

Balancing The Forces

Building Infrastructure Through Partnerships

Abstract

Delivery of major public sector transport infrastructure projects in the 21st Century is becoming increasingly complex. Government imperatives require much stronger emphasis on social justice, environmental sustainability, technological advancement and economic and regional development outcomes.

Community awareness has increased considerably, largely as a result of the technological revolution, which has increased the availability of information. The community is demanding and the government expects that they will have much greater participation in the decision-making processes. Project managers need to harness this increased interest and capitalise on it so that overall community benefits are achieved. This places increased demands on project managers to ensure that public sector expenditure maximises every opportunity to demonstrate stakeholder acceptance as well as being able to transparently substantiate value for money.

Peninsula District in conjunction with Project Management Services North Queensland (a branch of the Road System and Engineering Group of the Queensland Department of Main Roads) met this challenge for the East Evelyn Road upgrade project by applying sustainable development principles, and ensuring that the whole process recognized the interdependence of the project's success with community acceptance. For the East Evelyn project, management systems and practices focused on establishing partnerships with key community and stakeholder groups to meet the responsibilities of maintaining a quality of community life while allowing for sustained economic development without loss to the natural environment.

Management systems enhanced the natural environment, recognised indigenous rights and cultural heritage, acknowledged the desire for public participation and built trust and respect through this participation, increased scientific knowledge, facilitated technology transfer and promoted community and organisational development, thus ensuring that long term community benefits outweighed the initial capital investment.

Through this project the design standards of the Department of Main Roads aligned with World Heritage values, and demonstrated a new best practice model for meeting complex objectives for environmentally sustainable development in fragile and sensitive environments.

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The East Evelyn Road Range Upgrade

Engineering Challenge and Environmental Opportunity

The East Evelyn Range Upgrade was a \$13 million project to upgrade a strategic road link in Peninsula District by integrating specific economic, environmental and social objectives.

From concept stage it was developed and managed on the principle of ecological sustainability, by engaging whole-of-government, academic and community stakeholders, as well as the contractors, to formulate balanced objectives and performance indicators.

The participatory processes and supportive relationships developed during this project evolved a new model for managing road projects in sensitive and fragile environments.

1. The Context

The Force ‘Global’

The purpose of the East Evelyn Road upgrade was to support regional economic development on the Atherton Tableland and the Gulf areas to the northwest, by providing a direct link for Type 2 road trains to coastal ports, roads and rail routes to the south.

The upgrade was identified as a transport priority in the State Government’s Far North Queensland Regional Plan (February 2000), among a set of integrated social, economic and environmental objectives for this region, developed via extensive whole-of-government and community consultation.

From any perspective this project was challenging. A 3.2 kilometre section of steep winding road, separating the Mt Fischer and Mt Hypipamee Wet Tropics World Heritage Areas, was to be realigned and re-graded, and would involve substantial disturbance to the existing environment. The location was home to rare and threatened animal species including the endangered Southern Cassowary and the rare Lumholtz’ Tree-Kangaroo. But the earthworks also presented an opportunity to re-establish habitat connectivity, disrupted for more than a century by the existing road. The scenic value of the lookout at the top of the range, a local landmark, was also a preservation priority.

The project required extensive consultation with statutory and community stakeholders prior to the commencement of works to ensure adequate provision for amelioration of environmental effects and the minimisation of potential environmental harm.

The successful delivery of the project depended on the development of relationships between all stakeholders including Wet Tropics Management Authority, Environment Protection Agency, community groups, the construction contractor and the Principal.

Partnering workshops and regular meetings facilitated this process enabling the delivery of the project 8 months ahead of time and 10% under the project estimate.

2. Project overview

2.1 The Location

The project is situated in the volcanic rainforest highlands of Far North Queensland on the Atherton Tablelands. The route dissects World Heritage Areas immediately to the north and south of the site and is situated in the upper catchment of the South Johnston River.

