a big picture level as well as what it means at a tangible day-to-day level is part of the challenge.

A multi-disciplinary team approach (as in an alliance or other delivery model) provides a unique opportunity to benefit from people working together to find solutions, which are sustainable from an economic, environmental and social perspective. The involvement of key stakeholders in the development of best for project solutions can also enhance relationships and reputation. The ideal project delivery model will encourage individuals and teams to apply their minds to the challenges and opportunities of the system as a whole, rather than focusing on its individual parts in isolation.

Sustainability Framework – Benefits

Benefits to infrastructure designers and developers of using a sustainability framework:

- A clear demonstration of walking the talk on environmental and social responsibility
- An umbrella framework which pulls together aspects of the project which are important to the project owner and their stakeholders – the natural environment, community commitment and involvement, positive impacts on the local economy
- A transparent framework which support consent compliance and communication with regulators and stakeholders
- A vehicle for inspiring excellence and pride across all aspects of the project
- An opportunity to engage stakeholders actively and to explore with them the efforts being made on the project economic, environmental, social and cultural dimensions
- Opportunities to promote the work being done on the project with stakeholders, local and central government officials and politicians and the design and construction industries.
- Potential for recognition for taking a leading edge approach to integrating sustainability into significant infrastructure projects
- Financial benefits over the life of the project through resource and operational efficiencies

Case Study Example – ALPURT B2

Project Description

The SH1: Northern Motorway Extension (ALPURT B2) project is of regional and local significance. It is a key project in achieving the vision of the Auckland Regional Land Transport Strategy, supporting the regional direction outlined in the Regional Growth Strategy and meeting the local development needs of the Rodney District. This 7.5km motorway from Orewa to Puhoi will ease traffic congestion through Orewa, enhance opportunities for economic growth in the Rodney District and create a safer and easier route between Auckland and Northland.

The Northern Gateway Alliance (the Alliance) is responsible for project managing, designing and constructing ALPURT B2. The Alliance partners are Transit New Zealand, Fulton Hogan, Leighton Contractors, URS New Zealand, Tonkin & Taylor and Boffa Miskell.

The new motorway will pass through a diverse landscape containing steep topography, large tracts of native bush, regionally significant streams and estuaries and areas of pastoral farmland. The physical works consists of a 7.5 km of 4 lane motorway, 3.3 million cubic metres of soil and rock to excavate, move and compact, 6 bridges, a twin road tunnel, 200,000 m² pavements, drainage, retaining walls and barriers and tolling infrastructure.

New Legislative Environment

In December 2002 the New Zealand Government released the New Zealand Transport Strategy (NZTS). This strategy set the direction for the development in New Zealand of ‘an integrated, safe, responsive and sustainable land transport system.’ In November 2003 the Land Transport Management Act (LTMA) was passed. The LTMA puts into legislation the principles and objectives outlined in the NZTS.

ALPURT B2 is the first green-fields project to operate under the LTMA. As a result the Alliance has been required to consider questions of integration, sustainability and consultation which go beyond that of similar infrastructure projects in the past. This has resulted in additional opportunities and risks which have been developed and managed during the design phase and which continue to be part of the decision-making criteria and opportunity investigation throughout the project.

Specifically the LTMA requires the Alliance to consider how the project meets the objective of social and environmental responsibility and in particular contributes to the following outcomes:

- To assist economic development
- To assist safety and personal security
- To improve access and mobility
- To protect and promote public health
- To ensure environmental sustainability.

The LTMA stipulates specific consultation requirements to ensure that affected communities are adequately involved in the development of land transport systems. In response to the NZTS and the LTMA, the Alliance has taken specific action to incorporate the principles of sustainability – economic, social and environmental performance – into overall project

objectives and performance measures, design decisions, management plans, human resource management, stakeholder relationship strategies and construction methodologies.

INCORPORATING LTMA AND OTHER SUSTAINABILITY CRITERIA INTO DESIGN AND ASSESSING OPTIONS AGAINST THE RELEVANT CRITERIA

In designing individual elements of the project the relevant LTMA criteria as well as other sustainability criteria (whole of life considerations, waste management, cultural and community impacts) were considered by the Alliance. In particular when different options were being assessed these criteria formed part of the decision-making process.

Significant Enhancements to the Specimen Design

Under instruction from the Transit board in early 2004 the Alliance identified a number of significant opportunities for enhancement to the specimen design given the new imperative of the LTMA.

To provide a preliminary assessment of the options a review was carried out against the LTMA objective of social and environmental responsibility and the five outcomes outlined above. The review was undertaken by a multi-disciplinary team from the Alliance including ecological, environmental, sustainability and engineering expertise.

This first cut lead to a number of options being identified and presented for initial review. Detailed design and costing of the options was undertaken and in August 2004 the Transit board confirmed the Nukumea Viaduct, Johnstone's Hill Tunnel and 4-laning at Waiwera as part of the mainstream design.

Reviewing Design in Progress and Selecting Options

The table below summarises the various factors considered by the Alliance when assessing design elements in terms of sustainability. The LTMA does not stand on its own but needs to be considered alongside primary design objectives, consent criteria and design standards. In the end trade-offs are often required but the following table and the associated rating sheet provide a good checklist, a useful decision framework and an audit trail of considerations made.

Sustainable Design Decision Making Criteria:	
<i>Key Design Objectives</i>	The 'must meet' criteria for the specific design element eg 'At all times the road geometry will comply with the relevant New Zealand and Australian road standards'.
<i>Consent Criteria</i>	Both project generic and location specific consent requirements.
<i>Design Standards</i>	The relevant New Zealand and Australian Standards relating to the particular design element.
<i>Design Issues Related to LTMA, Whole of Life Considerations and Environmental Management.</i>	Relevant criteria were identified for each design element. These criteria were fed into the Sustainability Assessment rating sheet.

As a result of the Sustainability Assessment process, sustainability considerations were presented in all concept, preliminary and final design reports by the designers and peer reviewed by the sustainability advisors.

The following is a sample rating sheet:

LTMA Principles	Related Criteria	Specimen Design			Option 2	Option 3		
		Weighting (W)	Score (S)	WxS	Score (S)	WxS	Score (S)	WxS
Assist safety and personal security	Safety	40	3	120	0	0	0	0
	Weighted Total Safety and Personal Security	40.0		120.0		0.0		0.0
Improve Access and Mobility	Severance	3	3	9	0	0	0	0
	Public Transport	1	3	3	0	0	0	0
	Walking and Cycling	1	3	3	0	0	0	0
	Weighted Total Access and Mobility	5		15		0		0
Ensures environmental sustainability	Landscape	4	3	12	0	0	0	0
	Visual	4	3	12	0	0	0	0
	Wildlife	4	3	12	0	0	0	0
	Habitats	4	3	12	0	0	0	0
	Landtake	4	3	12	0	0	0	0
	Cultural / Heritage	4	3	12	0	0	0	0
	Earthworks Balance	4	3	12	0	0	0	0
	Drainage / Water Quality	4	3	12	0	0	0	0
	Air Pollution	4	3	12	0	0	0	0
	Noise & Other Disturbances	4	3	12	0	0	0	0
	Weighted Total Environmental Sustainability	40.0		120.0		0.0		0.0
	Community Impacts	Network Implications	3	3	9	0	0	0
Disruption to community (due to construction)		2	3	6	0	0	0	0
Weighted Total Community Impacts		5.0		15.0		0.0		0.0
Life Cycle Impacts	Material Demand	4	3	12	0	0	0	0
	Maintenance	3	3	9	0	0	0	0
	Disposal and Demolition	3	3	9	0	0	0	0
	Weighted Total Life Cycle Impacts	10.0		30.0		0.0		0.0
WEIGHTED TOTAL		100		300.0		0.0		0.0