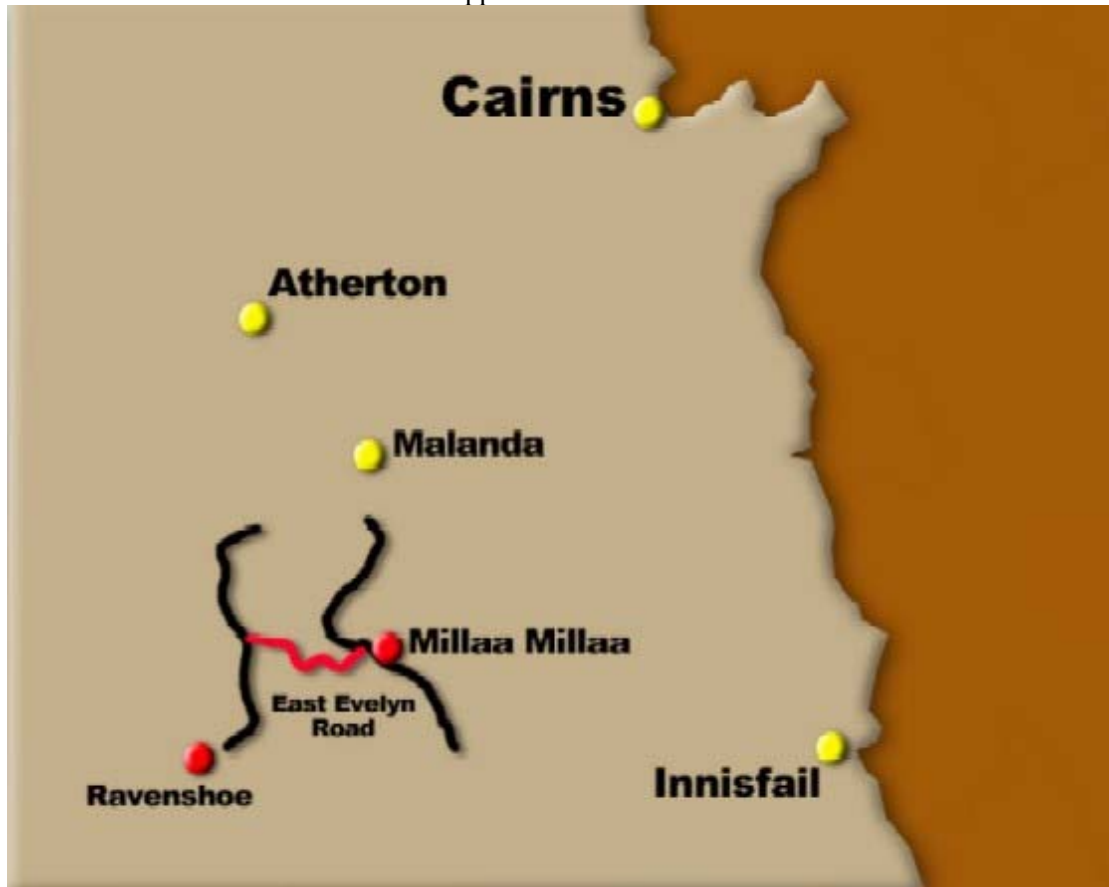


Photo 1 – Location Map

2.2 Project Description

The construction of approximately 3.2 km of roadworks including earthworks, stormwater drainage, subsurface drainage, pavement wearing course and ancillary works including temporary sidetrack, landscaping treatments, soil erosion and sediment control and environmental compliance activities.

The construction of flexible pavement for a new, essentially three lane single carriageway including “tie in” connections to existing sections.

Four major multi-plate horseshoe arch structures located within embankments to provide road crossings points for the local wildlife. The structures are exclusively for fauna connectivity between the World Heritage Areas north and south of the Works and the designed specifically to accommodate the local wildlife, which includes rare and endangered species.

The pavement design includes a 500mm layer of selected material located from –0.300mm to –0.800mm below finished surface level.

The pavement design consists of plant mixed cement treated sub base type 2.1 material (CBR 80) and plant mixed cement modified base type 2.1 material (CBR 80). The cutting pavement design includes a drainage blanket and subsoil drains to be constructed beneath the cement treated sub base and cement modified base pavement design.