Rating on scale of 1 to 5; relative scores using the specimen design as the point of comparison
Weightings Used for Overall Total: 40% - Safety, 5% - Access & Mobility, 40% - Environmental Sustainability, 5% Community Impacts; 10% - Life Cycle

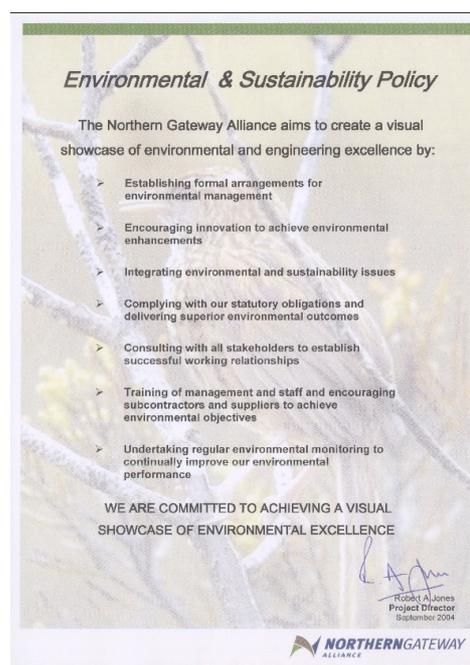
Sustainability Reflected in Project Management Plans

Project Managements plans incorporate sustainability criteria as appropriate to each area. In particular reference is made to compliance with the LTMA.

The Environmental Management Plan (EMP) specifically details the Alliance commitment and action regarding sustainability. The Environment and Sustainability Policy outlines the specific commitments made.

In addition to compliance with the extensive resource consent requirements, as indicated by the policy, there are a number of further sustainability activities governed by the EMP including:

- Sustainable Procurement Practices
- Sustainable Office Practices
- Waste and Energy Management Strategy

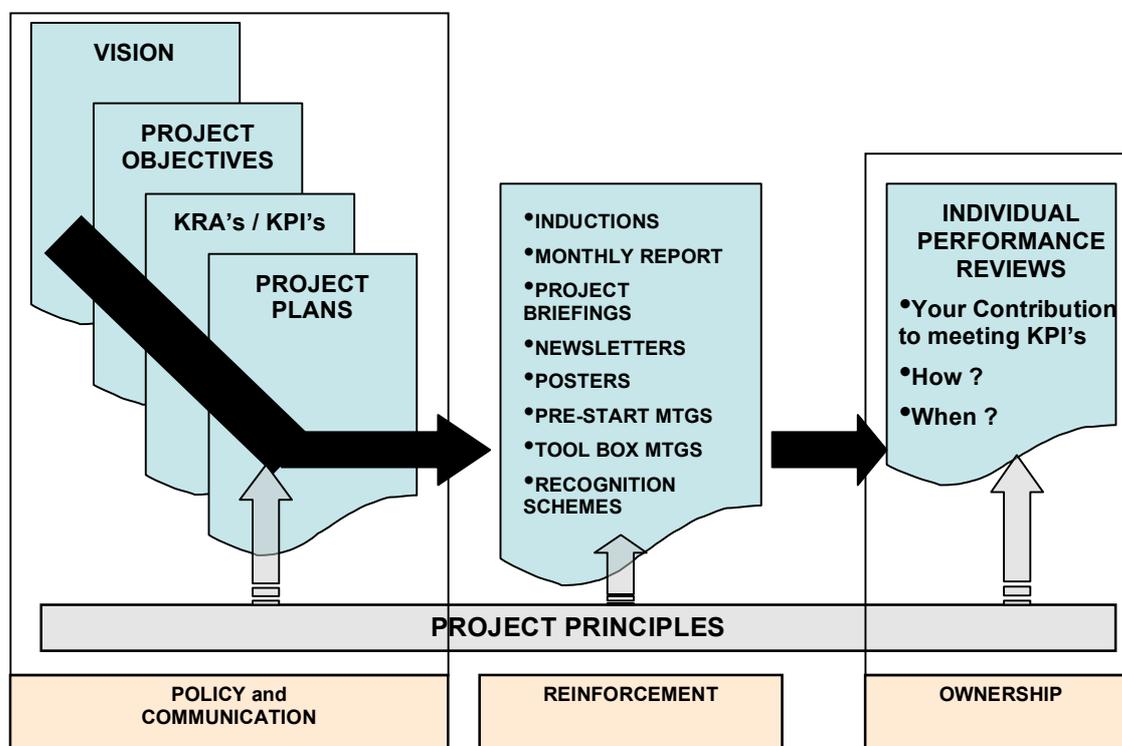


ESTABLISHING SUSTAINABILITY PERFORMANCE MEASURES AND PUTTING MONITORING AND MEASUREMENT SYSTEMS IN PLACE

Sustainability performance is often considered and represented using a Triple Bottom Line model - economic, social and environmental. While recognising limits with this approach in terms of the integration of economic, social and environmental concerns and outcomes, the Alliance has adopted the Triple Bottom Line as our 3 Key Result Areas (KRAs) and the basis for our performance management and measurement system. The Alliance's vision, objectives, Key Performance Indicators (KPIs) and triple bottom line approach are aligned with Transit's objectives for the project:

1. Deliver the Project as a Toll Road
2. Deliver the Project as quickly as possible
3. Provide certainty in respect of capital cost, ongoing maintenance, cost optimisation & value for money
4. Achieve unparalleled social & environmental outcomes
5. Enhance the Alliance model
6. Outstanding quality outcome with all technical standards met or exceeded, minimal rework leading to optimum whole of life expenditure

The diagram illustrates how the various aspects of the performance management and measurement system fit together and how high level statements are implemented in the project office and with the teams in the field:



REPORTING PROJECT PERFORMANCE AGAINST THE TRIPLE BOTTOM LINE

Reporting on the project has a number of purposes:

- To keep the board informed of project performance
- To ensure the management team has the information they need to manage and lead the project
- To keep the team updated and motivated
- To keep stakeholders and interested parties up-to-date and engaged

The three areas of social, environmental and economic performance are regularly reported on at the Alliance Management Team, the Alliance Board and the wider project team level through monthly reports, project briefings and newsletters as well as at various team meetings and events.

During the construction phase this reporting approach will be raised to another level, through the development and publication of an annual sustainability report, which will be shared with internal and external stakeholders. This style of reporting is in line with emerging practice in the construction industry in the United Kingdom and Europe and in a range of other businesses and public sector agencies in Australia and New Zealand including a number of the Alliance partners.

In early 2006, the project published its first Annual Sustainability Report which shared with the team and external stakeholders the year to date performance across the 3 Key Result Areas.



WORKING ALONGSIDE STAKEHOLDERS TO ENSURE NGA MEET THE NEEDS OF THE COMMUNITIES INVOLVED IN, AND AFFECTED, BY THE PROJECT

There is a strong focus within the project on environmental sustainability. This is however one aspect of providing sustainable outcomes, as the triple bottom line framework indicates. Community consultation and involvement is critical to ensuring that the final product delivered by the Alliance meets the needs of the community both today and in the future with disruption during construction kept to a minimum.

The establishment of a Community Reference Group (CRG) by the Alliance helps ensure community needs are factored into design and construction planning in a proactive way. The CRG members are drawn from community groups who have a significant interest in, or who are impacted by, the project. These include a range of local resident and ratepayer groups, the Department of Conservation, Auckland Regional Council, Rodney District Council and the NZ Police. The CRG meetings are held monthly and include updated on project activities as the opportunity to give feedback on proposals. CRG members also report back on the project to the organisations they represent.