- Total Clearing - 13 hectares

- Total Earthworks – Cut 300,000m³ / Embankment – 215,000m³
- Excavation in rock – 23,000m³
- Depth of main cut - 29 metres
- Height of main embankment - 37 metres
- Length of sidelong embankment 35 metres



2.3 Climatic Conditions

The site has an elevation of approximately 900 to 1000m, rising to range peaks to the south of between 1100 & 1200m. Mean Annual rainfall is 2634mm with ranges between 1735mm and 4025mm. There is a distinct wet and dry season effect in the monthly precipitation totals. In general the site receives 100-150mm per month within the dry season, with wet season monthly averages up to 700mm.

2.4 Geotechnical Conditions

The site comprised of mainly basalt materials consisting of extremely weathered to slightly weathered rock. Within the large cutting an extremely weathered agglomerate material was also present. Laboratory test results indicated the following properties for earthworks materials:

- LL >50% up to 70%
- PI 0 – 15%
- LS 4 – 10%
- OMC – 30 – 40%
- In situ Moisture Content 44 - 57% (140 –147% of OMC)



In situ Cutting Materials



Cutting Subgrade

Geotechnical drilling investigations revealed the water table present at 14 and 19 meters. Accordingly, extensive geotechnical provisions were utilised for the control of subsurface water flow to stabilise embankment foundations and cutting floors including:

- 2000mm x 1000mm vertical and 300mm x500mm subsurface horizontal drains in sidelong embankments
- Drilled horizontal drains in cutting
- Pavement design incorporated a 300mm drainage layer beneath the sub-base
- Soil nailing
- Rock netting

3. Project Values and Priorities

The Forces – ‘Risk Aversion’, ‘Individual Stakeholders’

For this road to be built at all, respect for World Heritage values had to be integral to the project, and Main Roads knew it would need expert assistance to answer significant environmental questions before it could even be designed. From concept stage the project managers purposely set out to draw on and develop relationships with all the expertise available to inform the project.

Ecologists, academics and community groups were invited to work alongside government environmental agencies and the contractors. The surrounding farming community and traditional landowners were consulted and detailed flora and fauna surveys were undertaken.



Fauna Crossing Under Construction

Participation included the Wet Tropics Management Authority, the Environmental Protection Agency and Queensland Parks and Wildlife Service, James Cook University, Eacham Shire Council, local schools, conservation and community groups, such as Trees for the Evelyn and Atherton Tablelands (TREAT) and The Tableland Tree-Kangaroo & Mammal Group. (See Appendix Participation.)

The main aim of the project was to **balance preservation of environmental values with safety and cost efficiency for an essential road project**. Throughout the life of the project consistent efforts were made to balance social, economic and environmental priorities without compromising engineering standards.

Alignment with the values of Wet Tropics World Heritage Areas was integral to the project and Main Roads resourced work on environmental objectives from the outset.

Stakeholder consultation reached local agricultural producers, traditional landowners, the transport and tourism industries, and all government authorities and agencies with interests in the surrounding areas. The **aims of the consultation plan were** to share ownership of the project with the community, by tapping additional expert and voluntary resources, and to build supportive relationships for the project to counter the adverse response anticipated for a large and disruptive road project. The video presented as part of this paper includes three external participants representing the range of support behind this project. (See Appendix # 1.4. for a full listing of participation)

Specific objectives relating to statutory and social responsibilities were:

- To demonstrate a comprehension of the existing environment to enable identification of potential impacts and assess whether the environment is able to sustain the proposal.
- To initiate and maintain public participation during all phases of the project, to facilitate decision-making.
- To demonstrate environmental certainty in the outcome of the project.
- To recognise the rights of indigenous heritage, culture and custodianship.



Five objectives relating to State Government policy for Ecological Sustainable Development (ESD) were established:

- Environmental limits - for biological, physical, social and economic components.
- Demand management - mechanisms to demonstrate supply and demand, and reduce or redirect demand.
- Environmental efficiency - maximising efficient use of natural resources and minimise waste production.
- Welfare efficiency - maximising human benefit from economic activity.
- Equity - correcting imbalances in consumption of natural resources and distribution of the economic benefits.

Specific initiatives based on the ESD objectives, included:

- research and development of effectiveness of fauna crossings in rainforest areas,
- transfer of ecological inheritance through community participation and custodianship,

- encouragement of community based activities and adult education programs,
- sharing of scientific learnings through school education programs,
- rehabilitation of cleared rainforest habitat,
- preservation of existing significant rainforest habitat,
- development of best environmental management practices for transport infrastructure in Wet Tropics World Heritage Areas, and
- incorporation of environmental valuation in project life cycle costing.