In addition to the Community Reference Group regular contact is maintained with affected landowners and the wide range of stakeholders directly involved in the various aspects of project delivery.

An annual survey of stakeholders – CRG members and others – provides an independent review point and opportunity for further improvements.

RAISING AWARENESS WITHIN THE PROJECT TEAM AND ESTABLISHING A CULTURE OF CARE

In addition to the design work and performance management approach outlined above, the Alliance has put a strong emphasis on imbedding sustainability into the culture of the project team. This reflects a clear understanding that raising awareness and developing mindsets is as much part of the process as is the physical design and the development of systems and measurement programmes. Understanding of what sustainability means at a big picture level as well as what it means at a tangible day-to-day level is part of the culture change challenge.

The following are some of the specific activities and programmes which are part of increasing the understanding of sustainability within the Alliance:

- The Lifetime Programme with its three pillars (or Values) – Be Green, Stay Safe and Live Well – including project briefings and staff involvement opportunities.
- Alliance induction process.
- Individual Performance Management connected to the three KRA areas.
- Staff survey questions directly related to environmental excellence, community needs, long term focus as well as overall staff satisfaction.
- Focus on sustainable office practices – paper use and recycling, energy use, transport.
- Visiting guest speakers and conference participation e.g. our fuel supplier Shell presented on sustainability considerations related to fuels; Beacon Pathway presented to the team on sustainability as it relates to building design

APPENDIX A - Sustainability Management Frameworks

The two frameworks outlined below can provide a useful starting point for the development of project specific sustainability management frameworks.

CEEQUAL - The Civil Engineering Environmental Quality Assessment and Award Scheme



The CEEQUAL Scheme assesses the environmental quality of civil engineering projects and publicly recognises the achievement of high environmental performance. Awards are made to projects in which clients, designers and constructors go beyond the legal and environmental minima to achieve distinctive environmental standards in their work.

CEEQUAL:

- provides a benchmark standard for environmental performance
- demonstrates the commitment of the civil engineering industry to environmental quality
- celebrates the achievement of high environmental standards in civil engineering projects.

The CEEQUAL Award is given through the Institution of Civil Engineers to projects that have been assessed against detailed and specific environmental criteria. It is applicable to civil engineering projects of any size or description.

CEEQUAL complements statutory requirements, by operating during and after design, checking what is actually built (except in the design-only award) and how it is built. It does not assess the environmental need for the project, but supports clients, designers and contractors in dealing positively with environmental quality issues relevant to the project, and helps to integrate such thinking into the design and construction processes. It uses a credit-based framework of issues and questions relating to:

- Project environmental management
- Land use
- Landscape
- Ecology and biodiversity
- Archaeology and cultural heritage
- Impacts on water resources
- Energy
- Material use
- Waste management
- Transport
- Nuisance to neighbours
- Community relations and joy in use