The values were incorporated into the project working arrangements, via:

- A draft Memorandum of Understanding with the Environmental Protection Agency, establishing environmental objectives and protocols for this project. Although not signed, due to departmental restructuring of the EPA during the project, the draft MOU is a blueprint for collaboration on future projects.
- Industry agreements between the principal and the contractor that moved away from traditional adversarial contracting to relationship contracting, aligning the parties on the basis of business and stakeholder objectives, and personal values.

4. Managing the Project

The Force – Separation of Powers

From the outset this was to be a whole-of-Government project. The **opportunity** was to tap all the expertise available in this region, within the community as a whole, to support the outcomes and supplement Main Roads' expertise in project planning and delivery.



The **challenge** of the collaborative approach was to create and lead processes involving professionals and volunteers with vastly different professional skills, priorities, roles and expectations, while ensuring that the experience and the outcomes were positive for all.

Management systems were needed to meet commercial obligations, statutory responsibilities and community expectation on the basis of:

- Strategic awareness - sustainability looking further ahead.
- Planning with people - encouraging ongoing active community involvement.
- Vision - shared understanding about processes, direction and project outcomes.

Operational processes were outcome-focused but flexible, to enable further evolution through:

- Dynamism - as project objectives were defined, other issues and options emerged.
- Selectivity - some issues were central to success, secondary issues - strategies could be amended.
- Networks - communication and relationships with a wide range of interests to work towards common objectives.

Group processes were set up to advise and guide the project:

- In the **design and assessment phase** – an Environmental Strategy Group provided guidance on best environmental practice and management. It comprised staff of Wet Tropics Management Authority, Environmental Protection Agency, Queensland Parks and Wildlife, James Cook University and Project Management Services NQ. It also established and maintained a proactive communication network for issues arising throughout the project.

“The significance of this project is the way Main Roads did not base the work solely on the traffic needs and engineering expediency.

Environmental considerations were an important part of early conceptual planning.”

Dr Lesley Clark MP

- In the **operation phase** - an Environmental Operations Group ensured a continuum and assisted with environmental compliance and best practice. This group comprised community representatives, Wet Tropics Management Authority, Trees for the Evelyn and Atherton Tablelands (TREAT), Department of Main Roads Peninsula District and Project Management Services NQ.

5. Managing Construction

The Force - ‘Mother Knows Best’

Our traditional Road Construction Contract (RCC) is well suited for the delivery of projects with objectives of time, cost and quality. However, when projects must be effective across a diverse range of objectives as well as deal with complex situations they may be inadequate.

Recent trends in contracting of roadworks have seen an increasing emphasis in the development of a whole of project team approach to project delivery. Processes such as team partnering that:

- recognise the interdependence between parties,
- develop a climate of trust and respect,
- equitably allocate risk, and
- encourage implementation of learning and innovation,

are frequently achieving the best outcomes for delivery of complex projects.



While the East Evelyn project was not originally set up as a relational management contract, the process is readily adaptable and the project team, including the successful contractor, recognised the benefits of this approach for delivery of this project.

5.1 Partnering Agreement

The Forces – ‘Fringe Dwellers’, ‘Professional Opinion’

The contract for the East Evelyn Project was awarded to Stockport (NQ) on 11 August 2000. While the successful tender was in line with the departmental estimate it was some \$1.5 M below the next lowest tender. In addition a number of issues arose early in the contract that had the potential to escalate into significant disputes under the conventional adversarial RCC contract.

Work did not commence on site until September 2000 due to a delay by the Contractor in executing the Formal Instrument of Agreement as a result of a dispute with the Principal. The late start coupled with an early start to the wet season meant the contractor did not complete his pioneering earth and drainage works which had the effect of pushing the construction program into the next wet season. Above average wet days and rainfall continued on the site until July 2001 compounding the problems. While an unusually dry wet season in 2001/02 ultimately meant this did not become an issue it was at the time.