Project Sustainability Management (PSM) – developed by FIDIC

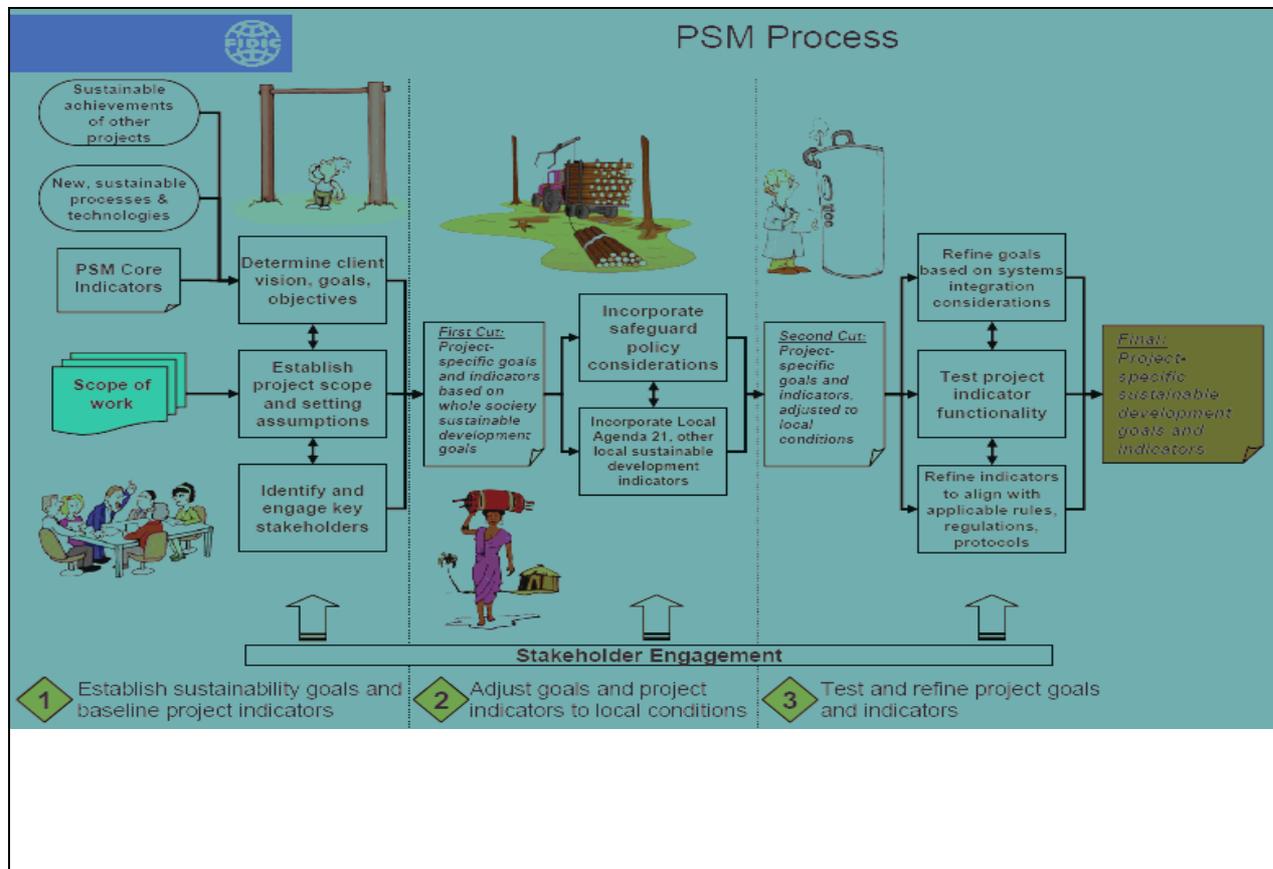
These Project Sustainability Management Guidelines describe how project owners and engineers can incorporate the principles of sustainable development into individual projects.



The system has two components:

- A framework of goals for sustainable development and the corresponding indicators, both of which map back to the issues, goals and priorities of Agenda 21.
- A process for setting and amending project goals and indicators making them consistent with the vision and goals of the project owner, compliant with Agenda 21 and tailored to local issues, priorities and stakeholder concerns.

The PSM Process consists of three phases outlined in the following graphic:



References

1. Kerry Griffiths, Sustainability Champion, Northern Gateway Alliance; *THE LAND TRANSPORT MANAGEMENT ACT – PROJECT IMPLEMENTATION*, Paper presented at Transit NZIHT 7th Annual Conference, 2005.
2. CEEQUAL: The Civil Engineering Environmental Quality Assessment and Award Scheme; Brochure.
3. FIDIC, Project Sustainability Management (PSM), Training Workshop Materials, April 2006.
4. NZSSES Forum May 2006, Presentations by Sally Garrett, GM, Business Services, Watercare Services Limited and Jim Bradley, Senior Environmental Public Health Engineer, MWH New Zealand.