Material from the cuts that was to be used as fill was coming out saturated (over 40% above laboratory OMC results) and was virtually unworkable unless it was mixed with drier material. This proved the most cost effective method in the end but again had a major impact on the contractor’s earthwork operations.

Given the inherent problems on the site the Principal and the Contractor agreed to enter into a Relationship Contracting Agreement based on Partnering. A foundation workshop to establish the Partnering Team for the East Evelyn Project was held on Wednesday 28 March 2001. Representatives included the:

- Principal’s Representative.
- Superintendent and support staff.
- Regional Geologist.
- Environmental Officer.

- Contractor and support staff.

The intention was to create an environment in which the parties to the contract could communicate and solve problems efficiently and fairly under the terms of the contract. This would require the key players (Contractor, Superintendent and Principal) to undertake their respective roles with no hidden agendas so as to develop an atmosphere of good faith and trust.

The process established:

- A shared Mission Statement.
- A set of mutually supportive objectives.
- Relationship Management processes (identification of behaviours that would contribute to or detract from the success of the Partnership).
- Risks and opportunities.
- Issues resolution process (including problem solving techniques).
- Review and evaluation process (how the partnership was progressing).
- On going support mechanisms/tools.

The Partnering Team held monthly meetings over the course of the project to review:

- progress on issues/actions from previous meetings,
- new issues and actions, and
- performance against the objectives (each individual evaluated performance of the team against the partnership objectives).

The East Evelyn Range project was completed 8 months ahead of time and 10% below the total project estimate, without major compromise on the objectives or engineering standards. While the final contract value was approximately \$1.0M over the tender amount this was due to significant design changes in drainage and environmental controls to suit the site conditions, additional unspecified works and additional costs of handling the saturated fill material. There were no ambient claims by the contractor or any claims for delay and disruption.

In the final review session of the Partnering Team all felt the partnering process had contribute to the overall success of the project due to the relationships that had been established and the learnings that evolved.

In the words of John Spannenburg, Project Manager for Stockport (NQ), *“The success of the of the project was based on the ability to throw away the book and get down to actual/practical solutions, displaying flexibility when needed.”*

5.2 Construction Procedures

The combination of the climatic conditions and the earthworks material characteristics required a carefully considered Materials Management Plan to be developed in consultation with geotechnical engineers. A combination of cost-effective earthworks techniques was developed to construct the embankments with the changing material characteristics from the cuttings (super saturated extremely weathered material through to rock requiring blasting).

Adopted techniques included a combination of:

- Sourcing suitable borrow material for blending.
- Geotextile reinforcement.
- Rock bridging layers.
- Chemical modification.

The partnering procedures allowed a free flow of information between all parties to develop the techniques as well as amendments to technical specifications.

6. Outcomes

6.1. The East Evelyn Range Upgrade project was completed 8 months ahead of time and 10% below the Total Project Estimate, without major compromise on the objectives or engineering standards.

6.2. The project aligned the design standards of the Department with the World Heritage values protecting the adjoining areas.

6.3. Main Roads developed a new model for future projects in fragile and sensitive environments, and an understanding of the requirements of other government departments and the community for projects in areas of high diversity values.

6.4. Specific environmental outcomes included:

- **Habitat connectivity** - first disrupted by this road more than a century ago, was re-established.

- **Revegetation** - about 15 hectares was revegetated with local plants identified through flora and fauna studies, to re-establish

vegetation connectivity and encourage the movement of wildlife safely under the road. The tree-planting community group Trees for the Evelyn and Atherton Tableland (TREAT) coordinated volunteers who collected, propagated and planted of some 40,000 trees, and contributed more than 8,000 hours of time.



6.5. Specific social outcomes included:

- **Cultural Heritage** – the traditional landowners and the local agricultural community were consulted from the earliest stages, and the traditional owners liaised closely at key stages of the excavations and realignment.
- **Educational programs** – a sub-group, TREAT on TAP, assisted with awareness and education programs for schools and community groups. This program also gave school children access to the learning opportunities of working at the Eacham Council nursery.
- **Skilling Queenslanders** – in support of State Government policy, Main Roads sponsored a local employment and skills transfer initiative, through the Eacham Shire Council, QPWS, professional consultants and community groups for employment of local people. The Project generated approximately 75 full time and part time positions.

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6.6 Specific economic outcomes:

- The upgraded road is now an efficient and major regional transport link, with capacity for Type 2 road trains that will ultimately greatly enhance road access to the coast and is capable of further supporting increased demand generated by economic development.

6.0. Learnings

- 6.1 **Engineering Education** – Community groups and non-engineering agencies are generally not well versed in engineering jargon and technical detail. Technical drawings, specifications and meetings need to be drafted in plain English and artistic impression where possible.
- 6.2 **Trust** – Some community groups as well as other administrative agencies do not automatically trust government agencies particularly with a past history of betrayal to their organisation's values. Project teams need to nurture an environment of trust without building unrealistic expectations.
- 6.3 **Communications** – Time is well spent on developing a solid project communication plan. The plan should included:
- organisation structure,
 - roles and responsibilities,
 - Clearly define lines of communication internally and externally,
 - the forms of media to be engaged, frequency, approvals, and
 - meeting arrangements.
- 6.4 **Relational contracting** agreements can be a useful tool for delivery of projects that must deal with complex situations and must be effective across a diverse range of objectives and outcomes that include: social; environmental; technical and economic and regional development.
- 6.5 **Design Review.** The project team must assess the effectiveness of design solutions proposed during and post implementation. Design teams should revisit the site during the construction phase to understand the site changes undertaken and apply to future projects.

6.6 **Preconstruction geotechnical investigations.** A coordinated approach to the investigation of alignment testing, pavement design and cutting investigation. The results need to be considered in total not separated.

6.7 **Research and Development.** Continued Research and Development projects will allay future uncertainty in stakeholder minds concerning the application of the precautionary principals for transport infrastructure.

7.0. Achievements

The East Evelyn Project has been fortunate to have been recognised with a number of awards for engineering and environmental excellence. These include:

- **Environmental Excellence.** Urban Development Industry of Australia 2000.
- **Excellence Award 2001.** Department of Main Roads, Queensland
- **Case Earth Award.** Project > \$10m. Civil Contractors Federation & CASE Corporation
- **Engineering Excellence – Environment,** Institution of Engineers Australia, Qld Division.

Appendix – 1.4. KEY AGENCY FUNCTION

FUNCTION	ORGANISATION	KEY PERSON
Client	District Director Peninsula District Department of Main Roads	Bruce Ollason District Director 074050 5444
Project Manager	Project Management Services NQ RS&E	Peter Dutailis 074039 0466
Environmental Advisor	Environmental Protection Agency	Geoff Meadows 07 4046 6701
Environmental Advisor	Wet Tropics Management Authority	Bruce Jennison 07 4052 0541
Environmental Assessment	Natural Resource Assessments	Tim Anderson 07 4031 5122
Rainforest Flora Design	Queensland Parks and Wildlife Service	Nigel Tucker 07 4095 3406
Rainforest Revegetation	Eacham Shire Wet Tropics Revegetation	Bronwyn Robertson 07 4096 5354
Rainforest Revegetation	Trees for the Revegetation of Atherton and Evelyn Tablelands (TREAT)	Joan Wright 07 4091 3474
Community Education	TREAT on TAP	Joan Wright 07 4091 3474
Fauna Research	Cooperative Research Centre James Cook University	Miriam Goosem 07 4042 1467
Rainforest Fauna Advisory Group	The Tree Kangaroo & Mammal Group	John Winter 07 4097 6053
Landscape Design	Siteplan Pty Ltd	Maarten Buijs 07 4051 3563
Soil Erosion and Sediment	Sinclair Knight Metz	Robert Carman 07 4031 4599
Control	Flanagan Consulting Group	Pat Flanagan 07 4031 3199

Peter Dutailis Director RECS Pty Ltd MIE Aust, CPEng, RPEQ has over 20 years experience in the management, supervision and construction of major transport infrastructure works in urban and rural environments. Projects within Kosciuzsko National Park, NSW Pacific Highway Development Program, Princes Highway and World Heritage Areas in North Queensland have involved community and environmental issues where Peter has been engaged for the provision of specialist professional services to plan and delivery major engineering projects in extremely sensitive environments. Peter also has a long association with private medium scale residential, commercial and industrial developments where developers' requirements are often challenged with broader landuse planning issues.